ATTACHMENTS

Ordinary Meeting of Council

Tuesday 22 April 2025

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CITY OF ALBANY

MONTHLY FINANCIAL REPORT

Containing the Statement of Financial Activity
and the Statement of Financial Position
FOR THE PERIOD ENDED 28 FEBRUARY 2025

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CITY OF ALBANY
COMPILATION REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

Report Purpose
This report is prepared to meet the requirements of Local Government (Financial Management) Regulations 1996, Regulations 34 and 35.

Overview
No significant matters are noted.

Statement Of Financial Activity by Nature Classifications
Shows a closing surplus for the period ended 28 February 2025 of $33,004,522.

Note: The Statements and accompanying notes are prepared based on all transactions recorded at the time of preparation and may vary.

Preparation
Prepared by: P. Martin
Financial Services Coordinator

Reviewed by: S. Van Nierop
Manager Finance

Date prepared: 24-Mar-2025

CITY OF ALBANY
STATEMENT OF FINANCIAL ACTIVITY
FOR THE PERIOD ENDED 28 FEBRUARY 2025

	Ref Note	Original Annual Budget	Revised Annual Budget	YTD Budget (a)	YTD Actual (b)	Var. $ (b)-(a)	Var. % (b)-(a) /(a)	Var.
		$	$	$	$	$	%	
OPERATING ACTIVITIES								
Revenue from operating activities								
Rates		46,387,060	46,433,252	46,398,252	**46,473,932**	75,680	0%	
Grants, subsidies and contributions		16,603,255	20,357,733	2,841,350	**2,838,551**	(2,799)	(0%)	
Fees and charges		22,377,965	23,478,761	16,400,669	**17,286,056**	885,387	5%	▲
Profit on asset disposal		23,662	23,662	12,960	**96,591**	83,631	645%	
Interest Earnings		3,661,997	4,235,997	3,054,268	**3,079,429**	25,161	1%	
Other Revenue		181,000	182,000	106,638	**70,788**	(35,850)	(34%)	
		89,234,939	94,711,405	68,814,137	**69,845,347**			
Expenditure from operating activities								
Employee costs		(36,058,373)	(36,074,727)	(23,517,707)	**(22,456,897)**	1,060,810	(5%)	▼
Materials and contracts		(30,547,736)	(31,066,325)	(15,374,830)	**(14,949,558)**	425,272	(3%)	▼
Utility charges		(2,135,643)	(2,135,643)	(1,234,974)	**(1,229,221)**	5,753	(0%)	
Depreciation on non-current assets		(18,858,067)	(18,858,067)	(12,623,063)	**(13,234,648)**	(611,585)	5%	▲
Finance costs		(340,597)	(343,006)	(155,320)	**(97,766)**	57,554	(37%)	
Insurance expenses		(1,115,524)	(1,111,970)	(830,230)	**(798,326)**	31,904	(4%)	
Loss on asset disposal		(582,423)	(582,423)	(130,713)	**(84,114)**	46,599	(36%)	
Other expenditure		(6,337,974)	(6,770,719)	(4,653,931)	**(3,486,625)**	1,167,306	(25%)	▼
		(95,976,337)	(96,942,880)	(58,520,768)	**(56,337,156)**			
Non-cash amounts excluded from operating activities								
Add: Depreciation on assets		18,858,067	18,858,067	12,623,063	**13,234,648**	611,585	5%	▲
Add: Loss on disposal of assets		582,423	582,423	130,713	**84,114**	(46,599)	(36%)	
Less: Profit of disposal of assets		(23,662)	(23,662)	(12,960)	**(96,591)**	(83,631)	645%	
Add: Implicit Interest		185,143	185,143	123,376	**8,410**	(114,966)	(93%)	▼
		19,601,971	19,601,971	12,864,192	**13,230,582**			
Amount attributable to operating activities		12,860,573	17,370,496	23,157,561	**26,738,773**			
INVESTING ACTIVITIES								
Capital grants, subsidies and contributions		27,728,788	31,178,081	4,332,788	**10,797,509**	6,464,721	149%	▲
Proceeds from disposal of assets		1,241,700	1,241,700	827,800	**411,591**	(416,209)	(50%)	▼
Purchase of property, plant and equipment	5	(14,017,973)	(16,387,875)	(9,515,025)	**(6,450,723)**	3,064,301	(32%)	▲
Purchase and construction of infrastructure	5	(44,970,701)	(47,634,549)	(23,512,129)	**(9,081,595)**	14,430,533	(61%)	▲
Amount attributable to investing activities		(30,018,186)	(31,602,643)	(27,866,565)	**(4,323,219)**			
FINANCING ACTIVITIES								
Repayment of borrowings		(1,137,545)	(1,264,026)	(688,948)	**(688,929)**	19	(0%)	
Proceeds from borrowings		1,495,000	1,495,000	-	**-**	-	-	
Proceeds from self-supporting loans		15,074	15,074	7,478	**7,478**	-	-	
Payments for principal portion of lease liabilities		(198,894)	(198,894)	(132,238)	**(128,384)**	3,854	(3%)	
Transfers to reserves (restricted assets)		(26,544,114)	(27,344,114)	-	**-**	-		
Transfers from reserves (restricted assets)		36,312,188	35,296,427	5,166,118	**5,166,119**	1	0%	
Amount attributable to financing activities		9,941,709	7,999,467	4,352,410	**4,356,284**			
Surplus/(Deficit) for current financial year		(7,215,904)	(6,232,680)	(356,594)	**26,771,838**			
Surplus/(Deficit) at start of financial year		7,215,904	6,232,680	6,232,680	**6,232,684**	4	-	
Surplus/(Deficit): closing funding position		-	-	5,876,086	**33,004,522**			

CITY OF ALBANY
STATEMENT OF FINANCIAL POSITION
FOR THE PERIOD ENDED 28 FEBRUARY 2025

	Ref Note	28 February 2025	30 June 2024
		$	$
CURRENT ASSETS			
Cash and cash equivalents	3	84,653,458	67,154,711
Trade and other receivables		8,814,690	3,579,983
Other financial assets	2	7,596	15,074
Inventories	2	1,341,155	1,424,647
Other assets		5,583,056	6,937,195
TOTAL CURRENT ASSETS		**100,399,955**	79,111,610
NON-CURRENT ASSETS			
Trade and other receivables		1,802,785	1,802,785
Other financial assets		301,898	301,898
Property, plant and equipment		172,070,453	169,642,260
Infrastructure		435,822,769	436,231,601
Right-of-use assets		423,978	544,786
TOTAL NON-CURRENT ASSETS		**610,421,883**	608,523,330
TOTAL ASSETS		**710,821,838**	687,634,940
CURRENT LIABILITIES			
Trade and other payables		8,998,156	9,946,337
Contract liabilities		4,845,448	4,059,258
Lease liabilities		83,134	211,624
Borrowings		575,096	1,264,026
Employee related provisions		7,019,553	7,158,944
Other provisions		242,391	242,391
TOTAL CURRENT LIABILITIES		**21,763,778**	22,882,580
NON-CURRENT LIABILITIES			
Other liabilities		906,187	906,187
Lease liabilities		453,586	453,586
Borrowings		2,603,906	2,603,906
Employee related provisions		701,391	701,391
Other provisions		11,097,000	11,097,000
TOTAL NON-CURRENT LIABILITIES		**15,762,070**	15,762,070
TOTAL LIABILITIES		**37,525,848**	38,644,650
NET ASSETS		**673,295,990**	648,990,290
EQUITY			
Retained surplus		364,684,804	340,379,104
Reserve accounts		51,456,924	51,456,924
Revaluation surplus		257,154,262	257,154,262
TOTAL EQUITY		**673,295,990**	648,990,290

CITY OF ALBANY
NOTES TO THE MONTHLY FINANCIAL REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

BASIS OF PREPARATION

BASIS OF PREPARATION
The City has reclassified a small number of accounts for comparative purposes. The impact of these reclassifications are considered minor and immaterial and have been made to improve the reporting alignment of the monthly financial report and the annual financial statements.

REPORT PURPOSE
This report is prepared to meet the requirements of *Local Government (Financial Management) Regulations 1996*, *Regulation 34 and 35*. Note: The statements and accompanying notes are prepared based on all transactions recorded at the time of preparation and may vary due to transactions being processed for the reporting period after the date of preparation.

BASIS OF ACCOUNTING
This statement comprises a special purpose financial report which has been prepared in accordance with Australian Accounting Standards (as they apply to local governments and not-for-profit entities) and Interpretations of the Australian Accounting Standards Board, and the *Local Government Act 1995* and accompanying regulations.

The *Local Government (Financial Management) Regulations 1996* take precedence over Australian Accounting Standards. Regulation 16 prohibits a local government from recognising as assets Crown land that is a public thoroughfare, such as land under roads, and land not owned by but under the control or management of the local government, unless it is a golf course, showground, racecourse or recreational facility of State or regional significance. Consequently, some assets, including land under roads acquired on or after 1 July 2008, have not been recognised in this financial report. This is not in accordance with the requirements of *AASB 1051 Land Under Roads paragraph 15* and *AASB 116 Property, Plant* and Equipment *paragraph 7.*

Accounting policies which have been adopted in the preparation of this financial report have been consistently applied unless stated otherwise. Except for cash flow and rate setting information, the report has been prepared on the accrual basis and is based on historical costs, modified, where applicable, by the measurement at fair value of selected non-current assets, financial assets and liabilities.

PREPARATION TIMING AND REVIEW

Date prepared: All known transactions up to 28 February 2025

SIGNIFICANT ACCOUNTING POLICES

CRITICAL ACCOUNTING ESTIMATES
The preparation of a financial report in conformity with Australian Accounting Standards requires management to make judgements, estimates and assumptions that effect the application of policies and reported amounts of assets and liabilities, income and expenses. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances; the results of which form the basis of making the judgements about carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

THE LOCAL GOVERNMENT REPORTING ENTITY
All funds through which the City controls resources to carry on its functions have been included in the financial statements forming part of this financial report.
In the process of reporting on the local government as a single unit, all transactions and balances between those funds (for example, loans and transfers between funds) have been eliminated.
All monies held in the Trust Fund are excluded from the financial statements.

GOODS AND SERVICES TAX
Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Australian Taxation Office (ATO). Receivables and payables are stated inclusive of GST receivable or payable. The net amount of GST recoverable from, or payable to, the ATO is included with receivables or payables in the statement of financial position. Cash flows are presented on a gross basis. The GST components of cash flows arising from investing or financing activities which are recoverable from, or payable to, the ATO are presented as operating cash flows.

ROUNDING OFF FIGURES
All figures shown in this statement are rounded to the nearest dollar.

CITY OF ALBANY
NOTES TO THE MONTHLY FINANCIAL REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

NOTE 1
EXPLANATION OF MATERIAL VARIANCES TO YTD BUDGET IN EXCESS OF $100,000

	Var. $	Var. %	Var.	Timing / Permanent	Explanation of Variance
OPERATING ACTIVITIES					
Revenue from operating activities					
Rates	75,680	0%			No material deviations observed.
Grants, subsidies and contributions	(2,799)	0%			No material deviations observed.
Fees and charges	885,387	5%	▲	Timing	Fees and charges income recognised for the period ending 28 February 2025 is tracking ↑$1.33m (7.69%)* relative to the same period in FY23/24 and ↑$2.48m (14.35%)* compared to FY22/23. Business units that have derived notable fees and charges in excess of the YTD budget include: - ALAC: Actual $2.09m vs Budget $1.81m (↑$286k or 15.83%), - Airport: Actual $1.72m vs $1.55m (↑$175k or 11.31%), and - Waste: Actual $8.13m vs Budget $8.01m (↑$102k or 8.22%), and *Note: FY22/23 & FY23/24 data has been normalised for comparative purposes.
Profit on Asset disposal	83,631	645%			No material deviations observed.
Interest earnings	25,161	1%			No material deviations observed.
Other revenue	(35,850)	-34%			No material deviations observed.
Expenditure from operating activities					
Employee costs	1,060,810	-5%	▼	Timing	Employee costs recognised for the period ending 28 February 2025 are tracking ↑$2.86m (14.63%) higher compared to the same period in FY23/24. Despite this year-on-year increase, there is an underspend relative to the year-to-date budget, primarily due to EOFY accruals and several budgeted positions remaining vacant. It is anticipated that the impact of these accruals and vacancies will be accounted for over the course of the financial year. As of 28 February, major variances can be observed in: - Salaries and wages: Actual $16.59m vs Budget $17.40m (↓$807k or -4.64%), and - Employee Provisions: Actual $2.12m vs Budget $2.29m (↓$169k or -7.37%).
Materials and contracts	425,272	-3%	▼	Timing	Materials and contracts expenditure for the period ending 28 February 2025 is tracking ↓$1.22m (-8.13%) compared to the same period in FY23/24. This year-on-year decrease is primarily attributed to reduced year-to-date Motorplex-related expenditure, which is ↓$2.00m (FY23/24: $2.52m vs FY24/25: $517k). The year-to-date underspend is also predominantly linked to the Motorplex Project: Actual $517k vs Budget $927k (↓$410k or -44.29%).

NOTE 1 (Continued)
EXPLANATION OF MATERIAL VARIANCES TO YTD BUDGET IN EXCESS OF $100,000

	Var. $	Var. %	Var.	Timing / Permanent	Explanation of Variance
Expenditure from operating activities (continued)					
Utility charges	5,753	0%			No material deviations observed.
Depreciation on non-current assets	(611,585)	5%	▲	Permanent	Depreciation charges for the period ending 28 February 2025 are tracking over budget, primarily due to the reassessment of useful lives and estimated end-of-life values for PPE-type assets conducted during FY23/24. This variance is non-cash and has no impact on the closing position reported in the Statement of Financial Activity.
Finance costs	57,554	-37%			No material deviations observed.
Insurance expenses	31,904	-4%			No material deviations observed.
Loss on asset disposal	46,599	-36%			No material deviations observed.
Other expenditure	1,167,306	-25%	▼	Timing	Other expenditure recognised for the period ending 28 February 2025 is tracking under budget predominantly due to budget phasing associated with Bicentenary 2026 Events: Actual $1.34m vs Budget $2.40m (↓$1.05m or -43.99%).
Non-cash amounts excluded from operating activities					
Add: Depreciation on assets	611,585	5%	▲	Permanent	Depreciation charges for the period ending 28 February 2025 are tracking over budget, primarily due to the reassessment of useful lives and estimated end-of-life values for PPE-type assets conducted during FY23/24. This variance is non-cash and has no impact on the closing position reported in the Statement of Financial Activity.
Add: Loss on disposal of assets	(46,599)	-36%			No material deviations observed.
Less: Profit of disposal of assets	(83,631)	645%			No material deviations observed.
Add: Implicit Interest	(114,966)	-93%	▼	Timing	Variance is due to budget phasing only and will run close to budget during the course of the financial year.
INVESTING ACTIVITIES					
Capital grants, subsidies and contributions	6,464,721	149%	▲	Timing	Capital grants recognised for the period ending 28 February 2025 are tracking ↑$6.39m (144.89%) compared to the same period in FY23/24. The recognition of income from capital grants is directly tied to achieving practical completion milestones for projects outlined in the City's capital works budget (refer to Note 5). The current positive variance to budget is primarily attributable to income being recognised ahead of phasing for: - Surf Reef: Actual $3.90m vs Budget $0m (↑$3.90m or N/A), - LRCI: Actual $1.51m vs Budget $0m (↑$1.51k or N/A), - Path Funding: Actual $686k vs Budget $0k (↑$686k or N/A), and - Roads to Recovery: Actual $1.06m vs Budget $502k (↑$561k or 111.72%). Variances from the budget are expected to continue throughout the remainder of the financial year.

NOTE 1 (Continued)
EXPLANATION OF MATERIAL VARIANCES TO YTD BUDGET IN EXCESS OF $100,000

	Var. $	Var. %	Var.	Timing / Permanent	Explanation of Variance
INVESTING ACTIVITIES (Continued)					
Proceeds from disposal of assets	(416,209)	-50%	▼	Timing	YTD PPE disposals made in accordance with the City's fleet replacement program are lower than prescribed in the budget. The timing of disposals is primarily affected by the availability of new vehicles and heavy equipment. It is expected that actual PPE disposals will align more closely with the budget as the year progresses. Total proceeds from the disposal of assets for the period ending 28 February 2025 are tracking ↓$289k (-41.26%) relative to FY23/24.
Purchase of property, plant and equipment	3,064,301	-32%	▲	Timing	Current underspend to budget is predominantly attributable to the phasing of the following programs: - Kalgan Bush Fire Brigade: Actual $204k vs Budget $1.55m (↓$1.35m or -86.88%), - Surf Lifesaving Club Redevelopment: Actual $1.78m vs Budget $2.35m (↓$568k or -24.15%), - Public Toilet Renewal: Actual $215k vs Budget $420k (↓$205k or -48.79%), - Heavy Plant Replacement Program: Actual $2.19m vs Budget $2.36m (↓$171k or -7.22%), - Town Hall - Replace Lift: Actual $114k vs Budget $250k (↓$136k or -54.30%), - North Rd Admin - Render Recladding: Actual $1k vs Budget $135k (↓$134k or -99.60%), - ALAC - Filter Sand - Shelter Replacement: Actual $0k vs Budget $120k (↓$120k or N?A), and - Solar Panel Installation: Actual $2k vs Budget $112k (↓$110k or -98.39%). As of 28 February 23.60% of the FY24/25 annual budget has been expended.
Purchase and construction of infrastructure	14,430,533	-61%	▲	Timing	Current underspend to budget is predominantly attributable to the phasing of the following programs: - Albany Artificial Surf Reef: Actual $1.38m vs Budget $6.55m (↓$5.17m or -78.90%), - Trails Strategy: Actual $15k vs Budget $900k (↓$885k or -98.31%), - Middleton Road: Actual $368k vs Budget $1.16m (↓$795k or -68.36%), - Middleton Road Link Shared Path: Actual $244k vs Budget $978k (↓$734k or -75.04%), - Lockyer East/West Path Link: Actual $314k vs Budget $815k (↓$501k or -61.49%), - Marine Drive - Lookout Refurbishment: Actual $4k vs Budget $392k (↓$388k or -98.95%), - Collingwood Road Mill And Fill Asphalt: Actual $1k vs Budget $360k (↓$359k or -99.68%), - North Road Mill And Fill Asphalt: Actual $1k vs Budget $340k (↓$340k or -99.83%), - Lancaster Road Widen and Overlay: Actual $45k vs Budget $371k (↓$326k or -87.78%), and - Centennial Youth Park - Multiuse Court: Actual $12k vs Budget $299k (↓$286k or -95.97%). As of 28 February 19.07% of the FY24/25 annual budget has been expended.

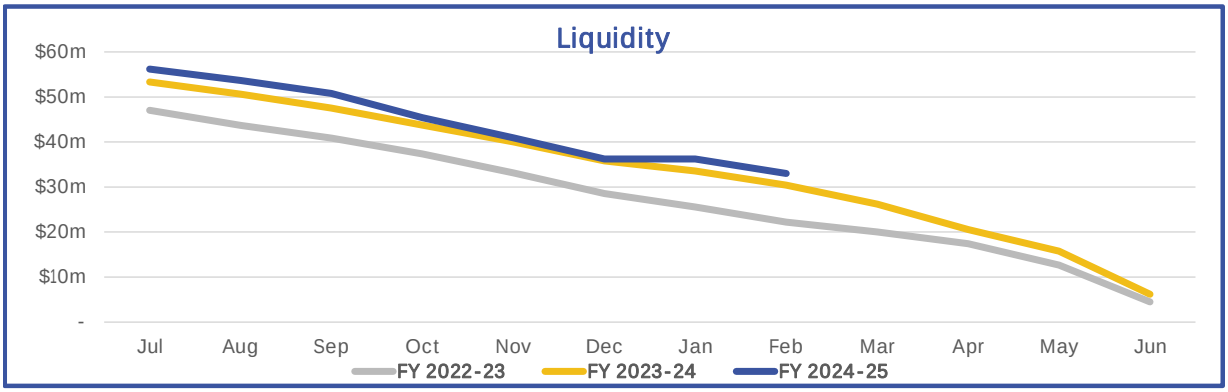
NOTE 1 (Continued)
EXPLANATION OF MATERIAL VARIANCES TO YTD BUDGET IN EXCESS OF $100,000

	Var. $	Var. %	Var.	Timing / Permanent	Explanation of Variance
INVESTING ACTIVITIES (Continued)					
Non-current to current movement	-				No material deviations observed.
FINANCING ACTIVITIES					
Repayment of borrowings	19	0%			No material deviations observed.
Proceeds from borrowings	-	0%			No material deviations observed.
Proceeds from self-supporting loans	-	0%			No material deviations observed.
Payments for principal portion of lease liabilities	3,854	-3%			No material deviations observed.
Restricted Cash Utilised	-				No material deviations observed.
Transfers to reserves (restricted assets)	-				No material deviations observed.
Transfers from reserves (restricted assets)	1	0%			No material deviations observed.
Surplus/(Deficit) at start of financial year	4	0%			No material deviations observed.

CITY OF ALBANY
NOTES TO THE MONTHLY FINANCIAL REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

NOTE 2
NET CURRENT ASSETS & FUNDING POSITION

	Ref Note	FOR THE PERIOD ENDED 28 FEBRUARY 2025	FOR THE PERIOD ENDED 31 JANUARY 2025	FOR THE PERIOD ENDED 29 FEBRUARY 2024
		$	$	$
Current Assets				
Cash - Unrestricted	3	36,521,252	42,055,997	34,479,696
Cash - Restricted	3	48,132,206	47,769,383	44,567,803
Trade Receivables - Rates and Rubbish	4	6,598,118	7,790,327	6,103,563
Trade Receivables - Other		2,216,572	1,897,054	2,440,986
Inventories		1,341,156	1,401,150	1,168,230
Grants Receivable		3,988,043	2,753,635	2,055,238
Other Current Assets		1,595,013	2,173,592	2,361,009
Other Financial Assets - Self Supporting Loan		7,596	7,596	7,363
		100,399,954	105,848,732	93,183,888
Less: Current Liabilities				
Trade & Other Payables		(8,998,156)	(10,437,943)	(9,614,214)
Contract Liabilities		(4,845,448)	(5,654,169)	(3,221,297)
Lease Liabilities		(83,134)	(99,258)	(70,735)
Borrowings		(575,096)	(575,096)	(707,083)
Provisions		(7,261,943)	(7,225,188)	(6,518,373)
		(21,763,778)	(23,991,655)	(20,131,702)
Net Current Assets		78,636,176	81,857,078	73,052,186
Adjustments				
Add Back: Borrowings		575,096	575,096	707,083
Add Back: ROU liabilities		83,134	99,258	70,735
Add Back: Head-lease liability amortisation		106	106	101
Add Back: Implicit Interest		8,410	7,435	10,439
(Less): Cash Backed Reserves		(46,290,805)	(46,290,805)	(43,441,121)
(Less): Other Financial Assets - Self Supporting Loan		(7,596)	(7,596)	(7,363)
		(45,631,654)	(45,616,505)	(42,660,126)
Net Current Funding Position		33,004,522	36,240,573	30,392,060



COMMENTS:
The Net Current Funding Position for the reporting period ending 28 February 2025 is ↑$2.61m (7.92%) compared to the same period in FY23/24. This year-over-year increase is predominantly attributable to higher capital grants, subsidies, and contributions recognised year-to-date, as noted in Note 1.

No other significant matters noted.

CITY OF ALBANY
NOTES TO THE MONTHLY FINANCIAL REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

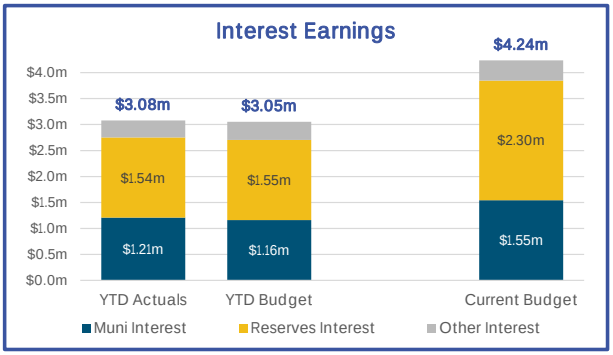
NOTE 3
CASH INVESTMENTS

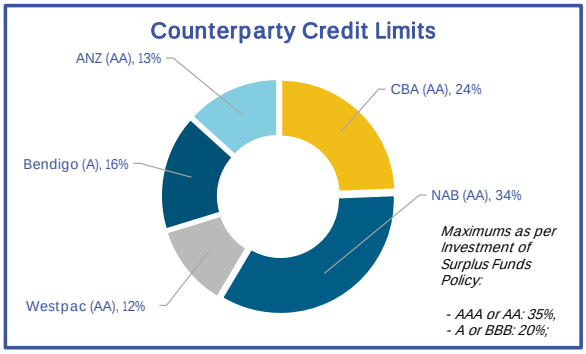
TERM DEPOSITS

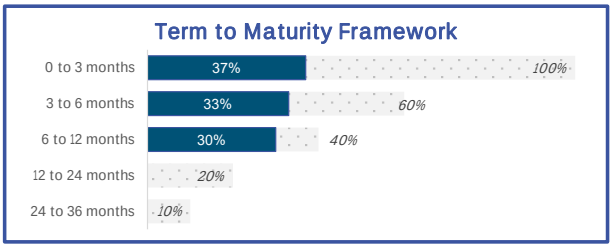
Investment Type	Institution	S&P Rating	Interest Rate	Deposit Date	Maturity	Investment Term Category	Amount Invested ($)	Expected Interest ($)
General Municipal	NAB	AA	5.00%	Dec-24	Mar-25	0 to 3 months	3,000,000	37,397
General Municipal	CBA	AA	4.91%	Dec-24	Mar-25	0 to 3 months	3,000,000	36,724
General Municipal	NAB	AA	5.00%	Jan-25	Apr-25	0 to 3 months	9,000,000	110,959
General Municipal	Bendigo	A	4.95%	Nov-24	Apr-25	3 to 6 months	2,000,000	40,956
General Municipal	Bendigo	A	4.90%	Dec-24	Apr-25	3 to 6 months	3,000,000	49,537
General Municipal	NAB	AA	4.95%	Jan-25	Apr-25	0 to 3 months	2,500,000	31,192
General Municipal	ANZ	AA	4.76%	Jan-25	Apr-25	0 to 3 months	2,500,000	29,995
General Municipal	ANZ	AA	4.78%	Jan-25	Apr-25	0 to 3 months	3,000,000	35,359
General Municipal	Bendigo	A	5.05%	Dec-24	Jun-25	6 to 12 months	3,000,000	75,958
							31,000,000	**448,076**
Reserves (Restricted)	CBA	AA	4.89%	Dec-24	Mar-25	0 to 3 months	5,500,000	67,053
Reserves (Restricted)	ANZ	AA	4.85%	Nov-24	Apr-25	3 to 6 months	5,000,000	100,322
Reserves (Restricted)	Westpac	AA	4.97%	Jan-25	Apr-25	0 to 3 months	750,000	9,191
Reserves (Restricted)	Bendigo	A	4.96%	Oct-24	Apr-25	3 to 6 months	5,000,000	123,660
Reserves (Restricted)	NAB	AA	5.10%	Dec-24	Jun-25	6 to 12 months	5,000,000	127,849
Reserves (Restricted)	NAB	AA	5.05%	Dec-24	Dec-25	6 to 12 months	7,500,000	378,750
Reserves (Restricted)	Westpac	AA	4.79%	Feb-25	Feb-26	6 to 12 months	8,500,000	407,150
Reserves (Restricted)	CBA	AA	4.63%	Feb-25	Aug-25	3 to 6 months	5,750,000	132,748
Reserves (Restricted)	CBA	AA	4.60%	Feb-25	Aug-25	3 to 6 months	5,000,000	114,055
							48,000,000	**1,460,778**
	Weighted Average Interest Rate:		**4.94%**			**SubTotal: Term Deposits:**	**79,000,000**	**1,908,855**

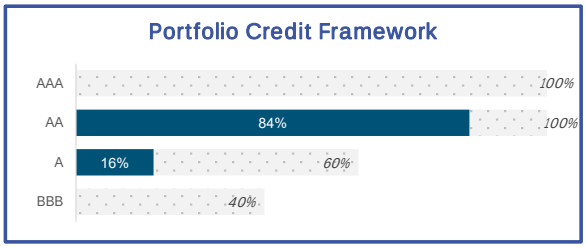
FUNDS AT-CALL

Type	Institution	S&P Rating	Interest Rate	Name / Purpose	Balance ($)
General Municipal	CBA	AA	4.00%	Municipal Operating Account	**693,199**
General Municipal	CBA	AA	4.10%	Municipal Savings Account	**4,828,053**
Reserves (Restricted)	CBA	AA	4.00%	Reserve Transactional Account	**132,206**
	Weighted Average Interest Rate:		**4.09%**	**SubTotal: Funds At-Call:**	**5,653,458**
	TOTAL Weighted Average Interest Rate:		**4.88%**	**Total Cash:**	**84,653,458**









COMMENTS:

Year-on-year movement in cash investment portfolio:

	28/02/2025	29/02/2024	$ MVT	% MVT	
Municipal	$31.0m	$27.0m	$4.0m	14.81%	
Reserve	$48.0m	$44.5m	$3.5m	7.87%	
Total	**$79.0m**	**$71.5m**	**$7.5m**	**10.49%**	
Average Return**	**4.94%**	**5.01%**		**-0.07%**	***Weighted Average Interest Rate for Term Deposits only*

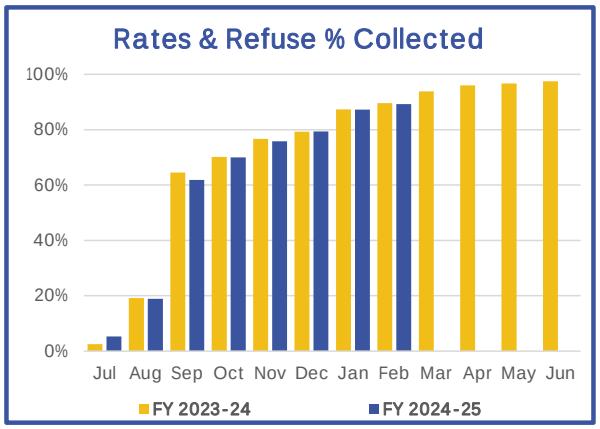
No significant matters noted.

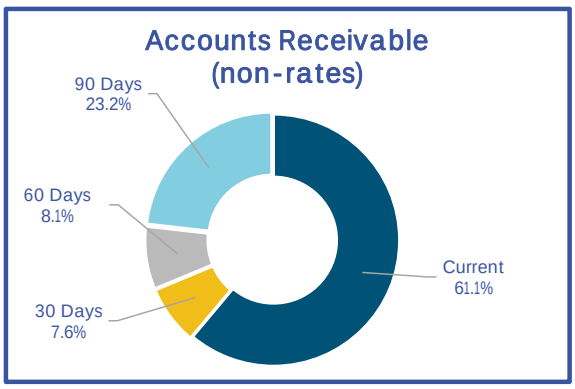
**Weighted Average Interest Rate for Term Deposits only

CITY OF ALBANY
NOTES TO THE MONTHLY FINANCIAL REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

NOTE 4
RECEIVABLES

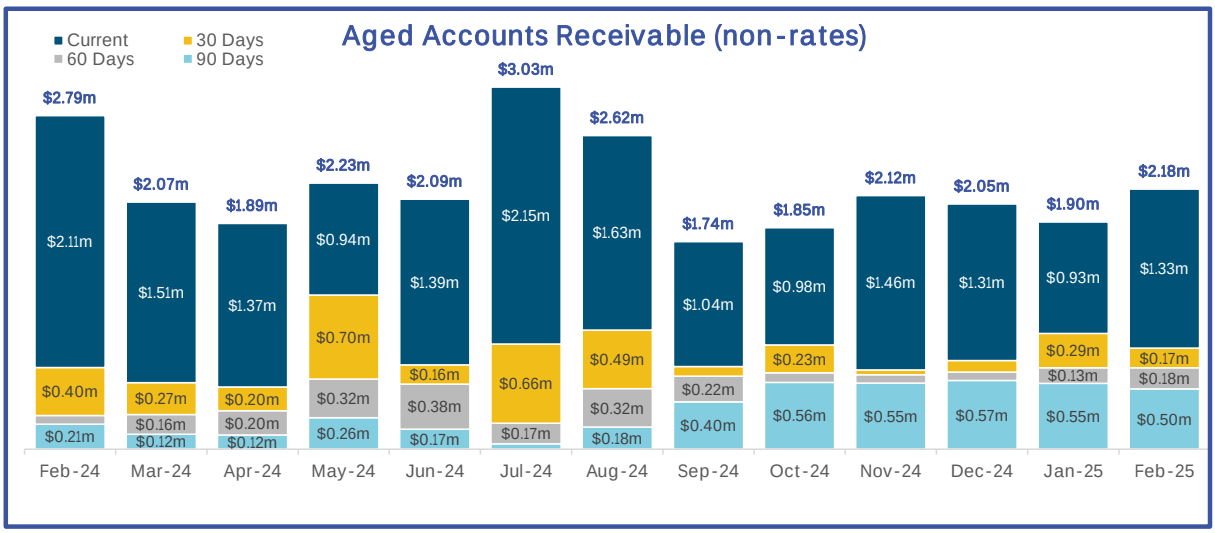
Rates & Refuse % Collected	$
Opening Arrears Previous Years	1,417,864
Rates Levied	46,473,932
Refuse Levied	8,825,244
ESL Levied	4,067,021
Other Charges Levied	423,485
Amount Levied	**61,207,546**
(Less): Collections	(54,609,428)
Total Rates & Charges Collectable	**6,598,118**
% Collected	*89.2%*





Accounts Receivable (non-rates)	$	%
Current	1,329,316	*61.1%*
30 Days	165,766	*7.6%*
60 Days	175,822	*8.1%*
90 Days	504,601	*23.2%*
	2,175,505	***100%***

Amounts shown above include GST (where applicable)



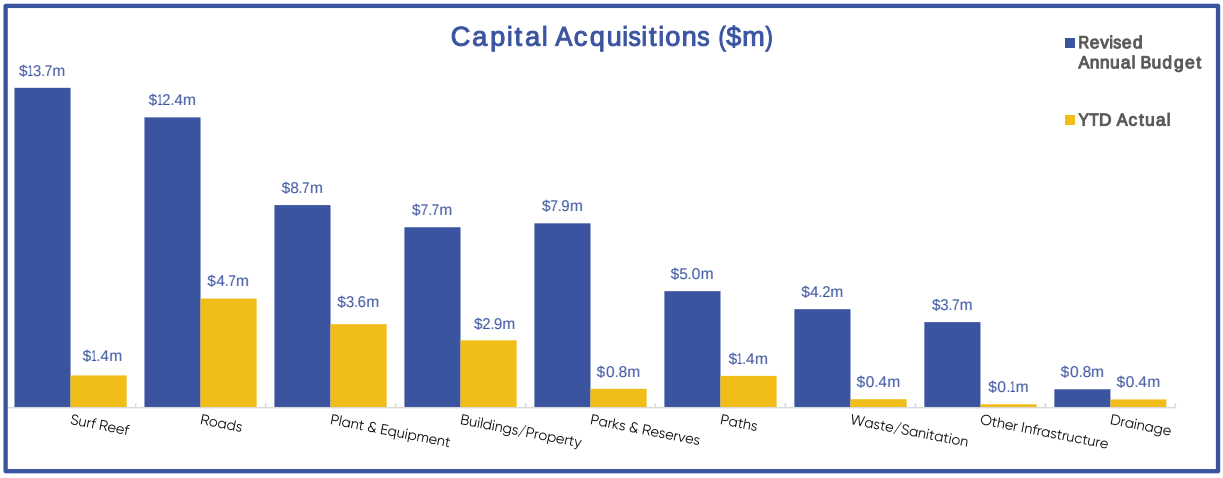
COMMENTS:
All amounts owed to the City by Regional Express Holdings Limited (Administrators Appointed) are now recorded in +90 days.

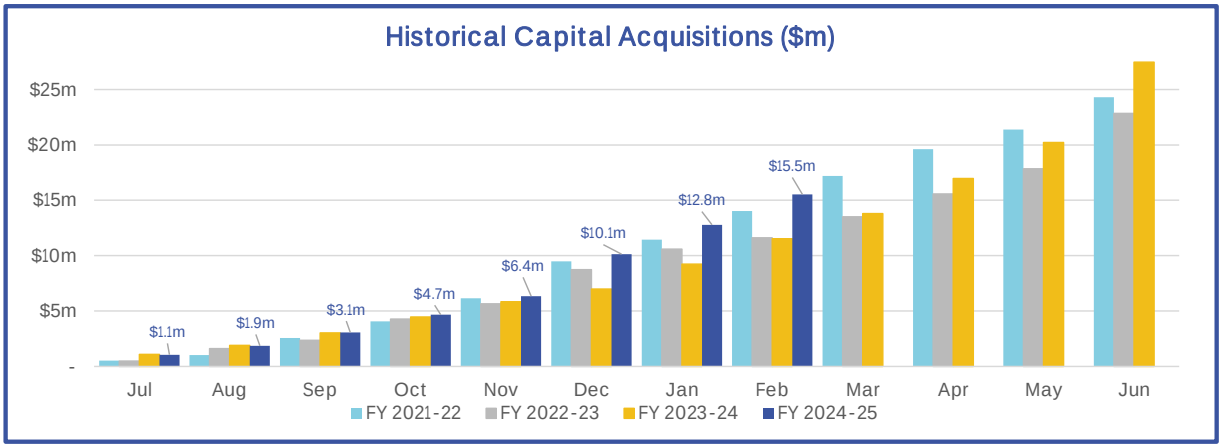
No other amounts significant matters noted.

CITY OF ALBANY
NOTES TO THE MONTHLY FINANCIAL REPORT
FOR THE PERIOD ENDED 28 FEBRUARY 2025

NOTE 5
CAPITAL ACQUISITIONS

Capital Acquisitions	Original Annual Budget	Revised Annual Budget	YTD Budget (a)	YTD Actual (b)	Var. $ (b)-(a)	Var. % (b)-(a)/(a)	Var.
	$	$	$	$	$	%	
Surf Reef	11,696,715	13,685,923	6,550,000	1,381,896	(5,168,104)	(79%)	▼
Roads	12,751,023	12,418,373	8,901,570	4,668,168	(4,233,402)	(48%)	▼
Plant & Equipment	7,042,416	8,671,122	3,539,672	3,571,672	32,001	1%	
Buildings/Property	6,975,557	7,716,753	5,975,354	2,879,051	(3,096,303)	(52%)	▼
Parks & Reserves	7,218,365	7,888,681	3,025,148	803,443	(2,221,706)	(73%)	▼
Paths	4,877,111	4,986,059	2,577,753	1,362,991	(1,214,762)	(47%)	▼
Waste/Sanitation	4,238,180	4,210,935	598,695	364,742	(233,953)	(39%)	▼
Other Infrastructure	3,452,751	3,658,562	1,365,452	146,962	(1,218,490)	(89%)	▼
Drainage	736,556	786,016	493,511	353,394	(140,117)	(28%)	▼
Total Capital Acquistions	**58,988,674**	**64,022,424**	**33,027,154**	**15,532,319**	**(17,494,836)**	**(53%)**	▼





COMMENTS:
Capital expenditure recorded to February FY24/25 of $15.53m is tracking ↑$4.00m (25.77%) compared to the equivalent reporting period in FY23/24, where total Capital Acquisitions recorded were $11.53m. Capital Expenditure is also ↑$3.92m (25.24%) compared to the equivalent reporting period in FY22/23, where total Capital Acquisitions recorded were $11.61m.

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 26 FEBRUARY 2025

CREDIT CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
29/01/2025	CORE ELECTRONICS	Components To Build Advertising TV Controller For Town Hall	$222.80
29/01/2025	REX	Flights - 5 Staff To Attend Grievance Training Perth	$2,044.73
29/01/2025	INDIAN OCEAN HOTEL	Accommodation - 5 Staff To Attend Grievance Training	$860.00
29/01/2025	MAIN ROADS WA HEAVY VE	Special Purpose Vehicle Permit	$50.00
29/01/2025	MAIN ROADS WA HEAVY VE	Overmasts Permit Fee	$1,296.00
31/01/2025	LANDGATE	Application Fee - Title Change Of Name Application	$210.30
3/02/2025	PAYPAL *KELYN TRAIN KE	Registration - Team Leader Civil Infrastructure - Advanced Worksite Traffic Management Course	$550.00
3/02/2025	DOME ALBANY	Refreshments - Meeting With Wagyl Kaip	$23.95
31/01/2025	DEPT OF RACING GAMIN	Application - Occasional Liquor License	$60.50
3/02/2025	HOLIDAY INN WESTPER PL	Accommodation - Community Development Officer - Community Development In LG Introductory Course	$491.26
3/02/2025	EG GROUP 4232	Refreshments - Staff Retirement	$27.50
31/01/2025	WESTERN POWER	Application - Removal Of Street Lights	$498.91
3/02/2025	GOOGLE ADS1978259392	Google Ad Cost Per Click Advertising - National Anzac Centre - Communications	$0.11
4/02/2025	WIX.COM 1159535291	Ongoing Contact Management System For NAC Yearly Invoice	$212.97
4/02/2025	INTNL TRANSACTION FEE	International Transaction Fee	$5.32
4/02/2025	REX	Flights - Western Australian Museum Project Officer - WA Museum Visit	$777.59
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$29.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$99.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$99.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$99.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$99.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$99.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$49.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$19.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$49.99
4/02/2025	ADJUSTMENT TO ACCOUNT	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$14.99
5/02/2025	COSAINT GLOBAL LLC	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$131.34

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 26 FEBRUARY 2025

CREDIT CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
5/02/2025	SQ *HAZBEANZ FINESTKIN	Refreshments - Chief Executive Officer, Executive Director Infrastructure, Development And Environment And Works Supervisor - Retirement Catch Up	$16.50
5/02/2025	INTNL TRANSACTION FEE	Fraudulent Transactions - Dispute Raised - Transaction Reversed	$3.28
6/02/2025	REX	Flights - Community Development Officer - Community Development In LG Introductory Course	$777.59
5/02/2025	REZDY	Booking Platform For NAC	$290.07
4/02/2025	DEPARTMENT OF TRANSPOR	Payment For Community Jetty Licence At Cape Riche	$104.65
4/02/2025	WESTERN POWER	Connection Of Mains Power To Kalgan Fire Shed	$498.91
4/02/2025	DMIRS EAST PERTH	High Risk Work Licence Renewal For Natural Reserves Maintenance Worker	$44.00
4/02/2025	PERTH LASER & FACE	Otolaryngologist Request By Workcover	$702.50
5/02/2025	CAFE ESPRESSO ONE	Refreshment - Executive Director Community Services & Cr Malcolm Traill - Albany 2026	$11.00
5/02/2025	SP MYFONTS INC	Resources - National Anzac Centre Fonts - Thesans Complete Family & The Serif Complete Family - Communications	$6,348.67
6/02/2025	WILLIAMS WOOLSHED	Refreshments - Staff - Transport Of DFES Fire Fleet	$27.36
6/02/2025	RIVERSIDE ROADHOUSE	Refreshments - Staff - Transport Of DFES Fire Fleet	$93.40
6/02/2025	INTUIT MAILCHIMP	Monthly Marketing Plan - Communications	$668.06
5/02/2025	WASTE MANAGEMENT	WMRR Membership For Manager Operations, Coordinator Sustainability and Waste Strategy & Coordinator Waste Operations	$1,377.67
6/02/2025	ALBANY TENNIS CLUB AUS	Tennis Court Hire For Well At Work Event	$120.00
6/02/2025	WESTERN POWER HEAD OFF	High Load Movement Permit	$277.59
7/02/2025	DROPBOX MPQTQ3PWG6Z3	Dropbox Business Standard Plan	$302.50
7/02/2025	WOOLWORTHS 4374	Refreshments For Civic Rooms	$98.90
10/02/2025	FACEBK *CV4WRGQX52	Facebook And Instagram Advertising	$166.45
10/02/2025	PLASTICS PLUS	Materials & Consumables - Lotteries House	$3.80
10/02/2025	JB HI FI ALBANY	Camera And Accessories - City Assets Footpath Condition Assessments	$774.00
10/02/2025	SOUNDTRACK YOUR BRAND	Albany Leisure & Aquatic Centre - Monthly Subscription - Music Service	$40.03
10/02/2025	INTNL TRANSACTION FEE	International Transaction Fee - Monthly Subscription - Music Service	$1.00
10/02/2025	TEAM GLOBAL EXPRESS PL	Courier Fee - Return Of Road Safety Banner - Albany To Perth - Grant Funding	$54.21
11/02/2025	LIVE PAYMENTS	Taxi Travel - 5 Staff To Attend Grievance Training	$147.44

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 26 FEBRUARY 2025

CREDIT CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
11/02/2025	YODECK.COM FLIPNODE	Monthly Subscription To Yodeck	$5.61
11/02/2025	INTNL TRANSACTION FEE	International Transaction Fee For Yodeck	$0.14
12/02/2025	DROPBOX*W8DFQKZZHPN1	Dropbox Account	$184.67
11/02/2025	LA CAPANNINA PERTH	Dinner - 5 Staff To Attend Grievance Training	$185.00
12/02/2025	DELAWARE NORTH RETAI	Dinner - 5 Staff To Attend Grievance Training	$119.00
12/02/2025	THE SANDBAR SCARBOROUG	Breakfast - 5 Staff To Attend Grievance Training	$149.21
13/02/2025	EBAY O*19-12689-59491	Equipment - IT Team	$63.56
12/02/2025	CONSTRUCTION TRAINING	Construction Training Fund Levy	$60.00
14/02/2025	SP DESIGNER DIRT	Gift Card - Staff Recognition	$50.00
14/02/2025	AMAZON AU MARKETPLACE	Phone Cases For IT Dept	$397.92
14/02/2025	WWW.SKYMESH.NET.AU	Monthly Fee For Cape Riche Internet Service	$65.61
14/02/2025	DEPT OF RACING GAMIN	Occasional Liquor License	$60.50
14/02/2025	DEPT OF RACING GAMIN	Occasional Liquor License	$60.50
14/02/2025	DEPT OF RACING GAMIN	Occasional Liquor License	$60.50
14/02/2025	DEPT OF RACING GAMIN	Occasional Liquor License	$60.50
17/02/2025	ASIC	ASIC Company Summary	$10.00
17/02/2025	ASIC	ASIC Company Summary	$20.00
17/02/2025	DEPARTMENT OF COMMUN	Waiver Application	$130.00
18/02/2025	COLES 0364COLES 0364	Kitchen Supplies	$40.50
18/02/2025	COLES 0364COLES 0364	Kitchen Supplies	$1.00
19/02/2025	COURTYARDPERMURDOCHFP	Accommodation - Reserves Officer - The Urban Forest Conference	$542.37
19/02/2025	COURTYARDPERMURDOCHFP	Accommodation - Climate and Sustainability Project Officer - The Urban Forest Conference	$526.06
19/02/2025	COURTYARDPERMURDOCHFP	Accommodation - GIS Specialist - The Urban Forest Conference	$537.28
19/02/2025	COURTYARDPERMURDOCHFP	Accommodation - Senior Planning Officer - The Urban Forest Conference	$652.87
19/02/2025	COURTYARDPERMURDOCHFP	Accommodation - Senior Planning Officer - The Urban Forest Conference	$20.00
19/02/2025	COURTYARDPERMURDOCHFP	Accommodation - Developed Reserves Supervisor - The Urban Forest Conference	$524.02
19/02/2025	MISCELLANEOUS CREDIT	Fraudulent Transactions - Dispute Raised - Transaction Reversal	-$131.34
19/02/2025	ROYALE PATISSERIE	Catering - Summer Event Series	$28.84
19/02/2025	ROYALE PATISSERIE	Refund - Catering - Summer Event Series	-$28.50

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 26 FEBRUARY 2025

CREDIT CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
19/02/2025	BAD BACKS - NEDLANDS	Ergonomic Chair	$769.00
19/02/2025	INTNL TRANS FEE REFUND	Fraudulent Transactions - Dispute Raised - Transaction Reversal	-$3.28
19/02/2025	BLOOMIN' FLOWERS SPENC	Flowers For Staff Retirement	$70.77
20/02/2025	INLOGIK PTY LIMITED	Corporate Card And Expense Claims Management System	$302.50
21/02/2025	COLES 0364COLES 0364	Staff Training - Catering	$107.25
21/02/2025	COLES 0364COLES 0364	Staff Training - Catering	$19.85
21/02/2025	YODECK.COM FLIPNODE	Advertising Software - Visitor Centre And Airport	$121.53
21/02/2025	INTNL TRANSACTION FEE	International Fee For Yodeck	$3.04
24/02/2025	WIX.COM AUSTRALIA PTY	Wix - Monthly Subscription - City Of Albany Events	$7.41
21/02/2025	ALBANY IGA	Staff Training - Catering	$25.96
21/02/2025	ALBANY IGA	Staff Training - Catering	$77.54
24/02/2025	SUBWAY ALBANY	Clean Up Australia Day - Catering	$138.55
24/02/2025	PAYPAL *WATERRA	Registration - Senior Civil Engineering Officer - Australian Rainfall and Runoff Training	$2,200.00
25/02/2025	ZOOM.COM 888-799-9666	Video Conferencing Facility	$201.54
25/02/2025	ZAMA YOGA	Registration - Online Yoga Instructor	$333.00
25/02/2025	DEPARTMENT OF TRANSPOR	Vehicle Registration	$106.65
25/02/2025	DEPARTMENT OF TRANSPOR	Vehicle Registration	$106.65
25/02/2025	DEPARTMENT OF TRANSPOR	Vehicle Registration	$8.25
25/02/2025	DEPARTMENT OF TRANSPOR	Vehicle Registration	$8.25
			$30,078.04

CITY OF ALBANY

LIST OF ACCOUNTS FOR PAYMENT

FOR THE PERIOD ENDING 15 MARCH 2025

PAYROLL TRANSACTIONS

DATE			DESCRIPTION	AMOUNT
20/02/2025			Salaries	$900,090.46
26/02/2025			Superannuation	$180,121.64
06/03/2025			Salaries	$927,195.12
11/03/2025			Superannuation	$180,120.94
				$2,187,528.16

CHEQUE TRANSACTIONS

DATE	CHEQUE	NAME	DESCRIPTION	AMOUNT
32794	06/03/2025	DEPARTMENT OF TRANSPORT	Amazing South Coast Number Plates	$200.00
				$200.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182034	20/02/2025	@THE POOLSIDE	Milk Supply	$414.20
EFT182001	20/02/2025	ABBEY'S EARTHMOVING SERVICES	Vegetation Maintenance Services C23009(A)	$3,536.50
EFT182428	06/03/2025	ABBEY'S EARTHMOVING SERVICES	Vegetation Maintenance Services C23009(A)	$5,280.00
EFT182008	20/02/2025	ABOUT FACE YOUTH CHOIR	Performance Fees	$1,000.00
EFT182002	20/02/2025	ACCESS ICON PTY LTD T/AS CASCADA	Manhole Covers	$1,600.50
EFT182258	27/02/2025	ACORN TREES AND STUMPS	Vegetation Maintenance Services C23012(D)	$13,169.75
EFT182620	13/03/2025	ACORN TREES AND STUMPS	Vegetation Maintenance Services C23012(D)	$6,586.25
EFT182004	20/02/2025	AD CONTRACTORS PTY LTD	Plant And Equipment Hire C23009(B)	$13,930.95
EFT182239	27/02/2025	AD CONTRACTORS PTY LTD	Plant And Equipment Hire C23009(B) / Road Maintenance Materials C23008(A)	$43,057.52
EFT182430	06/03/2025	AD CONTRACTORS PTY LTD	Plant And Equipment Hire C23009(B) / Road Maintenance Materials C23008(A)	$8,186.20
EFT182595	13/03/2025	AD CONTRACTORS PTY LTD	Plant And Equipment Hire C23009(B)	$27,752.45
EFT182429	06/03/2025	A MARCHE	Refund	$127.80
EFT182005	20/02/2025	ADVERTISER PRINT	Printing Services	$3,828.00
EFT182240	27/02/2025	ADVERTISER PRINT	Printing Services	$48.00
EFT182431	06/03/2025	ADVERTISER PRINT	Printing Services	$559.00
EFT182006	20/02/2025	AERODROME MANAGEMENT SERVICES PTY LTD	Airport Runway Marking	$12,048.70
EFT182241	27/02/2025	AERODROME MANAGEMENT SERVICES PTY LTD	Relief ARO/WSO	$28,618.15
EFT182317	27/02/2025	AFGRI EQUIPMENT AUSTRALIA PTY LTD	Plant Parts And Repairs	$1,518.08
EFT182507	06/03/2025	AFGRI EQUIPMENT AUSTRALIA PTY LTD	Plant Parts And Repairs	$1,151.65
EFT182672	13/03/2025	AFGRI EQUIPMENT AUSTRALIA PTY LTD	Plant Parts And Repairs	$1,947.04
EFT182011	20/02/2025	AHOY MANAGEMENT	Event Services	$11,000.00
EFT182432	06/03/2025	AIRBORNE MAPPING & PHOTOGRAPHY SERVICES	GIS Consultancy	$3,800.00
EFT182012	20/02/2025	AKOYA JEWELLERY	Stock Items - Visitor Centre	$71.25
EFT182597	13/03/2025	AKOYA JEWELLERY	Stock Items - Visitor Centre	$63.75
EFT182072	20/02/2025	AL CURNOW HYDRAULICS	Plant Parts And Repairs	$433.62
EFT182291	27/02/2025	AL CURNOW HYDRAULICS	Plant Parts And Repairs	$1,065.78
EFT182484	06/03/2025	AL CURNOW HYDRAULICS	Plant Parts And Repairs	$1,020.62

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182648	13/03/2025	AL CURNOW HYDRAULICS	Plant Parts And Repairs	$2,024.05
EFT182554	06/03/2025	A ROWE	Rates Refund	$415.45
EFT182596	13/03/2025	ALBANY AIR	Plant Parts and Repairs	$55.00
EFT182607	13/03/2025	ALBANY AND REGIONAL VOLUNTEER SERVICE	Grant Payment	$5,525.78
EFT182022	20/02/2025	ALBANY ART GROUP INC	Artwork Sales	$1,858.15
EFT182100	20/02/2025	ALBANY ASPHALT SERVICES - GORDON WALMSLEY PTY LTD	Asphalt Works C23015(A)	$45,395.00
EFT182248	27/02/2025	ALBANY AUTO ONE	Plant Parts And Repairs	$3,638.80
EFT182439	06/03/2025	ALBANY AUTO ONE	Plant Parts And Repairs	$1,984.40
EFT182605	13/03/2025	ALBANY AUTO ONE	Plant Parts And Repairs	$1,372.50
EFT182024	20/02/2025	ALBANY AUTOS	Plant Parts And Repairs	$124.18
EFT182043	20/02/2025	ALBANY BITUMEN SPRAYING	Bitumen Supply / Services	$25,538.42
EFT182625	13/03/2025	ALBANY BITUMEN SPRAYING	Bitumen Supply / Services	$3,682.25
EFT182602	13/03/2025	ALBANY CHAMBER OF COMMERCE & INDUSTRY INC	Conference Fees	$1,287.00
EFT182441	06/03/2025	ALBANY CITY KART CLUB INCORPORATED	Grant Payment	$2,800.00
EFT182149	20/02/2025	ALBANY CITY MOTORS	Vehicle Parts / Maintenance	$1,344.31
EFT182340	27/02/2025	ALBANY CITY MOTORS	Vehicle Purchases P25002 & P24004	$214,821.92
EFT182528	06/03/2025	ALBANY CITY MOTORS	Vehicle Parts / Maintenance	$1,039.23
EFT182686	13/03/2025	ALBANY CITY MOTORS	Vehicle Parts / Maintenance	$263.49
EFT182251	27/02/2025	ALBANY COMMUNITY FOUNDATION	Payroll Deductions	$5.00
EFT182608	13/03/2025	ALBANY COMMUNITY FOUNDATION	Payroll Deductions	$5.00
EFT182244	27/02/2025	ALBANY COMMUNITY HOSPICE	Payroll Deductions	$10.00
EFT182600	13/03/2025	ALBANY COMMUNITY HOSPICE	Payroll Deductions	$10.00
EFT182695	13/03/2025	ALBANY COMMUNITY PHARMACY	First Aid Supplies	$39.80
EFT182438	06/03/2025	ALBANY COMMUNITY RADIO T/AS GREAT SOUTHERN FM	Advertising	$300.30
EFT182147	20/02/2025	ALBANY EVENT HIRE	Event / Equipment Hire	$390.00
EFT182525	06/03/2025	ALBANY EVENT HIRE	Event / Equipment Hire	$417.85
EFT182685	13/03/2025	ALBANY EVENT HIRE	Event / Equipment Hire	$16,456.18
EFT182089	20/02/2025	ALBANY FENCING COMPANY	Fencing Hire	$396.00
EFT182662	13/03/2025	ALBANY FENCING COMPANY	Fencing Hire	$264.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182007	20/02/2025	ALBANY FENCING CONTRACTORS	Fencing Repairs	$2,783.00
EFT182010	20/02/2025	ALBANY GARDEN SERVICES	Gardening Services	$378.30
EFT182110	20/02/2025	ALBANY GIRL GUIDES WESTERN AUSTRALIA INC	Community Sponsorship Agreement	$7,315.00
EFT182385	27/02/2025	ALBANY IGA & SPENCER PARK IGA	Catering / Amenity Supplies	$316.52
EFT182732	13/03/2025	ALBANY IGA & SPENCER PARK IGA	Catering / Amenity Supplies	$861.88
EFT182245	27/02/2025	ALBANY INDOOR PLANT HIRE AND SALES	Indoor Plant Hire	$541.20
EFT182601	13/03/2025	ALBANY INDOOR PLANT HIRE AND SALES	Indoor Plant Hire	$275.28
EFT182130	20/02/2025	ALBANY INDOOR SPORTS CENTRE	Venue Hire	$440.00
EFT182250	27/02/2025	ALBANY IRRIGATION & DRILLING	Irrigation Maintenance Materials	$1,808.52
EFT182133	20/02/2025	ALBANY JB HI-FI GROUP PTY LTD	IT Equipment / Services	$5,950.00
EFT182324	27/02/2025	ALBANY JB HI-FI GROUP PTY LTD	IT Equipment / Services	$868.67
EFT182512	06/03/2025	ALBANY JB HI-FI GROUP PTY LTD	IT Equipment / Services	$3,781.73
EFT182019	20/02/2025	ALBANY LASERSCAPE	Event Services	$1,622.50
EFT182610	13/03/2025	ALBANY LAWN GAMES	Event Services	$175.00
EFT182199	20/02/2025	ALBANY LOCK & SECURITY	Locksmith / Security Services	$1,706.92
EFT182568	06/03/2025	ALBANY LOCK & SECURITY	Locksmith / Security Services	$1,557.00
EFT182731	13/03/2025	ALBANY LOCK & SECURITY	Locksmith / Security Services	$1,700.44
EFT182448	06/03/2025	ALBANY MAPPING & SURVEYING SERVICES	Surveying Services Q24017(C)	$3,500.00
EFT182021	20/02/2025	ALBANY MILK DISTRIBUTORS	Milk Delivery	$308.88
EFT182442	06/03/2025	ALBANY MILK DISTRIBUTORS	Milk Delivery	$675.88
EFT182247	27/02/2025	ALBANY MONUMENTAL MASONS	Masonry Services	$1,134.00
EFT182167	20/02/2025	ALBANY NEWS DELIVERY	Newspaper Deliveries	$382.34
EFT182694	13/03/2025	ALBANY NEWS DELIVERY	Newspaper Deliveries	$365.49
EFT182246	27/02/2025	ALBANY PANEL BEATERS AND SPRAY PAINTERS	Plant Parts And Repairs	$1,950.00
EFT182018	20/02/2025	ALBANY PLASTERBOARD COMPANY	Freight Charges	$1,760.00
EFT182176	20/02/2025	ALBANY PLUMBING AND GAS	Plumbing Services C24016	$16,096.30
EFT182363	27/02/2025	ALBANY PLUMBING AND GAS	Plumbing Services C24016	$3,412.45
EFT182545	06/03/2025	ALBANY PLUMBING AND GAS	Plumbing Services C24016	$586.45
EFT182350	27/02/2025	ALBANY RADIO COMMUNICATIONS	Plant Parts And Repairs	$449.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182692	13/03/2025	ALBANY RADIO COMMUNICATIONS	Plant Parts And Repairs	$2,958.00
EFT182023	20/02/2025	ALBANY RECORDS MANAGEMENT	Offsite Storage	$522.50
EFT182609	13/03/2025	ALBANY RECORDS MANAGEMENT	Offsite Storage	$606.65
EFT182603	13/03/2025	ALBANY RETRAVISION	Kitchen Appliances	$58.00
EFT182069	20/02/2025	ALBANY SIGNS	Sign Printing Services	$2,420.00
EFT182283	27/02/2025	ALBANY SIGNS	Sign Printing Services	$66.00
EFT182645	13/03/2025	ALBANY SIGNS	Sign Printing Services	$2,480.50
EFT182058	20/02/2025	ALBANY SKIPS AND WASTE SERVICES	Skip Bin Hire	$490.00
EFT182016	20/02/2025	ALBANY SWEEP CLEAN	Sweeping Services	$2,640.00
EFT182437	06/03/2025	ALBANY SWEEP CLEAN	Sweeping Services	$4,449.00
EFT182025	20/02/2025	ALBANY TANKS	Water Delivery	$800.00
EFT182032	20/02/2025	ALBANY TENNIS ACADEMY	Tennis Coaching	$150.00
EFT182013	20/02/2025	ALBANY TOYOTA	Vehicle Parts / Maintenance	$82.24
EFT182433	06/03/2025	ALBANY TOYOTA	Vehicle Parts / Maintenance	$930.99
EFT182212	20/02/2025	ALBANY TYREPOWER	Tyre Maintenance / Supply	$4,522.60
EFT182399	27/02/2025	ALBANY TYREPOWER	Tyre Maintenance / Supply	$13,395.20
EFT182581	06/03/2025	ALBANY TYREPOWER	Tyre Maintenance / Supply	$4,575.50
EFT182739	13/03/2025	ALBANY TYREPOWER	Tyre Maintenance / Supply	$3,420.00
EFT182015	20/02/2025	ALBANY V-BELT AND RUBBER	Plant Parts And Repairs	$647.79
EFT182243	27/02/2025	ALBANY V-BELT AND RUBBER	Plant Parts And Repairs	$93.60
EFT182436	06/03/2025	ALBANY V-BELT AND RUBBER	Plant Parts And Repairs	$826.47
EFT182599	13/03/2025	ALBANY V-BELT AND RUBBER	Plant Parts And Repairs	$527.47
EFT182020	20/02/2025	ALBANY WALLCUTTING SERVICES	Concrete Services	$368.50
EFT182735	13/03/2025	ALBANY WINDOW TINTING	Vehicle Parts / Maintenance	$800.00
EFT182519	06/03/2025	ALBANY WORLD OF CARS	Vehicle Parts / Maintenance	$334.27
EFT182252	27/02/2025	ALINTA	Gas Charges	$38.50
EFT182443	06/03/2025	ALINTA	Gas Charges	$51.70
EFT182446	06/03/2025	ALL FLAGS AND SIGNS PTY LTD	Flag Purchases	$1,840.30
EFT182452	06/03/2025	ALL SEASONS TIMBER	Retaining Wall Repairs	$5,984.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182434	06/03/2025	ALL TECH MECHANICAL / ALBANY BRAKE AND CLUTCH	Vehicle Parts / Maintenance	$258.00
EFT182612	13/03/2025	ALLIANCE DISTRIBUTION SERVICES	Stock Items - Forts Store	$557.70
EFT182288	27/02/2025	AMANDA CRUSE	Councillor Allowance	$3,152.34
EFT182027	20/02/2025	AMANDA JANE STANBOROUGH	Stock Items - Vancouver Arts Centre	$29.02
EFT182614	13/03/2025	AMD AUDIT & ASSURANCE PTY LTD	Audit Services P24001	$20,075.00
EFT182028	20/02/2025	AMPAC DEBT RECOVERY (WA) PTY LTD	Legal Fees	$449.19
EFT182056	20/02/2025	AMPOL AUSTRALIA PETROLEUM PTY LTD	Diesel Delivery	$53,552.61
EFT182273	27/02/2025	AMPOL AUSTRALIA PETROLEUM PTY LTD	Diesel Delivery	$31,373.14
EFT182473	06/03/2025	AMPOL AUSTRALIA PETROLEUM PTY LTD	Diesel Delivery	$42,465.51
EFT182636	13/03/2025	AMPOL AUSTRALIA PETROLEUM PTY LTD	Diesel Delivery	$3,455.76
EFT182635	13/03/2025	AMPOL LIMITED	Fuel Purchases	$10,647.66
EFT182330	27/02/2025	EVENTS COORDINATOR	Staff Reimbursement	$35.00
EFT182029	20/02/2025	ANTONIA'S DANCE STUDIO	Dance Class Delivery	$390.00
EFT182449	06/03/2025	ANTONIA'S DANCE STUDIO	Dance Class Delivery	$520.00
EFT182668	13/03/2025	APPLIED INDUSTRIAL TECHNOLOGIES GREAT SOUTHERN BEARINGS	Plant Parts And Repairs	$180.07
EFT182617	13/03/2025	AQUAGILITY PTY LTD	Membership Fees	$190.00
EFT182631	13/03/2025	ARC INFRASTRUCTURE PTY LTD	Lease Payment	$1,408.42
EFT182182	20/02/2025	ARCHERY SKIRMISH & BUBBLE BASH SOCCER	Event Services	$5,175.00
EFT182451	06/03/2025	ARTISAN SOAP WORKS	Stock Items - Forts Store	$310.50
EFT182031	20/02/2025	ARTSOUTHWA INCORPORATED	Event Services / Advertising / Entry Fees	$11,500.00
EFT182256	27/02/2025	ARTSOUTHWA INCORPORATED	Event Services / Advertising / Entry Fees	$250.00
EFT182450	06/03/2025	ARTSOUTHWA INCORPORATED	Event Services / Advertising / Entry Fees	$340.00
EFT182254	27/02/2025	A ANSARI	Refund	$155.20
EFT182618	13/03/2025	ASP ALLOY AND STAINLESS PRODUCTS	Plant Parts / Equipment	$1,407.12
EFT182033	20/02/2025	ATC WORK SMART	Casual Labour / Apprentices	$8,436.65
EFT182257	27/02/2025	ATC WORK SMART	Casual Labour / Apprentices	$1,669.30
EFT182453	06/03/2025	ATC WORK SMART	Casual Labour / Apprentices	$3,309.90
EFT182619	13/03/2025	ATC WORK SMART	Casual Labour / Apprentices	$3,396.20

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182611	13/03/2025	ATCO GAS AUSTRALIA	Plumbing Services	$1,576.65
EFT182035	20/02/2025	AURORA ENVIRONMENTAL ALBANY	Consulting Services	$3,520.00
EFT182038	20/02/2025	AUSCOINSWEST	Stock Items - Forts Store	$1,188.00
EFT182419	27/02/2025	AUSFLEET SOFTWARE	Subscription Fee	$183,538.00
EFT182255	27/02/2025	AUSROAD PLANT SERVICES PTY LTD	Plant And Equipment Hire	$25,949.00
EFT182412	27/02/2025	AUSSIE BROADBAND LIMITED	Internet Charges	$338.00
EFT182155	20/02/2025	AUSSIE MEDIA	Advertising	$495.00
EFT182036	20/02/2025	AUSTRALIA POST	Postage	$4,414.19
EFT182037	20/02/2025	AUSTRALIAN INSTITUTE OF MANAGEMENT WESTERN AUSTRALIA	Training	$1,941.00
EFT182026	20/02/2025	AUSTRALIAN LIBRARY AND INFORMATION ASSOCIATION LTD	Membership Fees / Training	$1,310.00
EFT182444	06/03/2025	AUSTRALIAN LIBRARY AND INFORMATION ASSOCIATION LTD	Membership Fees / Training	$550.00
EFT182030	20/02/2025	AUSTRALIAN PARKING & REVENUE CONTROL PTY LTD T/A APARC	Parking Subscription / Credit Card Fees	$315.75
EFT182616	13/03/2025	AUSTRALIAN PARKING & REVENUE CONTROL PTY LTD T/A APARC	Parking Subscription / Credit Card Fees	$309.99
EFT182260	27/02/2025	AUSTRALIAN SERVICES UNION WA BRANCH	Payroll Deductions	$1,068.50
EFT182622	13/03/2025	AUSTRALIAN SERVICES UNION WA BRANCH	Payroll Deductions	$1,068.50
EFT182259	27/02/2025	AUSTRALIAN TAXATION OFFICE	Payroll Deductions	$250,270.51
EFT182621	13/03/2025	AUSTRALIAN TAXATION OFFICE	Payroll Deductions	$261,663.75
EFT182454	06/03/2025	AUSTRALIA'S SOUTH WEST INCORPORATED	Monthly Mentoring Sessions	$330.00
EFT182455	06/03/2025	AVIATION ID AUSTRALIA	ASIC Card Fees	$924.00
EFT182039	20/02/2025	BAKERS FOOD & FUEL	Catering - Bushfire Event	$15.00
EFT182261	27/02/2025	BAKERS FOOD & FUEL	Catering - Bushfire Event	$1,763.36
EFT182297	27/02/2025	B DUNCAN	Refund	$150.00
EFT182459	06/03/2025	BEST OFFICE SYSTEMS	Photocopier Charges C21016	$4,560.00
EFT182041	20/02/2025	BETTER WORLD ARTS PTY LTD	Stock Items - Forts Store	$676.94
EFT182042	20/02/2025	BIBBULMUN TRACK FOUNDATION	Stock Items - Visitor Centre	$303.95
EFT182044	20/02/2025	BLACK AND WHITE CONCRETING	Footpath Repairs C22017(C)	$2,600.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182263	27/02/2025	BLACK AND WHITE CONCRETING	Footpath Repairs C22017(C)	$8,608.00
EFT182460	06/03/2025	BLACK AND WHITE CONCRETING	Footpath Repairs C22017(C)	$26,104.00
EFT182265	27/02/2025	BLACKBOY HILL FARMS	Pontoon Repairs	$1,033.56
EFT182266	27/02/2025	BLOOMIN FLOWERS SPENCER PARK	Floral Arrangements	$75.00
EFT182050	20/02/2025	BLUE SKY RENEWABLES PTY LTD	Thermal Energy Supply	$25,073.19
EFT182054	20/02/2025	BLUE VANE SCOREBOARDS PTY LTD	Repairs And Maintenance	$726.00
EFT182046	20/02/2025	BLUECOAST CONSULTING ENGINEERS PTY LTD	Construction Services Q23059	$33,939.48
EFT182627	13/03/2025	BLUECOAST CONSULTING ENGINEERS PTY LTD	Construction Services Q23059	$21,764.80
EFT182267	27/02/2025	BOC GASES AUSTRALIA LIMITED	Gas Bottle Charges	$115.07
EFT182628	13/03/2025	BOC GASES AUSTRALIA LIMITED	Gas Bottle Charges	$103.92
EFT182047	20/02/2025	BOOKEASY	Bookeasy Booking Fees	$1,084.30
EFT182464	06/03/2025	BP BIRD PLUMBING & GAS PTY LTD	Plant Parts And Repairs	$143.00
EFT182703	13/03/2025	BRAYDEN JOHN PARKER	Lawn Mowing Services	$250.00
EFT182466	06/03/2025	BRIEF INTERVENTION COUNSELLING	EAP Services	$319.00
EFT182630	13/03/2025	BRIEF INTERVENTION COUNSELLING	EAP Services	$319.00
EFT182468	06/03/2025	BROOKS HEAVY TRANSPORT SERVICE PTY LTD	Plant And Equipment Hire	$968.00
EFT182049	20/02/2025	BROOKS HIRE SERVICE PTY LTD	Plant And Equipment Hire	$2,997.19
EFT182268	27/02/2025	BROOKS HIRE SERVICE PTY LTD	Plant And Equipment Hire	$11,047.18
EFT182467	06/03/2025	BROOKS HIRE SERVICE PTY LTD	Plant And Equipment Hire	$52.24
EFT182469	06/03/2025	B LONIE	Rates Refund	$850.76
EFT182684	13/03/2025	BUCHER MUNICIPAL PTY LTD	Plant Parts And Repairs	$1,674.63
EFT182051	20/02/2025	BUILDING AND CONSTRUCTION INDUSTRY TRAINING BOARD	BCITF Levy	$351.75
EFT182471	06/03/2025	BULLSEYE PLUMBING & GAS	Drain Cleaning Services Q23045	$9,570.00
EFT182052	20/02/2025	BUNNINGS GROUP LIMITED	Hardware Supplies / Tools	$64.33
EFT182270	27/02/2025	BUNNINGS GROUP LIMITED	Hardware Supplies / Tools	$118.85
EFT182472	06/03/2025	BUNNINGS GROUP LIMITED	Hardware Supplies / Tools	$409.56
EFT182632	13/03/2025	BUNNINGS GROUP LIMITED	Hardware Supplies / Tools	$1,584.27
EFT182055	20/02/2025	C & C MACHINERY CENTRE	Plant Parts And Repairs	$1,134.08
EFT182271	27/02/2025	C & C MACHINERY CENTRE	Plant Parts And Repairs	$264.62

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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182633	13/03/2025	C & C MACHINERY CENTRE	Plant Parts And Repairs	$880.01
EFT182634	13/03/2025	CABCHARGE PAYMENTS PTY LTD	Taxi Fares	$127.06
EFT182478	06/03/2025	C CROSBY	Refund	$100.00
EFT182382	27/02/2025	CHILD CARE EDUCATOR ASSISTANT	Staff Reimbursement	$87.00
EFT182272	27/02/2025	CALIBRE CARE	Vegetation Management Equipment	$697.00
EFT182474	06/03/2025	CAMLYN SPRINGS	Water Refills	$580.00
EFT182060	20/02/2025	CENTENNIAL STADIUM INC	Utility Charges	$87.93
EFT182276	27/02/2025	CENTENNIAL STADIUM INC	Utility Charges	$309.97
EFT182639	13/03/2025	CENTENNIAL STADIUM INC	Utility Charges	$363.02
EFT182059	20/02/2025	CENTIGRADE SERVICES PTY LTD	Plant Maintenance Services C24018	$3,225.47
EFT182275	27/02/2025	CENTIGRADE SERVICES PTY LTD	Plant Maintenance Services C24018	$4,620.13
EFT182638	13/03/2025	CENTIGRADE SERVICES PTY LTD	Plant Maintenance Services C24018	$4,618.49
EFT182277	27/02/2025	CFMEU CONSTRUCTION & GENERAL DIVISION	Payroll Deductions	$30.00
EFT182640	13/03/2025	CFMEU CONSTRUCTION & GENERAL DIVISION	Payroll Deductions	$30.00
EFT182076	20/02/2025	CGS QUALITY CLEANING	Cleaning Services C23016	$32,144.83
EFT182294	27/02/2025	CGS QUALITY CLEANING	Cleaning Services C23016	$9,289.80
EFT182652	13/03/2025	CGS QUALITY CLEANING	Cleaning Services C23016	$417.32
EFT182061	20/02/2025	CHANDLER MACLEOD GROUP LIMITED	Consultancy Services	$654.50
EFT182062	20/02/2025	CHARIOT EARTHWORKS	Earthworks - Sand Removal	$360.00
EFT182278	27/02/2025	CHILD SUPPORT AGENCY	Payroll Deductions	$1,957.67
EFT182641	13/03/2025	CHILD SUPPORT AGENCY	Payroll Deductions	$1,957.67
EFT182477	06/03/2025	CINEFEST OZ	Sponsorship Payment	$19,250.00
EFT182063	20/02/2025	CIVIL SURVEY SOLUTIONS	Software Maintenance	$2,310.00
EFT182279	27/02/2025	CLEANAWAY PTY LIMITED	Waste Disposal Services P14021	$6,308.59
EFT182420	27/02/2025	CLEANAWAY PTY LIMITED	Waste Disposal Services P14021	$492,636.86
EFT182642	13/03/2025	CLEANAWAY PTY LIMITED	Waste Disposal Services P14021	$1,499.82
EFT182705	13/03/2025	CLEANFLOW ENVIRONMENTAL SOLUTIONS - PERTH PRESSURE JET SERVICES PTY LTD	Drainage Maintenance Services PSP009-009	$8,800.00
EFT182280	27/02/2025	CMM TECHNOLOGY	Calibration Services	$467.50

CITY OF ALBANY
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182067	20/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Groceries	$219.33
EFT182281	27/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Groceries	$23.00
EFT182479	06/03/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Groceries	$85.30
EFT182643	13/03/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Groceries	$7.35
EFT182289	27/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD (ONLINE ONLY)	Groceries	$114.00
EFT182162	20/02/2025	COLIN JOHN MONTEFIORE	Workshop Delivery	$420.00
EFT182644	13/03/2025	COMMON GROUND TRAILS PTY LTD	Consultancy Services	$5,328.40
EFT182282	27/02/2025	COMMUNITY ARTS NETWORK WA INC	Event Services	$18,425.00
EFT182647	13/03/2025	COMMUNITY RESOURCES LTD (SOFT LANDING)	Recycling Services Q24026	$6,058.12
EFT182476	06/03/2025	CORRS CHAMBERS WESTGARTH	Legal Fees	$42,640.68
EFT182344	27/02/2025	CRAIG MCKINLEY	Councillor Allowance	$3,152.34
EFT182071	20/02/2025	CREATIONS HOMES PTY LTD	Construction Services C23024	$26,190.11
EFT182287	27/02/2025	CREATIONS HOMES PTY LTD	Construction Services C23024	$1,314.28
EFT182646	13/03/2025	CREATIONS HOMES PTY LTD	Construction Services C23024	$13,588.14
EFT182070	20/02/2025	CREATIVE ALBANY INCORPORATED	Community Sponsorship - 2026 Project	$25,000.00
EFT182286	27/02/2025	CREATIVE ALBANY INCORPORATED	Community Sponsorship - 2026 Project	$25,000.00
EFT182482	06/03/2025	CREATIVE ALBANY INCORPORATED	Community Sponsorship - 2026 Project	$22,500.00
EFT182481	06/03/2025	CREATIVE PLAY PTY LTD	Purchase Of Puppets	$450.00
EFT182483	06/03/2025	CRUMPS CANVAS	Canvas Supply	$730.00
EFT182073	20/02/2025	D & K ENGINEERING	Plant Parts And Repairs	$2,552.00
EFT182485	06/03/2025	D & K ENGINEERING	Plant Parts And Repairs	$2,124.00
EFT182649	13/03/2025	D & K ENGINEERING	Plant Parts And Repairs	$533.50
EFT182445	06/03/2025	DA CHRISTIE PTY LTD	Hardware Supplies / Tools	$1,228.70
EFT182615	13/03/2025	DAMON ANNISON	Stock Items - Forts Store	$509.46
EFT182480	06/03/2025	D COTTON	Rates Refund	$853.60
EFT182486	06/03/2025	DATA #3 LIMITED	Subscription Fee	$3,972.66
EFT182074	20/02/2025	DATACOM SOLUTIONS (AU) PTY LTD	Implementation / Subscription Costs C23007	$23,162.70
EFT182293	27/02/2025	DATACOM SOLUTIONS (AU) PTY LTD	Implementation / Subscription Costs C23007	$6,600.00
EFT182487	06/03/2025	DATACOM SOLUTIONS (AU) PTY LTD	Implementation / Subscription Costs C23007	$18,975.00

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LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182529	06/03/2025	DAVID EDWARD CHARLES MCCRACKEN	Supply And Installation Of Blinds	$1,540.00
EFT182333	27/02/2025	DAVID LEECH	Stock Items - Forts Store	$240.00
EFT182391	27/02/2025	CURATOR PRINCESS ROYAL FORTRESS	Staff Reimbursement	$26.15
EFT182650	13/03/2025	DAVRIC AUSTRALIA	Stock Items - Visitor Centre	$2,855.27
EFT182220	20/02/2025	MANAGER PEOPLE AND CULTURE	Staff Reimbursement	$82.01
EFT182285	27/02/2025	DELMA BAESJOU	Councillor Allowance	$3,152.34
EFT182009	20/02/2025	DELTA AGRIBUSINESS PTY LTD T/AS WELLSTEAD RURAL SERVICES	Fuel / Garden Supplies	$244.65
EFT182242	27/02/2025	DELTA AGRIBUSINESS PTY LTD T/AS WELLSTEAD RURAL SERVICES	Fuel / Garden Supplies	$358.72
EFT182175	20/02/2025	DELTA AGRIBUSINESS T/A PETER GRAHAM CO	Fuel / Garden Supplies	$250.00
EFT182358	27/02/2025	DELTA AGRIBUSINESS T/A PETER GRAHAM CO	Fuel / Garden Supplies	$2,145.00
EFT182736	13/03/2025	DENMARK TRAFFIC PTY LTD	Traffic Management C24015(A)	$9,723.29
EFT182078	20/02/2025	DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS (FORMERLY DEPT OF PARKS & WILDLIFE)	Park Pass Resales	$4,770.00
EFT182654	13/03/2025	DEPARTMENT OF BIODIVERSITY CONSERVATION AND ATTRACTIONS (FORMERLY DEPT OF PARKS & WILDLIFE)	Park Pass Resales	$3,464.20
EFT181997	17/02/2025	DEPARTMENT OF JUSTICE - FINES ENFORCEMENT	Court Fees	$1,329.60
EFT182422	28/02/2025	DEPARTMENT OF JUSTICE - FINES ENFORCEMENT	Court Fees	$8,059.30
EFT182424	28/02/2025	DEPARTMENT OF JUSTICE - FINES ENFORCEMENT	Court Fees	$567.00
EFT182196	20/02/2025	DEPARTMENT OF THE PREMIER & CABINET - STATE LAW PUBLISHER	Advertising	$175.89
EFT182079	20/02/2025	DEPARTMENT OF TRANSPORT - MARINE SAFETY	Jetty Renewal Fee	$46.45
EFT182742	13/03/2025	DEPARTMENT OF WATER AND ENVIRONMENTAL REGULATION	License Fees	$13,484.98
EFT182533	06/03/2025	DIANA LOUISE MILLER	Stock Items - Visitor Centre	$360.00
EFT182655	13/03/2025	DISCOVERY BAY TOURISM PRECINCT LTD	Event Services	$27,418.60
EFT182488	06/03/2025	DJL ELECTRICAL CONTRACTING	Testing And Tagging Services Q21057	$1,386.66
EFT182656	13/03/2025	DJL ELECTRICAL CONTRACTING	Testing And Tagging Services Q21057	$160.60
EFT182296	27/02/2025	DTH CIVIL	Building Maintenance Services	$3,387.19

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182489	06/03/2025	DTH CIVIL	Building Maintenance Services	$440.13
EFT182490	06/03/2025	DYNAMIC GIFT INTERNATIONAL PTY LTD	Branded Merchandise	$738.10
EFT182081	20/02/2025	EARLY BIRD LANDSCAPING	Paving Repair Services Q24069	$3,542.00
EFT182657	13/03/2025	EARLY BIRD LANDSCAPING	Paving Repair Services Q24069	$1,144.00
EFT182298	27/02/2025	EASI PACKAGING PTY LTD	Payroll Deductions	$12,371.95
EFT182658	13/03/2025	EASI PACKAGING PTY LTD	Payroll Deductions	$12,371.95
EFT182082	20/02/2025	ECOSCAPE AUSTRALIA PTY LTD	Frenchman Bay Management Plan Q24011	$646.25
EFT182659	13/03/2025	EDITH COWAN UNIVERSITY (ECU)	Tuition Fees	$4,617.75
EFT182572	06/03/2025	E TAYLOR	Rates Refund	$850.76
EFT182083	20/02/2025	ELITE STEEL FABRICATION	Plant Parts And Repairs	$506.00
EFT182491	06/03/2025	ESRI AUSTRALIA PTY LTD	Subscription Payment P21040	$561.87
EFT182557	06/03/2025	E SCHLAGER	Rates Refund	$157.47
EFT182085	20/02/2025	E-STRALIAN PTY LTD T/A SPARQUE	Weekly E-Bike Leasing	$494.02
EFT182492	06/03/2025	E-STRALIAN PTY LTD T/A SPARQUE	Weekly E-Bike Leasing	$494.02
EFT182493	06/03/2025	EVERTRANS	Vehicle Parts / Maintenance	$847.00
EFT182087	20/02/2025	EXECUTIVE MEDIA PTY LTD	Advertising Fee	$1,850.00
EFT182088	20/02/2025	EYERITE SIGNS	Signage	$497.45
EFT182299	27/02/2025	EYERITE SIGNS	Signage	$975.70
EFT182495	06/03/2025	F E TECHNOLOGIES PTY LTD	Annual Maintenance Fee	$15,552.35
EFT182494	06/03/2025	FARMERS CENTRE (1978) PTY LTD	Plant Parts And Repairs	$245.11
EFT182066	20/02/2025	ADMINISTRATION OFFICER	Staff Reimbursement	$11.99
EFT182302	27/02/2025	FIRE AND SAFETY SUPPLIES WA	Uniforms / PPE	$8,024.89
EFT182090	20/02/2025	FIRST NATIONAL BAIRSTOW KERR	Rental Charges	$285.00
EFT182091	20/02/2025	FLEET NETWORK	Novated Lease And Associated Costs	$1,020.31
EFT182496	06/03/2025	FLEET NETWORK	Novated Lease And Associated Costs	$1,020.31
EFT182300	27/02/2025	FLIPS ELECTRICS	Electrical Services	$3,289.00
EFT182301	27/02/2025	FORM BUILDING A STATE OF CREATIVITY INC.	Event Services - 2026 Project	$287,650.00
EFT182092	20/02/2025	FOXTEL MANAGEMENT PTY LTD	Foxtel Subscription	$235.00
EFT182497	06/03/2025	FOXTEL MANAGEMENT PTY LTD	Foxtel Subscription	$235.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182094	20/02/2025	FREESTYLE NOW	Workshop Presentation	$3,300.00
EFT182093	20/02/2025	FREMANTLE ARTS CENTRE PRESS	Stock Items - Forts Store	$1,737.95
EFT182706	13/03/2025	FULTON HOGAN INDUSTRIES	Road Maintenance Services C23018	$69,314.81
EFT182095	20/02/2025	FVS FIRE PTY LTD	Fire Safety Services / Supplies Q24019	$302.50
EFT182498	06/03/2025	FVS FIRE PTY LTD	Fire Safety Services / Supplies Q24019	$46.59
EFT182663	13/03/2025	FVS FIRE PTY LTD	Fire Safety Services / Supplies Q24019	$5,622.10
EFT182551	06/03/2025	G & J RAVENHILL	Rates Refund	$151.09
EFT182718	13/03/2025	G & L SHEETMETAL	Building Maintenance Materials	$178.10
EFT182306	27/02/2025	G & M DETERGENTS & HYGIENE SERVICES ALBANY	Hygiene Services Q22034	$2,266.14
EFT182499	06/03/2025	G & M DETERGENTS & HYGIENE SERVICES ALBANY	Hygiene Services Q22034	$119.40
EFT182665	13/03/2025	G & M DETERGENTS & HYGIENE SERVICES ALBANY	Hygiene Services Q22034	$3,138.40
EFT182080	20/02/2025	G DOUGLAS	Rates Refund	$1,155.80
EFT182097	20/02/2025	GET GRAZING CO	Catering Services	$150.00
EFT182506	06/03/2025	GHD PTY LTD	Design Services PSP002-012 & Landfill Monitoring Services Q23018	$10,412.27
EFT182305	27/02/2025	GLASS SUPPLIERS	Repairs / Maintenance	$55.00
EFT182098	20/02/2025	GLENN'S HEAVY RECOVERY & TOWING	Plant And Equipment Hire	$4,345.00
EFT182099	20/02/2025	GLOBAL EDGE TRUST (GRAHAM EARNSHAW PHOTOGRAPHY)	Photography Services	$553.96
EFT182664	13/03/2025	GLOBAL MARINE ENCLOSURES PTY LTD	Maintenance Services Q24074	$7,062.00
EFT182109	20/02/2025	GOOD SAMARITAN INDUSTRIES TRADING AS GOOD SAMMY ENTERPRISES	Donations	$80.00
EFT182102	20/02/2025	GRACE TRAINING AND OPERATIONS	Staff Training	$1,612.50
EFT182107	20/02/2025	GREAT SOUTHERN FARM SERVICE	Plant Parts And Repairs Fire Equipment	$15,216.39
EFT182504	06/03/2025	GREAT SOUTHERN FARM SERVICE	Plant Parts And Repairs Fire Equipment	$303.60
EFT182669	13/03/2025	GREAT SOUTHERN FARM SERVICE	Plant Parts And Repairs Fire Equipment	$756.25
EFT182502	06/03/2025	GREAT SOUTHERN FUELS	Fuel Supplies	$2,851.20
EFT182108	20/02/2025	GREAT SOUTHERN GROVES PTY LTD	Stock Items - Visitor Centre	$658.05
EFT182501	06/03/2025	GREAT SOUTHERN PEST & WEED CONTROL / ALBANY PEST & WEED CONTROL	Pest Management Services	$3,022.88

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182105	20/02/2025	GREAT SOUTHERN SUPPLIES	Cleaning / Hygiene Supplies	$757.80
EFT182310	27/02/2025	GREAT SOUTHERN SUPPLIES	Cleaning / Hygiene Supplies	$2,258.45
EFT182503	06/03/2025	GREAT SOUTHERN SUPPLIES	Cleaning / Hygiene Supplies	$321.10
EFT182666	13/03/2025	GREAT SOUTHERN SUPPLIES	Cleaning / Hygiene Supplies	$10,556.40
EFT182262	27/02/2025	GREAT SOUTHERN TREE CARE PTY LTD	Vegetation Maintenance Services	$4,925.00
EFT182456	06/03/2025	GREAT SOUTHERN TREE CARE PTY LTD	Vegetation Maintenance Services	$7,050.00
EFT182106	20/02/2025	GREEN MAN MEDIA PRODUCTIONS	Advertising	$160.00
EFT182104	20/02/2025	GREEN SKILLS INCORPORATED	Vegetation Management Services C24011(D)	$47,685.00
EFT182309	27/02/2025	GREEN SKILLS INCORPORATED	Vegetation Management Services C24011(D)	$5,462.66
EFT182384	27/02/2025	GREGORY BRIAN STOCKS	Mayoral Allowance	$12,673.09
EFT182505	06/03/2025	GTR PUBLISHING T/AS THE LAST POST	Advertising	$1,089.00
EFT182065	20/02/2025	GULL ROCK CONSTRUCTIONS	Construction Services Q24002(D)	$7,942.00
EFT182111	20/02/2025	GYMCARE	Gym Equipment	$552.45
EFT182121	20/02/2025	H+H ARCHITECTS	Consultancy Services	$407.70
EFT182673	13/03/2025	H+H ARCHITECTS	Consultancy Services	$3,788.40
EFT182112	20/02/2025	HANDASYDES	Catering Services	$330.00
EFT182113	20/02/2025	HART SPORT	Sporting Equipment	$347.88
EFT182314	27/02/2025	HART SPORT	Sporting Equipment	$381.00
EFT182670	13/03/2025	HART SPORT	Sporting Equipment	$403.01
EFT182470	06/03/2025	HEAD TO TAIL PETS	Animal Management Supplies	$95.96
EFT182115	20/02/2025	HEMA MAPS PTY LTD	Stock Items - Visitor Centre	$576.89
EFT182315	27/02/2025	HERON CONSTRUCTION	Construction Services C24005	$423,613.23
EFT182123	20/02/2025	HHG LEGAL GROUP	Legal Fees	$3,548.60
EFT182508	06/03/2025	HHG LEGAL GROUP	Legal Fees	$258.50
EFT182316	27/02/2025	HIGHWAY WRECKERS	Towing Services	$440.00
EFT182116	20/02/2025	HIMAC ATTACHMENTS	Hardware Supplies / Tools	$1,041.48
EFT182671	13/03/2025	HIMAC ATTACHMENTS	Hardware Supplies / Tools	$3,026.72
EFT182117	20/02/2025	HITCHCOCK PANEL BEATERS	Vehicle Parts / Maintenance	$330.00
EFT182118	20/02/2025	HOBBS PAINTING AND DECORATING	Painting Services	$7,276.50

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182122	20/02/2025	HOPE TRAILS PSYCHOLOGY	EAP Services	$180.00
EFT182318	27/02/2025	HOPE TRAILS PSYCHOLOGY	EAP Services	$180.00
EFT182124	20/02/2025	HUMANFORCE	Implementation Costs Q24039	$12,788.83
EFT182319	27/02/2025	ICKY FINKS WAREHOUSE SALES	Office Supplies	$77.20
EFT182126	20/02/2025	ICS GROUP AUTO ELECTRICAL & AIR CONDITIONING PTY LTD	Plant Parts And Repairs	$413.05
EFT182129	20/02/2025	IMPACT SERVICES PTY LTD	Casual Labour / Apprentices	$4,608.46
EFT182320	27/02/2025	IMPACT SERVICES PTY LTD	Casual Labour / Apprentices	$2,538.32
EFT182510	06/03/2025	IMPACT SERVICES PTY LTD	Casual Labour / Apprentices	$2,398.84
EFT182674	13/03/2025	IMPACT SERVICES PTY LTD	Casual Labour / Apprentices	$4,770.54
EFT182509	06/03/2025	IMPULSE CYCLES	Plant Parts And Repairs	$199.90
EFT182125	20/02/2025	INDUSTRIAL AUTOMATION	Plant Parts And Repairs	$1,183.60
EFT182511	06/03/2025	INOVAAIR AUSTRALIA PTY LTD	Filtration Supplies	$200.00
EFT182132	20/02/2025	INSTANT RACKING	Hardware Supplies / Tools	$879.00
EFT182321	27/02/2025	INSTANT RACKING	Hardware Supplies / Tools	$7,075.00
EFT182131	20/02/2025	INSTITUTE OF PUBLIC WORKS ENGINEERING AUST LTD	Fleet Management Certificate	$1,732.50
EFT182322	27/02/2025	INTANDEM	Stock Items - Forts Store	$687.50
EFT182323	27/02/2025	INTREPID MINDS PTY LTD	Registration Fees	$2,084.50
EFT182057	20/02/2025	J & S CASTLEHOW ELECTRICAL SERVICES	Electrical Services C22021, C23011, Q22035	$14,537.43
EFT182274	27/02/2025	J & S CASTLEHOW ELECTRICAL SERVICES	Electrical Services C22021, C23011	$6,645.23
EFT182475	06/03/2025	J & S CASTLEHOW ELECTRICAL SERVICES	Electrical Services C22021, C23011, Q24048	$38,419.28
EFT182637	13/03/2025	J & S CASTLEHOW ELECTRICAL SERVICES	Electrical Services C22021, C23011, Q22033	$15,417.20
EFT182045	20/02/2025	J. BLACKWOOD & SON PTY LTD	Hardware Supplies / Tools	$22.53
EFT182264	27/02/2025	J. BLACKWOOD & SON PTY LTD	Hardware Supplies / Tools	$392.96
EFT182461	06/03/2025	J. BLACKWOOD & SON PTY LTD	Hardware Supplies / Tools	$231.92
EFT182626	13/03/2025	J. BLACKWOOD & SON PTY LTD	Hardware Supplies / Tools	$1,455.54
EFT182462	06/03/2025	J & M BLUNSDEN	Rates Refund	$859.27
EFT182556	06/03/2025	JAMIE SHANE SCALLY	Performance Fees	$195.00
EFT182206	20/02/2025	CHILD CARE EDUCATOR TEAM LEADER	Staff Reimbursement	$87.00
EFT182134	20/02/2025	JCA CONTRACTING SERVICES	Construction Services	$1,352.00

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LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182325	27/02/2025	JENNY FEAST PHOTOGRAPHY	Photography Services	$1,122.30
EFT182624	13/03/2025	JHODI BENNETT	Stock Items - Box Office	$50.00
EFT182064	20/02/2025	JILLIAN IRIS CLARKE	Book Publication	$80.00
EFT182137	20/02/2025	JO JOES DIAL A PIZZA AND KEBAB	Catering Services	$94.50
EFT182136	20/02/2025	JOHN KINNEAR AND ASSOCIATES	Surveying Services	$385.00
EFT182326	27/02/2025	JOHN KINNEAR AND ASSOCIATES	Surveying Services	$165.00
EFT182232	20/02/2025	JON WOOLF	Animal Collection Services Q23033	$425.00
EFT182415	27/02/2025	JON WOOLF	Animal Collection Services Q23033	$425.00
EFT182589	06/03/2025	JON WOOLF	Animal Collection Services Q23033	$425.00
EFT182292	27/02/2025	J DALLIMORE	Rates Refund	$322.00
EFT182559	06/03/2025	J SHARPE	Rates Refund	$900.00
EFT182084	20/02/2025	J ENGLISH	Rates Refund	$731.11
EFT182211	20/02/2025	JULIE TULIP	Workshop Facilitation	$280.00
EFT182138	20/02/2025	JUST SEW EMBROIDERY	Uniforms / PPE	$4,774.05
EFT182327	27/02/2025	JUST SEW EMBROIDERY	Uniforms / PPE	$2,231.35
EFT182513	06/03/2025	JUST SEW EMBROIDERY	Uniforms / PPE	$909.15
EFT182676	13/03/2025	JUST SEW EMBROIDERY	Uniforms / PPE	$2,108.85
EFT182096	20/02/2025	JUSTINE GAMBLIN	Artwork Sales	$80.40
EFT182677	13/03/2025	KALGAN QUEEN SCENIC CRUISES	REZDY Tour Sales	$2,299.25
EFT182328	27/02/2025	KALGAN SETTLERS ASSOCIATION	Community Hall Grant	$5,500.00
EFT182343	27/02/2025	K CORRIGAN	Refund	$110.00
EFT182457	06/03/2025	K BAYLISS	Rates Refund	$424.92
EFT182120	20/02/2025	LIBRARIAN ADULT AND COMMUNITY SERVICES	Staff Reimbursement	$28.49
EFT182375	27/02/2025	K SHEKELL	Refund	$15.04
EFT182139	20/02/2025	KEILOR CONTRACTING PTY LTD	Plant And Equipment Hire	$4,763.00
EFT182329	27/02/2025	KENNARDS HIRE PTY LTD	Plant And Equipment Hire	$459.00
EFT182678	13/03/2025	KENNARDS HIRE PTY LTD	Plant And Equipment Hire	$1,439.00
EFT182515	06/03/2025	KIM ANGELA TOMLINSON	EAP Services	$209.00
EFT182516	06/03/2025	KING RIVER RECREATIONAL CLUB INC	Community Sponsorship Milestone 1	$3,080.00

CITY OF ALBANY
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182140	20/02/2025	KLB SYSTEMS T/A TURN 7 MEDIA	IT Equipment / Services	$1,435.50
EFT182331	27/02/2025	KLB SYSTEMS T/A TURN 7 MEDIA	IT Equipment / Services	$379.50
EFT182141	20/02/2025	KMART ALBANY	Sporting / Daycare / Stationery / Office Supplies	$47.00
EFT182332	27/02/2025	KMART ALBANY	Sporting / Daycare / Stationery / Office Supplies	$228.00
EFT182517	06/03/2025	KMART ALBANY	Sporting / Daycare / Stationery / Office Supplies	$202.25
EFT182142	20/02/2025	KW SERVICES WA PTY LTD	Plant Parts / Repair	$1,065.74
EFT182679	13/03/2025	LA BOTANIC	Floral Arrangements	$140.00
EFT182520	06/03/2025	LAMINGTON DESIGN LTD (LAFITTE)	Stock Items - Visitor Centre	$502.93
EFT182077	20/02/2025	LANDGATE	Interim Valuations	$4,521.51
EFT182295	27/02/2025	LANDGATE	Interim Valuations	$189.60
EFT182653	13/03/2025	LANDGATE	Interim Valuations	$235.90
EFT182304	27/02/2025	L GILLETT	Refund	$245.00
EFT182143	20/02/2025	LGC TRAFFIC MANAGEMENT	Traffic Management C24015(B)	$12,972.88
EFT182334	27/02/2025	LGC TRAFFIC MANAGEMENT	Traffic Management C24015(B)	$26,121.66
EFT182521	06/03/2025	LGC TRAFFIC MANAGEMENT	Traffic Management C24015(B)	$34,843.97
EFT182680	13/03/2025	LGC TRAFFIC MANAGEMENT	Traffic Management C24015(B)	$14,066.35
EFT182522	06/03/2025	LIGHT APPLICATION PTY LTD	Service Fees	$2,508.00
EFT182086	20/02/2025	LINLEY RAE EWEN	Stock Items - Box Office	$40.72
EFT182660	13/03/2025	LINLEY RAE EWEN	Stock Items - Box Office	$9.00
EFT182550	06/03/2025	L RACKSTRAW	Waterwise Verge Rebate	$400.00
EFT182127	20/02/2025	LIZ TURNBULL	Artwork Sales	$29.09
EFT182145	20/02/2025	LOCAL GOVERNMENT PROFESSIONALS AUSTRALIA WA	Conference Fees	$3,190.00
EFT182336	27/02/2025	LOCHNESS LANDSCAPE SERVICES	Vegetation Management Services C22009	$2,479.99
EFT182682	13/03/2025	LOCHNESS LANDSCAPE SERVICES	Vegetation Management Services C22009	$18,893.98
EFT182523	06/03/2025	TECHNICIAN SERVICES COORDINATOR	Staff Reimbursement	$81.25
EFT182702	13/03/2025	LUTZ AND SALLY PAMBERGER	EAP Services	$748.00
EFT182339	27/02/2025	LYNN MACLAREN	Councillor Allowance	$3,152.34
EFT182337	27/02/2025	M AND B SALES PTY LTD	Construction Materials	$1,191.44
EFT182524	06/03/2025	M AND B SALES PTY LTD	Construction Materials	$45.76

CITY OF ALBANY
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182683	13/03/2025	M AND B SALES PTY LTD	Construction Materials	$193.88
EFT182202	20/02/2025	CHILD CARE EDUCATOR ASSISTANT	Staff Reimbursement	$87.00
EFT182218	20/02/2025	RISK MANAGEMENT/INSURANCE OFFICER	Staff Reimbursement	$37.57
EFT182526	06/03/2025	MAIN ROADS GREAT SOUTHERN REGION	Rates Refund	$431.07
EFT182527	06/03/2025	MAJOR MOTORS PTY LTD	Vehicle Parts / Maintenance	$93.16
EFT182148	20/02/2025	MALCOLM TRAILL	Community Event Funding	$2,920.00
EFT182284	27/02/2025	MALCOLM TRAILL	Councillor Allowance	$3,152.34
EFT182168	20/02/2025	MANLEY AUTOMOTIVES PTY LTD (NOVUS AUTO GLASS REPAIRS)	Vehicle Parts / Maintenance	$680.00
EFT182696	13/03/2025	MANLEY AUTOMOTIVES PTY LTD (NOVUS AUTO GLASS REPAIRS)	Vehicle Parts / Maintenance	$1,310.00
EFT182342	27/02/2025	MARIAN'S CATERING	Catering Services	$1,400.00
EFT182335	27/02/2025	MARIO LIONETTI	Councillor Allowance	$3,152.34
EFT182687	13/03/2025	MARSH PTY LTD	Professional Services	$2,832.50
EFT182341	27/02/2025	MARSHALL MOWERS	Vehicle Parts / Maintenance	$1,752.80
EFT182548	06/03/2025	MASTERS PSYCHOLOGY	EAP Services	$1,320.00
EFT182534	06/03/2025	MATT MCVEIGH DESIGN	Performance Fees	$500.00
EFT182458	06/03/2025	MATTHEW JAMES BEAMISH	Graphic Design Services	$300.00
EFT182623	13/03/2025	MATTHEW JAMES BEAMISH	Graphic Design Services	$350.00
EFT182151	20/02/2025	MAXCO AUSTRALIA PTY LTD	AV Equipment Q24055	$45,348.69
EFT182152	20/02/2025	MCINTOSH AND SON	Plant Parts And Repairs	$128.19
EFT182345	27/02/2025	MCLEODS LAWYERS PTY LTD	Legal Fees	$1,292.88
EFT182156	20/02/2025	MEGA MUSIC	IT Equipment / Services	$79.90
EFT182075	20/02/2025	MELISSA ANN DAW	Stock Items - Box Office	$25.00
EFT182651	13/03/2025	MELISSA ANN DAW	Stock Items - Box Office	$25.00
EFT182157	20/02/2025	MENTAL MEDIA PTY LTD	Podcatcher Fees	$48,324.27
EFT182160	20/02/2025	METROCOUNT PTY LTD	Traffic Counter Equipment	$988.90
EFT182690	13/03/2025	METROCOUNT PTY LTD	Traffic Counter Equipment	$11,396.00
EFT182531	06/03/2025	METROLL ALBANY	Building Maintenance Supplies	$1,386.67

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182688	13/03/2025	METROLL ALBANY	Building Maintenance Supplies	$144.97
EFT182159	20/02/2025	METTLER-TOLEDO LTD	Plant Parts And Repairs	$4,361.50
EFT182689	13/03/2025	METTLER-TOLEDO LTD	Plant Parts And Repairs	$2,513.50
EFT182154	20/02/2025	M PALANDRI	Refund	$75.35
EFT182541	06/03/2025	MICHAEL JAMES O'DOHERTY	Workshop Delivery	$533.00
EFT182691	13/03/2025	MICRO PRODUCTS AUSTRALIA	Plant Purchases	$775.00
EFT182048	20/02/2025	MILITARY SHOP	Stock Items - Forts Store	$1,957.21
EFT182465	06/03/2025	MILITARY SHOP	Stock Items - Forts Store	$1,856.16
EFT182629	13/03/2025	MILITARY SHOP	Stock Items - Forts Store	$3,986.29
EFT182347	27/02/2025	MINNA ENGINEERING	Clock Repairs	$803.00
EFT182348	27/02/2025	MJB INDUSTRIES PTY LTD	Stock Items - Depot	$17,816.92
EFT182349	27/02/2025	MMI (WA) PTY LTD T/A LIFT DESIGN AND VERTICAL MOTION SYSTEMS	Freight Services Q24045	$561.00
EFT182535	06/03/2025	MODERN TEACHING AIDS PTY LTD	Cleaning / Hygiene Supplies	$412.17
EFT182536	06/03/2025	MORAY & AGNEW LAWYERS	Legal Fees	$984.06
EFT182352	27/02/2025	MULE CREATIVE	Website Development	$3,375.90
EFT182161	20/02/2025	MULTICULTURAL FUTURES INC	Refund	$71.25
EFT182164	20/02/2025	MYVIEW HOLDINGS PTY LTD	Block Supply	$1,100.00
EFT182165	20/02/2025	NATURALISTE CHARTERS	REZDY Tour Sales	$2,704.70
EFT182166	20/02/2025	NEVILLES HARDWARE & BUILDING SUPPLIES	Hardware Supplies / Tools	$34.00
EFT182693	13/03/2025	NEVILLES HARDWARE & BUILDING SUPPLIES	Hardware Supplies / Tools	$269.50
EFT182538	06/03/2025	NEWMAN'S QUALITY CONCRETE PRODUCTS	Concrete Supplies	$20,966.00
EFT182101	20/02/2025	NICHOLAS JOHN GORMAN	Waste Disposal Services	$1,194.60
EFT182307	27/02/2025	NICHOLAS JOHN GORMAN	Waste Disposal Services	$1,194.60
EFT182539	06/03/2025	NORDIC FITNESS EQUIPMENT	Gym Equipment - Replacement	$34.45
EFT182540	06/03/2025	NORTH ROAD SUPA IGA	Catering Supplies	$267.72
EFT182697	13/03/2025	NORTH ROAD SUPA IGA	Catering Supplies	$393.84
EFT182698	13/03/2025	OCTAGON LIFTS PTY LTD	Lift Repair / Maintenance	$357.50
EFT182017	20/02/2025	OFFICE NATIONAL ALBANY	Office Supplies / Stationary Q25007	$1,493.08

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182249	27/02/2025	OFFICE NATIONAL ALBANY	Office Supplies / Stationary Q25007	$875.35
EFT182440	06/03/2025	OFFICE NATIONAL ALBANY	Office Supplies / Stationary Q25007	$1,808.11
EFT182606	13/03/2025	OFFICE NATIONAL ALBANY	Office Supplies / Stationary Q25007	$1,088.93
EFT182169	20/02/2025	OFFICEWORKS SUPERSTORES PTY LTD	Office Supplies / Stationary	$542.14
EFT182542	06/03/2025	OFFICEWORKS SUPERSTORES PTY LTD	Office Supplies / Stationary	$83.93
EFT182354	27/02/2025	O'KEEFE'S PAINTS	Painting Supplies	$1,208.25
EFT182355	27/02/2025	OMNICOM MEDIA GROUP AUSTRALIA PTY LTD	Advertisement	$1,115.72
EFT182170	20/02/2025	ONEMUSIC AUSTRALIA	Licence Fee	$175.00
EFT182014	20/02/2025	OPTEON (ALBANY AND GREAT SOUTHERN WA)	Valuation Services	$2,860.00
EFT182435	06/03/2025	OPTEON (ALBANY AND GREAT SOUTHERN WA)	Valuation Services	$5,885.00
EFT182598	13/03/2025	OPTEON (ALBANY AND GREAT SOUTHERN WA)	Valuation Services	$3,520.00
EFT182699	13/03/2025	ORIGIN ENERGY	LPG Usage	$8,573.13
EFT182700	13/03/2025	ORIKAN NEW ZEALAND LIMITED	Transaction Fee	$22.44
EFT182383	27/02/2025	ORRCON STEEL	Building Maintenance Supplies	$228.14
EFT182566	06/03/2025	ORRCON STEEL	Building Maintenance Supplies	$397.13
EFT182727	13/03/2025	ORRCON STEEL	Building Maintenance Supplies	$73.38
EFT182171	20/02/2025	OVER THE WIRE	Subscription Fee	$49.50
EFT182356	27/02/2025	OVER THE WIRE	Subscription Fee	$49.50
EFT182701	13/03/2025	OVER THE WIRE	Subscription Fee	$49.50
EFT182172	20/02/2025	PALMER EARTHMOVING - PALMER CIVIL CONSTRUCTION	Plant And Equipment Hire C23009(H)	$5,659.20
EFT182357	27/02/2025	PALMER EARTHMOVING - PALMER CIVIL CONSTRUCTION	Plant And Equipment Hire C23009(H)	$11,682.19
EFT182253	27/02/2025	PAPERBARK MERCHANTS	Library Stock Purchase / Newspaper Delivery	$965.09
EFT182153	20/02/2025	CUSTOMER SERVICE OFFICER ALAC	Staff Reimbursement	$87.00
EFT182135	20/02/2025	PATRICK JENNINGS T/A TORNDIRRUPWW	Stock Items - Box Office	$94.56
EFT182173	20/02/2025	PAUL ARMSTRONG PANELBEATERS	Vehicle Parts / Maintenance	$300.00
EFT182390	27/02/2025	PAUL TERRY	Deputy Mayoral Allowance	$5,175.59
EFT182543	06/03/2025	PENROSE PROFESSIONAL LAWNCARE	Lawn Maintenance	$308.00
EFT182361	27/02/2025	PERTH INTERNATIONAL DANCE	Performance Fees	$160.00
EFT182174	20/02/2025	PHOENIX CIVIL & EARTHMOVING PTY LTD	Plant and Equipment Hire C25004(I)	$7,614.20

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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182704	13/03/2025	PHOENIX CIVIL & EARTHMOVING PTY LTD	Plant and Equipment Hire C25004(I)	$34,265.00
EFT181998	20/02/2025	PIVOTEL SATELLITE PTY LIMITED	Spot Tracking / Satellite Phone Charges	$432.00
EFT182425	06/03/2025	PIVOTEL SATELLITE PTY LIMITED	Spot Tracking / Satellite Phone Charges	$742.00
EFT182360	27/02/2025	PLANNING INSTITUTE OF AUSTRALIA T/A PIA	Registration Fee	$360.00
EFT182362	27/02/2025	PLASTICS PLUS	Miscellaneous Supplies	$136.00
EFT182544	06/03/2025	PLASTICS PLUS	Miscellaneous Supplies	$53.90
EFT182707	13/03/2025	PLASTICS PLUS	Miscellaneous Supplies	$167.20
EFT182178	20/02/2025	PRATT TRANSPORT LOGISTICS	Plant And Equipment Hire	$1,930.50
EFT182365	27/02/2025	PRATT TRANSPORT LOGISTICS	Plant And Equipment Hire	$12,201.75
EFT182546	06/03/2025	PRATT TRANSPORT LOGISTICS	Plant And Equipment Hire	$12,078.00
EFT182709	13/03/2025	PRATT TRANSPORT LOGISTICS	Plant And Equipment Hire	$242.00
EFT182359	27/02/2025	PREMIER HOTEL ALBANY	Town Hall Bar Stock	$110.97
EFT182312	27/02/2025	PRIME MEDIA GROUP LTD	Advertisement	$718.30
EFT182547	06/03/2025	PRIMO PROMO PTY LTD	Branded Merchandise	$2,160.40
EFT182364	27/02/2025	PRINT MEDIA GROUP	Printing Services	$405.99
EFT182708	13/03/2025	PSL LEGAL	Legal Fees	$8,415.00
EFT182681	13/03/2025	PULSE SOFTWARE	Implementation Fee	$22,990.00
EFT182128	20/02/2025	QUBE LOGISTICS (WA2) PTY LTD	Freight Services	$3,849.55
EFT182179	20/02/2025	QUICKSTIX CLEANING	Cleaning Services Q24031	$1,432.00
EFT182367	27/02/2025	QUICKSTIX CLEANING	Cleaning Services Q24031	$7,506.00
EFT182549	06/03/2025	QUICKSTIX CLEANING	Cleaning Services Q24031	$1,682.00
EFT182710	13/03/2025	QUICKSTIX CLEANING	Cleaning Services Q24031	$302.00
EFT182366	27/02/2025	QUINTIS SANDALWOOD PTY LTD	Stock Items - Forts Store	$1,220.03
EFT182183	20/02/2025	R & J BATTERIES PTY LTD	Plant Parts And Repairs	$2,387.43
EFT182371	27/02/2025	R & J BATTERIES PTY LTD	Plant Parts And Repairs	$984.15
EFT182553	06/03/2025	R & J BATTERIES PTY LTD	Plant Parts And Repairs	$439.56
EFT182714	13/03/2025	R & J BATTERIES PTY LTD	Plant Parts And Repairs	$1,088.41
EFT182711	13/03/2025	RADICAL FITNESS	Group Fitness Licence	$224.00
EFT182177	20/02/2025	GIS SPECIALIST - ASSETS	Staff Reimbursement	$37.48

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182369	27/02/2025	RED DOT STORE	Arts Supplies	$47.95
EFT182713	13/03/2025	REECE PTY LTD	Building Maintenance Services	$48.08
EFT182180	20/02/2025	REPCO AUTO PARTS	Plant Parts And Repairs	$180.40
EFT182552	06/03/2025	REPLICA MEDALS & RIBBONS PTY LTD	Stock Items - Forts Store	$1,570.53
EFT182370	27/02/2025	R-GROUP INTERNATIONAL	IT Equipment / Services Q24010	$514.71
EFT182184	20/02/2025	RHYS OWEN JONES	Videography Services	$5,500.00
EFT182181	20/02/2025	RICOH	Photocopier Charges	$10,360.90
EFT182146	20/02/2025	ROBERT LESLIE MACKENZIE T/A GLENORAN LEATHER	Stock Items - Forts Store	$1,479.00
EFT182386	27/02/2025	ROBERT SUTTON	Councillor Allowance	$3,152.34
EFT182372	27/02/2025	ROIMATA HOWELL (RNB SOULD TRAIN)	Performance Fee	$800.00
EFT182555	06/03/2025	RUG LAUNDRY ALBANY	Plant And Equipment Hire	$60.50
EFT182235	20/02/2025	S & G WRIGHT	Rates Refund	$198.06
EFT182290	27/02/2025	S.E CUMMINGS & J.R WOODS (AWESOME ABORIGINAL CONSULTANCY)	Regional Heritage Conference Fees	$450.00
EFT182338	27/02/2025	RESERVES OFFICER / EVENTS ASSISTANT	Staff Reimbursement	$52.45
EFT182150	20/02/2025	S MANSER	Refund	$150.00
EFT182373	27/02/2025	SAPID CATERING	Catering Services	$120.00
EFT182720	13/03/2025	SCHMICK MOWING & MAINTENANCE	Vegetation Maintenance Materials	$3,150.00
EFT182565	06/03/2025	SCORPTEC COMPUTERS	IT Equipment / Services	$9,943.00
EFT182726	13/03/2025	SCORPTEC COMPUTERS	IT Equipment / Services	$829.00
EFT182715	13/03/2025	SECUREPAY PTY LTD	Web Payments	$10.40
EFT182188	20/02/2025	SG FLEET AUSTRALIA PTY LTD	Fleet Service And Costs	$1,449.12
EFT182717	13/03/2025	SG FLEET AUSTRALIA PTY LTD	Fleet Service And Costs	$1,449.12
EFT182405	27/02/2025	SHAUN WAKE-MAZEY	Artwork Sales	$9,360.00
EFT182716	13/03/2025	SHOP FITTINGS STORE PTY LTD	Kids Shopping Trolleys	$1,059.11
EFT182158	20/02/2025	SINCH MESSAGE MEDIA / MESSAGE4U PTY LTD	Monthly Access Fee	$46.20
EFT182530	06/03/2025	SINCH MESSAGE MEDIA / MESSAGE4U PTY LTD	Monthly Access Fee	$46.20
EFT182560	06/03/2025	SITECH (WA) PTY LTD	Plant / Software Purchases PSP006-008	$31,350.00
EFT182719	13/03/2025	SITECH (WA) PTY LTD	Plant / Software Purchases PSP006-008	$9,669.00

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182190	20/02/2025	SLEEPY SOPH	Performance Fees	$500.00
EFT182313	27/02/2025	SMITH CONSTRUCTIONS WA	Construction Services C24001	$105,300.58
EFT182191	20/02/2025	SOIL SOLUTIONS PTY LTD	Vegetation Maintenance Supplies	$568.68
EFT182376	27/02/2025	SOIL SOLUTIONS PTY LTD	Road Maintenance Materials C23008(E) & Vegetation Maintenance Supplies	$6,304.20
EFT182421	27/02/2025	SOIL SOLUTIONS PTY LTD	Waste Disposal Services C20019	$183,200.00
EFT182721	13/03/2025	SOIL SOLUTIONS PTY LTD	Road Maintenance Materials C23008(E)	$35.36
EFT182185	20/02/2025	SOLOMON BROS APPAREL	Stock Items - Forts Store	$202.40
EFT182722	13/03/2025	SONGSTORY PROJECT	Songstory Project	$1,300.00
EFT182194	20/02/2025	SOUTH COAST ENVIRONMENTAL	Vegetation Maintenance Services C24010	$13,508.00
EFT182103	20/02/2025	SOUTH REGIONAL TAFE	Staff Training	$37.00
EFT182308	27/02/2025	SOUTH REGIONAL TAFE	Staff Training	$67.10
EFT182500	06/03/2025	SOUTH REGIONAL TAFE	Staff Training	$31.60
EFT182193	20/02/2025	SOUTHCOAST SECURITY SERVICE	Security Services C23019	$75,075.01
EFT182562	06/03/2025	SOUTHCOAST SECURITY SERVICE	Security Services C23019	$11,433.26
EFT182724	13/03/2025	SOUTHCOAST SECURITY SERVICE	Security Services C23019	$352.14
EFT182186	20/02/2025	SOUTHERN BUS CHARTERS	Bus Charter	$3,046.33
EFT182374	27/02/2025	SOUTHERN BUS CHARTERS	Bus Charter	$805.71
EFT182379	27/02/2025	SOUTHERN CROSS AUSTEREO PTY LTD	Advertisement	$1,369.50
EFT182187	20/02/2025	SOUTHERN FILTER CLEANING	Cleaning Services	$280.00
EFT182604	13/03/2025	SOUTHERN PORTS	Licence Fee	$11.00
EFT182195	20/02/2025	SOUTHERN SITE HIRE	Plant and Equipment Hire Q24035	$5,729.63
EFT182378	27/02/2025	SOUTHERN SITE HIRE	Plant and Equipment Hire Q24035	$11,675.82
EFT182563	06/03/2025	SOUTHERN SITE HIRE	Plant and Equipment Hire Q24035	$996.19
EFT182192	20/02/2025	SOUTHERN TOOL AND FASTENER CO	Hardware Supplies / Tools	$475.00
EFT182377	27/02/2025	SOUTHERN TOOL AND FASTENER CO	Hardware Supplies / Tools	$281.12
EFT182561	06/03/2025	SOUTHERN TOOL AND FASTENER CO	Hardware Supplies / Tools	$823.00
EFT182723	13/03/2025	SOUTHERN TOOL AND FASTENER CO	Hardware Supplies / Tools	$1,002.54
EFT182567	06/03/2025	ST JOHN AMBULANCE WESTERN AUSTRALIA LTD	First Aid Supplies / Services	$1,267.88

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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182729	13/03/2025	ST JOHN AMBULANCE WESTERN AUSTRALIA LTD	First Aid Supplies / Services	$1,549.50
EFT182564	06/03/2025	STANTEC AUSTRALIA PTY LTD	Design Services Q24058 & PSP002-020	$8,159.25
EFT182381	27/02/2025	STAR IMS PTY LTD	Ergonomic / Workstation Assessment	$369.20
EFT182380	27/02/2025	STAR SALES AND SERVICE	Hardware Supplies / Tools	$34.50
EFT182189	20/02/2025	STARA LEARNING AND DEVELOPMENT	Staff Training	$363.00
EFT182197	20/02/2025	STATEWIDE BEARINGS	Plant Parts And Repairs	$17.27
EFT182725	13/03/2025	STATEWIDE BEARINGS	Plant Parts And Repairs	$75.68
EFT182311	27/02/2025	STEPHEN GRIMMER	Councillor Allowance	$3,152.34
EFT182389	27/02/2025	S TAPSCOTT	Rates Refund	$36.13
EFT182198	20/02/2025	STIRLING PRINT	Printing Services	$355.00
EFT182728	13/03/2025	STIRLING PRINT	Printing Services	$310.00
EFT182447	06/03/2025	STOCKER-CREW	Plant Parts And Repairs	$30,085.00
EFT182613	13/03/2025	STOCKER-CREW	Plant Parts And Repairs	$2,566.53
EFT182667	13/03/2025	STRATAGREEN	Vegetation Management Supplies	$392.04
EFT182730	13/03/2025	SUNNY INDUSTRIAL BRUSHWARE	Plant Parts And Repairs	$6,935.50
EFT182200	20/02/2025	SUPERCHEAP AUTOS	Vehicle Parts / Maintenance	$54.01
EFT182201	20/02/2025	SURF LIFE SAVING WESTERN AUSTRALIA	Lifeguard Services	$28,148.03
EFT182569	06/03/2025	SURF LIFE SAVING WESTERN AUSTRALIA	Lifeguard Services	$31,448.03
EFT182514	06/03/2025	SUSAN KETTLE	Artist Fees	$500.00
EFT182203	20/02/2025	SYNERGY	Electricity Charges	$70,883.87
EFT182387	27/02/2025	SYNERGY	Electricity Charges	$43,045.21
EFT182570	06/03/2025	SYNERGY	Electricity Charges	$75,397.80
EFT182204	20/02/2025	T & C SUPPLIES PTY LTD	Hardware Supplies / Tools	$1,969.24
EFT182388	27/02/2025	T & C SUPPLIES PTY LTD	Hardware Supplies / Tools	$1,607.83
EFT182571	06/03/2025	T & C SUPPLIES PTY LTD	Hardware Supplies / Tools	$1,343.13
EFT182733	13/03/2025	T & C SUPPLIES PTY LTD	Hardware Supplies / Tools	$3,497.03
EFT182346	27/02/2025	TANIA MEUZELAAR T/A HANDMADE BY TANIA	Stock Items - Forts Store	$400.00
EFT182532	06/03/2025	TANIA MEUZELAAR T/A HANDMADE BY TANIA	Stock Items - Forts Store	$75.00
EFT182068	20/02/2025	TANJA COLBY DESIGN	Stock Items - Forts Store	$110.00

CITY OF ALBANY
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ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182576	06/03/2025	TAPESTRY PSYCHOLOGY & CONSULTING PTY LTD	EAP Services	$275.00
EFT182207	20/02/2025	TEAM GLOBAL EXPRESS PTY LTD	Freight Charges	$882.99
EFT182393	27/02/2025	TEAM GLOBAL EXPRESS PTY LTD	Freight Charges	$544.85
EFT182574	06/03/2025	TEAM GLOBAL EXPRESS PTY LTD	Freight Charges	$241.67
EFT181999	20/02/2025	TELSTRA	Telephone Charges	$1,010.17
EFT182238	27/02/2025	TELSTRA	Telephone Charges	$19,058.41
EFT182426	06/03/2025	TELSTRA	Telephone Charges	$472.99
EFT182593	13/03/2025	TELSTRA	Telephone Charges	$1,840.54
EFT182000	20/02/2025	THE 12 VOLT WORLD	Plant Parts And Repairs	$79.00
EFT182427	06/03/2025	THE 12 VOLT WORLD	Plant Parts And Repairs	$449.25
EFT182303	27/02/2025	THE GALLUP ORGANISATION PTY LTD	Software Subscriptions Q24062	$33,099.00
EFT182119	20/02/2025	THE HOPPING KANGAROO PTY LTD	Stock Items - Forts Store	$929.50
EFT182518	06/03/2025	THE LAKE HOUSE DENMARK	Town Hall Bar Stock	$700.66
EFT182368	27/02/2025	THE LOCAL GOVERNMENT RACING & CEMETERIES EMPLOYEES UNION (WA)	Payroll Deductions	$22.00
EFT182712	13/03/2025	THE LOCAL GOVERNMENT RACING & CEMETERIES EMPLOYEES UNION (WA)	Payroll Deductions	$44.00
EFT182003	20/02/2025	THE MCNAMAR FAMILY TRUST T/A ALBANY COMMERCIAL DEBT COLLECTORS	Debt Collectors Service	$2,208.70
EFT182594	13/03/2025	THE MCNAMAR FAMILY TRUST T/A ALBANY COMMERCIAL DEBT COLLECTORS	Debt Collectors Service	$1,993.10
EFT182163	20/02/2025	THE MUFFIN QUEEN	Catering Services	$2,236.00
EFT182351	27/02/2025	THE MUFFIN QUEEN	Catering Supplies	$270.00
EFT182537	06/03/2025	THE MUFFIN QUEEN	Catering Services	$1,827.00
EFT182396	27/02/2025	THE REUSS FAMILY TRUST (INJINJI PERFORMANCE PRODUCTS)	Stock Items - Visitor Centre	$1,298.00
EFT182144	20/02/2025	THE TRUSTEE FOR LONELY LANDS AGENCY TRUST	Performance Fees	$6,600.00
EFT182740	13/03/2025	THE UNIVERSITY OF WESTERN AUSTRALIA	Survey Services	$8,800.00
EFT182224	20/02/2025	THE WEST AUSTRALIAN NEWSPAPERS LIMITED	Tourist Map Publication	$658.90
EFT182392	27/02/2025	THINK WATER GREAT SOUTHERN	Irrigation Costs Q24082	$126,545.54

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FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182573	06/03/2025	THINK WATER GREAT SOUTHERN	Irrigation Costs Q24082	$983.24
EFT182734	13/03/2025	THINK WATER GREAT SOUTHERN	Irrigation Costs Q24082	$296.62
EFT182269	27/02/2025	THOMAS BROUGH	Councillor Allowance	$3,152.34
EFT182575	06/03/2025	TOTAL GREEN RECYCLING	Recycling Services Q23038	$3,180.90
EFT182208	20/02/2025	TOTALLY SPORTS AND SURF	Sporting Equipment	$40.00
EFT182394	27/02/2025	TOTALLY SPORTS AND SURF	Sporting Equipment	$56.90
EFT182209	20/02/2025	TOURISM COUNCIL WESTERN AUSTRALIA	Nomination Fees	$110.00
EFT182205	20/02/2025	T-QUIP	Vehicle Parts / Maintenance	$137,801.40
EFT182395	27/02/2025	TRAILBLAZERS	Uniforms / PPE	$215.00
EFT182577	06/03/2025	TRAILBLAZERS	Uniforms / PPE	$1,642.20
EFT182579	06/03/2025	TRUCK CENTRE WA PTY LTD	Vehicle Parts / Maintenance	$240.61
EFT182397	27/02/2025	TRUCKLINE	Vehicle Parts / Maintenance	$173.76
EFT182578	06/03/2025	TRUCKLINE	Vehicle Parts / Maintenance	$175.66
EFT182737	13/03/2025	TRUCKLINE	Vehicle Parts / Maintenance	$163.33
EFT182210	20/02/2025	TURTLE TRAFFIC PTY LTD	Traffic Control C24015(C)	$56,174.77
EFT182398	27/02/2025	TURTLE TRAFFIC PTY LTD	Traffic Control C24015(C)	$19,241.80
EFT182580	06/03/2025	TURTLE TRAFFIC PTY LTD	Traffic Control C24015(C)	$49,056.78
EFT182738	13/03/2025	TURTLE TRAFFIC PTY LTD	Traffic Control C24015(C)	$1,306.80
EFT182040	20/02/2025	TUTT BRYANT EQUIPMENT	Hardware Supplies / Tools	$2,644.92
EFT182400	27/02/2025	ULVERSCROFT LARGE PRINT BOOKS	Printing Services	$995.97
EFT182353	27/02/2025	UMART ONLINE	IT Equipment / Services	$1,017.50
EFT182213	20/02/2025	UNIVERSITY OF SOUTH AUSTRALIA	Operational Management Benchmarking	$269.50
EFT182401	27/02/2025	URBIS PTY LTD	Consultancy Services	$1,386.00
EFT182114	20/02/2025	V HAWKINS	Rates Refund	$910.45
EFT182675	13/03/2025	VASHTI INNES-BROWN	Stock Items - Box Office	$36.40
EFT182463	06/03/2025	V BOSHELL	Rates Refund	$846.50
EFT182214	20/02/2025	VERVE ST	Performance Fee	$375.00
EFT182402	27/02/2025	VETERAN CAR CLUB OF WA (INC)	Delivery Of Calendars	$1,465.00
EFT182216	20/02/2025	ERP PROJECT TRAINING OFFICER	Staff Reimbursement	$35.50

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182403	27/02/2025	VINOFOOD PTY LTD	Stock Items - Forts Store	$458.31
EFT182750	14/03/2025	VIRGINIA MILES	Cleaning Services Q23030	$3,005.00
EFT182215	20/02/2025	VIVID ADS PTY LTD	Advertising	$162.70
EFT182217	20/02/2025	VOEGELER CREATIONS	Stock Items - Forts Store	$423.08
EFT182053	20/02/2025	WA BUSH HONEY	Stock Items - Visitor Centre	$120.00
EFT182661	13/03/2025	WA FOUNDATION FOR DEAF CHILDREN	Refund	$106.25
EFT182404	27/02/2025	WAGYL KAIP SOUTHERN NOONGAR ABORIGINAL CORPORATION	Consultation Fees	$7,793.49
EFT182219	20/02/2025	WATER CORPORATION	Water Charges	$9,245.28
EFT182406	27/02/2025	WATER CORPORATION	Water Charges	$822.85
EFT182582	06/03/2025	WATER CORPORATION	Water Charges	$8,127.34
EFT182741	13/03/2025	WATER CORPORATION	Water Charges	$3,319.58
EFT182221	20/02/2025	WCP CIVIL PTY LTD	Construction Services P24007 & C24017	$645,644.71
EFT182407	27/02/2025	WCP CIVIL PTY LTD	Construction Services C24002	$371,107.43
EFT182222	20/02/2025	WELLSTEAD PROGRESS ASSOCIATION	Electricity Charges	$134.83
EFT182743	13/03/2025	WELSH AIRCONDITIONING SERVICES	Refrigerant Reclaim	$1,100.00
EFT182416	27/02/2025	WEST OZ WINES	Town Hall Bar Stock	$1,307.16
EFT182226	20/02/2025	WESTBOOKS	Library Stock Purchase	$741.82
EFT182409	27/02/2025	WESTERN AUSTRALIAN MUSEUM ALBANY	Quarterly Mowing	$3,741.66
EFT182225	20/02/2025	WESTERN POWER CORPORATION	Power Supply	$8,903.00
EFT182744	13/03/2025	WESTERN POWER CORPORATION	Power Supply	$1,320.00
EFT182223	20/02/2025	WESTRAC EQUIPMENT PTY LTD	Plant Parts And Repairs	$2,015.43
EFT182408	27/02/2025	WESTRAC EQUIPMENT PTY LTD	Plant Parts And Repairs	$58.31
EFT182583	06/03/2025	WESTSHRED DOCUMENT DISPOSAL	Document Disposal Services	$674.30
EFT182227	20/02/2025	WE'VE DONE THE COOKING	Catering Services	$294.00
EFT182410	27/02/2025	WE'VE DONE THE COOKING	Catering Services	$306.00
EFT182584	06/03/2025	WE'VE DONE THE COOKING	Catering Services	$994.20
EFT182745	13/03/2025	WHALE WATCH WESTERN AUSTRALIA	REZDY Tour Sales	$2,165.40
EFT182229	20/02/2025	WHEATBELT SERVICES PTY LTD	Signage	$1,628.00
EFT182411	27/02/2025	WHEATBELT SERVICES PTY LTD	Signage	$2,685.10

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

ELECTRONIC FUND TRANSFER PAYMENTS

EFT	DATE	NAME	DESCRIPTION	AMOUNT
EFT182747	13/03/2025	WHEATBELT SERVICES PTY LTD	Signage	$4,224.00
EFT182230	20/02/2025	WILD EYED PRESS PTY LTD	Stock Items - Visitor Centre	$306.00
EFT182585	06/03/2025	WIN TELEVISION NSW PTY LIMITED	Advertisement	$330.00
EFT182587	06/03/2025	WIN TELEVISION QLD PTY LTD	Advertisement	$330.00
EFT182586	06/03/2025	WIN TELEVISION VIC PTY LTD	Advertisement	$330.00
EFT182413	27/02/2025	WIN TELEVISION WA PTY LTD	Advertisement	$2,717.00
EFT182423	28/02/2025	WINDCAVE PTY LTD	Windcave Subscription	$52.02
EFT182590	06/03/2025	WISE PERINATAL SERVICES	EAP Services	$346.50
EFT182231	20/02/2025	WOOLWORTHS GROUP LIMITED	Groceries For Daycare	$2,096.70
EFT182414	27/02/2025	WOOLWORTHS GROUP LIMITED	Groceries For Daycare	$747.44
EFT182588	06/03/2025	WOOLWORTHS GROUP LIMITED	Groceries For Daycare	$102.24
EFT182748	13/03/2025	WOOLWORTHS GROUP LIMITED	Groceries For Daycare	$1,098.42
EFT182228	20/02/2025	WORKFORCE HEALTH ASSESSORS PTY LTD	Medical Assessment	$1,232.00
EFT182746	13/03/2025	WORKFORCE HEALTH ASSESSORS PTY LTD	Medical Assessment	$440.00
EFT182233	20/02/2025	WREN OIL	Oil Waste Disposal	$528.00
EFT182234	20/02/2025	WRISTBAND FACTORY PTY LTD	Wristbands For Town Hall	$125.00
EFT182591	06/03/2025	WURTH AUSTRALIA PTY LTD	Vehicle Parts / Maintenance	$690.82
EFT182236	20/02/2025	YOUNGS SIDING GENERAL STORE	Fuel Supplies	$1,188.19
EFT182237	20/02/2025	ZENITH LAUNDRY	Laundry Services	$44.35
EFT182417	27/02/2025	ZENITH LAUNDRY	Laundry Services	$199.57
EFT182592	06/03/2025	ZENITH LAUNDRY	Laundry Services	$19.53
EFT182749	13/03/2025	ZENITH LAUNDRY	Laundry Services	$80.16
EFT182418	27/02/2025	CHILD CARE EDUCATOR ASSISSTANT	Staff Reimbursement	$87.00
				$6,809,301.83

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

PURCHASING CARD TRANSACTIONS

Fuel Cards:

DATE	PAYEE	DESCRIPTION	AMOUNT
01/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$223.36
01/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$147.02
01/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$74.14
01/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$248.77
01/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$69.67
01/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$64.51
01/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$45.43
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$159.25
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$228.84
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$140.74
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$195.18
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$43.55
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$66.92
02/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$222.81
03/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$65.41
03/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$131.80
03/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$97.91
04/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$177.01
04/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$167.91
04/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$137.34
04/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$83.21
04/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$81.20
03/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$89.71
03/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$51.24
04/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$75.74
05/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$53.59
05/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$237.98
04/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$18.70

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

PURCHASING CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
04/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$30.85
06/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$20.57
05/02/2025	WELLSTEAD S/STN	Fuel Supplies	$50.01
05/02/2025	WELLSTEAD S/STN	Fuel Supplies	$48.75
06/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$74.55
06/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$61.85
06/02/2025	AMPOL FOODARY CARINE	Fuel Supplies	$96.16
06/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$45.16
07/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$101.25
07/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$93.75
07/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$85.07
07/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$48.09
07/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$77.86
07/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$70.83
08/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$15.52
08/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$65.84
07/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$77.66
07/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$115.23
08/02/2025	WELLSTEAD S/STN	Fuel Supplies	$75.18
09/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$96.16
09/02/2025	AMPOL FOODARY LEEDERVILLE	Fuel Supplies	$76.33
10/02/2025	AMPOL FOODARY APPLECROSS	Fuel Supplies	$55.57
10/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$97.89
11/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$26.99
11/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$100.04
12/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$258.57
12/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$52.77
12/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$195.79
14/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$87.90
13/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$58.14

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

PURCHASING CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
15/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$104.13
15/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$25.47
15/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$8.06
15/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$64.08
15/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$29.61
15/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$255.48
15/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$91.83
14/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$87.45
14/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$19.03
16/02/2025	AMPOL FOODARY WILLIAMS	Fuel Supplies	$56.53
16/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$72.29
16/02/2025	AMPOL FOODARY WILLIAMS	Fuel Supplies	$155.71
17/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$66.73
17/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$41.82
17/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$151.63
17/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$111.76
17/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$114.36
17/02/2025	AMPOL FOODARY WILLIAMS	Fuel Supplies	$81.08
16/02/2025	AMPOL WOOLWORTHS FORRESTDALE	Fuel Supplies	$111.40
18/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$141.15
18/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$148.92
18/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$94.63
18/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$104.98
18/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$79.39
19/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$4.78
19/02/2025	AMPOL ALBANY DIESEL STOP	Fuel Supplies	$134.88
19/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$71.18
19/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$87.12
19/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$241.97
18/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$41.27

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

PURCHASING CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
19/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$60.64
18/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$36.05
20/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$84.22
20/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$82.77
19/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$85.54
20/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$17.99
21/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$12.01
20/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$35.57
22/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$227.29
22/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$54.65
22/02/2025	AMPOL FOODARY WILLIAMS	Fuel Supplies	$91.43
22/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$45.37
23/02/2025	AMPOL FOODARY BELMONT	Fuel Supplies	$105.17
24/02/2025	AMPOL FOODARY CARINE	Fuel Supplies	$92.49
24/02/2025	AMPOL WOOLWORTHS FORRESTDALE	Fuel Supplies	$46.55
24/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$75.36
26/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$87.68
25/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$146.91
26/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$20.99
27/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$66.14
27/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$49.26
27/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$139.34
28/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$229.32
28/02/2025	AMPOL FOODARY ALBANY NORTH	Fuel Supplies	$109.73
27/02/2025	EG AMPOL 94232 BROOKS GARDEN	Fuel Supplies	$87.20
		Subtotal	**$10,647.66**

CITY OF ALBANY
LIST OF ACCOUNTS FOR PAYMENT
FOR THE PERIOD ENDING 15 MARCH 2025

PURCHASING CARD TRANSACTIONS

DATE	PAYEE	DESCRIPTION	AMOUNT
Coles Cards:			
14/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Event Catering	$26.13
19/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Milk	$8.70
17/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Depot - Kitchen Supplies	$173.30
07/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Engineering - Milk	$11.20
25/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	NAC - Kitchen Supplies	$23.00
04/03/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Milk	$8.70
12/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Milk	$8.70
13/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Dishwashing Supplies	$12.50
13/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Event Catering	$55.40
07/02/2025	COLES SUPERMARKETS AUSTRALIA PTY LTD	Library - Milk	$7.35
		Subtotal	**$334.98**
Cabcharge Vouchers:			
03/02/2025	SWAN TAXIS CO OP LTD	Taxi Travel - Perth	$29.93
03/02/2025	SWAN TAXIS CO OP LTD	Taxi Travel - Perth	$44.63
03/02/2025	BLACK & WHITE CABS (WA) P/L	Taxi Travel - Perth	$52.50
		Subtotal	**$127.06**
		TOTAL	**$11,109.70**

Notes:
All Purchasing Card transactions noted above are dated in accordance with the supplier issued statement. All physical payments to the suppliers are made by Electronic Fund Transfer within the date range of 16 February 2025 to 15 March 2025

Document Number	Date	Description
EDR25194184	14/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Community Purpose - Freestanding Signs x 2 for Redmond Hall PARTIES: Redmond Community Association Inc. SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25194185	14/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Request to submit EO to Lotterywest under their Arts and Culture Infrastructure Grants stream for the Town Hall Auditorium: - Mezzanine level seating, carpet and aisle lighting replace - BioBox refurbishment - Lighting Bridge Walkway - Various stage works. PARTIES: Lotterywest SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193943	11/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Main Roads WA Authorisation to claim funds from Main Roads for 3 projects - Newby, Campbell, Middleton PARTIES: Main Roads SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193946	11/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Quarter 3 Invoice requiring CEO Authorisation PARTIES: Department of Fire and Emergency Services SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193947	11/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Development Application - Club premises - additions (covered area and weather protection on southern end of green) COA as landowner. PARTIES: Middleton Beach Bowling Club SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)

Document Number	Date	Description
EDR25193834	10/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Signing of Sustainable Energy Project Supply Agreement PARTIES: Electricity Generation and Retail Corporation trading as Synergy SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193696	06/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Application to Southern Ports under the Community Investment Program for the Maritime Treasure Trail 2025 PARTIES: Southern Ports SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193698	06/03/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Contract variation for expansion of Regional WA Library Consortium to include Shire of Brookton, Moora and Mukinbudin PARTIES: Shires of Brookton, Moora and Mukinbudin SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193447	28/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Award of Tender for C25004 - Racetrack Precinct Civil Construction Works - Albany Motorsport Park PARTIES: Phoenix Civil and Earthmoving Pty ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193408	27/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Authorise the payment of invoice for Ausfleet as the successful tender applicant for tender C24021. PARTIES: Ausfleet SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193410	27/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Annual Environmental Report for the City of Albany's Hanrahan Road Landfill, required to be submitted to the Department of Environment Regulations as part of the licence condition PARTIES: Department of Environment Regulations SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)

Document Number	Date	Description
EDR25193412	27/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Signing of Moore Australia Engagement Letter - P25005 - Review of Rating Structure PARTIES: Moore Australia SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193414	27/02/2025	COPY OF EXECUTED DOCUMENT ITEM: OCM 25 Feb 2025 DIS430 RE: Signing of Purchase order to award of contract C25006 - Seymour, Nelson, McLeod Pathway Construction PARTIES: WCP Civil Pty Ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193415	27/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Award of Tender for C25006 - Seymour, Nelson, Mcleod Pathway Construction PARTIES: WCP Civil Pty Ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193416	27/02/2025	COPY OF EXECUTED DOCUMENT ITEM: 25 Feb OCM DIS429 RE: To sign PO for award of contract C25004 PARTIES: Phoenix Civil and Earthmoving Pty Ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193434	27/02/2025	COPY OF EXECUTE DOCUMENT ITEM: N/A RE: AMD Questionnaires as required by Internal Audit PARTIES: AMD SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193024	20/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Fish cleaning stations and shelter at Lower King and Little Grove boat ramps PARTIES: RecfishWest SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)

Document Number	Date	Description
EDR25193030	20/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: CEO endorsement for submissions to 2025 Consultation paper on future regulation of Public Buildings under the Public Health Act PARTIES: Department of Health SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193033	20/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Signing of Invoice for Contract C24002 - Middleton Road Resurfacing and Cycle Link PARTIES: WCP Civil SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193042	20/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Authorisation for progress claim 4 - Surf Reef C24005 PARTIES: HERON SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25193095	20/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Invoice to be authorised for Milestone 2 payment of FORM Albany 2026 Major Events funding PARTIES: FORM SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 copy)
EDR25192903	17/02/2025	COPY OF EXECUTED DOCUMENT ITEM: N/A RE: Approval of evaluation report for waste sorted organics infrastructure grant - FOGO transfer station leachate and odour mitigation PARTIES: N/A SIGNED BY: Andrew Sharpe, Chief Executive Officer (1 Copy)
NCSR25193693	06/03/2025	COPY OF COMMON SEAL DOCUMENT ITEM: N/A RE: Signed contract for Tender C25006 - Seymour, Nelson, McLeod Pathway Constructions PARTIES: WCP Civil Pty Ltd IGNED BY: Andrew Sharpe, Chief Executive Officer and Gregory Stocks, Mayor (1 copy)

Document Number	Date	Description
NCSR25193534	04/03/2025	COPY OF COMMON SEAL DOCUMENT ITEM: N/A RE: Deed of Lease document - Optus Mobile Pty Ltd - Mt Melville Telecommunications facility and tower PARTIES: Optus Mobile Pty Limited SIGNED BY: Andrew Sharpe, Chief Executive Officer and Gregory Stocks, Mayor (3 copies)
NCSR25193535	04/03/2025	COPY OF COMMON SEAL DOCUMENT ITEM: OCM 25 February 2025 DIS429 RE: Award of Tender C25004 - Racetrack Precinct Civil Construction Works - Albany Motorsport Park PARTIES: Phoenix Civil & Earthmoving Pty Ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer and Gregory Stocks, Mayor (1 copy)
NCSR25193536	04/03/2025	COPY OF COMMON SEAL DOCUMENT ITEM: N/A RE: City of Albany consent regarding benefits from partial extinguishment of easement PARTIES: Landgate SIGNED BY: Andrew Sharpe, Chief Executive Officer and Gregory Stocks, Mayor (1 copies)
NCSR25193437	27/02/2025	COPY OF COMMON SEAL DOCUMENT ITEM: N/A RE: Deed of Variation of Lease - Airport Hangar Site 12 PARTIES: Reuben and Rebecca Bush SIGNED BY: Andrew Sharpe, Chief Executive Officer and Gregory Stocks, Mayor (2 copies)
NCSR25193098	20/02/2025	COPY OF COMMON SEAL DOCUMENT ITEM: N/A RE: The developers of Lot 9000 Rangatira Road, Drome are initiating Stage 2 of the subdivision and require easements from Stage 1 to be extinguished PARTIES: McLeods Lawyers SIGNED BY: Andrew Sharpe, Chief Executive Officer and Gregory Stocks, Mayor (2 copies)
NCSR25192839	17/02/2025	COPY OF COMMON SEAL DOCUMENT RE: Section 70a notification, condition of subdivision, 162732, Gunn Road, Drome PARTIES: Avonlight Enterprises Pty Ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer and Greg Stocks Mayor

Document Number	Date	Description
NCSR25192840	17/02/2025	COPY OF COMMON SEAL DOCUMENT RE: Section 70a notification condition of subdivision 162782, lots 228 and 249 Gunn Road PARTIES: Avonlight Enterprises Pty Ltd SIGNED BY: Andrew Sharpe, Chief Executive Officer and Greg Stocks Mayor
NCSR25192842	17/02/2025	COPY OF COMMON SEAL DOCUMENT RE: Subdivision Condition - notification on c/title - Lots not connected to reticulated potable water, lots 23-29 and 37 Overhue Drive, Kalgan PARTIES: Erujin Pty Ltd - SIGNED BY: Andrew Sharpe, Chief Executive Officer and Greg Stocks, Mayor
NCSR25192843	17/02/2025	COPY OF COMMON SEAL DOCUMENT RE: Deed of assignment of lease - portion reserve 878, site 2 Baxteri Road, Cheynes Beach PARTIES: Cornelius Wals, Katarina Wals, Ross Ernest Cameron, Anna Jane Cameron SIGNED BY: Andrew Sharpe, Chief Executive Officer and Greg Stocks, Mayor (3 copies)
NCSR25192844	17/02/2025	COPY OF COMMON SEAL DOCUMENT RE: Deed of renewal of variation of lease. Airport Hangar site 32 (exercising extended term of 10 years from 1 October 2024) PARTIES: Ross Blagrove SIGNED BY: Andrew Sharpe, Chief Executive Officer, Greg Stocks, Mayor (2 copies)

Quarterly Report - Tenders Awarded - January to March 2025

Contract Number	Name/Subject	Contractor	Start Date	Expiry Date	Contract Term	Local/Non Local	Local Content	Non Local Content	Tender Value (inc. GST)
C24014	Fire Equipment Maintenance for City of Albany Buildings and Fleet	Astar Safety Services Pty Ltd	01-Jan-25	31-Dec-28	3+2	Local	100%	0%	Schedule of Rates
C24021	Fleet Management System	AusFleet Software	13-Jan-25	12-Jan-28	3 + 2	Non Local	0%	100%	$ 361,623.00
C25006	Seymour, nelson, McLeod Pathway Construction	WCP Civil Pty Ltd	26-Feb-25	31-May-25	End of Defects	Local	100%	0%	$ 1,021,793.69
C25004	Racetrack Precinct Civil Construction Works - Albany Motorsport Park	Phoenix Civil & Earthmoving Pty Ltd	27-Feb-25	19-Jun-25	End of Defects	Local	100%	0%	$ 4,509,755.00

Corporate Scorecard - Q3 2024/25

City Of Albany

cammsstrategy

Print Date: 31-Mar-2025

ACTION SUMMARY

BY PERFORMANCE

0	OFF TRACK
3	MONITOR
49	ON TRACK
62	NO TARGET SET

ACTION PERFORMANCE AND TIMEFRAME

Timeline Legend: On Track | Monitor | Off Track | Complete | Project Timeframe

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
2.2.3.2 Provide for the implementation of the Hanrahan Landfill Closure Plan, once endorsed.	Manager Operations	01-07-2024	30-06-2025	60	AMBER									
Progress Comments: Achieve Council approval for future waste preferred option by June 2025. March 2025 update: Procurement completed for engagement of consultant to complete Detailed Closure Plan for Hanrahan Rd. Transfer Station concept design being updated to include best practice updates and future proofing. Scoping meeting held, procurement being developed to engage consultant to undertake concept design and feasibility of Lake Warburton site for future waste facility.														
3.4.1.5 Provide a "Maintenance Manual" that details tasks performed on roads, kerbs, drainage and paths and how they should be performed, specific to the region's methods and materials used.	Manager Operations	01-07-2024	30-06-2025	70	AMBER									
Progress Comments: Full review of Operations Department, including processes, systems and resource requirements. Documentation of technical services levels and work standards. 100% 24/25: The final compilation of the Maintenance Manual is to be carried out during 24/25 FY. March 2025 update: work on manual still being undertaken, though there has been some minor delay due to resource capacity and storm recovery.														

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
5.2.1.5 Provide an Integrated Business Solution to replace the City's legacy system.	Manager IT	01-07-2024	30-06-2025	80	AMBER									

Progress Comments: On-going process improvements with the implementation of the City's ICT Strategy with the primary objective being to undertake the necessary preparatory work to be in a position to commence the implementation of the core of the Datascape Enterprise Resource Planning (ERP) Software on 1 July 2025, with all modules to be implemented by 30 June 2026.

March 2025 update: Work on the implementation continues with efforts to ensure that the Finance and Rates module are in place by 1 July 2025. This remains the critical date as failure to reach this date pushes the project out one year. Customer Relationship Management, including the Antenno App, and a new Records module are on track for 1 July 2025, however, the priority of these is secondary to Finance and Rates modules. The implementation of the Payroll portion of the system was problematic, so a decision was made to defer the implementation to later in the calendar year while the problems are worked through and to allow sufficient resourcing of the Finance and Rates modules. A workshop shall be held with Council to demonstrate the new ERP prior to 30 June 2025 and outline the implementation progress.

Corporate Scorecard - Q3 2024/25: CEO KPIs

City Of Albany

cammsstrategy

Print Date: 31-Mar-2025

ACTION PERFORMANCE AND TIMEFRAME

Timeline Legend: On Track | Monitor | Off Track | Complete | Project Timeframe

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
1.2.2.2 Provide a business case for the Albany Leisure and Aquatic Centre upgrades.	Manager Recreation Services	01-07-2024	30-06-2025	90	GREEN									
Progress Comments: Undertake a study and needs analysis of Albany Leisure & Aquatic Centre that provides recommendations for future redevelopment options and priorities for Council consideration, that will ensure ALAC continues to meet community needs into the future. Dec 2024 update: Scoping paper being drafted for consideration. Project remains on track. Cost for business case and consultants has been factored into LTFP for further discussion with Council through budget process. March 2025 update: Scoping paper remains in progress. Cost to complete business case has been factored into the budget build for 2025/26.														
2.2.3.2 Provide for the implementation of the Hanrahan Landfill Closure Plan, once endorsed.	Manager Operations	01-07-2024	30-06-2025	60	AMBER									
Progress Comments: Achieve Council approval for future waste preferred option by June 2025. March 2025 update: Procurement completed for engagement of consultant to complete Detailed Closure Plan for Hanrahan Rd. Transfer Station concept design being updated to include best practice updates and future proofing. Scoping meeting held, procurement being developed to engage consultant to undertake concept design and feasibility of Lake Warburton site for future waste facility.														

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
3.3.1.5 Provide for the delivery of the Bicentennial Project, ensuring cultural recognition and inclusion that is informed by the local Noongar community.	Executive Director Community Services	01-07-2024	30-06-2025	70	GREEN									

Progress Comments: Deliver quarterly status updates and 2026 Strategic Plan adopted by Council. Secure external funding commitments to assist with the delivery of the 2026 program.

January '25 update:
- Issued quarterly status updates (briefing notes) to Council (Q2 & Q3 of 2024).
- Recruitment of Cultural Project Officer completed.
- Held 2026 Cultural Advice sub-committee meeting on October 22, 2024.
- All major event funding contracts signed and completed.
- Held civic function to publicly announce 2026 major event program (November 25, 2024).
- 1st and 2nd Lotterywest milestone payments received, 3rd milestone in progress.
- Community sponsorship grant applications assessed and approved by Council at Dec 2024 OCM.
- Engaged Breaksea to deliver 2026 opening ceremony entertainment.
- Confirmed dates for FORM's "Lighting the Sound" event with Kari Kola.

March '25 update:
- Issued quarterly status update (briefing note) to Council (Q4 of 2024)
- Held 2026 Cultural Advice sub-committee meeting on February 10, 2025
- Held 2026 Reference Group Meeting on February 28, 2025
- All 2026 community event funding grants signed and initial milestone payments processed
- Dates for all major events confirmed and published on website
- Met with ACCI & ASW to discuss stakeholder support for business and industry
- Engaged 303 MullenLowe to deliver 2026 marketing

4.1.1.8 Advocate for funding to enhance the Albany Airport	Executive Director Corporate and Commercial Services	01-07-2024	30-06-2025	100	GREEN									

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
Progress Comments: This action is the second major phase of the Albany Airport enhancement. Action 4.1.1.7 (the Airport Masterplan) has been completed and now funding is required per the associated business case. Advocacy initiatives for funding to be undertaken as opportunities arise. Sept '24 update: - Growing Regions Round 1 was applied for but unfortunately the application was unsuccessful. Round 2 of the Growing Regions fund is now being applied for. - The Local Member of State Parliament and Transport Minister have both been made aware of the need an quantity of funding required. This focus will switch to pre-selected candidates of each political party as the elections draws closer. - The airport has been included in the City of Albany investment prospectus and the RCAWA prospectus. 24/25 Q2: Applications were made for funding from the Growing Regions Round 2 Program and the Regional Air Ports Infrastructure Program. Advocacy to election candidates and the Deputy Premier was undertaken over the quarter. 24/25 Q3 Update: Complete - The application to the second round of Growing Regions was successful which brought over $14m of funding from the Federal Government. During the State Election Campaign, all major parties made a $14m commitment to the project. With the election decided, the administration has been working with the Department of Transport to develop the submission to Treasury. It is expected that the entire amount will included in the State Government's 2025/2026 Budget.													
5.1.1.7 Provide quarterly Corporate Scorecard to Council	Business Planning and Performance Coordinator	01-07-2024	30-06-2025	70	GREEN									

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
Progress Comments: Quarterly Corporate Scorecard presented to Council, with an expansion of high-risk strategic project reporting, including the Airport Project, Albany Leisure and Aquatic Centre (ALAC) Feasibility Review and Waste (these actions are tagged 'Expanded Reporting' within this reporting). Sept '24 update: Work well underway to deliver improved Corporate Scorecard. Per December 2024 Strategy Workshop, service-type actions within the Scorecard have been translated into an operational context and included in Service Plans. These are identified now as 'ongoing' in the CAMMS reporting and have 'no timeframe' in the dashboard provided the Council. Service Plans themselves are set to be presented by Managers to Council before the end of the 2024-25 financial year. Dec '24 update: Work underway to produce Q2 scorecard and CEO KPI report for February CCS. March '25 update: Work underway to produce Q3 scorecard and CEO KPI report for February CCS.													
5.2.1.1 Provide the mandatory reviews of the Strategic Community Plan and the Corporate Business Plan	Business Planning and Performance Coordinator	01-07-2024	30-06-2025	70	GREEN									

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
Progress Comments: Major review of Community Strategic Plan, with Plan adopted by Council in November 2025. Includes: - Project Group including all Elected Members to meet as part of a minimum of 3 Strategic Workshops - Ensure the Community Strategic Plan is informed by a Community Engagement plan endorsed by Council. Dec '24 update: CATALYSE engaged to further develop biennial community survey format to better reflect EMs concerns around expectations/LG sphere of influence. This will be provided to EMs ahead of 18 February 2025 Strategic Workshop, and provided this is readily approved, Major Review will remain on schedule. March 2025 update: CATALYSE survey has now been completed, and time set aside prior to May CCS to present to Elected Members. This will be a key component in the Major Strategic Review process, during which specific deliverables will be identified for inclusion in the 2025 Strategic Community and Corporate Business Plan.														
5.2.1.2 Provide new Service Delivery Plans for all Business Units	Executive Director Corporate and Commercial Services	01-07-2024	30-06-2025	90	GREEN									

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
Progress Comments: As part of the 2024/2025 Annual Budget Adoption include a framework which includes the delivery of service plans for all Business Units at the City of Albany. Sept '24 update: Progress on the Service Plans is variable. Initial drafts have been established for all service teams for a number of months, but further development is wanting in most instances. It has only recently been established as a CEO KPI and hopefully this gives it more attention at the executive level. There is also limited data available to inform priority activities, so expectations should be carefully managed in terms of Council presentations in May 2025 - these will still largely be based on anecdotal evidence. Lastly, the sole FTE responsible for this deliverable is also on a substantial period of leave over summer. Work to develop the plans ahead of October EMT presentations, particularly in concert with Team Leaders, continues. Dec '24 update: A second round of presentations on Service Plans was given to EMT by managers using an updated format for both the Service Plan and presentations. Feedback was sought following the presentations from selected managers and EMT. Following this, the Service Plan Format was updated. The updated Service Plan format was presented to Council to seek feedback. Limited feedback was received but Council appeared satisfied. Q3 will see the information transferred to the new format and then the Service Plans reviewed for correctness. 24/25 Q3 Update: The information for the plans has been transferred to the new format and information updated. The final part of the information needs to be entered to ensure alignment with the 2025/26 Budget and relevant strategies and plans. Final signoff by the Manager and EDCCS will then take place. Discussion will need to take place regarding the format of the presentations to Council.													
5.2.1.5 Provide an Integrated Business Solution to replace the City's legacy system.	Manager IT	01-07-2024	30-06-2025	80	AMBER									

Action	Responsible Officer	Start Date	End Date	% Complete	Performance	Jul-24	Aug-24	Sep-24	Oct-24	Nov-24	Dec-24	Jan-25	Feb-25	Mar-25
Progress Comments: On-going process improvements with the implementation of the City's ICT Strategy with the primary objective being to undertake the necessary preparatory work to be in a position to commence the implementation of the core of the Datascape Enterprise Resource Planning (ERP) Software on 1 July 2025, with all modules to be implemented by 30 June 2026. March 2025 update: Work on the implementation continues with efforts to ensure that the Finance and Rates module are in place by 1 July 2025. This remains the critical date as failure to reach this date pushes the project out one year. Customer Relationship Management, including the Antenno App, and a new Records module are on track for 1 July 2025, however, the priority of these is secondary to Finance and Rates modules. The implementation of the Payroll portion of the system was problematic, so a decision was made to defer the implementation to later in the calendar year while the problems are worked through and to allow sufficient resourcing of the Finance and Rates modules. A workshop shall be held with Council to demonstrate the new ERP prior to 30 June 2025 and outline the implementation progress.													
5.2.2.3 Provide Council with a position paper on future ratings options	Manager Finance	01-07-2024	30-06-2025	60	GREEN									
Progress Comments: Provide Elected Members with a position paper on future rating options, which would include increasing our rate yield on Unimproved Valuations for farming land to support better rural road outcomes, a differential rate on short term accommodation and examining our current minimum rate amount. This deliverable will also include option for meeting the City's Road Program, with additional funding options presented to Elected Members. Sep 2024 update: Preparing scope of works for consultant to assist with the position paper. Dec 2024 update: Rating strategy workshopped with Council in December 2024. Next action to engage consultant. Mar 2025 update: Procurement process has been conducted and completed, with consultant Moore Australia awarded. Initial kick off meeting has been held, and information gathering has commenced.													

ATTACHMENT

City of Albany
Proposed Surrender and Replacement New Lease – Rose Gardens Beachside Holiday Park – RAC Tourism Assets Pty Ltd
Portion of Reserve 22698 Emu Point

Schedule of Submissions

19 submissions received
All 19 objecting, raising similar concerns to the new lease proposal.

No.	Submitter Name	Submitter Comment	Officer Comment
1.	Lea Pedersen	I am writing to state my concerns about the proposal of the Shire to lease the above site to the RAC. The park is currently, and has been for many, many years, home to between 20 and 30 permanent residents (myself included) who will in all eventuality be displaced, as it is believed the RAC expect vacant possession. Given the high cost of living, the lack of affordable homes in the Albany, and any other area in WA, including in residential aged care, this move is likely to cause distress to a great many people. In consideration of residents moving their homes, this an incredibly expensive exercise as I have been recently quoted between 50, to 100 thousand dollars. That doesn't include the costs associated with where one might move the home to and then there are the costs for returning the site to original. My hope is that the park retain the permanent sites for these residents for at least 2-5 years to give people the best chance of securing appropriate accomodation. Though of course the best outcome would be to continue to provide permanency in situ.	The City acknowledges the concerns raised regarding the impact of the proposed lease and associated requirement for vacant possession on current long stay tenants. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs. The City understands the costs of relocating and site restoration can vary depending on individual circumstances. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. In this circumstance tenancies are being impacted by the sale though the ability of an operator to terminate tenancies is not restricted to only when there is a sale. In accordance with City of Albany Local Planning Scheme No.2 any future development of the park would not be able to include permanent sites without an amendment of the scheme.

		The park has long been a familiar fixture in Emu Point with returning visitors carrying fond memories of holidays past. It seems such a shame that the park as we know it will in all likelihood be redeveloped beyond recognition.	The City recognises the long-standing history of the park and the emotional connection many long stay tenants and visitors have to the site.
2.	Robert Templeton	I am writing as a permanent resident of a park home located within Crown Reserve 22698, Emu Point, in response to the City of Albany's proposal to lease this portion of land to RAC Tourism Assets Pty Ltd for a term of 21 years, with a further option of 21 years. As a permanent resident of a park home located at Rose Gardens Holiday Park, I am extremely concerned about the lack of publicly available protections for residents like myself under this proposed lease. The prospect of being forced to vacate our homes—either due to non-renewal of individual leases or decisions made by the incoming operator—is deeply distressing. My concerns include: 1. Lack of lease transparency and resident protections: There is no clarity on whether existing residents will be allowed to remain, nor what conditions might apply to our continued residence under the new lessee. The absence of this information raises serious concerns about long-term stability. 2. Financial burden of relocation: The cost of removing and relocating a park home is substantial. For residents on fixed or low incomes, this would be an unmanageable financial burden, particularly if relocation is involuntary. 3. Impact amidst a regional housing crisis: The Albany region is currently facing a significant homelessness and housing affordability crisis. Finding alternate accommodation—especially secure, long-term housing—is extremely difficult. The removal of residents from the park would only exacerbate this crisis and put vulnerable people at further risk. In light of these concerns, I respectfully urge the City of Albany to ensure that any lease agreement with RAC Tourism Assets Pty Ltd includes strong, enforceable protections for existing permanent residents. These should include: • Guaranteed long-term security of tenure for current residents.	The City recognises that long stay tenants are valued members of the Emu Point community and that any change in park management may cause uncertainty, stress, and hardship for individuals who have called the park home for many years. The City's lease with the incoming operator will not regulate individual tenancy agreements. These matters are governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants. The ability of an operator to terminate tenancies is not restricted to only when there is a sale. A lease is not able to override rights and obligations made by legislation. RAC and Redwood have committed to providing without-prejudice ex-gratia payments to eligible long stay tenants to assist with relocation costs, acknowledging the financial impacts associated with moving park homes. The City is committed to doing what it can to assist the long stayt tenants by advocating for access to housing support services and working with other park operators to explore possible tenant relocation options.

		• Minimum notice periods (e.g., at least 12 months) for any termination of residency. • Financial support or compensation to cover the cost of relocation if residents are asked to leave. • An open and transparent communication process between the new operator and all residents. We are not just tenants—we are members of the Emu Point community, and many of us have few, if any, realistic alternatives if we are forced out. I sincerely hope the City will consider the social and human impact of this lease proposal and act in a way that protects the wellbeing and dignity of all affected residents. Thank you for the opportunity to provide input on this matter.	
3.	Pippa Minchin	I wish to state my objection to the proposed takeover of the Rose Gardens Caravan Park lease of land by the RAC. I have discussed the issues with members of the council over the past few weeks, relating to what is going to happen to the residents of the Park, as the RAC have stated they want vacant possession once they take over. There has still been no mention of this and it is extremely disheartening. The residents and myself included, cannot afford to shift their places, as it is costly and difficult and as I have said before there is nowhere to shift them to. Homelessness is currently a huge issue for a lot of people and this will be adding to the problem. The RAC have a reputation for buying up Parks and demolishing everything back to bare ground. There is a lot of flora and fauna in this park that will be damaged by such development. Is this really what the Council and the public want for the environment ? I implore all of you on Council to have a conscience in this matter and at the very least make sure we residents are looked after in this situation. Please assist us to find some kind of beneficial resolution	The City acknowledges the concerns raised in the submission. The City recognises the importance of Rose Gardens Holiday Park not only as a place of residence but also as part of the broader Emu Point community. It also recognises the distress that change and uncertainty can cause for long stay tenants with the vacant possession requirement. The City will advocate for affected tenants to connect them with available housing support services. Efforts are also being made to explore relocation options with other parks for relocation opportunities. Any development of the site will be subject to a Development Application. Any clearing as part of this application will require flora and fauna surveys and will be subject to relevant environmental approvals.
4.	Garry Gardiner	As a permanent resident on the Rose Gardens Caravan Park, I would like to submit my personal concerns regarding my situation and the current lease proposal for RAC.	Thank you for sharing your concerns regarding the proposed lease to RAC and the impact it may have on your family's long-standing residence at Rose Gardens Caravan Park.

		As a family we have been permanent residents since 1995, when us four siblings purchased a new 40' caravan, hard annexe and the double cement pad with plumbing and electricity to supply a safe environment and home for our then retiring mother. Apart from myself who was able to come and stay every few months to check everything, my sisters all lived away, they also came to stay and ensure Mum was comfortable and happy too. When the site was offered to us/her, it was definitely not the open ocean view lot it is today. It was tucked down in the back corner of the park covered by trees and bushes with a double road between the park and the sandhills leading to the beach. It is years of wind and erosion that have worn away all traces of the vegetation and sand hills and of course the beach itself. Over the 20+ years our mother lived there, us children provided maintenance physically and financially giving her the ability to beautify her site turning it into an eye-catching icon of the park. With stunning gardens and impeccably maintained patios and caravan walls etc it became the requested caravan and tent site area for returning guests – year in and year out. Mum befriended everyone who came within her area and remained friends until her passing in 2021. This friendship with park guests clearly enhanced the holiday for all these families. On Mum's passing she officially willed the family home to us four siblings so there would be no confusion regarding ownership as we had always referred to the property as the family home. There was always concern that it would fall into disrepair if no-one was living in it and we were also aware that it could not be rented out. We were not keen to sell as we had outlaid considerable money and effort into the home, and I was also still living there having stayed and cared for Mum during her illness. I was a Farm Worker for years and had accommodation provided with the position but shortly after Mum passed, my own health suffered with serious heart concerns which effectively forced me to retire early. The family home then became a lifesaver for me and I have now taken up the family mantle and take great pride in the fact that the home is beautifully maintained and cared for.	The City acknowledges the history and deep connection that you and your family have had with this site for many years. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs. The City will advocate for affected tenants to connect them with available housing support services. Efforts are also being made to explore relocation options with other parks for parks relocation opportunities.

		This is the only home I have, and do not have the financial ability to purchase anything or to pay to relocate. Everything we had spare as a family, was used to upgrade and upkeep this home and Mum presumed I would also come and live with her in my retirement, and care for her as she aged. I am deeply concerned that the family home is being referred to as "a deceased estate" by management and don't understand what this implies for my security as this has been our family home for almost 30 years. I am almost 68 years old and a hardworking and respectable pensioner and would hope the RAC as the proposed Lessee would look at the situation with empathy and make a kind and considered decision.	
5.	Robin Heckler	I am an 87 y/old Long-stay park home owner in the above park. My concern is the present owners REDWOOD Corp. [who lease the land from Albany Shire] are in talks with RAC ? re. selling the park. If the sale goes through, I will be given maybe 180 day to some how, remove my substantial home to scrap, at a cost thousands of dollars?? Will the Albany Council do anything to rehouse me, along with the other 20??	The City acknowledges the concerns raised regarding the impact of the proposed lease and associated requirement for vacant possession on current long stay tenants. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. A lease is not able to override rights and obligations made by legislation. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs. The City will advocate for affected tenants to connect them with available housing support services and explore relocation options with other parks.
6.	Robin Bollard	You may recall there has been many residents of Rose Gdns attending council meetings recently, concerned about their homes in the park. I have been a resident for 25 years, am a pensioner and will have no where to go should RAC request the park to be vacated. Plus my residence is too old to be relocated and many others are in the same situation.	The City acknowledges the concerns raised by long stay tenants regarding the requirement to relocate due to the proposed lease sale to RAC.

		We have had no answers from the parties concerned with the sale of the park, despite our enquiries for months now. The council has been involved since October 2024 and the residents have been kept in the dark. This is morally wrong! Of course we object to the sale of the lease if it means we have to abandon our homes. Acclaim Parks have not been the greatest landlords either, they are up before SAT at present for malpractice of government park rules. One issue being residents with no leases at all! Also Acclaim Parks have neglected the upkeep of the park for sometime now. And they have had plenty of business with revenue coming in from chalets, caravaners, campers and of course the residents. So all up, it's not looking good for the resident's whichever way the sale is steered.	The City will advocate for affected tenants to connect them with available housing support services and explore potential relocation options with other parks. Redwood Corporate Pty Ltd is responsible for communication with long stay tenants about their tenancy. The City is not a party to these tenancy agreements. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale. Until this point, information about the sale were part of a private a sales agreement that the City was not involved in. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be relocated. The City notes your comments regarding the SAT matter and maintenance of the park under the current operator.
7.	Noel & Pam Parkin	We have been in the Park for over 30 years and as we were not allowed to sell in 2nd Avenue. We removed the unit and were permitted to buy a Park Home in site 200 5th Avenue. We are both in our 80s concerned about the stress around uncertainty for the sale of Park. We are concerned for lack of information given to us about future tendency.	The City recognises the stress and uncertainty regarding the sale of the park. On 30 March 2025, the current park operator sent a letter to all long-stay tenants confirming the sale of the park. The letter outlines the requirement for vacant possession and includes information about the ex-gratia payments from RAC and Redwood Corporate Pty Ltd to help affected tenants with relocation costs.

			The City will advocate for affected tenants to connect them with available housing support services and explore potential relocation options with other parks.
8.	Evan (John) Lloyd	I write regarding my home, it is one of the more solid homes on the Rose Gardens site. I would never be able to afford to have my home moved given the figures mentioned. Also, currently, there are no other sites available that offer permanent residency for park homes. It has been suggested that I put my name down for residential care; however, I understand these vacancies come up only rarely. If I was to be evicted The only option would be, that I would need to leave Albany to find affordable accommodation elsewhere. I am an aged pensioner about to turn 80. I have had the site on which I live for the last 12 years- during all this time I have volunteered several days a week with the Albany Historical Society as the coordinator of Patrick Taylor Cottage, I hope to continue in this role as long as lam able. I do not want to contemplate leaving my home or Albany.	The City acknowledges the practical challenges of relocation, particularly for long stay tenants with limited financial means and the costs involved in moving a park home. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be relocated. The City understands your desire to remain in the area and continue your volunteer work. The City will advocate for affected tenants to connect them with available housing support services and explore potential relocation options with other parks.
9.	Newton (Ted) Thompson	With response to the letter on the up-and-coming meeting, where the Council will be voting on our behalf, for the transfer between Acclaim and RAC to whether it involves Vacant Possession. This sort of thing is happening all over Australia putting senior people, who have resided in this sort of accommodation for many years, in a very demoralising position of homelessness. As we are all very aware there are shortages of rentals, or they are not obtainable as they are too expensive. In regard to relocating my home, the cost of trying to remove it would far out way the value of the van, but also my van will definitely NOT be able to be moved, as I have lived there for 32 years, and it has been there for many years before I brought it. It would break up in the move. It is also surrounded by large trees and garden. There is also nowhere to take it. Where do I go?	The City acknowledges how stressful this situation is, especially for senior tenants. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be moved.

		I would like you to consider – if this was your parent, what would you do? Many seniors (as in my case) are not wanting this to happen as it will put us under undue stress.	The City will advocate for affected tenants to connect them with available housing support services and explore potential relocation options with other parks.
10.	Stevenson Family	We would like to voice our concerns and impact that the pending sale and lease termination has upon our family. We have not received any correspondence or information regarding the sale of the park. The first we heard of this was through the media, as you can imagine the stress and panic this caused. Our elderly Father has been going to this onsite caravan on a regular basis for over 20 years. He has made numerous friends which is very valuable when aging. It gives him an outlet due to physically being unable to a lot of things anymore. It gives his something to look forward to and keeps his social circle going. Additionally, to our father's declining mobility, we have two family members taking on a caring role, both on carer's payment and unable to work due to the caring roles we provide. This makes having a bit of respite away from these roles unaffordable with the cost of living now. The Van provides a valuable asset to our situation. Our Van can not be relocated and would be unable to be sold under the current circumstances due to the pending sale of the park, therefore it would have to be destroyed and disposed of. This is something that would have a detrimental effect on our family. Apart from the expense of this, our father would lose contact with most of his social base and mentally not being able to take a break away from caring roles creates a huge mental challenge. I hope you take into consideration that this is the only outlet, place of solace that some people have known for a long time and to deny not only us, but others could be detrimental to people's health, wellbeing and mental state. Thank you for your time considering our concerns.	The City acknowledges the concerns raised regarding the proposed sale of the park, and the emotional and practical impact this is having on the family, especially the elderly father. We note the site is used by the family for respite. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale. Until this point, information was contained in a private sales agreement that the City was not a party to. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be moved.
11.	Brian and Debbie Stevenson	We would like to voice our concerns and impact the pending sale and lease transfer will have upon our family. Firstly we have had not correspondence or information about the sale or lease termination for the park, the first we knew of anything happening was through social media. Since then it has caused a lot of stress and anxiety to	The City acknowledges the concerns raised in your submission, especially the impact on the family. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale. Until this point, information

		myself and my elderly father. This has not been good for my dad who is not in the best of health. Dad has been going to his on-site van for over 20 years. In that time he has made many friends and loves to have a chat with everyone. He looks forward to going down to catch up with everyone. It really lifts his spirits. Dad's health is not the best so two family members have taken on the carers role both are on carers payment and are unable to work due to the care we provide. This makes having an affordable place for respite is a very valuable asset to our situation. The van now can not be sold or relocated. There is nowhere to relocate too, the van also would not survive any relocation. It is really upsetting not knowing what is happening to us and our many friends(the other residents). Thank you all for taking the time to listen to our concerns	was contained in a private and confidential sales agreement that the City was not a party to. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be moved.
12.	Beverley Taylor	My name is Beverly Taylor and I am 88 years old. I live at the Rose Gardens Caravan Park in a Caravan with a solid annex. I bought this caravan with a solid annex back in 1993 in good faith. The agreement was to pay rent for the site 2 weeks in advance. There was no written contract. Since purchasing my home, I have added on the carport in 1996 with the caravan parks permission. I have also provided pavers for the carport. Since the purchase of my home, I have maintained the premises with calling upon local trades people to either maintain or carry out repairs. I am an independent woman who is needing no age care and have loved my home at Rose Gardens. Since hearing of the proposal for the City of Albany to transfer the lease of Rose Gardens, from Acclaim to RAC Tourism Assets. I am very concerned with what the outcome will be for me. I fear of being homeless if RAC Tourist has the vacant possession arrangement. There is no provision for me to sell my home due to the circumstances that have arisen with the transfer of lease. Yes, I do have my name down to go into an independent rental situation, but there is a shortage of rentals available. The cost of rentals is out of reach for a pensioner like me. But the bottom line is that I cannot sell my home to relocate. There has been mentioned of removing /relocating the caravan to another premises. This is not an option as no other Caravan parks are allowing for	The City acknowledges the long-standing connection to the Rose Gardens Caravan Park and improvements to the van site. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale and provided information on the requirement for vacant possession. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be moved. The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.

		this to happen. The cost of removing/relocating will be a high cost. Unless it may be relocated to a different location within the same caravan park. With moving the caravan and the solid annex the caravan doesn't have wheels so I believe that moving my home will not survive being relocated. I feel the stress around this uncertain situation is unfortunate as this stage of my life. I feel I have bought my home in good faith to have it taken from me without any value. I feel I have lost my money. The lack of information has been very frustrating to say the least	
13.	Kerrie Stephens	A major and very concerning issue in all of Australia today is homelessness. Considering this I was alarmed to hear of councils plan to sell the tourist park in Emu Point housing 24 older residents in our community. These people have invested in their homes on this property and are now being asked to move the homes or demolish them and leave the site clean all at their own cost and with no recompense!! This is outrageous! These are not people with no capacity to go out and earn more money to try to dig their way out of the terrible situation imposed upon them. How can this align with the values of this community? Homelessness is becoming a looming reality for many. What conditions did the council insist on to protect the investment and rights of these long term tenants? I would like you to imagine yourself in such a position of insecurity at a latter stage of your life. How can there be no compensation to assist in rehousing these local residents. I will look forward to hearing from you in regards to my serious concerns and how you will address them	The City acknowledges the concerns raised regarding the potential impacts of the proposed lease, particularly in relation to housing security for long-term long stay tenants. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. The sales agreement, not the lease between the City and RAC, will deal with the issue of vacant possession.. A lease is not able to override rights and obligations made by legislation. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be relocated. The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.
14.	Bradley Scott Marwick	I am writing to you to say that I do oppose being relocated its my home its all I have got. Nowhere to go. Fear of being homeless & all the stress around not being told what is going on.	The City acknowledges the concerns raised in your submission. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale and requirement for vacant possession.

			RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be moved. The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.
15.	J Nickolson	On behalf of the 27 residences in Rose Gardens Caravan Park we are not in favour of R.A.C taking over the lease in this park. We will be all homeless as there is no sites available in Albany. I have seen what RAC does to parks they take. The bulldozers are bought in and razer the lot. The shingleback lizards & giant skinks will be killed plus birds that nest up in the trees which will be destroyed. Older people appreciate this park as it is a lot quieter than the parks which cater for families. I hope you take this into consideration as we will all be living on your streets if we are removed.	The City acknowledges the concerns raised in your submission regarding the impact of the proposed lease on long stay tenants. Any development of the site will be subject to a Development Application. As part of this, there will be requirements for flora and fauna surveys and will be subject to relevant environmental approvals. The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities. .
16.	Reg Hoyling & Eva Johnson	Our concerns are that We only bought our place in May 2023 on the understanding we would be here until we both turn our toes up (next to the beach). We contacted the Manager of the Park (Rose Garden Caravan Park for assistance on whether the Park is sold & issues & concerns within the Park. We have contacted Albany Legal Aid & Consumer Affairs in Perth but got told we need Legal Aid.	The City acknowledges the concerns raised in your submission and contact with the current park manager and Legal Aid. Tenancy at the park is governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale and requirement for vacant possession.

			RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be moved. The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.
17.	Kristin Withers	I am writing with concerns for the proposal to Dispose of property/ Rose Gardens Beachside Holiday Park. My concerns are for the elderly residents and their homes. The public housing priority wait list are only working on applications from 2021 so there is a four year wait. The standard public housing has a 9 year waitlist. Rental prices per week are more than half of the pension. So that leaves no money to spare once rent is paid. What are they to do? Where are they to go? Most of the residents spent large amounts of cash to purchase these properties in recent years and do not have any back up. I hope on humanitarian grounds peoples lives are put before profit and the residents are considered and compensated or moved on to safe housing. This is a social injustice.	The City acknowledges the concerns raised in your submission regarding the impact of the proposed lease on long stay tenants and availability of public housing. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be relocated. The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.
18.	Dee Kercheval	I have been a permanent resident of Rose Gardens Caravan Park since 2009 and I love living in Albany especially at Emu Point. I wish to comment on the proposed transfer of the Leasehold from Acclaim Parks to RAC. I understand and agree that this will benefit Albany as RAC have a reputation for investment whereas Acclaim do not. The rumours and lack of information has caused great anxiety throughout the Long Term Residents as well as for the Permanent Van owners. Among our concerns are: • Fear of being homeless	The City acknowledges the concerns raised in your submission regarding the impact of the proposed lease on long stay tenants. Since the submission, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale. Until this point, information was contained in a sales agreement that the City was not a party to. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be relocated.

		• Shortage of rentals • Cost of rentals • Cost of removing / relocating premises • Nowhere to relocate to • Our homes devaluing or becoming worthless - for many this is our largest asset (homes) • Ability for your residence to be moved eg: will it survive being relocated • Stress around the uncertain situation • Lack of information / transparency I remain optimistic and hope that the Lease is transferred from Acclaim to RAC, who will issue new leases to the Permanent Residents.	The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.
19.	Mervyn & Diana Aylmore	We write in response to advertising for public comment, as advertised. As long term (25yrs) permanent residents of Rose Gardens Beachside Holiday Park, we provide the following comments. We both sold our homes to purchase our park home in situ at Rose Gardens Holiday Park ("the Park"), plus a caravan so we could travel much of the year as 'grey nomads'. We have enjoyed this lifestyle ever since and are now aged in our 80's. Our permanent residence comprises of a 112sqm park home on wheels, including a permanent addition, attached under cover storage area paid for in situ at the Park. It also includes a double length carport, and approx. 33sqm of paving which we paid for as additions with council permits. We were not asked to sign a tenancy agreement at that time by previous park owners -- it was a handshake. Since then, we have paid weekly rent, plus services, without a tenancy agreement. Although we are now in our 80's, we planned to spend the rest of our independent lives at the Park, then sell our park home in situ and move to assisted care. We are currently both independent, both still drive, and have two cars.	The City acknowledges the concerns raised in the submission presented to Council meeting on 25 March 2025 regarding the impact the proposed lease will have on housing security, financial situation and wellbeing. The City recognises the long-stay tenants connection to the park and the impact changes to the park's future may have on them. The tenancy agreements between the park operator and long stay tenants are private agreements. The City is not a party to these agreements. These agreements are governed by the *Residential Parks (Long-stay Tenants) Act 2006* (WA), which sets out the rights and responsibilities of both park operators and long-stay tenants, including the minimum notice of 180 days to vacate. Since the closing of submissions, Redwood Corporate Pty Ltd has communicated with long stay tenants regarding the sale. Until this point, information was contained in a confidential sales agreement that the City was not a party to. RAC and the current park operator, Redwood Corporate Pty Ltd have committed to offering without-prejudice ex-gratia payments to eligible tenants to assist with relocation costs including those whose caravan or park homes that cannot be relocated.

		We have never been advised by the current lessee that the park is for sale or likely to be sold. Our first understanding was that we heard recently that other permanent residents could not sell their park homes in situ, as the current lessee would not grant a tenancy agreement to new buyers. We have been aware in the past of park homes having offers of up to $190,000 (in situ) one of which eventually went through. We have still not received any communication from current lessee in regard to sale or likely sale of the Park. On 13/03/25 we (and other permanent residents) were given a letter by the current lessee stating that our original tenancy agreement was not signed or lost, and that we were required to sign the attached agreement within 5 days and return. We have been unable to sign the tenancy agreement as; i) the compulsory consumer protection booklet (which states termination and other information such as notice periods etc) did not accompany the agreement as stated in the agreement, ii) the agreement states that we have sought and received independent legal advice however 5 days does not allow sufficient time to secure an appointment, iii) the non-standard specification page includes agreement that upon termination (such as when park is sold) the tenants must pay for all relocation of infrastructure costs and return of site to original condition. Our interpretation of the lessee issuing the tenancy agreement now, including these non standard specifications, is so that the agreement can be terminated by the current lessee upon sale of the Park, and that (against our wishes), we will be required to relocate at our own expense. This will result in unknown financial impost- depending on how far the relocation will be (km's), as well as dismantling of attached side room, carport, and storage area first, plus removing the 33 sqm of paving to return site to original condition. Our option to sell our Park home in situ will be removed, de-valuing our property to infrastructure (less removal costs) only. This is an untested amount as park homes have historically been sold in situ, and we have no	The City will advocate for affected tenants to connect them with available housing support services and has been working with other parks to explore potential relocation opportunities.

		way of knowing what another person would be prepared to pay for our infrastructure given relocation costs. The impact of the above situation is a severe burden on our finances as we sold our properties 25 years ago, and consideration received would not allow us to purchase a property in todays market. Accordingly, we ask the City of Albany, who manage the lease of this crown reserve, to ensure that before any new lease is granted, the current lessee provide adequate notice of relocation (we use this term because there is currently no tenancy to "terminate") and full compensation to all permanent residents for forced relocation costs due to their termination. We have no trust that any amount provided by a new lessee as ex gratia would be passed on to the residents. Our fear is that the current lessee would more likely withhold the payment and residents would be faced with civil action to recover our costs. This would be an unfair barrier for us as senior residents to attempt, who are left with forced eviction without adequate recompense. As you can imagine, in the current housing crisis, without any communication from current/proposed leases, or the City of Albany as manager of the Crown Reserve, this situation is causing undue stress to us and affecting our wellbeing. We are not trying to be unreasonable, however, we do not support the new lease without compensation to current permanent residents of the Park. Thank you for your consideration of our situation. We trust that the City, on behalf of City of Albany residents and ratepayers, will adequately manage the disposal of property under the current lease to ensure permanent residents receive adequate communication, notice period, and relocation compensation prior to assigning a new lease the RAC Tourism Assets Pty Ltd.	

LOCAL PLANNING SCHEME NO. 2

SCHEME AMENDMENT

City of Albany

MARBELUP LANDOWNER GROUP

Harley Dykstra

PLANNING & SURVEY SOLUTIONS

DOCUMENT CONTROL

Control Version	Date	Status	Distribution	Comment
A	14/04/2023	Draft	Internal	
B	24/05/2024	Draft	Internal	
C	18/06/2024	Draft	Internal	
D	22/07/2024	Final	City of Albany	
E	07/08/2024	Final	City of Albany	Resubmission
F/G	28/01/2025	Final	City of Albany	Resubmission to address Planner's comments
H	08/04/25	Final	City of Albany	Corrections made for Council Meeting

Prepared for: Marbelup Landowner Group

Prepared by: SJ

Reviewed by: HD

Date: 08/04/2025

Job No & Name: 22984

Version: H

DISCLAIMER

TABLE OF CONTENTS

FORM 2A

Planning and Development Act 2005

RESOLUTION TO ADOPT AMENDMENT TO LOCAL PLANNING SCHEME

City of Albany

Local Planning Scheme No. 2

Amendment No. 1

Note: Text to be updated in accordance with Council resolution.

RESOLVED that the local government pursuant to section 75 of the Planning and Development Act 2005, amend the above local planning scheme by:

(i) *Rezoning portion of Lot 9001 and Lots 124 (No. 47954), 125 (No. 47914) and 200 (DP52999), Marbelup from 'Rural' to 'Rural Residential'.*
(ii) *Rezoning portion of Lot 9001 (No.688) and Lots 201 (DP52999) and 44 (Plan 584), Marbelup from 'Rural' to 'Rural Smallholdings'.*
(iii) *Rezoning Lot 33 (Plan 584), Marbelup from 'Rural' to 'Drainage/Waterway'.*
(iv) *Rezoning Lot 7864 on Plan 16119 from 'Infrastructure Services' to 'Drainage/Waterway'.*
(v) *Amend the scheme map accordingly*

The Amendment is a complex amendment under the provisions of the *Planning and Development (Local Planning Scheme) Regulations 2015* for the following reason:

1. The amendment is not consistent with a local planning strategy for the scheme that has been endorsed by the Commission.

Dated this.....day of.....20.....

.....
(Chief Executive Officer)

1 INTRODUCTION

1.1 Purpose

Harley Dykstra Pty Ltd, as a long-established town planning consultancy within the Great Southern has been engaged by our valued client, the Marbelup Landowner Group, to prepare the following submission for a Scheme Amendment to the City of Albany's Local Planning Scheme No. 2, referred herein as 'LPS 2'.

This submission seeks for Lots 124 (No. 47954) and 125 (No. 47917) South Coast Highway, Marbelup and Lot 9001 (No. 688) Lower Denmark Road, Cuthbert (referred herein as 'the subject site') to be zoned Rural Residential and Rural Smallholding in the endorsed City of Albany Local Planning Scheme No. 2. This submission includes site context, detail of the rezoning as well as strategic and technical rationale for the modification to LPS 2.

1.2 Site Context

This submission relates specifically to Lots 124 (No. 47954) and 125 (No. 47917) South Coast Highway, Marbelup and Lot 9001 (No. 688) Lower Denmark Road, Cuthbert. The subject site is predominantly cleared and currently used for primary production purposes which is consistent with the current General Agriculture zoning of all sites.

The site is bound by the South Coast Highway to the north and Lower Denmark Road to the south. Rural Residential and Rural Smallholdings zoned land adjoin the subject sites to the north and east, and land west of the subject site is zoned Priority Agriculture.

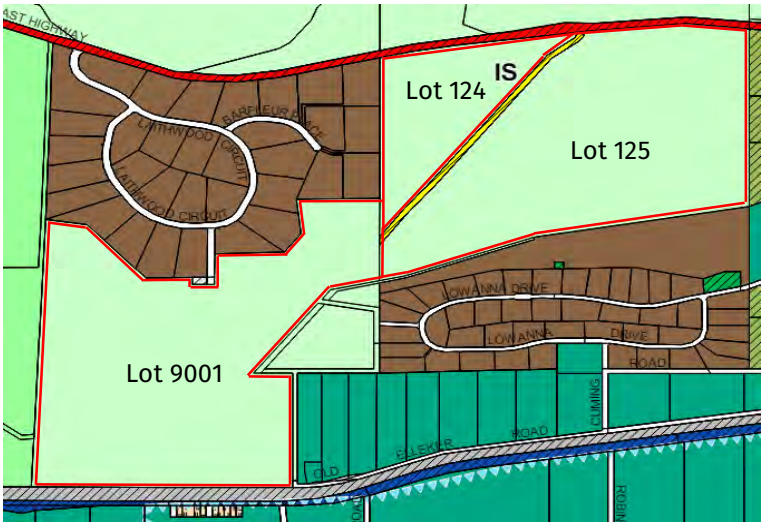


Image 1 – City of Albany Local Planning Scheme No. 2 Map 19 Extract

Image 2 – Aerial image of subject site via LocateV5 mapping

There is a Water Corporation drain, 5 Mile Creek, running from the northeastern area of the site, down to the southwestern corner of the subject site. This drain is centrally located along a low area of the site. There are several distinct areas of vegetation within the subject site, particularly within Lot 125 and Lot 9001. Image 2, above, provides aerial imagery and demonstrates the current site situation of the properties, also highlighting that the land is predominantly cleared.

The property details for the subject sites are as follows:

LOT NUMBER:	PLAN DETAIL	VOLUME/FOLIO:	LOT AREA:	REGISTERED PROPRIETOR:
124	P 16119	1792/396	25.6395ha	Brian Fuller
125	P 16119	1792/397	82.9201ha	Dora Porter
9001	DP 74816	2807/984	100.0755ha	Barry Panizza
44	P 584	2867/375	7.2749ha	Ramon Panizza Emma Panizza
200	DP 52999	2867/376	1.1826ha	Barry Panizza
201	DP 52999	2867/377	1.732ha	Ramon Panizza Emma Panizza
33	P 584	2746/901	1.5719ha	Grande Terra Land Development Pty Ltd

2 PROJECT DETAIL

2.1 Overview

The proposed rezoning has been designed to respond to site specific opportunities and constraints, whilst also ensuring a cohesive relationship with the adjoining properties and their existing uses.

Preliminary zoning design has been developed in conjunction with the specialist consultant team to ensure the design satisfies planning, bushfire and hydrological requirements. An extract of the proposed zoning layout is demonstrated in **Image 3**, below. A full copy of this plan is attached at **Appendix A** of this document.

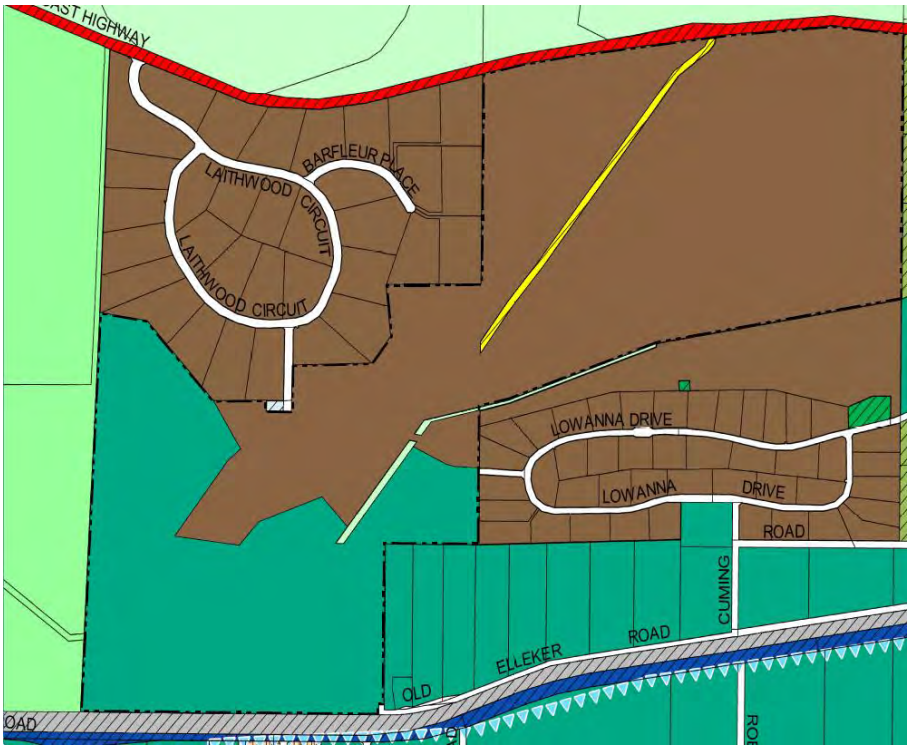


Image 3 – Rural Residential and Rural Small Holding zone design

It is proposed that areas along the western boundary of Lot 9001 will be rezoned to Rural Small Holding. The purpose of this zoning is to provide a transition between the neighbouring Priority Agriculture zoned land and proposed Rural Residential lots. Lots zoned Rural Small Holding are expected to achieve all prescribed requirements of the Rural Small Holding zone, as prescribed in the Local Planning Scheme No. 2.

The Effluent Disposal/Development Exclusion areas have been developed by the expert team at Bio Diverse Solutions. These restrictive areas are demonstrated on the Opportunities and Constraints Plan at **Appendix B**.

It is expected that most of Lot 33 will be reserved as drainage/waterway. This lot lies over the northern portion of 5 Mile Creek (within the subject site), the remainder of the site will comprise Rural Residential zoning. The Rural Residential zone will ensure the balance of the subject site is consistent with the neighbouring land uses.

At subdivision stage, each lot will be designed to respond to all site-specific requirements, which will be informed by the findings of the Local Water Management Strategy, Site and Soil Evaluation and Bushfire Management Plan prepared by Bio Diverse Solutions. It has been recognised that the drainage channel running through the current lots means that low-lying areas are in areas impacted by saturated soils. This has been addressed through ensuring all proposed lots provide a suitable space outside of the Effluent Disposal/Development Exclusion area to accommodate a dwelling and other relevant infrastructure as demonstrated on the Opportunities and Constraints Plan at **Appendix B**. Potential drainage easements have also been incorporated into preliminary designs of road networks.

2.2 Opportunities and Constraints

It is acknowledged that the subject site has a number of environmental constraints. The following table outlines all identified constraints and demonstrates the solutions to overcome these constraints. The solutions demonstrated within the table are informed by discussion with the relevant local or state government agencies, and sub consultants.

Government agencies who have provided advice include:

- Water Corporation,
- Main Roads WA,
- Department of Water and Environmental Regulation,
- City of Albany

Sub Consultants who have informed responses include:

- Bio Diverse Solutions,
- Stantec (formerly Cardno)

	Constraint Identified	**Solution**
1	***Neighbouring Land Use*** *Land immediately west of the subject site is zoned Priority Agriculture.*	The project design represents transitional land zoning, tailored specifically to suit the site-specific considerations relevant to this project. To prevent land use conflict between Priority Agriculture and Rural Residential land uses, the project has been designed with a margin of Rural Smallholding lots along the western side to buffer Priority Agriculture Uses to the Rural Residential lots.
2	***Drainage***	The concept plan has been designed to ensure larger lots will be created over more constrained land, to ensure all proposed lots have capacity to host a

	The site is currently identified as having portions of seasonally inundated areas and waterlogged areas.	dwelling and land application area outside of the Effluent Exclusion and Development Exclusion areas. A Local Water Management Strategy and Site and Soil Evaluation have been prepared, demonstrating the compliance of the site **(Appendix D)**.
3	***Drainage*** *Water flows into the Water Corporation drain must be consistent with existing flow rates.*	The prepared Local Water Management Strategy identifies the location and volume of drainage basins and associated easements to be developed at the subdivision stage of the project. These basins and easements will ensure that water flow rates into the Water Corporation drain are, at minimum, consistent with existing flow rates. Drainage design also includes solutions to rectify ongoing issues from adjoining Rural Residential subdivisions. The Local Water Management Strategy included in **Appendix D** provides further detail on this matter.
4	***Water Corporation Drain*** *Water Corporation drain runs from the northeastern to the southwestern section of the subject site.*	Engagement with Water Corporation Albany has concluded that Water Corporation would like all areas of the current drain to be ceded to Water Corporation as a condition of subdivision. Further, Water Corporation has indicated that they are likely to support the construction of a drain crossing for the purpose of an Emergency Access Way if required.
5	***Reticulated Water*** *Water Corporation relayed that the subject site does not currently have access to reticulated water supply.*	The Water Corporation has advised that a reticulated water connection from Lowanna Drive is accessible to the southwestern portion of the subject site, currently within Lot 9001.

		Water Corporation has advised that reticulated water connection to the northeastern portion of the subject site may not be feasible, and instead these lots could enjoy tank water collected from roof runoff.
6	***Bushfire*** *Areas of the subject site is identified as being bushfire prone.*	The allocation of the proposed zoning has been designed to respond directly to bushfire risk at the site. Provision for Emergency Access Way easements which comply with the statutory bushfire requirements have been embedded into the design of this project. A Bushfire Management Plan has been prepared to provide further detail on this matter **(Appendix E)**.
7	***Access*** *The subject site is bound by South Coast Highway to the north and Lower Denmark Road to the south.*	Preliminary discussions with MRWA have been initiated to collaborate on vehicular access to the sites. Two technical memorandums have been prepared by traffic engineers at Stantec, (formerly Cardno), in the form of both a turn warrant assessment, and an intersection analysis. Both technical memorandums find that the proposed rezoning can be serviced by the South Coast Highway **(Appendix F)**.

3 SUBCONSULTANT INVESTIGATIONS

3.1 Bio Diverse Solutions

3.1.1 Bushfire

Preliminary bushfire mapping, prepared by Bio Diverse Solutions, finds that future lots developed as a result of this scheme amendment request and subsequent subdivision can achieve a minimum BHL of 'Moderate' or lower **(Appendix E)**.

3.1.2 Water

Bio Diverse Solutions has prepared a Local Water Management Strategy (LWMS) and Site and Soil Evaluation (SSE) for the subject site **(Appendix C & D)**. These reports have been prepared to investigate the suitability of the subject site for the proposed rezoning. A summary of the findings of these reports is demonstrated in the following sections.

Local Water Management Strategy

The LWMS prepared for the subject site finds that appropriate drainage mechanisms can be installed to manage water flow at the site. Key elements of the proposed drainage system, as detailed in the LWMS, are as follows:

Lot Attenuation

- It is the landowner's responsibility to manage stormwater runoff from buildings, hard stand (impervious) areas and gardens within the property boundary consistent with the City of Albany's lot attenuation guidelines, i.e. 0.5m³ of storage is required per 100m² of impervious area. Individual Lot stormwater management systems should be assessed and approved by the City of Albany in accordance with future applications.
- Rainwater tanks are recommended on all lots and may be plumbed into homes using a mixed demand system or a trickle feed system to provide available storage for recurrent storm events.
- Soakwells shall only be utilised where there is adequate separation to the peak annual water-table from the base of the soakwell (>300 mm) and adequate gradient for graduated pipe overflow pipes. In areas with shallow depth to groundwater, attenuation basins integrated into the garden landscaping will provide the most effective attenuation mechanism. When designing lot stormwater management systems, overland flow routes directing runoff away from buildings and adjoining properties shall be considered. Lot stormwater management systems should be assessed and approved by the City of Albany.

Stormwater Conveyance

- Roadside swales designed to convey storm events up to the 20% AEP and where required, pipe drains to connect sections of swale sized to convey the 20% AEP storm event. Pipe drains include lot crossovers.

- Roadside swales shall have a minimum side slope of 1:4 between the road and swale and 1:5 between the lot boundary and swale for ease of maintenance. The swales shall be designed with adequate grade for peak runoff conveyance, the minimum longitudinal grade criterion for the swales is 1:200 (0.005). The estimated capacity and top water level of each section of swale shall be calculated using the Manning's formula or appropriate modelling software after earthwork design, once the incoming sub-catchment to each swale section is confirmed.
- Road drainage from storm events greater than the peak 20% AEP event up to the peak 1% AEP event will be directed to the lowest point in each catchment via overland flow along the road pavement. The ultimate road low point will be located adjacent to Five Mile Creek in each sub-catchment to ensure road runoff is directed off site during storm events greater than the 20% AEP. Runoff from storm events greater than the 20% AEP event will be directed off site unattenuated. Attenuation of flows for storm events greater than the peak 20% AEP event, up to the peak 1% AEP event are likely to have negligible impact on the flood regime of the downstream area.

Bio-retention and Stormwater Storage

- Drainage treatment train utilising bio-retention storages, designed to treat the first 15mm of rainfall, by providing infiltration close to source. Bio-retention storages shall be designed to convey up to the 20% AEP storm event. Storages will be located at the low point of the sub-catchments, to direct runoff away from infrastructure in the case that the capacity of the storage is exceeded. The bio-retention storages shall be located outside of Five Mile Creek and its flood/riparian vegetation zone.
- The maximum side slopes of the bio-retention storages shall be 1:6, with at least 0.3m of freeboard provided between the 20% AEP top water level and top of bank. A stabilised low point in the bank shall be provided at the 20% AEP top water level, located downstream in the bio-retention storage so that overflow is directed off site when/if the capacity of the storage is exceeded.
- The base of the bio-retention treatment area shall be underlain with 0.4m depth of amended soil, 0.15m depth of a transition layer (coarse sand) and 0.15m depth of a drainage layer with 100mm (maximum) perforated collection pipes (subsoils). Bio-retention treatment areas shall be planted.
- Outflow from the bio-retention treatment area of the storage for minor storm events (up to the 20% AEP) shall be set at the top water level of the first 15mm runoff event, this is set at a maximum depth of 0.3m to allow for adequate water quality treatment across a larger surface area. Outflow from the treatment area will be via an overflow pit sized to match the peak pre-development outflow for the 20% AEP storm event for each catchment.
- Outflow from the bio-retention storages for minor storm events (up to the 20% AEP) shall be set at the top water level of the first 15mm runoff event, this is set at a maximum depth of 0.5m to allow for adequate water quality treatment across a larger surface area. Outflow from the storages will be via an overflow pit sized to match the peak pre-development outflow for the 20% AEP storm event for each sub-catchment.
- Outflow from bio-retention storages in Sub-catchments A and B will discharge to Five Mile Creek. Outflow from Sub-catchment C will discharge to the Five Mile Creek tributary to the

south of the Subject Site, whilst Sub-catchment D will discharge to South Coast Highway and ultimately Five Mile Creek further downstream. The Sub-catchment D bio-retention storage is proposed to be a swale within the road reserve with side slopes consistent with that specified for roadside swales and all other specifications consistent with a bio-retention storage. Measures shall be taken at the downstream end of the storage outlets to ensure scouring, and movement of sediment is minimal, this may include rock pitching and stabilisation matting.

- All bio-retention/stormwater storages shall be contained within easements and have adequate access for maintenance. Bio-retention storages located adjacent to Five Mile Creek shall be located outside of the designated creek easement.

Flood Protection

- All building pad finished levels shall have a minimum of 0.3m separation above the estimated 20% AEP top water level in the bio-retention storages and above the 1% AEP top water level in nearby waterways and waterbodies consistent with the Local Government Guidelines for Subdivisional Development (IPWEA, 2017).
- All roads shall have a minimum separation of 0.3m above the 20 % AEP top water level in the bio-retention storages and nearby waterways and waterbodies.
- Building pads shall be set back a minimum of 100m from Five Mile Creek for both flood protection and environmental protection of the waterway.

Based upon these management strategies, detailed in the LWMS prepared in relation to the proposed rezoning, it is evident that any future lots developed as a result of the rezoning of the subject sites can appropriately manage stormwater runoff.

Site and Soil Evaluation

The SSE prepared by Bio Diverse Solutions to inform this project finds that lots resulting from the proposed rezoning can achieve the required outcomes of the Government Sewer Policy in terms of onsite effluent management.

Importantly, the SSE evaluates existing environmental limitations at the site which has been used to inform the zoning for different portions of the site. The concept plan has been designed to ensure that all future lots contain a portion of land which can host a Land Application Area, while achieving other planning requirements.

The SSE prepared for this project finds that the subject site can accommodate onsite effluent disposal systems, and that future lots can achieve adequate land application areas.

3.2 Stantec (Traffic)

Stantec has prepared two technical memorandums in relation to the proposed rezoning. These technical memorandums provide detail on the turn warrant and intersection analysis at the subject site.

These technical memorandums have been prepared by Stantec to inform the development of this Scheme Amendment application **(Appendix F)**.

Turn Warrant Assessment

The Turn Warrant Assessment in relation to the subject site finds that the South Coast Highway can host two new intersections to benefit the proposed development. Particularly, the technical memorandum details:

> *'Based on the assessment for both peak hours, auxiliary lanes are not required for Access 1* (the western access onto South Coast Highway)*. For Access 2* (the eastern access onto South Coast Highway)*, an AUR turn treatment is warranted in 2024 and 2034 turning movements and AUL(S) is warranted in 2034 from a safety perspective taking into consideration the posted speed on South Coast Highway is 110km/hr.'* Stantec, 2022

Therefore, any future intersections onto South Coast Highway required for the proposed development can be safely sited.

Intersection Analysis

The Intersection Analysis prepared by Stantec investigates the capacity of South Coast Highway to host increased traffic volumes which are expected if the proposed rezoning and subsequent subdivision progresses. This intersection analysis includes SIDRA modelling, and a summary of the findings of this document is as follows:

- *All the intersections are anticipated to operate at good levels of service, average delays and capacity during both the AM and PM Peak hour periods for the opening year at future 2034 horizon.*
- *Based on the SIDRA traffic modelling analysis, the proposed development is expected not to have any material or significant impact on the surrounding road network.* (Stantec) 2022

Therefore, SIDRA modelling undertaken by Stantec finds that intersections resulting from the proposed rezoning can be safely designed.

4 PLANNING FRAMEWORK

4.1 Strategic Rationale

4.1.1 Lower Great Southern Strategy

The Lower Great Southern Strategy 2016 (LGSS) identifies the key goals for the Lower Great Southern Region, including the City of Albany, over the next 20 years from 2016. The proposed rezoning is consistent with the LGSS as it represents investment in the region which will stimulate growth and development to the area. This directly corresponds to objective 2.3 Economic Growth of the LGSS, as the proposed rezoning will contribute positively to Albany and the wider Great Southern region.

4.1.2 City of Albany Strategic Community Plan 2032

The City of Albany's Strategic Community Plan 2032 (SCP) is the document which identifies the wants and needs of the community, as determined by the community through the Markyt Scorecard, and identifies how the City will work to achieve these desires over the next 10 years.

The Albany community identified "Place" to be a key area for improvement, with the City then describing a goal for Albany to be 'A responsibly planned city that is attractive, vibrant and well connected'. To contribute toward achieving this, Outcome 7 of SCP describes 'Responsible growth, development and urban renewal', with objectives of this outcome being:

> *7.1 Plan a compact city with diverse land, housing and development opportunities.*
>
> *7.2 Plan for adequate utilities to support responsible growth.*

The proposed zoning of the subject site to Rural Smallholding and Rural Residential allows for diversity of land use, which will contribute toward the overall vibrancy of land use in the growing Albany area. Further, diversity of zonings promotes extended development opportunities, which will proliferate into increased residency in the City of Albany.

4.1.3 City of Albany Local Planning Strategy

The City of Albany's Local Planning Strategy outlines the vision of Albany, and how this vision is to be actualised for the region.

Part 2.2.3 Rural Living of the City's Local Planning Strategy highlights that the strategic objectives of the strategy are to:

> *...encourage the efficient use of existing rural living areas by maximising their development potential and to avoid the development of rural living areas on productive agricultural land, important natural resource areas and areas of high bushfire risk* (City of Albany Local Planning Strategy, page 19).

As is demonstrated at **Image 3**, land bordering the subject site is already zoned and subdivided in accordance with its Rural Residential zoning. The proposed rezoning and consequential subdivision are consistent with maximising the development potential of the rural living area. Further, the subject site is considered to have restricted agricultural viability due to its proximity to rural residential zoned land and identified site constraints, making the proposed rezoning a progressive change and cohesive to the existing area.

The City's Local Planning Strategy goes on to describe that while there is substantial demand for rural living properties in the City, there has been a reduction in the volume of sales for properties above 1ha (The Hotspots Report, 2015). While this may have been the case when the Local Planning Strategy was written in 2019, private developers and market experts have identified change to buyer habits which has led to this project being developed. This rezoning will respond directly to the increased demand for Rural Living lots in the Albany area.

The City's Local Planning Strategy 2019 Image 4 Urban Strategy Map includes the subject site within Strategic Direction 4 of the plan (see **Image 4**, below).

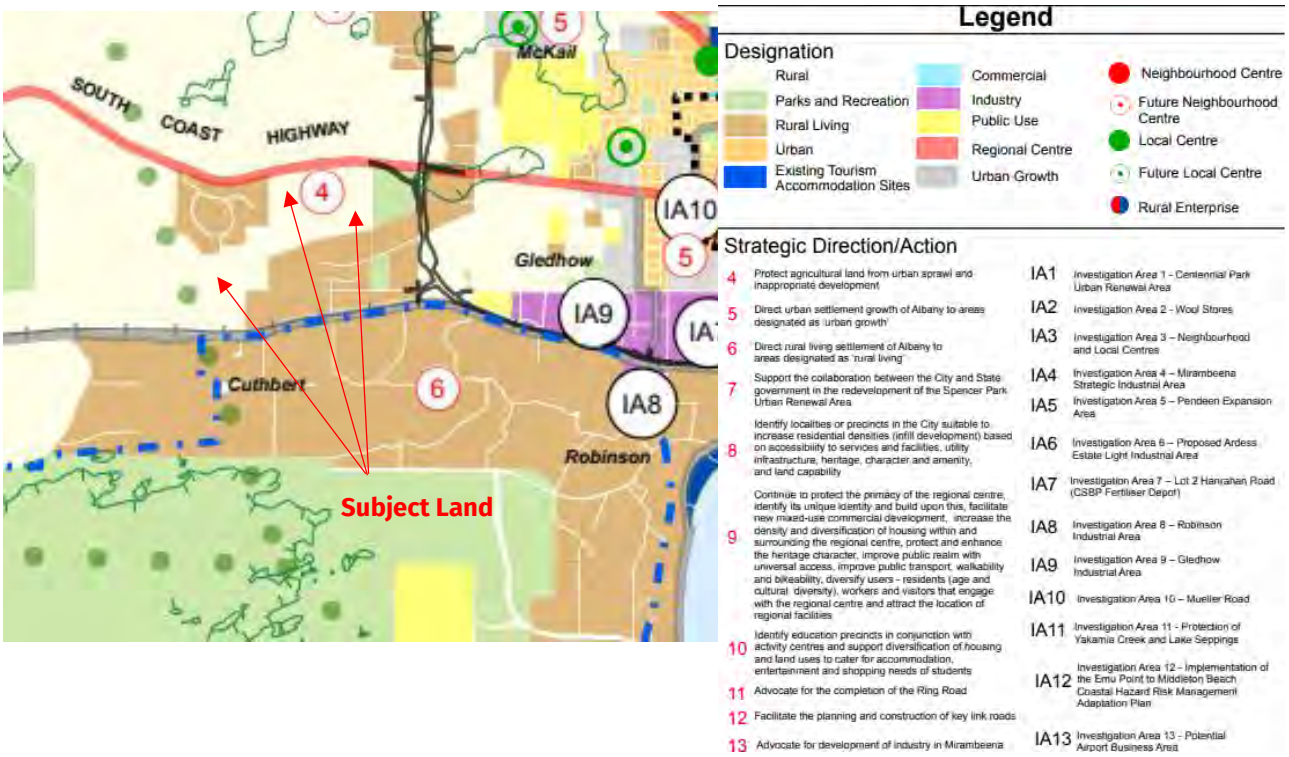


Image 4: Local Planning Strategy 2019 Urban Map

Strategic Direction/Action 4 is intended to 'protect agricultural land from urban sprawl and inappropriate development'. Land adjoining the site to the northwest and southeast are designated Rural Living, as is a large portion of land to the south of Lower Denmark Road. The proposed rezoning is considered infill development only and is consistent with the current surrounding land uses.

Finally, the completion of the construction of the Albany Ring Road ensures that local government can be confident in making decisions relating to land near the Albany Ring Road corridor. The Albany Ring Road corridor represents improved road connectivity for subdivisions such as the Lowanna Drive rural residential area, and the proposed subject site. This proposed change to the zone reinforces the clear consolidation of the Albany settlement pattern in this locality.

Based on this rationale, the proposed rezoning to Rural Residential and Rural Small Holding is considered consistent with the City's Local Planning Strategy.

4.2 Statutory Rationale

4.2.1 City of Albany Local Planning Scheme No. 2

It is recognised that the City of Albany Local Planning Scheme No. 2 (LPS 2) has been recently adopted by the City, after approval by the Minister for Planning. The subject site is zoned Rural in

the LPS 2. Land immediately west of the subject site is zoned Priority Agriculture, while land adjoining the sites to the north, east and south are zoned Rural Residential and Rural Smallholding.

The proposed rezoning will be consistent with the provisions of the Rural Residential and Rural Smallholding zones, as prescribed in the LPS 2.

The proposed zoning request of the subject site consolidates the surrounding Rural Residential footprint or the area. The ability for the subject site to be used for rural activities is heavily restricted by the adjoining Rural Residential zoning. Therefore, the landowners are seeking an avenue for their properties to serve them into the future by creating Rural Residential and Rural Smallholding lots, in the absence of being able to fully utilise their land for Rural pursuits due to land use conflicts.

The proposed rezoning has been designed to respond specifically to the existing surrounding land zones. Particularly, the portion of Rural Small Holding land along the far western boundary which has been positioned as a transition zone between the Rural Residential and the Priority Agriculture land.

4.3 Subdivision Requirements

The following policies will need to be addressed as part of the future subdivision applications for the subject site following gazettal of the scheme amendment.

4.3.1 Operational Policy 1.1 Subdivision of Land (General Principles)

The Operational Policy 1.1 Subdivision of Land (General Principles) (OP 1.1) sets out the general principles that are used by the WAPC in determining applications for subdivision of land.

Therefore, any future subdivision at the subject site will need to comply with OP 1.1.

4.3.2 Government Sewerage Policy

The Government Sewerage Policy (GSP) sets the State Government's position on how sewerage services are to be provided in Western Australia through the planning and development of land.

The subject site is not identified within a 'sewage sensitive area' and does not occur within a public drinking water source area. Preliminary hydrological investigation, summarised at Part 3.1.2 of this report, has found that lots located at the subject site are able to be adequately serviced for onsite effluent disposal systems. The Opportunities and Constraints plan, attached at **Appendix B**, identifies the recommended Land Application Areas for each proposed lot.

The SSE prepared for the subject land summarises the compliance to the GSP minimum requirements as follows:

Lot 9001	**Lot 124 & 125**
• Soils across the Subject Site varied with site and topography. Generally, the soil types encountered on site were found to be sand with silt, sand with silt over gravel, sand over gravel over rock and sand with silt and peat with the	• Based on soil type, onsite effluent disposal is achievable across the Subject Site using standard land application systems, such as leach drains and sub-surface irrigation systems with no special design considerations required.

Lot 9001	Lot 124 & 125
majority of the Subject Site consisting of sand with silt to 2 metres (Figure 11). Given the free draining nature of the soil types found across the Subject Site, onsite effluent disposal is achievable with standard land application systems, such as leach drains and subsurface irrigation systems, with no special design considerations required. It is recommended that onsite effluent disposal be avoided within the area classified as sand over gravel over rock. Proposed future lots that intersect this soil type can achieve onsite effluent disposal within the sand with silt over gravel soil type, directly downslope of the sand over gravel over rock soil type, thus avoiding potential failure of the land application system due to the impermeable nature of the rock. Where depths to rock or impermeable layers is less than 1.2m from the base of the land application system, and this cannot be avoided, imported fill and/or special design requirements and distribution techniques will be required.	The main soil profiles encountered on site were found to be sand with silt to the depth of the hole, sand with silt over sandy gravel, over sandy clay and sandy gravel/gravelly sand, over sandy clay/clayey sand. The soil types found onsite are generally associated with a moderate to rapid permeability rate due to their relatively high sand and silt content and absence of any heavy clay layers. TP10 was the only test pit to encounter a medium density clay layer within 2m depth of the surface, the infiltration rate for Land Application Areas (LAAs) in the vicinity of TP10 shall be confirmed prior to subdivision stage, to determine if special design is required. Bedrock was encountered at TP17 only, at a depth of 1300mm, the depth to bedrock shall be confirmed for LAAs in the vicinity of TP17 at subdivision stage, to ensure there is a minimum of 1200mm of separation between the base of the effluent application system and confining layers (bedrock). If 1200mm of separation to a confining layer is unachievable, imported fill and/or special design considerations may be required. Special design requirements for onsite effluent disposal at the Subject Site is discussed in Section 6.
• The slopes across the site generally do not exceed the minimum grade requirements (1:5) as outlined in Table 3 of the GSP (DPLH, 2019a). The Subject Site is generally flat except in the northwest of the site where slopes steepen towards the ridge line, with slopes here being approximately 1:10. Construction of Land Application Areas (LAA) on the steeper sections of the ridgeline shall be avoided where possible. LAAs shall run parallel with topographic contours and be flattened off within lots with gradual to moderate slopes.	• The slopes across the site generally do not exceed the minimum grade requirements (1:5) as outlined in Table 4 of the Draft Government Sewerage Policy. Where the slopes descend steeply towards Five Mile Creek (slopes here are a maximum of 1:6), care shall be taken to ensure LAAs run parallel with the topographic contours and flattened off to minimise runoff towards Five Mile Creek.

Lot 9001	Lot 124 & 125
• The minimum separation required between the peak annual water-table and effluent application in sandy soils is at least 1.5m (DPLH, 2019a). The depth to the peak annual water-table across the Subject Site is generally shallow (<1.5m). Where separation to groundwater is <1.5m, as seen across much of the site, imported fill and/or special design requirements (as discussed in Section 6) will be required for the LAAs to ensure the separation to groundwater requirement is met.	• The depth to the peak annual water-table across the site varied from at surface (0 mm BGL) to not encountered to 2 metres during the site investigation. Most of the low-lying areas associated with a high groundwater consist of sand with silt to 2 metres. The minimum separation required between the peak annual water-table and effluent disposal in sands, is at least 1.5m and 0.6m when a secondary treatment system is utilised. Where separation to the peak annual water-table is <1.5m using primary treatment only or <0.6m using a secondary treatment system, imported fill will be required for the LAA to ensure the separation to groundwater requirement is met. Where the depth to the peak annual water-table is <0.5m BGL, it is recommended that the building envelopes (including LAA) within the proposed lots be filled with suitable imported fill material, so that a minimum of 0.5m of separation to the peak annual water-table is achieved across the building envelope prior to subdivision. Further groundwater investigation may be required to better identify the areas that require filling to achieve 0.5m separation to the peak annual water table. Following subdivision, it shall be the responsibility of the future lot owner to ensure the GSP (2019a) groundwater separation requirement is met. This separation requirement is applicable to the LAA only, with the location of the LAA dependent on building placement. Where the depth to the peak annual water table is <0.5m, the lots shall be a minimum size of 1 ha.

Lot 9001	Lot 124 & 125
• The nearest domestic groundwater bore to the Subject Site is approximately 60m to the east (Figure 7). The minimum separation requirement between effluent application and domestic production bores is >30m, this is achievable at the Subject Site. Any future proposed domestic bores shall be situated at least 30m from any LAA.	• It shall be ensured that if the domestic production bore located within the Subject Site is to be retained, that >30m separation between the bore and LAAs be achieved. The nearest domestic groundwater bore to the Subject Site is approximately 150m to the west. The minimum separation requirement between effluent application and domestic production bores is >30m, this is therefore achievable at the Subject Site. Any future proposed domestic bores shall be situated at least 30m from any LAAs.
• The Subject Site is intersected by Five Mile Creek, there is also a tributary to Five Mile Creek in the central portion of the Subject Site, a constructed drain in the southwest of the site, and multiple smaller scale waterbodies/dams/seasonal drains in the south, central and northeast of the Subject Site. A 100m setback between Five Mile Creek, the Five Mile Creek tributary and the constructed drain in the southwest, to all LAAs shall apply. These are major waterways and flow for most of the year. A minimum 30m setback shall apply between the smaller and more seasonal in nature waterbodies/seasonal drains/dams to all LAAs. These waterways/waterbodies are generally only connected to the major waterways during larger storm events, and there is generally more opportunity for the infiltration and uptake (by vegetation) of any potential contaminants and nutrients generated from the effluent. A 30m setback shall also apply to any future proposed stormwater storages/swales and all LAAs.	• A 100m setback shall be implemented between Five Mile Creek and all LAAs at the Subject Site. There is also a tributary of Five Mile Creek running parallel to the southern boundary of the Subject Site that shall also have a 100m setback to all LAAs. There are several farm dams across the Subject Site, if these dams are maintained and not decommissioned as part of development works, a 30m setback between LAAs and the dam/s is recommended. A 30m setback shall also be applied between any maintained or future proposed constructed drains, stormwater storages/swales and all LAAs. These minor/seasonal waterways/waterbodies are generally only connected to the major waterways during larger storm events, and there is generally more opportunity for the infiltration and uptake (by vegetation) of any potential contaminants and nutrients generated from the nearby onsite effluent disposal systems.

Lot 9001	Lot 124 & 125
• According to data results for site No. 603115, the highest recorded level at the downstream end of Five Mile Creek within the Subject Site is 10.3m AHD (1997-2022), which was recorded on the 30th August 2001. LAA shall be setback 100m from Five Mile Creek and as such they will be located outside of the 1% AEP flood levels for Five Mile Creek.	• According to data results for site No. 603115, the highest recorded level at the downstream end of Five Mile Creek within the LSP area, is 10.3m AHD (1997-2022), which was recorded on the 30th August 2001. This flood level did not breach the creek channel by more than 10m. LAA shall be setback 100m from Five Mile Creek and as such they will be located outside of the 1% AEP flood levels for Five Mile Creek.
• LAAs shall not be located within areas deemed as subject to seasonal inundation, this is achievable at the Subject Site, as shown in Figure 15. LAAs shall be avoided in areas subject to seasonal waterlogging (<0.5m separation to groundwater) where possible. If areas subject to waterlogging cannot be avoided for LAAs, then imported fill and/or special design requirements will be required to meet GSP (DPLH, 2019a) requirements. In areas where the separation to groundwater is <0.5m, it shall be the responsibility of the proponent to fill a building envelope (including the LAA) to achieve at least 0.5m separation to the peak annual water-table. Following subdivision, it shall be the responsibility of the future lot owner to ensure the minimum groundwater separation requirement is met. This separation requirement is applicable to the LAA only, with the location of the LAA dependent on building placement. Where the depth to the peak annual water table is <0.5m, the lots shall be a minimum size of 1 ha.	• A 6m setback from the lot-to-lot boundaries to LAAs shall apply. Additionally, a 6m setback from the road reserve boundary to down-gradient LAAs shall also apply, and a 12m setback to LAAs that are up-gradient of the road reserve boundary shall apply to provide additional separation to any proposed roadside drains.

Lot 9001	Lot 124 & 125
• A 6m setback from the lot-to-lot boundaries to LAAs shall apply. Additionally, a 6m setback from the road reserve boundary to down-gradient LAAs shall also apply, and a 12m setback to LAAs that are up-gradient of the road reserve boundary shall apply to provide additional separation to any proposed roadside drains.	

Any future subdivision or development of the subject site will need to comply with the GSP.

4.3.3 State Planning Policy 3.7 Planning in Bushfire Prone Areas

State Planning Policy 3.7 Planning in Bushfire Prone Areas (SPP 3.7) determines the requirements of planning in areas which are identified as being bushfire prone. Portions of the subject site are identified as being a bushfire prone area, and therefore preliminary expert advice has been sought in support of the proposed rezoning.

The Bushfire Management Plan (BMP) identified most of the site as being subject to a moderate BHL. The future rural residential development will allow for BAL-29 APZ's to be implemented on all lots. There are small patches and thin strips of remnant forest vegetation within the development area. Appropriate setbacks from all areas of vegetation will ensure BAL-29 can be achieved for all lots. In the future, all APZ's will be maintained to the required standards set out in the guidelines. If the subsequent subdivision is staged, the developer will need to maintain the balance of land in ownership in accordance with the City of Albany Fire Management Notice and the WAPC APZ standards. Any landscaping, replanting for buffers, screening or enhancement of the site is to conform to WAPC APZ requirements and should be reviewed by the bushfire practitioner prior to approval from the Local Government to meet low fuel requirements or to ensure it does not increase the bushfire threat.

The BMP demonstrates further compliance to the four elements of the bushfire protection criteria (Appendix 4; WAPC, 2021).

The Opportunities and Constraints plan at **Appendix B** also demonstrates potential locations of Emergency Access Ways to ensure all lots adhere to the requirements of relevant planning and bushfire regulation.

Any future subdivision or development of the subject site will need to comply with the requirements of SPP 3.7 and the approved Bushfire Management Plan.

4.3.4 State Planning Policy 5.4 Road and Rail Noise

The subject land is within the trigger distance of State Planning Policy 5.4 (Road and Rail Noise). South Coast Highway is located to the north of the site, with a speed limit of 110km/hr.

Table 2 within the Road and Rail Noise Guidelines assists in the forecast of noise exposure category based on distance (m) from the edge of the main road carriageway. The assessment in **Table 2** below has been based on a 2 lane 'other significant freight/traffic routes.'

DWELLING	DISTANCE TO CARRIAGEWAY	FORECAST EXPOSURE CATEGORY	FORECAST NOISE EXCESS LEVEL	HOUSE PACKAGE
Indicative building envelope	100m	55dB	0 or less	-

Table 1 SPP 5.4 Noise Exposure Forecast

The calculation identifies no forecasted excess noise levels impacting proposed dwelling sites; therefore, no additional measures will be required on the assumption that development does not take place within a 100m setback from South Coast Highway. If development does take place within a 100m from South Coast Highway, the maximum excess noise level is 8-11dB requiring a noise management plan or quiet house package.

The subject land is also within the trigger distance of the freight railway line to the south. The assessment in **Table 2** below has been based on 'freight railways, up to 1 movement per hour'.

DWELLING	DISTANCE TO RAILWAY	FORECAST EXPOSURE CATEGORY	FORECAST NOISE EXCESS LEVEL	HOUSE PACKAGE
Indicative building envelope	150-200m	51-52dB	1 to 3	Quiet house package

Table 2 SPP 5.4 Noise Exposure Forecast

The calculation identifies an 'A' exposure category requiring mitigation measures in accordance with an approved noise management plan or quiet house package as specified.

This assessment demonstrates that compliance with the deemed to comply measures can be achieved, negating the need for a comprehensive noise management plan.

5 REQUESTED AMENDMENT

In acknowledgement of the above, we request that the following amendment be made to the City of Albany Local Planning Scheme No. 2:

1. Rezoning the subject site to Rural Residential and Rural Smallholding, consistent with the rezoning plan at **Appendix A** of this document.

This modification to the Local Planning Scheme No. 2 would ensure that current lots are able to be developed in a manner consistent with the environmental considerations at the site and the neighbouring land uses.

6 CONCLUSION

Harley Dykstra has prepared this Scheme Amendment application on behalf of the Marbelup Landowner Group to demonstrate the merits of amending the zoning demonstrated in the City of Albany's Local Planning Scheme No. 2.

Section 2.2 of this Scheme Amendment application has identified the 7 key constraints to the future development of this site. These constraints have been reviewed by the relevant local or state government agencies and appropriate specialist consultants who have provided solutions to each of these to demonstrate the suitability of the future development of the site. Section 3 provides details of the specialist consultants' reports which informed these solutions.

In Section 4, the strategic and statutory rationales are provided to address those elements of the planning framework that are applicable to this application.

Based on the description and rationale provided within this report, we respectfully request the City considers the proposed rezoning and amends Local Planning Scheme No. 2 accordingly.

Planning and Development Act 2005

RESOLUTION TO AMEND LOCAL PLANNING SCHEME

City of Albany

Town Planning Scheme No. 2

Amendment No. 1

RESOLVED that the local government pursuant to section 75 of the Planning and Development Act 2005, amend the above local planning scheme by:

(i) Rezoning portion of Lot 9001 and Lots 124 (No. 47954), 125 (No. 47914) and 200 (DP52999), Marbelup from 'Rural' to 'Rural Residential'.
(ii) Rezoning portion of Lot 9001 (No.688) and Lots 201 (DP52999) and 44 (Plan 584), Marbelup from 'Rural' to 'Rural Smallholdings'.
(iii) Rezoning Lot 33 (Plan 584), Marbelup from 'Rural' to 'Drainage/waterway'.
(iv) Rezoning Lot 7864 on Plan 16119 from 'Infrastructure Services' to 'Drainage/Waterway'.
(v) Amend the scheme map accordingly

Note: Text to be updated in accordance with Council resolution.

FORM 6A

COUNCIL ADOPTION
This Standard Amendment was adopted by resolution of the Council of the City of Albany at the Ordinary Meeting of the Council held on the ____ day of _____, 20____.

.....
MAYOR

.....
CHIEF EXECUTIVE OFFICER

COUNCIL RESOLUTION TO ADVERTISE
by resolution of the Council of the City of Albany at the Ordinary Meeting of the Council held on the _____ day of _____, 20____, proceed to advertise this Amendment.

.....
MAYOR

.....
CHIEF EXECUTIVE OFFICER

COUNCIL RECOMMENDATION
This Amendment is recommended for _____ by resolution of the City of Albany at the Ordinary Meeting of the Council held on the _____ day of _____, 20_____ and the Common Seal of the City of Albany was hereunto affixed by the authority of a resolution of the Council in the presence of:

.....
MAYOR

.....
CHIEF EXECUTIVE OFFICER

WAPC ENDORSEMENT (r.63)

.....
DELEGATED UNDER S.16
OF THE P&D ACT 2005

DATE.....

APPROVAL GRANTED

.....
MINISTER FOR PLANNING

DATE.....

APPENDIX A | REZONING PLAN

APPENDIX B | OPPORTUNITIES AND CONSTRAINTS PLANS

Harley Dykstra

APPENDIX C | LOCAL WATER MANAGEMENT STRATEGY

APPENDIX D | SITE SOIL EVALUATION

APPENDIX E | BHL ASSESSMENT AND BUSHFIRE MANAGEMENT PLAN

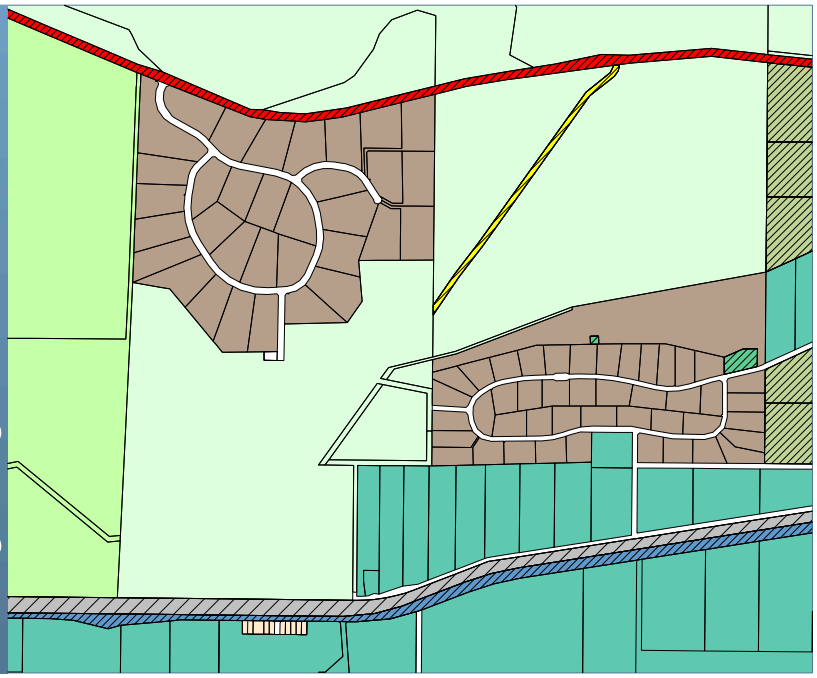
Harley Dykstra

APPENDIX F | TRAFFIC STUDIES

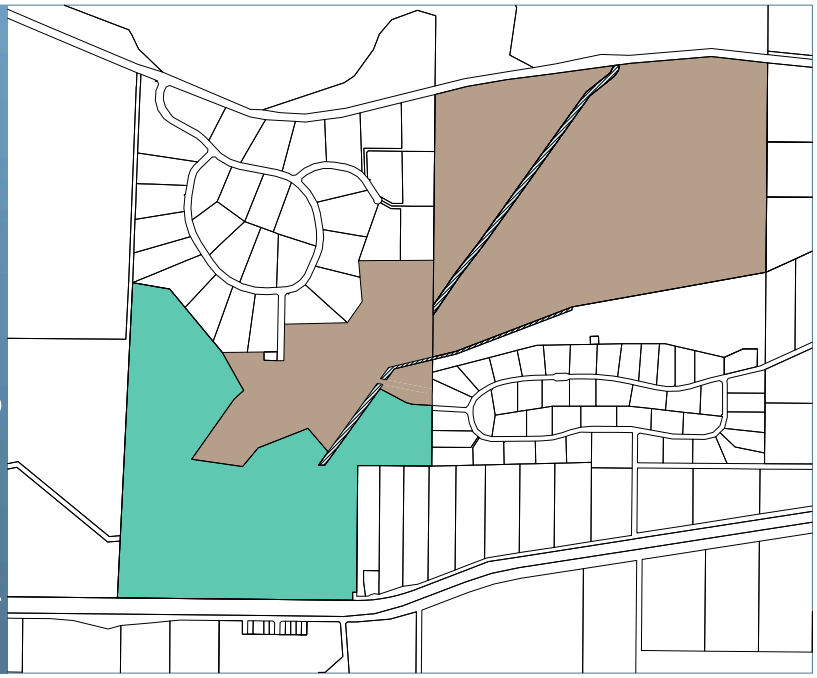
APPENDIX A | REZONING PLAN

CITY OF ALBANY
Local Planning Scheme No. 2
Amendment No. 1

Existing Zoning



Proposed Zoning



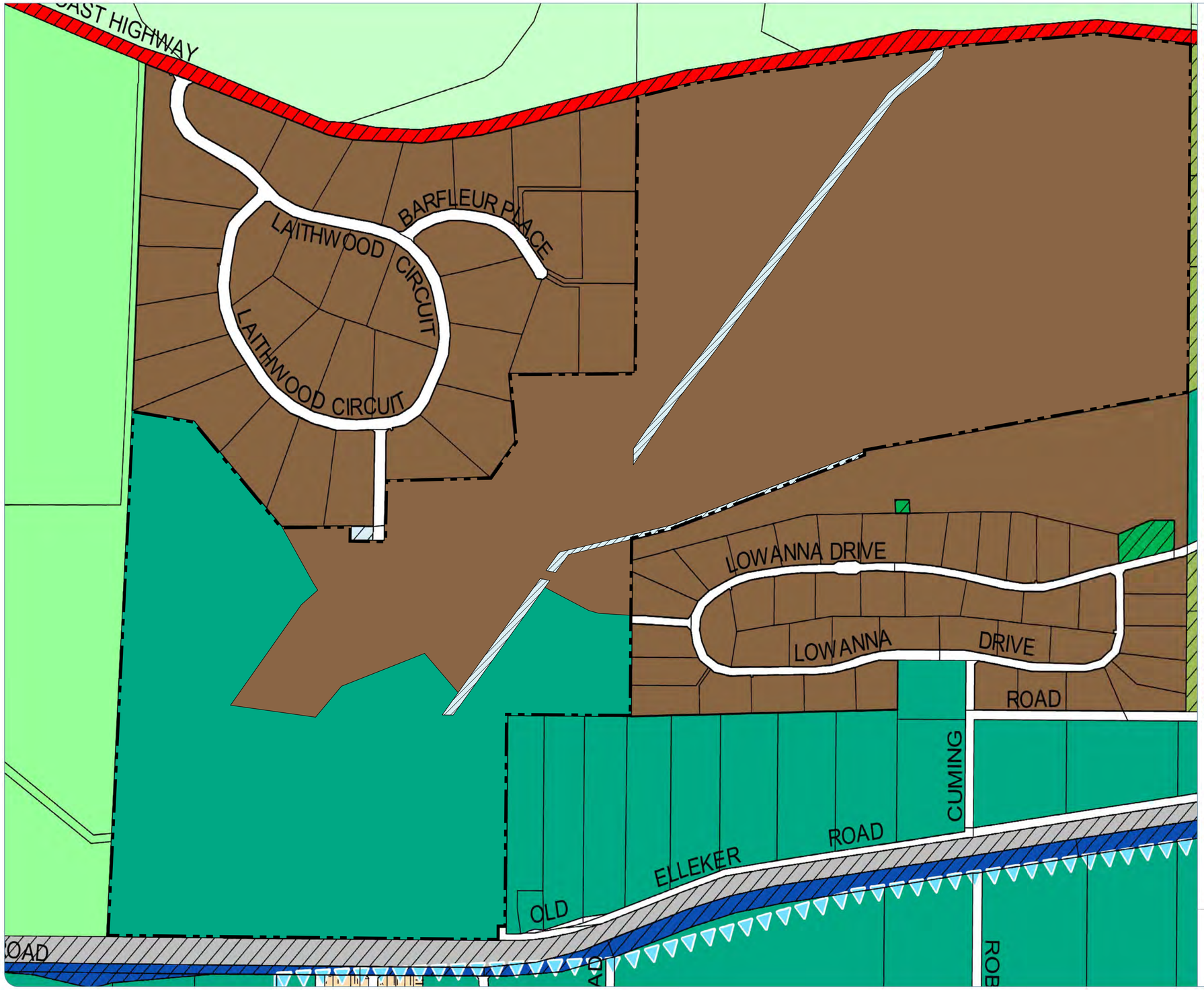
LOCAL SCHEME RESERVES

- Drainage/waterway
- Local Roads
- Primary Distributor Road
- District Distributor Road
- Environmental Conservation
- Public Open Space
- Rail ways
- Infrastructure Services

LOCAL SCHEME ZONES

- Rural
- Priority Agriculture
- Residential
- Rural Residential
- Rural Small Holdings

Mapping prepared by Harley Dykstra
31 Albany Highway, ALBANY WA 6330
T: 08 9844 5100
Plan No. | 22984-04E Drawn | NP 08/04/25



LEGEND

Subject Land

LOCAL SCHEME RESERVES

- CP Car Park
- CE Cemetery
- Civic and community
- C Cultural Facilities
- E Education
- ES Emergency Services
- GS Government Services
- H Heritage
- IS Infrastructure Services
- M Medical Services
- R Recreational
- SC Social Care Facilities
- Environmental Conservation Reserve
- Foreshore
- Drainage/waterway
- Local Road
- District Distributor Road
- Primary Distributor Road
- Public Open Space
- Public purposes
- Railways
- Special purpose reserve
- Strategic Infrastructure

LOCAL SCHEME ZONES

- Commercial
- Service Commercial
- NC Neighbourhood centre
- RC Regional Centre
- Mixed Use
- Residential
- Urban Development
- Light Industry
- General Industry
- Industrial development
- Environmental conservation
- Priority agriculture
- Rural
- Rural Residential
- Rural Smallholdings
- Rural enterprise
- Rural townsite
- Special use
- Tourism

OTHER CATEGORIES

(see scheme text for additional information)

- Scheme Boundary
- Local Government Boundary
- A1/AR1 Additional uses
- R1 Restricted uses
- SU1 Special use area
- R20 R Codes
- SCA1 Albany Airport Special Control Area
- SCA2 Public Drinking Water Source Area
- SCA3 Albany Speedway Noise Special Control Area
- SCA4 Water Corporation Wastewater Treatment Plant Odour Buffer
- SCA5 Spencer Park Special Control Area
- SCA6 Pendeen Special Control Area Buffer
- SCA7 Down Road East Special Control Area Buffer
- SCA8 Down Road West Special Control Area Buffer
- SCA9 Albany Port Special Control Area Buffer
- SCA10-12 Coastal Erosion Risk Special Control Area
- SCA13-19 Inundation Special Control Area
- Oceans/Waterways

VERSION No 1

City of Albany

Local Planning Scheme No. 2

DRAFT REZONING PLAN

Lots 124 (No.47954) & 125 (No.47917) South Coast Highway, 33 on Plan 584 & 9001 (No.688) Lower Denmark Road, MARBELUP and CUTHBERT

Plan No.	22984-02	
Date	08/04/25	
Drawn	NP	
Checked	SJ	
Revision	H	
Scale	1:6000@A2	0 10m 20m 30m

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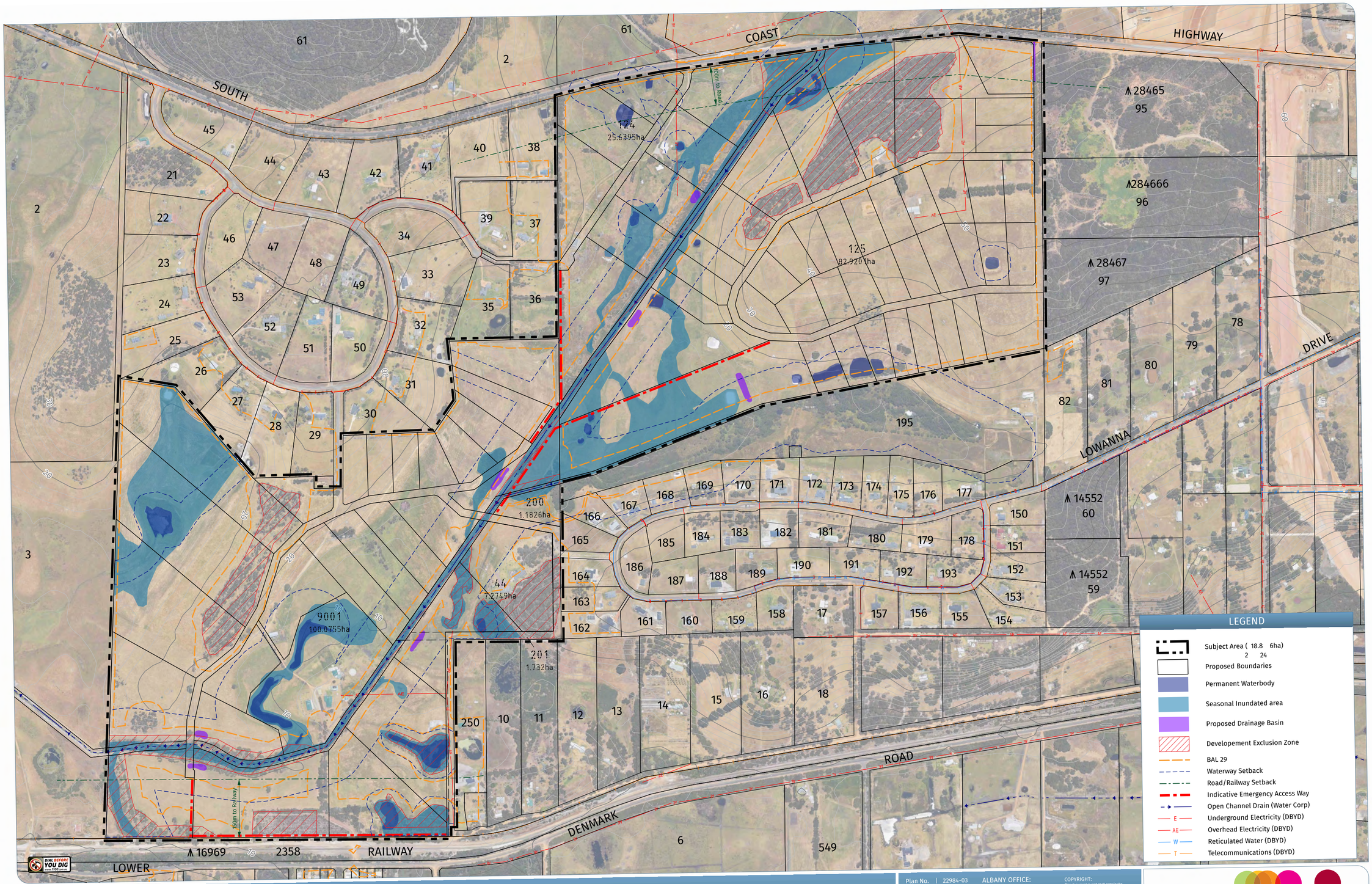
ALBANY | BUNBURY | BUSSELTON | FORRESTDALE | PERTH

NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

Harley Dykstra
PLANNING & SURVEY SOLUTIONS



OPPORTUNITIES AND CONSTRAINTS

Lots 124 (No.47954) & 125 (No.47917) South Coast Highway,
9001 (No.688) Lower Denmark Road MARBELUP and CUTHBERT

Plan No.	22984-03	
Date	28/01/25	
Drawn	NP	
Checked	SJ	
Revision	H	
Scale	1:6000@A2	0 50m 100m 150m

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NOTE: This plan has been prepared for planning purposes. Areas, Contours and Dimensions shown are subject to survey

Harley Dykstra
PLANNING & SURVEY SOLUTIONS

APPENDIX C | LOCAL WATER MANAGEMENT STRATEGY

LOCAL WATER MANAGEMENT STRATEGY

Lot 124 & 125 South Coast Hwy

Marbelup, WA 6330

01/05/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

Title: Local Water Management Strategy – Lot 124 & 125 South Coast Hwy, Marbelup WA

Author (s): Chiquita Cramer

Reviewer (s): Marisa Wearing & Alexandra Tucker

Job No.: HD0063-001

Client: Dora Porter & Brian Fuller

REVISION RECORD

Revision	Summary	Prepared By	Reviewed By	Date
Draft Id 24/04/2024	Prepared for QA review	C. Cramer	M. Wearing	24/04/2024
Draft Id 24/04/2024	Prepared for technical review	C. Cramer	A. Tucker	24/04/2024
Final 01/05/2024	Final report issued to client	C. Cramer	A. Tucker	01/05/2024

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1 Introduction

1.1 Background

Lot 124 and 125 South Coast Highway, Marbelup Local Water Management Strategy (LWMS), has been prepared by Bio Diverse Solutions on behalf of Dora Porter and Brian Fuller (the land owners) in support of a Scheme Amendment (SA)/rezoning and subsequent future subdivision prepared for the site.

The LWMS provides the framework for the application of total water cycle management to the proposed SA. This is consistent with the Department of Water and Environmental Regulation (DWER) principles of Water Sensitive Urban Design (WSUD), described in the Stormwater Management Manual (DoW, 2007).

1.2 Key Design Principles and Objectives

The LWMS employs the following key documents to define its content, key principles and objectives:

- Stormwater Management Manual for Western Australia (DoW, 2007).
- Better Urban Water Management (WAPC, 2008).

A summary of the key design principles and objectives from these documents is summarised below and provided in Table 1.

1.2.1 Stormwater Management Manual (DoW, 2007)

The Department of Water (DoW), now Department of Water and Environmental Regulation (DWER), released *A Manual for Managing Urban Stormwater Quality in Western Australia* in 1998. The manual defines and practically describes Best Management Practices (BMP's) to reduce pollutant and nutrient inputs to stormwater drainage systems. The Manual also aims to provide guidelines for the incorporation of water sensitive design principles into urban planning and design, which would enable the achievement of improved water quality from urban development.

The document was released to provide a guideline for best planning and management practices and was intended for use by the DoW (now DWER), but also by other State and Local Government Authorities and sectors of the urban development industry.

DoW completed a major review of the manual in consultation with a working team comprising industry and government representatives. The revised manual was officially launched in August 2007.

DWER's current position on urban stormwater management in Western Australia, is outlined in Chapter 2: *Understanding the Context of the Stormwater Management Manual for Western Australia* (DoW, 2007), which details the management objectives, principles and a stormwater delivery approach for WA. Principle objectives for managing urban water in WA are stated as:

- Water Quality: To maintain or improve the surface and groundwater quality within development areas relative to pre-development conditions.
- Water Quantity: To maintain the total water cycle balance within development areas relative to the pre-development conditions.
- Water Conservation: To maximise the reuse of stormwater.
- Ecosystem Health: To retain natural drainage systems and protect ecosystem health.
- Economic Viability: To implement stormwater systems that are economically viable in the long-term.
- Public Health: To minimise public risk, including risk of injury or loss of life to the community.
- Protection of Property: To protect the built environment from flooding and water logging.

- Social Values: To ensure that social aesthetic and cultural values are recognised and maintained when managing stormwater.
- Development: To ensure the delivery of best practice stormwater management through planning and development of high-quality developed areas, in accordance with sustainability and precautionary principles.

1.2.2 Better Urban Water Management (WAPC, 2008)

The guideline document Better Urban Water Management (BUWM; WAPC, 2008), focuses on the process of integration between land use and water planning. The document specifies the level of investigation and documentation required at various decision points in the planning process, rather than the provision of any specific design objectives and criteria for urban water management.

This LWMS complies with the BUWM process.

Table 1: Summary of design principles and objectives

Key Guiding Principles		
• Facilitate implementation of sustainable best practice urban water management. • Provide integration with planning processes and clarity for agencies involved with implementation. • To minimise public risk, including risk of injury or loss of life. • Protection of infrastructure and assets from flooding and inundation. • Encourage environmentally responsible development. • Facilitate adaptive management responses to the monitored outcomes of development.		
Category	**Key Design Principles & Objectives**	**LWMS Criteria**
Surface Water Management	• Minimise changes in hydrology to prevent impacts on receiving environments. • Manage water flows from major events to protect infrastructure and assets. • Apply the principles of WSUD. • Adopt nutrient load reduction design objectives for stormwater runoff. • Floodplain management and urban drainage. • Adopt treatment train approach.	• Post-development critical peak flows will be consistent with pre-development peak flow at the discharge point of each catchment within the Subject Site up to the 1% AEP. • First 15 mm of rainfall from storm events will be treated at source where possible. • Manage surface water flows from major events to protect infrastructure and assets from flooding and inundation.
Groundwater Management	• Manage groundwater levels to protect infrastructure and assets. • Maintain groundwater regimes for the protection of groundwater-dependent ecosystems. • Protect the value of groundwater resources. • Adopt nutrient load reduction design objectives for discharges to groundwater.	• Managing and minimising changes in groundwater levels and groundwater quality following development.
Monitoring and Implementation	• Adopt an adaptive management approach. • Maintain drainage and treatment structures.	• Design based on methodology in Stormwater Management Manual of adopting a treatment train including: • structural treatment measures (infiltration storages, plus bio-retention treatment structures). • Non-structural measures to reduce applied nutrient loads. • Maintain groundwater quality at pre-development levels (median winter concentrations) and, if possible, improve the quality of water leaving the development area to maintain and restore ecological systems.
Water Conservation	• Adopt drinking water consumption target. • Ensure that non-potable water supply systems deliver a net benefit to the community. • Ensure that non-potable water supply systems are designed as part of an integrated water supply.	• Aim to achieve the State Water Plan target for water use and reduce water use where possible. • Consider alternative fit for purpose water sources where appropriate and cost-effective.

1.3 Suitable Qualified Hydrologist

This LWMS has been prepared by Chiquita Cramer, who has 15 years of experience working as a hydrologist and hydrogeologist.

Chiquita Cramer currently has the following tertiary qualifications:

- Bachelor of Science in Natural Resource Management (University of Western Australia); and
- Graduate Certificate in Hydrogeology (University of Western Australia).

Chiquita completed a Bachelor of Science in Natural Resource Management in 2008 at the University of Western Australia. Chiquita worked as a hydrologist and senior hydrologist at JDA Consultant Hydrologists in Perth for 8 years. Chiquita's experience includes preparation of multiple local and urban water management strategies, hydrological and hydraulic investigations, surface water and groundwater monitoring reports and hydrogeological reports. Chiquita completed a Graduate Certificate in Hydrogeology and in 2017 joined Bio Diverse Solutions (BDS) to provide expertise in hydrology and hydrogeology to the company.

1.4 Location

The Subject Site is defined as Lots 124 and 125 South Coast Highway, Marbelup WA within the City of Albany. The site comprises of ~109 ha and is bound by South Coast Highway to the north, rural residential properties to the south and west and a City of Albany reserve to the east. The Subject Site is shown in Figure 1.

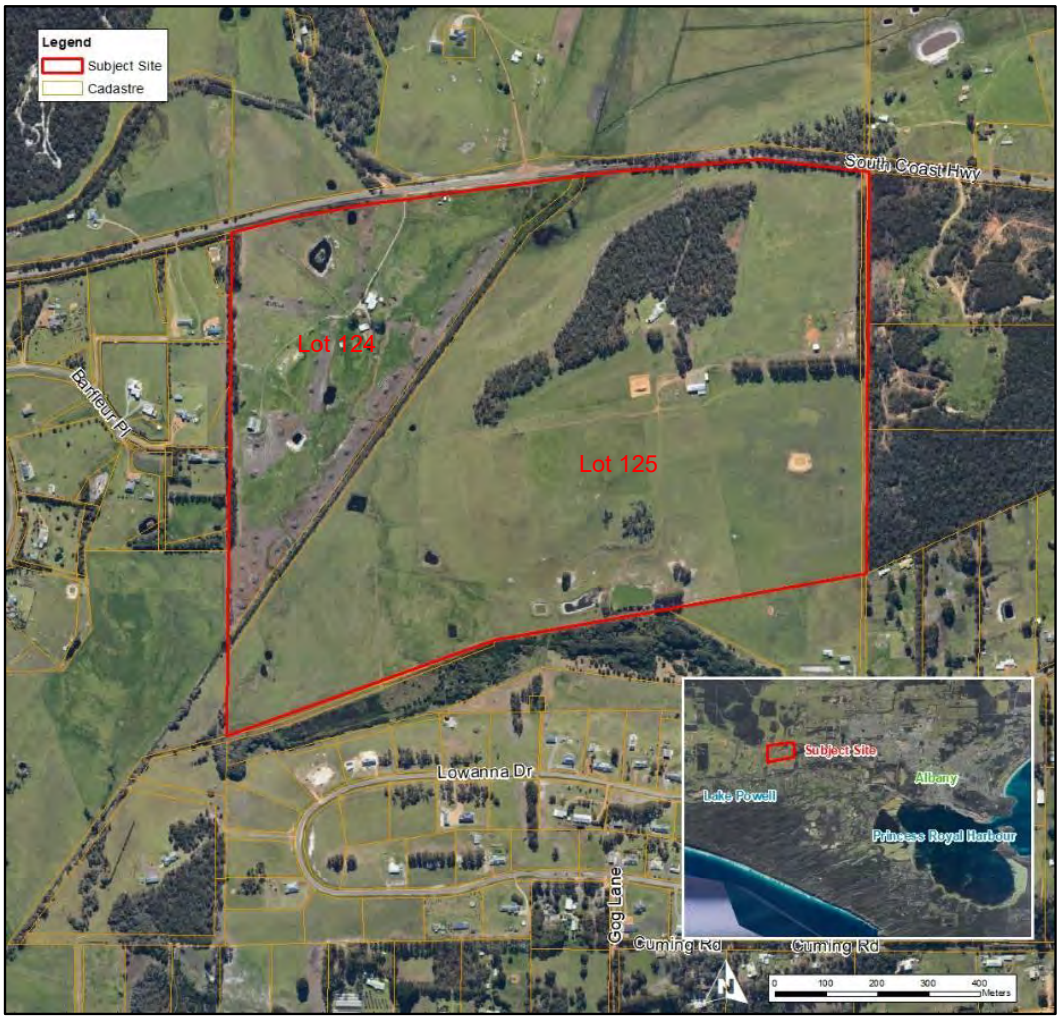


Figure 1: Location Plan

2 Proposed Development

The Subject Site is zoned as *'General Agriculture'* under the City of Albany's Local Planning Scheme No. 1 (DPLH, 2014). It is proposed the Subject Site be rezoned to '*Rural Residential'* and '*Rural smallholdings*', and forms part of a larger plan area that includes Lot 9001 Lower Denmark Road to the southwest of the Subject Site. The Scheme Amendment plan for the site is shown in Figure 2.

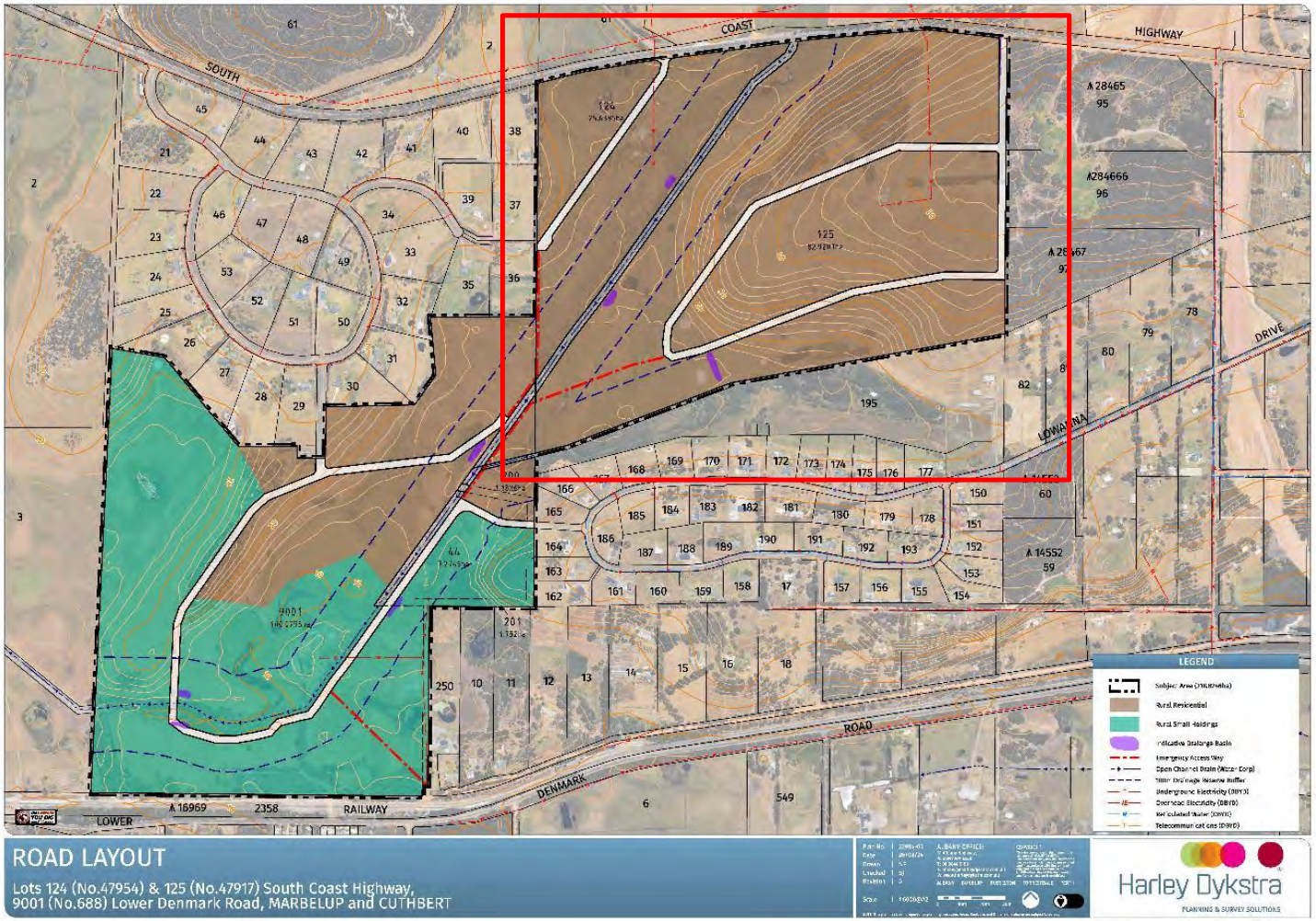


Figure 2: Scheme Amendment Plan. Subject Site is defined by red square.

3 Pre-development Environment

3.1 Existing Land Use

The site currently consists of agricultural land used for mixed cropping and livestock (Photo 1 and 2). There are two residential dwellings on the Subject Site, one to the west of Five Mile Creek, on Lot 124 (Photo 3 and 4) and one to the east on Lot 125. The land immediately south and west of the Subject Site is currently utilised for rural residential living.

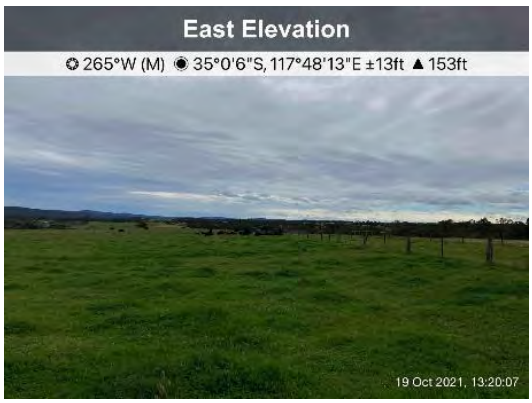


Photo 1: East elevation of agricultural land within the Subject Site.

Photo 2: View to the east of cattle within the Subject Site.

Photo 3: View to the east northeast of dwelling within the Subject Site in the northwest.

Photo 4: View to the north northwest of rural residential area to the west of the Subject Site.

3.2 Topography

The Subject Site is elevated in the eastern and central portions of the site with a slight elevation in the northwest. Elevation ranges from a high point of 54 mAHD in the east of the Subject Site, to a lowest point of 12 mAHD in the southwest. Topographic contours (2 metre) are shown in Figure 3.

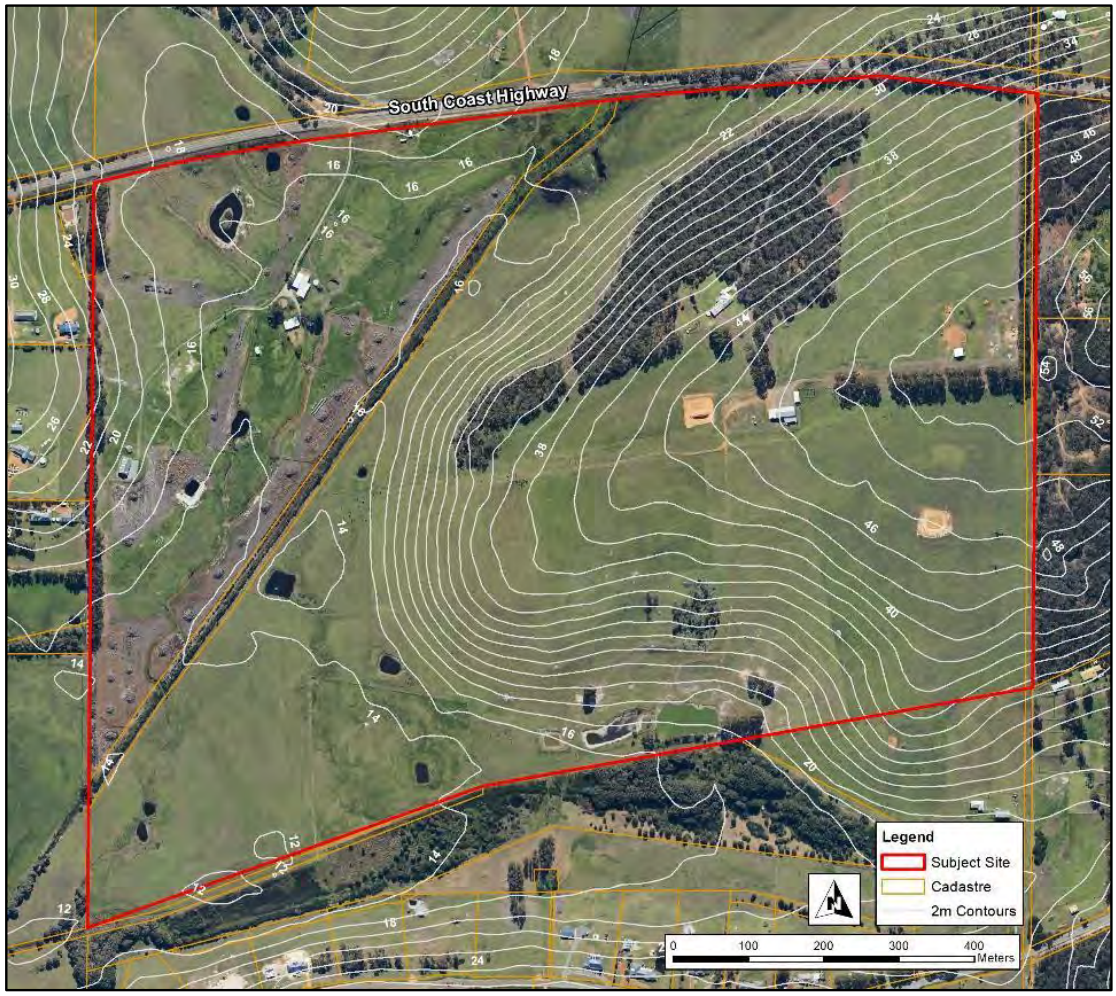


Figure 3: Topography

3.3 Climate

The Albany area is characterised by a Mediterranean climate with warm dry summers and cool wet winters. Rainfall data is from the nearby Bureau of Meteorology (BoM, 2022), Albany Station (Site No. 9500).

The closest open Bureau of Meteorology (BoM) station to the Subject Site, is the Albany Station (009500). The average annual temperature at Albany Station ranges from 8.3-22.9°C. The average summer temperature ranges between 14.1-22.9°C, whilst average winter temperatures range between 8.3-16.7°C. The annual mean rainfall for Albany station is 920.8 mm (BoM, 2023). On average the months of May - September are the months with the highest rainfall (Figure 4). There was a higher than average rainfall recorded in the months of April and June 2022, and October and November 2023.

The average annual pan evaporation for the Albany area is approximately 1397 mm (Luke et al 1988).

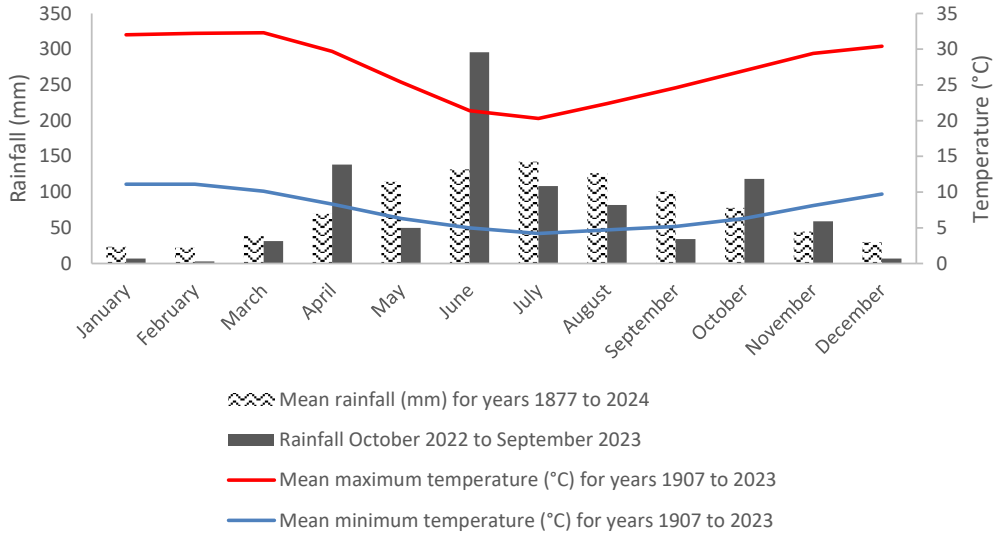


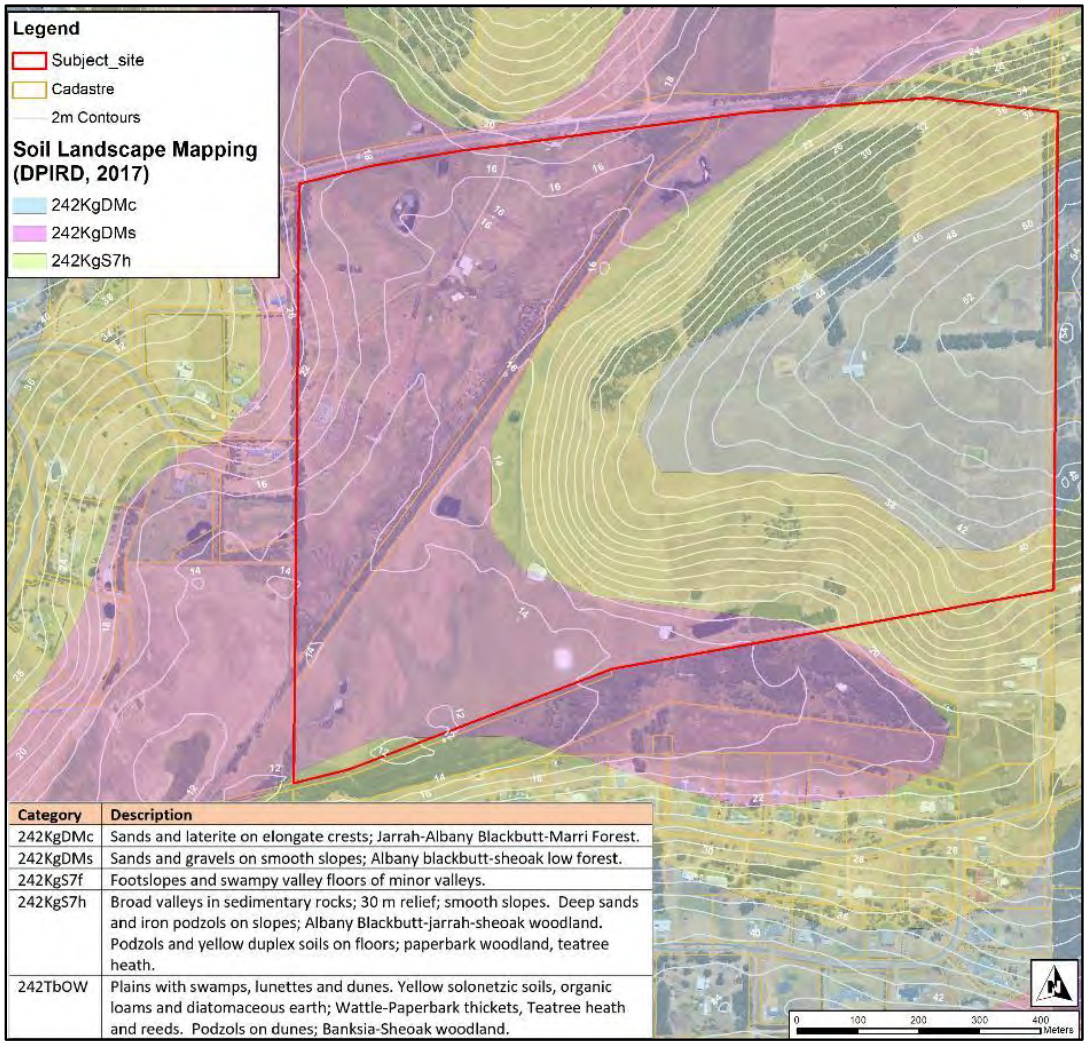
Figure 4: Climate Data for Albany BoM Weather Station No. 009500

3.4 Geology and Soils

Soil mapping – Zones (DPIRD, 2017a) shows the Subject Site lies within one soil zone being; the Albany Sandplain Zone (242). The Albany Sandplain Zone is described as '*Gently undulating plain dissected by a number of short rivers flowing south. Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels.'*.

Soil mapping – Systems (DPIRD, 2018) shows the Subject Site lies within one soil systems being; the King System (242Kg). The King System is described as *'Dissected siltstone and sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-sheoak woodland and mallee-heath.'*.

The Subject Site is also located within several sub-systems of the King system as defined by DPIRD (2017b). The sub-systems are shown and described in Figure 5.



Category	Description
242KgDMc	Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri Forest.
242KgDMs	Sands and gravels on smooth slopes; Albany blackbutt-sheoak low forest.
242KgS7f	Footslopes and swampy valley floors of minor valleys.
242KgS7h	Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
242TbOW	Plains with swamps, lunettes and dunes. Yellow solonetzic soils, organic loams and diatomaceous earth; Wattle-Paperbark thickets, Teatree heath and reeds. Podzols on dunes; Banksia-Sheoak woodland.

Figure 5: Soil Mapping (DPIRD, 2017b)

Site soil testing was conducted on the 19th of October 2021, by Great Southern Geotechnics, under late winter conditions. Testing involved site soil analysis, photographic recording, logging of soil types, measuring of water table and laboratory analysis. In total, 22 test holes were constructed up to a depth of 2 m and left open for a minimum of 1 hour to identify any water table present. The soil investigation for the site is shown in Appendix A, test hole locations are shown in Figure 6.

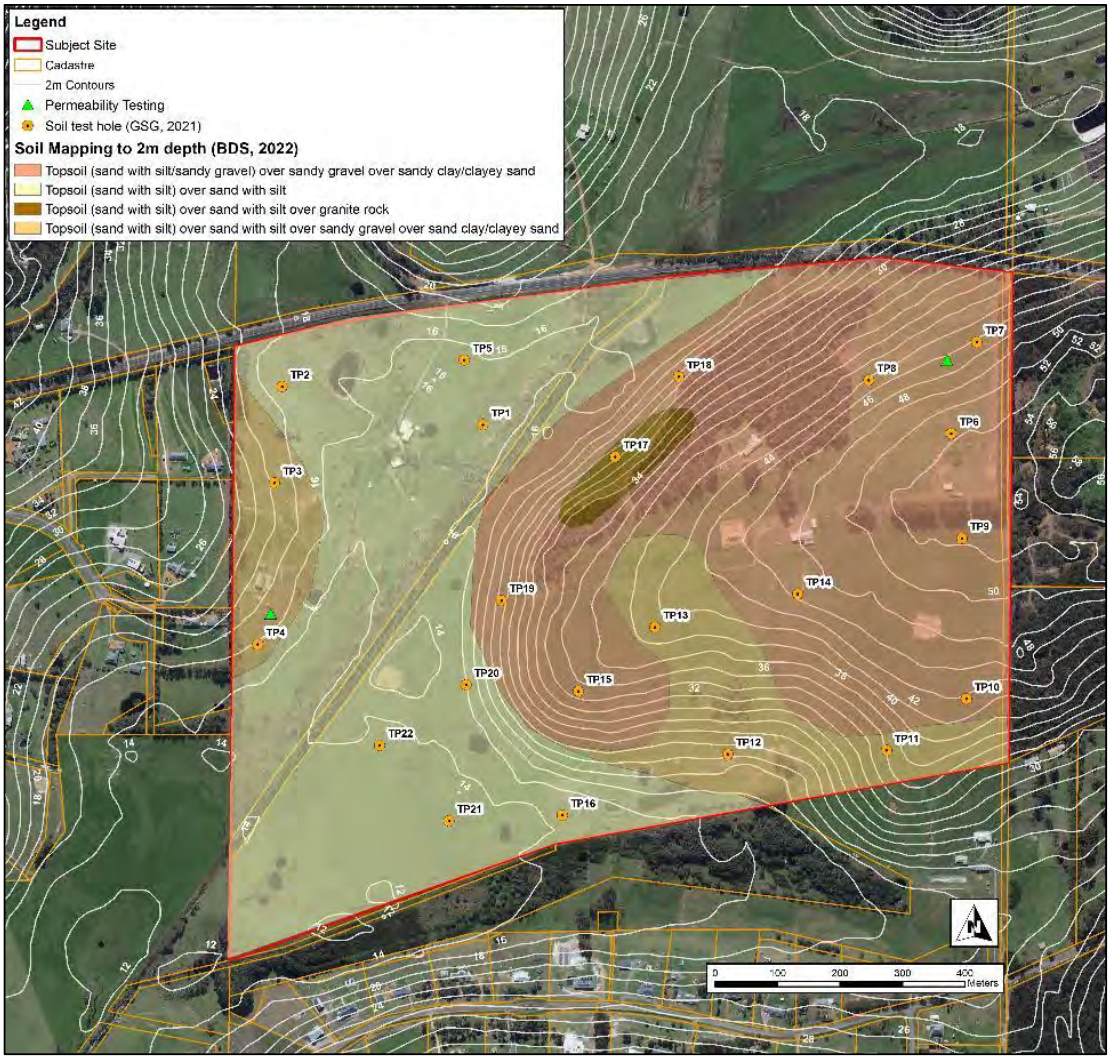


Figure 6: Soil Testing Locations and Soil Mapping

The 22 test pits (TP) revealed that soils across the Subject Site generally comprised of four soil profiles to 2 m depth, being;

- Topsoil (sand with silt), over sand with silt to the depth of the hole;
- Topsoil (sand with silt) over sand with silt (to a depth of between 460 and 1050 mm), over sandy gravel, over sandy clay/clayey sand;
- Topsoil (sand with silt or sandy gravel) over sandy gravel/gravelly sand (to a depth of between 300 and 920 mm), over sandy clay/clayey sand; and
- Topsoil (sand with silt), over sand with silt, over bedrock.

The four soil profiles identified at the Subject Site via the test pits, are mapped in Figure 6. Comprehensive soil logs for each soil testing hole are shown in Appendix A. TP17 was the only test hole to encounter refusal of drilling, which was encountered at 1300 mm depth, refusal was likely a result of hitting bedrock.

3.4.1 Phosphorous Retention Index

Phosphorous Retention Index (PRI) is a measure of the soils ability to absorb and treat nutrients within the soil (i.e., Soil microbe disinfecting ability). Soils with a PRI less than 1 have a very poor ability to treat effluent waters, whilst soils with a PRI of >5 having a high ability to treat effluent waters. PRI testing was conducted at TP4, TP7 and TP12. The PRI results are presented in Table 2.

Table 2: Phosphorus retention index results (CSBP, 2021)

Test Pit	Depth (mm)	Soil Type	Phosphorus Retention Index
TP4	160-1050	Sand with silt	327.4
TP7	180-400	Gravelly sand	810.8
TP12	200-800	Sand with silt	4.9
TP12	800-1000	Gravelly sand	844.0

PRI within the subsurface layers, varied consistent with soil type, as shown in Table 2. The PRI of the gravelly sand layers were found to be extremely high, whereas the PRI of the sand with silt layer varied from moderate to very high, likely dependant on the percentage of silt content.

3.4.2 Permeability

Silts and clay soils generally record poor permeability results whereas coarse sands and loose gravels generally record high permeability, as shown in Figure 7.

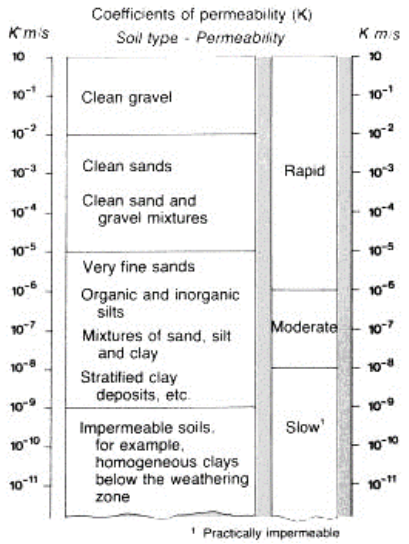


Figure 7: Hydraulic Conductivity of Soil Types (Artiola et al, *2004)*

In-field permeability testing was conducted during the site soil investigation by BDS, adjacent to TP4, within the sand with silt layer (at 500 mm depth BGL) and adjacent to TP7, within the clayey sand with gravel layer (Figure 6). Permeability testing was conducted using the Talsma-Hallam method. The Talsma-Hallam permeameter is suitable for use in soils with permeability in the range 0.009 to 2.9 metres/day ($1x10^{-7}$ to $3x10^{-5}$m/s). Hydraulic conductivity was found to be 1.50 x 10^{-5} m/sec (1.3 m/day) adjacent to TP4, which is considered a moderate to rapid permeability and 3.4 x 10^{-6} m/sec (0.29 m/day) adjacent to TP7, which is considered a moderate permeability.

3.5 Acid Sulphate Soils

Acid sulphate soils (ASS) are naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). When undisturbed below the water table, these soils are benign and not acidic (potential acid sulphate soils). However, if the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid. ASS Risk Mapping indicates the Subject Site lies within an area with moderate to low risk of ASS occurring within 3 metres of natural soil surface (DWER, 2017). ASS Risk Mapping (DWER, 2017) is shown in Figure 8.

Figure 8: ASS Risk Mapping

An ASS Preliminary Investigation was conducted on the property directly southwest of the Subject Site (Lot 9001 Lower Denmark Road, Cuthbert), on the 15th January 2008, as part of a Land Capability Assessment (Opus, 2007) for the site. Lot 9001 Lower Denmark Road has similar geological and hydrological features as the Subject Site. In summary, the investigation found the peat layers investigated at Lot 9001 Lower Denmark Road, Cuthbert had acidity levels which exceeded DWER Guidelines. However, the acidity was found not to be caused by sulfur and likely to be caused from the mobilisation of hydrolysed ions, likely attributed to iron or aluminium leaching through the soil profile (Opus, 2007).

Soil analysis showed the surface soils had high Electrical Conductivity (EC) and corresponding acidity, which Opus (2007) found is likely attributed to bicarbonate salts and not sulfur salts. Sulfur acidity (ASS) was detected in the soil layers from approximately 1000 mm BGL (Opus, 2007).

Opus (2007) recommended that the site not be excavated deeper than 500 mm to avoid mobilisation and oxidation of ASS. The top 500 mm of soil will still require treatment with lime upon disturbance and ASS shall be managed in accordance with ASS guidelines (Opus, 2007).

3.6 Surface Water Hydrology

The whole of the Subject Site drains towards Five Mile Creek. Five Mile Creek runs through the Subject Site from the central north to the south west of the site. Five Mile Creek connects to Seven Mile Creek to the southwest of the Subject Site and Seven Mile Creek discharges to Lake Powell and ultimately the Torbay Inlet further west. The surface hydrology of the Subject Site is shown in Figure 9.

There are no other major waterways or waterbodies within the Subject Site other than Five Mile Creek. There are several farm dams that are likely to be decommissioned as part of development works. There is also a tributary of Five Mile Creek that runs adjacent to the southern boundary of the Subject Site.

The Subject Site is located within one hydrographic catchment being Torbay Inlet and one hydrographic sub-catchment being Seven Mile Creek (DWER, 2018a).

According to flow modelling conducted for Five Mile Creek by DWER (Pers Comms N.Sykora, 2023), the maximum daily flow rate recorded in Five Mile Creek at the downstream end of the LSP area (DWER station No. 6031115), between 1997 and 2022 is 199,000 m^3. This equates to 2.3 m^3/sec. According to data results for site No. 603115, the highest recorded water level in Five Mile Creek at the downstream end of the LSP area is 10.3 m AHD, which was recorded on the 30th August 2001.

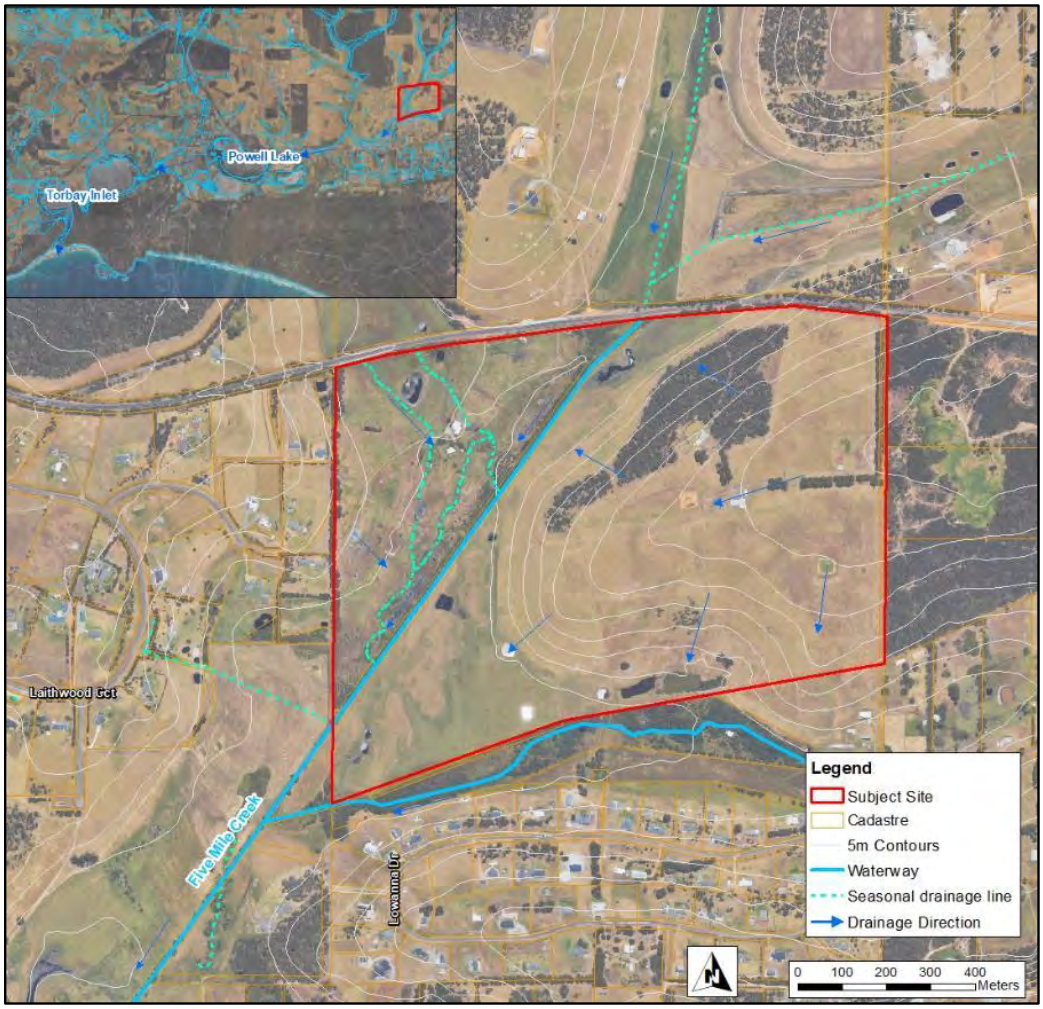


Figure 9: Surface Water Hydrology

3.6.1 Hydrological site assessment

A site investigation of the hydrological features of the site was conducted on the 19th of October 2021 to confirm the surface water hydrology and to assist the development of the stormwater management plan. Rainfall in the Albany area (BoM Station No. 009500) prior to the site investigation, was significantly higher than for the same time in an average year. The increased rainfall resulted in increased surface water expressions in the area compared to an average late winter period providing an adequate depiction of the 'worst case scenario' in terms of seasonal inundation. Photographs 5 to 8 show the hydrological features of the site during the site investigation.

Photo 5: A northeast elevation of Five Mile Creek, centrally located within the Subject Site. This is a general view of Five Mile creek within the Subject Site.

Photo 6: A northeast elevation of a seasonally inundated area adjacent to Five Mile Creek.

Photo 7: A southwest elevation of a farm dam in the northwest of the Subject Site.

Photo 8: A northeast elevation of farm dams along the southern boundary of the Subject Site.

In-situ water quality testing was conducted at three waterway locations on site. Water quality testing results are presented in Table 3. The surface water monitoring locations are shown in Figure 9.

Table 3: Water quality of Subject Site water bodies

Creek	Temperature (° C)	pH	Electrical Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	Total Dissolved Solids (g/L)
Dam 1 (Central west)	17.23	5.84	0.339	2.55	0.220
Dam 2 (North west)	17.10	5.81	0.344	3.70	0.225
Five Mile Creek (Central)	15.70	5.85	0.460	5.73	0.299
Five Mile Creek* (South)	11.44	5.93	1.33	5.80	0.851

Note: * Water quality sampling was conducted on a different day (12th Oct 2021)

Water quality testing results found that surface water within Five Mile Creek was slightly saline at the downstream end and reasonably fresh within the central portion of the creek within the Subject Site. The difference in salinity readings within Five Mile Creek is likely due to the different time of sampling and the varying rainfall received prior to the two sampling events. pH in Five Mile Creek and the dams was found to be slightly acidic. A slightly acidic pH is typical of waterways in low-lying areas in the south-west of Western Australia. Dissolved oxygen in Five Mile Creek was slightly lower than expected in a flowing creek and just below the ANZECC & ARMCANZ (2000) trigger value for low-lying rivers in South-west Australia. Dissolved oxygen in the farm dams was also low.

The surface water quality found in Five Mile Creek shall be maintained or improved in the post-development scenario.

3.7 Hydrogeology

Australian Geoscience Mapping and Department of Water and Environmental Regulation 250K Hydrogeological mapping (DWER, 2001) places the Subject Site within two hydrogeological zones as described in Table 4.

Table 4: 250K Hydrogeological zones within Subject Site

Geology Unit	Geology Time	Aquifer Description	Geology Description
TP	Tertiary – Cainozoic – Phanerozoic	Sedimentary aquifer with intergranular porosity - extensive aquifers, major groundwater resources.	PLANTAGENET GROUP - siltstone, spongolite; minor sandstone, peat, and conglomerate.
P_g	Proterozoic	Fractured and weathered rocks - local aquifer, minor groundwater resources.	Granitoid rock, porphyritic and even-grained, generally weathered to clayey sand.

The Subject Site is not situated within a Priority Drinking Water Catchment Area (DWER, 2018b). Desktop analysis of the site indicates that the nearest designated Public Drinking Water Source Area (PDWSA) is the "South Coast Water Reserve", as defined by the *Country Areas Water Supply Act 1947* located approximately 950 m south of the Subject Site.

3.1 Groundwater, Waterlogging and Seasonal Inundation

As determined by the Site Soil Investigation (Great Southern Geotechnics, 2021) on the 19th October 2021, the depth to the peak annual water-table varied across the Subject Site from at ground level in the lower lying areas, to not encountered to 2 m BGL in the elevated areas. The depth to the peak annual water-table at each test hole during the Site Soil Investigation is shown in Table 5, with test hole locations shown in Figure 10.

Table 5: Depth to peak annual water-table

Test Hole	Depth to peak annual water-table (mm BGL)	Test Hole	Depth to peak annual water-table (mm BGL)
TP1	0	TP12	850
TP2	50	TP13	400
TP3	1020	TP14	800
TP4	350	TP15	Not encountered
TP5	50	TP16	0
TP6	Not encountered	TP17	Not encountered
TP7	Not encountered	TP18	Not encountered
TP8	Not encountered	TP19	Not encountered
TP9	Not encountered	TP20	150
TP10	Not encountered	TP21	0
TP11	Not encountered	TP22	550

It is assumed that areas within the Subject Site that have 0.5 m or less separation to the peak annual water-table, are classified as being subject to seasonal waterlogging. The approximated areas subject to seasonal waterlogging at the Subject Site, during the site investigation, along with the peak annual water-table levels recorded at each test hole, on the 19th October, are shown in Figure 10. Figure 10 also shows the areas subject to seasonal inundation (water sitting on the surface for extended periods of time) during the site assessment.

The majority of the area subject to seasonal waterlogging was found to be in the low-lying elevations. TP13 was the only exception to this, situated mid slope, TP13 had a peak annual water-table of 400 mm BGL, this is likely a result of a perched water-table between soil layers in this area.

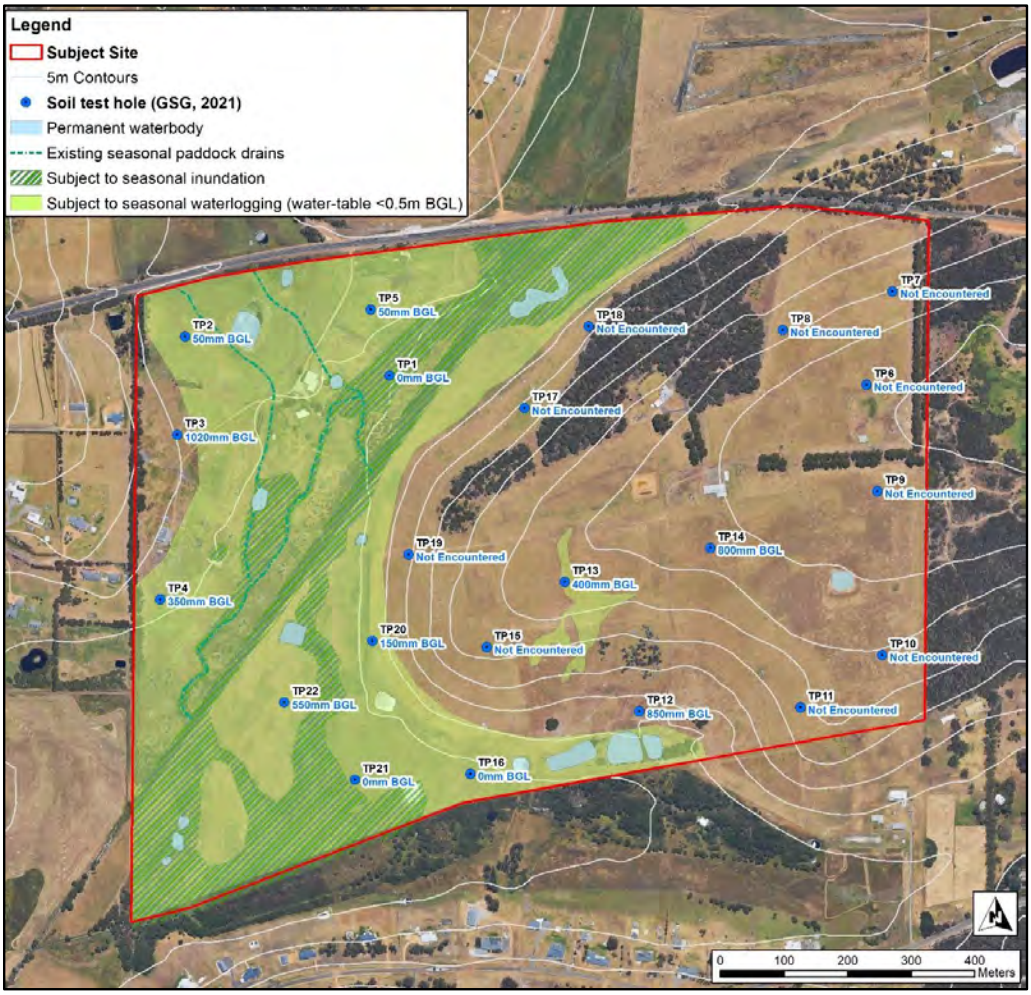


Figure 10: Groundwater levels, seasonal waterlogging and seasonal inundation

3.2 Wetlands

There are no significant wetlands within the Subject Site or within close proximity of the Subject Site. The nearest significant wetland is located approximately 1.1 km to the northwest of the Subject Site, being the Seven Mile Creek wetland. The Subject Site is located down-gradient of the Seven Mile Creek wetland (DBCA, 2017).

4 Wastewater Management

The Subject Site is situated in an area that does not have access to deep or reticulated sewerage. The health and environmental requirements for wastewater treatment and disposal for developments not serviced by deep sewerage systems are contained in the *Government Sewerage Policy* (GSP; DPLH, 2019). The GSP (DPLH, 2019) states minimum requirements apply for all on-site sewage disposal systems.

A Site Soil Evaluation (SSE; BDS, 2024) has been prepared for the Subject Site in conjunction with this LWMS. The SSE details the site soils under late winter conditions and assesses the suitability for on-site effluent disposal across the site in relation to the planning proposal.

In summary, the SSE identifies the areas within the Subject Site suitable for onsite effluent disposal as those that have free draining soil, are not located in heavily waterlogged or seasonally inundated areas and are a minimum of 100 m from Five Mile Creek and it's tributaries, and 30 m from other less significant waterways/waterbodies such as retained dams and seasonal drains (BDS, 2024). Given the shallow depth to groundwater across the western and southern portion of the site, imported fill and special design requirements and distribution techniques will be necessary to ensure that effluent disposal systems are free draining and meet the minimum separation to groundwater requirement stipulated in the GSP (DPLH, 2019).

Leach drains and irrigation systems (surface or subsurface) in conjunction with a secondary treatment system, have been identified as the most suitable land application systems for future lots, depending on localised site constraints. Areas deemed as suitable for LAAs and LAA specifications are described in more detail in the SSE (BDS, 2024).

5 Local Water Management Strategy

5.1 Water Sustainability Initiatives

5.1.1 Water Supply

Water supply to households is to be via extension of the scheme water system. The project civil engineer will negotiate the extension of the system with Water Corporation Western Australia.

5.1.2 Water Efficiency Measures

To achieve water efficiency targets, households are to be built consistent with current Building Code of Australia (BCA) water efficiency standards. Water efficiency initiatives are proposed to reduce potable water demand for irrigation of residential lots. These include encouragement of:

- Minimising turf areas;
- Selection of predominantly local native, drought tolerant plants;
- Use of waterwise gardens, restricted lawn areas and water wise lawn varieties;
- Use of rainwater tanks, and
- Community education initiatives on water conservation and reuse.

5.2 Stormwater Management

5.2.1 Design Capacity

The stormwater management system for the development has been designed in accordance with DWER guidelines, through the Better Urban Water Management framework and the requirements of the local government. The stormwater drainage system has been designed using a major/minor approach.

The stormwater drainage system is designed to manage a range of rainfall events up to 1% AEP.

The major drainage system is designed for rainfall events greater than the 20% AEP, up to the 1% AEP. The major system uses overland flow paths, which includes grading the road network to direct flow to the lowest point of the catchment for flood mitigation.

The minor drainage system has capacity for frequent rainfall events up to the 20% AEP and includes the pipe drainage system and use of bio-retention storages. The minor drainage system is designed to also provide the structural controls for water quality treatment.

5.2.2 Stormwater Modelling

The stormwater modelling has been completed utilising the Rational Method and the Boyd Equation. A critical design criterion for both these methods includes the runoff coefficients. The pre-development and post-development runoff coefficients assumed for the Subject Site, are shown in Table 6.

Table 6: Runoff coefficients

LAND USE	RUN OFF COEFFICIENT		
	First 15mm	20% AEP	1% AEP
Agricultural land	0	0.2	0.3
Road Reserve	0.8	0.8	0.9
Rural Residential	0	0.3	0.35

The general pre-development hydrological regime (Figure 9), is maintained in the post-development scenario, with the majority of the Subject Site proposed to discharge to Five Mile Creek either directly, via the internal road network or via the creek running along the southern boundary of the site.

The majority of the area proposed as Rural residential lots, will discharge unattenuated from the site towards Five Mile Creek or the creek along the southern boundary that discharges to Five Mile Creek, consistent with the existing hydrological regime. It is assumed that the majority of the lot area will remain grassed and/or vegetated with roofed areas connected to rainwater tanks, soakwells and/or rain gardens and therefore there will be little change in the runoff coefficient of these areas compared to the pre-development scenario. Where lots are upgradient of the internal road network, the road network will intercept runoff from the lots and direct it to the road's drainage system. Lot areas that discharge to the internal road network therefore form part of the site's drainage sub-catchments, as shown in Figure 11. The total area of each sub-catchment and the estimated land use area for each sub-catchment is presented in Table 7.

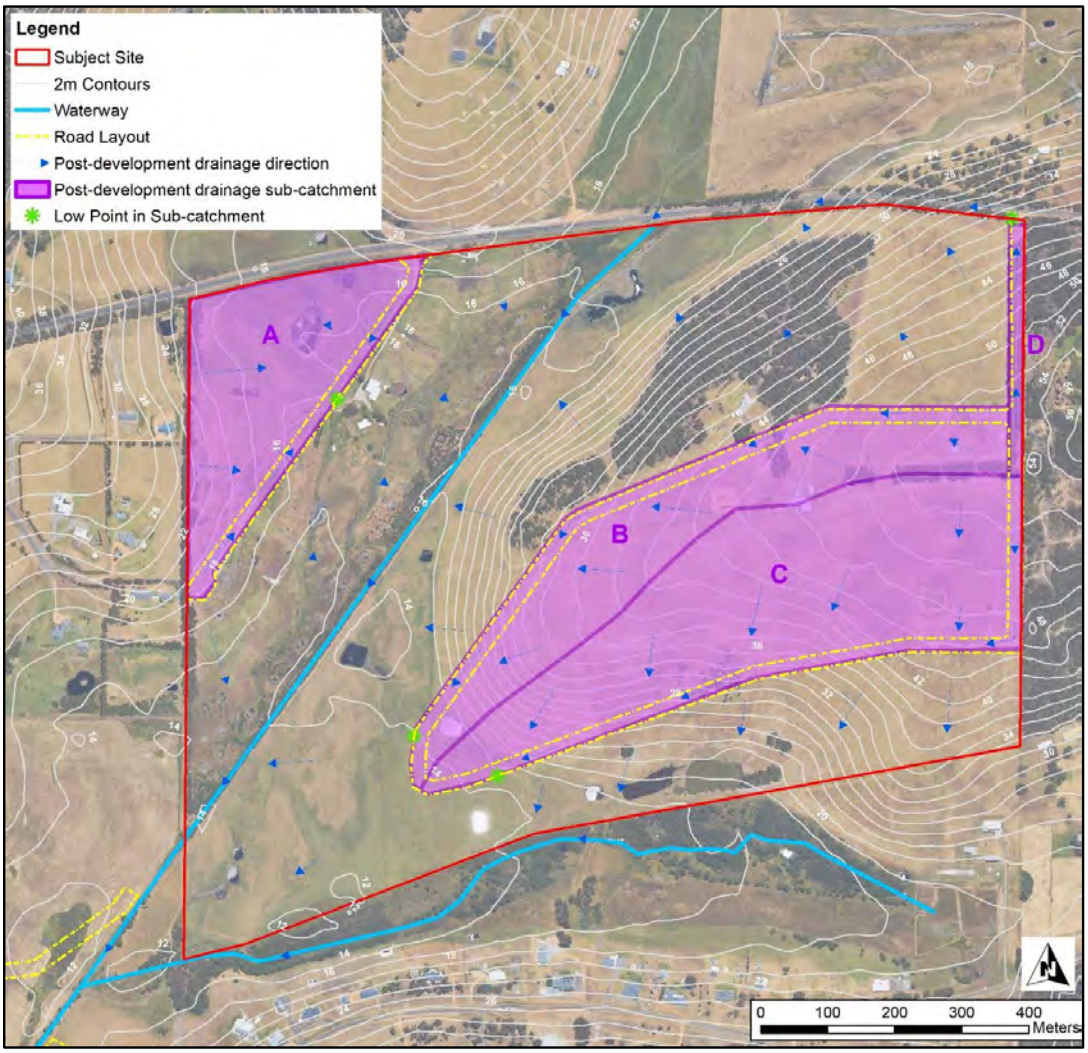


Figure 4: Post-development Drainage Catchments

Table 7: Post-development catchment areas

Land Use	Catchment			
	A	B	C	D
Road Reserve (ha)	1.3	2.2	2.3	0.8
Rural Residential (ha)	7.5	9.3	15.8	0
Total Area (ha)	**8.8**	**11.5**	**18.1**	**0.8**

Runoff from the Subject Site's internal road network will be retained on site within bio-retention storages with outflows from the bio-retention storages directed to Five Mile Creek. Outflow from the bio-retention storages will be consistent with estimated pre-development flow rates.

Multiple storm events have been modelled utilising the Rational Method, as described in Australian Rainfall and Runoff (AR & R) (Engineering Australia, 2001). Pre-development outflow rates have been calculated based upon peak flow stream discharge as determined by Section 1.4 of AR & R.

Rainfall intensities for the various storm events and storm durations are calculated and provided by the Bureau of Meteorology (BoM) computerised design Intensity Frequency Duration (IFD) Data System (www.bom.gov.au). Calculations have been undertaken utilising up to date IFD charts.

The Boyd method has been utilised to calculate the stormwater storage volume required for each sub-catchment based on the post-development runoff from the site and the allowable outflows set for the stormwater storages, which are determined by the peak pre-development outflow rate. The Boyd method is considered a conservative estimate of stormwater storage volume calculation.

5.2.3 Drainage System Requirements

Key elements of the proposed drainage system are as follows:

Lot Attenuation

- It is the landowner's responsibility to manage stormwater runoff from buildings, hard stand (impervious) areas and gardens within the property boundary consistent with the City of Albany's lot attenuation guidelines. I.e., 0.5 m³ of storage is required per 100 m² of impervious area. Lot stormwater management systems should be assessed and approved by the City of Albany upon Development Application.
- Rainwater tanks are recommended on all lots and shall be plumbed into homes using a mixed demand system or a trickle feed system to provide available storage for recurrent storm events.
- Soakwells shall only be utilised where there is adequate separation to the peak annual water-table from the base of the soakwell (>300 mm) and adequate gradient for graduated pipe overflow pipes. In areas with shallow depth to groundwater, attenuation basins integrated into the garden landscaping will provide the most effective attenuation mechanism. When designing lot stormwater management systems, overland flow routes directing runoff away from buildings and adjoining properties shall be considered. Lot stormwater management systems should be assessed and approved by the City of Albany upon Development Application.

Stormwater Conveyance

- Roadside swales designed to convey storm events up to the 20% AEP and where required, pipe drains to connect sections of swale sized to convey the 20% AEP storm event. Pipe drains include lot crossovers which shall be constructed prior to subdivision to ensure the integrity of the drainage system is maintained.
- Roadside swales shall have a minimum side slope of 1:4 between the road and swale and 1:5 between the lot boundary and swale for ease of maintenance. The swales shall be designed with adequate

grade for peak runoff conveyance, the minimum longitudinal grade criterion for the swales is 1:200 (0.005). The estimated capacity and top water level of each section of swale shall be calculated using the Manning's formula or appropriate modelling software subsequent to earthwork design, once the incoming sub-catchment to each swale section is confirmed.

- Road drainage from storm events greater than the peak 20% AEP event up to the peak 1% AEP event will be directed to the lowest point in each catchment via overland flow along the road pavement. The ultimate road low point will be located adjacent to Five Mile Creek in each sub-catchment to ensure road runoff is directed off site during storm events greater than the 20% AEP. Runoff from storm events greater than the 20% AEP event will be directed off site unattenuated. Attenuation of flows for storm events greater than the peak 20% AEP event, up to the peak 1% AEP event are likely to have negligible impact on the flood regime of the downstream area.

Bio-retention and Stormwater Storage

- Drainage treatment train utilising bio-retention storages, designed to treat the first 15 mm of rainfall, by providing infiltration close to source. Bio-retention storages shall be designed to convey up to the 20% AEP storm event. Storages will be located at the low point of the sub-catchments, to direct runoff away from infrastructure in the case that the capacity of the storage is exceeded. The bio-retention storages shall be located outside of Five Mile Creek and its flood/riparian vegetation zone. A conceptual cross section of the bio-retention storage is shown in Figure 12 and sizing of the bioretention storages for each sub-catchment is shown in Table 8.
- The maximum side slopes of the bio-retention storages shall be 1:6, with at least 0.3 m of freeboard provided between the 20% AEP top water level and top of bank. A stabilised low point in the bank shall be provided at the 20% AEP top water level, located downstream in the bio-retention storage so that overflow is directed off site when/if the capacity of the storage is exceeded.
- The base of the bio-retention treatment area shall be underlain with 0.4 m depth of amended soil, 0.15m depth of a transition layer (coarse sand) and 0.15 m depth of a drainage layer with 100 mm (maximum) perforated collection pipes (subsoils), as shown in Figure 12. Bio-retention treatment areas shall be planted, the specifications for the amended soil and the planting are provided in Section 5.4.
- Outflow from the bio-retention treatment area of the storage for minor storm events (up to the 20% AEP) shall be set at the top water level of the first 15 mm runoff event, this is set at a maximum depth of 0.3 m to allow for adequate water quality treatment across a larger surface area. Outflow from the treatment area will be via an overflow pit sized to match the peak pre-development outflow for the 20% AEP storm event for each catchment (Table 8).
- Outflow from the bio-retention storages for minor storm events (up to the 20% AEP) shall be set at the top water level of the first 15 mm runoff event, this is set at a maximum depth of 0.5 m to allow for adequate water quality treatment across a larger surface area. Outflow from the storages will be via an overflow pit sized to match the peak pre-development outflow for the 20% AEP storm event for each sub-catchment (Table 8).
- Outflow from bio-retention storages in Sub-catchments A and B will discharge to Five Mile Creek. Outflow from Sub-catchment C will discharge to the Five Mile Creek tributary to the south of the Subject Site, whilst Sub-catchment D will discharge to South Coast Highway and ultimately Five Mile Creek further downstream. The Sub-catchment D bio-retention storage is proposed to be a swale within the road reserve with side slopes consistent with that specified for roadside swales and all other specifications consistent with a bio-retention storage. Measures shall be taken at the downstream end of the storage outlets to ensure scouring and movement of sediment is minimal, this may include rock pitching and stabilisation matting.
- All bio-retention/stormwater storages shall be contained within easements and have adequate access for maintenance. Bio-retention storages located adjacent to Five Mile Creek shall be located outside of the designated creek easement.

Flood Protection

- All building pad finished levels shall have a minimum of 0.3 m separation above the estimated 20% AEP top water level in the bio-retention storages and above the 1% AEP top water level in nearby waterways and waterbodies consistent with the Local Government Guidelines for Subdivisional Development (IPWEA, 2017).
- All roads shall have a minimum separation of 0.3 m above the 20 % AEP top water level in the bio-retention storages and nearby waterways and waterbodies.
- Building pads shall be set back a minimum of 100 m from Five Mile Creek for both flood protection and environmental protection of the waterway.

The First 15mm, 20% AEP and 1% AEP storage requirements are presented in Table 8. The stormwater management plan for the Subject Site is shown in Figure 12.

Table 8: Drainage system requirements (bio-retention storages)

	Catchment			
	A	B	C	D
First 15mm				
Runoff Volume (m^3)	156	264	276	96
Storage Volume required (m^3)	156	264	276	96
Maximum Ponding Depth (m)	0.5	0.5	0.5	0.5
20% AEP				
Critical Storm Duration (hours)	1	1	1	1
Storm Duration Runoff Volume (m^3)	671	928	1342	131
Storage Volume (m^3)	312	459	604	98
Maximum Ponding Depth (m)	0.9	0.9	0.9	0.6
Allowable Outflow from Storage (L/s)	100	130	205	9

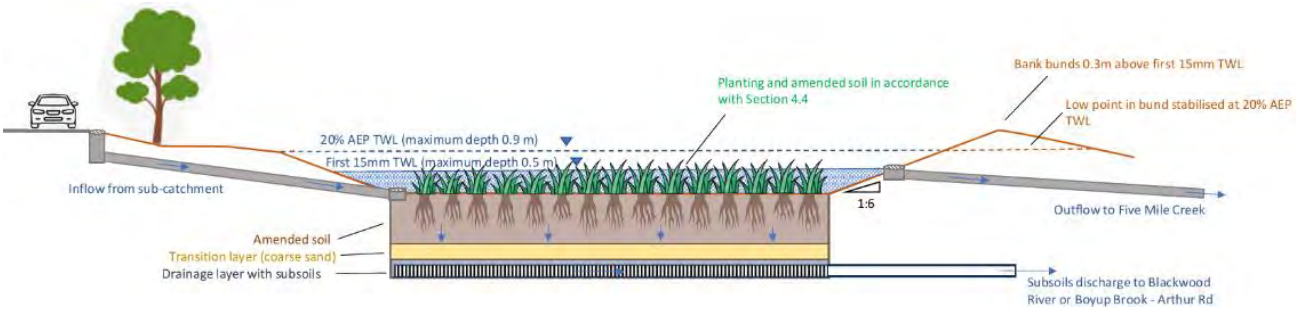
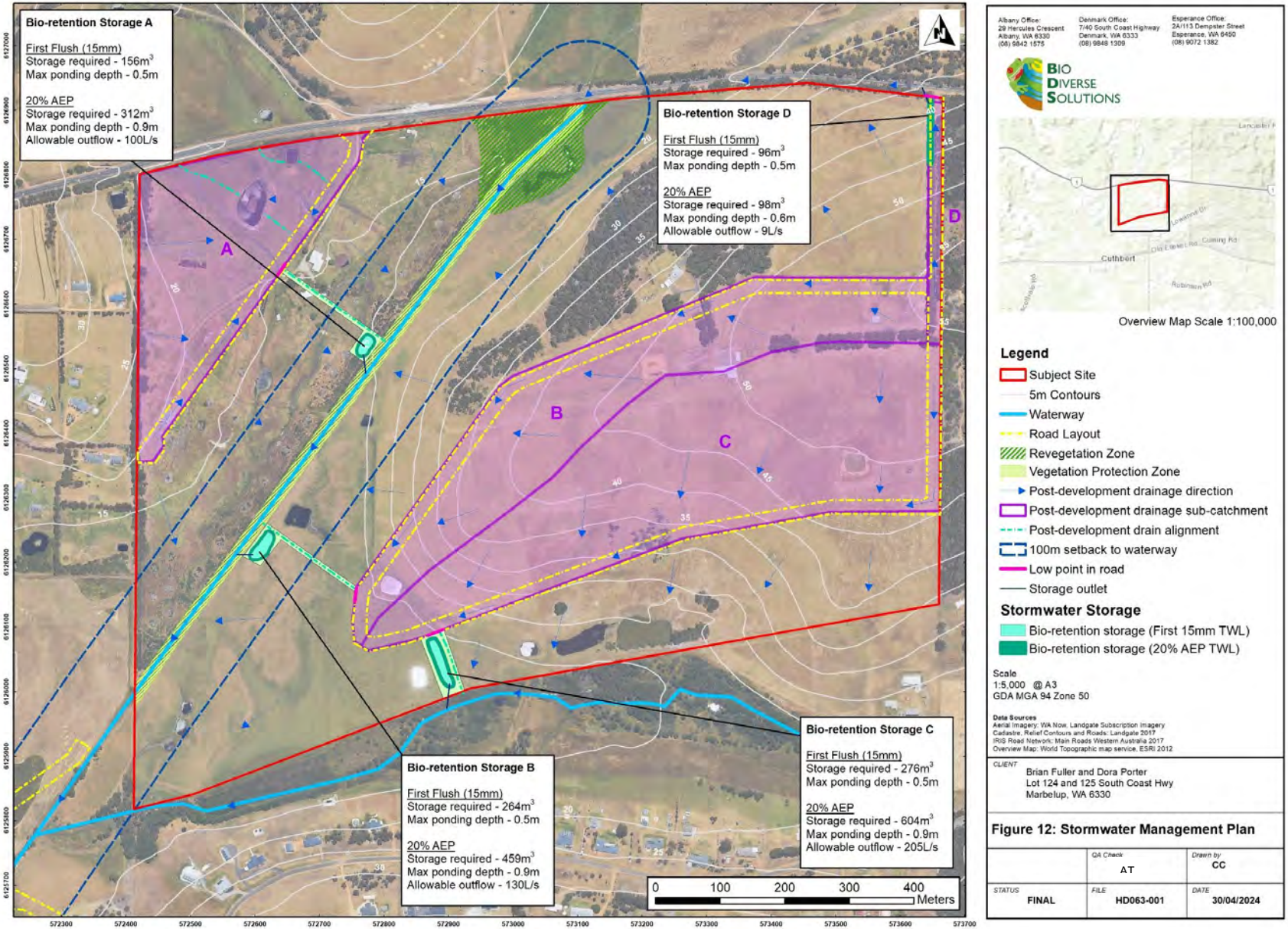


Figure 5: Conceptual cross-section of bio-retention storage/swale



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BIO DIVERSE SOLUTIONS

Legend

- Subject Site
- 5m Contours
- Waterway
- Road Layout
- Revegetation Zone
- Vegetation Protection Zone
- Post-development drainage direction
- Post-development drainage sub-catchment
- Post-development drain alignment
- 100m setback to waterway
- Low point in road
- Storage outlet

Stormwater Storage

- Bio-retention storage (First 15mm TWL)
- Bio-retention storage (20% AEP TWL)

Scale
1:5,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Brian Fuller and Dora Porter
Lot 124 and 125 South Coast Hwy
Marbelup, WA 6330

Figure 12: Stormwater Management Plan

	QA Check	Drawn by
	AT	CC
STATUS: FINAL	FILE: HD063-001	DATE: 30/04/2024

5.3 Groundwater Management

The groundwater management objectives for the Subject Site are to:

- Manage groundwater levels to protect infrastructure and assets;
- Maintain groundwater regimes for the protection of groundwater dependent ecosystems;
- Protect the value of groundwater resources; and
- Adopt nutrient load reduction design objectives for discharges to groundwater.

The following strategies will be implemented for the proposed development of the Subject Site to ensure the above objectives are met:

- To protect infrastructure from high seasonal groundwater levels. Building pads and foundations shall be set in accordance with applicable building standards based on soil type and separation to groundwater. Imported fill will be required where there is a low separation to groundwater, to ensure there is adequate separation between groundwater and building pads/foundations. A minimum separation of 1.5 m (in sands) is required between the land application of effluent disposal and peak groundwater levels (BDS, 2024). Where imported fill is required for the LAA, the same minimum fill depth shall be required for building pads.
- Subsoil drains shall be installed where the road finished level is less than 2 metres above the peak annual water-table. Subsoil drains shall have free draining outlets directed to bio-retention/stormwater storages for treatment prior to discharge.
- Bio-retention storages to have subsoils beneath the amended soil layer to prevent long standing water. Subsoil drains shall have a free draining outlet directed to Five Mile Creek.

5.4 Water Quality Management

The effective implementation of the structural and non-structural controls as part of the development will enhance water quality from this site as a result of the land use change from agricultural to rural residential.

The Subject Site uses a treatment train of structural and non-structural controls to treat up to the first 15 mm of rainfall from storm event.

Structural controls include the use of:

- Lot attenuation through the use of plumbed in rainwater tanks, soakwells and/or rain gardens to capture runoff from rooves and hardstand areas reducing runoff from the site. Infiltration of rainwater at source allows for treatment of water as it moves through the soil profile.
- Bio-retention storages which will receive runoff from the development's internal road network. Bio-retention storages are designed to treat the first flush event (first 15 mm) and retain up the 1% AEP storm event. Bio-retention storages will allow for infiltration at source, they will be underlain with amended soil and subsoils, and planted to allow for uptake of nutrients and heavy metals. The minimum specifications for all bio-retention storages are presented in Table 9.
- Revegetation of Five Mile Creek and the associated flood plain is proposed in the central north of the Subject Site where Five Mile Creek enters the Subject Site. This area receives untreated runoff from a relatively large section of South Coast Hwy and also receives inflow from the upstream catchment of Five Mile Creek, predominantly from agricultural areas. Revegetation shall be consistent with minimum requirements for the bio-retention storages (Table 9) with larger native shrubs suitable for the outer creek line. Figure 12 shows the area proposed to be revegetated. The existing fringing vegetation along Five Mile Creek within the drainage easement shall not be impacted as part of development works and as such has been categorised as a Vegetation Protection Zone (Figure 12).

- Any revegetation or bioretention planting has been accounted for in the Bushfire Management Plan (BMP), as Forest Type A or Shrubland Type C. Refer to details in the overall BMP for the rezoning.

Table 9: Minimum requirements for bio-retention storages

Item	Specification
Amended soil media	• Well graded sand. • Clay and silt content <3%. • Organic content between 3 and 5%. • Hydraulic Conductivity (sat) >150mm/hour. • Light compaction only. • Infiltration testing of material prior to installation and again once construction is complete. On-going testing as per the monitoring program.
Plant selection	• In accordance with Vegetation Guidelines for Stormwater Biofilters in the South-West of WA (Monash University, 2014). • Tolerant of periodic inundation and extended dry periods. • Spreading root system. • Preferential selection of endemic and local native species. • Planting to provide 70-80% coverage at plant maturity.
Planting density and distribution	• Planting density appropriate for species selection. • Even spatial distribution of plant species.

The bio-retention systems should be sized to function correctly with a hydraulic conductivity (K) (saturated) of at least 3 m/day. Research conducted by the Facility for Advancing Water Biofiltration (FAWB, 2008) indicates that the desired K_{sat} is in the range of 2.5 to 7 m/day, to fulfil the drainage requirements as well as retain sufficient moisture to support the vegetation. The FAWB (2008) research also specifies that for vegetated systems, some clogging will occur in the first few years until the vegetation is established. Once the plants are established, the roots and associated biological activity maintain the conductivity of the soil media over time.

Bio-retention systems are to be planted in a low fuel manner so as to not increase the bushfire risk of the area.

Non-structural source controls to reduce nutrient export from the Subject Site will focus on reducing the need for nutrient inputs into the landscape. The following strategies are proposed;

- Promotion of the use of local native plants for landscaping to new lot owners. The use of local native plants will reduce the need for fertilisers across the site; and
- Undertake education campaigns regarding source control practices to minimise pollution runoff into stormwater drainage system.

6 Implementation

6.1 Construction Management

Any temporary stormwater storage required during construction shall be built where the final storage area will be located. The temporary storage will be sized to contain the ultimate capacity of stormwater runoff from the connected area. Measures shall be taken to prevent the transportation of sediment during the construction phase, including infiltrating at source where possible and sand bagging/rock placement at the inlet of any pipe systems discharging outside the Subject Site. Remedial measures shall be undertaken by the developer if any disturbances to the surrounding areas are caused during construction.

6.2 Maintenance of Drainage Systems

The bio-retention swales and drainage system will require regular maintenance to ensure its efficient operation. It is considered the following operating and maintenance practices will be required and undertaken by the client periodically, until successful practical completion of the development and handover to the City of Albany. Following handover, it is the City of Albany's responsibility to maintain drainage structures accordingly:

- Removal of debris to prevent blockages;
- Maintenance of vegetation in bio-retention swales; and
- Cleaning of sediment build up and litter layer on the bottom of storages.

6.3 Monitoring Program

The monitoring program has been designed to allow a quantitative assessment of hydrological impacts of the proposed development.

6.3.1 Hydraulic Performance Monitoring

The hydraulic performance monitoring will aim to measure the movement of storm water through the stormwater storage structures to determine if stormwater conveyance is consistent with the intended design.

Where amended soil profiles have been installed in the bio-retention swales, infiltration testing shall be completed to test the hydraulic conductivity of the media. Testing should be repeated every 12 months to ensure clogging of the storages does not occur.

Water levels in the stormwater swales and the drainage basin east of the Subject Site shall be observed during significant storm events to ensure they are consistent with design and not overflowing.

6.3.2 Groundwater Monitoring

Two years of post-development groundwater level monitoring (quarterly) shall be conducted with results compared to the peak annual water-table levels recorded in the test pits constructed during the October 2021 Soil Investigation (GSG, 2021). A minimum of 8 groundwater monitoring bores shall be installed adjacent to eight test pit locations that intercepted groundwater during the Soil Investigation (GSG, 2021). If groundwater levels are found to exceed pre-development groundwater levels by more than 500 mm with no significant change in rainfall a review of the development design and operations will be required and alterations/modifications to the development will be conducted to reduce groundwater levels accordingly.

7 References

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Appendix A

Site Soil Investigation (Great Southern Geotechnics, 2021)

GREAT SOUTHERN GEOTECHNICS

CONSTRUCTION MATERIALS TESTING

Site Investigation

Report 5175/1

Monday, 25 October 2021

Bio Diverse Solutions

Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

Presented By: A.Purdie

Great Southern Geotechnics Pty Ltd

5a 209 Chester Pass Rd, Albany WA

GREAT SOUTHERN GEOTECHNICS

1.0 INTRODUCTION

As authorised by Bio Diverse Solutions an investigation for the proposed Development on Lot 124 & 125 South Cst Hwy, Marbellup WA 6330 was performed on the 19/10/2021

2.0 GENERAL

The intent of the investigation was to determine the following:

- In Situ soil types and profiles, and
- Depth of groundwater

3.0 SITE INVESTIGATION

Site conditions and test pit locations were recorded and are displayed in Appendix A - Maps.
Test pits logs/ soil profiles are noted in Appendix B - Test Pit Logs

The field investigation consisted of 22 Boreholes excavated on-site to depths of up to 2 meters using a Kubota KX41-3V mini excavator with a 300mm Auger.

Test pits were spread across the the proposed development as locations specified by the client.

All soil layers encountered were visually assessed and classified on-site.

IMPORTANT NOTE: The test pits have been spread so that they are representative of the subsurface materials across the intended reconstruction area, however, soil conditions may change dramatically over short distances and our investigations may not locate all soil variations across the site.

4.0 LABORATORY TESTING

N/A

This report and associated documentation was undertaken for the specific purpose described in the report and shall not be relied on for other purposes.

This report was prepared solely for the use by Bio Diverse Solutions any reliance assumed by other parties on this report shall be at such parties own risk.

Appendix A

Maps

Figure 1

Test Pits 1 to 22

Test Pit Locations

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 5175
Client: Bio Diverse Solutions
Project: Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

Appendix B

Test Pit Logs

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 1 of 44
5175/1	1	5175G1	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'59.69"S 117°47'52.75"E	A.Purdie	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ ground level.		
0 - 400	400	**(Topsoil) SAND with silt:** Grey/brown, fine to medium.	W	L-M				
		Contains roots and root fibres.						
400 - 1500	1100	**SAND with silt:** Grey to light grey, fine to medium.	W	L-MD				
1500 - 2000	500	**SAND with silt:** Light brown, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.1

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 2 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 3 of 44
5175/1	2	5175G2	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'57.79"S 117°47'40.05"E	A.Purdie	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 50mm below existing ground level.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
200 - 1350	1150	**SAND with silt**: Grey to light grey, fine to medium.	M-W	L-MD				
1350 - 2000	650	**SAND with silt:** Dark grey/black, fine to medium. (*Refer to comments)	M	MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Moderately cemented from 1550 to 2000	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.2

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 4 **of** 44

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 5 of 44
5175/1	3	5175G3	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'2.80"S 117°47'39.61"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 1020mm below existing ground level.		
0 - 120	120	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
120 - 500	380	**SAND with silt**: Grey to light grey, fine to medium.	M	L-MD				
500 - 1200	700	**Sandy GRAVEL:** Dark/light brown, fine to coarse, sub-rounded to sub-angular.	M	D-VD				
		Fine to medium grained sand. (*Refer to comments)						
1200 - 2000	800	**SANDY CLAY:** Low to medium plasticity, light brown/grey with red and orange mottle.	M	F-St				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Layer excavates as a Sandy GRAVEL, however consists of a conglomerate formation.	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

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Test Pit No.3

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 6 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 7 of 44
5175/1	4	5175G4	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'11.19"S 117°47'38.64"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 350mm below existing ground level.		
0 - 160	160	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
160 - 1050	890	**SAND with silt**: Grey to light grey, fine to medium.	M	W				
1050 - 1680	630	**Sandy GRAVEL:** Dark/light brown, fine to coarse, sub-rounded to sub-angular.	M	MD	PC			
		Fine to medium grained sand.						
1680 - 2000	320	**SAND:** Light brown/grey, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.4

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 8 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 9 of 44
5175/1	5	5175G5	

Client:	Bio Diverse Solutions	**Date Commenced**		**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330		19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**		**Excavation Method :**	300mm Auger
Location:	34°59'56.34"S 117°47'51.54"E		A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 50mm below existing ground level.		
0 - 220	220	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
220 - 2000	1780	**SAND with silt:** Grey to light grey, fine to medium.	M-W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.5

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 10 **of** 44

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 11 of 44
5175/1	6	5175G6	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'59.96"S 117°48'22.33"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 250	250	**(Topsoil) SAND with silt:** Grey, fine to medium.	M-W	L-MD				
		Contains roots and root fibres.						
250 - 325	75	**Sandy GRAVEL:** Brown/orange, fine to medium, sub-rounded to sub-angular.	M	MD				
		Fine to medium grained sand.						
325 - 780	455	**Sandy CLAY:** Low to medium plasticity, yellow.	M	F-St				
		Fine to medium grained sand. (*Refer to comments)						
780 - 2000	1220	**Sandy CLAY:** Dark brown/red with yellow and grey mottle.	M	F-St				
		fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains fine to medium, sub-rounded to sub-angular gravel to 450mm.	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.6

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 12 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 13 of 44
5175/1	7	5175G7	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'55.20"S 117°48'23.90"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
180 - 400	220	**Gravelly SAND:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres. (*Refer to comments)						
400 - 2000	1600	**Clayey SAND with gravel:** Low to medium plasticity, light brown, fine to medium.	M	F				
		Fine to coarse, sub-rounded to sub-angular gravel.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.7

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 14 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 15 of 44
5175/1	8	5175G8	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'57.21"S 117°48'17.10"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt and GRAVEL:** Grey, fine to medium.	M	L-MD				
		Fine to coarse, sub-rounded to sub-angular gravel.						
		Contains roots and root fibres.						
180 - 500	320	**Sandy GRAVEL:** Light brown/grey, fine to coarse, sub-rounded to sub-angular.	M	MD				
		Fine to medium grained sand. (*Refer to comments)						
500 - 1600	1100	**Clayey SAND with gravel:** Low to medium plasticity, light brown, fine to medium.	M	MD				
		Fine to coarse, sub-rounded to sub-angular gravel.						
1600 - 2000	400	**Silty SAND with clay:** Low plasticity, pale yellow with white mottle.	M	MD				
		Fine to medium grained sand.						

Samples Taken	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.8

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 16 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 17 of 44
5175/1	9	5175G9	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'5.39"S 117°48'23.06"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 140	140	**(Topsoil) Gravelly SAND:** Dark grey/brown, fine to medium.	M	L-MD				
		Fine to medium, rounded to sub-angular gravel.						
		Contains roots and root fibres.						
140 - 420	280	**Sandy CLAY with gravel:** Low to medium plasticity,	M	F				
		brown/orange with red and white mottle.						
		Fine to medium, rounded to sub-angular gravel.						
420 - 2000	1580	**Sandy CLAY:** Low to medium plasticity, red/brown with yellow and grey mottle.	M	F-St				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet N/A - Not Applicable N/D - Not Determined
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.9

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 5175/1
Client: Bio Diverse Solutions
Project: Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 19 of 44
5175/1	10	5175G10	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'13.73"S 117°48'23.43"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 120	120	**(Topsoil) Sandy GRAVEL:** Dark brown, fine to coarse, sub-rounded to sub angular.	M	MD				
		Fine to medium grained sand. (*Refer to comments)						
120 - 350	230	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD				
		Fine to medium grained sand.						
350 - 670	320	**Sandy CLAY:** Medium plasticity, yellow with red mottle.	M	St				
		Fine to medium grained sand.						
670 - 1200	530	**Sandy CLAY:** Low to medium plasticity, brown/red with white mottle.	M	F-St				
		Fine to medium grained sand.						
1200 - 200	800	**Silty SAND with clay:** Low plasticity, pale yellow with white mottle.	M	F-St				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.10

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 20 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 21 of 44
5175/1	11	5175G11	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'16.44"S 117°48'18.40"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 170	170	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
170 - 330	160	**SAND with silt:** Grey, fine to medium.	M	L-MD				
330 - 1150	820	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular.	M	D	WC			
		Fine to medium grained sand.						
1150 - 2000	850	**Sandy CLAY:** Low to medium plasticity,brown/orange.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.11

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 22 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Reort No	Test Pit No.	Sample No.	Sheet 23 of 44
5175/1	12	5175G12	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'16.70"S 117°48'8.39"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 850mm below existing ground level.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
200 - 800	600	**SAND with silt:** Grey/light grey, fine to medium.	M	L-MD				
800 - 1000	200	**Gravelly SAND:** Brown to dark brown, fine to medium.	M	MD				
		Fine to coarse, sub-rounded to sub-angular gravel.						
1000 - 2000	1000	**Clayey, Silty SAND:** Low plasticity, light brown/orange.	M-W	L-MD				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.12

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 24 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 25 of 44
5175/1	13	5175G13	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'10.14"S 117°48'3.72"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 400mm below existing ground level.		
0 - 120	120	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
120 - 460	340	**SAND with silt:** Light grey, fine to medium.	M	L-MD				
460 - 980	520	**Sandy GRAVEL:** Brown/orange, fine to coarse, sub-rounded to sub-angular.	M	D	MC			
		Fine to medium grained sand.						
980 - 1580	600	**Sandy CLAY:** Low to medium plasticity, brown/orange with red mottle.	M	F				
		Fine to medium grained sand.						
1580 - 2000	420	**Silty SAND with clay:** Low plasticity, pale yellow with white mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.13

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 26 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 27 of 44
5175/1	14	5175G14	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'8.35"S 117°48'12.72"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 800mm below existing ground level.		
0 - 300	300	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
300 - 720	420	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
720 - 990	270	**Sandy CLAY with gravel:** Medium plasticity, light brown/grey with red and orange mottle	W	S-F				
		Fine to medium , sub-rounded to sub-angular gravel.						
		Fine to medium grained sand.						
990 - 2000	1010	**Sandy CLAY:** Medium plasticity, red with grey and orange mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.14

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 28 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 29 of 44
5175/1	15	5175G15	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'13.50"S 117°47'58.91"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
200 - 810	610	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
810 - 1550	740	**Sandy CLAY:** Low plasticity, brown/orange with red mottle.	M	F				
		Fine to medium grained sand.						
1550 - 2000	450	**Silty SAND with trace clay:** Low plasticity, pale yellow with white mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.15

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 30 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 31 of 44
5175/1	16	5175G16	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'19.95"S 117°47'57.96"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ ground level.		
0 - 160	160	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
160 - 750	590	**SAND with silt:** Grey, fine to medium.	M	L-MD				
750 - 1250	500	**SAND with silt:** Light grey, fine to medium.	W	L-MD				
1250 - 1700	450	**SAND with silt:** Dark grey, fine to medium.	W	L-MD				
1700 - 2000	300	**SAND with silt:** Dark grey, fine to medium.	M	MD-D	WC			

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.16

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 32 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 33 of 44
5175/1	17	5175G17	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'1.30"S 117°48'1.12"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
200 - 760	560	**SAND with silt:** Light grey, fine to medium.	M	L-MD				
760 - 1300	540	**SAND with silt:** Brown, fine to medium.	M	VD	WC			
1300	0	**REFUSAL**						

Samples Taken			
	Target Depth		
	Cave In		
	Refusal	✓	1300
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.17

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 34 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 35 of 44
5175/1	18	5175G18	

Client:	Bio Diverse Solutions	**Date Commenced**		**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330		19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**		**Excavation Method :**	300mm Auger
Location:	34°59'57.11"S 117°48'5.08"E		A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 130	130	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
130 - 920	790	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular.	M	D	MC			
		Fine to medium grained sand.						
920 - 2000	1080	**Silty sandy CLAY:** Low to medium plasticity, light brown with grey mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet N/A - Not Applicable N/D - Not Determined
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.18

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 5175/1
Client: Bio Diverse Solutions
Project: Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 37 of 44
5175/1	19	5175G19	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'8.81"S 117°47'54.01"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 250	250	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
250 - 740	490	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand. (*Refer to comments)						
740 - 2000	1260	**Silty sandy CLAY:** Low to medium plasticity, light brown with red and white mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.19

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 38 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 39 of 44
5175/1	20	5175G20	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'13.22"S 117°47'51.81"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 150mm below existing ground level.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
200 - 1100	900	**SAND with silt:** Light grey, fine to medium.	M-W	L-MD				
1100 - 1200	100	**SAND with silt:** Dark brown, fine to medium.	M	MD	MC			
1200 - 2000	800	**SAND with silt:** Light brown, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.20

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 40 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 41 of 44
5175/1	21	5175G21	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'20.29"S 117°47'50.80"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ ground level.		
0 - 300	300	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
300 - 900	600	**SAND with silt:** Dark grey/grey, fine to medium.	W	L-MD				
900 - 1600	700	**SAND with silt:** Light grey, fine to medium.	W	L-MD				
1600 - 2000	400	**SAND with silt:** Brown, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.21

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 42 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 43 of 44
5175/1	22	5175G22	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'16.39"S 117°47'46.39"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 550mm below existing ground level.		
0 - 300	300	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
300 - 1600	1300	**SAND with silt:** Grey , fine to medium.	W	L-MD				
1600 - 2000	400	**SAND with silt:** Dark grey/ black , fine to medium.	W	L-MD	PC			

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.22

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 44 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

COLOURS

BLACK - BROWN (bk)	BLUE (bl)	ORANGE (or)
BROWN (br)	BLUE - GREEN (bl/gr)	RED (rd)
GREY - BROWN (gy/br)	GREEN (gr)	RED - BROWN (rd/br)
GREY (gy)	YELLOW (yl)	PINK (pk)
BLUE - GREY (bl/gy)	YELLOW - BROWN (yl/br)	PURPLE (pr)

MOISTURE CONDITION OF SOIL

TERM	DESCRIPTION
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

PARTICLE SHAPES

ANGULAR	SUB-ANGULAR	SUB-ROUNDED	ROUNDED

PARTICLE SIZES

BOULDERS	COBBLES	COARSE GRAVEL	MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY
>200mm	63-200mm	20-63mm	6-20mm	2.36-6mm	0.6-2.36mm	0.2-0.6mm	0.075-0.2mm	0.002-0.075mm	<0.002mm

GRAIN SIZE

SOIL TYPE (ABBREV.)	CLAY (CL)	SILT (SI)	← SAND (SA) →		← GRAVEL (GR) →			COBBLES (CO)
SIZE	< 2µm	2-75µm	Fine 0.075-0.2mm	Medium 0.2-0.6mm	Coarse 0.6-2.36mm	Fine 2.36-6mm	Medium 6-20mm	Coarse 20-63mm	63-200mm
SHAPE & TEXTURE	Shiny	Dull	← angular or sub angular or sub rounded or rounded →						
FIELD GUIDE	Not visible under 10x	Visible under 10x	Visible by eye	Visible at < 1m	Visible at < 3m	Visible at < 5m	Road gravel	Rail ballast	Beaching

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

CLASSIFICATION CHART

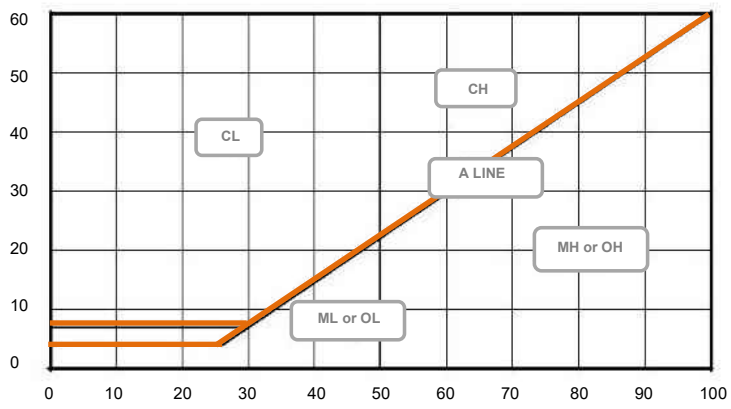
FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60mm and basing fractions on estimated mass)				GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% of material less than 63 mm is larger than 0.075 mm	GRAVELS More than 50% of coarse fraction is larger than 2.36mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	GP	Poorly Graded gravels and gravel-sand mixtures, little or no fines, uniform gravels
		GRAVELS WITH FINES (Appreciable amount of fines)	Dirty' materials with excess of non-plastic fines, zero to medium dry strength	GM	Silty gravels, gravel-sand-silt mixtures
			'Dirty' materials with excess of plastic fines, medium to high dry strength	GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction is smaller than 2.36mm	CLEAN SANDS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	SW	Well graded sands, gravelly sands, little or no fines
			Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength '	SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands
		SANDS WITH FINES (Appreciable amount of fines)	Dirty' materials with excess of non-plastic fines, zero to medium dry strength	SM	Silty sands, sand-silt mixtures
			'Dirty' materials with excess of plastic fines, medium to high dry strength	SC	Clayey sands, sand-clay mixtures

FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2mm					
		DRY STRENGTH	DILATANCY	TOUGHNESS		
	SILTS AND CLAYS Liquid limit less than 50	None to low	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with low plasticity. Silts of low to medium Liquid Limit.
		Medium to high	None to very slow	Medium	CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
		Low to medium	Slow	Low	OL	Organic silts and organic silt-clays of low to medium plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Low to medium	Slow to none	Low to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, silts of high Liquid Limit.
		High to very high	None	High	CH	Inorganic clays of high plasticity.
		Medium to high	None to very slow	Low to medium	OH	Organic clays of high plasticity

HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture	Pt	Peat and other highly organic soils

PLASTICITY CHART

For laboratory classification of fine grained soils



GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

PLASTICITY

DESCRIPTIVE TERM	OF LOW PLASTICITY	OF MEDIUM PLASTICITY	OF HIGH PLASTICITY
Range Of Liquid Limit (%)	≤ 35	> 35 ≤ 50	> 50

DESCRIPTION OF ORGANIC OR ARTIFICIAL MATERIALS

PREFERRED TERMS	SECONDARY DESCRIPTION
Organic Matter	Fibrous Peat/ Charcoal/ Wood Fragments/ Roots (greater than approximately 2mm diameter)/ Root Fibres (less than approximately 2mm diameter)
Waste Fill	Domestic Refuse/ Oil/ Bitumen/ Brickbats/ Concrete Rubble/ Fibrous Plaster/ Wood Pieces/ Wood Shavings/ Sawdust/ Iron Filings/ Drums/ Steel Bars/ Steel Scrap/ Bottles/ Broken Glass/ Leather

CONSISTENCY - Cohesive soils

TERM	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD
Symbol	VS	S	F	St	VSt	H
Undrained Shear Strength (kPa)	< 12	12 - 25	25 - 50	50 - 100	100 - 200	> 200
SPT (N) Blowcount	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	> 30
Field Guide	Exudes between the fingers when squeezed	Can be moulded by light finger pressure	Can be moulded by strong finger pressure	Cannot be moulded by fingers. Can be indented by thumb nail	Can be indented by thumb nail	Can be indented with difficulty with thumb nail

CONSISTENCY - Non-cohesive soils

TERM	VERY LOOSE	LOOSE	MEDIUM DENSE	DENSE	VERY DENSE	COMPACT
Symbol	VL	L	MD	D	VD	CO
SPT (N) Blowcount	0 - 4	4 - 10	10 - 30	30 - 50	50 - 100	> 50/150 mm
Density Index (%)	< 15	15 - 35	35 - 65	65 - 85	85 - 95	> 95
Field Guide	Ravels	Shovels easily	Shovelling very difficult	Pick required	Pick difficult	Cannot be picked

MINOR COMPONENTS

TERM	TRACE	WITH
% Minor Component	Coarse grained soils: < 5% Fine grained soils: <15%	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%
Field Guide	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary components	Presence easily detectable by feel or eye, soil properties little different to general properties of primary component

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

GEOLOGICAL ORIGIN

	TYPE	DETAILS
TRANSPORTED SOILS	Aeolian Soils	Deposited by wind
	Alluvial Soils	Deposited by streams and rivers
	Colluvial Soils	Deposited on slopes
	Lacustrine Soils	Deposited by lakes
	Marine Soils	Deposited in ocean, bays, beaches and estuaries
FILL MATERIALS	Soil Fill	Describe soil type, UCS symbol and add 'FILL'
	Rock Fill	Rock type, degree of weathering, and word 'FILL'.
	Domestic Fill	Percent soil or rock, whether pretrucible or not.
	Industrial Fill	Percent soil, whether contaminated, particle size & type of waste product, ie brick, concrete, metal

STRENGTH OF ROCK MATERIAL

TERM	SYMBOL	IS(50)	(MPA)	FIELD GUIDE TO STRENGTH
Extremely Low	EL	≤0.03		Easily remoulded by hand to a material with soil properties.
Very Low	VL	>0.03	≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxle sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	>0.1	≤0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	>0.3	≤1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	>1	≤3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	>3	≤10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	>10		Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded, in water.
Distinctly Weathered Rock	DW	Rock strength usually changed by weathering. Rock may be highly discoloured, usually be iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

LOCAL WATER MANAGEMENT STRATEGY

Lot 9001 Lower Denmark Road

Cuthbert, WA 6330

01/05/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

Title: Local Water Management Strategy – Lot 9001 Lower Denmark Road, Cuthbert WA

Author (s): Chiquita Cramer

Reviewer (s): Marisa Wearing and Alexandra Tucker

Job No.: HD063-002

Client: Barry Panizza

REVISION RECORD

Revision	Summary	Prepared By	Reviewed By	Date
Draft Id 22/04/2024	Prepared for QA review	C. Cramer	M. Wearing	22/04/2024
Draft Id 22/04/2024	Technical review	C. Cramer	A. Tucker	22/04/2024
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1 Introduction

1.1 Background

Lot 9001 Lower Denmark Road, Cuthbert WA Local Water Management Strategy (LWMS), has been prepared by Bio Diverse Solutions on behalf of Barry Panizza (the land owner), in support of a rezoning and subsequent future subdivision prepared for the site.

The LWMS provides the framework for the application of total water cycle management to the proposed rezoning. This is consistent with the Department of Water and Environmental Regulation (DWER) principles of Water Sensitive Urban Design (WSUD), described in the Stormwater Management Manual (DoW, 2007).

1.2 Key Design Principles and Objectives

The LWMS employs the following key documents to define its content, key principles and objectives:

- Stormwater Management Manual for Western Australia (DoW, 2007).
- Better Urban Water Management (WAPC, 2008).

A summary of the key design principles and objectives from these documents is summarised below and provided in Table 1.

1.2.1 Stormwater Management Manual (DoW 2007)

The Department of Water (DoW), now Department of Water and Environmental Regulation (DWER), released *A Manual for Managing Urban Stormwater Quality in Western Australia* in 1998. The manual defines and practically describes Best Management Practices (BMPs) to reduce pollutant and nutrient inputs to stormwater drainage systems. The Manual also aims to provide guidelines for the incorporation of water sensitive design principles into urban planning and design, which would enable the achievement of improved water quality from urban development.

The document was released to provide a guideline for best planning and management practices and was intended for use by the DoW (now DWER), but also by other State and Local Government Authorities and sectors of the urban development industry.

DoW completed a major review of the manual in consultation with a working team, comprising of industry and government representatives. The revised manual was officially launched in August 2007.

DWER's current position on urban stormwater management in Western Australia is outlined in Chapter 2: *Understanding the Context of the Stormwater Management Manual for Western Australia* (DoW, 2007), which details the management objectives, principles and a stormwater delivery approach for WA. Principle objectives for managing urban water in WA are stated as:

- Water Quality: To maintain or improve the surface and groundwater quality within development areas relative to pre-development conditions.
- Water Quantity: To maintain the total water cycle balance within development areas relative to the pre-development conditions.
- Water Conservation: To maximise the reuse of stormwater.
- Ecosystem Health: To retain natural drainage systems and protect ecosystem health.
- Economic Viability: To implement stormwater systems that are economically viable in the long-term.
- Public Health: To minimise public risk, including risk of injury or loss of life to the community.
- Protection of Property: To protect the built environment from flooding and water logging.

- Social Values: To ensure that social aesthetic and cultural values are recognised and maintained when managing stormwater.
- Development: To ensure the delivery of best practice stormwater management through planning and development of high-quality developed areas in accordance with sustainability and precautionary principles.

1.2.2 Better Urban Water Management (WAPC, 2008)

The guideline document Better Urban Water Management (BUWM; WAPC, 2008) focuses on the process of integration between land use and water planning. The document specifies the level of investigation and documentation required at various decision points in the planning process, rather than the provision of any specific design objectives and criteria for urban water management.

This LWMS complies with the BUWM process.

Table 1: Summary of design principles and objectives

Key Guiding Principles		
• Facilitate implementation of sustainable best practice urban water management. • Provide integration with planning processes and clarity for agencies involved with implementation. • To minimise public risk, including risk of injury or loss of life. • Protection of infrastructure and assets from flooding and inundation. • Encourage environmentally responsible development. • Facilitate adaptive management responses to the monitored outcomes of development.		
Category	**Key Design Principles & Objectives**	**LWMS Criteria**
Surface Water Management	• Minimise changes in hydrology to prevent impacts on receiving environments. • Manage water flows from major events to protect infrastructure and assets. • Apply the principles of WSUD. • Adopt water quality treatment design objectives for stormwater runoff. • Flood management. • Adopt treatment train approach.	• Post-development critical peak flows will be consistent with pre-development peak flows at the discharge point of each catchment within the Subject Site up to the 20% AEP. • First 15 mm of rainfall from storm events intercepting road network will be treated at source where possible. • Manage surface water flows from major storm events to protect infrastructure and assets from flooding and inundation.
Groundwater Management	• Manage groundwater levels to protect infrastructure and assets. • Maintain groundwater regimes for the protection of groundwater-dependent ecosystems. • Protect the value of groundwater resources.	• Managing and minimising changes in groundwater levels and groundwater quality following development.
Monitoring and Implementation	• Adopt an adaptive management approach. • Maintain drainage and treatment structures.	• Design based on methodology in Stormwater Management Manual of adopting a treatment train including: • Structural treatment measures (bio-retention treatment structures). • Non-structural measures to reduce applied nutrient loads. • Maintain groundwater quality at pre-development levels (median winter concentrations) and, if possible, improve the quality of water leaving the development area to maintain and restore ecological systems.
Water Conservation	• Adopt drinking water consumption target. • Ensure that non-potable water supply systems deliver a net benefit to the community. • Ensure that non-potable water supply systems are designed as part of an integrated water supply.	• Aim to achieve the State Water Plan target for water use and reduce water use where possible. • Consider alternative fit for purpose water sources where appropriate and cost-effective.

1.3 Suitable Qualified Hydrologist

This LWMS has been prepared by Chiquita Cramer, who has 15 years of experience working as a hydrologist and hydrogeologist.

Chiquita Cramer currently has the following tertiary qualifications:

- Bachelor of Science in Natural Resource Management (University of Western Australia); and
- Graduate Certificate in Hydrogeology (University of Western Australia).

Chiquita completed a Bachelor of Science in Natural Resource Management in 2008 at the University of Western Australia. Chiquita worked as a hydrologist and senior hydrologist at JDA Consultant Hydrologists in Perth for 8 years. Chiquita's experience includes preparation of multiple local and urban water management strategies, hydrological and hydraulic investigations, surface water and groundwater monitoring reports and hydrogeological reports. Chiquita completed a Graduate Certificate in Hydrogeology and in 2017 joined Bio Diverse Solutions (BDS) to provide expertise in hydrology and hydrogeology to the company.

1.4 Location

The Subject Site is defined as Lot 9001 (No. 688) Lower Denmark Road, Cuthbert WA within the City of Albany. The site has an area of ~107 ha and is bound by Lower Denmark Road to the south, rural residential lots to the north and east, and agricultural land to the west. The location of the Subject Site is shown in Figure 1.

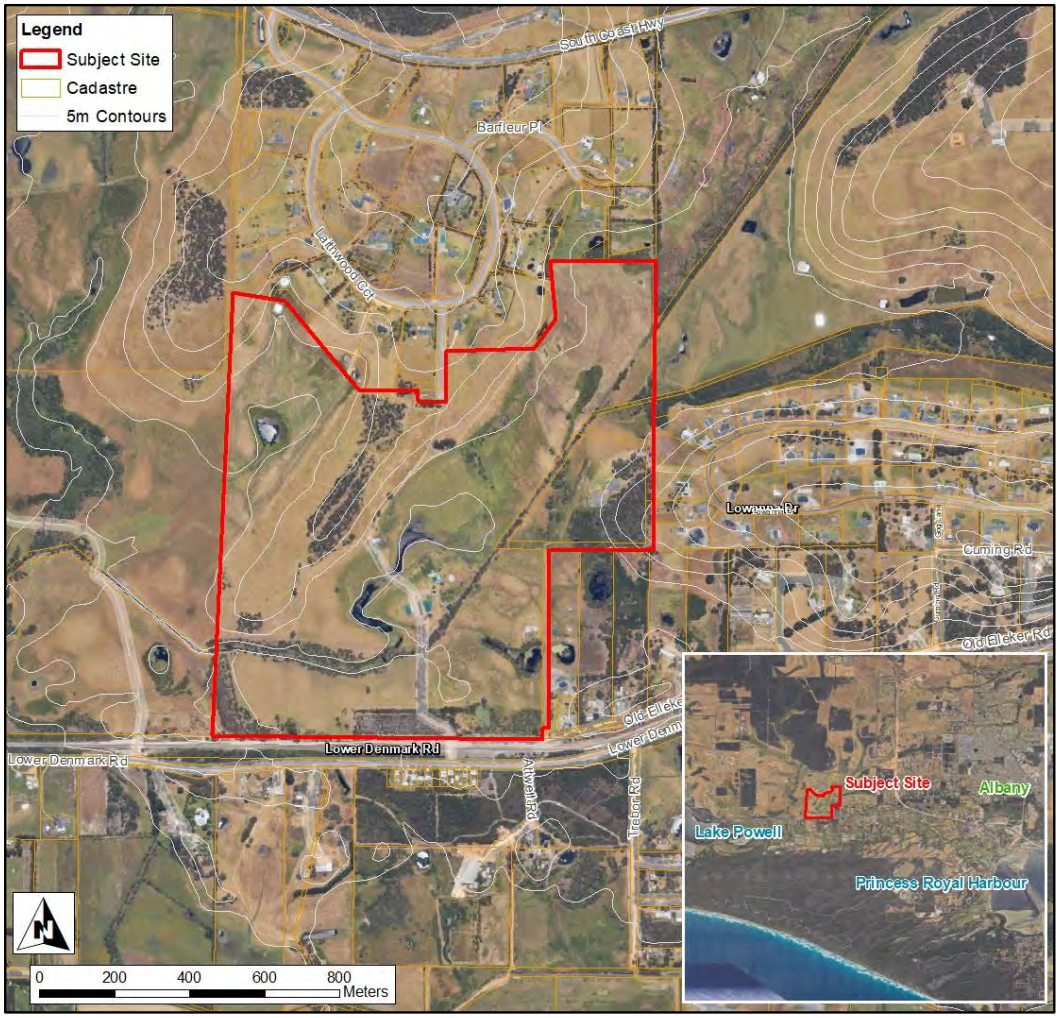


Figure 1: Location plan

2 Proposed Development

The Subject Site is zoned as *'General Agriculture'* under the City of Albany's Local Planning Scheme No. 1 (DPLH, 2019). It is proposed the Subject Site be rezoned to '*Rural residential'* and *'Rural smallholdings',* and forms part of a larger structure plan area that includes Lots 124 and 125 South Coast Highway to the northeast of the Subject Site. The proposed rezoning for the site is shown in Figure 2.

Figure 2: Zone Plan (Harley Dykstra, 2022). Note Subject Site area depicted by blue square.

3 Pre-development Environment

3.1 Existing Land Use

The site currently consists of agricultural land used for mixed cropping and livestock (Photo 1). There is one residential dwelling, centrally located on the Subject Site (Photo 2 to 4). The land immediately north and east of the Subject Site is currently utilised for rural residential living.

Photo 1: View to the west of agricultural land within the Subject Site.

Photo 2: View to the south southeast of driveway to Subject Site.

Photo 3: View to the southwest of dwelling centrally located within the Subject Site.

Photo 4: View to the east southeast of rural residential property to the east of Subject Site.

3.2 Topography

The Subject Site is generally low lying and flat, with an elevated ridgeline running from northeast to southwest in the central west of the site. The northwest corner and the central eastern edge of the Subject Site are also elevated. Elevation ranges from a high point of 32 mAHD in the northwest of the Subject Site to a low point of 10 mAHD in the central and southern portions of the site. Topographic contours are shown in Figure 3.

Figure 3: Topography

3.3 Climate

The Albany area is characterised by a Mediterranean climate with warm dry summers and cool wet winters. Rainfall data is from the nearby Bureau of Meteorology (BoM, 2023) Albany Station (Site No. 009500).

The closest open Bureau of Meteorology (BoM) station to the Subject Site, is the Albany Station (009500). The average annual temperature at Albany Station ranges from 8.3-22.9°C. The average summer temperature ranges between 14.1-22.9°C, whilst average winter temperatures range between 8.3-16.7°C. The annual mean rainfall for Albany station is 920.8 mm (BoM, 2023). On average the months of May - September are the months with the highest rainfall (Figure 4). There was a higher than average rainfall recorded in the months of April and June 2022, and October and November 2023.

The average annual pan evaporation for the Albany area is approximately 1397 mm (Luke et al., 1988).

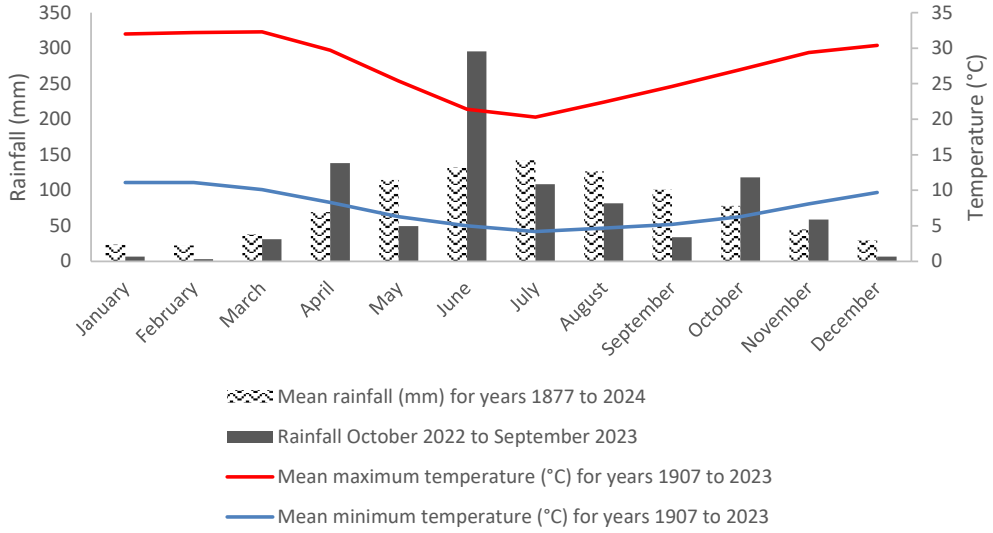


Figure 4: Climate Data for Albany BoM Weather Station No. 009500

3.4 Remnant Vegetation

The Subject Site predominantly consists of cleared agricultural land with scattered paddock trees, and patches of remnant vegetation surrounding waterways/waterbodies and the ridge in the northwest. The Subject Site lies within the JF02 – Jarrah Forrest Interim Bio-geographic Regional Area (IBRA) and characterised by Jarrah-Marri forest on laterite gravels. Eluvial and alluvial deposits support Agonis shrublands (DSEWPC, 2012).

The vegetation has also been mapped on a broad scale by J.S. Beard (Shepherd et al., 2002) in the 1970's, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics. A GIS search of J.S. Beards vegetation classification places the Subject Site within two System and Vegetation Associations as shown in Table 2 (DPIRD, 2017a).

Table 2: Vegetation Associations (DPIRD, 2017a)

System Association Name	Vegetation Association Number	Vegetation Description
Albany	3	Mainly jarrah and marri *Eucalyptus marginata*, *Corymbia calophylla*.
Denmark	51	Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West).

There are no Conservation Parks or Class "A" Reserves within the Subject Site or within the vicinity of the Subject Site.

3.5 Acid Sulphate Soils

Acid Sulphate Soils (ASS) are naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). When undisturbed below the water table, these soils are benign and not acidic (potential ASS). However, if the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid. ASS Risk Mapping indicates that the low-lying areas within the Subject Site are situated within an area of moderate to low risk of ASS occurring within 3 metres of natural soil surface, as shown in Figure 5 (DWER, 2017).

Figure 5: ASS risk mapping

An ASS Preliminary Investigation was conducted at the Subject Site by Opus on the 15th January 2008 as part of an Addendum to the Land Capability Assessment (Opus, 2007). In summary, the investigation found the peat layers at the Subject Site had acidity levels which exceeded DWER Guidelines. The acidity was found not to be caused by sulphur and likely to be caused from the mobilisation of hydrolysed ions, attributed to iron or aluminium leaching through the soil profile (Opus, 2007).

Soil analysis showed the surface soils had high Electrical Conductivity (EC) and corresponding acidity, which Opus (2007) found likely to be attributed to bicarbonate salts and not sulphur salts. Sulphur acidity (ASS) was detected in the soil layers from approximately 1000 mm BGL (Opus, 2007).

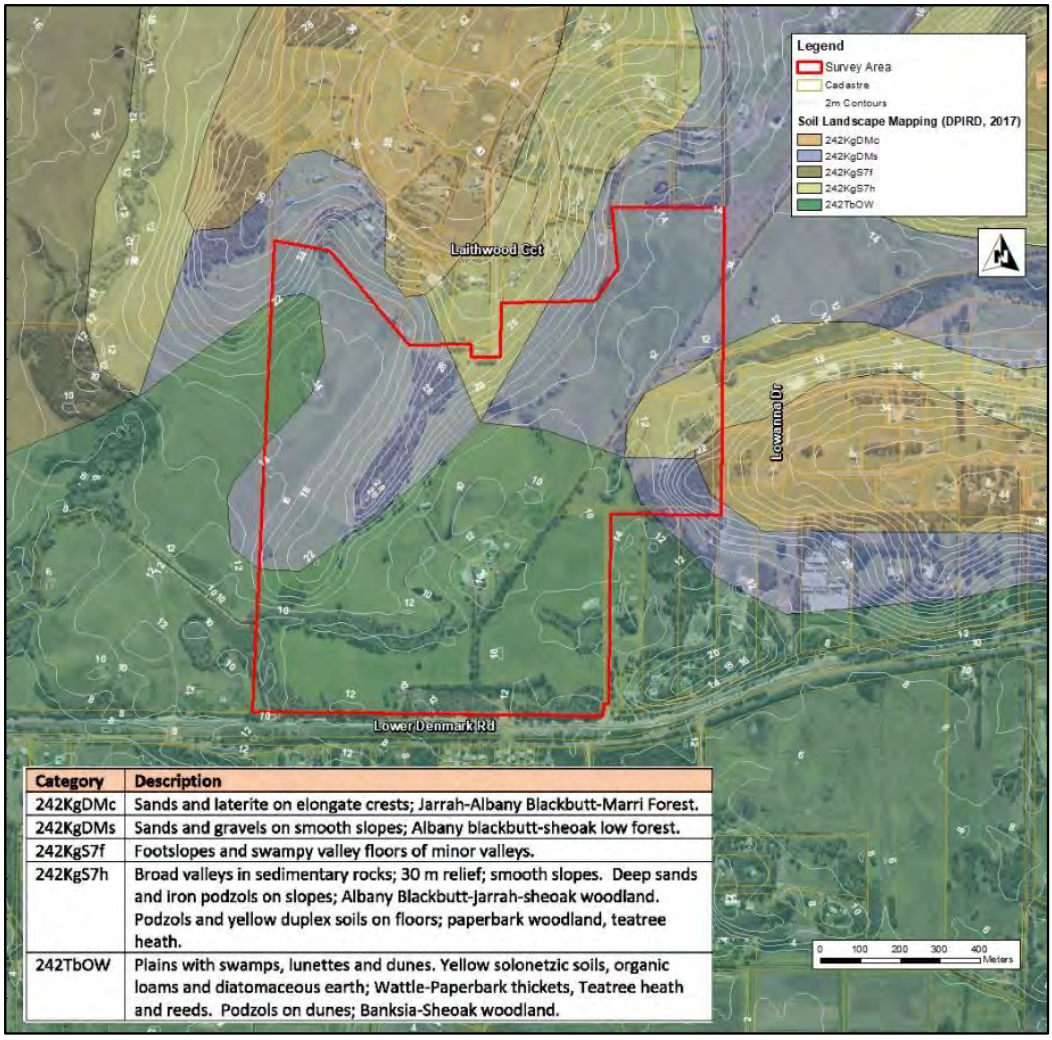
Opus (2007) recommended that the site not be excavated deeper than 500 mm to avoid mobilisation and oxidation of ASS. The top 500 mm of soil will require treatment with lime upon disturbance and ASS shall be managed in accordance with ASS guidelines (Opus, 2007).

3.6 Geology and Soils

Soil Mapping – Zones (DPIRD, 2017c) shows the Subject Site is within the Albany Sandplain Zone (242) and described as '*Gently undulating plain dissected by a number of short rivers flowing south. Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels.*'

Soil mapping – Systems (DPIRD, 2018) shows the Subject Site lies within two soil systems being; the King System (242Kg) and the Torbay System (242Tb). The King System is described as *'Dissected siltstone and sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-sheoak woodland and mallee-heath.'* and the Torbay System (242Tb) is described as '*Narrow swampy coastal plain, on the southern edge of the Albany sandplain Zone. Non-saline wet soil and pale deep sand. Sedgelands, ti-tree heath and wattie-paperbark thickets'* (DPIRD, 2018).

The Subject Site is located within four sub-systems of the King and Torbay Systems, as defined by DPIRD (2017b). The sub-systems are shown and described in Figure 6.



Category	Description
242KgDMc	Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri Forest.
242KgDMs	Sands and gravels on smooth slopes; Albany blackbutt-sheoak low forest.
242KgS7f	Footslopes and swampy valley floors of minor valleys.
242KgS7h	Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-Jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
242TbOW	Plains with swamps, lunettes and dunes. Yellow solonetzic soils, organic loams and diatomaceous earth; Wattle-Paperbark thickets, Teatree heath and reeds. Podzols on dunes; Banksia-Sheoak woodland.

Figure 6: Soil mapping

3.6.1 Soil Classification (BDS, 2013)

Site soil testing was conducted on the 1st August 2013 by Bio Diverse Solutions under late winter conditions. Testing involved site soil analysis, photographic recording, logging of soil types and measuring of water table. In total, eight test/bore holes were constructed to a minimum depth of 2 metres and left open for a minimum of 1 hour to identify any water table present. The soil test hole (bore hole) locations are shown in Figure 7.

Figure 7: BDS (2013) soil testing and bore locations

The eight test holes revealed that soils across the Subject Site were relatively consistent and found to be peaty sand/sandy peat over sand/silty sand with pebbles and coffee rock encountered at TP6 (1.2-2.0 mm BGL) and TP8 (1.7-2.0 mm BGL) only. Details of the site soils as classified by BDS (2013) are summarised in Table 3.

Table 3: Soil testing results (BDS, 2013)

Test Pit	Depth (mm)	Soil Type and Description
TP1	0-25 25-350 350-750 750-1070 1070-2000 2000-2500	Dark brown peaty sand, organic matter. Dark grey, sandy peat, organic matter. Dark brown sand, moist. Light brown sand, wet. Brown silty sand. Brown silty sand.
TP2	0-25 25-300 300-900 900-2000 2000-2500	Dark brown peaty sand. Dark grey sand. Grey sand. Light brown silty sand. Brown silty sand, wet.
TP3	0-30 30-300 300-600 600-900 900-1800 1800-3000	Dark brown peaty sand, organic matter, wet. Dark brown peaty sand, organic matter, moist. Dark grey silty sand. Light brown silty sand. Light grey silty sand. Light brown silty sand.
TP4	0-40 40-300 300-750 750-1300 1300-2000	Dark brown peaty sand, organic matter. Dark grey sandy silt, organic matter. Grey sandy silt. Light grey sand silt. Brown silty sand, wet.
TP5	0-240 240-400 400-700 700-1000 1000-1500 1500-1800 1800-2000	Dark brown peaty sand, organic matter. Dark grey sandy peat, organic matter. Dark grey sandy silt. Light grey silty sand. Light brown silty sand. Brown silty sand. Brown silty sand.
TP6	0-200 200-750 750-1200 1200-1800 1800-2500	Brown peaty sand. Dark brown silty sand. Light brown silty sand. Dark brown silty sand with pebbles (5-10mm). Dark brown silty sand, coffee rock, cemented.
TP7	0-250 250-600 600-1800 1800-2000 2000-	Dark brown sandy silt. Dark grey silty sand. Grey silty sand. Light brown silty sand, wet. Rock refusal.
TP8	0-100 100-450 450-750 750-1700 1700-2000	Dark brown silty sand, organic matter. Dark grey silty sand. Grey silty sand. Light grey silty sand. Dark brown silty sand, coffee rock.

3.6.2 Soil Classification (Opus, 2007)

A Land Capability Assessment (LCA; Opus, 2007) was conducted at the Subject Site to ascertain the ability of the land to sustain the Rural Residential development proposal. The LCA (Opus, 2007) has been included as Appendix A.

Testing as part of the LCA involved site soil analysis, photographic recording, logging of soil types, measuring of water table, permeability testing and laboratory PRI testing. A total of 25 test holes were constructed to a depth of 2 m with a mechanical auger and left open for a minimum of 1 hour to identify any water table present. Test hole locations are shown in Figure 8.

Four soil types were identified across the Subject Site from the soil testing results. Soil types identified by Opus (2007) include; sand with silt, sand with silt over gravel, sand over gravel over rock and sand with silt and peat, as shown in Figure 8. The majority of the Subject Site is mapped as sand with silt. More detailed descriptions of soil types found at the Subject Site are presented in Appendix A.

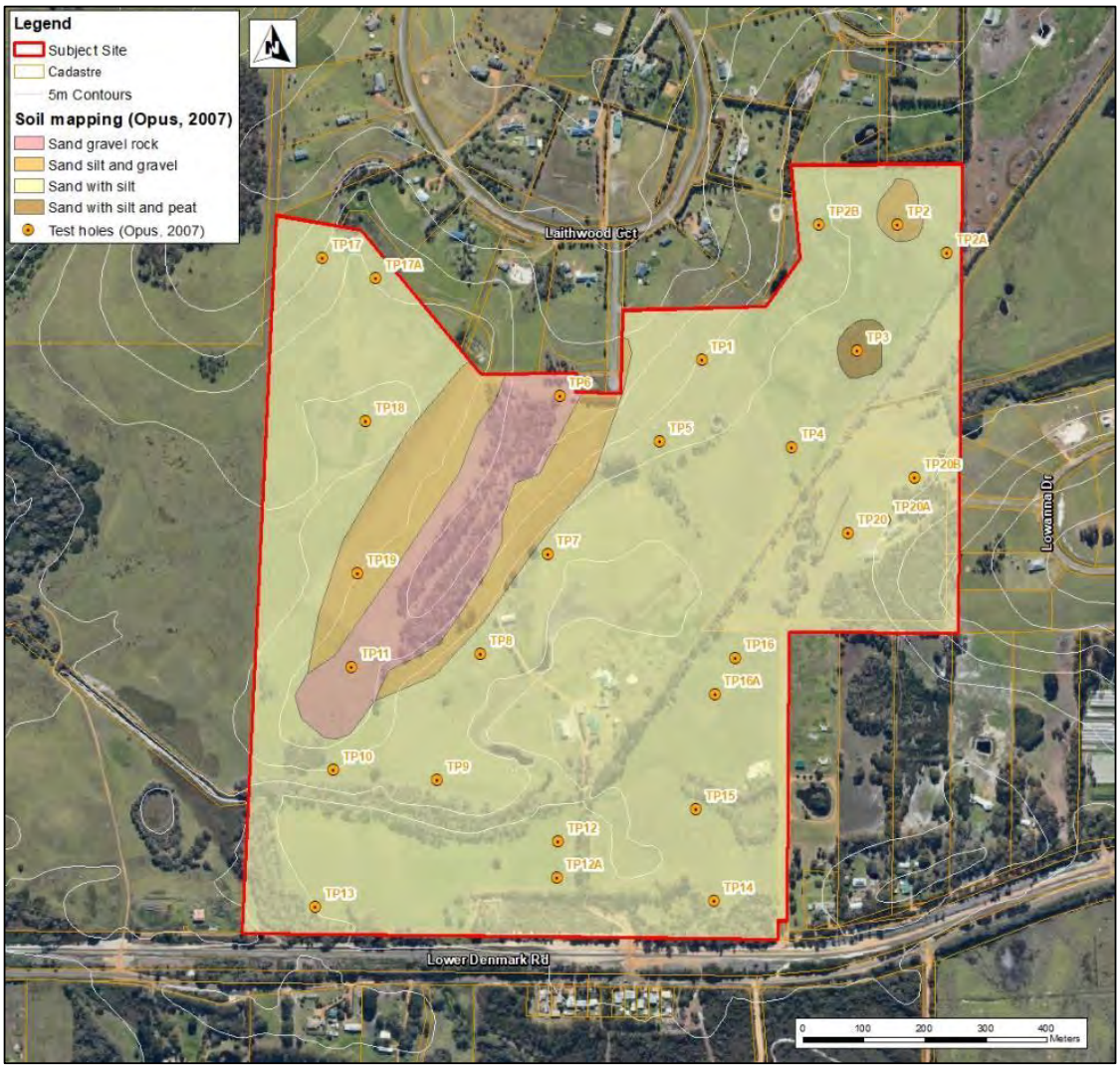


Figure 8: Soil mapping and test hole locations (Opus, 2007)

3.6.1 Soil Phosphorus Retention Index

Phosphorus Retention Index (PRI) testing was conducted by Opus (2007) on the sandy silt at Test Pits 4 and 7 (150-2000 mm depth) and the sandy gravel at Test Pit 19 (100-700 mm depth). The PRI results showed that the sandy silt had a low PRI (<1.0) and the sandy gravel had a very high PRI (324) typical of soil type (Opus, 2007).

3.6.1 Soil Permeability

Silts and clay soils generally record poor permeability results whereas coarse sands and loose gravels generally record high permeability, as shown in Figure 9.

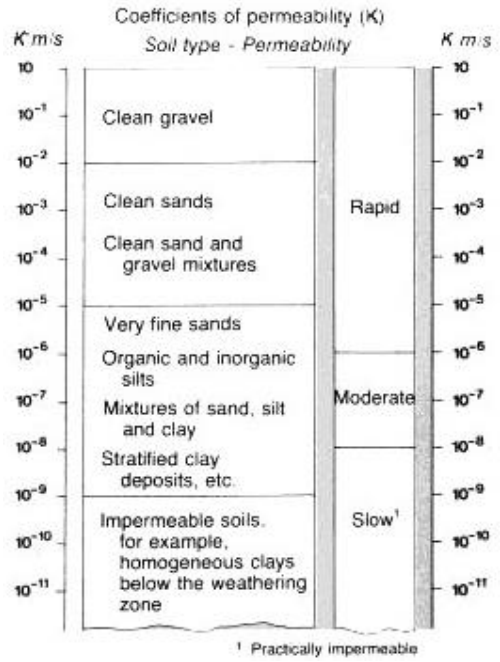


Figure 9: Hydraulic conductivity of soil types (Artiola et al., 2004)

In-field permeability testing was conducted during a site investigation by BDS on the 12th October 2021. Permeability testing was conducted adjacent to groundwater monitoring bore BH1 (Figure 7) within the silty sand layer (at 500 mm BGL). Permeability testing was conducted using the Talsma-Hallam method. Hydraulic conductivity adjacent to BH1 was found to be 4.20 x 10^{-5} m/sec (3.63 m/day) which is considered a rapid to moderate permeability, as shown in Figure 9. Permeability was also found to be consistent with Soil Category 2 - Sandy loams (weakly structured) as shown in Table L1 of AS/NZS 1547:2012.

Laboratory permeability testing was also conducted by Opus (2007) on sandy silt samples from TP4 and TP7 (150 - 2000 mm depth) and sandy gravel samples from TP19 (100 – 700 mm). Results showed that the soils were free draining typical of the sandy soil types (Appendix A; Opus, 2007).

3.7 Surface Water Hydrology

Stormwater runoff from the southern and eastern portions of the site is directed directly to Five Mile Creek. Five Mile Creek runs through the Subject Site from the northeast corner of the site to the southwest corner. The northwest corner of the Subject Site discharges to the southeast and ultimately Five Mile Creek further downstream. Five Mile Creek connects to Seven Mile Creek to the southwest of the Subject Site and Seven Mile Creek discharges to Lake Powell and ultimately the Torbay Inlet further west. The surface hydrology of the Subject Site is shown in Figure 10.

There are several less significant water bodies within the Subject Site, including a series of relatively small wetlands in the south, constructed farm dams in the central portion of the site and seasonally inundated pockets in the lower lying areas. There is also a constructed drain in the southwest corner of the site which discharges to Five Mile Creek, as shown in Figure 10.

The Subject Site is located within one hydrographic catchment, being the Torbay Inlet and one hydrographic sub-catchment, being Seven Mile Creek (DWER, 2018a).

According to flow modelling conducted for Five Mile Creek by DWER (Pers Comms N.Sykora, 2023), the maximum daily flow rate recorded at the downstream end of Five Mile Creek within the Subject Site (DWER station No. 6031115), between 1997 and 2022 is 199,000 m^3. This equates to 2.3 m^3/sec. According to data results for site No. 603115, the highest recorded level at the downstream end of Five Mile Creek within the Subject Site is 10.3 m AHD, which was recorded on the 30th August 2001.

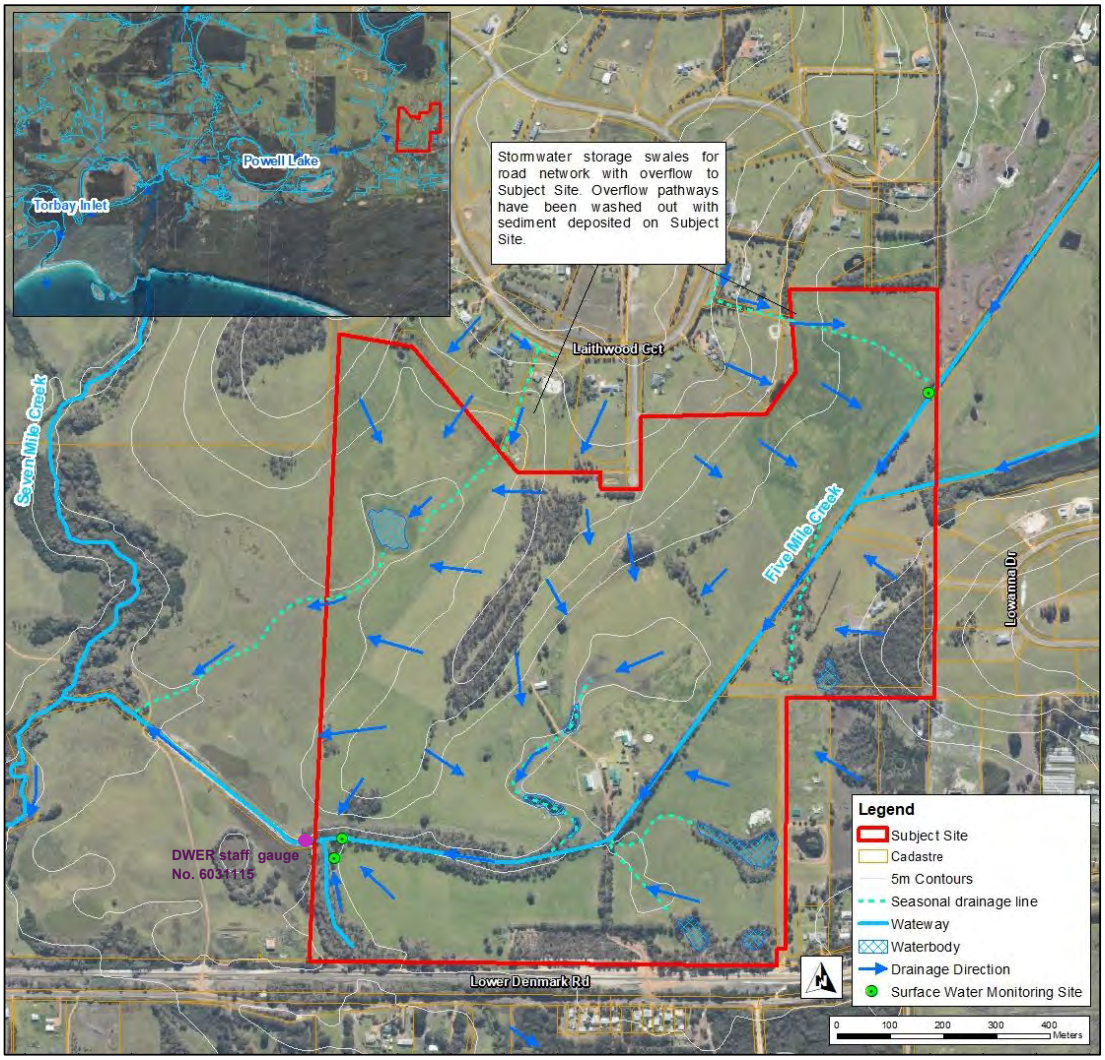


Figure 10: Surface water hydrology

3.7.1 Hydrological Site Assessment

A site investigation of the hydrological features was conducted on the 12th of October 2021 to confirm the surface water hydrology and to assist the development of the stormwater management plan. Rainfall in the Albany area (BoM Station No. 9500), prior to the site investigation was significantly higher than for the same time in an average year. The increased rainfall resulted in increased surface water expressions in the area compared to an average late winter period, providing an adequate depiction of the 'worst case scenario' in terms of seasonal inundation. Photographs 5 to 12 show the hydrological features of the site during the site investigation.

Photo 5: A general view to the east northeast of Five Mile Creek in the south of the Subject Site.

Photo 6: View to the west of Five Mile Creek at the western boundary of the Subject Site.

Photo 7: View to the south of constructed drain discharging to Five Mile Creek in the southwest of the Subject Site.

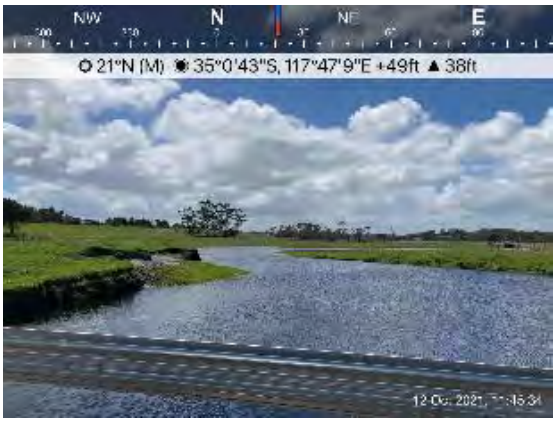


Photo 8: View to the north northeast of seasonally inundated area in the low-lying central portion of the Subject Site.

Photo 9: View to the east northeast of seasonally inundated area (wetland) in the south of the Subject Site.

Photo 10: View to the southeast of seasonally inundated area in the northwest of Subject Site.

Photo 11: View to the west northwest of eroded drainage easement to the west of eastern corner of Subject Site. Easement discharging runoff and sediment into the Subject Site.

Photo 12: View to the north of eroded drainage easement to the north of Subject Site. Easement discharging runoff and sediment into the Subject Site.

During the hydrological investigation, two drainage easements discharging into the Subject Site in the north were identified as having significant erosion and deposition of sediment in to the Subject Site. Photos of the two eroded drainage easements upstream of the Subject Site are shown in Photos 11 and 12. The location of the drainage easements discharging into the Subject Site are shown in Figure 10 (Seasonal Drainage lines).

It is recommended the drainage easements be redesigned and stabilised to prevent future erosion of the easements and sedimentation into the Subject Site and Five Mile Creek. It shall be the responsibility of the City of Albany to redesign and stabilise the easements, as these easements are not within the management of the property owner. Upon development of the Subject Site, the drainage lines extending from the drainage easements through the Subject Site shall be continued and stabilised up until the drainage pathways have reached an existing waterway/waterbody. Stabilisation methods may include rock pitching, vegetating the drain, stabilisation matting and meandering of the swale to reduce velocity. In-situ water quality testing was conducted at three waterway locations on site. The location of the water quality testing sites is shown in Figure 8. Water quality testing results are presented in Table 4.

Table 4: Water quality of Subject Site waterways

Creek	Temperature (°C)	pH	Electrical Conductivity (dS/cm)	Dissolved Oxygen (mg/L)	Total Dissolved Solids (g/L)
Five Mile Creek Upstream	13.99	6.04	0.366	6.35	0.234
Five Mile Creek Downstream	11.44	5.93	1.33	5.80	0.851
Constructed Drain Downstream (In the southwest of Subject Site)	12.41	6.36	1.28	9.32	0.819

Water quality testing results found that surface water within Five Mile Creek was slightly saline to brackish at the downstream end, and fresh to slightly saline at the upstream end. The constructed drain that discharges to Five Mile Creek at the downstream end was also found to be slightly saline to brackish. pH in Five Mile Creek and the drain was found to be slightly acidic. A slightly acidic pH is typical of waterways in low-lying areas in the south-west of Western Australia. Dissolved oxygen in Five Mile Creek was slightly lower than expected in a flowing creek and just below the ANZECC (2000) trigger value for low-lying rivers in South-west Australia. Quarterly Surface water monitoring (water quality) was conducted from August 2013 to May 2015 by BDS at two locations along the 5 mile creek at monitoring locations within the Subject Site. The Water Quality results are presented in Table 5.The surface water quality found in Five Mile Creek shall be maintained or improved in the post-development scenario.

Table 5: Water Quality Results -Surface Water (BDS, 2013-2015)

SAMPLED PARAMETER	SAMPLING DATE EVENT								
	Sampling Creek (CK001) 0571244 6125136	**8/08/2013**	**12/11/2013**	**11/02/2014**	**8/05/2014**	**8/08/2014**	**12/11/2014**	**12/02/2015**	**11/05/2015**
	Groundwater temperature (°C)	14.5	20.94	19.8	16.99	17.98	18.84	22.32	16.06
	pH	5.64	6.18	6.22	6.66	7.07	6.48	5.99	6.85
	Electrical conductivity (mg/cm)	0.616	1.01	0.532	0.744	0.52	0.529	0.51	0.738
	Dissolved Oxygen (mg/L)	7.58	8.85	3.67	5.24	5.62	6.48	5.14	5.54
	TDS	0.394	0.648	0	0.476	0.333	0.339	0.326	0.472
	Total N (Mg/L)	0.333	0.795	0.34	0.311	0.183	0.162	0.392	0.265
	Total P (Mg/L)	0.406	0.084	0.161	2.14	0.111	0.117	0.131	0.366
	Comments	Med flow	Low Flow	Low Flows	Low Flows		Low Flows	very low flows	Low flows

Table 5: Continued

SAMPLED PARAMETER	SAMPLING DATE EVENT								
	Sampling Creek (CK002) 0572398 6125982	**8/08/2013**	**12/11/2013**	**11/02/2014**	**8/05/2014**	**8/08/2014**	**12/11/2014**	**12/02/2015**	**11/05/2015**
	Groundwater temperature (°C)	16.22	20.49	20.08	16.91	17.06	18.8	23.96	15.9
	pH	6.03	5.91	6.02	6.22	6.09	6.09	5.93	6.46
	Electrical conductivity (mg/cm)	0.658	7.92	0.524	0.652	0.511	0.497	0.519	0.709
	Dissolved Oxygen (mg/L)	6.53	2.87	3.1	3.54	5.31	8.02	8.51	4.96
	TDS	0.421	0.507	0.335	0.417	0.327	0.323	0.332	0.454
	Total N (Mg/L)	0.113	0.481	<0.01	0.146	0.133	0.123	0.456	0.074
	Total P (Mg/L)	0.342	<0.001	0.0691	0.113	0.111	0.767	0.085	0.19
	Comments	Med flow	Low Flow	Low Flows cattle evident	Low flows		Low Flows	very low flows	Low flows

3.8 Hydrogeology and Groundwater

3.8.1 Hydrogeology

Australian Geoscience Mapping and Department of Water and Environmental Regulation 250K Hydrogeological mapping (DWER, 2001), places the Subject Site within one hydrogeological zone described as:

Geology Type: TP.
Geology Time: Tertiary – Cainozoic – Phanerozoic.
Aquifer Description: Sedimentary aquifer with intergranular porosity - extensive aquifers, major groundwater resources.
Geology Description: PLANTAGENET GROUP - siltstone, spongolite, minor sandstone, peat, and conglomerate.

The Subject Site is not situated within a Priority Drinking Water Catchment Area (DWER, 2018b). Desktop analysis of the site indicates that the nearest designated Public Drinking Water Source Area (PDWSA) is the South Coast Water Reserve as defined by the *Country Areas Water Supply Act 1947,* located approximately 80 m south of the Subject Site.

3.8.2 Groundwater

The original soil testing by Opus was conducted in June 2007, Opus consultants returned to the Subject Site to conduct late winter water-table monitoring in August 2007. Test pits were excavated to a depth of 2 m and the water table was encountered in 13 out of the 20 test pits. Five additional test pits (TP2a, TP2b, TP17a, TP20a and TP20b) were constructed alongside existing test pits to confirm soils and the high water-table level. Water-table measurements from these additional test pits were found to be the same or similar to the originally constructed test pits. The August 2007 water-table levels for each test pit are shown in Table 5.

Table 6: Water-table observations (Aug 2007)

Test Pit	Water-table observations – August 2007
1	Groundwater not encountered
2	0 mm BGL (waterlogged)
2a	500 mmm BGL (additional test pit)
2b	450 mm BGL (additional test pit)
3	0 mm BGL (waterlogged)
4	760 mm BGL
5	Groundwater not encountered
6	Groundwater not encountered
7	150 mm BGL
8	150 mm BGL
9	1400 mm BGL
10	Groundwater not encountered
11	Groundwater not encountered
12	100 mm BGL
13	980 mm BGL
14	550 mm BGL
15	800 mm BGL
16	220 mm BGL
16a	600 mm BGL

Table 6: continued.

Test Pit	Water-table observations – August 2007
17	Groundwater not encountered
17a	Groundwater not encountered (additional test pit)
18	150 mm BGL
19	Groundwater not encountered
20a	1300 mm BGL (additional test pit)
20b	1300 mm BGL (additional test pit)

Quarterly groundwater monitoring (levels and water quality) was conducted from August 2013 to May 2015 by BDS at 8 groundwater monitoring locations within the Subject Site. The location of the groundwater monitoring bores is shown in Figure 7. The depth to groundwater for each monitoring bore is presented in Table 6 and the groundwater quality results are shown in Tables 7 and 8.

Table 7: Groundwater monitoring levels

Bore	Sampling event							
	Aug 2013 (mm BGL)	Nov 2013 (mm BGL)	Feb 2014 (mm BGL)	May 2014 (mm BGL)	Aug 2014 (mm BGL)	Nov 2014 (mm BGL)	Feb 2015 (mm BGL)	May 2015 (mm BGL)
BH1	1011	640	1330	-	890	1040	1550	-
BH2	1236	1100	-	-	1145	1310	dry	-
BH3	0	0	870	1175	360	640	1017	310
BH4	150	670	1220	1105	635	1000	1400	1115
BH5	0	0	720	450	40	410	940	590
BH6	0	0	-	1006	165	1070	1600	840
BH7	790	1330	-	-	1470	1810	dry	-
BH8	530	1020	1830	-	1175	1510	dry	-

Groundwater level monitoring shows depth to groundwater varied across the site and throughout the year. Generally, the site has a shallow depth to groundwater. Groundwater was found to be at or near surface at BH3, BH4, BH5 and BH6 during the late winter period, noting that the depth to groundwater at BH4 was significantly greater in August 2014 (635 mm BGL) compared to August 2013 (150 mm BGL). Groundwater depths at BH1, BH2, BH7 and BH8 were still relatively shallow during the late winter period ranging between 530 -1236 mm BGL in August 2013 and 890-1470 mm BGL in August 2014.

Table 8: Average groundwater quality testing results

Parameter	*ANZECC Guideline Trigger Value*	Bore Number							
		BH1	BH2	BH3	BH4	BH5	BH6	BH7	BH8
Temperature (°C)	-	19.0	18.3	18.7	17.9	18.2	17.8	17.7	17.0
pH	6.5 – 8.0	5.10	4.70	5.17	5.25	5.26	5.08	5.29	5.14
EC (mS/cm)	0.12 - 0.3	0.58	0.77	0.37	0.43	0.32	0.36	0.57	0.59
Dissolved Oxygen (%)	80 – 120	49.4	29.0	40.4	29.0	43.7	44.6	46.4	22.7
Total N (mg/L)	1.20	1.53	2.81	1.29	0.55	0.80	1.42	0.66	1.68
Total P (mg/L)	0.065	2.39	1.77	2.05	0.54	0.37	0.54	1.07	1.21

Note: Orange shading indicates recorded value has exceeded ANZECC and ARMCANZ (2000) guideline trigger value for lowland rivers in South-west Australia.

Groundwater monitoring of the physical parameters and nutrients shows groundwater quality is typical of that in agricultural areas of South-west Australia. pH was found to be below the ANZECC and ARMCANZ (2000) trigger value range for lowland rivers in the South-west of Australia, and Total N and Total P levels were generally found to be above trigger values. Salinity (EC) and dissolved oxygen levels were also found to be above and below (respectively) of the ANZECC and ARMCANZ (2000) trigger value range for lowland rivers in the southwest of Australia (Table 8).

Table 9: Groundwater heavy metal concentrations

Heavy Metals	*ANZECC Guideline Trigger Value*	Bore Number & Sampling Event							
		BH3		BH4		BH5		BH6	
		22/05/2015	27/05/2015	22/05/2015	27/05/2015	22/05/2015	27/05/2015	22/05/2015	27/05/2015
Chromium (mg/L)	-	<0.01	0.003	0.017	0.012	<0.01	0.004	<0.01	0.015
Cobalt (mg/L)	-	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001
Nickel (mg/L)	-	0.036	<0.001	<0.01	0.04	<0.01	0.005	<0.01	<0.001
Lead (mg/L)	<0.0034	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001	<0.01	<0.001
Cadmium (µg/L)	<0.0002	<0.002	<0.001	<0.002	<0.001	<0.002	<0.001	<0.002	<0.001
Mercury (µg/L)	0.6	<0.01	0.056	0.078	<0.01	0.022	0.056	<0.01	<0.01
Arsenic (ug/L)	<13	4.73	4.07	3.23	2.05	<0.01	0.982	6.49	16.6

Note: Orange shading indicates recorded value has exceeded ANZECC and ARMCANZ (2000) trigger value for toxicants in freshwater ecosystems at 95% level of protection.

Groundwater testing of the heavy metals indicated levels are generally below the ANZECC and ARMCANZ (2000) guideline trigger values, with the exception of Arsenic at BH6 in May 2015, which was found to be just above the trigger value (Table 9).

3.8.3 Waterlogging and Seasonal Inundation

The areas subject to seasonal waterlogging and seasonal inundation were mapped by Opus (2007) as part of the LCA. Areas subject to seasonal waterlogging (groundwater $\leq$ 0.5 m BGL) and seasonal inundation (water sitting on the surface for extended periods of time) were confirmed during the site assessment on the 12th October 2021 and using historical imagery of the site. Approximate areas found to be subject to seasonal waterlogging and seasonal inundation are shown in Figure 11.

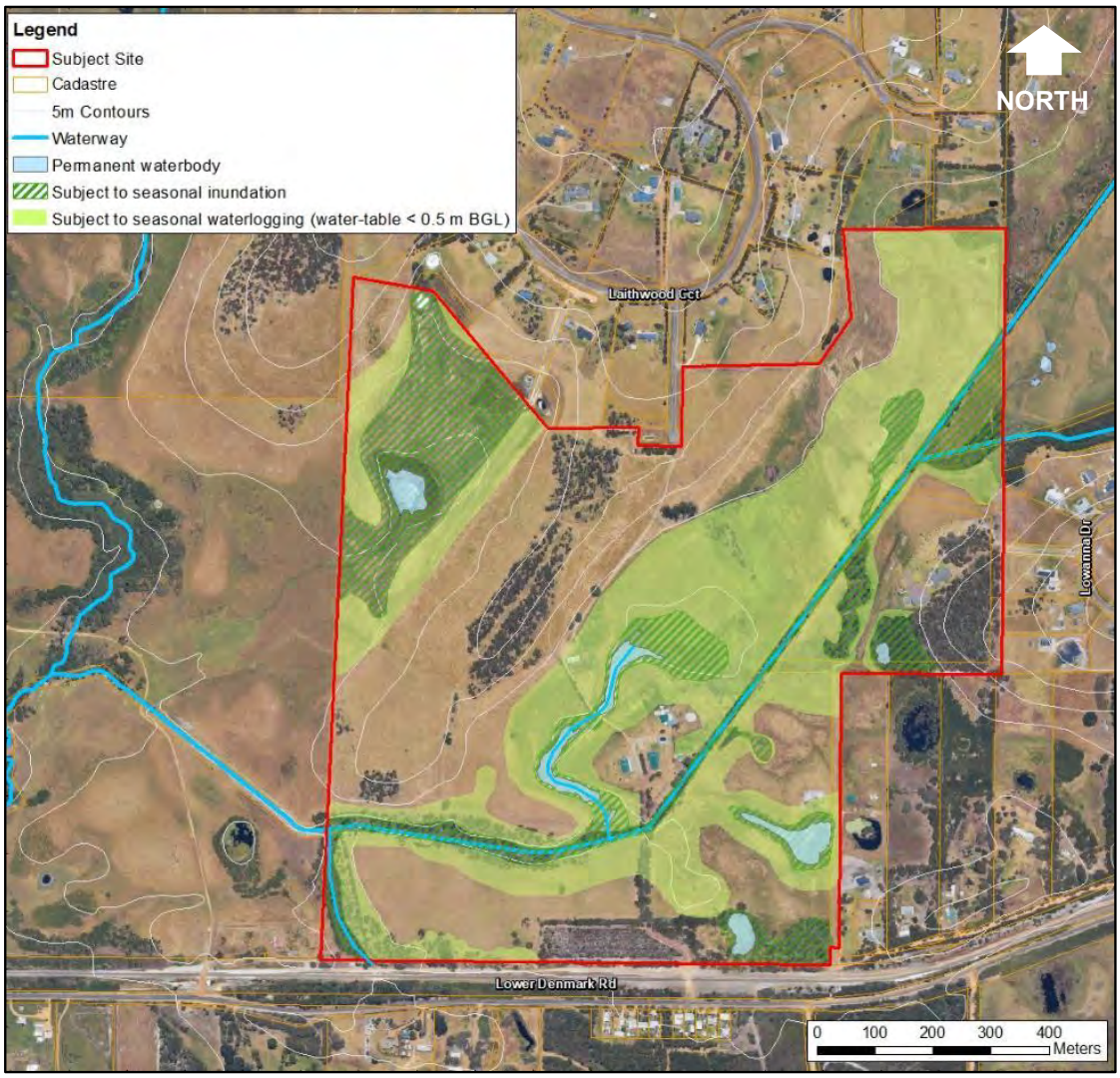


Figure 11: Waterlogged and seasonally inundated areas

3.9 Wetlands & Environmentally Sensitive Areas

There are no significant wetlands within the Subject Site or within close proximity of the Subject Site. The nearest significant wetland is located approximately 1.0 km to the north of the Subject Site, being the Seven Mile Creek wetland (DBCA, 2017). Noting that the Subject Site is down-gradient of the Seven Mile Creek wetland.

There are no Environmentally Sensitive Areas (ESA) within the Subject Site or within close proximity of the Subject Site. The nearest Environmentally Sensitive Area (ESA) is located approximately 2.5 km west of the Subject Site, being Lake Powell (DWER, 2018c). Noting that the Subject Site ultimately discharges to Lake Powell via Five Mile Creek and Seven Mile Creek.

4 Wastewater Management

The Subject Site is situated in an area that does not have access to deep or reticulated sewerage. The health and environmental requirements for wastewater treatment and disposal for developments not serviced by deep sewerage systems are contained in the *Government Sewerage Policy* (GSP; DPLH, 2019). The GSP (DPLH, 2019) states minimum requirements apply for all on-site sewage disposal systems.

A Site Soil Evaluation (SSE) (BDS, 2024) has been prepared for the Subject Site in conjunction with this LWMS. The SSE details the site soils under late winter conditions and assesses the suitability for on-site effluent disposal across the site in relation to the planning proposal.

The SSE identifies the areas within the Subject Site suitable for onsite effluent disposal as those that have free draining soil, are not located in heavily waterlogged or seasonally inundated areas and are a minimum of 100 m from Five Mile Creek and its connected tributaries/drains, and 30 m from other less significant waterway/waterbody (BDS, 2024). Effluent disposal systems shall also be a minimum of 30 m from any stormwater storage area and 12 m from any down-gradient roadside drain.

Given the shallow depth to groundwater across much of the Subject Site, imported fill and special design requirements and distribution techniques will be necessary in the low-lying areas to ensure the effluent disposal systems are free draining and meet the minimum separation to groundwater requirement, as stipulated in the GSP (DPLH, 2019).

Leach drains and irrigation systems (surface or subsurface) in conjunction with a secondary treatment system have been identified as the most suitable land application systems for future lots depending on localised site constraints. Areas deemed as suitable for LAAs and LAA specifications are described in more detail in the SSE (BDS, 2024).

5 Local Water Management Strategy

5.1 Water Sustainability Initiatives

5.1.1 Water Supply

Water supply to households is to be via extension of the scheme water system. The project civil engineer will negotiate the extension of the system with Water Corporation Western Australia.

5.1.2 Water Efficiency Measures

To achieve water efficiency targets, households are to be built consistent with current Building Code of Australia (BCA) water efficiency standards. Water efficiency initiatives are proposed to reduce potable water demand for irrigation of residential lots. These include encouragement of:

- Minimising turf areas;
- Selection of predominantly local native, drought tolerant plants;
- Use of waterwise gardens, restricted lawn areas and water wise lawn varieties;
- Use of rainwater tanks; and
- Community education initiatives on water conservation and reuse.

5.2 Stormwater Management

5.2.1 Design Capacity

The stormwater management system for the development has been designed in accordance with DWER guidelines through the Better Urban Water Management framework and the requirements of the City of Albany. The stormwater drainage system has been designed using a major/minor approach.

The stormwater drainage system is designed to manage a range of rainfall events up to the 1% AEP.

The major drainage system is designed for rainfall events greater than the 20% AEP up to the 1% AEP. The major system uses overland flow paths, which includes grading the road network to direct flow to the lowest point of the catchment for flood mitigation.

The minor drainage system has capacity for frequent rainfall events up to the 20% AEP and includes any pipe drainage system, roadside swales and use of bio-retention storages. The minor drainage system is designed to also provide the structural controls for water quality treatment.

5.2.2 Stormwater Modelling

The stormwater modelling has been completed utilising the Rational Method and the Boyd Equation. A critical design criterion for both these methods includes the runoff coefficients. The pre-development and post-development runoff coefficients assumed for the Subject Site are shown in Table 9.

Table 10: Runoff coefficients

LAND USE	RUN OFF COEFFICIENT		
	First 15mm	20% AEP	1% AEP
Agricultural land	0	0.2	0.3
Road Reserve	0.8	0.8	0.9
Rural Residential	0	0.3	0.35
Rural Smallholdings	0	0.25	0.30

The general pre-development hydrological regime (Figure 10) is maintained in the post-development scenario, with the north western portion of the Subject Site discharging to the southwest via a valley system and a seasonal creek line, and the remainder of the Subject Site discharging towards Five Mile Creek either directly or via seasonal creek lines or cut drains within the Subject Site.

The post-development drainage sub-catchments have been determined ensuring that all road runoff up to the critical 20% AEP storm event is captured and retained within the Subject Site. Post-development sub-catchments for the Subject Site are shown in Figure 12. The total area of each sub-catchment and the estimated land use area for each sub-catchment is presented in Table 10.

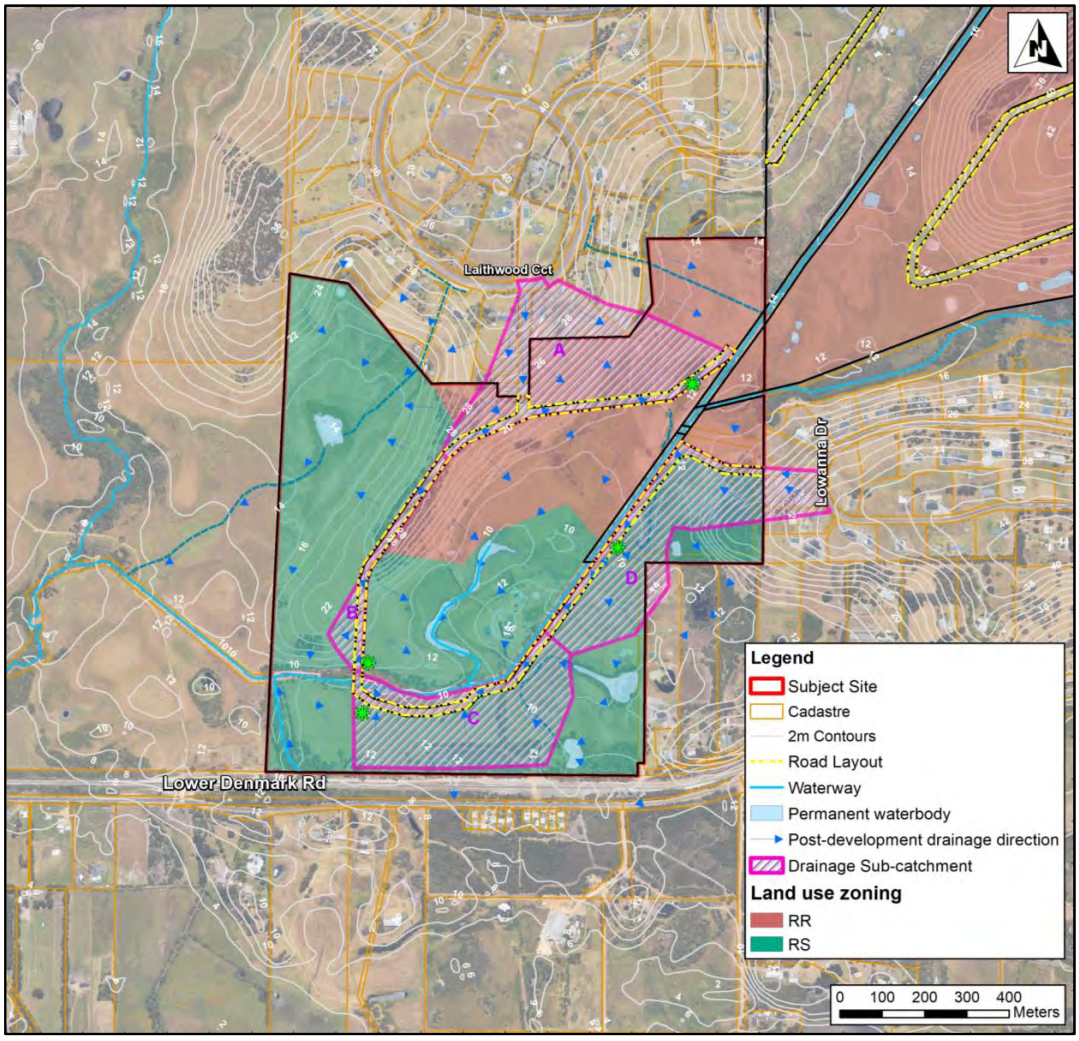


Figure 12: Post-development drainage sub-catchments

Table 11: Post-development sub-catchment areas

Land Use	Catchment			
	A	B	C	D
Road Reserve (ha)	2.4	1.2	1.3	1.8
Rural Residential Lots (ha)	10.9	0	0	0
Rural Small Holding lots (ha)	0	0.7	9.2	9.6
Total Area (ha)	**13.3**	**1.9**	**10.5**	**11.4**

The majority of the proposed lot area will discharge unattenuated from the site towards Five Mile Creek or the seasonal drainage line in the northwest of the site, consistent with the existing hydrological regime. It is assumed that the majority of the lot area will remain grassed and/or vegetated with roofed areas connected to rainwater tanks, soakwells and/or rain gardens, and therefore there will be little change in the runoff coefficient of these areas compared to the pre-development scenario. Where lots are up-gradient of the internal road network, the road network will intercept runoff from the lots and direct it to the road's drainage system. Lot areas that discharge to the internal road network therefore form part of the site's drainage sub-catchments, as shown in Figure 11.

Runoff from the Subject Site's internal road network will be retained on site within bio-retention storages with outflows from the bio-retention storages directed to Five Mile Creek. Outflow from the bio-retention storages will be consistent with estimated pre-development flow rates.

Multiple storm events have been modelled utilising the Rational Method as described in Australian Rainfall and Runoff (AR & R) (Engineering Australia, 2016). Pre-development outflow rates have been calculated based upon peak flow stream discharge as determined by Section 1.4 of AR & R.

Rainfall intensities for the various storm events and storm durations are calculated and provided by the Bureau of Meteorology (BoM) computerised design Intensity Frequency Duration (IFD) Data System (www.bom.gov.au). Calculations have been undertaken utilising up to date IFD charts.

The Boyd method has been utilised to calculate the stormwater storage volume required for each sub-catchment based on the post-development runoff from the site and the allowable outflows set for the stormwater storages, which are determined by the peak pre-development outflow rate. The Boyd method is considered a conservative estimate of stormwater storage volume calculation.

5.2.3 Drainage System Requirements

Key elements of the proposed drainage system are as follows:

Lot Attenuation

- It is the landowner's responsibility to manage stormwater runoff from buildings, hard stand (impervious) areas and gardens within the property boundary consistent with the City of Albany's lot attenuation guidelines (i.e., 0.5 m³ of storage is required per 100 m² of impervious area). Lot stormwater management systems should be assessed and approved by the City of Albany upon Development Application.
- Rainwater tanks are recommended on all lots and shall be plumbed into homes using a mixed demand system or a trickle feed system to provide available storage for recurrent storm events.
- Soakwells shall only be utilised where there is adequate separation to the peak annual water-table from the base of the soakwell (>300 mm) and adequate gradient for graduated pipe overflow pipes. In areas with shallow depth to groundwater, attenuation basins integrated into the garden landscaping will provide the most effective attenuation mechanism. When designing lot stormwater management systems overland flow routes directing runoff away from buildings and adjoining properties shall be

considered. Lot stormwater management systems should be assessed and approved by the City of Albany upon Development Application.

Stormwater Conveyance

- Roadside swales designed to convey storm events up to the 20% AEP and where required, pipe drains to connect sections of swale sized to convey the 20% AEP storm event. Pipe drains include lot crossovers which shall be constructed prior to subdivision to ensure the integrity of the drainage system is maintained.
- Roadside swales shall have a minimum side slope of 1:4 between the road and swale and 1:5 between the lot boundary and swale for ease of maintenance. The swales shall be designed with adequate grade for peak runoff conveyance. The minimum longitudinal grade criterion for the swales is 0.003 (absolute) and 0.005 (preferred). The estimated capacity and top water level of each section of swale shall be calculated using the Manning's formula or appropriate modelling software subsequent to earthwork design once the incoming sub-catchment to each swale section is confirmed.
- Road drainage from storm events greater than the peak 20% AEP event up to the peak 1% AEP event will be directed to the lowest point in each catchment via overland flow along the road pavement. The ultimate road low point will be located adjacent to Five Mile Creek in each sub-catchment to ensure road runoff is directed off site during storm events greater than the 20% AEP. Runoff from storm events greater than the 20% AEP event will be directed off site unattenuated. Attenuation of flows for storm events greater than the peak 20% AEP event, up to the peak 1% AEP event are likely to have negligible impact on the flood regime of the downstream area.
- Where the two existing drainage easements discharge to the Subject Site in the north, the drains will be extended within the Subject Site discharging to Five Mile Creek in the northeast and the seasonally inundated low point in the northwest (Figure 13). The drains will be stabilised using rock pitching, vegetation and/or stabilisation matting. It is recommended the drains within the Subject Site be constructed subsequent to the re-establishment and stabilisation of the upstream sections of the drain, as discussed in Section 3.7.1, to prevent sedimentation and erosion within the newly constructed sections of drain.
- Where the internal road network crosses Five Mile Creek culverts shall be installed and sized to convey up to the critical 1% AEP storm event within Five Mile Creek and the road level shall be set 0.3 m above the 1% AEP TWL. Given the highest TWL recorded between 1997 and 2022 was 10.3 mAHD (recorded on the 30th Aug 2001) and given the land between the location of the creek cross over and the DWER staff gauge is flat (on the same contour line). A top water level within the creek of 10.3 mAHD shall be used as the 1% AEP top water level at the creek cross over. Given the maximum daily flow rate in Five Mile Creek near the proposed culvert was modelled by DWER to be 199,000 m^3, equating to 2.3 m^3/s. A 1% AEP flow rate of 4.6 m^3/sec shall be adopted for the creek cross over culverts. This flow rate is double the modelled daily flow rate, to allow for shorter more intense rainfall events and subsequent flows.

Bio-retention and Stormwater Storage

- Drainage treatment train utilising bio-retention storages, designed to treat the first 15 mm of rainfall, by providing infiltration close to source. Bio-retention storages shall be designed to convey up to the 20% AEP storm event. Storages will be located at the low point of the sub-catchments, to direct runoff away from infrastructure in the case that the capacity of the storage is exceeded. The bio-retention storages shall be located outside of Five Mile Creek and its flood/riparian vegetation zone. A conceptual cross section of the bio-retention storage is shown in Figure 13 and sizing of the bioretention storages for each sub-catchment is shown in Table 12.
- The maximum side slopes of the bio-retention storages shall be 1:6, with at least 0.3 m of freeboard provided between the 20% AEP top water level and top of bank. A stabilised low point in the bank shall be provided at the 20% AEP top water level, located downstream in the bio-retention storage so that overflow is directed off site when/if the capacity of the storage is exceeded.

- The base of the bio-retention storage shall be underlain with 0.4 m depth of amended soil, 0.15 m depth of a transition layer (coarse sand) and 0.15 m depth of a drainage layer with 100 mm (maximum) perforated collection pipes (subsoils), as shown in Figure 13. Bio-retention storages shall also be planted, the specifications for the amended soil and the planting are provided in Section 5.4.
- Outflow from the bio-retention storages for minor storm events (up to the 20% AEP) shall be set at the top water level of the first 15 mm runoff event, this is set at a maximum depth of 0.5 m to allow for adequate water quality treatment across a larger surface area. Outflow from the storages will be via an overflow pit sized to match the peak pre-development outflow for the 20% AEP storm event for each sub-catchment (Table 10).
- Outflow from bio-retention storages in all sub-catchments (A, B, C and D) will discharge to Five Mile Creek. Measures shall be taken at the downstream end of the storage outlets to ensure scouring and movement of sediment is minimal, this may include rock pitching and stabilisation matting.
- All bio-retention/stormwater storages shall be contained within easements and have adequate access for maintenance. Bio-retention storages shall be located outside of the designated Five Mile Creek easement.

Flood Protection

- All building pad finished levels shall have a minimum of 0.3 m separation above the estimated 20% AEP top water level in the bio-retention storages and above the 1% AEP top water level in nearby waterways and waterbodies consistent with the Local Government Guidelines for Subdivisional Development (IPWEA, 2017).
- All roads shall have a minimum separation of 0.3 m above the 20 % AEP top water level in the bio-retention storages and nearby waterways and waterbodies.
- Building pads shall be set back a minimum of 100 m from Five Mile Creek for both flood protection and environmental protection of the waterway. Given the highest maximum flood level at the downstream end of Five Mile Creek was recorded to be 10.3 mAHD, a 100 m setback to Five Mile Creek, ensures building envelopes are outside of the 1% AEP flood levels.

The First 15 mm and 20% AEP storage requirements are presented in Table 13. The stormwater management plan for the Subject Site is shown in Figure 14.

Table 12: Drainage system requirements (bio-retention storages)

	Catchment			
	A	B	C	D
First 15mm				
Runoff Volume (m^3)	288	144	156	216
Storage Volume required (m^3)	288	144	156	216
Maximum Ponding Depth (m)	0.5	0.5	0.5	0.5
20% AEP				
Critical Storm Duration (hours)	1	1	1	1
Storm Duration Runoff Volume (m^3)	1059	232	681	783
Storage Volume (m^3)	516	154	253	318
Maximum Ponding Depth (m)	0.9	0.9	0.9	0.9
Allowable Outflow from Storage (L/s)	151	21	119	129

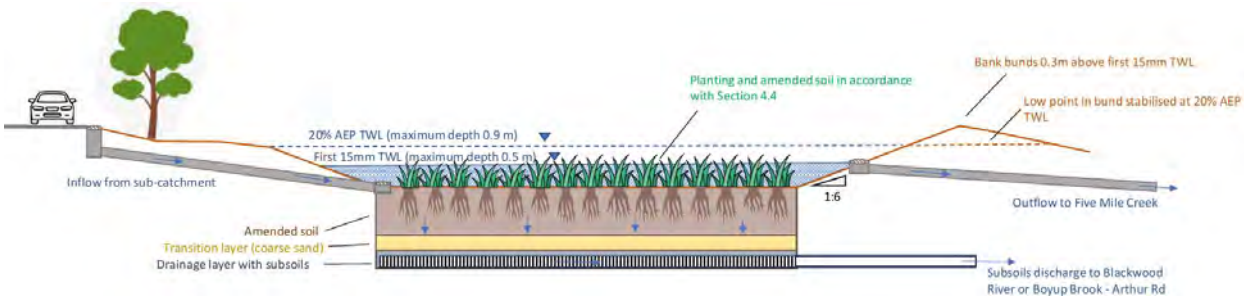
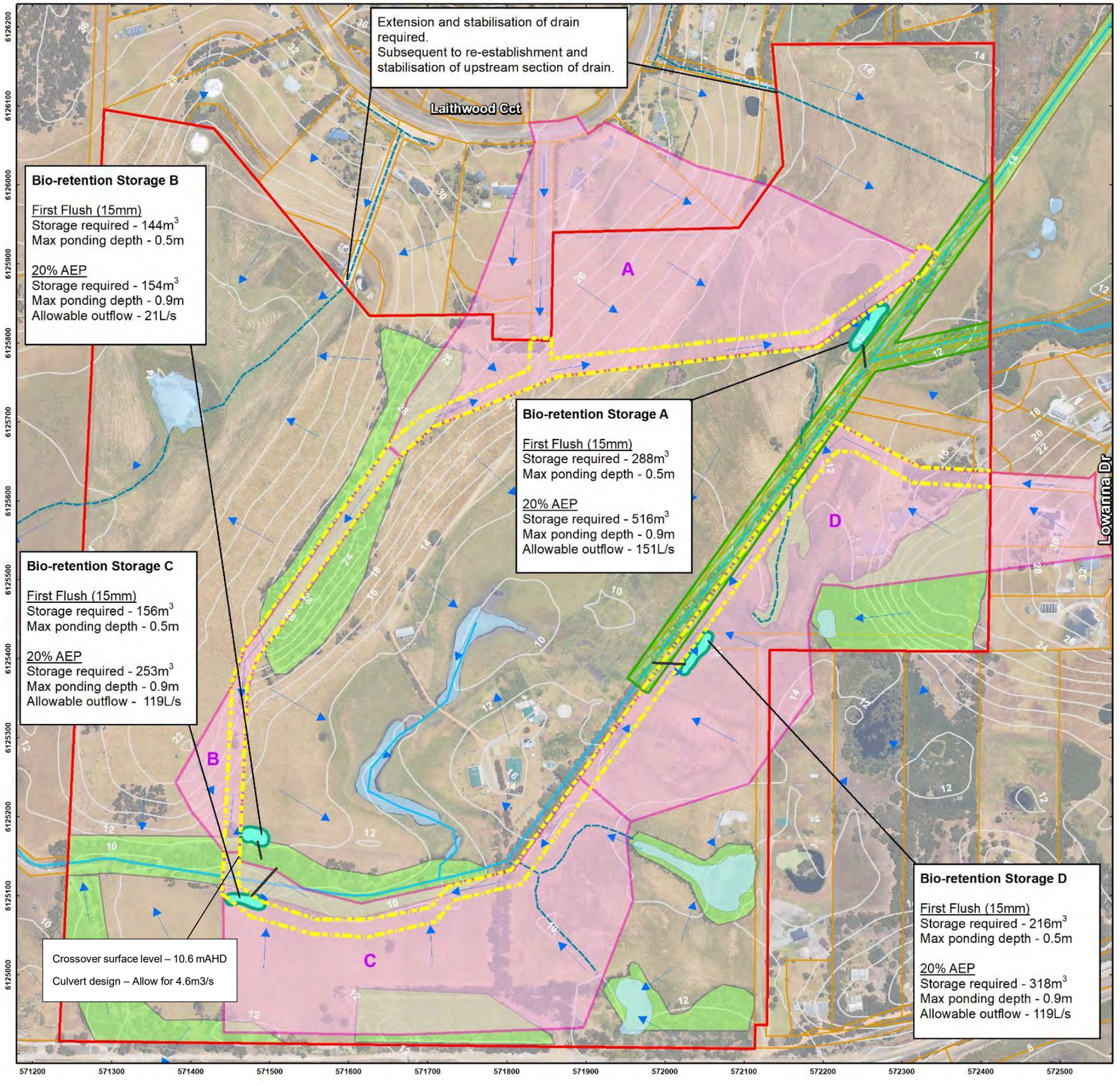


Figure 13: Conceptual cross-section of bioretention storage



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BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- 2m Contours
- Waterway
- Road Layout
- Post-development Drainage Direction
- Vegetation Protection Zone
- Drainage Sub-catchment
- Proposed culverts
- Bio-retention storage (First 15mm TWL)
- Bio-retention storage (20% AEP storage TWL)
- Revegetation area

Scale
1:4,700 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Barry Panizza
Lot 9001 Lower Denmark Road
Cuthbert, WA 6330

Figure 14: Stormwater Management Plan

	QA Check	Drawn by
	AT	CC
STATUS	FILE	DATE
FINAL	HD0063 005	26/04/2024

5.3 Groundwater Management

The groundwater management objectives for the Subject Site are to:

- Manage groundwater levels to protect infrastructure and assets;
- Maintain groundwater regimes for the protection of groundwater dependent ecosystems;
- Protect the value of groundwater resources; and
- Adopt nutrient load reduction design objectives for discharges to groundwater.

The following strategies will be implemented for the proposed development of the Subject Site to ensure the above objectives are met:

- To protect infrastructure from high seasonal groundwater levels. Building pads and foundations shall be set in accordance with applicable building standards based on soil type and separation to groundwater. Imported fill will be required where there is a low separation to groundwater, to ensure there is adequate separation between groundwater and building pads/foundations. A minimum separation of 1.5 m (in sands) is required between the land application of effluent disposal and peak groundwater levels (BDS, 2024). Where imported fill is required for the LAA, the same minimum fill depth shall be required for building pads.
- Subsoil drains shall be installed where the road finished level is less than 2 metres above the peak annual water-table. Subsoil drains shall have free draining outlets directed to bio-retention/stormwater storages for treatment prior to discharge.
- Bio-retention storages to have subsoils beneath the amended soil layer to prevent long standing water. Subsoil drains shall have a free draining outlet directed to Five Mile Creek.

5.4 Water Quality Management

The effective implementation of the structural and non-structural controls as part of the development will enhance water quality from this site as a result of the land use change from agriculture to rural residential/rural smallholdings.

The Subject Site uses a treatment train of structural and non-structural controls to treat up to the first 15 mm of rainfall from storm event.

Structural controls include the use of:

- Lot attenuation through the use of plumbed-in rainwater tanks, soakwells and/or rain gardens to capture runoff from roofs and hardstand areas reducing runoff from the site. Infiltration of rainwater at source allows for treatment of water as it moves through the soil profile.
- Bio-retention storages which will receive runoff from the development's internal road network. Bio-retention storages are designed to treat the first flush event (first 15 mm) and retain up the 20% AEP storm event. Bio-retention storages will allow for infiltration at source, they will be underlain with amended soil and subsoils, and planted to allow for uptake of nutrients and contaminants. The minimum specifications for all bio-retention storages are presented in Table 12.
- The revegetation of Five Mile Creek's riparian zone in the northeast is proposed. Revegetation of the riparian zone shall be consistent with minimum requirements for the bio-retention storages (Table 12), with larger native shrubs suitable for the outer creek line. Figure 14 shows the area proposed to be revegetated, this area has been selected based on being the most degraded vegetation fringing the creek. The existing fringing vegetation along Five Mile Creek within the drainage easement and the proposed revegetation area shall not be impacted as part of development works and as such these areas along with other vegetated areas within the Subject Site are proposed to be categorised as a Vegetation Protection Zone (Figure 14).

- Any revegetation or bioretention planting has been accounted for in the Bushfire Management Plan (BMP), as Forest Type A or Shrubland Type C. Refer to details in the overall BMP for the rezoning.

Table 13: Minimum requirements for bio-retention storages

Item	Specification
Amended soil media	• Well graded sand. • Clay and silt content <3%. • Organic content between 3 and 5%. • Hydraulic Conductivity (sat) >150mm/hour. • Light compaction only. • Infiltration testing of material prior to installation and again once construction is complete. On-going testing as per the monitoring program.
Plant selection	• In accordance with Vegetation Guidelines for Stormwater Biofilters in the South-West of WA (Monash University, 2014). • Tolerant of periodic inundation and extended dry periods. • Spreading root system. • Preferential selection of endemic and local native species. • Planting to provide 70-80% coverage at plant maturity.
Planting density and distribution	• Planting density appropriate for species selection. • Even spatial distribution of plant species.

The bio-retention systems should be sized to function correctly with a hydraulic conductivity (K) (saturated) of at least 3 m/day. Research conducted by the Facility for Advancing Water Biofiltration (FAWB, 2008) indicates that the desired K_{sat} is in the range of 2.5 to 7 m/day, to fulfil the drainage requirements as well as retain sufficient moisture to support the vegetation. The FAWB (2008) research also specifies that for vegetated systems some clogging will occur in the first few years until the vegetation is established. Once the plants are established, the roots and associated biological activity maintain the conductivity of the soil media over time.

Non-structural source controls to reduce nutrient export from the Subject Site will focus on reducing the need for nutrient inputs into the landscape. The following strategies are proposed;

- Promotion of the use of local native plants for landscaping to new lot owners. The use of local native plants will reduce the need for fertilisers across the site; and
- Undertake education campaigns regarding source control practices to minimise pollution runoff into stormwater drainage system.

6 Implementation

6.1 Construction Management

Any temporary stormwater storage required during construction shall be built where the final storage area will be located. The temporary storage will be sized to contain the ultimate capacity of stormwater runoff from the connected area. Measures shall be taken to prevent the transportation of sediment during the construction phase including infiltrating at source where possible and sand bagging/rock placement at the inlet of any pipe systems discharging outside the Subject Site. Remedial measures shall be undertaken by the developer if any disturbances to the surrounding areas are caused during construction.

6.2 Maintenance of Drainage Systems

The bio-retention storages and drainage system will require regular maintenance to ensure its efficient operation. It is considered the following operating and maintenance practices will be required and undertaken by the proponent periodically until successful practical completion of the development and handover to the City of Albany. Following handover, it is the City of Albany's responsibility to maintain drainage structures accordingly:

- Removal of debris to prevent blockages;
- Maintenance of vegetation in bio-retention swales; and
- Cleaning of sediment build up and litter layer on the bottom of storages.

6.3 Monitoring Program

The monitoring program has been designed to allow a quantitative assessment of hydrological impacts of the proposed development.

6.3.1 Hydraulic Performance Monitoring

The hydraulic performance monitoring will aim to measure the movement of stormwater through the storage structures to determine if stormwater conveyance is consistent with the intended design.

Where amended soil profiles have been installed in the bio-retention storages, infiltration testing shall be completed to test the hydraulic conductivity of the media. Testing should be repeated every 12 months to ensure clogging of the storages does not occur.

Water levels in the bio-retention storages and the roadside swales shall be observed during significant storm events to ensure they are consistent with design and not overflowing.

6.3.2 Groundwater Monitoring

A series of groundwater monitoring bores (BH1 - BH8) have been established across the Subject Site to determine pre-development groundwater levels. The location of the monitoring bores is shown in Figure 7.

Groundwater levels have been measured quarterly and include one late winter period prior to development to establish baseline groundwater level data. Post-development groundwater level monitoring (quarterly) shall include two winter periods and be conducted at the same bore locations (or the nearest practical location where the same location is not possible) as the pre-development groundwater investigation, with results compared to pre-development levels. If groundwater levels are found to exceed pre-development groundwater levels by more than 500 mm with no significant change in rainfall, a review of the development design and operations will be required and alterations/modifications to the development will be conducted to reduce groundwater levels accordingly.

7 References

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Appendix A

Land Capability Assessment – Lot 800 South Coast Hwy, Cuthbert (Opus, 2007)

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

OPUS

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

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Reference: G:\Environmental Services\Environmental Projects\Whelans

Status: Final
Reference: Job No: WAENV047

LAND CAPABILITY ASSESSMENT

LOT 800 SOUTH COAST HWY, CUTHBERT, ALBANY

APPENDICES

A. Subdivision Guide Plan
B. Site Soil Test Pit Locations and Field Testing Results
C. Late Winter Water Table Testing
D. Proposed Buffer Distances
E. Approved Health Department ATU's

LIST OF TABLES IN REPORT

Executive Summary

A Land Capability Assessment was conducted on lot 800 South Coast Highway, Albany to ascertain the ability of the land to sustain Rural Residential development proposals. Grande Terra Land Development Pty Ltd engaged Opus Consultants to undertake the assessment.

Grande Terra Land Development Pty Ltd proposes to develop Lot 800 South Coast Highway, Albany into residential lots. Stage One of Albany Green is currently being developed into Rural Residential lots. Please refer to Appendix A, Copy of Subdivision proposal.

The assessment included analysis of the geology and landforms, vegetation, and historical land-uses. Site Soil Investigations were carried out in the field and in the laboratory by Opus Consultants and Albany Soil and Concrete Testing. The Land Capability Assessment was conducted as per the Department of Agriculture Land Capability Assessment Guidelines, with the proposed Rural Residential zoning being assessed against the criteria of Rural Residential with on-site effluent disposal (Land Capability Assessment for Rural Strategies 1989).

Four mapping units were identified from the soil types and landforms within the area; these were defined into mapping units A, B, C and D (refer to Mapping, page 20). The results of the Land Capability Assessment indicate there are limitations, however mainly restricted to low lying areas. The Land Capability recommends that there is some design changes to the present lot and road concept plan to follow contours and for best practise designs to be implemented for drainage.

Summary of Map Unit A

Map Unit A is predominantly sandy soils in the lower contour areas. There is remnant vegetation in this mapping unit however in poor to degraded condition from decades of stock grazing. This unit had some limitations with an overall Land Capability Rating of III – Mapping unit fairly capable of supporting the proposed Land Use (residential) with moderate physical limitations. To overcome limitations in this mapping unit it is proposed to install phosphorous retention Alternative Treatment Units (ATU's) to ensure there is little risk of water pollution, revegetate along watercourses and drains, implement Water Sensitive Urban Design principles, and if there is excavation, then an Acid Sulphate Soils Investigation will need to be initiated.

The rural component of this mapping unit was rated very low capability, with a high degree of physical limitations. The sandy soils are very poorly structured with limited nutrients (poor fertility status) and productivity, requiring regular fertiliser application and improvement. The waterlogged areas and creeklines are suffering degradation causing erosion to banks and sedimentation along watercourses.

Summary of Map Unit B

Mapping Unit B is sand over gravel and is located along the slopes of the dominant ridge which protrudes from the north to the southwest of the lot. The residential component of the Land Capability found no limitations on this soil type. Sand over gravel is very nutrient absorbing for on-site effluent disposal and traditional septic tanks could be installed. Mapping Unit B had an overall residential capability rating of II – mapping unit is highly capable of supporting the land use.

The rural component of this land use was rated III– mapping unit has a fair capability with moderate physical limitations. The soils are nutrient deficient and poorly structured with low fertility. Improvements could be made to pasture by adding fertilisers.

Summary of Map Unit C

Overall there were few limitations in mapping Unit C, which consists of shallow sand over ironstone rock. This may limit the ease of excavation if required for residential development. The Jarrah woodland present in this mapping unit is in very poor condition from decades of grazing with little to no understorey species and no regeneration of trees. Clearing of native vegetation is subject to EPA Clearing Legislation. Mapping Unit C had an overall residential capability rating of I - the mapping unit is highly capable of supporting the land use.

The rural pursuits were classified similar to Map Unit C, rated III – mapping unit has a fair capability with moderate physical limitations. Generally the soils are not favourable as there is very shallow sand over ironstone rock which gives very poorly structured soils, low moisture availability and low fertility. Improvements to soil would be required and should not be stocked at great intensities.

Summary map Unit D

This Map Unit encompasses the waterlogged soils which did not achieve greater than 500mm water table below natural ground surface. These areas have a high degree of limitation for development and it has been recommended that these areas are avoided. Native vegetation is in very poor to degraded condition with weed infestations considerable along the Five Mile Creek system. There is high risk of off-site environmental harm if these areas are developed. The land capability rating was V– Very poorly capable of supporting land use, many limitations to overcome.

The land capability for rural pursuits was also rated very poor due to the degradation that is presently occurring and contributions to offsite pollution of effluent from stock and sedimentation of eroded banks. It is recommended that these areas are fenced from stock and revegetated. This land use was rates as IV - area with low capability, high degree of physical limitations

Summary of Whole Site

Engineering design of the proposed development will control surface water runoff during and after construction, minimising concentration and erosion effects by ensuring natural landscape contours are followed where possible. Waterlogged areas should be avoided due to large limitations for development and high risk of environmental harm and off-site impacts.

The retaining of remnant vegetation into Public Open Space or drainage reserves shall enhance the native vegetation values by the proposed subdivision, as currently there is no management of these. Presently there are heavy infestations of introduced plants (weeds), which is degrading the vegetation structure and restricting natural re-establishment of native vegetation. The removal of pest weed species will encourage native vegetation recruitment.

The overall capability of the land to support rural residential development is sustainable, with low intensities of agricultural pursuits, and waterlogged areas excluded from development. It is recommended that with management and careful consideration incorporated into the planning and engineering designs the identified limitations could be overcome.

1 Introduction

Grande Terra Land Development Pty Ltd commissioned Opus Consultants to undertake a Land Capability Assessment, Environmental Assessment and give Engineering Comment on constructability of the proposed Albany Green Stage Two. The subdivision site is located on lot 800 South Coast Highway and Stage Two is the southern end of the lot bordering onto the Lower Denmark Road, near Cuthbert Village.

This report outlines the Land Capability for the proposed development of the southern half of lot 800 South Coast Highway, and is aligned to the Department of Agriculture Western Australia and State Planning Commission three step methodology for Land Capability Assessment, being:

- Land Use Requirements of the proposal,
- Land Resource Survey, and
- Land Capability Analysis

(Land Capability Assessment for Local Rural Strategies, Department of Agriculture and State Planning Commission, 1989)

This report evaluates the subject land according to Rural Residential proposed land-use (Land Capability Assessment for Local Rural Strategies, 1989). The Dept. Agriculture Land Capability Assessment Guidelines assesses Rural Residential development according to proposed lot sizes. The proposed lots are described as Rural Residential development from 1ha to 5ha. The land use requirements have been rated in view of the soil investigation, historical land use, vegetation mapping, survey and topography.

2 Locality and Site Description

The project site, lot 800 South Coast Highway is located in the village of Cuthbert west of Albany, Albany, Western Australia. Please refer to the location map* below. Albany Green Stage Two covers an area of approximately 115 hectares. The subject site is bordered by South Coast Highway to the north and Lower Denmark Road to the south. The east and west boundaries of the site are adjacent to private properties.

3 Development Proposal

Grande Terra Land Development Pty Ltd propose to subdivide the subject site, Albany Green Stage Two (lot 800 South Coast Highway) into 45 lots ranging from 1 hectare to 4.5 ha each in size. It is also proposed to develop one lot into a super lot for future Chalet resort and rural lots (proposed lot 32). Please refer to Appendix A – Subdivision Guide Plan. There is one existing residence on the subject site. The existing residence utilises septic tanks with leach drains for onsite effluent disposal.

4 Site Soil Assessment

The Geological Survey of Australia Geological Map Series 1:250, 000 mapping describes the subject site as clay silt, sand and gravel in water courses and sand, white grey or brown commonly containing iron pisoliths and overlaying alterite. The site soil testing confirmed this.

Opus Consultants and Albany Soils and Concrete Testing carried out a site inspection and conducted field testing on the 14th and 15th June 2007. The site assessment included recording of site details as per Australian Standard AS/NZS 1547:2000, soil profile logging by visual classification to a depth of 2m and observing water table depths to water table below existing surface level. Please refer to Appendix B – Soil testing results.

Please note the original site assessment was conducted in June 2007, Opus re-visited the site in late August 2007 to conduct late winter water testing.

A total of 20 bore pits were drilled by mechanical auger and water depths were recorded. Permeability and Phosphorous Retention tests were conducted on 3 samples – one sample from test pit 4 (extracted from 150 to 2000mm below surface level), one sample from test pit 7 (extracted from 150 to 2000mm below surface level) and one sample from test pit 19 (extracted from 100 to 700mm below surface level). Further test pits were excavated underlate winter conditions to verify water table levels.

Surface soils indicated that the site is primarily sand with silt over most of the site with some sand over gravel/rock in elevated areas, and small areas of sand with minor peat soils in low lying areas.

Please note that the investigation and the writing of this report does not take into account any current or future zoning of the subject land, and focuses on land use and subsequent land capability.

4.1 Site Report

The subject site, lot 800 South Coast Highway, is situated on the south side of a ridge running east west parallel to South Coast Highway and Lower Denmark Road. The site has a 2 to 10% linear planar slope, with a dominant ridge which descends in a south westerly direction. The site is predominantly cleared, there are some isolated pockets of remnant vegetation, please refer to Section 5.3.

The soil profile across the site was predominantly sand with silt and 15 test pits recorded these characteristics. Five pits recorded either sand with silt and peat (test pit 3) which is expected in lower lying areas; sand with silt over gravel (test pit 2 and 19) along mid slope areas; and sand over gravel over rock (test pit 6 and 11) on the highest contours across the site. The soil types have been representatively mapped in Appendix B from the site soil testing.

Sand with Silt

The top layer of the soil profile consisted of moist sand with silt which was light grey to dark grey in colour. The sand with silt layer extended from the surface to 2000 below the surface. The majority of the test pits across the site recorded this soil type on or below the 15m contour. Please see photographs below.

Photo One – Sand with Silt

Photo Two – View of test pit sand with silt

Sand with Silt over Gravel

Test pit 2 and 19 recorded black sand to dark grey sand with silt over brown sand with gravel. These soils were found mid slope along the ridge, with the gravel layer varying from 100mm below surface level to 900mm. Test pit 19 had some silty clayey sand below the gravel layer. The presence of gravel soils indicates that there is the capacity of the soil to absorb phosphorous and nitrogen. Test pit 2 in the north west corner was the only test pit with gravel which encountered water table (in June 2007 sampling).

Photo 4: Sand over gravel Test pit 19

Photo Four: Test pit 2 sand over gravel, water table at 1.1m in June, and water table at ground level in August.

Sand over Gravel over Rock

Test pits 6 and 11 recorded shallow layers (0-100mm) of dark grey sand with silt over brown sandy gravel ranging from 100mm to 600mm below ground level, See Photo five below. The test pits were terminated due to the auger unable to penetrate past the rock layer. The locations are on the highest points of the subject site.

Photo Five: Sand over rock

Photo Six: Sand with silt and peat

Sand with Silt and Peat

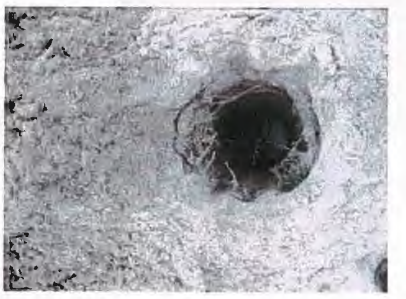
Test pit 3 was the only test pit within this sample regime which had black peaty sand with silt extending to 700mm over dark brown sand with silt. Please see photograph 6 above. This test pit reached the water table at 1.1m, sampled under late winter conditions water table was reached at ground level. Test pits 16 and 18 are low in the contour (<5m contour) and recorded high organic content in the topsoil, however were predominantly sandy silt in profile. These test pits recorded high water table under late winter conditions.

Late Winter Water Table Testing

Original testing was conducted in June, Opus Consultants returned to the site to conduct late winter water testing in August 2007. Test pits were excavated to a depth of 2m, water table was reached in 13 pits of the 20. 5 additional test pits were excavated to confirm the soil mapping and late winter water table levels across the site, please refer to Appendix C – Late Winter Water Table Testing. From this testing more definitive hydrological flow paths were noted and mapped. Please refer to mapping in Appendix C.

Gregg Harwood, City of Albany Senior Environmental Health Officer attended the late winter water table testing and the following recommendations were discussed at length on site and are formulated from these discussions.

Photo Seven, Left – Test pit 12, water table at 1000mm.
Photo Eight, Right – Test pit 9 water table at 1400mm.



Permeability Testing
The permeability tests were conducted by Albany Soil and Concrete Testing on the 150 to 2000mm of the Sandy Silt (Test pits 4 and 7) and the 100 to 700mm of the sandy gravel (Test pit 19), please refer to permeability results in Appendix B - Soil testing report. These results are typical for sandy soils and show that the soils are free draining. The concern with this site is the separation of water table as per the minimum requirement of the Health Department WA.
Testing was undertaken on three representative samples from the three main soil types, sand, sand over gravel and sand over rock.

Phosphorous Retention Index
The Phosphorous Retention Index (PRI) tests were conducted by Albany Soil and Concrete on the 150 to 2000mm of the Sandy Silt (test pits 4 and 7) and the 100-700mm of the sandy gravel (test pit 19), please refer to PRI results in Appendix B - Soil testing report.

The PRI's reveal that the sandy silt soil type has poor phosphorous retention ability with results showing at Test pits 4 and 7 being less than 1.0, whereas the PRI for the sand over gravel has very high ability and is at 323.75. The soil types with sand over gravel are very conducive to traditional on-site effluent disposal.

4.2 Policy and Legislation On-site Effluent Disposal

The *Draft Country Sewerage Policy* (Amended 2003) states the following specific requirements for on-site wastewater disposal. Large lots, where lot subdivision is to occur with divided parcels of land no smaller that 2000m^2 and development density is greater than R5, must comply with the following criteria as discussed in the appendices of the *Draft Country Sewerage Policy* (Amended 2003):

- *Irrespective of the type of on-site wastewater disposal system proposed, there should be at least 0.5 metres separation between the natural ground surface and the highest known groundwater level;*
- *The site is required to have soil characteristics capable of receiving all wastewater likely to be generated on the site without risk to public health or the environment; and*
- *The natural land slope on which wastewater disposal is to occur shall not exceed a one in five gradient.*

Wastewater System Installation Requirements:
- *The wastewater disposal site should not be subject to inundation or flooding at a probability greater than once in 10 years;*
- *No wastewater system shall be constructed so that effluent or liquid wastes will be discharged into the ground at a distance less than 30 metres from any well, stream or private supplies intended for consumption by humans;*
- *The depth to highest groundwater level from the underside of a septic tank effluent drainage receptacle shall be a minimum of 1.2metres. (For existing developed areas or infill areas a depth to highest known groundwater level may be a minimum of 1.2metres from ground level);*
- *Setbacks, groundwater clearance and installation requirements of systems other than conventional septic tank systems shall comply with any particular treatment relevant to the particular system. These are as required under the Health (Treatment of Sewerage and Disposal of Effluent and Liquid Waste) Regulations 1974, or conditions set by the Executive Director, Public Health.*

Due to environmental concerns with this particular site, it is proposed to utilise Phosphate Removing Alternative Treatment Units (ATU's). A copy of the approved Health Department WA Phosphate Removing ATU's is provided in Appendix E.
The Draft Country Sewerage Policy requires minimum setbacks and buffer distances to ensure that material does not leach into adjacent areas. The area around the Five Mile Creek and

associated creeks are classified as Environmentally Sensitive Areas according to the Draft Country Sewerage Policy. The Draft Country Sewerage Policy States the following requirements:

Table One - Environmentally Sensitive Areas

Feature	*Soil Type*	*Minimum buffer distance*	*Comments*
Environmentally sensitive areas (1) – wetlands (h) only	*All soils*	*50 metres*	*This buffer reflects the Water and Rivers Commission's and Environmental Protection Authority's policies on the minimum buffer required for any type of development near a wetland*
Environmentally sensitive areas (1) - watercourses, estuaries and marine environment only	*All soils*	*30 metres*	*Where floodplain mapping information (eg flood levels) is not available, the wastewater disposal area should be at least 30 metres from the edge of a watercourse channel. The wastewater disposal system should only be located at this distance if installation does not disturb riparian vegetation.*

Draft Country Sewerage Policy 2003.

4.3 Recommendations on site effluent disposal – Rural Residential

The site can meet on-site effluent disposal if approved phosphate removing ATU's are used and the 50m buffer distance is applied to the creeklines and drains. As the soils are relatively free draining, a separation from water table must be achieved. To achieve these minimum requirements, proposed setbacks and disposal field areas have been mapped for the site. In some areas the disposal field may be a distance from the house and pumped to the disposal area. The City of Albany Senior Environmental Health Officer (G.Harwood) attended on site and confirmed this could occur. A copy of these buffer distances is provided in Appendix D.

In reference to the above considerations which address the *Draft Country Sewerage Policy* (Amended 2003) guidelines, and in consideration that the proposed subdivision has lot sizes of greater than 1 hectares in size, Opus Consultants recommends that lot 800 South Coast Highway has a demonstrated capacity to support effluent absorption with the following conditions:

- Minimum setback distances of 50m from creeklines and drains are adhered to;
- Phosphate absorbing ATU's are utilised in depression areas. A copy of approved Health Department WA ATU's is provided in Appendix E;
- A separation of 0.5m is achieved from existing ground level and water table; and
- Disposal fields are located in designated building envelopes.

Opus Consultants concludes that the subject site is capable of supporting the proposed subdivision site effluent disposal with the above limitations to reduce negative impacts to the surrounding environment or watercourses. The limitations are included on the Land Capability rating and mapping in Section 7 of this document.

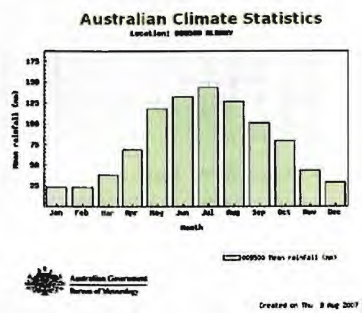
5 Environmental Assessment

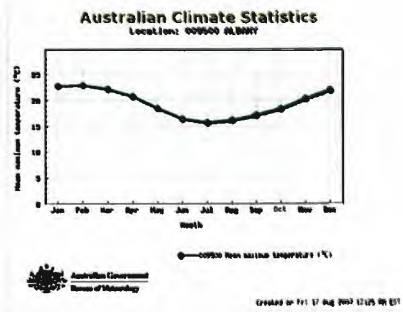
The Environmental Assessment for the subject site involved desktop analysis of climate, history fauna, and acid sulphate soils of the site; and on ground assessment of remnant vegetation and fire management. The results of these assessments are included in the land capability rating and mapping in Section 7 of this document.

5.1 Climate

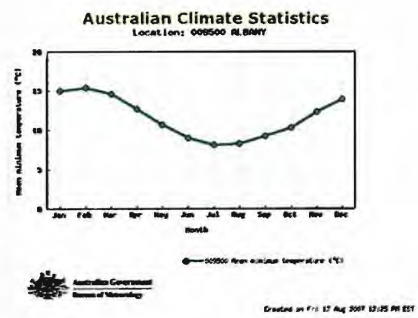
Albany sustains a Mediterranean type climate with generally warm summers and cool, wet winters. A major factor influencing Albany's climate is the Southern Ocean, giving a moderating influence via sea breezes in the warmer months and a relatively mild, moist airmass at any time through the year. During summer there is a development high pressure band (sub tropical ridges) across the south west giving north south movements. Albany's south coast aspect means winds progress with these ridges from east through north, west, south and returning to the east over periods of days and weeks bringing large variations in weather conditions. During the winter months these ridges bring moist westerly winds south of the ridge, delivering much of Albany's rainfall.

Albany's long term median rainfall is approximately 930mm (Bureau of Meteorology), with considerable variation from year to year. On average 72 per cent of Albany's rainfall occurs between May and October. Please refer to Bureau of Meteorology charts over page. Average temperatures peak in summer in January and February, with monthly maximum means of 23°C and overnight mean minimum of 15°C. Winter daily maximum temperatures average at approximately 16°C while the average daily minimum is 8°C in July. Please refer to temperature charts from the Bureau of Meteorology below.





Climate Statistical Graphs from the Bureau of Meteorology website 2007.



5.2 Current and Historical Land use

The Cuthbert area was cleared in the 1950's of native vegetation. The properties to the south of Lower Denmark Road near Cuthbert were cleared for potato growing and the areas to the north were cleared for grazing. (pers comms T.Saggers, Aug 2007) Lot 800 was cleared by the Burkin family where they grazed cattle for many years.

Lot 800 has been historically used for sheep and cattle grazing. The current tenants of the property graze cattle over the whole site and it is understood the previous owners ran a few sheep (pers comms M.J.Gibbs June 2007). The grazing across this site has been extensive with all remnant vegetation areas grazed, the drain running through the middle of the property is fenced to exclude stock, however, remnant vegetation is in very poor condition and quite degraded. (Please refer to Vegetation Assessment Section 5.3).

Stock (cattle) currently grazed on the property have access to all creek and wetland systems on the property. This is causing erosion to the creek lines and loss of vegetation to these areas. Please refer to photographs Nine and Ten below.

Photo Nine: Erosion to the banks of Five Mile Creek from cattle.

Photo Ten: Sediments and cattle effluent drain freely into five mile creek system.

The predominant soil type across Lot 800 is sandy silt. These soil types have poor structure and moisture withholding ability. Photographs Eleven and Twelve show nutrient deficient pasture in the peak growth period of August. Pasture improvement would be required for maximum nutrition for grazing, such as application of fertilisation with phosphorous & Nitrogen. This does not make the soil type suitable for pasture enhancement or tillage. Historically the Cuthbert area is known for intensive horticulture from potato growing, this site however is unsuitable for this agricultural pursuit.

Discussion with the current tenants indicates there are no sheep dip areas or potential areas for chemical contamination. A contaminated site investigation was not carried out as part of this brief, discussion to date and site visits do not indicate this would be necessary.

Photo Eleven (left): Pasture showing death and yellowing – nutrient deficiency.
Photo Twelve: ((right)) View of pasture showing nutrient deficiencies.

5.3 Vegetation Assessment

Vegetation Assessment was undertaken on site by Kathryn White Opus Consultants on 7th July 2007. Assessment was undertaken of all remnant vegetation by visual assessment. Two vegetation associations were mapped across the site, Taxandria Woodland and Jarrah Woodland. These vegetation associations have limited understorey species, consisting mostly of introduced weeds and are in degraded condition from grazing of stock.

Taxandria Woodland

Vegetation Association along the creeklines is remnant riparian vegetation consisted of dominant overstorey species such as *Taxandria juniperina, Agonis flexuosa, Callystachis lanceolata,* sparse pine trees near the existing house and sparse *Eucalyptus rudis* and *Maleleuca raphiophylla* along the Five Mile creek system. The understorey species was predominantly introduced species such as Taylorina, Blackberry, Arum lily, Inkweed, Bridal Creeper, Aloe vera, and Kikuyu, with minor native species of *Pteridium esculentum, Juncus* spp, *Hibbertia cuneformis* and *Lepidosperma* spp.

Photo Thirteen Right: View of riparian vegetation along Five Mile Creek
Photo Fourteen: View of Taxandria's

Jarrah Woodland

There are two remnant patches of Jarrah woodland, located in the north centre of the lot and along the eastern boundary. These stands have little to no understorey, and scattered A*llocasuarina frasieriana* and B*anksias grandis* (on eastern side only). The eastern remnant bushland is undergoing some unidentified dieback, this could be from a canker or from pressure from grazing.There was very limited species diversity within this association, which is a direct reflect from long term grazing pressure on the vegetation. A development buffer of 30 metres is required away from watercourses and drains. It is recommended that this buffer area is revegetated with providence species to reclaim and stabilise these areas. Vegetating along the watercourses

(especially the Five Mile Creek through the property) would also provide more sustainable fauna habitat and create micro-corridors for native animal movement. At the very minimum it is recommended that these areas are fenced off from cattle grazing.

Photo Fifteen (left): Low Jarrah forest, limited understorey. Photo Sixteen (right): View of casuarinas and jarrah on eastern side under some stress.

A comprehensive weed management plan needs to be implemented, as there are large infestations of Blackberry, Taylorina, Ink weed and Arum lily along the Five Mile Creek and adjacent watercourses. These species should be eradicated as per Department of Agriculture and Food guidelines to prevent further spread and infestations occurring.

5.4 Fauna

A complete fauna survey of the area was not completed for the purposes of this management plan. Known species to the area include western grey kangaroo, southern brown bandicoo, bush rat, honey possum, tiger snake, dugite, whistling kite, nankeen kestrel western, pacific black duck, kookaburra, rosella, grey fantail, new holland honey eater and banjo frog.

The remnant areas of vegetation have limited understorey, in reflection of this it would be assumed that there would be minimal representation of mammals and more representation from amphibians, birds and reptiles. Revegetation across the site would provide habitat for native animals and provide linking corridors to adjacent bushland areas.

5.5 Fire management

A Fire Management Plan in consultation with Fire and Emergency Services (FESA) has not been prepared as part of this assessment. Fire management aligned to the FESA guidelines states that buildings should have a minimum setback from bushfire hazards of 100 metres. Where this cannot be achieved, AS3959 building standards apply.

As this site is predominantly cleared of native vegetation, the only identified fire hazard applicable is adjacent to the eastern boundary (near proposed lot 30 and 31) where a remnant patch of vegetation occurs. A 100m setback from buildings could be applied to this area, more consultation is required with FESA and CoA Fire Managers to confirm. As it is not a continuous vegetated area, AS3959 may not apply. A minimum fuel reduction area of 20m (if under 10° slope) will need to be implemented, as per City of Albany Fire Prevention Plan. This is not mapped as a limitation.

5.6 Wetlands and water ways

The "Five Mile Creek" drains through the property from the north east corner of stage two to the south western corner. The Five Mile Creek forms part of the Torbay Catchment and drains to Lake Powell, which is a "Class A" Nature Reserve vested with the Department of Environment and Conservation. A search of the DEC database places Lake Powell as an Environmentally Sensitive Area, the subject site is not located within this area, and is located 3km from the lake edge. A

search was conducted of the Department of Water database's revealing the subject site is not in a Public Drinking Water Source Protection Area or has any wetlands of regional significance on the property.

The site is only classified as an Environmentally Sensitive Area under the Country Sewerage Policy and as discussed in Section 4.3, an on-site effluent disposal system should be setback 50 metres from adjacent creek lines and drains. A drainage easement has been placed over the Five Mile Creek and a development exclusion of 30 metres placed from the drain centreline and adjacent creek tributaries, please refer to Land Capability Mapping Section 7. It is recommended that the development exclusion area is fenced free from any stock grazing and re-vegetated with local endemic species.

It is proposed that with careful planning of site drainage and on-site effluent disposal this development would have less impact on the Five Mile Creek system than the existing rural land use is having on the area.

Evidence that this is probable is from Department of Health WA document "Movement of Nutrients from On-Site Waste Water Systems in Soils". A comparable table for phosphorous and nitrogen inputs for an onsite effluent disposal system and rural pursuits is copied from this document over the page.

Table Two Comparison of Nutrient Inputs from Agriculture and Domestic Activities

Table 1 **Overview of nutrients inputs from animals, agricultural activities and domestic septic tanks**

land use	housing density (R-)	P input unsewered kg/ha/year	N input unsewered kg/ha/year	P input sewered kg/ha/year	N input sewered kg/ha/year	P input kg/ha/year	N input kg/ha/year	P input kg/year	N input kg/year	references
rural residential	0.5	0	27	5	18					1
residential	5	25	125	15	25					1
residential	10	25	260	40	80					2
residential	10			30	120					3
market gardens	-					200-1200	500-900			4,5
orchard	-					100	200			4
pasture 1	-					20	20			4
pasture 2	-					20	70			4
1 septic tank								3.5	18	2
1 cat								0.25	1	1
1 dog								1.3	5	1
1 horse-a								18	70	5,6
1 horse-b								12	45	7,6
1 horse-c								10	40	5,6
1 chook								0.4	0.7	5,6
1 pig (<20kg)								0.65	2.7	9
1 pig (20-50 kg)								2	8.4	9
1 pig (50-110 kg)								3.1	12.9	9

references:
1- Gerritse, Adeney and Bates (1992).
2- Gerritse, Barber and Adeney (1996).
3 JDA Consultant Hydrologists (2001).
4- Gerritse (1990)
5- Kinhill Engineers (1995).
6- van Keimpema, Devaney and Kerkhof (1996).
7- Barker, Hodges and Campbell (1999)
8- Primrose McConnell (1976)
9- Beavers and Neuroska (1977)

Department of Health WA "Movement of Nutrients from on-site waste water systems in soils" 2001

Based on the above information, the following assumptions could be made;

- Impact on Lake Powell from rural residential development would be greatly reduced through less stock being run and reduced N and P loadings into the creek lines.

- The onsite effluent disposal system proposed for the subdivision is phosphorous removing systems and thus would have miniimal impact on the creek lines.
- Better management and revegetation of the riparian creek lines would have a positive effect on the downstream Lake Powell.
- Nutrient stripping and retention of storm water on site will mitigate the risk of any pollution of water courses from this proposed development.

Opus Consultants have undergone preliminary consultation with the Department of Water (DoW), and there are concerns regarding drainage and effluent disposal. It is recommended that if the development proceeds, a Water Management Plan is prepared in consultation with the City of Albany and DoW.

6 Engineering Assessment

A site visit was undertaken by Scott Curran Senior Engineer Opus Consultants in light of the proposed development. The environment of the site is mainly pastured and therefore road construction and service installation should not be affected by general urban environment constructability issues such as clearing, traffic, noise and dust issues.

Cut and fill balances should be able to be managed through the design to reduce the volume of imported embankment or spoil materials. The major cut and fill design is between Lots 8 to 5 on the western side of the proposed development site. In designing this portion of road, considerations may be given to the road alignment at this location to allow the alignment to better follow the contours and reduce the gradient of the road and batter slopes. This may require consideration for adjustment to the lot boundaries.

Construction programming of the project should be carefully considered to take into account the building of roads and culverts in the lower lying areas and it is recommended to stage these works to coincide during drier months.

It is recommended that further Geotechnical investigation be undertaken on the road alignment to determine the bearing capacity of the underlying soil structure prior to pavement design. This would be particularly important where the proposed road alignment expends past Lot 22.

6.1 Ease of excavation

The site is predominantly sandy silt with some gravel through the ridge in the northwest of the lot, it is not envisaged this will pose a problem for excavation or for development of road and housing. The ease of excavation has been rated for the land capability assessment as very low limitation.

Dependant on the final design and depth of cut, it is anticipated the iron stone will be encountered along the top of the ridge between Lot 21 to Lot 16. This would not be seen as extraordinary but again should be investigated at design phase.

6.2 Foundation stability

There were no reactive clays noted across the site, a full geotechnical investigation was not carried out as part of this land capability. Given the majority of the soils are mostly sand or silty sand with no reactive clays, this would class the majority of the site as Class A soils.

The classification of soils at Loc 2, 3, 8, 12, 16 indicate that these sites could be considered as Class P and any structural elements planned for these areas will require certification of a structural engineer.

In light of the land capability assessment this was rated as High – moderately deep sandy soils with undulating plains (2-8%)

6.3 Drainage requirements

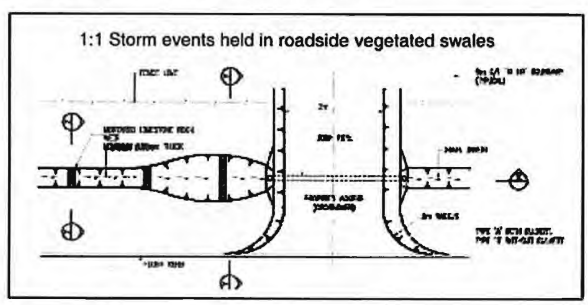
The majority of the site is relatively free draining sandy soils and is a model site for water sensitive urban design to be applied. Water management strategies should be aligned to current Best Practise and applied to this development these include:

1. Maintain and where possible enhance water quality by:
   - Minimise waterborne sediment loading
   - Minimise export of pollutants to surface or ground water
   - Minimise post development flows across the site
   - Apply point source water management
   - Encourage prospective landowners not to use fertilisers on land

2. Encourage water conservation by:
   - Minimise the export and use of scheme water
   - Promote the use of rainwater
   - Promote ground water recharge
   - Reduce irrigation requirements

3. Management of the water regime by:
   - Prevent flood damage in existing and proposed development areas
   - Prevent erosion of adjacent wetlands, waterways and slopes
   - Ensure pollutants do not enter into adjacent waterways

A concept drainage design was not prepared as part of this assessment, site investigation in light of the proposal did not see any major restrictions on drainage. The proposal involves large lots sizes and drainage easements adjacent to road terminations. The use of water sensitive urban design principles should be applied where all 1:1 events are contained in road side swales. A representative drawing of this concept is provided below.



Larger 1:10 events will need to be detained prior to entering the Five Mile Creek, it is recommended that bio-retention basins, vegetated with endemic rushes and sedges are developed at all proposed drainage points from the drainage easements. This is shown as a medium limitation in the land capability to be considered in more detail in the engineering design stage.

It is recommended that roads are aligned along contours to reduce speed of runoff along drains and to implement more effective Water Sensitive Urban Design Principles. A design which replicates the roads along the contours and the lots aligned off this would allow best Practise drainage design.

6.4 Waterlogging hazard

Areas from the aerial mapping showing water logging have been mapped and were confirmed with intensive sampling regime undertaken in late winter. These areas have been mapped on are a limitation in Section 7 Land Capability. Photographs Seventeen to Eighteen below show typical waterlogged areas across the site.

Photo Seventeen: Water logged area in northwest corner.

Photo Eighteen: Close up of waterlogged soils

Development should be excluded from these waterlogged areas and revegetation of provenance and endemic species. A weed management plan should be prepared to address the major infestations along the creek lines.

Suitable land use for the water logged areas is POS or vacant land. This land is not suitable for grazing or residential use due to the water logging through most of the year and the subsequent erosion from animals in those areas. This is mapped in the Land Capability as Map Unit D. All other map units achieve a greater than 0.5m separation from natural ground level and natural water table level under late winter conditions.

Opus Consultants recommend that the residential design is redone to exclude these areas, align residential areas to higher ground and parallel to contours. Residential boundaries can extend into these areas, however development is not recommended.

6.5 Acid Sulphate Soils

The WAPC Acid Sulphate Soils Risk Mapping Classifies the lower half of lot 800 South Coast Highway as a Medium risk of Acid Sulphate Soils occurring. This investigation did not include Acid Sulphate Soil Testing, a desktop assessment was undertaken, please refer to WAPC Acid Sulphate Soil mapping in Appendix B.

Acid Sulphate Soils occur in waterlogged soils and typically sandy silts and peat soils. It was noted on site that the low lying waterlogged soils had sulphur like smells and there is a possibility that Acid Sulphate soils could occur in these areas. It is recommended that a Preliminary Acid Sulphate Soil Investigation is undertaken when the exact extent of the development is known and if there is any excavation or cut and fill proposed, the Acid Sulphate Soil Investigation targets these areas.

7 Land Capability Assessment

7.1 Description of Land Use Requirements

Areas of land for sub-division approval are assessed through Land Capability to analyse the sustainability of the particular activity and the environmental effects the proposed use may have on the land. This determines the attributes the land contains which can affect the proposed land use for the area. The Land Use proposed for this development is Rural Residential with areas for Public Open Space, and possible chalet style development.

Please refer to Appendix A for the proposed layout plan of the subdivision.

7.1.1 Rural Residential

The land use proposed for Special Residential land use is 115 ha, with 28.53 ha (lot 32) for chalet accommodation or rural (subject to land capability). The qualities required for consideration for this zoning at lot 800 South Coast Highway are defined by Agriculture Western Australia as being:

Rural Residential development with on-site effluent disposal

- *Land should be free from effects of storm surge, flooding, wave erosion or slope instability.*
- *Land should not be susceptible to a degree of erosion hazard which would prohibit its sustained use or cause off-site effects detrimental to adjacent land users or the community.*
- *Soils for effluent disposal area to be sufficiently permeable and absorptive to accept and purify effluent.*
- *Ground water or surface pollution does not occur on site or off-site.*
- *Land is sufficiently free of water logging and inundation.*
- *Land is not saline so that trees, garden or lawn establishment becomes prohibitive.*

7.1.2 Proposed Chalet Site and Rural use

The proposed Chalet site land use and rural use is proposed in lot 32. These pursuits are subject to the Land Capability Assessment, the chalet land use has been assessed, similar to "Residential" components and rural land use is assessed separately as "Rural or Hobby Farms".

It is more likely that areas in Lot 32 will become POS areas as there is a prominent amount of waterlogging through the middle of this lot.

7.2 Land Capability Assessment Method

The Land Capability Assessment compares the physical requirements for a particular land use with the qualities of the land. This analysis determines the ability of the land to sustain a particular land use without resulting in significant environmental degradation. The land use that has been considered for this study area is Rural Residential with on-site effluent disposal.

This study has included analysis of the soil and landform from soil survey, environmental assessment and engineering assessment. Late winter water levels were obtained during the soils assessment.

7.3 Land Resource Characteristics

The Land Resource Characteristics have been overlaid to determine the mapping units assessed at lot 800, South Coast Highway, as detailed on Map Two page 20. The mapping units were determined by the following information:

- Soil and Landscape characteristics, including texture, depth, soil profile, aspect, slope and water table.
- Soil testing and Laboratory analysis.
- Environmental mapping
- Historical land use.

The Four mapping units are defined in Table Three below.

Table Three– Mapping Units Lot 800

MAP UNIT	CHARACTERISTICS
Map Unit A	Sand with silt soils, well draining soils, dark grey to black and light grey sands, very little topsoil. Predominant soil type below the 15m contour. Prominently pasture, cleared land.
Map Unit B	Sand with silt over gravel, moderate to well draining soils, good nutrient and phosphorous retention ability. Along ridges above the 15m contour, predominantly pasture.
Map Unit C	Sand over gravel over rock, this soil type is prominent along the ridge, the highest point on the lot. Presently covered by degraded Jarrah woodland.
Map Unit D	Sand with silt and peat, these soils are generally in the waterlogged areas and along watercourses. Predominantly degraded riparian vegetation (Taxandria) and introduced weeds species.

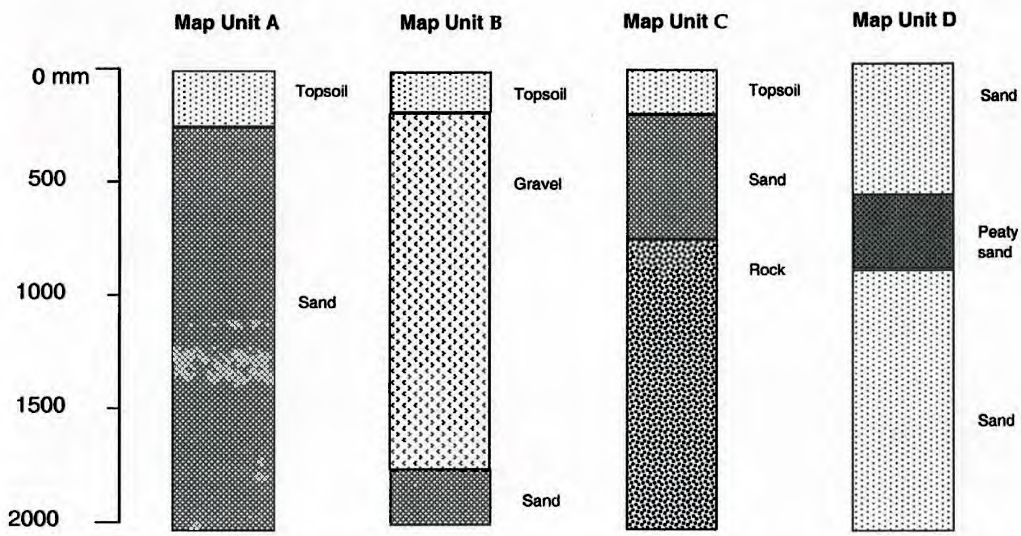
The mapping units have grouped soil characteristics that shall be referred to in the Land Capability Rating procedure and have been summarised in Table Four over the page.

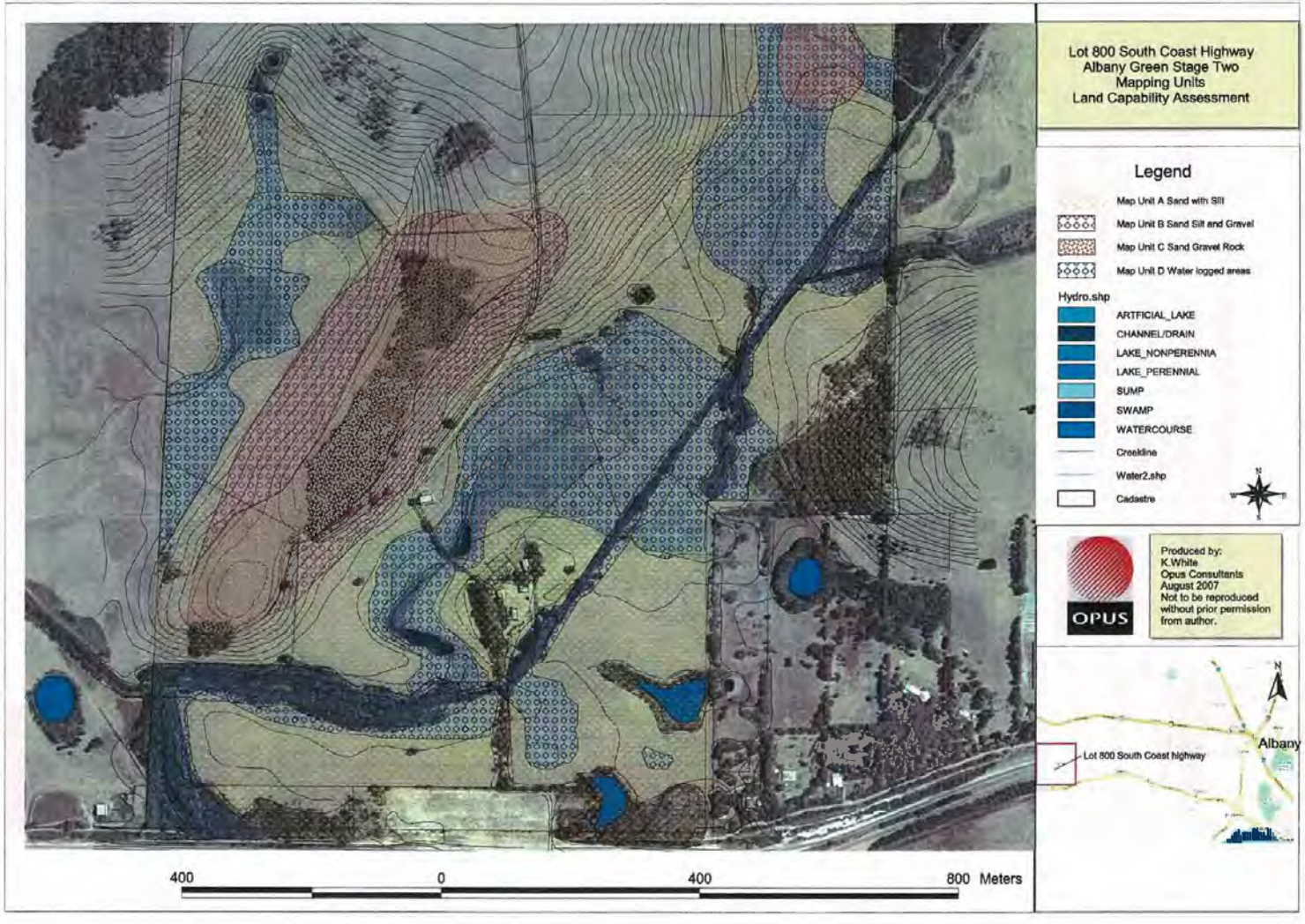
Table Four Soils Summary of Final Mapping Units

Final Mapping Units	Soil Texture	Soil Depth (max)	Slope (degrees)	Soil Permeability
A	Sand/silt	≤2000mm	<10	well drained
B	Sand/silt/gravel	≤2000mm	>10	mod – well drained
C	Sand/gravel	<600mm	>10	mod – well drained
D	Sand/silt/peat	> 2000mm	<10	well drained

The Final Mapping units soil profile descriptions are represented diagrammatically (Figure One, below). Information was compiled from the soil sampling with each test pit averaged to give representative profile descriptions of each mapping unit. The four mapping units are overlaid on lot 800 South Coast Highway, Albany, over the page.

Figure One– Soil Profile Descriptions of the Three Mapping Units




Lot 800 South Coast Highway
Albany Green Stage Two
Mapping Units
Land Capability Assessment
Legend
Map Unit A Sand with Silt
Map Unit B Sand Silt and Gravel
Map Unit C Sand Gravel Rock
Map Unit D Water logged areas
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Water2.shp
Cadastre
N
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N
Albany
Lot 800 South Coast highway
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800 Meters

8 Land Resource Survey

8.1 Qualities and limitations

The proposed land use has a set of qualities for which the Land Capability Assessment will be considered. Table Four and Five below outlines the landscape qualities and characteristics that will be assessed within the scope of this study at location 800 South Coast Highway Albany.

Table Five – Landscape Qualities and Limitations – Residential Component

Landscape qualities	Subclass	Landscape qualities	Subclass
Ease of excavation	x	Phosphorous retention ability	p
Foundation stability	b	Water pollution hazard	s
Services (reticulated water, power, telephone)	r	Soil salinity	y
Water logging hazard	i	Bushfire hazard	z
Water erosion hazard	e	Native vegetation retention	n
Wind erosion hazard	w	Potential Acid Sulphate Soils	as
Flood hazard	f		

Table Six – Landscape Qualities and Limitations – Rural Component

Landscape qualities	Subclass	Landscape qualities	Subclass
Plant growth	pl	Water availability	a
Soil trafficability	t	Shallow Soils	ss
Soil fertility status	l	Erosion	er
Soil moisture availability	m	Flood Hazard	f
Rooting conditions	l	Water pollution hazard	s

The landscape qualities are surveyed from the previously presented information in this report (Sections 1-6) and assessed for capability. The Department of Agriculture utilises a five class system of assessing land capability, these five classes rate the degree of physical limitations associated with land use and management needed for these. Please refer to Table Seven over the page.

Table Seven Land Capability Classes – Dept Agriculture Western Australia

CAPABILITY CLASS	DEGREE OF LIMITATION	GENERAL DESCRIPTION
I	Very low	Areas with a very high capability for the proposed activity or use. Very few physical limitations to the specified use are present or else they are easily overcome. Risk of land degradation under the proposed use is negligible.
II	Low	Areas with a high capability for the proposed activity or use. Some physical limitations to the use do occur affecting either its productive use or the hazard of land degradation. These limitations can however, be overcome through careful planning.
III	Moderate	Areas with a fair capability for the proposed activity or use. Moderate physical limitations to the land use do occur which will significantly affect its productive use or result in moderate risk of land degradation unless careful planning and conservation measures are undertaken.
IV	High	Areas with a low capability for the proposed activity or use. There is a high degree of physical limitations which are either not easily overcome by standard development techniques or which result in a high risk of land degradation without extensive conservation requirements.
V	Very High	Areas with a very poor capability for the proposed activity or use and the severity of physical imitations is such that its use is usually prohibitive in terms of either development costs or the associated risk of land degradation.

8.2 Land Capability Rating for Land Use Rural Residential – Degree of limitation

Land qualities have been assessed in terms of the degree of limitation (Tables Eight to Eleven in following sections) to the proposed land-use. The limitation is then matched to what the land can support and rated on the limitations map (each Map unit has a limitation map proceeding). The limitations which affect the proposed land-use are given ratings and keys according to their Land Capability Sub-class (from Tables Four and Five). Limitations which record very low are not mapped as they are not deemed to be a limiting factor to the proposed land use

8.2.1 Degree of Limitation – Map Unit A

Table Eight (a) Degree of Limitation Map Unit A - Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Very low	Ease of excavation	Not deemed to have inherent risks	Residential	-
Very low	Foundation stability	Not deemed to have inherent risks	Residential	-
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	Residential	
Very low	Waterlogging hazard	Not deemed to have inherent risks	Residential	IV-i
Very low	Water erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Wind erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Flood hazard	Not deemed to have inherent risks	Residential	-
Moderate	Phosphorous retention	Installation of ATU	Residential	III-p
Moderate	Water pollution hazard	Requires setback distances to creeks	Residential	III-s
Very low	Soil salinity	Not recorded present	Residential	-
Very low	Bushfire hazard	Not deemed to have inherent risks	Residential	-
Low	Native Vegetation retention	Clearing as per EPA regulations	Residential	II-v
Moderate	Acid Sulphate Soils	Moderate risk rating WAPC mapping	Roads / residential	III-as

Limitations Include:

- Phosphorous retention ability (III-p) - Phosphate absorbing ATU's should utilised in this mapping unit. A copy of approved Health Department WA ATU's is provided in Appendix E;
- Water Pollution Hazard (III-s) – Utilise Phosphate absorbing ATU's, drainage aligned to water sensitive urban design principles, bio retention basins to nutrient and pollution strip prior to entering waterways. A 50m setback limitation is mapped for this limitation.
- Native Vegetation (II-v) – Some remnant riparian vegetation (taxandria's), vegetation should remain and be re-vegetated with endemic species. Weed management required along creeklines and drains. Vegetation in poor condition due of decades of grazing. Very minimum these areas should be fenced from stock.
- Acid Sulphate Soils (III-as) – WAPC mapping indicates there is a moderate risk, this can be overcome with management, an Acid Sulphate Soil Investigation should be undertaken to identify if present.

Overall Capability Rating for Residential- III Area with fair capability, moderate physical limitations.

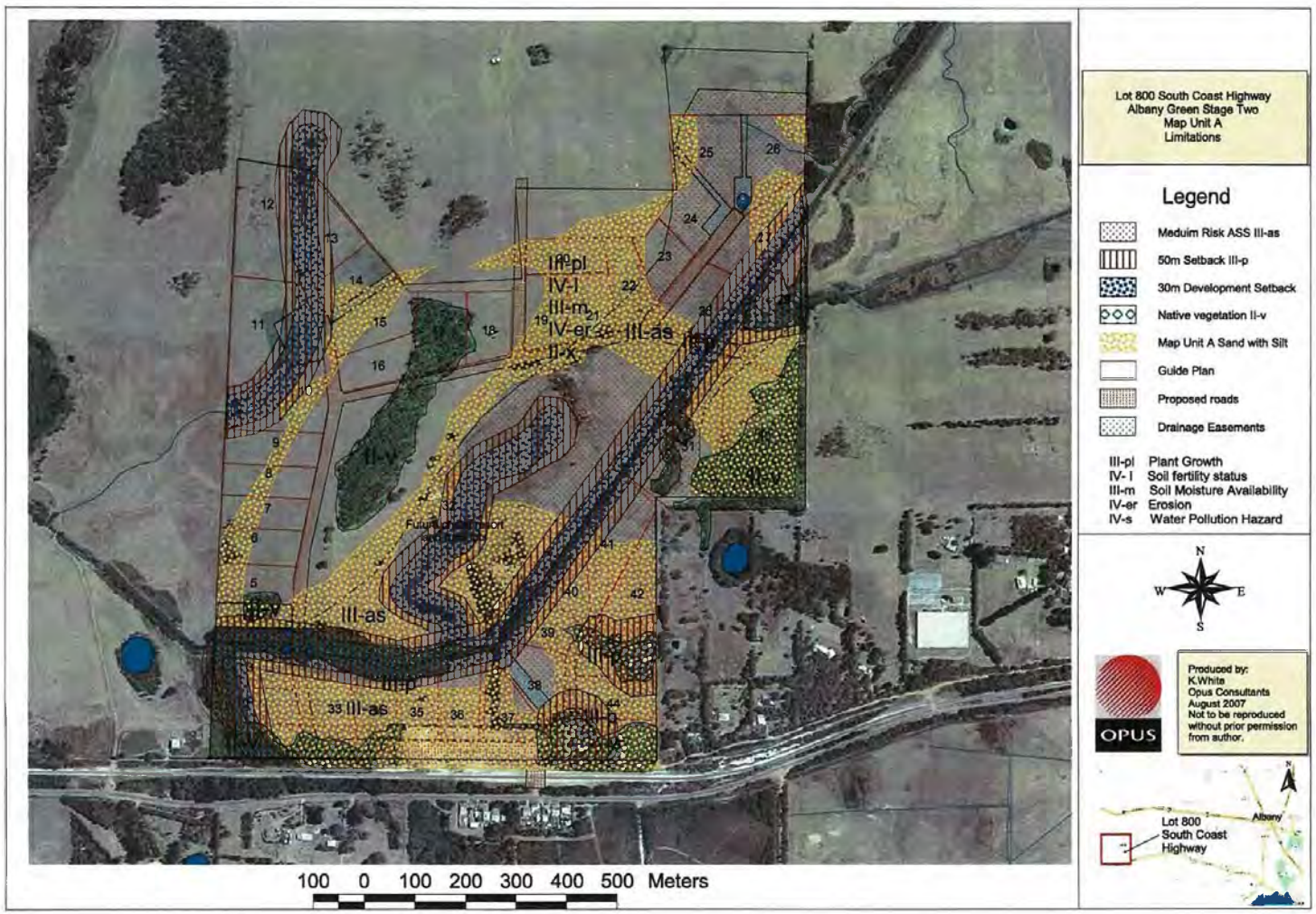
Table Eight (b) Degree of Limitation Map Unit A - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	POS	III-pl
Very low	Soil trafficability	Not deemed to have inherent risks	Rural	-
High	Soil fertility status	Poor structure soils, low fertility	POS / Reveg	IV-l
Moderate	Soil moisture availability	Freely draining sands, low moisture withholding capacity	POS / Reveg	III-m
Very low	Rooting conditions	Not deemed to have inherent risks	Rural	-
Very low	Water availability	Not deemed to have inherent risks	Rural	-
Very Low	Shallow soils	Not deemed to have inherent risks	Rural	-
Very High	Erosion	Grazing causing erosion to banks and slopes	POS / Reveg	IV-er
Moderate	Flood hazard	Low lying areas	Reveg	III-f
Very High	Water Pollution Hazard	Nutrients from animals and fertilizer application	Reveg	IV-s

Limitations Include:

- Plant growth (III-pl) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application and enhancement of soils.
- Soil Moisture availability (III-m) – sandy silty soils have limited ability to withhold moisture, only waterlogged areas able to retain moisture.
- Erosion (IV-er) – Grazing from hoofed animals causing erosion to banks and slopes.
- Flood hazard (III-f) –these areas should be avoided in the planning process (same areas mapped as waterlogging hazard).
- Water Pollution Hazard (IV-s) –cattle effluent from untreated runoff from paddocks, fertiliser application required to increase fertility, causing nutrient runoff into adjacent watercourses.

Overall Capability Rating for Rural Land Use – IV Area with low capability, high degree of physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit A
Limitations
Legend
Meduim Risk ASS III-as
50m Setback III-p
30m Development Setback
Native vegetation II-v
Map Unit A Sand with Silt
Guide Plan
Proposed roads
Drainage Easements
III-pl Plant Growth
IV- I Soil fertility status
III-m Soil Moisture Availability
IV-er Erosion
IV-s Water Pollution Hazard
III-pl
IV-I
III-m
IV-er
III-as
II-x
II-v
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Albany
Lot 800
South Coast
Highway

8.2.2 Degree of Limitation – Map Unit B

Table Nine(a) Degree of Limitation Map Unit B - Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Very low	Ease of excavation	Not deemed to have inherent risks	Residential	-
Very low	Foundation stability	Not deemed to have inherent risks	Residential	-
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	Residential	
Very low	Waterlogging hazard	Not deemed to have inherent risks	Residential	-
Very low	Water erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Wind erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Flood hazard	Not deemed to have inherent risks	Residential	-
Very low	Phosphorous retention ability	Not deemed to have inherent risks	Residential	-
Very low	Water pollution hazard	Not deemed to have inherent risks	Residential	-
Very low	Soil salinity	Not recorded present	Residential	-
Very low	Bushfire hazard	Not deemed to have inherent risks	Residential	-
Very low	Native Vegetation retention	Clearing as per EPA regulations, most remnant native vegetation in poor condition	POS /residential	-
Very low	Acid Sulphate Soils	Low risk rating WAPC mapping	Roads /residential	-

Limitations Include:

- This mapping unit recorded no limitations,
- Please note the area in the north west of the lot which has this soil type has included into the effluent Waterlogged Map Unit D, and assessed against the relevant criteria and not recommended for development.

Overall Capability Rating for Residential- I, very highly capable of supporting land use few physical limitations

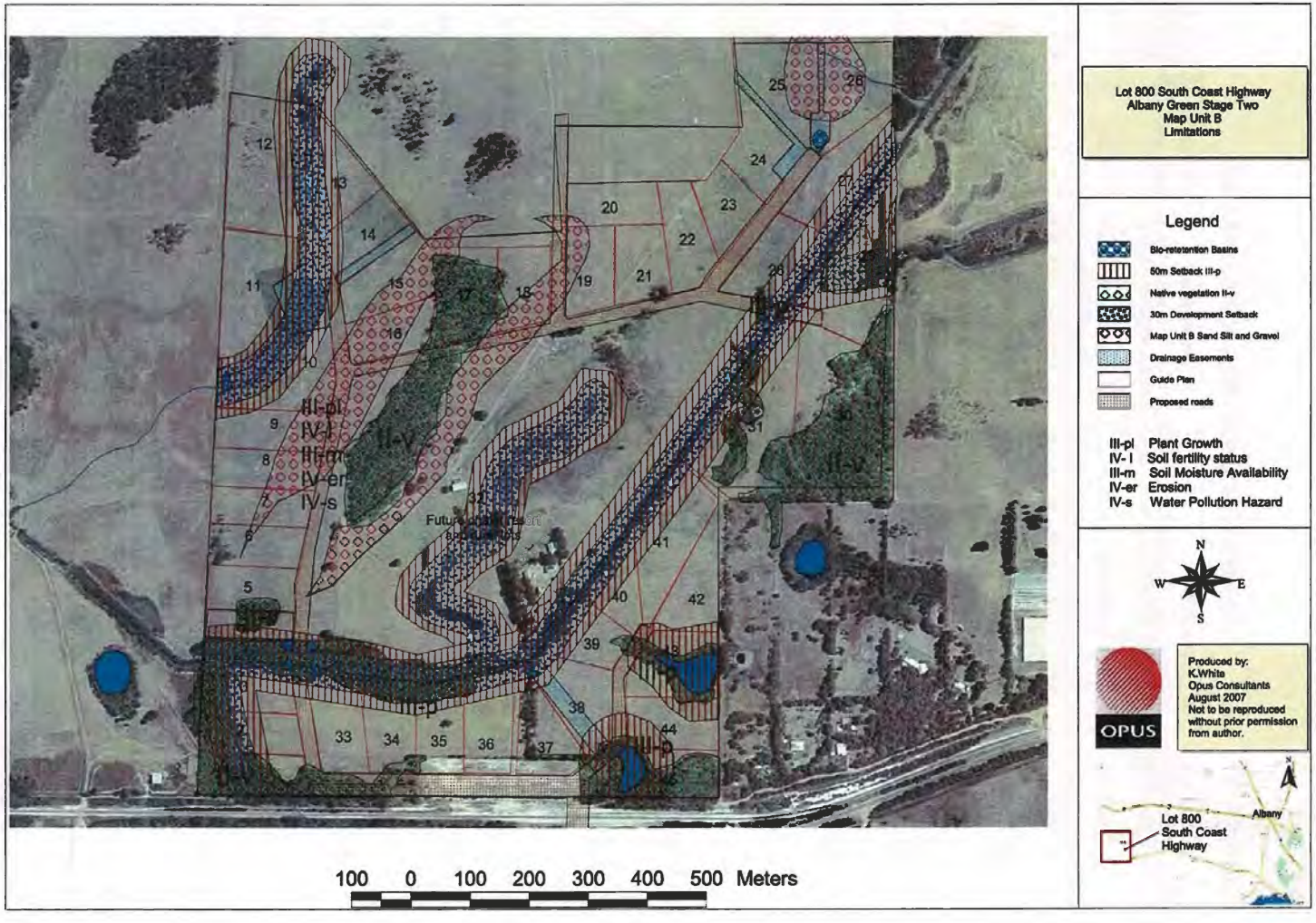
Table Nine (b) Degree of Limitation Map Unit B - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	-	III-pl
Very low	Soil trafficability	Not deemed to have inherent risks	Rural	-
High	Soil fertility status	Poor structure soils, low fertility	-	IV-l
Moderate	Soil moisture availability	Freely draining sands in topsoil, low moisture withholding capacity	-	III-m
Very low	Rooting conditions	Not deemed to have inherent risks	Rural	-
Very low	Water availability	Not deemed to have inherent risks	Rural	-
Very Low	Shallow soils	Not deemed to have inherent risks	Rural	-
Very High	Erosion	Grazing causing erosion to slopes	-	IV-er
Very low	Flood hazard	Low lying areas	Rural	-
Very High	Water Pollution Hazard	Nutrients from animals and fertilizer application	-	IV-s

Limitations Include:

- Plant growth (III-pl) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application and enhancement of soils.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil Moisture availability (III-m) – sandy silty soils in Horizon A have limited ability to withhold moisture, only waterlogged areas able to retain moisture.
- Erosion (IV-er) – Grazing from hoofed animals causing erosion to banks and slopes.
- Water Pollution Hazard (IV-s) – effluent from cattle untreated, runoff from paddocks, from fertilizer application, (required to increase fertility), and nutrient runoff into adjacent watercourses.

Overall Capability Rating for Rural Land Use - III Area with fair capability, moderate physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit B
Limitations
Legend
Bio-retention Basins
50m Setback III-p
Native vegetation II-v
30m Development Setback
Map Unit B Sand Silt and Gravel
Drainage Easements
Guide Plan
Proposed roads
III-pl Plant Growth
IV- I Soil fertility status
III-m Soil Moisture Availability
IV-er Erosion
IV-s Water Pollution Hazard
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Lot 800
South Coast
Highway
Albany
100 0 100 200 300 400 500 Meters

8.2.3 Degree of Limitation – Map Unit C

Table Ten (a) Degree of Limitation Map Unit C- Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Low	Ease of excavation	Some modification required on shallow rock areas	Residential/ roads	II-x
Very low	Foundation stability	Not deemed to have inherent risks	Residential	-
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	Residential	-
Very low	Waterlogging hazard	Not deemed to have inherent risks	Residential	-
Very low	Water erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Wind erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Flood hazard	Not deemed to have inherent risks	Residential	-
Very low	Phosphorous retention ability	Not deemed to have inherent risks	Residential	-
Very low	Water pollution hazard	Not deemed to have inherent risks	Residential	-
Very low	Soil salinity	Not recorded present	Residential	-
Very low	Bushfire hazard	Not deemed to have inherent risks	Residential	-
Low	Native Vegetation retention	Clearing as per EPA regulations, most remnant native vegetation in poor condition	Residential	II-v
Very low	Acid Sulphate Soils	Low risk rating WAPC mapping	Roads /residential	-

Limitations Include:

- Ease of Excavation (II-X) – Shallow sands over rock, may require some excavation or fill.
- Native Vegetation (II-v) – Some remnant Jarrah woodland along ridge, clearing permit or WAPC subdivision approval required prior to clearing. Vegetation in poor condition due to decades of grazing.

Overall Capability Rating for Residential- I, very highly capable of supporting land use few physical limitations

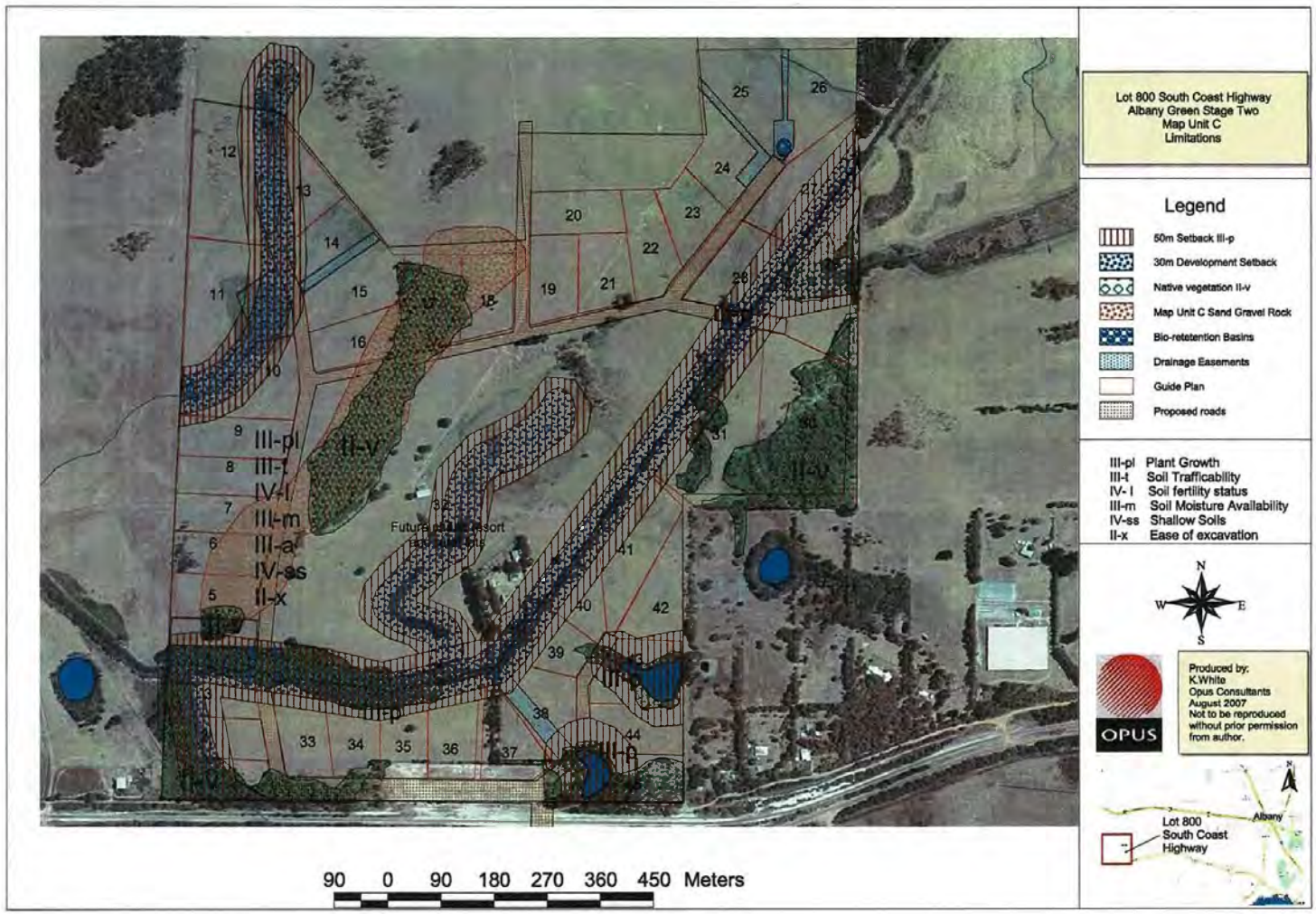
Table Ten (b) Degree of Limitation Map Unit C - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	-	III-pl
Moderate	Soil trafficability	Very shallow sandy soils over rock	-	III-t
High	Soil fertility status	Poor structure soils, low fertility	-	IV-l
Moderate	Soil moisture availability	Freely draining sands in topsoil, low moisture withholding capacity	-	III-m
Very low	Rooting conditions	Not deemed to have inherent risks	Rural	-
Moderate	Water availability	Sand over rock, high in landscape, low water availability	-	III-m
High	Shallow soils	Limit plant growth	-	IV-ss
Very low	Erosion	Not deemed to have inherent risks	Rural	-
Very low	Flood hazard	Low lying areas	Rural	-
Very low	Water Pollution Hazard	Not deemed to have inherent risks	-	-

Limitations Include:

- Plant growth (III-pl) - poorly structured sandy soils with limited nutrients, low productivity, would require fertilizer application.
- Soil trafficability (III-t) – shallow rock, often close to surface.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil moisture availability (III-m) – sandy silty soils have limited ability to withhold moisture, only waterlogged areas able to retain moisture.
- Water availability (III-m) –High in landscape, low water availability.
- Shallow Soils (IV-ss) –shallow sands over rock often close to surface.

Overall Capability Rating for Rural Land Use - III Area with fair capability, moderate physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit C
Limitations
Legend
50m Setback III-p
30m Development Setback
Native vegetation II-v
Map Unit C Sand Gravel Rock
Bio-retetention Basins
Drainage Easements
Guide Plan
Proposed roads
III-pl Plant Growth
III-t Soil Trafficability
IV- l Soil fertility status
III-m Soil Moisture Availability
IV-ss Shallow Soils
II-x Ease of excavation
III-pl
III-t
IV-l
III-m
III-a
IV-ss
II-x
II-v
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Albany
Lot 800
South Coast
Highway

8.2.4 Degree of Limitation – Map Unit D

Table Eleven (a) Degree of Limitation Map Unit D- Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Ease of excavation	Would require dewatering	POS / Reveg	III-x
Moderate	Foundation stability	Would require fill to bring out of water table	POS / Reveg	III-b
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	-	-
Very high	Waterlogging hazard	Low lying creekline areas	POS / Reveg	IV- i
Moderate	Water erosion hazard	Low lying creekline areas	POS / Reveg	III-e
Very low	Wind erosion hazard	Not deemed to have inherent risks	-	-
Very high	Flood hazard	Low lying creekline areas	POS / Reveg	IV-f
Very high	Phosphorous retention ability	Free draining soils with shallow water table	POS / Reveg	IV-p
Very high	Water pollution hazard	Free draining soils with shallow water table	POS / Reveg	IV-s
Very low	Soil salinity	Not recorded present	-	-
Very low	Bushfire hazard	Not deemed to have inherent risks	-	-
Moderate	Native Vegetation retention	Clearing as per EPA regulations, most remnant native vegetation in poor condition	POS/ drainage reserves	II-v
Moderate	Acid Sulphate Soils	Low risk rating WAPC mapping	Roads / drainage reserves	III-as

Limitations Include:

- Ease of Excavation (II-x) – Shallow water table in sands and possibly peat, may require excavation and/or fill.
- Foundation stability (III-b) - Shallow water table in sands and possibly peat, would require drainage and excavation and/or fill.
- Waterlogging (IV-j) – These areas should be avoided in the planning process, a 30m setback limitation has been mapped.
- Water erosion (III-e) – Creeklines subject to inundation are very susceptible to water erosion, in depression areas.
- Flood hazard (III-f) –these areas should be avoided in the planning process (same areas mapped as waterlogging hazard.
- Phosphorous retention ability (III-p) - Phosphate absorbing ATU's should utilised in this mapping unit. A copy of approved Health Department WA ATU's is provided in Appendix E; most areas in this mapping unit did not meet country sewerage policy

requirements and should be avoided.

- Water Pollution Hazard (V-s) – Drainage aligned to water sensitive urban design principles, bioretention basins to nutrient and pollution strip prior to entering waterways.
- Native Vegetation (II-v) – Some remnant riparian vegetation (Taxandria's), vegetation should remain and be re-vegetated with endemic species. Weed management required along creeklines and drains. Vegetation in poor condition due to decades of grazing. Very minimum these areas should be fenced from stock.
- Acid Sulphate Soils – WAPC mapping indicates there is a moderate risk, this can be overcome with management, an Acid Sulphate Soil Investigation should be undertaken to identify if present.

Overall Capability Rating for Residential- V very poorly capable of supporting land many limitations to overcome

Table Eleven (b) Degree of Limitation Map Unit D - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	Drainage reserve	III-pl
Moderate	Soil trafficability	Very shallow sandy soils over rock	Drainage reserve	III-t-
High	Soil fertility status	Poor structure soils, low fertility	Drainage reserve	IV-l
Very low	Soil moisture availability	Not deemed to have inherent risks	-	-
Very low	Rooting conditions	Not deemed to have inherent risks	-	-
Very low	Water availability	Not deemed to have inherent risks	-	-
Very low	Shallow soils	Not deemed to have inherent risks	-	-
Very High	Erosion	Grazing causing erosion to banks and slopes	Drainage reserve	IV-er
Moderate	Flood hazard	Low lying areas	Drainage reserve	III-f
Very High	Water Pollution Hazard	Nutrients from animals and fertilizer application	Drainage reserve	IV-s

Limitations Include:

- Plant growth (III-pl) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil trafficability (III-t) – shallow rock, often close to surface.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Erosion (IV-er) – Grazing from hoofed animals causing erosion to banks and slopes. These areas should be fenced from grazing animals, weeds controlled and re-vegetation of local endemic species.
- Flood hazard (III-f) –these areas should be avoided in the planning process (same areas mapped as waterlogging hazard.
- Water Pollution Hazard (IV-s)– effluent from cattle through untreated runoff from paddocks, fertiliser application required to increase fertility, causing nutrient runoff into adjacent watercourses.

Overall Capability Rating for Rural Land Use - IV Area with low capability, high degree of physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit D
Limitations
Legend
50m Setback III-p
30m Development Setback
Native vegetation II-v
Map Unit D Water logged areas
Drainage Easements
Guide Plan
Medulm Risk ASS III-as
Proposed roads
III-pl Plant Growth
III-t Soil Trafficability
IV- l Soil fertility status
III-f Flooding hazard
IV-er Erosion hazard
IV-s Water Pollution Hazard
II-x Ease of excavation
III-b Foundation stability
IV-i Waterlogging hazard
III-e Water erosion hazard
IV-f Flood hazard
IV-s Water pollution hazard
III-as
II-v
N
W
E
S
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Albany
Lot 800
South Coast
Highway
100 0 100 200 300 400 500 Meters

9 Land Capability Analysis

The overall capability of the subject area to sustain the proposed developments is summarised within the mapping units in Table Twelve.

Figure Twelve – Overall land Capability Summary Table

Mapping Unit	Residential	Rural
Mapping Unit A	III	IV
Mapping Unit B	I	III
Mapping Unit C	I	IV
Mapping Unit D	V	V

I = Mapping Unit capable of supporting the Land Use.

II = Mapping Unit capable of supporting the land use and limitations can be overcome by design and management inputs.

III- Mapping Unit with a fair capability, moderate physical limitations occur which significantly affect productive use or result in moderate risk of land degradation.

IV – Areas with low capability for the proposed activity or use, high degree of physical limitations.

V – Areas with poor capability for the proposed activity or use, severity of limitations, use is prohibitive in terms of either development costs or risk of land degradation

A summary of recommendations within each Mapping Unit from the Land Capability Assessment has been provided on Page 36, Section 10 – Planning and Management Considerations.

10 Planning and Management Considerations for Rural Residential

The following recommended planning and land management considerations arise from the Land Capability Assessment:

10.1 On-site Septic Effluent Disposal

Overall the subject site has soils which are conducive to on-site effluent disposal; it is recommended that a phosphate removing ATU on site effluent system is installed in sandy areas to ensure that there is no effluent leaching into waterways. The elevated areas along the ridgeline and where sand over gravel occurs, traditional septics can be used, as there is excellent phosphorous retention ability in these soils. A list of recommended ATU's is supplied in Appendix E. The waterlogged areas (Map Unit D) where ground and water table separation is less than 500mm are not suitable for development.

It is recommended that:

- A 50m setback be applied from all creeks and drains;
- Areas which achieve a 500mm water table clearance (Map Unit A-C) are suitable for on-site effluent disposal;
- Deep sands are not suitable for traditional septic systems and phosphorous absorbing ATU's should be installed on these soil types (Map Unit A); and
- Map Unit B and C have very well nutrient absorbing capacity and traditional septic systems could be utilised on these soil types.
- Map Unit D is unsuitable for on-site effluent disposal

10.2 General Foundation and building stability

The site is predominantly sandy soils with sand over gravel or rock in elevated areas. With appropriate site preparation where required, the subject land will support building development resulting from the proposed sub-division. The dominant soil type is sand, and is suitable to be reused as fill where required. Sands should be compacted and free of loose materials and debris through screening prior to compaction. Loose sands should be protected from erosion factors.

It is recommended that:

- Consideration is give to road alignment to follow contours;
- Construction programming should occur in dry months;
- Development should not occur in waterlogged or flood prone areas (Map Unit D)
- Further geotechnical investigation is required to determine bearing capacity for pavement design; and
- Further investigation may be required at design phase to address the shallow rock in Map Unit C.

10.3 Drainage and Water Sensitive Urban Design Principles

To enable implementation of WSUD principles, planning consideration should be given to realignment of the proposed lots and roads. To more effectively manage road drainage across the site it is recommended that the development plan is re-aligned with the road designed to follow contours. This will allow for vegetated swales to be implemented to hold the 1:1 storm events and reduce the speed of run-off into adjacent areas.

It is recommended that:

- A 50 m development setback be applied around all drains and creeks;
- Bioretention basins should be strategically placed on any entering points into the creeklines or drains;

- native vegetation should be planted into drainage areas to encourage uptake of nutrients and hydrocarbons, encourage removal of sediments as a filter prior to entry of waterways.

10.4 Rural Pursuits

The land is generally very poor for pasture growth, unless fertilisers are added regularly. This is not recommended given the proximity of Lake Powell. If rural pursuits are proposed, it is recommended that this site is not suitable for intensive stocking or grazing.

It is recommended that:

- The creek areas are fenced and revegetated with native endemic plant species to reduce erosion and encourage habitat along micro corridors;
- Stock are not allowed to graze in the drainage corridors;
- Rural pursuits would need to be carefully considered in this area to ensure there is little off-site environmental harm, stocking and grazing causes erosion in sandy soils and nitrification in waterlogged soils.

10.5 Erosion (Gully erosion, wind erosion)

The Land Capability Assessment did not determine if the land was subject to wind or gully erosion and there was no evidence on site of this. It was noted there was erosion along the creeklines from stock.

It is recommended that:

- Fencing occurs to exclude animals and prevent further erosion and degradation of the creeks;
- As the site is predominantly sandy in nature it is recommended that best practise is carried out if the site is developed for residential and sediment traps are installed during development and any cleared areas are stabilised with mulched vegetation; and
- The proposed residential development would best deal with any erosion by aligning the properties and roads along the contours to ensure that storm water does not scour and encouraged to seep into road reserves.

10.6 Vegetation

There is some remnant native vegetation on site, however is in degraded to poor condition due to decades of grazing of stock.

It is recommended that:

- Native vegetation is retained across the site, and a weed management plan is implemented to reduce the competition of introduced species and encourage regrowth of ground and mid structure species;

- A revegetation program should be implemented utilising providence species. This program will need to be implemented by the developer in the first instance and then the responsibility of individual land owners;
- A weed management plan is implemented across the site to eliminate the extensive invasions of weeds, this should be aligned to WA Agriculture and Food guidelines; and
- Any native vegetation clearing is subject to EPA Clearing regulations.

10.7 Acid Sulphate Soils

A detailed Acid Sulphate Soils Investigation aligned to Department of environment and Conservation (DEC) Guidelines, was not undertaken as part of these investigations. The lower half of the subject site has a Medium Risk Rating according to WAPC mapping. Acid Sulphate Soils can be managed, DEC Best guidelines and best practise encourages avoidance, lime application or lime barriers, and protection of groundwater sources.

It is recommended that

- A Preliminary Acid Sulphate Soil Investigation is undertaken when the exact extent of the development is known and if there is any excavation or cut and fill proposed the Acid Sulphate Soil Investigation targets these areas.

11 Conclusions

Grande Terra Land Development Pty Ltd commissioned Opus Consultants to undertake Site Investigations for Land Capability Assessment for lot 800 South Coast Highway, Albany Green Stage Two. Stage One of Albany Green is currently being developed into Rural Residential lots.

The Land Capability Assessment examined the Soil Characteristics, Environmental and Engineering investigations. The investigation and the writing of this report does not take into account any current or future zoning of the subject land, and focuses on land use and subsequent land capability.

Overall the subject site has the capability to be residential development within Map Unit A, B and C. Further consideration to planning the lot layout and road alignments in light of the Land Capability Assessment findings would assist in overcoming any limitations. The waterlogged areas on the subject site are unsuitable for development and rural pursuits (Map Unit D). These areas should be revegetated or remain as vacant land possibly (POS), it is also unsuitable for rural pursuits.

Rural activities such as grazing or horticulture are not recommended; the sandy soils are highly conducive to erosion and require regular improvement as are very nutrient poor. Rural pursuits would need to be of low intensity and ensure have setbacks from the current creek and drain areas. Erosion and degradation of waterways and vegetation is inherent across the site from decades of grazing. At the very minimum, to reduce off-site environmental harm, the creeks and drains should be fenced to exclude stock.

The Chalets proposed through the central area are generally not recommended, unless these are placed out of waterlogged areas. Grouped chalets could be sustained to one central phosphorous absorbing ATU within Map Unit A, this would need appropriate design, planning and aligned to setback's as described in this report.

12 References

Land Capability Assessment for Local Rural Strategies, 1989, Department of Agriculture Western Australia.

The Beard's Vegetation Classification dataset ,1:3,000,000 digital representation of Beard's vegetation map of the state of Western Australia.

"Australian Geoscience Mapping, Map series S50-11 Part of Sheet S150-15, Mt Barker to Albany".

pers comms Thomas Saggers local historian Albany region, 20/8/07

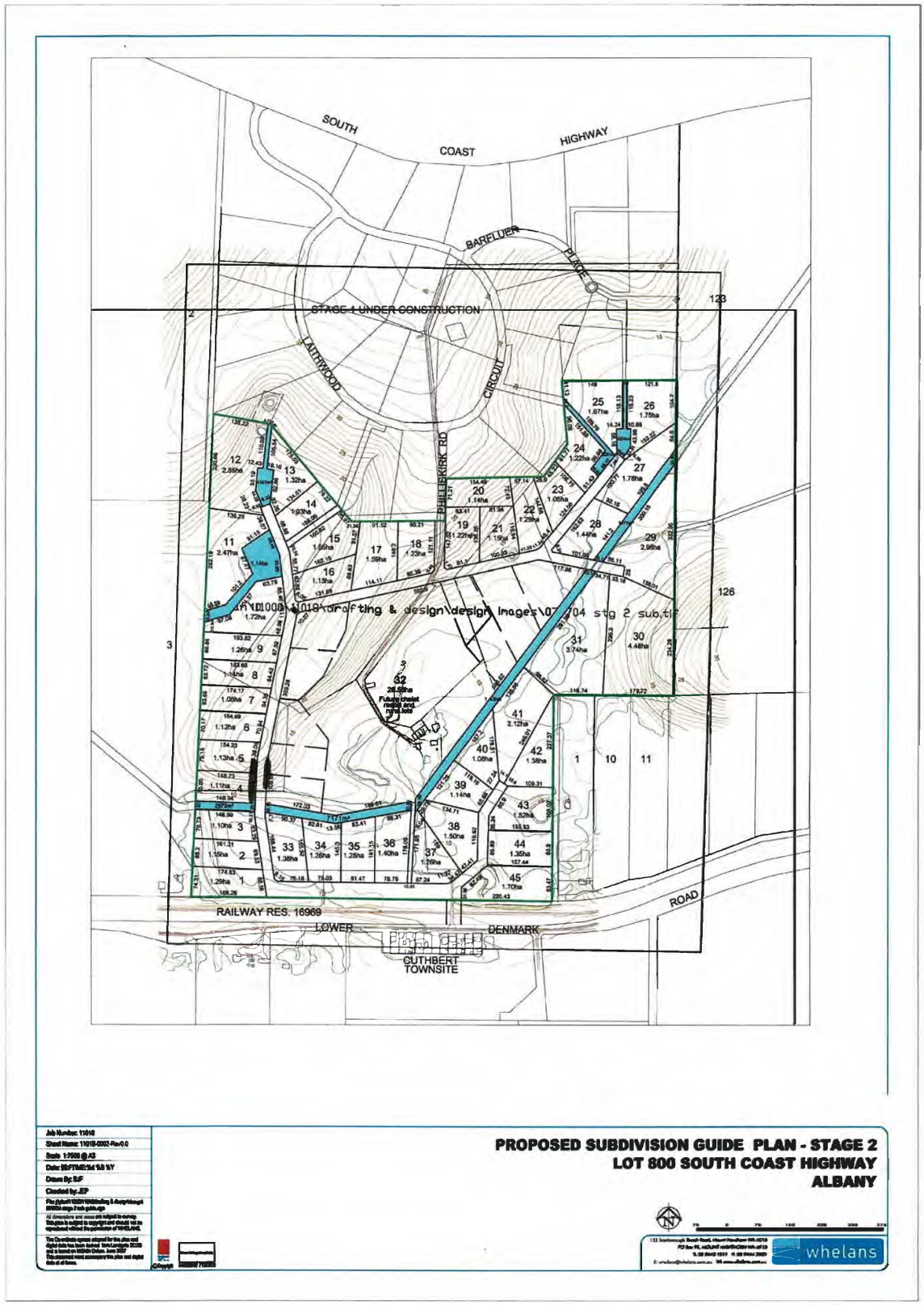
pers comms M.J.Gibbs current occupier lot 800 South Coast Highway 14th June 2007

Department of Health WA "Movement of Nutrients from on-site waste water systems in soils" 2001

Appendices

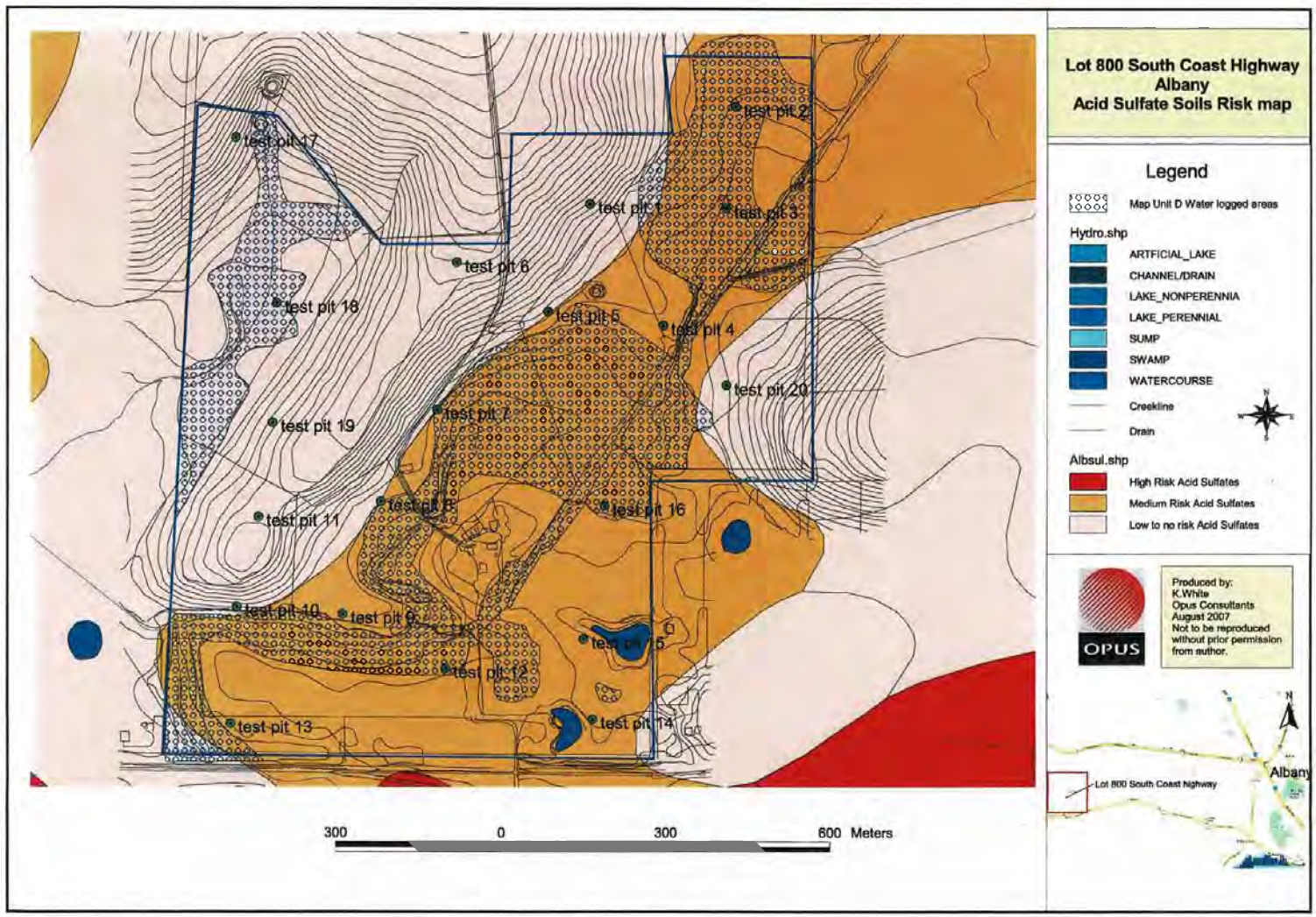
Appendix A

Subdivision Guide Plan


SOUTH COAST HIGHWAY
BARFLUER PLACE
STAGE 1 UNDER CONSTRUCTION
FAITHWOOD CIRCUIT
PHILLISKIRK RD
RAILWAY RES. 16969
LOWER DENMARK ROAD
CUTHBERT TOWNSITE
PROPOSED SUBDIVISION GUIDE PLAN - STAGE 2
LOT 800 SOUTH COAST HIGHWAY
ALBANY
whelans

Appendix B

Test Pit Locations
Field Testing Results


test pit 17
test pit 2
test pit 1
test pit 3
test pit 6
test pit 18
test pit 5
test pit 4
test pit 20
test pit 19
test pit 7
test pit 8
test pit 16
test pit 11
test pit 10
test pit 9
test pit 15
test pit 12
test pit 13
test pit 14
300
0
300
600 Meters
Lot 800 South Coast Highway
Albany
Acid Sulfate Soils Risk map
Legend
Map Unit D Water logged areas
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Albsul.shp
High Risk Acid Sulfates
Medium Risk Acid Sulfates
Low to no risk Acid Sulfates
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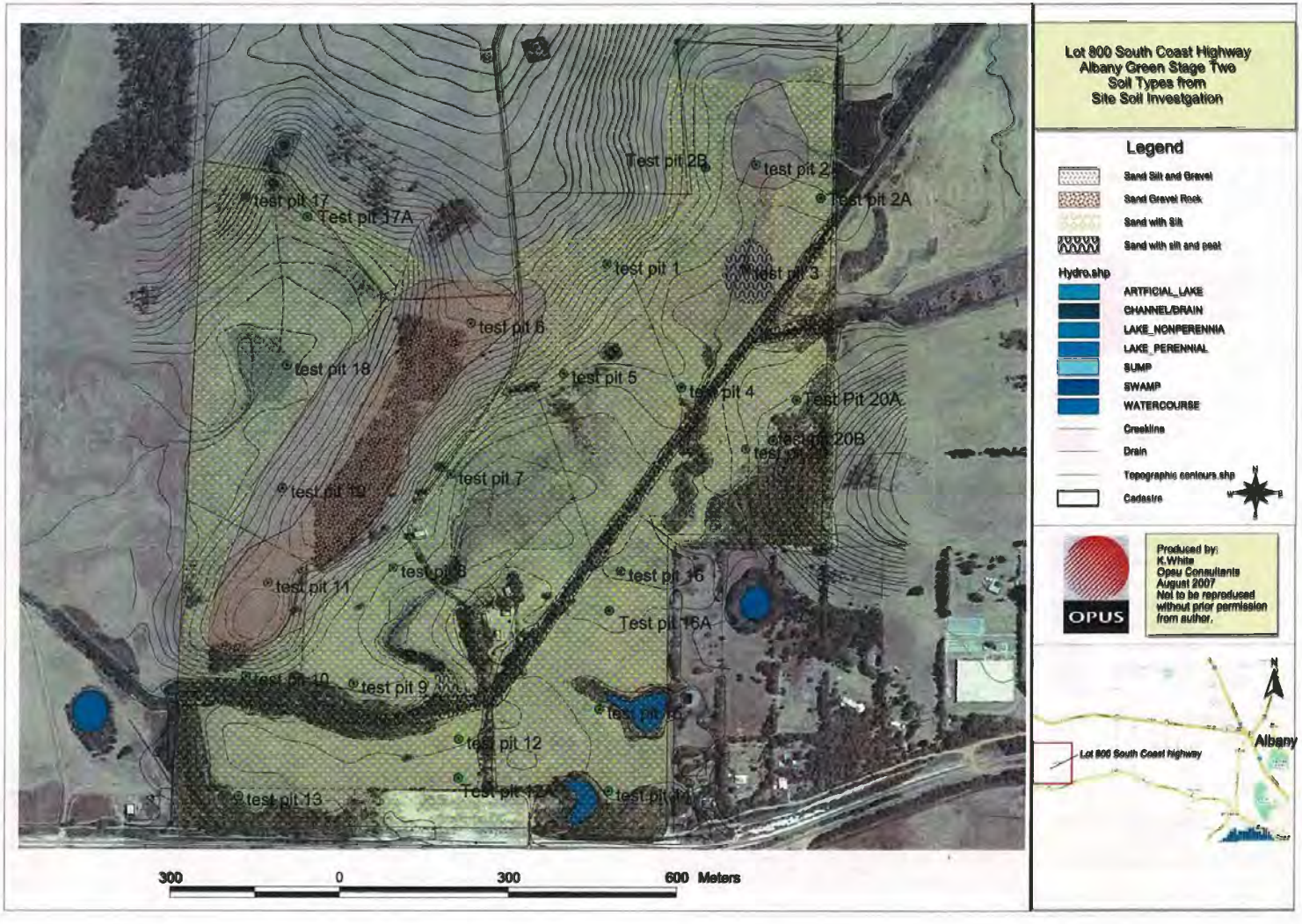
N
Albany
Lot 800 South Coast Highway


Lot 800 South Coast Highway
Albany Green Stage Two
Soil Types from
Site Soil Investgation
Legend
Sand Silt and Gravel
Sand Gravel Rock
Sand with Silt
Sand with silt and peat
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Topographic contours.shp
Cadastre
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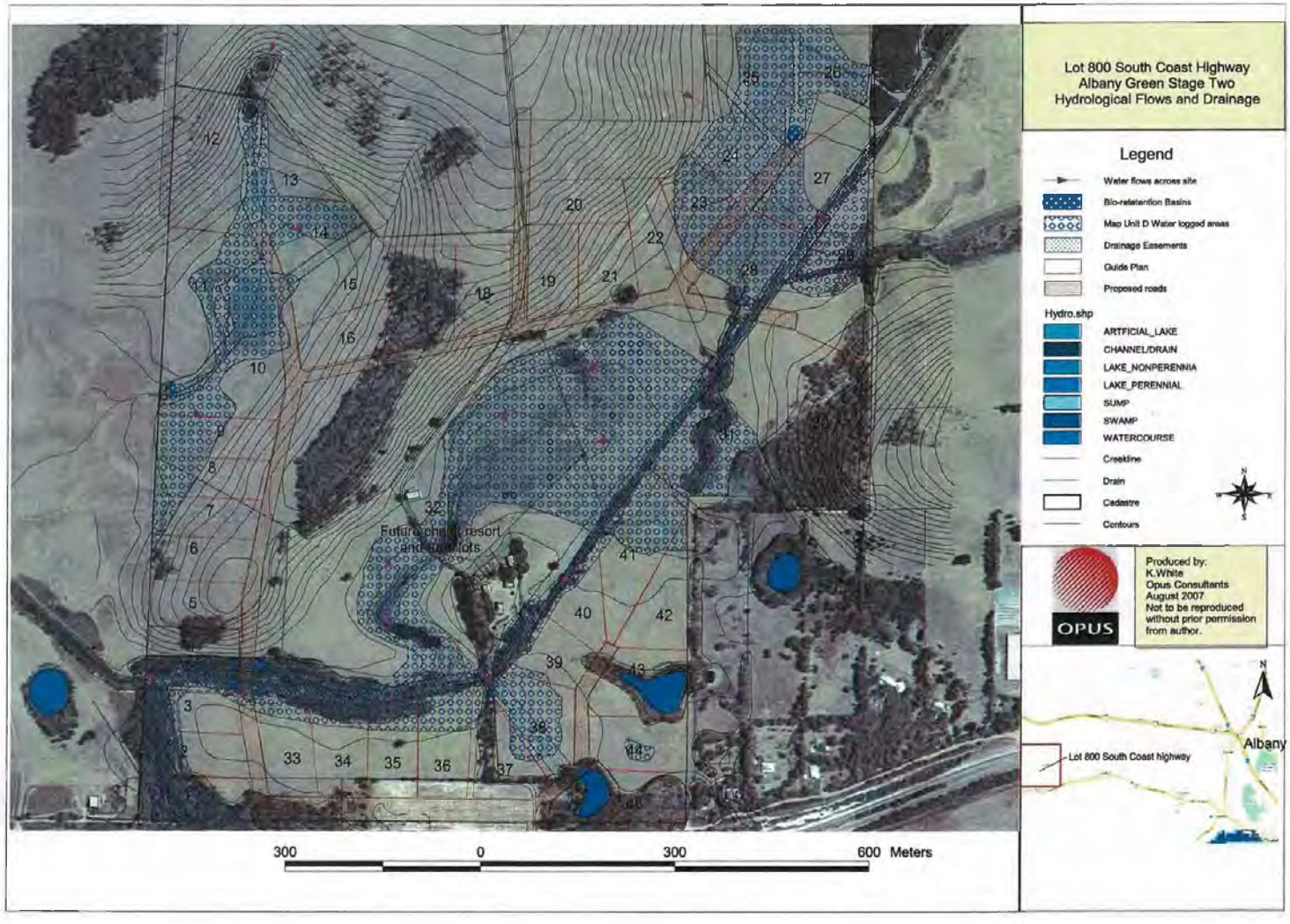
Albany
Lot 800 South Coast Highway
Test pit 2B
test pit 2
Test pit 2A
test pit 17
Test pit 17A
test pit 1
test pit 3
test pit 6
test pit 18
test pit 5
test pit 4
Test Pit 20A
test pit 20B
test pit 7
test pit 11
test pit 8
test pit 16
Test pit 16A
test pit 10
test pit 9
test pit 12
Test pit 12A
test pit 13
300
0
300
600 Meters

Appendix C

Late Winter Water Table Testing


Lot 800 South Coast Highway
Albany Green Stage Two
Hydrological Flows and Drainage
Legend
Water flows across site
Bio-retetention Basins
Map Unit D Water logged areas
Drainage Easements
Guide Plan
Proposed roads
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Cadastre
Contours
Future chalet resort and cul-de-sac lots
OPUS
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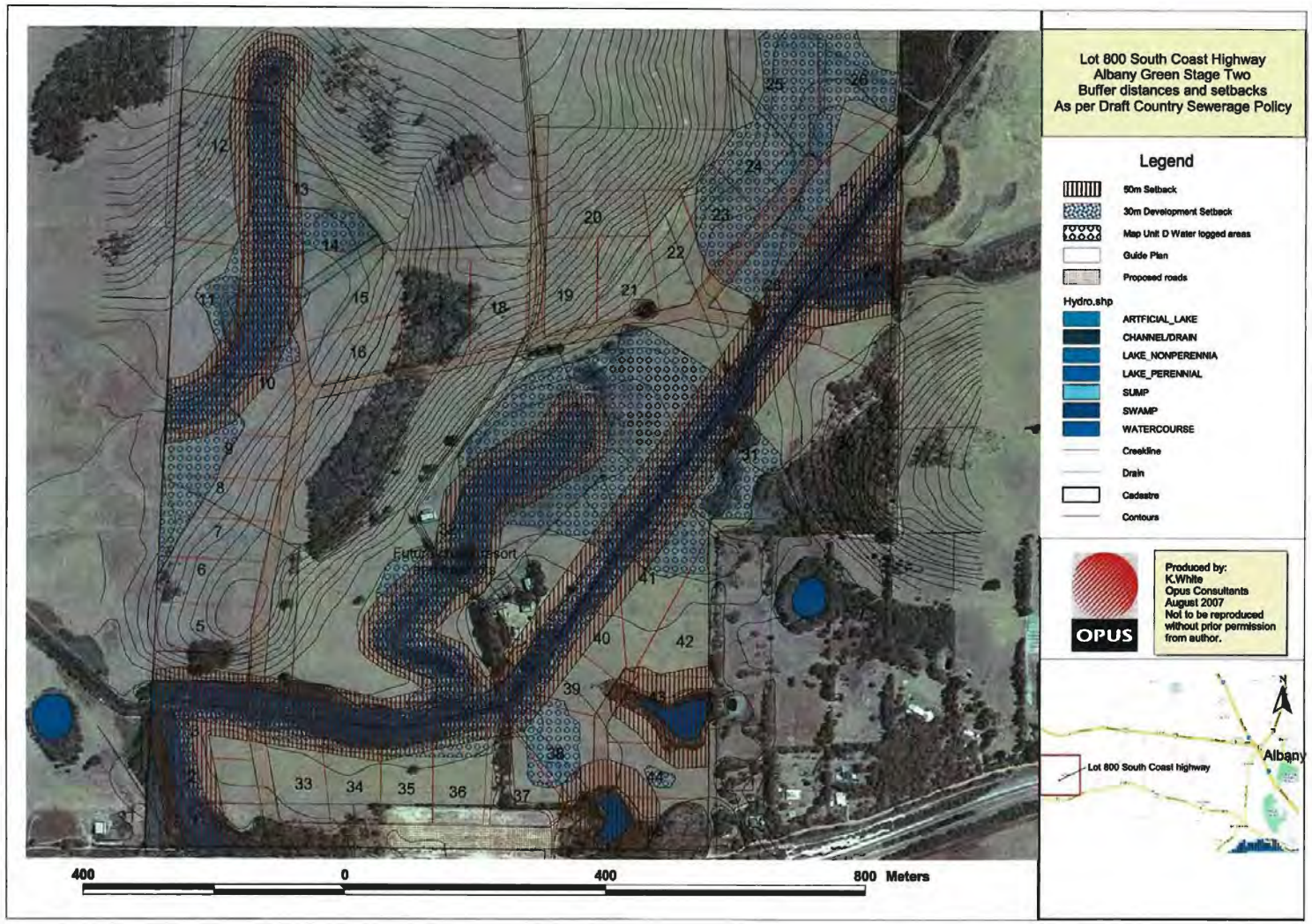
Albany
Lot 800 South Coast highway
300
0
300
600 Meters

Test Pit	Late Winter Table	Comments
1	No water table	
2	0mm	Water logged
2a	500mm	New test pit – sand with silt
2b	450mm	New test pit – sand with silt
3	0mm	Water logged
4	760mm	
5	No water table	
6	No water table	
7	150mm	
8	150mm	
9	1400mm	
10	No water table	
11	No water table	
12	100mm	
13	980mm	
14	550mm	
15	800mm	
16	220mm	
16a	600mm	
17	No water table	
17a	No water table	New test pit – sand gravel clay
18	150mm	
19	No water table	
20a	1300mm	New test pit – sand with silt
20b	1300mm	New test pit – sand with silt

Appendix D

Proposed buffer distances


Lot 800 South Coast Highway
Albany Green Stage Two
Buffer distances and setbacks
As per Draft Country Sewerage Policy
Legend
50m Setback
30m Development Setback
Map Unit D Water logged areas
Guide Plan
Proposed roads
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Cadastre
Contours
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N
Albany
Lot 800 South Coast highway
400
0
400
800 Meters

Appendix E

Approved Health Department WA Phosphate removing Alternative Treatment Units (ATU's)

Addendum

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

Addendum

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

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Date: August 2007
Reference: G:\Environmental Services\Environmental Projects\Whelans
Status: Final
Reference: Job No: WAENV047/04za

Contents

1 Introduction

Grande Terra Land Development Pty Ltd commissioned Opus Consultants to undertake a Land Capability Assessment, Environmental Assessment and give Engineering Comment on constructability of the proposed Albany Green Stage Two. The subdivision site is located on lot 800 South Coast Highway and Stage Two is the southern end of the lot bordering onto the Lower Denmark Road, near Cuthbert Village.

The Land Capability Assessment undertaken by Opus Consultants, assessed the site to define the limitations on the site and any planning considerations related to the site for the proposed future land use. The proponent Grande Terra Land Development Pty Ltd referred the Land Capability Assessment to the City of Albany, whom forwarded this to the Department of Agriculture. As part of this referral process some specific questions were raised requiring further investigation in regards to:

- Acid Sulphate Soils Risk Assessment;
- Soil Quality Assessment;
- Hydrology of the landscape and surface water flows; and
- Drainage and constructability of the site for rural residential development

This addendum provides additional information and discussion to the Land Capability Assessment Report produced by Opus Consultants (2007) to address the above issues.

1.1 Consultation

A meeting was held with the Department of Agriculture specialists, Tim Overhue (NRM Research, Agriculture Resource Management) and Adam Lillicrap (Development Officer, Hydrology Agriculture Resource Management). To discuss the extent of Acid Sulphate Soils (ASS) across the subject site and the CSBP soil results in relation to horticultural viability of the site.

An informal meeting was held with Kevin Hopkinson (Department of Water) to discuss the hydrology of the site and the status of the Five Mile Creek.

2 Acid Sulphate Soils Preliminary Investigation

On the 15th January 2008, a further sixteen test pits across lot 800 were excavated and logged. Soil samples were collected at 250mm, 500mm, 1000mm, 1500mm and 2000mm below surface level, at each test pit location. This was conducted by Opus Consultants Kathryn White, Amanda Broome and Great Southern Drilling. For details of the methodology used for soil sampling, please refer to ASS Preliminary Investigation Report. The results of the Acid Sulphate Soil sampling is attached in this Addendum, please refer to Attachment A – Test Pit locations, Soil Profile Descriptions and Cross Sections of the Soil Profiles.

The predominant soil present at all test pit locations excavated on 15th January 2008, was grey or brown sand, sandy silt or sandy peat. In elevated areas on lot 800, as in the June 2007 sampling, sand over gravel rock was identified.

At all test pits, dry brown topsoil with organic matter was recorded at 50mm to 100mm from the surface. At test pits 21, 24, 25, 27, 30, 33, 34 and 35 peat was recorded at 300mm to 530mm from the surface. These test pits were excavated in the low lying drainage areas on the lot. Test pit 22 and 28 recorded a layer of peat or clayey peat at depth.

Test pits 21, 31, 32, 34 and 36 recorded a layer of cemented sand with coffee rock fragments (at 10 to 15mm) and with the exception of test pit 31 excavation ceased at between 1200mm and 1500mm as the geoprobe could no longer penetrate the rock.

The water table was reached in all test pits, with the exception of test pit 32, and ranged from 300mm to 1300mm below ground level at 15th January 2008 (please refer to Attachment A- Test Pit Locations, Soil Profile Description and Cross Section of Soil Profile).

A selection of soil samples as per DEC guidelines '*Starting at the ground surface, soils samples…at intervals not exceeding* **0.5m down the profile from each sampling location**.' (DoE, 2006) were couriered to NATA certified laboratory for analysis. A total of 76 samples were tested by the SPOS and Chromium Reducible method.

2.1 Laboratory Analysis

If the proposed development on lot 800 requires a soil disturbance of more than 1,000 tonnes of soil then in reference to DoE Guidelines Acid Sulphate Soils Guideline Series, *Draft Identification and Investigation of Acid Sulphate Soils – May 2006*., 27 of the 76 laboratory tested soil samples, exceed the criteria for SPOS.

The 25 samples that exceed the guidelines ranged from 0.04% to 0.59%. It was also found that 56 of the 77 laboratory tested soil samples exceed the criteria for TPA. The TPA samples that exceed the guidelines range from 0.04 to 1.30%. Additionally, 33 of the soil samples exceeded the guidelines for TAA, and these ranged from 0.04 to 0.22%. For a summary of laboratory results and field data, please refer to the Summary Tables in Attachment A.

The Chromium Reducible Sulphur (SCr) was also laboratory tested for the peat layer at the surface for all test pits, with the exception of test pit 32. These results indicate that there is some acidity derived from the organic matter in the peat layer. An additional sample at test pit 2 at 1100mm was also tested. Of the 19 samples tested for SCr the sample at test pit 2 (1100mm) was the only

one to exceed the criteria for SCr. This will require consideration when calculating the liming rates for neutralisation of soil and avoidance of ASS during development of the site.

2.2 Summary of ASS Investigation

In summary the peat layer recorded acidity levels exceeding the DEC Guidelines, however this acidity is not caused from sulphur, and from further discussion with Adam Lillicrap from Department of Agriculture, this acidity could be caused from mobilisation of hydrolysed ions, which may be attributable from iron or aluminium leaching through the soil profile.

Analysis of the soil samples revealed there is a high conductivity and corresponding acidity of the surface soils which is suspected to be attributable to bicarbonate salts, not sulphur salts. The electrical conductivity recorded in the CSBP soil tests confirms this suspicion. (Refer to Section 3 of this report). Sulphur acidity (Acid Sulphate Soils) was detected in the soil layers from approximately 1000mm below surface level.

It is recommended that the site is not excavated deeper than 500mm to avoid mobilisation and oxidation of the acid sulphate soils. The top 500mm of soils will still need to be treated with lime upon disturbance of these soils. **Figure 1 over the page shows a generalised diagram recommended by Opus Consultants of the extent of organic acidity, ASS and maximum affordable depth of disturbance of soils.**

The laboratory results clearly indicate that the some of the soil samples derived from lot 800 exceed the guideline limits set by the DEC. It is a requirement that the acidic soil conditions are managed in accordance with ASS guidelines.

2.3 Recommendations of Preliminary ASS Investigation

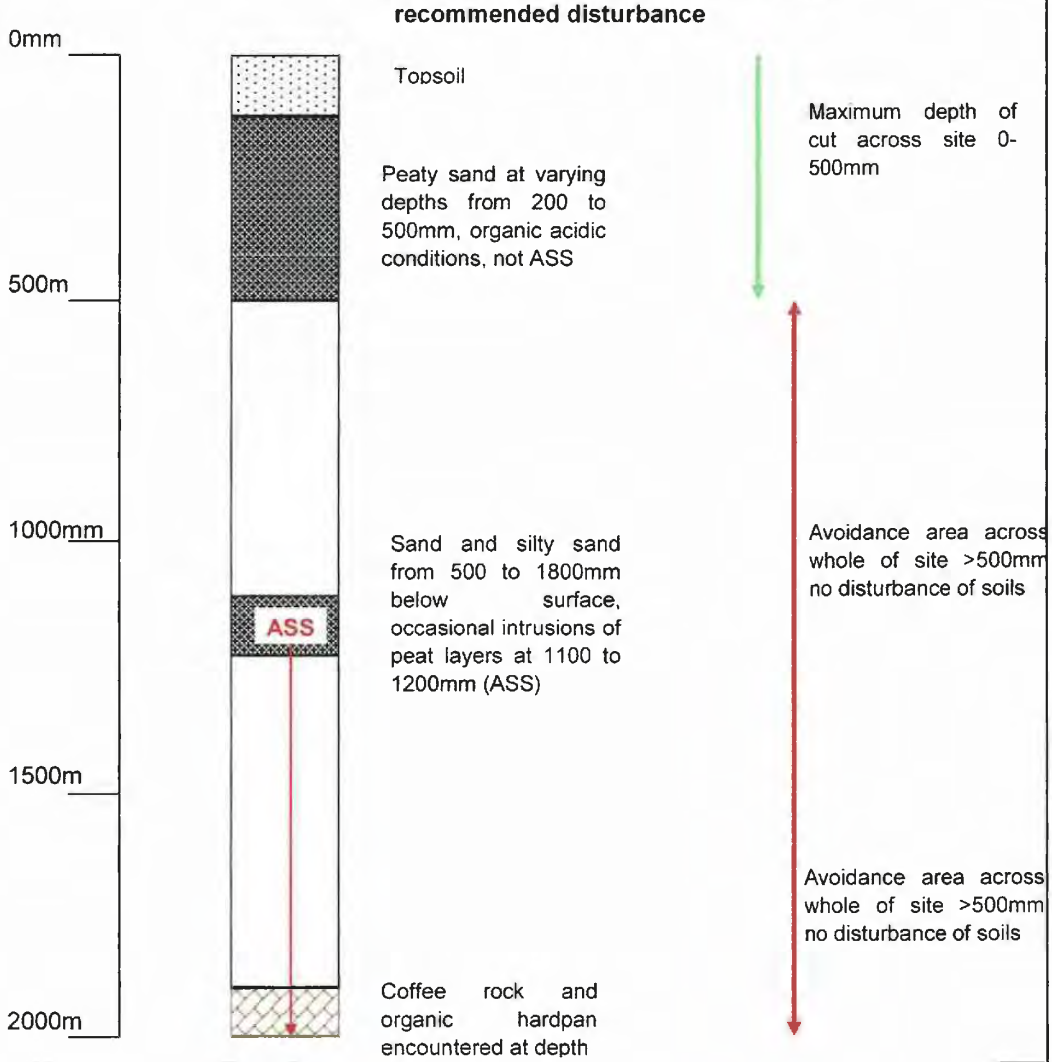
Laboratory testing confirmed that lot 800 South Coast Highway contains acid sulphate soils. The soil acidity exceeds DEC guidelines and action criteria and is required to be managed accordingly.

At the time of writing, the extent of cut and fill for future development is unknown. However if over 100 m3 will be required to be cut and used as fill or for service works Opus Consultants recommend:

1. In the areas which exceed ASS guidelines:
   - Avoidance of Acid Sulphate Soils where possible;
   - Minimise the disturbance of soil where possible;
   - Neutralisation of soil where avoidance is not possible; and
   - Ensure best practice aligned to DEC Guidelines is used.

2. If it is anticipated that to complete the future development, excavation will exceed 100m^3, DEC Guidelines state that an Acid Sulphate Soil Management Plan is to be prepared as per DEC Guidelines. Opus Consultants recommend that an Acid Sulphate Soil Management Plan is prepared and is completed and approved by the DEC prior to commencement of site works or construction.

FIGURE 1: Generalised diagram of ASS and extent of recommended disturbance



3 Soil Quality Assessment

On the 15th January 2008, a further six test pits across lot 800 were excavated, logged and soil samples were collected at depths of 0-2000mm and 6000mm below surface level, at each test pit location. This was conducted by Opus Consultants Kathryn White, Amanda Broome and Great Southern Drilling. These samples were sent to CSBP for testing, please refer to Attachment B for CSBP Results.

Kathryn White and Vicki Laurie (Opus Consultants) met with Adam Lillicrap and Tim Overhue (Department of Agriculture and Food) upon receipt of the soil test results to discuss the Acid Sulphate Soils and the productivity value of the land for agriculture. It was noted during discussions with the Agriculture Department representatives that less than 10% of the land on lot 800 could be used for either perennial or annual horticulture.

3.1 CSBP Testing Results

Generally the Nitrogen availability was low across the site (greater than 2 is favourable) and the organic carbon was high to medium in the topsoil, however very low in the subsoil samples. (2004, G.Moore). The response of the soils to Phosphorus (P) fertiliser application was probable (<10 probable, > 30 unlikely). Test pit 12 recorded an unlikely response to P application. Overall all the soil samples showed low potassium concentrations. Potassium is regarded as the third most important nutrient after Nitrogen and Phosphorous (2004, G.Moore). The soils were generally acidic, indicating that lime application would be necessary for optimum growth of crops.

Analysis of the soil samples revealed there is a high conductivity and corresponding acidity of the surface soils which is suspected to be attributable to bicarbonate salts, not Sulphur salts. The electrical conductivity recorded in the CSBP soil tests confirms this suspicion. Sulphur in the form of ASS was noted at depths below 1000mm surface level from the ASS Investigation and laboratory testing.

3.2 Perennial Horticulture

Perennial crops such as grape vines, olives and stone fruit crops require intensive amounts of water and often require irrigation. The soils which are suitable for the growing of these crops are located along the ridges where the sand forms over laterite. These soils are free draining and have good phosphorous retention ability. The perennial crops require unrestricted rooting depth, so any areas of rock are unfavourable (such as on top of the dominant ridge). A shallow water table and water logging restricts favourable budding conditions in September. This leaves limited area which would be suitable for these crops.

The areas suitable for perennial horticulture are along the slopes of the dominant ridge and represent less than 10% of the area. If irrigation is required for perennial horticulture, Adam Lillicrap mentioned that the Werrilup formation is the best quality aquifer for irrigation for use. Consultation with Kevin Hopkinson at the Department of Water has revealed that the geology indicates tertiary sediments of the Plantagenet Group, and at this point was not clear of this includes any Werrilup formation sediments. Please refer to the DoW generated map located in Attachment C.

3.3 Annual Horticulture

The results for the CSBP testing indicate that the soils have minerals present at adequate levels for horticultural crops, with the acidic conditions favourable to *Brassica sp* (cabbages, cauliflowers, broccoli etc). These species are best located in acidic soils (such as those present at lot 800), however the conductivity levels (salinity) at these sites are at levels which could inhibit growth and productivity.

In the water logged areas there would still be a requirement for large amounts of lime to be added to the soils so they are suitable for crops. Potatoes are grown to the south of the subject site (south of Cuthbert), however it was noted that the sandy soils located here are best suited to seed potatoes, and this represented less that 1% of the subject site, (pers comms T.Overhue).

Annual horticulture requires irrigated water. As mentioned in perennial horticulture Section 3.1, the aquifer below the subject site is questionable in origin and suitability for irrigation. Further investigation would be required.

3.4 Conclusions from Soil (CSPB Testing) Investigations

The subject site has some areas which would be suitable for intensive horticulture pursuits, although this would be a small proportion of the subject site. In general it was confirmed through discussions with the Department of Agriculture representatives that to make the site nutrient efficient and suitable for annual and perennial horticulture, the site would require a substantial modification of the soils for optimum growth conditions (ie. Liming, suitable water sources, salinity measures and fertiliser application)

It was noted by T. Overhue during the discussions that this site would form a good buffer to agriculture pursuits to the west of the subject site, with rural residential land use a favourable buffer type. There are currently no residential developments to the west of this site, however rural residential is prominent to the east, south at Cuthbert and north at Stage One Albany Green.

4 Hydrology and surface water flows

The subject site is situated on the south side of a ridge running east west parallel to South Coast Highway and Lower Denmark Road. The site has a 2 to 10% linear planar slope, with a dominant ridge (approximately 24m AHD)) which descends in a south westerly direction. The valley floors of the site are approximately 10m AHD.

4.1 Surface water flows

The site has surface watershed in a south easterly and south westerly direction from the dominant ridge into the valley floors. The valley areas collect into man made drains known as the Five Mile Creek. In one site north of the Five Mile Creek there is one open water body central to the lot, adjacent to the existing dwelling. This collects surface water all year prior to entering the creek system.

There is a second large pond located in the south east of the subject site. It may be fed from a spring or external source, though this was not evident from site inspection. Further investigation of this water body may be warranted if the site is proposed to be rural residential.

The Five Mile Creek drains into Lake Powell (confirmed by K.Hopkinson DOW). This forms part of the Torbay Catchment, which is currently being targeted for research and investigation by the South Coast Natural Resource Management Group for protection and investment of nutrient reducing actions.

4.2 Ground Water

Winter periods find the valley floors with waterlogged soil profiles (refer to Land Capability Report) and during summer these areas are dry with water table varying from 300mm (adjacent to Five Mile Creek) to 1300mm below surface level.

Ground water hydrology appears from the site investigation to be flowing from the ridge, seeping into the valley floors at three major points. Please refer to Attachment D for surface water directions and ground water seepage sites.

The seepage sites are quite recognisable from the aerials and from site assessment. There is darker colouring of the pasture in these areas, which indicates increases in moisture. Analysis of the soil samples revealed there is a high acidity of the surface soils (and possibly the ground water) which is suspected to be attributable to bicarbonate salts, not sulphur salts.

4.3 Nutrient export

Currently nutrients are exported uncontrolled from the site via surface water and groundwater movement to the Five Mile Drain ((constructed drain)). These nutrients come from two main sources, animal effluent and fertiliser application for improvement to field pastures.

Located to the south of Cuthbert village is a variety of farms currently farming potatoes and other intensive horticulture crops. It has been recognised that these areas can export nutrients into the catchment area and can lead to nutrification of the Lake Powell and subsequently the Torbay Inlet Catchment.

5 Drainage and constructability of site for rural residential development

Opus Consultants have undertaken a field assessment and concept planning to address possible drainage requirements of the site in the event the subject site becomes a rural residential development. Based on a current version of the proposed lot layout some concepts for the drainage of site surface water and nutrient treatments were developed. Please refer to the sketches provided in Attachment E.

5.1 Road layout

i) Overall the lot and road layout favours the existing contours. Construction cuts and fills should be able to be kept to a minimum over the site with road alignments at, or close to, existing ground levels.

ii) There is an 'at grade' rail crossing proposed prior to Lower Denmark Road. Currently this is a driveway crossing; however the developer should liase with Westrail during the planning process to establish their requirements for control. Considering the potential increased traffic movements at the crossing, Westrail may require a stop signalised crossing at this point.

5.2 Pavements

Although no detailed pavement investigation has been completed on the site, review of the soil profiles and site inspections indicate that a standard pavement design of approximately 200mm pavement should be sufficient on the higher contours.

However, on lower lying areas the ground conditions appear saturated with peat or sandy peat. On the lower lying areas, the subgrade may require modification to obtain suitable bearing capacity. This may be achieved by removal of the peat and replacement with compacted sand and an increased pavement depth. Pavement condition will also be improved by installing suitable drainage, table drains and possibly sub-soil drains in the lower lying areas.

A detailed pavement design will be completed at design stage of this project.

5.3 Bridges and Culverts

i) Two bridges or culverts are proposed crossing Five Mile Creek. These will have to be designed to accommodate flood events and would be best positioned on an embankment above flood levels. Culverts of sufficient capacity to accommodate flood events would likely be too large to fit into the available space in the creek bed. Opus Consultants recommend that a single span pre-fabricated bridge deck above the flood levels should be appropriate for this location. Consideration would be needed that any embankment approaching the bridge would not divert flood flows into neighbouring properties. Further information is required from the DoW whether 1:100 flood levels are available for the Five Mile Creek.

ii) The road turning head located adjacent to Lot 2 is located in the drainage reserve and will require culvert structures beneath the turning head. It is recommended that the location of the turning head be moved westwards so that the length of culvert structures can be reduced and located on the narrower section of roadway.

iii) Culvert crossings have been marked on the sketch in Attachment E. An additional culvert/ access is required to access lot 32. Culverts will be designed to manage a 1:10 year rainfall event.

5.4 Drainage/Retention

Four locations have been identified where there are drainage issues affecting planning and construction.

i) In the vicinity of Lots 31, 32, 33, 34 and 35 very wet ground conditions were observed. From inspection it is difficult to ascertain whether this is due to surface runoff being held back due to a small ridge or if it is ground water seepage from stage 1 above or even from another source.

Detailed investigation and design is required, however construction could require the lots to be lifted approximately 200 or 300mm above existing ground level and the open drain re-graded to approximately 500mm below existing ground level at a constant grade towards Lot 43 in order for the water to flow freely from the site. The re-graded drain could assist in drying out the lots and the road subgrade. The road would have to be constructed 200 to 300mm above existing ground level to prevent failure from water ingress into the pavement. We would recommend cutting the drains a year ahead of construction of the road to attempt to dry out the subgrade if possible.

A detailed survey of the site would be required to determine the extent of drainage improvement necessary over these lots.

ii) There is a large pond located between lots 55 and 56 which is not shown on the concept pond. The pond looks larger than expected from the surrounding catchment. It may be fed from a spring or external source, though this was not evident from our inspection. It may be unfeasible to fill the pond and it should remain as a feature. An overflow drainage easement is required between lots 61 and 62 to replicate the natural overflow that exist in the area.

iii) Lots 58 and 59 are in a low lying area that appears to be susceptible to flooding from Five Mile Creek. The flood banks are low at this point and it looks as if this area could have once formed part of a natural flood plain. It is recommended that flood levels on these lots are established and either the flood bank is lifted or lots filled to accommodate a 1:100 year flood.

iv) It is recommended that a retention pond is constructed in the POS adjacent to lot 42 north of the road crossing to cater for a 1 in 100 year flood. The sizing of the culverts below the road would be suitable to maintain flows that are equal to or less than pre development flows.

5.5 Drainage from Stage 1

Drainage structures that have been constructed in Stage 1 should aid in restricting rain water runoff and flooding from Stage 1 development to the Stage 2 developments. The existing drainage structures in Stage 1 are to be assessed and included as part of the overall drainage scheme for the whole site. Net gains in terms of drainage/stormwater runoff may have already been made due to the control of water from the above sites.

5.6 Nutrient Stripping

Nutrient stripping within the site would be obtained from providing shallow retention ponds at the drainage line outlets on the site adjacent to lot 3 and lot 42 and 117 as shown on the sketch plan. The ponds would be planted with nutrient stripping native vegetation and an outlet strategically placed to control and hold a one in one year rainfall event.

Further planting would be provided in the drainage swales as defined on the concept plan. Limited nutrient control would be provided in the roadside swales, particularly in low lying areas where it is important to get the drainage clear of the pavement as quickly as possible. Vegetation would restrict the drainage paths in the road side swales. It is preferred that the nutrient stripping and soakage occurs within the POS drainage swales and retention ponds.

A plan will be required to manage drainage lines and lots that flow directly to Five Mile Creek. Some additional drainage reserve may be required where the road is crossing Five Mile Creek (Lots 62 and 63 as well as Lots 46 to 57) to construct retention swales for nutrient stripping from the lots and roads south and east of the creek.

5.7 Water main supply

From the Water Corporation asset data base, the nearest existing water main to the site is located on Lowanna Drive to the east of the site and adjacent to lot 126. No water main is available nearby on Lower Denmark Road.

Opus understands there is a proposal to develop lot 126, but is not aware as to the programme or stage of the development.

No water main exists on Lower Denmark Road in the vicinity of the development.

At this stage, Opus have not discussed water supply issues with Water Corporation, though extension of the existing water main will most probably be entirely developer funded.

The most likely option is to extend the Lowanna Drive water main through the proposed development on lot 126. This will be dependent on the proposed development of lot 126 proceeding. The alternative would be either to establish an easement through lot 126 or, although not desirable, extend the water main along Lower Denmark Road.

6 Concepts for Storm Water Treatments

The concepts proposed are aligned to DoW Best Practice and the DoW Stormwater Management Manual (2007). Water Sensitive Urban Design techniques which would be applied to the site, rely on the philosophy of treating water at point of source. This technique allows for treatment of nutrients and for natural ground water re-charge instead of directing water into water ways or sensitive receptors.

The planning for Lot 800 Albany Green storm water design is subject to detailed modelling and calculations of pre-development flows and post-development water movement and catchments. This would be the next stage of the project, and is not within the scope of this brief.

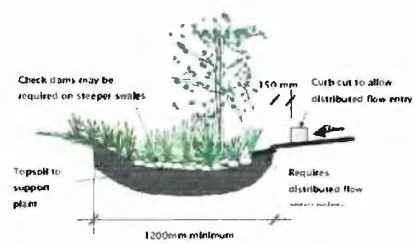
The following sections outline some recommended treatments to be applied across the site at Lot 800 Albany highway for rural residential development.

6.1 Vegetated Swales

Drainage throughout the site will be in the form of vegetated swales. Sedges and rushes will be planted in all of the swales to act as natural biofilters, and will provide cost effective, safe and attractive alternatives to pipes and drains. Endemic sedges and rushes will be used for vegetating the swales as some non endemic species are prone to multiplying rapidly in wet areas and have the potential to 'clog up' drainage lines and waterways.

The swales will follow natural drainage lines wherever possible and will have riffles (strategically placed rock beds) intermittently placed across them to slow the water down, and to create micro habitats and stabilise sediment. The vegetated swales will be located strategically along road verges and will be documented in detailed engineering design.

Figure 2: Vegetated Swales



Typical section through a swale

Swales can be used inside or outside the property boundary.

6.2 Rainwater Harvesting and Re-use

Surface water runoff will be minimised by slowing the movement of rainwater from the catchment and reducing peak flows. To reduce the amount of surface water, and for household water use, all homes will collect the rainwater from their rooftops into rainwater tanks.

6.3 Retention ponds and Living streams

To ensure that predevelopment flows are maintained across the site, it is proposed to have retention ponds with linking living streams which can filter nutrients and sediments, store water and allow for infiltration to the ground water.

Living streams feature stabilised vegetated banks and replicate a natural stream formation providing habitat for animals such as frogs, fish and waterbirds. The Living Stream concept utilises the drain infrastructure as a feature of the development with native plants, stabilised vegetated banks, rock riffles, meandering pathways and function as a conveyance system for stormwater.

The living streams proposed for Albany Green will interconnect the drainage system through the central area of the lots and feed into the retention ponds. The design of the living stream will follow Best Management Practise as per the Stormwater Management Manual DOW (2007). Examples of living streams are well documented by the DoW and shown in examples within Western Australian rural and urban developed areas.

The detailed engineering and environmental detailed design of the Living Stream and Retention ponds will consider:

- Channel Design
- Erosion prevention
- Disharge and retention capacities
- Flow velocities
- Consideration of water table and existing hydrology
- Vegetation management
- Maintenance

The retention and living streams proposed will be designed in consultation with the DoW and CoA to ensure Best practise methodology is applied.

6.4 Revegetation

Revegetation using native plants along the POS areas and in the streetscape will also allow for surface water and nutrient uptake. The swales are designed to have plants in the swale for nutrient uptake and to assist in maintaining pre-development flows. Water sensitive urban design fundamental techniques revolve around water passing over vegetation to uptake nutrients and to encourage ground water recharge.

This rural residential village is very suited to native plant revegetation and will assist in the amenity of the rural residential design. It is recommended that a Landscaping Master Plan be produced with native planting and revegetation to assist in the storm water concept design.

6.5 Water Saving Reticulation Design

To encourage water saving at individual houses, it is recommended that all reticulation across the site utilise subsurface drip lines to minimise surface water run-off and to minimise water usage.

Turfed Areas

Turfed areas will command a major portion of total water use. Considerable savings will be made by including these features in the system.

- Utilise emitters which provide coarse drops, preferably at a low trajectory. These will minimise evaporation. Gear drive sprinklers and impact sprinklers are best where large, regular areas are involved. Pop-up sprays are appropriate for smaller areas of lawn.
- Choose spray heads to closely match the outlines of the lawn. This will minimise overspray onto paths and gardens. A range of spray patterns are available.
- Purchase the highest quality emitters, and standardise on that brand - at least within each watering station. Uniform distribution is a critical consideration in water saving.
- Locate the sprinkler pop-ups at the intervals recommended by the manufacturer - usually spray head to spray head - and staggered if in rows.
- When defining the watering stations and locating the main lines, be sure that the lawn and each garden watering zone are on separate programs.

Garden areas

The important thing is to water directly onto the root zone - not onto the leaves, and not onto the areas between plants.

- Shrubs and perennials. Use drippers to individual small plants. When choosing components, work on providing 10 litres per square metre of watered soil. This corresponds to the Perth Standard Drink of 10 mm depth of precipitation.
- Larger shrubs and fruit trees. Low pressure micro-irrigation sprinklers spread water across the entire drip zone. Their low trajectory undershoots foliage, and avoids wind losses.
- Bedding plants. Large beds of densely planted flowers can also be watered by low pressure micro-irrigation sprinklers. Smaller beds may need Micro-sprays, but these must be on a pressure regulated line to avoid misting
- Pot plants and hanging baskets. Use drippers or multi-outlet emitters to each plant. Water storing granules mixed through the soil save water and improve distribution through the mix.

These water efficiency strategies could be combined into the development's policy or to new lot owners at point of sale.

6.6 Nutrient treatment of WSUD techniques

The WSUD treatments proposed manage water from the point of source. Nutrients are treated through native vegetation uptake from the vegetated swales or from the living streams. Nutrients will also be absorbed into the soil profile, as the soils are sandy allowing good infiltration and permeability. The pollutant trapping efficiency of the proposed applications on lot 800 is shown in

the Table 1 over the page.

Table 1 – Pollutant Trapping Efficiency (Source: WSUD Technical Guidelines for Western Sydney, 2004)

WSUD Element	WSUD Category	Level Control	Pollutant removal efficiencies						
			Gross Pollutants	Coarse sediment	Medium Sediment	Fine Sediment	Free Oil and grease	Nutrients	Metals
Vegetated swales	Secondary	Convey-ance Control	-	50-80%	30-50%	10-50%	10-50%	10-50%	10-50%
Retention ponds/ Living Streams	Tertiary	Discharge Control	-	80-100%	50-80%	30-50%	30-50%	30-50%	30-50%
Gravel Cells	Secondary	Source Control		50-80%	50-80%	30-50%	30-50%	30-50%	30-50%
Gross Pollutant Traps	Primary	Source Control	80-100%	80-100%	30-50%	10-50%	10-50%	10-50%	10-50%
Rainwater tanks		Source Control							

7 Conclusions

Opus Consultants carried out further investigations upon the request the Department of Agriculture and Food's queries from the Land Capability Assessment carried out by Opus in 2007. This Addendum report provides further information and investigations regarding Lot 800 and the proposed future land use of rural residential.

Acid Sulphate Soils

The site was found to have acid soils in the top 500mm of soils below ground level, this was not attributable to sulphur acidity but could be from mobilised ions of aluminium and iron and bicarbonate salts. It is recommended that if soil disturbance is proposed that the site is managed in accordance with the DEC ASS guidelines. It is further recommended by Opus Consultants that the site soils are not disturbed below the 15m contour deeper than 500mm, as sulphur soils (Acid Sulphate Soils and Potential Acid Sulphate Soils) are located from the 1000mm below surface level.

Horticulture

The subject site has some soils which are suitable for horticulture, however represent less than 10% of the subject site. The economics of having this as a sustainable pursuit in the current economic climate is questionable. It is recognised that intensive cropping of horticulture (annual and perennial crops) would require modification of the current landscape and would still contribute unrestricted nutrient flows into the Five Mile Creek and into Lake Powell, within the Torbay Catchment.

Hydrology and Surface Water

The site has predominantly surface water movement from the ridges into the valley floors, where is collects into the Five Mile Creek (a constructed drain). This drain feeds into Lake Powell and forms part of the Torbay Catchment. The valley floors of the site sustain some year round water logging and has one open water body centrally located in the site and one to the south east of the subject site. Further investigation of these water bodies may be warranted if the site is proposed to be rural residential.

Currently there is unrestricted flow of nutrients from the site into the Five Mile Drain and into Lake Powell. This site is not the only creek or tributary to Lake Powell.

Constructability/Engineering

The investigation into the constructability of the subject site for rural residential requires more defined modelling and investigations would be required prior to considering detailed engineering design. Opus Consultants have recognised there are issues of drainage, flooding and road construction which can be overcome with careful planning and design considerations, as outlined in the body of this report.

Storm water Design

Opus Consultants propose that if the subject site was to become rural residential then WSUD concepts would suit this environment. Treatment of point of source surface water flows and storm water prior to entering the Five Mile Creek would substantially reduce nutrient export from the site.

8 References

(2004) Moore, G. Soil Guide, A Handbook for understanding and Managing Agricultural Soil, Department of Agriculture and Food WA.

Pers comms Tim Overhue and K.White February 2008

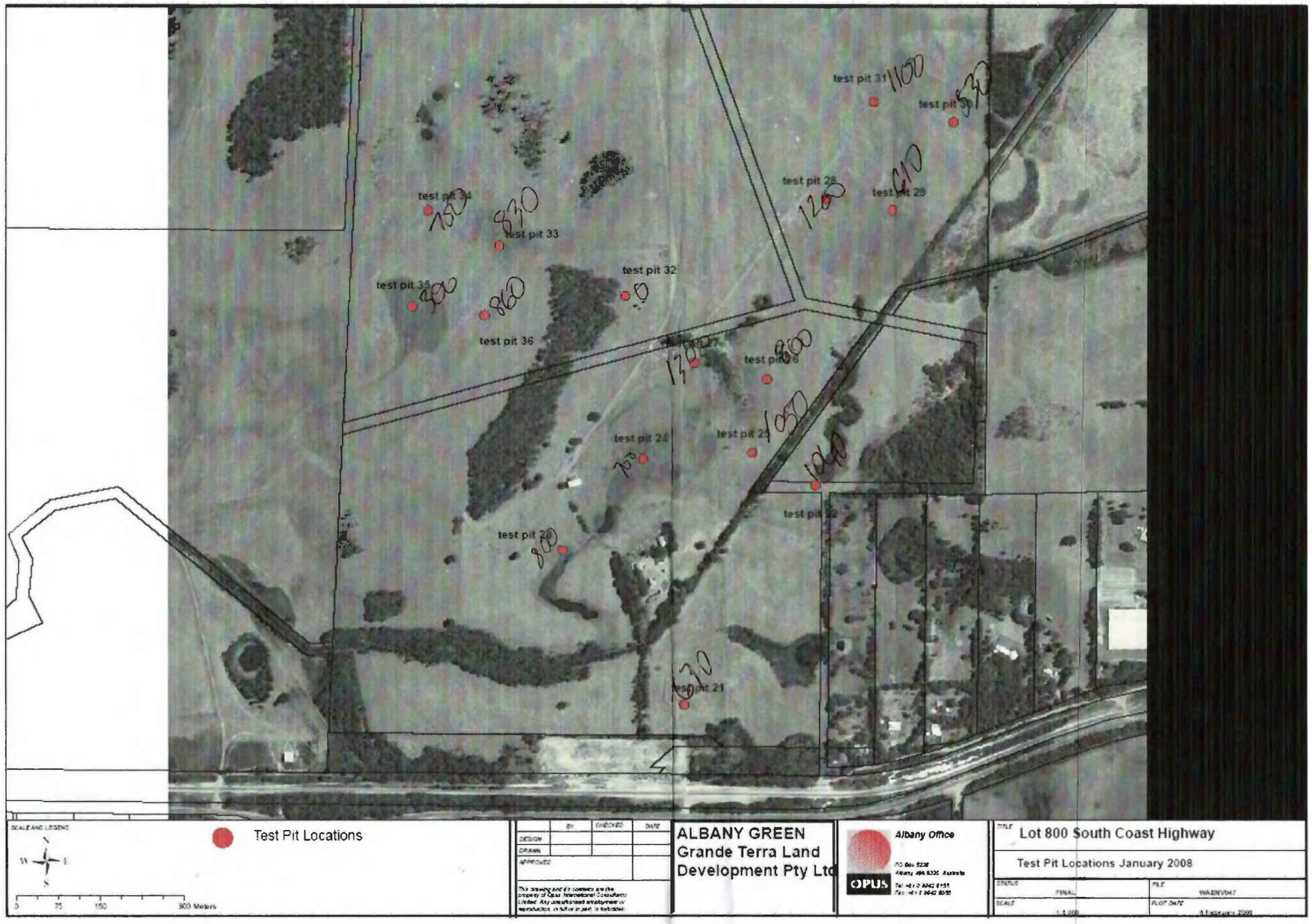
DoE Guidelines Acid Sulphate Soils Guideline Series, *Draft Identification and Investigation of Acid Sulphate Soils – May 2006.*

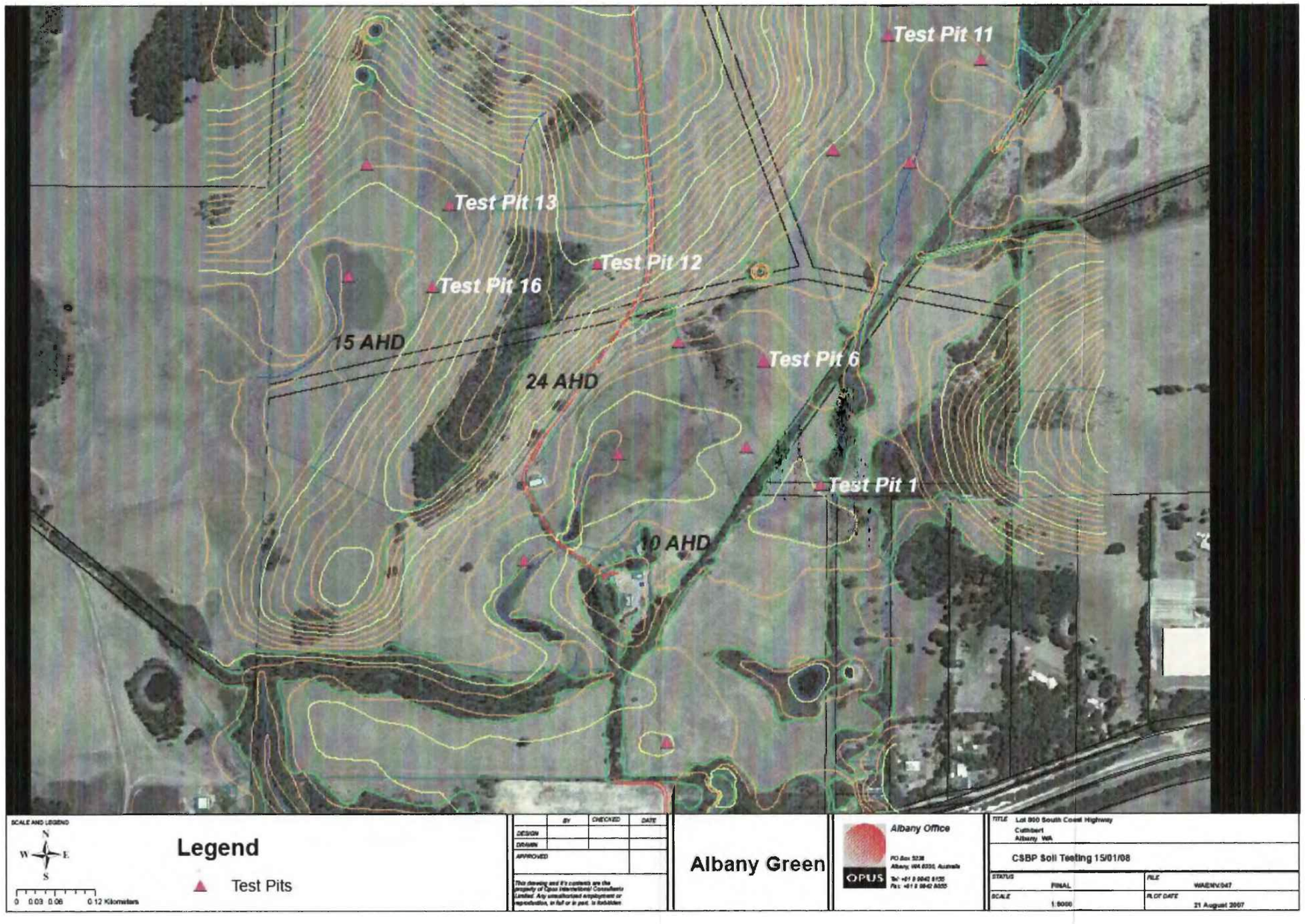
Whelans, Halpern Glick Maunsell, Thompson Palmer and Institute for Science and Technology Policy, Murdoch University, 1993. *Water Sensitive Urban (Residential) Design Guidelines for the Perth Region: Discussion Paper.*

Attachment A

Test Pit Identification

Test Pit ID January 2008 (ALS Client Sample ID)	Test Pit ID for the purposes of this report
TP 1	TP 21
TP 2	TP 22
TP 3	TP 23
TP 4	TP 24
TP 5	TP 25
TP 6	TP 26
TP 7	TP 27
TP 8	TP 28
TP 9	TP 29
TP 10	TP 30
TP 11	TP 31
TP 12	TP 32
TP 13	TP 33
TP 14	TP 34
TP 15	TP 35
TP 16	TP 36


test pit 31
1100
test pit 30
530
test pit 28
1200
test pit 29
610
test pit 34
150
test pit 33
830
test pit 32
0
test pit 35
900
test pit 36
860
test pit 26
800
test pit 24
700
test pit 25
1050
1040
test pit 22
test pit 20
900
test pit 21
730
Test Pit Locations
ALBANY GREEN
Grande Terra Land
Development Pty Ltd
Albany Office
OPUS
Lot 800 South Coast Highway
Test Pit Locations January 2008


Test Pit 11
Test Pit 13
Test Pit 12
Test Pit 16
15 AHD
24 AHD
Test Pit 6
Test Pit 1
10 AHD
SCALE AND LEGEND
N
W
E
S
0 0.03 0.06 0.12 Kilometers
Legend
Test Pits
BY CHECKED DATE
DESIGN
DRAWN
APPROVED
This drawing and it's contents are the property of Opus International Consultants Limited. Any unauthorised employment or reproduction, in full or in part, is forbidden
Albany Green
Albany Office
OPUS
TITLE Lot 800 South Coast Highway
Cuthbert
Albany WA
CSBP Soil Testing 15/01/08
STATUS FINAL
FILE WA01417.047
SCALE 1:5000
PLOT DATE 21 August 2007

Soil Profile

Location: Albany Green Stage Two
Date tested: 15th January 2008
Sampled by: Kathryn White

Location	Site description	Depth of profile (mm)	Soil Description
Test Pit 21 E 574871 N 6125036 Front east paddock	Open paddock in depression	0 – 50mm 50 – 300mm 300 – 450mm 450 – 630mm 630 – 1400mm Water table	Dry brown topsoil with organic matter Moist dark brown peaty sand Moist grey sand Moist brown sand Wet cemented dark brown sand 630mm
Test Pit 22 E 572107 N 6125428 Front east paddock	Near Taxandrias and north end of paddock near fence	0 – 50mm 50 – 300mm 300 – 1040mm 1040 – 1300mm 1300 – 2000mm Water table	Dry brown topsoil with organic matter Moist grey sand with rootlets Moist light grey sand Wet black sandy silty clayey peat Wet brown sand 1040mm
Test Pit 23 E 571653 N 6125313 In paddock west of sheds	Low lying in drainage line, cleared open paddock	0 – 100mm 100 – 300mm 300 – 1100mm 1100 – 2000mm Water table	Dry brown topsoil with organic matter Moist dark grey sand Wet dark brown sand Wet dark brown/black sandy silt (fine grained) 800mm
Test Pit 24 E 571797 N 6125475 In shed paddock, east of shed	Open paddock in drainage line	0 – 50mm 50 – 200mm 200 – 400mm 400 – 600mm 600 – 2000mm Water table	Dry brown topsoil with organic matter Dry dark brown peaty sand Slightly moist dark grey sandy silty peat Moist dark grey sandy silt Wet light brown sand 700mm

Test Pit 25 E 571994 N6125487 In windmill paddock	Open paddock	0 – 50mm 50 – 300mm 300 – 460mm 460 – 800mm 800 – 1100mm 1100 – 2000mm Water table	Dry brown topsoil with organic matter Moist grey sand with some peat (very fine) Moist dark grey silty sand (very fine) Moist grey sand (very fine) Moist grey (slightly brown) sand (very fine) Moist dark brown/black sand 1050mm
Test Pit 26 E 572020 N 6125618	Cleared paddock – Windmill paddock	0 – 50mm 50 – 200mm 200 – 500mm 500 – 800mm 800 – 1100mm 1100 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist grey sand Moist dark grey sand Moist grey sand (very fine) Moist grey (slightly brown) sand (very fine) Moist dark brown/black sand 800mm
Test Pit 27 E 571890 N 6125648 East of main race, shed paddock	Cleared open paddock	0 – 50mm 50 – 300mm 300 – 500mm 500 – 700mm 700 – 1200mm 1200 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey sandy peat Slightly moist dark grey sand Moist grey sand Moist light brown sand Wet dark brown sand 1300mm
Test Pit 28 E 572126 N 6125941	Open paddock, deep divots in ground	0 – 150mm 150 – 300mm 300 – 700mm 700 – 1350mm 1350 – 1850mm 1850 – 2000mm NB: 2000 – 2100mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey/black clayey silty sand Slightly moist black/ dark brown silty sand Moist grey sand Wet grey/brown sand Wet dark brown sand with organic matter Peat 1200mm

Test Pit 29 E 572243 N 6125920	Open paddock	0 – 50mm 50 – 250mm 250 – 600mm 600 – 850mm 850 – 1030mm 1030 – 1250mm 1250 – 1800mm 1800 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey sand Moist grey sand Wet light grey sand Wet dark brown/ black sand Wet black organic hardpan Wet light brown sand Wet dark brown sand 610mm
Test Pit 30 E 572352 N 6126077	Open paddock	0 – 100mm 100 – 260mm 260 – 530mm 530 – 1200mm 1200 – 1850mm 1850 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist grey sand Moist black peaty sand with rootlets Wet brown sand Wet light brown sand Wet light brown sand 530mm
Test Pit 31 E 572210 N 6126113		0 – 50mm 50 – 200mm 200 – 600mm 600 – 1150mm 1150 – 1350mm 1350 – 1700mm 1700 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey sand Slightly moist grey sand Moist light grey sand Wet dark brown sand with large cemented pebbles Wet grey sand Wet dark brown silty sand 1100mm
Test Pit 32 E 571766 N 6125767 East side of ridge – top of slope	Cleared paddock – top of hill	0 – 50mm 50 – 100mm 100 – 300mm 300 – 900mm 900 – 1500mm Water table	Dry brown topsoil with organic matter Dry slightly brown sand with large gravel stones (10-15mm) with roots Dry orange gravel Dry orange laterite Dry cemented orange clayey sand none reached

Test Pit 33 E 571540 N 6125857 West side of ridge	Cleared paddock	0 – 50mm 50 – 130mm 130 – 230mm 230 – 430mm 430 – 900mm 900 – 1220mm 1220 – 2000mm Water table	Dry brown topsoil with organic matter Moist dark grey sand Moist black peaty silty sand Moist dark grey sand Wet grey sand Wet brown sand Wet dark brown silty sand 830mm
Test Pit 34 E 571414 N 6125919		0 – 100mm 100 – 200mm 200 – 300mm 300 – 400mm 400 – 1000mm 1000 – 1200mm Water table	Dry brown topsoil with organic matter Moist dark grey sand with roots Slightly moist black peaty silty sand Moist dark brown sand Moist to wet light brown sand Wet dark brown sandy silt cemented in places with coffee rock 750mm
Test Pit 35 E 571385 N 6125748		0 – 100mm 100 – 200mm 250 – 600mm 600 – 1000mm 1000 – 2000mm Water table	Dry brown topsoil with organic matter Moist black peat with roots Wet dark brown sandy silt Moist dark brown clayey sandy silt with roots Wet brown sand 300mm
Test Pit 36 E 571514 N 6125732 West of ridge	Open paddock	0 – 50mm 50 – 300mm 300 – 770mm 770 – 900mm 900 – 1200mm Water table	Dry brown topsoil with organic matter Moist grey sand Moist light grey sand with roots Moist brown sand Wet cemented brown sand with coffee rock 860mm

Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF - pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 21																				
TP21/SS1	250	moist dark brown peaty sand		n/a	n/a		n/a	5.1	2.7	<0.02	0.23	0.21	0.02					<0.02	0.04	
TP21/SS2	500	moist brown sand	630	n/a	n/a		n/a	5.8	3.5	<0.02	<0.02	<0.02	<0.02						<0.02	
TP21/SS3	1000	wet cemented dark brown sand		n/a	n/a		n/a	4.1	2.2	0.19	0.61	0.42	0.11						0.32	
TP21/SS4	1400	wet cemented dark brown sand		n/a	n/a		n/a	4.7	2.7	0.07	0.18	0.11	0.04						0.11	
		Pit terminated at 1400mm due to rock																		
Test Pit 22																				
TP22/SS1	250	moist grey sand with rootlets		n/a	n/a		n/a	5.2	2.7	<0.02	0.11	0.10	<0.02					<0.02	0.03	
TP22/SS2	500	moist light grey sand		n/a	n/a		n/a	5.5	3.1	<0.02	0.05	0.04	<0.02						<0.02	
TP22/SS3	1000	moist light grey sand	1040	n/a	n/a		n/a	5.5	3.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP22/SS4	1500	wet brown sand		n/a	n/a		n/a	5.2	2.7	<0.02	0.12	0.10	0.11						0.13	
TP22/SS5	2000	wet brown sand		n/a	n/a		n/a	5.1	2.6	<0.02	0.12	0.10	0.10						0.11	
TP22/SS6	1100	wet black sandy silty clayey peat						4.4	1.8	0.13	0.90	0.77	0.59					0.33	0.73	
Test Pit 23																				
TP23/SS1	250	moist dark grey sand		4.3	4.1		M	5.0	2.5	0.03	0.20	0.18	0.06					<0.02	0.08	
TP23/SS2	500	wet dark brown sand		4.8	4.2		M	5.1	2.8	<0.02	0.18	0.16	0.03						0.05	
TP23/SS4	1000	wet dark brown sand	800	5.1	4.2		S	5.3	3.0	<0.02	0.04	0.03	0.03						0.04	
TP23/SS6	1500	wet dark brown/black sandy silt		4.8	3.9		S	5.1	2.5	0.04	0.15	0.12	0.09						0.13	
TP23/SS8	2000	wet dark brown/black sandy silt		4.5	4.0		S	5.1	2.6	0.05	0.15	0.11	0.09						0.14	
Test Pit 24																				
TP24/SS1	250	slightly moist dark grey sandy silty peat		4.7	4.1		M	4.6	2.2	0.08	0.56	0.48	0.08					<0.02	0.16	
TP24/SS2	500	moist dark grey sandy silt	700	4.8	4.3		M	4.9	2.5	<0.02	0.38	0.36	0.08					<0.02	0.10	
TP24/SS3	1000	wet light brown sand		4.9	5.3		N	5.8	4.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP24/SS4	1500	wet light brown sand		4.3	5.6		N	5.7	4.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP24/SS5	2000	wet light brown sand		4.5	6.1		N	5.8	4.6	<0.02	<0.02	<0.02	<0.02						<0.02	

Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF- pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 25																				
TP25/SS1	250	moist grey sand with some peat		4.3	3.5		M	4.2	2.3	0.13	0.81	0.68	0.02					<0.02	0.16	
TP25/SS2	500	moist grey sand		3.5	4.0		S	5.0	2.7	<0.02	0.08	0.07	<0.02						<0.02	
TP25/SS3	1000	moist grey (slightly brown) sand	1050	3.1	3.9		S	5.6	3.5	<0.02	<0.02	<0.02	<0.02						<0.02	
TP25/SS4	1500	moist dark brown/ black sand		3.5	4.1		N	4.1	2.2	0.18	0.73	0.55	0.11						0.30	
TP25/SS5	2000	moist dark brown/ black sand		4.1	4.1		N	4.6	2.3	0.08	0.34	0.27	0.07						0.14	
Test Pit 26																				
TP26/SS1	250	moist dark grey sand		3.5	3.5		n/a	4.3	2.4	0.08	0.35	0.27	<0.02					<0.02	0.09	
TP26/SS2	500	moist grey sand	800	3.2	3.5		n/a	4.7	2.5	0.05	0.11	0.06	0.03					<0.02	0.08	
TP26/SS3	1000	moist grey (slightly brown) sand		3.2	3.7		n/a	5.0	2.7	0.03	0.09	0.06	0.02					<0.02	0.05	
TP26/SS4	1500	moist dark brown/ black sand		n/a	n/a		n/a	4.5	2.3	0.10	0.36	0.26	0.05						0.15	
TP26/SS5	2000	moist dark brown/ black sand		n/a	n/a		n/a	4.6	2.3	0.08	0.29	0.21	0.04						0.12	
Test Pit 27																				
TP27/SS1	250	slightly moist dark grey sandy peat		4.4	4.9		M	4.3	2.4	0.08	0.74	0.65	0.04					<0.02	0.13	
TP27/SS2	500	moist grey sand		4.8	5.0		S-M	6.2	2.9	<0.02	0.10	0.10	<0.02						<0.02	
TP27/SS3	1000	moist light brown sand	1300	4.6	5.4		S	5.7	3.3	<0.02	<0.02	<0.02	<0.02						<0.02	
TP27/SS4	1500	wet dark brown sand		4.7	4.3		Very S	4.6	2.5	0.11	0.33	0.22	0.06						0.17	
TP27/SS5	2000	wet dark brown sand		5.0	4.2		S	4.7	2.3	0.10	0.30	0.21	0.06						0.16	
Test Pit 28																				
TP28/SS1	250	slightly moist dark grey/ black clayey silty sand		3.3	3.1		S-M	3.6	2.0	0.22	1.21	0.99	0.05					<0.02	0.28	
TP28/SS2	500	slightly moist dark grey/ black clayey silty sand		3.9	3.5		S-M	4.7	2.4	0.04	0.39	0.35	0.04					<0.02	0.07	
TP28/SS3	1000	moist grey sand	1200	4.1	4.7		N	5.5	3.1	<0.02	0.04	0.04	<0.02						<0.02	
TP28/SS4	1500	wet grey/ brown sand		4.5	5.2		N	5.6	3.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP28/SS5	2000	wet dark brown sand with organic matter		4.6	3.7		N	4.7	2.3	0.07	0.32	0.25	0.03						0.10	

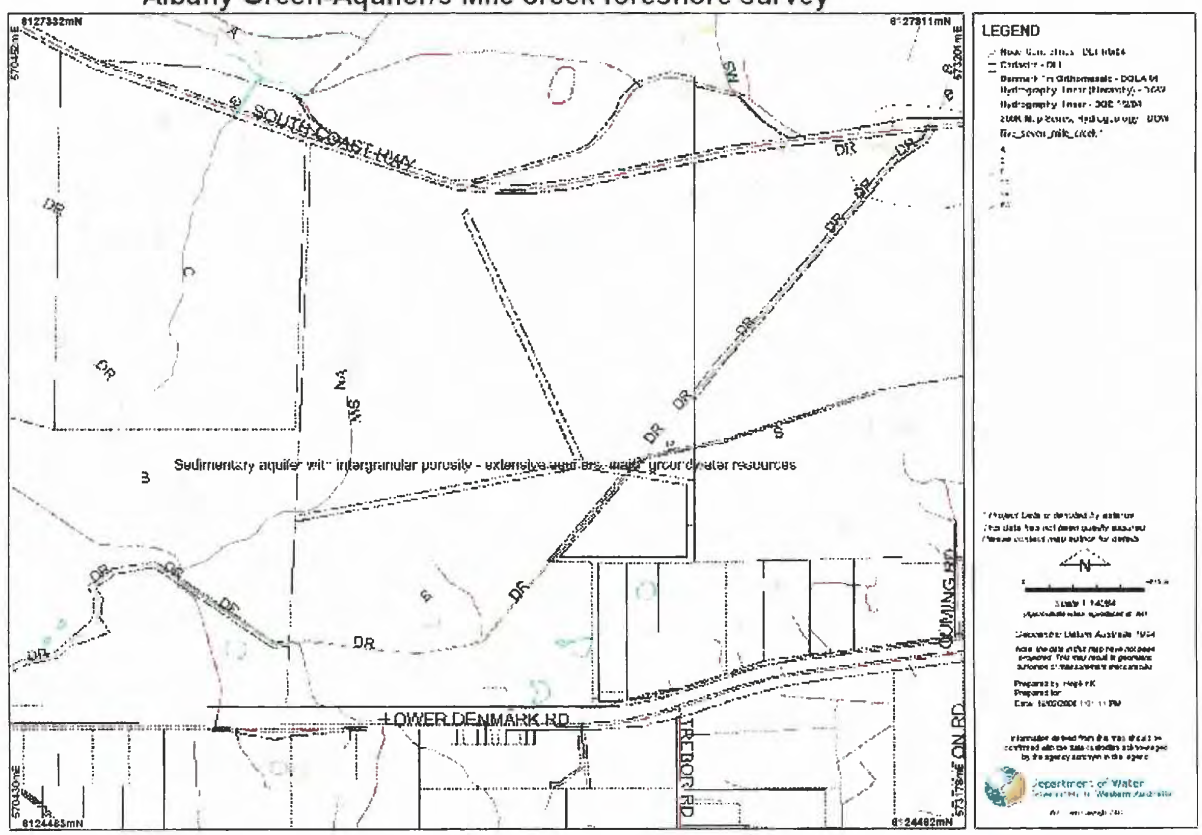
Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Criteria	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF- pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 29																				
TP29/SS1	250	moist grey sand		3.9	3.7		M	4.3	2.2	0.14	1.30	1.16	0.06					<0.02	0.21	
TP29/SS2	500	moist grey sand	610	4.1	4.8		S	5.1	2.8	<0.02	0.09	0.07	<0.02						0.03	
TP29/SS3	1000	wet light grey sand		4.6	4.8		N	4.6	3.1	0.13	0.38	0.25	0.05						0.18	
TP29/SS4	1500	wet light brown sand		4.3	5.3		N	5.4	3.1	<0.02	0.05	0.03	0.03						0.05	
TP29/SS5	2000	wet dark brown sand		4.6	5.5		N	5.3	3.2	<0.02	0.05	0.04	<0.02						0.04	
Test Pit 30																				
TP30/SS1	250	slightly moist grey sand		n/a	n/a		n/a	4.4	2.5	0.07	0.40	0.33	0.03					<0.02	0.10	
TP30/SS2	500	moist black peaty sand with rootlets	530	n/a	n/a		n/a	5.0	2.6	0.02	0.19	0.17	0.03						0.05	
TP30/SS3	1000	wet brown sand		n/a	n/a		n/a	5.2	3.1	<0.02	0.02	<0.02	<0.02						<0.02	
TP30/SS4	1500	wet light brown sand		n/a	n/a		n/a	5.4	3.6	<0.02	<0.02	<0.02	<0.02						<0.02	
TP30/SS5	2000	wet light brown sand		n/a	n/a		n/a	5.5	4.1	<0.02	<0.02	<0.02	<0.02						<0.02	
Test Pit 31																				
TP31/SS1	250	slightly moist grey sand		n/a	n/a		n/a	5.5	2.6	0.03	0.46	0.43	0.02					<0.02	0.05	
TP31/SS2	500	slightly moist grey sand		n/a	n/a		n/a	5.4	2.9	<0.02	0.10	0.09	<0.02						0.02	
TP31/SS3	1000	moist light grey sand	1100	n/a	n/a		n/a	5.8	4.1	<0.02	<0.02	<0.02	<0.02						<0.02	
TP31/SS4	1500	wet grey sand		n/a	n/a		n/a	5.1	2.8	<0.02	0.05	0.03	<0.02						0.02	
TP31/SS5	2000	wet grey sand		n/a	n/a		n/a	4.3	2.5	0.16	<0.02	<0.02	0.07						<0.02	
Test Pit 32																				
TP32/SS1	250	dry orange gravel		4.2	4.9		S	6.0	5.8	<0.02	0.47	0.46	<0.02						<0.02	
TP32/SS2	500	dry orange laterite		4.7	4.9		N	5.8	5.4	<0.02	<0.02	<0.02	<0.02						<0.02	
TP32/SS3	1000	wet cemented orange clayey sand		n/a	n/a		n/a	5.8	4.8	<0.02	<0.02	<0.02	<0.02						<0.02	
TP32/SS4	1500	wet cemented orange clayey sand		n/a	n/a		n/a	5.7	5.0	<0.02	<0.02	<0.02	<0.02						<0.02	
		Pit terminated at 1500mm due to rock																		

Water table – none reached

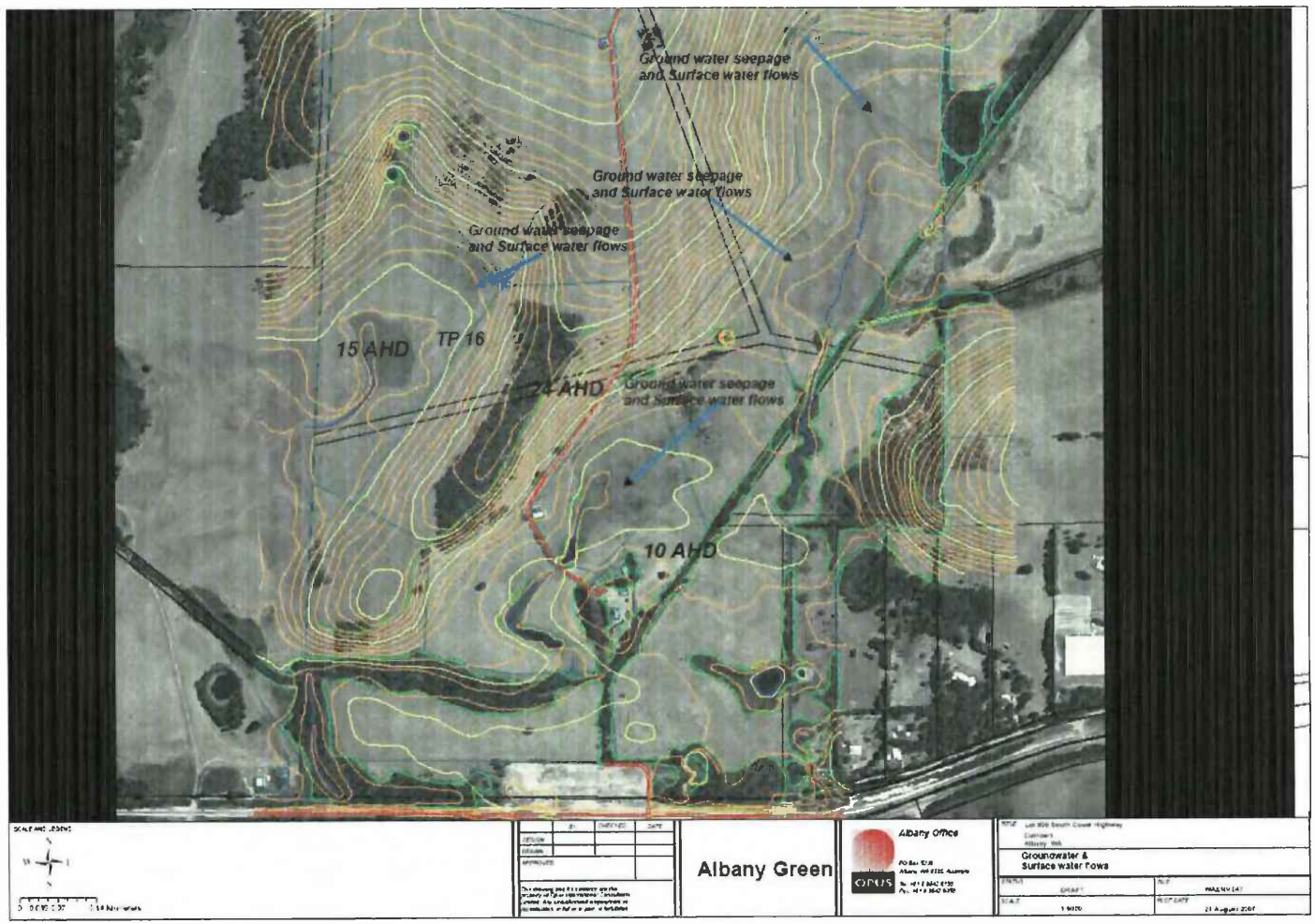
Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF- pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 33																				
TP33/SS1	250	moist dark grey sand		n/a	n/a		n/a	4.8	2.6	0.04	0.23	0.19	<0.02					<0.02	0.06	
TP33/SS2	500	wet grey sand	830	n/a	n/a		n/a	5.8	4.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP33/SS3	1000	wet brown sand		n/a	n/a		n/a	5.3	3.6	<0.02	0.03	0.03	<0.02						<0.02	
TP33/SS4	1500	wet dark brown silty sand		n/a	n/a		n/a	4.9	2.6	0.04	0.11	0.07	0.03						0.08	
TP33/SS5	2000	wet dark brown silty sand		n/a	n/a		n/a	4.8	2.6	0.05	0.17	0.11	0.04						0.09	
Test Pit 34																				
TP34/SS1	250	slightly moist black peaty silty sand		n/a	n/a		n/a	3.8	2.1	0.20	1.09	0.88	0.06						0.27	
TP34/SS2	500	moist to wet light brown sand		n/a	n/a		n/a	5.1	2.9	<0.02	0.06	0.05	<0.02						<0.02	
TP34/SS3	750	moist to wet light brown sand	750	n/a	n/a		n/a	5.4	3.3	<0.02	0.02	<0.02	<0.02						<0.02	
TP34/SS4	1000	wet dark brown sandy silt cemented in places with coffee rock		n/a	n/a		n/a	4.6	2.6	0.06	0.14	0.08	<0.02						0.06	
TP34/SS5	1200	wet dark brown sandy silt cemented in places with coffee rock		n/a	n/a		n/a	4.1	2.7	0.24	0.40	0.17	0.07						0.31	
Test Pit 35																				
TP35/SS1	250	wet dark brown sandy silt	300	n/a	n/a		n/a	4.6	2.5	0.08	0.17	0.08	0.02					<0.02	0.10	
TP35/SS2	500	wet dark brown sandy silt		n/a	n/a		n/a	4.8	2.7	0.04	0.17	0.13	0.02						0.06	
TP35/SS4	1000	wet brown sand		n/a	n/a		n/a	5.1	2.6	0.03	0.10	0.07	0.07						0.10	
TP35/SS6	1500	wet brown sand		n/a	n/a		n/a	5.7	3.3	<0.02	<0.02	<0.02	<0.02						<0.02	
TP35/SS8	2000	wet brown sand		n/a	n/a		n/a	5.5	3.0	<0.02	0.05	0.04	0.04						0.05	
Test Pit 36																				
TP36/SS1	250	moist grey sand		n/a	n/a		n/a	4.7	2.4	0.05	0.28	0.23	0.02					<0.02	0.07	
TP36/SS2	500	moist light grey sand with roots	860	n/a	n/a		n/a	5.6	3.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP36/SS3	1000	wet cemented brown sand with coffee rock		n/a	n/a		n/a	5.4	3.4	0.04	0.21	0.17	<0.02						0.05	
		Pit terminated at 1200mm due to rock																		

Attachment C – DoW Generated Map

Albany Green-Aquifer/5 Mile creek foreshore survey

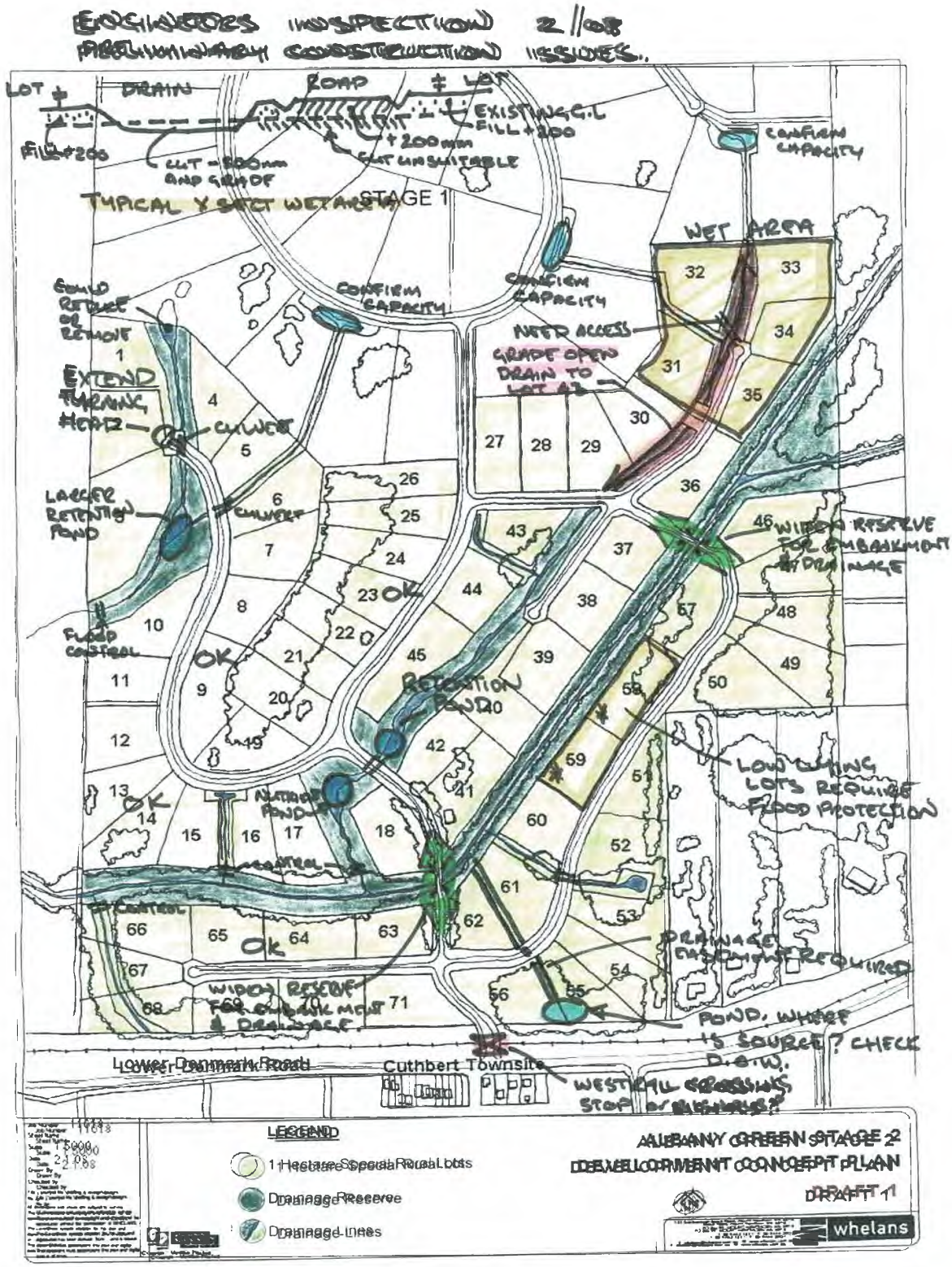


Attachment D – Surface Water Flows



Attachment E Concept drainage for Rural Residential Development

Attachment E Concept drainage for Rural Residential Development



APPENDIX D | SITE SOIL EVALUATION

SITE SOIL EVALUATION

Lot 124 and 125 South Coast Highway
Marbelup, WA 6330

01/05/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

Title: Site Soil Evaluation – Lot 124 and 125 South Coast Highway, Marbelup
Author (s): Chiquita Cramer
Reviewer (s): Marisa Wearing and Alexandra Tucker
Job No.: HD063-001
Client: Dora Porter & Brian Fuller

REVISION RECORD

Revision	Summary	Revised By	Date
Draft ID 22/04/2024	Internal QA Review	C. Cramer	22/04/2022
Draft ID 24/04/2024	Technical Review	A. Tucker	24/04/2024
Final ID 01/05/2024	Final Report issued to client	A. Tucker	01/05/2024

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Appendix A – Site Soil Investigation (Great Southern Geotechnics, 2021)

1. Introduction

Bio Diverse Solutions was commissioned by Dora Porter and Brian Fuller (the clients) to conduct a Site Soil Evaluation (SSE) to determine onsite effluent disposal suitability at Lot 124 and 125 South Coast Highway, Marbelup, herein referred to as the Subject Site. This SSE has been prepared to support and guide a proposed local planning scheme amendment and subsequent subdivision. This report details the site soils under late winter conditions and suitability for on-site effluent disposal across the site in relation to the planning proposal.

1.1. Alignment to Legislation, Policy and Guidelines

Bio Diverse Solutions has prepared this report aligned to the following legislation:

- *Government Sewerage Policy (2019);*
- *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations (1974);*
- *Health Act 1911* and *Public Health Act 2016;*
- *Country Area Water Supply Act 1947;*
- Australian Standard (AS)1547:2012; and
- State Planning Policy 2.9

1.2. Suitable Qualified Hydrologist

This SSE has been prepared by Chiquita Cramer, who has 15 years of experience working as a hydrologist and hydrogeologist.

Chiquita Cramer has the following tertiary qualifications:

- Bachelor of Science in Natural Resource Management (University of Western Australia); and
- Graduate Certificate in Hydrogeology (University of Western Australia).

Chiquita worked as a hydrologist and senior hydrologist at JDA Consultant Hydrologists in Perth for 8 years, during this time she also completed a Graduate Certificate in Hydrogeology. In 2017 she joined Bio Diverse Solutions (BDS) to provide expertise in hydrology and hydrogeology to the company. Chiquita's experience includes preparation of local and urban water management strategies, hydrological and hydraulic investigations, surface water and groundwater monitoring reports, hydrogeological reports and site soil evaluations for onsite disposal suitability. Chiquita has successfully completed numerous SSE reports for a range of developments at various planning stages. Chiquita also attended a workshop on SSE reporting organised by the Department of Health in 2021.

1.3. Location

The Subject Site is defined as Lots 124 and 125 South Coast Highway, Marbelup WA within the City of Albany. The Subject Site consists of ~10 9ha and is bound by South Coast Highway to the north, rural residential properties to the south and west, and City of Albany reserve to the east. The Subject Site is shown in Figure 1.

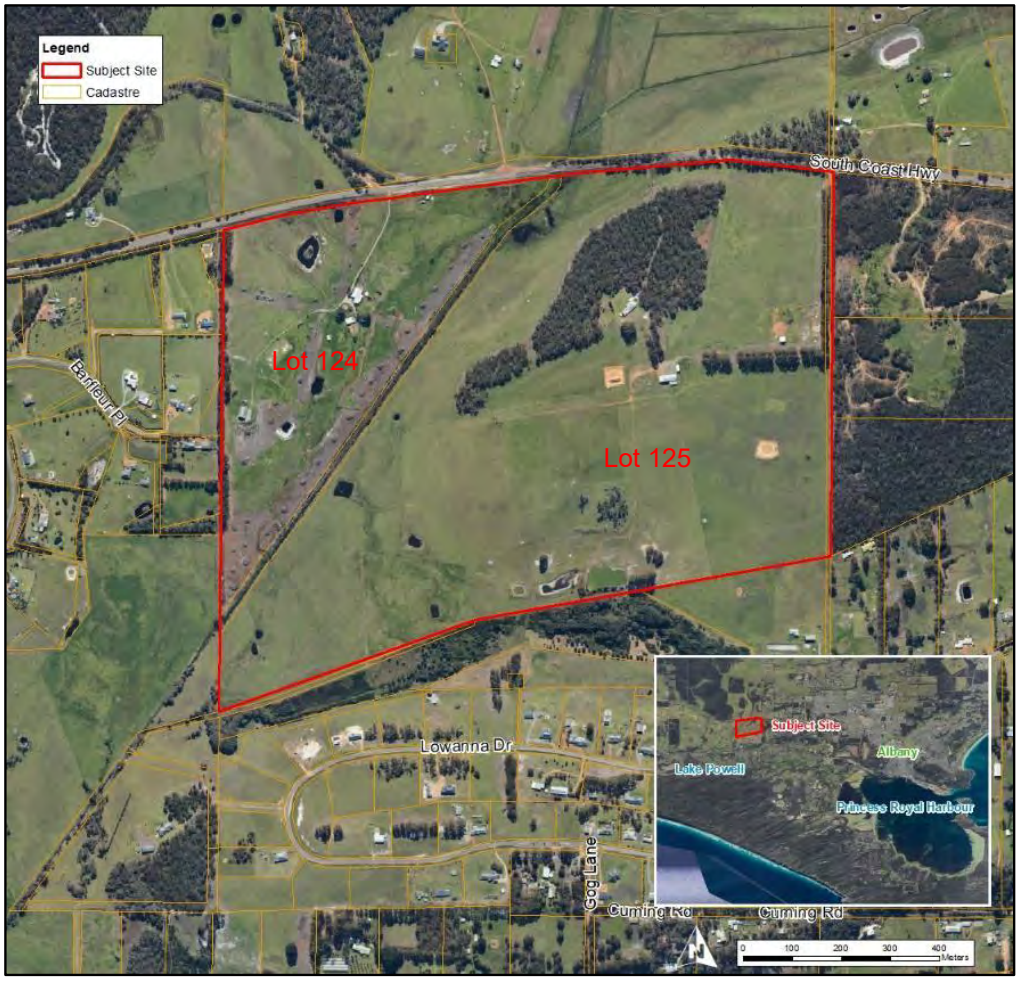


Figure 1: Location Plan

2. **Development Proposal**

The Subject Site is zoned as *'General Agriculture'* under the City of Albany's Local Planning Scheme No. 1 (DPLH, 2014). It is proposed the Subject Site be rezoned to '*Rural Residential'* and '*Rural smallholdings*', and forms part of a larger Scheme Amendment (SA) and Rezoning plan area that includes Lot 9001 Lower Denmark Road to the southwest of the Subject Site. The SA plan for the site is shown in Figure 2.

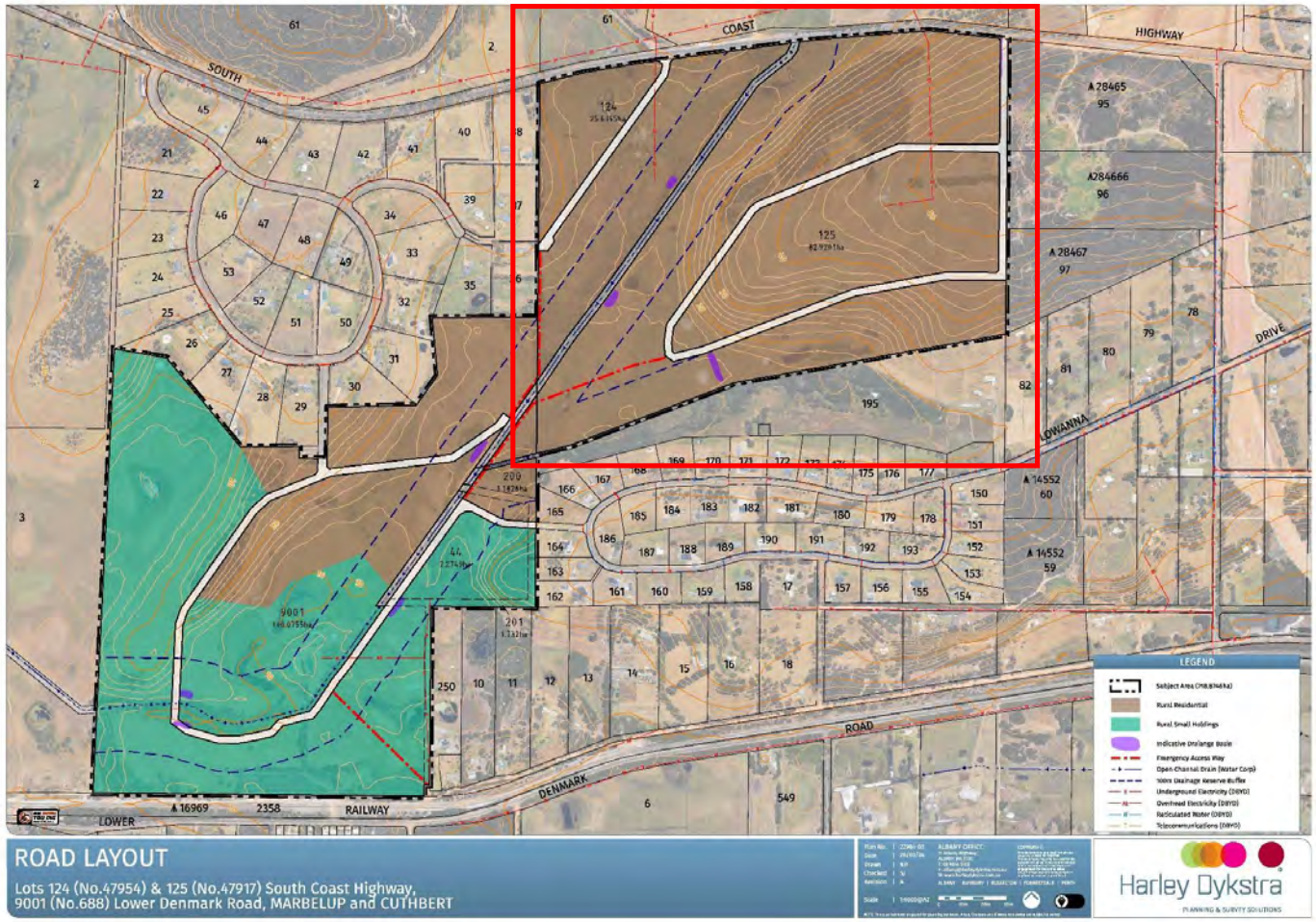


Figure 2: Scheme Amendment Plan (Harley Dykstra, 2024). Subject Site is defined by red square.

3. Desktop Assessment

3.1. Topography

The Subject Site is elevated in the eastern and central portions of the site with a slight elevation in the northwest. Elevations ranges from a high point of 54 mAHD in the east of the Subject Site to a low point of 12 mAHD in the southwest. Topographic contours (2 metre) are shown in Figure 3.

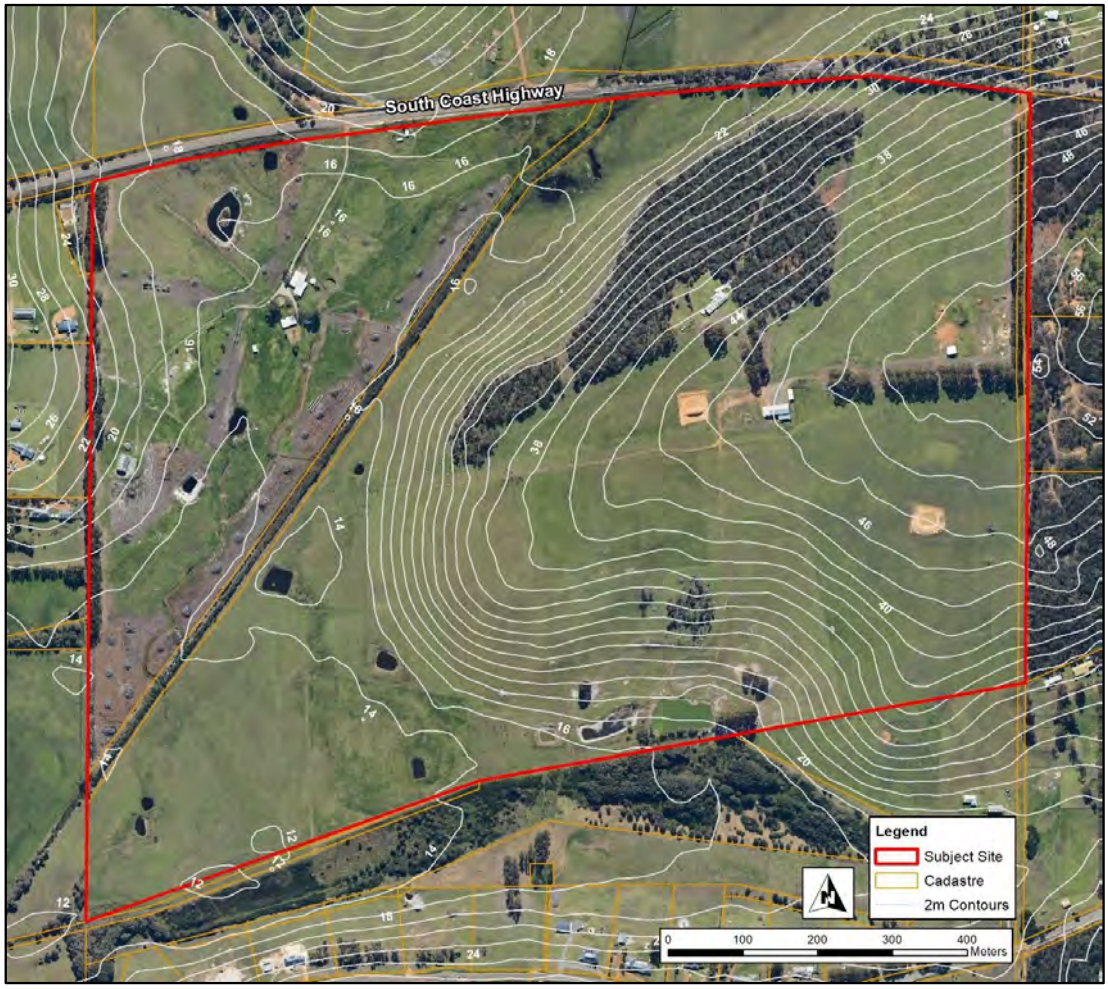


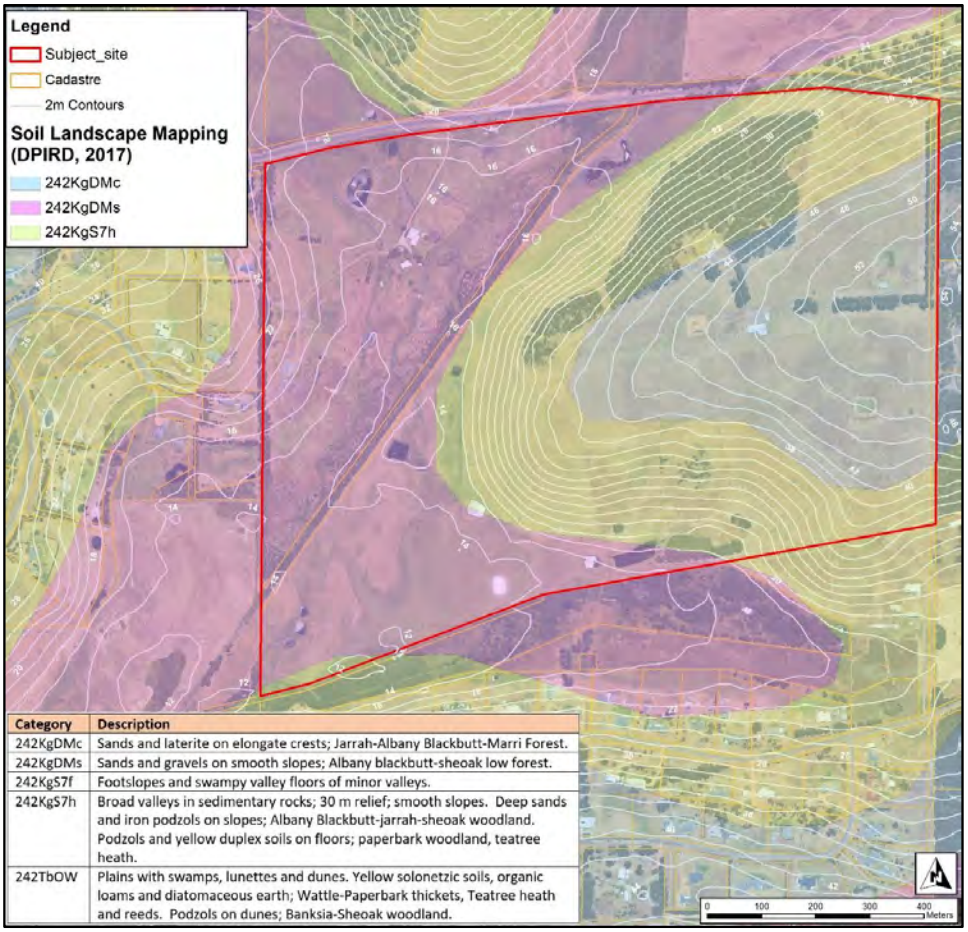
Figure 3: Topography

3.2. Geology and Soils

Soil mapping – Zones (DPIRD, 2017a) shows the Subject Site lies within one soil zone being the Albany Sandplain Zone (242). The Albany Sandplain Zone is described as; '*Gently undulating plain dissected by a number of short rivers flowing south. Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels.'.*

Soil mapping – Systems (DPIRD, 2018) shows the Subject Site lies within one soil systems being the King System (242Kg). The King System is described as *'Dissected siltstone and sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-sheoak woodland and mallee-heath.'*

The Subject Site is also located within three sub-systems of the King System as defined by DPIRD (2017b). The sub-systems are shown and described in Figure 4.



Category	Description
242KgDMc	Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri Forest.
242KgDMs	Sands and gravels on smooth slopes; Albany blackbutt-sheoak low forest.
242KgS7f	Footslopes and swampy valley floors of minor valleys.
242KgS7h	Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
242TbOW	Plains with swamps, lunettes and dunes. Yellow solonetzic soils, organic loams and diatomaceous earth; Wattle-Paperbark thickets, Teatree heath and reeds. Podzols on dunes; Banksia-Sheoak woodland.

Figure 4: Soil Mapping (DPIRD, 2017b)

3.3. Surface Hydrology

The whole of the Subject Site drains towards Five Mile Creek. Five Mile Creek runs through the Subject Site from the central north to the south west of the site. Five Mile Creek connects to Seven Mile Creek to the southwest of the Subject Site and Seven Mile Creek discharges to Powell Lake and ultimately the Torbay Inlet further west. The surface hydrology of the Subject Site is shown in Figure 5.

There are no other major waterways or waterbodies within the Subject Site other than Five Mile Creek. There are several farm dams across the Subject Site and a seasonal constructed drain network connecting to Five Mile Creek within Lot 124.

The Subject Site is located within one hydrographic catchment being Torbay Inlet and one hydrographic sub-catchment being Seven Mile Creek (DWER, 2018a).

According to flow modelling conducted for Five Mile Creek by DWER (Sykora, N [2023] email to C. Cramer, 28th November), the maximum daily flow rate recorded in Five Mile Creek at the downstream end of the LSP area (DWER station No. 6031115), between 1997 and 2022 is 199,000 m^3. This equates to 2.3 m^3/sec. According to data results for site No. 603115, the highest recorded water level in Five Mile Creek at the downstream end of the LSP area is 10.3 m AHD, which was recorded on the 30th August 2001.

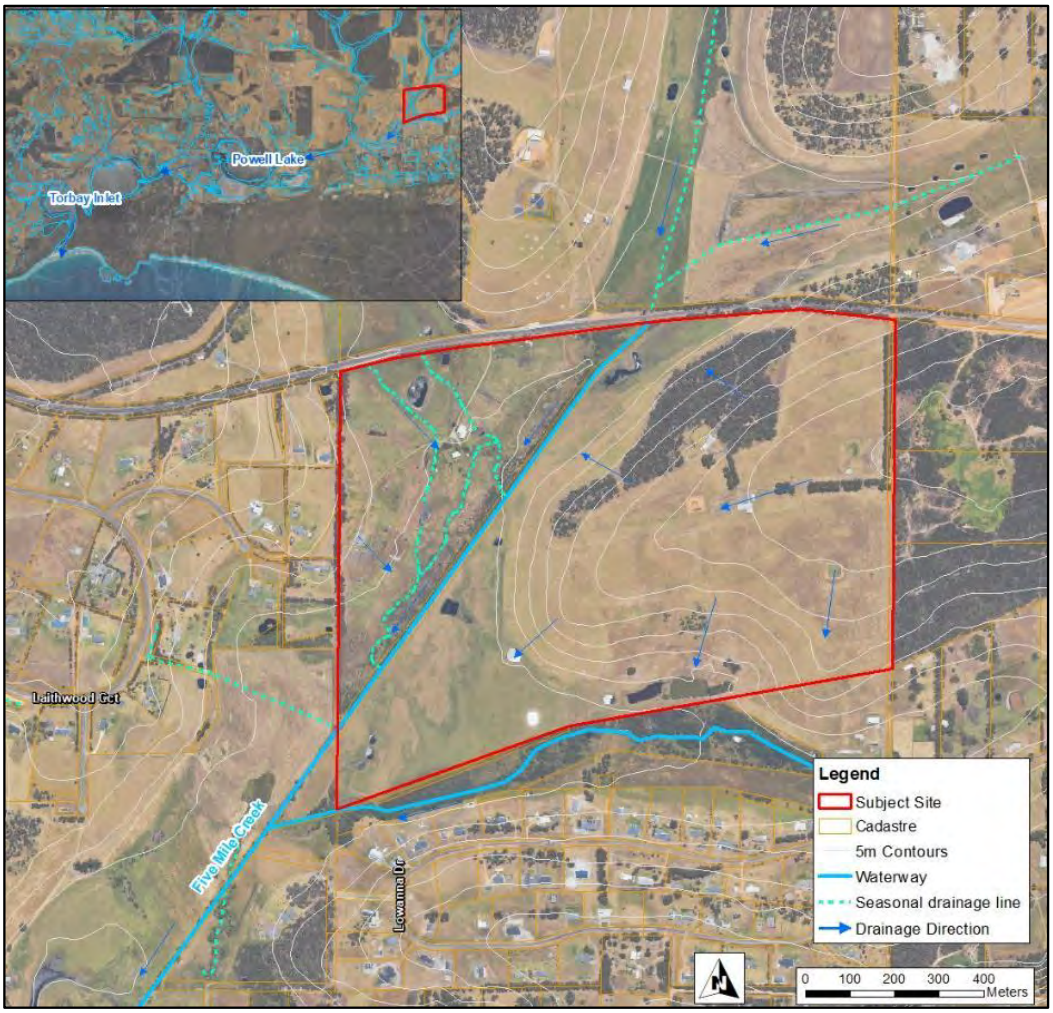


Figure 5: Surface Water Hydrology

3.4. Hydrogeology and Groundwater

Australian Geoscience Mapping and Department of Water and Environmental Regulation 250K Hydrogeological mapping (DWER, 2001), places the Subject Site within two hydrogeological zones as described in Table 1.

Table 1: 250K Hydrogeological zones within Subject Site

Geology Unit	Geology Time	Aquifer Description	Geology Description
TP	Tertiary – Cainozoic – Phanerozoic	Sedimentary aquifer with intergranular porosity - extensive aquifers, major groundwater resources.	PLANTAGENET GROUP - siltstone, spongolite; minor sandstone, peat, and conglomerate.
P_g	Proterozoic	Fractured and weathered rocks - local aquifer, minor groundwater resources	Granitoid rock, porphyritic and even-grained, generally weathered to clayey sand

The Subject Site is not situated within a Priority Drinking Water Catchment Area (DWER, 2018b). Desktop analysis of the site indicates that the nearest designated Public Drinking Water Source Area (PDWSA) is the "South Coast Water Reserve" as defined by the *Country Areas Water Supply Act 1947,* located approximately 950 m south of the Subject Site.

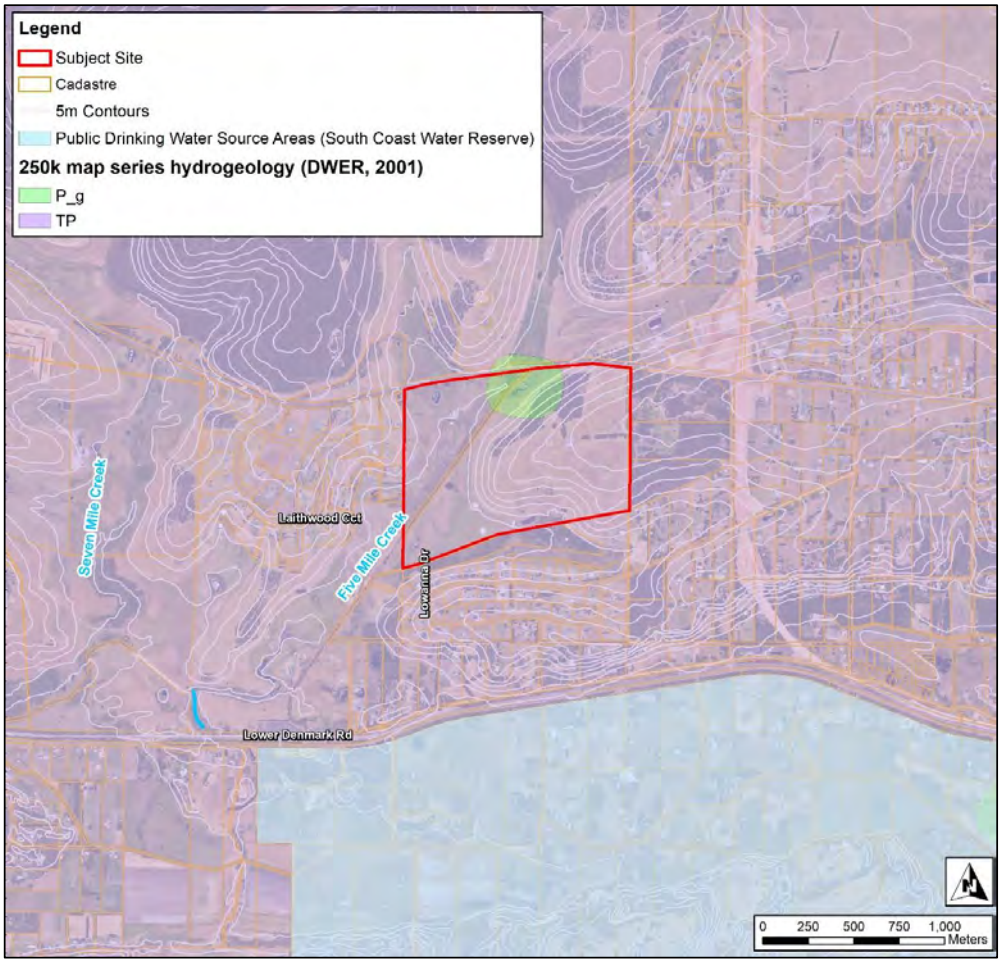


Figure 6: Hydrogeological and PDWSA Mapping

The Department of Water and Environmental Regulation Water Information Reporting Tool (DWER, 2024), shows 4 domestic groundwater bores/wells detected within a 500 m radius of the Subject Site. One bore is located in the subject site and one due north of subject site (Bore no. 60310654 and no. 600303001 repsectively). There is one domestic bore is located approximately 150 m west (60370048) of the Subject Site boundary. Refer to Figure 7.

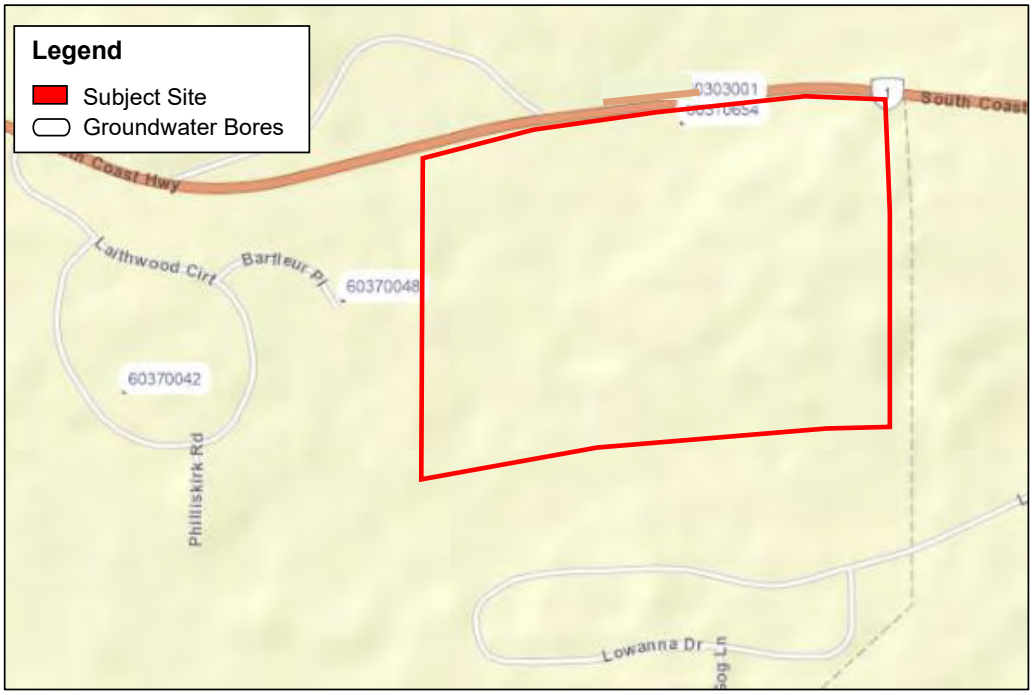


Figure 7: Nearest Domestic Groundwater Bores

3.5. Acid Sulphate Soils

Acid sulphate soils (ASS) are naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). When undisturbed below the water table, these soils are benign and not acidic (potential acid sulphate soils). If the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid. ASS Risk Mapping indicates the low-lying areas within the Subject Site are located in an area classified as having a moderate to low risk of ASS occurring within 3 metres of natural soil surface (DWER, 2017). ASS Risk Mapping (DWER, 2017) is shown in Figure 8.

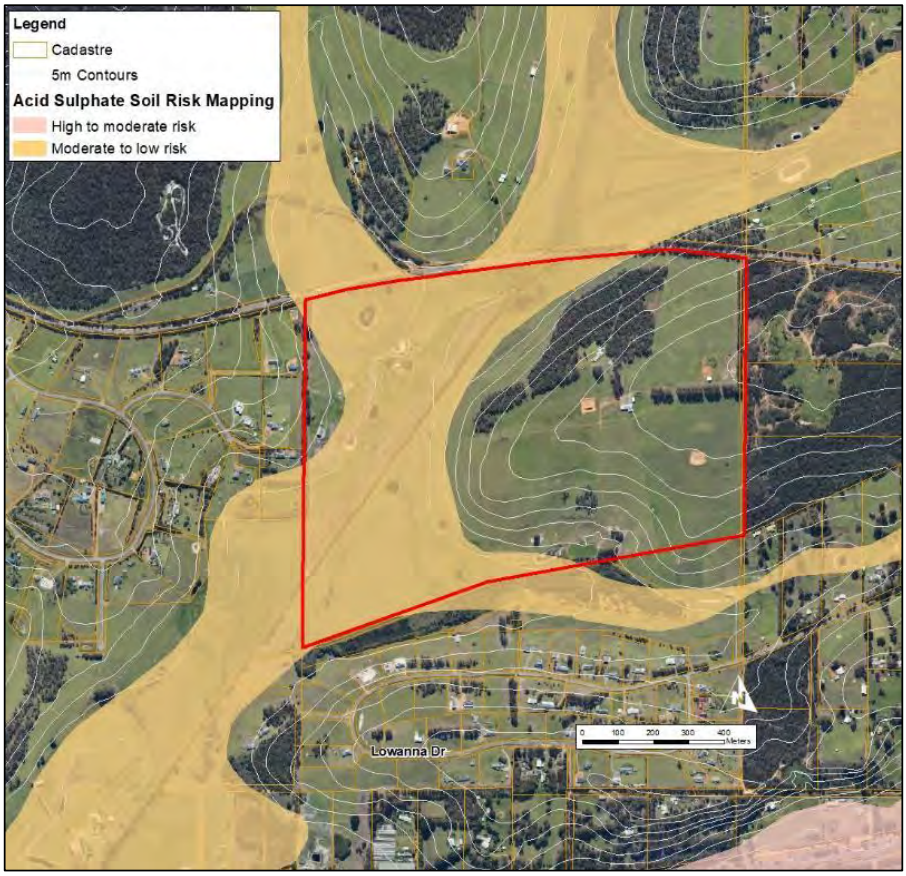


Figure 8: ASS Risk Mapping

An ASS Preliminary Investigation was conducted on the property directly southwest of the Subject Site (Lot 9001 Lower Denmark Road, Cuthbert) on the 15th January 2008 as part of a Land Capability Assessment (Opus, 2007) for the site. In summary, the investigation found the peat layers investigated at Lot 9001 Lower Denmark Road, Cuthbert had acidity levels which exceeded DWER Guidelines, however the acidity was found not to be caused by sulfur and likely to be caused from the mobilisation of hydrolysed ions, likely attributed to iron or aluminium leaching through the soil profile (Opus, 2007).

Soil analysis showed the surface soils had high Electrical Conductivity (EC) and corresponding acidity, which Opus (2007) found is likely attributed to bicarbonate salts and not sulfur salts. Sulfur acidity (ASS) was detected in the soil layers from approximately 1000 m BGL (Opus, 2007).

Opus (2007) recommended that the site not be excavated deeper than 500 mm to avoid mobilisation and oxidation of ASS. The top 500 mm of soil will still require treatment with lime upon disturbance and ASS shall be managed in accordance with ASS guidelines (Opus, 2007).

3.6. Environmentally Sensitive Areas

There is no Environmentally Sensitive Areas (ESA) within the Subject Site or within close proximity of the Subject Site. The nearest Environmentally Sensitive Area (ESA) is located approximately 3.5 km west of the Subject Site being Lake Powell (DWER, 2018c). The Subject Site ultimately discharges to Powell Lake via Five Mile Creek and Seven Mile Creek.

3.7. Wetlands

There are no significant wetlands within the Subject Site or within close proximity of the Subject Site. The nearest significant wetland is located approximately 1.1 km to the northwest of the Subject Site, being the Seven Mile Creek wetland. The Subject Site is located down gradient of, and is not hydrologically connected to the Seven Mile Creek wetland (DBCA, 2017).

3.8. Sewage Sensitive Areas

The Subject Site is not located in a Sewage Sensitive Area according to the Department of Planning, Lands and Heritage Sewage Sensitive Area Mapping (DPLH, 2019b). Sewage Sensitive Area mapping is shown in Figure 9.

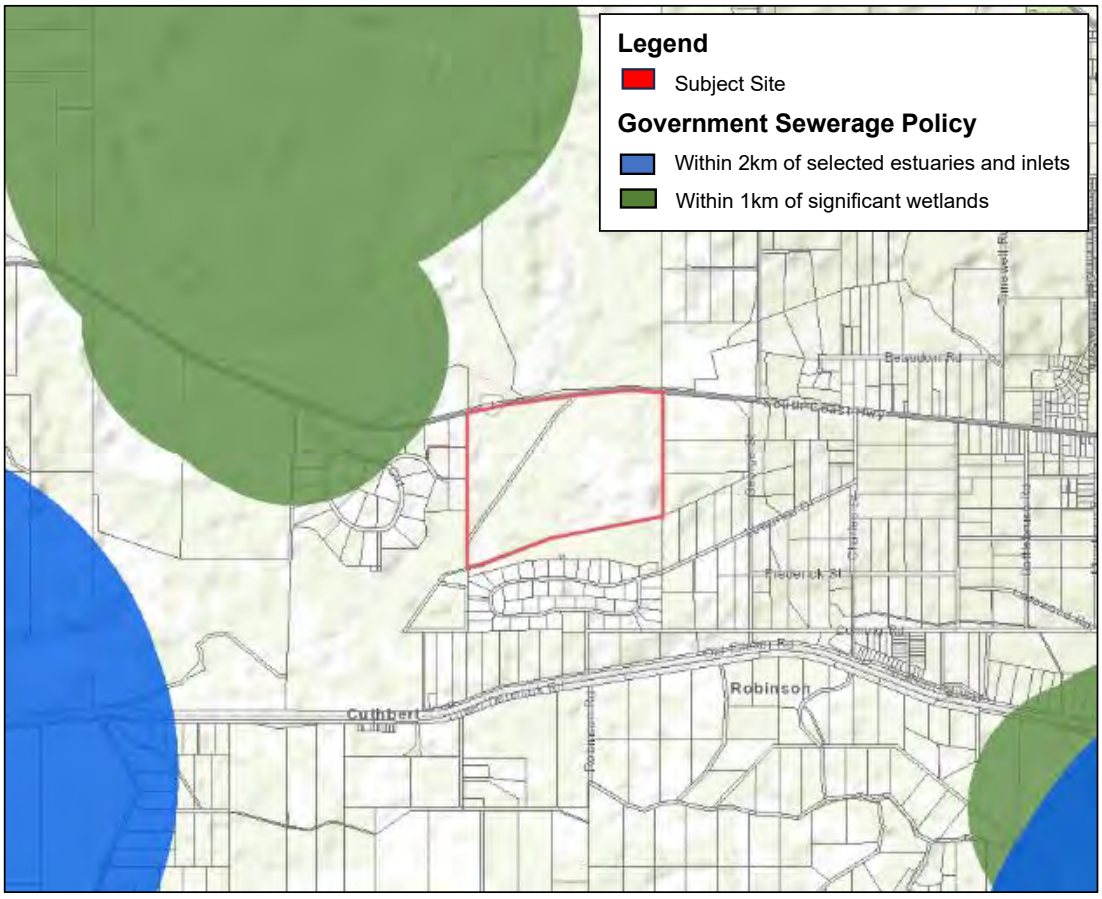


Figure 9: Sewage Sensitive Area Mapping (DPLH, 2019a)

4. Site Soil Investigation

Site soil testing was conducted on the 19th of October 2021 by Great Southern Geotechnical, under late winter conditions. Testing involved site soil analysis, photographic recording, logging of soil types, measuring of water table and in-situ permeability testing. In total, 22 test holes were constructed to a minimum depth of 2 m and left open for a minimum of 1 hour to identify any water table present. The soil investigation for the site is shown in Appendix A, test hole locations are shown in Figure 10.

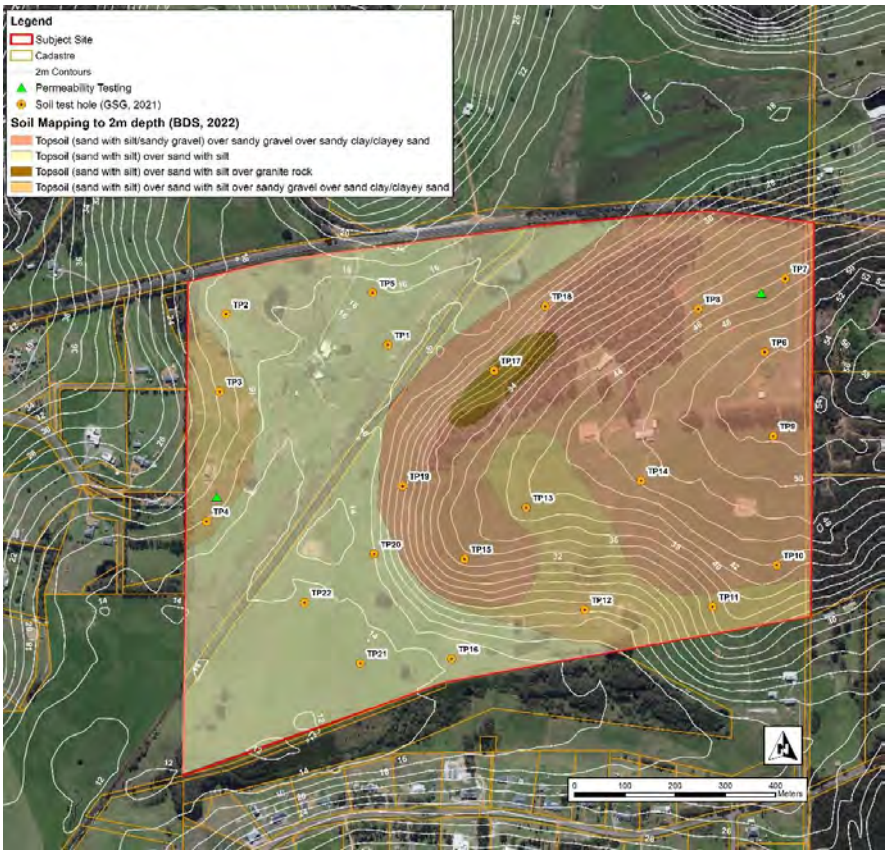


Figure 10: Soil Testing Locations and Mapping

The 22 test pits (TP) revealed that soils across the Subject Site generally comprised of four soil profiles to 2 m depth, being;

- Topsoil (sand with silt), over sand with silt to the depth of the hole;
- Topsoil (sand with silt) over sand with silt (to a depth of between 460 and 1050mm), over sandy gravel, over sandy clay/clayey sand;
- Topsoil (sand with silt or sandy gravel) over sandy gravel/gravelly sand (to a depth of between 300 and 920mm), over sandy clay/clayey sand; and
- Topsoil (sand with silt), over sand with silt, over bedrock.

The four soil profiles identified at the Subject Site are mapped and presented in Figure 10. Comprehensive soil logs for each soil testing hole are shown in Appendix A. TP17 was the only test hole to encounter refusal of drilling, which was encountered at 1300 mm depth, refusal was likely a result of hitting bedrock.

4.1. Phosphorous Retention Index

Phosphorous Retention Index (PRI) is a measure of the soils ability to absorb and treat nutrients within the soil (i.e., Soil microbe disinfecting ability). Soils with a PRI less than 1 have a very poor ability to treat effluent waters, whilst soils with a PRI of >5 having a high ability to treat effluent waters. PRI testing was conducted at TP4, TP7 and TP12. The PRI results are presented in Table 2.

Table 2: Phosphorus Retention Index Results (CSBP, 2021)

Test Pit	Depth (mm)	Soil Type	Phosphorus Retention Index
TP4	160-1050	Sand with silt	327.4
TP7	180-400	Gravelly sand	810.8
TP12	200-800	Sand with silt	4.9
TP12	800-1000	Gravelly sand	844.0

PRI within the subsurface layers varied across the site consistent with soil type, as shown in Table 2. The PRI of the gravelly sand layers was found to be extremely high whereas the PRI of the sand with silt layer varied from moderate to very high, likely dependant on the percentage of silt content.

4.2. Permeability

Silts and clay soils generally record poor permeability results whereas coarse sands and loose gravels generally record high permeability, as shown in Figure 11.

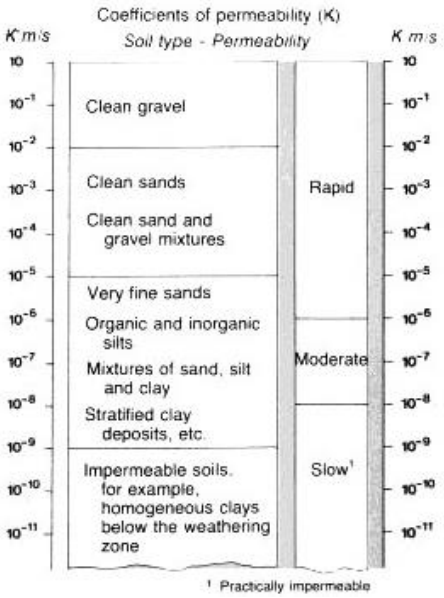


Figure 11: Hydraulic Conductivity of Soil Types (Artiola et al, 2004*)*

In-field permeability testing was conducted during the site soil investigation by BDS, adjacent to TP4 (Figure 10) within the sand with silt layer (at 500 mm depth BGL) and adjacent to TP7 within the clayey sand with gravel layer. Permeability testing was conducted using the Talsma-Hallam method. The Talsma-Hallam permeameter is suitable for use in soils with permeability in the range 0.009 to 2.9 m/day ($1x10^{-7}$ to $3x10^{-5}$m/s), this covers the range of soils to which treated effluent is typically applied. Hydraulic conductivity was found to be 1.50 x 10^{-5} m/sec (1.30 m/day) adjacent to TP4, which is considered a rapid to moderate permeability and consistent with Soil Category 3 – Loams (weakly structured) in accordance with Table L1 of AS/NZS

1547:2012. The hydraulic conductivity adjacent to TP7 was found to be 3.4 x 10^{-6} m/sec (0.29 m/day), which is considered a moderate permeability and consistent with Soil Category 4 – Clay loams (weakly structured).

4.3. Groundwater, waterlogging and seasonal inundation

The depth to the peak annual water-table varied across the Subject Site from at ground level in the lower lying areas to not encountered to 2 mBGL in the elevated areas. The depth to the peak annual water-table at each test hole during the site soil investigation is shown in Table 3.

Table 3: Depth to peak annual water-table

Test Pit	Depth to peak annual water-table (mm BGL)	Test Pit	Depth to peak annual water-table (mm BGL)
TP1	0	TP12	850
TP2	50	TP13	400
TP3	1020	TP14	800
TP4	350	TP15	Not encountered
TP5	50	TP16	0
TP6	Not encountered	TP17	Not encountered
TP7	Not encountered	TP18	Not encountered
TP8	Not encountered	TP19	Not encountered
TP9	Not encountered	TP20	150
TP10	Not encountered	TP21	0
TP11	Not encountered	TP22	550

It is assumed that areas within the Subject Site that have 0.5 m or less separation to the peak annual water-table are classified as being subject to seasonal waterlogging. The approximated areas subject to seasonal waterlogging at the Subject Site during the site investigation, along with the peak annual water-table level recorded at each test holes, are shown in Figure 12. Figure 12 also shows the areas subject to seasonal inundation (water sitting at surface) during the time of the site investigation.

The majority of the areas deemed as having seasonal waterlogging, were found to be in the low-lying elevations, TP13 was the only exception to this, situated mid slope, TP13 had a peak annual water-table of 400 mm BGL, which is likely a result of a perched water-table in this area.

It is noted that rainfall in the months (April - July) prior to the site investigation was significantly higher than average, as such the depth to the high water-table across the site was notably less than during an average late winter period. Areas mapped as subject to seasonal waterlogging or seasonally inundation is therefore a good example of the worst-case scenario.

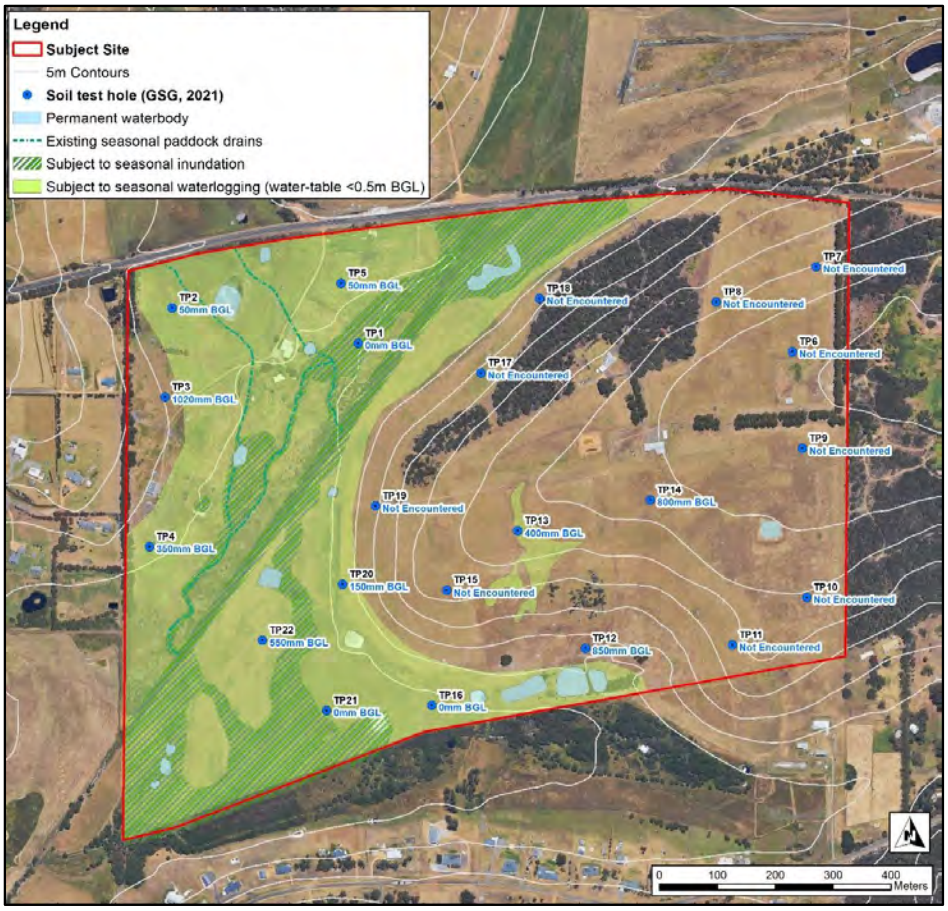


Figure 12: Areas subject to seasonal waterlogging and seasonal inundation

5. Site Suitability

The Subject Site is situated in an area that does not have access to deep or reticulated sewerage. The health and environmental requirements for wastewater treatment and disposal for developments not serviced by deep sewerage systems, are outlined in the *Government Sewerage Policy* (GSP; DPLH, 2019a). The GSP (DPLH, 2019a) states minimum requirements apply for all on-site sewage disposal systems.

A summary of compliance to the GSP (DPLH, 2019a) minimum requirements is as follows:

- Based on soil type, onsite effluent disposal is achievable across the Subject Site using standard land application systems, such as leach drains and sub-surface irrigation systems with no special design considerations required. The main soil profiles encountered on site were found to be; sand with silt to the depth of the hole, sand with silt over sandy gravel, over sandy clay and sandy gravel/gravelly sand, over sandy clay/clayey sand. The soil types found onsite are generally associated with a moderate to rapid permeability rate due to their relatively high sand and silt content and absence of any heavy clay layers. TP10 was the only test pit to encounter a medium density clay layer within 2 m depth of the surface, the infiltration rate for Land Application Areas (LAAs) in the vicinity of TP10 shall be confirmed prior to subdivision stage, to determine if special design is required. Bedrock was encountered at TP17 only, at a depth of 1300 mm, the depth to bedrock shall be confirmed for LAAs in the vicinity of TP17 at subdivision stage, to ensure there is a minimum of 1200 mm of separation between the base of the effluent application system and confining layers (bedrock). If 1200 mm of separation to a confining layer is unachievable, imported fill and/or special design considerations may be required. Special design requirements for onsite effluent disposal at the Subject Site is discussed in Section 6.

- The slopes across the site generally do not exceed the minimum grade requirements (1:5) as outlined in Table 4 of the Draft Government Sewerage Policy. Where the slopes descend steeply towards Five Mile Creek (slopes here are a maximum of 1:6), care shall be taken to ensure LAAs run parallel with the topographic contours and flattened off to minimise runoff towards Five Mile Creek.
- The depth to the peak annual water-table across the site varied from at surface (0 mm BGL) to not encountered to 2 metres during the site investigation. The majority of the low-lying areas associated with a high groundwater consist of sand with silt to 2 metres. The minimum separation required between the peak annual water-table and effluent disposal in sands, is at least 1.5 m and 0.6 m when a secondary treatment system is utilised. Where separation to the peak annual water-table is <1.5 m using primary treatment only or <0.6 m using a secondary treatment system, imported fill will be required for the LAA to ensure the separation to groundwater requirement is met.
  Where the depth to the peak annual water-table is <0.5 m BGL, it is recommended that the building envelopes (including LAA) within the proposed lots be filled with suitable imported fill material, so that a minimum of 0.5 m of separation to the peak annual water-table is achieved across the building envelope prior to subdivision. Further groundwater investigation may be required to better identify the areas that require filling to achieve 0.5 m separation to the peak annual water table. Following subdivision, it shall be the responsibility of the future lot owner to ensure the GSP (2019a) groundwater separation requirement is met. This separation requirement is applicable to the LAA only, with the location of the LAA dependent on building placement. Where the depth to the peak annual water table is <0.5 m, the lots shall be a minimum size of 1 ha.
- It shall be ensured that if the domestic production bore located within the Subject Site is to be retained, that >30 m separation between the bore and LAAs be achieved. The nearest domestic groundwater bore to the Subject Site is approximately 150 m to the west. The minimum separation requirement between effluent application and domestic production bores is >30 m, this is therefore achievable at the Subject Site. Any future proposed domestic bores shall be situated at least 30 m from any LAAs.

- A 100 m setback shall be implemented between Five Mile Creek and all LAAs at the Subject Site. There is also a tributary of Five Mile Creek running parallel to the southern boundary of the Subject

Site that shall also have a 100 m setback to all LAAs. There is a number of farm dams across the Subject Site, if these dams are maintained and not decommissioned as part of development works, a 30 m setback between LAAs and the dam/s is recommended. A 30 m setback shall also be applied between any maintained or future proposed constructed drains, stormwater storages/swales and all LAAs. These minor/seasonal waterways/waterbodies are generally only connected to the major waterways during larger storm events, and there is generally more opportunity for the infiltration and uptake (by vegetation) of any potential contaminants and nutrients generated from the nearby onsite effluent disposal systems.

- According to data results for site No. 603115, the highest recorded level at the downstream end of Five Mile Creek within the LSP area, is 10.3 m AHD (1997-2022), which was recorded on the 30th August 2001. This flood level did not breach the creek channel by more than 10 m. LAA shall be setback 100 m from Five Mile Creek and as such they will be located outside of the 1% AEP flood levels for Five Mile Creek.

- A 6 m setback from the lot-to-lot boundaries to LAAs shall apply. Additionally, a 6 m setback from the road reserve boundary to down-gradient LAAs shall also apply, and a 12 m setback to LAAs that are up-gradient of the road reserve boundary shall apply to provide additional separation to any proposed roadside drains.

Minimum requirements for all on-site wastewater disposal systems and design specific standards are shown in Table 4. The areas of the Subject Site identified as suitable for onsite effluent disposal are shown in Figure 13.

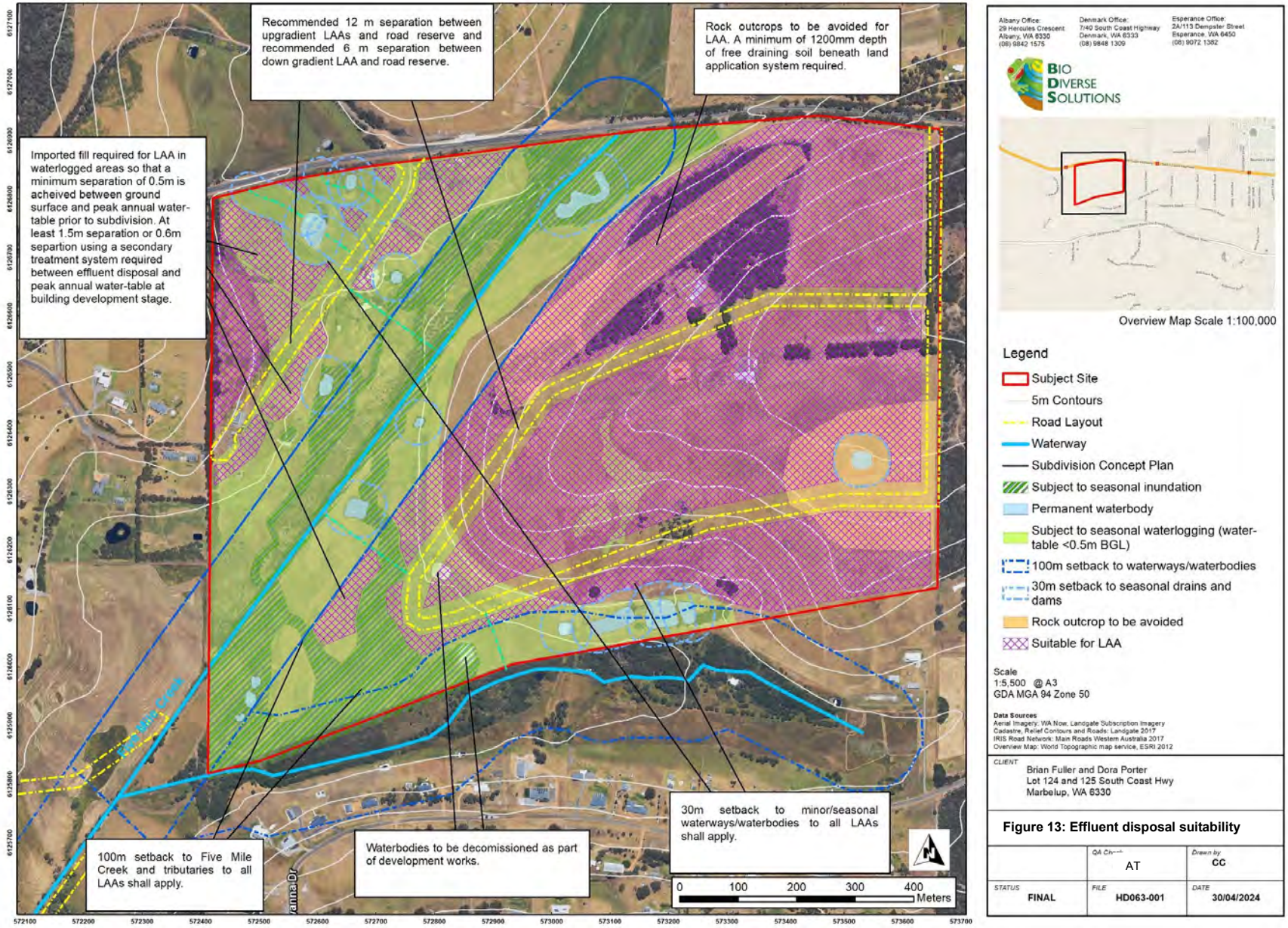

Recommended 12 m separation between upgradient LAAs and road reserve and recommended 6 m separation between down gradient LAA and road reserve.
Rock outcrops to be avoided for LAA. A minimum of 1200mm depth of free draining soil beneath land application system required.
Imported fill required for LAA in waterlogged areas so that a minimum separation of 0.5m is acheived between ground surface and peak annual water-table prior to subdivision. At least 1.5m separation or 0.6m separtion using a secondary treatment system required between effluent disposal and peak annual water-table at building development stage.
100m setback to Five Mile Creek and tributaries to all LAAs shall apply.
Waterbodies to be decomissioned as part of development works.
30m setback to minor/seasonal waterways/waterbodies to all LAAs shall apply.
Five Mile Creek
Tanna Dr
0 100 200 300 400 Meters
Albany Office: 29 Hercules Crescent Albany, WA 6330 (08) 9842 1575
Denmark Office: 7/40 South Coast Highway Denmark, WA 6333 (08) 9848 1309
Esperance Office: 2A/113 Dempster Street Esperance, WA 6450 (08) 9072 1382
BIO DIVERSE SOLUTIONS
Overview Map Scale 1:100,000
Legend
Subject Site
5m Contours
Road Layout
Waterway
Subdivision Concept Plan
Subject to seasonal inundation
Permanent waterbody
Subject to seasonal waterlogging (water-table <0.5m BGL)
100m setback to waterways/waterbodies
30m setback to seasonal drains and dams
Rock outcrop to be avoided
Suitable for LAA
Scale
1:5,500 @ A3
GDA MGA 94 Zone 50
Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012
CLIENT
Brian Fuller and Dora Porter
Lot 124 and 125 South Coast Hwy
Marbelup, WA 6330
Figure 13: Effluent disposal suitability
QA Check AT
Drawn by CC
STATUS FINAL
FILE HD063-001
DATE 30/04/2024

Table 4: Minimum requirements for all on-site wastewater disposal systems and design specific standards (DPLH, 2019a)

Site Feature	Minimum Requirement	Requirement met
Separation from waterways	A wellhead protection zone or on Crown land within a reservoir protection zone; 100 metres of the high-water mark of a reservoir or 100 metres of any bore used for public drinking water supply where: — a wellhead protection zone or reservoir protection zone has not been assigned; or — where existing lots would be rendered undevelopable by the wellhead protection zone.	Yes The Subject Site is not located within the vicinity of a Sewage Sensitive Area or Priority Drinking Water Source Area (PDWSA) and associated wellheads. The nearest PDWSA is 950 m away being the South Coast Water Reserve.
	30 metres of a private bore used for household/ drinking water purposes.	Yes It is proposed a 30 m setback to any existing domestic bore within the Subject Site be applied. The nearest existing private bore according to the Water Information Reporting Tool (DWER, 2019) is 150m west of the Subject Site boundary meeting the setback requirement. Any future proposed domestic bores shall be located a minimum of 30m from the designated LAAs.
	100 metres of a waterway or significant wetland and not within a waterway foreshore area or wetland buffer. The separation distance should be measured outwards from the outer edge of riparian or wetland vegetation.	Yes Five Mile Creek runs through the Subject Site, a 100m setback to LAAs shall apply from Five Mile Creek and its tributaries. A 30 m setback from LAAs to any less significant/seasonally connected waterbodies/waterways shall also apply. The reduced setback of 30 m is recommended due to the seasonal nature and relatively low ecological value of any other waterbodies/drains on site.
	100 metres of a drainage system that discharges directly into a waterway or significant wetland without treatment.	Yes There are no other major drainage systems (additional to those mentioned above). It is proposed that a 12 m setback be applied between the road reserve and upgradient LAAs within lots to allow adequate separation to any possible roadside drains.
	Any area subject to inundation and/or flooding in a 10 per cent Annual Exceedance Probability (AEP) rainfall event.	Yes The majority of the Subject Site is not subject to flooding in a 10% AEP rainfall event. Low-lying areas found to be seasonally inundated shall be avoided for LAAs.
Separation from groundwater – outside of public drinking water source areas.	Where land is not within a public drinking water source area or a sewage sensitive area, the discharge point of the on-site sewage system should be located the following distances above the highest groundwater level: • for loams and heavy soils, at least 0.6 metres. • for gravels, at least one metre. • for sands, at least 1.5 metres. Where a nutrient retentive secondary treatment system is used, at least 0.6 metres.	Yes The minimum separation required between the peak annual water-table and LAAs in sands (as found across the majority of the low-lying area) is 1.5 m (0.6 m with secondary treatment system). The peak annual water-table was encountered <1.5 m BGL at several locations across the Subject Site. In areas where separation to the peak annual water-table is <0.5m it is recommended lots be at least 1ha in size and have their building envelope (including LAA) filled with imported fill prior to subdivision approval to achieve a minimum of 0.5 m separation to groundwater. It shall be the responsibility of the future lot owner to achieve the minimum separation requirement between LAAs and the peak annual water-table, as this requirement is best achieved at a lot scale based on the preferred location of the LAA. Separation to the peak annual water-table may be achieved using imported fill and/or special design requirements as discussed in Section 6.

Table 4 continued.

Site Feature	Minimum Requirement	Requirement met
Land Application Area	A land application area should be provided for all development in accordance with tables 2 and 3 of this schedule for the disposal of sewage.	Yes LAAs shall be located in areas deemed suitable for LAAs (Figure 13). The location of the LAAs shall be confirmed upon final design of the development. LAAs shall be calculated in accordance with the Government Sewage Policy and AS/NZS 1547:2012 as discussed in Section 6.
	The land application area includes the area restricted to the distribution of treated sewage only and should be kept free of any temporary or permanent structures.	Yes The proposed LAAs shall be kept free of any temporary or permanent structures. The LAAs shall be placed in an area so that requirements are met. Site plans are to be forwarded to the City of Albany (CoA) and the Department of Health (DoH) prior to development approval.
	Activities within the land application area shall not interfere with the function of the current and future land application system and people should avoid potential contact with effluent residues. Unless allowed for in the design, the land application area) should: • not be built on or paved in a manner which precludes reasonable access; • not be subject to vehicular traffic (other than a pedestrian-controlled lawnmower); • not be subject to regular foot traffic such as pathways and clothes line areas; and • should be kept in a manner which enables servicing and maintenance of the disposal system.	Yes Future LAAs shall be placed a sufficient distance to areas that are utilised for activity or pedestrian traffic. The LAAs for each lot shall be placed in an area so that requirements are met. Site plans to be forwarded to CoA/DoH prior to Development Approval.
Gradient of the land application area	Where slope exceeds one in five (1:5), the land application area should be engineered to prevent run-off from the land application area. Surface contours should be provided on the site plan.	Yes The natural topography across the Subject Site does not exceed 1:5 grade. Natural and finished gradients of LAAs shall not exceed 1:5 gradient. Site plans to be forwarded to CoA/DoH prior to Development Approval.
Location of land application area within building envelope	Local government may approve the location of land application areas outside building envelopes where proposed location meets requirements outlined above.	Noted

6. Land Application Areas

In response to the site soil conditions depth to groundwater and environmental constraints of the site, it is recommended that LAAs for onsite effluent disposal be located within the areas deemed as suitable to receive effluent disposal as shown in Figure 13. Standard leach drains or irrigation systems are both suitable land application methods for the Subject Site depending on localised site constraints.

Standard leach drains may be utilised if there is an adequate depth of free draining soil and an adequate depth to the peak annual water-table from the base of the leach drains. In areas dominated by heavy clays, bedrock or high groundwater, standard leach drains are subject to failure because the rate of percolation of effluent through the soil is less than the effluent generation rate. In this instance, the most suitable system is an irrigation system in conjunction with a secondary treatment system. Irrigation systems operate both by soil absorption and by evapotranspiration from plants and therefore are less susceptible to failure. In addition, irrigation systems generally require less imported fill material to achieve the minimum separation to the peak annual water-table as they are installed much closer to the ground surface.

Typically, in irrigation systems, secondary treated effluent is applied by one of the following types of irrigation systems:

- Subsurface drip irrigation in which dripper lines are buried in the topsoil at shallow depth;
- Surface drip irrigation in which dosing lines are laid on prepared ground surface and covered in bark or mulch; and
- Spray irrigation system that distributes disinfected effluent (quality as per 5.4.2.5.1 of AS/NZS 1547) over the surface of the ground (AS1547:2012).

Irrigation systems shall be designed to ensure that effluent is not applied at rates which exceed the absorption capacity of the soil. Care shall be taken to ensure that the application rate does not lead to:

- Adverse effects on soil properties and plant growth through excess salt accumulation in the root zone during extended dry periods;
- Harmful long-term environmental effects to the soil of the land application system or the adjacent surface water and groundwater; or
- Increased risk to public health from surface ponding in the land application area or channeling or seepage beyond the land application area.

Irrigation system shall be designed to promote evapotranspiration. Care shall be taken to ensure that the irrigation area is well planted with plant species that are:

- Water tolerant;
- Appropriate for the site conditions; and
- Planted at an appropriate density for effective evapotranspiration.

Secondary treatment systems are recommended when using irrigation systems due to the shallow nature of the system and the exposure of the effluent to the surface, which may pose a risk to health and the environment. Given the Subject Site is not located within a Sewage Sensitive Area, secondary treatment systems will not be required for LAAs utilising leach drains, given there is an adequate depth of free draining soil (>1.2 m) to ensure adequate distribution of effluent and an adequate separation to the peak annual water-table (>1.5 m) beneath the leach drain.

The size of the LAAs required on individual lots based on a single household (occupancy of 6 persons in a 5-bedroom house), is shown in Table 5. This has been determined in conjunction with loading rates outlined in

Table L1 in AS/NZS 1547:2012. The required size of the LAAs based on a single household, are achievable at the Subject Site with the smallest proposed lot size being 10,000 m^2. The soil types encountered at The Subject Site were found to be consistent with Soil Category 3 – Loams and Soil Category 4 – Sand loams corresponding to required LAAs of 429 – 620 m^2 using primary treatment or 225 – 257 m^2 using secondary treatment, both of which are achievable within the proposed lots.

Table 5: Land application areas for single houses (GSP, 2019a)

Soil category	Soil texture	Land Application Area (m^2)	
		Primary treatment (Includes area required for setbacks)	Secondary treatment (Excludes setbacks)
1	Gravels and sands	339	180
2	Sandy loams	339	180
3	Loams	429	225
4	Clay loams	620	257
5	Light clays	1,156	300
6	Medium to heavy clays	Special design	450

Upon final placement of the house and permanent infrastructure, the new lot owner is to provide all applicable information (e.g., land application area, on-site effluent system etc.) to the City of Albany and Department of Health for approval prior to installation of the onsite effluent disposal system (as shown on Figure 13).

This assessment does not include meeting the objectives of the Code of Practice for On-site Sewerage management, with detailed loadings and design capacity of the effluent system to be provided by the owner (to the relevant agencies) at the time of building approval stages.

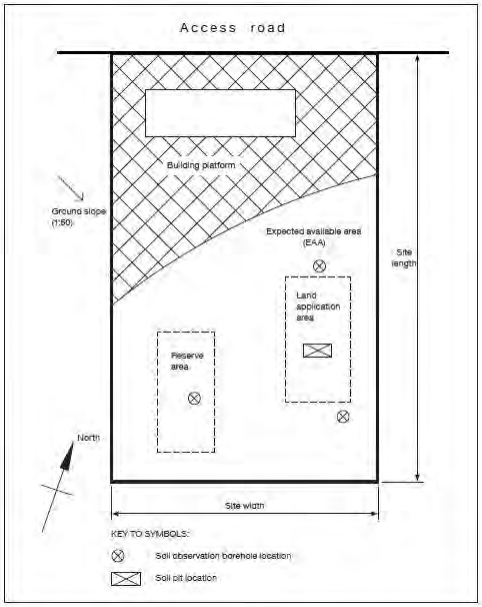


Figure 7: Generalised site plan for a single lot (AS/AZS 1547: 2012)

7. References

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Appendix A

Site Soil Investigation (Great Southern Geotechnics,2021)

GREAT SOUTHERN GEOTECHNICS

CONSTRUCTION MATERIALS TESTING

Site Investigation

Report 5175/1

Monday, 25 October 2021

Bio Diverse Solutions

Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

Presented By: A.Purdie

Great Southern Geotechnics Pty Ltd

5a 209 Chester Pass Rd, Albany WA

GREAT SOUTHERN GEOTECHNICS

1.0 INTRODUCTION

As authorised by Bio Diverse Solutions an investigation for the proposed Development on Lot 124 & 125 South Cst Hwy, Marbellup WA 6330 was performed on the 19/10/2021

2.0 GENERAL

The intent of the investigation was to determine the following:

- In Situ soil types and profiles, and
- Depth of groundwater

3.0 SITE INVESTIGATION

Site conditions and test pit locations were recorded and are displayed in Appendix A - Maps.
Test pits logs/ soil profiles are noted in Appendix B - Test Pit Logs

The field investigation consisted of 22 Boreholes excavated on-site to depths of up to 2 meters using a Kubota KX41-3V mini excavator with a 300mm Auger.

Test pits were spread across the the proposed development as locations specified by the client.

All soil layers encountered were visually assessed and classified on-site.

IMPORTANT NOTE: The test pits have been spread so that they are representative of the subsurface materials across the intended reconstruction area, however, soil conditions may change dramatically over short distances and our investigations may not locate all soil variations across the site.

4.0 LABORATORY TESTING

N/A

This report and associated documentation was undertaken for the specific purpose described in the report and shall not be relied on for other purposes.

This report was prepared solely for the use by Bio Diverse Solutions any reliance assumed by other parties on this report shall be at such parties own risk.

Appendix A

Maps

Figure 1

Test Pits 1 to 22

Test Pit Locations

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 5175
Client: Bio Diverse Solutions
Project: Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

Appendix B

Test Pit Logs

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 1 of 44
5175/1	1	5175G1	

Client:	Bio Diverse Solutions	**Date Commenced**	19/10/2021	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330			**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	A.Purdie	**Excavation Method :**	300mm Auger
Location:	34°59'59.69"S 117°47'52.75"E			**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ ground level.		
0 - 400	400	**(Topsoil) SAND with silt:** Grey/brown, fine to medium.	W	L-M				
		Contains roots and root fibres.						
400 - 1500	1100	**SAND with silt:** Grey to light grey, fine to medium.	W	L-MD				
1500 - 2000	500	**SAND with silt:** Light brown, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.1

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 2 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 3 of 44
5175/1	2	5175G2	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'57.79"S 117°47'40.05"E	A.Purdie	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 50mm below existing ground level.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
200 - 1350	1150	**SAND with silt**: Grey to light grey, fine to medium.	M-W	L-MD				
1350 - 2000	650	**SAND with silt:** Dark grey/black, fine to medium. (*Refer to comments)	M	MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Moderately cemented from 1550 to 2000	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.2

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 4 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 5 of 44
5175/1	3	5175G3	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'2.80"S 117°47'39.61"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 1020mm below existing ground level.		
0 - 120	120	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
120 - 500	380	**SAND with silt**: Grey to light grey, fine to medium.	M	L-MD				
500 - 1200	700	**Sandy GRAVEL:** Dark/light brown, fine to coarse, sub-rounded to sub-angular.	M	D-VD				
		Fine to medium grained sand. (*Refer to comments)						
1200 - 2000	800	**SANDY CLAY:** Low to medium plasticity, light brown/grey with red and orange mottle.	M	F-St				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Layer excavates as a Sandy GRAVEL, however consists of a conglomerate formation.	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.3

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 6 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 7 of 44
5175/1	4	5175G4	

Client:	Bio Diverse Solutions	**Date Commenced**		**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330		19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**		**Excavation Method :**	300mm Auger
Location:	35° 0'11.19"S 117°47'38.64"E		A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 350mm below existing ground level.		
0 - 160	160	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
160 - 1050	890	**SAND with silt**: Grey to light grey, fine to medium.	M	W				
1050 - 1680	630	**Sandy GRAVEL:** Dark/light brown, fine to coarse, sub-rounded to sub-angular.	M	MD	PC			
		Fine to medium grained sand.						
1680 - 2000	320	**SAND:** Light brown/grey, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.4

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 8 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 9 of 44
5175/1	5	5175G5	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'56.34"S 117°47'51.54"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
0 - 220	220	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD		Water table encountered @ 50mm below existing ground level.		
		Contains roots and root fibres.						
220 - 2000	1780	**SAND with silt:** Grey to light grey, fine to medium.	M-W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.5

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 10 **of** 44

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 11 of 44
5175/1	6	5175G6	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'59.96"S 117°48'22.33"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 250	250	**(Topsoil) SAND with silt:** Grey, fine to medium.	M-W	L-MD				
		Contains roots and root fibres.						
250 - 325	75	**Sandy GRAVEL:** Brown/orange, fine to medium, sub-rounded to sub-angular.	M	MD				
		Fine to medium grained sand.						
325 - 780	455	**Sandy CLAY:** Low to medium plasticity, yellow.	M	F-St				
		Fine to medium grained sand. (*Refer to comments)						
780 - 2000	1220	**Sandy CLAY:** Dark brown/red with yellow and grey mottle.	M	F-St				
		fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains fine to medium, sub-rounded to sub-angular gravel to 450mm.	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.6

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 12 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 13 of 44
5175/1	7	5175G7	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'55.20"S 117°48'23.90"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
180 - 400	220	**Gravelly SAND:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres. (*Refer to comments)						
400 - 2000	1600	**Clayey SAND with gravel:** Low to medium plasticity, light brown, fine to medium.	M	F				
		Fine to coarse, sub-rounded to sub-angular gravel.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.7

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 14 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 15 of 44
5175/1	8	5175G8	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°59'57.21"S 117°48'17.10"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt and GRAVEL:** Grey, fine to medium.	M	L-MD				
		Fine to coarse, sub-rounded to sub-angular gravel.						
		Contains roots and root fibres.						
180 - 500	320	**Sandy GRAVEL:** Light brown/grey, fine to coarse, sub-rounded to sub-angular.	M	MD				
		Fine to medium grained sand. (*Refer to comments)						
500 - 1600	1100	**Clayey SAND with gravel:** Low to medium plasticity, light brown, fine to medium.	M	MD				
		Fine to coarse, sub-rounded to sub-angular gravel.						
1600 - 2000	400	**Silty SAND with clay:** Low plasticity, pale yellow with white mottle.	M	MD				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.8

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 16 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 17 of 44
5175/1	9	5175G9	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'5.39"S 117°48'23.06"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 140	140	**(Topsoil) Gravelly SAND:** Dark grey/brown, fine to medium.	M	L-MD				
		Fine to medium, rounded to sub-angular gravel.						
		Contains roots and root fibres.						
140 - 420	280	**Sandy CLAY with gravel:** Low to medium plasticity,	M	F				
		brown/orange with red and white mottle.						
		Fine to medium, rounded to sub-angular gravel.						
420 - 2000	1580	**Sandy CLAY:** Low to medium plasticity, red/brown with yellow and grey mottle.	M	F-St				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.9

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 18 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 19 of 44
5175/1	10	5175G10	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'13.73"S 117°48'23.43"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 120	120	**(Topsoil) Sandy GRAVEL:** Dark brown, fine to coarse, sub-rounded to sub angular.	M	MD				
		Fine to medium grained sand. (*Refer to comments)						
120 - 350	230	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD				
		Fine to medium grained sand.						
350 - 670	320	**Sandy CLAY:** Medium plasticity, yellow with red mottle.	M	St				
		Fine to medium grained sand.						
670 - 1200	530	**Sandy CLAY:** Low to medium plasticity, brown/red with white mottle.	M	F-St				
		Fine to medium grained sand.						
1200 - 200	800	**Silty SAND with clay:** Low plasticity, pale yellow with white mottle.	M	F-St				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.10

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 20 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 21 of 44
5175/1	11	5175G11	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'16.44"S 117°48'18.40"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 170	170	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
170 - 330	160	**SAND with silt:** Grey, fine to medium.	M	L-MD				
330 - 1150	820	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular.	M	D	WC			
		Fine to medium grained sand.						
1150 - 2000	850	**Sandy CLAY:** Low to medium plasticity,brown/orange.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.11

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 22 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Reort No	Test Pit No.	Sample No.	Sheet 23 of 44
5175/1	12	5175G12	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'16.70"S 117°48'8.39"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 850mm below existing ground level.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
200 - 800	600	**SAND with silt:** Grey/light grey, fine to medium.	M	L-MD				
800 - 1000	200	**Gravelly SAND:** Brown to dark brown, fine to medium.	M	MD				
		Fine to coarse, sub-rounded to sub-angular gravel.						
1000 - 2000	1000	**Clayey, Silty SAND:** Low plasticity, light brown/orange.	M-W	L-MD				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.12

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 24 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 25 of 44
5175/1	13	5175G13	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'10.14"S 117°48'3.72"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 400mm below existing ground level.		
0 - 120	120	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
120 - 460	340	**SAND with silt:** Light grey, fine to medium.	M	L-MD				
460 - 980	520	**Sandy GRAVEL:** Brown/orange, fine to coarse, sub-rounded to sub-angular.	M	D	MC			
		Fine to medium grained sand.						
980 - 1580	600	**Sandy CLAY:** Low to medium plasticity, brown/orange with red mottle.	M	F				
		Fine to medium grained sand.						
1580 - 2000	420	**Silty SAND with clay:** Low plasticity, pale yellow with white mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.13

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 5175/1
Client: Bio Diverse Solutions
Project: Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 27 of 44
5175/1	14	5175G14	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'8.35"S 117°48'12.72"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 800mm below existing ground level.		
0 - 300	300	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
300 - 720	420	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
720 - 990	270	**Sandy CLAY with gravel:** Medium plasticity, light brown/grey with red and orange mottle	W	S-F				
		Fine to medium , sub-rounded to sub-angular gravel.						
		Fine to medium grained sand.						
990 - 2000	1010	**Sandy CLAY:** Medium plasticity, red with grey and orange mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.14

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 28 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 29 of 44
5175/1	15	5175G15	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'13.50"S 117°47'58.91"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	M	L-MD				
		Contains roots and root fibres.						
200 - 810	610	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
810 - 1550	740	**Sandy CLAY:** Low plasticity, brown/orange with red mottle.	M	F				
		Fine to medium grained sand.						
1550 - 2000	450	**Silty SAND with trace clay:** Low plasticity, pale yellow with white mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.15

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 30 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 31 of 44
5175/1	16	5175G16	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'19.95"S 117°47'57.96"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ ground level.		
0 - 160	160	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
160 - 750	590	**SAND with silt:** Grey, fine to medium.	M	L-MD				
750 - 1250	500	**SAND with silt:** Light grey, fine to medium.	W	L-MD				
1250 - 1700	450	**SAND with silt:** Dark grey, fine to medium.	W	L-MD				
1700 - 2000	300	**SAND with silt:** Dark grey, fine to medium.	M	MD-D	WC			

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.16

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 32 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 33 of 44
5175/1	17	5175G17	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'1.30"S 117°48'1.12"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
200 - 760	560	**SAND with silt:** Light grey, fine to medium.	M	L-MD				
760 - 1300	540	**SAND with silt:** Brown, fine to medium.	M	VD	WC			
1300	0	**REFUSAL**						

Samples Taken			
	Target Depth		
	Cave In		
	Refusal	✓	1300
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.17

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 34 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 35 of 44
5175/1	18	5175G18	

Client:	Bio Diverse Solutions	**Date Commenced**		**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330		19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**		**Excavation Method :**	300mm Auger
Location:	34°59'57.11"S 117°48'5.08"E		A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 130	130	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
130 - 920	790	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular.	M	D	MC			
		Fine to medium grained sand.						
920 - 2000	1080	**Silty sandy CLAY:** Low to medium plasticity, light brown with grey mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet N/A - Not Applicable N/D - Not Determined
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

Test Pit No.18

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 5175/1
Client: Bio Diverse Solutions
Project: Lot 124 & 125 South Cst Hwy, Marbellup WA 6330

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 37 of 44
5175/1	19	5175G19	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'8.81"S 117°47'54.01"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 250	250	**(Topsoil) SAND with silt:** Grey, fine to medium.	M	L-MD				
250 - 740	490	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand. (*Refer to comments)						
740 - 2000	1260	**Silty sandy CLAY:** Low to medium plasticity, light brown with red and white mottle.	M	F				
		Fine to medium grained sand.						

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
* Contains cobbles and boulders	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.19

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 38 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 39 of 44
5175/1	20	5175G20	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'13.22"S 117°47'51.81"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 150mm below existing ground level.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
200 - 1100	900	**SAND with silt:** Light grey, fine to medium.	M-W	L-MD				
1100 - 1200	100	**SAND with silt:** Dark brown, fine to medium.	M	MD	MC			
1200 - 2000	800	**SAND with silt:** Light brown, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.20

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 40 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 41 of 44
5175/1	21	5175G21	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'20.29"S 117°47'50.80"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ ground level.		
0 - 300	300	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
300 - 900	600	**SAND with silt:** Dark grey/grey, fine to medium.	W	L-MD				
900 - 1600	700	**SAND with silt:** Light grey, fine to medium.	W	L-MD				
1600 - 2000	400	**SAND with silt:** Brown, fine to medium.	W	L-MD				

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented
F - Firm	MD - Medium Dense	L - Low	
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented
VSt - Very Stiff	VD - Very Dense	H - High	
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented
		EH - Extremely High	

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

w1726_5175G'1-22_0

Test Pit No.21

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 42 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Report No	Test Pit No.	Sample No.	Sheet 43 of 44
5175/1	22	5175G22	

Client:	Bio Diverse Solutions	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	19/10/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0578	**Logged By**	**Excavation Method :**	300mm Auger
Location:	35° 0'16.39"S 117°47'46.39"E	A.Purdie	**Position:**	See site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						Water table encountered @ 550mm below existing ground level.		
0 - 300	300	**(Topsoil) SAND with silt:** Dark grey, fine to medium.	W	L-MD				
		Contains roots and root fibres.						
300 - 1600	1300	**SAND with silt:** Grey , fine to medium.	W	L-MD				
1600 - 2000	400	**SAND with silt:** Dark grey/ black , fine to medium.	W	L-MD	PC			

Samples Taken			
	Target Depth	✓	2000
	Cave In		
	Refusal		
Comments	Near Refusal		
	Flooding		
	Lack of Reach		

Cohesive	Non-Cohesive	Rock	Cementation	General
VS - Very Soft	VL - Very Loose	EL - Extremely Low	IN - Indurated	D - Dry M - Moist W - Wet
S - Soft	L - Loose	VL - Very Low	PC - Poorly Cemented	
F - Firm	MD - Medium Dense	L - Low		N/A - Not Applicable
St - Stiff	D - Dense	M - Medium	MC - moderately Cemented	
VSt - Very Stiff	VD - Very Dense	H - High		N/D - Not Determined
H - Hard	CO - Compact	VH - Very High	WC - Well Cemented	
		EH - Extremely High		

w1726_5175G'1-22_0

Test Pit No.22

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 5175/1 **Client:** Bio Diverse Solutions **Project:** Lot 124 & 125 South Cst Hwy, Marbellup WA 6330	**Sheet** 44 **of** 44

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GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

COLOURS

BLACK - BROWN (bk)	BLUE (bl)	ORANGE (or)
BROWN (br)	BLUE - GREEN (bl/gr)	RED (rd)
GREY - BROWN (gy/br)	GREEN (gr)	RED - BROWN (rd/br)
GREY (gy)	YELLOW (yl)	PINK (pk)
BLUE - GREY (bl/gy)	YELLOW - BROWN (yl/br)	PURPLE (pr)

MOISTURE CONDITION OF SOIL

TERM	DESCRIPTION
Dry	Cohesive soils; hard and friable or powdery, well dry of plastic limit. Granular soils; cohesionless and free-running.
Moist	Soil feels cool, darkened in colour. Cohesive soils can be moulded. Granular soils tend to cohere.
Wet	Soil feels cool, darkened in colour. Cohesive soils usually weakened and free water forms on hands when handling. Granular soils tend to cohere and free water forms on hands when handling.

PARTICLE SHAPES

ANGULAR	SUB-ANGULAR	SUB-ROUNDED	ROUNDED

PARTICLE SIZES

BOULDERS	COBBLES	COARSE GRAVEL	MEDIUM GRAVEL	FINE GRAVEL	COARSE SAND	MEDIUM SAND	FINE SAND	SILT	CLAY
>200mm	63-200mm	20-63mm	6-20mm	2.36-6mm	0.6-2.36mm	0.2-0.6mm	0.075-0.2mm	0.002-0.075mm	<0.002mm

GRAIN SIZE

SOIL TYPE (ABBREV.)	CLAY (CL)	SILT (SI)	← SAND (SA) →		← GRAVEL (GR) →			COBBLES (CO)
SIZE	< 2µm	2-75µm	Fine 0.075-0.2mm	Medium 0.2-0.6mm	Coarse 0.6-2.36mm	Fine 2.36-6mm	Medium 6-20mm	Coarse 20-63mm	63-200mm
SHAPE & TEXTURE	Shiny	Dull	← angular or sub angular or sub rounded or rounded →						
FIELD GUIDE	Not visible under 10x	Visible under 10x	Visible by eye	Visible at < 1m	Visible at < 3m	Visible at < 5m	Road gravel	Rail ballast	Beaching

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

CLASSIFICATION CHART

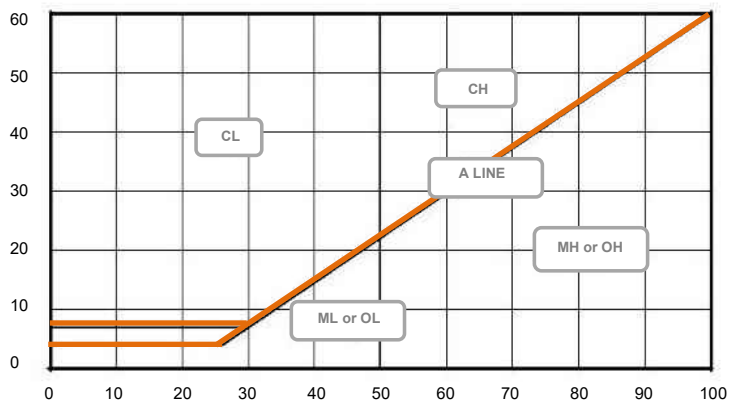
FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60mm and basing fractions on estimated mass)				GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% of material less than 63 mm is larger than 0.075 mm	GRAVELS More than 50% of coarse fraction is larger than 2.36mm	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	GW	Well graded gravels, gravel-sand mixtures, little or no fines
			Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength	GP	Poorly Graded gravels and gravel-sand mixtures, little or no fines, uniform gravels
		GRAVELS WITH FINES (Appreciable amount of fines)	Dirty' materials with excess of non-plastic fines, zero to medium dry strength	GM	Silty gravels, gravel-sand-silt mixtures
			'Dirty' materials with excess of plastic fines, medium to high dry strength	GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction is smaller than 2.36mm	CLEAN SANDS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate sizes, not enough fines to bind coarse grains, no dry strength	SW	Well graded sands, gravelly sands, little or no fines
			Predominantly one size or range of sizes with some intermediate sizes missing, not enough fines to bind coarse grains, no dry strength '	SP	Poorly graded sands and gravelly sands; little or no fines, uniform sands
		SANDS WITH FINES (Appreciable amount of fines)	Dirty' materials with excess of non-plastic fines, zero to medium dry strength	SM	Silty sands, sand-silt mixtures
			'Dirty' materials with excess of plastic fines, medium to high dry strength	SC	Clayey sands, sand-clay mixtures

FINE GRAINED SOILS More than 50% of material less than 63 mm is smaller than 0.075 mm	IDENTIFICATION PROCEDURES ON FRACTIONS <0.2mm					
		DRY STRENGTH	DILATANCY	TOUGHNESS		
	SILTS AND CLAYS Liquid limit less than 50	None to low	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands with low plasticity. Silts of low to medium Liquid Limit.
		Medium to high	None to very slow	Medium	CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays.
		Low to medium	Slow	Low	OL	Organic silts and organic silt-clays of low to medium plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Low to medium	Slow to none	Low to medium	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, silts of high Liquid Limit.
		High to very high	None	High	CH	Inorganic clays of high plasticity.
		Medium to high	None to very slow	Low to medium	OH	Organic clays of high plasticity

HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture	Pt	Peat and other highly organic soils

PLASTICITY CHART

For laboratory classification of fine grained soils



GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

PLASTICITY

DESCRIPTIVE TERM	OF LOW PLASTICITY	OF MEDIUM PLASTICITY	OF HIGH PLASTICITY
Range Of Liquid Limit (%)	≤ 35	> 35 ≤ 50	> 50

DESCRIPTION OF ORGANIC OR ARTIFICIAL MATERIALS

PREFERRED TERMS	SECONDARY DESCRIPTION
Organic Matter	Fibrous Peat/ Charcoal/ Wood Fragments/ Roots (greater than approximately 2mm diameter)/ Root Fibres (less than approximately 2mm diameter)
Waste Fill	Domestic Refuse/ Oil/ Bitumen/ Brickbats/ Concrete Rubble/ Fibrous Plaster/ Wood Pieces/ Wood Shavings/ Sawdust/ Iron Filings/ Drums/ Steel Bars/ Steel Scrap/ Bottles/ Broken Glass/ Leather

CONSISTENCY - Cohesive soils

TERM	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD
Symbol	VS	S	F	St	VSt	H
Undrained Shear Strength (kPa)	< 12	12 - 25	25 - 50	50 - 100	100 - 200	> 200
SPT (N) Blowcount	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	> 30
Field Guide	Exudes between the fingers when squeezed	Can be moulded by light finger pressure	Can be moulded by strong finger pressure	Cannot be moulded by fingers. Can be indented by thumb nail	Can be indented by thumb nail	Can be indented with difficulty with thumb nail

CONSISTENCY - Non-cohesive soils

TERM	VERY LOOSE	LOOSE	MEDIUM DENSE	DENSE	VERY DENSE	COMPACT
Symbol	VL	L	MD	D	VD	CO
SPT (N) Blowcount	0 - 4	4 - 10	10 - 30	30 - 50	50 - 100	> 50/150 mm
Density Index (%)	< 15	15 - 35	35 - 65	65 - 85	85 - 95	> 95
Field Guide	Ravels	Shovels easily	Shovelling very difficult	Pick required	Pick difficult	Cannot be picked

MINOR COMPONENTS

TERM	TRACE	WITH
% Minor Component	Coarse grained soils: < 5% Fine grained soils: <15%	Coarse grained soils: 5 - 12% Fine grained soils: 15 - 30%
Field Guide	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary components	Presence easily detectable by feel or eye, soil properties little different to general properties of primary component

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

GEOLOGICAL ORIGIN

	TYPE	DETAILS
TRANSPORTED SOILS	Aeolian Soils	Deposited by wind
	Alluvial Soils	Deposited by streams and rivers
	Colluvial Soils	Deposited on slopes
	Lacustrine Soils	Deposited by lakes
	Marine Soils	Deposited in ocean, bays, beaches and estuaries
FILL MATERIALS	Soil Fill	Describe soil type, UCS symbol and add 'FILL'
	Rock Fill	Rock type, degree of weathering, and word 'FILL'.
	Domestic Fill	Percent soil or rock, whether pretrucible or not.
	Industrial Fill	Percent soil, whether contaminated, particle size & type of waste product, ie brick, concrete, metal

STRENGTH OF ROCK MATERIAL

TERM	SYMBOL	IS(50)	(MPA)	FIELD GUIDE TO STRENGTH
Extremely Low	EL	≤0.03		Easily remoulded by hand to a material with soil properties.
Very Low	VL	>0.03	≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxle sample by hand. Pieces up to 3 cm thick can be broken by finger pressure.
Low	L	>0.1	≤0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium	M	>0.3	≤1.0	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High	H	>1	≤3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High	VH	>3	≤10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High	EH	>10		Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

ROCK MATERIAL WEATHERING CLASSIFICATION

TERM	SYMBOL	DEFINITION
Residual Soil	RS	Soil developed on extremely weathered rock; the mass structure and substance fabric are no longer evident; there is a large change in volume but the soil has not been significantly transported
Extremely Weathered Rock	XW	Rock is weathered to such an extent that it has 'soil' properties, i.e. it either disintegrates or can be remoulded, in water.
Distinctly Weathered Rock	DW	Rock strength usually changed by weathering. Rock may be highly discoloured, usually be iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathering products in pores.
Slightly Weathered Rock	SW	Rock is slightly discoloured but shows little or no change of strength from fresh rock.
Fresh Rock	FR	Rock shows no sign of decomposition or staining.

SITE SOIL EVALUATION

Lot 9001 Lower Denmark Road

Cuthbert, WA 6330

01/05/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

Title: Site Soil Evaluation – Lot 9001 (No. 688) Lower Denmark Road, Cuthbert WA

Author (s): Chiquita Cramer

Reviewer (s): A. Tucker and M. Wearing

Job No.: HD063-002

Client: Barry Panizza

REVISION RECORD

Revision	Summary	Revised By	Date
Draft ID 18/04/2024	Internal QA Review	C. Cramer	18/04/2024
Draft ID 18/04/2024	Technical review	A.Tucker	18/04/2024
Final ID 01/05/2024	Final Report issued to client	A.Tucker	01/05/2024

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ABN 46 643 954 929

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1. Introduction

Bio Diverse Solutions (BDS) was commissioned by Barry Panizza (the client) to conduct a Site Soil Evaluation (SSE) to determine onsite effluent disposal suitability at Lot 9001 (No. 688) Lower Denmark Road, Cuthbert, herein referred to as the Subject Site. This SSE has been prepared to support and guide a proposed local planning scheme amendment and subsequent subdivision. This report details the site soils under late winter conditions and suitability of the site for effluent disposal in relation to the planning proposal.

1.1. Alignment to Legislation, Policy and Guidelines

Bio Diverse Solutions has prepared this report aligned to the following legislation:

- *Government Sewerage Policy (2019);*
- *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations (1974);*
- *Health (Miscellaneous Provisions) Act 1911* and *Public Health Act 2016;*
- *Country Area Water Supply Act 1947;*
- Australian Standard (AS)1547:2012; and
- State Planning Policy 2.9.

1.2. Suitable Qualified Hydrologist

This SSE has been prepared by Chiquita Cramer, who has 15 years of experience working as a hydrologist and hydrogeologist.

Chiquita Cramer has the following tertiary qualifications:

- Bachelor of Science in Natural Resource Management (University of Western Australia); and
- Graduate Certificate in Hydrogeology (University of Western Australia).

Chiquita worked as a hydrologist and senior hydrologist at JDA Consultant Hydrologists in Perth for 8 years, during this time she also completed a Graduate Certificate in Hydrogeology. In 2017 she joined Bio Diverse Solutions (BDS) to provide expertise in hydrology and hydrogeology to the company. Chiquita's experience includes preparation of local and urban water management strategies, hydrological and hydraulic investigations, surface water and groundwater monitoring reports, hydrogeological reports and site soil evaluations for onsite disposal suitability. Chiquita has successfully completed numerous SSE reports for a range of developments at various planning stages. Chiquita also attended a workshop on SSE reporting organised by the Department of Health in 2021.

1.3. Location

The Subject Site is defined as Lot 9001 (No. 688) Lower Denmark Road, Cuthbert WA within the City of Albany. The site comprises of ~107 ha and is bound by Lower Denmark Road to the south, rural residential lots to the north and the east, and agricultural land to the west and northeast. The location of the Subject Site is shown in Figure 1.

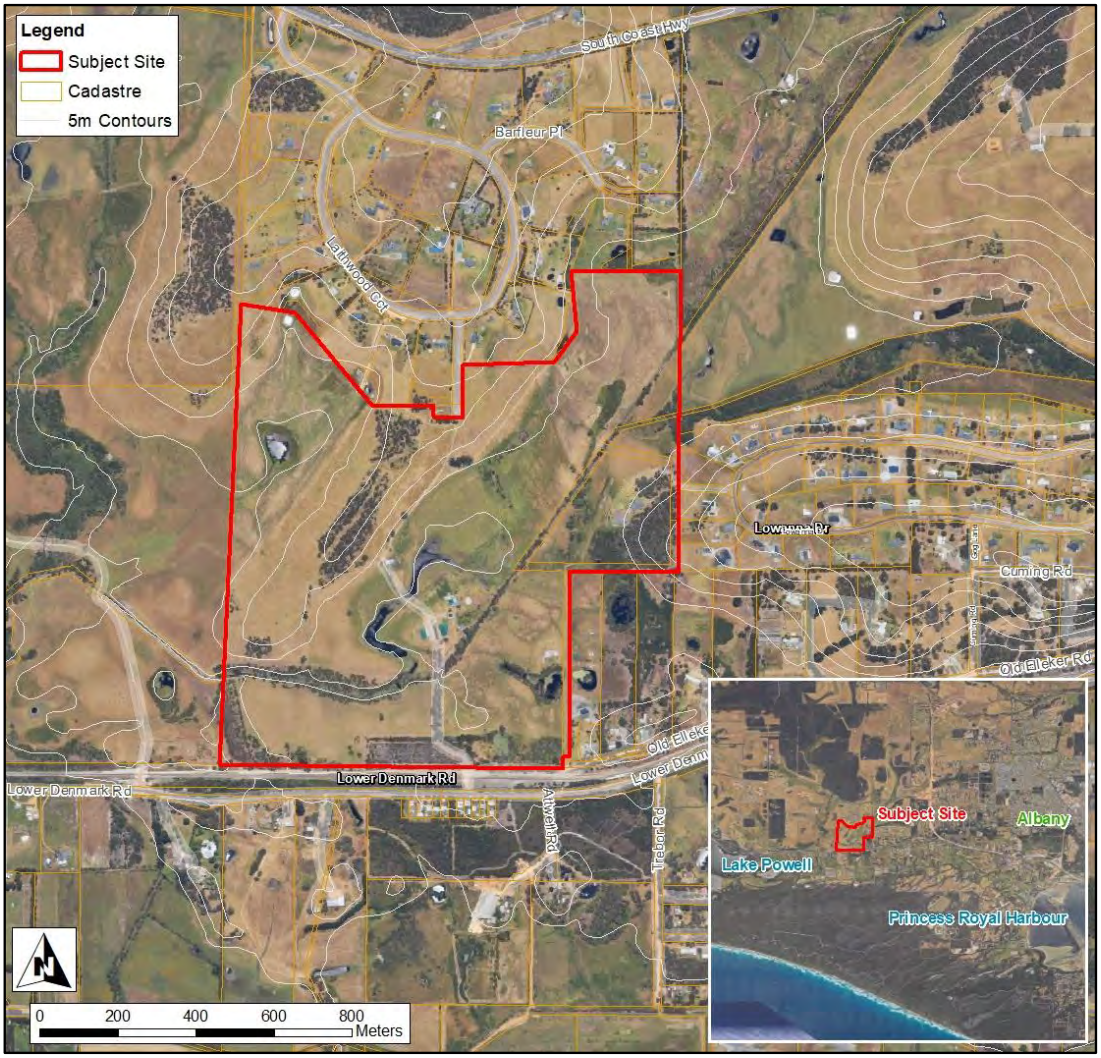


Figure 1: Location plan

2. **Development Proposal**

The Subject Site is zoned as *'General Agriculture'* under the City of Albany's Local Planning Scheme No. 1 (DPLH, 2014). It is proposed the Subject Site be rezoned to '*Rural residential'* and *'Rural smallholdings'* and forms part of a larger re-zoning area that includes Lots 124 and 125 South Coast Highway to the northeast of the Subject Site. The proposed zoning plan for the site is shown in Figure 2.

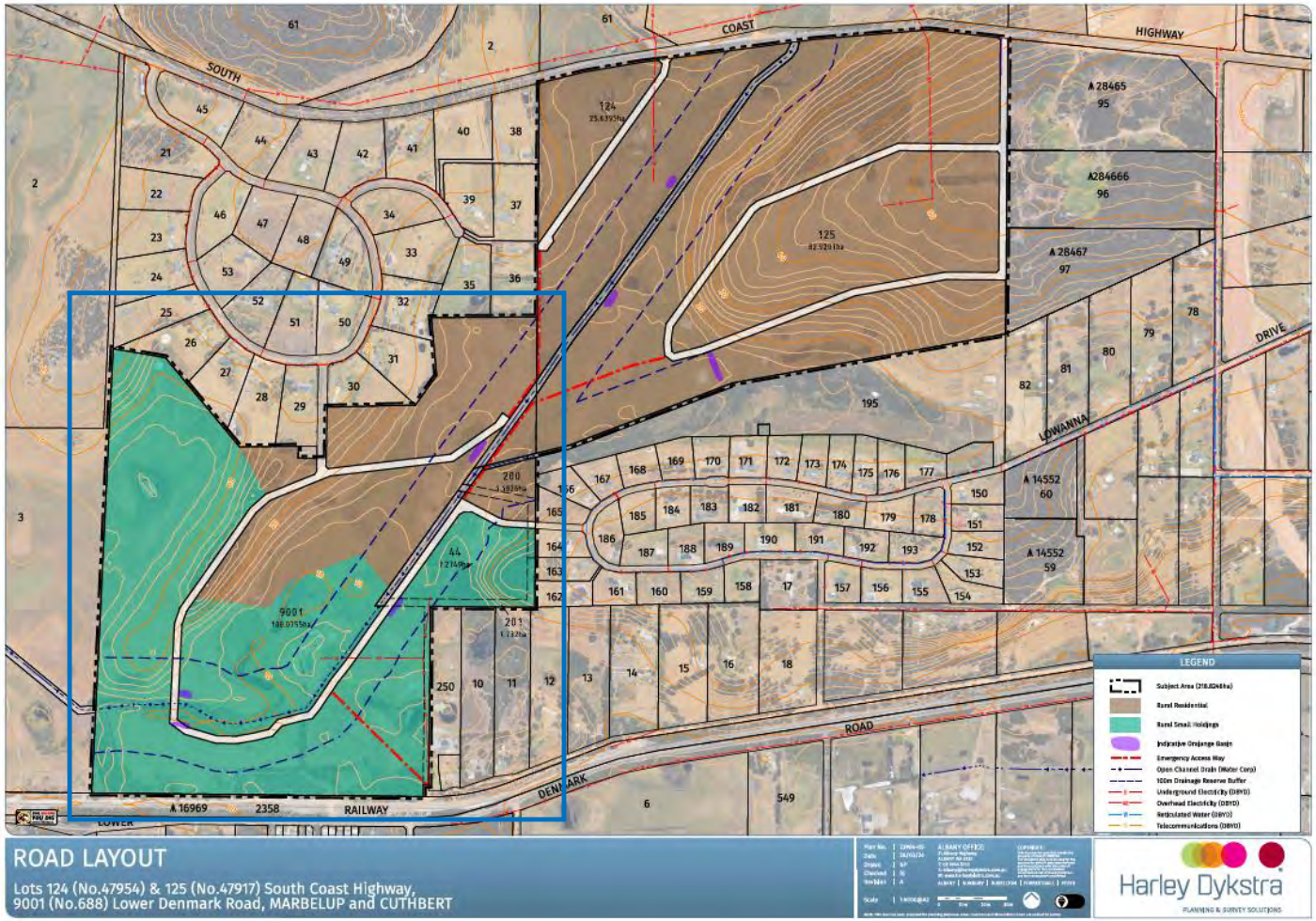


Figure 2: Zoning plan concept plan (Harley Dykstra, 2024). Note Subject Site area depicted by blue square.

3. Desktop Assessment

3.1. Topography and Slope

The Subject Site is generally low lying and flat, with an elevated ridgeline running from northeast to southwest in the central west of the site. The northwest corner and the central eastern edge of the Subject Site are also elevated. Elevation ranges from a high point of 32 mAHD in the northwest of the Subject Site to a low point of 10 mAHD in the central and southern portions of the site. Topographic contours are shown in Figure 3.

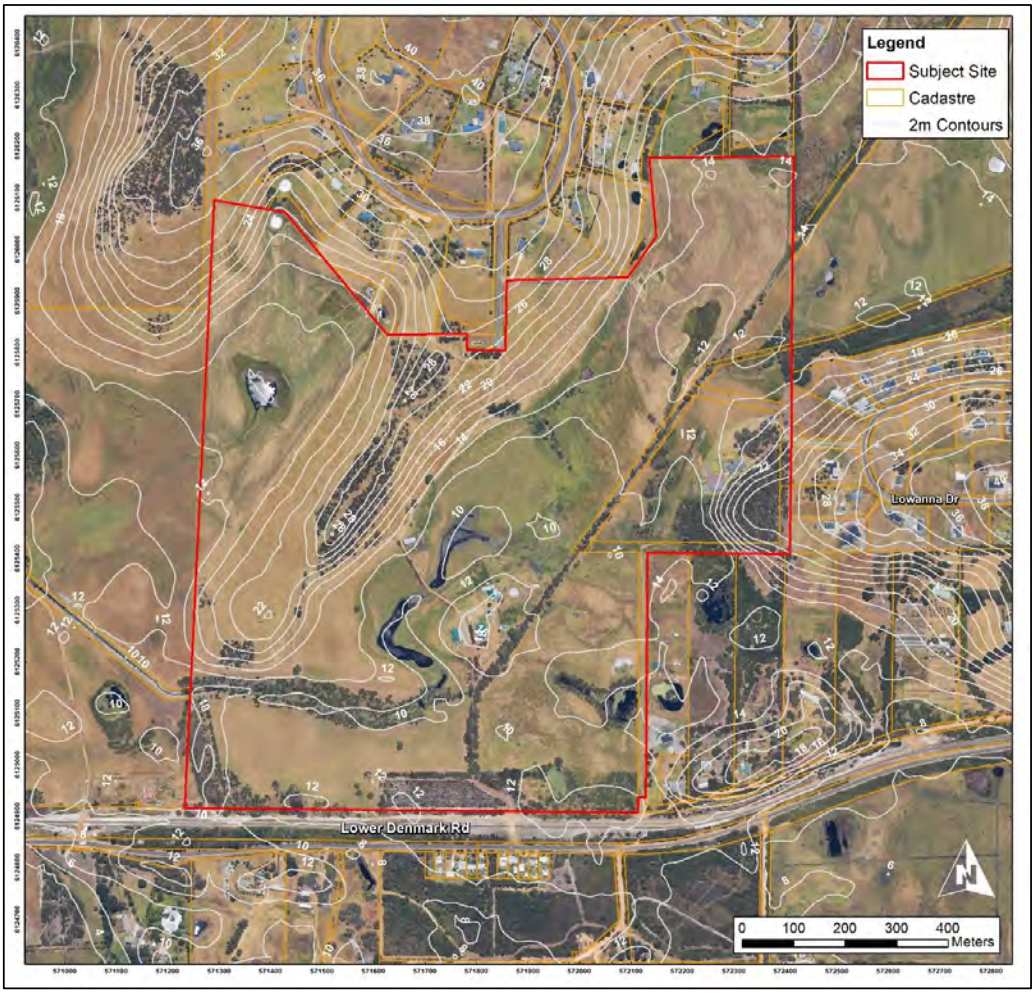


Figure 3: Topography

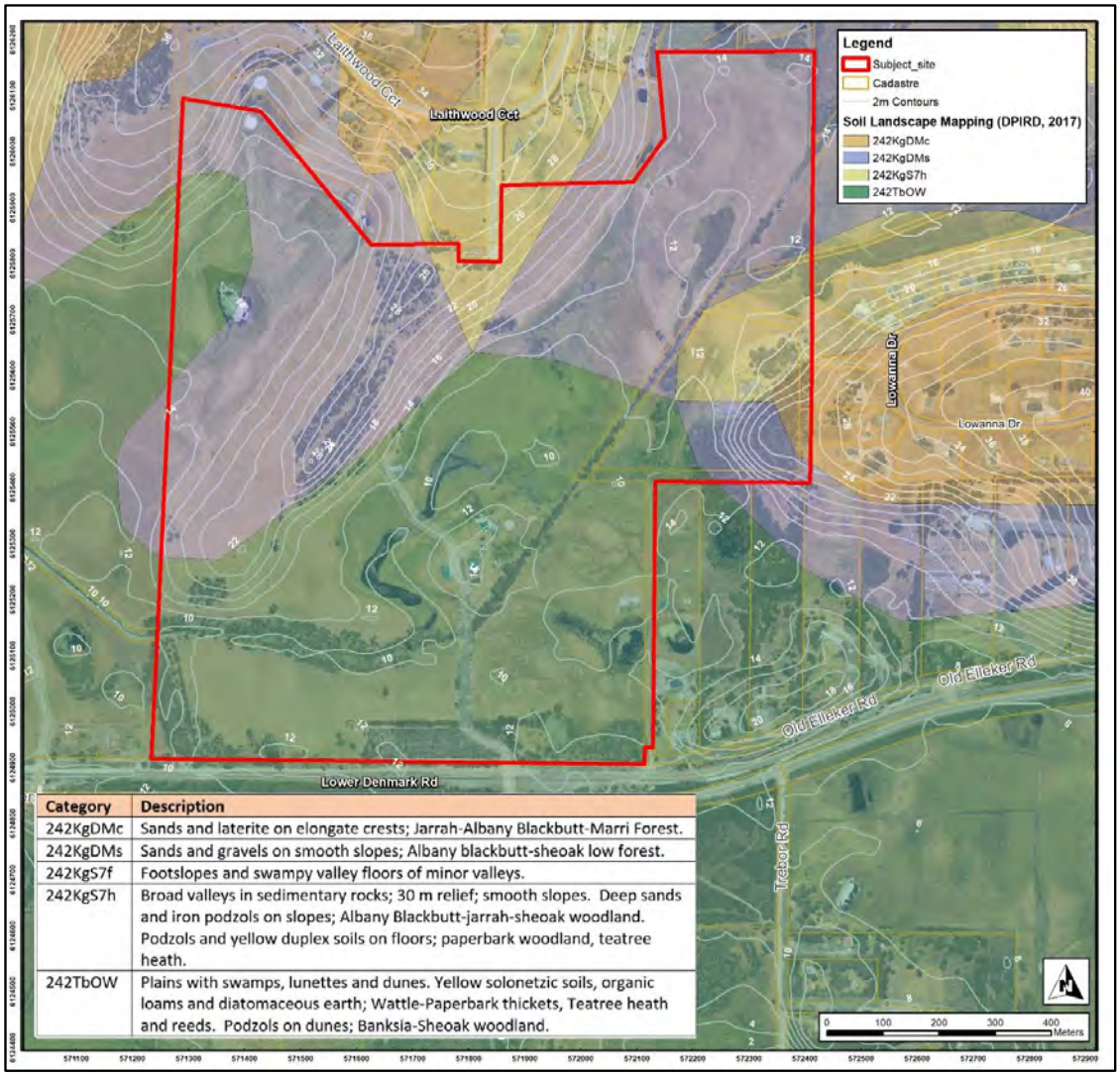
3.2. Geology and Soils

Soil Mapping – Zones (DPIRD, 2017a) shows the Subject Site is within the Albany Sandplain Zone (242) and described as '*Gently undulating plain dissected by a number of short rivers flowing south. Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels.*'

Soil mapping – Systems (DPIRD, 2018) shows the Subject Site lies within two soil systems being; the King System (242Kg) and the Torbay System (242Tb). The King System is described as *'Dissected siltstone and*

sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-sheoak woodland and mallee-heath.' and the Torbay System (242Tb) is described as '*Narrow swampy coastal plain, on the southern edge of the Albany sandplain Zone. Non-saline wet soil and pale deep sand. Sedgelands, ti-tree heath and wattie-paperbark thickets.'*.

The Subject Site is located within four sub-systems of the King and Torbay Systems as defined by DPIRD (2017b). The sub-systems are shown and described in Figure 4.



Category	Description
242KgDMc	Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri Forest.
242KgDMs	Sands and gravels on smooth slopes; Albany blackbutt-sheoak low forest.
242KgS7f	Footslopes and swampy valley floors of minor valleys.
242KgS7h	Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
242TbOW	Plains with swamps, lunettes and dunes. Yellow solonetzic soils, organic loams and diatomaceous earth; Wattle-Paperbark thickets, Teatree heath and reeds. Podzols on dunes; Banksia-Sheoak woodland.

Figure 4: Soil mapping

3.3. Surface Hydrology

Stormwater runoff from the southern and eastern portions of the site flows into Five Mile Creek. Five Mile Creek runs through the Subject Site from the northeast corner of the site to the southwest corner. The northwest corner of the Subject Site discharges to the southeast and ultimately Five Mile Creek further downstream. Five Mile Creek connects to Seven Mile Creek to the southwest of the Subject Site and Seven Mile Creek discharges to Lake Powell and ultimately the Torbay Inlet further west. The surface hydrology of the Subject Site is shown in Figure 5.

There are several less significant water bodies within the Subject Site including a series of relatively small wetlands in the south, constructed farm dams in the central portion of the site and seasonally inundated pockets in the lower lying areas. There is also a constructed drain in the southwest corner of the site which discharges to Five Mile Creek, as shown in Figure 5.

The Subject Site is located within one hydrographic catchment, being the Torbay Inlet, and one hydrographic sub-catchment being Seven Mile Creek (DWER, 2018a).

According to flow modelling conducted for Five Mile Creek by DWER (Pers Comms N.Sykora, 2023), the maximum daily flow rate recorded at the downstream end of Five Mile Creek within the Subject Site (DWER station No. 6031115), between 1997 and 2022 is 199,000m^3. This equates to 2.3 m^3/sec. According to data results for site No. 603115, the highest recorded level at the downstream end of Five Mile Creek within the Subject Site is 10.3 m AHD, which was recorded on the 30th August 2001.

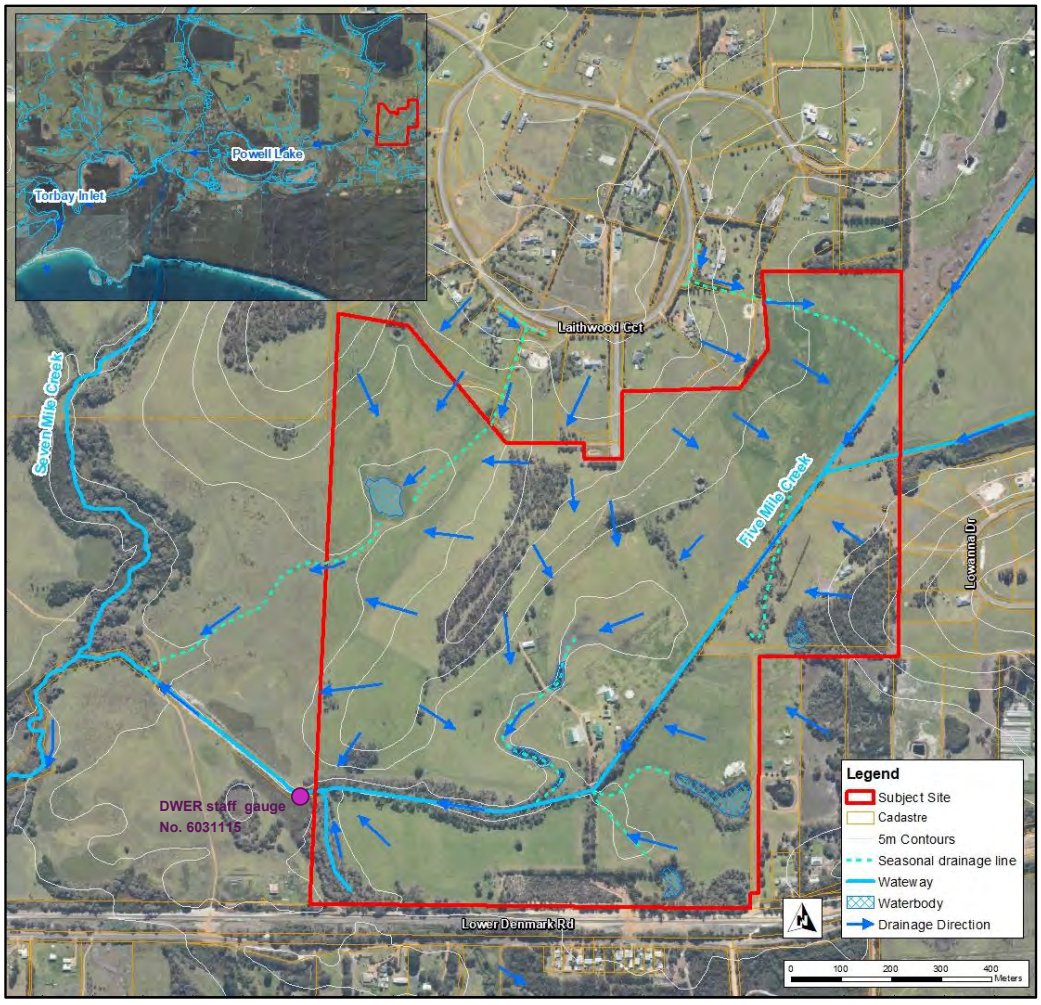


Figure 5: Surface hydrology

3.4. Hydrogeology and Groundwater

Australian Geoscience Mapping and Department of Water and Environmental Regulation 250K Hydrogeological mapping (DWER, 2001) places the Subject Site within one hydrogeological zone described as:

Geology Type: TP.
Geology Time: Tertiary – Cainozoic – Phanerozoic.
Aquifer Description: Sedimentary aquifer with intergranular porosity - extensive aquifers, major groundwater resources.
Geology Description: PLANTAGENET GROUP - siltstone, spongolite, minor sandstone, peat, and conglomerate.

The Subject Site is not situated within a Priority Drinking Water Catchment Area (DWER, 2018b). Desktop analysis of the site indicates that the nearest designated Public Drinking Water Source Area (PDWSA) is the "South Coast Water Reserve" as defined by the *Country Areas Water Supply Act 1947,* located approximately 80 m south of the Subject Site.

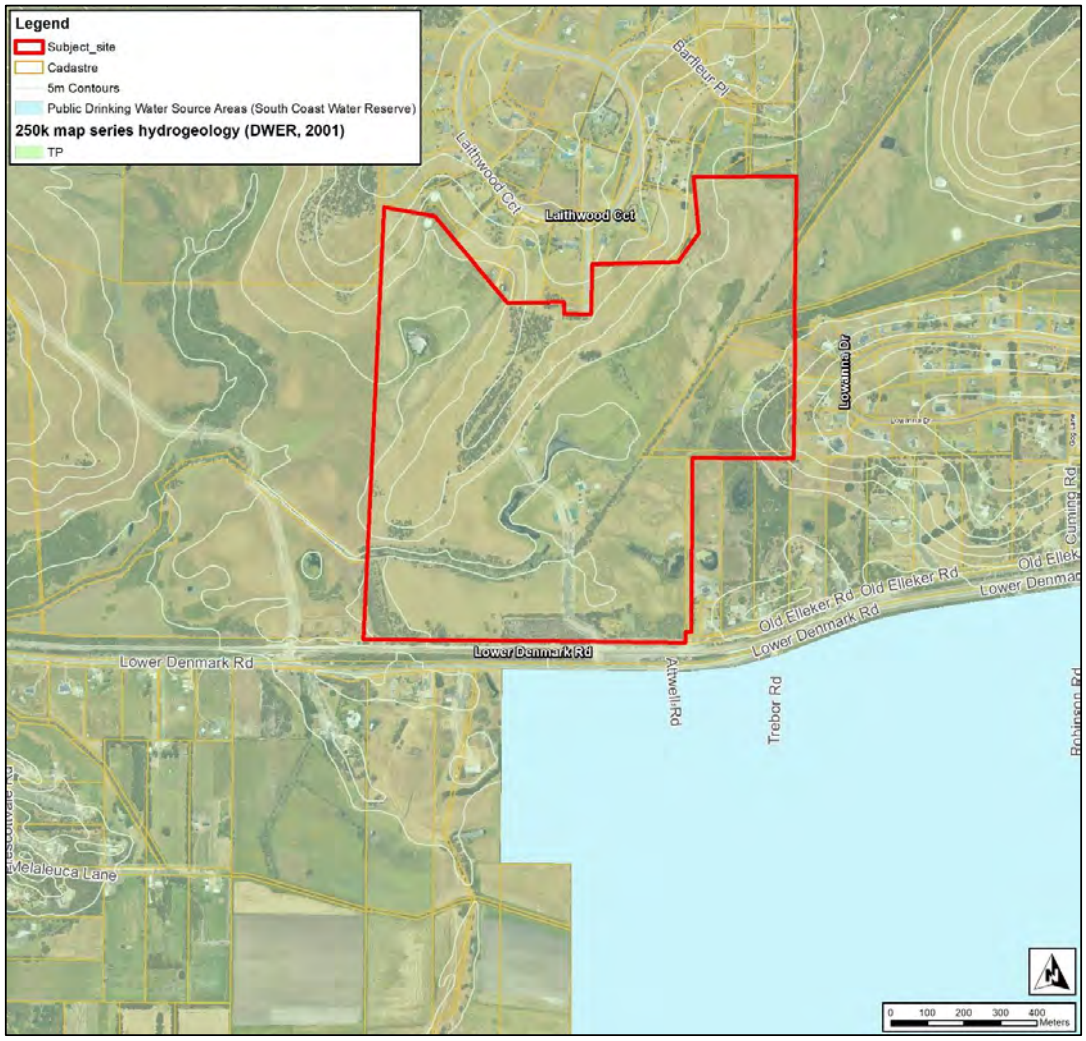


Figure 6: Hydrogeological and PDWSA Mapping

The Department of Water and Environmental Regulation Water Information Reporting Tool (DWER, 2024), shows 12 domestic groundwater bores/wells were detected within a 500 m radius of the Subject Site, the locations of the 12 domestic bores are shown in Figure 7. The nearest domestic bore to the Subject Site is located approximately 60 m to the east of the Subject Site boundary (Bore No. 6031096).

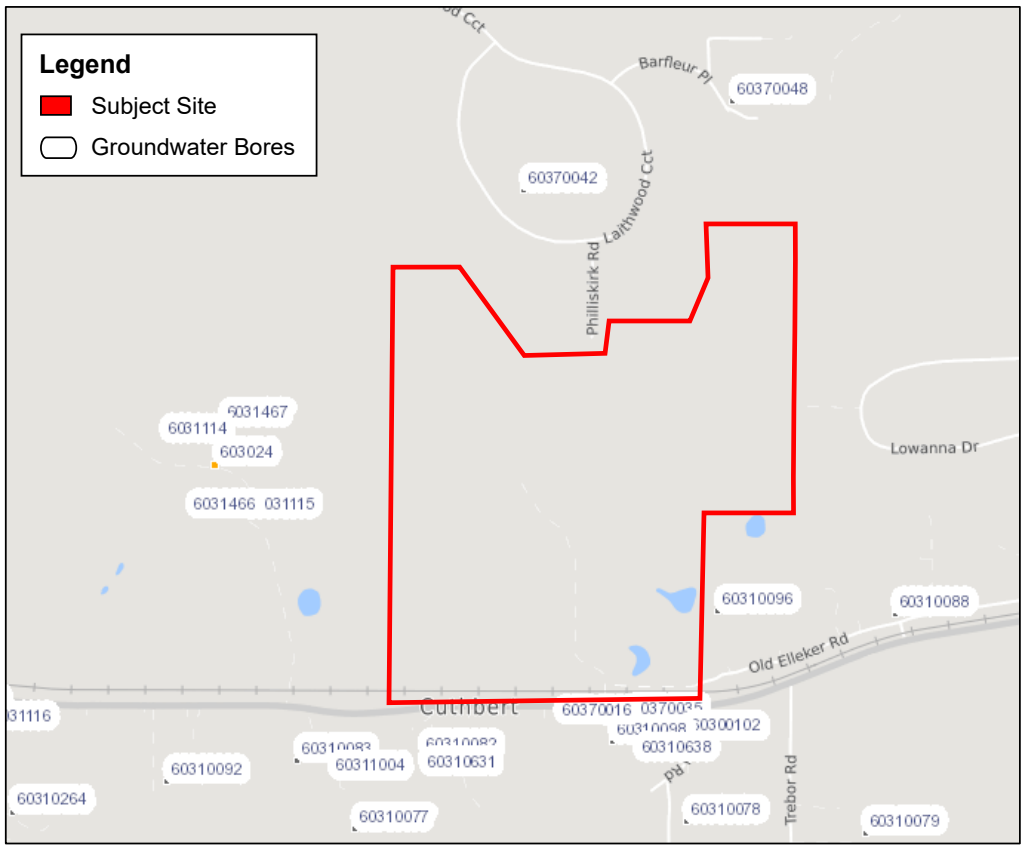


Figure 7: Nearest domestic groundwater bores (DWER, 2018)

3.5. Acid Sulphate Soils

Acid Sulphate Soils (ASS) are naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). When undisturbed below the water table, these soils are benign and not acidic (potential acid sulphate soils). However, if the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid. ASS Risk Mapping indicates the majority of the Subject Site lies within an area with moderate to low risk of ASS occurring within 3 metres of natural soil surface (DWER, 2017). ASS Risk Mapping (DWER, 2017) is shown in Figure 8.

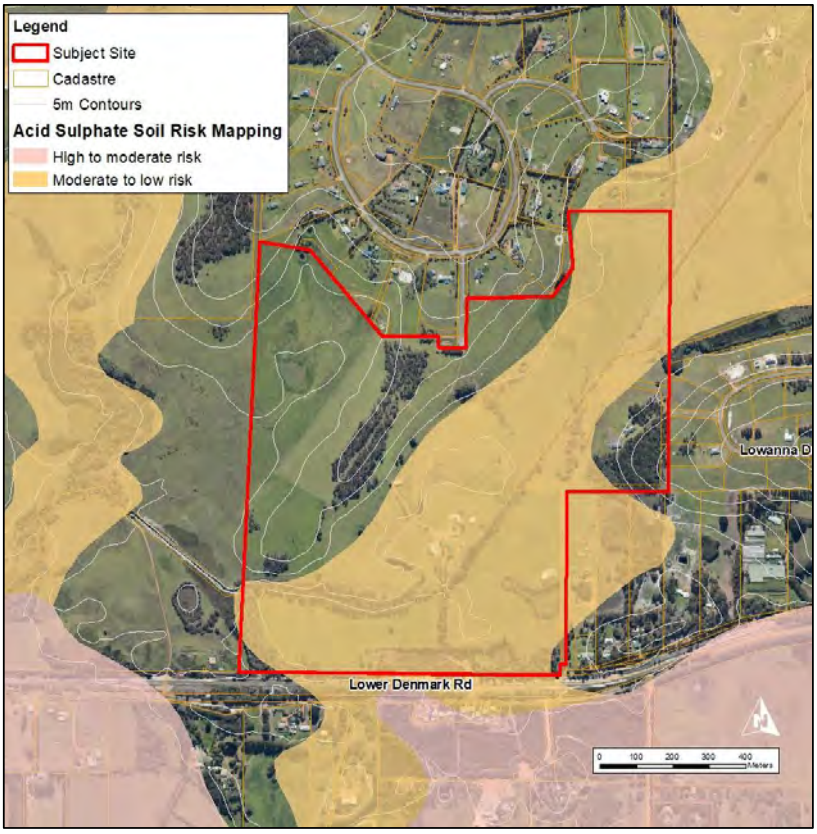


Figure 8: ASS Risk Mapping

An ASS Preliminary Investigation was conducted at the Subject Site by Opus on the 15th January 2008, as part of an Addendum to the Land Capability Assessment (Opus, 2007). In summary, the investigation found the peat layers at the Subject Site had acidity levels which exceeded DWER Guidelines, however the acidity was found not to be caused by sulphur and likely to be caused from the mobilisation of hydrolysed ions, which are likely attributed to iron or aluminium leaching through the soil profile (Opus, 2007).

Soil analysis showed the surface soils had high Electrical Conductivity (EC) and corresponding acidity, which Opus (2007) found is likely attributed to bicarbonate salts and not sulphur salts. Sulphur acidity (ASS) was detected in the soil layers from approximately 1.0 m BGL (Opus, 2007).

Opus (2007) recommended that the site not be excavated deeper than 0.5 m BGL, to avoid mobilisation and oxidation of ASS. The top 0.5 m of soil will still require treatment with lime, upon disturbance, and ASS shall be managed in accordance with ASS guidelines (Opus, 2007).

3.6. Environmentally Sensitive Areas

There are no Environmentally Sensitive Areas (ESA) within the Subject Site or within close proximity of the Subject Site. The nearest ESA is located approximately 2.5 km west of the Subject Site, being Lake Powell (DWER, 2018c). The Subject Site ultimately discharges to Lake Powell via Five Mile Creek and Seven Mile Creek.

3.7. Wetlands

There are no significant wetlands within the Subject Site or within close proximity of the Subject Site. The nearest significant wetland is located approximately 1.0 km to the north of the Subject Site, being the Seven Mile Creek wetland (DBCA, 2017). Noting, this wetland is upgradient and not hydrologically connected to the Subject Site.

3.8. Sewage Sensitive Areas

The Subject Site is not located in a Sewage Sensitive Area according to the Department of Planning, Lands and Heritage Sewage Sensitive Area Mapping (DPLH, 2019b). Sewage Sensitive Area mapping is shown in Figure 9.

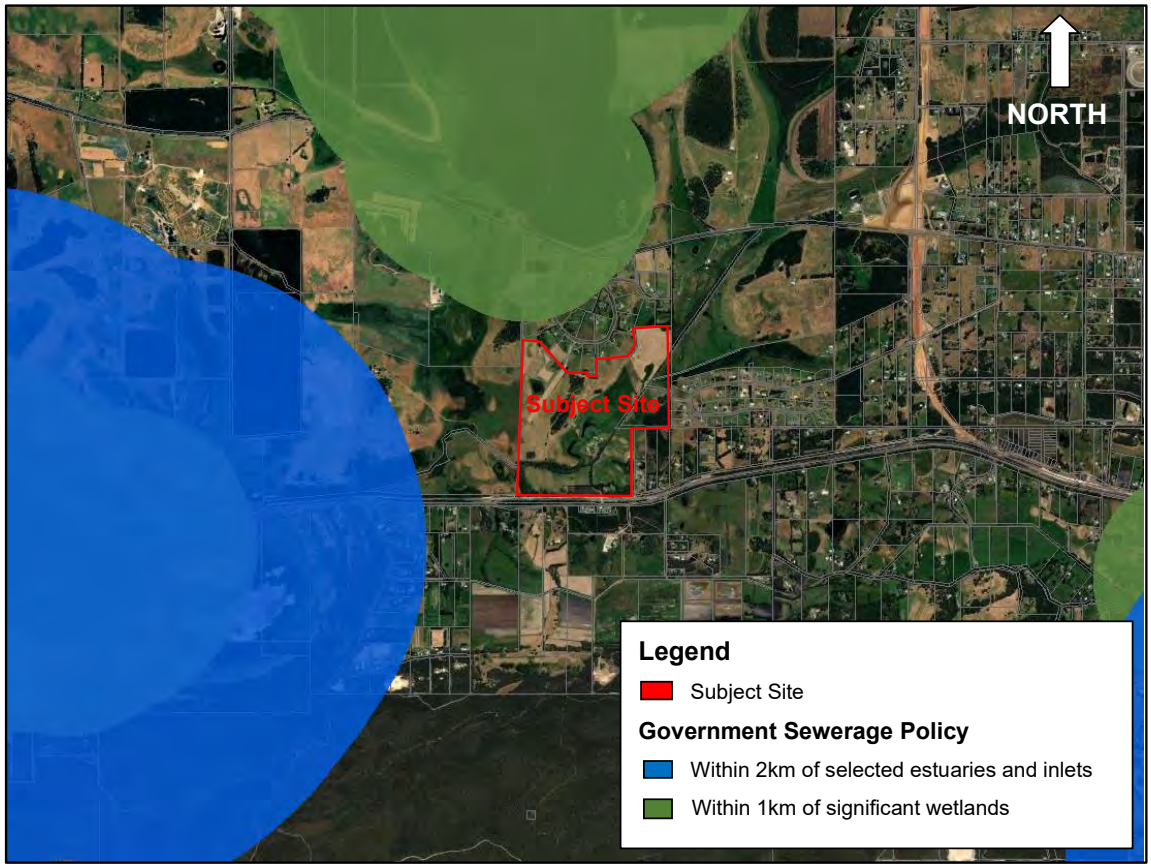


Figure 9: Sewage sensitive area mapping (DPLH, 2019b)

4. Site Soil Investigations

4.1. Site Soil Investigation (BDS, 2013)

Site soil testing was conducted on the 1st August 2013 by Bio Diverse Solutions under late winter conditions. Testing involved site soil analysis, photographic recording, logging of soil types and measuring of the water table. In total, eight test/bore holes were constructed to a minimum depth of 2 metres and left open for a minimum of 1 hour to identify any water table present. The soil testing locations (bore holes) are shown in Figure 10.

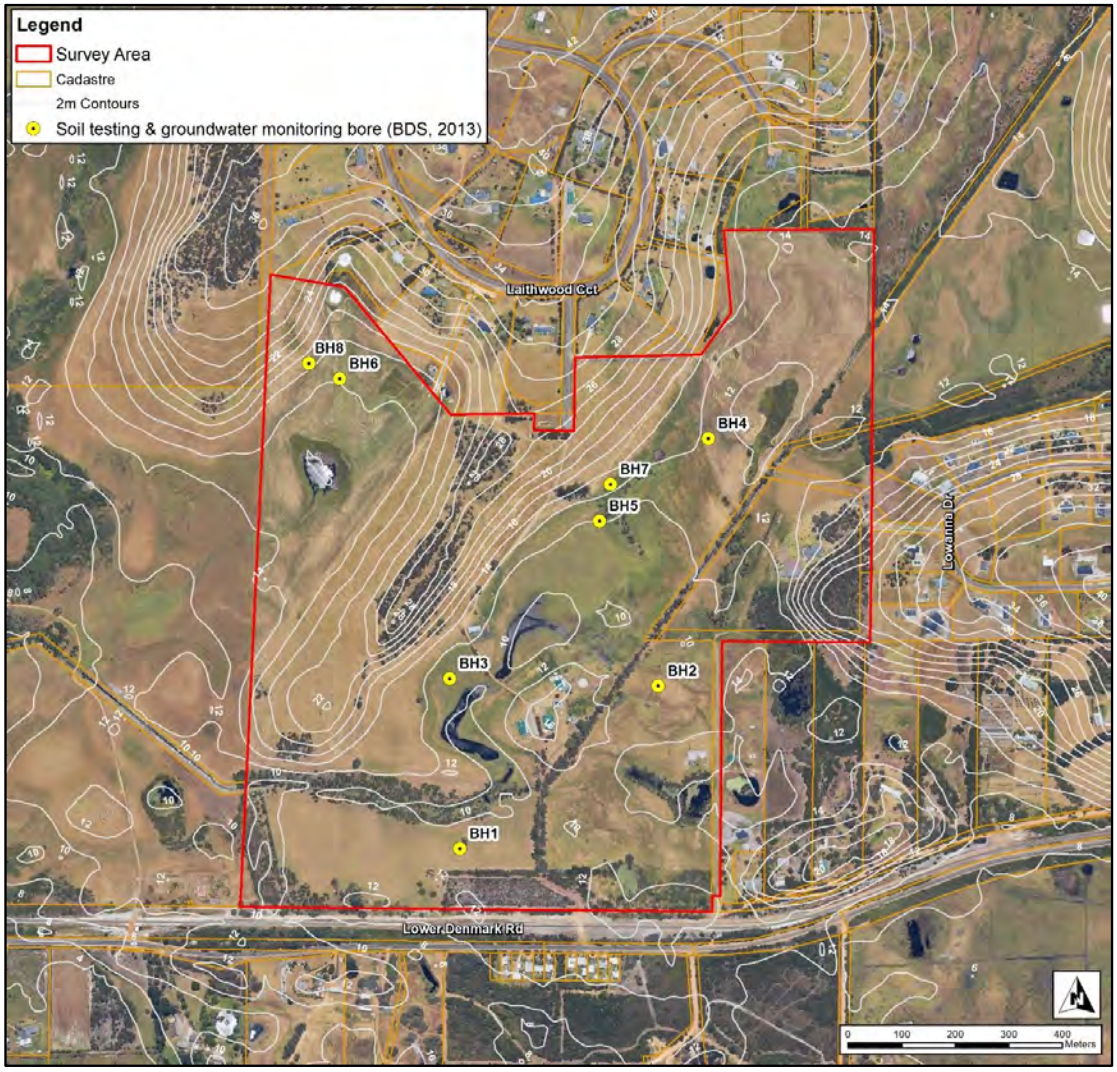


Figure 10: BDS (2013) soil testing and groundwater monitoring bore locations

The eight test holes revealed that soils across the Subject Site were relatively consistent and found to be peaty sand/sandy peat over sand/silty sand with pebbles and coffee rock encountered at BH6 (1.2-2.0m BGL) and BH8 (1.7-2.0m BGL) only. Details of the site soils as classified by BDS (2013) are summarised in Table 1.

Table 1: Soil testing results (BDS, 2013)

Test Pit	Depth (mm)	Soil Type and Description
BH1	0-25	Dark brown peaty sand, organic matter.
	25-350	Dark grey, sandy peat, organic matter.
	350-750	Dark brown sand, moist.
	750-1070	Light brown sand, wet.
	1070-2000	Brown silty sand.
	2000-2500	Brown silty sand.
BH2	0-25	Dark brown peaty sand.
	25-300	Dark grey sand.
	300-900	Grey sand.
	900-2000	Light brown silty sand.
	2000-2500	Brown silty sand, wet.
BH3	0-30	Dark brown peaty sand, organic matter, wet.
	30-300	Dark brown peaty sand, organic matter, moist.
	300-600	Dark grey silty sand.
	600-900	Light brown silty sand.
	900-1800	Light grey silty sand.
	1800-3000	Light brown silty sand.
BH4	0-40	Dark brown peaty sand, organic matter.
	40-300	Dark grey sandy silt, organic matter.
	300-750	Grey sandy silt.
	750-1300	Light grey sand silt.
	1300-2000	Brown silty sand, wet.
BH5	0-240	Dark brown peaty sand, organic matter.
	240-400	Dark grey sandy peat, organic matter.
	400-700	Dark grey sandy silt.
	700-1000	Light grey silty sand.
	1000-1500	Light brown silty sand.
	1500-1800	Brown silty sand.
	1800-2000	Brown silty sand.
BH6	0-200	Brown peaty sand.
	200-750	Dark brown silty sand.
	750-1200	Light brown silty sand.
	1200-1800	Dark brown silty sand with pebbles (5-10mm).
	1800-2500	Dark brown silty sand, coffee rock, cemented.
BH7	0-250	Dark brown sandy silt.
	250-600	Dark grey silty sand.
	600-1800	Grey silty sand.
	1800-2000	Light brown silty sand, wet.
	2000-	Rock refusal.
BH8	0-100	Dark brown silty sand, organic matter.
	100-450	Dark grey silty sand.
	450-750	Grey silty sand.
	750-1700	Light grey silty sand.
	1700-2000	Dark brown silty sand, coffee rock.

4.1.1. Groundwater Monitoring (BDS, 2013)

Groundwater monitoring was conducted by BDS at the Subject Site, quarterly, from August 2013 to May 2015, capturing groundwater levels from two late winter periods. The groundwater level data for the monitoring period is presented in Table 2 and the location of the groundwater monitoring bores is shown in Figure 10.

Table 2: Groundwater monitoring levels (2013-2015)

Bore	Depth of hole (mm BGL)	Sampling event							
		Aug 2013 (mm BGL)	Nov 2013 (mm BGL)	Feb 2014 (mm BGL)	May 2014 (mm BGL)	Aug 2014 (mm BGL)	Nov 2014 (mm BGL)	Feb 2015 (mm BGL)	May 2015 (mm BGL)
BH1	2340	1011	640	1330	-	890	1040	1550	-
BH2	2700	1236	1100	-	-	1145	1310	dry	-
BH3	3000	0	0	870	1175	360	640	1017	310
BH4	2400	150	670	1220	1105	635	1000	1400	1115
BH5	2660	0	0	720	450	40	410	940	590
BH6	2100	0	0	-	1006	165	1070	1600	840
BH7	2000	790	1330	-	-	1470	1810	dry	-
BH8	2000	530	1020	1830	-	1175	1510	dry	-

Groundwater monitoring results (2013 - 2015) show the depth to groundwater varied across the site and throughout the year. However, generally the site has a shallow depth to groundwater. Groundwater was found to be at or near surface at BH3, BH4, BH5 and BH6 during the late winter period, noting that the depth to groundwater at BH4 was significantly greater in Aug 2014 (635 mm BGL) compared to August 2013 (150 mm BGL). Groundwater depths at BH1, BH2, BH7 and BH8 were lower, however still relatively shallow during the late winter period ranging between 530-1236 mm BGL in August 2013 and 890-1470mm BGL in August 2014.

4.2. Land Capability Assessment (Opus, 2007)

A Land Capability Assessment (LCA; Opus, 2007) was conducted at the Subject Site to ascertain the ability of the land to sustain the Rural Residential development proposal. The LCA (Opus, 2007) has been included as Appendix A.

Testing as part of the LCA involved site soil analysis, photographic recording, logging of soil types, measuring of water table, permeability testing and laboratory Phosphorous Retention Index (PRI) testing. A total of 25 test holes were constructed to a depth of 2 m with a mechanical auger and left open for a minimum of 1 hour to identify any water table present. Soil test hole locations are shown in Figure 11.

Four soil types were identified, by Opus (2007), across the Subject Site from the soil testing data. Soil types include; sand with silt, sand with silt over gravel, sand over gravel over rock and sand with silt and peat. The soil types identified by Opus (2007) are shown in Figure 11. The majority of the Subject Site is mapped as sand with silt. More detailed descriptions of soil types found at the Subject Site are presented in Appendix A.

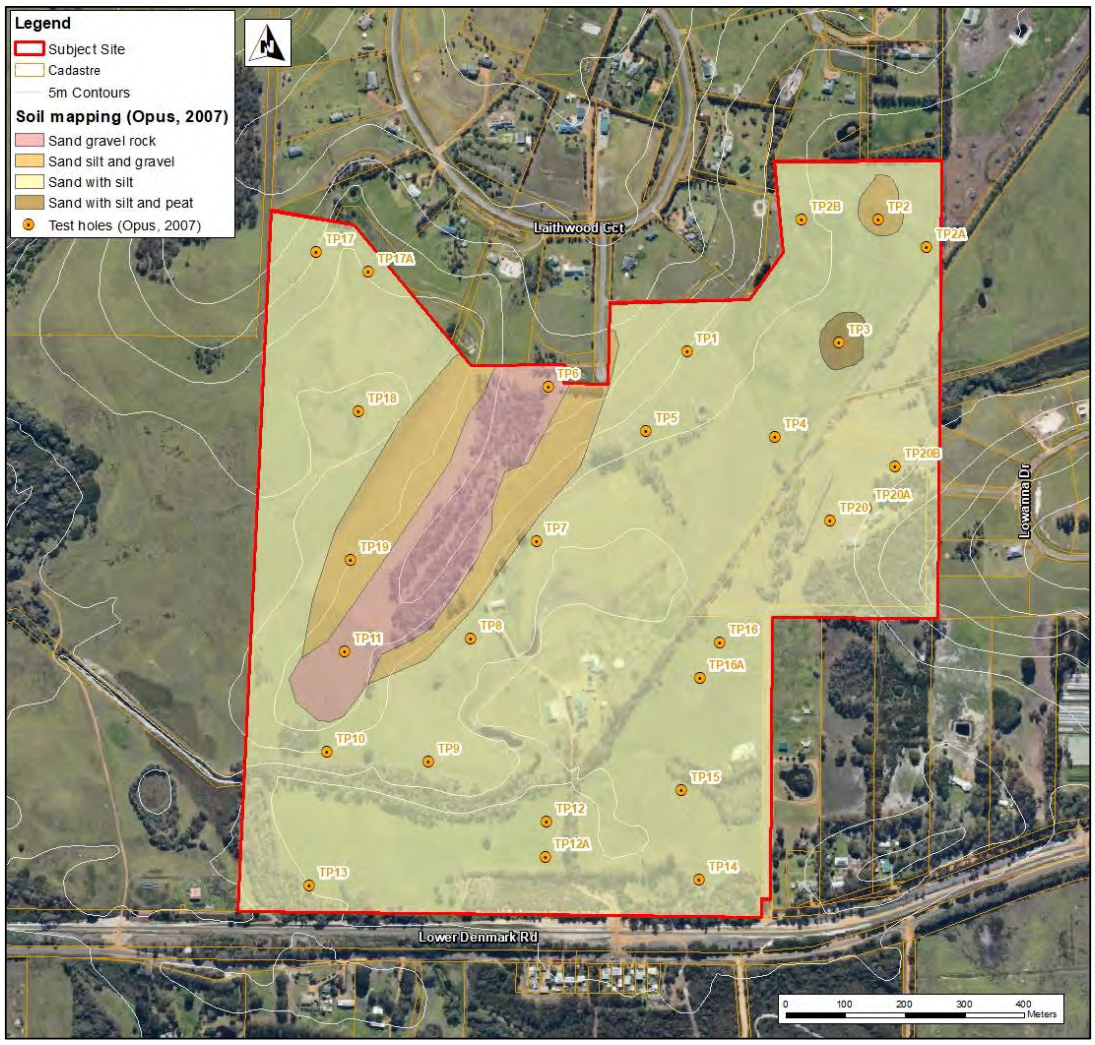


Figure 11: Soil mapping and test hole locations (Opus, 2007)

Permeability testing was conducted by Opus (2007) on sandy silt samples from TP4 and TP7 (150 – 2000 mm depth) and sandy gravel samples from TP19 (100 – 700 mm). Results showed that the soils were free draining typical of the sandy soil types (Appendix A; Opus, 2007).

PRI testing was conducted on the sandy silt at TP4 and TP7 (150 – 2000 mm depth) and the sandy gravel at TP19 (100 – 700 mm depth). The PRI results showed that the sandy silt had a low PRI (<1.0) and the sandy gravel had a very high PRI (324) typical of the soil type (Appendix A; Opus, 2007).

4.2.1. Groundwater Assessment (Opus, 2007)

The original soil testing by Opus was conducted in June 2007. Opus consultants returned to the Subject Site to conduct late winter water-table monitoring in August 2007. Test pits were excavated to a depth of 2 m and the water table was encountered in 13 out of the 20 test pits. Five additional test pits (TP2a, TP2b, TP17a, TP20a and TP20b) were constructed alongside existing test pits to confirm soils and the high water-table level. Water-table measurements from these additional test pits were found to be the same or similar to the originally constructed test pits. The August 2007 water-table levels for each test pit are shown in Table 3.

Table 3: Water-table observations (Opus, 2007)

Test Pit	Water-table observations – August 2007
1	Groundwater not encountered
2	0 mm BGL (waterlogged)
2a	500 mmm BGL (additional test pit)
2b	450 mm BGL (additional test pit)
3	0 mm BGL (waterlogged)
4	760 mm BGL
5	Groundwater not encountered
6	Groundwater not encountered
7	150 mm BGL
8	150 mm BGL
9	1400 mm BGL
10	Groundwater not encountered
11	Groundwater not encountered
12	100 mm BGL
13	980 mm BGL
14	550 mm BGL
15	800 mm BGL
16	220 mm BGL
16a	600 mm BGL
17	Groundwater not encountered
17a	Groundwater not encountered (additional test pit)
18	150 mm BGL
19	Groundwater not encountered
20a	1300 mm BGL (additional test pit)
20b	1300 mm BGL (additional test pit)

4.2.2. Mapping Units and Limitations (Opus, 2007)

Opus (2007) identified four mapping units from the soil types and landforms within the Subject Site; these were defined into mapping units A, B, C and D. Mapping units are summarised in Table 4, shown in Figure 12 and described in more detail in Appendix A (Opus, 2007).

Table 4: Mapping units and limitations (Opus, 2007)

Mapping unit	Description	Limitations
A	Predominately the sandy soils in the low contour areas.	Low PRI of soil may result in contamination of waterways from onsite effluent disposal.
B	Sand over gravel located along the slopes of the ridge line.	No limitations described in relation to land use proposal.
C	Shallow sand over ironstone rock.	Difficult excavation of ironstone and low permeability expected.
D	Waterlogged soils which did not achieve greater than 500 mm separation between the high water-table and surface.	Onsite effluent disposal shall be avoided where possible.

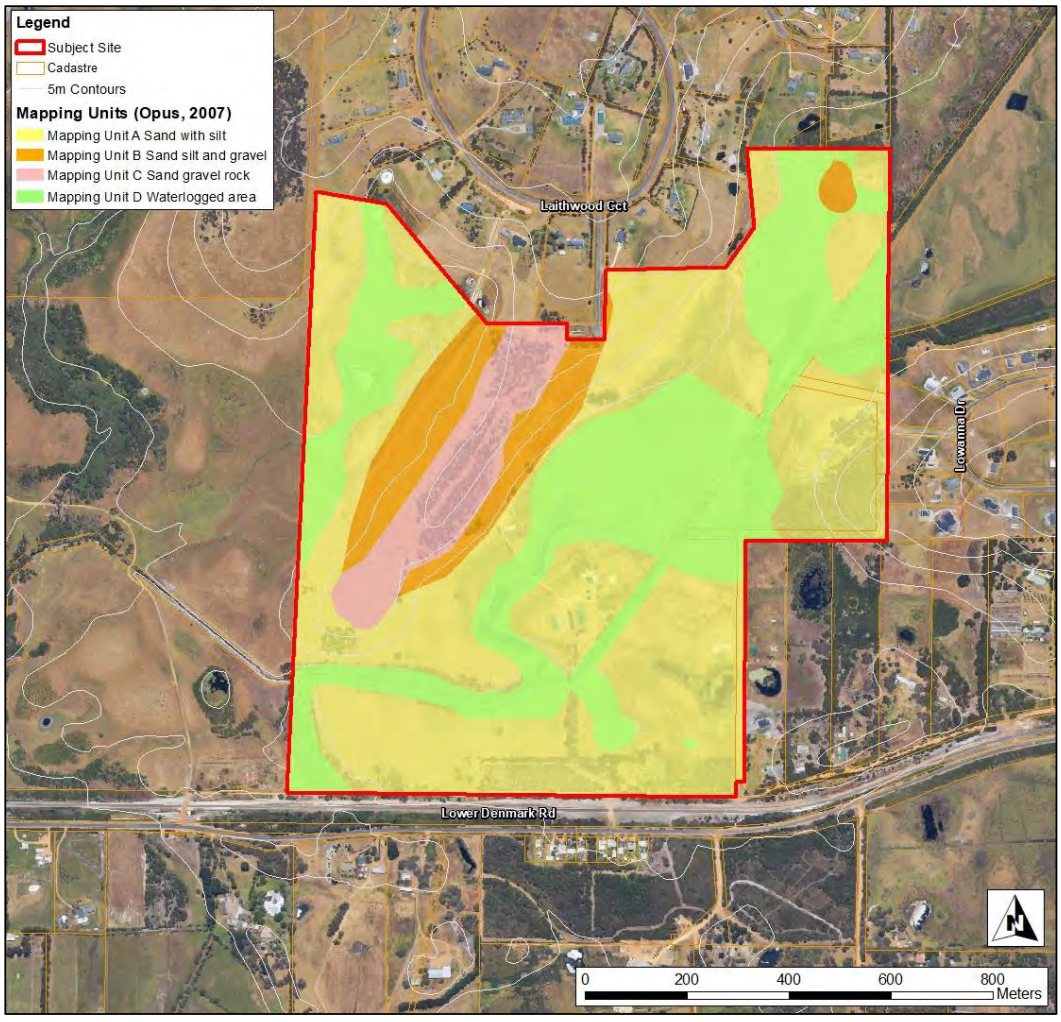


Figure 12: Soil type/landform mapping units (Opus, 2007)

4.3. Site Assessment (BDS, 2021)

An additional site assessment was conducted by BDS on the 12th October 2021 to confirm site conditions, site constraints, groundwater levels and extent of areas subject to waterlogged and seasonally inundation. Rainfall in the Albany area (BoM Station No. 9500) in the months prior to the site investigation was significantly higher than for the same time in an average year. The increased rainfall resulted in increased surface water expressions in the area compared to an average late-winter period. Photographs 1 to 7 show the hydrological features of the site during the site investigation.

Photo 1: View to the east-northeast of Five Mile Creek in the south of the Subject Site.

Photo 2: View to the west of Five Mile Creek at the western boundary of the Subject Site.

Photo 3: View to the south of drain discharging into Five Mile Creek in the southwest of the Subject Site.

Photo 4: View to the west of wetland area in the south of the Subject Site.

Photo 5: View to the north-northeast of seasonally inundated area in the central portion of the Subject Site.

Photo 6: View to the south of seasonally inundated area in the central portion of the Subject Site.

Photo 7: View to the southeast of seasonally inundated area in the northwest of the Subject Site.

4.3.1. Soil Permeability

Silts and clay soils generally record poor permeability results whereas coarse sands and loose gravels generally record high permeability, as shown in Figure 13.

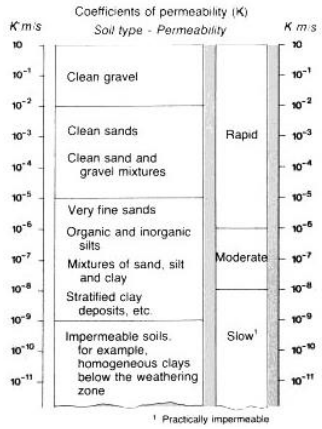


Figure 13: Hydraulic Conductivity of Soil Types (Artiola et al, 2004)

In-field permeability testing was conducted during the site soil investigation by BDS, adjacent to groundwater monitoring bore BH1 (Figure 10), within the silty sand layer (500 mm depth BGL). Permeability testing was conducted using the Talsma-Hallam method. Hydraulic conductivity was found to be 4.20 x 10^{-5} m/sec (3.63 m/day) which is considered a rapid permeability, as shown in Figure 13. Permeability was also found to be consistent with Soil Category 2 - Sandy loams (weakly structured) as shown in Table L1 of AS/NZS 1547:2012.

4.3.2. Seasonal Inundation and Waterlogging

The areas subject to seasonal waterlogging and seasonal inundation were mapped by Opus (2007) as part of the LCA. Areas subject to seasonal waterlogging (groundwater ≤ 0.5 m BGL) and seasonal inundation (water sitting on the surface for extended periods of time), were confirmed during the site assessment on the 12th October 2021 and using historical imagery of the site. Approximate areas found to be subject to seasonal waterlogging and seasonal inundation are shown in Figure 14.

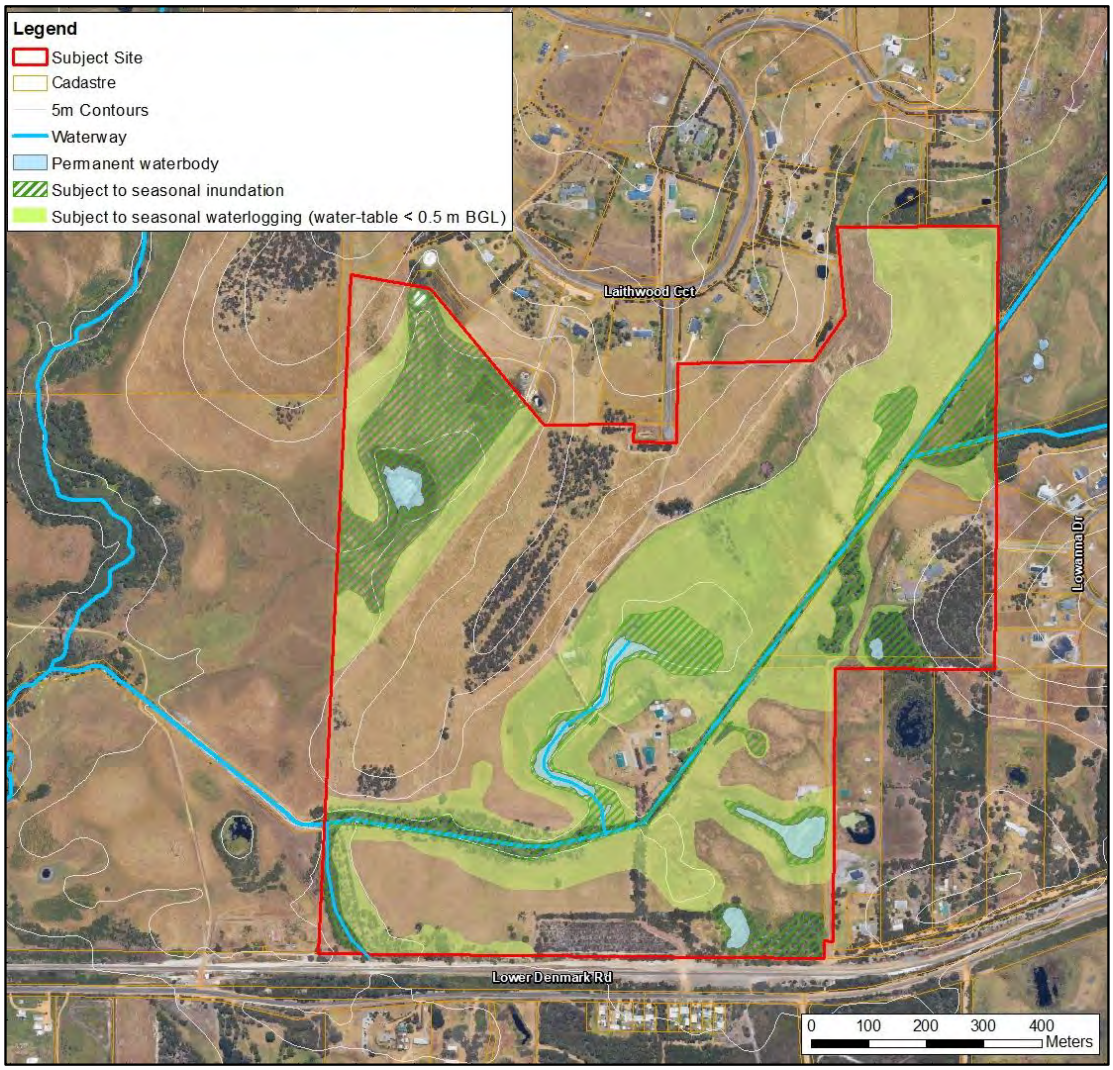


Figure 14: Areas subject to seasonal inundation and waterlogging

5. Site Suitability

The Subject Site is situated in an area that does not have access to deep or reticulated sewerage. The health and environmental requirements for wastewater treatment and disposal for developments not serviced by deep sewerage systems, are outlined in the *Government Sewerage Policy* (GSP; DPLH, 2019a). The GSP (DPLH, 2019a) states minimum requirements apply for all on-site sewage disposal systems.

A summary of compliance to the GSP (DPLH, 2019a) minimum requirements is as follows:

- Soils across the Subject Site varied with site and topography. Generally, the soil types encountered on site were found to be sand with silt, sand with silt over gravel, sand over gravel over rock and sand with silt and peat with the majority of the Subject Site consisting of sand with silt to 2 metres (Figure 11). Given the free draining nature of the soil types found across the Subject Site, onsite effluent disposal is achievable with standard land application systems, such as leach drains and sub-surface irrigation systems, with no special design considerations required. It is recommended that onsite effluent disposal be avoided within the area classified as sand over gravel over rock. Proposed future lots that intersect this soil type can achieve onsite effluent disposal within the sand with silt over gravel soil type, directly downslope of the sand over gravel over rock soil type, thus avoiding potential failure of the land application system due to the impermeable nature of the rock. Where depths to rock or impermeable layers is less than 1.2 m from the base of the land application system, and this cannot be avoided, imported fill and/or special design requirements and distribution techniques will be required.

- The slopes across the site generally do not exceed the minimum grade requirements (1:5) as outlined in Table 3 of the GSP (DPLH, 2019a). The Subject Site is generally flat except in the northwest of the site where slopes steepen towards the ridge line, with slopes here being approximately 1:10. Construction of Land Application Areas (LAA) on the steeper sections of the ridgeline shall be avoided where possible. LAAs shall run parallel with topographic contours and be flattened off within lots with gradual to moderate slopes.

- The minimum separation required between the peak annual water-table and effluent application in sandy soils is at least 1.5 m (DPLH, 2019a). The depth to the peak annual water-table across the Subject Site is generally shallow (<1.5 m). Where separation to groundwater is <1.5 m, as seen across much of the site, imported fill and/or special design requirements (as discussed in Section 6) will be required for the LAAs to ensure the separation to groundwater requirement is met.

- The nearest domestic groundwater bore to the Subject Site is approximately 60 m to the east (Figure 7). The minimum separation requirement between effluent application and domestic production bores is >30 m, this is achievable at the Subject Site. Any future proposed domestic bores shall be situated at least 30 m from any LAA.

- The Subject Site is intersected by Five Mile Creek, there is also a tributary to Five Mile Creek in the central portion of the Subject Site, a constructed drain in the southwest of the site, and multiple smaller scale waterbodies/dams/seasonal drains in the south, central and northeast of the Subject Site. A 100 m setback between Five Mile Creek, the Five Mile Creek tributary and the constructed drain in the southwest, to all LAAs shall apply. These are major waterways and flow for the majority of the year. A minimum 30 m setback shall apply between the smaller and more seasonal in nature waterbodies/seasonal drains/dams to all LAAs. These waterways/waterbodies are generally only connected to the major waterways during larger storm events, and there is generally more opportunity

for the infiltration and uptake (by vegetation) of any potential contaminants and nutrients generated from the effluent. A 30 m setback shall also apply to any future proposed stormwater storages/swales and all LAAs.

- According to data results for site No. 603115, the highest recorded level at the downstream end of Five Mile Creek within the Subject Site is 10.3 m AHD (1997-2022), which was recorded on the 30th August 2001. LAA shall be setback 100 m from Five Mile Creek and as such they will be located outside of the 1% AEP flood levels for Five Mile Creek.

- LAAs shall not be located within areas deemed as subject to seasonal inundation, this is achievable at the Subject Site, as shown in Figure 15. LAAs shall be avoided in areas subject to seasonal waterlogging (<0.5 m separation to groundwater) where possible. If areas subject to waterlogging cannot be avoided for LAAs, then imported fill and/or special design requirements will be required to meet GSP (DPLH, 2019a) requirements. In areas where the separation to groundwater is <0.5 m, it shall be the responsibility of the proponent to fill a building envelope (including the LAA) to achieve at least 0.5 m separation to the peak annual water-table. Following subdivision, it shall be the responsibility of the future lot owner to ensure the minimum groundwater separation requirement is met. This separation requirement is applicable to the LAA only, with the location of the LAA dependent on building placement. Where the depth to the peak annual water table is <0.5 m, the lots shall be a minimum size of 1 ha.

- A 6 m setback from the lot-to-lot boundaries to LAAs shall apply. Additionally, a 6 m setback from the road reserve boundary to down-gradient LAAs shall also apply, and a 12 m setback to LAAs that are up-gradient of the road reserve boundary shall apply to provide additional separation to any proposed roadside drains.

Minimum requirements for all on-site wastewater disposal systems and design specific standards are shown in Table 5. The areas of the Subject Site identified as suitable for LAAs are shown in Figure 15.

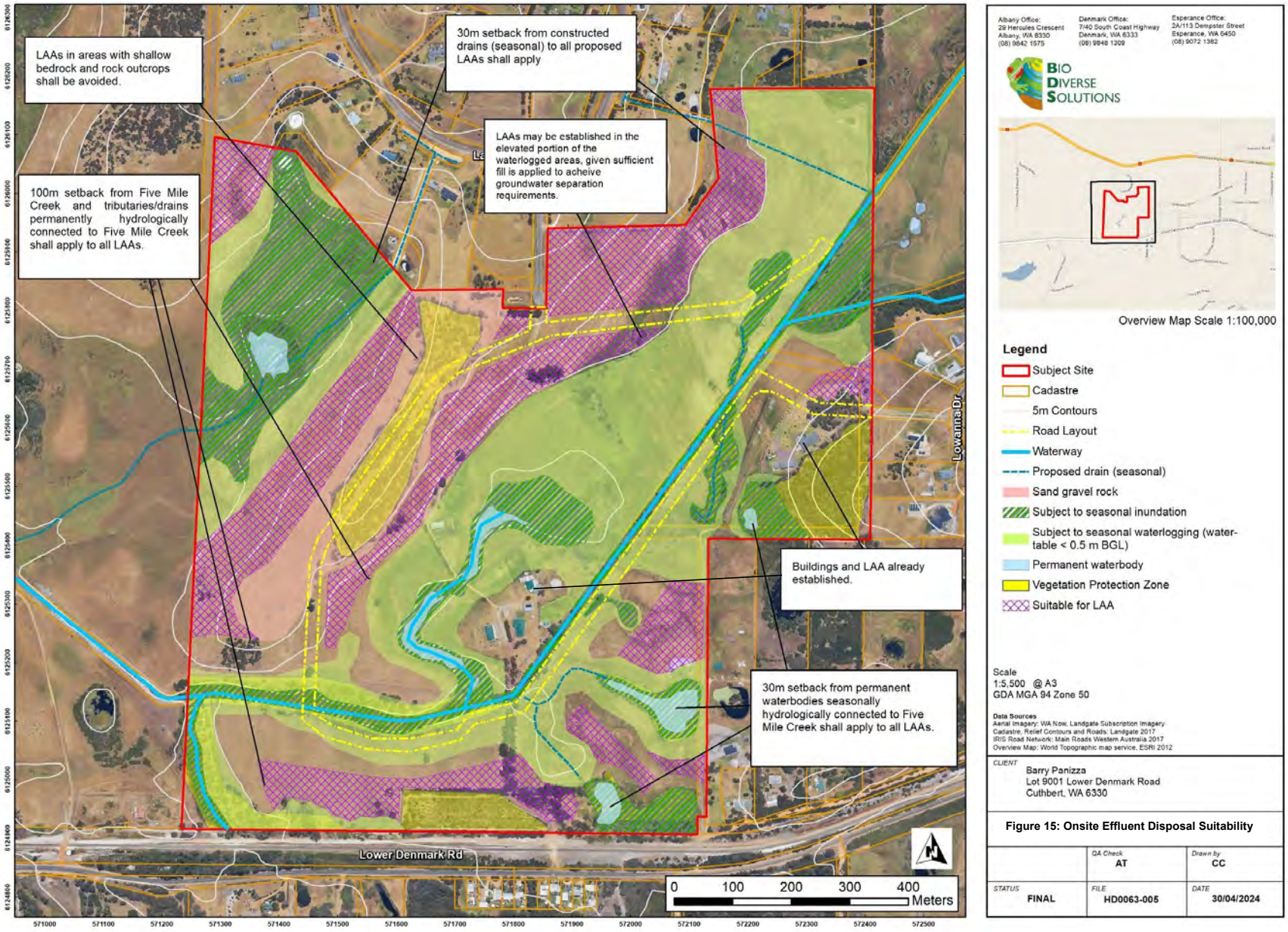

LAAs in areas with shallow bedrock and rock outcrops shall be avoided.
30m setback from constructed drains (seasonal) to all proposed LAAs shall apply
LAAs may be established in the elevated portion of the waterlogged areas, given sufficient fill is applied to acheive groundwater separation requirements.
100m setback from Five Mile Creek and tributaries/drains permanently hydrologically connected to Five Mile Creek shall apply to all LAAs.
Buildings and LAA already established.
30m setback from permanent waterbodies seasonally hydrologically connected to Five Mile Creek shall apply to all LAAs.
Lowanna Dr
Lower Denmark Rd
0 100 200 300 400 Meters
Albany Office: 29 Hercules Crescent Albany, WA 6330 (08) 9842 1575
Denmark Office: 7/40 South Coast Highway Denmark, WA 6333 (08) 9848 1309
Esperance Office: 2A/113 Dempster Street Esperance, WA 6450 (08) 9072 1382
BIO DIVERSE SOLUTIONS
Overview Map Scale 1:100,000
Legend
Subject Site
Cadastre
5m Contours
Road Layout
Waterway
Proposed drain (seasonal)
Sand gravel rock
Subject to seasonal inundation
Subject to seasonal waterlogging (water-table < 0.5 m BGL)
Permanent waterbody
Vegetation Protection Zone
Suitable for LAA
Scale
1:5,500 @ A3
GDA MGA 94 Zone 50
Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012
CLIENT
Barry Panizza
Lot 9001 Lower Denmark Road
Cuthbert, WA 6330
Figure 15: Onsite Effluent Disposal Suitability
QA Check AT
Drawn by CC
STATUS FINAL
FILE HD0063-005
DATE 30/04/2024

Table 5: Minimum requirements for all on-site wastewater disposal systems and design specific standards (DPLH, 2019a)

Site Feature	Minimum Requirement	Requirement met
Separation from waterways	a wellhead protection zone or on Crown land within a reservoir protection zone; 100 metres of the high-water mark of a reservoir or 100 metres of any bore used for public drinking water supply where: — a wellhead protection zone or reservoir protection zone has not been assigned; or — where existing lots would be rendered undevelopable by the wellhead protection zone.	Yes The Subject Site is not located within a Priority Drinking Water Source Area (PDWSA) or in the vicinity of wellheads associated with the PDWSA. The nearest PDWSA is South Coast Water Reserve located 80 m south of the Subject Site.
	30 metres of a private bore used for household/ drinking water purposes.	Yes The nearest existing private bore according to the Water Information Reporting Tool (DWER, 2022) is 60 m east of the Subject Site boundary. Any future proposed domestic bores shall be located a minimum of 30 m from the designated LAAs.
	100 metres of a waterway or significant wetland and not within a waterway foreshore area or wetland buffer. The separation distance should be measured outwards from the outer edge of riparian or wetland vegetation.	Yes Five Mile Creek runs from the northeast corner to the southwest corner through the Subject Site, a 100 m setback shall apply from Five Mile Creek and its permanently connected tributaries/drains to all LAAs. A 30 m setback from LAAs to the smaller seasonally connected waterbodies/waterways/dams shall also apply. The reduced setback of 30 m is recommended due to the seasonal nature and relatively low ecological value of the waterbodies/drains/dams.
	100 metres of a drainage system that discharges directly into a waterway or significant wetland without treatment.	Yes There are no other major drainage systems (additional to those mentioned above). It is proposed that a 12 m setback be applied between the road reserve and upgradient LAAs on lots to allow adequate separation to any possible roadside drains.
	Any area subject to inundation and/or flooding in a 10 per cent Annual Exceedance Probability (AEP) rainfall event.	Yes The majority of the Subject Site is not subjected to flooding in a 10% AEP rainfall event. A 100 m setback is required between Five Mile Creek eliminating any flooding risk to LAAs. LAAs shall be avoided within areas deemed as subject to seasonal inundation. Areas subject to seasonal inundation are shown in Figures 14 and 15.

Table 5 continued.

Site Feature	Minimum Requirement	Requirement met
Separation from groundwater – outside of public drinking water source areas.	Where land is not within a public drinking water source area or a sewage sensitive area, the discharge point of the on-site sewage system should be located the following distances above the highest groundwater level: • for loams and heavy soils, at least 0.6 metres. • for gravels, at least one metre. • for sands, at least 1.5 metres. Where a nutrient retentive secondary treatment system is used, at least 0.6 metres.	Yes The minimum separation required between the peak annual water-table and onsite effluent disposal in sands (as found across the majority of the Subject Site) is at least 1.5 m. The peak annual water-table was encountered <1.5 m BGL at several locations across the Subject Site. Separation to the peak annual water-table in the lower lying areas shall be achieved using imported fill and/or special design requirements as discussed in Section 6. The Subject Site is not located within a PDWSA or a Sewage Sensitive Area.
Land Application Area	A LAA should be provided for all development in accordance with tables 2 and 3 of this schedule for the disposal of sewage.	Yes All LAAs shall be located in an area deemed as suitable for onsite effluent disposal (Figure 15). The location of the LAAs shall be confirmed by the future lot owners at the Development Application stage. LAAs shall be calculated in accordance with the GSP (DPLH, 2019a) and AS/NZS 1547:2012 as discussed in Section 6.
	The land application area includes the area restricted to the distribution of treated sewage only and should be kept free of any temporary or permanent structures.	Yes The proposed LAAs shall be kept free of any temporary or permanent structures. The LAAs shall be placed in an area so that requirements are met. Site plans to be forwarded to the City of Albany (CoA) and the Department of Health (DoH) prior to Development Approval.
	Activities within the land application area shall not interfere with the function of the current and future land application system and people should avoid potential contact with effluent residues. Unless allowed for in the design, the land application area) should: • not be built on or paved in a manner which precludes reasonable access; • not be subject to vehicular traffic (other than a pedestrian-controlled lawnmower); • not be subject to regular foot traffic such as pathways and clothes line areas; and • should be kept in a manner which enables servicing and maintenance of the disposal system.	Yes Future LAAs shall be placed a sufficient distance to areas that are utilised for activity or pedestrian traffic. The LAAs for each lot shall be placed in an area so that requirements are met. Site plans to be forwarded to CoA/DoH prior to Development Approval.
Gradient of the land application area	Where slope exceeds one in five (1:5), the land application area should be engineered to prevent run-off from the land application area. Surface contours should be provided on the site plan.	Yes The natural topography across the Subject Site does not exceed 1:5 grade, except in the northwest of the Subject Site. Natural and finished gradients of LAAs shall not exceed 1:5 gradient. Site plans to be forwarded to CoA/DoH prior to development approval.

6. Land Application Areas

In response to the site soil conditions, depth to groundwater and environmental constraints of the site, it is recommended that LAAs for onsite effluent disposal be located only within the areas deemed as suitable to receive effluent disposal as shown in Figure 15. Standard leach drains or irrigation systems are both suitable land application methods for the Subject Site depending on localised site constraints.

Standard leach drains may be utilised if there is an adequate depth of free draining soil and an adequate depth to the peak annual water-table (>1.5 m) from the base of the leach drains. In areas dominated by bedrock or high groundwater, standard leach drains are subjected to failure because the rate of percolation of effluent through the soil is less than the effluent generation rate. In this instance the most suitable system is an irrigation system in conjunction with a secondary treatment system. Irrigation systems operate both by soil absorption and by evapotranspiration from plants, and therefore are less susceptible to failure. In addition, irrigation systems generally require less imported fill material to achieve the minimum separation to the peak annual water-table, as they are installed much closer to the ground surface.

Typically, when using irrigation systems, secondary treated effluent is applied by one of the following types of irrigation systems:

- Subsurface drip irrigation in which dripper lines are buried in the topsoil at shallow depth;
- Surface drip irrigation in which dosing lines are laid on prepared ground surface and covered in bark or mulch; and
- Spray irrigation system that distributes disinfected effluent (quality as per 5.4.2.5.1 of AS/NZS 1547) over the surface of the ground (AS1547:2012).

Irrigation systems shall be designed to ensure that effluent is not applied at rates which exceed the absorption capacity of the soil. Care shall be taken to ensure that the application rate does not lead to:

- Adverse effects on soil properties and plant growth through excess salt accumulation in the root zone during extended dry periods;
- Harmful long-term environmental effects to the soil of the land application system or the adjacent surface water and groundwater; or
- Increased risk to public health from surface ponding in the land application area or channeling or seepage beyond the land application area.

Irrigation systems shall be designed to promote evapotranspiration. Care shall be taken to ensure that the irrigation area is well planted with plant species that are:

- Water tolerant;
- Appropriate for the site conditions; and
- Planted at an appropriate density for effective evapotranspiration.

Secondary treatment systems are recommended when using irrigation systems due to the shallow nature of the system and the exposure of the effluent to the surface, which may pose a risk to health and the environment. Given the Subject Site is not located within a Sewage Sensitive Area, secondary treatment systems are not required for LAAs utilising leach drains, as long as there is an adequate depth of free draining soil (>1.2 m) to ensure adequate distribution of effluent and an adequate separation to the peak annual water-table (>1.5 m) beneath the leach drain.

The size of the LAAs required on individual lots based on a single household (occupancy of 6 persons in a 5-bedroom house), is shown in Table 6. This has been determined in conjunction with loading rates outlined in Table L1 in AS/NZS 1547:2012. The required size of the LAAs based on a single household are achievable at the Subject Site with the smallest proposed lot size being 10,000 m^2. The soil types encountered at The Subject Site were generally found to be consistent with Soil Category 1 – Gravels/sands and Soil Category 2 – Sandy loams corresponding to a LAA size of 339 m^2 using primary treatment only or 180 m^2 using secondary treatment, both of which are achievable within the proposed lots.

Table 6: Land application areas for single houses (GSP, 2019a)

Soil category	Soil texture	Land Application Area (m^2)	
		Primary treatment (Includes area required for setbacks)	Secondary treatment (Excludes setbacks)
1	Gravels and sands	339	180
2	Sandy loams	339	180
3	Loams	429	225
4	Clay loams	620	257
5	Light clays	1,156	300
6	Medium to heavy clays	Special design	450

Upon final placement of the house and permanent infrastructure, the new lot owner is to provide all applicable information (e.g., land application area, on-site effluent system etc.) to the City of Albany and Department of Health for approval prior to installation of the onsite effluent disposal system (as shown on Figure 16).

This assessment does not include meeting the objectives of the Code of Practice for On-site Sewerage management with detailed loadings and design capacity of the effluent system to be provided by the owner (to the relevant agencies) at the time of development approval stages.

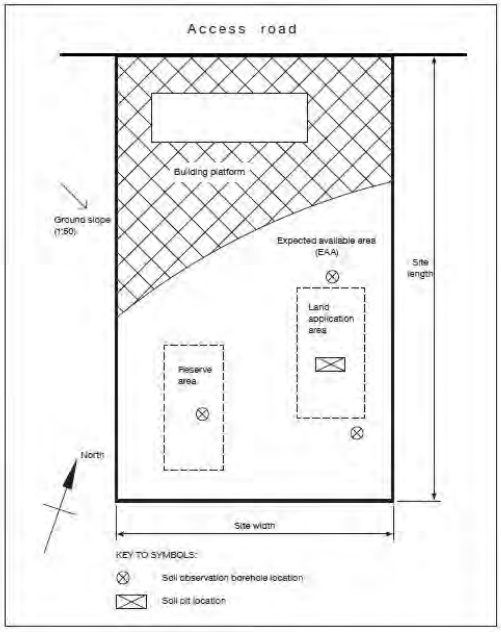


Figure 16: Generalised site plan for a single lot (AS/AZS 1547: 2012)

7. References

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Personal Communications N. Sykora, to C. Cramer via email (2023)

Appendix A

Land Capability Assessment – Lot 800 South Coast Hwy, Cuthbert (Opus, 2007)

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

OPUS

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

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Facsimile: +61 8 9842 6055

Date: August 2007
Reference: G:\Environmental Services\Environmental Projects\Whelans

Status: Final
Reference: Job No: WAENV047

LAND CAPABILITY ASSESSMENT

LOT 800 SOUTH COAST HWY, CUTHBERT, ALBANY

APPENDICES

A. Subdivision Guide Plan
B. Site Soil Test Pit Locations and Field Testing Results
C. Late Winter Water Table Testing
D. Proposed Buffer Distances
E. Approved Health Department ATU's

LIST OF TABLES IN REPORT

Executive Summary

A Land Capability Assessment was conducted on lot 800 South Coast Highway, Albany to ascertain the ability of the land to sustain Rural Residential development proposals. Grande Terra Land Development Pty Ltd engaged Opus Consultants to undertake the assessment.

Grande Terra Land Development Pty Ltd proposes to develop Lot 800 South Coast Highway, Albany into residential lots. Stage One of Albany Green is currently being developed into Rural Residential lots. Please refer to Appendix A, Copy of Subdivision proposal.

The assessment included analysis of the geology and landforms, vegetation, and historical land-uses. Site Soil Investigations were carried out in the field and in the laboratory by Opus Consultants and Albany Soil and Concrete Testing. The Land Capability Assessment was conducted as per the Department of Agriculture Land Capability Assessment Guidelines, with the proposed Rural Residential zoning being assessed against the criteria of Rural Residential with on-site effluent disposal (Land Capability Assessment for Rural Strategies 1989).

Four mapping units were identified from the soil types and landforms within the area; these were defined into mapping units A, B, C and D (refer to Mapping, page 20). The results of the Land Capability Assessment indicate there are limitations, however mainly restricted to low lying areas. The Land Capability recommends that there is some design changes to the present lot and road concept plan to follow contours and for best practise designs to be implemented for drainage.

Summary of Map Unit A

Map Unit A is predominantly sandy soils in the lower contour areas. There is remnant vegetation in this mapping unit however in poor to degraded condition from decades of stock grazing. This unit had some limitations with an overall Land Capability Rating of III – Mapping unit fairly capable of supporting the proposed Land Use (residential) with moderate physical limitations. To overcome limitations in this mapping unit it is proposed to install phosphorous retention Alternative Treatment Units (ATU's) to ensure there is little risk of water pollution, revegetate along watercourses and drains, implement Water Sensitive Urban Design principles, and if there is excavation, then an Acid Sulphate Soils Investigation will need to be initiated.

The rural component of this mapping unit was rated very low capability, with a high degree of physical limitations. The sandy soils are very poorly structured with limited nutrients (poor fertility status) and productivity, requiring regular fertiliser application and improvement. The waterlogged areas and creeklines are suffering degradation causing erosion to banks and sedimentation along watercourses.

Summary of Map Unit B

Mapping Unit B is sand over gravel and is located along the slopes of the dominant ridge which protrudes from the north to the southwest of the lot. The residential component of the Land Capability found no limitations on this soil type. Sand over gravel is very nutrient absorbing for on-site effluent disposal and traditional septic tanks could be installed. Mapping Unit B had an overall residential capability rating of II – mapping unit is highly capable of supporting the land use.

The rural component of this land use was rated III– mapping unit has a fair capability with moderate physical limitations. The soils are nutrient deficient and poorly structured with low fertility. Improvements could be made to pasture by adding fertilisers.

Summary of Map Unit C

Overall there were few limitations in mapping Unit C, which consists of shallow sand over ironstone rock. This may limit the ease of excavation if required for residential development. The Jarrah woodland present in this mapping unit is in very poor condition from decades of grazing with little to no understorey species and no regeneration of trees. Clearing of native vegetation is subject to EPA Clearing Legislation. Mapping Unit C had an overall residential capability rating of I - the mapping unit is highly capable of supporting the land use.

The rural pursuits were classified similar to Map Unit C, rated III – mapping unit has a fair capability with moderate physical limitations. Generally the soils are not favourable as there is very shallow sand over ironstone rock which gives very poorly structured soils, low moisture availability and low fertility. Improvements to soil would be required and should not be stocked at great intensities.

Summary map Unit D

This Map Unit encompasses the waterlogged soils which did not achieve greater than 500mm water table below natural ground surface. These areas have a high degree of limitation for development and it has been recommended that these areas are avoided. Native vegetation is in very poor to degraded condition with weed infestations considerable along the Five Mile Creek system. There is high risk of off-site environmental harm if these areas are developed. The land capability rating was V– Very poorly capable of supporting land use, many limitations to overcome.

The land capability for rural pursuits was also rated very poor due to the degradation that is presently occurring and contributions to offsite pollution of effluent from stock and sedimentation of eroded banks. It is recommended that these areas are fenced from stock and revegetated. This land use was rates as IV - area with low capability, high degree of physical limitations

Summary of Whole Site

Engineering design of the proposed development will control surface water runoff during and after construction, minimising concentration and erosion effects by ensuring natural landscape contours are followed where possible. Waterlogged areas should be avoided due to large limitations for development and high risk of environmental harm and off-site impacts.

The retaining of remnant vegetation into Public Open Space or drainage reserves shall enhance the native vegetation values by the proposed subdivision, as currently there is no management of these. Presently there are heavy infestations of introduced plants (weeds), which is degrading the vegetation structure and restricting natural re-establishment of native vegetation. The removal of pest weed species will encourage native vegetation recruitment.

The overall capability of the land to support rural residential development is sustainable, with low intensities of agricultural pursuits, and waterlogged areas excluded from development. It is recommended that with management and careful consideration incorporated into the planning and engineering designs the identified limitations could be overcome.

1 Introduction

Grande Terra Land Development Pty Ltd commissioned Opus Consultants to undertake a Land Capability Assessment, Environmental Assessment and give Engineering Comment on constructability of the proposed Albany Green Stage Two. The subdivision site is located on lot 800 South Coast Highway and Stage Two is the southern end of the lot bordering onto the Lower Denmark Road, near Cuthbert Village.

This report outlines the Land Capability for the proposed development of the southern half of lot 800 South Coast Highway, and is aligned to the Department of Agriculture Western Australia and State Planning Commission three step methodology for Land Capability Assessment, being:

- Land Use Requirements of the proposal,
- Land Resource Survey, and
- Land Capability Analysis

(Land Capability Assessment for Local Rural Strategies, Department of Agriculture and State Planning Commission, 1989)

This report evaluates the subject land according to Rural Residential proposed land-use (Land Capability Assessment for Local Rural Strategies, 1989). The Dept. Agriculture Land Capability Assessment Guidelines assesses Rural Residential development according to proposed lot sizes. The proposed lots are described as Rural Residential development from 1ha to 5ha. The land use requirements have been rated in view of the soil investigation, historical land use, vegetation mapping, survey and topography.

2 Locality and Site Description

The project site, lot 800 South Coast Highway is located in the village of Cuthbert west of Albany, Albany, Western Australia. Please refer to the location map* below. Albany Green Stage Two covers an area of approximately 115 hectares. The subject site is bordered by South Coast Highway to the north and Lower Denmark Road to the south. The east and west boundaries of the site are adjacent to private properties.

3 Development Proposal

Grande Terra Land Development Pty Ltd propose to subdivide the subject site, Albany Green Stage Two (lot 800 South Coast Highway) into 45 lots ranging from 1 hectare to 4.5 ha each in size. It is also proposed to develop one lot into a super lot for future Chalet resort and rural lots (proposed lot 32). Please refer to Appendix A – Subdivision Guide Plan. There is one existing residence on the subject site. The existing residence utilises septic tanks with leach drains for onsite effluent disposal.

4 Site Soil Assessment

The Geological Survey of Australia Geological Map Series 1:250, 000 mapping describes the subject site as clay silt, sand and gravel in water courses and sand, white grey or brown commonly containing iron pisoliths and overlaying alterite. The site soil testing confirmed this.

Opus Consultants and Albany Soils and Concrete Testing carried out a site inspection and conducted field testing on the 14th and 15th June 2007. The site assessment included recording of site details as per Australian Standard AS/NZS 1547:2000, soil profile logging by visual classification to a depth of 2m and observing water table depths to water table below existing surface level. Please refer to Appendix B – Soil testing results.

Please note the original site assessment was conducted in June 2007, Opus re-visited the site in late August 2007 to conduct late winter water testing.

A total of 20 bore pits were drilled by mechanical auger and water depths were recorded. Permeability and Phosphorous Retention tests were conducted on 3 samples – one sample from test pit 4 (extracted from 150 to 2000mm below surface level), one sample from test pit 7 (extracted from 150 to 2000mm below surface level) and one sample from test pit 19 (extracted from 100 to 700mm below surface level). Further test pits were excavated underlate winter conditions to verify water table levels.

Surface soils indicated that the site is primarily sand with silt over most of the site with some sand over gravel/rock in elevated areas, and small areas of sand with minor peat soils in low lying areas.

Please note that the investigation and the writing of this report does not take into account any current or future zoning of the subject land, and focuses on land use and subsequent land capability.

4.1 Site Report

The subject site, lot 800 South Coast Highway, is situated on the south side of a ridge running east west parallel to South Coast Highway and Lower Denmark Road. The site has a 2 to 10% linear planar slope, with a dominant ridge which descends in a south westerly direction. The site is predominantly cleared, there are some isolated pockets of remnant vegetation, please refer to Section 5.3.

The soil profile across the site was predominantly sand with silt and 15 test pits recorded these characteristics. Five pits recorded either sand with silt and peat (test pit 3) which is expected in lower lying areas; sand with silt over gravel (test pit 2 and 19) along mid slope areas; and sand over gravel over rock (test pit 6 and 11) on the highest contours across the site. The soil types have been representatively mapped in Appendix B from the site soil testing.

Sand with Silt

The top layer of the soil profile consisted of moist sand with silt which was light grey to dark grey in colour. The sand with silt layer extended from the surface to 2000 below the surface. The majority of the test pits across the site recorded this soil type on or below the 15m contour. Please see photographs below.

Photo One – Sand with Silt

Photo Two – View of test pit sand with silt

Sand with Silt over Gravel

Test pit 2 and 19 recorded black sand to dark grey sand with silt over brown sand with gravel. These soils were found mid slope along the ridge, with the gravel layer varying from 100mm below surface level to 900mm. Test pit 19 had some silty clayey sand below the gravel layer. The presence of gravel soils indicates that there is the capacity of the soil to absorb phosphorous and nitrogen. Test pit 2 in the north west corner was the only test pit with gravel which encountered water table (in June 2007 sampling).

Photo 4: Sand over gravel Test pit 19

Photo Four: Test pit 2 sand over gravel, water table at 1.1m in June, and water table at ground level in August.

Sand over Gravel over Rock

Test pits 6 and 111 recorded shallow layers (0-100mm) of dark grey sand with silt over brown sandy gravel ranging from 100mm to 600mm below ground level, See Photo five below. The test pits were terminated due to the auger unable to penetrate past the rock layer. The locations are on the highest points of the subject site.

Photo Five: Sand over rock

Photo Six: Sand with silt and peat

Sand with Silt and Peat

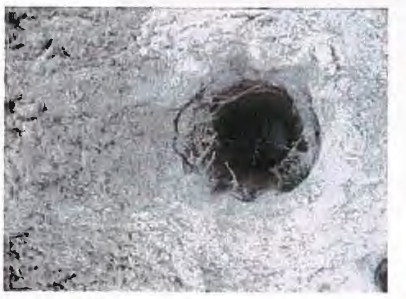
Test pit 3 was the only test pit within this sample regime which had black peaty sand with silt extending to 700mm over dark brown sand with silt. Please see photograph 6 above. This test pit reached the water table at 1.1m, sampled under late winter conditions water table was reached at ground level. Test pits 16 and 18 are low in the contour (<5m contour) and recorded high organic content in the topsoil, however were predominantly sandy silt in profile. These test pits recorded high water table under late winter conditions.

Late Winter Water Table Testing

Original testing was conducted in June, Opus Consultants returned to the site to conduct late winter water testing in August 2007. Test pits were excavated to a depth of 2m, water table was reached in 13 pits of the 20. 5 additional test pits were excavated to confirm the soil mapping and late winter water table levels across the site, please refer to Appendix C – Late Winter Water Table Testing. From this testing more definitive hydrological flow paths were noted and mapped. Please refer to mapping in Appendix C.

Gregg Harwood, City of Albany Senior Environmental Health Officer attended the late winter water table testing and the following recommendations were discussed at length on site and are formulated from these discussions.

Photo Seven, Left – Test pit 12, water table at 1000mm.
Photo Eight, Right – Test pit 9 water table at 1400mm.



Permeability Testing
The permeability tests were conducted by Albany Soil and Concrete Testing on the 150 to 2000mm of the Sandy Silt (Test pits 4 and 7) and the 100 to 700mm of the sandy gravel (Test pit 19), please refer to permeability results in Appendix B - Soil testing report. These results are typical for sandy soils and show that the soils are free draining. The concern with this site is the separation of water table as per the minimum requirement of the Health Department WA.
Testing was undertaken on three representative samples from the three main soil types, sand, sand over gravel and sand over rock.

Phosphorous Retention Index
The Phosphorous Retention Index (PRI) tests were conducted by Albany Soil and Concrete on the 150 to 2000mm of the Sandy Silt (test pits 4 and 7) and the 100-700mm of the sandy gravel (test pit 19), please refer to PRI results in Appendix B - Soil testing report.

The PRI's reveal that the sandy silt soil type has poor phosphorous retention ability with results showing at Test pits 4 and 7 being less than 1.0, whereas the PRI for the sand over gravel has very high ability and is at 323.75. The soil types with sand over gravel are very conducive to traditional on-site effluent disposal.

4.2 Policy and Legislation On-site Effluent Disposal

The *Draft Country Sewerage Policy* (Amended 2003) states the following specific requirements for on-site wastewater disposal. Large lots, where lot subdivision is to occur with divided parcels of land no smaller that 2000m^2 and development density is greater than R5, must comply with the following criteria as discussed in the appendices of the *Draft Country Sewerage Policy* (Amended 2003):

- *Irrespective of the type of on-site wastewater disposal system proposed, there should be at least 0.5 metres separation between the natural ground surface and the highest known groundwater level;*
- *The site is required to have soil characteristics capable of receiving all wastewater likely to be generated on the site without risk to public health or the environment; and*
- *The natural land slope on which wastewater disposal is to occur shall not exceed a one in five gradient.*

Wastewater System Installation Requirements:
- *The wastewater disposal site should not be subject to inundation or flooding at a probability greater than once in 10 years;*
- *No wastewater system shall be constructed so that effluent or liquid wastes will be discharged into the ground at a distance less than 30 metres from any well, stream or private supplies intended for consumption by humans;*
- *The depth to highest groundwater level from the underside of a septic tank effluent drainage receptacle shall be a minimum of 1.2metres. (For existing developed areas or infill areas a depth to highest known groundwater level may be a minimum of 1.2metres from ground level);*
- *Setbacks, groundwater clearance and installation requirements of systems other than conventional septic tank systems shall comply with any particular treatment relevant to the particular system. These are as required under the Health (Treatment of Sewerage and Disposal of Effluent and Liquid Waste) Regulations 1974, or conditions set by the Executive Director, Public Health.*

Due to environmental concerns with this particular site, it is proposed to utilise Phosphate Removing Alternative Treatment Units (ATU's). A copy of the approved Health Department WA Phosphate Removing ATU's is provided in Appendix E.
The Draft Country Sewerage Policy requires minimum setbacks and buffer distances to ensure that material does not leach into adjacent areas. The area around the Five Mile Creek and

associated creeks are classified as Environmentally Sensitive Areas according to the Draft Country Sewerage Policy. The Draft Country Sewerage Policy States the following requirements:

Table One - Environmentally Sensitive Areas

Feature	*Soil Type*	*Minimum buffer distance*	*Comments*
Environmentally sensitive areas (1) – wetlands (h) only	*All soils*	*50 metres*	*This buffer reflects the Water and Rivers Commission's and Environmental Protection Authority's policies on the minimum buffer required for any type of development near a wetland*
Environmentally sensitive areas (1) - watercourses, estuaries and marine environment only	*All soils*	*30 metres*	*Where floodplain mapping information (eg flood levels) is not available, the wastewater disposal area should be at least 30 metres from the edge of a watercourse channel. The wastewater disposal system should only be located at this distance if installation does not disturb riparian vegetation.*

Draft Country Sewerage Policy 2003.

4.3 Recommendations on site effluent disposal – Rural Residential

The site can meet on-site effluent disposal if approved phosphate removing ATU's are used and the 50m buffer distance is applied to the creeklines and drains. As the soils are relatively free draining, a separation from water table must be achieved. To achieve these minimum requirements, proposed setbacks and disposal field areas have been mapped for the site. In some areas the disposal field may be a distance from the house and pumped to the disposal area. The City of Albany Senior Environmental Health Officer (G.Harwood) attended on site and confirmed this could occur. A copy of these buffer distances is provided in Appendix D.

In reference to the above considerations which address the *Draft Country Sewerage Policy* (Amended 2003) guidelines, and in consideration that the proposed subdivision has lot sizes of greater than 1 hectares in size, Opus Consultants recommends that lot 800 South Coast Highway has a demonstrated capacity to support effluent absorption with the following conditions:

- Minimum setback distances of 50m from creeklines and drains are adhered to;
- Phosphate absorbing ATU's are utilised in depression areas. A copy of approved Health Department WA ATU's is provided in Appendix E;
- A separation of 0.5m is achieved from existing ground level and water table; and
- Disposal fields are located in designated building envelopes.

Opus Consultants concludes that the subject site is capable of supporting the proposed subdivision site effluent disposal with the above limitations to reduce negative impacts to the surrounding environment or watercourses. The limitations are included on the Land Capability rating and mapping in Section 7 of this document.

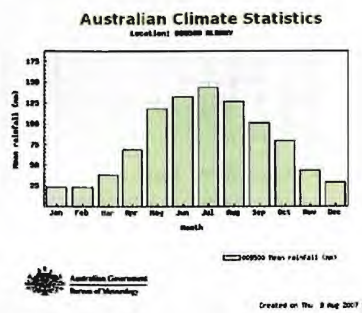
5 Environmental Assessment

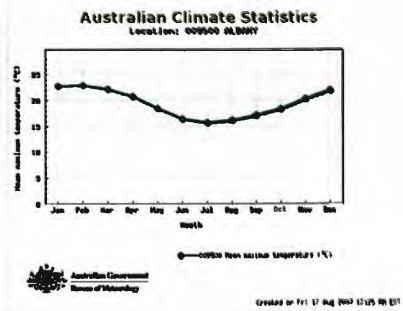
The Environmental Assessment for the subject site involved desktop analysis of climate, history fauna, and acid sulphate soils of the site; and on ground assessment of remnant vegetation and fire management. The results of these assessments are included in the land capability rating and mapping in Section 7 of this document.

5.1 Climate

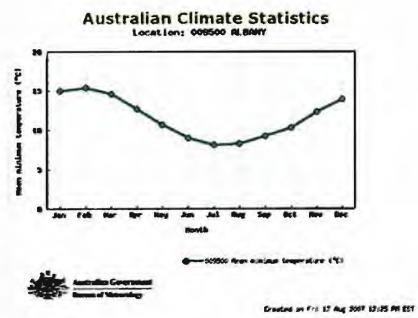
Albany sustains a Mediterranean type climate with generally warm summers and cool, wet winters. A major factor influencing Albany's climate is the Southern Ocean, giving a moderating influence via sea breezes in the warmer months and a relatively mild, moist airmass at any time through the year. During summer there is a development high pressure band (sub tropical ridges) across the south west giving north south movements. Albany's south coast aspect means winds progress with these ridges from east through north, west, south and returning to the east over periods of days and weeks bringing large variations in weather conditions. During the winter months these ridges bring moist westerly winds south of the ridge, delivering much of Albany's rainfall.

Albany's long term median rainfall is approximately 930mm (Bureau of Meteorology), with considerable variation from year to year. On average 72 per cent of Albany's rainfall occurs between May and October. Please refer to Bureau of Meteorology charts over page. Average temperatures peak in summer in January and February, with monthly maximum means of 23°C and overnight mean minimum of 15°C. Winter daily maximum temperatures average at approximately 16°C while the average daily minimum is 8°C in July. Please refer to temperature charts from the Bureau of Meteorology below.





Climate Statistical Graphs from the Bureau of Meteorology website 2007.



5.2 Current and Historical Land use

The Cuthbert area was cleared in the 1950's of native vegetation. The properties to the south of Lower Denmark Road near Cuthbert were cleared for potato growing and the areas to the north were cleared for grazing. (pers comms T.Saggers, Aug 2007) Lot 800 was cleared by the Burkin family where they grazed cattle for many years.

Lot 800 has been historically used for sheep and cattle grazing. The current tenants of the property graze cattle over the whole site and it is understood the previous owners ran a few sheep (pers comms M.J.Gibbs June 2007). The grazing across this site has been extensive with all remnant vegetation areas grazed, the drain running through the middle of the property is fenced to exclude stock, however, remnant vegetation is in very poor condition and quite degraded. (Please refer to Vegetation Assessment Section 5.3).

Stock (cattle) currently grazed on the property have access to all creek and wetland systems on the property. This is causing erosion to the creek lines and loss of vegetation to these areas. Please refer to photographs Nine and Ten below.

Photo Nine: Erosion to the banks of Five Mile Creek from cattle.

Photo Ten: Sediments and cattle effluent drain freely into five mile creek system.

The predominant soil type across Lot 800 is sandy silt. These soil types have poor structure and moisture withholding ability. Photographs Eleven and Twelve show nutrient deficient pasture in the peak growth period of August. Pasture improvement would be required for maximum nutrition for grazing, such as application of fertilisation with phosphorous & Nitrogen. This does not make the soil type suitable for pasture enhancement or tillage. Historically the Cuthbert area is known for intensive horticulture from potato growing, this site however is unsuitable for this agricultural pursuit.

Discussion with the current tenants indicates there are no sheep dip areas or potential areas for chemical contamination. A contaminated site investigation was not carried out as part of this brief, discussion to date and site visits do not indicate this would be necessary.

Photo Eleven (left): Pasture showing death and yellowing – nutrient deficiency.
Photo Twelve: ((right)) View of pasture showing nutrient deficiencies.

5.3 Vegetation Assessment

Vegetation Assessment was undertaken on site by Kathryn White Opus Consultants on 7th July 2007. Assessment was undertaken of all remnant vegetation by visual assessment. Two vegetation associations were mapped across the site, Taxandria Woodland and Jarrah Woodland. These vegetation associations have limited understorey species, consisting mostly of introduced weeds and are in degraded condition from grazing of stock.

Taxandria Woodland

Vegetation Association along the creeklines is remnant riparian vegetation consisted of dominant overstorey species such as *Taxandria juniperina, Agonis flexuosa, Callystachis lanceolata,* sparse pine trees near the existing house and sparse *Eucalyptus rudis* and *Maleleuca raphiophylla* along the Five Mile creek system. The understorey species was predominantly introduced species such as Taylorina, Blackberry, Arum lily, Inkweed, Bridal Creeper, Aloe vera, and Kikuyu, with minor native species of *Pteridium esculentum, Juncus* spp, *Hibbertia cuneformis* and *Lepidosperma* spp.

Photo Thirteen Right: View of riparian vegetation along Five Mile Creek
Photo Fourteen: View of Taxandria's

Jarrah Woodland

There are two remnant patches of Jarrah woodland, located in the north centre of the lot and along the eastern boundary. These stands have little to no understorey, and scattered A*llocasuarina frasieriana* and B*anksias grandis* (on eastern side only). The eastern remnant bushland is undergoing some unidentified dieback, this could be from a canker or from pressure from grazing.There was very limited species diversity within this association, which is a direct reflect from long term grazing pressure on the vegetation. A development buffer of 30 metres is required away from watercourses and drains. It is recommended that this buffer area is revegetated with providence species to reclaim and stabilise these areas. Vegetating along the watercourses

(especially the Five Mile Creek through the property) would also provide more sustainable fauna habitat and create micro-corridors for native animal movement. At the very minimum it is recommended that these areas are fenced off from cattle grazing.

Photo Fifteen (left): Low Jarrah forest, limited understorey. Photo Sixteen (right): View of casuarinas and jarrah on eastern side under some stress.

A comprehensive weed management plan needs to be implemented, as there are large infestations of Blackberry, Taylorina, Ink weed and Arum lily along the Five Mile Creek and adjacent watercourses. These species should be eradicated as per Department of Agriculture and Food guidelines to prevent further spread and infestations occurring.

5.4 Fauna

A complete fauna survey of the area was not completed for the purposes of this management plan. Known species to the area include western grey kangaroo, southern brown bandicoo, bush rat, honey possum, tiger snake, dugite, whistling kite, nankeen kestrel western, pacific black duck, kookaburra, rosella, grey fantail, new holland honey eater and banjo frog.

The remnant areas of vegetation have limited understorey, in reflection of this it would be assumed that there would be minimal representation of mammals and more representation from amphibians, birds and reptiles. Revegetation across the site would provide habitat for native animals and provide linking corridors to adjacent bushland areas.

5.5 Fire management

A Fire Management Plan in consultation with Fire and Emergency Services (FESA) has not been prepared as part of this assessment. Fire management aligned to the FESA guidelines states that buildings should have a minimum setback from bushfire hazards of 100 metres. Where this cannot be achieved, AS3959 building standards apply.

As this site is predominantly cleared of native vegetation, the only identified fire hazard applicable is adjacent to the eastern boundary (near proposed lot 30 and 31) where a remnant patch of vegetation occurs. A 100m setback from buildings could be applied to this area, more consultation is required with FESA and CoA Fire Managers to confirm. As it is not a continuous vegetated area, AS3959 may not apply. A minimum fuel reduction area of 20m (if under 10° slope) will need to be implemented, as per City of Albany Fire Prevention Plan. This is not mapped as a limitation.

5.6 Wetlands and water ways

The "Five Mile Creek" drains through the property from the north east corner of stage two to the south western corner. The Five Mile Creek forms part of the Torbay Catchment and drains to Lake Powell, which is a "Class A" Nature Reserve vested with the Department of Environment and Conservation. A search of the DEC database places Lake Powell as an Environmentally Sensitive Area, the subject site is not located within this area, and is located 3km from the lake edge. A

search was conducted of the Department of Water database's revealing the subject site is not in a Public Drinking Water Source Protection Area or has any wetlands of regional significance on the property.

The site is only classified as an Environmentally Sensitive Area under the Country Sewerage Policy and as discussed in Section 4.3, an on-site effluent disposal system should be setback 50 metres from adjacent creek lines and drains. A drainage easement has been placed over the Five Mile Creek and a development exclusion of 30 metres placed from the drain centreline and adjacent creek tributaries, please refer to Land Capability Mapping Section 7. It is recommended that the development exclusion area is fenced free from any stock grazing and re-vegetated with local endemic species.

It is proposed that with careful planning of site drainage and on-site effluent disposal this development would have less impact on the Five Mile Creek system than the existing rural land use is having on the area.

Evidence that this is probable is from Department of Health WA document "Movement of Nutrients from On-Site Waste Water Systems in Soils". A comparable table for phosphorous and nitrogen inputs for an onsite effluent disposal system and rural pursuits is copied from this document over the page.

Table Two Comparison of Nutrient Inputs from Agriculture and Domestic Activities

Table 1 **Overview of nutrients inputs from animals, agricultural activities and domestic septic tanks**

land use	housing density (R-)	P input	N input	P input	N input	P input	N input	P input	N input	references
		kg/ha/year		kg/ha/year		kg/ha/year		kg/year		
		unsewered		sewered						
rural residential	0.5	6	27	5	18					1
residential	5	25	125	15	25					1
residential	10	25	260	40	80					2
residential	10			30	120					3
market gardens	-					200-1200	500-900			4,5
orchard	-					100	200			4
pasture 1	-					20	20			4
pasture 2	-					20	70			4
1 septic tank								3.5	18	2
1 cat								0.25	1	1
1 dog								1.3	5	1
1 horse-a								18	70	5,6
1 horse-b								12	45	7,6
1 horse-c								10	40	5,6
1 chook								0.4	0.7	5,6
1 pig (<20kg)								0.65	2.7	9
1 pig (20-50 kg)								2	8.4	9
1 pig (50-110 kg)								3.1	12.9	9

references:
1- Gerritse, Adeney and Bates (1992).
2- Gerritse, Barber and Adeney (1996).
3 JDA Consultant Hydrologists (2001).
4- Gerritse (1990)
5- Kinhill Engineers (1995).
6- van Keimpema, Devaney and Kerkhof (1996).
7- Barker, Hodges and Campbell (1999)
8- Primrose McConnell (1976)
9- Beavers and Neuroska (1977)

Department of Health WA "Movement of Nutrients from on-site waste water systems in soils" 2001

Based on the above information, the following assumptions could be made;

- Impact on Lake Powell from rural residential development would be greatly reduced through less stock being run and reduced N and P loadings into the creek lines.

- The onsite effluent disposal system proposed for the subdivision is phosphorous removing systems and thus would have miniimal impact on the creek lines.
- Better management and revegetation of the riparian creek lines would have a positive effect on the downstream Lake Powell.
- Nutrient stripping and retention of storm water on site will mitigate the risk of any pollution of water courses from this proposed development.

Opus Consultants have undergone preliminary consultation with the Department of Water (DoW), and there are concerns regarding drainage and effluent disposal. It is recommended that if the development proceeds, a Water Management Plan is prepared in consultation with the City of Albany and DoW.

6 Engineering Assessment

A site visit was undertaken by Scott Curran Senior Engineer Opus Consultants in light of the proposed development. The environment of the site is mainly pastured and therefore road construction and service installation should not be affected by general urban environment constructability issues such as clearing, traffic, noise and dust issues.

Cut and fill balances should be able to be managed through the design to reduce the volume of imported embankment or spoil materials. The major cut and fill design is between Lots 8 to 5 on the western side of the proposed development site. In designing this portion of road, considerations may be given to the road alignment at this location to allow the alignment to better follow the contours and reduce the gradient of the road and batter slopes. This may require consideration for adjustment to the lot boundaries.

Construction programming of the project should be carefully considered to take into account the building of roads and culverts in the lower lying areas and it is recommended to stage these works to coincide during drier months.

It is recommended that further Geotechnical investigation be undertaken on the road alignment to determine the bearing capacity of the underlying soil structure prior to pavement design. This would be particularly important where the proposed road alignment expends past Lot 22.

6.1 Ease of excavation

The site is predominantly sandy silt with some gravel through the ridge in the northwest of the lot, it is not envisaged this will pose a problem for excavation or for development of road and housing. The ease of excavation has been rated for the land capability assessment as very low limitation.

Dependant on the final design and depth of cut, it is anticipated the iron stone will be encountered along the top of the ridge between Lot 21 to Lot 16. This would not be seen as extraordinary but again should be investigated at design phase.

6.2 Foundation stability

There were no reactive clays noted across the site, a full geotechnical investigation was not carried out as part of this land capability. Given the majority of the soils are mostly sand or silty sand with no reactive clays, this would class the majority of the site as Class A soils.

The classification of soils at Loc 2, 3, 8, 12, 16 indicate that these sites could be considered as Class P and any structural elements planned for these areas willl require certification of a structural engineer.

In light of the land capability assessment this was rated as High – moderately deep sandy soils with undulating plains (2-8%)

6.3 Drainage requirements

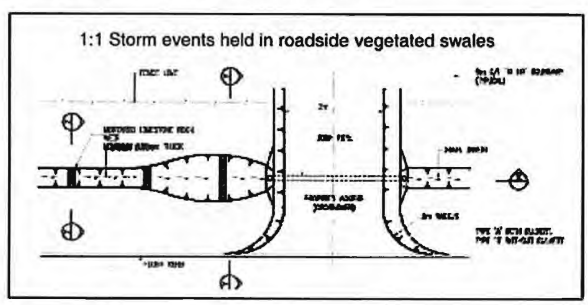
The majority of the site is relatively free draining sandy soils and is a model site for water sensitive urban design to be applied. Water management strategies should be aligned to current Best Practise and applied to this development these include:

1. Maintain and where possible enhance water quality by:
   - Minimise waterborne sediment loading
   - Minimise export of pollutants to surface or ground water
   - Minimise post development flows across the site
   - Apply point source water management
   - Encourage prospective landowners not to use fertilisers on land

2. Encourage water conservation by:
   - Minimise the export and use of scheme water
   - Promote the use of rainwater
   - Promote ground water recharge
   - Reduce irrigation requirements

3. Management of the water regime by:
   - Prevent flood damage in existing and proposed development areas
   - Prevent erosion of adjacent wetlands, waterways and slopes
   - Ensure pollutants do not enter into adjacent waterways

A concept drainage design was not prepared as part of this assessment, site investigation in light of the proposal did not see any major restrictions on drainage. The proposal involves large lots sizes and drainage easements adjacent to road terminations. The use of water sensitive urban design principles should be applied where all 1:1 events are contained in road side swales. A representative drawing of this concept is provided below.



Larger 1:10 events will need to be detained prior to entering the Five Mile Creek, it is recommended that bio-retention basins, vegetated with endemic rushes and sedges are developed at all proposed drainage points from the drainage easements. This is shown as a medium limitation in the land capability to be considered in more detail in the engineering design stage.

It is recommended that roads are aligned along contours to reduce speed of runoff along drains and to implement more effective Water Sensitive Urban Design Principles. A design which replicates the roads along the contours and the lots aligned off this would allow best Practise drainage design.

6.4 Waterlogging hazard

Areas from the aerial mapping showing water logging have been mapped and were confirmed with intensive sampling regime undertaken in late winter. These areas have been mapped on are a limitation in Section 7 Land Capability. Photographs Seventeen to Eighteen below show typical waterlogged areas across the site.

Photo Seventeen: Water logged area in northwest corner.

Photo Eighteen: Close up of waterlogged soils

Development should be excluded from these waterlogged areas and revegetation of provenance and endemic species. A weed management plan should be prepared to address the major infestations along the creek lines.

Suitable land use for the water logged areas is POS or vacant land. This land is not suitable for grazing or residential use due to the water logging through most of the year and the subsequent erosion from animals in those areas. This is mapped in the Land Capability as Map Unit D. All other map units achieve a greater than 0.5m separation from natural ground level and natural water table level under late winter conditions.

Opus Consultants recommend that the residential design is redone to exclude these areas, align residential areas to higher ground and parallel to contours. Residential boundaries can extend into these areas, however development is not recommended.

6.5 Acid Sulphate Soils

The WAPC Acid Sulphate Soils Risk Mapping Classifies the lower half of lot 800 South Coast Highway as a Medium risk of Acid Sulphate Soils occurring. This investigation did not include Acid Sulphate Soil Testing, a desktop assessment was undertaken, please refer to WAPC Acid Sulphate Soil mapping in Appendix B.

Acid Sulphate Soils occur in waterlogged soils and typically sandy silts and peat soils. It was noted on site that the low lying waterlogged soils had sulphur like smells and there is a possibility that Acid Sulphate soils could occur in these areas. It is recommended that a Preliminary Acid Sulphate Soil Investigation is undertaken when the exact extent of the development is known and if there is any excavation or cut and fill proposed, the Acid Sulphate Soil Investigation targets these areas.

7 Land Capability Assessment

7.1 Description of Land Use Requirements

Areas of land for sub-division approval are assessed through Land Capability to analyse the sustainability of the particular activity and the environmental effects the proposed use may have on the land. This determines the attributes the land contains which can affect the proposed land use for the area. The Land Use proposed for this development is Rural Residential with areas for Public Open Space, and possible chalet style development.

Please refer to Appendix A for the proposed layout plan of the subdivision.

7.1.1 Rural Residential

The land use proposed for Special Residential land use is 115 ha, with 28.53 ha (lot 32) for chalet accommodation or rural (subject to land capability). The qualities required for consideration for this zoning at lot 800 South Coast Highway are defined by Agriculture Western Australia as being:

Rural Residential development with on-site effluent disposal

- *Land should be free from effects of storm surge, flooding, wave erosion or slope instability.*
- *Land should not be susceptible to a degree of erosion hazard which would prohibit its sustained use or cause off-site effects detrimental to adjacent land users or the community.*
- *Soils for effluent disposal area to be sufficiently permeable and absorptive to accept and purify effluent.*
- *Ground water or surface pollution does not occur on site or off-site.*
- *Land is sufficiently free of water logging and inundation.*
- *Land is not saline so that trees, garden or lawn establishment becomes prohibitive.*

7.1.2 Proposed Chalet Site and Rural use

The proposed Chalet site land use and rural use is proposed in lot 32. These pursuits are subject to the Land Capability Assessment, the chalet land use has been assessed, similar to "Residential" components and rural land use is assessed separately as "Rural or Hobby Farms".

It is more likely that areas in Lot 32 will become POS areas as there is a prominent amount of waterlogging through the middle of this lot.

7.2 Land Capability Assessment Method

The Land Capability Assessment compares the physical requirements for a particular land use with the qualities of the land. This analysis determines the ability of the land to sustain a particular land use without resulting in significant environmental degradation. The land use that has been considered for this study area is Rural Residential with on-site effluent disposal.

This study has included analysis of the soil and landform from soil survey, environmental assessment and engineering assessment. Late winter water levels were obtained during the soils assessment.

7.3 Land Resource Characteristics

The Land Resource Characteristics have been overlaid to determine the mapping units assessed at lot 800, South Coast Highway, as detailed on Map Two page 20. The mapping units were determined by the following information:

- Soil and Landscape characteristics, including texture, depth, soil profile, aspect, slope and water table.
- Soil testing and Laboratory analysis.
- Environmental mapping
- Historical land use.

The Four mapping units are defined in Table Three below.

Table Three– Mapping Units Lot 800

MAP UNIT	CHARACTERISTICS
Map Unit A	Sand with silt soils, well draining soils, dark grey to black and light grey sands, very little topsoil. Predominant soil type below the 15m contour. Prominently pasture, cleared land.
Map Unit B	Sand with silt over gravel, moderate to well draining soils, good nutrient and phosphorous retention ability. Along ridges above the 15m contour, predominantly pasture.
Map Unit C	Sand over gravel over rock, this soil type is prominent along the ridge, the highest point on the lot. Presently covered by degraded Jarrah woodland.
Map Unit D	Sand with silt and peat, these soils are generally in the waterlogged areas and along watercourses. Predominantly degraded riparian vegetation (Taxandria) and introduced weeds species.

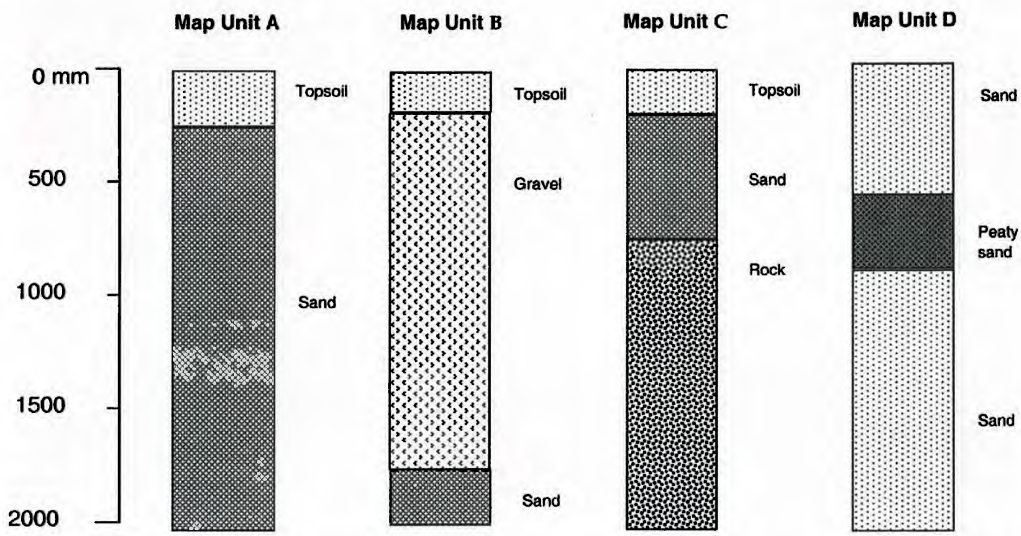
The mapping units have grouped soil characteristics that shall be referred to in the Land Capability Rating procedure and have been summarised in Table Four over the page.

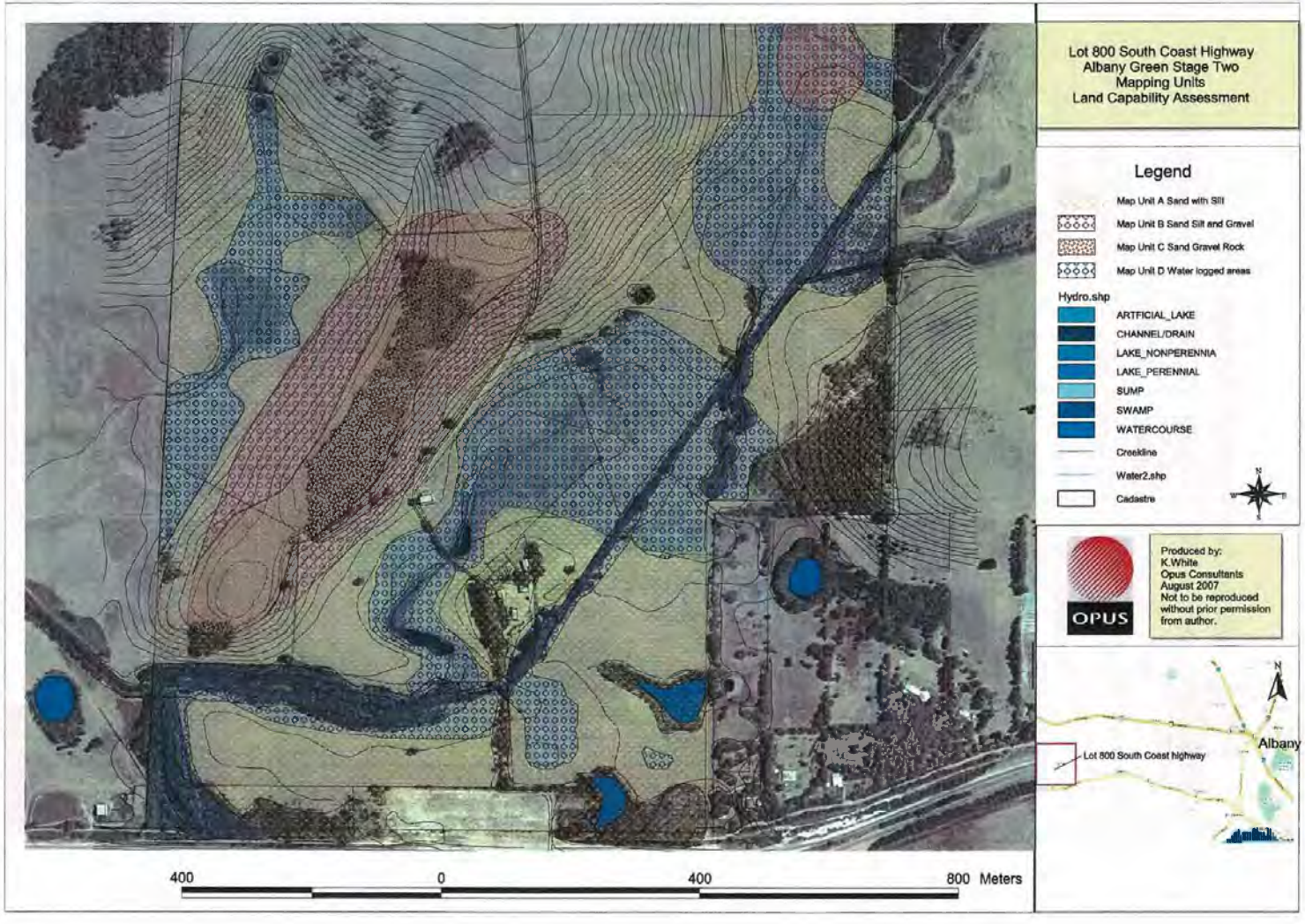
Table Four Soils Summary of Final Mapping Units

Final Mapping Units	Soil Texture	Soil Depth (max)	Slope (degrees)	Soil Permeability
A	Sand/silt	≤2000mm	<10	well drained
B	Sand/silt/gravel	≤2000mm	>10	mod – well drained
C	Sand/gravel	<600mm	>10	mod – well drained
D	Sand/silt/peat	> 2000mm	<10	well drained

The Final Mapping units soil profile descriptions are represented diagrammatically (Figure One, below). Information was compiled from the soil sampling with each test pit averaged to give representative profile descriptions of each mapping unit. The four mapping units are overlaid on lot 800 South Coast Highway, Albany, over the page.

Figure One– Soil Profile Descriptions of the Three Mapping Units




Lot 800 South Coast Highway
Albany Green Stage Two
Mapping Units
Land Capability Assessment
Legend
Map Unit A Sand with Silt
Map Unit B Sand Silt and Gravel
Map Unit C Sand Gravel Rock
Map Unit D Water logged areas
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Water2.shp
Cadastre
N
OPUS
Produced by:
K.White
Opus Consultants
August 2007
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from author.
N
Albany
Lot 800 South Coast highway
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800 Meters

8 Land Resource Survey

8.1 Qualities and limitations

The proposed land use has a set of qualities for which the Land Capability Assessment will be considered. Table Four and Five below outlines the landscape qualities and characteristics that will be assessed within the scope of this study at location 800 South Coast Highway Albany.

Table Five – Landscape Qualities and Limitations – Residential Component

Landscape qualities	Subclass	Landscape qualities	Subclass
Ease of excavation	x	Phosphorous retention ability	p
Foundation stability	b	Water pollution hazard	s
Services (reticulated water, power, telephone)	r	Soil salinity	y
Water logging hazard	i	Bushfire hazard	z
Water erosion hazard	e	Native vegetation retention	n
Wind erosion hazard	w	Potential Acid Sulphate Soils	as
Flood hazard	f		

Table Six – Landscape Qualities and Limitations – Rural Component

Landscape qualities	Subclass	Landscape qualities	Subclass
Plant growth	pl	Water availability	a
Soil trafficability	t	Shallow Soils	ss
Soil fertility status	l	Erosion	er
Soil moisture availability	m	Flood Hazard	f
Rooting conditions	l	Water pollution hazard	s

The landscape qualities are surveyed from the previously presented information in this report (Sections 1-6) and assessed for capability. The Department of Agriculture utilises a five class system of assessing land capability, these five classes rate the degree of physical limitations associated with land use and management needed for these. Please refer to Table Seven over the page.

Table Seven Land Capability Classes – Dept Agriculture Western Australia

CAPABILITY CLASS	DEGREE OF LIMITATION	GENERAL DESCRIPTION
I	Very low	Areas with a very high capability for the proposed activity or use. Very few physical limitations to the specified use are present or else they are easily overcome. Risk of land degradation under the proposed use is negligible.
II	Low	Areas with a high capability for the proposed activity or use. Some physical limitations to the use do occur affecting either its productive use or the hazard of land degradation. These limitations can however, be overcome through careful planning.
III	Moderate	Areas with a fair capability for the proposed activity or use. Moderate physical limitations to the land use do occur which will significantly affect its productive use or result in moderate risk of land degradation unless careful planning and conservation measures are undertaken.
IV	High	Areas with a low capability for the proposed activity or use. There is a high degree of physical limitations which are either not easily overcome by standard development techniques or which result in a high risk of land degradation without extensive conservation requirements.
V	Very High	Areas with a very poor capability for the proposed activity or use and the severity of physical imitations is such that its use is usually prohibitive in terms of either development costs or the associated risk of land degradation.

8.2 Land Capability Rating for Land Use Rural Residential – Degree of limitation

Land qualities have been assessed in terms of the degree of limitation (Tables Eight to Eleven in following sections) to the proposed land-use. The limitation is then matched to what the land can support and rated on the limitations map (each Map unit has a limitation map proceeding). The limitations which affect the proposed land-use are given ratings and keys according to their Land Capability Sub-class (from Tables Four and Five). Limitations which record very low are not mapped as they are not deemed to be a limiting factor to the proposed land use

8.2.1 Degree of Limitation – Map Unit A

Table Eight (a) Degree of Limitation Map Unit A - Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Very low	Ease of excavation	Not deemed to have inherent risks	Residential	-
Very low	Foundation stability	Not deemed to have inherent risks	Residential	-
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	Residential	
Very low	Waterlogging hazard	Not deemed to have inherent risks	Residential	IV-i
Very low	Water erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Wind erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Flood hazard	Not deemed to have inherent risks	Residential	-
Moderate	Phosphorous retention	Installation of ATU	Residential	III-p
Moderate	Water pollution hazard	Requires setback distances to creeks	Residential	III-s
Very low	Soil salinity	Not recorded present	Residential	-
Very low	Bushfire hazard	Not deemed to have inherent risks	Residential	-
Low	Native Vegetation retention	Clearing as per EPA regulations	Residential	II-v
Moderate	Acid Sulphate Soils	Moderate risk rating WAPC mapping	Roads / residential	III-as

Limitations Include:

- Phosphorous retention ability (III-p) - Phosphate absorbing ATU's should utilised in this mapping unit. A copy of approved Health Department WA ATU's is provided in Appendix E;
- Water Pollution Hazard (III-s) – Utilise Phosphate absorbing ATU's, drainage aligned to water sensitive urban design principles, bio retention basins to nutrient and pollution strip prior to entering waterways. A 50m setback limitation is mapped for this limitation.
- Native Vegetation (II-v) – Some remnant riparian vegetation (taxandria's), vegetation should remain and be re-vegetated with endemic species. Weed management required along creeklines and drains. Vegetation in poor condition due of decades of grazing. Very minimum these areas should be fenced from stock.
- Acid Sulphate Soils (III-as) – WAPC mapping indicates there is a moderate risk, this can be overcome with management, an Acid Sulphate Soil Investigation should be undertaken to identify if present.

Overall Capability Rating for Residential- III Area with fair capability, moderate physical limitations.

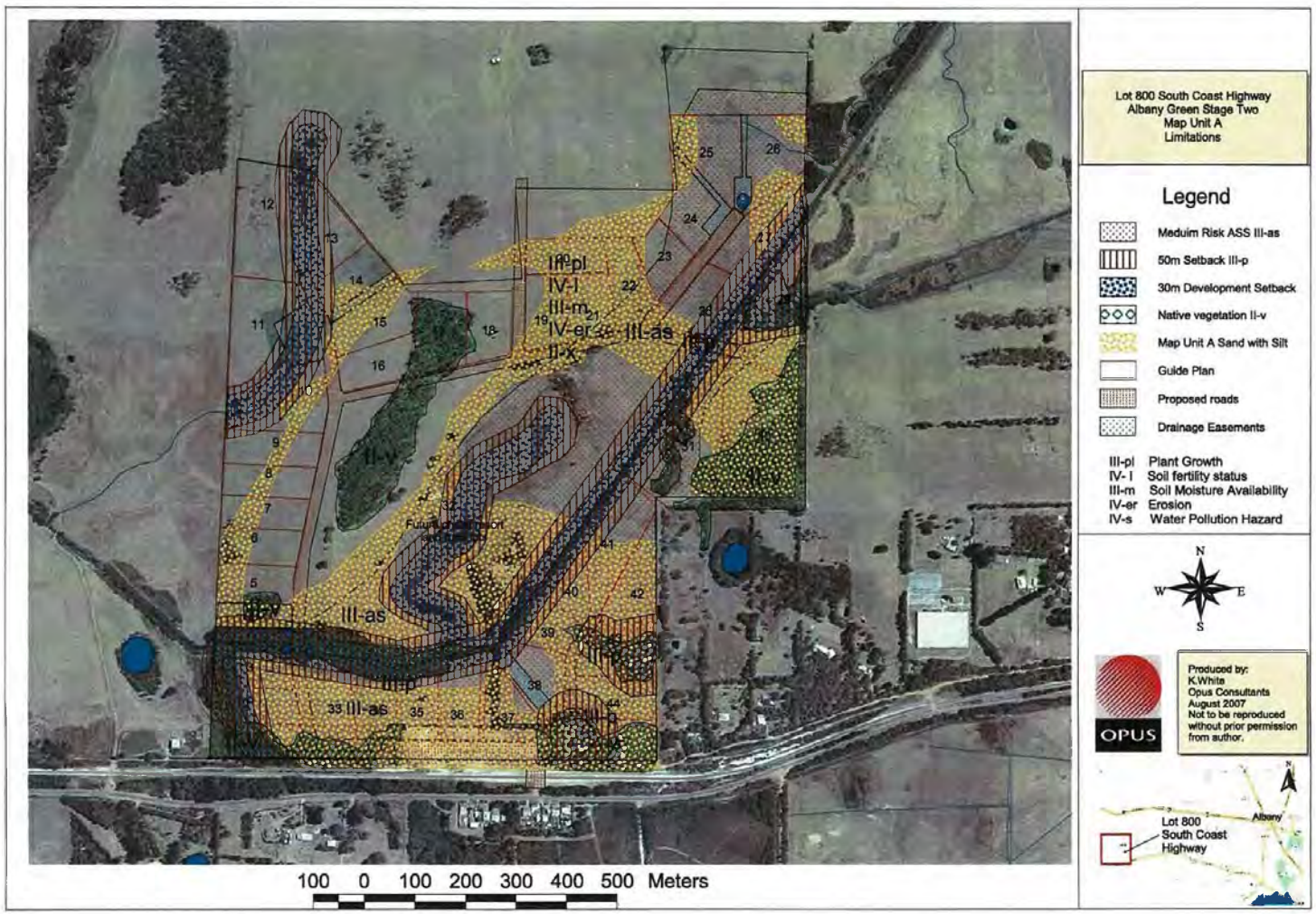
Table Eight (b) Degree of Limitation Map Unit A - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	POS	III-pl
Very low	Soil trafficability	Not deemed to have inherent risks	Rural	-
High	Soil fertility status	Poor structure soils, low fertility	POS / Reveg	IV-l
Moderate	Soil moisture availability	Freely draining sands, low moisture withholding capacity	POS / Reveg	III-m
Very low	Rooting conditions	Not deemed to have inherent risks	Rural	-
Very low	Water availability	Not deemed to have inherent risks	Rural	-
Very Low	Shallow soils	Not deemed to have inherent risks	Rural	-
Very High	Erosion	Grazing causing erosion to banks and slopes	POS / Reveg	IV-er
Moderate	Flood hazard	Low lying areas	Reveg	III-f
Very High	Water Pollution Hazard	Nutrients from animals and fertilizer application	Reveg	IV-s

Limitations Include:

- Plant growth (III-pl) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application and enhancement of soils.
- Soil Moisture availability (III-m) – sandy silty soils have limited ability to withhold moisture, only waterlogged areas able to retain moisture.
- Erosion (IV-er) – Grazing from hoofed animals causing erosion to banks and slopes.
- Flood hazard (III-f) –these areas should be avoided in the planning process (same areas mapped as waterlogging hazard).
- Water Pollution Hazard (IV-s) –cattle effluent from untreated runoff from paddocks, fertiliser application required to increase fertility, causing nutrient runoff into adjacent watercourses.

Overall Capability Rating for Rural Land Use – IV Area with low capability, high degree of physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit A
Limitations
Legend
Meduim Risk ASS III-as
50m Setback III-p
30m Development Setback
Native vegetation II-v
Map Unit A Sand with Silt
Guide Plan
Proposed roads
Drainage Easements
III-pl Plant Growth
IV- I Soil fertility status
III-m Soil Moisture Availability
IV-er Erosion
IV-s Water Pollution Hazard
III-pl
IV-I
III-m
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Albany
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8.2.2 Degree of Limitation – Map Unit B

Table Nine(a) Degree of Limitation Map Unit B - Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Very low	Ease of excavation	Not deemed to have inherent risks	Residential	-
Very low	Foundation stability	Not deemed to have inherent risks	Residential	-
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	Residential	
Very low	Waterlogging hazard	Not deemed to have inherent risks	Residential	-
Very low	Water erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Wind erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Flood hazard	Not deemed to have inherent risks	Residential	-
Very low	Phosphorous retention ability	Not deemed to have inherent risks	Residential	-
Very low	Water pollution hazard	Not deemed to have inherent risks	Residential	-
Very low	Soil salinity	Not recorded present	Residential	-
Very low	Bushfire hazard	Not deemed to have inherent risks	Residential	-
Very low	Native Vegetation retention	Clearing as per EPA regulations, most remnant native vegetation in poor condition	POS /residential	-
Very low	Acid Sulphate Soils	Low risk rating WAPC mapping	Roads /residential	-

Limitations Include:

- This mapping unit recorded no limitations,
- Please note the area in the north west of the lot which has this soil type has included into the effluent Waterlogged Map Unit D, and assessed against the relevant criteria and not recommended for development.

Overall Capability Rating for Residential- I, very highly capable of supporting land use few physical limitations

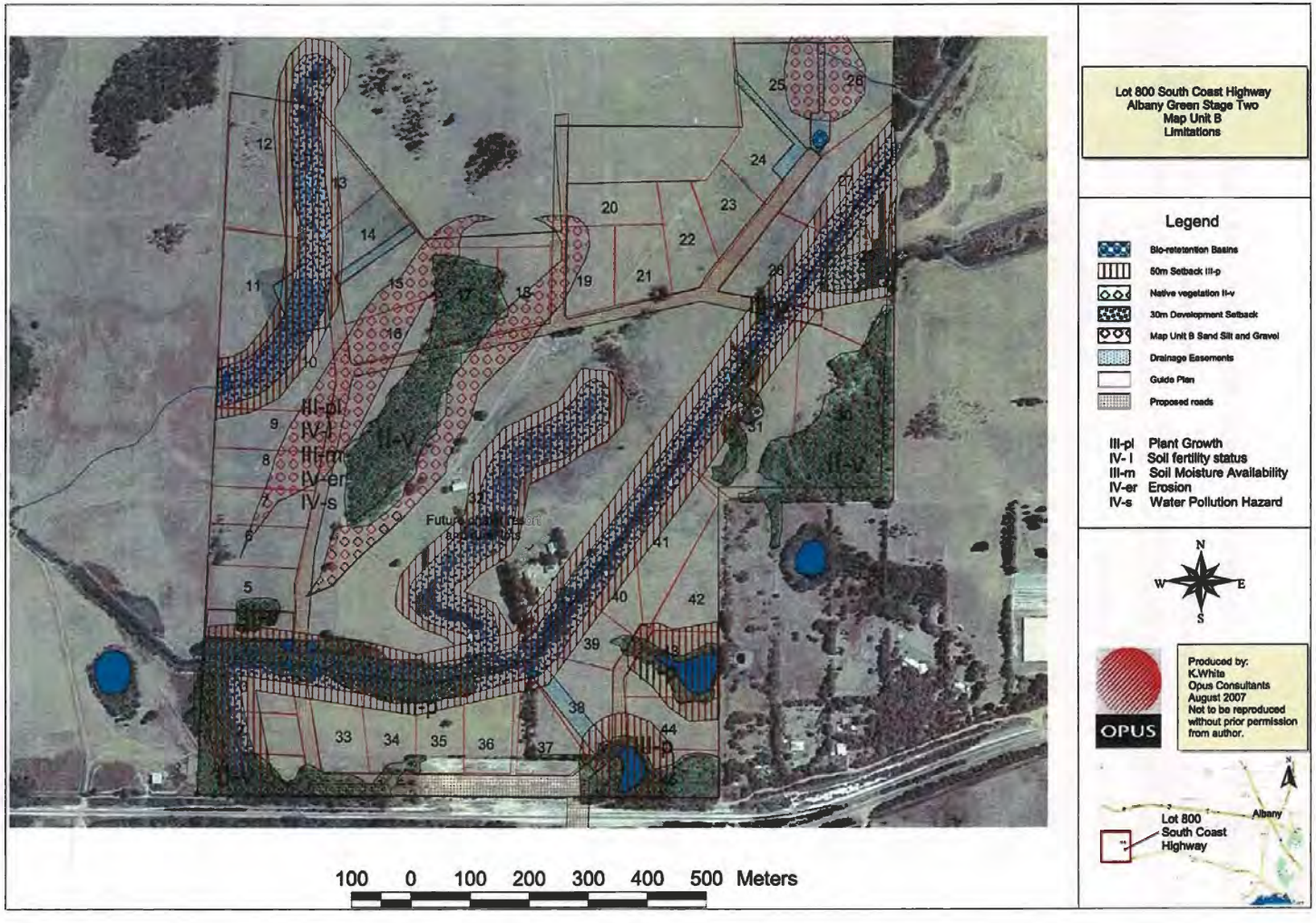
Table Nine (b) Degree of Limitation Map Unit B - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	-	III-pl
Very low	Soil trafficability	Not deemed to have inherent risks	Rural	-
High	Soil fertility status	Poor structure soils, low fertility	-	IV-l
Moderate	Soil moisture availability	Freely draining sands in topsoil, low moisture withholding capacity	-	III-m
Very low	Rooting conditions	Not deemed to have inherent risks	Rural	-
Very low	Water availability	Not deemed to have inherent risks	Rural	-
Very Low	Shallow soils	Not deemed to have inherent risks	Rural	-
Very High	Erosion	Grazing causing erosion to slopes	-	IV-er
Very low	Flood hazard	Low lying areas	Rural	-
Very High	Water Pollution Hazard	Nutrients from animals and fertilizer application	-	IV-s

Limitations Include:

- Plant growth (III-pl) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application and enhancement of soils.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil Moisture availability (III-m) – sandy silty soils in Horizon A have limited ability to withhold moisture, only waterlogged areas able to retain moisture.
- Erosion (IV-er) – Grazing from hoofed animals causing erosion to banks and slopes.
- Water Pollution Hazard (IV-s) – effluent from cattle untreated, runoff from paddocks, from fertilizer application, (required to increase fertility), and nutrient runoff into adjacent watercourses.

Overall Capability Rating for Rural Land Use - III Area with fair capability, moderate physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit B
Limitations
Legend
Bio-retetention Basins
50m Setback III-p
Native vegetation II-v
30m Development Setback
Map Unit B Sand Silt and Gravel
Drainage Easements
Guide Plan
Proposed roads
III-pl Plant Growth
IV- I Soil fertility status
III-m Soil Moisture Availability
IV-er Erosion
IV-s Water Pollution Hazard
III-pl
IV-I
III-m
IV-er
IV-s
II-V
II-v
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Lot 800
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8.2.3 Degree of Limitation – Map Unit C

Table Ten (a) Degree of Limitation Map Unit C- Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Low	Ease of excavation	Some modification required on shallow rock areas	Residential/ roads	II-x
Very low	Foundation stability	Not deemed to have inherent risks	Residential	-
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	Residential	-
Very low	Waterlogging hazard	Not deemed to have inherent risks	Residential	-
Very low	Water erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Wind erosion hazard	Not deemed to have inherent risks	Residential	-
Very low	Flood hazard	Not deemed to have inherent risks	Residential	-
Very low	Phosphorous retention ability	Not deemed to have inherent risks	Residential	-
Very low	Water pollution hazard	Not deemed to have inherent risks	Residential	-
Very low	Soil salinity	Not recorded present	Residential	-
Very low	Bushfire hazard	Not deemed to have inherent risks	Residential	-
Low	Native Vegetation retention	Clearing as per EPA regulations, most remnant native vegetation in poor condition	Residential	II-v
Very low	Acid Sulphate Soils	Low risk rating WAPC mapping	Roads /residential	-

Limitations Include:

- Ease of Excavation (II-X) – Shallow sands over rock, may require some excavation or fill.
- Native Vegetation (II-v) – Some remnant Jarrah woodland along ridge, clearing permit or WAPC subdivision approval required prior to clearing. Vegetation in poor condition due to decades of grazing.

Overall Capability Rating for Residential- I, very highly capable of supporting land use few physical limitations

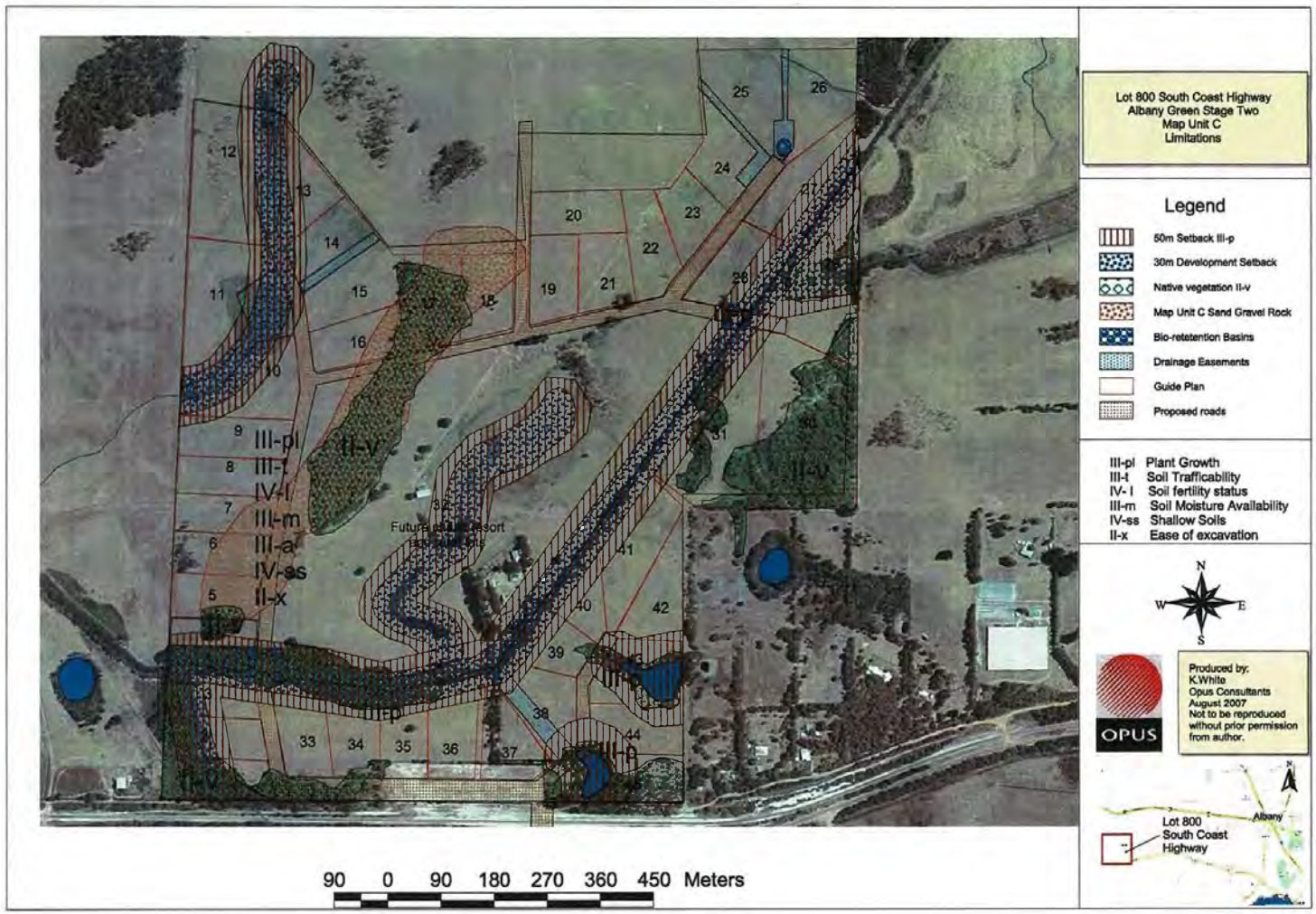
Table Ten (b) Degree of Limitation Map Unit C - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	-	III-pl
Moderate	Soil trafficability	Very shallow sandy soils over rock	-	III-t
High	Soil fertility status	Poor structure soils, low fertility	-	IV-l
Moderate	Soil moisture availability	Freely draining sands in topsoil, low moisture withholding capacity	-	III-m
Very low	Rooting conditions	Not deemed to have inherent risks	Rural	-
Moderate	Water availability	Sand over rock, high in landscape, low water availability	-	III-m
High	Shallow soils	Limit plant growth	-	IV-ss
Very low	Erosion	Not deemed to have inherent risks	Rural	-
Very low	Flood hazard	Low lying areas	Rural	-
Very low	Water Pollution Hazard	Not deemed to have inherent risks	-	-

Limitations Include:

- Plant growth (III-pl) - poorly structured sandy soils with limited nutrients, low productivity, would require fertilizer application.
- Soil trafficability (III-t) – shallow rock, often close to surface.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil moisture availability (III-m) – sandy silty soils have limited ability to withhold moisture, only waterlogged areas able to retain moisture.
- Water availability (III-m) –High in landscape, low water availability.
- Shallow Soils (IV-ss) –shallow sands over rock often close to surface.

Overall Capability Rating for Rural Land Use - III Area with fair capability, moderate physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit C
Limitations
Legend
50m Setback III-p
30m Development Setback
Native vegetation II-v
Map Unit C Sand Gravel Rock
Bio-retetention Basins
Drainage Easements
Guide Plan
Proposed roads
III-pl Plant Growth
III-t Soil Trafficability
IV- l Soil fertility status
III-m Soil Moisture Availability
IV-ss Shallow Soils
II-x Ease of excavation
III-pl
III-t
IV-l
III-m
III-a
IV-ss
II-x
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8.2.4 Degree of Limitation – Map Unit D

Table Eleven (a) Degree of Limitation Map Unit D- Residential

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Ease of excavation	Would require dewatering	POS / Reveg	III-x
Moderate	Foundation stability	Would require fill to bring out of water table	POS / Reveg	III-b
Very low	Services (reticulated water, power, telephone)	Not deemed to have inherent risks	-	-
Very high	Waterlogging hazard	Low lying creekline areas	POS / Reveg	IV- i
Moderate	Water erosion hazard	Low lying creekline areas	POS / Reveg	III-e
Very low	Wind erosion hazard	Not deemed to have inherent risks	-	-
Very high	Flood hazard	Low lying creekline areas	POS / Reveg	IV-f
Very high	Phosphorous retention ability	Free draining soils with shallow water table	POS / Reveg	IV-p
Very high	Water pollution hazard	Free draining soils with shallow water table	POS / Reveg	IV-s
Very low	Soil salinity	Not recorded present	-	-
Very low	Bushfire hazard	Not deemed to have inherent risks	-	-
Moderate	Native Vegetation retention	Clearing as per EPA regulations, most remnant native vegetation in poor condition	POS/ drainage reserves	II-v
Moderate	Acid Sulphate Soils	Low risk rating WAPC mapping	Roads / drainage reserves	III-as

Limitations Include:

- Ease of Excavation (II-x) – Shallow water table in sands and possibly peat, may require excavation and/or fill.
- Foundation stability (III-b) - Shallow water table in sands and possibly peat, would require drainage and excavation and/or fill.
- Waterlogging (IV-j) – These areas should be avoided in the planning process, a 30m setback limitation has been mapped.
- Water erosion (III-e) – Creeklines subject to inundation are very susceptible to water erosion, in depression areas.
- Flood hazard (III-f) –these areas should be avoided in the planning process (same areas mapped as waterlogging hazard.
- Phosphorous retention ability (III-p) - Phosphate absorbing ATU's should utilised in this mapping unit. A copy of approved Health Department WA ATU's is provided in Appendix E; most areas in this mapping unit did not meet country sewerage policy

requirements and should be avoided.

- Water Pollution Hazard (V-s) – Drainage aligned to water sensitive urban design principles, bioretention basins to nutrient and pollution strip prior to entering waterways.
- Native Vegetation (II-v) – Some remnant riparian vegetation (Taxandria's), vegetation should remain and be re-vegetated with endemic species. Weed management required along creeklines and drains. Vegetation in poor condition due to decades of grazing. Very minimum these areas should be fenced from stock.
- Acid Sulphate Soils – WAPC mapping indicates there is a moderate risk, this can be overcome with management, an Acid Sulphate Soil Investigation should be undertaken to identify if present.

Overall Capability Rating for Residential- V very poorly capable of supporting land many limitations to overcome

Table Eleven (b) Degree of Limitation Map Unit D - Rural

Degree of Limitation	Limitation	Description	Capability	Rating & Sub-class
Moderate	Plant growth	Poor structure soils, low fertility	Drainage reserve	III-pl
Moderate	Soil trafficability	Very shallow sandy soils over rock	Drainage reserve	III-t-
High	Soil fertility status	Poor structure soils, low fertility	Drainage reserve	IV-l
Very low	Soil moisture availability	Not deemed to have inherent risks	-	-
Very low	Rooting conditions	Not deemed to have inherent risks	-	-
Very low	Water availability	Not deemed to have inherent risks	-	-
Very low	Shallow soils	Not deemed to have inherent risks	-	-
Very High	Erosion	Grazing causing erosion to banks and slopes	Drainage reserve	IV-er
Moderate	Flood hazard	Low lying areas	Drainage reserve	III-f
Very High	Water Pollution Hazard	Nutrients from animals and fertilizer application	Drainage reserve	IV-s

Limitations Include:

- Plant growth (III-pl) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Soil trafficability (III-t) – shallow rock, often close to surface.
- Soil fertility status (IV-l) - poorly structured sand soils with limited nutrients, low productivity, would require fertilizer application.
- Erosion (IV-er) – Grazing from hoofed animals causing erosion to banks and slopes. These areas should be fenced from grazing animals, weeds controlled and re-vegetation of local endemic species.
- Flood hazard (III-f) –these areas should be avoided in the planning process (same areas mapped as waterlogging hazard.
- Water Pollution Hazard (IV-s)– effluent from cattle through untreated runoff from paddocks, fertiliser application required to increase fertility, causing nutrient runoff into adjacent watercourses.

Overall Capability Rating for Rural Land Use - IV Area with low capability, high degree of physical limitations.


Lot 800 South Coast Highway
Albany Green Stage Two
Map Unit D
Limitations
Legend
50m Setback III-p
30m Development Setback
Native vegetation II-v
Map Unit D Water logged areas
Drainage Easements
Guide Plan
Medulm Risk ASS III-as
Proposed roads
III-pl Plant Growth
III-t Soil Trafficability
IV- l Soil fertility status
III-f Flooding hazard
IV-er Erosion hazard
IV-s Water Pollution Hazard
II-x Ease of excavation
III-b Foundation stability
IV-i Waterlogging hazard
III-e Water erosion hazard
IV-f Flood hazard
IV-s Water pollution hazard
III-as
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9 Land Capability Analysis

The overall capability of the subject area to sustain the proposed developments is summarised within the mapping units in Table Twelve.

Figure Twelve – Overall land Capability Summary Table

Mapping Unit	Residential	Rural
Mapping Unit A	III	IV
Mapping Unit B	I	III
Mapping Unit C	I	IV
Mapping Unit D	V	V

I = Mapping Unit capable of supporting the Land Use.

II = Mapping Unit capable of supporting the land use and limitations can be overcome by design and management inputs.

III- Mapping Unit with a fair capability, moderate physical limitations occur which significantly affect productive use or result in moderate risk of land degradation.

IV – Areas with low capability for the proposed activity or use, high degree of physical limitations.

V – Areas with poor capability for the proposed activity or use, severity of limitations, use is prohibitive in terms of either development costs or risk of land degradation

A summary of recommendations within each Mapping Unit from the Land Capability Assessment has been provided on Page 36, Section 10 – Planning and Management Considerations.

10 Planning and Management Considerations for Rural Residential

The following recommended planning and land management considerations arise from the Land Capability Assessment:

10.1 On-site Septic Effluent Disposal

Overall the subject site has soils which are conducive to on-site effluent disposal; it is recommended that a phosphate removing ATU on site effluent system is installed in sandy areas to ensure that there is no effluent leaching into waterways. The elevated areas along the ridgeline and where sand over gravel occurs, traditional septics can be used, as there is excellent phosphorous retention ability in these soils. A list of recommended ATU's is supplied in Appendix E. The waterlogged areas (Map Unit D) where ground and water table separation is less than 500mm are not suitable for development.

It is recommended that:

- A 50m setback be applied from all creeks and drains;
- Areas which achieve a 500mm water table clearance (Map Unit A-C) are suitable for on-site effluent disposal;
- Deep sands are not suitable for traditional septic systems and phosphorous absorbing ATU's should be installed on these soil types (Map Unit A); and
- Map Unit B and C have very well nutrient absorbing capacity and traditional septic systems could be utilised on these soil types.
- Map Unit D is unsuitable for on-site effluent disposal

10.2 General Foundation and building stability

The site is predominantly sandy soils with sand over gravel or rock in elevated areas. With appropriate site preparation where required, the subject land will support building development resulting from the proposed sub-division. The dominant soil type is sand, and is suitable to be reused as fill where required. Sands should be compacted and free of loose materials and debris through screening prior to compaction. Loose sands should be protected from erosion factors.

It is recommended that:

- Consideration is give to road alignment to follow contours;
- Construction programming should occur in dry months;
- Development should not occur in waterlogged or flood prone areas (Map Unit D)
- Further geotechnical investigation is required to determine bearing capacity for pavement design; and
- Further investigation may be required at design phase to address the shallow rock in Map Unit C.

10.3 Drainage and Water Sensitive Urban Design Principles

To enable implementation of WSUD principles, planning consideration should be given to realignment of the proposed lots and roads. To more effectively manage road drainage across the site it is recommended that the development plan is re-aligned with the road designed to follow contours. This will allow for vegetated swales to be implemented to hold the 1:1 storm events and reduce the speed of run-off into adjacent areas.

It is recommended that:

- A 50 m development setback be applied around all drains and creeks;
- Bioretention basins should be strategically placed on any entering points into the creeklines or drains;

- native vegetation should be planted into drainage areas to encourage uptake of nutrients and hydrocarbons, encourage removal of sediments as a filter prior to entry of waterways.

10.4 Rural Pursuits

The land is generally very poor for pasture growth, unless fertilisers are added regularly. This is not recommended given the proximity of Lake Powell. If rural pursuits are proposed, it is recommended that this site is not suitable for intensive stocking or grazing.

It is recommended that:

- The creek areas are fenced and revegetated with native endemic plant species to reduce erosion and encourage habitat along micro corridors;
- Stock are not allowed to graze in the drainage corridors;
- Rural pursuits would need to be carefully considered in this area to ensure there is little off-site environmental harm, stocking and grazing causes erosion in sandy soils and nitrification in waterlogged soils.

10.5 Erosion (Gully erosion, wind erosion)

The Land Capability Assessment did not determine if the land was subject to wind or gully erosion and there was no evidence on site of this. It was noted there was erosion along the creeklines from stock.

It is recommended that:

- Fencing occurs to exclude animals and prevent further erosion and degradation of the creeks;
- As the site is predominantly sandy in nature it is recommended that best practise is carried out if the site is developed for residential and sediment traps are installed during development and any cleared areas are stabilised with mulched vegetation; and
- The proposed residential development would best deal with any erosion by aligning the properties and roads along the contours to ensure that storm water does not scour and encouraged to seep into road reserves.

10.6 Vegetation

There is some remnant native vegetation on site, however is in degraded to poor condition due to decades of grazing of stock.

It is recommended that:

- Native vegetation is retained across the site, and a weed management plan is implemented to reduce the competition of introduced species and encourage regrowth of ground and mid structure species;

- A revegetation program should be implemented utilising providence species. This program will need to be implemented by the developer in the first instance and then the responsibility of individual land owners;
- A weed management plan is implemented across the site to eliminate the extensive invasions of weeds, this should be aligned to WA Agriculture and Food guidelines; and
- Any native vegetation clearing is subject to EPA Clearing regulations.

10.7 Acid Sulphate Soils

A detailed Acid Sulphate Soils Investigation aligned to Department of environment and Conservation (DEC) Guidelines, was not undertaken as part of these investigations. The lower half of the subject site has a Medium Risk Rating according to WAPC mapping. Acid Sulphate Soils can be managed, DEC Best guidelines and best practise encourages avoidance, lime application or lime barriers, and protection of groundwater sources.

It is recommended that

- A Preliminary Acid Sulphate Soil Investigation is undertaken when the exact extent of the development is known and if there is any excavation or cut and fill proposed the Acid Sulphate Soil Investigation targets these areas.

11 Conclusions

Grande Terra Land Development Pty Ltd commissioned Opus Consultants to undertake Site Investigations for Land Capability Assessment for lot 800 South Coast Highway, Albany Green Stage Two. Stage One of Albany Green is currently being developed into Rural Residential lots.

The Land Capability Assessment examined the Soil Characteristics, Environmental and Engineering investigations. The investigation and the writing of this report does not take into account any current or future zoning of the subject land, and focuses on land use and subsequent land capability.

Overall the subject site has the capability to be residential development within Map Unit A, B and C. Further consideration to planning the lot layout and road alignments in light of the Land Capability Assessment findings would assist in overcoming any limitations. The waterlogged areas on the subject site are unsuitable for development and rural pursuits (Map Unit D). These areas should be revegetated or remain as vacant land possibly (POS), it is also unsuitable for rural pursuits.

Rural activities such as grazing or horticulture are not recommended; the sandy soils are highly conducive to erosion and require regular improvement as are very nutrient poor. Rural pursuits would need to be of low intensity and ensure have setbacks from the current creek and drain areas. Erosion and degradation of waterways and vegetation is inherent across the site from decades of grazing. At the very minimum, to reduce off-site environmental harm, the creeks and drains should be fenced to exclude stock.

The Chalets proposed through the central area are generally not recommended, unless these are placed out of waterlogged areas. Grouped chalets could be sustained to one central phosphorous absorbing ATU within Map Unit A, this would need appropriate design, planning and aligned to setback's as described in this report.

12 References

Land Capability Assessment for Local Rural Strategies, 1989, Department of Agriculture Western Australia.

The Beard's Vegetation Classification dataset ,1:3,000,000 digital representation of Beard's vegetation map of the state of Western Australia.

"Australian Geoscience Mapping, Map series S50-11 Part of Sheet S150-15, Mt Barker to Albany".

pers comms Thomas Saggers local historian Albany region, 20/8/07

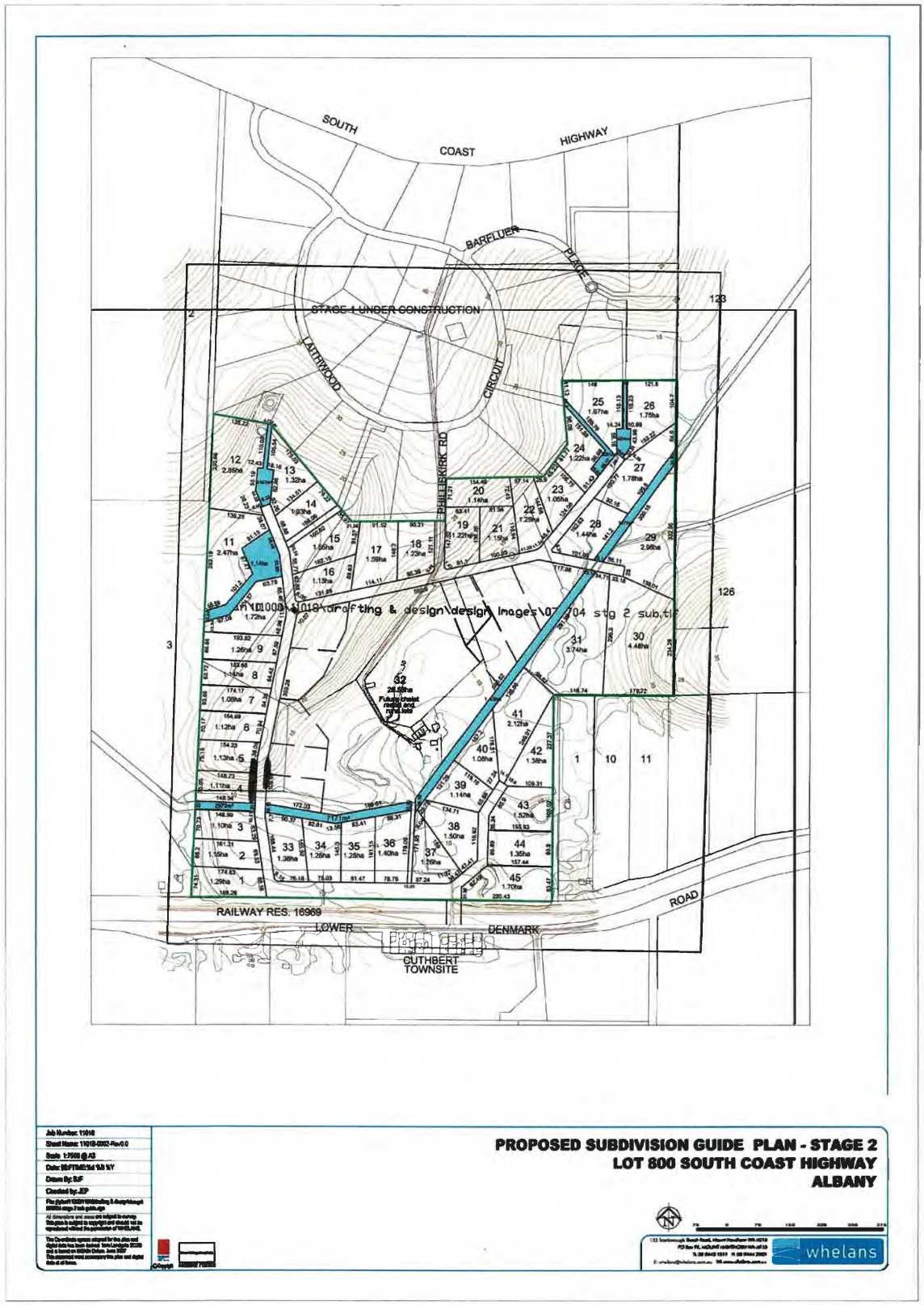
pers comms M.J.Gibbs current occupier lot 800 South Coast Highway 14th June 2007

Department of Health WA "Movement of Nutrients from on-site waste water systems in soils" 2001

Appendices

Appendix A

Subdivision Guide Plan


SOUTH COAST HIGHWAY
BARFLUER PLACE
STAGE 1 UNDER CONSTRUCTION
FAITHWOOD CIRCUIT
PHILLISKIRK RD
RAILWAY RES. 16969
LOWER DENMARK ROAD
CUTHBERT TOWNSITE
PROPOSED SUBDIVISION GUIDE PLAN - STAGE 2
LOT 800 SOUTH COAST HIGHWAY
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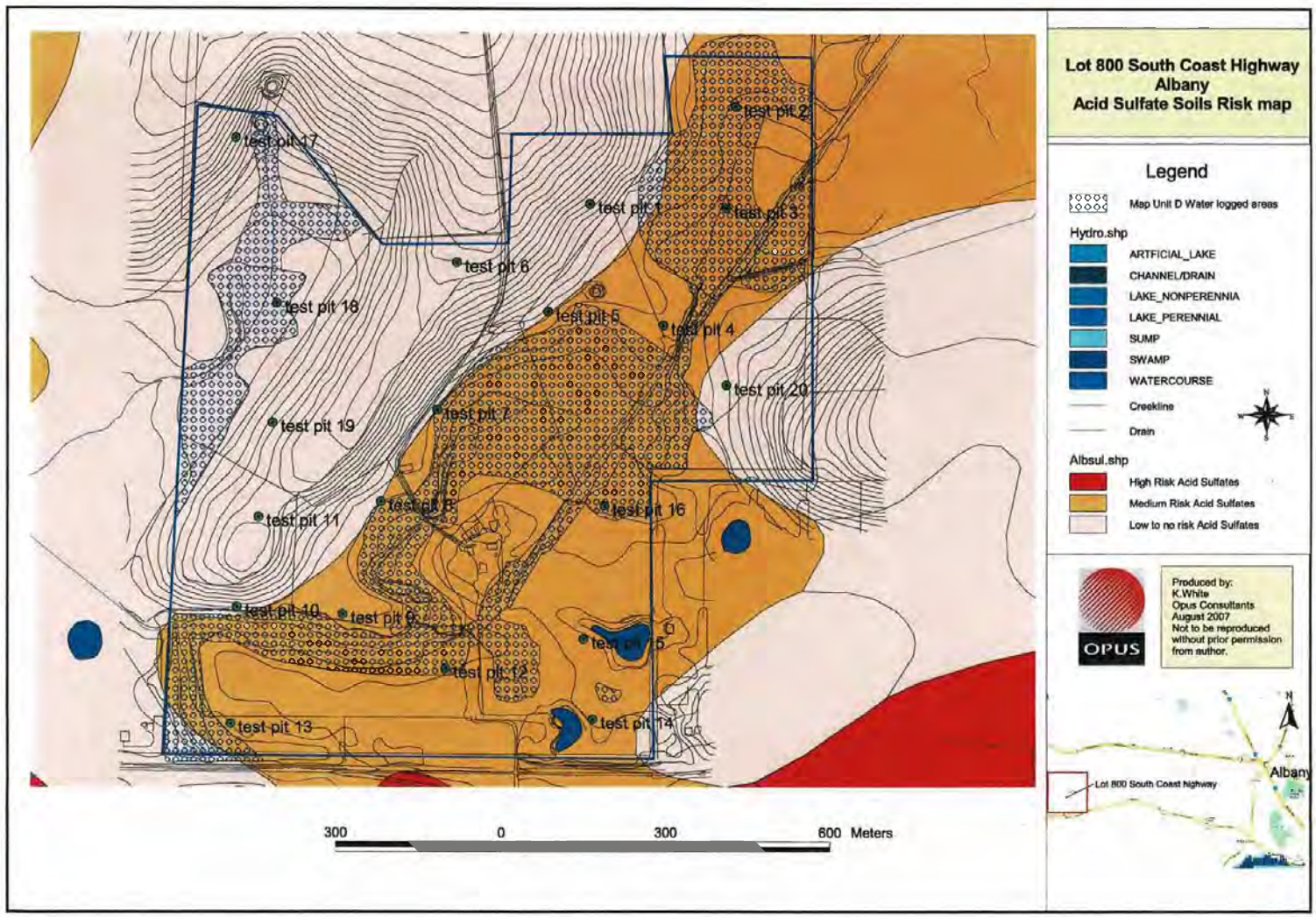
Appendix B

Test Pit Locations
Field Testing Results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600 Meters
Lot 800 South Coast Highway
Albany
Acid Sulfate Soils Risk map
Legend
Map Unit D Water logged areas
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Albsul.shp
High Risk Acid Sulfates
Medium Risk Acid Sulfates
Low to no risk Acid Sulfates
OPUS
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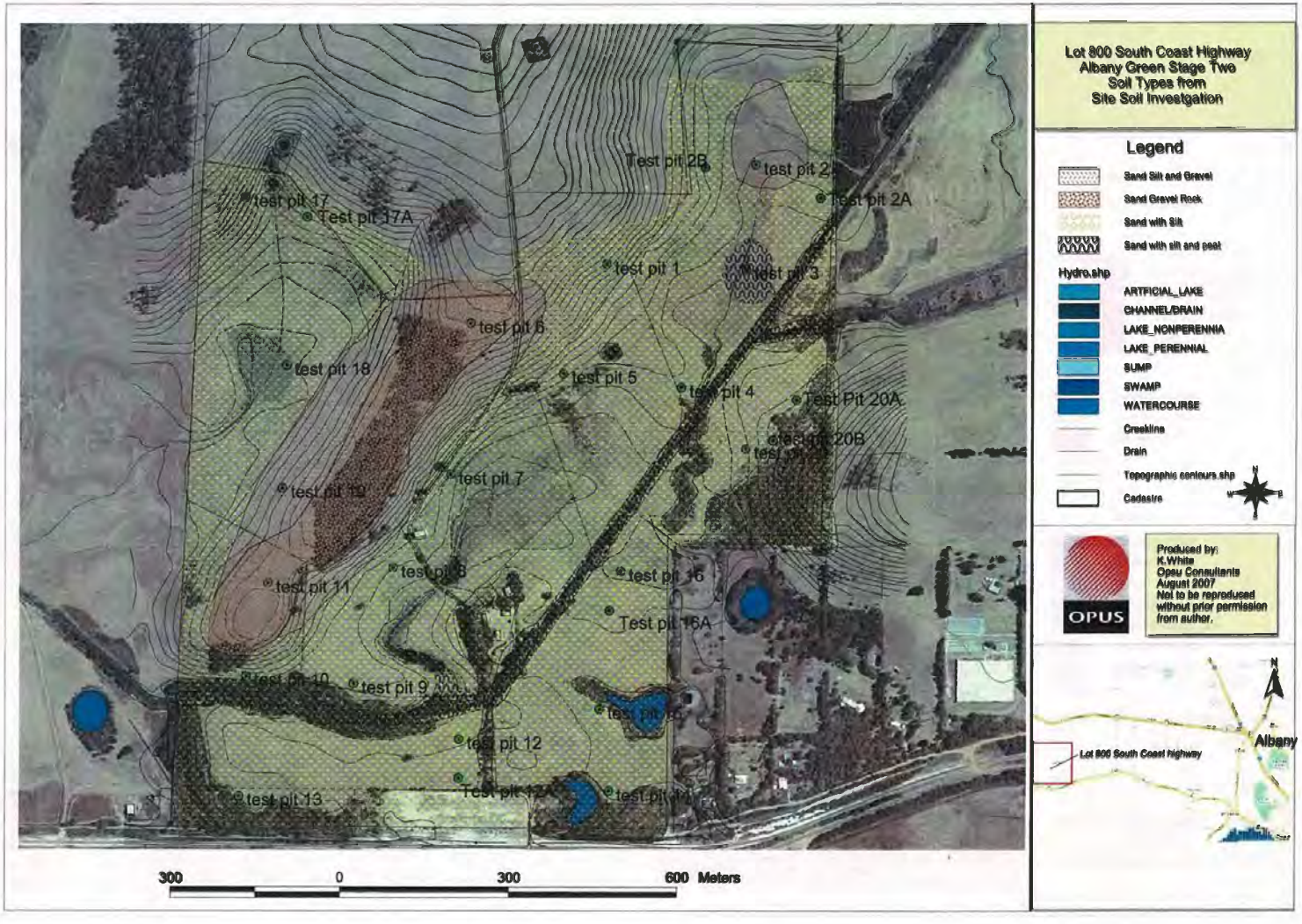
N
Albany
Lot 800 South Coast Highway


Lot 800 South Coast Highway
Albany Green Stage Two
Soil Types from
Site Soil Investgation
Legend
Sand Silt and Gravel
Sand Gravel Rock
Sand with Silt
Sand with silt and peat
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Topographic contours.shp
Cadastre
OPUS
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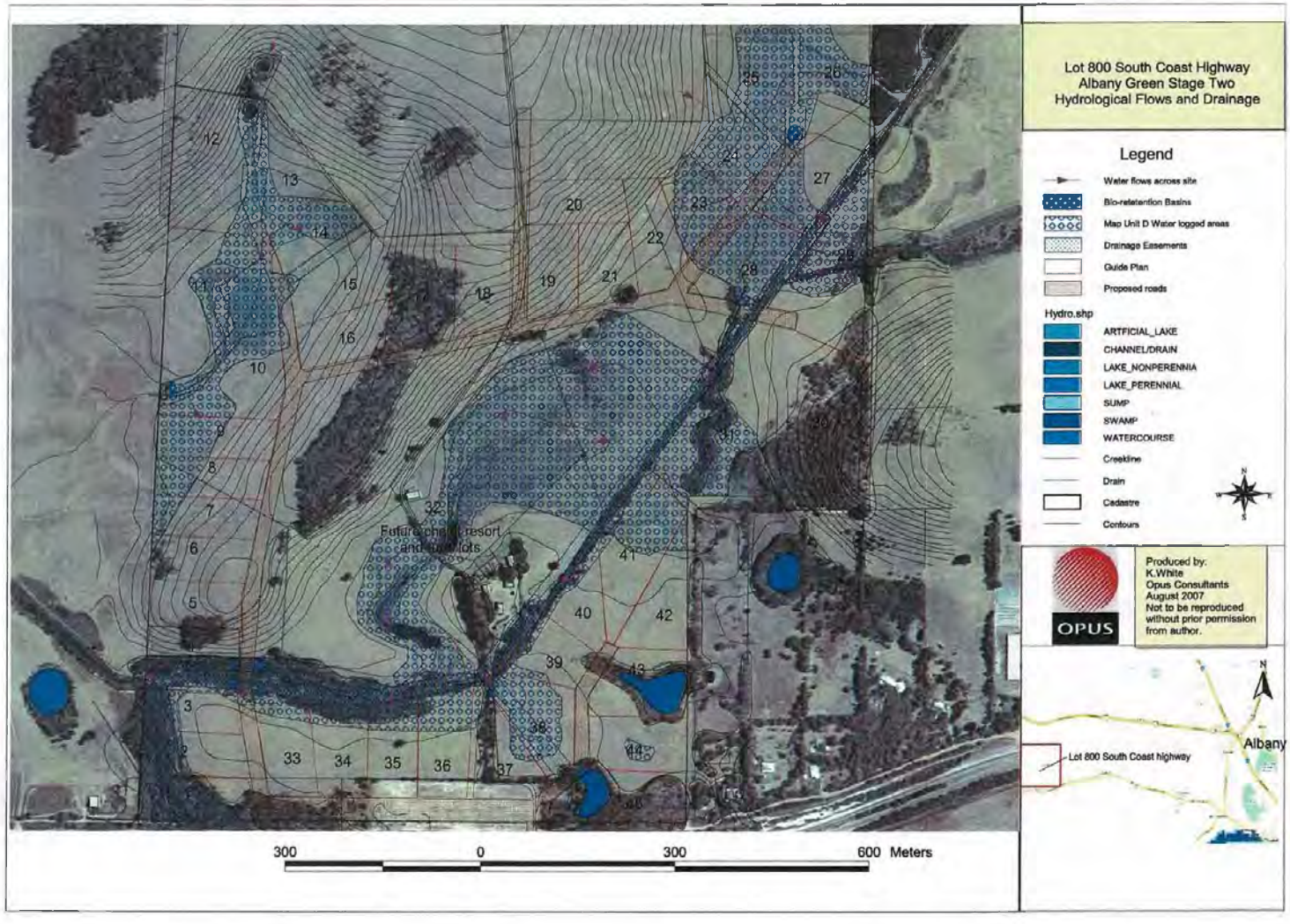
Albany
Lot 800 South Coast Highway
Test pit 2B
test pit 2
Test pit 2A
test pit 17
Test pit 17A
test pit 1
test pit 3
test pit 6
test pit 18
test pit 5
test pit 4
Test Pit 20A
test pit 20B
test pit 7
test pit 11
test pit 8
test pit 16
Test pit 16A
test pit 10
test pit 9
test pit 12
Test pit 12A
test pit 13
300
0
300
600 Meters

Appendix C

Late Winter Water Table Testing


Lot 800 South Coast Highway
Albany Green Stage Two
Hydrological Flows and Drainage
Legend
Water flows across site
Bio-retetention Basins
Map Unit D Water logged areas
Drainage Easements
Guide Plan
Proposed roads
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Cadastre
Contours
Future chalet resort and cul-de-sac lots
OPUS
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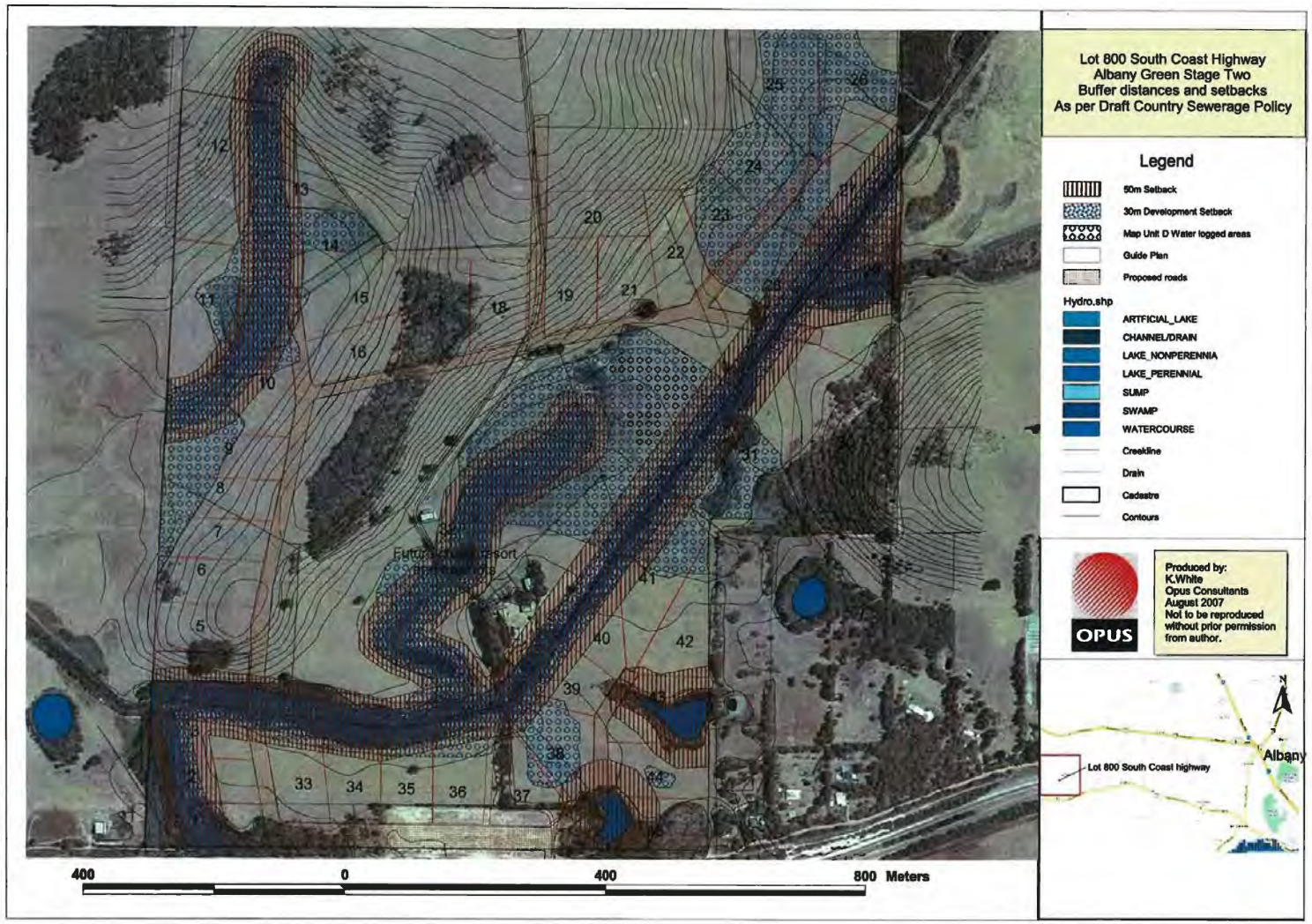
Albany
Lot 800 South Coast highway
300
0
300
600 Meters

Test Pit	Late Winter Table	Comments
1	No water table	
2	0mm	Water logged
2a	500mm	New test pit – sand with silt
2b	450mm	New test pit – sand with silt
3	0mm	Water logged
4	760mm	
5	No water table	
6	No water table	
7	150mm	
8	150mm	
9	1400mm	
10	No water table	
11	No water table	
12	100mm	
13	980mm	
14	550mm	
15	800mm	
16	220mm	
16a	600mm	
17	No water table	
17a	No water table	New test pit – sand gravel clay
18	150mm	
19	No water table	
20a	1300mm	New test pit – sand with silt
20b	1300mm	New test pit – sand with silt

Appendix D

Proposed buffer distances


Lot 800 South Coast Highway
Albany Green Stage Two
Buffer distances and setbacks
As per Draft Country Sewerage Policy
Legend
50m Setback
30m Development Setback
Map Unit D Water logged areas
Guide Plan
Proposed roads
Hydro.shp
ARTFICIAL_LAKE
CHANNEL/DRAIN
LAKE_NONPERENNIA
LAKE_PERENNIAL
SUMP
SWAMP
WATERCOURSE
Creekline
Drain
Cadastre
Contours
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Albany
Lot 800 South Coast highway
400
0
400
800 Meters

Appendix E

Approved Health Department WA Phosphate removing Alternative Treatment Units (ATU's)

Addendum

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

Addendum

Land Capability Assessment
Albany Green Stage Two
Lot 800 South Coast Hwy
Albany

Grande Terra Land Development Pty Ltd

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Date: August 2007
Reference: G:\Environmental Services\Environmental Projects\Whelans

Approved by _____
Evan Chadfield
Manager, Albany

Status: Final
Reference: Job No: WAENV047/04za

Contents

1 Introduction

Grande Terra Land Development Pty Ltd commissioned Opus Consultants to undertake a Land Capability Assessment, Environmental Assessment and give Engineering Comment on constructability of the proposed Albany Green Stage Two. The subdivision site is located on lot 800 South Coast Highway and Stage Two is the southern end of the lot bordering onto the Lower Denmark Road, near Cuthbert Village.

The Land Capability Assessment undertaken by Opus Consultants, assessed the site to define the limitations on the site and any planning considerations related to the site for the proposed future land use. The proponent Grande Terra Land Development Pty Ltd referred the Land Capability Assessment to the City of Albany, whom forwarded this to the Department of Agriculture. As part of this referral process some specific questions were raised requiring further investigation in regards to:

- Acid Sulphate Soils Risk Assessment;
- Soil Quality Assessment;
- Hydrology of the landscape and surface water flows; and
- Drainage and constructability of the site for rural residential development

This addendum provides additional information and discussion to the Land Capability Assessment Report produced by Opus Consultants (2007) to address the above issues.

1.1 Consultation

A meeting was held with the Department of Agriculture specialists, Tim Overhue (NRM Research, Agriculture Resource Management) and Adam Lillicrap (Development Officer, Hydrology Agriculture Resource Management). To discuss the extent of Acid Sulphate Soils (ASS) across the subject site and the CSBP soil results in relation to horticultural viability of the site.

An informal meeting was held with Kevin Hopkinson (Department of Water) to discuss the hydrology of the site and the status of the Five Mile Creek.

2 Acid Sulphate Soils Preliminary Investigation

On the 15th January 2008, a further sixteen test pits across lot 800 were excavated and logged. Soil samples were collected at 250mm, 500mm, 1000mm, 1500mm and 2000mm below surface level, at each test pit location. This was conducted by Opus Consultants Kathryn White, Amanda Broome and Great Southern Drilling. For details of the methodology used for soil sampling, please refer to ASS Preliminary Investigation Report. The results of the Acid Sulphate Soil sampling is attached in this Addendum, please refer to Attachment A – Test Pit locations, Soil Profile Descriptions and Cross Sections of the Soil Profiles.

The predominant soil present at all test pit locations excavated on 15th January 2008, was grey or brown sand, sandy silt or sandy peat. In elevated areas on lot 800, as in the June 2007 sampling, sand over gravel rock was identified.

At all test pits, dry brown topsoil with organic matter was recorded at 50mm to 100mm from the surface. At test pits 21, 24, 25, 27, 30, 33, 34 and 35 peat was recorded at 300mm to 530mm from the surface. These test pits were excavated in the low lying drainage areas on the lot. Test pit 22 and 28 recorded a layer of peat or clayey peat at depth.

Test pits 21, 31, 32, 34 and 36 recorded a layer of cemented sand with coffee rock fragments (at 10 to 15mm) and with the exception of test pit 31 excavation ceased at between 1200mm and 1500mm as the geoprobe could no longer penetrate the rock.

The water table was reached in all test pits, with the exception of test pit 32, and ranged from 300mm to 1300mm below ground level at 15th January 2008 (please refer to Attachment A- Test Pit Locations, Soil Profile Description and Cross Section of Soil Profile).

A selection of soil samples as per DEC guidelines '*Starting at the ground surface, soils samples…at intervals not exceeding 0.5m down the profile from each sampling location.*' (DoE, 2006) were couriered to NATA certified laboratory for analysis. A total of 76 samples were tested by the SPOS and Chromium Reducible method.

2.1 Laboratory Analysis

If the proposed development on lot 800 requires a soil disturbance of more than 1,000 tonnes of soil then in reference to DoE Guidelines Acid Sulphate Soils Guideline Series, *Draft Identification and Investigation of Acid Sulphate Soils – May 2006*., 27 of the 76 laboratory tested soil samples, exceed the criteria for SPOS.

The 25 samples that exceed the guidelines ranged from 0.04% to 0.59%. It was also found that 56 of the 77 laboratory tested soil samples exceed the criteria for TPA. The TPA samples that exceed the guidelines range from 0.04 to 1.30%. Additionally, 33 of the soil samples exceeded the guidelines for TAA, and these ranged from 0.04 to 0.22%. For a summary of laboratory results and field data, please refer to the Summary Tables in Attachment A.

The Chromium Reducible Sulphur (SCr) was also laboratory tested for the peat layer at the surface for all test pits, with the exception of test pit 32. These results indicate that there is some acidity derived from the organic matter in the peat layer. An additional sample at test pit 2 at 1100mm was also tested. Of the 19 samples tested for SCr the sample at test pit 2 (1100mm) was the only

one to exceed the criteria for SCr. This will require consideration when calculating the liming rates for neutralisation of soil and avoidance of ASS during development of the site.

2.2 Summary of ASS Investigation

In summary the peat layer recorded acidity levels exceeding the DEC Guidelines, however this acidity is not caused from sulphur, and from further discussion with Adam Lillicrap from Department of Agriculture, this acidity could be caused from mobilisation of hydrolysed ions, which may be attributable from iron or aluminium leaching through the soil profile.

Analysis of the soil samples revealed there is a high conductivity and corresponding acidity of the surface soils which is suspected to be attributable to bicarbonate salts, not sulphur salts. The electrical conductivity recorded in the CSBP soil tests confirms this suspicion. (Refer to Section 3 of this report). Sulphur acidity (Acid Sulphate Soils) was detected in the soil layers from approximately 1000mm below surface level.

It is recommended that the site is not excavated deeper than 500mm to avoid mobilisation and oxidation of the acid sulphate soils. The top 500mm of soils will still need to be treated with lime upon disturbance of these soils. **Figure 1 over the page shows a generalised diagram recommended by Opus Consultants of the extent of organic acidity, ASS and maximum affordable depth of disturbance of soils.**

The laboratory results clearly indicate that the some of the soil samples derived from lot 800 exceed the guideline limits set by the DEC. It is a requirement that the acidic soil conditions are managed in accordance with ASS guidelines.

2.3 Recommendations of Preliminary ASS Investigation

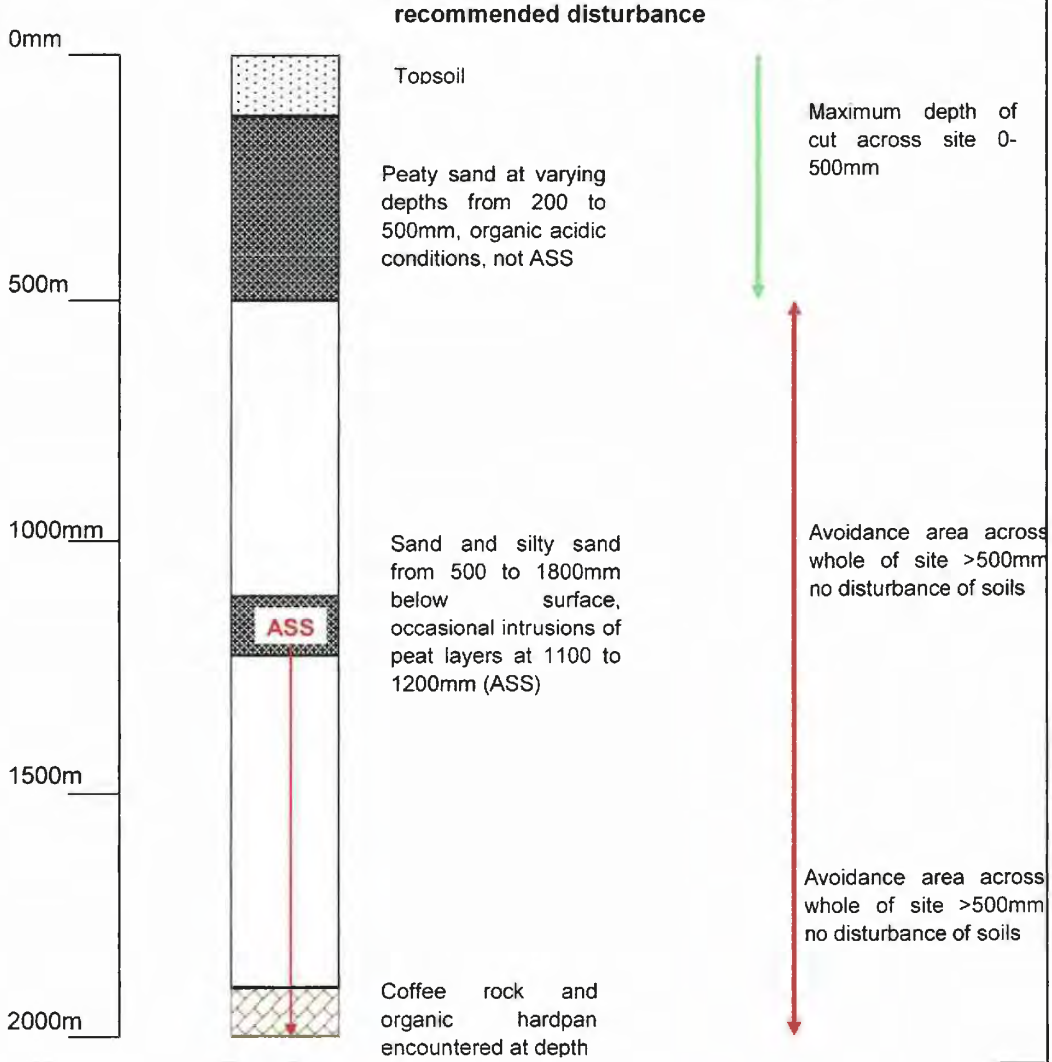
Laboratory testing confirmed that lot 800 South Coast Highway contains acid sulphate soils. The soil acidity exceeds DEC guidelines and action criteria and is required to be managed accordingly.

At the time of writing, the extent of cut and fill for future development is unknown. However if over 100 m3 will be required to be cut and used as fill or for service works Opus Consultants recommend:

1. In the areas which exceed ASS guidelines:
   - Avoidance of Acid Sulphate Soils where possible;
   - Minimise the disturbance of soil where possible;
   - Neutralisation of soil where avoidance is not possible; and
   - Ensure best practice aligned to DEC Guidelines is used.

2. If it is anticipated that to complete the future development, excavation will exceed 100m^3, DEC Guidelines state that an Acid Sulphate Soil Management Plan is to be prepared as per DEC Guidelines. Opus Consultants recommend that an Acid Sulphate Soil Management Plan is prepared and is completed and approved by the DEC prior to commencement of site works or construction.

FIGURE 1: Generalised diagram of ASS and extent of recommended disturbance



3 Soil Quality Assessment

On the 15th January 2008, a further six test pits across lot 800 were excavated, logged and soil samples were collected at depths of 0-2000mm and 6000mm below surface level, at each test pit location. This was conducted by Opus Consultants Kathryn White, Amanda Broome and Great Southern Drilling. These samples were sent to CSBP for testing, please refer to Attachment B for CSBP Results.

Kathryn White and Vicki Laurie (Opus Consultants) met with Adam Lillicrap and Tim Overhue (Department of Agriculture and Food) upon receipt of the soil test results to discuss the Acid Sulphate Soils and the productivity value of the land for agriculture. It was noted during discussions with the Agriculture Department representatives that less than 10% of the land on lot 800 could be used for either perennial or annual horticulture.

3.1 CSBP Testing Results

Generally the Nitrogen availability was low across the site (greater than 2 is favourable) and the organic carbon was high to medium in the topsoil, however very low in the subsoil samples. (2004, G.Moore). The response of the soils to Phosphorus (P) fertiliser application was probable (<10 probable, > 30 unlikely). Test pit 12 recorded an unlikely response to P application. Overall all the soil samples showed low potassium concentrations. Potassium is regarded as the third most important nutrient after Nitrogen and Phosphorous (2004, G.Moore). The soils were generally acidic, indicating that lime application would be necessary for optimum growth of crops.

Analysis of the soil samples revealed there is a high conductivity and corresponding acidity of the surface soils which is suspected to be attributable to bicarbonate salts, not Sulphur salts. The electrical conductivity recorded in the CSBP soil tests confirms this suspicion. Sulphur in the form of ASS was noted at depths below 1000mm surface level from the ASS Investigation and laboratory testing.

3.2 Perennial Horticulture

Perennial crops such as grape vines, olives and stone fruit crops require intensive amounts of water and often require irrigation. The soils which are suitable for the growing of these crops are located along the ridges where the sand forms over laterite. These soils are free draining and have good phosphorous retention ability. The perennial crops require unrestricted rooting depth, so any areas of rock are unfavourable (such as on top of the dominant ridge). A shallow water table and water logging restricts favourable budding conditions in September. This leaves limited area which would be suitable for these crops.

The areas suitable for perennial horticulture are along the slopes of the dominant ridge and represent less than 10% of the area. If irrigation is required for perennial horticulture, Adam Lillicrap mentioned that the Werrilup formation is the best quality aquifer for irrigation for use. Consultation with Kevin Hopkinson at the Department of Water has revealed that the geology indicates tertiary sediments of the Plantagenet Group, and at this point was not clear of this includes any Werrilup formation sediments. Please refer to the DoW generated map located in Attachment C.

3.3 Annual Horticulture

The results for the CSBP testing indicate that the soils have minerals present at adequate levels for horticultural crops, with the acidic conditions favourable to *Brassica sp* (cabbages, cauliflowers, broccoli etc). These species are best located in acidic soils (such as those present at lot 800), however the conductivity levels (salinity) at these sites are at levels which could inhibit growth and productivity.

In the water logged areas there would still be a requirement for large amounts of lime to be added to the soils so they are suitable for crops. Potatoes are grown to the south of the subject site (south of Cuthbert), however it was noted that the sandy soils located here are best suited to seed potatoes, and this represented less that 1% of the subject site, (pers comms T.Overhue).

Annual horticulture requires irrigated water. As mentioned in perennial horticulture Section 3.1, the aquifer below the subject site is questionable in origin and suitability for irrigation. Further investigation would be required.

3.4 Conclusions from Soil (CSPB Testing) Investigations

The subject site has some areas which would be suitable for intensive horticulture pursuits, although this would be a small proportion of the subject site. In general it was confirmed through discussions with the Department of Agriculture representatives that to make the site nutrient efficient and suitable for annual and perennial horticulture, the site would require a substantial modification of the soils for optimum growth conditions (ie. Liming, suitable water sources, salinity measures and fertiliser application)

It was noted by T. Overhue during the discussions that this site would form a good buffer to agriculture pursuits to the west of the subject site, with rural residential land use a favourable buffer type. There are currently no residential developments to the west of this site, however rural residential is prominent to the east, south at Cuthbert and north at Stage One Albany Green.

4 Hydrology and surface water flows

The subject site is situated on the south side of a ridge running east west parallel to South Coast Highway and Lower Denmark Road. The site has a 2 to 10% linear planar slope, with a dominant ridge (approximately 24m AHD)) which descends in a south westerly direction. The valley floors of the site are approximately 10m AHD.

4.1 Surface water flows

The site has surface watershed in a south easterly and south westerly direction from the dominant ridge into the valley floors. The valley areas collect into man made drains known as the Five Mile Creek. In one site north of the Five Mile Creek there is one open water body central to the lot, adjacent to the existing dwelling. This collects surface water all year prior to entering the creek system.

There is a second large pond located in the south east of the subject site. It may be fed from a spring or external source, though this was not evident from site inspection. Further investigation of this water body may be warranted if the site is proposed to be rural residential.

The Five Mile Creek drains into Lake Powell (confirmed by K.Hopkinson DOW). This forms part of the Torbay Catchment, which is currently being targeted for research and investigation by the South Coast Natural Resource Management Group for protection and investment of nutrient reducing actions.

4.2 Ground Water

Winter periods find the valley floors with waterlogged soil profiles (refer to Land Capability Report) and during summer these areas are dry with water table varying from 300mm (adjacent to Five Mile Creek) to 1300mm below surface level.

Ground water hydrology appears from the site investigation to be flowing from the ridge, seeping into the valley floors at three major points. Please refer to Attachment D for surface water directions and ground water seepage sites.

The seepage sites are quite recognisable from the aerials and from site assessment. There is darker colouring of the pasture in these areas, which indicates increases in moisture. Analysis of the soil samples revealed there is a high acidity of the surface soils (and possibly the ground water) which is suspected to be attributable to bicarbonate salts, not sulphur salts.

4.3 Nutrient export

Currently nutrients are exported uncontrolled from the site via surface water and groundwater movement to the Five Mile Drain (constructed drain). These nutrients come from two main sources, animal effluent and fertiliser application for improvement to field pastures.

Located to the south of Cuthbert village is a variety of farms currently farming potatoes and other intensive horticulture crops. It has been recognised that these areas can export nutrients into the catchment area and can lead to nutrification of the Lake Powell and subsequently the Torbay Inlet Catchment.

5 Drainage and constructability of site for rural residential development

Opus Consultants have undertaken a field assessment and concept planning to address possible drainage requirements of the site in the event the subject site becomes a rural residential development. Based on a current version of the proposed lot layout some concepts for the drainage of site surface water and nutrient treatments were developed. Please refer to the sketches provided in Attachment E.

5.1 Road layout

i) Overall the lot and road layout favours the existing contours. Construction cuts and fills should be able to be kept to a minimum over the site with road alignments at, or close to, existing ground levels.

ii) There is an 'at grade' rail crossing proposed prior to Lower Denmark Road. Currently this is a driveway crossing; however the developer should liase with Westrail during the planning process to establish their requirements for control. Considering the potential increased traffic movements at the crossing, Westrail may require a stop signalised crossing at this point.

5.2 Pavements

Although no detailed pavement investigation has been completed on the site, review of the soil profiles and site inspections indicate that a standard pavement design of approximately 200mm pavement should be sufficient on the higher contours.

However, on lower lying areas the ground conditions appear saturated with peat or sandy peat. On the lower lying areas, the subgrade may require modification to obtain suitable bearing capacity. This may be achieved by removal of the peat and replacement with compacted sand and an increased pavement depth. Pavement condition will also be improved by installing suitable drainage, table drains and possibly sub-soil drains in the lower lying areas.

A detailed pavement design will be completed at design stage of this project.

5.3 Bridges and Culverts

i) Two bridges or culverts are proposed crossing Five Mile Creek. These will have to be designed to accommodate flood events and would be best positioned on an embankment above flood levels. Culverts of sufficient capacity to accommodate flood events would likely be too large to fit into the available space in the creek bed. Opus Consultants recommend that a single span pre-fabricated bridge deck above the flood levels should be appropriate for this location. Consideration would be needed that any embankment approaching the bridge would not divert flood flows into neighbouring properties. Further information is required from the DoW whether 1:100 flood levels are available for the Five Mile Creek.

ii) The road turning head located adjacent to Lot 2 is located in the drainage reserve and will require culvert structures beneath the turning head. It is recommended that the location of the turning head be moved westwards so that the length of culvert structures can be reduced and located on the narrower section of roadway.

iii) Culvert crossings have been marked on the sketch in Attachment E. An additional culvert/ access is required to access lot 32. Culverts will be designed to manage a 1:10 year rainfall event.

5.4 Drainage/Retention

Four locations have been identified where there are drainage issues affecting planning and construction.

i) In the vicinity of Lots 31, 32, 33, 34 and 35 very wet ground conditions were observed. From inspection it is difficult to ascertain whether this is due to surface runoff being held back due to a small ridge or if it is ground water seepage from stage 1 above or even from another source.

Detailed investigation and design is required, however construction could require the lots to be lifted approximately 200 or 300mm above existing ground level and the open drain re-graded to approximately 500mm below existing ground level at a constant grade towards Lot 43 in order for the water to flow freely from the site. The re-graded drain could assist in drying out the lots and the road subgrade. The road would have to be constructed 200 to 300mm above existing ground level to prevent failure from water ingress into the pavement. We would recommend cutting the drains a year ahead of construction of the road to attempt to dry out the subgrade if possible.

A detailed survey of the site would be required to determine the extent of drainage improvement necessary over these lots.

ii) There is a large pond located between lots 55 and 56 which is not shown on the concept pond. The pond looks larger than expected from the surrounding catchment. It may be fed from a spring or external source, though this was not evident from our inspection. It may be unfeasible to fill the pond and it should remain as a feature. An overflow drainage easement is required between lots 61 and 62 to replicate the natural overflow that exist in the area.

iii) Lots 58 and 59 are in a low lying area that appears to be susceptible to flooding from Five Mile Creek. The flood banks are low at this point and it looks as if this area could have once formed part of a natural flood plain. It is recommended that flood levels on these lots are established and either the flood bank is lifted or lots filled to accommodate a 1:100 year flood.

iv) It is recommended that a retention pond is constructed in the POS adjacent to lot 42 north of the road crossing to cater for a 1 in 100 year flood. The sizing of the culverts below the road would be suitable to maintain flows that are equal to or less than pre development flows.

5.5 Drainage from Stage 1

Drainage structures that have been constructed in Stage 1 should aid in restricting rain water runoff and flooding from Stage 1 development to the Stage 2 developments. The existing drainage structures in Stage 1 are to be assessed and included as part of the overall drainage scheme for the whole site. Net gains in terms of drainage/stormwater runoff may have already been made due to the control of water from the above sites.

5.6 Nutrient Stripping

Nutrient stripping within the site would be obtained from providing shallow retention ponds at the drainage line outlets on the site adjacent to lot 3 and lot 42 and 117 as shown on the sketch plan. The ponds would be planted with nutrient stripping native vegetation and an outlet strategically placed to control and hold a one in one year rainfall event.

Further planting would be provided in the drainage swales as defined on the concept plan. Limited nutrient control would be provided in the roadside swales, particularly in low lying areas where it is important to get the drainage clear of the pavement as quickly as possible. Vegetation would restrict the drainage paths in the road side swales. It is preferred that the nutrient stripping and soakage occurs within the POS drainage swales and retention ponds.

A plan will be required to manage drainage lines and lots that flow directly to Five Mile Creek. Some additional drainage reserve may be required where the road is crossing Five Mile Creek (Lots 62 and 63 as well as Lots 46 to 57) to construct retention swales for nutrient stripping from the lots and roads south and east of the creek.

5.7 Water main supply

From the Water Corporation asset data base, the nearest existing water main to the site is located on Lowanna Drive to the east of the site and adjacent to lot 126. No water main is available nearby on Lower Denmark Road.

Opus understands there is a proposal to develop lot 126, but is not aware as to the programme or stage of the development.

No water main exists on Lower Denmark Road in the vicinity of the development.

At this stage, Opus have not discussed water supply issues with Water Corporation, though extension of the existing water main will most probably be entirely developer funded.

The most likely option is to extend the Lowanna Drive water main through the proposed development on lot 126. This will be dependent on the proposed development of lot 126 proceeding. The alternative would be either to establish an easement through lot 126 or, although not desirable, extend the water main along Lower Denmark Road.

6 Concepts for Storm Water Treatments

The concepts proposed are aligned to DoW Best Practice and the DoW Stormwater Management Manual (2007). Water Sensitive Urban Design techniques which would be applied to the site, rely on the philosophy of treating water at point of source. This technique allows for treatment of nutrients and for natural ground water re-charge instead of directing water into water ways or sensitive receptors.

The planning for Lot 800 Albany Green storm water design is subject to detailed modelling and calculations of pre-development flows and post-development water movement and catchments. This would be the next stage of the project, and is not within the scope of this brief.

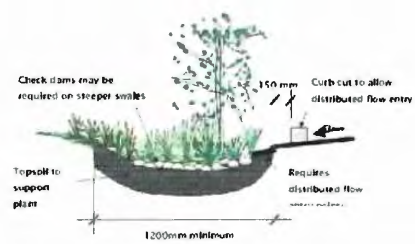
The following sections outline some recommended treatments to be applied across the site at Lot 800 Albany highway for rural residential development.

6.1 Vegetated Swales

Drainage throughout the site will be in the form of vegetated swales. Sedges and rushes will be planted in all of the swales to act as natural biofilters, and will provide cost effective, safe and attractive alternatives to pipes and drains. Endemic sedges and rushes will be used for vegetating the swales as some non endemic species are prone to multiplying rapidly in wet areas and have the potential to 'clog up' drainage lines and waterways.

The swales will follow natural drainage lines wherever possible and will have riffles (strategically placed rock beds) intermittently placed across them to slow the water down, and to create micro habitats and stabilise sediment. The vegetated swales will be located strategically along road verges and will be documented in detailed engineering design.

Figure 2: Vegetated Swales



Typical section through a swale

Swales can be used inside or outside the property boundary.

6.2 Rainwater Harvesting and Re-use

Surface water runoff will be minimised by slowing the movement of rainwater from the catchment and reducing peak flows. To reduce the amount of surface water, and for household water use, all homes will collect the rainwater from their rooftops into rainwater tanks.

6.3 Retention ponds and Living streams

To ensure that predevelopment flows are maintained across the site, it is proposed to have retention ponds with linking living streams which can filter nutrients and sediments, store water and allow for infiltration to the ground water.

Living streams feature stabilised vegetated banks and replicate a natural stream formation providing habitat for animals such as frogs, fish and waterbirds. The Living Stream concept utilises the drain infrastructure as a feature of the development with native plants, stabilised vegetated banks, rock riffles, meandering pathways and function as a conveyance system for stormwater.

The living streams proposed for Albany Green will interconnect the drainage system through the central area of the lots and feed into the retention ponds. The design of the living stream will follow Best Management Practise as per the Stormwater Management Manual DOW (2007). Examples of living streams are well documented by the DoW and shown in examples within Western Australian rural and urban developed areas.

The detailed engineering and environmental detailed design of the Living Stream and Retention ponds will consider:

- Channel Design
- Erosion prevention
- Disharge and retention capacities
- Flow velocities
- Consideration of water table and existing hydrology
- Vegetation management
- Maintenance

The retention and living streams proposed will be designed in consultation with the DoW and CoA to ensure Best practise methodology is applied.

6.4 Revegetation

Revegetation using native plants along the POS areas and in the streetscape will also allow for surface water and nutrient uptake. The swales are designed to have plants in the swale for nutrient uptake and to assist in maintaining pre-development flows. Water sensitive urban design fundamental techniques revolve around water passing over vegetation to uptake nutrients and to encourage ground water recharge.

This rural residential village is very suited to native plant revegetation and will assist in the amenity of the rural residential design. It is recommended that a Landscaping Master Plan be produced with native planting and revegetation to assist in the storm water concept design.

6.5 Water Saving Reticulation Design

To encourage water saving at individual houses, it is recommended that all reticulation across the site utilise subsurface drip lines to minimise surface water run-off and to minimise water usage.

Turfed Areas

Turfed areas will command a major portion of total water use. Considerable savings will be made by including these features in the system.

- Utilise emitters which provide coarse drops, preferably at a low trajectory. These will minimise evaporation. Gear drive sprinklers and impact sprinklers are best where large, regular areas are involved. Pop-up sprays are appropriate for smaller areas of lawn.
- Choose spray heads to closely match the outlines of the lawn. This will minimise overspray onto paths and gardens. A range of spray patterns are available.
- Purchase the highest quality emitters, and standardise on that brand - at least within each watering station. Uniform distribution is a critical consideration in water saving.
- Locate the sprinkler pop-ups at the intervals recommended by the manufacturer - usually spray head to spray head - and staggered if in rows.
- When defining the watering stations and locating the main lines, be sure that the lawn and each garden watering zone are on separate programs.

Garden areas

The important thing is to water directly onto the root zone - not onto the leaves, and not onto the areas between plants.

- Shrubs and perennials. Use drippers to individual small plants. When choosing components, work on providing 10 litres per square metre of watered soil. This corresponds to the Perth Standard Drink of 10 mm depth of precipitation.
- Larger shrubs and fruit trees. Low pressure micro-irrigation sprinklers spread water across the entire drip zone. Their low trajectory undershoots foliage, and avoids wind losses.
- Bedding plants. Large beds of densely planted flowers can also be watered by low pressure micro-irrigation sprinklers. Smaller beds may need Micro-sprays, but these must be on a pressure regulated line to avoid misting
- Pot plants and hanging baskets. Use drippers or multi-outlet emitters to each plant. Water storing granules mixed through the soil save water and improve distribution through the mix.

These water efficiency strategies could be combined into the development's policy or to new lot owners at point of sale.

6.6 Nutrient treatment of WSUD techniques

The WSUD treatments proposed manage water from the point of source. Nutrients are treated through native vegetation uptake from the vegetated swales or from the living streams. Nutrients will also be absorbed into the soil profile, as the soils are sandy allowing good infiltration and permeability. The pollutant trapping efficiency of the proposed applications on lot 800 is shown in

the Table 1 over the page.

Table 1 – Pollutant Trapping Efficiency (Source: WSUD Technical Guidelines for Western Sydney, 2004)

WSUD Element	WSUD Category	Level Control	Pollutant removal efficiencies						
			Gross Pollutants	Coarse sediment	Medium Sediment	Fine Sediment	Free Oil and grease	Nutrients	Metals
Vegetated swales	Secondary	Convey-ance Control	-	50-80%	30-50%	10-50%	10-50%	10-50%	10-50%
Retention ponds/ Living Streams	Tertiary	Discharge Control	-	80-100%	50-80%	30-50%	30-50%	30-50%	30-50%
Gravel Cells	Secondary	Source Control		50-80%	50-80%	30-50%	30-50%	30-50%	30-50%
Gross Pollutant Traps	Primary	Source Control	80-100%	80-100%	30-50%	10-50%	10-50%	10-50%	10-50%
Rainwater tanks		Source Control							

7 Conclusions

Opus Consultants carried out further investigations upon the request the Department of Agriculture and Food's queries from the Land Capability Assessment carried out by Opus in 2007. This Addendum report provides further information and investigations regarding Lot 800 and the proposed future land use of rural residential.

Acid Sulphate Soils

The site was found to have acid soils in the top 500mm of soils below ground level, this was not attributable to sulphur acidity but could be from mobilised ions of aluminium and iron and bicarbonate salts. It is recommended that if soil disturbance is proposed that the site is managed in accordance with the DEC ASS guidelines. It is further recommended by Opus Consultants that the site soils are not disturbed below the 15m contour deeper than 500mm, as sulphur soils (Acid Sulphate Soils and Potential Acid Sulphate Soils) are located from the 1000mm below surface level.

Horticulture

The subject site has some soils which are suitable for horticulture, however represent less than 10% of the subject site. The economics of having this as a sustainable pursuit in the current economic climate is questionable. It is recognised that intensive cropping of horticulture (annual and perennial crops) would require modification of the current landscape and would still contribute unrestricted nutrient flows into the Five Mile Creek and into Lake Powell, within the Torbay Catchment.

Hydrology and Surface Water

The site has predominantly surface water movement from the ridges into the valley floors, where is collects into the Five Mile Creek (a constructed drain). This drain feeds into Lake Powell and forms part of the Torbay Catchment. The valley floors of the site sustain some year round water logging and has one open water body centrally located in the site and one to the south east of the subject site. Further investigation of these water bodies may be warranted if the site is proposed to be rural residential.

Currently there is unrestricted flow of nutrients from the site into the Five Mile Drain and into Lake Powell. This site is not the only creek or tributary to Lake Powell.

Constructability/Engineering

The investigation into the constructability of the subject site for rural residential requires more defined modelling and investigations would be required prior to considering detailed engineering design. Opus Consultants have recognised there are issues of drainage, flooding and road construction which can be overcome with careful planning and design considerations, as outlined in the body of this report.

Storm water Design

Opus Consultants propose that if the subject site was to become rural residential then WSUD concepts would suit this environment. Treatment of point of source surface water flows and storm water prior to entering the Five Mile Creek would substantially reduce nutrient export from the site.

8 References

(2004) Moore, G. Soil Guide, A Handbook for understanding and Managing Agricultural Soil, Department of Agriculture and Food WA.

Pers comms Tim Overhue and K.White February 2008

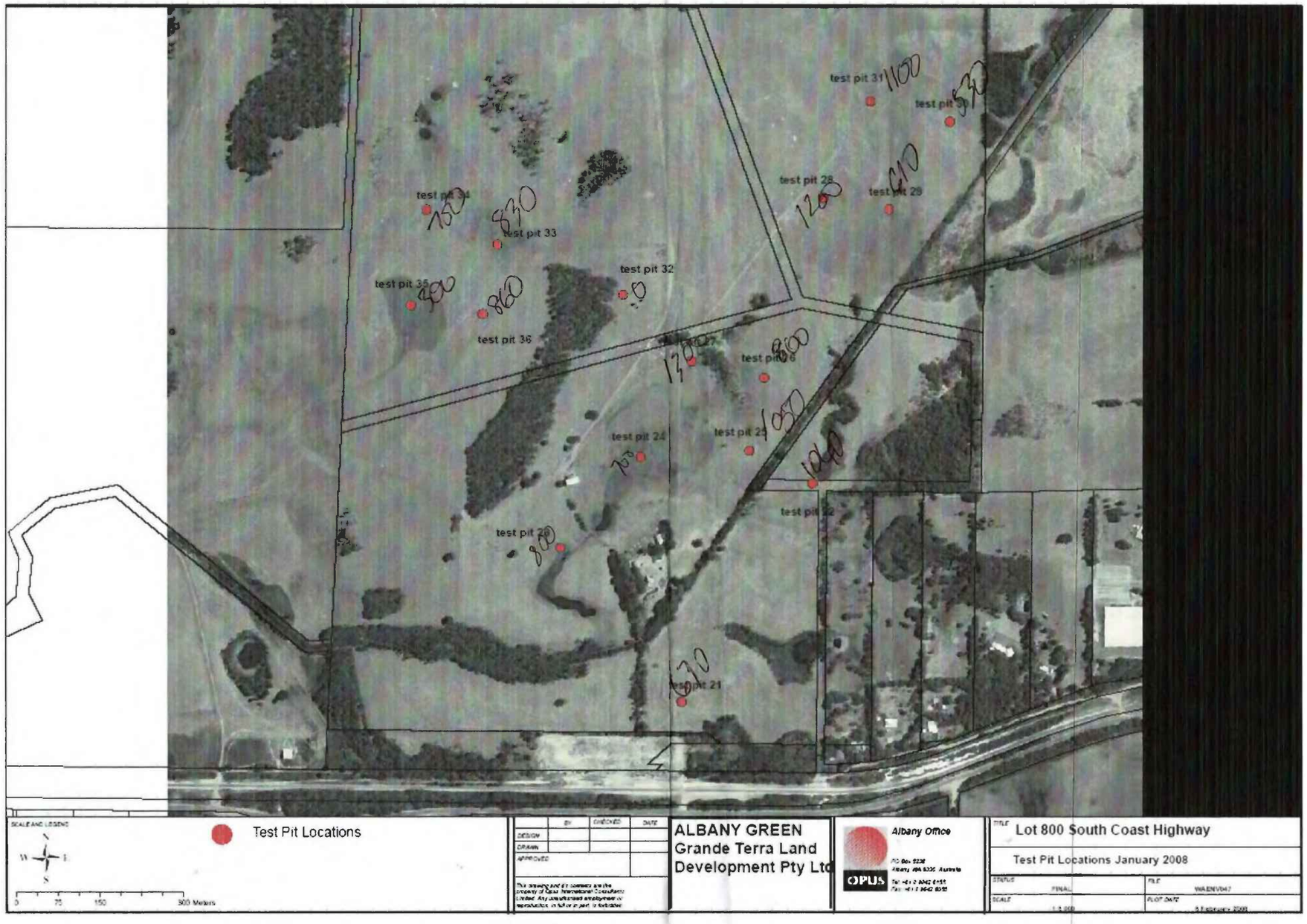
DoE Guidelines Acid Sulphate Soils Guideline Series, *Draft Identification and Investigation of Acid Sulphate Soils – May 2006.*

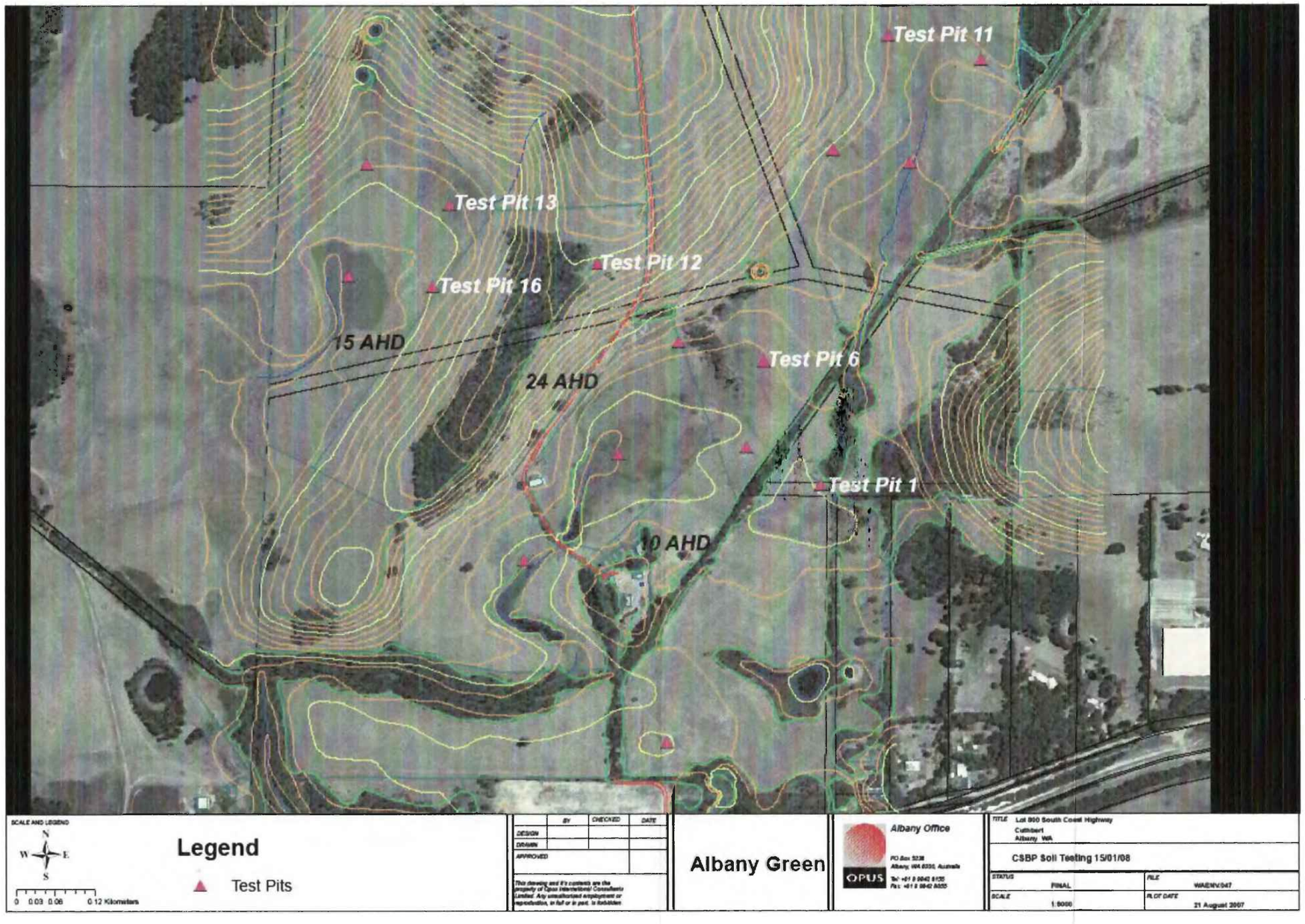
Whelans, Halpern Glick Maunsell, Thompson Palmer and Institute for Science and Technology Policy, Murdoch University, 1993. *Water Sensitive Urban (Residential) Design Guidelines for the Perth Region: Discussion Paper.*

Attachment A

Test Pit Identification

Test Pit ID January 2008 (ALS Client Sample ID)	Test Pit ID for the purposes of this report
TP 1	TP 21
TP 2	TP 22
TP 3	TP 23
TP 4	TP 24
TP 5	TP 25
TP 6	TP 26
TP 7	TP 27
TP 8	TP 28
TP 9	TP 29
TP 10	TP 30
TP 11	TP 31
TP 12	TP 32
TP 13	TP 33
TP 14	TP 34
TP 15	TP 35
TP 16	TP 36


test pit 31
1100
test pit 30
530
test pit 28
1200
test pit 29
610
test pit 34
150
test pit 33
830
test pit 32
0
test pit 35
900
test pit 36
860
test pit 26
800
test pit 24
700
test pit 25
1050
1040
test pit 22
test pit 20
900
test pit 21
730
Test Pit Locations
ALBANY GREEN
Grande Terra Land
Development Pty Ltd
Albany Office
OPUS
Lot 800 South Coast Highway
Test Pit Locations January 2008


Test Pit 11
Test Pit 13
Test Pit 12
Test Pit 16
15 AHD
24 AHD
Test Pit 6
Test Pit 1
10 AHD
SCALE AND LEGEND
N
W
E
S
0 0.03 0.06 0.12 Kilometers
Legend
Test Pits
BY CHECKED DATE
DESIGN
DRAWN
APPROVED
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Albany Green
Albany Office
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Fax: +61 8 9842 8555
TITLE Lot 800 South Coast Highway
Cuthbert
Albany WA
CSBP Soil Testing 15/01/08
STATUS FINAL
FILE WAENV547
SCALE 1:5000
PLOT DATE 21 August 2007

Soil Profile

Location: Albany Green Stage Two
Date tested: 15th January 2008
Sampled by: Kathryn White

Location	Site description	Depth of profile (mm)	Soil Description
Test Pit 21 E 574871 N 6125036 Front east paddock	Open paddock in depression	0 – 50mm 50 – 300mm 300 – 450mm 450 – 630mm 630 – 1400mm Water table	Dry brown topsoil with organic matter Moist dark brown peaty sand Moist grey sand Moist brown sand Wet cemented dark brown sand 630mm
Test Pit 22 E 572107 N 6125428 Front east paddock	Near Taxandrias and north end of paddock near fence	0 – 50mm 50 – 300mm 300 – 1040mm 1040 – 1300mm 1300 – 2000mm Water table	Dry brown topsoil with organic matter Moist grey sand with rootlets Moist light grey sand Wet black sandy silty clayey peat Wet brown sand 1040mm
Test Pit 23 E 571653 N 6125313 In paddock west of sheds	Low lying in drainage line, cleared open paddock	0 – 100mm 100 – 300mm 300 – 1100mm 1100 – 2000mm Water table	Dry brown topsoil with organic matter Moist dark grey sand Wet dark brown sand Wet dark brown/black sandy silt (fine grained) 800mm
Test Pit 24 E 571797 N 6125475 In shed paddock, east of shed	Open paddock in drainage line	0 – 50mm 50 – 200mm 200 – 400mm 400 – 600mm 600 – 2000mm Water table	Dry brown topsoil with organic matter Dry dark brown peaty sand Slightly moist dark grey sandy silty peat Moist dark grey sandy silt Wet light brown sand 700mm

Test Pit 25 E 571994 N6125487 In windmill paddock	Open paddock	0 – 50mm 50 – 300mm 300 – 460mm 460 – 800mm 800 – 1100mm 1100 – 2000mm Water table	Dry brown topsoil with organic matter Moist grey sand with some peat (very fine) Moist dark grey silty sand (very fine) Moist grey sand (very fine) Moist grey (slightly brown) sand (very fine) Moist dark brown/black sand 1050mm
Test Pit 26 E 572020 N 6125618	Cleared paddock – Windmill paddock	0 – 50mm 50 – 200mm 200 – 500mm 500 – 800mm 800 – 1100mm 1100 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist grey sand Moist dark grey sand Moist grey sand (very fine) Moist grey (slightly brown) sand (very fine) Moist dark brown/black sand 800mm
Test Pit 27 E 571890 N 6125648 East of main race, shed paddock	Cleared open paddock	0 – 50mm 50 – 300mm 300 – 500mm 500 – 700mm 700 – 1200mm 1200 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey sandy peat Slightly moist dark grey sand Moist grey sand Moist light brown sand Wet dark brown sand 1300mm
Test Pit 28 E 572126 N 6125941	Open paddock, deep divots in ground	0 – 150mm 150 – 300mm 300 – 700mm 700 – 1350mm 1350 – 1850mm 1850 – 2000mm NB: 2000 – 2100mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey/black clayey silty sand Slightly moist black/ dark brown silty sand Moist grey sand Wet grey/brown sand Wet dark brown sand with organic matter Peat 1200mm

Test Pit 29 E 572243 N 6125920	Open paddock	0 – 50mm 50 – 250mm 250 – 600mm 600 – 850mm 850 – 1030mm 1030 – 1250mm 1250 – 1800mm 1800 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey sand Moist grey sand Wet light grey sand Wet dark brown/ black sand Wet black organic hardpan Wet light brown sand Wet dark brown sand 610mm
Test Pit 30 E 572352 N 6126077	Open paddock	0 – 100mm 100 – 260mm 260 – 530mm 530 – 1200mm 1200 – 1850mm 1850 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist grey sand Moist black peaty sand with rootlets Wet brown sand Wet light brown sand Wet light brown sand 530mm
Test Pit 31 E 572210 N 6126113		0 – 50mm 50 – 200mm 200 – 600mm 600 – 1150mm 1150 – 1350mm 1350 – 1700mm 1700 – 2000mm Water table	Dry brown topsoil with organic matter Slightly moist dark grey sand Slightly moist grey sand Moist light grey sand Wet dark brown sand with large cemented pebbles Wet grey sand Wet dark brown silty sand 1100mm
Test Pit 32 E 571766 N 6125767 East side of ridge – top of slope	Cleared paddock – top of hill	0 – 50mm 50 – 100mm 100 – 300mm 300 – 900mm 900 – 1500mm Water table	Dry brown topsoil with organic matter Dry slightly brown sand with large gravel stones (10-15mm) with roots Dry orange gravel Dry orange laterite Dry cemented orange clayey sand none reached

Test Pit 33 E 571540 N 6125857 West side of ridge	Cleared paddock	0 – 50mm 50 – 130mm 130 – 230mm 230 – 430mm 430 – 900mm 900 – 1220mm 1220 – 2000mm Water table	Dry brown topsoil with organic matter Moist dark grey sand Moist black peaty silty sand Moist dark grey sand Wet grey sand Wet brown sand Wet dark brown silty sand 830mm
Test Pit 34 E 571414 N 6125919		0 – 100mm 100 – 200mm 200 – 300mm 300 – 400mm 400 – 1000mm 1000 – 1200mm Water table	Dry brown topsoil with organic matter Moist dark grey sand with roots Slightly moist black peaty silty sand Moist dark brown sand Moist to wet light brown sand Wet dark brown sandy silt cemented in places with coffee rock 750mm
Test Pit 35 E 571385 N 6125748		0 – 100mm 100 – 200mm 250 – 600mm 600 – 1000mm 1000 – 2000mm Water table	Dry brown topsoil with organic matter Moist black peat with roots Wet dark brown sandy silt Moist dark brown clayey sandy silt with roots Wet brown sand 300mm
Test Pit 36 E 571514 N 6125732 West of ridge	Open paddock	0 – 50mm 50 – 300mm 300 – 770mm 770 – 900mm 900 – 1200mm Water table	Dry brown topsoil with organic matter Moist grey sand Moist light grey sand with roots Moist brown sand Wet cemented brown sand with coffee rock 860mm

Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF - pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 21																				
TP21/SS1	250	moist dark brown peaty sand		n/a	n/a		n/a	5.1	2.7	<0.02	0.23	0.21	0.02					<0.02	0.04	
TP21/SS2	500	moist brown sand	630	n/a	n/a		n/a	5.8	3.5	<0.02	<0.02	<0.02	<0.02						<0.02	
TP21/SS3	1000	wet cemented dark brown sand		n/a	n/a		n/a	4.1	2.2	0.19	0.61	0.42	0.11						0.32	
TP21/SS4	1400	wet cemented dark brown sand		n/a	n/a		n/a	4.7	2.7	0.07	0.18	0.11	0.04						0.11	
		Pit terminated at 1400mm due to rock																		
Test Pit 22																				
TP22/SS1	250	moist grey sand with rootlets		n/a	n/a		n/a	5.2	2.7	<0.02	0.11	0.10	<0.02					<0.02	0.03	
TP22/SS2	500	moist light grey sand		n/a	n/a		n/a	5.5	3.1	<0.02	0.05	0.04	<0.02						<0.02	
TP22/SS3	1000	moist light grey sand	1040	n/a	n/a		n/a	5.5	3.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP22/SS4	1500	wet brown sand		n/a	n/a		n/a	5.2	2.7	<0.02	0.12	0.10	0.11						0.13	
TP22/SS5	2000	wet brown sand		n/a	n/a		n/a	5.1	2.6	<0.02	0.12	0.10	0.10						0.11	
TP22/SS6	1100	wet black sandy silty clayey peat						4.4	1.8	0.13	0.90	0.77	0.59					0.33	0.73	
Test Pit 23																				
TP23/SS1	250	moist dark grey sand		4.3	4.1		M	5.0	2.5	0.03	0.20	0.18	0.06					<0.02	0.08	
TP23/SS2	500	wet dark brown sand		4.8	4.2		M	5.1	2.8	<0.02	0.18	0.16	0.03						0.05	
TP23/SS4	1000	wet dark brown sand	800	5.1	4.2		S	5.3	3.0	<0.02	0.04	0.03	0.03						0.04	
TP23/SS6	1500	wet dark brown/black sandy silt		4.8	3.9		S	5.1	2.5	0.04	0.15	0.12	0.09						0.13	
TP23/SS8	2000	wet dark brown/black sandy silt		4.5	4.0		S	5.1	2.6	0.05	0.15	0.11	0.09						0.14	
Test Pit 24																				
TP24/SS1	250	slightly moist dark grey sandy silty peat		4.7	4.1		M	4.6	2.2	0.08	0.56	0.48	0.08					<0.02	0.16	
TP24/SS2	500	moist dark grey sandy silt	700	4.8	4.3		M	4.9	2.5	<0.02	0.38	0.36	0.08					<0.02	0.10	
TP24/SS3	1000	wet light brown sand		4.9	5.3		N	5.8	4.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP24/SS4	1500	wet light brown sand		4.3	5.6		N	5.7	4.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP24/SS5	2000	wet light brown sand		4.5	6.1		N	5.8	4.6	<0.02	<0.02	<0.02	<0.02						<0.02	

Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF- pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 25																				
TP25/SS1	250	moist grey sand with some peat		4.3	3.5		M	4.2	2.3	0.13	0.81	0.68	0.02					<0.02	0.16	
TP25/SS2	500	moist grey sand		3.5	4.0		S	5.0	2.7	<0.02	0.08	0.07	<0.02						<0.02	
TP25/SS3	1000	moist grey (slightly brown) sand	1050	3.1	3.9		S	5.6	3.5	<0.02	<0.02	<0.02	<0.02						<0.02	
TP25/SS4	1500	moist dark brown/ black sand		3.5	4.1		N	4.1	2.2	0.18	0.73	0.55	0.11						0.30	
TP25/SS5	2000	moist dark brown/ black sand		4.1	4.1		N	4.6	2.3	0.08	0.34	0.27	0.07						0.14	
Test Pit 26																				
TP26/SS1	250	moist dark grey sand		3.5	3.5		n/a	4.3	2.4	0.08	0.35	0.27	<0.02					<0.02	0.09	
TP26/SS2	500	moist grey sand	800	3.2	3.5		n/a	4.7	2.5	0.05	0.11	0.06	0.03					<0.02	0.08	
TP26/SS3	1000	moist grey (slightly brown) sand		3.2	3.7		n/a	5.0	2.7	0.03	0.09	0.06	0.02					<0.02	0.05	
TP26/SS4	1500	moist dark brown/ black sand		n/a	n/a		n/a	4.5	2.3	0.10	0.36	0.26	0.05						0.15	
TP26/SS5	2000	moist dark brown/ black sand		n/a	n/a		n/a	4.6	2.3	0.08	0.29	0.21	0.04						0.12	
Test Pit 27																				
TP27/SS1	250	slightly moist dark grey sandy peat		4.4	4.9		M	4.3	2.4	0.08	0.74	0.65	0.04					<0.02	0.13	
TP27/SS2	500	moist grey sand		4.8	5.0		S-M	6.2	2.9	<0.02	0.10	0.10	<0.02						<0.02	
TP27/SS3	1000	moist light brown sand	1300	4.6	5.4		S	5.7	3.3	<0.02	<0.02	<0.02	<0.02						<0.02	
TP27/SS4	1500	wet dark brown sand		4.7	4.3		Very S	4.6	2.5	0.11	0.33	0.22	0.06						0.17	
TP27/SS5	2000	wet dark brown sand		5.0	4.2		S	4.7	2.3	0.10	0.30	0.21	0.06						0.16	
Test Pit 28																				
TP28/SS1	250	slightly moist dark grey/ black clayey silty sand		3.3	3.1		S-M	3.6	2.0	0.22	1.21	0.99	0.05					<0.02	0.28	
TP28/SS2	500	slightly moist dark grey/ black clayey silty sand		3.9	3.5		S-M	4.7	2.4	0.04	0.39	0.35	0.04					<0.02	0.07	
TP28/SS3	1000	moist grey sand	1200	4.1	4.7		N	5.5	3.1	<0.02	0.04	0.04	<0.02						<0.02	
TP28/SS4	1500	wet grey/ brown sand		4.5	5.2		N	5.6	3.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP28/SS5	2000	wet dark brown sand with organic matter		4.6	3.7		N	4.7	2.3	0.07	0.32	0.25	0.03						0.10	

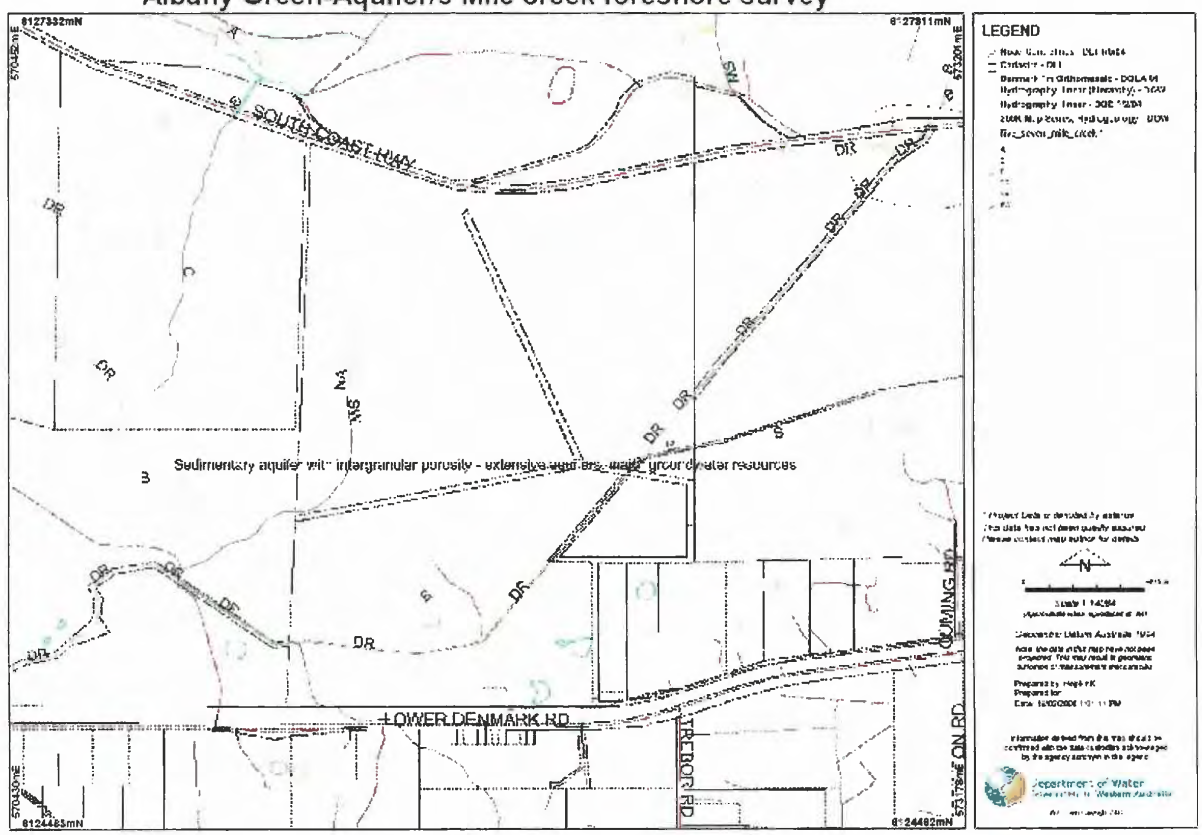
Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF- pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 29																				
TP29/SS1	250	moist grey sand		3.9	3.7		M	4.3	2.2	0.14	1.30	1.16	0.06					<0.02	0.21	
TP29/SS2	500	moist grey sand	610	4.1	4.8		S	5.1	2.8	<0.02	0.09	0.07	<0.02						0.03	
TP29/SS3	1000	wet light grey sand		4.6	4.8		N	4.6	3.1	0.13	0.38	0.25	0.05						0.18	
TP29/SS4	1500	wet light brown sand		4.3	5.3		N	5.4	3.1	<0.02	0.05	0.03	0.03						0.05	
TP29/SS5	2000	wet dark brown sand		4.6	5.5		N	5.3	3.2	<0.02	0.05	0.04	<0.02						0.04	
Test Pit 30																				
TP30/SS1	250	slightly moist grey sand		n/a	n/a		n/a	4.4	2.5	0.07	0.40	0.33	0.03					<0.02	0.10	
TP30/SS2	500	moist black peaty sand with rootlets	530	n/a	n/a		n/a	5.0	2.6	0.02	0.19	0.17	0.03						0.05	
TP30/SS3	1000	wet brown sand		n/a	n/a		n/a	5.2	3.1	<0.02	0.02	<0.02	<0.02						<0.02	
TP30/SS4	1500	wet light brown sand		n/a	n/a		n/a	5.4	3.6	<0.02	<0.02	<0.02	<0.02						<0.02	
TP30/SS5	2000	wet light brown sand		n/a	n/a		n/a	5.5	4.1	<0.02	<0.02	<0.02	<0.02						<0.02	
Test Pit 31																				
TP31/SS1	250	slightly moist grey sand		n/a	n/a		n/a	5.5	2.6	0.03	0.46	0.43	0.02					<0.02	0.05	
TP31/SS2	500	slightly moist grey sand		n/a	n/a		n/a	5.4	2.9	<0.02	0.10	0.09	<0.02						0.02	
TP31/SS3	1000	moist light grey sand	1100	n/a	n/a		n/a	5.8	4.1	<0.02	<0.02	<0.02	<0.02						<0.02	
TP31/SS4	1500	wet grey sand		n/a	n/a		n/a	5.1	2.8	<0.02	0.05	0.03	<0.02						0.02	
TP31/SS5	2000	wet grey sand		n/a	n/a		n/a	4.3	2.5	0.16	<0.02	<0.02	0.07						<0.02	
Test Pit 32																				
TP32/SS1	250	dry orange gravel		4.2	4.9		S	6.0	5.8	<0.02	0.47	0.46	<0.02						<0.02	
TP32/SS2	500	dry orange laterite		4.7	4.9		N	5.8	5.4	<0.02	<0.02	<0.02	<0.02						<0.02	
TP32/SS3	1000	wet cemented orange clayey sand		n/a	n/a		n/a	5.8	4.8	<0.02	<0.02	<0.02	<0.02						<0.02	
TP32/SS4	1500	wet cemented orange clayey sand		n/a	n/a		n/a	5.7	5.0	<0.02	<0.02	<0.02	<0.02						<0.02	
		Pit terminated at 1500mm due to rock																		

Water table – none reached

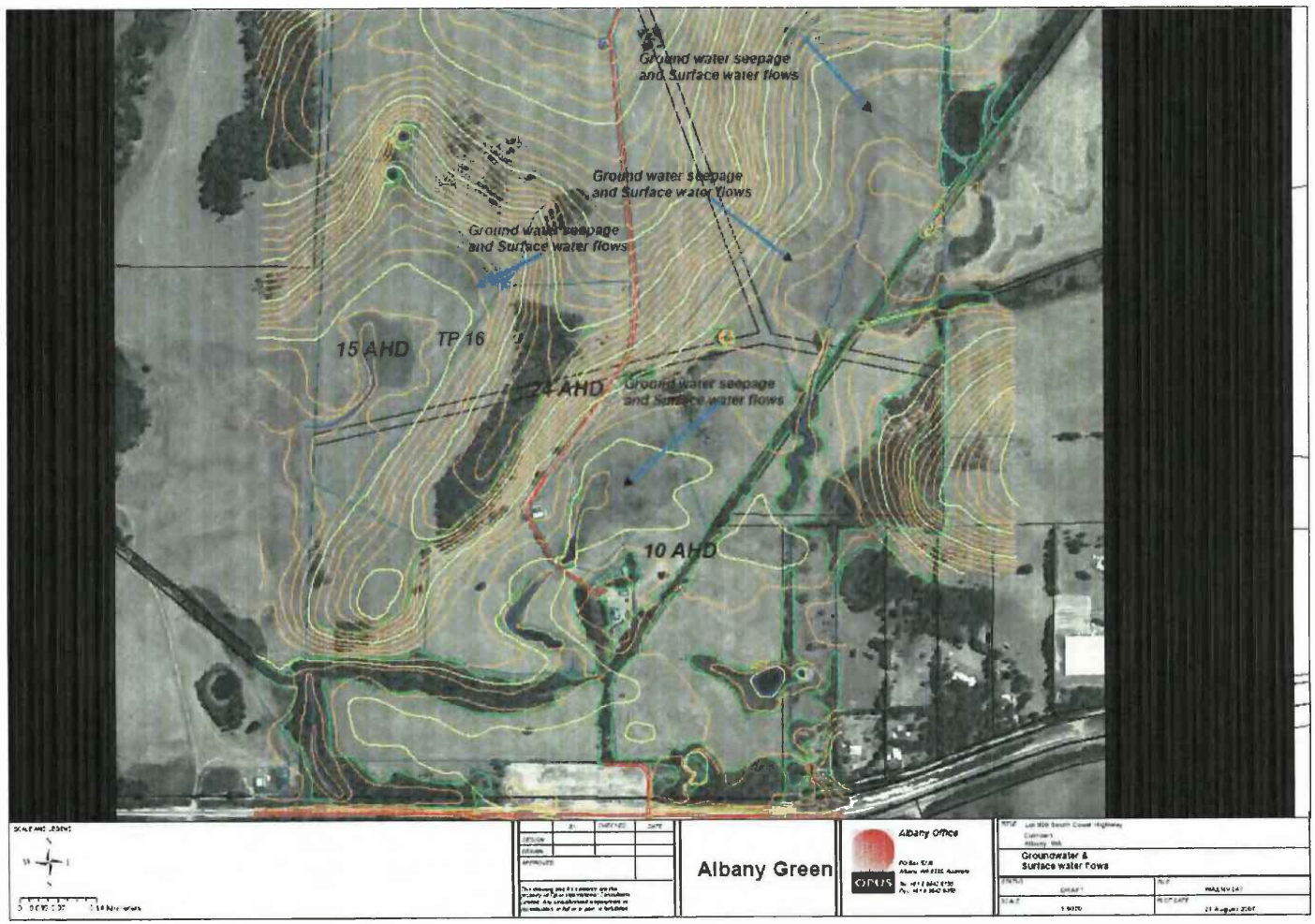
Field Observations				Field Test				Lab pH		SPOCAS						S_{CR} Suite			Action Critera	
Sample ID		Soil Description	Depth to Water	pHF	pHFOX	pHF- pHFOX	Reaction Rate	pH KCl	pH OX	TAA	TPA	TSA	S_{POS}	ANC_E	Net Acidity	pH KCl	TAA	S_{CR}	Net Acidity (SPOCAS)	Net Acidity (S_{CR})
Location	mmBGL		mmBGL	pH units	pH units	pH units	LMHXV	pH units	pH units	%S	%S	%S	%S	%S	%S	pH	%S	%S	%S	%S
Assessment Critera			-	4	4	1	NV	4	NV	0.03	0.03		0.03	0.03	NV	NV	NV	0.03	0.03	0.03
Test Pit 33																				
TP33/SS1	250	moist dark grey sand		n/a	n/a		n/a	4.8	2.6	0.04	0.23	0.19	<0.02					<0.02	0.06	
TP33/SS2	500	wet grey sand	830	n/a	n/a		n/a	5.8	4.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP33/SS3	1000	wet brown sand		n/a	n/a		n/a	5.3	3.6	<0.02	0.03	0.03	<0.02						<0.02	
TP33/SS4	1500	wet dark brown silty sand		n/a	n/a		n/a	4.9	2.6	0.04	0.11	0.07	0.03						0.08	
TP33/SS5	2000	wet dark brown silty sand		n/a	n/a		n/a	4.8	2.6	0.05	0.17	0.11	0.04						0.09	
Test Pit 34																				
TP34/SS1	250	slightly moist black peaty silty sand		n/a	n/a		n/a	3.8	2.1	0.20	1.09	0.88	0.06						0.27	
TP34/SS2	500	moist to wet light brown sand		n/a	n/a		n/a	5.1	2.9	<0.02	0.06	0.05	<0.02						<0.02	
TP34/SS3	750	moist to wet light brown sand	750	n/a	n/a		n/a	5.4	3.3	<0.02	0.02	<0.02	<0.02						<0.02	
TP34/SS4	1000	wet dark brown sandy silt cemented in places with coffee rock		n/a	n/a		n/a	4.6	2.6	0.06	0.14	0.08	<0.02						0.06	
TP34/SS5	1200	wet dark brown sandy silt cemented in places with coffee rock		n/a	n/a		n/a	4.1	2.7	0.24	0.40	0.17	0.07						0.31	
Test Pit 35																				
TP35/SS1	250	wet dark brown sandy silt	300	n/a	n/a		n/a	4.6	2.5	0.08	0.17	0.08	0.02					<0.02	0.10	
TP35/SS2	500	wet dark brown sandy silt		n/a	n/a		n/a	4.8	2.7	0.04	0.17	0.13	0.02						0.06	
TP35/SS4	1000	wet brown sand		n/a	n/a		n/a	5.1	2.6	0.03	0.10	0.07	0.07						0.10	
TP35/SS6	1500	wet brown sand		n/a	n/a		n/a	5.7	3.3	<0.02	<0.02	<0.02	<0.02						<0.02	
TP35/SS8	2000	wet brown sand		n/a	n/a		n/a	5.5	3.0	<0.02	0.05	0.04	0.04						0.05	
Test Pit 36																				
TP36/SS1	250	moist grey sand		n/a	n/a		n/a	4.7	2.4	0.05	0.28	0.23	0.02					<0.02	0.07	
TP36/SS2	500	moist light grey sand with roots	860	n/a	n/a		n/a	5.6	3.2	<0.02	<0.02	<0.02	<0.02						<0.02	
TP36/SS3	1000	wet cemented brown sand with coffee rock		n/a	n/a		n/a	5.4	3.4	0.04	0.21	0.17	<0.02						0.05	
		Pit terminated at 1200mm due to rock																		

Attachment C – DoW Generated Map

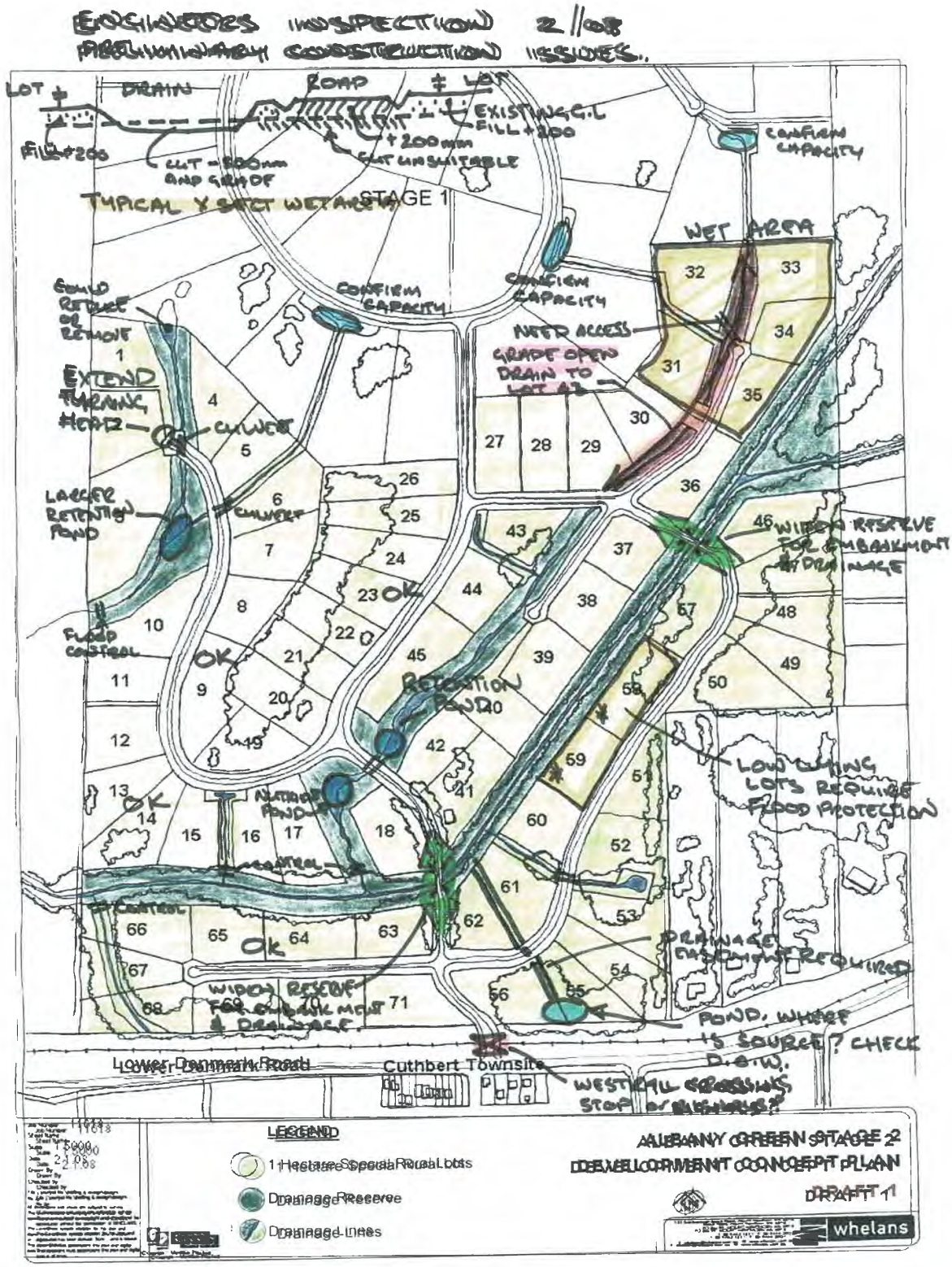
Albany Green-Aquifer/5 Mile creek foreshore survey



Attachment D – Surface Water Flows



Attachment E Concept drainage for Rural Residential Development



APPENDIX E | BHL ASSESSMENT AND BUSHFIRE MANAGEMENT PLAN

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Lot 124 and Lot 125 South Coast Highway, Lot 9001 Lower Denmark Road, Lot 44 and Lot 200			
Suburb: Marbelup and Cuthbert		**State:** WA	**P/code:** 6330
Local government area: City of Albany			
Description of the planning proposal: Scheme Amendment (Rezoning Application)			
BMP Plan / Reference Number: HD063-007	**Version:** Version 1	**Date of Issue:** 01/05/2024	
Client / Business Name: Dora Porter, Brian Fuller and Barry Panizza			

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☐	☒
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☒
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☒
Strategic planning proposal (including rezoning applications)	☒	☐
Minor development (in BAL-40 or BAL-FZ)	☐	☒
High risk land-use	☐	☒
Vulnerable land-use	☐	☒

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

This overall proposal is for a Scheme Amendment (Rezoning Application)

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Jason Benson	Level 2	BPAD-37893	01/08/2024
Company Bio Diverse Solutions		**Contact No.** 9842 1575	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner  **Date** 01/05/2024

BHL Assessment and Bushfire Management Plan

Lot 124 and Lot 125 South Coast Highway, Lot 9001 Lower Denmark Road, Lot 44 and Lot 200

Marbelup and Cuthbert, WA 6330

Final

1/05/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

Site Details					
Address:	Lot 124 and Lot 125 South Coast Highway, Lot 9001 Lower Denmark Road, Lot 44 and Lot 200				
Suburb:	Marbelup and Cuthbert	State:	W.A.	Postcode	6330
Local Government Area:	City of Albany				
Description of Proposal:	Scheme Amendment (Rezoning Application)				
Stage of WAPC Planning	Rezoning				

BAL Contour Plan Details			
Report / Job Number:	HD063 -007	Report Version:	Final
Assessment Date:	15 February 2022	Report Date:	1 May 2024
BPAD Practitioner	Jason Benson (Level 2)	Accreditation No.	BPAD-37893
BPAD Practitioner	Kathryn Kinnear (Level 2)	Accreditation No.	BPAD-30794

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1. Introduction

Harley Dykstra commissioned Bio Diverse Solutions (Bushfire Consultants) on behalf of the landowners (Dora Porter, Brian Fuller and Barry Panizza) to prepare a Bushfire Management Plan (BMP) to support the proposed scheme amendment (rezoning) at Lot 124 and Lot 125 South Coast Highway, Marbelup, Lot 9001 Lower Denmark Road, Lot 44 and Lot 200, Cuthbert, within the City of Albany (CoA).

The rezoning plan provides for Rural Residential and Rural Small Holding zoned land. In the future, the area will be provided with connecting public roads, Emergency Access Ways (EAW) and various residential/rural zoned land. This BMP has been prepared to assess the whole subject site (5 lots) to the current and endorsed Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC, 2021) and the State Planning Policy 3.7 (WAPC, 2015). The proposed lot layout is not currently finalised and the overall proposed rezoning plan, showing the future access and zoning has been provided to indicate how it will achieve compliance to the current guidelines, see Figure 2: Zoning Plan.

The new public roads, and EAW's will be constructed linking the existing road network from Lower Denmark in the south, to South Coast Highway in the north. This BMP has been prepared to assess the overall rezoning proposal with individual BMPs over the lots proposed in subsequent planning stages.

1.1 Location

The subject site is located to the west of the Albany CBD, in the locality of Marbelup and Cuthbert, see Figure 1.

Figure 1: Location mapping of the subject site

1.2 Development Proposal

The subject sites are defined for the purpose of this BMP as Lot 124 (25.63ha) and Lot 125 (82.92ha) South Coast Highway, Lot 9001 Lower Denmark Road (100.07ha), Lot 44 (7.27ha) and Lot 200 (1.18ha) which are presently zoned as 'Rural' under the City of Albany's Local Planning Scheme No. 2 (DPLH, 2024). The proposal will include connecting public roads, Emergency Access Ways (EAW) and various residential/rural zoned land. The proposed area for rezoning is shown in Figure 2: Zoning Plan.

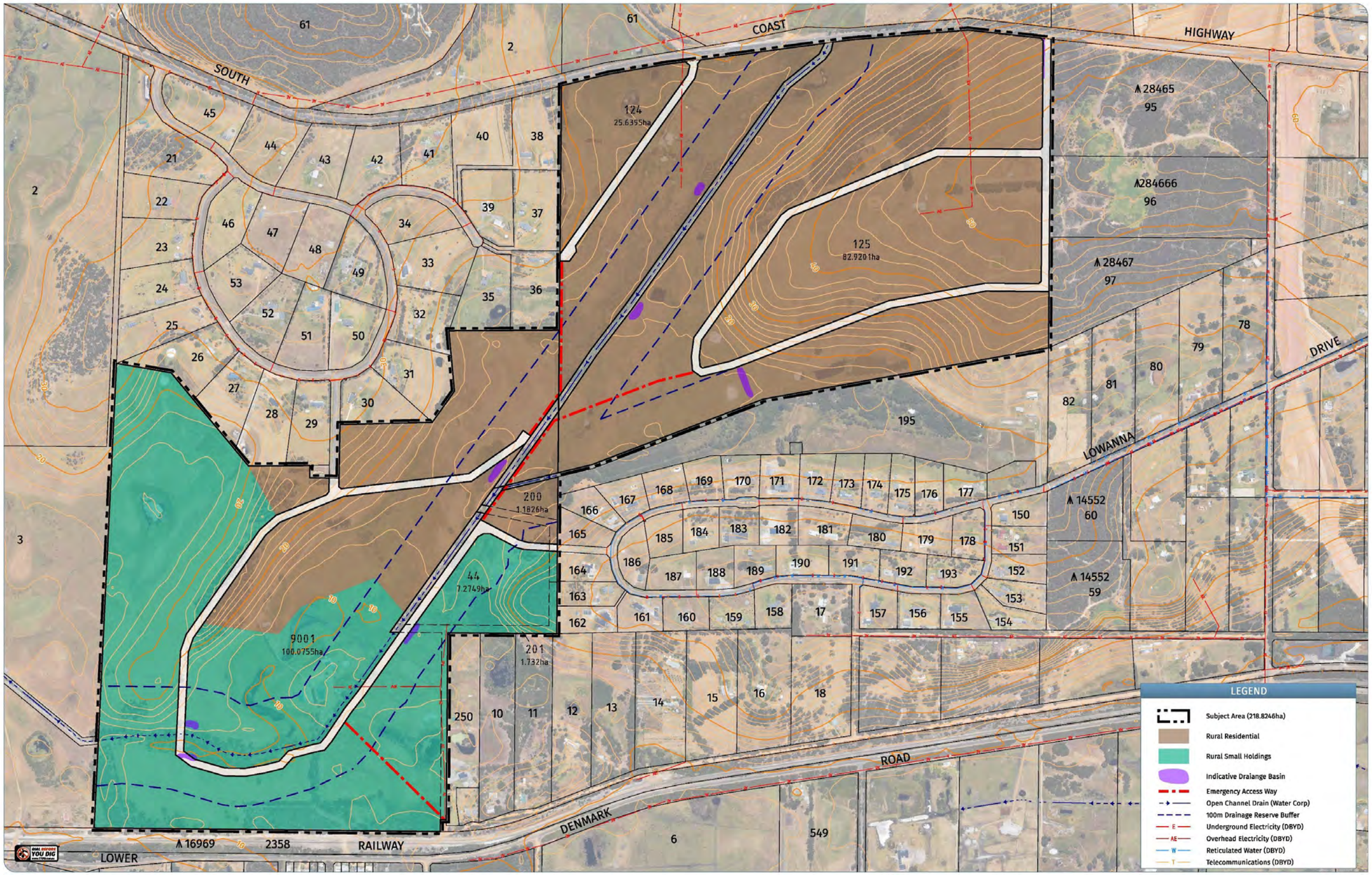


Figure 2: Zoning Plan

Lots 124 (No.47954) & 125 (No.47917) South Coast Highway,
9001 (No.688) Lower Denmark Road, MARBELUP and CUTHBERT

1.3 Bushfire Prone Area

The publicly released Map of Bushfire Prone Areas (OBRM, 2021) shows that the subject site is located within a Bushfire Prone Area (within 100m of >1ha of bushfire prone vegetation) and as such, is subject to a planning assessment of the bushfire risks. Bushfire Prone Area Mapping (OBRM, 2021) is shown in Figure 3.

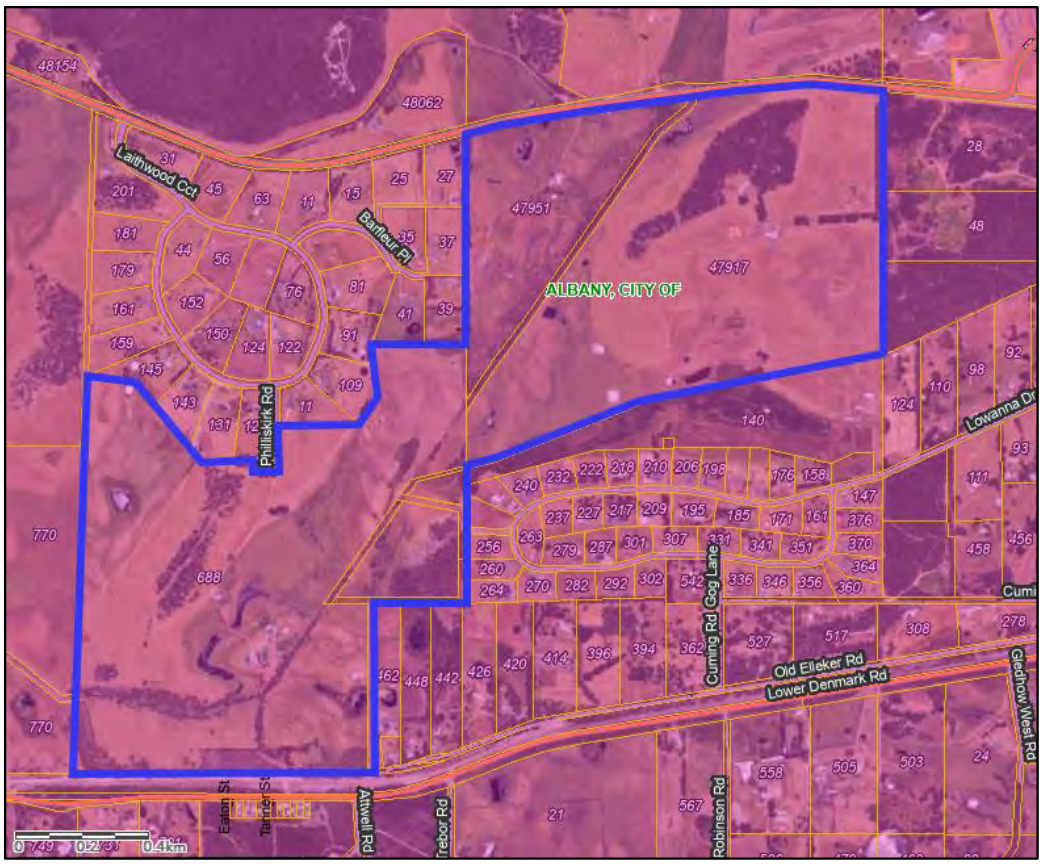


Figure 3: Map of Bushfire Prone Areas and relevance to subject site (OBRM, 2021)

1.4 Statutory Framework

This document and the recommendations contained within are aligned to the following policy and guidelines:

- *Planning and Development Act 2005*;
- *Planning and Development (Local Planning Scheme) Regulations 2015;*
- State Planning Policy (SPP 3.7) Planning in Bushfire Prone Areas 2015 (WAPC, 2015);
- Guidelines for Planning in Bushfire Prone Areas, Version 1.4 (WAPC, 2021);
- *Building Act 2011;*
- *Building Regulations 2012;*
- Building Code of Australia (National Construction Code) (NCC, n.d.);
- *Fire and Emergency Services Act 1998*;
- AS3959-2018 "Construction of Buildings in Bushfire Prone Areas" current and endorsed standards;
- *Bushfires Act 1954*; and
- CoA Fire Management Notice (CoA, 2023/24).

2 Environmental Considerations

2.1 Native Vegetation – Modification and Clearing

This BMP utilises the assumption that in the future all lots can be located in a moderate Bushfire Hazard Level (BHL) which meets the requirements of the guidelines. The site predominantly consists of grassland vegetation and some small patches of forest internal to the subject site. The removal of native vegetation is not planned as part of this proposal.

2.2 Review of the Environmental Data Sets (Landgate, 2022)

A review of the environmental data sets (Landgate, 2022) as identified in the Department of Planning, Lands and Heritage BMP Template for a complex development application, does not identify that any regulated (restricted) vegetation will be affected by the proposal, see Table 1: Environment Dataset Review.

Table 1: Environmental Dataset Review

Dataset	Impact on Proposal	Comment
Conservation category wetlands and buffer	No	A public drinking water source area (South Coast Water Reserve) and an Albany groundwater area are located to the south of the subject site.
Wetlands and Waterways	No	A creek line and seasonally inundated area is located within the site. A 100m drainage reserve buffer will be implemented as part of this proposal, see Figure 2: Zoning Plan.
Landscape Hazards	Potentially	Soil Landscape Risk - Wind and water erosion risk area covers the subject site and surrounds. Soil Landscape Quality - surface acidity and salinity risk area cover the subject site area and surrounds.
RAMSAR wetlands (DBCA-010)	No	
Threatened and Priority Flora (DBCA-036)	Unaware	There is potential for threatened flora to be impacted by this proposal. However, priority flora locations can only be seen to a scale of 1:200,000 and it is difficult to establish the level of impact this proposal will have.
Threatened Ecological Communities (DBCA-038)	No	
Bush Forever sites 2000 (DPLH-019)	No	
Clearing regulations –Environmentally Sensitive Areas (DWER-046)	No	
Swan Bioplan Regionally Significant Natural Areas 2010 (DWER-069)	No	
Conservation Covenants Western Australia (DPIRD-023)	Unaware	This dataset is not publicly available.

Note: The management strategies contained in this report, assume that all environmental approvals will be achieved.

2.3 Revegetation or Landscaping

There are several indicative drainage basins indicated on Figure 2: Zoning Plan. In the future, the drainage basins will be revegetated as per the associated Local Water Management Strategy (LWMS) for the site. It is estimated that the likely revegetation will consist of sedges, rushes, and reeds. The likely classification of this area will be Shrubland Type C and will not negatively impact on the BAL ratings over future lots. Drainage basins are not located close to dwellings with large rural and small residential rural lots proposed and will not increase the overall bushfire risk for the proposed rezoning plan area. A BAL contour plan will be completed over the site at the subdivision stage. An accredited Level 2 Bushfire Practitioner is to review and approve any future planting, revegetation, or landscaping within the development area to ensure the planting does not increase the potential bushfire risk.

3 Bushfire Assessment Results

The bushfire assessment for this site has followed the Bushfire Attack Level (BAL) Assessment and WAPC Planning in Bushfire Prone Areas Guidelines Version 1.4 (WAPC, 2021).

3.1 Assessment Inputs

Bushfire Assessment inputs for the site have been calculated using the Method 1 BAL Assessment procedure as outlined in AS3959-2018. This incorporates the following factors:

- WA adopted Fire Danger Index (FDI), being FDI 80;
- Vegetation Classes;
- Effective Slope under classified vegetation; and
- Distance between proposed development site and classified vegetation.

3.1.1 Vegetation Classification

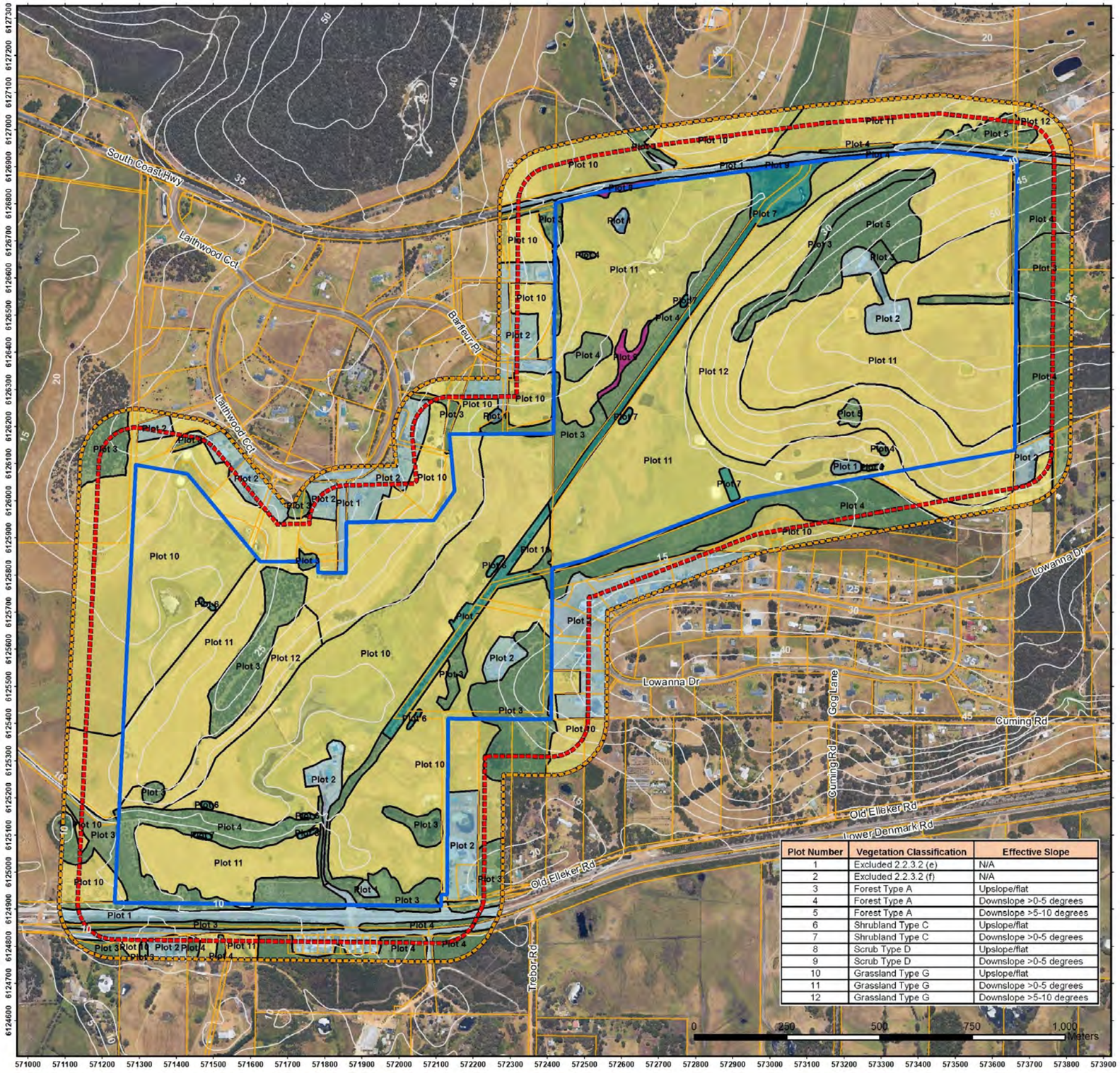
Site assessment occurred on the 12th October 2021 by Kathryn Kinnear (Level 2 BPAD-30794) and the 19th October 2021 by Jason Benson (Level 2 BPAD-37893). Site conditions have not changed since the 2021 site assessments with subsequent site checks since original assessment occurred in 2023/2024 during the preparation of this report. All vegetation within 150m of the site/proposed development was classified in accordance with Clause 2.2.3 of AS3959-2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown on Figure 4: Overall Vegetation Classification Map on the following page. Further detail on vegetation classification and plot data can be obtained by reviewing the Original Vegetation Classifications to AS3959 for the northern and southern sites in Appendix A and Appendix B of this report.

A summary of the combined overall plot data for the site assessed as per Clause 2.2.3 of AS3959-2018 is provided below in Table 2 below.

Table 2: Overall Vegetation Classification Table (in accordance with AS3959-2018) of the subject site

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Forest Type A	Downslope >5-10 degrees
6	Shrubland Type C	Upslope/flat
7	Shrubland Type C	Downslope >0-5 degrees
8	Scrub Type D	Upslope/flat
9	Scrub Type D	Downslope >0-5 degrees
10	Grassland Type G	Upslope/flat
11	Grassland Type G	Downslope >0-5 degrees
12	Grassland Type G	Downslope >5-10 degrees

Note: The above table indicates the combined overall vegetation for the entire site. Originally, the northern and southern sites were assessed independently. The original vegetation classifications report to AS3959 for the northern and southern sites can be found in Appendix A and B of this report. Plot numbering in the overall vegetation map differs slightly to the original assessments.



Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Forest Type A	Downslope >5-10 degrees
6	Shrubland Type C	Upslope/flat
7	Shrubland Type C	Downslope >0-5 degrees
8	Scrub Type D	Upslope/flat
9	Scrub Type D	Downslope >0-5 degrees
10	Grassland Type G	Upslope/flat
11	Grassland Type G	Downslope >0-5 degrees
12	Grassland Type G	Downslope >5-10 degrees

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BPAD Bushfire Planning & Design
BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:10,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Harley Dykstra & Barry Panizza
Lot 124 No 47951 & 125 No 47917 South Coast Highway
& Lot 9001 No 688 Lower Denmark Road Marbelup Cuthbert
Cuthbert WA 6330

Figure 4: Overall Vegetation Classification Map

BAL Assessor	*QA Check*	*Drawn by*
JRB	**MKG**	**GSK**
STATUS	*FILE*	*DATE*
FINAL	**HD063-007**	**01/05/2024**

3.2 Assessment Outputs (Bushfire Hazard Level)

The BHL process provides an indication of the likely impact of a bushfire event as it interacts with the bushfire hazards within and adjacent to the site. The BHL is a measure of the likely intensity of a bushfire and the likely level of bushfire attack on a site by categorizing the hazard (WAPC, 2021). The allocation of category of the bushfire hazard is determined as per Table 3 of the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021), as shown on Figure 5.

Table 3: BHL and classified vegetation (as per AS-3959)

HAZARD LEVEL	CHARACTERISTICS
Extreme	• Class A: Forest • Class B: Woodland (05) • Class D: Scrub • Any classified vegetation with a greater than 10 degree slope
Moderate	• Class B: Open woodland (06), Low woodland (07), Low open woodland (08), Open shrubland (09)* • Class C: Shrubland • Class E: Mallee/Mulga • Class G: Grassland, including sown pasture and crops • Vegetation that has a low hazard level but is within 100 metres of vegetation classified as a moderate or extreme hazard, is to adopt a moderate hazard level.
Low	• Low threat vegetation may include areas of maintained lawns, golf courses, public recreation reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. • Managed grassland in a minimal fuel condition (insufficient fuel is available to significantly increase the severity of the bushfire attack). For example, short-cropped grass to a nominal height of 100 millimetres. • Non-vegetated areas including waterways, roads, footpaths, buildings and rock outcrops.

Figure 5: BHL Assessment allocation of category (WAPC, 2021)

3.3 Potential Bushfire Impacts - BHL allocation

The potential bushfire impact to the site/proposed development from each of the identified vegetation plots are presented in Table 3 and shown in Figure 6: BHL Map.

Table 3: Potential Bushfire impacts to the Site (BHL)

Plot Number	Vegetation Type (Table 2.3)	Effective Slope (Table2.4.3)	BHL Allocation
1	Excluded 2.2.3.2 (e)	N/A	Low
2	Excluded 2.2.3.2 (f)	N/A	Moderate
3	Forest Type A	Upslope/flat	Extreme
4	Forest Type A	Downslope >0-5 degrees	Extreme
5	Forest Type A	Downslope >5-10 degrees	Extreme
6	Shrubland Type C	Upslope/flat	Moderate
7	Shrubland Type C	Downslope >0-5 degrees	Moderate
8	Scrub Type D	Upslope/flat	Extreme
9	Scrub Type D	Downslope >0-5 degrees	Extreme
10	Grassland Type G	Upslope/flat	Moderate
11	Grassland Type G	Downslope >0-5 degrees	Moderate
12	Grassland Type G	Downslope >5-10 degrees	Moderate

NOTES ON BHL ASSESSMENT

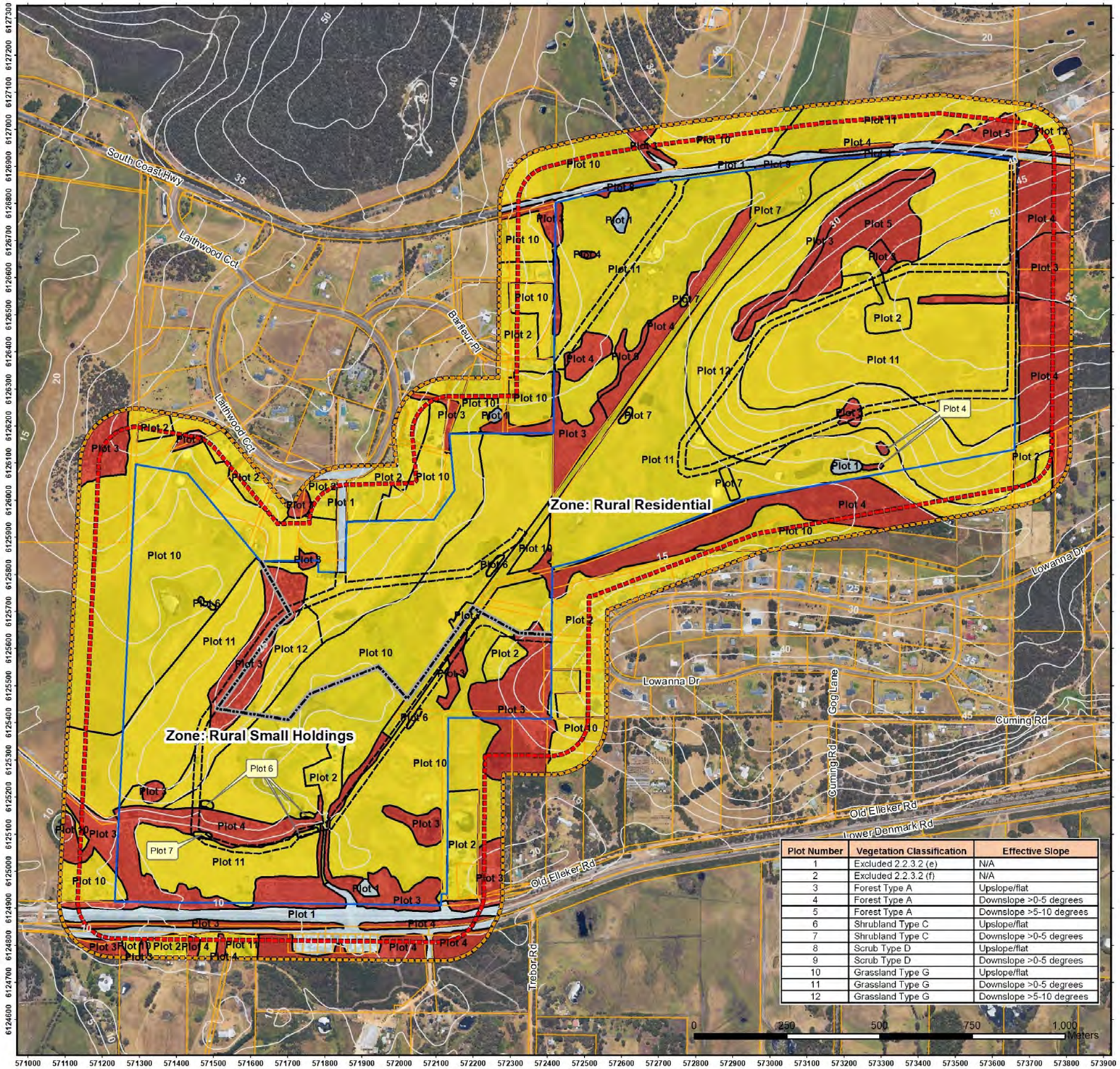
- The BHL assessment was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD-37893);
- The BHL Assessment and Map has been prepared in accordance with the current endorsed Department of Planning, Lands and Heritage (WAPC) Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC, 2021);
- The majority of the site is subject to a Moderate BHL with some areas of extreme BHL due to the remanent vegetation internal to the site. The plan is to retain as much vegetation as possible while keeping future lots in a moderate/low BHL;
- The area proposed for Rural Residential and Rural Small Holding is currently subject to a moderate BHL;
- The internal remitment vegetation predominantly consists of forest which is defined as an extreme BHL. However, appropriate separation distances can be achieved for future developments;
- The assumptions contained within this report are based on the Zoning Plan as supplied by the client (Figure 2); and
- Subject site is located in a Bushfire Prone Area; see Figure 3 (OBRM, 2021).

Note on internal vegetation

The lot contains significant areas of internal grasslands which are mapped as a moderate bushfire hazard. Internal to the subject site to the east of the small lot is a small area of Forest Type A (refer to Figure 4: Overall Vegetation Classification Map). Onsite vegetation is within the control of the landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to approval. Offsite vegetation is not within the control of the landowner. This vegetation cannot be removed or modified by the landowner and as a result bushfire threat from offsite vegetation is unable to be reduced. Bushfire management measures external to the subject site are not required as part of this proposal. For the required separation distances from each vegetation plot to achieve a BAL-29 compliant Asset Protection Zone (APZ), refer to Table 4.

Table 4: Separation Distances to achieve BAL-29 from each Vegetation Plot (BAL-29 APZ)

BAL-29 Asset Protection Zone				
Plot Number	Vegetation Classification	Effective Slope Degrees	Achievable BAL Rating	Minimum Separation Distance Required (metres)
3	Forest Type A	Upslope/flat	BAL-29	21
4	Forest Type A	Downslope >0-5 degrees		27
5	Forest Type A	Downslope >5-10 degrees		33
6	Shrubland Type C	Upslope/flat		9
7	Shrubland Type C	Downslope >0-5 degrees		10
8	Scrub Type D	Upslope/flat		13
9	Scrub Type D	Downslope >0-5 degrees		15
10	Grassland Type G	Upslope/flat		8
11	Grassland Type G	Downslope >0-5 degrees		9
12	Grassland Type G	Downslope >5-10 degrees		10



Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Forest Type A	Downslope >5-10 degrees
6	Shrubland Type C	Upslope/flat
7	Shrubland Type C	Downslope >0-5 degrees
8	Scrub Type D	Upslope/flat
9	Scrub Type D	Downslope >0-5 degrees
10	Grassland Type G	Upslope/flat
11	Grassland Type G	Downslope >0-5 degrees
12	Grassland Type G	Downslope >5-10 degrees

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BPAD Bushfire Planning & Design
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Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Road Layout
- Zone Boundary
- Vegetation/Plot Boundary

Bushfire Hazard Level

- Extreme
- Moderate
- Low

Scale
1:10,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 6: BHL Map (Pre and Post Development)

BAL Assessor	*QA Check*	*Drawn by*
JRB	MKG	GSK
STATUS	*FILE*	*DATE*
FINAL	HD063-007	01/05/2024

4 Identification of Bushfire Hazard Issues

4.1 Bushfire Hazard Level

The identified bushfire risks associated with the subject sites are patches of remnant native vegetation internal to the site and external in the north, east, south and west of the subject site, including north of South Coast Highway, west in paddock areas, south near Cuthbert townsite and west in small rural land holdings. Remnant forest areas presents as predominantly Forest Type A which is defined as an Extreme Bushfire Hazard Level (BHL). Under hot, dry and unstable conditions (Extreme to Catastrophic bushfire weather) the subject site is most at risk from bushfire from these directions.

Internal to the site in the north, east, south and west and external in the north, south and west are large areas of paddock/pasture (Grassland Type G), if left unmanaged this grassland vegetation poses a moderate BHL to the proposed development. To the southeast and northwest of the development site, existing rural residential areas occur (Lowanna Drive and Laithwood Circuit) which is predominately low fuel, presenting a Low BHL. Post development all future lots can be located within a moderate BHL, which is consistent with the acceptable solutions of the WAPC guidelines.

The predominant internal vegetation is Grassland Type G, which can easily be modified and maintained in a low threat state, as per Appendix C: Schedule 1 WAPC Asset Protection Zone (APZ) standards to apply to ensure BAL-29 or lower can be achieved for all future lots. The establishment of future APZ's on individual lots will be established at the subdivision stage. If the rezoning plan and subsequent subdivision application are approved, ongoing management of vegetation compliance will be regulated via the BMP for the site and the prevailing CoA Fire Management Notice. A detailed BAL contour plan will be prepared at future Western Australian Planning Commission (WAPC) subdivision stage/s.

Given the moderate to extreme bushfire risk associated with the site, it is recommended that planting guides are given to new lot owners indicating more flammable/less flammable plant species. This can assist in the land owner's decision making in the establishment and development of their lot. The predominant onsite vegetation modification will consist of the management of grasses in paddock areas and the ongoing management of new planted vegetation in the rural/rural residential lots, which can increase the bushfire risk of the area if left unmanaged.

4.2 Climate

The closest Bureau of Meteorology (BoM) site is Albany (009500). Albany's long-term mean annual rainfall is approximately 925.2 mm though there can be considerable variation in the total rainfall from year to year. Approximately 75 per cent of the annual rainfall occurs between May and October. Although cold fronts are responsible for much of the recorded rainfall total, a moist onshore flow can occur in any season and bring showers or drizzle along the south coast. Albany records rainfall on average 103.5 (≥1mm) rain days annually (BoM, 2022). July is the wettest month (long term average of 142.8mm). The driest month is February with a long-term average of 22.6 mm.

The average maximum temperatures peak in January and February, with monthly means of 22.8°C and 22.9°C (respectively) although temperatures above 35°C sometimes occur when hot, dry northerly winds arrive from the interior of WA. Overnight minimums also peak in January and February at a mild 15.6°C, on average. Winter daily maximum temperatures average approximately 15.8°C (July), while the average minimum is approximately 8.2°C to 8.5°C in July and August (respectively).

The dominant wind direction in summer is from the east and afternoon sea breezes occur from the south west/south east. During winter, southwest winds prevail and northwest storm events occur (BoM, 2022). Although fronts and depressions may bring strong to gale force winds, winter winds are more variable and generally lighter than those of summer. Please refer to Figures 7 to 10.

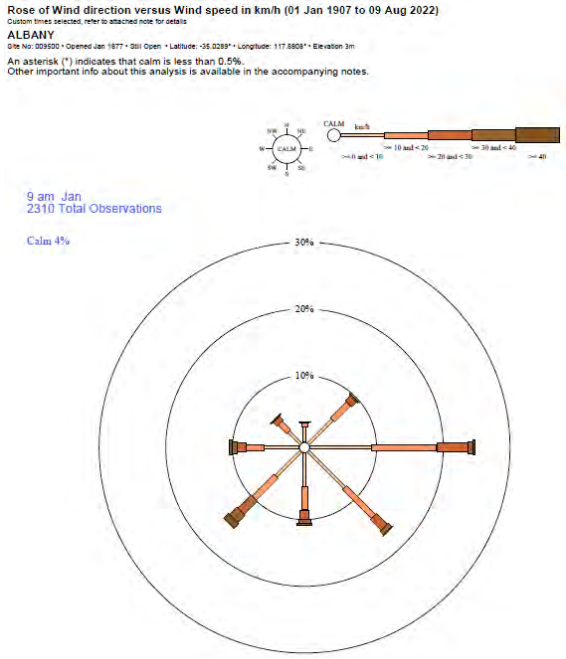


Figure 7: Albany Summer (Jan) 9am wind rose. (BOM, 2022)

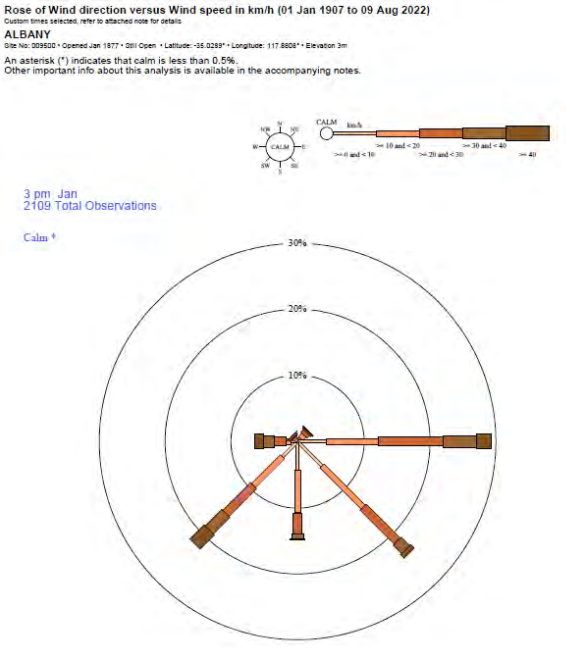


Figure 8: Albany Summer (Jan) 3pm wind rose. (BOM, 2022)

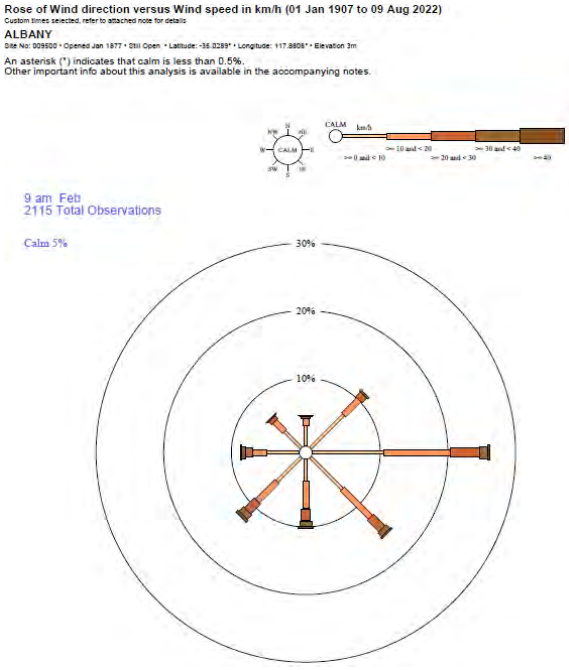


Figure 9: Albany Summer (Feb) 9am wind rose. (BoM, 2022)

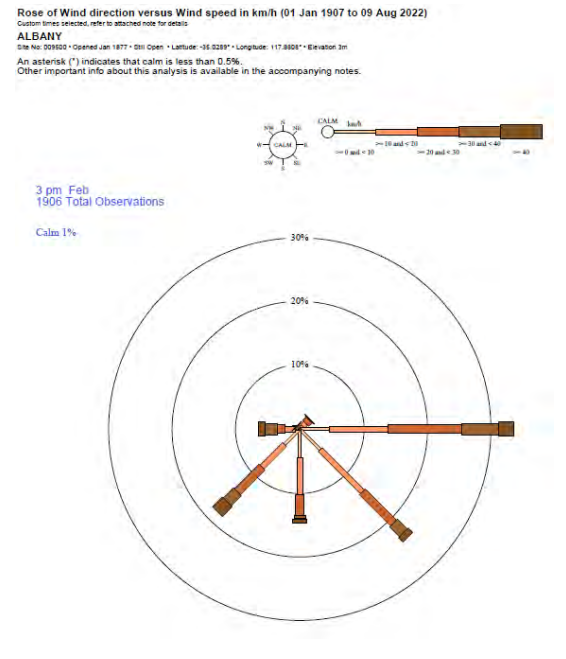


Figure 10: Albany Summer (Feb) 3pm wind rose. (BoM, 2022)

December, January, and February all have the lowest mean 3pm relative humidity recordings on average of 67. Highest curing rates for grasses for the south coast region are on average during January and February (driest periods and lowest relative humidity). Grassland curing refers to the dying or senescence of plant material caused by seasonal weather patterns, species specific phenological cycles and plant succession. Curing has a significant impact on fire behaviour in grasslands, particularly the probability of ignition and the subsequent rate of spread (CRC, 2010). The degree (as a percent) of grassland curing and moisture content are inputs into fire rate of spread models and grassland fire danger ratings.

Fire weather along the south coast region is characterised by mid-level disturbances across the southwest of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or northwest wind directions. This is characteristic of "Extreme" Fire Weather conditions to the area with hot dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to bushfires under these conditions. Following the unstable conditions, westerly and south westerly fronts across the south coast can bring strong onshore winds.

Prevalent winds which most bushfire events occur in the region are from the northwest, west and northeast direction. Conditions tend to be dry with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong easterly and south-westerly winds exist at the subject site during dry summer periods as shown from Albany wind roses in Figure 7-10. The risk of fire from the east onto the subject site (prevalent wind direction) is limited with the lower risk of the Albany urban areas from this direction, also see Section 4.3 Broader Landscape Risk.

4.3 Broader Landscape Risk

Analysis of the broader landscape indicates the subject site is in a predominantly cleared agricultural landscape, the 5km and 10km Bushfire awareness mapping (see Figure 11 over the page) indicates that the bushfire risks on a landscape scale would be from the northwest and west, and south with lesser risks to the east due to the urban areas of Albany. Forest Type A would increase the scale and intensity of bushfire, with Grassland Type G creating fast moving intense fires in the landscape. The coastal areas to the south (along the Southern Ocean) present large areas of coastal health landforms with is dominated by Scrub Type D and Shrubland Type C, these types of fires are also very fast moving in the landscape and have high intensities.

Analysis of the landscape risks outlines the vegetation to the southwest, west and northwest which correspondingly has the highest risk of fire run into the subject site. Forest Type A is classified as Extreme BHL and present extreme risks to the subject site. Modified agricultural landscapes dominated by Grassland Type G exist to the north, northeast, south and east pose a moderate risk of fire run into the subject site.

Generally, rural residential land uses present a moderate bushfire risk when first developed especially when located in previous agricultural areas (grassland dominates which is a Moderate BHL). Over time as properties are developed and planted for amenity, the lot plantings can often increase the bushfire risk. Examples of older subdivisions near recent fire events in 2022 (Denmark and Bridgetown fire events) indicates and underpins the importance of the application of the Section 33 Fire Notices to ensure APZ's are established and maintained around dwellings. The APZ around assets (water tanks) and dwellings is paramount to the ongoing bushfire protection for rural residential areas. It is recommended that planting guides are given to new lot owners indicating more flammable/less flammable planting can assist in the land owner's decision making of the establishment and development of their lot.

Perimeter firebreaks also assist in managing grassland fires, the CoA Fire Management Notice (FMN) outlines the requirement of perimeter firebreaks to 3m required in rural residential and rural lots. Perimeter fire breaks are an important aspect of fire mitigation in these grassland landscapes and is integral to the ongoing fire management for the area post development.

As previously stated, (Section 2 of this report) there is no native vegetation modification proposed at this stage of development. The predominant vegetation modification is the management of grasses in paddock areas and the ongoing management of new planted vegetation which can increase the bushfire risk of the area. It is strongly recommended a planting guide accompanies the BAL contour plan to prospective owners during sales and due diligence stages. Consideration of notification through the scheme amendment/rezoning for the development of the planting guide is recommended. Grasses in rural residential land use areas should be maintained at <100mm at all times. Grazing is recommended to occur on the larger lots to control grasses and bushfire risks. Where grazing cannot be achieved, slashing is recommended on a monthly basis during the fire control period (as established by the CoA Fire Management Notice, December to April inclusive) to control grassland fire risk.

The safer location in the event of bushfire is an early evacuation to the east to the Albany CBD, this is also in the direction of least landscape bushfire risk to the subject site.

Figure 11: 5km and 10km Bushfire awareness mapping

4.4 Access

Currently the subject site is accessed from three public roads being South Coast Highway and Phillliskirk Road to the north and Lowanna Drive to the southeast, providing multiple access routes. Internal to the site, the plan is to construct a series of new public roads and EAW's linking the site to the north and south and providing safe access and egress in two different directions, to two alternative destinations. An EAW of approximately 350m links the development in the south to Old Elleker Road and Lower Denmark Road. Two more EAW's will link the proposed internal access from the northeast to the southwest. The public designated road of Lowanna Drive also links to the greater road network to the east of the subject site to South Coast Highway/Lower Denmark Road. While Phillliskirk Road links to the greater road network to the north of the subject site to South Coast Highway. Both South Coast Highway and Lower Denmark Road are major arterial Main Roads WA managed transport networks which connect to the Albany CBD. New internal linking public roads will establish access to the existing road network and EAW's will link through from the two access roads in the northeast to the access road in the southwest and another EAW will connect the south access road with Old Elleker Road, to greatly improve the access for the area, providing future and existing residents with two-way access while also improving firefighting capabilities. Refer to Figure 12: Access mapping.

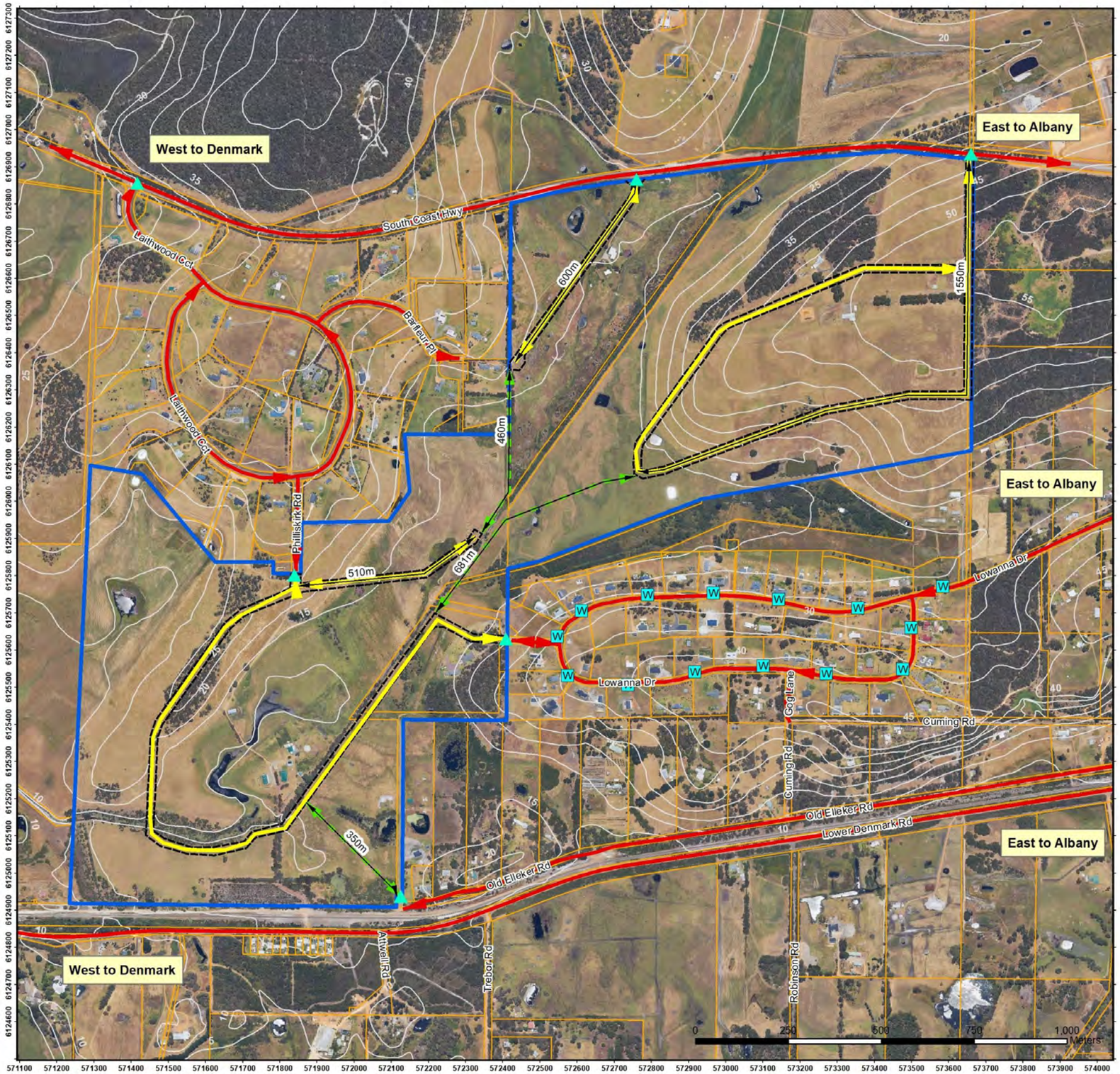
Although two access points onto South Coast Highway is not the most desired outcome for this proposal it presents the safest way to evacuate the site quickly and efficiently from a northwest, west and southwest fire run. The EAW link south to Old Elleker Road allows for an alternative option south if required. The bushfire risk is greater on a north, west and north-westerly bushfire run where the more extreme landscape occurs. Evacuation to the north and east to Albany CBD is recommended away from the bushfire risks.

A cul-de-sac is proposed on Lot 124 (600m) and another on Lot 9001 (510m). An EAW is to link the two cul-de-sacs from Lot 124 (eastern side of Five Mile Creek) to Lot 9001 (measuring 460m). A one loop road is proposed on Lot 125 (Approx. 1550m one way), another EAW is proposed from Lot 125 to lot 9001 (measuring 681m). The third EAW links the southern portion of the proposed new public road to the Old Elleker Road and Lower Denmark Road (measuring 350m). It is noted that the cul-de-sac roads and loop road exceeds the minimum length established by the guidelines (200m). This is due to the environmental constraints in the low-lying areas along Five Mile Creek which cannot be avoided for the larger lots to have access. Additionally, the adjacent rail corridor to the south, the existing road layout surrounding the site and a limited ability to provide additional access points onto South Coast Highway restrict alternative road layouts.

The rezoning plan provides for increased access to existing cul-de-sac roads in the locality vastly increasing access in an emergency and as far as possible, meets compliance with the guidelines by having access in two different directions to two separate destinations. The existing public road network is constructed to the required standards and all new access routes will meet the technical requirements established by the guidelines. All new driveways will be constructed to the minimum technical requirements established by the guidelines and will be actioned in subsequent planning stages (DA and building approval). All EAW's are to have a minimum of 6m wide horizontal trafficable surface, 4.5m wide vertical clearances and easement in gross. All technical standards for access are to be as per the minimum requirements of the guidelines (refer to Figure 13) and with approval from the City of Albany and subdivision stages. The cul-de-sac turnaround area is to be to the technical standards for the cul-de-sac bulb as shown in Figure 14.

4.5 Water Supply

A reticulated water supply is currently not available to the site. The nearest Water Corporation WA (WCWA) standard hydrant is located adjacent to the east along Lowanna Drive. Reticulated water will not be supplied to the development area. Numerous opportunities for strategic water exist within the development. A suitable strategic water source will be designated in consultation with the City of Albany during the subsequent stages of planning. All future landowners will be required to implement a standalone firefighting supply (minimum of 10,000L) for the purposes of firefighting water supply. Also refer to additional information in Section 5.2.4 of this report.



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BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- 5m Contours
- Road Layout
- Existing Access Routes
- Proposed Access Route
- Proposed EAW (Easement in Gross)
- Distance
- Access Points
- Water Point

Scale
1:10,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Cuthbert WA 6330

Figure 12: Access Map

BAL Assessor	*QA Check*	*Drawn by*
JRB	**MKG**	**GSK**
STATUS	*FILE*	*DATE*
FINAL	**HD063-007**	**01/05/2024**

5 Assessment against the Bushfire Protection Criteria

5.1 Compliance Table

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021) outlines bushfire protection criteria which subdivision and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4; WAPC, 2021) are performance-based criteria utilised to assess bushfire risk management measures, outlining four elements, being:

- Element 1: Location;
- Element 2: Siting and Design of Development;
- Element 3: Vehicle Access; and
- Element 4: Water.

The subject site has been assessed and are required to meet the "Acceptable Solutions" of each element of the bushfire mitigation measures (WAPC, 2021). The proposal has been assessed against all elements of the bushfire protection criteria and found to be compliant, refer to Table 5.

Table 5: Bushfire protection criteria applicable to the subject site

Element	Acceptable Solution	Applicable or not Yes/No	Proposal meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	Compliant As per SPP.3.7 and the Guidelines for Planning in Bushfire Prone Areas, the rezoning area and subsequent subdivision development will not be subject to a higher BHL than moderate. All new residential buildings can be located within a "Moderate" BHL area. A BAL contour map will be completed at the subdivision stage, the large rural residential lots and the moderate BHL prevailing over most of the application area should allow for BAL-29 or less to be achieved. Appropriate setbacks from all areas of vegetation will ensure BAL-29 can be achieved for all lots. For required setbacks from classified vegetation, refer to Table 4: Separation Distances to achieve BAL-29 from each Vegetation Plot (BAL-29 APZ). Proposal meets Acceptable Solution A1.1.
Element 2 – Siting and Design	A2.1 Asset Protection Zone (APZ)	Yes	Compliant The majority of the site is subject to a moderate BHL, see Figure 6: BHL Map (Pre and Post Development). The future rural development will allow for BAL-29 APZ's to be implemented on all lots. There are small patches and thin strips of remnant forest vegetation within the development area. Appropriate setbacks from all areas of vegetation will ensure BAL-29 can be achieved for all lots. For required setbacks from classified vegetation, refer to Table 4: Separation Distances to achieve BAL-29 from each Vegetation Plot (BAL-29 APZ). In the future, all APZ's will be maintained to the required standards set out in the guidelines, see Appendix C: Schedule - 1 WAPC Asset Protection Zone (APZ) standards. If the subsequent subdivision is staged, the developer is to maintain the balance of land in ownership in accordance with the CoA Fire Management Notice and the WAPC APZ standards. Any landscaping, replanting for buffers, screening or enhancement of the site is to conform to WAPC APZ requirements and should be reviewed by the bushfire practitioner prior to approval from the Local Government to meet low fuel requirements or to ensure it does not increase the bushfire threat. Proposal meets Acceptable Solution A2.1.
Element 3 – Vehicular Access	A3.1 Public Roads	Yes	Compliant The existing and proposed public roads are or will be constructed to the minimum technical standards as required by the guidelines, refer to Figure 13: Access Technical Requirements. All public roads are to meet the relevant trafficable (carriageway/pavement) width as defined/established by CoA. Internal roads currently indicate they will have a minimum 15-20m wide road reserve (subject to detailed engineering design). Public road designs are to be approved at subdivision approval stages by the CoA. Proposal meets Acceptable Solution A3.1.

Table 5 cont.

Element	Acceptable Solution	Applicable or Not Yes/No	Proposal meets Acceptable Solution
Element 3 – Vehicular Access cont.	A3.2a Multiple Access Routes	Yes	Compliant Currently the subject site is accessed via three public roads being Lowanna Drive to the southeast, Phillliskirk Road to the north (onto South Coast Highway) and via two new roads from the site onto South Coast Highway. The new access road in Lot 9001 will connect Lowanna Drive with Phillliskirk Road which provides an alternative route for the existing areas. The major arterial roads of South Coast Highway and Lower Denmark Road provide access which connects to the Albany CBD or Denmark town centre. EAW's will connect all proposed new roads which will provide two-way access to the development area north and south connecting both lots 124 and 125 to Lot 9001. One EAW will connect the southern portion of the proposed access in Lot 9001 to the western end to Old Elleker Road and Lower Denmark Road. As sealed public roads and publicly accessible EAW's (easements in gross), they will be available to all residents and the public at all times and under all weather conditions. Refer to Figure 12: Access Map. All surrounding roads are currently loop roads, linking Lowanna Drive and Phillliskirk Road will provide an alternative access option for this site and the surrounding area. The rezoning plan provides for increased access to existing cul-de-sac in the locality vastly increasing access in an emergency. Proposal meets Acceptable Solution A3.2a.
	A3.2b Emergency Access Ways	Yes	One of the EAW's is Non-Compliant Three EAW's are proposed as part of this proposal. Two will link Lot 124 and 125 to Lot 9001, measuring 460m and 681m respectively and one to the south to Old Elleker Road, measuring 350m. Multiple access options were considered however due to the environmental constraints in the low-lying areas along Five Mile Creek which cannot be avoided for the larger lots to have access. Additionally, the adjacent rail corridor to the south, the existing road layout surrounding the site, a limited ability to provide additional access points onto South Coast Highway, the existing lot layout to the west and the South Down Slurry easement to the east, further public road designation could not be achieved. These EAW's will create two-way access for the local area and will meet the technical requirements established by the guidelines, see Figure 13: Access Technical Requirements. Proposal does not meet the Acceptable Solution A3.2b on one EAW.
	A3.3 Through Roads	Yes	Compliant Compliance with this element is reliant on the proposed new access being approved and constructed. A cul-de-sac is proposed on Lot 124 (600m) and another on Lot 9001 (510m). An EAW is to link the two cul-de-sacs from Lot 124 (eastern side of Five Mile Creek) to Lot 9001 (measuring 460m). A one loop road is proposed on Lot 125 (Approx. 1550m one way), another EAW is proposed from Lot 125 to lot 9001 (measuring 681m). The third EAW links the southern portion of the proposed new public road to the Old Elleker Road and Lower Denmark Road (measuring 350m). It is noted that the cul-de-sac roads and loop road exceeds the minimum length established by the guidelines (200m) this is due to the environmental constraints on the low-lying areas along Five Mile Creek, the adjacent rail corridor, and the existing surrounding road layout which cannot be avoided for the larger lots to have access. The cul-de-sacs will have a complaint turn around area and be constructed to the minimum technical requirements established by the guidelines see Figure 13: Access Technical Requirements and Figure 14: Complaint Turn Around Areas. Upon construction proposal can meet the Acceptable Solution A3.3.

Table 5 cont.

Element	Acceptable Solution	Applicable or Not Yes/No	Proposal meets Acceptable Solution
Element 3 – Vehicular Access cont.	A3.4a Perimeter roads	No	The lots are rural residential and rural small holdings, lots ranging from 1ha to 8.50ha, perimeter roads are not required for rural residential zoning or lots in Grassland Type G. Not assessed to A3.4b.
	A3.4b Fire Service Access Route	No	A Fire Service Access Route is not required as the public road networks will be utilised. Where Forest Type A Vegetation occurs on lots access to the lots will be via the public road network and established driveways. Not assessed to A3.4b.
	A3.5 Battle axe access legs	No	Not addressed at this stage of planning, to be actioned in subsequent planning stages. Not assessed to A3.5.
	A3.6 Private driveways	No	Not addressed at this stage of planning, to be actioned in subsequent planning stages (DA and building approval). Not assessed to A3.6.
Element 4 – Water	A4.1 Identification of future water supply	Yes	Compliant in future stages A reticulated water supply is currently not available to the site. The nearest Water Corporation WA (WCWA) standard hydrant is located adjacent to the east along Lowanna Drive. Reticulated water will not be supplied to the subdivision. Numerous opportunities for strategic water exist in the development. A suitable strategic water source will be designated in consultation with the City of Albany during the subsequent stages of planning. All future landowners will be required to implement a standalone firefighting supply (minimum of 10,000L) for the purposes of firefighting water supply. Also refer to additional information in Section 5.2.4 of this report. Proposal meets Acceptable Solution A4.1.
	A4.2 Provision of water for firefighting supply	Yes	Not addressed at this stage of planning, to be actioned in subsequent planning stages. Not assessed to A4.2.

5.2 Other Bushfire Mitigation Measures

Refer to section 5.1 access standards.

New public roads will meet the technical requirements established by the guidelines. The proposed new access will be constructed to the standards stated in the Figure 13 below.

TECHNICAL REQUIREMENTS	1 Public roads	2 Emergency access way[1]	3 Fire service access route[1]	4 Battle-axe and private driveways[2]
Minimum trafficable surface (metres)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (metres)	N/A	6	6	6
Minimum vertical clearance (metres)	4.5			
Minimum weight capacity (tonnes)	15			
Maximum grade unsealed road[3]	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum grade sealed road[3]		1:7 (14.3%)		
Maximum average grade sealed road		1:10 (10%)		
Minimum inner radius of road curves (metres)		8.5		

Notes:

[1] To have crossfalls between 3 and 6%.

[2] Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3] Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle.

Figure 13: Access Technical Requirements

The dimensions for a turn-around area on a no through road are indicated below in the Figure 14 below.

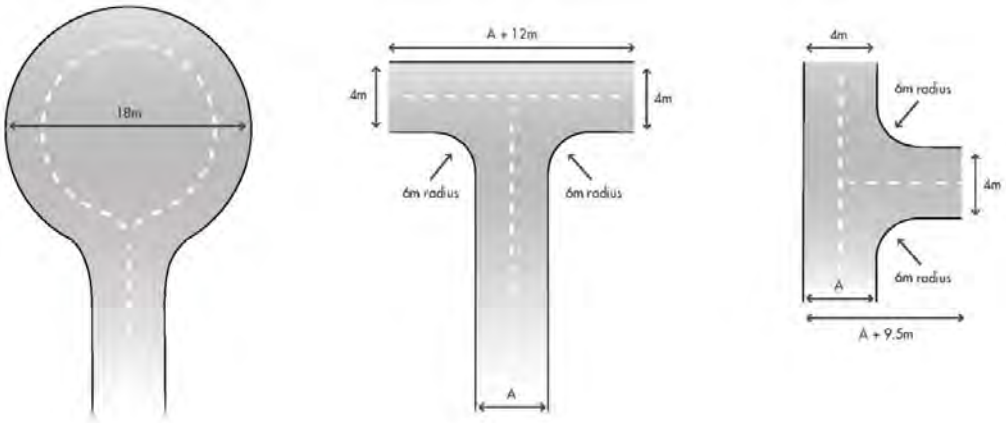

Figure 14: Turn-around Area Technical Requirements

6 Implementation Actions

The responsibilities of the developer(s), landowners and local government are shown in Table 6, 7 and 8.

6.1 Future lot owner's responsibility

It is recommended the future property owners shall be responsible for the following:

Table 6: Implementation actions, future lot owners

Future Lot owner				
No	Implementation Action	Initial	Annual	All times
1	Build to AS3959-2018 as it applies to their property and provide a certified BAL to their proposed building at building approval stages.	✓		
2	Establish/maintain APZ's and low fuel areas to the standard and extent stated in this BMP and/or their allocated certified BAL, see Schedule 1 Standards for APZ's.	✓		✓
3	Maintain individual lots fire breaks and bushfire fuel load in accordance with this BMP and the current CoA Fire Management Notice.		✓	
4	A driveway cross over to be designated/ installed for access into the lots to the minimum technical standards as required by current and endorsed WAPC guidelines. To be demonstrated to CoA at planning approval/building approval stages.	✓		✓
5	Ensure a minimum 10,000 litre standalone water tank is installed for strategic firefighting purposes. To be demonstrated to CoA at planning approval/building approval stages.	✓		

6.2 Developer's responsibility

It is recommended the developer be responsible for the following:

Table 7: Implementation actions, current land owner/developer

Developer		
No	Implementation Action	Entity Responsible
1	Planning approval may be conditioned with the requirement to make appropriate notifications (on the certificates of title and the deposited plan), of the existence of this Bushfire Management Plan and that the land is within a designated bushfire prone area. A Notification, pursuant to Section 165 of the Planning and Development Act 2005 may be required to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factors. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows: 'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan. Additional planning and building requirements apply to development on this land'.	Developer
2	Ensure a BMP/BAL contour plan is prepared to support the WAPC subdivision application at the subdivision stage. Individual BMPs over the rezoning plans may be developed in subsequent planning stages and if the lots are subdivided at differing times.	Developer
3	Continue to manage lots in ownership as per the current CoA Fire Management Notice and the requirements within this BMP until lots are sold and titles relinquished.	Landowner
4	Ensure in the future that prospective buyers are aware of the BAL Contour Plan and the applicable BAL to their property through provision of BAL Contour Plan. Update the BAL contour plan and provide certification of BAL Contour prior to lodgement of titles (post construction).	Developer
5	Ensure lots are compliant with the relevant local government's annual firebreak notice issued under s33 of the Bushfires Act 1954.	Developer
6	Ensure public roads are constructed to the required standards, all public roads approved by the City of Albany at subdivision approval stages.	Developer and civil engineer
7	Ensure the Emergency Access Way is ceded as an easement in favour and constructed to the standards stated in Figure 13: Access Technical Requirements.	Developer and civil engineer
8	The cul-de-sacs will have a complaint turn around area and be constructed to the minimum technical requirements established by the guidelines see Figure 13: Access Technical Requirements and Figure 14: Complaint Turn Around Areas. The vehicular access standards should be documented in civil engineering drawings for construction and implemented at subdivision construction stages. To be approved by the CoA.	Developer and civil engineer
9	Ensure strategic water is designated through the subsequent stages in consultation with the City of Albany. Implementation of strategic water supply will be at the cost of the developer and implemented prior to subdivision clearance/issue of titles.	Developer and civil engineer
10	A localised planting guide accompanies the BAL contour plan to prospective owners during sales and due diligence stages.	N/A recommended not mandatory

6.3 Local Government Responsibility

It is recommended the local government be responsible for the following:

Table 8: Implementation actions, City of Albany

CoA		
No	Implementation Action	Stage of Approval
1	Request for the update of the BAL contour plan and certification of BAL Contour prior to clearance of titles (post construction).	WAPC Subdivision Stage
2	Request BAL certification at Building Approval stages on any proposed habitable buildings. Buildings to be located in BAL-29, BAL-19 and BAL-12.5 zones. Increased construction standards to BAL and AS3959-2018 applies to buildings located in the WA bushfire Prone Area Mapping (OBRM, 2021).	Development and Building Approval
3	Ensure vehicle access standards are achieved as per Figure 13 and 14.	WAPC Subdivision Stage
4	Ensure a minimum 10,000 litre standalone water tank is installed for strategic firefighting purposes on each lot. To be demonstrated to CoA at planning approval/building approval stages.	Development Approval
5	Ensure all buildings and their respective driveways conform at DA stages to the current and endorsed WAPC guidelines technical standards which apply to driveway construction.	Development Approval
6	Monitor landowner compliance with the Bushfire Management Plan and the annual CoA Fire Management Notice.	Ongoing
7	Ensure that if the Emergency Access Way is gated, that it always remains unlocked.	Ongoing
8	If agreed to by CoA, ensure strategic water is suppled in accordance with the WAPC guidelines and available to emergency services. Maintenance of the strategic water supply will be the responsibility of the CoA.	Subsequent planning stages

7 Disclaimer

The recommendations and measures contained in this assessment report are based on the information available at the time of writing following the instructions of the regulatory authorities and following the requirements of the Australian Standards 3959-2018 – Building in Bushfire Prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas version 1.4 (WAPC, 2021), and applying best practise as described by Fire Protection Association Australia. These are considered the minimum standards required to balance the protection of the dwellings and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire, people injured, or fatalities occur either at the site or while evacuating. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed development are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the bushfire consultant has no control. Notwithstanding anything contained within, the consultant/s will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the bushfire consultant) arising out of the services rendered by the consultant.

AS3959-2018 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2018) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.

Building to AS3959-2018 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself (AS3959, 2018).

8 Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level (s) stated in this document have been prepared in accordance with the requirements of AS3959-2018 and the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021).

SIGNED, ASSESSOR: ..... DATE: 1/05/2024

Jason Benson, Bio Diverse Solutions

Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD-37893)

9 Revision Record

Revision	Prepared By	Summary	Reviewed By	Date
Draft Id	Jason Benson	Internal QA Review	Michelle Gray	29/04/2024
Draft Id	Jason Benson	Internal Technical Review	Kathryn Kinnear	29/04/2024
Final Id	Jason Benson	Issued to Client		1/05/2024

10 References

AS3959-2018 Australian Standard, *Construction of buildings in bushfire-prone areas*, Building Code of Australia, Primary Referenced Standard, Australian Building Codes Board and Standards Australia.

Bureau of Meteorology (2022) Climate data online, data retrieved from: http://www.bom.gov.au/climate/data/?ref=ftr

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Government of Western Australia (GoWA) (2021). *Emergency WA Warnings and Incidents.* Accessed at: https://www.emergency.wa.gov.au/

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Government of Western Australia (GoWA) (1954). *Bushfire Act 1954.*

Office of Bushfire Risk management (OBRM) (2021). Map of Bushfire Prone Areas. Data retrieved from State Land Information Portal (SLIP) https://maps.slip.wa.gov.au/landgate/bushfireprone/

Water Corporation (WC, 2016). *Design standards DS63-01, Water Reticulation Standard – Supplement – Dual Water Supply Systems.*

Western Australian Planning Commission (WAPC) (2015). *State Planning Policy 3.7 Planning in Bushfire Prone.*

Western Australian Planning Commission (WAPC) (2021). *Guidelines for Planning in Bushfire Prone Areas Version 1.4.* Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

11 Appendices

Appendix A: Original Vegetation Classifications to AS3959 (North)

Appendix B: Original Vegetation Classifications to AS3959 (South)

Appendix C: Schedule 1 - WAPC Asset Protection Zone (APZ) standards to apply

Appendix A
Original Vegetation Classifications to AS3959 (North)

Vegetation classification to AS3959-2018

Site Details			
Address:	Lot 124 (No. 47951) & Lot 125 (No. 47917) South Coast Highway		
Suburb:	Marbelup	**State:**	W.A.
Local Government Area:	City of Albany		
Stage of WAPC Planning	Rezoning		

BMP Plan Details			
Report / Job Number:	HD063-003	**Report Version:**	Final
Assessment Date:	19 October 2021	**Report Date:**	7 December 2022
BPAD Practitioner	Jason Benson	**Accreditation No.**	BPAD 37893

Vegetation Classification

Site assessment occurred on the 19th October 2021 by Jason Benson (BPAD 37893) site conditions were verified by Kathryn Kinnear in 2022. All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS3959-2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown Table 1 and on the Vegetation, Classes Maps Page 2 and 3.

Table 1: Vegetation Classification Table (in accordance with AS 3959-2018) of the subject site

Plot number	Vegetation Type (Table 2.3)	Slope (Table 2.4.3)
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Grassland Type G	Upslope/flat
4	Grassland Type G	Downslope >0-5 degrees
5	Grassland Type G	Downslope >5-10 degrees
6	Forest Type A	Upslope/flat
7	Forest Type A	Downslope >0-5 degrees
8	Forest Type A	Downslope >5-10 degrees
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Forest Type A	Upslope/flat
12	Forest Type A	Upslope/flat
13	Shrubland Type C	Downslope >0-5 degrees

Plot Number	Vegetation Type	Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Grassland Type G	Upslope/flat
4	Grassland Type G	Downslope >0-5 degrees
5	Grassland Type G	Downslope >5-10 degrees
6	Forest Type A	Upslope/flat
7	Forest Type A	Downslope >0-5 degrees
8	Forest Type A	Downslope >5-10 degrees
9	Scrub Type D	Upslope/flat
10	Scrub Type D	Downslope >0-5 degrees
11	Forest Type A	Upslope/flat
12	Forest Type A	Upslope/flat
13	Shrubland Type C	Downslope >0-5 degrees

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Slopes Degrees
- Photo Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

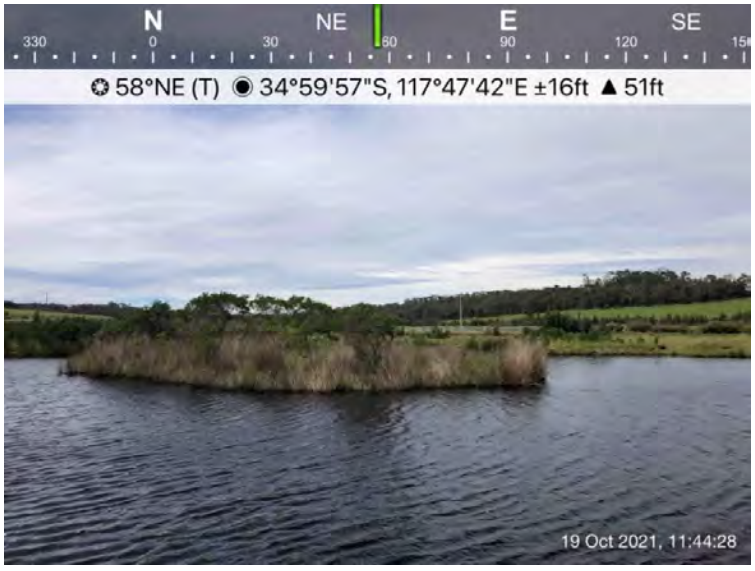
Scale
1:5,500 @ A3
GDA MGA 94 Zone 50

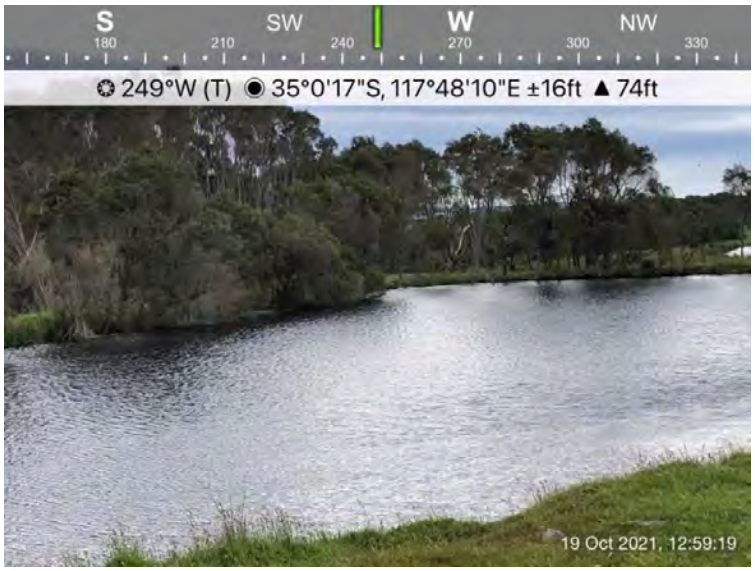
Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Harley Dykstra
Lot 124 (No. 47951) South Coast Highway
Cuthbert, WA 6330

Vegetation Classes - NORTH

BAL Assessor	QA Check	Drawn by
JRB	MLH	GSK
STATUS	**FILE**	**DATE**
FINAL	HD063-003	13/12/2022

Plot	1	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			**Location:** Internal to the subject site in the north and south and external in the north. **Description:** Roads, driveways, buildings, dams and other non-vegetated areas. As per exclusion clause 2.2.3.2 (e) of AS3959-2018.
Photo Id 1: View facing west along South Coast Highway, located to the north of the subject site.			
Plot	**1 cont.**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)**
			**Additional Photo of Plot 1.**
Photo Id 2: View facing northeast towards a dam, located near the northwest corner of the subject site.			

Plot	1 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			**Additional Photo of Plot 1.**
Photo Id 3: View facing west-southwest towards a dam, located near the southern boundary of the subject site.			
Plot	**2**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)**
			**Location:** Central to the subject site surrounding existing house and shed. External in the southeast, south and west. **Description:** Maintained gardens and lawns in Asset Protection Zone (APZ) areas surrounding existing buildings and managed firebreaks. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha.
Photo Id 4: View facing southeast towards low threat area surrounding existing shed, located central east in the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional Photo of Plot 2.**
Photo Id 5: View facing north towards APZ area surrounding existing house, located centrally east within the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional Photo of Plot 2.**
Photo Id 6: View facing southwest towards low threat area, located central east in the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional Photo of Plot 2.**
Photo Id 7: View facing east-northeast towards low threat area, located adjacent to the southeast corner of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)
			**Additional Photo of Plot 2.**
Photo Id 8: View facing east towards low threat area on vacant lots, located adjacent to the southwest corner of the subject site.			

Plot	3	Classification or Exclusion Clause	Grassland Type G
			**Location:** North, south and west of the subject site. **Separation Distance:** 0m. **Description:** Mixed unmanaged grasses, sedges and weeds in paddock area. Some trees present, less than 10% canopy cover noted. **Average vegetation height:** 50-500mm. **Vegetation Coverage:** <10% Trees. **Available fuel loading:** 4.5t/ha. **Effective slope:** Upslope/flat.

Photo Id 9. View facing west towards grassland vegetation, located to the west of the subject site.

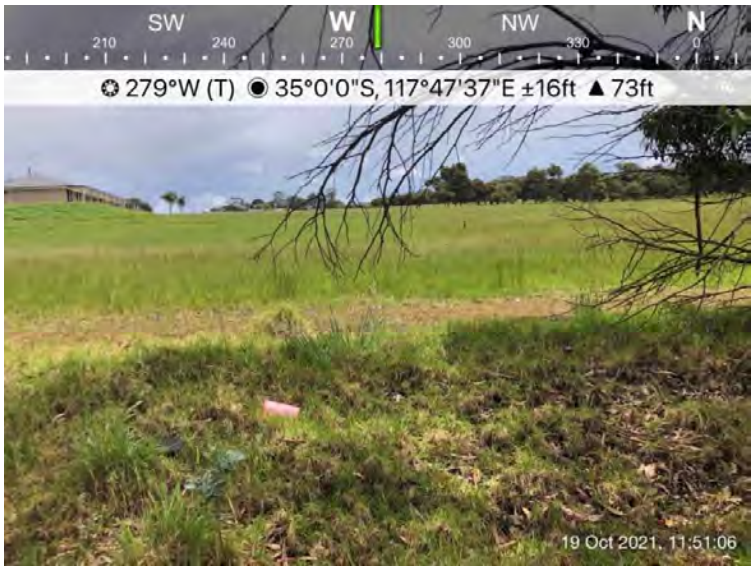
Plot	3 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 3.**

Photo Id 10: View facing west towards grassland vegetation, located to the west of the subject site.

Plot	3 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 3.**
Photo Id 11: View facing north towards grassland vegetation, located to the north of the subject site.			
Plot	**3 cont.**	**Classification or Exclusion Clause**	**Grassland Type G**
			**Additional Photo of Plot 3.**
Photo Id 12: View facing south-southwest towards grassland vegetation, located to the north of the subject site.			

Plot	4	Classification or Exclusion Clause	Grassland Type G
			**Location:** Internal and external to the subject site in the north, south and west of the subject site. **Separation Distance:** 0m. **Description:** Mixed unmanaged grasses, sedges and weeds in paddock area. Some trees present, less than 10% canopy cover noted. **Average vegetation height:** 50-500mm. **Vegetation Coverage:** <10% Trees. **Available fuel loading:** 4.5t/ha. **Effective slope:** Downslope >0-5 degrees.

Photo Id 13: View facing west towards grassland vegetation, located central south in the subject site.

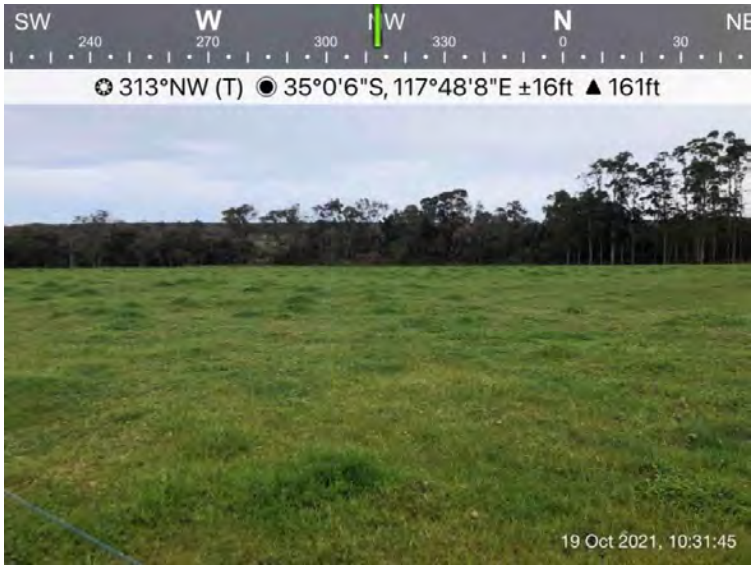
Plot	4 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 4.**

Photo Id 14: View facing northwest towards grassland vegetation, located central to the subject site.

Plot	4 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 4.**

Photo Id 15: View facing north towards grassland vegetation, located central west in the subject site.

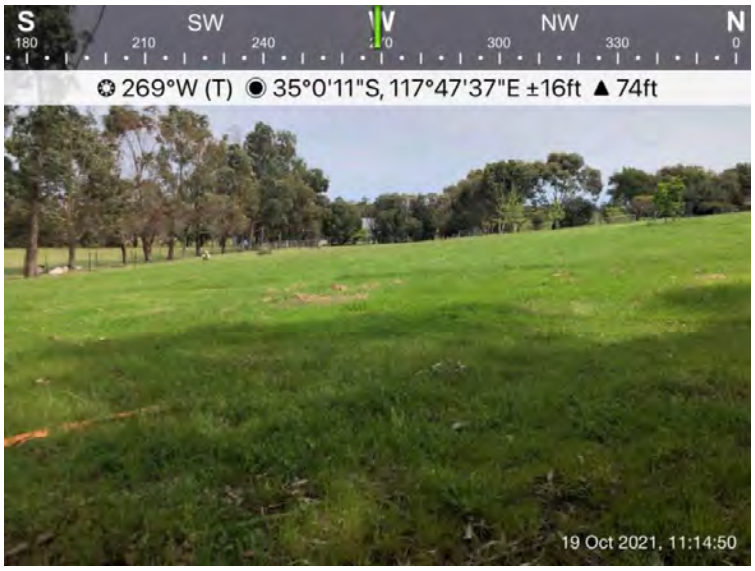
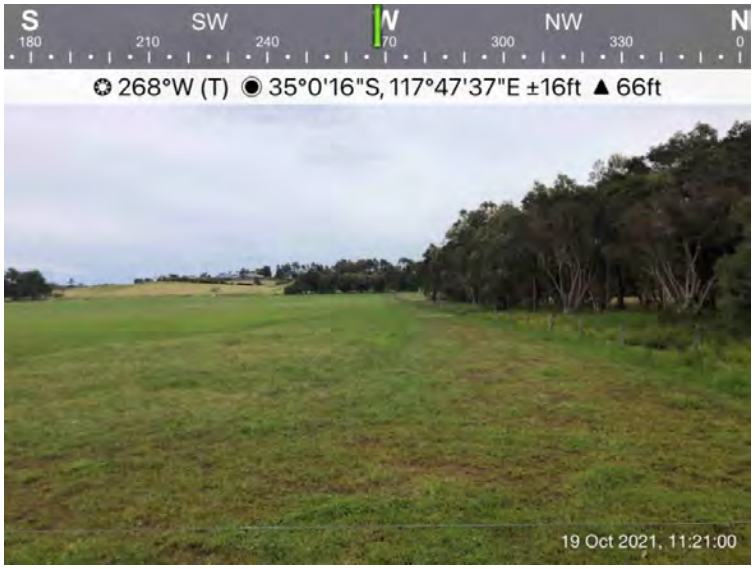
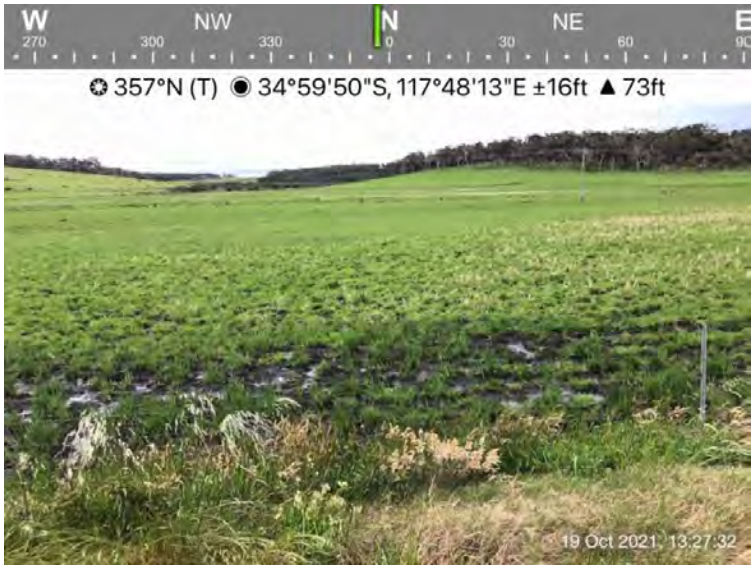
Plot	4 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 4.**

Photo Id 16: View facing west towards grassland vegetation, located to the west of the subject site.

Plot	4 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 4.**
Photo Id 17: View facing west towards grassland vegetation, located to the west of the subject site.			

Plot	4 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 4.**
Photo Id 18: View facing west towards grassland vegetation, located to the near the eastern boundary of the subject site.			

Plot	4 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 4.**
Photo Id 19: View facing north towards grassland vegetation, located to the north of the subject site.			

Plot	5	Classification or Exclusion Clause	Grassland Type G
			**Location:** Internal to the subject site in the northeast, central and southeast and external to the northeast. **Separation Distance:** 0m. **Description:** Mixed unmanaged grasses, sedges and weeds in paddock area. Some trees present, less than 10% canopy cover noted. **Average vegetation height:** 50-500mm. **Vegetation Coverage:** <10% Trees. **Available fuel loading:** 4.5t/ha. **Effective slope:** Downslope >5-10 degrees.
Photo Id 20: View facing north-northeast towards grassland vegetation, located central north in the subject site.			

Plot	5 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 5.**

Photo Id 21: View facing south-southeast towards grassland vegetation, located central northeast in the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Grassland Type G
			**Additional Photo of Plot 5.**

Photo Id 22: View facing east-northeast towards grassland vegetation, located to the northeast of the subject site.

Plot	6	Classification or Exclusion Clause	Forest Type A
			**Location:** Internal to the subject site in the northwest and west. External in the north, east and west. **Separation Distance:** 0m. **Description:** Forest vegetation consisting Warren River Cedar and mixed native and non-native Eucalyptus Trees. Dense canopy cover with multilayered scrub mid/understorey of Acacia, Hibbertia, Taylorina, Banksia, sedges and rushes. **Average vegetation height:** 10-20m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading**: 25-35t/ha. **Effective slope:** Upslope/flat.

Photo Id 23: View facing south towards thin strip of forest vegetation, located on the western boundary of the subject site.

Plot	6 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 6.**

Photo Id 24: View facing northwest towards forest vegetation, located to the north of the subject site.

Plot	6 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 6.**
Photo Id 25: View facing east towards forest vegetation, located to the east of the subject site.			
Plot	**7**	**Classification or Exclusion Clause**	**Forest Type A**
			**Location:** Internal and external to the subject site in the north, east, south and west. **Separation Distance:** 0m. **Description:** Forest vegetation consisting Warren River Cedar and mixed Eucalyptus Trees. Dense canopy cover with multilayered scrub mid/understorey of Acacia, Hibbertia, Taylorina, Banksia, sedges and rushes. Some areas consist of trees that have been removed and have resprouted. Precautionary principle has been applied. **Average vegetation height:** 8-18m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading**: 25-35t/ha. **Effective slope:** Downslope >0-5 degrees.
Photo Id 26: View facing north towards thin strip of forest vegetation, located central within the subject site in creek line.			

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.** *Note: Planted rows of Eucalypt trees, can be modified to a low threat state.*

Photo Id 27: View facing west towards rows of planted Eucalyptus trees adjacent to driveway, located central east in the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.** *Note: Trees in this area have been removed and resprouted, it is expected that at maturity this vegetation will return to Forest Type A. Precautionary principle has been applied.*

Photo Id 28: View facing south towards forest vegetation, located central west in the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.**

Photo Id 29: View facing north towards forest vegetation, located near the western boundary of the subject site.

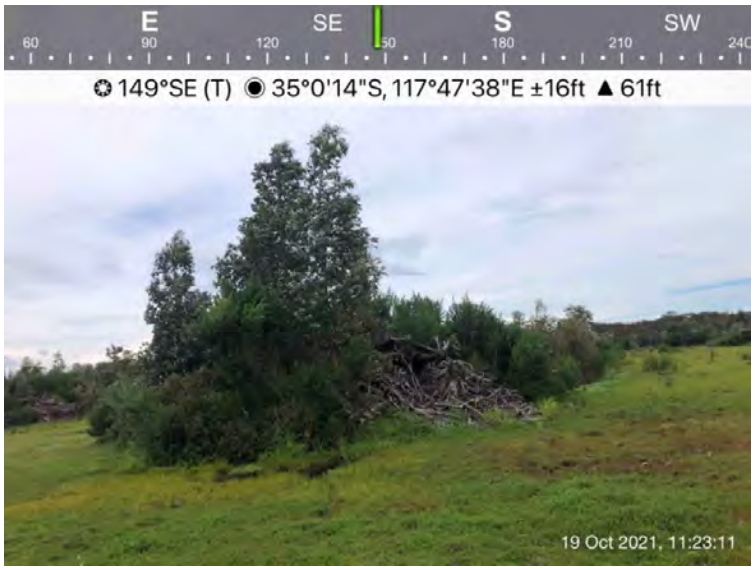
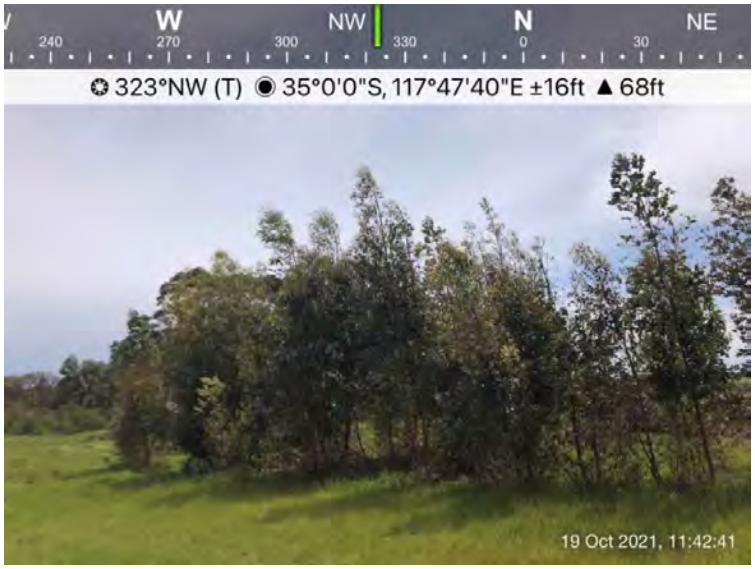
Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.** *Note: Trees in this area have been removed and resprouted, it is expected that at maturity this vegetation will return to Forest Type A. Precautionary principle has been applied.*

Photo Id 30: View facing south-southeast towards forest vegetation, located central west in the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.** *Note: Trees in this area have been removed and resprouted, it is expected that at maturity this vegetation will return to Forest Type A. Precautionary principle has been applied.*
Photo Id 31: View facing northwest towards small patch of forest vegetation, located near the northwest corner in the subject site.			

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.**
Photo Id 32: View facing north-northwest towards thin strip of forest vegetation, located adjacent to south Coast Highway to the north of the subject site.			

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.**

Photo Id 33: View facing west towards small patch of forest vegetation, located near the southern boundary of the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.**

Photo Id 34: View facing east towards forest vegetation, located to the south eastern of the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.** *Note: Photo 35 show native forest vegetation to the left of the photo and rows of planted Eucalyptus trees to the right of the photo.*
Photo Id 35: View facing south towards forest vegetation, located to the northeast corner of the subject site.			

Plot	7 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 7.**
Photo Id 36: View facing west towards thin strip of forest vegetation, located adjacent to south Coast Highway to the north of the subject site.			

Plot	8	Classification or Exclusion Clause	Forest Type A
			**Location:** Internal and external to the subject site in the north and northeast. **Separation Distance:** 0m. **Description:** Forest vegetation consisting Warren River Cedar and mixed native and non-native Eucalyptus Trees. Dense canopy cover with multilayered scrub mid/understorey of Acacia, Hibbertia, Taylorina, Banksia, sedges and rushes. **Average vegetation height:** 8-18m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading**: 25-35t/ha. **Effective slope:** Downslope >5-10 degrees.

Photo Id 37: View facing west-northwest towards forest vegetation, located central northeast in the subject site.

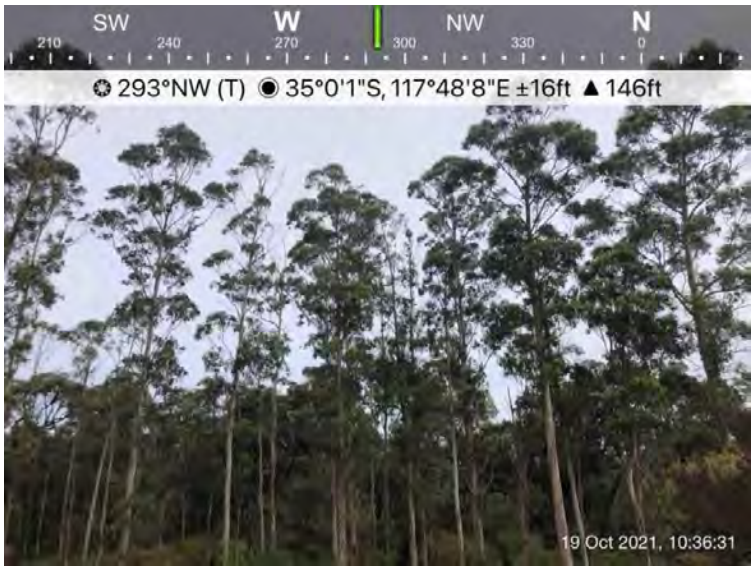
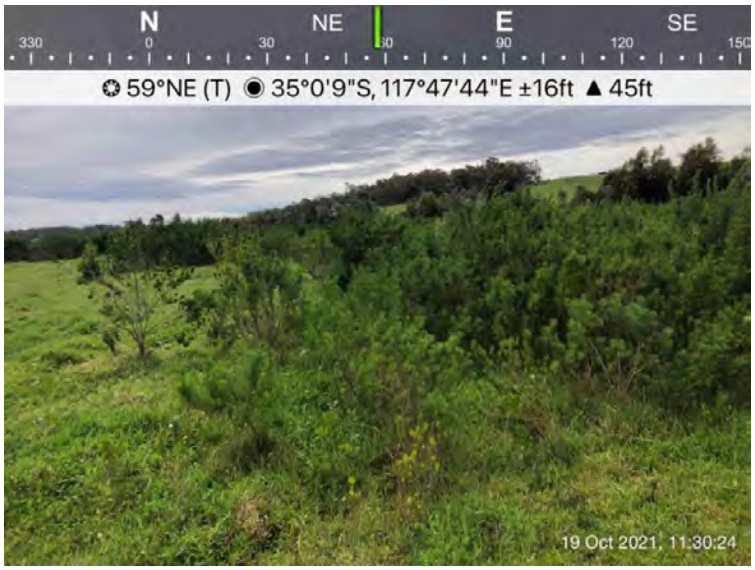
Plot	8 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 8.**

Photo Id 38: View facing west-northwest towards forest vegetation, located central north in the subject site.

Plot	8 cont.	Classification or Exclusion Clause	Forest Type A
			**Additional Photo of Plot 8.**
Photo Id 39: View facing west-southwest towards forest vegetation, located central south in the subject site.			
Plot	**8 cont.**	**Classification or Exclusion Clause**	**Scrub Type D**
			**Additional Photo of Plot 8.**
Photo Id 40: View facing northwest towards forest vegetation, located to the northeast of the subject site.			

Plot	9	Classification or Exclusion Clause	Scrub Type D
			**Location:** Internal and external to the subject site in the north. **Separation Distance:** 0m. **Description:** Scrub vegetation consisting of Taylorina, grasses, sedges and rushes. **Average vegetation height:** 2-4m. **Vegetation Coverage:** >10-30% foliage cover. **Available fuel loading**: 25t/ha. **Effective slope:** Upslope/flat.
Photo Id 41: View facing northeast towards scrub vegetation, located on the northern boundary of the subject site.			
Plot	**10**	**Classification or Exclusion Clause**	**Scrub Type D**
			**Location:** Internal to the subject site in the north and west and external in the north. **Separation Distance:** 0m. **Description:** Scrub vegetation consisting of Taylorina, grasses, sedges and rushes. **Average vegetation height:** 2-4m. **Vegetation Coverage:** >10-30% foliage cover. **Available fuel loading**: 25t/ha. **Effective slope:** Downslope >0-5 degrees.
Photo Id 42: View facing east-northeast towards scrub vegetation, located central west in the subject site.			

Plot	10 cont.	Classification or Exclusion Clause	Scrub Type D
			**Additional Photo of Plot 10.**

Photo Id 43: View facing east-southeast towards scrub vegetation, located central west in the subject site.

Plot	10 cont.	Classification or Exclusion Clause	Scrub Type D
			**Additional Photo of Plot 10.**

Photo Id 44: View facing south-southwest towards scrub vegetation, located to the north of the subject site.

Plot	11	Classification or Exclusion Clause	Forest Type A
			**Location:** central north to the subject site. **Separation Distance:** 0m. **Description:** Forest vegetation consisting Warren River Cedar and mixed native and non-native Eucalyptus Trees. Dense canopy cover with multilayered scrub mid/understorey of Acacia, Hibbertia, Taylorina, Banksia, sedges and rushes. *Note: This vegetation plot is upslope/flat in relation to the existing house central north within Lot 125.* **Average vegetation height:** 8-18m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading**: 25-35t/ha. **Effective slope:** Upslope/flat.

Photo Id 45: View facing north towards forest vegetation, located central north in the subject site.

Plot	12	Classification or Exclusion Clause	Forest Type A
			**Location:** central north to the subject site. **Separation Distance:** 0m. **Description:** Forest vegetation consisting Warren River Cedar and mixed native and non-native Eucalyptus Trees. Dense canopy cover with multilayered scrub mid/understorey of Acacia, Hibbertia, Taylorina, Banksia, sedges and rushes. *Note: This vegetation plot is upslope/flat in relation to the proposed new lots impacted by this vegetation.* **Average vegetation height:** 8-18m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading**: 25-35t/ha. **Effective slope:** Upslope/flat.

Photo Id 46: View facing east towards forest vegetation, located central north in the subject site.

Plot	13	Classification or Exclusion Clause	Shrubland Type C
No photo available			**Location:** Internal in proposed stormwater retention basis. **Separation Distance:** 0m. **Description:** low sedgeds and heath species associated with stormwater retention basins. Refer to the LWMS. **Average vegetation height:** 1-1.5m. **Vegetation Coverage:** >10-30% foliage cover. **Available fuel loading**: 15t/ha. **Effective slope:** Downslope >0-5 degrees. Note these areas are applying the precautionary principle based on the findings in the Local Water Management Strategy (LWMS).
No photo.			

COMMENTS ON VEGETATION CLASSIFCATIONS:

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2018) Simplified procedure was used for vegetation classification Assessment process;
- All vegetation was classified within the subject site and within 150m of the lot boundaries to AS3959 Table 2.3; and
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps.

CERTIFICATION

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2018.

SIGNED, ASSESSOR: ..... DATE: 1/12/2021

Jason Benson, Bio Diverse Solutions
Accredited Level 2 BAL Assessor (Accreditation No: BPAD37893)

REVISION RECORD

Revision	Prepared By	Summary	Reviewed By	Date
Draft Id	Jason Benson	Internal Review	Melanie Haymont	25/10/2021
Final Id	Jason Benson	Final Issued to Client		1/12/2021
Final Id	Kathryn Kinnear	Updated with stormwater retention basis included on vegetation classes mapping		7/12/2022

Appendix B
Original Vegetation Classifications to AS3959 (South)

Vegetation classification to AS3959-2018

Site Details			
Address:	Lot 9001 Lower Denmark Road		
Suburb:	Cuthbert	**State:**	W.A.
Local Government Area:	City of Albany		
Stage of WAPC Planning	Rezoning		

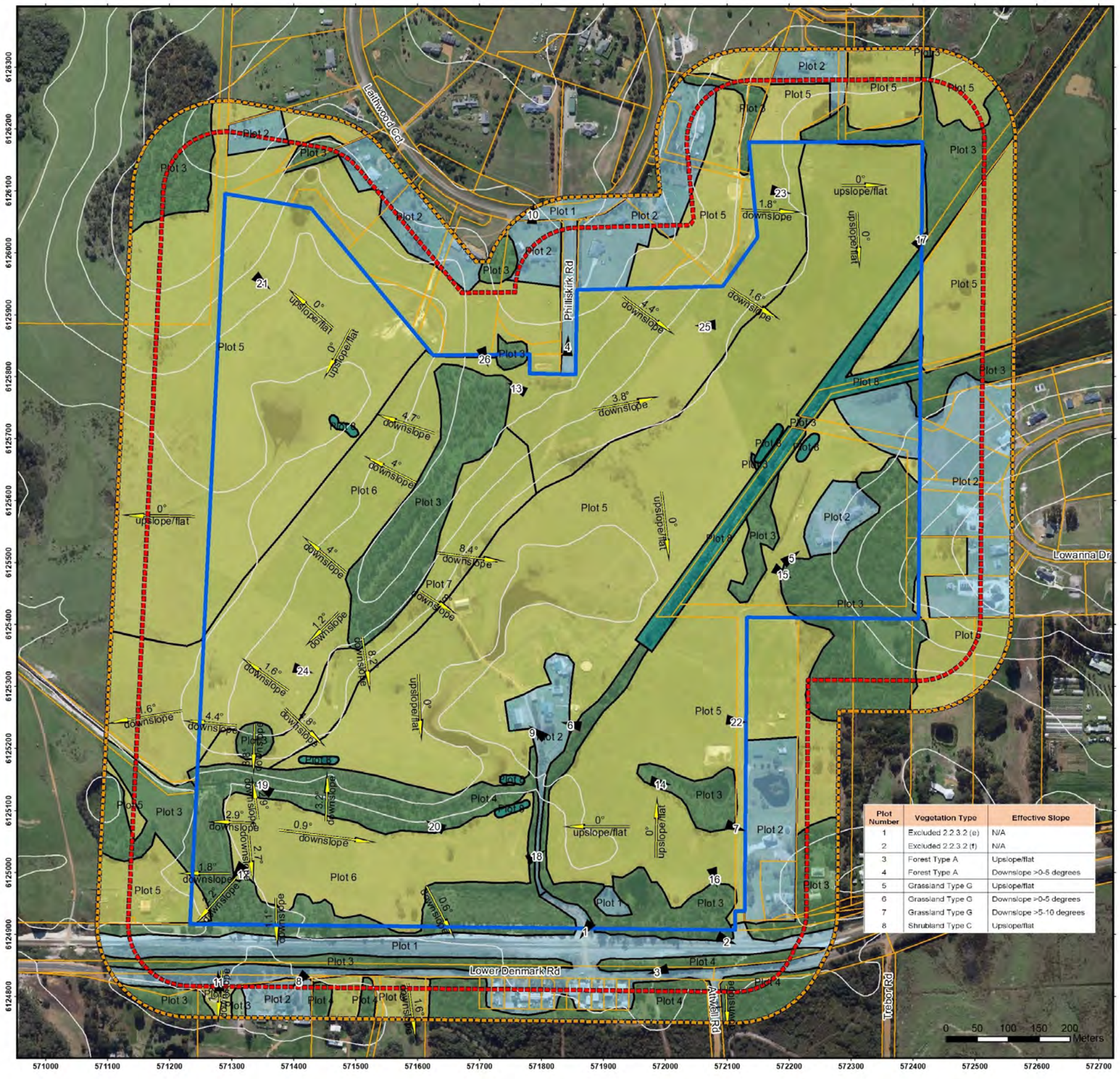
BMP Plan Details			
Report / Job Number:	HD063-004	**Report Version:**	Final
Assessment Date:	11 February 2020	**Report Date:**	19 December 2022
BPAD Practitioner	Kathryn Kinnear	**Accreditation No.**	BPAD 30794

Vegetation Classification

Site assessment occurred on the 12 October 2021 and reviewed in 2022 by Kathryn Kinnear (BPAD 30794). All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown on the Vegetation Classes Map Page 3.

Table 1: Vegetation Classification Table (in accordance with AS 3959-2018) of the subject site

Plot Number	Vegetation Type	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Grassland Type G	Upslope/flat
6	Grassland Type G	Downslope >0-5 degrees
7	Grassland Type G	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat



Plot Number	Vegetation Type	Effective Slope
1	Excluded 2.2.3.2 (e)	N/A
2	Excluded 2.2.3.2 (f)	N/A
3	Forest Type A	Upslope/flat
4	Forest Type A	Downslope >0-5 degrees
5	Grassland Type G	Upslope/flat
6	Grassland Type G	Downslope >0-5 degrees
7	Grassland Type G	Downslope >5-10 degrees
8	Shrubland Type C	Upslope/flat

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 5m Contours
- Slopes Degrees
- Photo Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Shrubland Type C
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:6,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2017
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Barry Panizza
Lot 9001 (No. 688) Lower Denamrk Road
Cuthbert, WA 6330

Vegetation Classes

BAL Assessor	*QA Check*	*Drawn by*
KPK	BMT	GSK
STATUS	*FILE*	*DATE*
FINAL	HD063-005	19/12/2022

Plot	1	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Location:** North and south of the subject site in existing road reserves. **Description:** Roads, driveways, rail corridor and hardstand areas. As per exclusion clause 2.2.3.2 (e) of AS3959-2018.

Photo Id 1: View to the south west of hardstand areas and rail corridor located to the south of the subject site.

Plot	1 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Additional Photo of Plot 1.**

Photo Id 2: View to the east along the rail corridor, located to the south east of the subject site.

Plot	1 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Additional Photo of Plot 1.**
Photo Id 3: View to the west of Lower Denmark Road, located to the south of the subject site.			

Plot	1 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Additional Photo of Plot 1.**
Photo Id 4: View to the north of Phillskirk Road, located to the north of the subject site.			

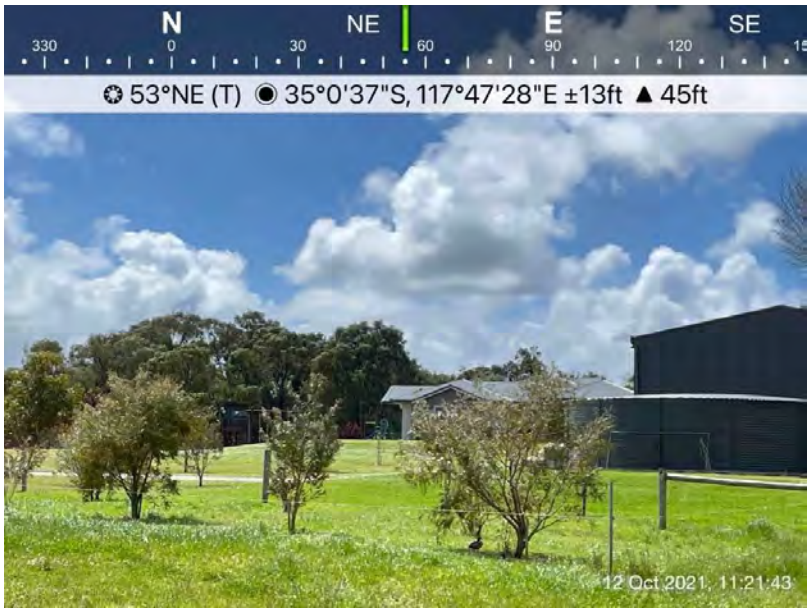
Plot	2	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Location:** Within the subject site, north, east and south in APZ areas around existing dwellings and buildings. **Description:** Maintained gardens and lawns in APZ areas surrounding existing buildings. Excluded as per AS3959 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2 t/ha.

Photo Id 5: View facing north east of low fuel-maintained area, around existing house in the east of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 2.**

Photo Id 6: View to the west of low fuel-maintained areas around existing dwelling, located central south of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 2.**
Photo Id 7: View to the west of low fuel-maintained areas around existing dwelling, located to the south east of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 2.**
Photo Id 8: View to the south west of low fuel maintained areas around existing dwelling, located to the south of the subject site in the village of Cuthbert.			

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 2.**
Photo Id 9: View to the north west of low fuel-maintained areas around lots, located in Albany Green rural residential subdivision to the north of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 2.**
Photo Id 10: View to the north west of low fuel-maintained areas around lots located in Albany Green rural residential subdivision to the north of the subject site.			

Plot	3	Classification or Exclusion Clause	Class A Forest - Low open forest A-04

Location: North, east, southeast and southwest of the subject site.

Separation Distance: 82m to the north, 21m to the east, 74m to the southeast and 74m to the southwest.

Description: Forest vegetation consisting of mixed Jarrah, Marri, (some Blue gums) Warren River Cedar and Callistachys trees. Dense canopy cover with multilayered understorey of Acacia, Tea Tree, sedges and rushes. Sometimes grazed with no midstorey but has canopy connection.

Average vegetation height: 6-10m.

Vegetation Coverage: 30-70% foliage cover.

Available fuel loading: 25-35t/ha.

Effective slope: Upslope/flat.

Photo Id 11: View to the north of Forest Type A, located to the south (external) to the site in rail and road corridors.

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04

Additional Photo of Plot 3.

Photo Id 12: View to the south-west through Forest Type A located internal to the site, located in the south west of the subject site.

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 3.** Note: The central areas of Plot 3 have been heavily grazed and have nil to limited understorey, due to canopy connection Forest Type A has been applied.
Photo Id 13: View to the west through Forest Type A, located internal to the site and located in the north of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 3.** Note: Some areas of Plot 3 have been heavily grazed and have nil to limited understorey, due to canopy connection Forest Type A has been applied.
Photo Id 14: View to the east through Forest Type A, located internal to the site and located in the south east of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 3.**
Photo Id 15: View to the south east through Forest Type A, located internal to the site and located in the east of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 3.**
Photo Id 16: View to the south through Forest Type A, located internal to the site and located in the south east of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 3.** Note: The vegetation along the Five-mile Creek has areas of revegetation which due to the wet nature and low-lying location have been classified as future Forest Type A.

Photo Id 17: View to the south east through Forest Type A, located to the east of the subject site.

Plot	3 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 3.** Note: The vegetation along the driveway in the south has been planted and can be reclassified as low fuel in the future with maintenance and thinning of the planted trees. Utilising the precautionary principle, this been classified as future Forest Type A.

Photo Id 18: View to the north east through Forest Type A, located internal to the site located along the existing driveway.

Plot	4	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Location:** North, east, southeast and southwest of the subject site. **Separation Distance:** 82m to the north, 21m to the east, 74m to the southeast and 74m to the southwest. **Description:** Forest vegetation consisting of mixed Jarrah, Marri, (some Blue gums) Warren River Cedar and Callistachys trees. Dense canopy cover with multilayered understorey of Acacia, Tea Tree, sedges and rushes. Sometimes grazed with no midstorey but has canopy connection. **Average vegetation height:** 6-10m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading**: 25-35t/ha. **Effective slope:** Downslope >0-5 degrees.
Photo Id 19. View to the north west through Forest Type A vegetation, located along Five Mile Creek central south of the subject site.			
Plot	**4 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 4.**
Photo Id 20: View to the west, north west through Forest Type A vegetation located along Five Mile Creek located central south of the subject site.			

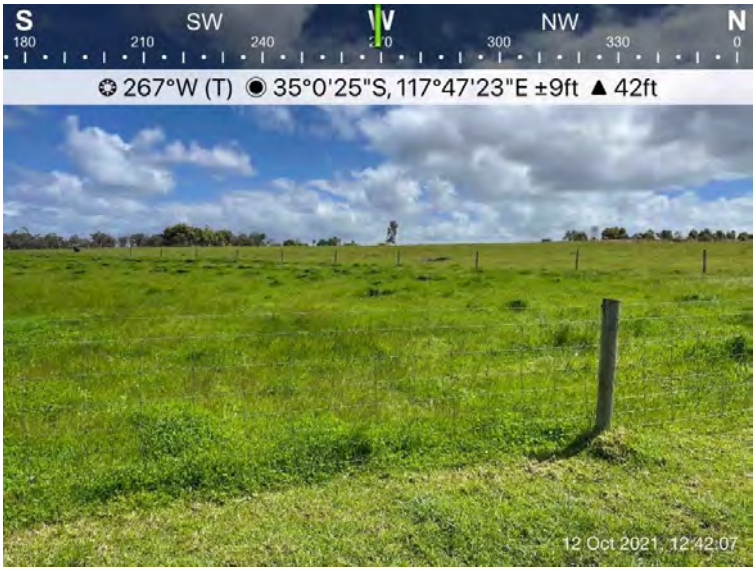
Plot	5	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Location:** North-east, south and south-east of the subject site. **Separation Distance:** 0m. **Description:** Kikuyu, rye grass and mixed clovers, and other grazed mixed grasses and weeds. **Average vegetation height:** 100mm. **Vegetation Coverage:** <10% Trees. **Available fuel loading:** 4.5t/ha. **Effective slope:** Upslope/Flat.

Photo Id 21: View facing south west towards Grassland Type G vegetation, located to the north-west of the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**

Photo Id 22: View facing east towards Grassland Type G vegetation, located to the east of the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**
Photo Id 23: View facing east towards Grassland Type G vegetation, located internal north west of the subject site			
Plot	**6**	**Classification or Exclusion Clause**	**Class G Grassland – Sown pasture G-26**
			**Location:** Central to the subject site in upslopes of the subject site. **Separation Distance:** 0m. **Description:** Kikuyu, rye grass and mixed clovers, and other grazed mixed grasses and weeds. **Average vegetation height:** 100mm. **Vegetation Coverage:** <10% Trees. **Available fuel loading:** 4.5t/ha. **Effective slope:** Downslope >0-5 degrees.
Photo Id 24: View facing south-west towards Grassland Type G vegetation, located to the south-west of the subject site.			

Plot	6 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 6.**
Photo Id 25: View facing-west towards Grassland Type G vegetation located in the north-west of the subject site..			
Plot	**7**	**Classification or Exclusion Clause**	**Class G Grassland – Sown pasture G-26**
			**Location:** Central to the subject site in upslopes of the subject site. **Separation Distance:** 0m. **Description:** Kikuyu, rye grass and mixed clovers, and other grazed mixed grasses and weeds. **Average vegetation height:** 100mm. **Vegetation Coverage:** <10% Trees. **Available fuel loading:** 4.5t/ha. **Effective slope:** Downslope >5-10 degrees.
Photo Id 26: View facing North East towards Grassland Type G vegetation located to in the central areas of the subject site.			

Plot	8	Classification or Exclusion Clause	Shrubland Type C
No photo available			**Location:** Internal in proposed stormwater retention basis. **Separation Distance:** 0m. **Description:** low sedges and heath species associated with stormwater retention basins. Refer to the LWMS. **Average vegetation height:** 1-1.5m. **Vegetation Coverage:** >10-30% foliage cover. **Available fuel loading**: 15t/ha. **Effective slope:** Downslope >0-5 degrees. Note these areas are applying the precautionary principle based on the findings in the Local Water Management Strategy (LWMS).
No photo.			

COMMENTS ON VEGETATION CLASSIFCATIONS:

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2018) Simplified procedure was used for vegetation classification Assessment process;
- All vegetation was classified within the subject site and within 150m of the lot boundaries to AS3959 Table 2.3; and
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps.

CERTIFICATION

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2018.

SIGNED, ASSESSOR: ..... DATE: 19/12/2022

Kathryn Kinnear , Bio Diverse Solutions
Accredited Level 2 BAL Assessor (Accreditation No: BPAD30794)

REVISION RECORD

Revision	Prepared By	Summary	Reviewed By	Date
Draft Id	Kathryn Kinnear	Internal Review	Mary Holt	19/12/2022
Final Id	Kathryn Kinnear	Final Issued to Client	Jason Benson	19/12/2022

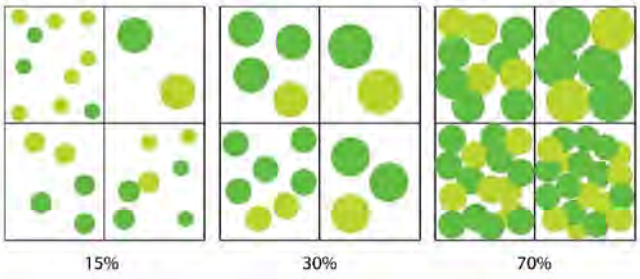
Appendix C
Schedule 1 WAPC Asset Protection Zone (APZ) standards to apply

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.

Figure 19: Tree canopy cover – ranging from 15 to 70 per cent at maturity



ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

Harley Dykstra

APPENDIX F | TRAFFIC STUDIES

Technical Memorandum

Cardno now Stantec

To	BJ Panizza Family Trust	**Project No**	CW1200522/304900887
Project Name	Lot 124, Lot 125 & Lot 9001 South Coast Highway, Marbellup	**Status**	A
Date	05/12/2022	**Discipline**	Traffic & Transport
Author	Lovely Lal		
Reviewer	Desmond Ho	**Office**	Perth

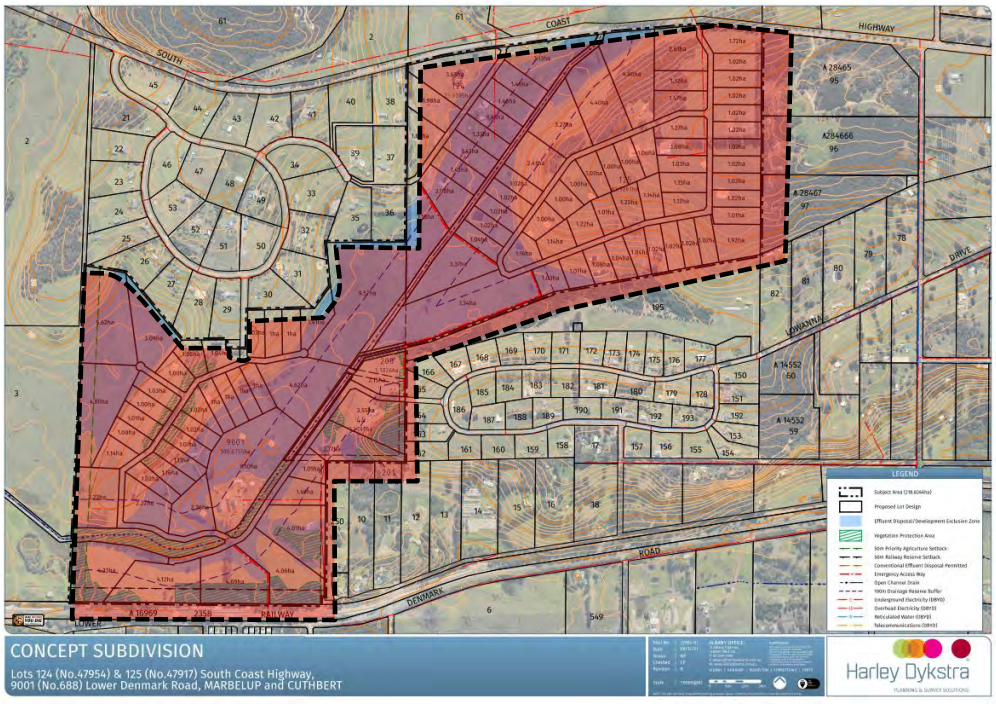
1 Introduction

Cardno now Stantec has been commissioned by BJ Panizza Family Trust to undertake a Turn Warrant Assessment for the proposed new accesses for the rural residential subdivision located on Lots 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road, Marbelup and Cuthbert , within the City of Albany.

2 Site Context

The subject Site is currently vacant spanning 208.5 hectares in extent and is located on Lot 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road, within the City of Albany as shown in **Figure 2-1.**

Figure 2-1 Aerial image of site



Source: Harley Dykstra

Registration Name | Business Registration
Address Line 1
Address Line 2, Suburb
State, Postcode
00 0 0000 0000 | www.cardno.com | www.stantec.com

2.2 Existing Road Network

The layout and classification of the roads under the *Main Roads WA Road Hierarchy* surrounding the Site is summarised in **Table 2-1** and illustrated in **Figure 2-2.**

Table 2-1 Road Network Classification

Street Names	Road Hierarchy		Road Network			
	Road Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Width (m)	Posted Speed (km/h)
South Coast Highway	Primary Distributor	Main Roads	2	0	7.0	110
Lower Denmark Road	Regional Distributor	Local Government	2	0	7.0	90*

**A portion of Lower Denmark Road between Prescottvale Rd &Trebor Rd has a speed limit of 70km/h*

Source: Main Roads Information Mapping Centre

Figure 2-2 Road Network Classification

Source: Road Mapping and Information System

Registration Name | Business Registration
Address Line 1
Address Line 2, Suburb
State, Postcode
00 0 0000 0000 | www.cardno.com | www.stantec.com

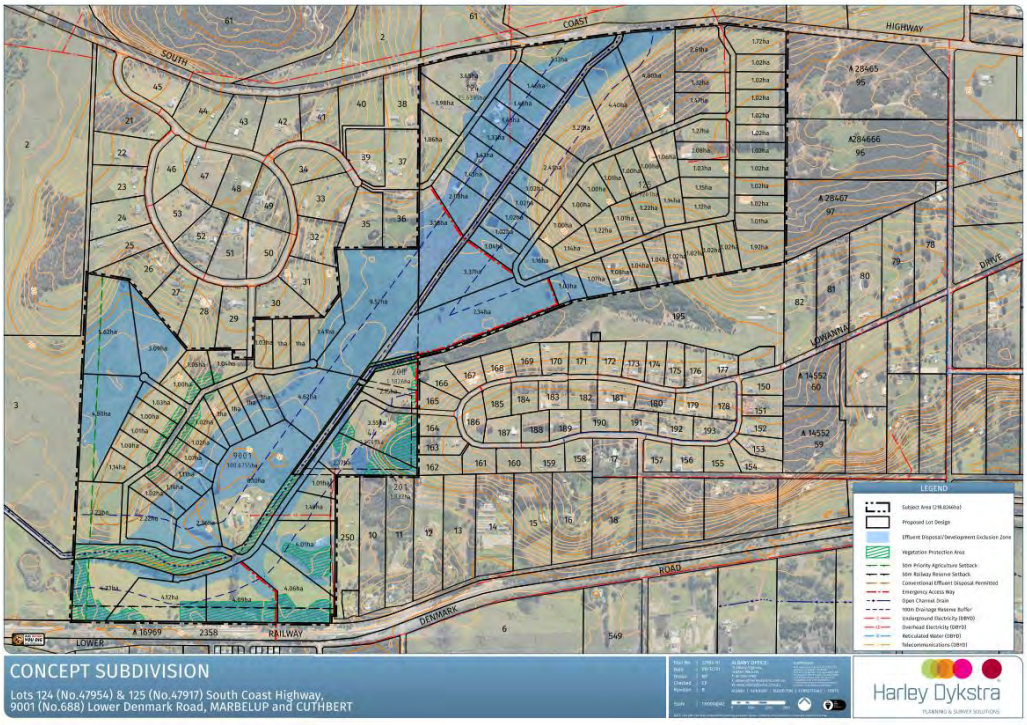
3 Proposed Development

The proposed subdivision is proposed on multiple lots with a combined area of approximately 208.5 hectares. The Site is divided into three lots: Lots 124 & Lot 125 South Coast Highway and Lot 90001 Lower Denmark Road.

- Lot 124 is approximately 25.6 hectares in extent and is proposed to be subdivided into 10 rural residential lots;
- Lot 125 is approximately 82.9 hectares in extent and proposed to be subdivided into 51 rural residential lots with lot sizes ranging from 1.02 hectares to 7.34 hectares; and
- Lot 9001 is proposed to be subdivided into 34 rural residential lots with lot sizes ranging from 1.0 hectare to 8.50 hectares.

The layout of the proposed Site is shown in **Figure 3-1.**

Figure 3-1 Subdivision Plan



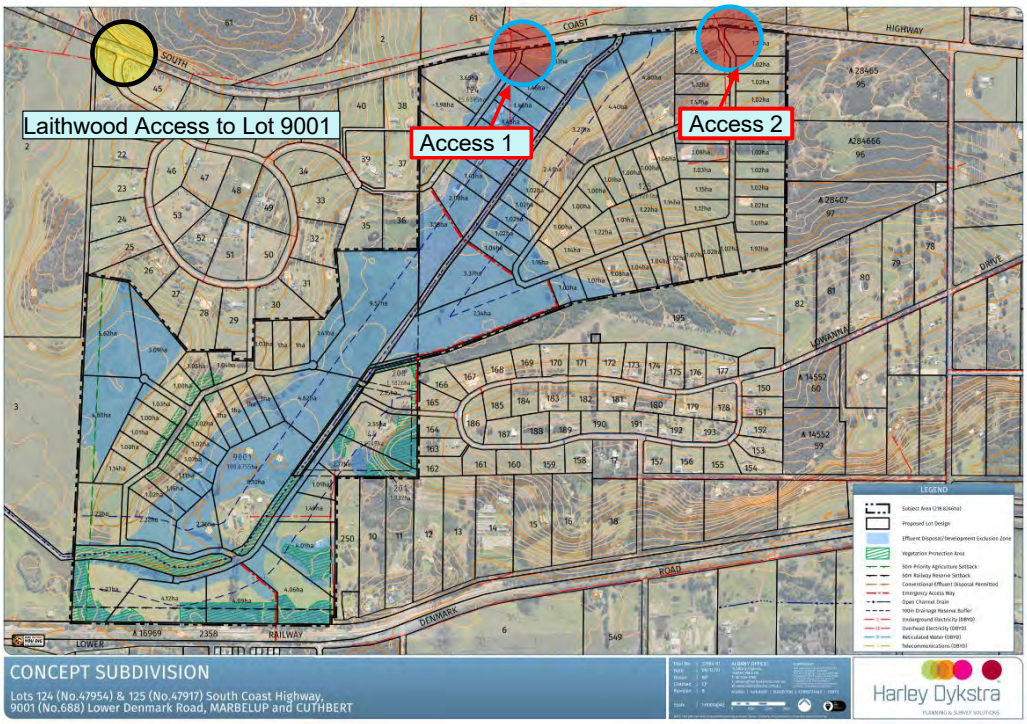
Source: Harley Dykstra

Registration Name | Business Registration
Address Line 1
Address Line 2, Suburb
State, Postcode
00 0 0000 0000 | www.cardno.com | www.stantec.com

3.2 Access Arrangements

The main accesses to the developments are proposed to be located on South Coast Highway as shown in **Figure 3-2.** The existing intersection at Laithwood Circuit will serve as access to the rural lots at Lot 9001.Two new intersections (Access 1 & 2) are proposed to be built on South Coast Highway for access to the rural residential housing proposed on Lots 124 and 125. Access 1 mainly serves residential units in Lot 124 and Access 2 serves developments in Lot 125.

Figure 3-2 Access Arrangements



Source: Harley Dykstra

Registration Name | Business Registration
Address Line 1
Address Line 2, Suburb
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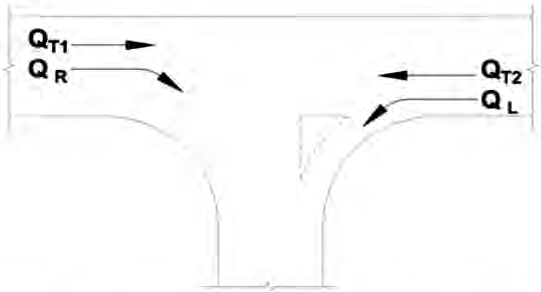
4 Turn Warrant Assessment Parameters

Main Roads Western Australia supplement to Austroads *Guide to Road Design Part 4A -A.8* which provides a warrant for the preferred minimum turn treatments on major roads (i.e. the road that has traffic priority over another at an intersection).

The preferred turn treatments are determined by the following parameters:

- **QL or QR**: development peak hour entry turning movement volume.
- **QM**: traffic volume on the major road, see **Figure 4-1** for the calculation of QM for a two-way two-lane road; and
- **design speed** – *120km*/h design speed is adopted with the acknowledgement that South Coast Highway would have 110km/h posted speed limit in the medium to long term.
- **Traffic volume** – Existing SWCH traffic volumes sourced from Main Roads Trafficmap in 2021/22 and the turning movements based on the Site traffic generation will be used for this assessment.

Figure 4-1 Calculation of QM



Road type	Turn type	Splitter island	Q_M (veh/h)
Two-lane two-way	Right	No	$= Q_{T1} + Q_{T2} + Q_L$
		Yes	$= Q_{T1} + Q_{T2}$
	Left	Yes or no	$= Q_{T2}$
Four-lane two-way	Right	No	$= 50\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 50\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 50\% \times Q_{T2}$
Six-lane two-way	Right	No	$= 33\% \times Q_{T1} + Q_{T2} + Q_L$
		Yes	$= 33\% \times Q_{T1} + Q_{T2}$
	Left	Yes or no	$= 33\% \times Q_{T2}$

Source: TMR (2016a).

As per Main Roads Western Australia supplement to Austroads *Guide to Road Design Part 4A -A.8,* it is important to note that these warrants focus on safety performance outcomes and not operational performance. Additionally, it is developed for intersections on new roads and is not intended for direct application to accesses and driveways.

The warrants have been analysed for the opening year (2024) and the future year (2034).

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4.1 Traffic Generation

Trip generation has been calculated for the proposed development utilising trip generation rates from the *Institute of Transportation Engineers (ITE) "Trip Generation" 10th Ed*. **Table 4-1** provides the trip generation rates for the AM and PM peak hour periods. **Table 4-2** outlines the directional distribution and **Table 4-3** summarises the total trips expected to be generated by the proposed development. **Figure 4-2** shows development traffic volumes.

Table 4-1 Trip Generation Rate – Peak Hour Generator

Land Use	ITE Code	AM Peak Rate	PM Peak Rate	Daily Rate
Residential	ITE 210	0.76 trips per dwellings	1 trip per dwellings	9.44 trips per dwellings

Table 4-2 Directional Distribution

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Residential	26%	74%	64%	36%	50%	50%

Table 4-3 Total Trip Generation

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Lot 9001 (Residential)	8	23	26	15	194	194
Lot 124 (Residential)	3	7	8	4	57	57
Lot 125 (Residential)	10	29	33	19	245	245
Sub-Total	21	59	67	38	496	496
Total	**80**		**105**		**992**	

4.2 Traffic Volumes & Trip Distribution

The existing traffic volumes were derived from Main Roads Traffic Map as shown in **Figure 4-2**. The available traffic counts along South Coast Highway does not show any incremental increase in traffic historically and for the purpose of a robust assessment, a 1% annual background traffic growth rate was assumed for this study. This has been applied to the background traffic for the opening year (2024) and future design year (2034) for this assessment. **Figure 4-2** shows development traffic volumes and **Figure 4-3** shows the estimated volumes for the 2024 and 2034 design years with the proposed development traffic.

The trip distribution for the Site was derived from the 2016 ABS Census place of work and residential census within the City of Albany and the surrounding suburbs. It is assumed that 75% of the residents will be attracted to the East, as this is where the Albany CBD is located and other popular commercial and office industries. The remaining 25% will be attracted to other destinations such as the Town of Denmark and other locations within the Albany region to the west of the subject Site.

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Figure 4-2 Development Traffic & 2022 Traffic Volumes

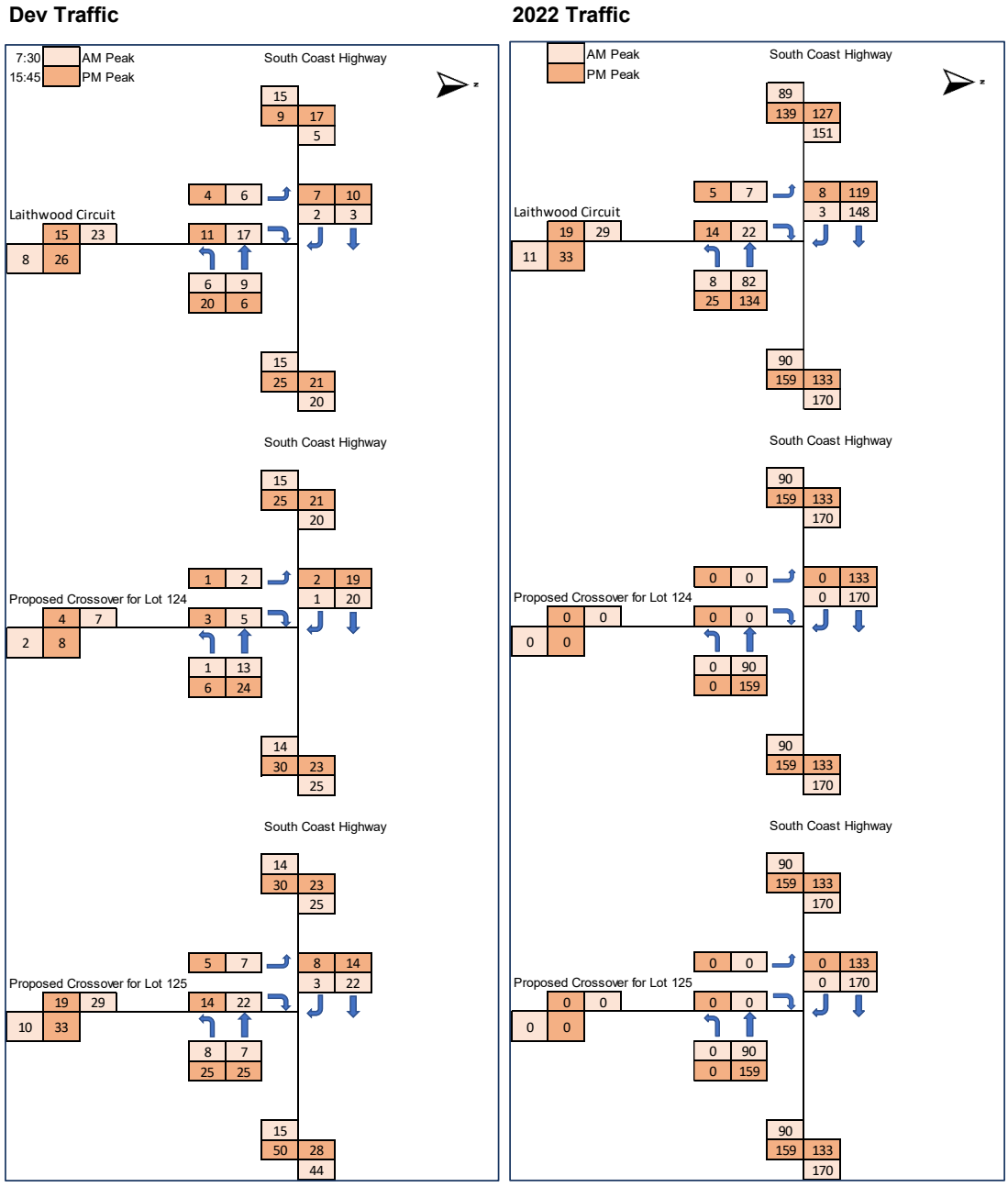

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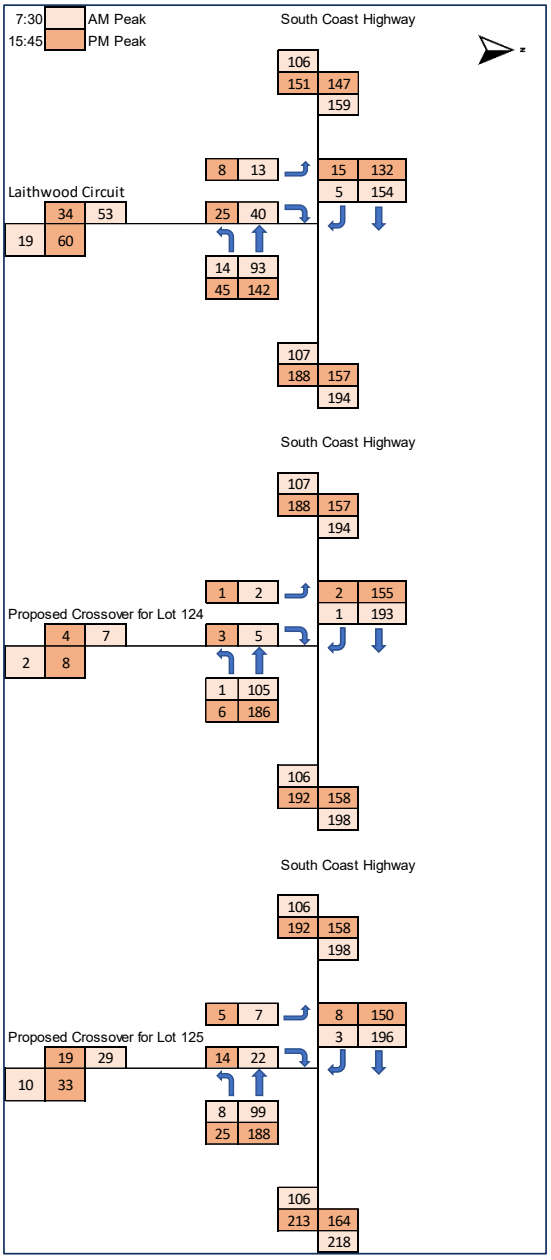
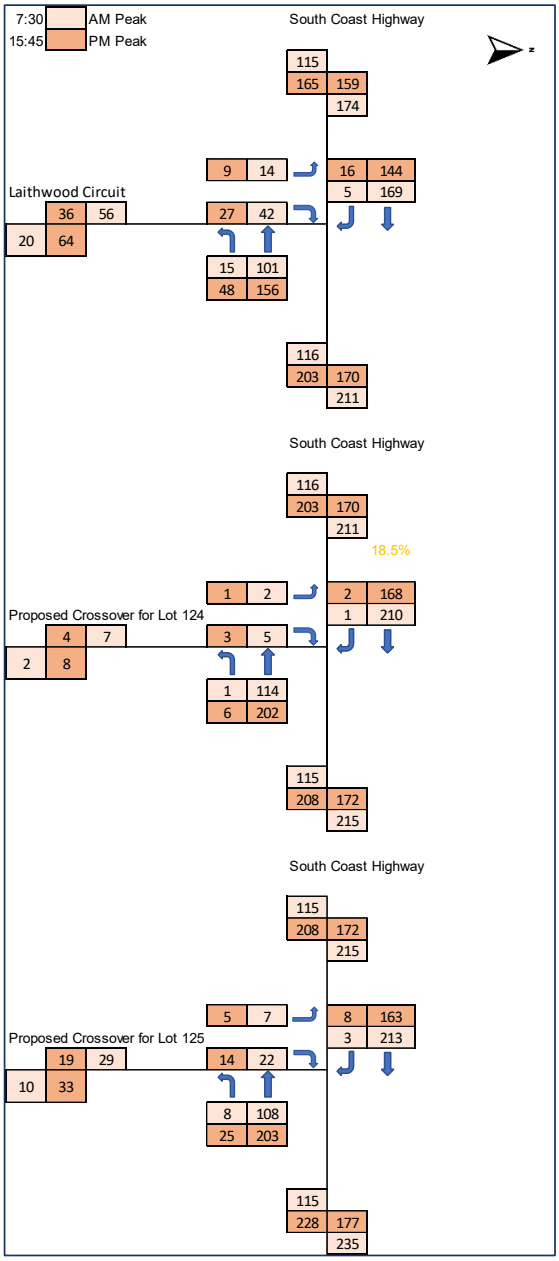
Figure 4-3 2024 & 2034 Traffic With Development

2024 + Dev Traffic



2034 + Dev Traffic



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4.3 Turn Warrant Assessment

The key intersections analysed are:

> South Coast Highway/ Lot 124 Access (Access 1); and

> South Coast Highway/ Lot 125 Access (Access 2).

4.3.1 South Coast Highway/Lot 124 (Access 1) Assessment

Table 4-4 summarises the turn warrant assessment for the AM and PM peak hour periods respectively for the opening year (2024) and future 10 years after opening (2034).

Table 4-4 Access 1 – South Coast Highway/Access 1

Two lane Two way				
South Coast Highway / Lot 124(Access 1)				
	2024 With Development		2034 With Development	
	AM	PM	AM	PM
Q_{T1}	193	155	210	168
HV (%) – Q_{T1}	12.2	18.5	12.2	18.5
Q_R	1	2	1	2
HV (%) - Q_R	0	0	0	0
Q_{T2}	105	186	114	202
HV (%) - Q_{T2}	24.4	6	24.4	6
Q_L	2	6	2	6
HV (%) - Q_L	0	0	0	0
Left Turn Treatment	**BAL**	**BAL**	**BAL**	**BAL**
Right Turn Treatment	**BAR**	**BAR**	**BAR**	**BAR**

Based on the assessment above for both peak hours, basic right turn (BAR) and basic left turn (BAL) treatments are recommended for 2024 and 2034 scenarios.

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4.3.2 South Coast Highway/Lot 125 (Access 2) Assessment

Table 4-5 summarises the turn warrant assessment for AM and PM peak hour periods respectively for the opening year (2024) and future 10 years after opening (2034).

Table 4-5 Access 2 – South Coast Highway/Access 2

Two lane Two way				
South Coast Highway / Lot 125(Access 2)				
	2024 With Development		2034 With Development	
	AM	PM	AM	PM
Q_{T1}	196	150	213	163
HV (%) – Q_{T1}	12.2	18.5	12.2	18.5
Q_R	3	8	3	8
HV (%) - Q_R	0	0	0	0
Q_{T2}	99	188	108	203
HV (%) - Q_{T2}	24.4	6	24.4	6
Q_L	8	25	8	25
HV (%) - Q_L	0	0	0	0
Left Turn Treatment	**BAL**	**BAL**	**BAL**	**AUL(S)**
Right Turn Treatment	**BAR**	**AUR**	**BAR**	**AUR**

Based on the assessment above for both peak hours, an AUR turn treatment is warranted in 2024 and AUR and AUL(S) is warranted in 2034.

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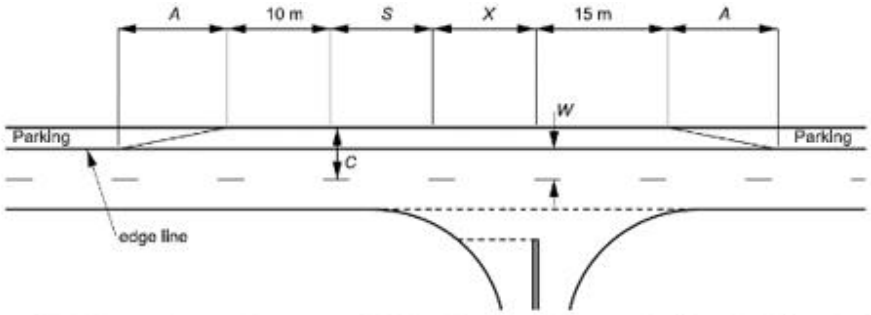
4.3.3 Turn Treatment Types

4.3.3.1 Basic Right Turn Treatment (BAR)

The BAR turn treatment is applicable to intersections of two-lane urban roads and minor local roads where traffic volumes do not warrant a higher-order treatment. It should provide sufficient pavement width for the design through vehicle to pass a vehicle waiting to turn right. **Figure 4-4** illustrates a typical layout for BAR treatment.

Figure 4-4 Typical BAR Treatment



Notes: This diagram does not show any specific bicycle facilities. Where required bicycle facilities should be provided in accordance with this Part.

The dimensions of the treatment are defined thus:

- W = *Nominal through lane width (m) (including widening for curves). Width to be continuous through the intersection.*
- C = *On straights* – *6.0 m minimum*
  – *6.5 m minimum for 19 m semi-trailers and B-doubles*
  – *7.0 m minimum for Type 1 and Type 2 road trains*
  On curves – *widths as above + curve widening (based on widening for the design turning vehicle plus*
  – *widening for the design through vehicle).*
- $A = \frac{0.5V(C-W)}{3.6}$

  Increase length A on tighter curves (e.g. where side friction demand is greater than the maximum desirable). Where the design through vehicle is larger than or equal to a 19 m semi-trailer, the minimum speed used to calculate A is 80 km/h.
- V = *Design speed of major road approach (km/h).*
- S = *Storage length to cater for one design turning vehicle (m) (minimum length 12.5 m).*
- X = *Distance based on design vehicle turning path, refer to Design Vehicles and Turning Path Templates (Austroads 2013f).*

Source: Department of Main Roads (2006)[30].

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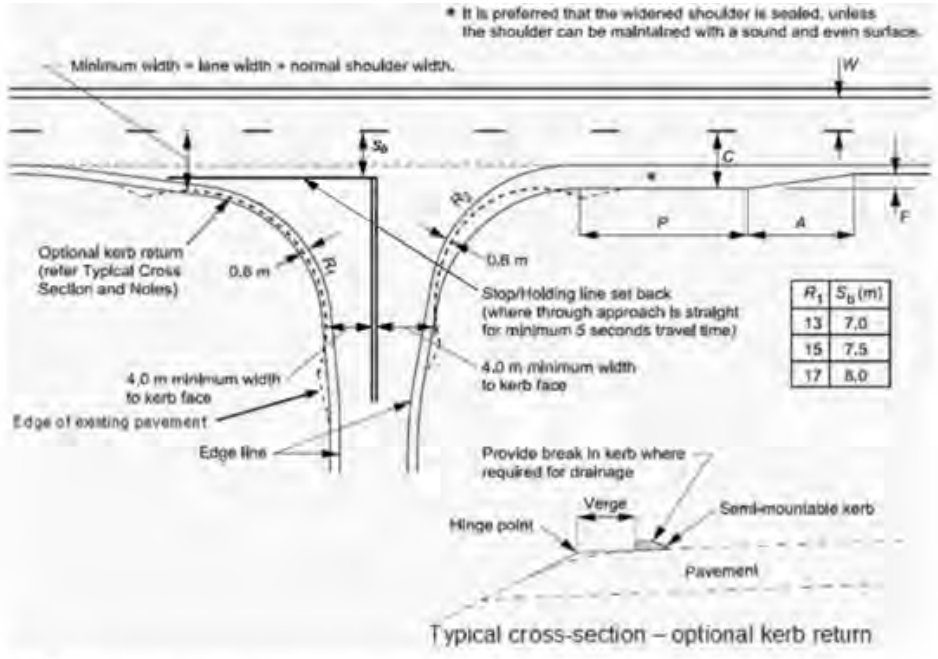
4.3.3.2 Basic Left Turn Treatment (BAL)

Figure 4-5 shows a minimum treatment for use in a rural situation which provides tapers leading into and out of the left turn treatment.

Figure 4-5 Typical BAL Treatment



R_1	S_b (m)
13	7.0
15	7.5
17	8.0

Notes:

- *R_1 and R_2 are determined by the swept path of the design vehicle.*
- *The dimensions of the treatment are defined thus:*

W = *Nominal through lane width (m) (including widening for curves).*

C = *On straights – 6.0 m minimum.*
On curves – 6.0 m plus curve widening (based on widening for the design turning vehicle plus widening for the design through vehicle).

$A = \frac{0.5VF}{3.6}$

V = *Design speed of major road approach (km/h).*

F = *Formation/carriageway widening (m).*

P = *Minimum length of parallel widened shoulder (Table 8.1).*

S_b = *Setback distance between the centre of the major road and the give way or stop line in the minor road.*

Source: Department of Main Roads (2006)[10]

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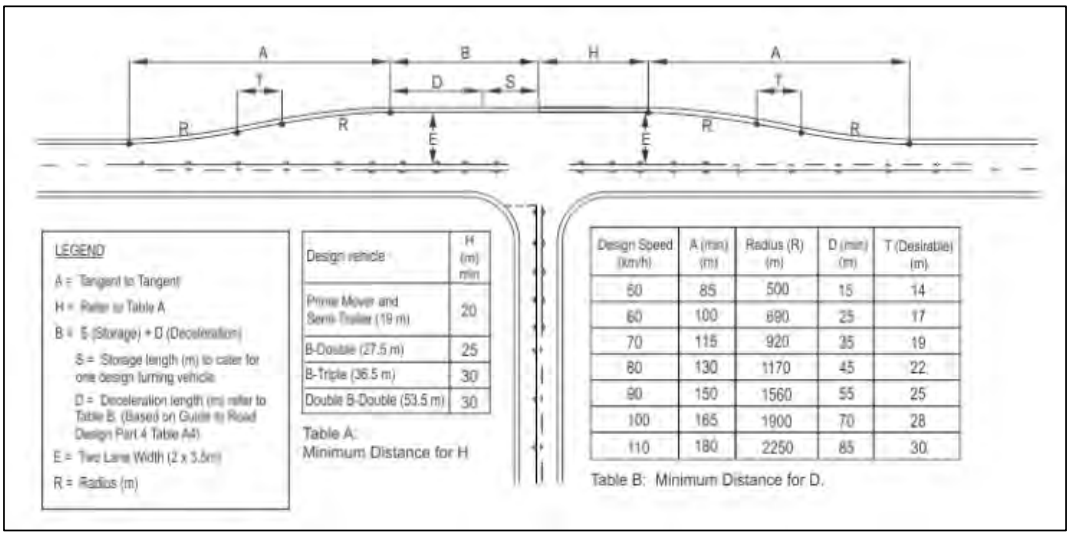
4.3.3.3 AUR Treatment

AUR treatment is a right turn treatment that involves the creation of an additional short lane on the major road to allow through traffic to bypass a right turning vehicle. This treatment does not involve channelisation of the additional lane. **Figure 4-6** illustrates a typical layout for AUR treatment.

Figure 4-6 Typical Main Roads Type AUR treatment



Source: MRWA Supplement to Austroads Guide to Road Design – Part 4 Appendix A

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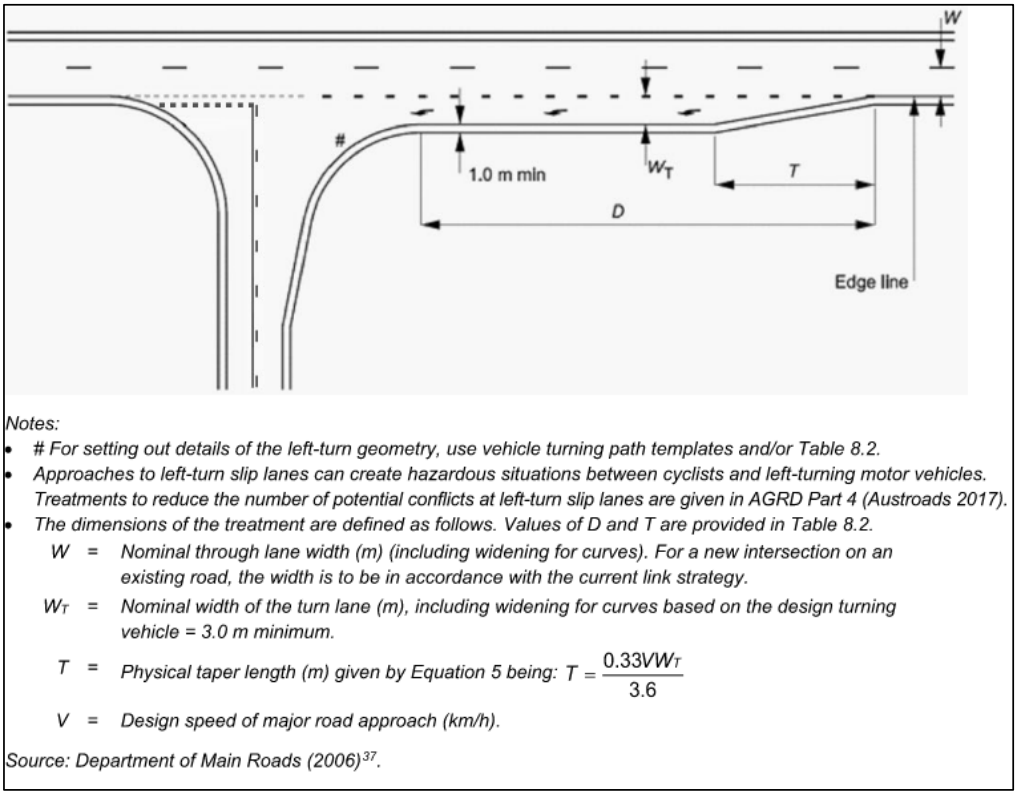
4.3.3.4 AUL(S) Treatment

AUL(S) is a left turn treatment provided on the major road, by providing an idented lane, separated from the through lanes. **Figure 4-7** below shows a typical layout for AUL(S).

Figure 4-7 Rural AUL(S) treatment with a short left-turn lane



Notes:

- *# For setting out details of the left-turn geometry, use vehicle turning path templates and/or Table 8.2.*
- *Approaches to left-turn slip lanes can create hazardous situations between cyclists and left-turning motor vehicles. Treatments to reduce the number of potential conflicts at left-turn slip lanes are given in AGRD Part 4 (Austroads 2017).*
- *The dimensions of the treatment are defined as follows. Values of D and T are provided in Table 8.2.*

W = Nominal through lane width (m) (including widening for curves). For a new intersection on an existing road, the width is to be in accordance with the current link strategy.

W_T = Nominal width of the turn lane (m), including widening for curves based on the design turning vehicle = 3.0 m minimum.

T = Physical taper length (m) given by Equation 5 being: $T = \frac{0.33VW_T}{3.6}$

V = Design speed of major road approach (km/h).

Source: Department of Main Roads (2006)[37].

Source: Austroads Guide to Road Design Part 4A

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5 Conclusions and Recommendations

The Turn treatment warrant assessment has been undertaken for the proposed access on South Coast Highway. It is important to note that these warrants are developed for intersections on new roads and is not intended for direct application to accesses and driveways.

The key intersections analysed are:

- South Coast Highway/ Lot 124 Access (Access 1); and
- South Coast Highway/ Lot 125 Access (Access 2).

Based on the assessment for both peak hours, auxiliary lanes are not required for Access 1. For Access 2, an AUR turn treatment is warranted in 2024 and 2034 turning movements and AUL(S) is warranted in 2034 from a safety perspective taking into consideration the posted speed on South Coast Highway is 110km/hr.

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To	BJ Panizza Family Trust	**Project No**	CW1200522/304900887
Project Name	Lot 124, Lot 125 & Lot 9001 South Coast Highway, Marbellup	**Status**	A
Date	05/12/2022	**Discipline**	Traffic & Transport
Author	Lovely Lal		
Reviewer	Desmond Ho	**Office**	Perth

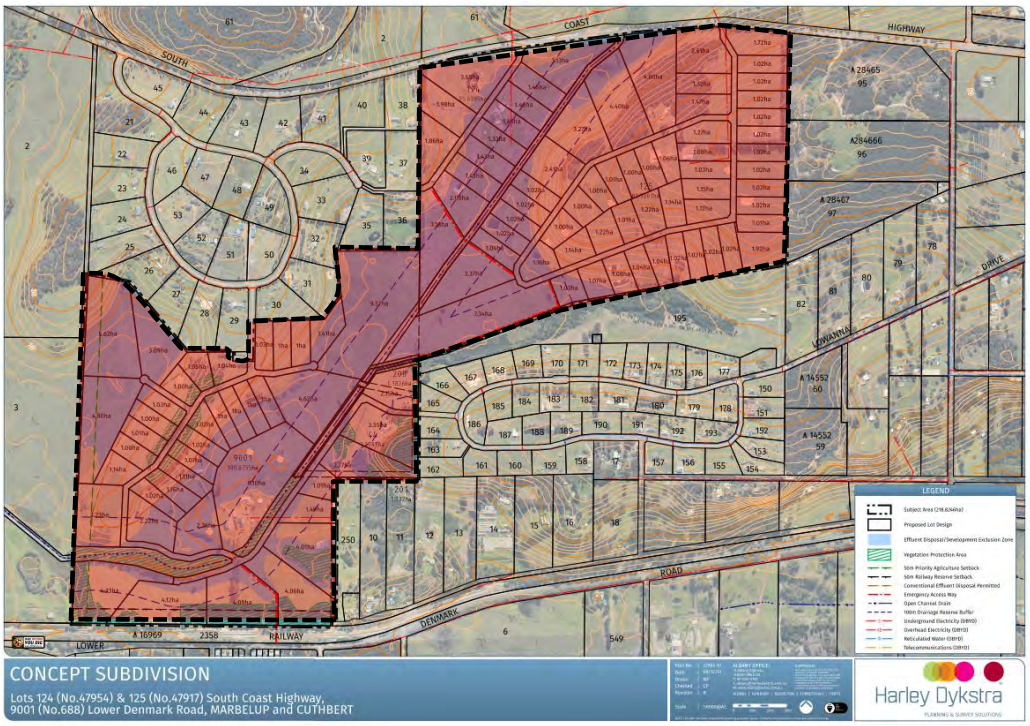
1 Introduction

Cardno now Stantec was commissioned by BJ Panizza Family Trust to undertake an intersection analysis for the new access roads proposed for the rural residential subdivision to be located on Lots 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road, Marbelup and Cuthbert, within the City of Albany.

2 Site Context

The subject Site is currently vacant spanning 208.5 hectares in extent and is located on Lot 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road, within the City of Albany as shown in **Figure 2-1.**

Figure 2-1 Aerial image of site



Source: Harley Dykstra

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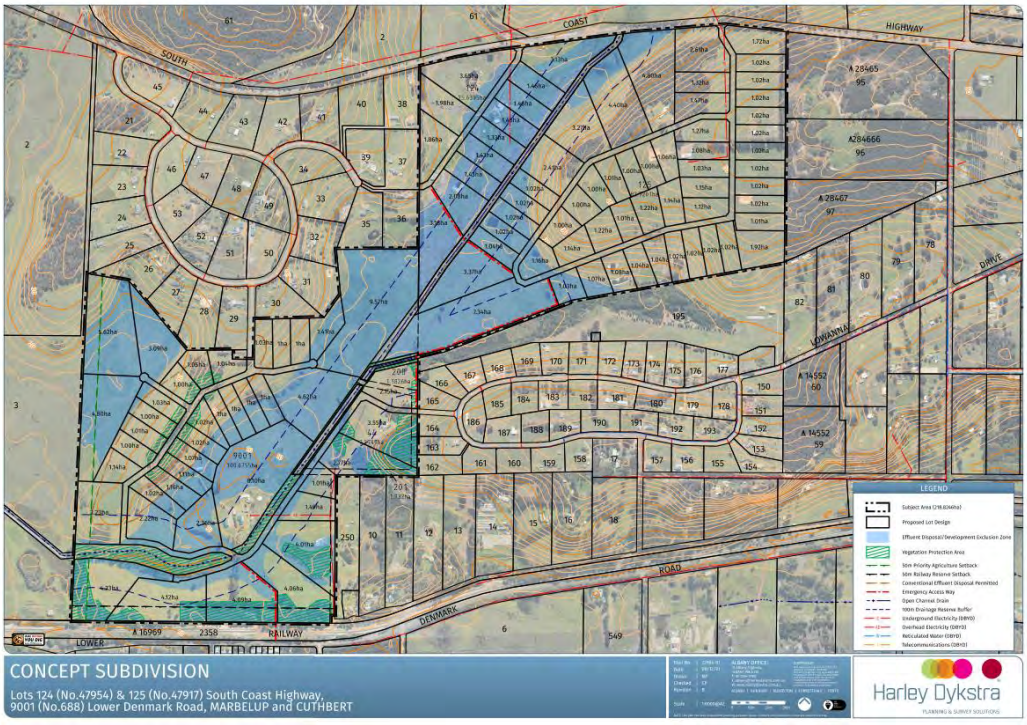
3 Proposed Development

The proposed subdivision is proposed on multiple lots with a combined area of approximately 208.5 hectares. The Site is divided into three lots: Lots 124 & Lot 125 South Coast Highway and Lot 90001 Lower Denmark Road.

- Lot 124 is approximately 25.6 hectares in extent and is proposed to be subdivided into 10 rural residential lots;
- Lot 125 is approximately 82.9 hectares in extent and proposed to be subdivided into 51 rural residential lots with lot sizes ranging from 1.02 hectares to 7.34 hectares; and
- Lot 9001 is proposed to be subdivided into 34 rural residential lots with lot sizes ranging from 1.0 hectare to 8.50 hectares.

The layout of the proposed Site is shown in **Figure 3-1.**

Figure 3-1 Subdivision Plan



Source: Harley Dykstra

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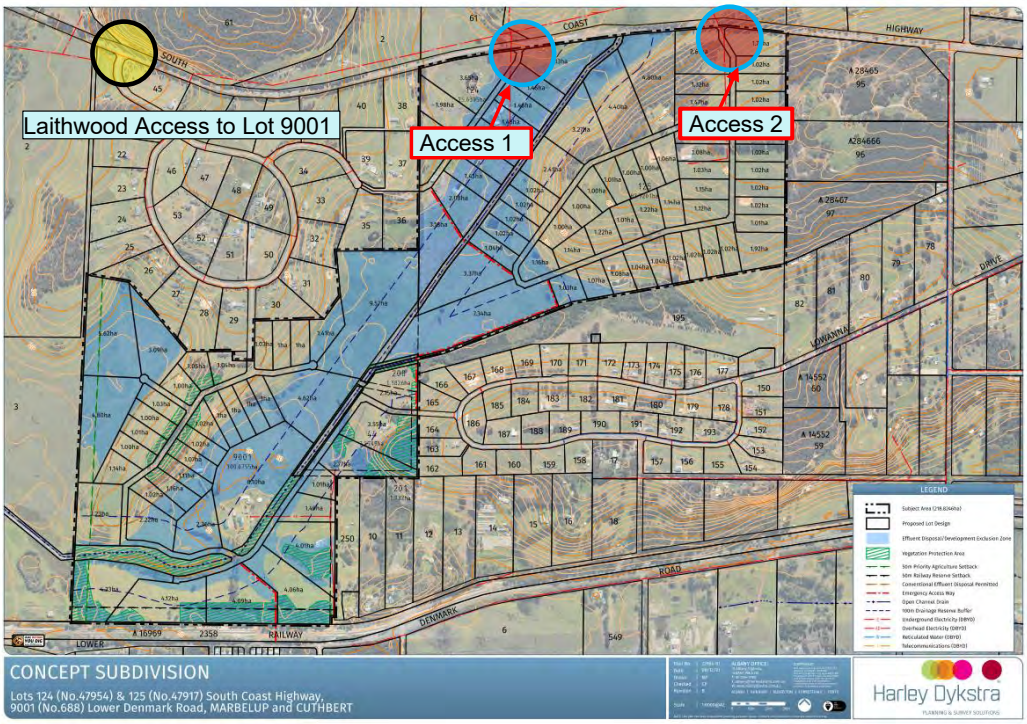
3.2 Access Arrangements

The main accesses to the developments are proposed to be located on South Coast Highway as shown in **Figure 3-2.** The existing intersection at Laithwood Circuit will serve as access to the rural lots at Lot 9001. Two new intersections (Access 1 & 2) are proposed to be built on South Coast Highway for access to the rural residential housing proposed on Lots 124 and 125. Access 1 mainly serves residential units in Lot 124 and Access 2 serves developments in Lot 125.

Figure 3-2 Access Arrangements



Source: Harley Dykstra

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3.3 Traffic Generation

Trip generation has been calculated for the proposed development utilising trip generation rates from the *Institute of Transportation Engineers (ITE) "Trip Generation" 10th Ed*. **Table 3-1** provides the trip generation rates for the AM and PM peak hour periods. **Table 3-2** outlines the directional distribution and **Table 3-3** summarises the total trips expected to be generated by the proposed development.

Table 3-1 Trip Generation Rate – Peak Hour Generator

Land Use	ITE Code	AM Peak Rate	PM Peak Rate	Daily Rate
Residential	ITE 210	0.76 trips per dwellings	1 trip per dwellings	9.44 trips per dwellings

Table 3-2 Directional Distribution

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Residential	26%	74%	64%	36%	50%	50%

Table 3-3 Total Trip Generation

Land Use	AM Peak Hour		PM Peak Hour		Daily	
	IN	OUT	IN	OUT	IN	OUT
Lot 9001 (Residential)	8	23	26	15	194	194
Lot 124 (Residential)	2	7	8	4	57	57
Lot 125 (Residential)	10	29	33	19	245	245
Sub-Total	21	59	67	38	496	496
Total	**80**		**105**		**992**	

The proposed development is expected to generate approximately 80 vehicles during the AM peak hour and 105 vehicles during the PM peak hour respectively.

3.4 Traffic Volumes & Trip Distribution

The existing traffic volumes were derived from Main Roads Traffic Map as shown in **Figure 3-3.** The available traffic counts along South Coast Highway does not show any incremental increase in traffic historically and for the purpose of a robust assessment, a 1% annual background traffic growth rate was assumed for this study. This has been applied to the background traffic for the opening year (2024) and future design year (2034) for this assessment. **Figure 3-3** shows development traffic volumes and **Figure 3-4** shows the estimated volumes for the 2024 and 2034 design years with the proposed development traffic.

The trip distribution for the Site was derived from the 2016 ABS Census place of work and residential census within the City of Albany and the surrounding suburbs. It is assumed that 75% of the residents will be attracted to the East, as this is where the Albany CBD is located and other popular commercial and office industries. The remaining 25% will be attracted to other destinations such as the Town of Denmark and other locations within the Albany region to the west of the subject Site.

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Figure 3-3 Development Traffic & 2022 Traffic Volumes

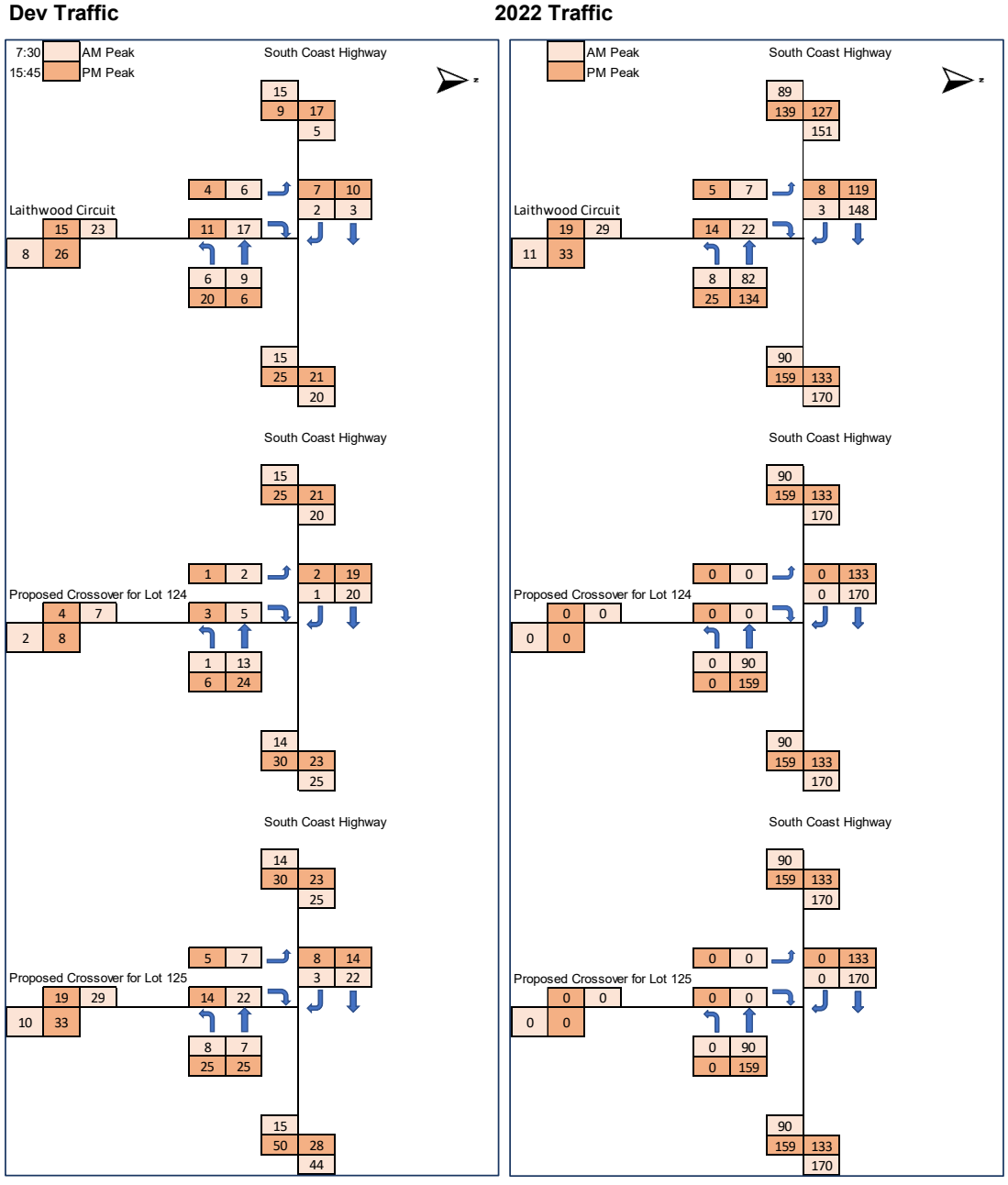
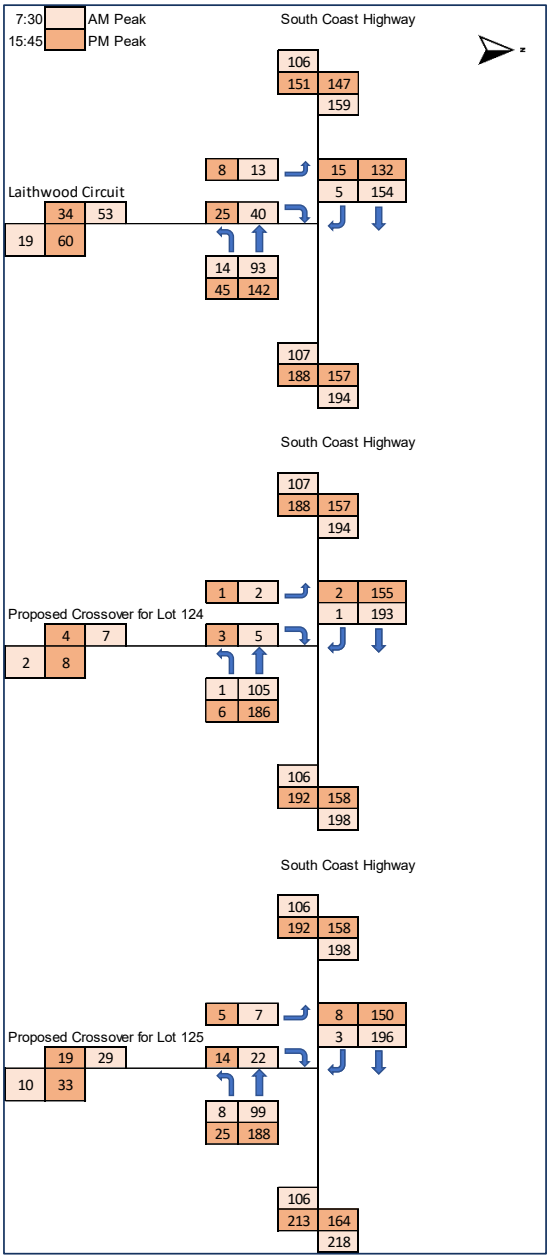
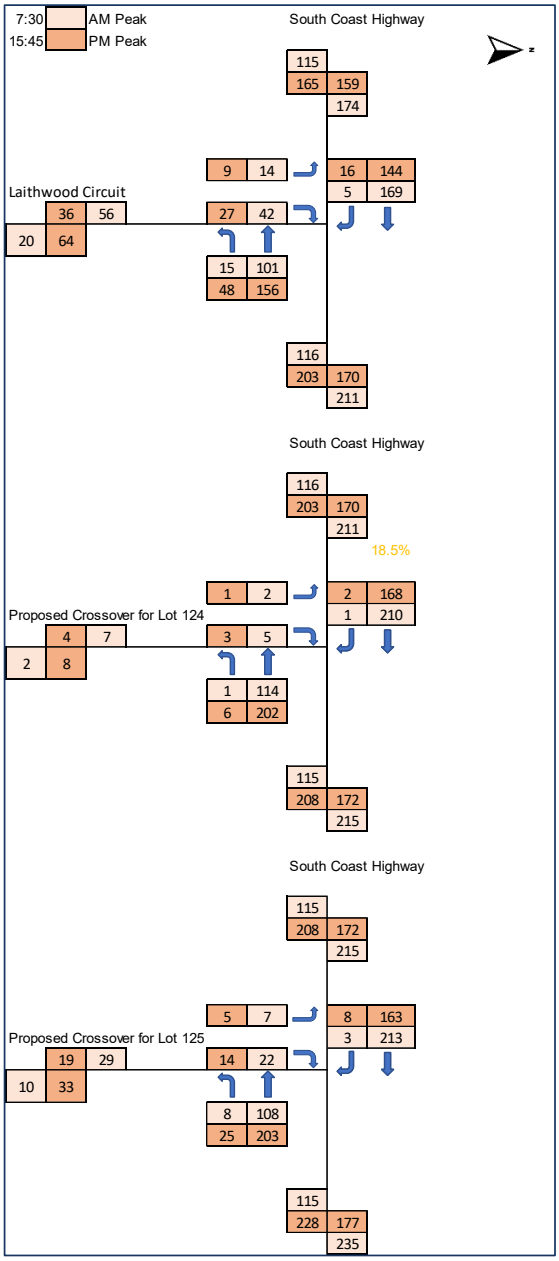


Figure 3-4 2024 & 2034 Traffic With Development

2024 + Dev Traffic



2034 + Dev Traffic



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4 SIDRA Modelling

4.1 Intersection Performance

Analysis of the traffic impacts of the proposed development has been undertaken for the following intersections:

- South Coast Highway/Proposed Access Road (Lot 124)
- South Coast Highway/Proposed Access Road (Lot 125)

The identified intersections have been analysed using the SIDRA analysis program. This program calculates the performance of intersections based on input parameters, including geometry and traffic volumes. As an output SIDRA provides values for the Degree of Saturation (DOS), queue lengths, delays, level of service, and 95th Percentile Queue. These parameters are defined as follows:

- Degree of Saturation (DOS): is the ratio of the arrival traffic flow to the capacity of the approach during the same period. The theoretical intersection capacity is exceeded for an un-signalized intersection where DOS > 0.80;
- 95% Queue: is the statistical estimate of the queue length up to or below which 95% of all observed queues would be expected;
- Average Delay: is the average of all travel time delays for vehicles through the intersection. An unsignalised intersection can be considered to be operating at capacity where the average delay exceeds 40 seconds for any movement; and
- Level of Service (LOS): is the qualitative measure describing operational conditions within a traffic stream and the perception by motorists and/or passengers. The different levels of service can generally be described as shown in **Table 4-1.**

Table 4-1 Level of Service (LoS) Performance Criteria

LOS	Description	Signalised Intersection	Unsignalised Intersection
A	Free-flow operations (best condition)	≤10 sec	≤10 sec
B	Reasonable free-flow operations	10-20 sec	10-15 sec
C	At or near free-flow operations	20-35 sec	15-25 sec
D	Decreasing free-flow levels	35-55 sec	25-35 sec
E	Operations at capacity	55-80 sec	35-50 sec
F	A breakdown in vehicular flow (worst condition)	≥80 sec	≥50 sec

A LOS exceeding these values indicates that the road section is exceeding its practical capacity. Above these values, users of the intersection are likely to experience unsatisfactory queueing and delays during the peak hour periods.

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4.1 SIDRA Analysis Results

The following scenarios were considered for analysis:

- Opening Year Background Traffic (with growth) + Full development (2024)
- 10-Year Horizon Background traffic (with growth) + Full development (2034)

4.1.1 South Coast Highway/Proposed Access Road (Lot 124)

The proposed intersection layout has been modelled in SIDRA as shown in **Figure 4-1**. **Table 4-2** and **Table 4-3** summarise the results for 2024 and 2034 with development.

Figure 4-1 Proposed Intersection Layout of South Coast Highway / Lot 124 Access

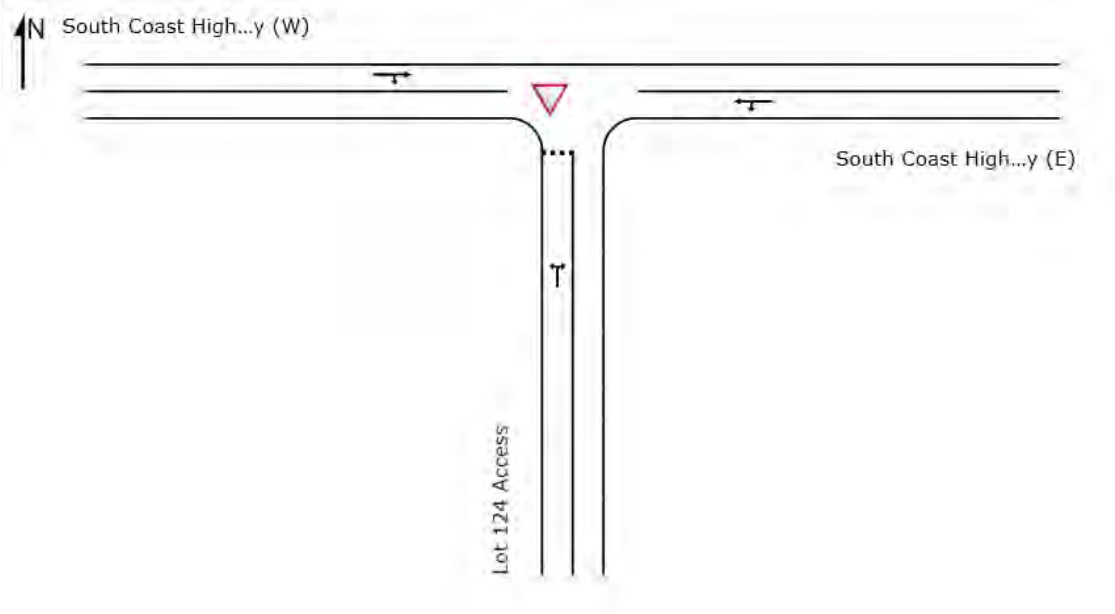

Table 4-2 South Coast Highway-Lot 124 Access Road – 2024 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 124 Access	L	0.007	4.9	A	0.2	0.004	5.1	A	0.1
	R	0.007	5.8	A	0.2	0.004	6.0	A	0.1
East: South Coast Highway (E)	L	0.071	8.2	A	0.0	0.109	8.2	A	0.0
	T	0.071	0	A	0.0	0.109	0.0	A	0.0
West: South Coast Highway (W)	T	0.116	0	A	0.1	0.099	0.0	A	0.1
	R	0.116	8.2	A	0.1	0.099	8.5	A	0.1
All Vehicles		0.116	0.2	NA	0.2	0.109	0.3	A	0.1

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Table 4-3 South Coast Highway-Lot 124 Access Road– 2034 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 124 Access	L	0.007	4.9	A	0.2	0.004	5.2	A	0.1
	R	0.007	5.9	A	0.2	0.004	6.1	A	0.1
East: South Coast Highway (E)	L	0.077	8.2	A	0.0	0.118	8.2	A	0.0
	T	0.077	0.0	A	0.0	0.118	0.0	A	0.0
West: South Coast Highway (W)	T	0.127	0.0	A	0.1	0.108	0.0	A	0.1
	R	0.127	8.3	A	0.1	0.108	8.6	A	0.1
All Vehicles		0.127	0.2	NA	0.2	0.118	0.2	A	0.1

4.1.2 South Coast Highway/Proposed Access Road (Lot 125)

The proposed intersection layout has been modelled in SIDRA as shown in **Figure 4-1**. **Table 4-2** and **Table 4-3** summarise the results for 2024 and 2034 with development.

Figure 4-2 Proposed Intersection Layout of South Coast Highway / Lot 125 Access Road

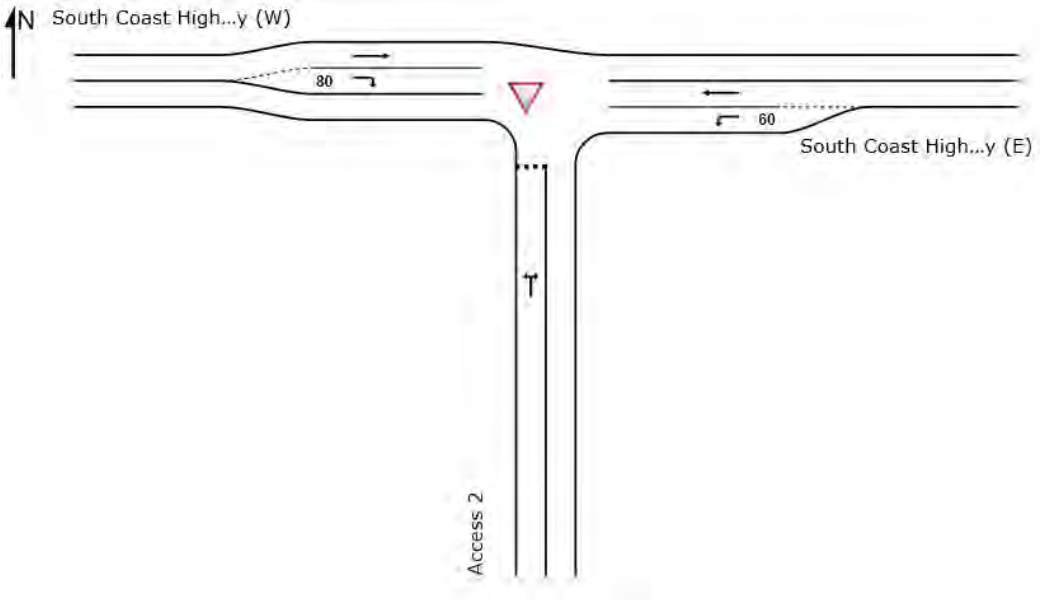

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Table 4-4 South Coast Highway-Lot 125 Access Road – 2024 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 125 Access	L	0.039	5.0	A	1.1	0.027	5.3	A	0.7
	R	0.039	7.0	A	1.1	0.027	7.5	A	0.7
East: South Coast Highway (E)	L	0.004	8.2	A	0.0	0.014	8.2	A	0.0
	T	0.066	0.0	A	0.0	0.106	0.0	A	0.0
West: South Coast Highway (W)	T	0.117	0.0	A	0.0	0.095	0.0	A	0.0
	R	0.002	8.3	A	0.1	0.007	8.7	A	0.2
All Vehicles		0.117	0.8	NA	1.1	0.106	1.0	NA	0.7

Table 4-5 South Coast Highway-Lot 125 Access Road – 2034 With Development

Intersection Approach		AM peak				PM peak			
		DOS	Delay (s)	LOS	95% Queue (m)	DOS	Delay (s)	LOS	95% Queue (m)
South: Lot 125 Access	L	0.040	5.0	A	1.1	0.028	5.4	A	0.8
	R	0.040	7.3	A	1.1	0.028	7.8	A	0.8
East: South Coast Highway (E)	L	0.004	8.2	A	0.0	0.014	8.2	A	0.0
	T	0.072	0.0	A	0.0	0.115	0.0	A	0.0
West: South Coast Highway (W)	T	0.128	0.0	A	0.0	0.103	0.0	A	0.0
	R	0.002	8.3	A	0.1	0.007	8.8	A	0.2
All Vehicles		0.128	0.8	NA	1.1	0.115	1.0	NA	0.8

The SIDRA network analysis shows that both intersections will perform satisfactorily during the opening year and 10 years after opening.

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5 High Level Cost Estimate

A high level cost estimate has been prepared for the proposed Access 1 and Access 2 based on the turn warrant treatment recommendations detailed in a separate Technical Note dated 5 December 2022.

The estimated cost for construction of the proposed intersections is summarised as follows:

i) Access 1 - $ 245,010.19 + GST

ii) Access 2 - $1,408,867.50 +GST

A cost estimate schedule has been included in **Appendix A**.

The following exclusions and assumptions apply.

- High level costing based on SIDRA information provided
- Services taken from DBYD only
- 40% continency added
- Geotech and feature survey estimated costs included
- We have only allowed for minimal service relocations

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6 Conclusion

The following is concluded:

- The proposed subdivision consists of 105 rural residential lots spread across Lots 124 & Lot 125 South Coast Highway and Lot 9001 Lower Denmark Road
- The subject Site is anticipated to generated 80 vehicle trips in the AM peak and 105 vehicle trips in the PM peak.
- All of the intersections are anticipated to operate at good levels of service, average delays and capacity during both the AM and PM Peak hour periods for the opening year and future 2034 horizon.
- Based on the SIDRA traffic modelling analysis, the proposed development is expected not to have any material or significant impact on the surrounding road network.
- The high level cost estimate for providing Access 1 and Access 2 is $ 245,010.19 +GST and $1,408,867.50 +GST respectively.

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APPENDIX A

COST ESTIMATE

Technical Memorandum

Cardno now Stantec

South Coast Highway / Lot 124 Access (Access 1) — **Revision** A
OPC — **Date:** 30/11/2022

No.	Description	Unit	Qty	Rate	Amount
1	**Preliminaries**				
	Geotechnical Investigation & Report	item	1	$ 8,000.00	$ 8,000.00
	Feature Survey of the Site	item	1	$ 10,000.00	$ 10,000.00
	Contractor's preliminaries and site overheads	item	20%	-	$ 16,167.88
	Traffic Management	week	6	$ 10,000.00	$ 60,000.00
	TOTAL PRELIMINARIES				$ 94,167.88
2	**Builder's Works**				
	Summary of works				
2.1	**Earthwork and Demolition**				
	Site Clearing, heavy	m^2	1060	$ 2.00	$ 2,120.00
	Existing feature removal and disposal	m	100	$ 50.00	$ 5,000.00
	Median island removal	m^2	0	$ 75.00	$ -
	Removal and disposal of Pavement (300 thick)	m^2	0	$ 3.85	$ -
	Removal and disposal of Seal	m^2	0	$ 0.38	$ -
	Removal and disposal of Kerb	m	0	$ 10.55	$ -
	Compact and trim pavement subgrade	m^2	475	$ 4.00	$ 1,900.00
	Tree removal	No	10	$ 1,000.00	$ 10,000.00
	Removal of existing line marking	m	0	$ 2.25	$ -
	Removal of existing ramp	m^2	0	$ 3.85	$ -
	Removal of Existing Concrete Footpath	m^2	0	$ 16.94	$ -
2.2	**Roadworks**				
	Construct pavement as specified				
	200mm crushed rock basecourse	m^2	475	$ 20.00	$ 9,500.00
	200mm crushed limestone subbase	m^2	475	$ 12.00	$ 5,700.00
	Construct pavement seal as specified				
	30 thick open graded black asphalt	m^2	475	$ 15.12	$ 7,182.00
	Prime coat	m^2	475	$ 1.40	$ 665.00
	Supply and lay extruded concrete kerbing as shown				
	Semi-mountable (SMK)	m	0	$ 29.55	$ -
	Construct footpaths as specified				
	Compact and trim footpath subgrade (min 450mm depth)	m^2	0	$ 10.00	$ -
	Concrete footpath	m^2	0	$ 103.81	$ -
	Construct traversable median				
	Brick paving including 30 thick sand bedding	m^2	0	$ 67.20	$ -
	Concrete treatment end	m^2	0	$ 60.87	$ -
	Concrete infill	m^2	0	$ 60.87	$ -
	Crossover extension				
	Concrete infill	m^2	0	$ 60.87	$ -
	150mm crushed rock basecourse	m^2	0	$ 15.50	$ -
	Flush pedestrian crossing	m^2	0	$ 20.16	$ -
	Ramp installation	No	0	$ 3,000.00	$ -
2.4	**Signage and Linemarking**				
	Linemarking - Continuity Line	m	65	$ 0.56	$ 36.40
	Linemarking - Broken - Giveway	m	20	$ 0.56	$ 11.20
	Signage - Single	No.	2	$ 336.00	$ 672.00
	Guide post	No.	10	$ 44.80	$ 448.00
	Linemarking - Direction Arrow	No.	3	$ 201.60	$ 604.80
2.6	**Stormwater Drainage (Provisional Rates)**				
	Proposed Road Side Swale	m	100	$ 70.00	$ 7,000.00
	Culvert Crossing Upgrade	No.	1	$ 10,000.00	$ 10,000.00
2.7	**Lighting and Power (Provisional Rates)**				
	Relocation of Existing Services	No.	2	$ 10,000.00	$ 20,000.00
	TOTAL BUILDER'S WORKS				$ 80,839.40
	SUBTOTAL				$ **175,007.28**
3	**Contingencies**				
	Contingency allowance items	item	40%	$ 175,007.28	$ 70,002.91
	TOTAL CONTINGENCIES				$ 70,002.91
	GRAND TOTAL				$ **245,010.19**

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Technical Memorandum

Cardno now Stantec

South Coast Highway / Lot 124 Access (Access 2) — **Revision** A
OPC — **Date:** 24/11/2022

No.	Description	Unit	Qty	Rate	Amount
1	**Preliminaries**				
	Geotechnical Investigation & Report	item	1	$ 10,000.00	$ 10,000.00
	Feature Survey of the Site	item	1	$ 15,000.00	$ 15,000.00
	Contractor's preliminaries and site overheads	item	20%	-	$ 136,888.99
	Traffic Management	week	16	$ 10,000.00	$ 160,000.00
	TOTAL PRELIMINARIES				$ 321,888.99
2	**Builder's Works**				
	Summary of works				
2.1	**Earthwork and Demolition**				
	Site Clearing, heavy	m^2	4550	$ 2.00	$ 9,100.00
	Existing feature removal and disposal	m	1000	$ 50.00	$ 50,000.00
	Median island removal	m^2	0	$ 75.00	$ -
	Removal and disposal of Pavement (300 thick)	m^2	4774	$ 3.85	$ 18,379.90
	Removal and disposal of Seal	m^2	0	$ 0.38	$ -
	Removal and disposal of Kerb	m	0	$ 10.55	$ -
	Compact and trim pavement subgrade	m^2	7174	$ 4.00	$ 28,696.00
	Tree removal	No	20	$ 1,000.00	$ 20,000.00
	Removal of existing line marking	m	0	$ 2.25	$ -
	Removal of existing ramp	m^2	0	$ 3.85	$ -
	Removal of Existing Concrete Footpath	m^2	0	$ 16.94	$ -
2.2	**Roadworks**				
	Construct pavement as specified				
	200mm crushed rock basecourse	m^2	7174	$ 20.00	$ 143,480.00
	200mm crushed limestone subbase	m^2	7174	$ 12.00	$ 86,088.00
	Construct pavement seal as specified				
	40 thick intersection mix	m^2	7174	$ 30.00	$ 215,220.00
	Prime coat	m^2	7174	$ 1.40	$ 10,043.60
	Supply and lay extruded concrete kerbing as shown				
	Semi-mountable (SMK)	m	0	$ 29.55	$ -
	Construct footpaths as specified				
	Compact and trim footpath subgrade (min 450mm depth)	m^2	0	$ 10.00	$ -
	Concrete footpath	m^2	0	$ 103.81	$ -
	Construct traversable median				
	Brick paving including 30 thick sand bedding	m^2	0	$ 67.20	$ -
	Concrete treatment end	m^2	0	$ 60.87	$ -
	Concrete infill	m^2	0	$ 60.87	$ -
	Crossover extension				
	Concrete infill	m^2	0	$ 60.87	$ -
	150mm crushed rock basecourse	m^2	0	$ 15.50	$ -
	Flush pedestrian crossing	m^2	4	$ 20.16	$ 80.64
	Ramp installation	No	4	$ 3,000.00	$ 12,000.00
2.4	**Signage and Linemarking**				
	Linemarking - Continuity Line	m	1000	$ 0.56	$ 560.00
	Linemarking - Broken - Giveway	m	500	$ 0.56	$ 280.00
	Signage - Single	No.	6	$ 336.00	$ 2,016.00
	Guide post	No.	20	$ 44.80	$ 896.00
	Linemarking - Direction Arrow	No.	3	$ 201.60	$ 604.80
2.6	**Stormwater Drainage (Provisional Rates)**				
	Proposed Road Side Swale	m	1100	$ 70.00	$ 77,000.00
	Culvert Crossing Upgrade	No.	1	$ 10,000.00	$ 10,000.00
2.7	**Lighting and Power (Provisional Rates)**				
	Relocation of Existing Services	No.	0	$ 5,000.00	$ -
	TOTAL BUILDER'S WORKS				$ 684,444.94
	SUBTOTAL				$ 1,006,333.93
3	**Contingencies**				
	Contingency allowance items	item	40%	$ 1,006,333.93	$ 402,533.57
	TOTAL CONTINGENCIES				$ 402,533.57
	GRAND TOTAL				$ 1,408,867.50

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McKail North Local Structure Plan

Standard Structure Plan

DYNAMIC PLANNING AND DEVELOPMENTS

Prepared for
Vegate Pty Ltd

History and Status of this Document

Revision	Date issued	Prepared by	Reviewed by	Revision type
LSP	14/11/24	RC	NT	Lodgement

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Author/s Reegan Cake
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Document Version Rev 1

DYNAMIC PLANNING AND DEVELOPMENTS

TABLE OF AMENDMENTS

Amendment No.	Summary of the Amendment	Date Supported by Council	Date approved by WAPC

DYNAMIC PLANNING AND DEVELOPMENTS

Executive Summary

The McKail North Local Structure Plan comprises of 68.1613ha of land, being generally bound by Gladville Road, existing rural residential development, Lancaster Road, Lot 301 (No. 36) Timewell Road and Lot 201 Lancaster Road.

The Structure Plan is zoned 'Future Urban' under the City of Albany Local Planning Scheme 1 (LPS1). This Structure Plan replaces the prior approved McKail North Outline Development Plan which presently applies to the subject land and has been prepared to be in accordance with the WA Planning Manual – Guidance for Structure Plans.

The Structure Plan proposes residential development at a density from R2.5 up to R25 in close proximity to a proposed primary school and areas of public open space. It is expected that the Structure Plan will accommodate up to 570 dwellings and 1,482 residents.

A permeable road network is proposed with multiple connections to the established road network in Lancaster Road, Gladville Road and Morgan Road. Within the Structure Plan the road network will present as grid pattern with a higher order central north/south road running from Gladville Road in the north to Lancaster Road in the south and providing access to the primary school.

All essential service infrastructure is located within proximity and is easily extended to the Structure Plan area.

The Structure Plan is supported by a number of technical reports which are provided as appendices and include:

- Bushfire Management Plan.
- Traffic Impact Assessment.
- Noise Assessment.
- Engineering and Servicing Report.
- Local Water Management Strategy

Table 1 provides a land use summary of the Structure Plan.

Iteam	Data	Reference
Total Structure Plan Area	68.1613ha	Section 1.2.2
Area of each land use zones: • **Residential**	 47.8793ha	Section 3.2
Area of reserves: • **Road Reserves** • **Public Open Space** • **Primary School**	 10.2342ha 6.5478ha 3.5ha	
Estimated lot yield	570 lots	Section 3.2
Estimated dwellings	570 dwellings	
Estimated density per site hectare	11.9 dwellings	Section 3.3
Estimated population	1482 residents @ 2.6 people per household.	Section 3.2
Primary Schools	One (1)	Section 3.2
High Schools	None	

Table 1 – Land Use Summary

LOCAL STRUCTURE PLAN

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DYNAMIC PLANNING AND DEVELOPMENTS

LOCAL STRUCTURE PLAN

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DYNAMIC PLANNING AND DEVELOPMENTS

LOCAL STRUCTURE PLAN

Part One - Implementation

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DYNAMIC PLANNING AND DEVELOPMENTS

PART ONE – IMPLEMENTATION

1.0 Structure Plan Area and Operation

This Standard Structure Plan (Structure Plan) applies to the entirety of:

- Lot 526 Gladville Road;
- Lot507 (No. 204) Lancaster Road;
- Lot 300 (No. 2) Timewell Road; and
- Lot 1 (No. 7) to Lot 13 (No. 206) Lancaster Road.

The above properties are the land contained within the inner edge of the line denoting the Structure Pan Boundary on the Structure Plan Map (Refer to Plan 1 situated at the end of Part 1 of this Structure Plan Report). The plan is in effect from the date stated on the cover and for a period of 10 years.

2.0 Purpose

This Structure Plan is intended to guide subdivision and the creation of important housing supply for the City of Albany. The Structure Plan comprises:

a) Part One – Implementation Section
This section contains the structure plan map and outlines the intent of the structure plan.
b) Part Two – Explanatory Section
This section contains the background and explanation of the structure plan, including design methodology, relevance and compliance with the planning framework at the State and Local levels.

3.0 Staging

Given the size of the site, development within the Structure Plan area is expected to occur in a staged manner as illustrated on the Structure Plan Map.

4.0 Subdivision and Development Requirements

4.1 Land use zones and reserves

Zones
The Structure Plan Map (Plan 1) outlines land use, zones and reserves applicable within the Structure Plan area. The zones and reserves designated under this Structure Plan apply to the land within it as if the zones and reserves were incorporated into the City of Albany Local Planning Scheme No.1 (LPS1).

On this basis under LPS1, the 'Future Urban' zoned portion will accommodate residential, public open space and primary school land uses.

Road Reserves
The proposed street network within the Structure Plan is consistent with an Access Street D classification in accordance with Liveable Neighbourhoods. These will consist of a 15m wide road reserve with the cross section depicted below.

There will also be one 20m wide road reserve running north to south and abutting the proposed primary school. This road reserve will be consistent with an Access Street C classification in accordance with Liveable Neighbourhoods.

DYNAMIC PLANNING AND DEVELOPMENTS

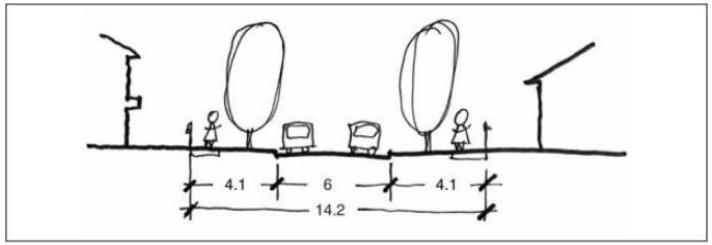

Figure 1 – Access Street D road cross section

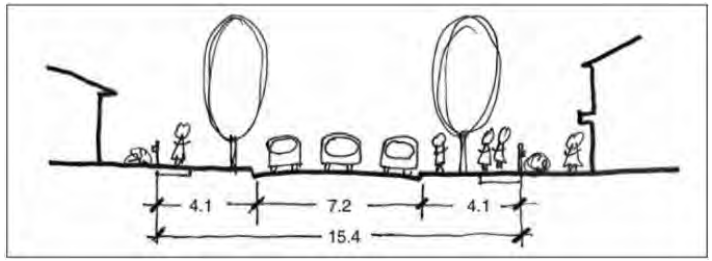

Figure 2 – Access Street C road cross section

Public Open Space

The function of the public open space (POS) will be generally consistent with a Local Park classification in accordance with Liveable Neighbourhoods. It is envisaged that the portion of public open space abutting the primary school will include sports ovals and provide for recreational activities for both the school and the general public.

The Structure Plan provides a total of 6.5478ha of POS which equates to a total of 10.1% of the total gross subdividable area. Table 2 below provides a schedule of POS within the Structure Plan Area.

PUBLIC OPEN SPACE SCHEDULE			
Structure Plan Site Area			68.1613ha
Less			
- Environmental protection policy areas Wetlands to be ceded	n/a		
- Protected bushland site	n/a		
- Unrestricted public open space sites not included in public open space contribution	n/a		
- Foreshore reserves to be ceded	n/a		
Total		0.00 ha	
Net site area			68.1613ha
DEDUCTIONS			
Primary School	3.5ha		
Town Centre and commercial	n/a		
Dedicated drainage reserve	n/a		
Transmission corridors	n/a		
Road Widening	n/a		
Gross Subdivisible area			64.6613ha
Public open space @ 10 per cent			**6.4661ha**
Public open space contribution			
May comprise:			
- Minimum 80 per cent unrestricted public open space		5.173ha	
- Minimum 20 per cent restricted use public open space		1.2931ha	
Unrestricted public open space sites			
- POS		5.7495ha	5.7495 ha
Restricted use public open space sites			
Total restricted use public open space		0.7983ha	0.7983ha
Public Open Space provision			**6.5478 ha (10.1%)**
Note: Gross subdivisible area includes house lots, access roads, and any land incidental to the subdivision. The gross subdivisible area does not include			

areas for schools, shopping centres, infrastructure (e.g. land required for sewer pump stations), dedicated drainage sites not having a recreational function and land set aside for arterial roads and other non-residential uses.

Table 2 – POS Schedule

Other Reserves

The Structure Plan includes a Local Scheme Reserve for the purposes of a Government primary school. The size of the proposed primary school site is consistent with the prior approved McKail North Outline Development Plan and Operational Policy 2.4 – Planning for school sites.

4.2 Density and Development

Density and R-codes

The residential density codes applicable to the Structure Plan shall be in accordance with those shown on the Structure Plan Map (Plan 1). The proposed densities will result in an intensification of development within McKail with much of the surrounding development consisting of larger rural residential development.

The predominant R15 density code provides a sensible transition from rural residential development to a more urban fabric, whilst still meting the lifestyle amenity of buyers in the locality. Areas of higher density (R20 and R25) have been proposed around the three areas of public open space given the higher amenity afforded to these areas.

The design of the Structure Plan also includes a split density coding. Lots subject to a split density coding will be developed at the lower density unless access to Gladville Road can be provided giving the lots additional road frontage.

Local Development Plans

The WAPC may require, as a condition of subdivision approval, that a local development plan(s) be prepared in accordance with Part 6 of Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015, prior to the creation or development of lots:

i. With an area less than 260m2 or irregularly configured.
ii. Abutting public open space.
iii. Affected by noise exceeding targets set out in the planning framework.
iv. Where specific vehicle access and egress control is required.

Interface with adjoining areas

The Structure Plan integrates with adjoining development by providing public road connections to adjoining properties that will allow expansion of development to the west and north (when Gladville Road is extended).

To the east and south of the Structure Plan is existing fragmented rural landholdings and some residential development. It is unlikely these areas will be substantially redeveloped and as such the Structure Plan has been designed with retention of this development in mind.

4.3 Other requirements

Notifications on title

Notifications(s) is / are to be placed on titles of all affected lots to advise:

i. That the lot is located near the Albany Speedway and higher construction standards may be required to reduce noise to acceptable levels in accordance with the City of Albany Speedway Noise Special Control Area.
ii. That the lot is located within an area which has been declared bushfire prone and may be subject to a bushfire management plan and additional construction requirements may apply in accordance with Australian standard (AS3959) Construction of buildings in bushfire prone areas (as emended).

A BAL assessment and contour plan will be submitted with subdivision applications.

Restrictive covenant

A restrictive covenant may be required on titles of all affected lots that have been assessed as BAL-40 or BAL-Flame Zone, with notice of this restriction to be included on the diagram or plan of survey (deposited plan) to advise that no habitable buildings are to be built within areas as BAL-40 of BAL-Flame Zone.

Bushfire protection

The Structure Plan is supported by a Bushfire Hazard Level (BHL) Assessment and a Bushfire Management Plan (BMP). Regardless of whether the land has been formally designated as bushfire prone, any buildings to be erected on land identified as falling within 100 metres of a bushfire hazard shall comply with the requirements of Australian Standard (AS3959) Construction of buildings in bushfire prone areas (as amended).

Noise management

The structure plan is affected by noise from the Albany Speedway and in accordance with the City of Albany Speedway Noise Buffer Area Policy, some lots require quiet house design requirements in accordance with the Noise Assessment prepared by Herring Storer Acoustics. These quiet house design requirements are limited to the northern section of the LSP.

Infrastructure arrangements

Earthworks – Site grading and remodelling will be kept to minimum limits wherever possible but will be required across the site to enable the construction of the proposed roads, intended lot layout and facilitating the provision of services to each lot.

Water – There are existing Water Corporation assets within the vicinity of the Structure plan which are capable of being upgraded and extended according to the Water Corporation specifications to service the proposed development.

Sewer – Water Corporation has prepared scheme planning to demonstrate servicing strategies over the development site. Broadly following the natural catchments over the site, a WWPS is proposed in the north-east of Lot 507 with an additional pump station proposed in the south-west of Lot 300. The scheme planning also shows the northern portion of Lot 526 as being serviced by a third WWPS, proposed to be located at the northern boundary of Lot 124, however the proposed subdivision is not reliant on a third WWPS.

Stormwater Drainage – There will be three (3) catchment areas with the land to the north of Lancaster Road forming two separate catchments and land to the south of Lancaster Road forming a separating, smaller catchment. Pit and piped drainage systems are proposed throughout to convey stormwater to formalised drainage basins and a living stream in the POS south of Lancaster Road.

Electrical –All lots will be serviced with underground power with the existing network having adequate capacity to service the proposed development. The existing overhead power lines will be replaced with an underground power service as part of the proposed development. The total load expected to service the development is in order of 1.9MVA with the existing network capacity modelling indicating an available capacity of 5-10MVA.

Telecommunications – The proposed subdivision falls within NBN's rollout footprint. It is therefore expected NBN Co will extend its fixed line footprint to cover the proposed development providing Fibre to the Premises (FTTP) infrastructure. This will be resolved when a Developer Agreement application is submitted to NBN Co for detailed assessment.

Gas – There are existing medium pressure gas mains in the vicinity of the site, approximately 350m east of the development boundary in Lancaster Road reserve. There are no existing gas mains in Morgan Road, or at the northern boundary of the site, in Gladville Road. There are no obvious

constraints to the extension of this network with sufficient capacity available to service the development if required.

5.0 Additional Details

Additional Information	Approval Stage	Consultation Requirement
Landscape Management Plan	Subdivision Application	City of Albany
Urban Water Management Plan	Subdivision Application	DWER and City of Albany
Bushfire Attack Level Assessment and Plan	Subdivision Application	DFES, DPLH and City of Albany
Acoustic Assessment	Subdivision Application	DPLH and City of Albany

LOCAL STRUCTURE PLAN

McKail North Local Structure Plan
STANDARD STRUCTURE PLAN

Plan 1 – Structure Plan Map

DYNAMIC PLANNING AND DEVELOPMENTS

LOCAL STRUCTURE PLAN

Part Two – Explanatory Section

Prepared for
Vegate Pty Ltd

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South Perth WA 6151

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Como WA 6152

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Perth WA 6000

DYNAMIC PLANNING AND DEVELOPMENTS

PART TWO – EXPLANATORY SECTION

1.0 Introduction and Purpose

This report has been prepared on behalf of Vegate Pty Ltd in support of Local Structure Plan that replaces the existing McKail North Outline Development (ODP).

The Structure Plan will provide for residential development, a primary school and associated open space together with complimentary portions of public open space. The purpose of the Structure Plan is as follows:

- To provide guidance on the use, subdivision and development of land to create a high quality urban environment.
- To achieve an optimum housing density and diversity with an emphasis on achieving consistency with the existing and future housing demand for the locality.
- Maximise the quality of living of future residents.

The project team involved in delivering the Structure Plan includes:

- Dynamic Planning and Development – Town Planning.
- TABEC – Engineering.
- Biodiverse Solutions – Hydrology and Bushfire.
- PJA – Traffic Engineering.
- Herring Storer – Acoustics.
- Acumen Development Solutions – Project Manager

2.0 Site and Context Analysis

2.1 Location

The Structure Plan is located within the suburb of McKail, within the municipality of the City of Albany. The Structure Plan area is located approximately 8.2 kilometres north west of the Albany City Centre and 6.1 kilometres south east of the Albany Airport.

As the existing area is primarily rural residential development there are limited public transport services in the locality with the exception of school bus stops. The closest public bus stop is the 808 bus on McGonnell Road some 2km away. The closest schools include Mount Lockyer Primary School (4.7km) and North Albany Senior High School (3.9km).

Figures 3 and 4 below illustrates the Structure Plan in its regional and local context, respectively.

2.2 Area and Land Use

The Structure Plan area encompasses a total land area of approximately 68.1613ha and comprises of:

- Lot 526 Gladville Road;
- Lot507 (No. 204) Lancaster Road;
- Lot 300 (No. 2) Timewell Road; and
- Lot 1 (No. 7) to Lot 13 (No. 206) Lancaster Road.

At present the structure plan includes primarily existing agricultural land and some rural residential properties. Surrounding the Structure Plan area includes a number of other agricultural and rural residential properties with the closest 'urban' development located to the southeast at Lot 55 (No. 245) Lancaster Road.

DYNAMIC PLANNING AND DEVELOPMENTS

LOCAL STRUCTURE PLAN

Other relevant land uses in proximity to the structure plan area include the Albany Harness Racing Club at the corner of Lancaster Road and Timewell Road and the Albany Speedway Track to the north of the structure plan area at Lot 302 (No. 27) Reddale Road.

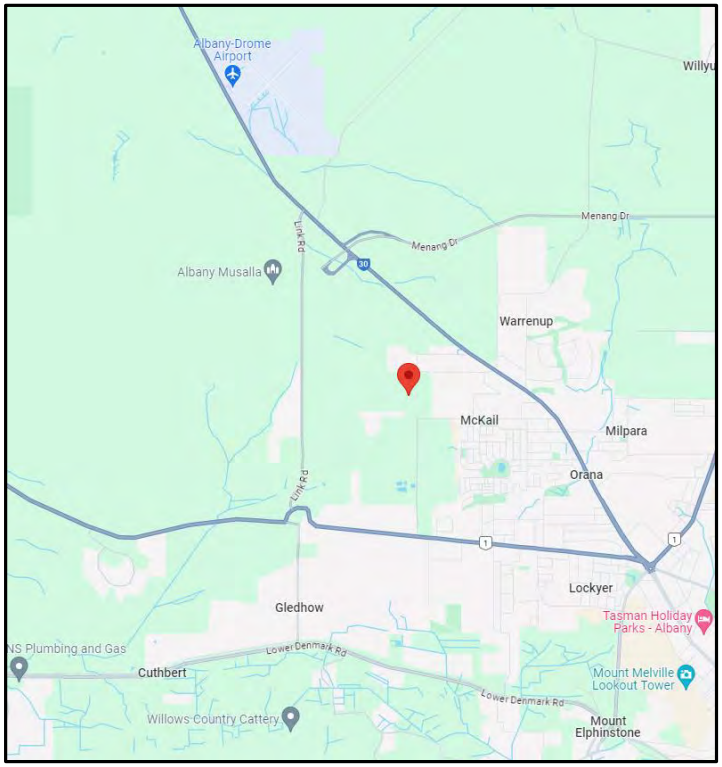

Figure 3 – Regional Context (Source: Google Maps)

Figure 4 – Local Context (Source: MNG Access)

2.3 Legal Description and Land Ownership

The structure plan has a total area of 68.1613ha. The Certificate of Title & Property Details are detailed in Table 3 below.

Lot	Street Address	Ownership	Vol / Folio	Lot Area
526	n/a	Vegate Pty Ltd	1302/687	19.447ha
507	204 Lancaster Road	Vegate Pty Ltd	1302/687	38.047ha
300	2 Timewell Road	Lancaster Park Pty Ltd	2590/382	5.241ha
1	270 Lancaster Road	Talitha Archer	1167/66	0.406ha
2	264 Lancaster Road	Andrew Daubney	1226/506	0.405ha
3	260 Lancaster Road	Steven & Julie-Anne Tomasini	1227/210	0.405ha
4	254 Lancaster Road	Francis & Sheryl Shelton	1298/384	0.405ha
5	252 Lancaster Road	Mark & Fiona Klau	1498/50	0.405ha
6	244 Lancaster Road	Hugh & Margaret Thobaven	1702/173	0.405ha
7	234 Lancaster Road	Fiona & Peter Dall	1755/682	0.403ha
8	232 Lancaster Road	Nathan Mooney	1814/968	0.403ha
9	226 Lancaster Road	Margaret Miller	1536/982	0.405ha
10	220 Lancaster Road	John & Gillian Fagg	2080/800	0.405ha
12	216 Lancaster Road	Caryn & Sale McWhirter	1381/602	0.405ha
13	206 Lancaster Road	Timothy Stone	1381/603	0.811ha

Table 3 – Certificate of Title & Property Details

2.4 City of Albany Local Planning Scheme No. 1

Under the provisions of the City of Albany Local Planning Scheme No. 1 (LPS1), the Structure Plan is zoned 'Future Urban' as illustrated in Figure 5 below.

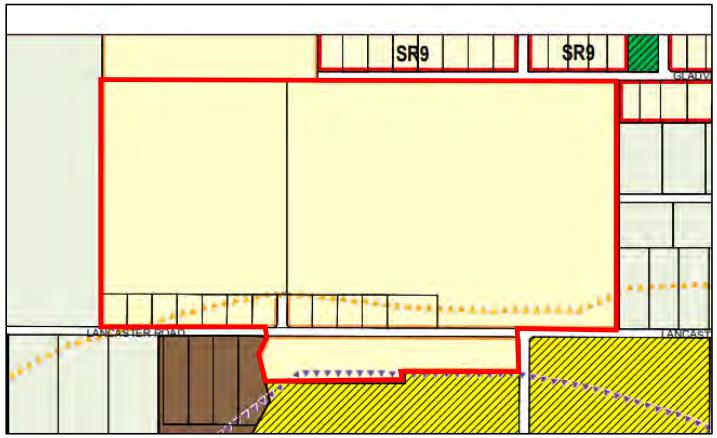

Figure 5 – City of Albany LPS1 Zoning

In accordance with Clause 3.2.3, the relevant objectives for the Future Urban zone are:

a) *Maintain viable use for existing lots until the land is required to be fully-serviced urban development.*
b) *Preserve individual land parcels with their maximum area, so that the land will not be prematurely fragmented and future development options compromised.*
c) *Maintain and enhance the physical characteristics, environmental qualities and scenic qualities in the locality.*
d) *Permit limited development which is in keeping with the existing character of the locality and compatible with the likely future use of the land for urban or other purposes as determined by the Local Government following the preparation of a Structure Plan.*
e) *Provide for structure planning of land within the zone to guide and coordinate land use and infrastructure provision where multiple ownerships or larger parcels of land requiring the staging of development is involved so that:*

i. *Future urban land is not fragmented or developed in such a way as to make urban development more costly or difficult;*
ii. *Development does not create an unreasonable or uneconomic demand for agencies to provide or extend public infrastructure or services;*
iii. *There is equitable sharing of the costs of infrastructure between owners and to ensure that cost contributions are only required towards such infrastructure as is reasonably required as a result of the subdivision and development of land; and*
iv. *Servicing agencies and Local Government can coordinate the timely provision of infrastructure to support the subdivision and development*

As a requirement for land zoned 'Future Urban' in LPS1, a Structure Plan has to be prepared prior to Council providing comment on subdivision applications and determining development applications. At present the McKail North ODP has been adopted to guide subdivision and development within the area, however as the intended development outcome is not consistent with the approved ODP, this Structure Plan will update and modify the approved planning framework to enable subdivision and development in accordance with an improved framework.

The Structure Plan is also impacted by two Special Control Areas:

- Albany Speedway Noise Special Control Area – a noise assessment has been completed by Herring Storer Acoustics that examines the impact of noise from the speedway and has determined design requirements that will apply to future dwellings.
- Water Corporation Waste Water Treatment Plan Odour Buffer Special Control Area – the buffer only impacts a small amount of the southern extent of the structure plan and as such the subdivision concept plan has been designed to enable all lots to locate dwellings outside the buffer area.

2.5 State Policies

Liveable Neighbourhoods

Liveable Neighbourhoods is the primary policy used for the design and assessment of structure plans (regional, district and local) and subdivision and development applications for new urban areas. Its primary objective is to promote the design of walkable neighbourhoods, places that support community and a sense of place, mixed use and active streets, accessible and sustainable parking, energy efficient design, and housing choice.

The primary objectives are addressed in eight design elements, which if implemented appropriately are considered to fulfil the overall objectives of Liveable Neighbourhoods. These eight design elements are to be considered at the various levels of planning (structure planning and subdivision) to ensure that development will occur in a thoughtful and sustainable manner.

Liveable Neighbourhoods was at the forefront when establishing the structure plan layout and it is considered that the resultant road network, public open space and proposed density will provide diversity in housing choice and residential development that is integrated seamlessly with the surrounding neighbourhood. A comprehensive justification of how the structure plan meets the requirements of Liveable Neighbourhoods is provided in Section 3.2 to 3.9 of this report.

State Planning Policy 3.7 – Planning in Bushfire Prone Areas

State Planning Policy No 3.7 – Planning in Bushfire Prone Areas (SPP 3.7) applies to land identified and designated by the Fire and Emergency Services Commissioner under the *Fire and Emergency Services Act 1998 (as amended).* Such areas are identified on the Map of Bush Fire Prone Areas. Designation of an area as being bushfire prone reflects the potential of bushfire to affect that site.

Under the provisions of SPP 3.7, strategic planning proposals are to be accompanied by the following information:

a) *The results of a BHL assessment determining the applicable hazard level(s) across the subject land, in accordance with the methodology set out in the Guidelines. BHL assessments should be prepared by an accredited Bushfire Planning Practitioner; or*
b) *Where the lot layout of the proposal is known, a BAL Contour Map to determine the indicative acceptable BAL ratings across the structure plan area, in accordance with the Guidelines. The BAL Contour Map should be prepared by an accredited Bushfire Planning Practitioner; and*
c) *The identification of any bushfire hazard issues arising from the relevant assessment; and*
d) *Clear demonstration that compliance with the bushfire protection criteria in the Guidelines can be achieved in subsequent planning stages.*

Further detail on bushfire planning for the structure plan is contained under Section 3.12 of this report.

Operational Policy 2.4 – Planning for School Sites

As the Structure Plan includes a proposed primary school, Operational Policy 2.4 (OP2.4) has been considered with regard to the siting and design of the proposed primary school site. OP2.4 establish the following requirements with regard to primary school sites:

- Required area to accommodate a government primary school.
- Physical site requirements, servicing and access.
- Movement network and road safety.

Further detail on the design of the proposed primary school site has been address in Section 3.5 of this report.

2.6 Local Government Planning Strategies and Policies

City of Albany Local Planning Strategy

The Local Planning Strategy (LPS) has been prepared to set out the long-term planning directions for the City and to guide land use planning within the City over the next ten to fifteen years. The Local Planning Strategy outlines and applies the wide range of relevant State, regional and local planning policies and strategies, and provides the rationale for the land use and development controls in Local Planning Scheme No. 1.

The objectives of the Local Planning Strategy include:

- *Contain urban development and rural living within the existing supply of land zoned and planned for settlement growth.*
- *Promote urban consolidation by making better use of existing zoned land and infrastructure through urban renewal and infill residential and rural living development.*
- *Facilitate the growth of sustainable rural villages to support agricultural and hinterland communities.*
- *Plan for a variety of housing types in close proximity to services and facilities, in particular affordable housing and one and two bedroom units that meet the needs of young people, retirees and the elderly.*
- *Provide an appropriate level of community facilities and services in existing and planned settlement areas.*
- *Enable people to make healthy choices through effective planning and urban design.*
- *Conserve places and areas of Aboriginal and historic heritage significance.*
- *Incorporate recognition of Native Title rights and interests in planning determinations.*

- *Facilitate accessibility to services and facilities through integrated public transport linkages and cycle and pedestrian-friendly environments.*
- *Build on the existing strengths of the regional centre, Middleton Beach and Albany Waterfront.*
- *Progressively move retail centric shopping centres towards true activity centres that needs the shopping, employment and recreation needs of the community.*
- *Designate sufficient light and general industrial land to support long term economic growth.*
- *Facilitate the diversification of the City's competitive advantages in agriculture and tourism.*
- *Protect the City's pristine natural and coastal environments and other landscape qualities.*
- *Protect agricultural land from inappropriate development.*
- *Plan for an efficient road network and protect rail infrastructure.*
- *Protect regional assets such as the airport and port facilities.*
- *Meet the service infrastructure requirements for settlement growth.*

The Structure Plan area is identified in the Local Planning Strategy for 'Urban Growth' and the development of this land, where vacant, is a priority for the City as this will result in the utilisation of existing infrastructure and services. Subdivision and development of the Structure Plan area in accordance with this proposed Structure Plan is considered to be consistent with the intent of the 'Urban Growth' areas identified in the Local Planning Strategy.

Local Planning Policy – McKail North Outline Development Plan

The prior approved Outlined Development Plan (ODP) which provides the framework for subdivision and development of the Structure Plan area is currently an approved Local Planning Policy.

The existing McKail North ODP is applicable to all land within the Structure Plan area with the intended development outcomes summarised as follows:

- Residential development at a density of R20 and R30.
- Provision for a 3.5ha primary school site with an adjoining 3ha area for district open space in the northeast of the ODP area.
- Provision for a possible future Local Centre in the southeast of the ODP area along Lancaster Road.
- A total POS provision of 6.2998ha.
- A grid pattern road network that provides connections to the existing road network whilst also allowing for integration with future development.

As the proposed Structure Plan seeks to amend the prior approved ODP, it is expected that upon adoption the Local Planning Policy will no longer be required.

DYNAMIC PLANNING AND DEVELOPMENTS

3.0 Opportunities and Constraints Analysis

3.1 Bushfire Hazard

A Bushfire Management Plan has been prepared to accompany the Structure Plan in order to address the requirements of SPP3.7 as the subject site is identified as being located within a bushfire prone area. Details on how the Bushfire Management Plan impacts the Structure Plan are addressed in Section 3.12 with the report included in Appendix 2.

3.2 Noise

A noise assessment has been prepared to accompany the Structure Plan in order to examine the impacts of noise from the speedway in accordance with the requirements of the Albany Speedway Noise Special Control Area. Implications of the acoustic report on the Structure Plan are addressed in Section 3.13 below, with the report included in Appendix 3.

3.3 Wastewater Treatment Plant Buffer

A portion of the Structure Plan Area (land within Lot 300 (No. 2) Timewell Road) is impacted by a buffer associated with the Water Corporation Wastewater Treatment Plant. The design of the subdivision concept plan is such that lots impacted by the buffer are able to accommodate a dwelling outside of the buffer area.

3.4 Acid Sulphate Soils & Contaminated Sites

The Structure Plan is not identified as having any risk of Acid Sulphate Soils and it is not identified as being a contaminated site on the DWER Contained Sites database.

3.5 Ground and Surface Water

Surface water in the northern portion of the site generally drains toward the northeast toward Gladville Road and the adjacent rural property. The southern portion of the site drains south towards a creek line for which the upper reaches commence within a drainage easement immediately north of Lancaster Road. Water features within the Structure Plan include the upper reaches of the creek line, three (3) farm dams and a soak/inundated area in the northeast of the site. The maximum groundwater levels across the development site varied from 0.32m to 0.7m below ground level.

3.6 Aboriginal and European Heritage

The Structure Plan has not been identified as having any Aboriginal or European Heritage.

3.7 Design Considerations

In considering the design of the Structure Plan, the following consideration have informed the location and density of residential development, location and size of public open space and the road layout.

- Proximity to the trotting track has led to the establishment of a designated equine precinct on the land to the south of Lancaster Road. This land will be used to establish training facilities and is already used informally for this purpose.
- Larger lots immediately to the north of Lancaster Road in order to better manage sloping ground levels with reduced reliance on retaining walls as well as better integration with existing lots along Lancaster Road.
- A predominant north south road alignment to ensure access to northern light for the resultant dwellings.

LOCAL STRUCTURE PLAN

- Three distinct areas of public open space to address drainage and also a recreational function that supports higher density development.
- A split density coding to allow for further subdivision when Gladville Road is extended in the property to the north .

DYNAMIC PLANNING AND DEVELOPMENTS

4.0 Stakeholder and Community Engagement

Prior to formal lodgement of the Structure Plan, initial discussions were held with the City of Albany, the WAPC, the Department of Education and Water Corporation. These liaisons can be summarised as follows:

- Preliminary discussions with the City and the WAPC regarding concerns with the ability to implement the prior approved ODP and a desire to modify the approved framework.
- Discussions with the Department of Education on the requirement to deliver the proposed primary school as well as the necessary size remaining consistent with the prior approved ODP.
- Liaison with Water Corporation around the available servicing capacity for the Structure Plan area.
- A number of pre-lodgement meetings and discussions regarding the Structure Plan layout and design.

Formal community consultation was not undertaken as part of the Structure Plan preparation.

5.0 Design Response

5.1 Purpose

The purpose of the Structure Plan is as follows:

- To provide guidance on the use, subdivision and development of land to create a high quality urban environment.
- To achieve an optimum housing density and diversity with an emphasis on achieving consistency with the existing and future housing demand for the locality.
- Maximise the quality of living of future residents.

5.2 Community Design

The Structure Plan proposes residential development on the subject site with the land use permissibility to be consistent with the 'Residential' zone under LPS1. The proposed residential density of between R2.5 and R25 is considered to be 'low density' and is appropriate when considering the existing 'rural' setting within which the Structure Plan exists.

A copy of the relevant Structure Plan is illustrated in Figure 6 below. An overview of the key elements is provided in Table 4 below.

Item	
Total Structure Plan Area	68.1613ha
Area of each land use zones: • Residential	 47.8793ha
Area of reserves: • Road Reserves • Public Open Space • Primary School	 10.2342ha 6.5478ha 3.5ha
Estimated lot yield	570 lots
Estimated dwellings	570 dwellings
Estimated density per site hectare	11.9 dwellings
Estimated population	1482 residents @ 2.6 people per household.
Primary Schools	One (1)
High Schools	None
Total Structure Plan Area	68.1613ha

Table 4 – Structure Plan Summary

Figure 6 – Structure Plan

LOCAL STRUCTURE PLAN

5.3 Movement Network

The proposed street network within the structure plan area has been guided by the provisions of Liveable Neighbourhoods and is considered to provide a permeable road network that will facilitate ease of movement through the Structure Plan Area and beyond through the numerous connections with the surrounding local road network. PJA were also engaged to prepare a Traffic Impact Assessment that looked at the proposed road network, their report is included in Appendix 4.

The majority of the proposed roads within the Structure Plan are consistent with an Access Street D classification in accordance with Liveable Neighbourhoods. There will also be a higher order north south connection between Gladville Road and Lancaster Road that abuts the primary school which will be 20m wide and consistent with an Access Street C classification (see Figure 7 below).

Street type and function	Street characteristics	Street name	Max design speed/ target operating speed (km/hr)	Indicative volume range* (vehicles per day)	Indicative street reserve width (metres)+	Indicative road pavement width (metres)
Access streets Access streets are to accommodate shared pedestrian, bike and vehicular movements. The requirements of adjacent land uses should be supported through street design.	Varied formats to suit a range of typical conditions in predominantly residential areas at different densities, and with different traffic volumes. An avenue access street (Access street A) with median is particularly suited to incorporation of a drainage swale.	**Access street A** – avenue	50/40	3000	20-24	2 x 3.5 (or 2 x 3.6 under some conditions) plus indented parking.
	Access street B is a wider undivided street for situations with increased parking and/or traffic demand.	**Access street B** – wider street	50/40	3000	16.5-18	9.7
	The most typical and most common residential street will be Access street C – Yield street.	**Access street C** – yield or give way street	50/40	3000	15.4-16	7.2 (7-7.5)
	Access street D is for short, low volume and low parking demand streets. In addition, a comprehensively designed variant with 3.5 m travel lane with indented parking, is also specified for very low volume short streets.	**Access street D** – narrow yield or give way street	50/30	1000	14.2	5.5-6
			50/20	150	14.2	3.5 (plus parking indents)

Figure 7 – Access Street Requirements

Intersections within the Structure Plan area will primarily be priority controlled (at T-junctions) or sign controlled (give way/stop at 4-way junctions). The higher order north south road is expected to require at least one roundabout near the proposed school to assist circulation for school peak times.

The proposed movement network is broadly consistent with the existing approved McKail North ODP except for the extension of Timewell Road through to Gladville Road. Removing this four (4) way intersection with Lancaster Road is considered to improve traffic safety with regard to access and egress into and out of the Structure Plan area.

5.4 Lot Layout

The residential densities proposed in the Structure Plan range from R2.5 through to R25. The lower R2.5 density applies only to the land south of Lancaster Road which is an isolated cell of 'Future Urban' zoned land that abuts a public use reserve and 'Rural Residential' zoned land. In this regard the lower R2.5 density and larger 4,000-5,500sqm lots represents appropriate integration with these adjoining uses and has been targeted for the ability of these lots to be used as housing with annexed stables to support facilities for trainers/owners associated with the Albany Trotting Club nearby.

The R5 density coding applies to the existing 4,000sqm lots abutting Lancaster Road which is proposed to be continued along the Structure Plan extent fronting Lancaster Road. This is intended to enable a continuation of similar sized lots along Lancaster Road to what has already been established whilst also ensuring a similar streetscape outcome along Lancaster Road in light of the R2.5 density coding to the south of Lancaster Road. It also provides for better opportunities for tree retention on these lots as well as improved management of sloping ground levels to reduce the reliance on retaining walls.

DYNAMIC PLANNING AND DEVELOPMENTS

There is a small section of R10 coded land in the northwest of the Structure Plan. This is intended to accommodate larger 2,000sqm lots that are capable of further subdivision at a density of R20 when Gladville Road is extended through Lot 124 to the north. The intent is for these lots to then be subdivided into four (4) by ensuring any subdivision that occurs prior to the road extension creates lots with a minimum frontage of 20m to the proposed subdivisional road on the southern boundary of this cell of land. This will then allow the creation of four (4) street facing lots each with a minimum frontage of 10m. The other area of R10 coded lot abuts the R5 density coding along Lancaster Road enabling a smooth transition in lot sizes and reduced reliance on retaining to manage a change in levels.

The Structure Plan also proposes sections of R20 and R25 coded land surrounding areas of public open space and the school which have been identified as areas within the Structure Plan that will have higher amenity value due to the proximity to the public open space.

Whilst the proposed density coding represents a reduction to the existing approved densities under the McKail North ODP, the lot product that will result will meet market expectations in the area and ensure delivery of the estate in the short term to meet the housing needs of the local community. This is further justified when considering the lack of local services and amenities to support the growing population as local schools are a considerable distance away and whilst the Structure Plan does propose a primary school site, the timeframe on the delivery of this is unknown. The closest local commercial centre is in Orana, some 3.3km away with no local commercial centre within walking distance of the site. There is also no local public transport within close proximity of the site, only a school bus.

The proposed residential densities will ensure the delivery of a lot product that meets current market expectations whilst also existing harmoniously within the surrounding rural residential and agricultural land uses that surround the Structure Plan, and creating a legible neighbourhood and considered lot layout that doesn't prevent future recoding and intensification of density when it is justified.

5.5 Public Parkland

The location and size of the proposed public open space (POS) areas are intended to service the residents of the Structure Plan and beyond through the open space area abutting the proposed primary school.

The function of the POS will be consistent with a Local Park classification in accordance with Liveable Neighbourhoods.

The Structure Plan provides a total of 6.5478ha of POS which equates to a total of 10.1% of the total gross subdividable area. Table 2 below provides a schedule of POS within the Structure Plan Area.

PUBLIC OPEN SPACE SCHEDULE			
Structure Plan Site Area			68.1613ha
Less			
- Environmental protection policy areas Wetlands to be ceded	n/a		
- Protected bushland site	n/a		
- Unrestricted public open space sites not included in public open space contribution	n/a		
- Foreshore reserves to be ceded	n/a		
Total		0.00 ha	
Net site area			68.1613ha
DEDUCTIONS			
Primary School	3.5ha		
Town Centre and commercial	n/a		
Dedicated drainage reserve	n/a		
Transmission corridors	n/a		
Road Widening	n/a		
Gross Subdivisible area			64.6613ha
Public open space @ 10 per cent			**6.4661ha**
Public open space contribution			

May comprise:		
- Minimum 80 per cent unrestricted public open space - Minimum 20 per cent restricted use public open space	5.173ha 1.2931ha	
Unrestricted public open space sites - POS	5.7495ha	5.7495 ha
Restricted use public open space sites		
Total restricted use public open space	0.7983ha	0.7983ha
Public Open Space provision		**6.5478 ha (10.1%)**
Note: Gross subdivisible area includes house lots, access roads, and any land incidental to the subdivision. The gross subdivisible area does not include areas for schools, shopping centres, infrastructure (e.g. land required for sewer pump stations), dedicated drainage sites not having a recreational function and land set aside for arterial roads and other non-residential uses.		

Table 5 – Public Open Space Schedule

5.6 Urban Water Management

The stormwater management system for the development has been designed in accordance with the guidelines of the DWER through the Better Urban Water Management framework and the requirements of the City of Albany. The stormwater drainage system has been designed using a major/minor approach.

The minor drainage system has capacity for frequent rainfall events up to the 20% AEP and includes the pipe drainage system, lot attenuation and bioretention storage areas. The minor drainage system is designed to also provide the structural controls for water quality treatment.

The major drainage system is designed to manage a range of rainfall events up to 1% AEP. The major drainage system is designed for rainfall events greater than the 20% AEP, up to the 1% AEP. The major system uses overland flow paths, which includes grading the road network to direct flow to the lowest point of the catchment for flood mitigation.

The capacity of the proposed stormwater drainage system is detailed in the Local Water Management Strategy included in Appendix 5.

5.7 Utilities

An Engineering Servicing Report has been prepared by TABEC which details that the structure plan will have no servicing impediments to the future intended residential development. A copy of the Engineering Serving Report is included in Appendix 6 with a summary of the findings below.

Earthworks – Site grading and remodelling will be kept to minimum limits wherever possible but will be required across the site to enable the construction of the proposed roads, intended lot layout and facilitating the provision of services to each lot.

Water – There are existing Water Corporation assets at the boundaries of the Structure Plan which includes a DN100mm main in the northern verge of Gladville Road, a small DN58mm main in the southern verge of Morgan Road and a DN200mm main in the southern verge of Lancaster Road. The water main in Lancaster Road converts to a DN100mm main, west of unmade road at the location of existing Lot 7. There is also an existing DN100mm main in the western verge of Timewell Road. Water mains within the proposed subdivision are to be designed and constructed according to the Water Corporation specifications with installation funded by the developer based on the staged delivery of the subdivision. Standard infrastructure contributions will also be included.

Sewer – Water Corporation has prepared scheme planning to demonstrate servicing strategies over the development site. Broadly following the natural catchments over the site, a Type 10 WWPS is proposed in the north-east of Lot 507, identified as Willyung PS C.

An additional pump station is proposed in the south-west of Lot 300 to service the southern catchments of Lots 507, 526 and Lot 300, which is Type 40, identified as Willyung PS A. The scheme planning also shows the northern portion of Lot 526 as being serviced by a third WWPS, proposed to be located at the northern boundary of Lot 124 (Willyung PS B). Based on the Subdivision Concept Plan, the full extent of Lot 526 is however able to be graded toward the north-east of Lot 507 and therefore the subdivision is not reliant on a third WWPS.

Stormwater Drainage – There will be three (3) catchment areas with the land to the north of Lancaster Road forming two separate catchments and land to the south of Lancaster Road forming a separating, smaller catchment. Pit and piped drainage systems are proposed throughout to convey stormwater to formalised drainage basins and a living stream in the POS south of Lancaster Road.

Electrical –All lots will be serviced with underground power with the existing network having adequate capacity to service the proposed development. The existing overhead power lines will be replaced with an underground power service as part of the proposed development. To sufficiently service the proposed development, including the primary school site, HV power assets will require up to 4 transformers and 3 switchgears with the total load expected to service the development being in order of 1.9MVA. The existing network capacity modelling indicates an available capacity of 5-10MVA.

Telecommunications – The proposed subdivision falls within NBN's rollout footprint. It is therefore expected NBN Co will extend its fixed line footprint to cover the proposed development providing Fibre to the Premises (FTTP) infrastructure. This will be resolved when a Developer Agreement application is submitted to NBN Co for detailed assessment.
Gas – There are existing medium pressure gas mains in the vicinity of the site, approximately 350m east of the development boundary in Lancaster Road reserve. There are no existing gas mains in Morgan Road, or at the northern boundary of the site, in Gladville Road. There are no obvious constraints to the extension of this network with sufficient capacity available to service the development if required.

5.8 Activity Centre and Employment

The prior approved McKail North ODP included a 'potential Local Centre' which has been removed from the proposed Structure Plan. The progression of the potential Local Centre never occurred with inclusion into the City of Albany Activity Centres Strategy required before planning could progress for this Local Centre.

Whilst the site is identified in the City of Albany Local Planning Strategy as a location for a potential Local Centre, no work has been completed on an Activity Centres Strategy to determine the necessity for this centre. Further, with the reduction in likely lot yield, the justification or need for a local centre has been reduced and as such it has been removed from the Structure Plan.

5.9 Schools

The proposed primary school site has been relocated slightly from the existing approved McKail North ODP into what we consider is a preferable location as it removes the interface with abutting rural residential development. The modified location and size of the primary school site has considered the following:

1. The existing approved area under the McKail North ODP. This is broadly consistent with OP2.4 which ordinarily requires a land area of 4ha unless it adjoins an area of district open space accommodation sporting or recreational facilities which is proposed through the Structure Plan. In this regard the proposed 3.5ha is entirely appropriate.

DYNAMIC PLANNING AND DEVELOPMENTS

2. The land identified for the school site is largely flat and free from constraints and as such there will be no impediment to the delivery of the school site.
3. The requirement to provide three road frontages noted in OP2.4.

5.10 Public Transport

At present there are no bus routes within 400m or rail routes within 800m of the Structure Plan. There is a local school bus service in the vicinity of the Structure Plan area.

5.11 Pedestrian and Cycle Network

No footpaths are present in the existing semi-rural area surrounding the Structure Plan and as such there are no connection opportunities in the short term. Despite this and to future proof the Structure Plan, space within the verge areas will be available for the construction of footpaths.

5.12 Bushfire Management

As the subject site is designated as a bushfire prone area, consideration of State Planning Policy 3.7 – Planning in Bushfire Prone Area (SPP3.7) is warranted. In accordance with SPP3.7, Biodiverse Solutions have prepared a Bushfire Management Plan (BMP) to demonstrate how the Structure Plan will comply with the provisions of SPP3.7. A copy of the relevant BMP is included in Appendix 2 with the findings relevant to the Structure Plan noted below:

- The site is only partially impacted by a bushfire prone designation.
- There is a mostly moderate level of bushfire hazard across the site.
- The proposal is compliant with all bushfire protection criteria noted in SPP3.7.
- The BMP includes the following implementation actions to be considered in subsequent stages of planning and development.

Developer		
No	**Implementation Action**	**Subdivision Clearance**
1	Planning approval may be conditioned with the requirement to make appropriate notifications (on the certificates of title and the deposited plan), of the existence of this Bushfire Management Plan and that the land is within a designated bushfire prone area. A Notification, pursuant to Section 165 of the Planning and Development Act 2005 may be required to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factors. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows: • 'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan. Additional planning and building requirements apply to development on this land'.	**Developer**
2	Ensure a BMP/BAL contour plan is prepared to support the WAPC subdivision application at the subdivision stage.	**Developer**
3	Ensure in the future that prospective buyers are aware of the BAL Contour Plan and the applicable BAL to their property through provision of BAL Contour Plan. Update the BAL contour plan and provide certification of BAL Contour prior to lodgement of titles (post construction).	**Bushfire practitioner**
4	Ensure lots are compliant with the relevant local government's annual firebreak notice issued under s33 of the Bushfires Act 1954.	**Bushfire practitioner**
5	Construct public roads to the standards stated in this BMP (Figure 14).	**Developer and civil engineer**
6	Install reticulated water supply to the standards stated in this BMP.	**Developer and civil engineer**
7	Update or review this BMP report as required or as further planning or design information is available to assist through subsequent levels of WAPC planning.	**Developer**

Figure 8 – BMP Implementation Actions

5.13 Noise Management

Given the Structure Plan is located within the Albany Speedway Noise Special Control Area Herring Storer were engaged to model the likely noise impacts at the future residential lots and recommend noise mitigation measures. A copy of their report is included in Appendix 3 with the critical findings noted below.

- Noise amelioration measures are only required to the first row of residences and the first floor of the second row of residences (if proposed) closest to the speedway as these dwellings will act as a buffer to the noise from the speedway.
- There are two areas that require specific design guidance with regard to noise amelioration and these are referred to as Area A1

and Area A2. The design requirements for these areas are noted below in Figures 9 and 10.

- Where possible, residences are orientated such that garages are located on the side facing the Speedway;
- Front doors facing the speedway, entrance lobbies are incorporated in the design, such that they provide a buffer space between the entrance and the remainder of the residence;
- Double brick or concrete construction;
- Casement windows (with winders) in timber or commercial steel frames and compressible seals;
- Using the 68 dB(A) contour as the buffer zone, glazing to be either 10.38mm or 6.5mm (VLAM Hush) laminated glass to bedrooms facing or exposed to the Speedway;
- Using the 66 dB(A) contour as the buffer zone, glazing to be 6.38mm laminated glass to bedrooms facing or exposed to the Speedway;
- Cantilevered sliding doors to facing or exposed to the speedway are acceptable, provided they had interlocking meeting stiles such as for the Capral 889. Double sliding doors with meeting stiles that butt together are not allowed;
- Eaves to be enclosed using 9mm thick compressed cement sheeting or equivalent;
- Roofs are to be colourbond with minimum 50mm anticon, with ceilings on the top floor to be minimum 2 layer 13mm thick plasterboard to bedrooms and walk in robes, and 1 layer 13mm thick plasterboard to all other spaces, and R3 insulation laid over the top; and
- Recessed light fittings in bedroom ceilings to the top storey are to be acoustically rated.

Figure 9 – Area A1 Design Requirements

- Residences to be located on southern portion of lot.
- Where possible, bedrooms are located on the opposite side of the dwelling away from the Speedway
- Laundry and Bathrooms are preferably located on the same side as the Speedway.
- Double brick or concrete construction.
- Casement windows (with winders) in timber or commercial steel frames and compressible seals.
- For bedrooms facing or exposed to the speedway, glazing to be minimum 6.38mm thick laminated glass.
- Roofs are to be colourbond with minimum 50mm anticon, with ceilings on the top floor to be minimum 1 layer 13mm thick plasterboard to bedrooms and walk in robes.
- Installing the windows slightly forward in the reveal to allow a secondary sliding window to be installed or select frames that allow for the installation of a second operable window to be installed within the frame, such as a Capral window frame or equivalent.

Figure 10 – Area A2 Design Requirements

5.14 Local Development Plans

It is expected that the WAPC may require, as a condition of subdivision approval, that a local development plan(s) be prepared in accordance with Part 6 of Schedule 2 of the Planning and Development (Local Planning Schemes) Regulations 2015.

The local development plan(s) should address:

- Fencing requirements.
- Dwelling orientation.
- Location of crossovers and garages.
- Specific quiet house design requirements.

R2.5	4.24ha
R5	2.76ha
R10	8.21ha
R20	23.33ha
R25	3.3857ha

Legend:

Total LSP Area:	68.13ha
Total area of school:	3.50ha
Total POS are provided:	6.5478ha

Albany Speedway Noise Special Control Area (see c.6.5)

Water Corporation Waste Water Treatment Plant Odour Buffer Special Control Area (see c.6.6)

SUBDIVISION CONCEPT PLAN

LOTS 1 - 13, 507, 526 AND 300 LANCASTER ROAD
McKAIL

Urban Development Institute of Australia WESTERN AUSTRALIA

Planning Institute Australia

CPP CERTIFIED PRACTISING PLANNER

SCALE: 1:5000 @ A3
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N W E S

Bushfire Management Plan Coversheet

This Coversheet and accompanying Bushfire Management Plan has been prepared and issued by a person accredited by Fire Protection Association Australia under the Bushfire Planning and Design (BPAD) Accreditation Scheme.

Bushfire Management Plan and Site Details

Site Address / Plan Reference: Lot 300 (No. 2), 507 (No. 204) Lancaster Road			
Suburb: McKail		**State:** WA	**P/code:** 6330
Local government area: City of Albany			
Description of the planning proposal: Local structure plan to guide a future subdivision			
BMP Plan / Reference Number: MSC0595-001	**Version:** 5.0	**Date of Issue:** 01/08/2024	
Client / Business Name: Acumen Development Solutions			

Reason for referral to DFES	Yes	No
Has the BAL been calculated by a method other than method 1 as outlined in AS3959 (tick no if AS3959 method 1 has been used to calculate the BAL)?	☐	☒
Have any of the bushfire protection criteria elements been addressed through the use of a performance principle (tick no if only acceptable solutions have been used to address all of the BPC elements)?	☐	☒
Is the proposal any of the following special development types (see SPP 3.7 for definitions)?		
Unavoidable development (in BAL-40 or BAL-FZ)	☐	☒
Strategic planning proposal (including rezoning applications)	☒	☐
Minor development (in BAL-40 or BAL-FZ)	☐	☒
High risk land-use	☐	☒
Vulnerable land-use	☐	☒

If the development is a special development type as listed above, explain why the proposal is considered to be one of the above listed classifications (E.g. considered vulnerable land-use as the development is for accommodation of the elderly, etc.)?

The purpose of this proposal is for a local structure plan to guide a future subdivision.

Note: The decision maker (e.g. local government or the WAPC) should only refer the proposal to DFES for comment if one (or more) of the above answers are ticked "Yes".

BPAD Accredited Practitioner Details and Declaration

Name	Accreditation Level	Accreditation No.	Accreditation Expiry
Jason Benson	Level 2	BPAD-37893	01/08/2025
Company Bio Diverse Solutions		**Contact No.** 9842 1575	

I declare that the information provided within this bushfire management plan is to the best of my knowledge true and correct

Signature of Practitioner  **Date** 01/08/2024

BHL Assessment and Bushfire Management Plan

Lot 300 (No. 2), 507 (No. 204) and Lot 526 Lancaster Road

McKail, WA 6330

Final v5

31/07/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

Site Details					
Address:	Lot 300 (No. 2), 507 (No. 204) Lancaster Road				
Suburb:	McKail	State:	W.A.	Postcode	6330
Local Government Area:	City of Albany				
Description of Building Works:	Local structure plan to guide a future subdivision				
Stage of WAPC Planning	Local Structure Planning				

BHL Plan Details			
Report / Job Number:	MSC0595	Report Version:	Final v5
Assessment Date:	18 July 2023	Report Date:	1 August 2024
BPAD Practitioner	Jason Benson (Level 2)	Accreditation No.	BPAD-37893
BPAD Practitioner	Kathryn Kinnear (Level 2)	Accreditation No.	BPAD-30794

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1. Introduction

Acumen Development Solutions commissioned Bio Diverse Solutions (Bushfire Consultants) on behalf of the landowners to prepare a Bushfire Hazard Level (BHL) assessment and Bushfire Management Plan (BMP) to accompany the Local Structure Plan (LSP) to guide a future subdivision at Lot 300 (No. 2), 507 (No. 204) and Lot 526 Lancaster Road, McKail within the City of Albany (CoA). The BMP has been developed to assess the proposal to ensure it is consistent with the current and endorsed 'Guidelines for Planning in Bushfire Prone Areas Version v1.4 (WAPC, 2021)' and 'State Planning Policy 3.7 (WAPC, 2015).

This land was subject to the approved McKail North Outline Development Plan (ODP) in 2015. The updated LSP provides for approximately 309 residential lots ranging between 542sqm and 5,720sqm in area. The plan is for this LSP to provide 15m to 20m wide connecting public roads, various residentially zoned land (R2.5, R5, R10, R15, R20 and R25), four areas of Public Open Space (POS), including a district oval and a public-school site. BDS has prepared this BMP and has been assessed according to the current WAPC guidelines (WAPC, 2021). The proposed lot layout is not currently finalised. The overall proposed structure plan, showing the future access and R-codes, has been provided to indicate how it will comply with the new guidelines, see Figure 2: Local Structure Plan.

1.1 Location

The subject site is located to the northwest of the Albany CBD, as shown in Figure 1.

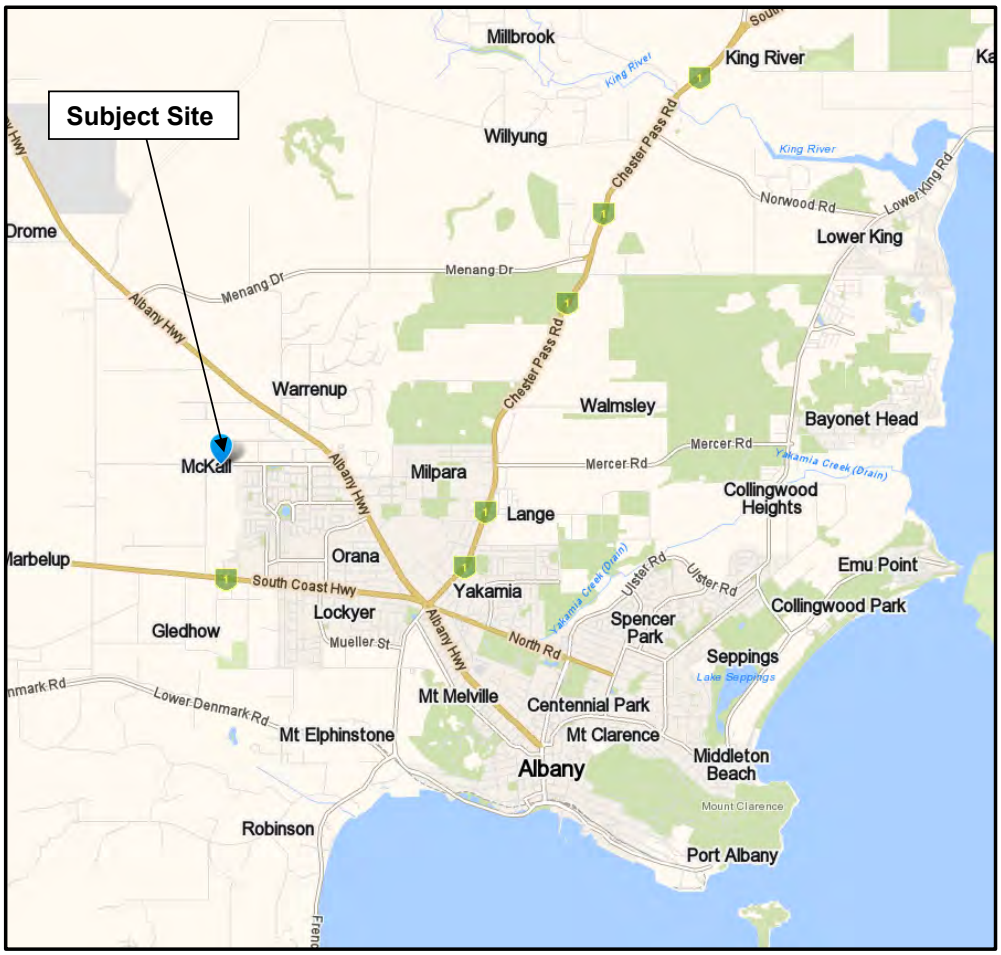

Figure 1: Location Mapping of the subject site

1.2 Development Proposal

The total area of the subject site is approximately 62.7347ha in size and is currently zoned as 'Urban development' under the City of Albany Local Planning Scheme (No. 2). The purpose of this report is to support an LSP to guide the future subdivision application of the site. The future subdivision will allow for approximately 309 new residential lots (R2.5, R5, R10, R15, R20 and R25), new public roads and POS and a public school site, see Figure 2: Local Structure Plan.

Yield Summary		
R2.5	4.24ha	10 Lots
R5	2.52ha	12 Lots
R10	8.23ha	81 Lots
R15	20.1211ha	295 Lots
R20	3.8325ha	81 Lots
R25	3.3857ha	91 Lots
	Total Lots	570 Lots

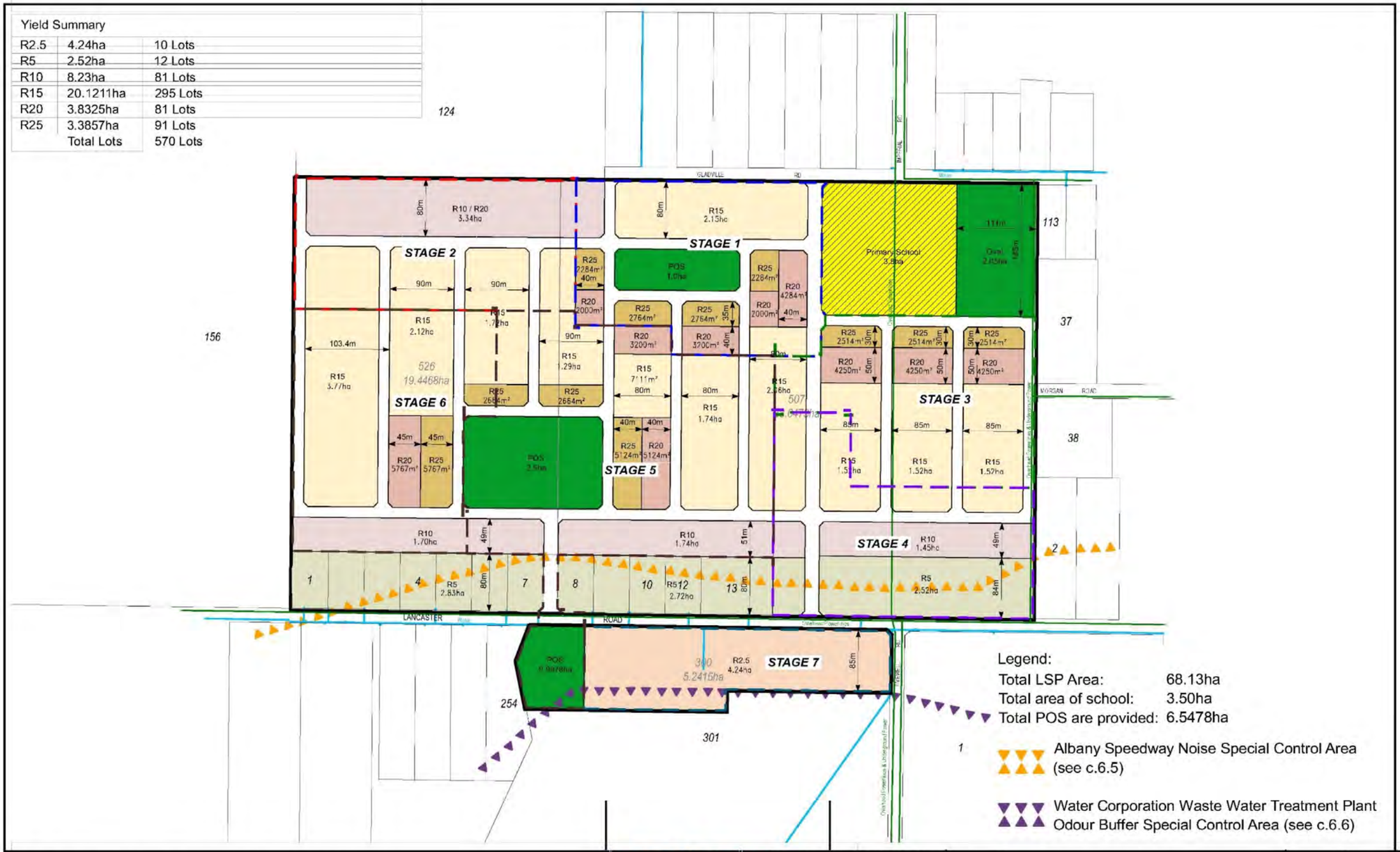

Figure 2: LOCAL STRUCTURE PLAN

LOTS 1 - 13, 507, 526 AND 300 LANCASTER ROAD
McKAIL

Urban Development Institute of Australia WESTERN AUSTRALIA
PIA Planning Institute Australia
CPP CERTIFIED PRACTISING PLANNER

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N W E S

1.3 Bushfire Prone Area

The publicly released Map of Bushfire Prone Areas (OBRM, 2021) shows that the subject site is partially located within a Bushfire Prone Area (within 100m of >1ha of bushfire prone vegetation) and as such is subject to a planning assessment of the bushfire risks. Bushfire Prone Area Mapping (OBRM, 2021) is shown in Figure 3.

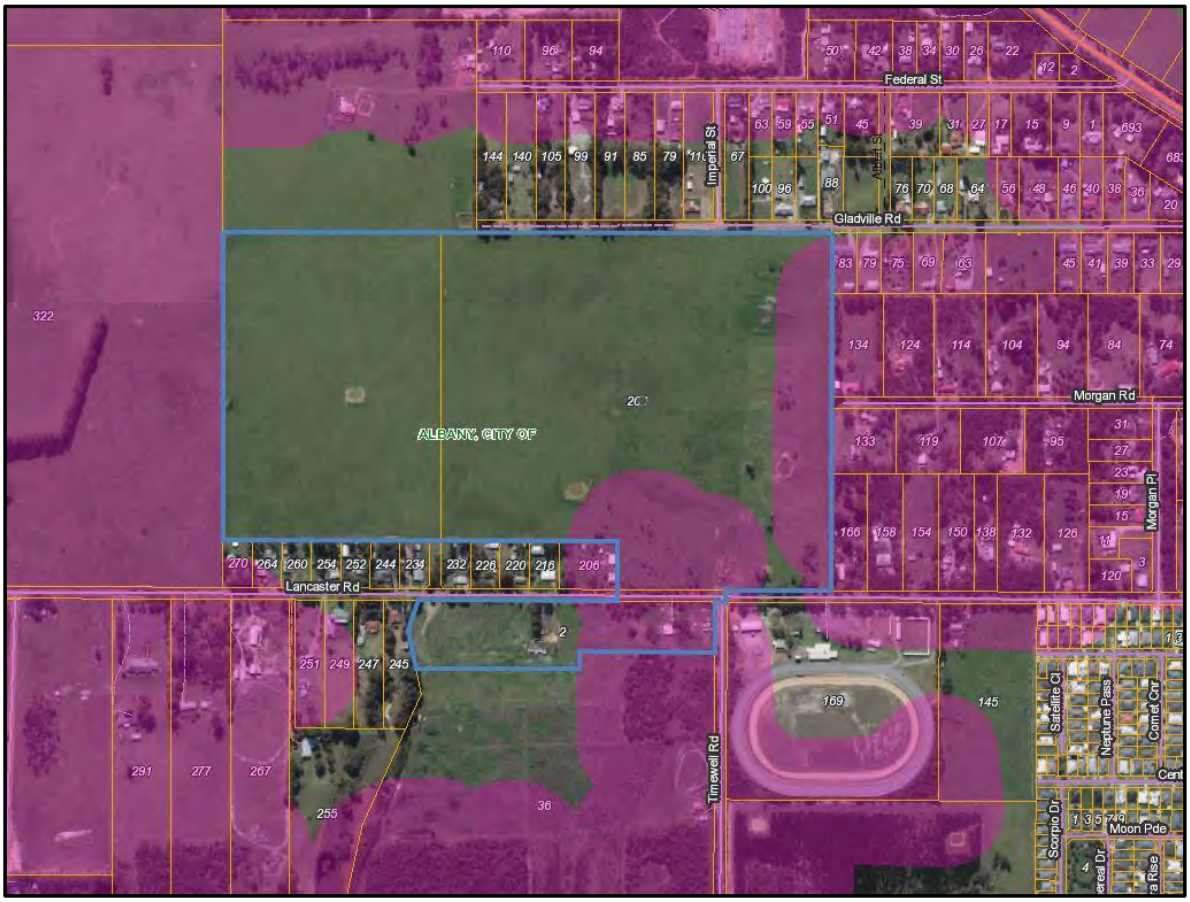


Figure 3: Map of Bushfire Prone Areas and relevance to subject site (OBRM, 2021)

1.4 Statutory Framework

This document and the recommendations contained within are aligned to the following policy and guidelines:

- Planning and Development Act 2005;
- Planning and Development (Local Planning Scheme) Regulations 2015;
- State Planning Policy (SPP) 3.7 Planning in Bushfire Prone Areas 2015 (WAPC, 2015);
- Guidelines for Planning in Bushfire Prone Areas v1.4 (WAPC, 2021);
- Building Act 2011;
- Building Regulations 2012;
- Building Code of Australia (National Construction Code) (NCC, n.d.);
- Fire and Emergency Services Act 1998;
- AS3959-2018 “Construction of Buildings in Bushfire Prone Areas” current and endorsed standards;
- Bushfires Act 1954; and
- CoA Fire Management Notice (CoA, 2023/24).

1.5 Suitably Qualified Bushfire Consultant

This BMP has been prepared by Jason Benson and Kathryn Kinnear. Jason has 8 years of operational fire experience with the (formerly) DEC (between 2002-2012) and has the following accreditation in bushfire management:

- Heavy Duty Fire Appliance Operator;
- Wildfire Suppression 1 & 2;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Jason Benson is an accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD-37893) and has been an accredited Bushfire Consultant for 9 years. Jason is a suitably qualified Bushfire Practitioner to prepare this BMP.

Kathryn Kinnear (nee White), has 10 years of operational fire experience with the (formerly) DEC (1995-2005) and has the following accreditation in bushfire management:

- Incident Control Systems;
- Operations Officer;
- Prescribed Burning Operations;
- Fire and Incident Operations;
- Wildfire Suppression 1, 2 & 3;
- Structural Modules – Hydrants and hoses, Introduction to Structural Fires, and Fire extinguishers; and
- Ground Controller.

Kathryn Kinnear currently has the following tertiary qualifications:

- BAS Technology Studies & Environmental Management;
- Diploma Business Studies;
- Graduate Diploma in Environmental Management; and
- Progression to Masters Environmental Science (ECU).

Kathryn Kinnear is an accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD-30794) with 29 years of bushfire management and planning experience. Bio Diverse Solutions are Silver Corporate Members of the Fire Protection Australia Association and are suitably qualified Bushfire Practitioners to prepare this BMP.

1.6 Objectives

The objectives of this BMP are to assess the present and future bushfire risks associated with the site for the proposed LSP to guide the future subdivision of Lot 300 (No. 2), 507 (No. 204) and Lot 526 Lancaster Road, McKail. The BMP aims to reduce the occurrence of, and minimise the impact of bushfires, thereby reducing the threat to life, property, and the environment. It also aims to guide the LSP by assessing the site to the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas Vers 1.4 (WAPC, 2021).

The BMP objectives are to:

- Achieve consistency with objectives and policy measures of SPP 3.7 (WAPC, 2015);
- Classify the vegetation in accordance with the AS3959-2018;
- Document areas for future fuel reduction within the development area;
- Assess any building requirements to AS3959-2018 (current and endorsed standards) and BAL Construction;
- Assess the proposed LPS against the Bushfire Protection Criteria Acceptable Solutions as outlined in the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021);
- Undertake a broader Landscape Risk Assessment of the proposal;
- Understand and document the extent of the bushfire risk and hazards pertinent to the subject site;
- Establish and document the requirements for access and a firefighting water supply;
- Prepare bushfire management measures within the subject site with due regard to life, property, infrastructure, and the environment; and
- Nominate individuals and organisations responsible for bushfire management and associated works for implementation within the subject site in the subsequent planning stages.

2 Environmental Considerations

2.1 Native Vegetation – Modification and Clearing

This BMP utilises the assumption that the future lots can be maintained in a low fuel state as per the WAPC Asset Protection Zone (APZ) Standards, Schedule 1 (refer to Appendix B). The site predominantly consists of grassland vegetation and some small patches of forest in the south of the subject site. The forest vegetation consists predominately of isolated paddock trees and is in a degraded state. The removal of native vegetation is not planned as part of this proposal, although, in the future, some vegetation may be modified as part of the subdivision (subsequent planning stage), see future low fuel in Figure 4: Vegetation Classes Map. Additional strategies to manage onsite vegetation for the developer and future landowners are outlined in Section 5.2 of this report.

2.2 Review of the Environmental Data Sets (Landgate, 2022)

A review of the environmental data sets (Landgate SLIP) as identified in the Department of Planning, Lands and Heritage BMP Template for a complex development application, does not identify that any regulated (restricted) vegetation will be affected by the proposal, see Table 1 Environment Dataset Review.

Table 1: Environmental Dataset Review.

Dataset	Impact on Proposal	Comment
Conservation category wetlands and buffer	Potentially	Part of the site is within an Albany waterways management area.
DBCA Lands of interest	No	
Wetlands and Waterways	No	
Landscape Hazards	Potentially	Soil Landscape Risk - Wind and water erosion risk area covers the subject site area and surrounds. Soil Landscape Quality - Surface acidity and salinity risk areas cover the subject site area and surrounds.
RAMSAR wetlands	No	
Threatened and priority flora	No	
Threatened Ecological Communities	No	
Clearing regulations – Environmentally Sensitive Areas	No	
Swan Bioplan Regionally Significant Natural Areas 2010	No	
Conservation Covenants Western Australia	Unaware	

Note: Relevant checks have been completed and the proposal does not currently impact on any of the above sites. However, the management strategies contained in this BMP, assume that all environmental approvals will be achieved or clearing permit exemptions will be applied. It is recommended that the proponent seeks specific advice in relation to the clearing of any native vegetation that is proposed as part of this development. Clearing of native vegetation may utilise an exemption under the EP act through the WAPC process. It is advised that the proponent seek further advice from an Environmental Consultant or the WA Department of Biodiversity, Conservation and Attractions (DBCA) on the condition and species contained within the development area and any requirement for referral of the proposal.

2.3 Revegetation or Landscaping

There are four proposed POS areas planned internal to the site. The area of POS in the north will be landscaped (turf, gardens, trees, playgrounds, drainage swale) and (in the long term) managed by the City of Albany. The POS area on the south side of Lancaster Road will consist of turf/trees and a drainage basin/swale. The drainage basin may be vegetated in the future, but at this stage the proposed revegetation strategy and management is unknown. It is estimated that the likely revegetation will consist of sedges, rushes, and reeds and will not negatively impact the BAL ratings over future lots. If the drainage basin is planted out, it should be done in a way that does not increase the bushfire risk over the site. A BAL contour plan will be reviewed and updated accordingly over the site at the subdivision stage. A third POS to the north of Lancaster Road will be the largest central POS and consist of turf/trees and a drainage basin/swale, while the school oval will be the fourth POS managed by the school site. An accredited Level 2 Bushfire Practitioner is to review and approve any future planting, revegetation, or landscaping within the development area to ascertain if the actions will increase the potential bushfire risk over the development.

3 Bushfire Assessment Results

The bushfire assessment for this site has followed the 'Bushfire Attack Level (BAL) Assessment' and 'WAPC Planning in Bushfire Prone Areas Guidelines v1.4' (WAPC, 2021).

3.1 Assessment Inputs

Bushfire Assessment inputs for the site has been calculated using the Method 1 BAL Assessment procedure as outlined in AS3959-2018. This incorporates the following factors:

- WA adopted Fire Danger Index (FDI), being FDI 80;
- Vegetation Classes;
- Effective Slope under classified vegetation; and
- Distance between proposed development site and classified vegetation.

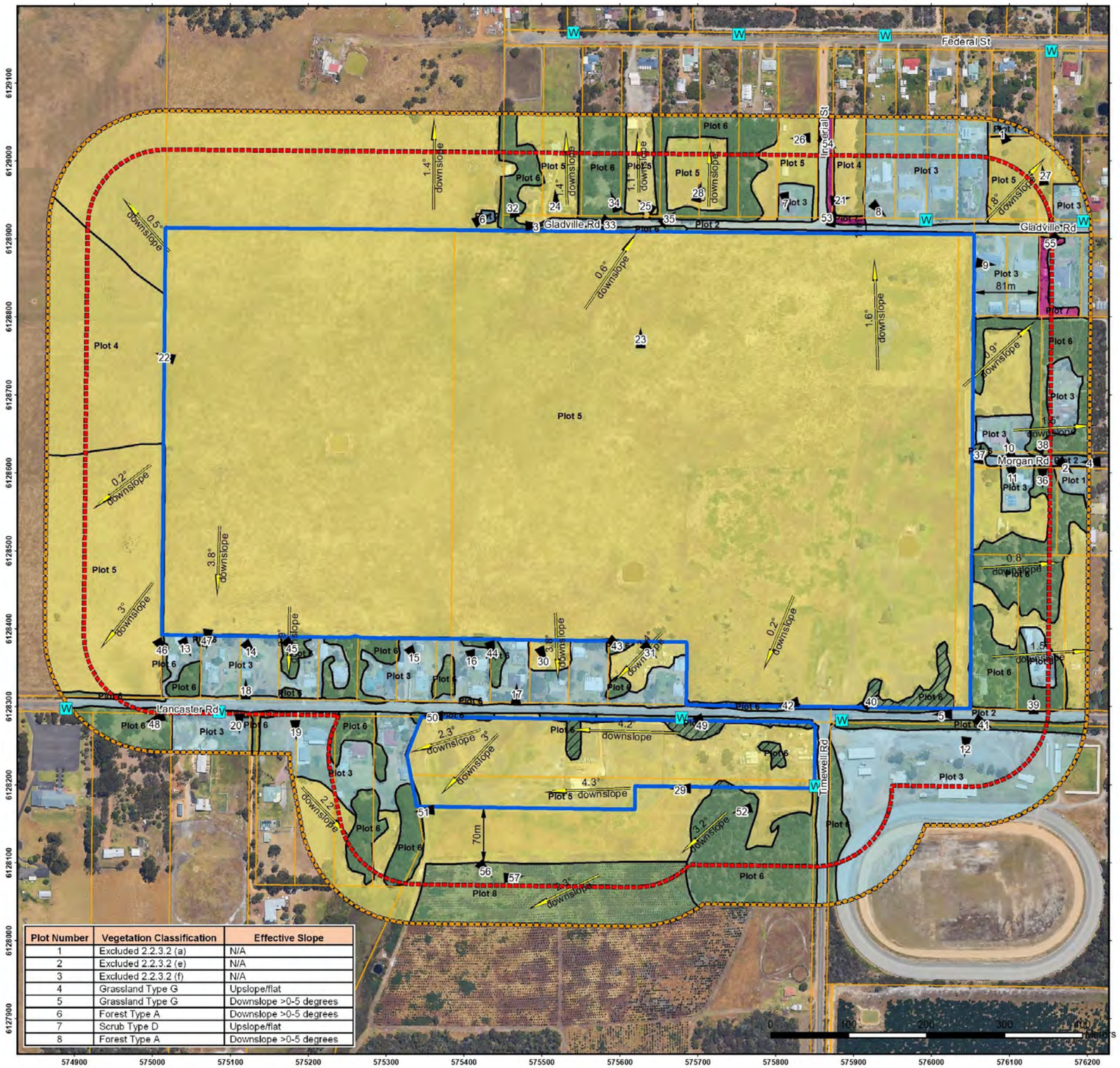
3.1.1 Vegetation Classification

Site assessment occurred on the 18th of July 2023 by Bushfire Practitioners from BDS, Jason Benson (BPAD-37893) and Kathryn Kinnear (BPAD-30794). All vegetation within 150m of the site/proposed development was classified in accordance with Clause 2.2.3 of AS3959-2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown on the Vegetation Classes Map, see Figure 4.

A summary of the Plot data assessed as per Clause 2.2.3 of AS3959-2018 is provided below in Table 2, detailed plot data is provided in Appendix A.

Table 2: Vegetation Classification Table (in accordance with AS 3959-2018) of the subject site.

Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (a)	N/A
2	Excluded 2.2.3.2 (e)	N/A
3	Excluded 2.2.3.2 (f)	N/A
4	Grassland Type G	Upslope/flat
5	Grassland Type G	Downslope >0-5 degrees
6	Forest Type A	Downslope >0-5 degrees
7	Scrub Type D	Upslope/flat
8	Forest Type A	Downslope >0-5 degrees



Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (a)	N/A
2	Excluded 2.2.3.2 (e)	N/A
3	Excluded 2.2.3.2 (f)	N/A
4	Grassland Type G	Upslope/flat
5	Grassland Type G	Downslope >0-5 degrees
6	Forest Type A	Downslope >0-5 degrees
7	Scrub Type D	Upslope/flat
8	Forest Type A	Downslope >0-5 degrees

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BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Separation Distance
- Slopes Degrees
- Photo Point
- Water Point
- Future Low Fuel
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:4,750 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Acumen Development Solutions (Jarrod Rendell)
Lancaster Road Structure Plan
Lancaster Road
McKail, WA 6330

Figure 4: Vegetation Classes

BAL Assessor	*QA Check*	*Drawn by*
JRB	BRM	GSK
STATUS	*FILE*	*DATE*
FINAL	MSC0595	27/09/2023

3.2 Assessment Outputs (Bushfire Hazard Level)

The BHL process provides an indication of the likely impact of a bushfire event as it interacts with the bushfire hazards within and adjacent to the site. The BHL is a measure of the likely intensity of a bushfire and the likely level of bushfire attack on a site by categorizing the hazard (WAPC, 2021). The allocation of category of the bushfire hazard is determined as per Table 3 of the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021), as shown on Figure 5.

Table 3: BHL and classified vegetation (as per AS-3959)

HAZARD LEVEL	CHARACTERISTICS
Extreme	• Class A: Forest • Class B: Woodland (05) • Class D: Scrub • Any classified vegetation with a greater than 10 degree slope
Moderate	• Class B: Open woodland (06), Low woodland (07), Low open woodland (08), Open shrubland (09)* • Class C: Shrubland • Class E: Mallee/Mulga • Class G: Grassland, including sown pasture and crops • Vegetation that has a low hazard level but is within 100 metres of vegetation classified as a moderate or extreme hazard, is to adopt a moderate hazard level.
Low	• Low threat vegetation may include areas of maintained lawns, golf courses, public recreation reserves and parklands, vineyards, orchards, cultivated gardens, commercial nurseries, nature strips and windbreaks. • Managed grassland in a minimal fuel condition (insufficient fuel is available to significantly increase the severity of the bushfire attack). For example, short-cropped grass to a nominal height of 100 millimetres. • Non-vegetated areas including waterways, roads, footpaths, buildings and rock outcrops.

Figure 5: BHL Assessment allocation of category (WAPC, 2021)

3.3 Potential Bushfire Impacts - BHL allocation

The potential bushfire impact on the site/proposed development from each of the identified vegetation plots is presented in Table 3 and shown in Figure 6: BHL Map (Pre-Construction) and in Figure 7: BHL Map (Post-Construction).

Table 3: Potential Bushfire impacts on the Site (BHL Pre and Post-Construction).

Plot Number	Vegetation Type (Table 2.3)	Effective Slope (Table2.4.3)	BHL Allocation (Pre-Construction)	BHL Allocation (Post-Construction)
1	Excluded 2.2.3.2 (a)	N/A	Moderate	Moderate
2	Excluded 2.2.3.2 (e)	N/A	Low	Low
3	Excluded 2.2.3.2 (f)	N/A	Moderate	Low/Moderate
4	Grassland Type G	Upslope/flat	Moderate	Moderate
5	Grassland Type G	Downslope >0-5 degrees	Moderate	Low/Moderate
6	Forest Type A	Downslope >0-5 degrees	Extreme	Moderate/Extreme
7	Scrub Type D	Upslope/flat	Extreme	Extreme
8	Forest Type A	Downslope >0-5 degrees	Extreme	Extreme

NOTES ON BHL ASSESSMENT

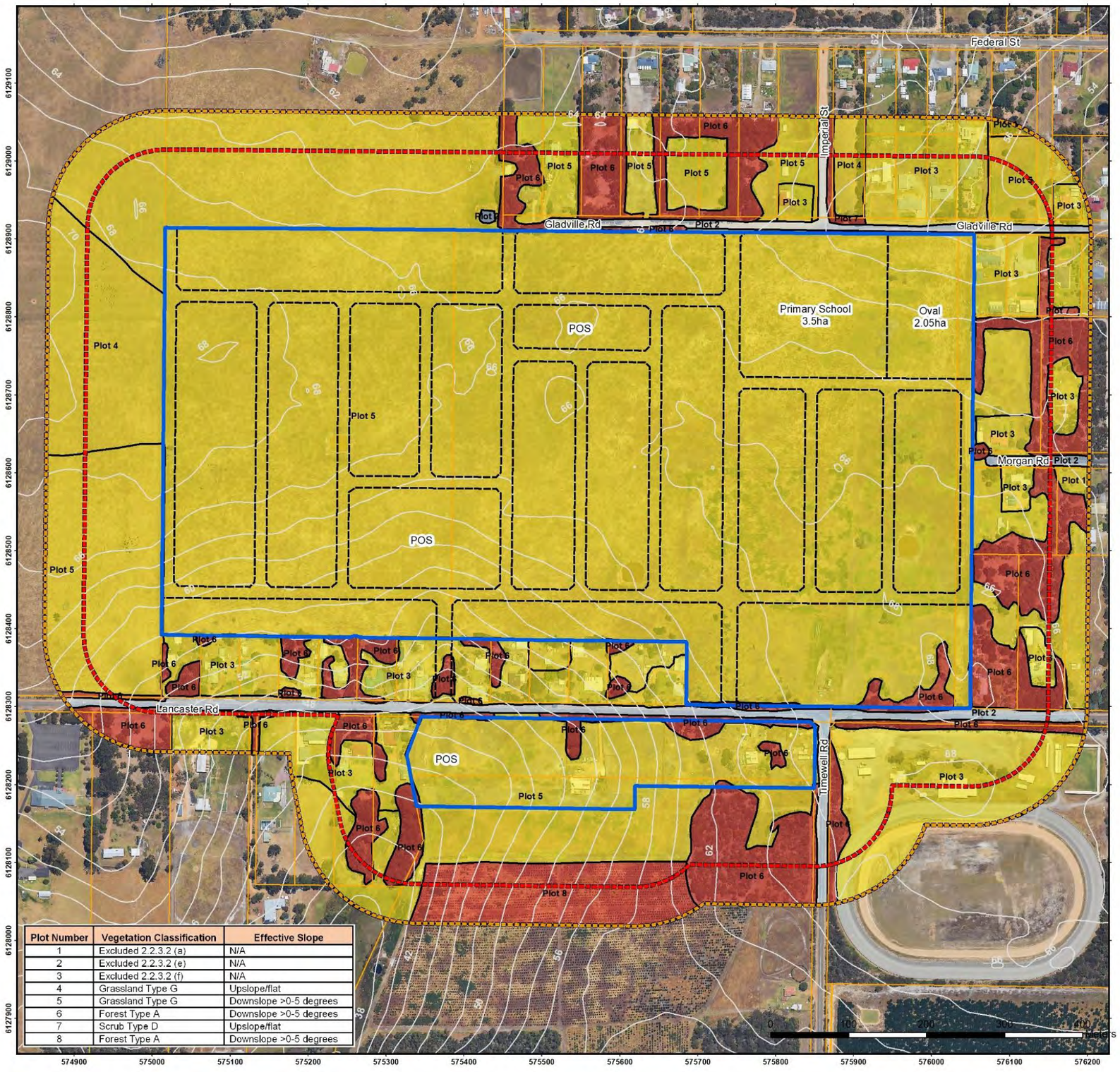
- The BHL assessment was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD37893);
- The BHL Assessment and Map has been prepared in accordance with Department of Planning (WAPC) Guidelines for Planning in Bushfire Prone Areas Version 1.4 (WAPC, 2021);
- It is noted that some of the vegetation is internal to the subject site. Therefore, the separation distance from this vegetation is 0m. However, this vegetation is in under the control of the landowner and can be removed/modified to a low threat state;
- In the future, internal grassland vegetation (part of Plot 5) will be managed in a low fuel condition;
- Forest vegetation (part of Plot 6), internal to the subject site in the south can be removed/modified to a low threat state. Therefore, the post development the BHL will be moderate/low;
- The area proposed for residential development is currently subject to a moderate BHL;
- The area in the southeast of the site (Plots 6 Forest), is currently an extreme BHL. Although, this internal vegetation will be modified to a low threat state in the future and subsequently presents as a Moderate BHL in the post development BHL. The appropriate separation distances will be established at the subdivision stage;
- The post development BHL will be dependent on the management of the internal grassland, it is expected that at the subdivision stage, the BHL over the site will be low/moderate;
- Once the lot layout is established, at the subdivision stage, a BAL contour plan will be completed to determine the BAL ratings over the proposed lots
- The assumptions contained within this report are based on the Local Structure Plan as supplied by the client (Figure 2); and
- Subject site is located in a Bushfire Prone Area; see Figure 3 (OBRM, 2021).

Note on internal vegetation

The lot contains significant areas of internal grasslands which are mapped as a moderate bushfire hazard. Internal to the subject site to the east of the small lot is a small area of Forest Type A (refer to Figure 4: Vegetation Classes Map). Onsite vegetation is within the control of the landowner and therefore can potentially be removed or modified to lower the bushfire risk, subject to approval. Offsite Vegetation is not within the control of the landowner. Therefore, this vegetation cannot be removed or modified by the landowner and as a result bushfire threat from offsite vegetation is unable to be reduced. Bushfire management measures external to the subject site are not required as part of this proposal. For the required separation distances from each vegetation plot to achieve a BAL-29 compliant Asset Protection Zone (APZ), refer to Table 4. A BAL-29 Developable Area has also been indicated on Figure 6 Bushfire Hazard Level Map.

Table 4: Separation Distances to achieve BAL-29 from each Vegetation Plot (BAL-29 APZ).

BAL-29 Asset Protection Zone				
Plot Number	Vegetation Classification	Effective Slope Degrees	Achievable BAL Rating	Minimum Separation Distance Required (metres)
4	Grassland Type G	Upslope/flat	BAL-29	8
5	Grassland Type G	Downslope >0-5 degrees		9
6	Forest Type A	Downslope >0-5 degrees		27
7	Scrub Type D	Upslope/flat		13
8	Forest Type A	Downslope >0-5 degrees		27



Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (a)	N/A
2	Excluded 2.2.3.2 (e)	N/A
3	Excluded 2.2.3.2 (f)	N/A
4	Grassland Type G	Upslope/flat
5	Grassland Type G	Downslope >0-5 degrees
6	Forest Type A	Downslope >0-5 degrees
7	Scrub Type D	Upslope/flat
8	Forest Type A	Downslope >0-5 degrees

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Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- 2m Contours
- Proposed Lot Layout
- Vegetation/Plot Boundary

Bushfire Hazard Level

- Extreme
- Moderate
- Low

Scale
1:4,750 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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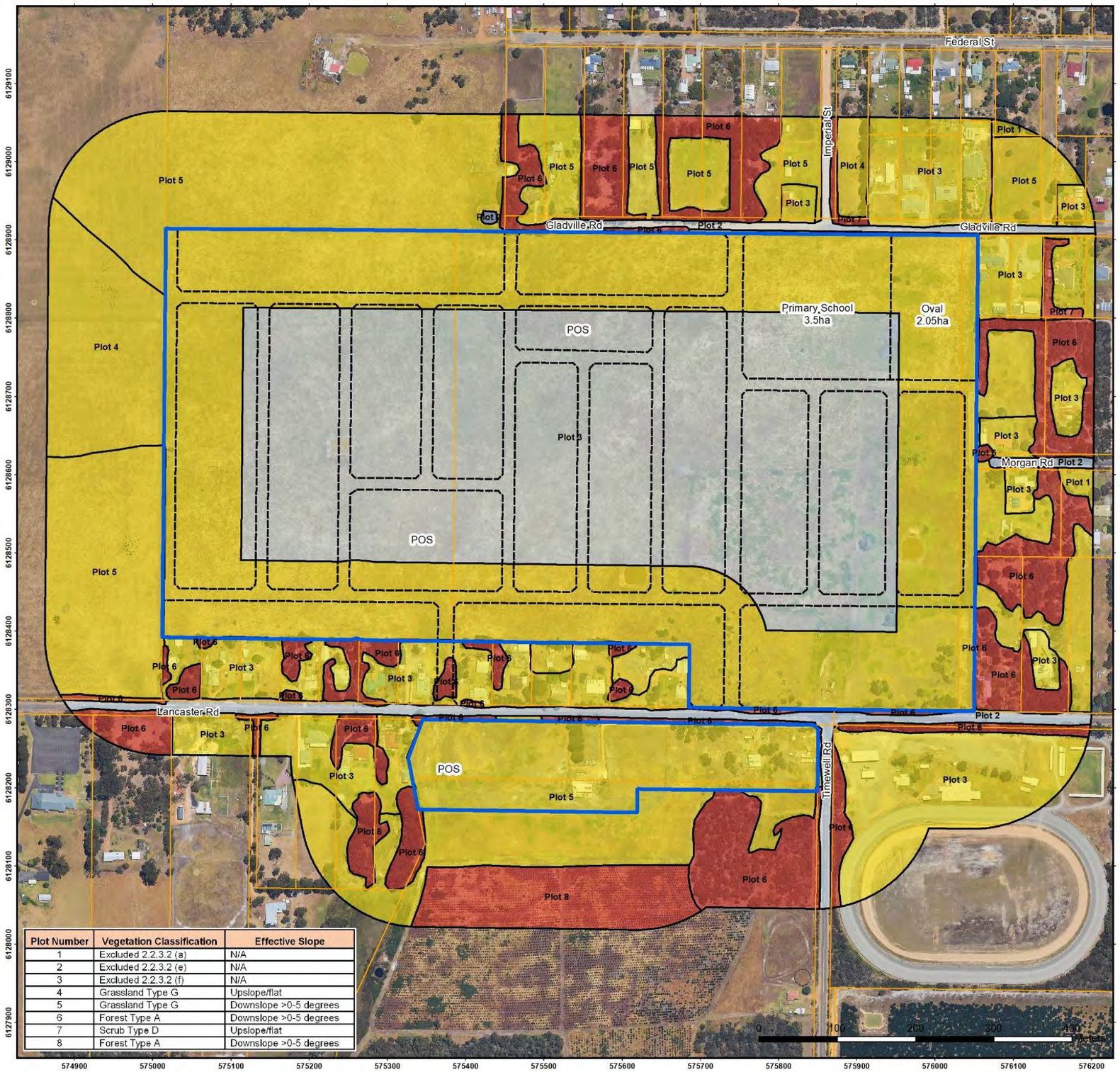
Figure 6: BHL Map (Pre-Construction)

BAL Assessor	*QA Check*	*Drawn by*
JRB	BRM	GSK
STATUS	*FILE*	*DATE*
FINAL	MSC0595	01/08/2024



Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (a)	N/A
2	Excluded 2.2.3.2 (e)	N/A
3	Excluded 2.2.3.2 (f)	N/A
4	Grassland Type G	Upslope/flat
5	Grassland Type G	Downslope >0-5 degrees
6	Forest Type A	Downslope >0-5 degrees
7	Scrub Type D	Upslope/flat
8	Forest Type A	Downslope >0-5 degrees

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Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- Proposed Lot Layout
- Vegetation/Plot Boundary

Bushfire Hazard Level

- Extreme
- Moderate
- Low

Scale
1:4,750 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 7: BHL Map (Post-Construction)

BAL Assessor	*QA Check*	*Drawn by*
JRB	**BRM**	**GSK**
STATUS	*FILE*	*DATE*
FINAL	**MSC0595**	**01/08/2024**

4 Identification of Bushfire Hazard Issues

4.1 Bushfire Hazard Level

The identified bushfire risks associated with the subject site is the strips of vegetation external to the site to the north, east and south of the subject site. These areas consist of Forest Type A and Scrub Type D vegetation classification to AS3959 which is defined as an Extreme BHL. Under hot, dry, and unstable conditions (Extreme to Catastrophic bushfire weather) the subject site is most at risk from bushfire from these directions. Internal to the subject site in the southeast corner is a small patch of degraded forest vegetation, in the future (subdivision stage), it is expected that this vegetation will be modified to a low threat state.

Internal to the site and external in the north, east, south, and west are large areas of open unmanaged grasses and paddock areas. This vegetation has been classified as Grassland Type G, if left unmanaged this vegetation poses a moderate BHL to the proposed development. To the east and southeast of the subject site is an existing rural residential and residential subdivision and the City of Albany CBD which is predominately low fuel, presenting as a Low BHL. Although, if the fuel loads in these areas are not appropriately managed, can still pose a risk of bushfire to the site.

Post development the subject site will be predominantly located in a Moderate/Low BHL (See Figure 7: BHL Map Post-Construction) which is consistent with the acceptable solutions of the WAPC guidelines. At the subdivision stage, onsite vegetation within the subject site (Plot 4 and Plot 5 Grassland and Plot 6 Forest) will be modified and maintained in a low threat state, as per Appendix B Schedule 1 WAPC Asset Protection Zone (APZ) standards to apply. If the local structure plan and subsequent subdivision application are approved, ongoing management of vegetation compliance will be regulated via this BMP for the site and the prevailing CoA Fire Management Notice. A detailed BAL contour plan will be prepared at future West Australian Planning Commission (WAPC) subdivision stage/s.

The outer perimeter roads, structure plan layout and future onsite vegetation management will ensure that BAL 29 or less will prevail on the lot layout. Given the moderate to extreme bushfire risk associated with the site, it is recommended that planting guides are given to new lot owners indicating more flammable/less flammable plant species. This can assist in the land owner's decision making in the establishment and development of their lot. Also see Section 5.2.2.

The predominant onsite vegetation modification will consist of the management of grasses in paddock areas and the ongoing management of new planted vegetation, which can increase the bushfire risk of the area if left unmanaged. Grasses in residential land use areas should be maintained at <100mm at all times, with the balance of land in ownership of the developer to be maintained to this standard at all times.

4.2 Climate

The closest Bureau of Meteorology (BoM) site is Albany (009500). Albany's long-term mean annual rainfall is approximately 925.2 mm though there can be considerable variation in the total rainfall from year to year. Approximately 75 per cent of the annual rainfall occurs between May and October. Although cold fronts are responsible for much of the recorded rainfall total, a moist onshore flow can occur in any season and bring showers or drizzle along the south coast. Albany records rainfall on average 103.5 (≥1mm) rain days annually (BoM, 2022). July is the wettest month (long term average of 142.8mm). The driest month is February with a long-term average of 22.6 mm.

The average maximum temperatures peak in January and February, with monthly means of 22.8°C and 22.9°C (respectively) although temperatures above 35°C sometimes occur when hot, dry northerly winds arrive from the interior of WA. Overnight minimums also peak in January and February at a mild 15.6°C, on average. Winter daily maximum temperatures average approximately 15.8°C (July), while the average minimum is approximately 8.2°C to 8.5°C in July and August (respectively).

The dominant wind direction in summer is from the east and afternoon sea breezes occur from the south west/south east. During winter, southwest winds prevail and northwest storm events occur (BoM, 2022). Although fronts and depressions may bring strong to gale force winds, winter winds are more variable and generally lighter than those of summer. Please refer to Figures 8 to 11.

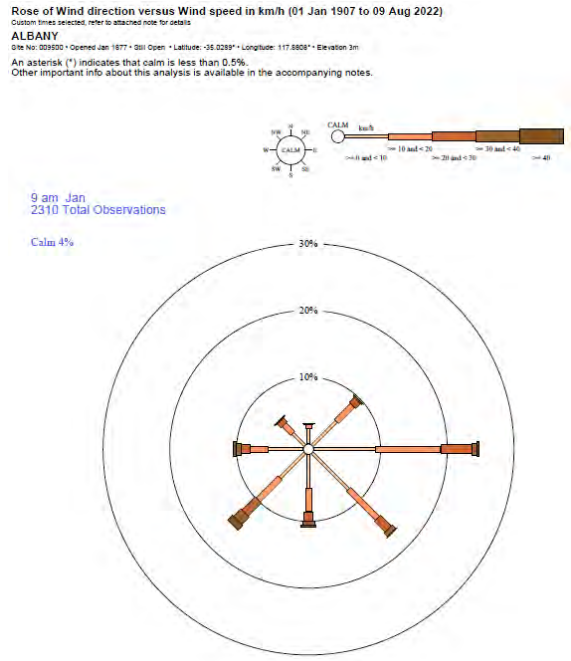


Figure 8: Albany Summer (Jan) 9am wind rose. (BOM, 2022)

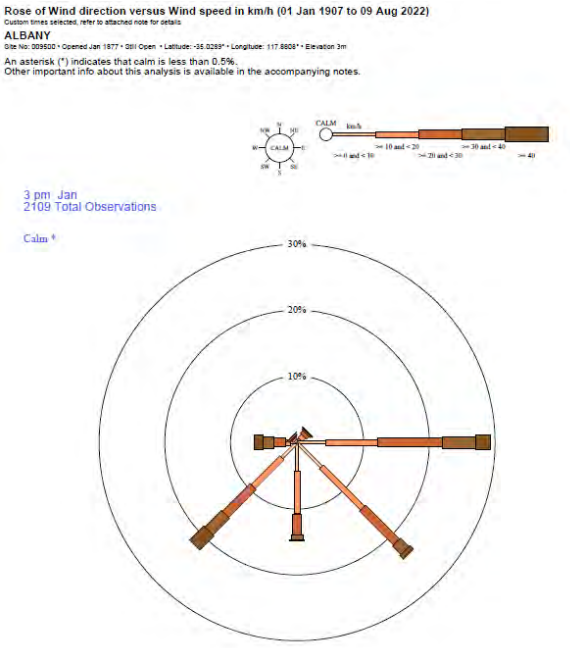


Figure 9: Albany Summer (Jan) 3pm wind rose (BOM, 2022)

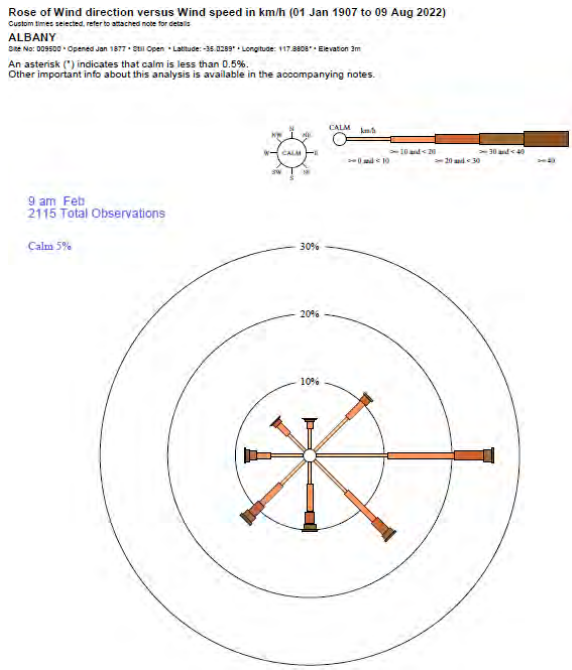


Figure 10: Albany Summer (Feb) 9am wind rose. (BoM, 2022)

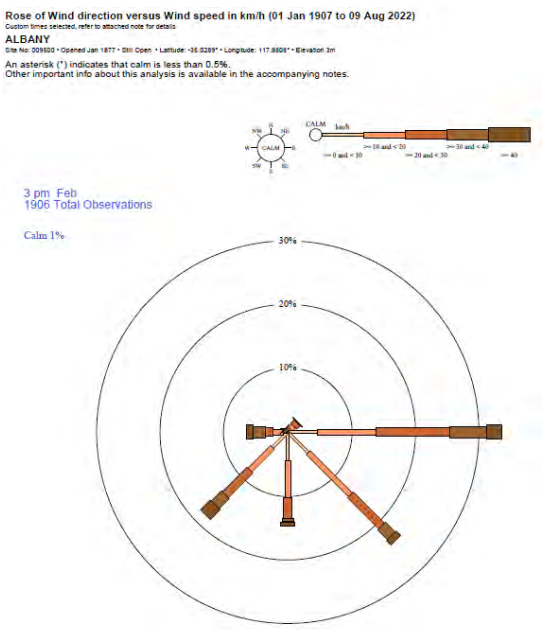


Figure 11: Albany Summer (Feb) 3pm wind rose. (BoM, 2022)

December, January, and February all have the lowest mean 3pm relative humidity recordings on average of 67. Highest curing rates for grasses for the south coast region are on average during January and February (driest periods and lowest relative humidity). Grassland curing refers to the dying or senescence of plant material caused by seasonal weather patterns, species specific phenological cycles and plant succession. Curing has a significant impact on fire behaviour in grasslands, particularly the probability of ignition and the subsequent rate of spread (CRC, 2010). The degree (as a percent) of grassland curing and moisture content are inputs into fire rate of spread models and grassland fire danger ratings.

Fire weather along the south coast region is characterised by mid-level disturbances across the southwest of Western Australia, bringing unstable atmospheric conditions (thunder and lightning) from the north or northwest wind directions. This is characteristic of "Extreme" Fire Weather conditions to the area with hot dry conditions prior to storm events. Risk of lightning strikes, spark ignition, arson and other causes of fire give rise to bushfires under these conditions. Following the unstable conditions, westerly and south westerly fronts across the south coast can bring strong onshore winds.

Prevalent winds which most bushfire events occur in the region are from the northwest, west and northeast direction. Conditions tend to be dry with low relative humidity. High winds and excess fuels can lead to hazardous conditions for residents. Strong easterly and south-westerly winds exist at the subject site during dry summer periods as shown from Albany wind roses in Figure 8-11. The risk of fire from the east onto the subject site (prevalent wind direction) is limited with the lower risk of the Albany urban areas from this direction, also see Section 4.3 Broader Landscape Risk.

4.3 Broader Landscape Risk

Analysis of the broader landscape indicates the subject site is in a predominantly cleared agricultural landscape, the 2km mapping (see Figure 12) indicates that the bushfire risks on a landscape scale would be from the north, northwest and west, and southwest with lesser risks to the south, east and northeast due to the urban areas of Albany. Forest Type A would increase the scale and intensity of bushfire, with Grassland Type G creating fast moving intense fires in the landscape. The fragmented rural residential areas to the south present moderate bushfire risk to the proposed LSP with smaller fragmented areas of Forest Type A, Grassland Type G and Low Fuel exclusions to AS3959.

The vegetation to the north, northwest and west, and southwest has the highest risk of bushfire run into the subject site. Forest Type A is classified as Extreme BHL and presents the highest risk to the site, with large tracts of Forest Type A located to the west of the subject site (>2km from the site). Modified agricultural landscapes dominated by Grassland Type G exist adjacent to the site to the north, northwest, west and pose a moderate risk of fire run into the subject site.

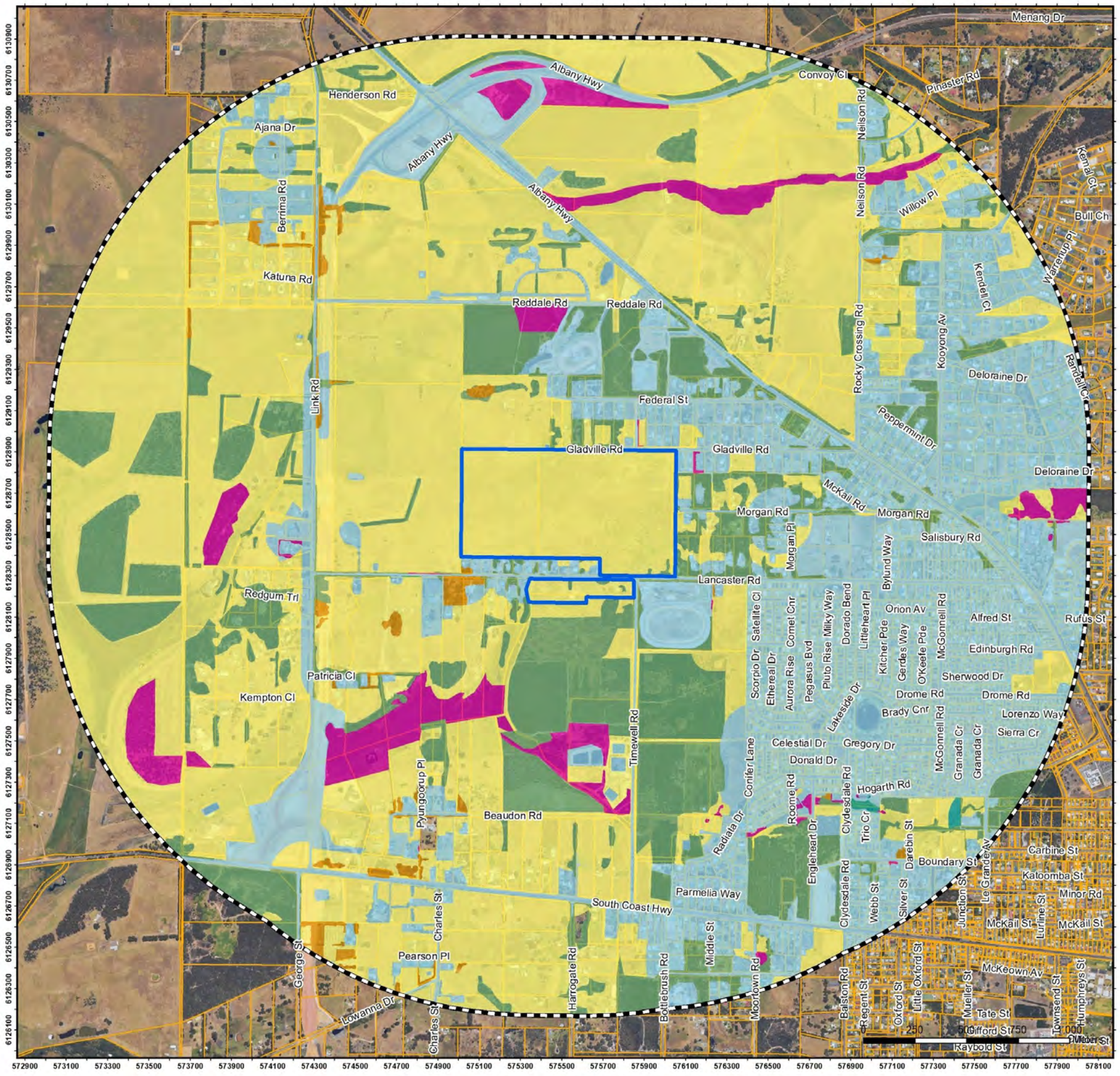
The LSP outlines approximately 326 residential lots ranging between 476sqm and 5719sqm in area. Other future urban development is proposed to the north and west of the subject site. The bushfire risks for the proposed LSP will be the external perimeters to the north and the west until the future urbanisation of the local area occurs. Outer perimeter roads are proposed with the extension of Gladville Road to the west in future development (along most of the northern boundary). Perimeter roads can offer some protection to bushfire attack and enable firefighting agencies to conduct suppression operations more safely.

The predominant vegetation within and surrounding the development area is Grassland Type G in existing paddock/pasture areas. The ongoing management of grasses within residential areas should be maintained at <100mm at all times. The management of new planted vegetation can impact the overall bushfire risk of the area if not maintained in a low fuel condition. Given the bushfire risk associated with the site, it is recommended that new lot owners are provided with planting guides to ensure that the vegetation planted within the lots does not add to the overall fuel loads in the area and contribute to a landscape scale bushfire. Onsite vegetation management and planting of low flammability species can reduce the likelihood of bushfire attack within the future residential development, also see Section 5.2.2.

The safer location in the event of bushfire is evacuation early to the east to the Albany CBD, this is also in the direction of least landscape bushfire risk to the subject site. Also see Section 4.4 Access.

In assessing the broader landscape risk, and noting the proposed development of a school site within the LSP is being contemplated, the draft Planning for Bushfire Guidelines (WAPC, 2023) "Points-based system for determining a broader landscape type" was assessed. This was undertaken as the span of this LSP approval may require assessment in the future to version 2.0 of the WAPC bushfire/framework and guidelines. An assessment of the broader landscape risk has determined a scoring of 5 points, Broader Landscape A based on:

- Proximity of the planning proposal to a suitable destination: *Not adjoining but within 1km – 2 points.*
- The road pattern immediate to the planning proposal is: *Direct and/or straight view lines (grid or modified grid)– 1 point.*
- Public road access to a suitable destination from the planning proposal is: *Provided to two suitable destinations – 1 point.*
- Exposure of the planning proposal to an identified external bushfire hazard (excluding Grassland Type G) is from: *from nil, one or two aspects only; and all of the identified aspects have a slope under the vegetation of less than 10 degrees – 1 point.*



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Overview Map Scale 1:250,000

Legend

- Subject Site
- Cadastre
- 2km Awareness Zone

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:18,000 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 12: Broader Landscape Assessment

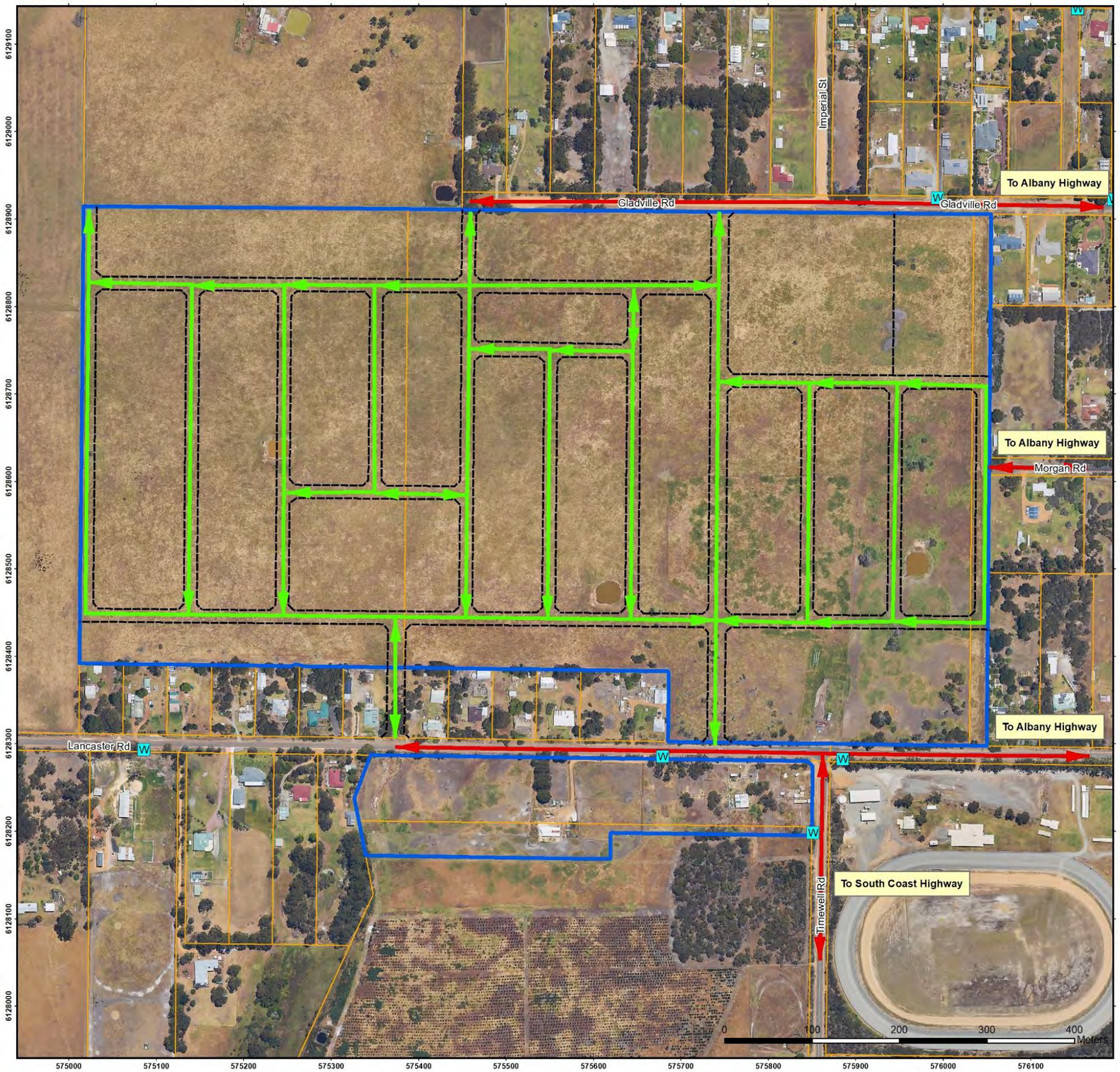
BAL Assessor	QA Check	Drawn by
JRB	KPK	GSK
STATUS	FILE	DATE
FINAL	MSC0595	05/10/2023

4.4 Access

The development area is accessed via Gladville Road to the north, Morgan Road to the east and Lancaster Road to the south, which all connect with Albany Highway to the east. Albany Highway heads south to the Albany CBD and north to Mount Barker. The proposal will include the construction of a new internal road network as well as upgrading and extending the existing Gladville Road. In the future, all new lots will have safe access and egress in two different directions to at least two different destinations, see Figure 13: Access and Water Map. All new and existing public roads will be all-weather construction and meet the minimum technical requirements established by the guidelines, see Figure 14: Vehicle Access Technical Requirements.

4.5 Water Supply

A reticulated water supply will be made available to the subject site. The nearest Water Corporation WA (WCWA) standard hydrant is located directly adjacent to the subject site on Lancaster Road to the south and Gladville Road to the north. The reticulated water network will be extended into the development area at the subdivision stage and new hydrants will be installed consistent with the Design Standard DS63 Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250 (Water Corporation, 2012). All new hydrants will be identified by standard pole and/or road markings. This will meet the current acceptable solutions of the guidelines.



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Overview Map Scale 1:100,000

Legend

- Subject Site
- Cadastre
- Proposed Lot Layout
- W Water Point
- Existing Access Route
- Proposed Access Route

Scale
1:4,250 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

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Figure 13: Access and Water Map

BAL Assessor	*QA Check*	*Drawn by*
JRB	BRM	GSK
STATUS	*FILE*	*DATE*
FINAL	MSC0595	01/08/2024

5 Assessment against the Bushfire Protection Criteria

5.1 Compliance Table

The Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021) outlines bushfire protection criteria which subdivision and development proposals are assessed for compliance. The bushfire protection criteria (Appendix 4, WAPC, 2021) are performance-based criteria utilised to assess bushfire risk management measures and they outline four elements, being:

- Element 1: Location;
- Element 2: Siting and Design of Development;
- Element 3: Vehicle Access; and
- Element 4: Water.

The subject site and the plan of subdivision has been assessed and are required to meet the "Acceptable Solutions" of each element of the bushfire mitigation measures (WAPC, 2021). The proposal has been assessed against all elements of the bushfire protection criteria and found to be compliant, refer to Table 5.

Table 5: Bushfire protection criteria applicable to the subject site.

Element	Acceptable Solution	Applicable or not Yes/No	Proposal meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	Compliant As per SPP 3.7 and the Guidelines for Planning in Bushfire Prone Areas, the local structure plan and subsequent subdivision development will not be subject to a higher BHL than moderate. All new residential buildings can be located within a "Moderate" BHL area and in the future, BAL-29 or lower can be achieved on the lots. Proposal meets Acceptable Solution A1.1.
Element 2 – Siting and Design	A2.1 Asset Protection Zone (APZ)	Yes	Compliant An APZ can be applied and maintained within all future lots and will be required to meet BAL-29 or less. APZ areas associated with BAL-29 or less are deemed to be achievable in the low-fuel urban environment proposed. Moderate to Low BHL will prevail over all lots post-development, see Figure 7: BHL Map (Post-Construction). There is a small patch of forest vegetation in the southeast of the development area. It is expected that in the future at the subdivision stage, this internal vegetation will be modified to a low-threat state and appropriate setbacks from all areas of vegetation will ensure BAL-29 can be achieved for all lots. For required setbacks from classified vegetation, refer to Table 4: BAL-29 Compliant Asset Protection Zone. In the future, all APZs will be maintained to the required standards set out in the guidelines, see Appendix B – Schedule 1 WAPC Asset Protection Zone (APZ) standards. If the subsequent subdivision is staged, the developer is to maintain the balance of land in ownership in accordance with the CoA Fire Management Notice and the WAPC APZ standards. Any landscaping, replanting for buffers, screening or enhancement of the site is to conform to WAPC APZ requirements and should be reviewed by the bushfire practitioner before approval from the Local Government to meet low fuel requirements or to ensure it does not increase the bushfire threat. Proposal meets Acceptable Solution A2.1.
Element 3 – Vehicular Access	A3.1 Public Roads	Yes	Compliant All existing and public roads are or will be constructed to the minimum technical standards as required by the guidelines, refer to Figure 14. All public roads are to meet the relevant trafficable (carriageway/pavement) width as defined/established by CoA. Internal roads currently indicate they will have a 15-20m wide road reserve (subject to detailed engineering design). Public road designs are to be approved at subdivision approval stages by the CoA. Proposal meets Acceptable Solution A3.1.
	A3.2a Multiple Access Routes	Yes	Compliant Lancaster Road, Timewell Road, Morgan Road, Gladville Road, Imperial Street, the surrounding existing road network and the proposed internal road network will provide safe access and egress to two different destinations. Gladville Road will be extended to the west to connect to the proposed new road. The new public road will also connect to Lancaster Road in two locations. Timewell Road heads south to South Coast Highway and Lancaster Road, Morgan Road and Gladville Road all head east, connecting onto Albany Highway, see Figure 13: Access and Water Map. Proposal meets Acceptable Solution A3.2a.
	A3.2b Emergency Access Ways	No	Emergency Access Ways and not planned or required as part of this proposal. Not assessed to A3.2b.

Table 5 cont.

Element	Acceptable Solution	Applicable or Not Yes/No	Proposal meets Acceptable Solution
Element 3 – Vehicular Access cont.	A3.3 Through Roads	Yes	Compliant Lancaster Road, Morgan Road and Gladville Road are currently no through roads, these will be extended/connected to meet two-way access requirements. All new lots will have access to the public road network and have the option of travelling in two different directions to a suitable destination. No through roads are not planned as part of this proposal. Proposal meets Acceptable Solution A3.3.
	A3.4a Perimeter roads	No	Upon completion, the subject site will have constructed public roads to the west and part of the north, part of the east and south as well as an internal road network. External to the subject site on the western and northwestern boundaries, is grassland vegetation. To the north, east and south are mixed forest, grassland, and low fuel areas and will predominantly have a moderate BHL in these areas. All future lots will have public road frontage. Perimeter roads are not planned as part of this proposal. Not assessed to A3.4a.
	A3.4b Fire Service Access Route	No	Suitable access will be provided within the proposed development. No Fire Service Access Routes are proposed. Not assessed to A3.4b.
	A3.5 Battle axe access legs	No	Not addressed at the structure plan stage, to be actioned at the WAPC subdivision stage (WAPC approval) not assessed to A3.5.
	A3.6 Private driveways	No	Not addressed at the structure plan stage, to be actioned in subsequent planning stages (D.A and building approval) not assessed to A3.6.
Element 4 – Water	A4.1 Identification of future water supply	Yes	Compliant. A reticulated water supply will be made available to the subject site. The nearest Water Corporation WA (WCWA) standard hydrants are located to the north on Gladville Road and south on Lancaster Road, in the nearby Rural Residential development. The reticulated water network will be extended into the development area at the subdivision stage and new hydrants will be installed consistent with the Design Standard DS 63 Water Reticulation Standard Design and Construction Requirements for Water Reticulation Systems up to DN250 (Water Corporation, 2012). All new hydrants will be identified by standard pole and/or road markings. This will meet the acceptable solutions of the guidelines. Proposal meets Acceptable Solution A4.1.
	A4.2 Provision of water for firefighting supply	No	Not addressed at the structure plan stage, to be actioned at the WAPC subdivision stage (WAPC approval) not assessed to A4.2.

5.2 Other Bushfire Mitigation Measures

The bushfire risk assessment (Section 4) and assessment to the Bushfire Protection Criteria (Section 5.1) has outlined the bushfire risks for the site and the future development of the subject site. The following sections outlines additional measures and strategies to mitigate the bushfire risk and assist in guiding the future lot owners and the developer of the lots.

5.2.1 Vehicle access technical requirements

All public roads are to be constructed in accordance with the WAPC guidelines. The developer and the appointed civil engineer are to ensure all public roads meet the standards stated in the Figure 14 below at the WAPC subdivision stage.

TECHNICAL REQUIREMENTS	1 Public roads	2 Emergency access way[1]	3 Fire service access route[1]	4 Battle-axe and private driveways[2]
Minimum trafficable surface (metres)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (metres)	N/A	6	6	6
Minimum vertical clearance (metres)	4.5			
Minimum weight capacity (tonnes)	15			
Maximum grade unsealed road[3]	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum grade sealed road[3]		1:7 (14.3%)		
Maximum average grade sealed road		1:10 (10%)		
Minimum inner radius of road curves (metres)		8.5		

Notes:

[1] To have crossfalls between 3 and 6%.

[2] Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3] Dips must have no more than a 1 in 8 (12.5% -7.1 degree) entry and exit angle.

Figure 14: Vehicle Access Technical Requirements

Turnarounds are to be constructed in accordance with the WAPC guidelines, see Figure 15 below.

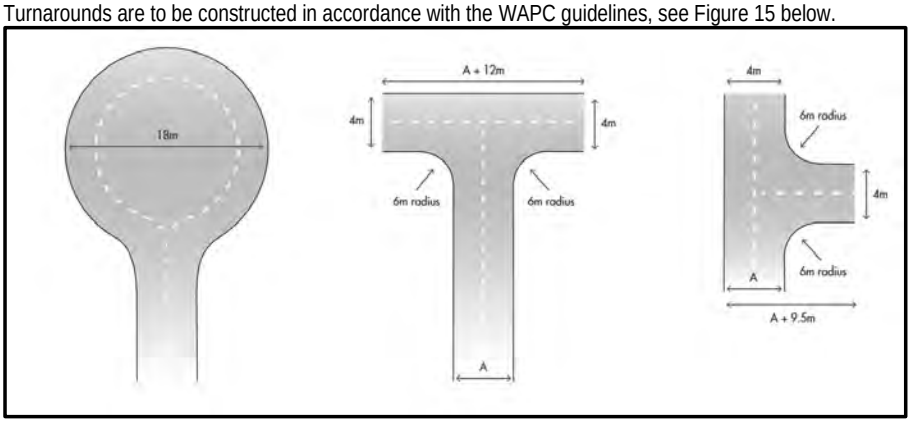

Figure 15: Turn Around Technical Requirements

5.2.2 Minimise Ignition Sources

There is little control of offsite ignition sources, however the following is recommended to be undertaken by the developer while in ownership of the land and any subsequent lots.

Prior to the bushfire season (October) the following activities are undertaken:

- Mowing, slashing and brush cutting (noting illegal to do so on designated total fire ban days) to maintain low fuel across the subject lots and road reserves;
- Maintenance of road access into and out of the site; and
- Sub-contractors are aware of their obligations of minimising ignition sources through documented contractual requirements.

During the summer bushfire season (1st December to 30th April inclusive as designated in the fire control notice) maintenance activities internal to the site should be planned and risk assessed prior to commencement. This includes but not limited to:

- Mowing, slashing and brush cutting (noting illegal to do so on designated total fire ban days);
- Welding, grinding and hot works (not undertaken on designated total fire ban days);
- Temporary waste disposal areas and green waste dumps – ensure piles are not exceeding 1.5m high and have bare mineral earth surrounding (min of 10m); and
- A water tender (min of 200L) fast attack unit is on site during the fire season (any site construction activities).

The Site Construction manager (during subdivision construction phases) in consultation with developer are responsible for safety in construction activities during the bushfire season and are to ensure safety of the site and adjacent properties at all times from potential ignition sources.

5.2.3 Fuel Reduction and APZ Management

Ongoing fuel reduction by landowners to ensure their allocated BAL applies through mechanical slashing and mowing will be required to be undertaken regularly to ensure all internal grasses are maintained. Buildings are to be inspected regularly for build-up of wind-borne debris and leaf accumulation in gutters and at penetrations to buildings (doors, windows, etc). The lot owner is to be responsible for implementation of the maintenance schedule to maintain their BAL setback zones and general bushfire preparedness which should generally reflect the following actions, refer to Table 6.

Table 6: Maintenance schedule – landowners.

Frequency	*Activity*
Weekly (During fire season operations and prior to bushfire event) Also refer to Schedule 1, Appendix B	Check all buildings for wind-borne debris build-up and remove.
	Check gutters are free from vegetation or overhanging branches.
	Trimming and removing dead plants or leaf litter.
	Pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors.
	Check outdoor objects around buildings (see list below).
	Raking and cleaning underfloor spaces (if applicable).
Monthly	Mowing, slashing, and maintaining grasses, more frequently during spring and autumn growth periods.
	Whipper snipper/grass cutter around all buildings.
	Check no combustible materials are stored near buildings or penetrations of buildings (windows doors etc), includes but not limited to – gas bottles, fences, stored combustible material, vines, plants etc.
	Ensure weeds or woody material is not encroaching into the APZ area around buildings (20m minimum), attend to any dead material through trimming and pruning, raking and removing to green waste.
	Any material from pre fire season preparation is either disposed to green waste or burn in piles away for the buildings with a 10m mineral earth break around the pile.

Prior to a bushfire event best practice recommends that objects within the APZ are moved away from the building prior to any bushfire event. Objects may include, but are not limited to:

- Door mats;
- Outdoor furniture;
- Potted plants;
- Shade sails or umbrellas;
- Plastic garbage bins;
- Firewood stacks;
- Flammable sculptures; and
- Playground equipment and children's toys.

These should always be considered in the proximity to buildings and stored appropriately when not in attendance at site. For any replanting or landscaping refer to the Country Fire Authority's Landscaping for Bushfire: Garden Design and Plant Selection (CFA, 2022), and the CFA Key Plant Selection which aims for plants within the APZ that have the following characteristics:

- Grow in a predicted structure, shape and height.
- Are open and loose branching with leaves that are thinly spread.
- Have a coarse texture and low surface-area-to-volume ratio.
- Will not drop large amounts of leaves or limbs, that require regular maintenance.
- Have wide, flat, and thick or succulent leaves.
- Trees that have bark attached tightly to their trunk or have smooth bark.
- Have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed).
- Do not produce or hold large amounts of fine dead material in their crowns.
- Will not become a weed in the area.

Also refer to Schedule 1, Appendix B of this report.

5.2.4 Barrier Fencing

In November 2010, the Australian Bushfire CRC issued a "Fire Note" (Bushfire CRC, 2010), which outlined the potential for residential fencing systems to act as a barrier against radiant heat, burning debris and flame impingement during bushfire. The research aimed to observe, record, measure and compare the performance of commercial fencing of Colourbond steel and timber (treated softwood and hardwood).

The findings of the research found that:

".. *Colourbond steel fencing panels do not ignite and contribute significant heat release during cone calorimeter exposure"* (exposure to heat)

".. Colourbond steel (fencing) had the best performance as a non-combustible material. It maintained structural; integrity as a heat barrier under all experimental exposure conditions, and it did not spread flame laterally and contribute to fire intensity during exposure"

It is also noted that non-combustible fences are recommended by (WAPC, 2021), through APZ standards: Fences and sheds within the APZ are constructed using non-combustible materials e.g. colourbond iron, brick, limestone, metal post and wire. The developer will be encouraged to build Colourbond or non-combustible fences where applicable.

5.2.5 Evaporative Air Conditioners

Evaporative air conditioning units can catch fire as a result of embers from bushfires entering the unit. These embers can then spread quickly through the home causing rapid destruction. It can be difficult for fire-fighters to put out a fire in the roof spaces of homes.

It is also recommended that the Proponent:

- Ensure that suitable external ember screens are placed on roof top mounted evaporative air conditioners compliant with AS3959-2018 (current and endorsed standards) and that the screens are checked annually; and
- Maintain evaporative air conditioners regularly as per DFES recommendations, refer to the DFES website for further details: http://www.dfes.wa.gov.au.

5.2.6 Individual Fire Plan

Residents should prepare their own individual fire plans, as they need to make a commitment to develop a bushfire survival plan detailing preparations and actions to take if a bushfire threatens. By compiling information as outlined above, the individual lot owner can be prepared for their response in a bushfire emergency. Home owners should not rely on emergency personnel to attend their home and thus it is stressed to prepare an individual bushfire emergency plan regarding their intentions and property. This Bushfire Management Plan is not an individual bushfire emergency plan. More information can be gained from the DFES website (s):

www.dfes./wa.gov.au

www.emergency.wa.gov.au

Figure 16: DFES emergency access plan home page (DFES, 2022)

The DFES FDR ratings and warning systems are shown below in Figure 17.

Figure 17: DFES Warning Systems (DFES, 2022)

6 Implementation Actions

The responsibilities of the developer(s), Landowners and local government are shown in Table 7, 8 and 9.

6.1 **Future Lot owner's Responsibility**

It is recommended the future property owners shall be responsible for the following:

Table 7: Implementation actions future lot owners.

Future Lot owner				
No	Implementation Action	Initial	Annual	All times
1	Build to AS3959-2018 as it applies to their property and provide a certified BAL to their proposed building at building approval stages.	✓		
2	Establish/maintain APZ's to the standard stated in this BMP and their allocated certified BAL, see Schedule 1 Standards for APZ's (Appendix B; WAPC, 2021).	✓	✓	✓
3	Maintain individual lots fire breaks and bushfire fuel load in accordance with the current CoA Fire Management Notice and Schedule 1 Standards for APZs (See Appendix B).		✓	
4	A driveway cross over to be designated/ installed for access into the lots to the minimum technical standards as required by current and endorsed WAPC guidelines. To be demonstrated to CoA at planning approval / building approval stages.	✓		✓

6.2 **Developer's** Responsibility

It is recommended the developer be responsible for the following:

Table 8: Implementation actions current land owner/developer.

Developer		
No	Implementation Action	Subdivision Clearance
1	Planning approval may be conditioned with the requirement to make appropriate notifications (on the certificates of title and the deposited plan), of the existence of this Bushfire Management Plan and that the land is within a designated bushfire prone area. A Notification, pursuant to Section 165 of the Planning and Development Act 2005 may be required to be placed on the certificate(s) of title of the proposed lot(s) with a Bushfire Attack Level (BAL) rating of 12.5 or above, advising of the existence of a hazard or other factors. Notice of this notification is to be included on the diagram or plan of survey (deposited plan). The notification is to state as follows: 'This land is within a bushfire prone area as designated by an Order made by the Fire and Emergency Services Commissioner and is subject to a Bushfire Management Plan. Additional planning and building requirements apply to development on this land'.	Developer
2	Ensure a BMP/BAL contour plan is prepared to support the WAPC subdivision application at the subdivision stage.	Developer
3	Ensure in the future that prospective buyers are aware of the BAL Contour Plan and the applicable BAL to their property through provision of BAL Contour Plan. Update the BAL contour plan and provide certification of BAL Contour prior to lodgement of titles (post construction).	Bushfire practitioner
4	Ensure lots are compliant with the relevant local government's annual firebreak notice issued under s33 of the Bushfires Act 1954.	Bushfire practitioner
5	Construct public roads to the standards stated in this BMP (Figure 14).	Developer and civil engineer
6	Install reticulated water supply to the standards stated in this BMP.	Developer and civil engineer
7	Update or review this BMP report as required or as further planning or design information is available to assist through subsequent levels of WAPC planning.	Developer

6.3 Local Government Responsibility

It is recommended the local government be responsible for the following:

Table 9: Implementation actions, City of Albany.

CoA		
No	Implementation Action	Stage of approval
1	Request for the update of the BAL contour plan and certification of BAL Contour prior to clearance of titles (post construction).	WAPC Subdivision Stage
2	Request BAL certification at Building Approval stages on any proposed habitable buildings. Buildings to be located in BAL-29, BAL-19 and BAL-12.5 zones. Increased construction standards to BAL and AS3959-2018 applies to buildings located in the WA bushfire Prone Area Mapping (OBRM, 2021).	Development and Building Approval
3	Ensure vehicle access standards are achieved as per Figure 8.	WAPC Subdivision Stage
4	Ensure all buildings and their respective driveways conform at DA stages to the current and endorsed WAPC guidelines technical standards which apply to driveway construction.	Development Approval
5	Ensure reticulated water is suppled in accordance with the Water Corporation's No. 63 Water Reticulation Standard (WC, 2016) and hydrants are to be identified by standard pole and/or road markings at WAPC subdivision stage.	WAPC Subdivision Stage
6	Monitor landowner compliance with this Bushfire Management Plan and the annual CoA Fire Management notice.	Ongoing
7	Where control of an area of vegetated land is vested in the control of the local government and that area of land has potential to influence the assessed BAL rating/s of future buildings - there is an obligation to consider the impact of any changes to future vegetation management and/or revegetation plans with respect to that area.	Ongoing

7 Disclaimer

The recommendations and measures contained in this assessment report are based on the information available at the time of writing following the instructions of the regulatory authorities and following the requirements of the Australian Standards 3959-2018 – Building in Bushfire Prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021), and applying best practise as described by Fire Protection Association Australia. These are considered the minimum standards required to balance the protection of the dwellings and occupants with the aesthetic and environmental conditions required by local, state and federal government authorities. They DO NOT guarantee that a building will not be destroyed or damaged by a bushfire, people injured, or fatalities occur either at the site or while evacuating. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed development are made in good faith on the basis of the information available to the fire protection consultant at the time of assessment. The achievement of the level of implementation of fire precautions will depend amongst other things on actions of the landowner or occupiers of the land, over which the bushfire consultant has no control. Notwithstanding anything contained within, the consultant/s will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the bushfire consultant) arising out of the services rendered by the consultant.

AS3959-2018 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2018) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.

Building to AS3959-2018 is a standard primarily concerned with improving the ability of buildings in designated bushfire prone areas to better withstand attack from bushfire thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself (AS3959, 2018).

8 Certification

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level(s) stated in this document have been prepared in accordance with the requirements of AS 3959-2018 and the Guidelines for Planning in Bushfire Prone Areas (WAPC, 2021).

SIGNED, ASSESSOR: ..... DATE: 1/08/2024

Jason Benson, Bio Diverse Solutions

Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD3785)

9 Revision Record

Revision	Prepared By	Summary	Reviewed By	Date
Draft Id	Jason Benson	Internal QA review	Graham Penter	5/10/2023
Draft Id	Jason Benson	Internal Technical review	Melanie Haymont	6/10/2023
Final Id v1	Jason Benson	Final Issued to client		9/10/2023
Final Id v2	Jason Benson	Minor amendments		19/01/2024
Final Id v3	Jason Benson	Minor amendments		12/02/2024
Final Id v4	Jason Benson	Minor amendments		15/03/2024
Final Id v5	Jason Benson	Minor amendments		1/08/2024

10 References

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11 Appendices

Appendix A: Vegetation Classifications to AS3959-2018

Appendix B: Schedule 1 - WAPC Asset Protection Zone (APZ) standards to apply

Appendix C: City of Albany, Fire Management Notice (CoA 2023/2024)

Appendix A

Vegetation Classification to AS3959-2018

Vegetation classification to AS3959-2018

Site Details			
Address:	Lots 526 &507 Lancaster Road		
Suburb:	McKail	**State:**	W.A.
Local Government Area:	City of Albany		
Stage of WAPC Planning	Local Structure Planning		

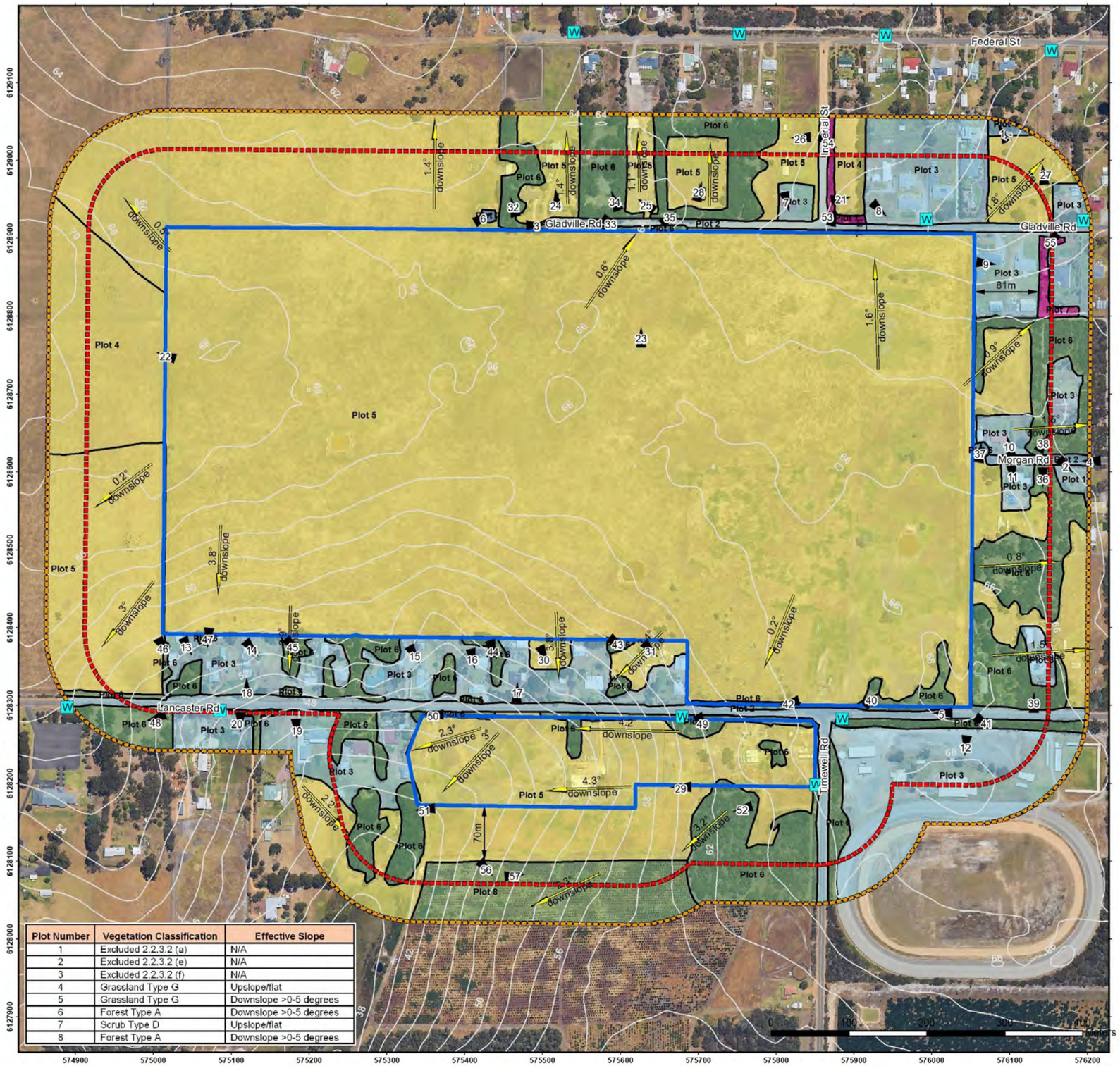
BMP Plan Details			
Report / Job Number:	MSC0595	**Report Version:**	Final
Assessment Date:	18 July 2023	**Report Date:**	31 July 2024
BPAD Practitioner	Jason Benson	**Accreditation No.**	BPAD 37893
BPAD Practitioner	Kathryn Kinnear	**Accreditation No.**	BPAD 30794

Vegetation Classification

Site assessment occurred on the 18 July 2023 by Jason Benson (BPAD 37893) and Kathryn Kinnear (BPAD 30794). All vegetation within 150m of the site / proposed development was classified in accordance with Clause 2.2.3 of AS 3959-2018. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified in the following pages and shown on the Vegetation Classes Map Page 3.

Table 1: Vegetation Classification Table (in accordance with AS 3959-2018) of the subject site

Plot Number	Vegetation Classification	Slope (Table 2.4.3)
1	Excluded 2.2.3.2 (a)	N/A
2	Excluded 2.2.3.2 (e)	N/A
3	Excluded 2.2.3.2 (f)	N/A
4	Grassland Type G	Upslope/flat
5	Grassland Type G	Downslope >0-5 degrees
6	Forest Type A	Downslope >0-5 degrees
7	Scrub Type D	Downslope >0-5 degrees
8	Forest Type A	Downslope >0-5 degrees



Plot Number	Vegetation Classification	Effective Slope
1	Excluded 2.2.3.2 (a)	N/A
2	Excluded 2.2.3.2 (e)	N/A
3	Excluded 2.2.3.2 (f)	N/A
4	Grassland Type G	Upslope/flat
5	Grassland Type G	Downslope >0-5 degrees
6	Forest Type A	Downslope >0-5 degrees
7	Scrub Type D	Upslope/flat
8	Forest Type A	Downslope >0-5 degrees

Albany Office:
29 Hercules Crescent
Albany, WA 6330
(08) 9842 1575

Denmark Office:
7/40 South Coast Highway
Denmark, WA 6333
(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450
(08) 9072 1382

BPAD Bushfire Planning & Design

BIO DIVERSE SOLUTIONS

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- 150m Assessment Boundary
- 2m Contours
- Separation Distance
- Slopes Degrees
- Photo Point
- W Water Point
- Vegetation/Plot Boundary

Vegetation

- Forest Type A
- Scrub Type D
- Grassland Type G
- Excluded 2.2.3.2

Scale
1:4,750 @ A3
GDA MGA 2020 Zone 50

Data Sources
Aerial Imagery: WA Now, Landgate Subscription Imagery
Cadastre, Relief Contours and Roads: Landgate 2022
IRIS Road Network: Main Roads Western Australia 2017
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Acumen Development Solutions (Jarrod Rendell)
Lancaster Road Structure Plan
Lancaster Road
McKail, WA 6330

Vegetation Classes

BAL Assessor	QA Check	Drawn by
JRB	BRM	GSK
STATUS	**FILE**	**DATE**
FINAL	MSC0595	16/08/2023

Plot	1	Classification or Exclusion Clause	Excludable - 2.2.3.2(a) >100m from site
			**Location:** Northeast and east of the subject site. **Separation Distance:** >100m. **Description:** Areas of classified vegetation >100m from the subject site. Excluded as per AS3959 exclusion clause 2.2.3.2 (a).
Photo Id 1: View to the north-northwest towards vegetation located >100m from the subject site to the northeast. Note: Photo taken at a distance due to lack of access.			
Plot	**1 cont.**	**Classification or Exclusion Clause**	**Excludable - 2.2.3.2(a) >100m from site**
			**Additional Photo of Plot 1.**
Photo Id 2: View to the southeast towards vegetation located >100m from the subject site to the east. Note: Direction stamp on photo is incorrect.			

Plot	2	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Location:** North, east, and south of the subject site. **Description:** Roads, driveways, buildings, dams, and other non-vegetated areas. As per exclusion clause 2.2.3.2 (e) of AS3959-2018.

Photo Id 3: View facing east along Gladville Road, located to the north of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Additional Photo of Plot 2.**

Photo Id 4: View facing west along Morgan Road, located to the east of the subject site.

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Additional Photo of Plot 2.**
Photo Id 5: View facing west along Lancaster Road, located adjacent to the southeast corner of the subject site.			

Plot	2 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(e) Non Vegetated Areas
			**Additional Photo of Plot 2.**
Photo Id 6: View to the east-northeast towards a dam, located to the north of the subject site.			

Plot	3	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Location:** North, east, and south of the subject site. **Description:** Maintained gardens and lawns in Asset Protection Zone (APZ) areas surrounding existing buildings, managed lawns at the trotting track, City of Albany managed road reserves and firebreaks. As per exclusion clause 2.2.3.2 (f) of AS3959-2018.
Photo Id 7: View to the south-southeast towards a maintained APZ, located to the north of the subject site.			
Plot	**3 cont.**	**Classification or Exclusion Clause**	**Excludable - 2.2.3.2(f) Low Threat Vegetation**
			**Additional Photo of Plot 3.**
Photo Id 8: View to the southeast towards a maintained APZ, located to the north of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**

Photo Id 9. View to the east towards a maintained APZ, located to the east of the subject site, adjacent to the northeast corner.

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**

Photo Id 10: View to the north towards a maintained APZ, located to the east of the subject site.

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 11: View facing south towards a maintained APZ, located to the east of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 12: View facing south towards managed area at the Albany Trotting Track, located to the southeast of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 13: View facing south-southeast towards maintained APZ area, located to the south of the northern portion of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 14: View facing southeast towards maintained APZ area, located to the south of the northern portion of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**

Photo Id 15: View facing south-southeast towards maintained APZ area, located to the south of the northern portion of the subject site.

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**

Photo Id 16: View facing south towards maintained APZ area, located to the south of the northern portion of the subject site.

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 17: View facing north towards maintained APZ, located between the two portions of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 18: View facing north towards maintained APZ, located to the south of the northern portion of the subject site. Note: Direction stamp on photo is incorrect.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 19: View facing south towards maintained APZ, located to the south of the northern portion of the subject site.			

Plot	3 cont.	Classification or Exclusion Clause	Excludable - 2.2.3.2(f) Low Threat Vegetation
			**Additional Photo of Plot 3.**
Photo Id 20: View facing south towards managed low fuel area, located to the south of the northern portion of the subject site. Note: Direction stamp on photo is incorrect.			

Plot	4	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Location:** North and west of the subject site. **Separation Distance:** 0m from the subject site boundary. **Description:** Mixed unmanaged grasses, sedges, and weeds in paddock and other open areas. Some trees present, less than 10% canopy cover noted. **Average vegetation height:** 50-300m. **Vegetation Coverage:** <10% trees. **Available fuel loading**: 4.5t/ha. **Effective slope:** Upslope/flat.
Photo Id 21: View facing east towards grassland vegetation, located to the north of the subject site.			
Plot	**4 cont.**	**Classification or Exclusion Clause**	**Class G Grassland – Sown pasture G-26**
			**Additional Photo of Plot 4.**
Photo Id 22: View facing west-northwest towards grassland vegetation, located to the west of the subject site.			

Plot	5	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Location:** Internal to the subject site in the north, east, south, and west. **Separation Distance:** 0m. **Description:** Mixed unmanaged grasses, sedges, and weeds in paddock and other open areas. Some trees present, less than 10% canopy cover noted. **Average vegetation height:** 50-300m. **Vegetation Coverage:** <10% trees. **Available fuel loading**: 4.5t/ha. **Effective slope:** Downslope >0-5 degrees.

Photo Id 23: View facing north towards grassland vegetation, located to the north of the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**

Photo Id 24: View facing north towards grassland vegetation, located to the north of the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**
Photo Id 25: View facing northwest towards grassland vegetation, located to the north of the subject site.			

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**
Photo Id 26: View facing west towards grassland vegetation, located to the north of the subject site.			

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.** .
Photo Id 27: View facing north towards grassland vegetation, located to the northeast of the subject site.			
Plot	**5 cont.**	**Classification or Exclusion Clause**	**Class G Grassland – Sown pasture G-26**
			**Additional Photo of Plot 5.** .
Photo Id 28: View facing north-northeast towards grassland vegetation, located to the north of the subject site.			

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**

Photo Id 29: View facing west towards grassland vegetation, located to the south of the southern portion of the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**

Photo Id 30: View facing south-southeast toward grassland vegetation, located to the south of the subject site.

Plot	5 cont.	Classification or Exclusion Clause	Class G Grassland – Sown pasture G-26
			**Additional Photo of Plot 5.**
Photo Id 31: View facing southeast towards grassland vegetation, located to the south of the subject site.			
Plot	**6**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Location:** Internal in the south and southeast and external in the north, east, and south of the subject site. **Separation Distance:** 0m. **Description:** Forest vegetation consisting of mixed Eucalyptus, Casuarina, marri, and Acacia Trees. Dense canopy cover with multilayered scrub mid/understorey of Acacia, Leucopogon, Xanthorrhoea, grasses, sedges, and rushes. **Average vegetation height:** 4-15m. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective slope:** Downslope >0-5 degrees.
Photo Id 32: View facing north-northwest towards forest vegetation, located to the north of the subject site.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.** *Note: Single row of trees, ongoing management unknown, precautionary principle applied.*
Photo Id 33: View facing east-southeast toward forest vegetation, located to the north of the subject site.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 34: View facing north-northwest toward forest vegetation, located to the north of the subject site. Note: Photo direction incorrect.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 35: View facing northeast toward forest vegetation, located to the north of the subject site			
Plot	**6 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 6.**
Photo Id 36: View facing south toward forest vegetation, located to the east of the subject site. Note: Photo direction incorrect.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 37: View facing north toward small patch of forest vegetation located to the east of the subject site.			
Plot	**6 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 6.**
Photo Id 38: View facing north-northeast toward forest vegetation, located to the east of the subject site. Note: Photo direction incorrect.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 39: View facing north toward forest vegetation, located near the southeast corner of the subject site.			
Plot	**6 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 6.**
Photo Id 40: View facing northeast towards thin strip of forest vegetation, located to the south of the northern portion of the subject site.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 41: View facing east-southeast toward forest vegetation, located adjacent to the southeast corner of the subject site.			
Plot	**6 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 6.**
Photo Id 42: View facing west towards forest vegetation, located to the south of the northern portion of the subject site.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 43: View facing southeast towards forest vegetation, located to the south of the northern portion of the subject site in adjacent private property.			
Plot	**6 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 6.**
Photo Id 44: View facing south-southeast towards forest vegetation, located to the south of the northern portion of the subject site in adjacent private property.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 45: View facing southeast towards forest vegetation, located to the south of the northern portion of the subject site in adjacent private property.			
Plot	**6 cont.**	**Classification or Exclusion Clause**	**Class A Forest - Low open forest A-04**
			**Additional Photo of Plot 6.**
Photo Id 46: View facing south-southeast towards forest vegetation, located to the south of the northern portion of the subject site in adjacent private property.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 47: View facing south towards forest vegetation, located to the south of the northern portion of the subject site in adjacent private property.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**
Photo Id 48: View facing west-southwest towards forest vegetation, located near the southwest corner of the subject site.			

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**

Photo Id 49: View facing south-southeast towards forest vegetation, located on the northern boundary of the southern portion of the subject site.

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**

Photo Id 50: View facing west towards forest vegetation, located on the northern boundary of the southern portion of the subject site.

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**

Photo Id 51: View facing west towards forest vegetation, located in the southwest corner of the southern portion of the subject site.

Plot	6 cont.	Classification or Exclusion Clause	Class A Forest - Low open forest A-04
			**Additional Photo of Plot 6.**

Photo Id 52: View facing west-southwest towards forest vegetation, located to the south of the subject site.

Plot	7	Classification or Exclusion Clause	Class D Scrub - Open scrub D-14

Location: North and east of the subject site.

Separation Distance: 11m to the north and 81m to the east.

Description: Scrub vegetation consisting of planted rows of mixed garden plants and scrub species.

Average vegetation height: 2-4m.

Vegetation Coverage: 10-30% foliage cover.

Available fuel loading: 25t/ha.

Effective slope: Upslope/flat.

Photo Id 53: View facing north-northeast toward scrub vegetation, located to the north of the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Class D Scrub - Open scrub D-14

Additional Photo of Plot 7.

Photo Id 54: View facing east-southeast toward scrub vegetation, located to the north of the subject site.

Plot	7 cont.	Classification or Exclusion Clause	Class D Scrub - Open scrub D-14
			**Additional Photo of Plot 7.**
Photo Id 55: View facing southwest toward scrub vegetation, located to the east-northeast of the subject site.			
Plot	**8**	**Classification or Exclusion Clause**	**Class A Forest - Pine plantation**
			**Location:** South of the subject site. **Separation Distance:** 70m. **Description:** Forest vegetation consisting of planted pine trees. Currently only young and approximately 4-6m in height. At maturity could reach up to 30m and will present as forest vegetation. **Average vegetation height:** Currently 4-6m, though could reach up to 30m in height. **Vegetation Coverage:** 30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective slope:** Downslope >0-5 degrees.
Photo Id 56: View facing southeast through forest vegetation, located to the south of the subject site.			

Plot	8 cont.	Classification or Exclusion Clause	Class A Forest - Pine plantation
			**Additional Photo of Plot 8.**
Photo Id 57: View facing east through forest vegetation, located to the south of the subject site.			

COMMENTS ON VEGETATION CLASSIFCATIONS:

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2018) Simplified procedure was used for vegetation classification Assessment process;
- All vegetation was classified within the subject site and within 150m of the lot boundaries to AS3959 Table 2.3; and
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps.

CERTIFICATION

I hereby certify that I have undertaken the assessment of the above site and determined the Bushfire Attack Level stated above in accordance with the requirements of AS 3959-2018.

SIGNED, ASSESSOR: ..... DATE: 31/07/2024

Jason Benson, Bio Diverse Solutions
Accredited Level 2 BAL Assessor (Accreditation No: BPAD37893)

REVISION RECORD

Revision	Prepared By	Summary	Reviewed By	Date
Draft Id	Jason Benson	Internal Review	Melanie Haymont	16/08/2023
Final Id	Jason Benson	Final Issued to Client		12/02/2024
Final Id	Jason Benson	Minor amendments		31/07/2024

Appendix B

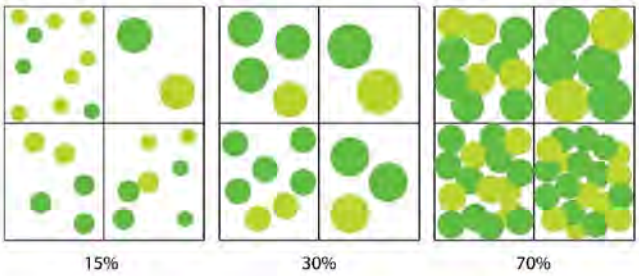
Schedule 1 WAPC Asset Protection Zone (APZ) standards to apply

ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Fences within the APZ	• Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959).
Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness)	• Should be managed and removed on a regular basis to maintain a low threat state. • Should be maintained at <2 tonnes per hectare (on average). • Mulches should be non-combustible such as stone, gravel or crushed mineral earth or wood mulch >6 millimetres in thickness.
Trees* (>6 metres in height)	• Trunks at maturity should be a minimum distance of six metres from all elevations of the building. • Branches at maturity should not touch or overhang a building or powerline. • Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation. • Canopy cover within the APZ should be <15 per cent of the total APZ area. • Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.
Shrub* and scrub* (0.5 metres to six metres in height). Shrub and scrub >6 metres in height are to be treated as trees.	• Should not be located under trees or within three metres of buildings. • Should not be planted in clumps >5 square metres in area. • Clumps should be separated from each other and any exposed window or door by at least 10 metres.
Ground covers* (<0.5 metres in height. Ground covers >0.5 metres in height are to be treated as shrubs)	• Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above. • Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.

Figure 19: Tree canopy cover – ranging from 15 to 70 per cent at maturity



ELEMENT 2: SITING AND DESIGN OF DEVELOPMENT

SCHEDULE 1: STANDARDS FOR ASSET PROTECTION ZONES

OBJECT	REQUIREMENT
Grass	• Grass should be maintained at a height of 100 millimetres or less, at all times. • Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
Defendable space	• Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.
LP Gas Cylinders	• Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building. • The pressure relief valve should point away from the house. • No flammable material within six metres from the front of the valve. • Must sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

Appendix C

City of Albany, Fire Management Notice (CoA, 2023/2024)

FIRE MANAGEMENT NOTICE
2023 - 2024

FIRST AND FINAL NOTICE IS HEREBY SERVED TO OWNERS AND OCCUPIERS OF LAND IN THE CITY OF ALBANY

This Notice constitutes the City of Albany Fire Management Notice pursuant to Section 33 of the *Bush Fires Act 1954*.

You are required to prepare and maintain your property for the fire season. This Notice sets out the actions you must take.

All fire mitigation measures must be in place by and maintained for the following periods:

NORTHEAST SECTOR	01 October 2023 to 30 April 2024
SOUTHWEST SECTOR	01 December 2023 to 14 May 2024

City of Albany officers are authorised to enter private property, without notice to the owner, to inspect and confirm compliance with this notice. If you fail to comply with the requirements contained within this Notice, penalties under the *Bush Fire Act 1954* may apply.

CITY OF Albany

The owner or occupier of land who has received notice under Section 33(1) of the Bush Fires Act 1954 and who fails or neglects in any respect duly to comply with the requirements of the notice is guilty of an offence and liable to a fine of $5000.

Properties up to 4000m2

The owner or occupier must reduce any fire hazard on their land by:

- Creating and maintaining *perimeter fire breaks**
- Maintaining *fine fuel load** over whole property to an average of two (2) tonnes per hectare
- Creating and maintaining *hazard specific fire breaks**
- Creating and maintaining *building protection zones**

*SEE DEFINITIONS

Properties 4000m2 to 50 Hectares

The owner or occupier must reduce any fire hazard on their land by:

- Creating and maintaining *perimeter fire breaks**
- Maintaining *fine fuel load** over whole property to an average of eight (8) tonnes per hectare
- Creating and maintaining *hazard specific fire breaks**
- Creating and maintaining *building protection zones**

*SEE DEFINITIONS

Non-Agricultural Non-Cropping Non-Stock Properties over 50 Hectares

The owner or occupier must reduce any fire hazard on their land by:

- Creating and maintaining *perimeter fire breaks**
- Creating and maintaining *hazard specific fire breaks**
- Creating and maintaining *building protection zones**

*SEE DEFINITIONS

Agricultural Cropping and/or Stock Properties over 50 Hectares

The owner or occupier must reduce any fire hazard on their land by:

- Creating and maintaining *perimeter fire breaks** are not compulsory but recommended
- Creating and maintaining *hazard specific fire breaks**
- Creating and maintaining *building protection zones**
- Cropping paddocks must be broken into compartments not exceeding 250 hectares in area, each separated by internal trafficable breaks.

*SEE DEFINITIONS

Definitions

Perimeter Fire Breaks - are a continuous *trafficable* access track that has standard dimensions of 3 metres wide with 4 metres vertical clearance, located within 20 metres of the property boundary. It can be created by ploughing, cultivating, scarifying, burning or otherwise clearing including slashing and maintaining vegetation length below 50mm.

Hazard Specific Fire Breaks - are a 3 metre low fuel area around inflammable hazards with vegetation maintained below 50mm. Includes but is not limited to; haystacks, non-dwelling sheds, green electricity power domes, electricity power poles and fuel storage areas.

Fine Fuel Load - are grasses and dead combustible vegetation matter less than 6mm in thickness. It does not include processed mulch below an average depth of 50mm.

Building Protection Zone - is a defendable space immediately adjacent to a building *no less* than three metres wide, clear of inflammable vegetation and material. Further, combustible objects, plants, garden supplies such as mulches should be avoided within 10 metres of the building and vegetation kept to a minimum and kept in a low fuel state. The *building protection zone* may reduce the likelihood and impact that direct flame contact, radiant heat or ember attack may have on buildings in the event of a bushfire.

Inflammable - means a substance or material easily ignited and capable of bursting into flames without the need of an ignition source.

Trafficable - means the capacity to allow a firefighting truck or other firefighting vehicle to safely navigate the interior perimeter of the property safely without impediment.

Information Subsidiary to the Fire Management Notice

Variation to the requirements of the Fire Management Notice:

If you cannot meet these fire management notice requirements, you must apply for a variation or submit an approved Bush Fire Management Plan (BFMP).
Applications for variations must be submitted to the City of Albany by the 01 November 2023.

The City will only accept a BFMP completed by an accredited Bush Fire Planning and Design Practitioner. A BFMP can encompass single or multiple properties. All properties covered by a BFMP must comply with the conditions of the BFMP.

Please contact the City of Albany on 6820 3000 or visit the City's website www.albany.wa.gov.au.

Conservation, Special Residential, Rural Residential and Special Rural Zones:

Properties located in these zones approved under subdivision plans in the Albany Local Planning Scheme Number 1 where required are to comply with fire mitigation requirement conditions under the subdivision plan. If an owner or occupier of a property in one of these zones fails to maintain the mitigation requirements under the subdivision plan, then they will be subject to the requirements of this Fire Management Notice.
To check your property zone and subdivision mitigation requirements please contact City of Albany Planning Services on 6820 3000 or email planning@albany.wa.gov.au

Information Subsidiary to the Fire Management Notice

Plantation Lots:

Owners and lessees of plantation lots must comply with the Department of Fire and Emergency Services (DFES) *Guidelines for Plantation Fire Protection (the guidelines)* in addition to this fire management notice. The guidelines are available from the DFES website https://publications.dfes.wa.gov.au/.

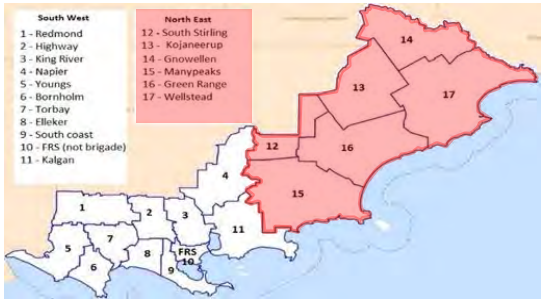
Significant Dates:

NORTH EAST SECTOR FIRE SEASON	
1 October 2023 – 14 November 2023	Restricted Burning permits required
1 October 2023	Requirements of Fire Notice MUST be in place and maintained
15 November 2023 – 15 February 2024	BURNING PROHIBITED
16 February 2024 – 30 April 2024	Restricted Burning permits required

SOUTH WEST SECTOR FIRE SEASON	
1 November 2023 – 14 December 2023	Restricted Burning permits required
1 December 2023	Requirements of Fire Notice MUST be in place and maintained
15 December 2023 – 14 March 2024	BURNING PROHIBITED
15 March 2024 – 14 May 2024	Restricted Burning permits required

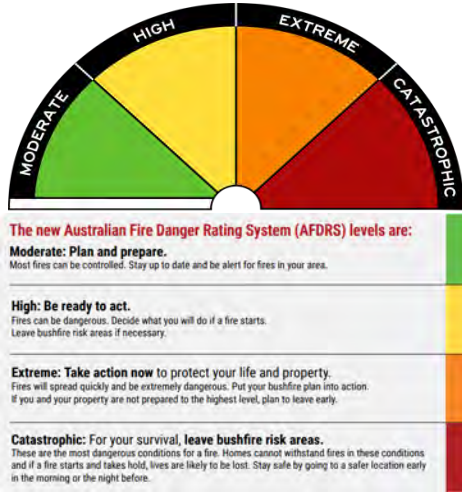
These dates are subject to change. Any changes will be published in the local newspapers and on the City of Albany website at www.albany.wa.gov.au

City of Albany Sector Map



Fire Danger Rating

Fire Danger Ratings (FDRs) tell you how dangerous a fire would be if one started. The higher the FDR, the more severe the bushfire will be. They are based on weather conditions forecast by the Bureau of Meteorology.



Disclaimer:

The requirement to clear a fire break exempts an owner or occupier from needing a permit to clear native vegetation under the Environmental Protection Act 1986 however it does not authorise an owner or occupier to carry out excessive clearing. Clearing or removal of native vegetation beyond the requirements of this notice will require permission from other State Legislative Authorities.

The City of Albany, or a contractor engaged by the City, may enter your land to install fire breaks or reduce fuel loads with any expenses incurred charged to the owner or occupier.

The City may vary a requirement or condition of this Notice at its discretion.

Any 'variation to requirements' approval you hold may be declared void at any time by the City.

This notice is issued and authorised by:

Andrew Sharpe
Chief Executive Officer

102 North Road, Yakamia
PO Box 484, ALBANY WA 6330
Phone 6820 3000
Email staff@albany.wa.gov.au
www.albany.wa.gov.au

RESIDENTIAL DEVELOPMENT
LANCASTER ROAD, NORTH McKAIL

LOTS 526, 507 AND 300

ENVIRONMENTAL NOISE ASSESSMENT

FEBRUARY 2024

OUR REFERENCE: 32194-3-24035

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
HERRING STORER ACOUSTICS
P.O. Box 219, Como, W.A. 6952
(08) 9367 6200
hsa@hsacoustics.com.au

DOCUMENT CONTROL PAGE

ENVIRONMENTAL NOISE ASSESSMENT

McKAIL ROAD, LANCASTER

Job No: 24035

Document Reference: 32194-3-24035

FOR

VEGATE PTY LTD

DOCUMENT INFORMATION			
Author:	Paul Daly	**Checked By:**	Tim Reynolds
Date of Issue:	5 February 2024		

REVISION HISTORY				
Revision	**Description**	**Date**	**Author**	**Checked**
1	Client comments	19/02/2024	PLD	

DOCUMENT DISTRIBUTION				
Copy No.	**Version No.**	**Destination**	**Hard Copy**	**Electronic Copy**
1	3	Acumen Attn: Jarrod Rendell Email: jarrod@acumends.com.au CC reegancake@dynamicplanning.net.au		✓

CONTENTS

APPENDICIES

1.0 INTRODUCTION

Herring Storer Acoustics was commissioned by Acumen on behalf of Vegate Pty Ltd to carry out a noise impact assessment for a proposed residential development located at Lots 526, 507 and 300 Lancaster Road, North McKail (see Figure A1 and A2 in Appendix A for Study Area). The site is adjacent to the Albany Speedway.

The site falls within the City of Albany's "Speedway Noise Buffer Area Policy". It has been recommended by the *Environmental Protection Authority* that an acoustic assessment be completed, with regards to noise emissions from the speedway at the residential development. Appendix C provides a copy of the "Speedway Noise Buffer Area Policy".

The objective of this study was to detail a suitable combination of buffer distance and mandatory acoustic insulation/quiet house design parameters.

The proposed residential area of concern is located on the west and southern quadrants from the speedway and includes the following lots:

- Lots 300, 507, 526 and 1918 Lancaster Road.

This acoustic assessment has been provided in support of the ODP application.

The concept plan is shown below in figure 1.1, and in Appendix A.

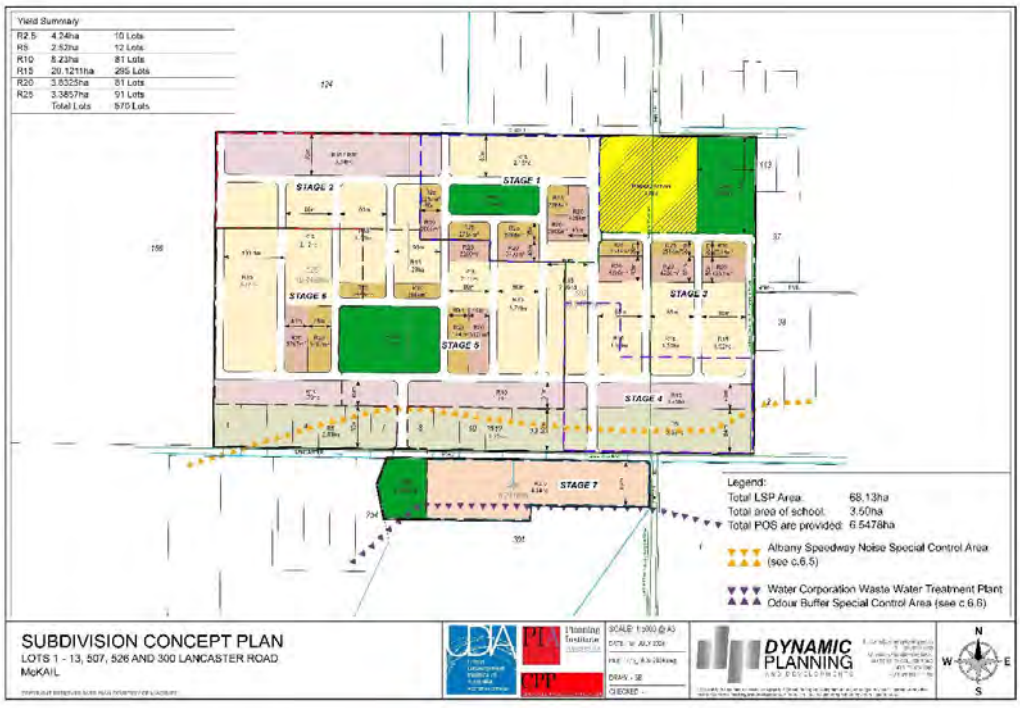


FIGURE 1.1 – CONCEPT LAYOUT PLAN

2.0 SUMMARY

From the City of Albany's "Speedway Noise Buffer Area Policy" the internal acoustic criteria are:

- Common areas 55 dB(A)
- Living areas 45 dB(A)
- Sleeping areas 40 dB(A)

We note that the above noise levels are "maximum" L_{Aeq} recorded over a short period of time during a race.

Based on the criteria there are a number of combinations of buffer distances and quiet house requirements that can be used. These being:

1 A buffer zone of 700 metres with no "Quiet House design" requirements.

2 A buffer zone of 400-500 metres with "Quiet House design" which allows bedrooms to face the speedway; and

3 A buffer zone of 200-300 metres with "Quiet House design' with bedrooms on the side of the house opposite the speedway, but with living areas facing the speedway.

Noise contours from the speedway emissions show that the development lots as per this assessment have a maximum noise level ranging from 64 to 67 dB(A) at the boundaries facing the speedway.

Two buffer zones particular to each lot, have been identified and are shown in Appendix B, Figure B1. The buffer zones have been classified into two areas, A1 and A2. Design guidelines for each zone have been developed and are detailed in section 5.

The noise amelioration is only required to the first row of residences and the first floor of the second row, as these houses provide an adequate barrier between the speedway and the other residences.

Given the number of speedway events held each year, the use of double glazing is not a recommendation of the mandatory acoustic guidelines. However, it is recommended that the single glazing be installed such that it can be upgraded to a double glazed window system if desired by the occupant. This can be achieved by either:

- Installing the windows slightly forward in the reveal to allow a secondary sliding window to be installed, or

- Selecting frames that allow for the installation of a second operable window to be installed, such as a Capral window frame or equivalent.

Alternatively, it is understood that 6.5mm laminated glass (VLAM Hush) can achieve the same noise reduction as 10.38mm laminate glass. The use of this 6.5mm laminated glass allows the installation of standard window frames and the option to upgrade the glass.

3.0 CRITERIA

The City of Albany's "Speedway Noise Buffer Area Policy" cites the following internal noise levels as the acoustic criteria:

- Common areas 55 dB(A)
- Living areas 45 dB(A)
- Sleeping areas 40 dB(A)

We note that the above noise levels are "maximum" L_{Aeq} recorded over a short period of time during a race.

A copy of the "Speedway Noise Buffer Area Policy" is attached in Appendix C.

4.0 ACOUSTIC ASSESSMENT

From previous measurements and observations on site, as noted by the DWER, noise received at a location is dominated by noise emissions from one vehicle and not the accumulative effect of all vehicles racing. Therefore, the noise model was modified to reflect this noise propagation, by running various scenarios using a single car located at various locations around the track, then combining the results to provide a 'maximum' contour.

From file data, it was determined that the sound power level of a single Late Model V8 car at maximum engine speed was 129 dB(A), which can be compared to a sound power level of a single Sprint Car at maximum engine speed was 132 dB(A). This sound power level correlates to that stated by the DWER. The resultant contours relate to the noise emissions from Sprint Cars.

Using the sprint car noise levels, modelling was carried out with the environmental noise modelling computer program SoundPlan. SoundPlan uses the theoretical sound power levels determined from measured sound pressure levels to calculate the noise level received at a specific location.

The calculations used the following input data:

a) Ground contours;

b) Sound power levels of 132 dB(A) per car with 10 vehicles in a race.

Weather conditions for the modelling were as stipulated within the Environmental Protection Authority's "*Draft Guidance for Assessment of Environmental Factors No. 8 – Environmental Noise"* for the day and night periods were as listed in Table 1.

TABLE 1 – WEATHER CONDITIONS

Condition	Day Period
Temperature	15 °C
Relative Humidity	50%
Pasquil Stability Class	F
Wind Speed	3m/s*

* From sources, towards receivers.

Appendix B, Figure 1 shows the resultant noise contour plot.

Additionally, single point receiver noise levels were calculated for each boundary location (facing speedway) for the residential lots. Noise level results are shown in Table 2.

TABLE 2 – NOISE LEVELS AT BOUNDARY LOCATION – RESIDENTIAL LOTS

Residential Lot	Exterior Noise Level
Lot 300 Lancaster Road	56
Lot 507 Lancaster Road	67
Lot 526 Lancaster Road	66

Additional to the single point receivers and contour plot, noise reduction calculations were carried out to determine the noise reduction that is achieved by various glazing thickness. This reduction was then used to determine the maximum external noise level allowable to still comply with the internal criteria. Calculations were carried out for the following glazing thickness:

- 4mm float glass;
- 6mm float glass;
- 6.38mm laminated glass;
- 6.5mm laminated glass; and
- 10.38mm laminated glass.

The noise reductions achieved by the above glazing and the corresponding maximum external noise level to achieve compliance with the acoustic criteria is listed in Table 3.

TABLE 3 – MAXIMUM EXTERNAL NOISE LEVELS

Glazing	Noise Reduction	Maximum External Noise Level (dB(A))		
		Common	Living	Bedrooms
4mm float glass	20	75	65	60
6mm float glass	23	78	68	63
6.38mm laminated glass	26	81	71	66
6.5mm laminated glass	28	83	73	68
10.38mm laminated glass	28	83	73	68

5.0 DESIGN GUIDELINES

Noise contours at the boundary location (facing speedway) for any of the proposed residential development lots (with the exception of lot 300) range from 64 to 67 dB(A). Based on these noise levels, design guidelines have been detailed below. Dependent on the location of residential housing these guidelines are for the first row of housing, and housing first floor of the second row, facing the speedway. Noise levels after this will be reduced both from the barrier effect and distance attenuation.

Note: Lot 300 is 1000 metres from the speedway, therefore it is outside any buffer zone and it requires no noise amelioration in the design.

5.1 AREA A1 - (NOISE CONTOUR LINE 67 dB(A))

For the scenario with bedroom and/or common areas facing the Speedway, the required buffer zones using 6.38mm or 10.38mm laminated glass are the 66 and 68 dB(A) noise contours, respectively, as shown on the contour plot attached in Appendix B.

Incorporated with the above buffer zone, the following recommendations are provided:

- Where possible, residences are orientated such that garages are located on the side facing the Speedway;
- Front doors facing the speedway, entrance lobbies are incorporated in the design, such that they provide a buffer space between the entrance and the remainder of the residence;
- Double brick or concrete construction;
- Casement windows (with winders) in timber or commercial steel frames and compressible seals;
- Using the 68 dB(A) contour as the buffer zone, glazing to be either 10.38mm or 6.5mm (VLAM Hush) laminated glass to bedrooms facing or exposed to the Speedway;
- Using the 66 dB(A) contour as the buffer zone, glazing to be 6.38mm laminated glass to bedrooms facing or exposed to the Speedway;
- Cantilevered sliding doors to facing or exposed to the speedway are acceptable, provided they had interlocking meeting stiles such as for the Capral 889. Double sliding doors with meeting stiles that butt together are not allowed;
- Eaves to be enclosed using 9mm thick compressed cement sheeting or equivalent;
- Roofs are to be colourbond with minimum 50mm anticon, with ceilings on the top floor to be minimum 2 layer 13mm thick plasterboard to bedrooms and walk in robes, and 1 layer 13mm thick plasterboard to all other spaces, and R3 insulation laid over the top; and
- Recessed light fittings in bedroom ceilings to the top storey are to be acoustically rated.

All dwellings required to comply with the “Quiet House” design guidelines must submit an Acoustic Report by a qualified Acoustic Engineer stating that the design and construction of the dwellings adequately attenuates noise emissions from the Speedway.

Alternative constructions are acceptable providing that they comply with the Quiet House Guidelines and are supported by an Acoustic Report by a qualified Acoustic Engineer stating that the design and construction of the dwellings adequately attenuates noise emissions from the Speedway provided it achieves compliance with the City of Albany’s “Speedway Noise Buffer Area policy”.

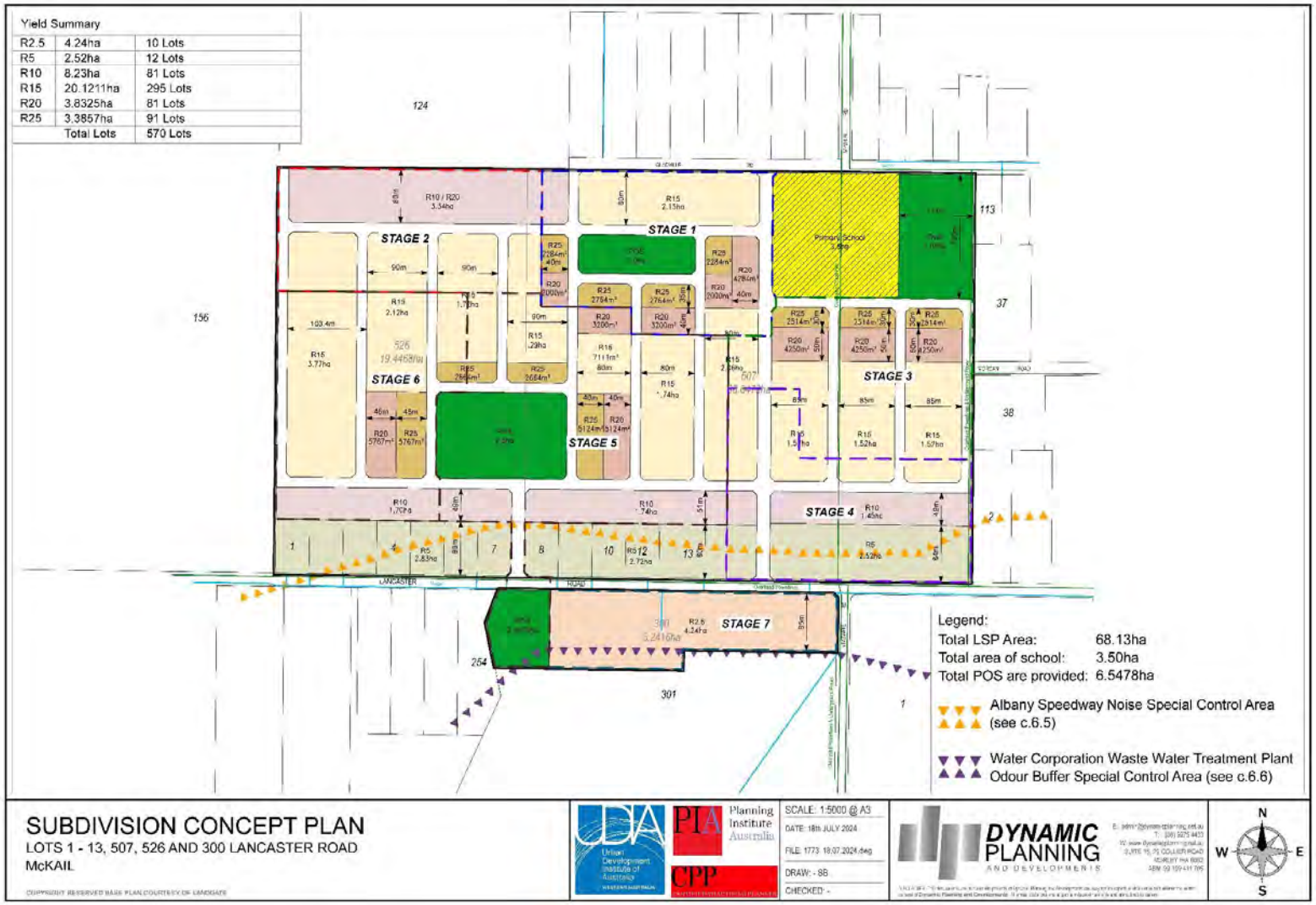
Notification of speedway noise levels and the “Quiet House” design guideline will be placed on the Certificate of Title for the specific lots.

5.2 AREA A2 - (NOISE CONTOUR LINE 66 DB(A))

- Residences to be located on southern portion of lot.
- Where possible, bedrooms are located on the opposite side of the dwelling away from the Speedway
- Laundry and Bathrooms are preferably located on the same side as the Speedway.
- Double brick or concrete construction.
- Casement windows (with winders) in timber or commercial steel frames and compressible seals.
- For bedrooms facing or exposed to the speedway, glazing to be minimum 6.38mm thick laminated glass.
- Roofs are to be colourbond with minimum 50mm anticon, with ceilings on the top floor to be minimum 1 layer 13mm thick plasterboard to bedrooms and walk in robes.
- Installing the windows slightly forward in the reveal to allow a secondary sliding window to be installed or select frames that allow for the installation of a second operable window to be installed within the frame, such as a Capral window frame or equivalent.

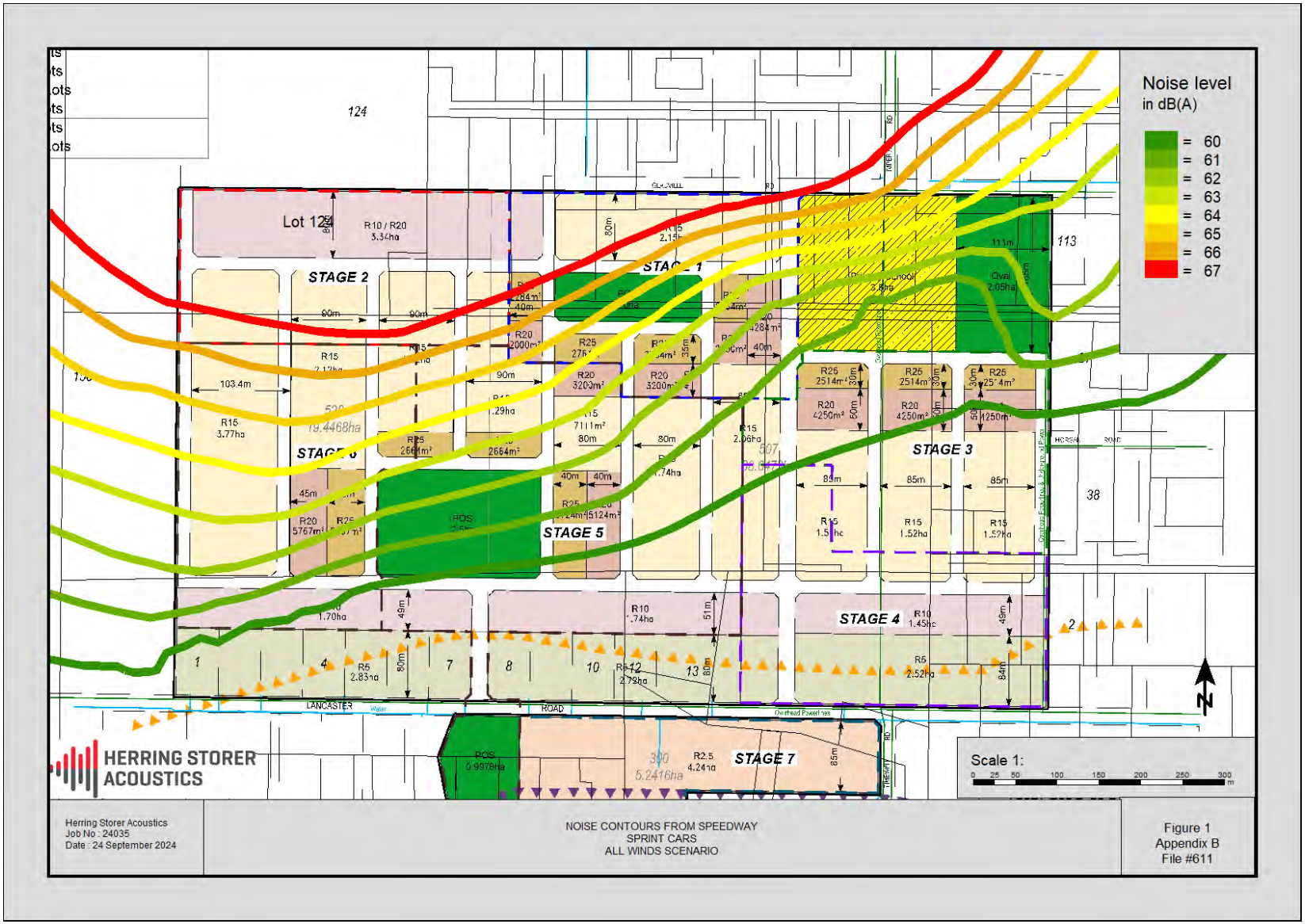
APPENDIX A

RESIDENT LOCATION


Yield Summary
R2.5 4.24ha 10 Lots
R5 2.52ha 12 Lots
R10 8.23ha 81 Lots
R15 20.1211ha 295 Lots
R20 3.8325ha 81 Lots
R25 3.3857ha 91 Lots
Total Lots 570 Lots
STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
STAGE 6
STAGE 7
LANCASTER ROAD
Legend:
Total LSP Area: 68.13ha
Total area of school: 3.50ha
Total POS are provided: 6.5478ha
Albany Speedway Noise Special Control Area (see c.6.5)
Water Corporation Waste Water Treatment Plant Odour Buffer Special Control Area (see c.6.6)
SUBDIVISION CONCEPT PLAN
LOTS 1 - 13, 507, 526 AND 300 LANCASTER ROAD
McKAIL
SCALE: 1:5000 @ A3
DATE: 18th JULY 2024
DRAW: - BB
CHECKED: -
DYNAMIC PLANNING AND DEVELOPMENT
N
W
E
S

APPENDIX B

NOISE CONTOUR PLOT


Noise level
in dB(A)
= 60
= 61
= 62
= 63
= 64
= 65
= 66
= 67
STAGE 1
STAGE 2
STAGE 3
STAGE 4
STAGE 5
STAGE 7
Lot 125
R10 / R20
3.34ha
19.4468ha
5.2416ha
LANCASTER ROAD
HERRING STORER ACOUSTICS
Scale 1:
0 25 50 100 150 200 250 300 m
N
Herring Storer Acoustics
Job No : 24035
Date : 24 September 2024
NOISE CONTOURS FROM SPEEDWAY
SPRINT CARS
ALL WINDS SCENARIO
Figure 1
Appendix B
File #611

APPENDIX C

CITY of ALBANY
"SPEEDWAY NOISE BUFFER AREA POLICY"

CITY OF ALBANY
SPEEDWAY NOISE BUFFER AREA POLICY

OBJECTIVE

The objectives of the policy are to:

- allow for the ongoing operations of the speedway at Atwell Park and encourage the operators to incorporate additional noise attenuation measures to reduce noise impacts into adjoining residential developments.
- acknowledge and recognise existing approved residential developments within the buffer area.
- ensure that new developments incorporate measures to advise purchasers within the buffer area of the speedway operations and noise generated during their events.

POLICIES

1.1 For existing dwellings, additions/alterations to an existing dwelling or the replacement of an existing dwelling, noise attenuation measures are not mandatory within the buffer area (Map No. 1). Whilst it is expected that those premises will experience noise levels in excess of the provisions contained in the *Environmental Protection (Noise) Regulations 1997* from periodic speedway activity, Council will not seek to modify the 'as existing' conditions.

1.2 Residents are encouraged to consider the following information and methods of noise attenuation in planning the construction of new residences within the buffer area:

- the AS/NZS 2107:2000 Standard 'Acoustics – Recommended design sound levels and reverberation times for building interiors' recommends the following maximum internal noise levels (L_{Aeq}):
  - common areas 55dB(A)
  - living areas 45dB(A)
  - sleeping areas 40dB(A)
- the following techniques known as 'quiet house' design and construction methods/materials should be considered to achieve practical reduction in internal noise levels in new residences:
  - locating habitable rooms such as bedrooms on the opposite side of dwelling to speedway.
  - locating non-habitable rooms such as laundries/bathrooms on same side of dwelling as speedway.
  - protect main entrance from speedway noise.
  - insulation of the dwelling including enclosed eaves, insulate roof spaces or double brick construction.
- the erection of internal property fences between the speedway and dwelling so that it that forms a continuous and solid barrier (recommended density is a minimum of 10kg/m²).

1.3 Upon the transfer of land within the buffer area, a notation shall be provided on the zoning certificate issued by the City advising of the relationship of the land to the speedway and of this Policy.

ADDITIONAL INFORMATION

1. *For the purpose of this Policy, an existing dwelling is defined as a dwelling either constructed, under construction or approved for construction at the time of adoption of this Policy*

2. *The information used to formulate this Policy was prepared by Herring Storer Acoustics (Acoustic Consultants).*

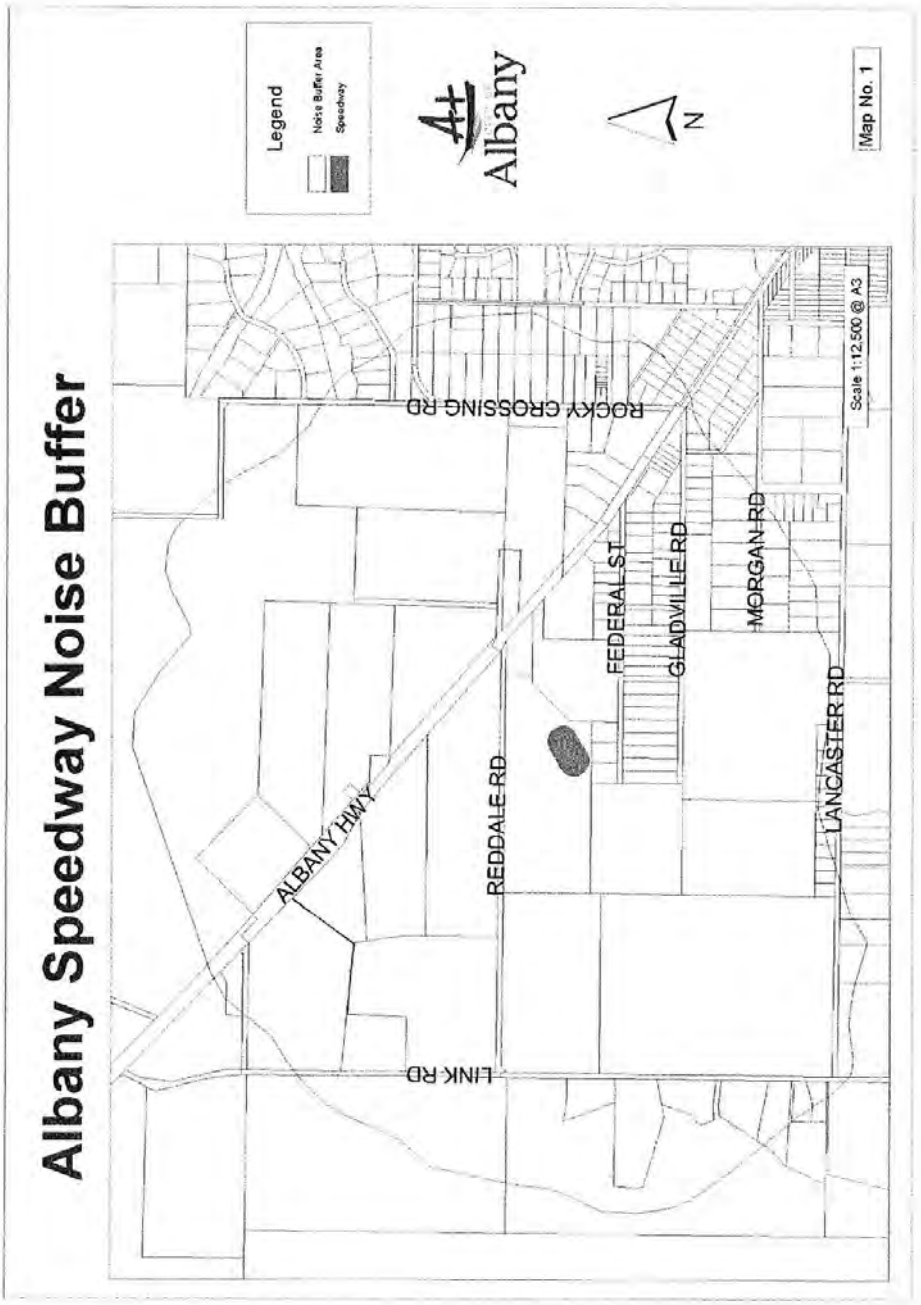
3. *The Herring Storer Acoustics report for the speedway contains some recommendations on future works at the speedway including the construction of barrier fencing that would reduce the impact of noise from the speedway and hence buffer zone required. The report recommends that upon completion of these works, additional modelling will need to be undertaken to redefine the buffer zone boundary shown in this Policy. The City has agreed to consider ways of assisting the speedway club to undertake these modifications.*

4. *For information purposes, the approximate density of some commonly used construction materials are:*

6mm compressed cement fence sheeting	*11kg/m²*
common brick	*180kg/m²*
200mm limestone blocks	*350kg/m²*
100mm concrete	*260kg/m²*

5. *Preliminary discussion with Council Officers is encouraged for any application likely to be affected by this Policy.*

Policy Status
Draft Policy Adopted for Advertising (October 2003 - Item 11.3.2 DS)
Final Policy Adopted (October 2004 – Item 11.3.3 DS)


Albany Speedway Noise Buffer
Legend
Noise Buffer Area
Speedway
Albany
N
Map No. 1
Scale 1:12,500 @ A3
ROCKY CROSSING RD
FEDERAL ST
GLADVILLE RD
MORGAN RD
LANCASTER RD
REDDALE RD
ALBANY HWY
LINK RD

Vegate Pty Ltd

Lots 507, 526 & 300 Lancaster Road, McKail
Local Structure Plan Amendment

Transport Impact Assessment

August 2024

Project Code: 07524/A

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Version Control and Approval

Version	Date	Main Contributor	Issued by	Approved by
A – Draft	19 October 2023	RD	TM	TM
B – Final	19 January 2024	RD	RD	TM
C – Final Final LSP/Sub Plans added	13 February 2024	RD	RD	TM
D – Final Updated plans	14 March 2024	CS	TM	TM
E – Revised plans	1 August 2024	RD	TM	TM

Prepared for

Vegate Pty Ltd c/o Jarrod Rendell
Principal
18 Lyall Street
South Perth WA 6151

Contents

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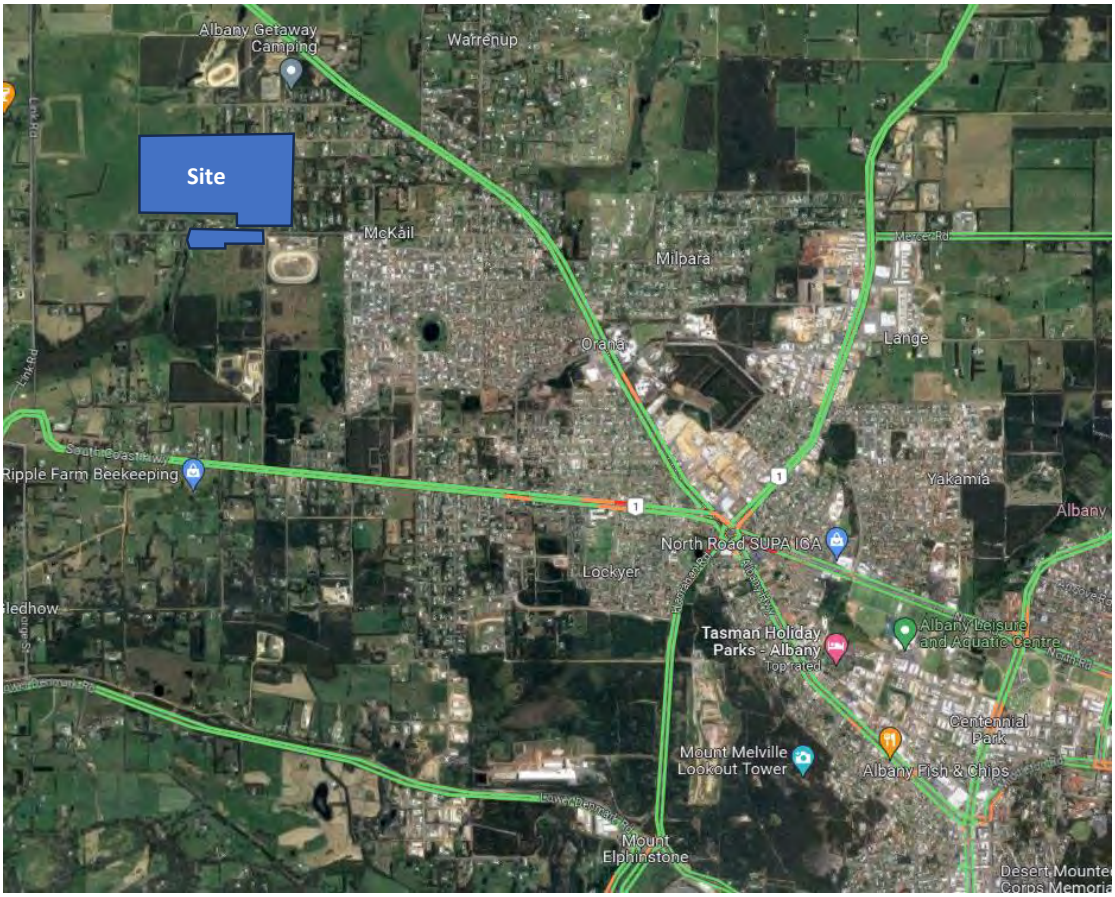
Appendices

1 Introduction

1.1 Introduction and Background

1.1.1 This Transport Impact Assessment (TIA) has been prepared by PJA for Acumen Development Solutions on behalf of Vegate Pty Ltd. Its purpose is to support a Local Structure Plan (LSP) Amendment for up to a proposed 570 residential lots, a primary school (~3.5ha) and total public open space including a school oval (~6.5ha) on land at Lots 507, 526 and 300 Lancaster Road in McKail in the City of Albany. The original Outline Development Plan over the site was approved in August 2015.

Figure 1-1: Site Location Plan



Source: Google Maps

1.2 Purpose of this Report

1.2.1 The *Western Australia Planning Commission Transport Assessment Guidelines* (WAPC Guidelines) sets out what level of assessment is necessary, based on the expected traffic impact of a proposed development. This specifies that where a development is forecast to generate more than 100 trips per hour in the peaks, a Transport Impact Assessment is required, whilst where this is not the case a Transport Impact Statement (TIS) would suffice. A TIA has a greater focus on the external traffic impact resulting from the development.

1.2.2 Based on the proposed scale of development, which is nominal 570 residential lots and a primary school, the impact could be considered 'high' and a TIA would be required. A TIA has therefore been prepared, the subject of this report.

1.3 Transport Assessment Objectives

1.3.1 In line with the WAPC Guidelines, this TIA seeks to demonstrate that the proposed LSP Amendment would:

- *"Provide safe and efficient access for all modes;*
- *be well integrated with the surrounding land uses;*
- *not adversely impact the surrounding land uses; and*
- *not adversely impact the surrounding transport networks or the users of those networks."*

1.3.2 This TIA considers all transport modes, including public transport, walking, and cycling, as well as private motor vehicles, servicing, and delivery vehicles.

1.4 Layout of this Report

1.4.1 The remaining chapters of this TIA cover the following:

- **Chapter 2** sets out details of the proposed LSP Amendment
- **Chapter 3** provides details of the existing situation
- **Chapter 4** establishes the proposals for the internal transport networks
- **Chapter 5** sets out changes proposed to external transport networks
- **Chapter 6** demonstrates how the development will integrate with the surrounding area
- **Chapter 7** analyses the internal transport networks
- **Chapter 8** analyses the external transport networks
- **Chapter 9** includes a review of safety issues
- **Chapter 10** concludes the TIA.

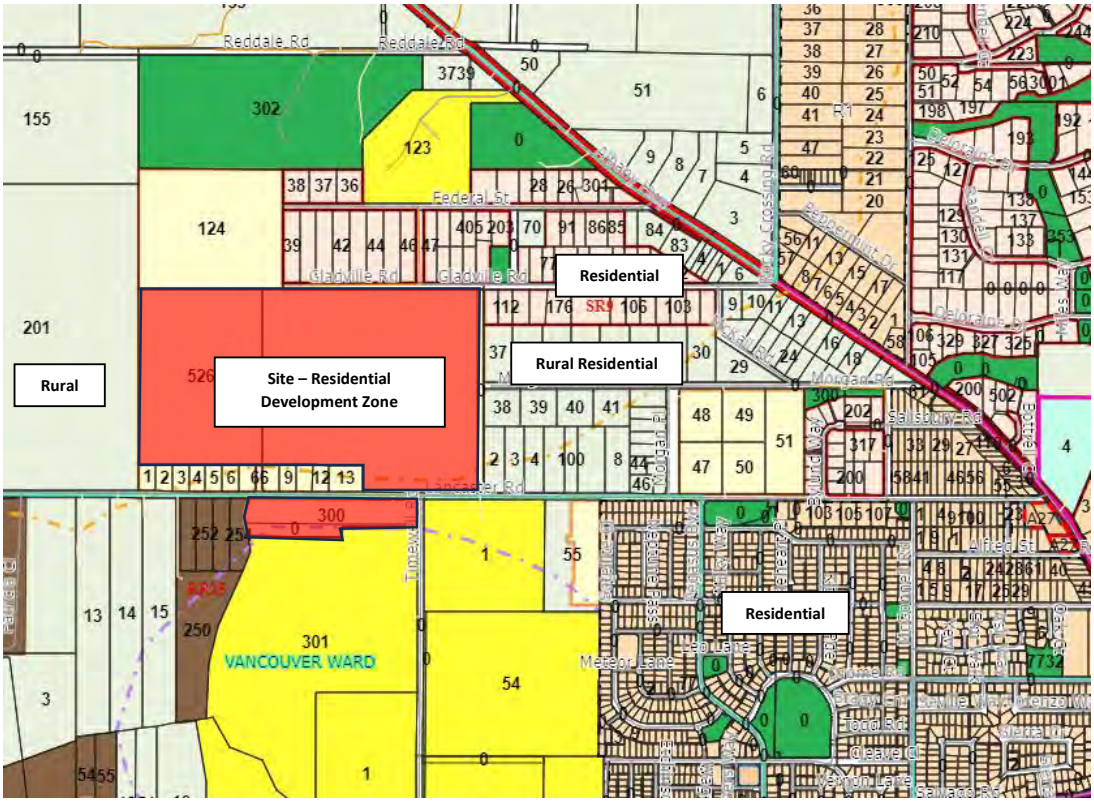
2 LSP Proposal

2.1 Regional Context

2.1.1 The LSP Amendment area is zoned for 'Future Urban' in the City of Albany's Local Planning Scheme No.1 (LPS1) and consists of the same area as the LSP Amendment, shown in Figure 2-1. The LPS1 was originally gazetted in 2014 and a draft LPS2 is presently under consideration to replace it. The zoning under LPS2 for the LSP Amendment area is proposed to be 'Urban Development'.

2.1.2 Albany is a major coastal town on the great southern coast of Western Australia. The LSP Amendment site is located in the locality of McKail approximately 7.5km north-west of the centre of Albany town within the Local Government Authority of the City of Albany. The site is located on Lancaster Road and has access to the regional road networks via Lancaster Road and Gladville Road (both to Albany Highway) and Timewell Road (to South Coast Highway).

Figure 2-1: LSP Boundary and LPS1



Source: https://albanywa.maps.arcgis.com/apps/webappviewer/index.html?id=738bbc232a654c5386ad196811c36d85

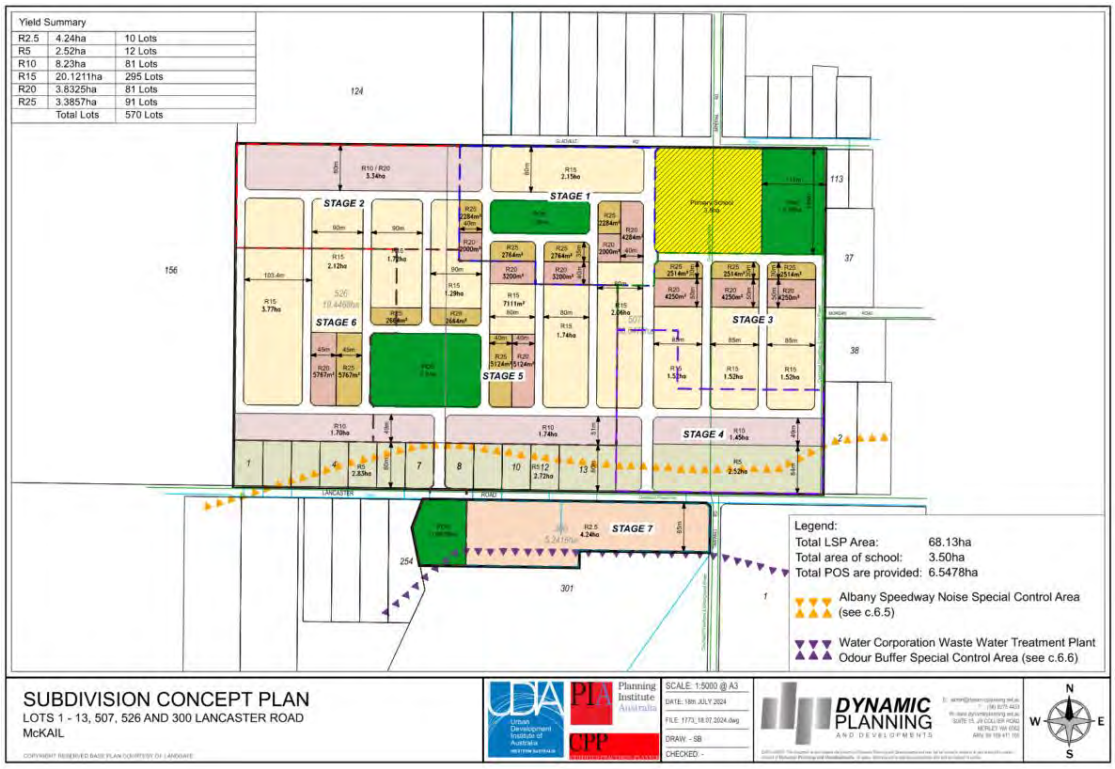
2.2 Proposed Land Uses

2.2.1 The LSP Amendment proposal of 68.13ha of land at Lancaster Road includes the following:

- Up to 570 freehold residential lots are proposed, varying in zoning size from R2.5 to R25. The site will be mostly low-density with dwelling codes of R15 and below;
- Public Open Space and the School Oval (POS) totalling approximately 6.5ha, equating to approximately 9.6% of the site area, in the north east and southern side of the site; and
- Road reserves in width of 15m mostly across the site with a single 20m wide north-south street connecting Lancaster Road to Gladville Road and running past the primary school site. Pedestrian links and multiple vehicular access points will be provided across the site boundaries.

Refer to Figure 2-2 for a figure showing the Local Structure Plan.

Figure 2-2: Local Structure Plan



Source: Dynamic Planning, July 2024

2.2.2 The lots will be sized as shown in Table 2-1.

Table 2-1: Possible LSP Amendment Lots and Sizes

Size of Lot	Number of Lots
R2.5	10
R5	12
R10	81
R15	295
R20	81
R25	91
Total	**570**

2.2.3 A plan showing the proposed LSP Amendment is provided in **Appendix A**.

2.3 Parking and the Low-Density Design Code

2.3.1 The WAPC *State Planning Policy 7.3 Residential Design Codes Volume 1* (R-Codes) (SPP 7.3) refers to parking standards for new residential developments. Paragraph C3.3 states the minimum standards required.

2.3.2 On the basis that the proposed LSP Amendment is not located near public transport, across all dwellings the site will be required to have at least an average of 2 spaces per dwelling. Therefore, equating to, a total of 1,140 parking spaces across the site under the General R-Codes.

2.3.3 These spaces will be provided on each lot in private garages.

2.4 Cycling Facilities

2.4.1 SPP 7.3 does not set specific cycle parking standards for single dwelling housing. It would be envisaged that each lot would have sufficient space within the curtilage of their dwelling that could be used for cycle storage.

2.5 Deliveries and Servicing

2.5.1 The Main Roads WA Functional Road Hierarchy designates Lancaster Road as a Local Distributor whilst Gladville and Timewell Roads are classified as Access Roads.

2.5.2 Lancaster Road, as a Local Distributor, is defined to "*carry traffic within a cell and link District Distributors or Regional Distributors at the boundary, to access roads. The route of Local Distributors should discourage through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to, or serving the area. These roads should accommodate buses, but discourage trucks*."

2.5.3 However, access to the LSP Amendment area via Lancaster Road for deliveries and service vehicles can be accommodated by the number and proximity of the street connections in the design, as well as the additional north-south connection proposed between Lancaster Road and Gladville Road to help service the site. The anticipated type of servicing vehicles will be the weekly refuse collection vehicle and the occasional heavy rigid for furniture deliveries or a semi-trailer (potentially) to the primary school. This level of servicing provision is in line with the expected servicing demand at the site and the design and function of Lancaster Road.

2.6 Specific Issues

2.6.1 There are no specific transport issues that have been identified in relation to the proposed LSP Amendment.

2.6.2 Notwithstanding the above, the biggest challenge from a transport engineering perspective for this site is that there are no nearby public transport services and facilities and therefore walking, wheeling, and cycling are the only other modes of travel beyond the private car. Given the location on the fringes of the Albany townsite, where existing walking and cycling facilities are also limited to connect to/from, the sharing of road reserve space between the different modes in a safe manner will be the most important consideration. Design must therefore focus on lowering speeds per Safe System Principles, wherever practical and the provision of good active transport infrastructure within the LSP amendment area to provide local access to/from the primary school.

2.6.3 The access to the LSP Amendment area via the primary road network (Albany Highway and South Coast Highway) are both under the control of Main Roads Western Australia which means consultation and approvals will need to be undertaken with Main Roads.

3 Existing Situation

3.1 Existing (2024) Land Uses

3.1.1 The LSP Amendment area is vacant land, except for a small number of scattered sheds from the use of the site as farmland. These sheds and the previous farm use will be removed from the area and replaced by the proposed residential development and primary school.

3.2 Existing (2024) Road Network

3.2.1 Figure 3-1 shows the existing road network surrounding LSP Amendment area application site.

Figure 3-1: Main Roads WA Functional Road Hierarchy

Source: Main Roads WA Road Information Mapping System (https://mrwebapps.mainroads.wa.gov.au/PublicMaps/RoadInformationMapping)

Lancaster Road

3.2.2 Lancaster Road is a Local Distributor (Main Roads WA Road Hierarchy) running from east to west which previously connected Albany Highway in the east (at a T junction) with Link Road in the west. The connection to Link Road has now been closed as part of the Albany Ring Road project. Link Road is to become the Albany Ring Road between Albany Highway and South Coast Highway. Thus, Lancaster Road will only retain the access to Albany Highway, as well as the existing local road connections along it. Lancaster Road currently measures approximately 6.5 to 7.0m in pavement width, across both lanes with 1-2m wide unsealed gravel shoulders and typically has no centreline.

3.2.3 In the vicinity of the LSP Amendment area, Lancaster Road comprises a two-lane single-carriageway and is subject to an 80km/h speed limit with a central white dividing line at its intersection with Timewell Road. As Lancaster Road approaches Albany Highway, the speed limit reduces to the general built up area limit of 50km/h, which in this case is sign posted, approximately 350m east of the eastern boundary of the LSP Amendment area.

3.2.4 Lancaster Road intersects with Albany Highway as an AUR/BAL intersection treatment.

Timewell Road

3.2.5 Timewell Road is an Access Road (Main Roads WA Road Hierarchy) running from north to south which connects Lancaster Road in the north to South Coast Highway in the south, both as T-junctions. Timewell Road measures approximately 6.5 to 7.0m in pavement width, across both lanes with 1-2m wide unsealed gravel shoulders and includes a centreline.

3.2.6 In the vicinity of the LSP Amendment area, Timewell Road comprises a two-lane single-carriageway and is not speed zoned but is subject to a speed limit of up to 110km/h if safe to do so, with a central white dividing line.

3.2.7 Timewell Road intersects with South Coast Highway as a BAR/BAL intersection treatment.

Gladville Road

3.2.8 Gladville Road is an Access Road (Main Roads WA Road Hierarchy) running from east to west which connects Albany Highway in the east (at a 4-way junction) and terminates near the LSP Amendment area as a cul-de-sac. Timewell Road carriageway measures approximately 6.3m width, across both lanes with 1-2m wide unsealed shoulders and no centreline. West of the intersection of Imperial Street, Gladville Road is an unsealed road.

3.2.9 Gladville Road comprises a two-lane single-carriageway and is not speed zoned but is subject to a speed limit of up to 110km/h if safe to do so.

3.2.10 Gladville Road intersects with Albany Highway as a BAR/BAL intersection treatment.

Albany Highway

3.2.11 Albany Highway is a Primary Distributor Road (Main Roads WA Road Hierarchy) which commences in Perth and continues south and terminates in Albany. Albany Highway carriageway measures approximately 7.0m in width, across both lanes with 1.5m wide sealed shoulders and a further 1-2m unsealed gravel shoulders.

3.2.12 In the vicinity of Lancaster and Gladville Roads, Albany Highway comprises a two-lane single-carriageway and is subject to a 60km/h posted speed limit with a central white dividing line.

South Coast Highway

3.2.13 South Coast Highway is a Primary Distributor Road (Main Roads WA Road Hierarchy) which commences in Albany and continues westwards to join with the South Western Highway. South Coast Highway measures approximately 7.0m in carriageway width, across both lanes with 1.5m wide sealed shoulders and a further 1-2m unsealed gravel shoulders.

3.2.14 In the vicinity of Timewell Road, South Coast Highway comprises a two-lane single-carriageway and is subject to a 60km/h posted speed limit with a central white dividing line.

3.3 Existing Traffic Flows

3.3.1 Traffic count data has been obtained from Main Roads WA Traffic Map and from the City of Albany, where available.

3.3.2 One count point was identified on Albany Highway, approximately 950m north of Gladville Road (Count Site 52411). Another count site was identified on South Coast Highway, just east of Timewell Road (Count Site 15516). Three weekly vehicle counts have also been undertaken by the City (in 2023, 2013 and 2015) on Lancaster Road, Gladville Road and Timewell Road, respectively.

3.3.3 The results of the counts are provided in full in **Appendix B,** summarised below in Table 3-1.

3.3.4 Traffic growth rates were assessed at these count sites over extended periods (11 years to 2022 for Albany Highway and 17 years to 2022 for South Coast Highway). These were found to show a uniform growth rate of +1.9% per annum for Albany Highway, while South Coast Highway has shown a -0.2% per annum decrease in traffic. Local roads were assumed to have no growth, as there were no major developments in the area in the past decade or so.

Table 3-1: Traffic Flows

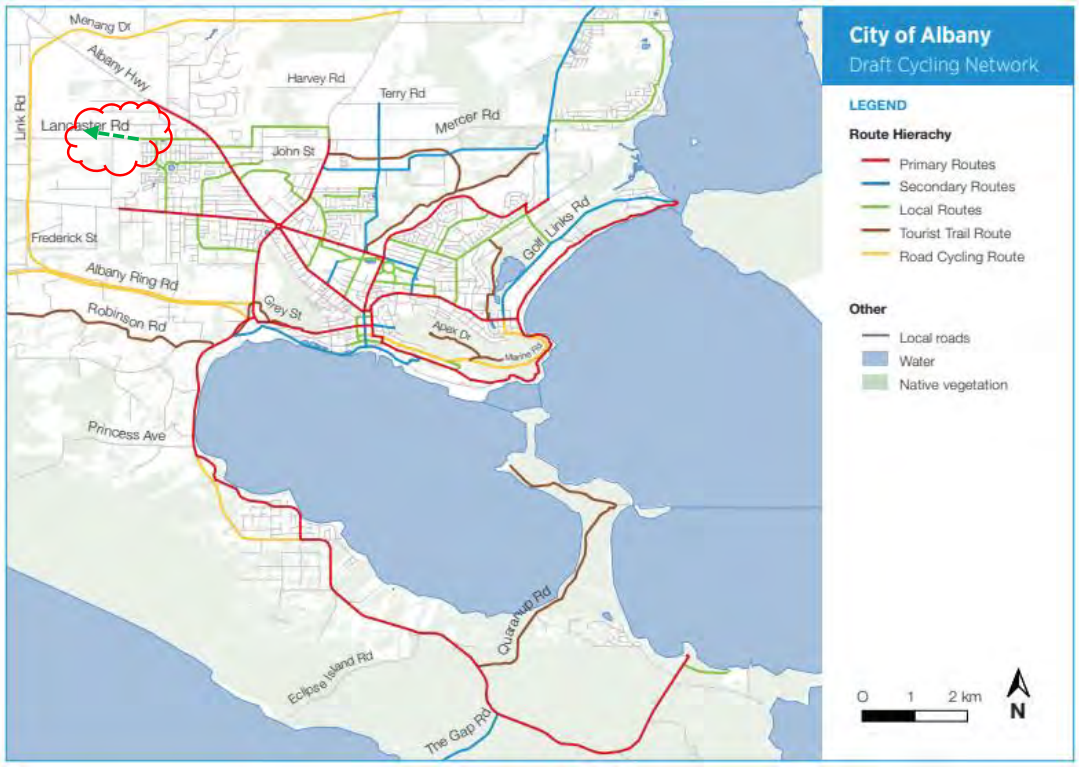
Road	Direction	Eastbound/Southbound	Westbound/Northbound	Total
Albany Highway (2022/23)	AM Peak (08:00-09:00)	246	232	478
	PM Peak (15:00-16:00)	3531	222	573
+1.9%pa growth	Daily	3,169	3,037	6,206 (12.5% Trucks)
South Coast Highway (2022/23)	AM Peak (08:00-09:00)	240	116	356
	PM Peak (15:00-16:00)	147	202	349
-0.2%pa growth	Daily	1,857	1,802	3,659 (9.5% Trucks)
Lancaster Road (2023)	AM Peak (08:00-09:00)	117	54	171
	PM Peak (17:00-18:00)	64	113	177
+0.0%pa growth	Daily	968	983	1,955 (12.8% Trucks)
Gladville Road (2013)	AM Peak (07:00-08:00)	17	7	24
	PM Peak (17:00-18:00)	11	27	38
+0.0%pa growth	Daily	167	167	334 (~6% Trucks)
Timewell Road (2015)	AM Peak (09:00-10:00)	13	7	20
	PM Peak (17:00-18:00)	12	10	22
+0.0%pa growth	Daily	112	101	213 (13.4% Trucks)

3.4 Existing Pedestrian and Cycle Provision

3.4.1 Pedestrian and cycle infrastructure surrounding the LSP Amendment area is limited due to the semi-rural nature of the area. In some of the more built-up areas of McKail, footpaths are present on at least one of side of the carriageway facilitating some pedestrian routes. With the development of this LSP Amendment area, pedestrian routes will be enabled for use to facilitate movements to/from the Primary School and into the wider locality of McKail.

3.4.2 For longer-distance cycling, the Great Southern 2050 Cycling Strategy (currently in draft format and out for public comment) has identified Lancaster Road as a future Local Route (green) as far as the current urban development extends on Lancaster Road. This route then connects to a Primary Route (red) on Alany Highway and then into Albany townsite. This Local Route designation should be extended further west to the proposed LSP Amendment area.

Figure 3-2: Great Southern 2050 Cycling Strategy



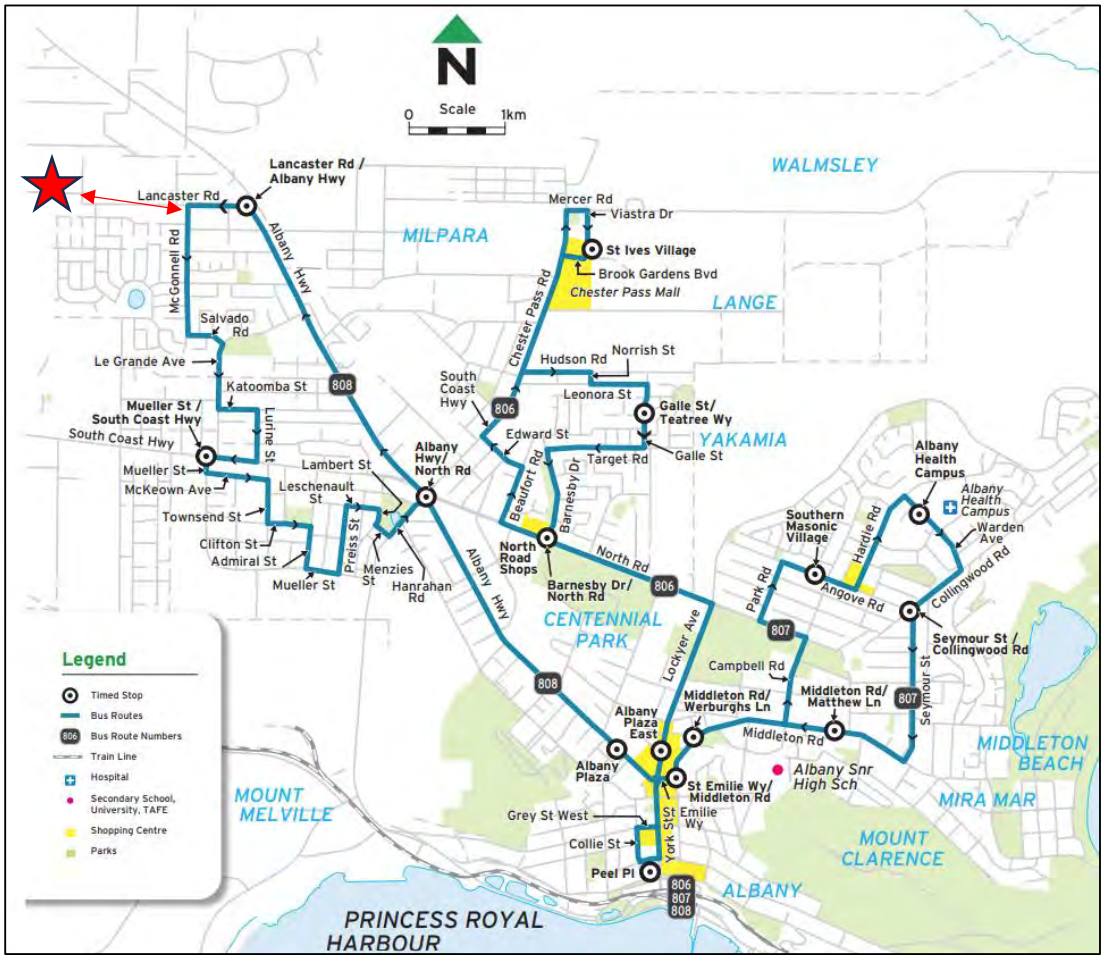
Source: Department of Transport

3.4.3 However, beyond the above noted facilitates, cyclists are currently required to cycle on-road and pedestrians are currently required to make use of verges next to the carriageway to access nearby areas by walking. These should only be in low-speed environments (30km/hr or less under Safe System Principles) unless the modes are physically separated, and the most vulnerable of road users have a level of protection such as separated facilities.

3.5 Existing Public Transport Provision

Given the rural location of the site, access to public transport is non-existent with no bus stops or railway stations within typical walking or cycling distances. The nearest bus stops for Route 808 (located in McGonnell Road), is located approximately 1.2km from the south east corner of the LSP Amendment area and generally run once every hour in each direction. These bus stops can be reached in approximately a 15-minute walk for the able bodied if residents of the proposed LSP Amendment area do need to use public transport as their only means of access.

Figure 3-3: Albany Bus Routes



Source: Transperth

3.6 RAV Routes

Both Albany Highway and South Coast Highway are Restricted Access Vehicle (RAV) routes and neither Lancaster Road, Timewell Road nor Gladville Road are RAV routes.

Albany Highway allows vehicles up to Network 7 size (typically 36.5m long road trains). South Coast Highway allows access up to Network 4 size (typically 27.5m long B-doubles and short road trains).

The Albany Ring Road project is expected to reduce the number of RAVs on both Albany Highway and South Coast Highway (and also the number of general heavy vehicles) near Lancaster, Gladville and Timewell Road as this new road will provide a new access into the Port of Albany. The Albany Ring Road bypasses the roads and highways currently used by numerous other vehicles that are currently not accessing the Port.

4 Proposed Internal Transport Networks

4.1 Proposed Road Network

4.1.1 Five points of access are proposed to the LSP Amendment area to allow the site to be permeable via all modes to the surrounding areas. Each access will accommodate vehicular traffic, as well as pedestrian and cycle movements via the use of verges and/or shared roadway at appropriate differential speeds. These are as follows:

- Two accesses onto Gladville Road, both priority-controlled T-junctions
- Two access onto Lancaster Road, both priority-controlled T-junctions
- One access onto Morgan Road, being the continuation of Morgan Road into the LSP Amendment area.

4.1.2 The proposed road network within the LSP Amendment area can be seen in the plan included in **Appendix A**.

4.1.3 All road reserves within the site connecting to the external intersections, will be 15m in width and are therefore likely to be provided Road Type 'Access Street D' (per *WA Liveable Neighbourhoods Update 02*, dated January 2009). The only exception is a proposed 20m north south road reserve connecting Gladville Road to Lancaster Road, this also running past the proposed Primary School site, this being an 'Access Street C'.

4.1.4 'Access Street C' represents a yield (give way) street with a maximum design speed of 50km/h, a target speed of 40km/h including during school times and an indicative traffic volume of less than 3,000vpd.

4.1.5 'Access Street D' represents a yield (give way) street with a maximum design speed of 50km/h, a target speed of 30km/h and an indicative traffic volume of less than 1,000vpd. Refer to Figure 4-1.

4.1.6 On the 'Access Street C', the indicative street reserve width will be approximately 15.4m and a road pavement width will be 7.2m (or between 7-7.5m). Infrequent on-street parking is expected on both sides for this area, buses are not expected to use these routes and designated on-street cycle lanes are also not expected but adequately catered for off-street. Refer to Figure 4-2.

Figure 4-1: Access Street C Indicative Cross Section

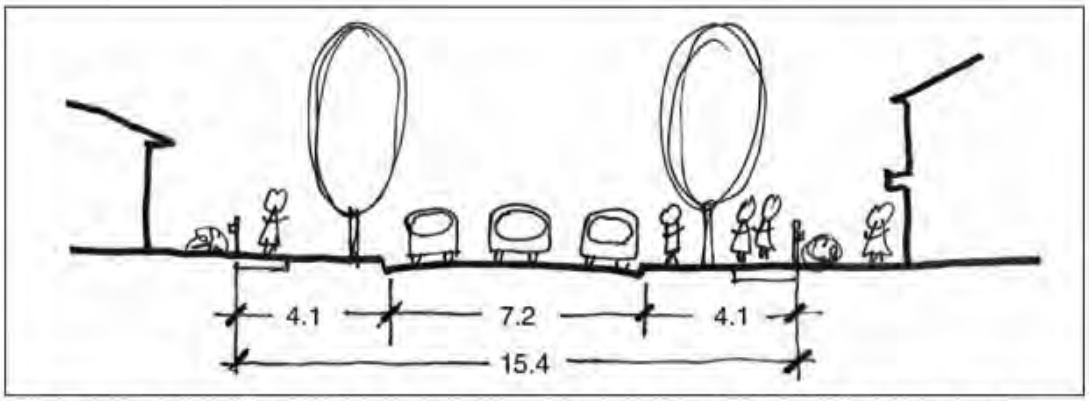


Figure 21: Access street C – yield (or give way) street – Target speed 40 km/hr (< 3000 vehicles per day).

Source: Liveable Neighbourhoods (WAPC, 2009)

4.1.7 On the 'Access Street D', the indicative reserve width will be about 14.2m and a pavement width will be 6.0m. Infrequent on-street parking is expected on both sides for this area, buses are not expected to use these routes and designated on-street cycle lanes are also not expected but adequately catered for off-street.

Figure 4-2: Access Street D Indicative Cross Section

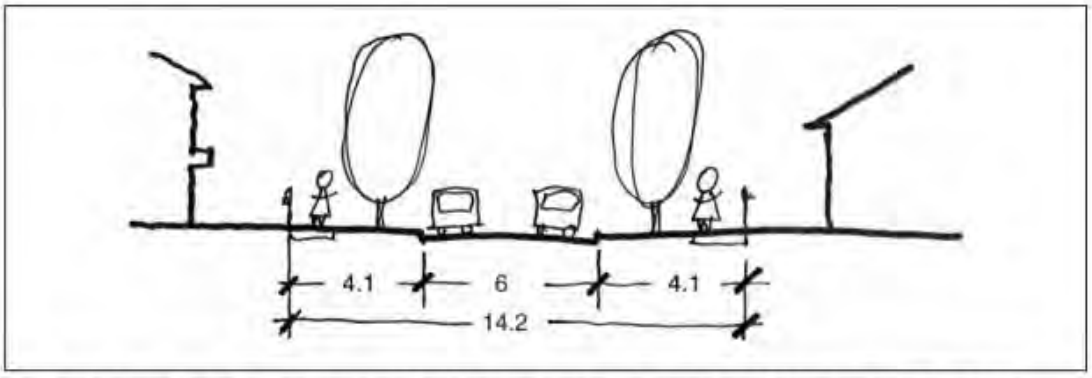


Figure 22: Access street D – narrow yield (or give way) street – Target speed 30 km/hr (< 1000 vehicles per day).

Source: Liveable Neighbourhoods (WAPC, 2009)

4.2 Intersection Controls

4.2.1 Due to the ultimately low volume and low-speed residential nature of the LSP Amendment area, all intersections within the area are intended to be constructed as priority-controlled (at T-junctions) or sign controlled (Give Way/Stop at 4-way junctions) intersections.

4.2.2 The majority of 4-way intersections are expected to have traffic flows less than 2,000vpd (passing through the intersection from all directions), with the exception being the 4-way intersections of the 'Access Street C' north-south street, perpendicular to Lancaster Road. The 4-way intersection near the school is recommended to be controlled via a roundabout to assist circulation for school peak times, subject to detailed design. The 4-way intersection near Lancaster Road is recommended for further investigation as to the appropriate control, being either a roundabout, restricted movements or Stop controlled, subject to detailed design.

4.2.3 The Stop/Give Way signs on the north-south road in the centre of the LSP, should be placed to face north-south vehicle, this creating very short slow speed approaches. This may then necessitate the installation of traffic calming devices or design treatments on the east-west streets, given these streets are straight and longer than the suggested 100 – 130m lengths in *Liveable Neighbourhoods*.

4.2.4 Refer to Figure 4-3 below for proposed intersection controls. Only exceptions to the priority control at T-junctions are shown.

Figure 4-3: LSP Proposed Intersection Controls

Base map: Dynamic Planning, July 2024

4.3 Pedestrian and Cycle Network

4.3.1 No footpaths are present in the existing semi-rural area and given the proposed R2.5 to R25 densities, this is likely not required as there are no connection opportunities in the short term outside the LSP area. However, to future proof the LSP Amendment area for more intense future development, space should be available in the verges for the future construction of footpaths at a minimum 1.5m in width with ramps at all intersections, this to allow connection to and from the school.

4.3.2 Due to the ultimate low traffic volume and low-speed nature of the residential LSP Amendment, cyclists are able to cycle within the LSP Amendment streets, if the streets continue to experience volumes typically less than 1,000 vehicles per day (as expected) and vehicles travel at 30km/hr or less.

4.4 Public Transport Routes

4.4.1 No public transport routes or stops will be provided within the LSP Amendment area.

5 Changes to External Transport Networks

5.1 Albany Ring Road

This project is now compete and has been constructed to enable freight vehicles to be able to gain better access to the Port at Albany. This project will also reduce the number and size of heavy vehicles currently mixing with general traffic on South Coast Highway and Albany Highway, nearer to Albany, thereby improving immediate congestion and safety.

This project has used the Link Road alignment west of the proposed LSP Amendment area to connect Albany Highway to South Coast Highway and then continue on a new route south of South Coast Highway, into the Port of Albany. Refer to Figure 5-1 below.

Figure 5-1: Albany Ring Road Alignment

Source: MRWA

5.1.1 As previously mentioned, the Albany Ring Road project also includes the closure of Lancaster Road at Link Road, west of the LSP Amendment area. Assessment of traffic flows on Timewell Road (approximately 210vpd), Landcaster Road east of Timewell Road (approximately 800vpd) and locally generated traffic along Lancaster Road, indicates that this severance should decrease traffic flows on Lancaster Road in the order of 500vpd. Thus, traffic flows recorded on Lancaster Road should decrease from about 2,000vpd to about 1,500vpd closer to Albany Highway.

6 Integration with Surrounding Area

6.1 Local Attractors / Generators

6.1.1 Given the primarily residential uses on the LSP Amendment area, it is expected that the majority of the trips to/from the area by residents will be generated towards places of education, employment, retail and leisure uses, this mainly to and from the Albany town centre. Access to and from the Primary School will mainly be from the LSP Amendment area and possibly from areas of McKail within a 400-800m walkable catchment.

6.2 Travel Desire Lines

Pedestrian / Cycling

6.2.1 To access facilities east of the site by walk / cycle mode, pedestrians and cyclists will be able to follow routes along Lancaster Road, from the southeastern corner of the site. Pedestrian / cyclist use along these routes may be subject to pedestrian / cycling infrastructure improvements to prioritise user safety and enable these modes.

6.2.2 Further east of the LSP Amendment area, Lancaster Road does provide some footpaths to serve existing residential dwellings and access to bus stops, which could provide an opportunity for connections, though no formal pedestrian crossing opportunities are provided along Lancaster Road. Additionally, no dedicated infrastructure is provided for cyclists in the vicinity of the LSP Amendment area and cyclists are therefore required to cycle on the carriageway. Shared use should only be encouraged in low traffic volume and low-speed environments (30km/hr or less under Safe System Principles) unless the modes are physically separated, and the most vulnerable road users are protected.

Motor Vehicles

6.2.3 The LSP Amendment area is located adjacent to Lancaster Road, Gladville Road and Timewell Road, which all provide key connections eastwards and southwards from the site to major roads and then the central area of Albany. Morgan Road will allow access into the area for properties immediately east of the area. All intersections in the vicinity of the LSP Amendment area are (and will likely remain) priority controlled and this is not proposed to change with this development. All proposed intersection locations are considered appropriate with respect to available sight distances which has been reviewed at a high level (using Google StreetView and Nearmap) and is subject to detailed design checks.

6.2.4 The only intersection that is cause of some concern is the southern intersection on Lancaster Road west of Timewell Road, where there is a crest of the eastern approach to the proposed intersection. However, an assessment of available sight distance (using Google StreetView and Nearmap), indicates, that expected sight distance to/from the east would be approximately 285m. For the 80km/h speed limit a sight distance (in this case the Safe Intersection Sight Distance, SISD) of 226m would be required (this based on a 2.5s reaction time and a 90km/h approach speed as a safety buffer above the posted speed limit).

6.2.5 The section of Gladville Road, west of Imperial Road is presently unsealed. This section of road should be sealed to accommodate the expected increased traffic flows.

6.2.6 The existing and planned road provisions are deemed acceptable, and no remedial measures are required beyond as described above.

Public Transport

6.2.7 As mentioned above, no bus or rail services are available within a reasonable walking, wheeling, or cycling distance of the LSP Amendment area. Although, if required to access public transport, bus stops are accessible for an able-bodied person within about a 15-minute walk.

7 Analysis of Internal Transport Networks

7.1 Internal Road Network and Traffic Impact

7.1.1 Two-way, two-lane roads are proposed within the LSP Amendment area to accommodate the anticipated traffic flows, as detailed previously in Section 4.1.

7.1.2 Adequate sight distance is to be checked and provided at each intersection in the detailed designs.

7.1.3 As detailed in Section 4.1, most intersections will take the form of priority-controlled intersections which can adequately accommodate the anticipated traffic flows. Any delays to vehicles at these intersections would be minimal, given the low vehicular traffic volumes forecast. There are expected to be some 4-way intersections, and these are recommended to be controlled by Stop/Give Way signs at lower volume intersections and a roundabout near Lancaster Road.

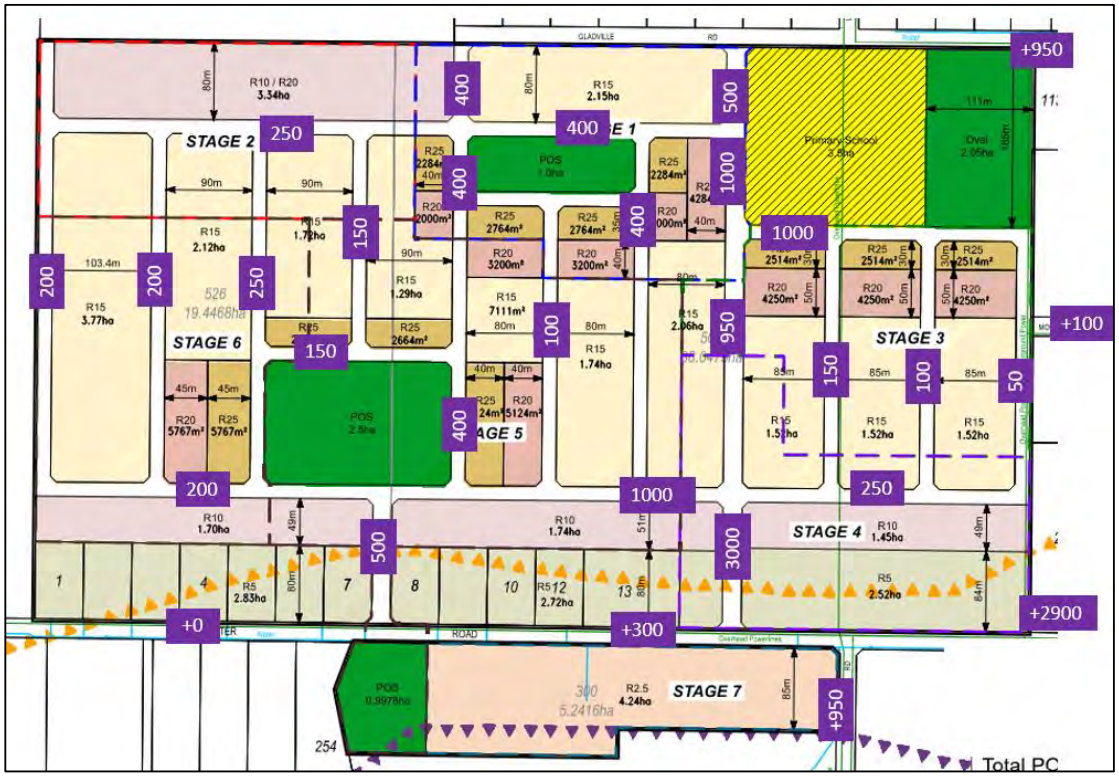
7.1.4 The maximum anticipated hourly two-way trips within the area is approximately 300 vehicles in each peak hour on the north-south 'Access Street C' near Lancaster Road, this as a result of LSP Amendment residential traffic and external traffic accessing the school site, with other through traffic is forecast to be negligible under current planning provisions. Other roads within the LSP Amendment area are not expected to carry more than around 40vph or no more than 400vpd. Therefore, it is acceptable that properties fronting roads are accessed directly from the streets.

7.1.5 The expected traffic flows on the streets within the LSP Amendment area are shown below in Figure 7-1.

7.1.6 With target speeds of 30 to 40km/h, the straight sections of roadway, may encourage speeds in excess of this desired speeds. To maintain speeds at these targets, sloe points should be considered at appropriate spacing as follows:

- Access Street C: 100 to 130m (for 40km/h target speed)
- Access Street D: 70 to 80m (for 30km/h target speed).

Figure 7-1: Expected Internal Traffic Flows (vehicles per day) – Ultimate Development



7.2 Internal Pedestrian/Cycle Network

7.2.1 As the internal roads within the LSP Amendment area are anticipated to have low volumes of traffic, with up to 300 two-way vehicle trips in both AM and PM peak periods (300vph), it is considered that none of the proposed roads within the LSP Amendment area would be difficult for pedestrians and cyclists to cross.

7.2.2 This is in line with Table 4 of the *WAPC Transport Impact Assessment Guidelines Volume 3*. This states that for a two-lane undivided road, the ability of pedestrians to cross would only be affected if there are more than 1,100 vph.

7.3 Safe Walk/Cycle to School Assessment

7.3.1 With a Primary School proposed to be located within the LSP Amendment area, all streets near the school should have a footpath on the school side of the roadway, and then ultimately on both sides of the street if demand for densities opposite the school site increase to R20. Emphasis in general by the City to enable walking, wheeling, and cycling as attractive modes to the primary school should be encouraged with adequate comfort facilities provided by the City such as rest spots and shelter for all weather conditions for any desire routes outside of the LSP Amendment area.

7.4 Pedestrian Permeability and Efficiency

7.4.1 The guidance set out within *Liveable Neighbourhoods* within Appendix 2, is not considered to be appropriate for the proposed LSP Amendment area as the site is not located within a 5-minute walk of a local centre or a 10-minute walk of a train station. Therefore, the specific guidelines set out within the *Liveable Neighbourhoods* for pedestrian permeability are not considered to be appropriate for this particular project.

7.4.2 The LSP Amendment road network enables accessibility for pedestrians with the bus stops for bus route 808 and other accessible within an approximate 15-minute walk of the site.

8 Analysis of External Transport Networks

8.1 Scope of Assessment

8.1.1 There are three logical access routes to/from the LSP Amendment area via Lancaster Road, Gladville Road and Timewell Road. These three roads intersect with the primary road network at Albany Highway and South Coast Highway and these intersections have therefore been assessed. Being a residential development, normally an AM peak assessment would suffice which includes the peak Primary School traffic movements but given the possible right turn access to the site from South Coast Highway into Timewell Road in the PM peak, a PM peak assessment was also undertaken.

8.2 Proposed Residential Trip Rates and Generation

8.2.1 For the proposed residential use, PJA has adopted the following trip rates and generation based on the *WAPC Transport Impact Assessment Planning Guidelines (Volume 2: Planning Schemes, Structure Plans & Activity Centre Plans, August 2016)*.

8.2.2 Table 8-1 summarises the adopted trip rates and the resultant trip generation for the proposed LSP Amendment for the 570 proposed lots and for a Primary School catering for some 650 students for the weekday AM peak (between 07:00-09:00) and PM peak (15:00-17:00) periods.

8.2.3 The majority of the school vehicular trips will be linked to internal trips as residents may drive to work and drop children at the school or pick them up on the way home. It has been assumed that the school will have 80% of trips related to this linking (internal school trips). Thus 20% of the total trips expected to be generated by the school will be external trips to and from the LSP Amendment area.

Table 8-1: Weekday AM and PM Residential Peak Hour Trip Rates and Generation

Period	Weekday AM Peak			Weekday PM Peak		
	In	Out	Two-way	In	Out	Two-way
Per Residential Dwellings (WAPC Guidelines)	0.2	0.6	0.8	0.5	0.3	0.8
Per Primary School Student (WAPC Guidelines)	0.5	0.5	1	0.5	0.5	1
Total Trip Generation (allowing for primary school adjustment)	180	405	585	350	235	585

8.2.4 From the vehicle trip rates in Table 8-1, in the AM peak hour approximately 585 two-way trips (180 inbound, 405 outbound) were predicted to be generated by the LSP and in the PM peak hour 585 two-way trips (350 inbound, 235 outbound) are forecast to be generated. Over a full day there is expected to be approximately 4,800 trips to and from the proposed LSP Amendment area.

8.3 Trip Distribution

8.3.1 For the purposes of estimating vehicle movements, the directional distributions shown in Table 8-2 have been assumed for the LSP Amendment area. The proportions have been based on assessment of both the proximity of LSP Amendment lots to these roads and also likely routes between the LSP Amendment area and the most likely destination, being Albany.

Table 8-2: Trip Distribution

External Route to/from	Percentage Distribution
Gladville Road to Albany Highway	20%
Lancaster Road to Albany Highway	60%
Timewell Road to South Coast Highway	20%

8.3.2 Applying these distribution proportions with the trip generation in Table 8-1 (these do not include primary school traffic) results in the following anticipated traffic flows onto the surrounding external roads. Primary School traffic has been excluded as this traffic will access the current developed areas of McKail southeast of the LSP Amendment area and not need to use these intersections.

Table 8-3: Resulting Trips Distributed

External Roads	AM peak hour trips		PM peak hour trips	
	In	Out	In	Out
Gladville Road	35	80	70	45
Lancaster Road	105	245	210	140
Timewell Road	35	80	70	45

8.4 Traffic Impacts

To determine the impact of the LSP Amendment area on the intersections of Lancaster Road and Gladville Road with Albany Highway and Timewell Road / South Coast Highway, traffic modelling was undertaken using Sidra Intersection for the following scenarios:

- 2023 base case
- 2036 without development
- 2036 with development (full build out).

The assessment utilised the available traffic volumes for Albany Highway and South Coast Highway. Then using TomTom Traffic OD Data[1], the directional split of current traffic flows was determined at each intersection. This TomTom data indicated that 90% of movements from Lancaster Road and Gladville Road intersections would be to/from the south, and 10% to/from the north. For the Timewell intersection with South Coast Highway, the current flows were more evenly distributed in each direction.

An assessment of the current and expected traffic flows has shown that the roads will be carrying traffic within their midblock traffic carrying ability. This assessment is shown below in Table 8-4.

The only exception to this is Lancaster Road, where traffic flows are expected to be slightly more than the indicative volume range. However, given the free flow nature of traffic on Lancaster Road and the exceedance is not significant, the current layout of Lancaster Road is considered acceptable.

Table 8-4: Resulting Midblock Daily Traffic Flows

Road	Current Flows	Without Development (2036)	With Development (2036)	Theoretical Maximum Capacity
Albany Highway (2022/23)	6,206	7,740	10,300	15,000
South Coast Highway (2022/23)	3,659	3,660	4,140	15,000
Lancaster Road (2023)	1,955	1,960	4,840	7,000
Gladville Road (2013)	334	330	1,290	3,000
Timewell Road (2015)	213	210	1,170	3,000

[1] move.tomtom.com

8.5 SIDRA Analysis

8.5.1 The operation of each intersection has been analysed using SIDRA Intersection (Version 9.1). The key outputs of SIDRA are summarised below:

- **Degree of Saturation (DOS)** is the ratio of the volume of traffic observed making a particular movement compared to the maximum capacity for that movement.
- The **95th Percentile (95th %ile) Queue** represents the maximum queue length that can be expected in 95% of observed queue lengths in the peak hour.
- **Average Delay** is the delay time that can be expected over all vehicles making a particular movement in the peak hour.

8.5.2 The WAPC Guidelines indicate an average delay for each vehicle passing through an intersection to be less than 35 seconds for a priority intersection approach and 45 seconds for any individual movement.

8.5.3 The SIDRA results for the intersections for the current 2024 and future 2036 estimated future volumes is presented in the tables Table 8-4 to Table 8-6.

8.5.4 For the assessments it has been assumed that the current geometry of the intersections will remain unchanged.

8.5.5 For the 2036 assessment 'with the development' scenario, all intersections are expected to operate well. For the intersection with the highest traffic flows, Lancaster Road, there is expected to be a slight worsening in the LoS for the Lancaster Road intersection from LoS B to C, but overall, the intersection is expected to be entirely acceptable in its present layout. Delays, at worst on Lancaster Road right turn approach is expected to be 24s in the PM peak (compared to 21s in 2036 without the development), whilst the DoS is expected to be no worse than 0.60 for the same right turn in the AM peak.

8.5.6 These excellent operational results confirm that the current intersection formats can cater for the expected traffic flow increases due to the proposed LSP Amendment.

Table 8-5: Gladville Road/Albany Highway – SIDRA Results

Lane	AM Peak				PM Peak			
	Degree of Saturation	Average Delay (s)	Level of Service	95th %ile Q (m)	Degree of Saturation	Average Delay (s)	Level of Service	95th %ile Q (m)
Current								
South: Albany Hwy LT/Th	0.17	0.2		0	0.19	0.4		0
North: Albany Hwy Th	0.22	0.1		0	0.26	0.1		0
North: Albany Hwy RT	0.01	7		0.2	0.002	7		0.1
West: Gladville Rd LT	0.002	6		0.1	0.001	6		0
West: Gladville Rd RT	0.05	11		1	0.03	12		0.7
Intersection (based on minor leg approach)	**0.05**	**10**	**B**	**1**	**0.03**	**12**	**B**	**0.7**
2036 No Development								
South: Albany Hwy LT/Th	0.22	0.2		0	0.24	0.3		0
North: Albany Hwy Th	0.28	0.1		0	0.32	0.1		0
North: Albany Hwy RT	0.01	7		0.2	0.002	7		0.1
West: Gladville Rd LT	0.002	6		0.1	0.001	6		0
West: Gladville Rd RT	0.07	14		2	0.04	17		1
Intersection (based on minor leg approach)	**0.07**	**13**	**B**	**2**	**0.04**	**16**	**C**	**1**
2036 with Development								
South: Albany Hwy LT/Th	0.23	1		0	0.27	1		0
North: Albany Hwy Th	0.28	0.1		0	0.32	0.1		0
North: Albany Hwy RT	0.01	7		0.3	0.01	7		0.3
West: Gladville Rd LT	0.01	6		0.2	0.01	6		0.2
West: Gladville Rd RT	0.28	16		8	0.19	18		5
Intersection (based on minor leg approach)	**0.28**	**16**	**C**	**8**	**0.19**	**18**	**C**	**5**

Table 8-6: Lancaster Road/Albany Highway – SIDRA Results

Lane	AM Peak				PM Peak			
	Degree of Saturation	Average Delay (s)	Level of Service	95th %ile Q (m)	Degree of Saturation	Average Delay (s)	Level of Service	95th %ile Q (m)
Current								
South: Albany Hwy LT/Th	0.18	0.6		0	0.26	2		0
North: Albany Hwy Th	0.22	0.1		0	0.26	0.1		0
North: Albany Hwy RT	0.003	7		0.1	0.01	7		0.4
West: Lancaster Rd LT	0.01	6		0.2	0.02	6		0.4
West: Lancaster Rd RT	0.29	13		9	0.20	14		5
Intersection (based on minor leg appr)	**0.29**	**12**	**B**	**9**	**0.20**	**13**	**B**	**5**
2036 No Development								
South: Albany Hwy LT/Th	0.23	0.5		0	0.30	2		0
North: Albany Hwy Th	0.28	0.1		0	0.32	0.1		0
North: Albany Hwy RT	0.003	7		0.1	0.01	8		0.4
West: Lancaster Rd LT	0.01	6		0.2	0.02	6		0.5
West: Lancaster Rd RT	0.39	18		13	0.28	21		8
Intersection (based on minor leg appr)	**0.39**	**17**	**C**	**13**	**0.28**	**18**	**C**	**8**
2036 with Development								
South: Albany Hwy LT/Th	0.27	2		0	0.39	2		0
North: Albany Hwy Th	0.28	0.1		0	0.32	0.1		0
North: Albany Hwy RT	0.01	7		0.3	0.04	9		1
West: Lancaster Rd LT	0.03	7		1	0.03	6		1
West: Lancaster Rd RT	0.87	35		63	0.67	29		26
Intersection (based on minor leg appr)	**0.87**	**35**	**E**	**63**	**0.67**	**29**	**D**	**26**

Table 8-7: Timewell Road/South Coast Highway – SIDRA Results

Lane	AM Peak				PM Peak			
	Degree of Saturation	Average Delay (s)	Level of Service	95th %ile Q (m)	Degree of Saturation	Average Delay (s)	Level of Service	95th %ile Q (m)
Current								
East: South Coast Hwy Th/RT	0.08	0.3		0.3	0.13	0.2		0.4
North: Timewell Rd LT	0.01	8		0.2	0.005	8		0.2
North: Timewell Rd RT	0.03	9		0.8	0.02	9		0.4
West: South Coast Hwy LT/Th	0.14	0.3		0	0.09	0.5		0
Intersection (based on minor leg appr)	**0.03**	**9**	**A**	**0.8**	**0.02**	**8**	**A**	**0.4**
2036 No Development								
East: South Coast Hwy Th/RT	0.08	0.3		0.3	0.13	0.2		0.4
North: Timewell Rd LT	0.01	8		0.2	0.005	8		0.2
North: Timewell Rd RT	0.03	9		0.8	0.02	9		0.4
West: South Coast Hwy LT/Th	0.14	0.3		0	0.09	0.5		0
Intersection (based on minor leg appr)	**0.03**	**9**	**A**	**0.8**	**0.02**	**8**	**A**	**0.4**
2036 with Development								
East: South Coast Hwy Th/RT	0.09	2		2	0.15	2		2
North: Timewell Rd LT	0.04	8		1	0.02	8		1
North: Timewell Rd RT	0.08	9		2	0.04	9		1
West: South Coast Hwy LT/Th	0.15	1		0	0.11	2		0
Intersection (based on minor leg appr)	**0.08**	**9**	**A**	**2**	**0.04**	**9**	**A**	**1**

8.6 Road Safety

8.6.1 The ultimate low levels of traffic generated by the proposed LSP Amendment and the modelled levels of vehicle delays exiting or accessing the site directly from the major roads are not anticipated to worsen the existing relatively low-level crash history (refer to Section 9 for further discussion).

8.7 Analysis of Pedestrian / Cycle Networks

8.7.1 Table 4 of the WAPC Guidelines Volume 3 has been reproduced below.

Table 8-8: Traffic Volumes Affecting Pedestrian Crossing Amenity

Road Cross-Section	Traffic Volume Affecting the Ability of Pedestrians to Cross (vehicles per hour – two-way)
2 lane undivided	1,100 vph
2-lane divided (or with pedestrian refuge islands)	2,800 vph
4 lane undivided (without pedestrian refuge islands)	700 vph
4-lane divided (or with pedestrian refuge islands)	1,600 vph

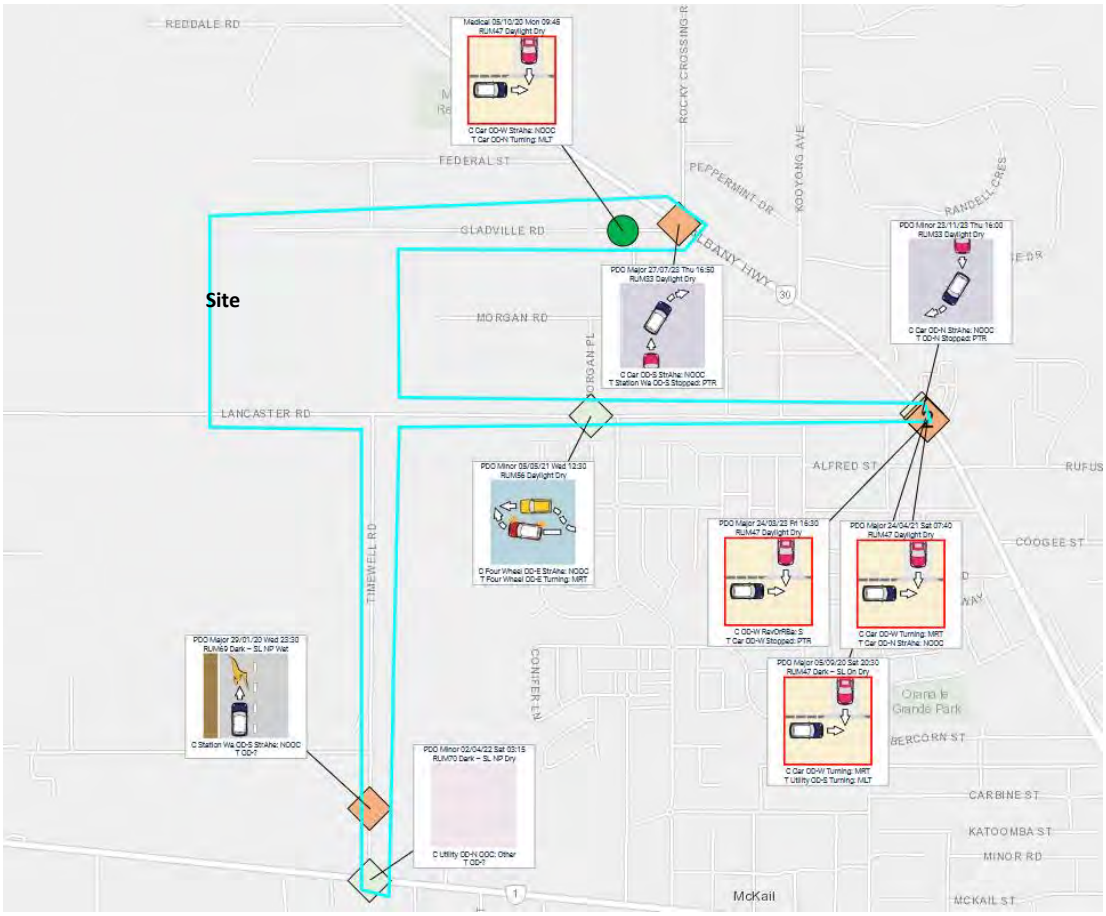
8.7.2 The roads surrounding the site are all categorised as two-lane undivided roads and therefore the ability of pedestrians to cross would only be affected if there are more than 1,100 vph. The distributed traffic flows for the LSP Amendment, demonstrates that the peak of the expected traffic within the LSP Amendment area should not exceed 300 two-way movements in a peak hour. The ability for pedestrians to cross internal streets and of any adjacent road for that matter should not be impacted by the level of volume experienced and this will not be worsened with the construction of the proposed development.

9 Safety Issues

9.1.1 The level of internal traffic and therefore exposure to vehicles has been shown to be relatively low given the residential nature of the LSP Amendment. Further, the internal roads will have a 15m to 20m road reserve with an anticipated 6m to 7.2m carriageway width or narrower and speed controls recommended at intervals along the lengths of east-west streets, to encourage slower vehicle speeds. These characteristics will inherently improve the safety of the LSP Amendment area.

9.1.2 Crash history has been reviewed from the Main Roads WA Crash Information map on streets in the vicinity of the development site. Crashes in the vicinity of the site were identified and the locations of which are shown in Figure 9-1.

Figure 9-1: Location of Crashes: 2019-2023



Source: Main Roads WA: Crash Map

9.1.3 Over the latest 5-year period, up to December 2023, nine (9) crashes were recorded on roads likely to be used as access routes to and from the LSP Amendment area. Apart from one crash requiring medical attention all other crashes were classified as Property Damage Only (PDO, Major/Minor). There is one cluster of crashes, with three crashes occurring near the intersection of Lancaster Road and Albany Highway, possibly related to access to and from the service station and liquor store on the south western corner of the intersection.

9.1.4 The crash resulting in medical attention involved a car travelling from west to east on Gladville Road, colliding with a truck exiting a driveway on the north side of the road, to head towards Albany Highway. The higher severity might be related to Gladville Road which is not speed signed and therefore subject to unrestricted speeds of up to 110km/h.

10 Summary and Conclusion

10.1.1 This Transport Impact Assessment (TIA) has been prepared by PJA for Acumen Development Solutions on behalf of Vegate Pty Ltd, in relation to a combined LSP Amendment on land at Lots 507, 526 & 300 Lancaster Road in McKail. The LSP Amendment proposal include the following.

- 570 freehold residential lots, varying in size from R2.5 to R25 density. The site will provide a low-density LSP with most dwellings codes at R15 (with flexibility for R25 opposite the school site if demand for this product increases in the future)
- Primary School with up to approximately 650 students
- Public Open Space (POS) totalling approximately 6.5ha
- Road reserves in width of generally 15m across the site and a main north-south road reserve of 20m width.

10.1.2 The LSP Amendment area, in totality, would generate 585 two-way vehicle trips in the weekday AM and PM peak periods, with no more than 300 two-way vehicle trips and the internal street network, and when distributed onto the adjacent road network, the Sidra modelling outputs represents a negligible impact to the local road network.

10.1.3 Due to the ultimately low traffic volume and low-speed residential nature of the LSP Amendment, all intersections within the LSP Amendment area are intended to be constructed as priority-controlled (at T-junctions) or sign controlled (Give Way/Stop at 4-way junctions) intersections. One of the two 4-way intersections is expected to have traffic flows less than 2,000vpd (passing through the intersection from all directions), whilst the other 4-way intersection nearer to Lancaster Road is recommended to be controlled via a roundabout to assist circulation for school peak times, subject to detailed design and as entry flows are expected to exceed 2,000vpd. The 4-way intersection near Gladville Road is recommended for further investigation as to the appropriate control, being either a roundabout, restricted movements or Stop controlled, subject to detailed design.

10.1.4 From a transport engineering perspective, this LSP Amendment area has no attractive nearby public transport services and facilities and therefore walking, wheeling, and cycling are the only other modes of travel beyond the private car. Given the location on the fringes of the Albany townsite where existing walking and cycling facilities are also limited to connect to/from, the sharing of road reserve space between the different modes in a safe manner will be the most important consideration in next stages of design. Design must therefore focus on lowering speeds per Safe System Principles, wherever practical and the provision of good active transport infrastructure within the LSP Amendment area to provide local access to/from the primary school.

10.1.5 The Albany Ring Road project will provide a new access into the Port of Albany and is expected to reduce the number of RAVs and general heavy vehicles on both Albany Highway and South Coast Highway near Lancaster, Gladville and Timewell Roads. The Albany Ring Road project also includes the closure of Lancaster Road at Link Road, west of the LSP Amendment area. Assessment of traffic flows on Timewell Road and locally generated traffic along Lancaster Road, indicates that this severance should decrease traffic flows on Lancaster Road in the order of 500vpd. Thus, traffic flows recorded on Lancaster Road should decrease from about 2,000vpd to about 1,500vpd closer to Albany Highway.

10.1.6 There will not be any upgrades or modifications needed to existing intersections to cater for the increased traffic flows from the LSP Amendment. Current road cross sections can be retained as they should cater for expected traffic flows.

10.1.7 This Transport Impact Assessment has been prepared in accordance with the *WAPC Transport Impact Assessment Guidelines Volume 3 for Planning Schemes, Structure Plans & Activity Centre Plans*, the completed checklist is provided in Appendix C.

Appendix A Proposed LSP Plan

Yield Summary		
R2.5	4.24ha	10 Lots
R5	2.52ha	12 Lots
R10	8.23ha	81 Lots
R15	20.1211ha	295 Lots
R20	3.8325ha	81 Lots
R25	3.3857ha	91 Lots
	Total Lots	570 Lots

Legend:

Total LSP Area: 68.13ha
Total area of school: 3.50ha
Total POS are provided: 6.5478ha

Albany Speedway Noise Special Control Area (see c.6.5)

Water Corporation Waste Water Treatment Plant Odour Buffer Special Control Area (see c.6.6)

SUBDIVISION CONCEPT PLAN

LOTS 1 - 13, 507, 526 AND 300 LANCASTER ROAD
McKAIL

Urban Development Institute of Australia WESTERN AUSTRALIA
Planning Institute Australia
CPP CERTIFIED PRACTISING PLANNER

SCALE: 1:5000 @ A3
DATE: 18th JULY 2024
FILE: 1773_18.07.2024.dwg
DRAW: - SB
CHECKED: -

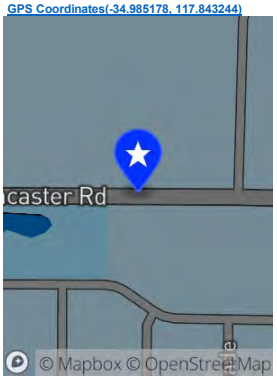
DYNAMIC PLANNING AND DEVELOPMENTS
E: admin@dynamicplanning.net.au
T: (08) 9275 4433
W: www.dynamicplanning.net.au
SUITE 15, 29 COLLIER ROAD
MORLEY WA 6062
ABN: 99 169 411 705

N W E S

Appendix B Traffic Counts

Lancaster Rd-SLK 0.8
Lancaster Rd-SLK 0.8

GPS Coordinates(-34.985178, 117.843244)



Data Summary
16 days data in total contribute to the report, which include:
2023: 16 days, From 2023-02-02 to 2023-02-17

Summary Data (2023)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
West	972	992	918	62.60km/h	56.38km/h	62.32km/h	56.16km/h	63.40km/h	56.95km/h
East	947	976	869	62.39km/h	55.69km/h	62.39km/h	55.66km/h	62.39km/h	55.76km/h
Both directions	1918	1966	1786	62.50km/h	56.02km/h	62.39km/h	55.91km/h	63.00km/h	56.38km/h

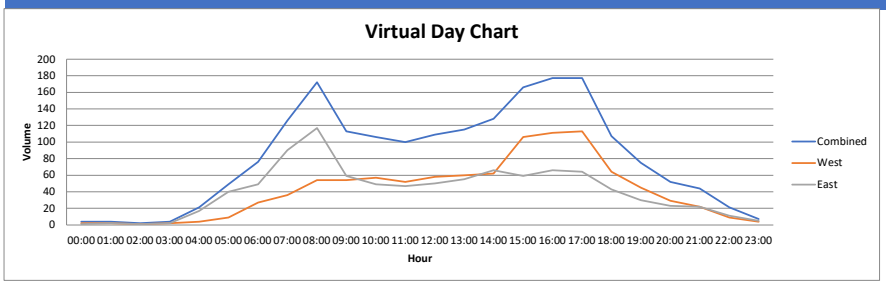
Virtual Day Summary Table(2023)

	Both directions				West		East	
	Weekday		Weekend		Weekday	Weekend	Weekday	Weekend
All day (0-24)	1955	100.00%	1777	100.00%	983	908	968	860
Daytime [7-19)	1596	81.64%	1531	86.16%	827	781	765	748
Evening [19-23)	192	9.82%	149	8.38%	105	82	86	65
Night [23-7)	167	8.54%	97	5.46%	51	45	117	47
2 Hours Morning Peak [7-9)	298	15.24%	135	7.60%	90	50	207	85
2 Hour Afternoon Peak [16-18)	354	18.11%	268	15.08%	224	142	130	126

Virtual Day Detail Table(2023)

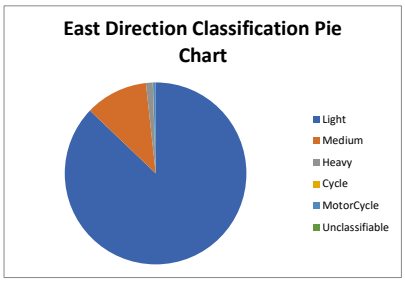
Time Range			Both directions				West		East	
			Weekday		Weekend		Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	4	0.20%	13	0.73%	2	7	1	6
01:00	-	02:00	4	0.20%	9	0.51%	2	4	2	4
02:00	-	03:00	2	0.10%	3	0.17%	1	1	1	2
03:00	-	04:00	4	0.20%	5	0.28%	2	1	2	3
04:00	-	05:00	21	1.07%	8	0.45%	4	4	17	3
05:00	-	06:00	49	2.51%	15	0.84%	9	6	40	8
06:00	-	07:00	76	3.89%	30	1.69%	27	14	49	16
07:00	-	08:00	126	6.45%	47	2.64%	36	16	90	31
08:00	-	09:00	172	8.80%	88	4.95%	54	34	117	54
09:00	-	10:00	113	5.78%	132	7.43%	54	64	59	68
10:00	-	11:00	106	5.42%	159	8.95%	57	83	49	76
11:00	-	12:00	100	5.12%	165	9.29%	52	80	47	85
12:00	-	13:00	109	5.58%	158	8.89%	58	92	50	65
13:00	-	14:00	115	5.88%	142	7.99%	60	74	55	68
14:00	-	15:00	128	6.55%	142	7.99%	62	75	66	67
15:00	-	16:00	166	8.49%	148	8.33%	106	82	59	65
16:00	-	17:00	177	9.05%	144	8.10%	111	78	66	66
17:00	-	18:00	177	9.05%	124	6.98%	113	64	64	60
18:00	-	19:00	107	5.47%	82	4.61%	64	39	43	43
19:00	-	20:00	75	3.84%	59	3.32%	45	29	30	30
20:00	-	21:00	52	2.66%	45	2.53%	29	24	23	20
21:00	-	22:00	44	2.25%	27	1.52%	22	18	22	9
22:00	-	23:00	21	1.07%	18	1.01%	9	11	11	6
23:00	-	00:00	7	0.36%	14	0.79%	4	8	5	5

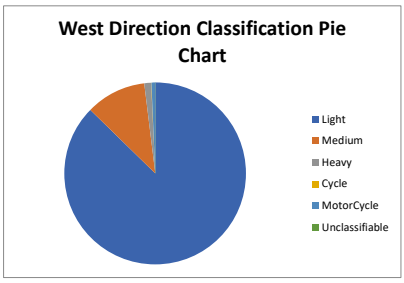
Weekday Virtual Day Graph(2023)



Classification (2023)

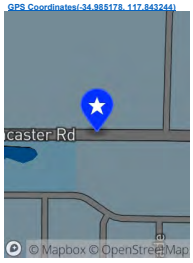
	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total
West	87.32%	10.73%	1.21%	0.05%	0.68%	0.01%	14564
East	87.13%	11.16%	1.18%	0.05%	0.48%	0.00%	14187





Lancaster Rd-SLK 0.8
Lancaster Rd-SLK 0.8

GPS Coordinates(-34.985178, 117.843244)



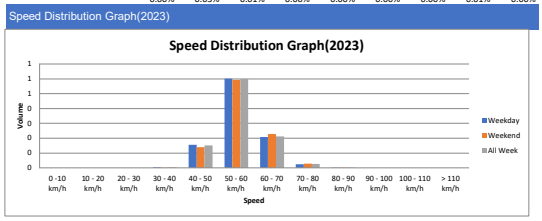
Speed Summary(2023)

	West			East			Both directions		
	Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
85th	63.40	62.32	62.60	62.39	62.39	62.39	63.00	62.39	62.50
Avg	56.95	56.16	56.38	55.76	55.66	55.69	56.38	55.91	56.02

Speed Distribution(2023)

	West			East			Both directions		
	Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
0 -10 km/h	0	0	0	0	0	0	0	0	0
10 - 20 km/h	0.02%	0.03%	0.02%	0.05%	0	0.04%	0.03%	0.01%	0.03%
20 - 30 km/h	0.16%	0.05%	0.13%	0.06%	0.03%	0.05%	0.11%	0.04%	0.09%
30 - 40 km/h	0.39%	0.30%	0.36%	0.37%	0.43%	0.39%	0.38%	0.36%	0.38%
40 - 50 km/h	12.53%	10.85%	12.11%	18.76%	17.35%	18.42%	15.62%	14.01%	15.22%
50 - 60 km/h	63.17%	60.52%	62.50%	57.18%	58.32%	57.46%	60.20%	59.45%	60.02%
60 - 70 km/h	20.84%	24.45%	21.75%	20.63%	21.10%	20.74%	20.74%	22.82%	21.25%
70 - 80 km/h	2.58%	3.16%	2.73%	2.53%	2.39%	2.50%	2.55%	2.79%	2.61%
80 - 90 km/h	0.26%	0.44%	0.30%	0.34%	0.29%	0.32%	0.30%	0.36%	0.31%
90 - 100 km/h	0.06%	0.11%	0.08%	0.07%	0.09%	0.07%	0.06%	0.10%	0.07%
100 - 110 km/h	0	0.03%	0.01%	0.01%	0	0.01%	0.00%	0.01%	0.01%
> 110 km/h	0	0.03%	0.01%	0.01%	0	0.01%	0.00%	0.01%	0.01%
	0.00%	0.03%	0.01%	0.00%	0.00%	0.00%	0.00%	0.01%	0.00%

Speed Distribution Graph(2023)



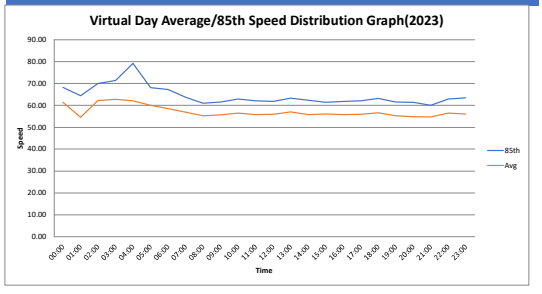
Virtual Day 85th Speed Distribution(2023)

Time Range			West			East			Both directions		
			Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
00:00	-	01:00	68.26	68.65	68.65	68.51	64.30	66.42	68.62	66.46	68.26
01:00	-	02:00	64.48	63.40	63.97	63.58	64.08	64.01	64.30	63.76	64.12
02:00	-	03:00	70.02	82.01	71.50	69.70	62.86	70.02	70.24	71.10	70.81
03:00	-	04:00	71.35	65.20	70.16	64.26	64.94	64.91	69.44	64.98	67.72
04:00	-	05:00	79.20	77.00	79.31	63.40	63.61	63.47	64.91	71.96	65.45
05:00	-	06:00	68.11	68.11	68.18	64.51	59.22	64.12	65.09	64.44	65.09
06:00	-	07:00	67.28	64.12	66.24	62.24	63.50	62.32	63.50	64.12	63.50
07:00	-	08:00	63.83	62.71	63.79	60.52	62.35	60.52	61.42	62.60	61.42
08:00	-	09:00	61.02	64.73	61.81	60.41	60.84	60.55	60.70	62.50	60.91
09:00	-	10:00	61.60	62.78	61.92	62.21	61.20	61.96	61.88	61.99	61.99
10:00	-	11:00	62.89	63.29	63.00	62.71	61.88	62.32	62.78	62.60	62.71
11:00	-	12:00	62.10	62.24	62.21	62.89	61.99	62.64	62.39	62.24	62.32
12:00	-	13:00	61.88	63.18	62.32	62.50	62.60	62.50	62.10	63.00	62.32
13:00	-	14:00	63.40	64.01	63.65	62.06	63.40	62.60	62.89	63.83	63.11
14:00	-	15:00	62.39	63.22	62.60	62.32	61.45	61.99	62.32	62.42	62.32
15:00	-	16:00	61.49	62.89	61.88	63.25	61.78	62.89	62.21	62.50	62.39
16:00	-	17:00	61.81	63.11	62.10	63.18	62.39	63.00	62.32	63.00	62.50
17:00	-	18:00	62.06	62.82	62.21	63.18	63.43	63.22	62.39	63.29	62.50
18:00	-	19:00	63.22	63.68	63.29	62.82	63.36	63.00	63.11	63.50	63.22
19:00	-	20:00	61.52	64.44	62.10	62.53	61.70	62.28	61.81	62.89	62.21
20:00	-	21:00	61.38	62.35	61.70	62.24	64.69	63.11	61.70	63.50	62.10
21:00	-	22:00	60.08	62.03	60.55	63.79	63.97	63.86	62.78	62.64	62.75
22:00	-	23:00	62.86	62.89	62.96	63.18	62.68	63.14	63.18	63.04	63.18
23:00	-	00:00	63.47	62.35	63.22	64.08	61.42	64.01	63.65	62.32	63.58

Virtual Day Average Speed Distribution(2023)

Time Range			West			East			Both directions		
			Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
00:00	-	01:00	61.45	60.44	60.95	58.46	58.21	58.32	60.44	59.40	59.87
01:00	-	02:00	54.65	57.56	55.80	55.19	57.56	56.27	54.90	57.56	56.02
02:00	-	03:00	62.28	70.96	64.19	61.88	59.22	60.77	62.17	64.55	62.89
03:00	-	04:00	62.86	59.47	62.14	58.07	59.47	58.46	60.01	59.47	59.87
04:00	-	05:00	62.10	62.17	62.10	55.73	54.61	55.66	56.92	58.82	57.17
05:00	-	06:00	60.12	60.73	60.26	56.27	54.22	56.12	56.99	57.06	56.99
06:00	-	07:00	58.54	57.82	58.43	55.73	55.51	55.73	56.74	56.63	56.74
07:00	-	08:00	56.95	57.92	57.10	54.36	55.30	54.47	55.08	56.20	55.22
08:00	-	09:00	55.30	57.46	55.69	54.76	54.65	54.76	54.94	55.73	55.04
09:00	-	10:00	55.69	57.28	56.20	55.19	55.01	55.15	55.44	56.12	55.66
10:00	-	11:00	56.48	57.17	56.74	55.51	55.30	55.44	56.05	56.27	56.12
11:00	-	12:00	55.84	56.27	55.98	56.12	55.76	55.98	55.98	56.02	55.98
12:00	-	13:00	55.98	56.74	56.23	55.80	56.05	55.87	55.87	56.45	56.09
13:00	-	14:00	56.99	57.02	56.99	55.58	55.87	55.66	56.30	56.48	56.34
14:00	-	15:00	55.87	56.48	56.05	55.80	55.33	55.66	55.84	55.94	55.87
15:00	-	16:00	56.05	56.88	56.23	56.48	56.16	56.41	56.20	56.56	56.30
16:00	-	17:00	55.87	56.48	56.02	56.38	55.51	56.12	56.05	56.05	56.05
17:00	-	18:00	56.02	56.99	56.20	56.34	56.41	56.34	56.12	56.70	56.27
18:00	-	19:00	56.70	56.95	56.74	55.84	56.16	55.91	56.34	56.52	56.38
19:00	-	20:00	55.30	57.24	55.66	55.76	55.69	55.73	55.48	56.45	55.69
20:00	-	21:00	54.94	56.59	55.30	55.66	57.89	56.20	55.22	57.17	55.69
21:00	-	22:00	54.72	55.98	55.01	56.56	56.59	56.56	55.62	56.20	55.73
22:00	-	23:00	56.52	57.24	56.74	55.66	57.89	56.02	56.05	57.46	56.38
23:00	-	00:00	56.12	56.30	56.20	57.02	57.71	57.28	56.52	56.84	56.63

Virtual Day Average/85th Speed Distribution Graph(2023)



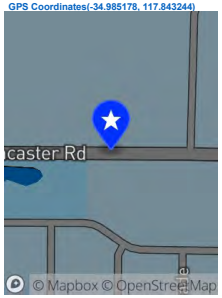
Virtual Week 85th/Average Speed Distribution(2023)

	West		East		Both directions	
	85th	Average	85th	Average	85th	Average
Monday	62.60	56.38	62.50	55.94	62.60	56.16
Tuesday	61.20	55.58	62.10	55.51	61.56	55.55
Wednesday	61.88	55.80	61.81	55.33	61.81	55.55
Thursday	62.50	56.30	62.89	55.80	62.71	56.05
Friday	63.11	56.56	62.50	55.62	62.78	56.09
Saturday	63.29	57.02	62.78	55.87	63.11	56.45
Sunday	63.50	56.92	61.88	55.62	62.78	56.27
All Week	62.32	56.16	62.39	55.66	62.39	55.91
Weekday	63.40	56.95	62.39	55.76	63.00	56.38

Lancaster Rd-SLK 0.8

Lancaster Rd-SLK 0.8

GPS Coordinates(-34.985178, 117.843244)



Virtual Day Class/Volume Matrix Weekday(2023)

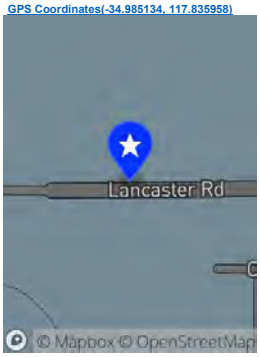
	West							East							Both directions						
	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total
00:00 - 01:00	3	0	0	0	0	0	3	1	0	0	0	0	0	1	4	0	0	0	0	0	4
01:00 - 02:00	2	0	0	0	1	0	3	2	0	0	0	0	0	2	4	0	0	0	1	0	5
02:00 - 03:00	1	0	0	0	0	0	1	1	0	0	0	0	0	1	2	0	0	0	0	0	2
03:00 - 04:00	2	0	0	0	0	0	2	2	0	0	0	0	0	2	4	0	0	0	0	0	4
04:00 - 05:00	4	0	0	0	0	0	4	15	2	0	0	0	0	17	19	2	0	0	0	0	21
05:00 - 06:00	7	2	0	0	0	0	9	34	5	0	0	0	0	39	41	7	0	0	0	0	48
06:00 - 07:00	22	5	0	0	0	0	27	43	6	0	0	0	0	49	65	11	0	0	0	0	76
07:00 - 08:00	28	6	1	0	0	0	35	80	8	2	0	0	0	90	108	14	3	0	0	0	125
08:00 - 09:00	43	10	1	0	0	0	54	105	11	1	0	0	0	117	148	21	2	0	0	0	171
09:00 - 10:00	45	8	1	0	0	0	54	50	8	1	0	0	0	59	95	16	2	0	0	0	113
10:00 - 11:00	48	8	1	0	0	0	57	40	8	1	0	0	0	49	88	16	2	0	0	0	106
11:00 - 12:00	41	9	2	0	0	0	52	39	7	1	0	0	0	47	80	16	3	0	0	0	99
12:00 - 13:00	49	8	1	0	1	0	59	42	7	1	0	0	0	50	91	15	2	0	1	0	109
13:00 - 14:00	50	9	1	0	1	0	61	45	9	1	0	0	0	55	95	18	2	0	1	0	116
14:00 - 15:00	51	10	1	0	0	0	62	55	9	1	0	1	0	66	106	19	2	0	1	0	128
15:00 - 16:00	94	11	2	0	1	0	108	50	9	1	0	0	0	60	144	20	3	0	1	0	168
16:00 - 17:00	99	11	1	0	1	0	112	56	10	1	0	0	0	67	155	21	2	0	1	0	179
17:00 - 18:00	102	10	1	0	0	0	113	57	7	0	0	0	0	64	159	17	1	0	0	0	177
18:00 - 19:00	59	4	0	0	0	0	63	39	4	0	0	0	0	43	98	8	0	0	0	0	106
19:00 - 20:00	41	4	0	0	0	0	45	28	2	0	0	0	0	30	69	6	0	0	0	0	75
20:00 - 21:00	28	1	0	0	0	0	29	21	1	0	0	0	0	22	49	2	0	0	0	0	51
21:00 - 22:00	22	1	0	0	0	0	23	20	2	0	0	0	0	22	42	3	0	0	0	0	45
22:00 - 23:00	9	0	0	0	0	0	9	10	1	0	0	0	0	11	19	1	0	0	0	0	20
23:00 - 00:00	4	0	0	0	0	0	4	4	1	0	0	0	0	5	8	1	0	0	0	0	9
All day (0-24)	854	117	13	0	5	0	989	839	117	11	0	1	0	968	1693	234	24	0	6	0	1957
Daytime [7-19)	709	104	13	0	4	0	830	658	97	11	0	1	0	767	1367	201	24	0	5	0	1597
Evening [19-23)	100	6	0	0	0	0	106	79	6	0	0	0	0	85	179	12	0	0	0	0	191
Night [23-7)	45	7	0	0	1	0	53	102	14	0	0	0	0	116	147	21	0	0	1	0	169
2 Hours Morning Peak [7-9)	71	16	2	0	0	0	89	185	19	3	0	0	0	207	256	35	5	0	0	0	296
2 Hour Afternoon Peak [16-18)	201	21	2	0	1	0	225	113	17	1	0	0	0	131	314	38	3	0	1	0	356

Classification Speed Matrix, Absolute Volume(2023)

	West							East							Both directions						
	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total
Under 10 km/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 - 20 km/h	3	0	0	0	0	0	3	1	3	0	0	1	0	5	4	3	0	0	1	0	8
20 - 30 km/h	13	4	0	1	1	0	19	2	2	1	1	1	0	7	15	6	1	2	2	0	26
30 - 40 km/h	46	5	0	1	1	0	53	34	17	0	4	0	0	55	80	22	0	5	1	0	108
40 - 50 km/h	1560	170	13	1	19	0	1763	2296	273	26	1	17	0	2613	3856	443	39	2	36	0	4376
50 - 60 km/h	7964	949	123	4	61	2	9103	7152	884	86	1	29	0	8152	15116	1833	209	5	90	2	17255
60 - 70 km/h	2742	376	37	0	13	0	3168	2528	353	48	0	14	0	2943	5270	729	85	0	27	0	6111
70 - 80 km/h	338	52	3	0	4	0	397	296	46	7	0	5	0	354	634	98	10	0	9	0	751
80 - 90 km/h	39	5	0	0	0	0	44	41	4	0	0	1	0	46	80	9	0	0	1	0	90
90 - 100 km/h	9	2	0	0	0	0	11	9	1	0	0	0	0	10	18	3	0	0	0	0	21
100 - 110 km/h	1	0	0	0	0	0	1	1	0	0	0	0	0	1	2	0	0	0	0	0	2
> 110 km/h	2	0	0	0	0	0	2	1	0	0	0	0	0	1	3	0	0	0	0	0	3

LANCASTER ROAD-SLK1450
2156

GPS Coordinates(-34.985134, 117.835958)



Data Summary
23 days data in total contribute to the report, which include:
2020: 23 days, From 2020-06-10 to 2020-07-02

Summary Data (2020)

	ADT	AWDT	AWEDT	85th	Avg	85th Weekday	Avg Weekday	85th Weekend	Avg Weekend
West	435	435	440	69.30km/h	60.23km/h	69.08km/h	60.01km/h	69.70km/h	60.73km/h
East	389	394	383	68.90km/h	59.80km/h	68.80km/h	59.69km/h	68.90km/h	60.05km/h
Both directions	824	829	818	69.08km/h	60.01km/h	69.01km/h	59.87km/h	69.30km/h	60.41km/h

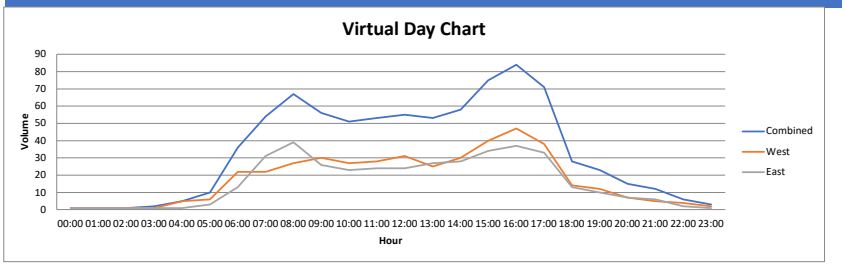
Virtual Day Summary Table(2020)

	Both directions				West		East	
	Weekday		Weekend		Weekday	Weekend	Weekday	Weekend
All day (0-24)	820	100.00%	808	100.00%	426	427	386	372
Daytime [7-19]	705	85.98%	724	89.60%	359	385	339	333
Evening [19-23]	56	6.83%	49	6.06%	28	23	25	22
Night [23-7]	59	7.20%	35	4.33%	39	19	22	17
2 Hours Morning Peak [7-9]	121	14.76%	50	6.19%	49	26	70	23
2 Hour Afternoon Peak [16-18]	155	18.90%	132	16.34%	85	56	70	74

Virtual Day Detail Table(2020)

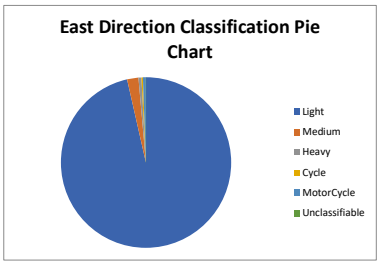
Time Range			Both directions				West		East	
			Weekday		Weekend		Weekday	Weekend	Weekday	Weekend
00:00	-	01:00	1	0.12%	8	0.99%	1	4	1	4
01:00	-	02:00	1	0.12%	2	0.25%	1	1	1	1
02:00	-	03:00	1	0.12%	4	0.50%	1	2	1	2
03:00	-	04:00	2	0.24%	1	0.12%	1	1	1	1
04:00	-	05:00	5	0.61%	3	0.37%	5	2	1	1
05:00	-	06:00	10	1.22%	2	0.25%	6	1	3	1
06:00	-	07:00	36	4.39%	8	0.99%	22	4	13	3
07:00	-	08:00	54	6.59%	17	2.10%	22	8	31	8
08:00	-	09:00	67	8.17%	33	4.08%	27	18	39	15
09:00	-	10:00	56	6.83%	61	7.55%	30	35	26	25
10:00	-	11:00	51	6.22%	78	9.65%	27	44	23	33
11:00	-	12:00	53	6.46%	76	9.41%	28	46	24	30
12:00	-	13:00	55	6.71%	75	9.28%	31	42	24	32
13:00	-	14:00	53	6.46%	72	8.91%	25	39	27	33
14:00	-	15:00	58	7.07%	73	9.03%	30	39	28	34
15:00	-	16:00	75	9.15%	82	10.15%	40	44	34	38
16:00	-	17:00	84	10.24%	76	9.41%	47	35	37	40
17:00	-	18:00	71	8.66%	56	6.93%	38	21	33	34
18:00	-	19:00	28	3.41%	25	3.09%	14	14	13	11
19:00	-	20:00	23	2.80%	19	2.35%	12	8	10	10
20:00	-	21:00	15	1.83%	11	1.36%	7	4	7	6
21:00	-	22:00	12	1.46%	10	1.24%	5	6	6	3
22:00	-	23:00	6	0.73%	9	1.11%	4	5	2	3
23:00	-	00:00	3	0.37%	7	0.87%	2	4	1	4

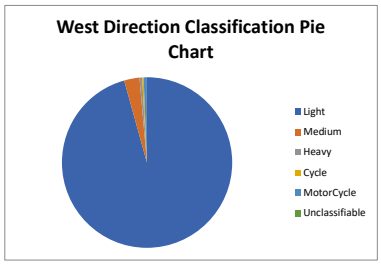
Weekday Virtual Day Graph(2020)



Classification (2020)

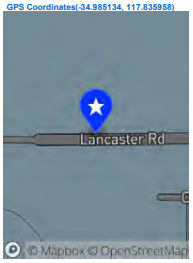
	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total
West	95.69%	2.89%	0.51%	0.27%	0.64%	0.00%	8791
East	96.43%	2.17%	0.53%	0.28%	0.55%	0.04%	7863





LANCASTER ROAD-SLK1450
2156

GPS Coordinates(-34.985134, 117.835958)



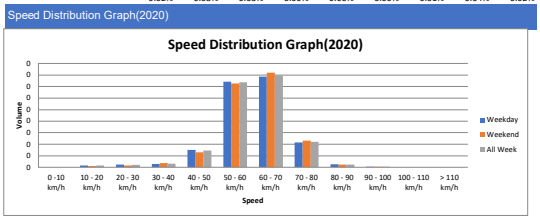
Speed Summary(2020)

	West			East			Both directions		
	Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
85th	69.70	69.08	69.30	68.90	68.80	68.90	69.30	69.01	69.08
Avg	60.73	60.01	60.23	60.05	59.69	59.80	60.41	59.87	60.01

Speed Distribution(2020)

	West			East			Both directions		
	Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
0 -10 km/h	0	0	0	0	0	0	0	0	0
10 - 20 km/h	0.40%	0.42%	0.41%	1.32%	0.71%	1.14%	0.84%	0.55%	0.76%
20 - 30 km/h	1.36%	0.92%	1.23%	1.02%	0.62%	0.90%	1.20%	0.78%	1.07%
30 - 40 km/h	1.36%	1.19%	1.31%	1.53%	2.52%	1.82%	1.44%	1.81%	1.55%
40 - 50 km/h	8.15%	6.80%	7.75%	7.03%	6.24%	6.80%	7.62%	6.54%	7.30%
50 - 60 km/h	37.51%	36.43%	37.19%	36.73%	36.21%	36.58%	37.14%	36.33%	36.90%
60 - 70 km/h	38.35%	39.98%	38.84%	40.35%	42.05%	40.84%	39.31%	40.94%	39.79%
70 - 80 km/h	10.88%	12.31%	11.31%	10.66%	10.67%	10.66%	10.78%	11.55%	11.00%
80 - 90 km/h	1.38%	1.38%	1.38%	1.20%	0.89%	1.11%	1.29%	1.15%	1.25%
90 - 100 km/h	0.44%	0.42%	0.43%	0.12%	0.09%	0.11%	0.29%	0.27%	0.28%
100 - 110 km/h	0.11%	0.08%	0.10%	0.04%	0	0.03%	0.08%	0.04%	0.07%
> 110 km/h	0.03%	0	0.02%	0	0	0	0.02%	0	0.01%
	0.02%	0.08%	0.03%	0.00%	0.00%	0.00%	0.01%	0.04%	0.02%

Speed Distribution Graph(2020)



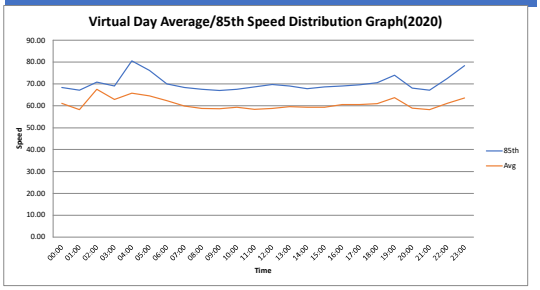
Virtual Day 85th Speed Distribution(2020)

Time Range			West			East			Both directions		
			Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
00:00	-	01:00	68.36	74.99	72.22	55.58	68.69	68.65	68.33	71.50	69.08
01:00	-	02:00	67.10	66.28	70.24	77.62	57.10	60.59	74.45	62.57	68.80
02:00	-	03:00	70.85	81.61	77.04	67.79	66.74	70.56	71.96	74.59	72.14
03:00	-	04:00	69.08	77.69	69.41	73.01	57.31	69.80	69.48	72.83	70.20
04:00	-	05:00	80.53	83.38	80.68	82.51	59.62	71.10	81.04	77.18	80.64
05:00	-	06:00	76.25	66.96	75.28	65.63	77.87	67.21	73.48	71.71	73.30
06:00	-	07:00	70.06	69.01	70.02	69.37	63.40	69.34	69.80	68.80	69.73
07:00	-	08:00	68.36	70.49	68.69	66.89	68.29	67.10	67.28	69.34	67.61
08:00	-	09:00	67.57	68.69	68.26	70.20	69.34	69.91	68.90	69.08	69.01
09:00	-	10:00	67.03	68.98	67.90	68.08	68.80	68.47	67.61	68.90	68.11
10:00	-	11:00	67.50	68.72	68.29	66.96	67.97	67.61	67.18	68.36	67.90
11:00	-	12:00	68.65	70.06	69.19	68.18	68.83	68.80	68.54	69.70	68.90
12:00	-	13:00	69.80	69.30	69.70	69.26	69.70	69.52	69.70	69.52	69.62
13:00	-	14:00	69.08	69.01	69.08	69.70	70.24	70.09	69.52	69.80	69.59
14:00	-	15:00	67.90	70.70	68.80	69.08	68.69	69.05	68.62	69.59	68.98
15:00	-	16:00	68.69	69.70	68.98	68.80	68.18	68.51	68.69	69.19	68.87
16:00	-	17:00	69.08	69.70	69.26	67.72	67.46	67.64	68.51	68.69	68.62
17:00	-	18:00	69.59	70.99	69.80	67.39	68.58	67.75	68.18	69.26	68.62
18:00	-	19:00	70.60	68.44	69.88	68.65	67.64	68.40	69.55	68.40	69.19
19:00	-	20:00	73.98	69.52	72.43	70.49	68.29	69.62	72.18	68.69	71.24
20:00	-	21:00	68.15	72.32	68.76	73.44	68.65	72.79	72.11	69.26	72.00
21:00	-	22:00	67.18	68.62	67.82	71.39	74.41	71.71	70.20	69.91	70.20
22:00	-	23:00	72.47	66.64	69.77	72.25	69.52	71.57	72.47	68.83	70.88
23:00	-	00:00	78.44	71.50	73.69	77.26	69.84	71.78	78.34	70.70	72.79

Virtual Day Average Speed Distribution(2020)

Time Range			West			East			Both directions		
			Weekday	Weekend	All Week	Weekday	Weekend	All Week	Weekday	Weekend	All Week
00:00	-	01:00	61.13	61.63	61.52	55.08	62.32	60.30	58.10	61.96	60.95
01:00	-	02:00	58.21	62.46	60.88	77.62	44.78	48.89	63.04	52.16	54.86
02:00	-	03:00	67.61	67.00	67.21	61.67	62.96	62.46	65.09	65.30	65.23
03:00	-	04:00	62.93	62.68	62.89	62.93	46.80	58.90	62.93	59.15	62.10
04:00	-	05:00	65.77	74.92	67.14	67.86	54.25	61.06	65.95	67.32	66.24
05:00	-	06:00	64.62	61.81	64.40	49.75	63.18	51.55	59.26	62.50	59.58
06:00	-	07:00	62.39	60.30	62.24	57.74	57.13	57.67	60.66	58.93	60.52
07:00	-	08:00	59.90	62.21	60.23	58.00	62.28	58.46	58.82	62.24	59.22
08:00	-	09:00	58.86	60.80	59.29	61.20	60.01	61.02	60.23	60.44	60.26
09:00	-	10:00	58.72	61.13	59.51	59.11	60.55	59.54	58.90	60.88	59.54
10:00	-	11:00	59.36	59.80	59.54	58.64	60.44	59.33	59.04	60.08	59.44
11:00	-	12:00	58.36	61.20	59.51	58.50	59.83	58.97	58.43	60.66	59.29
12:00	-	13:00	58.79	60.19	59.33	60.05	60.70	60.26	59.33	60.41	59.72
13:00	-	14:00	59.72	60.16	59.90	59.08	61.34	59.80	59.40	60.70	59.87
14:00	-	15:00	59.40	61.09	59.98	60.16	59.83	60.05	59.76	60.52	60.01
15:00	-	16:00	59.40	61.27	59.98	60.44	59.51	60.16	59.90	60.44	60.05
16:00	-	17:00	60.62	59.47	60.34	59.33	60.05	59.54	60.05	59.80	59.98
17:00	-	18:00	60.59	62.14	60.88	59.58	59.33	59.51	60.12	60.37	60.19
18:00	-	19:00	60.95	60.80	60.91	61.02	57.89	60.19	60.98	59.54	60.59
19:00	-	20:00	63.76	58.10	62.46	61.56	59.44	60.91	62.75	58.82	61.74
20:00	-	21:00	59.00	59.18	59.04	63.29	59.36	62.28	61.09	59.29	60.66
21:00	-	22:00	58.28	61.24	59.29	63.40	62.75	63.29	61.13	61.74	61.27
22:00	-	23:00	61.09	58.93	60.26	59.51	57.96	58.90	60.48	58.54	59.72
23:00	-	00:00	63.61	62.75	63.22	73.44	61.60	66.42	66.89	62.17	64.51

Virtual Day Average/85th Speed Distribution Graph(2020)

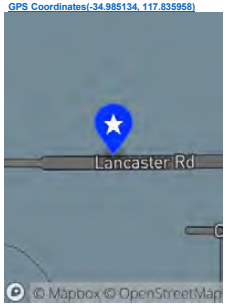


Virtual Week 85th/Average Speed Distribution(2020)

	West		East		Both directions	
	85th	Average	85th	Average	85th	Average
Monday	69.70	60.59	69.70	60.26	69.70	60.44
Tuesday	68.90	59.94	69.41	60.08	69.08	60.01
Wednesday	68.87	59.87	68.11	59.22	68.51	59.58
Thursday	68.98	59.98	68.62	59.80	68.80	59.90
Friday	69.19	59.62	68.00	58.93	68.62	59.29
Saturday	70.09	60.80	69.19	59.94	69.59	60.41
Sunday	69.30	60.62	68.62	60.12	68.90	60.41
All Week	69.08	60.01	68.80	59.69	69.01	59.87
Weekday	69.70	60.73	68.90	60.05	69.30	60.41

LANCASTER ROAD-SLK1450
2156

GPS Coordinates(-34.985134, 117.835958)



Virtual Day Class/Volume Matrix Weekday(2020)

	West							East							Both directions						
	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total
00:00 - 01:00	1	0	0	0	0	0	1	1	0	0	0	0	0	1	2	0	0	0	0	0	2
01:00 - 02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
02:00 - 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
03:00 - 04:00	2	0	0	0	0	0	2	0	0	0	0	0	0	0	2	0	0	0	0	0	2
04:00 - 05:00	5	0	0	0	0	0	5	1	0	0	0	0	0	1	6	0	0	0	0	0	6
05:00 - 06:00	6	0	0	0	0	0	6	4	0	0	0	0	0	4	10	0	0	0	0	0	10
06:00 - 07:00	22	0	0	0	0	0	22	13	0	0	0	0	0	13	35	0	0	0	0	0	35
07:00 - 08:00	21	1	0	0	0	0	22	30	1	0	0	0	0	31	51	2	0	0	0	0	53
08:00 - 09:00	25	2	1	0	0	0	28	38	1	0	0	0	0	39	63	3	1	0	0	0	67
09:00 - 10:00	28	2	0	0	0	0	30	25	1	0	0	0	0	26	53	3	0	0	0	0	56
10:00 - 11:00	26	1	0	0	0	0	27	22	1	0	0	0	0	23	48	2	0	0	0	0	50
11:00 - 12:00	27	2	0	0	0	0	29	24	1	0	0	0	0	25	51	3	0	0	0	0	54
12:00 - 13:00	29	2	0	0	0	0	31	23	1	0	0	0	0	24	52	3	0	0	0	0	55
13:00 - 14:00	24	1	0	0	0	0	25	26	1	0	0	0	0	27	50	2	0	0	0	0	52
14:00 - 15:00	29	1	0	0	0	0	30	28	1	0	0	0	0	29	57	2	0	0	0	0	59
15:00 - 16:00	39	1	0	0	0	0	40	34	0	0	0	0	0	34	73	1	0	0	0	0	74
16:00 - 17:00	45	2	0	0	0	0	47	36	0	1	0	0	0	37	81	2	1	0	0	0	84
17:00 - 18:00	38	1	0	0	0	0	39	33	0	0	0	0	0	33	71	1	0	0	0	0	72
18:00 - 19:00	15	0	0	0	0	0	15	13	0	0	0	0	0	13	28	0	0	0	0	0	28
19:00 - 20:00	13	0	0	0	0	0	13	11	0	0	0	0	0	11	24	0	0	0	0	0	24
20:00 - 21:00	8	0	0	0	0	0	8	8	0	0	0	0	0	8	16	0	0	0	0	0	16
21:00 - 22:00	6	0	0	0	0	0	6	7	0	0	0	0	0	7	13	0	0	0	0	0	13
22:00 - 23:00	4	0	0	0	0	0	4	3	0	0	0	0	0	3	7	0	0	0	0	0	7
23:00 - 00:00	2	0	0	0	0	0	2	1	0	0	0	0	0	1	3	0	0	0	0	0	3
All day (0-24)	415	16	1	0	0	0	432	381	8	1	0	0	0	390	796	24	2	0	0	0	822
Daytime [7-19]	346	16	1	0	0	0	363	332	8	1	0	0	0	341	678	24	2	0	0	0	704
Evening [19-23]	31	0	0	0	0	0	31	29	0	0	0	0	0	29	60	0	0	0	0	0	60
Night [23-7]	38	0	0	0	0	0	38	20	0	0	0	0	0	20	58	0	0	0	0	0	58
2 Hours Morning Peak [7-9]	46	3	1	0	0	0	50	68	2	0	0	0	0	70	114	5	1	0	0	0	120
2 Hour Afternoon Peak [16-18]	83	3	0	0	0	0	86	69	0	1	0	0	0	70	152	3	1	0	0	0	156

Classification Speed Matrix, Absolute Volume(2020)

	West							East							Both directions						
	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total	Light	Medium	Heavy	Cycle	MotorCycle	Unclassifiable	Total
Under 10 km/h	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 - 20 km/h	17	1	0	18	0	0	36	89	1	0	0	0	0	90	106	2	0	18	0	0	126
20 - 30 km/h	98	6	0	4	0	0	108	43	8	2	16	1	1	71	141	14	2	20	1	1	179
30 - 40 km/h	103	9	2	0	1	0	115	133	5	0	4	0	1	143	236	14	2	4	1	1	258
40 - 50 km/h	613	52	8	1	7	0	681	496	31	7	0	1	0	535	1109	83	15	1	8	0	1216
50 - 60 km/h	3119	124	16	0	10	0	3269	2773	68	15	2	17	1	2876	5892	192	31	2	27	1	6145
60 - 70 km/h	3334	50	16	1	13	0	3414	3133	49	14	0	15	0	3211	6467	99	30	1	28	0	6625
70 - 80 km/h	972	8	3	0	11	0	994	818	9	4	0	7	0	838	1790	17	7	0	18	0	1832
80 - 90 km/h	116	2	0	0	3	0	121	85	0	0	0	2	0	87	201	2	0	0	5	0	208
90 - 100 km/h	31	2	0	0	5	0	38	9	0	0	0	0	0	9	40	2	0	0	5	0	47
100 - 110 km/h	5	0	0	0	4	0	9	2	0	0	0	0	0	2	7	0	0	0	4	0	11
> 110 km/h	3	0	0	0	2	0	5	0	0	0	0	0	0	0	3	0	0	0	2	0	5

MetroCount Traffic Executive
Daily Classes

DailyClass-15 -- English (ENA)

Datasets:

Site:	**[1514] Gladville R374 (Albany - McKail) 0.09 / 0.00 - 0.18**
Attribute:	SLK 0.09
Direction:	6 - West bound A>B, East bound B>A. **Lane:** 0
Survey Duration:	0:00 Tuesday, 30 April 2013 => 14:32 Tuesday, 14 May 2013,
Zone:	
File:	151414May2013.EC0 (Plus)
Identifier:	K329W9WR MC56-6 [MC55] (c)Microcom 02/03/01
Algorithm:	Factory default axle (v5.05)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**0:00 Tuesday, 30 April 2013 => 14:32 Tuesday, 14 May 2013 (14.6059)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = East, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 4722 / 4731 (99.81%)

Daily Classes

DailyClass-15
Site: 1514.0.1WE
Description: **Gladville R374 (Albany - McKail) 0.09 / 0.00 - 0.18**
Filter time: **0:00 Tuesday, 30 April 2013 => 14:32 Tuesday, 14 May 2013**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 29 April 2013

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue	328	18	11	0	0	1	0	0	0	0	0	0	358
(%)	91.6	5.0	3.1	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
Wed	284	19	13	4	0	0	1	0	0	0	0	0	321
(%)	88.5	5.9	4.0	1.2	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Thu	275	13	16	1	0	0	0	0	0	0	0	0	305
(%)	90.2	4.3	5.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fri	317	11	17	5	1	0	0	0	0	0	0	0	351
(%)	90.3	3.1	4.8	1.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat	337	17	8	0	0	0	2	0	0	0	0	0	364
(%)	92.6	4.7	2.2	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	
Sun	253	10	9	0	0	0	0	0	0	0	0	0	272
(%)	93.0	3.7	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week													
	299	15	12	2	0	0	1	0	0	0	0	0	329
(%)	91.0	4.5	3.8	0.5	0.1	0.1	0.2	0.0	0.0	0.0	0.0	0.0	
Weekdays													
	301	15	14	3	0	0	0	0	0	0	0	0	334
(%)	90.2	4.6	4.3	0.7	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	
Weekend													
	295	14	9	0	0	0	1	0	0	0	0	0	318
(%)	92.8	4.2	2.7	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-15
Site: 1514.0.1WE
Description: **Gladville R374 (Albany - McKail) 0.09 / 0.00 - 0.18**
Filter time: **0:00 Tuesday, 30 April 2013 => 14:32 Tuesday, 14 May 2013**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 6 May 2013

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	302	15	12	6	0	1	0	0	0	0	0	0	336
(%)	89.9	4.5	3.6	1.8	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
Tue	335	6	16	2	0	1	0	0	0	0	0	0	360
(%)	93.1	1.7	4.4	0.6	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	
Wed	277	8	11	3	0	0	0	0	0	0	0	0	299
(%)	92.6	2.7	3.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu	311	1	11	0	0	1	1	0	0	0	0	0	325
(%)	95.7	0.3	3.4	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.0	0.0	
Fri	318	11	19	0	0	0	1	0	0	0	0	0	349
(%)	91.1	3.2	5.4	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	
Sat	309	21	7	1	0	0	0	0	0	0	0	0	338
(%)	91.4	6.2	2.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun	261	11	6	0	0	0	0	0	0	0	0	0	278
(%)	93.9	4.0	2.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week													
	302	10	12	2	0	0	0	0	0	0	0	0	326
(%)	92.5	3.2	3.6	0.5	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	
Weekdays													
	309	8	14	2	0	1	0	0	0	0	0	0	334
(%)	92.5	2.5	4.1	0.7	0.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	
Weekend													
	285	16	7	1	0	0	0	0	0	0	0	0	308
(%)	92.5	5.2	2.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-15
Site: 1514.0.1WE
Description: **Gladville R374 (Albany - McKail) 0.09 / 0.00 - 0.18**
Filter time: **0:00 Tuesday, 30 April 2013 => 14:32 Tuesday, 14 May 2013**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 13 May 2013

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	292	10	8	0	0	0	0	0	0	0	0	0	310
(%)	94.2	3.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	147	1	7	1	0	0	0	0	0	0	0	0	156
(%)	94.2	0.6	4.5	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fri*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week

	292	10	8	0	0	0	0	0	0	0	0	0	310
(%)	94.2	3.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Weekdays

	292	10	8	0	0	0	0	0	0	0	0	0	310
(%)	94.2	3.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Weekend No complete days.

*** - Incomplete**

MetroCount Traffic Executive
Daily Classes

DailyClass-14 -- English (ENA)

Datasets:

Site:	**[1703] R432 (South Coast - Beaudon) SLK 0.05 / 0.0 - 0.44**
Attribute:	Timewell Rd
Direction:	7 - North bound A>B, South bound B>A. **Lane:** 0
Survey Duration:	12:00 Friday, 16 January 2015 => 8:24 Monday, 2 February 2015,
Zone:	
File:	1703 Timewell Rd 2015-02-02 0824.EC0 (Plus)
Identifier:	GY50GV51 MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default axle (v5.05)
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**12:00 Friday, 16 January 2015 => 8:24 Monday, 2 February 2015 (16.8501)**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound), P = North, Lane = 0-16
Separation:	Headway > 0 sec, Span 0 - 100 metre
Name:	Default Profile
Scheme:	Vehicle classification (AustRoads94)
Units:	Metric (metre, kilometre, m/s, km/h, kg, tonne)
In profile:	Vehicles = 3235 / 3240 (99.85%)

Daily Classes

DailyClass-14
Site: 1703.0.1NS
Description: **R432 (South Coast - Beaudon) SLK 0.05 / 0.0 - 0.44**
Filter time: **12:00 Friday, 16 January 2015 => 8:24 Monday, 2 February 2015**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 12 January 2015

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fri*	111	6	2	0	0	1	0	0	0	0	0	0	120
(%)	92.5	5.0	1.7	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	
Sat	272	18	9	0	1	0	12	0	0	0	0	0	312
(%)	87.2	5.8	2.9	0.0	0.3	0.0	3.8	0.0	0.0	0.0	0.0	0.0	
Sun	220	3	10	0	2	0	5	0	0	0	0	0	240
(%)	91.7	1.3	4.2	0.0	0.8	0.0	2.1	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week

	246	11	10	0	2	0	9	0	0	0	0	0	276
(%)	89.1	3.8	3.4	0.0	0.5	0.0	3.1	0.0	0.0	0.0	0.0	0.0	

Weekdays No complete days.
Weekend

	246	11	10	0	2	0	9	0	0	0	0	0	276
(%)	89.1	3.8	3.4	0.0	0.5	0.0	3.1	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-14
Site: 1703.0.1NS
Description: **R432 (South Coast - Beaudon) SLK 0.05 / 0.0 - 0.44**
Filter time: **12:00 Friday, 16 January 2015 => 8:24 Monday, 2 February 2015**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 19 January 2015

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	170	5	8	9	1	0	8	1	0	0	0	0	202
(%)	84.2	2.5	4.0	4.5	0.5	0.0	4.0	0.5	0.0	0.0	0.0	0.0	
Tue	170	8	13	0	0	0	6	0	1	0	0	0	198
(%)	85.9	4.0	6.6	0.0	0.0	0.0	3.0	0.0	0.5	0.0	0.0	0.0	
Wed	171	13	20	2	0	2	8	0	0	0	0	0	216
(%)	79.2	6.0	9.3	0.9	0.0	0.9	3.7	0.0	0.0	0.0	0.0	0.0	
Thu	166	15	17	1	0	2	10	0	0	0	0	0	211
(%)	78.7	7.1	8.1	0.5	0.0	0.9	4.7	0.0	0.0	0.0	0.0	0.0	
Fri	200	3	17	0	0	2	14	0	0	0	0	0	236
(%)	84.7	1.3	7.2	0.0	0.0	0.8	5.9	0.0	0.0	0.0	0.0	0.0	
Sat	183	10	15	0	0	0	4	0	0	0	0	0	212
(%)	86.3	4.7	7.1	0.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	
Sun	291	19	22	2	0	0	13	0	0	0	0	0	347
(%)	83.9	5.5	6.3	0.6	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week													
	193	10	16	2	0	1	9	0	0	0	0	0	232
(%)	83.3	4.5	6.9	0.9	0.1	0.4	3.9	0.1	0.1	0.0	0.0	0.0	
Weekdays													
	175	9	15	2	0	1	9	0	0	0	0	0	213
(%)	82.5	4.1	7.1	1.1	0.1	0.6	4.3	0.1	0.1	0.0	0.0	0.0	
Weekend													
	237	15	19	1	0	0	9	0	0	0	0	0	280
(%)	84.8	5.2	6.6	0.4	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-14
Site: 1703.0.1NS
Description: **R432 (South Coast - Beaudon) SLK 0.05 / 0.0 - 0.44**
Filter time: **12:00 Friday, 16 January 2015 => 8:24 Monday, 2 February 2015**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 26 January 2015

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon	176	8	13	4	1	0	5	0	0	0	0	0	207
(%)	85.0	3.9	6.3	1.9	0.5	0.0	2.4	0.0	0.0	0.0	0.0	0.0	
Tue	180	9	12	0	0	0	8	0	0	0	0	0	209
(%)	86.1	4.3	5.7	0.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	
Wed	172	8	11	0	2	1	9	0	0	0	0	0	203
(%)	84.7	3.9	5.4	0.0	1.0	0.5	4.4	0.0	0.0	0.0	0.0	0.0	
Thu	184	5	22	1	0	0	7	0	0	0	0	0	219
(%)	84.0	2.3	10.0	0.5	0.0	0.0	3.2	0.0	0.0	0.0	0.0	0.0	
Fri	90	1	9	1	0	0	2	0	0	0	0	0	103
(%)	87.4	1.0	8.7	1.0	0.0	0.0	1.9	0.0	0.0	0.0	0.0	0.0	
Sat	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week													
	115	4	10	1	0	0	4	0	0	0	0	0	134
(%)	85.2	3.3	7.1	0.6	0.3	0.1	3.3	0.0	0.0	0.0	0.0	0.0	
Weekdays													
	160	6	13	1	1	0	6	0	0	0	0	0	188
(%)	85.2	3.3	7.1	0.6	0.3	0.1	3.3	0.0	0.0	0.0	0.0	0.0	
Weekend													
	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

*** - Incomplete**

Daily Classes

DailyClass-14
Site: 1703.0.1NS
Description: **R432 (South Coast - Beaudon) SLK 0.05 / 0.0 - 0.44**
Filter time: **12:00 Friday, 16 January 2015 => 8:24 Monday, 2 February 2015**
Scheme: Vehicle classification (AustRoads94)
Filter: Cls(1-12) Dir(NESW) Sp(10,160) Headway(>0) Span(0 - 100) Lane(0-16)

Monday, 2 February 2015

	1	2	3	4	5	6	7	8	9	10	11	12	Total
Mon*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Tue*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Wed*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Thu*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Fri*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sat*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Sun*	0	0	0	0	0	0	0	0	0	0	0	0	0
(%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

Average daily volume

Entire week No complete days.
Weekdays No complete days.
Weekend No complete days.

*** - Incomplete**

mainroads WESTERN AUSTRALIA

SITE 15516

Hourly Volume

South Coast Hwy (H009)

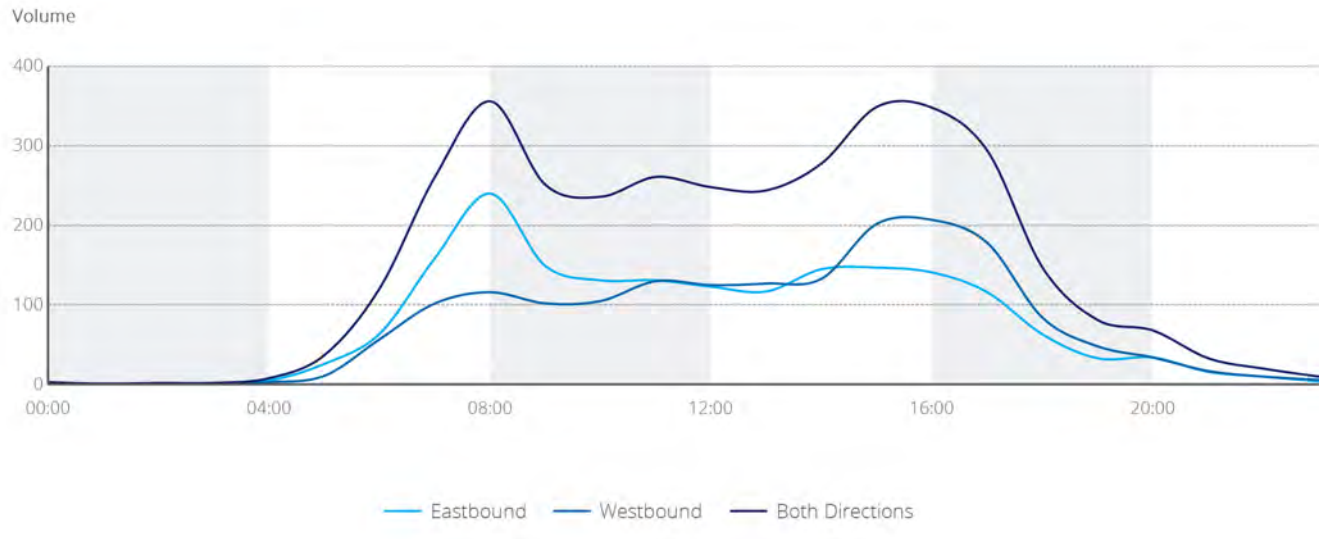
West of Bottlebrush Rd (SLK 511.05)

2022/23
Monday to Friday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	1	2	3	0	0	0	0.0
01:00	0	1	1	0	0	0	0.0
02:00	1	1	2	0	0	0	0.0
03:00	1	1	2	0	0	0	0.0
04:00	5	3	8	0	1	1	12.5
05:00	26	11	37	2	3	5	13.5
06:00	64	57	121	5	8	13	10.7
07:00	159	102	261	16	21	37	14.2
08:00	240	116	356	22	24	46	12.9
09:00	149	102	251	14	19	33	13.1
10:00	131	105	236	14	14	28	11.9
11:00	131	130	261	19	14	33	12.6
12:00	123	125	248	17	14	31	12.5
13:00	117	127	244	18	13	31	12.7
14:00	145	133	278	16	12	28	10.1
15:00	147	202	349	15	22	37	10.6
16:00	141	207	348	11	13	24	6.9
17:00	116	178	294	11	12	23	7.8
18:00	63	84	147	6	5	11	7.5
19:00	33	48	81	1	2	3	3.7
20:00	34	34	68	4	2	6	8.8
21:00	16	17	33	1	1	2	6.1
22:00	10	10	20	0	0	0	0.0
23:00	4	6	10	0	0	0	0.0
TOTAL	1857	1802	3659	192	200	392	10.7

Peak Statistics

AM	TIME	07:45	11:15	07:45	07:30	07:30	07:30
	VOL	252	132	360	27	26	53
PM	TIME	15:30	16:30	15:30	13:15	15:30	15:30
	VOL	152	214	366	19	24	38



mainroads WESTERN AUSTRALIA

SITE 15516

Hourly Volume

South Coast Hwy (H009)

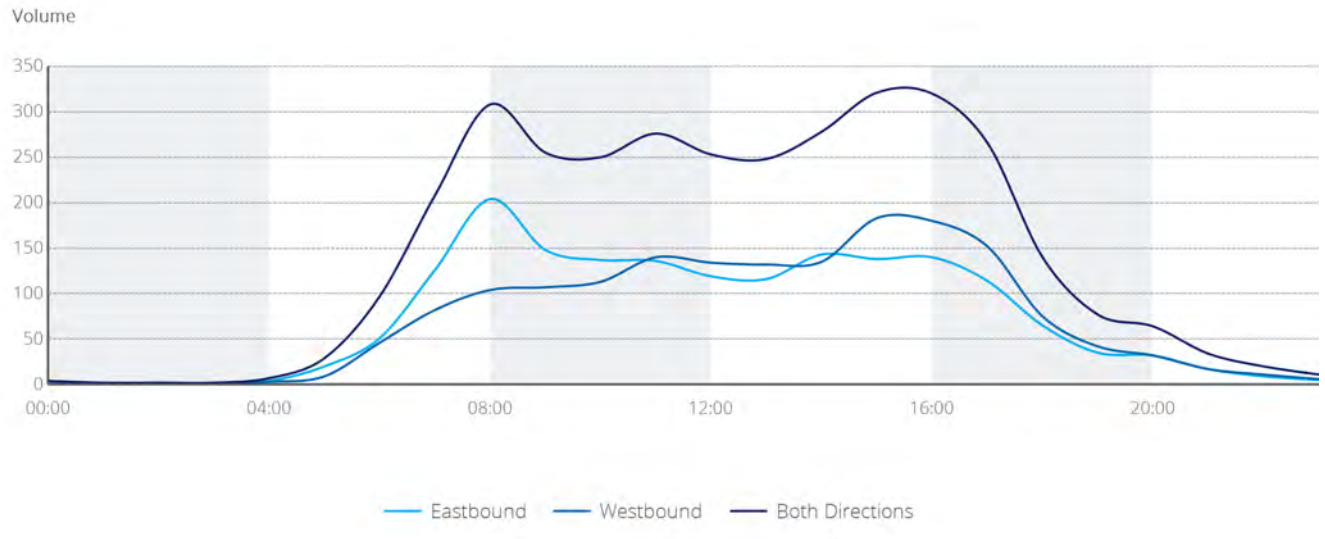
West of Bottlebrush Rd (SLK 511.05)

2022/23
Monday to Sunday

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	1	3	4	0	0	0	0.0
01:00	1	1	2	0	0	0	0.0
02:00	1	1	2	0	0	0	0.0
03:00	1	1	2	0	0	0	0.0
04:00	4	3	7	0	1	1	14.3
05:00	20	9	29	1	2	3	10.3
06:00	51	46	97	3	6	9	9.3
07:00	126	82	208	13	16	29	13.9
08:00	204	104	308	18	20	38	12.3
09:00	148	107	255	14	15	29	11.4
10:00	137	113	250	12	12	24	9.6
11:00	136	140	276	18	14	32	11.6
12:00	119	134	253	13	13	26	10.3
13:00	116	132	248	13	11	24	9.7
14:00	143	135	278	14	11	25	9.0
15:00	138	183	321	11	18	29	9.0
16:00	140	180	320	11	11	22	6.9
17:00	114	152	266	10	10	20	7.5
18:00	65	75	140	5	3	8	5.7
19:00	35	42	77	2	1	3	3.9
20:00	32	32	64	3	2	5	7.8
21:00	17	17	34	1	1	2	5.9
22:00	9	11	20	0	0	0	0.0
23:00	5	6	11	0	0	0	0.0
TOTAL	1763	1709	3472	162	167	329	9.5

Peak Statistics

AM	TIME	07:45	11:15	08:00	07:30	07:30	07:30
	VOL	210	142	308	22	20	42
PM	TIME	14:15	15:30	15:30	14:45	15:30	15:30
	VOL	145	189	333	15	19	31



mainroads WESTERN AUSTRALIA

SITE 15516

Hourly Volume

South Coast Hwy (H009)

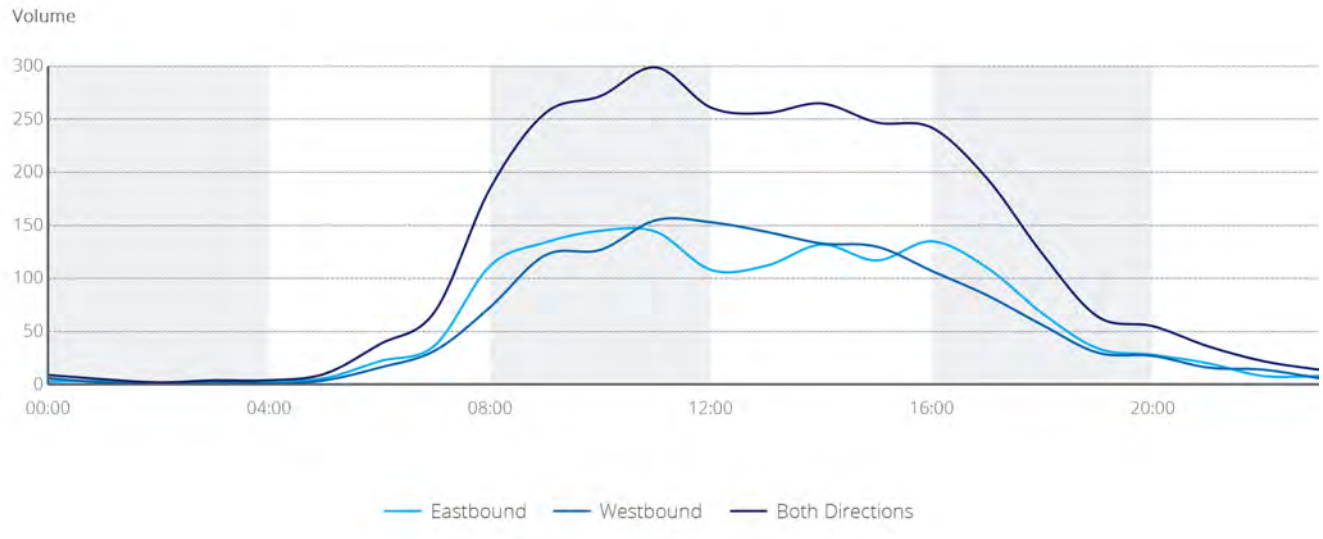
West of Bottlebrush Rd (SLK 511.05)

2022/23
Weekend

	All Vehicles			Heavy Vehicles			
	EB	WB	Both	EB	WB	Both	%
00:00	3	6	9	0	0	0	0.0
01:00	3	2	5	0	0	0	0.0
02:00	1	1	2	0	0	0	0.0
03:00	1	3	4	0	0	0	0.0
04:00	3	1	4	0	0	0	0.0
05:00	6	4	10	0	0	0	0.0
06:00	22	16	38	1	2	3	7.9
07:00	37	32	69	5	5	10	14.5
08:00	112	73	185	8	9	17	9.2
09:00	134	122	256	8	9	17	6.6
10:00	145	127	272	7	6	13	4.8
11:00	144	155	299	12	9	21	7.0
12:00	108	153	261	8	9	17	6.5
13:00	112	144	256	5	7	12	4.7
14:00	132	133	265	9	7	16	6.0
15:00	117	130	247	5	9	14	5.7
16:00	135	107	242	12	6	18	7.4
17:00	110	84	194	8	7	15	7.7
18:00	67	56	123	3	3	6	4.9
19:00	34	30	64	2	2	4	6.3
20:00	28	27	55	2	3	5	9.1
21:00	20	16	36	2	1	3	8.3
22:00	8	14	22	0	1	1	4.5
23:00	8	6	14	0	0	0	0.0
TOTAL	1490	1442	2932	97	95	192	6.5

Peak Statistics

AM	TIME	10:30	11:30	11:00	11:00	08:30	11:00
	VOL	150	165	299	12	11	21
PM	TIME	16:00	12:15	13:45	16:15	12:30	16:00
	VOL	135	153	266	12	10	18



mainroads WESTERN AUSTRALIA

SITE 52411

Hourly Volume

Albany Hwy (H001)

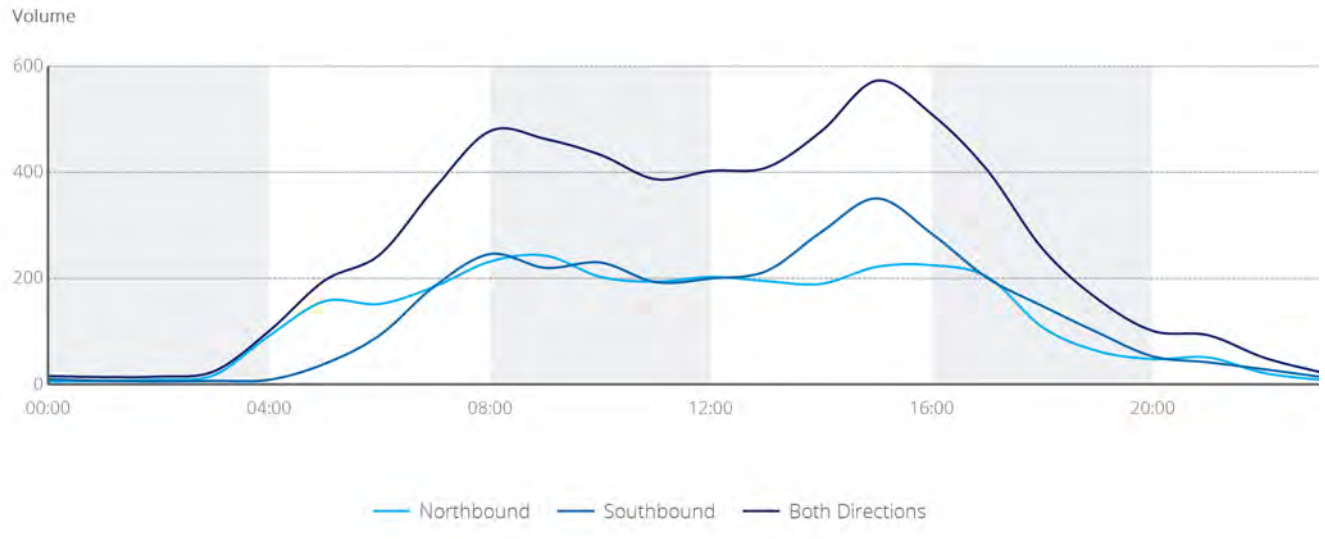
South of Reddale Rd (SLK 399.88)

2022/23
Monday to Friday

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	6	10	16	2	3	5	31.3
01:00	7	7	14	4	3	7	50.0
02:00	9	6	15	4	2	6	40.0
03:00	18	7	25	3	2	5	20.0
04:00	92	9	101	9	3	12	11.9
05:00	157	39	196	14	2	16	8.2
06:00	152	93	245	28	7	35	14.3
07:00	185	186	371	30	23	53	14.3
08:00	232	246	478	39	34	73	15.3
09:00	243	220	463	36	36	72	15.6
10:00	203	230	433	28	38	66	15.2
11:00	194	193	387	31	39	70	18.1
12:00	203	200	403	33	35	68	16.9
13:00	195	214	409	36	34	70	17.1
14:00	190	288	478	30	44	74	15.5
15:00	222	351	573	30	45	75	13.1
16:00	225	284	509	20	39	59	11.6
17:00	203	201	404	10	21	31	7.7
18:00	108	148	256	6	11	17	6.6
19:00	63	98	161	7	7	14	8.7
20:00	48	53	101	3	5	8	7.9
21:00	51	42	93	5	6	11	11.8
22:00	22	29	51	3	4	7	13.7
23:00	9	15	24	3	5	8	33.3
TOTAL	3037	3169	6206	414	448	862	13.9

Peak Statistics

AM	TIME	08:45	07:45	07:45	08:00	11:15	07:45
	VOL	248	264	487	39	41	74
PM	TIME	15:30	15:15	15:15	12:30	15:30	15:00
	VOL	238	368	598	38	47	75



mainroads WESTERN AUSTRALIA

SITE 52411

Hourly Volume

Albany Hwy (H001)

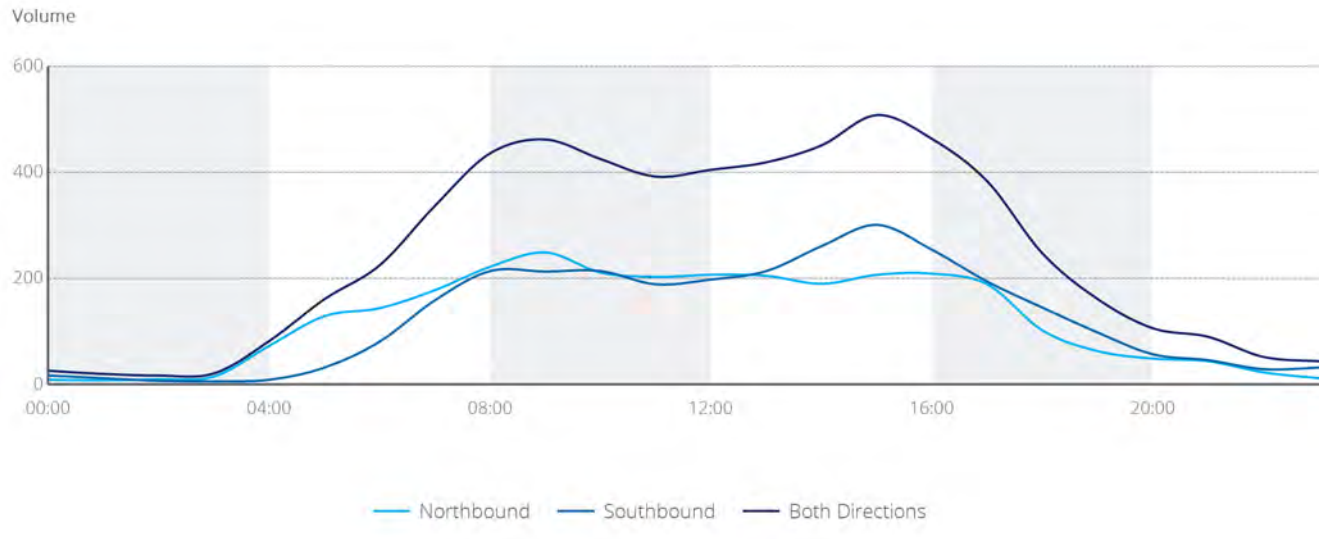
South of Reddale Rd (SLK 399.88)

2022/23
Monday to Sunday

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	9	17	26	2	4	6	23.1
01:00	8	12	20	4	4	8	40.0
02:00	10	7	17	5	3	8	47.1
03:00	15	6	21	3	2	5	23.8
04:00	73	9	82	8	3	11	13.4
05:00	129	32	161	13	3	16	9.9
06:00	144	81	225	23	7	30	13.3
07:00	178	159	337	25	19	44	13.1
08:00	222	214	436	33	26	59	13.5
09:00	249	213	462	33	27	60	13.0
10:00	211	214	425	27	28	55	12.9
11:00	203	189	392	29	31	60	15.3
12:00	207	198	405	29	29	58	14.3
13:00	205	214	419	34	28	62	14.8
14:00	190	261	451	28	35	63	14.0
15:00	207	301	508	27	35	62	12.2
16:00	209	254	463	18	32	50	10.8
17:00	189	194	383	9	17	26	6.8
18:00	102	145	247	5	9	14	5.7
19:00	63	98	161	6	7	13	8.1
20:00	49	57	106	4	6	10	9.4
21:00	44	46	90	3	5	8	8.9
22:00	23	29	52	3	3	6	11.5
23:00	12	32	44	3	5	8	18.2
TOTAL	2951	2982	5933	374	368	742	12.5

Peak Statistics

AM	TIME	08:45	07:45	08:45	08:15	10:30	08:45
	VOL	252	225	462	34	32	62
PM	TIME	15:30	15:15	15:15	13:00	15:45	13:15
	VOL	222	313	530	34	36	65



mainroads WESTERN AUSTRALIA

SITE 52411

Hourly Volume

Albany Hwy (H001)

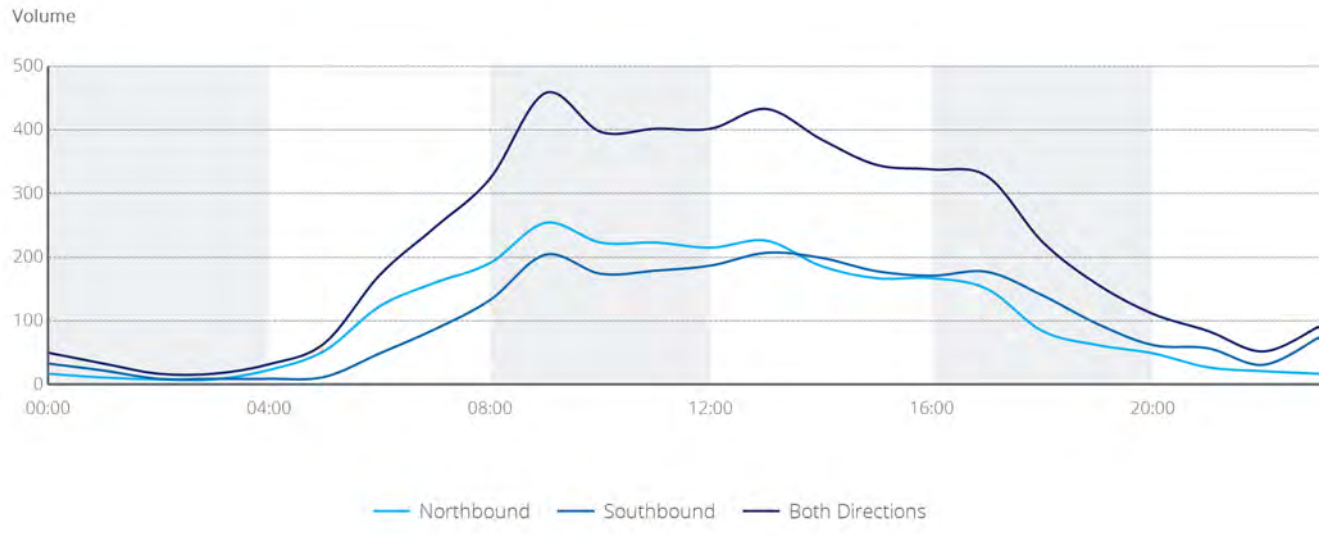
South of Reddale Rd (SLK 399.88)

2022/23
Weekend

	All Vehicles			Heavy Vehicles			
	NB	SB	Both	NB	SB	Both	%
00:00	17	33	50	4	6	10	20.0
01:00	11	22	33	5	7	12	36.4
02:00	8	9	17	4	6	10	58.8
03:00	8	9	17	5	4	9	52.9
04:00	23	9	32	7	5	12	37.5
05:00	53	12	65	9	3	12	18.5
06:00	123	49	172	13	6	19	11.0
07:00	160	87	247	15	7	22	8.9
08:00	191	133	324	15	12	27	8.3
09:00	254	204	458	21	14	35	7.6
10:00	223	174	397	20	8	28	7.1
11:00	223	179	402	25	15	40	10.0
12:00	215	187	402	21	11	32	8.0
13:00	226	207	433	31	11	42	9.7
14:00	186	199	385	24	20	44	11.4
15:00	167	178	345	19	16	35	10.1
16:00	167	171	338	14	11	25	7.4
17:00	150	177	327	9	9	18	5.5
18:00	84	140	224	7	10	17	7.6
19:00	62	95	157	2	7	9	5.7
20:00	49	62	111	4	3	7	6.3
21:00	27	57	84	0	3	3	3.6
22:00	21	31	52	2	0	2	3.8
23:00	17	74	91	3	5	8	8.8
TOTAL	2665	2498	5163	279	199	478	9.3

Peak Statistics

AM	TIME	09:00	09:00	09:00	11:15	08:45	11:00
	VOL	254	204	458	26	17	40
PM	TIME	12:30	13:00	13:00	13:15	14:15	14:00
	VOL	235	207	433	33	21	44



Appendix C WAPC Guidelines Checklist

Item	Provided	Comments / Proposals
Summary		
Introduction / Background		
name of applicant and consultant	Y	
LSP location and context	Y	
brief description of the LSP	Y	
key issues	Y	No key issues identified
background information	Y	
LSP Proposal		
regional context	Y	
proposed land uses	Y	
table of land uses and quantities	Y	
major attractors/generators	Y	The site is to be fully residential with some external traffic attracted due to the primary school
any specific issues	Y	
Existing Situation		
existing land uses within the structure plan	Y	
existing land uses surrounding the LSP	Y	
the existing road network within the LSP	N/A	No road network within the area at present
existing road network surrounding the LSP	Y	
traffic flows on roads within the LSP (AM and PM peak hours)	N/A	No road network within the area at present
traffic flows on roads surrounding the LSP (AM and PM peak hours)	Y	
existing pedestrian/cycle networks within the LSP	N/A	No pedestrian/cycle network within the area at present
existing pedestrian/cycle networks surrounding the LSP	Y	
existing public transport services within the LSP	N/A	No public transport services within the area at present
existing public transport services surrounding the LSP	Y	
Proposed Internal Transport Networks		
changes/additions to the existing road network	Y	
road reservation widths	Y	
road cross-sections & speed limits	Y	
intersection controls	Y	
pedestrian/cycle networks and crossing facilities	Y	
public transport routes	Y	
Changes to external transport networks		
road network	N/A	No changes to the external transport networks are proposed due to proposal
intersection controls	N/A	No changes to the external transport networks are proposed

Item	Provided	Comments / Proposals
pedestrian/cycle networks and crossing facilities	N/A	No changes to the external transport networks are proposed
public transport services	N/A	No changes to the external transport networks are proposed
Integration with the surrounding area		
surrounding attractors/generators	Y	
proposed changes to surrounding land uses	Y	
travel desire lines from the LSP to these attractors/generators	Y	
adequacy of existing transport networks	Y	
deficiencies in existing transport networks	Y	lack of footpath connectivity along Lancaster Road
remedial measures to address deficiencies	Y	extend footpath network to LSP area
Analysis of internal transport networks		
assessment years and periods	Y	
LSP generated traffic	Y	
extraneous (through) traffic	Y	
design traffic flows	Y	
road cross-sections	Y	
intersection sight distances	Y	
intersection operation and method of control	Y	
frontage access strategy	Y	
pedestrian/cycle networks	Y	
safe walk/cycle to school assessment (residential LSP s only)	Y	
pedestrian permeability & efficiency	Y	
access to public transport	Y	No public transport provision is proposed within the LSP amendment area
Analysis of external transport networks		
base flows for assessment years	Y	
total traffic flows	Y	
road cross-sections	Y	
intersection operation	Y	
pedestrian/cycle networks	Y	
Safety issues		
identify issues	Y	
remedial measures	N/A	No need for remedial measures
Conclusions		

LOCAL WATER MANAGEMENT STRATEGY

Lots 526, 300 and 507 Lancaster Road

McKail, WA 6330

Version 2.

29/10/2024

BUSHFIRE | ENVIRONMENTAL | WATER | GIS

DOCUMENT CONTROL

Title: LWMS - Lots 526, 300 and 507 Lancaster Road, McKail

Author (s): David Lynch / Chiquita Cramer

Reviewer (s): B. Theyer and A. Tucker (Original)

Job No: MSC0595-002

Client: Acumen Development Solutions – Jarrod Rendell

REVISION RECORD

Revision	Summary	Revised By	Date
Draft ID 13-12-23	Internal QA Review	B. Theyer	13-12-2023
Draft ID 14-12-23	Technical Review	A. Tucker	02-01-2024
Draft ID 08-01-24	Draft report issued to project team for comment	J. Rendell & J. Small	08-01-2024
Final ID 12-02-24	Final report issued to client	C. Cramer	12-02-2024
Review 23-10-24	Review following lot redesign	D. Lynch	16-10-2024

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1 Introduction

Lots 526, 300 and 507 Lancaster Road, McKail Local Water Management Strategy (LWMS) has been prepared by Bio Diverse Solutions on behalf of Acumen Development Solutions in support of an amendment to the Local Planning Scheme and to provide guidance to the Local Structure Plan (LSP) prepared for the site.

The LWMS provides the framework for the application of total water cycle management to the proposed urban structure. This is consistent with the Department of Water and Environmental Regulation (DWER) principles of Water Sensitive Urban Design (WSUD) described in the Stormwater Management Manual (DoW, 2007).

1.1 Key Design Principles and Objectives

The LWMS employs the following key documents to define its content, key principles and objectives:

- Stormwater Management Manual for Western Australia (DoW, 2007).
- Better Urban Water Management (WAPC, 2008).

A summary of the key design principles and objectives from these documents is summarised below and provided in Table 1.

1.1.1 Stormwater Management Manual (DoW, 2007)

The Department of Water (DoW), now Department of Water and Environmental Regulation (DWER) released *A Manual for Managing Urban Stormwater Quality in Western Australia* in 1998. The manual defines and practically describes Best Management Practices (BMP's) to reduce pollutant and nutrient inputs to stormwater drainage systems. The manual also aims to provide guidelines for the incorporation of water sensitive design principles into urban planning and design, which would enable the achievement of improved water quality from urban development.

The document was released to provide a guideline for best planning and management practices and was intended for use by the DoW (now DWER), but also by other State and Local Government Authorities and sectors of the urban development industry.

DoW completed a major review of the manual in consultation with a working team comprising industry and government representatives. The revised manual was officially launched in August 2007.

DWER's current position on urban stormwater management in Western Australia is outlined in Chapter 2: *Understanding the Context of the Stormwater Management Manual for Western Australia* (DoW, 2007), which details the management objectives, principles and a stormwater delivery approach for WA. Principle objectives for managing urban water in WA are stated as:

- Water Quality: To maintain or improve the surface and groundwater quality within development areas relative to pre-development conditions.
- Water Quantity: To maintain the total water cycle balance within development areas relative to the pre-development conditions.
- Water Conservation: To maximise the reuse of stormwater.
- Ecosystem Health: To retain natural drainage systems and protect ecosystem health.
- Economic Viability: To implement stormwater systems that are economically viable in the long-term.
- Public Health: To minimise public risk, including risk of injury or loss of life to the community.
- Protection of Property: To protect the built environment from flooding and water logging.
- Social Values: To ensure that social aesthetic and cultural values are recognised and maintained when managing stormwater.
- Development: To ensure the delivery of best practice stormwater management through planning and development of high-quality developed areas in accordance with sustainability and precautionary principles.

1.1.2 Better Urban Water Management (WAPC, 2008)

The guideline document Better Urban Water Management ([BUWM]WAPC, 2008), focuses on the process of integration between land use and water planning. The document specifies the level of investigation and documentation required at various decision points in the planning process, rather than the provision of any specific design objectives and criteria for urban water management.

This LWMS complies with the BUWM process.

Table 1: Summary of design principles and objectives

Key Guiding Principles		
• Facilitate implementation of sustainable best practice urban water management. • Provide integration with planning processes and clarity for agencies involved with implementation. • To minimise public risk, including risk of injury or loss of life. • Protection of infrastructure and assets from flooding and inundation. • Encourage environmentally responsible development. • Facilitate adaptive management responses to the monitored outcomes of development.		
Category	**Key Design Principles & Objectives**	**LWMS Criteria**
Surface Water Management	• Minimise changes in hydrology to prevent impacts on receiving environments. • Manage water flows from major events to protect infrastructure and assets. • Apply the principles of WSUD. • Adopt nutrient load reduction design objectives for stormwater runoff. • Floodplain management. • Adopt treatment train approach.	• Post-development critical peak flows will be consistent with pre-development peak flow at the discharge point of each catchment within the Subject Site up to the 1% AEP. • First 15mm of rainfall from storm events will be treated at source where possible. • Manage surface water flows from major events to protect infrastructure and assets from flooding and inundation. • Provide a treatment train approach, including bio-retention storages for nutrient/contaminant removal.
Groundwater Management	• Manage groundwater levels to protect infrastructure and assets. • Maintain groundwater regimes for the protection of groundwater-dependent ecosystems. • Protect the value of groundwater resources. • Adopt nutrient load reduction design objectives for discharges to groundwater.	• Managing and minimising changes in groundwater levels and groundwater quality following development. • Provide a treatment train approach, including bio-retention storages for nutrient/contaminant removal of stormwater prior to entering the groundwater system.
Monitoring and Implementation	• Adopt an adaptive management approach. • Maintain drainage and treatment structures.	• Design based on methodology in Stormwater Management Manual of adopting a treatment train including: • structural treatment measures (infiltration storages; bio-retention treatment structures). • Non-structural measures to reduce applied nutrient loads. • Maintain groundwater quality at pre-development levels and, if possible, improve the quality of water leaving the development area to maintain and restore ecological systems.
Water Conservation	• Adopt drinking water consumption target. • Ensure that non-potable water supply systems deliver a net benefit to the community. • Ensure that non-potable water supply systems are designed as part of an integrated water supply.	• Aim to achieve the State Water Plan target for water use and reduce water use where possible. • Consider alternative fit for purpose water sources where appropriate and cost-effective.

1.2 Suitable Qualified Hydrologist

The original LWMS was been prepared by Chiquita Cramer, who has 14 years of experience working as a hydrologist and hydrogeologist.

Chiquita Cramer has the following tertiary qualifications:

- Bachelor of Science in Natural Resource Management (University of Western Australia); and
- Graduate Certificate in Hydrogeology (University of Western Australia).

Chiquita completed a Bachelor of Science in Natural Resource Management in 2008 at the University of Western Australia. She then went on to work as a hydrologist and senior hydrologist at JDA Consultant Hydrologists in Perth where she worked for 8 years. Chiquita's experience includes preparation of multiple local and urban water management strategies, hydrological and hydraulic investigations, surface water and groundwater monitoring reports and hydrogeological reports. Chiquita furthered her studies in 2012 by completing a Graduate Certificate in Hydrogeology and in 2017 she joined Bio Diverse Solutions to provide expertise in hydrology and hydrogeology to the company.

Subsequent to this original report the proposed lot design was altered to reflect lots with a predominantly east-west arrangement changing the major road direction to north – south. This has minor effects on the catchment sizes but a review of the LMWS was requested for clarity during the planning phases. This review was undertaken by David Lynch.

David is an accredited soil surveyor and has a B.Sc.(Honours) majoring in Geology. He joined BDS in 2024 to provide expertise in hydrology and hydrogeology to the company. David's experience includes assisting in preparation of local and urban water management strategies, hydrological and hydraulic investigations, surface water and groundwater monitoring reports, hydrogeological reports and site soil evaluations for onsite disposal suitability.

1.3 Location

Lots 526, 300 and 507 Lancaster Road, McKail WA (herein referred to as the Subject Site) comprises of ~68 ha and is located ~6.8 km northwest of the Albany town centre. The Subject Site is bound by Gladville Road and an agricultural property to the north, an agricultural property to the west, rural residential lots to the east and rural residential lots and Lancaster Road to the south of the main portion of the Subject Site, with a smaller portion of the Subject Site to the south of Lancaster Road. The location of the Subject Site is shown on Figure 1.

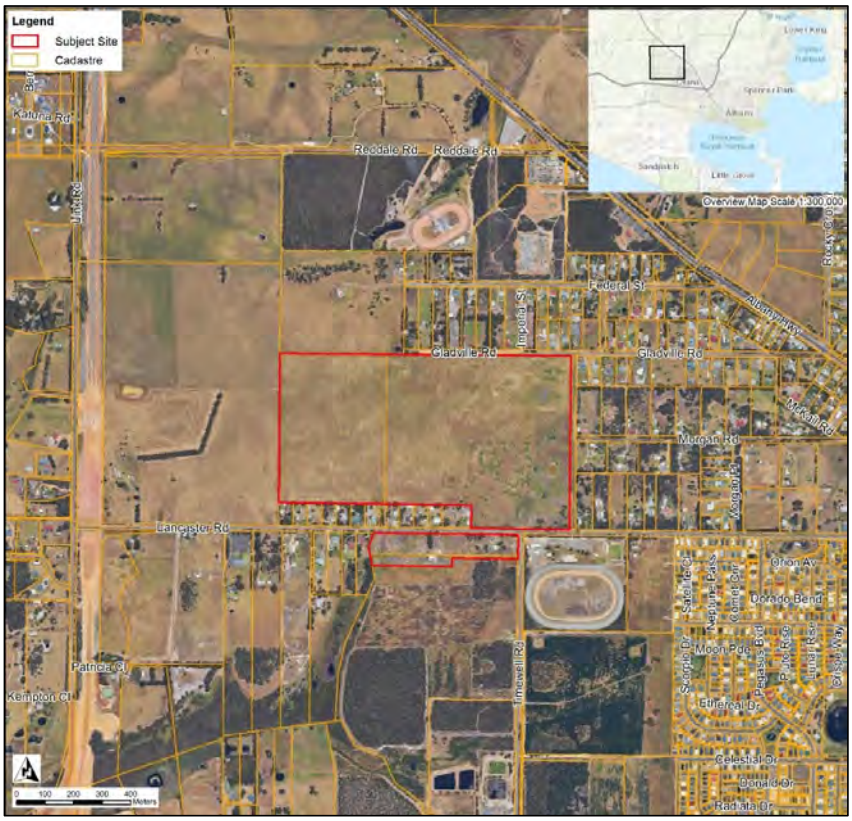

Figure 1: Location Plan

2 Proposed Development

The Subject Site is situated within the City of Albany and zoned *Future Urban* under the City of Albany Local Planning Scheme No. 1 (DPLH, 2014). The Subject Site is also located with the Albany Speedway Noise Special Control Area with the potential implications for the development included in the City of Albany Local Planning Scheme No. 1 (DPLH, 2014). Residential lots range in size from R2.5 on the south side of Lancaster Road to R25 in the northeast of the site. The majority of the Subject Site is proposed to be Residential R15. The LSP also includes two Public Open Space (POS) areas, a district oval and a primary school.

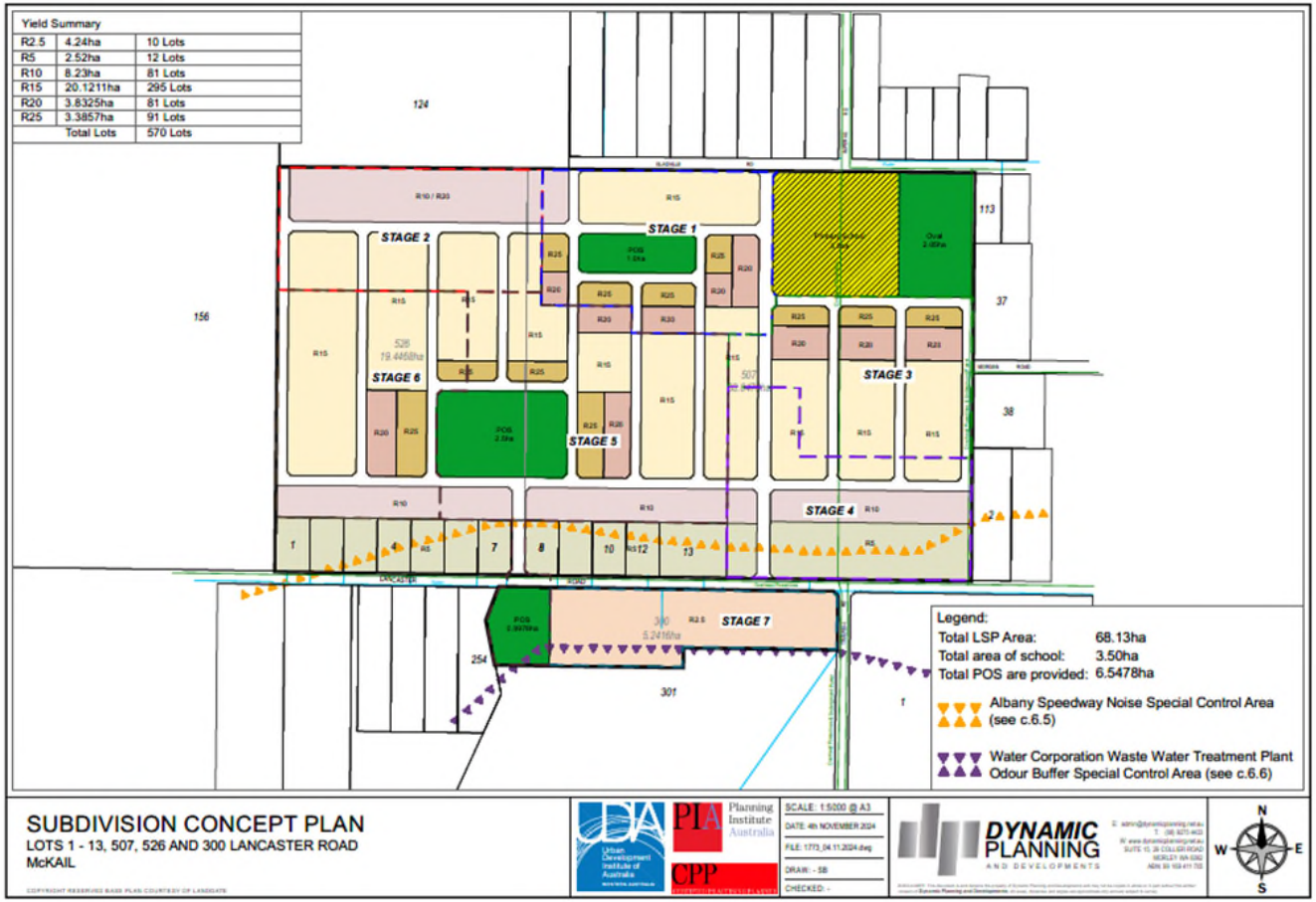

Figure 2: New Proposed Road Layout with LSP

3 Pre-development Environment

3.1 Existing Land Use

The site currently consists of agricultural land used for livestock. There are no residential dwellings located on the site. The Subject Site is surrounded by rural residential lots to the north, south and east and the rural land to the west.

3.2 Topography

The majority of the Subject Site is relatively flat, sloping down in the northeast corner of the site and to the central south. Elevation ranges from a high point of 68m AHD in the southeast and northwest to a low point of 52m AHD in the central south. Topographic contours (2 m) for the Subject Site, are shown in Figure 3.

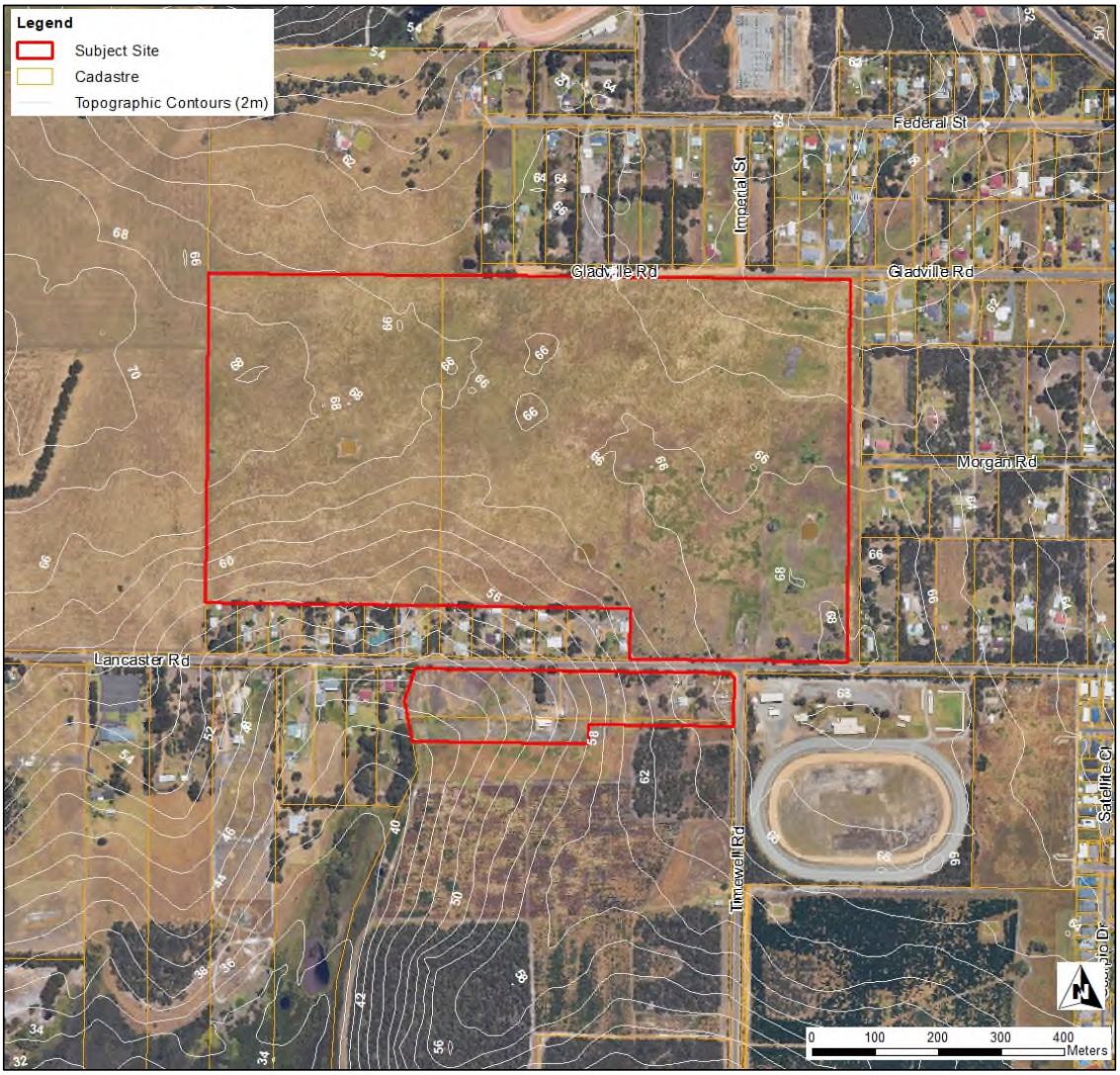

Figure 3: Topography

3.2 Climate

The Albany area has a Mediterranean climate characterised by dry, warm summers and mild, wet winters. The long-term average annual rainfall is 923 mm (1877 to 2023). This average has decreased between 2000 to 2023, to an average annual rainfall of 856 mm, reflecting a 7% reduction compared to the long-term average, consistent with a general drying trend in the Southwest of WA. Rainfall data is from the nearby Bureau of Meteorology (BoM, 2021) Albany Station (Site No. 9500).

The average annual pan evaporation for the Albany area is approximately 1399 mm (Luke *et al* 1988).

3.3 Remnant Vegetation

The Subject Site predominantly consists of cleared agricultural land with only a few scattered paddock trees (eucalyptus) in the southeast.

The Subject Site lies within the JAF – Jarrah Forest Interim Bio-geographic Regional Area (IBRA).

The vegetation has been mapped on a broad scale by J.S. Beard (Shepherd *et al* 2002) in the 1970's, where a system was devised for state-wide mapping and vegetation classification based on geographic, geological, soil, climate structure, life form and vegetation characteristics. A GIS search of J.S. Beards vegetation classification places the Subject Site within one System and Vegetation Association (DPIRD, 2017a):

System Association Name: Albany.
Vegetation Association Number: 978.
Vegetation Description: Jarrah, banksia or casuarina Eucalyptus marginata, Banksia spp., Allocasuarina spp.

There are no Conservation Parks or Class "A" Reserves within the Subject Site or within the vicinity of the Subject Site.

3.4 Acid Sulphate Soils

Acid Sulphate Soils (ASS) are naturally occurring soils and sediments containing sulphide minerals, predominantly pyrite (an iron sulphide). When undisturbed below the water table, these soils are benign and not acidic (potential acid sulphate soils). However, if the soils are drained, excavated or exposed by lowering of the water table, the sulphides will react with oxygen to form sulphuric acid. Acid Sulphate Soil (ASS) Risk Mapping indicates the Subject Site does not lie within any known areas of ASS (DWER, 2017).

3.5 Geology and Soils

Soil mapping – Zones (DPIRD, 2017b) shows the Subject Site lies within one soil zone being; the Albany Sandplain Zone (242). The Albany Sandplain Zone is described as '*Gently undulating plain dissected by a number of short rivers flowing south. Eocene marine sediments overlying Proterozoic granitic and metamorphic rocks. Soils are sandy duplex soils, often alkaline and sodic, with some sands and gravels.'*

Soil mapping – Systems (DPIRD, 2018) shows the Subject Site lies within one soil system being; the King System (253Bv). The King System is described as *'Dissected siltstone and sandstone terrain, on the southern edge of the Albany Sandplain Zone, with shallow gravel, sandy gravel, grey sandy duplex and pale deep sand. Jarrah-marri-sheoak woodland and mallee-heath.'*

The Subject Site is located within two sub-systems of the King System as defined by DPIRD (2017c). The sub-systems are described in Table 2 and shown in Figure 4.

Table 2: Soil Sub-systems (DPIRD, 2017c)

Map Unit Symbol	Map Unit Name	Map Unit Description
242KgDMc	Dempster crest phase	Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
242KgS7h	Minor Valleys S7 slope phase	Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, tea tree heath.

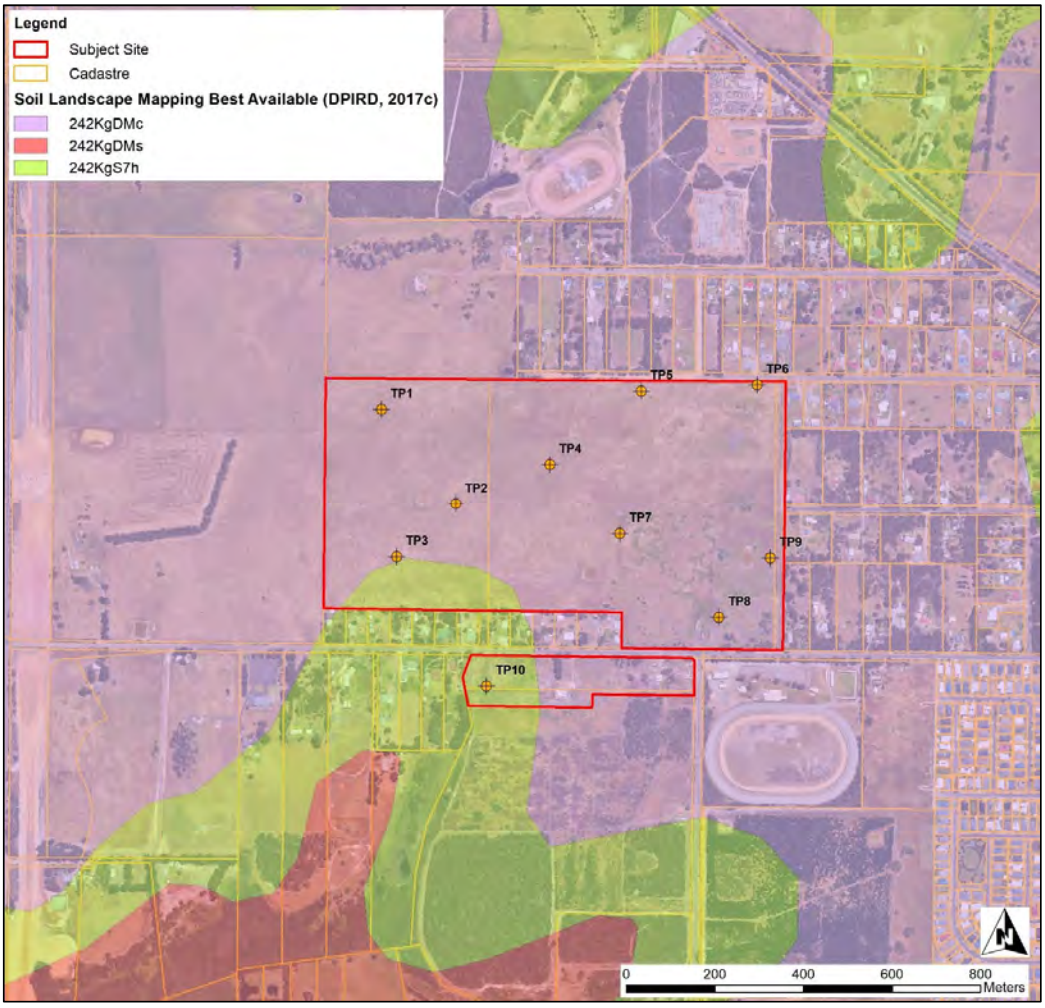

Figure 4: Soil Mapping (DPIRD, 2018)

3.5.1 Site Soil Investigation

A site soil investigation was conducted on the 13th July 2023 by Great Southern Geotechnics. The site investigation included the construction of 10 test holes to a depth of up to 2.5 metres, logging of soils to the depth of the hole with inspection and measuring of the water table. The test holes were constructed using a

mini excavator with a 300 mm auger and were left open for 1hr for inspections of water table depth. The soil investigation for the site is shown in Appendix A and the location of the 10 test holes is shown in Figure 4.

The investigation revealed that soils across the site comprised of two main soil types:

- Silty sand topsoil over sandy gravel over sandy clay, with a perched water table encountered at the top of the sandy clay layer. Encountered across the majority of the Subject Site (TP1 – T9); and
- Topsoil (sand with silt) over sand with silt to the depth of the hole. Encountered to the south of Lancaster Road within the lower reaches of the site (TP10).

In-field permeability testing was conducted at TP1, TP5 and TP10 during the site soil investigation by Great Southern Geotechnics, the location of the permeability tests is shown in Figure 4. Permeability testing was conducted using the Talsma-Hallam method, which is a constant head test. The permeability (hydraulic conductivity) recorded at the three testing locations is shown in Table 3.

Table 3: Permeability Results

Permeability Testing Site	Soil type in which permeability testing was applied	Hydraulic conductivity (m/d)
TP1	Sand with silt	No infiltration recorded after 20 minutes of observation
TP5	Sand with silt / Sandy gravel	No infiltration recorded after 20 minutes of observation
TP8	Sand with silt / Sandy gravel	No infiltration recorded after 20 minutes of observation

Testing showed that permeability was low across the site with no permeability evident after 20 minutes of commencing the permeability test at all three testing locations.

3.6 Surface Water Hydrology

The northern portion of the Subject Site drains to the northeast towards Gladville Road and towards the adjacent rural property. The northern portion of the Subject Site ultimately discharges to Willyung Creek further to the northeast. Willyung Creek discharges to the King River and ultimately Oyster Harbour. The southern portion of the site drains south towards a creek line which upper reaches commence within a drainage easement south of the main Subject Site area and north of Lancaster Road. The creek line ultimately discharges to Five Mile Creek south of the Subject Site. Five Mile Creek discharges to Seven Mile Creek further to the southwest and Seven Mile Creek discharges to Powell Lake and ultimately the Torbay Inlet further west. Water features within the Subject Site include the upper reaches of the creek line in the south, three farm dams and a soak/inundated area in the northeast of the site.

The pre-development surface water hydrology of the site and surrounding areas is shown in Figure 5. The general surface water hydrology of the site shall be maintained post-development noting that post-development catchments may be altered by installed drainage and proposed earthworks.

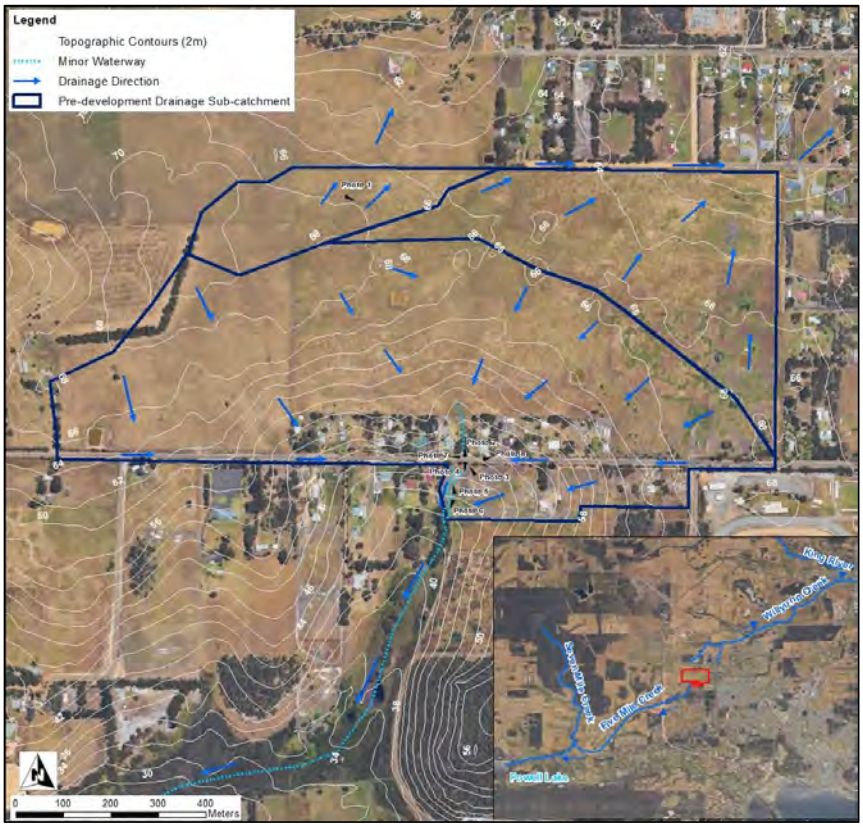

Figure 5: Pre-development Surface Water Hydrology

The northern portion of the Subject Site is located within the Oyster Harbour Kalgan King hydrographic catchment and the King River sub-catchment (DWER, 2018a). The southern portion of the Subject Site is located in the Torbay Inlet hydrographic catchment and the Seven Mile Creek sub-catchment.

3.6.1 Site Hydrological Investigation

A site investigation was conducted on the 3rd July 2023 to confirm the surface water hydrology of the site and guide the post development surface water management strategy. Rainfall prior to the site investigation was significantly higher than average for the months of April and June 2023, as shown in Table 4.

Table 4: 2023 monthly rainfall prior to site investigation

Month	Average rainfall for Albany* (mm)	2023 Rainfall for Albany* (mm)
January	23.6	6.9
February	22.4	3.0
March	38.2	31.3
April	69.3	138.4
May	114.5	49.7
June	131.8	295.6
Total (Jan-Jun)	399.8	524.9

* Rainfall taken from BoM Albany Station (No. 9500).

The following photos show the hydrological features of the site.

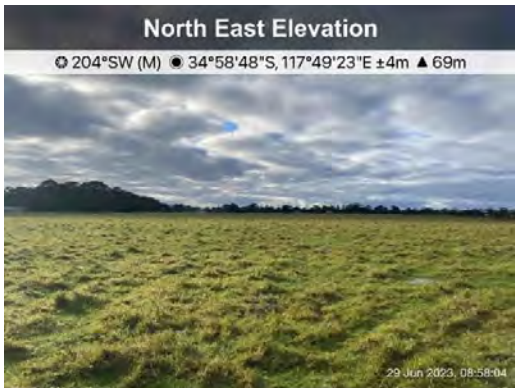

Photo 1: View to the southwest of a relatively flat site, with some small localised pockets of seasonal inundation.

Photo 2: View to the north from Lancaster Road of upper reaches of creek line within easement in the central south.

Photo 3: View to the northwest of box culvert (downstream end) under Lancaster Road. Box culvert is 750mm high x 1200mm wide.

Photo 4: View to the south from Lancaster Road of culverts discharging to creek line within the south of the Subject Site. Culverts are 2 x 750mm diameter.

Photo 5: View to the north of creek line in the south of the Subject Site.

Photo 6: View to the south of creek line in the south of the Subject Site.

Photo 7: View to the west of Lancaster Road roadside swale.

Photo 8: View to the northeast of Lancaster Road roadside swale driveway culvert crossing.

3.7 Hydrogeology

Australian Geoscience Mapping and Department of Water and Environmental Regulation 250K Hydrogeological Mapping (DWER, 2001) places the Subject Site within one hydrogeological zone described as:

Geology Type: TP.
Geology Time: TERTIARY - CAINOZOIC - PHANEROZOIC.
Aquifer Description: Sedimentary aquifer with intergranular porosity - extensive aquifers, major groundwater resources.
Geology Description: PLANTAGENET GROUP - siltstone, spongolite; minor sandstone, peat, and conglomerate.

3.8 Groundwater

Pre-development groundwater monitoring was conducted at the Subject Site from early July 2023 to October 2023. Monitoring included 5 rounds of groundwater level monitoring (early Jul, late Jul, early Sep, late Sep and Oct 23) and 2 rounds of water quality monitoring (early Jul and Oct 23). Ten groundwater bores (BH1 to BH10) were monitored as part of the monitoring program, details of the groundwater monitoring bores are presented in Table 5 and the location of the bores is shown in Figure 6.

These bores were not checked during the winter of 2024.

Table 5: Details of monitoring wells

Monitoring well	Co-ordinates		Monitoring well Screening depth (m)	Depth of hole (m)
	Easting	Northing		
BH1	575161.76	6128843.59	2.06 - 3.06	3.06
BH2	575305.61	6128627.29	2.06 - 3.06	3.06
BH3	575162.00	6128463.63	2.04 – 3.04	3.04
BH4	575520.86	6128714.63	2.09 – 3.09	3.09
BH5	575731.12	6128884.77	2.07 – 3.07	3.07
BH6	576018.49	6128882.24	2.10 – 3.10	3.10
BH7	575736.87	6128554.12	2.09 – 3.09	3.09
BH8	575876.52	6128344.01	2.05 – 3.05	3.05
BH9	576016.81	6128601.85	2.09 - 3.09	3.09
BH10	575377.35	6128242.08	2.04 – 3.04	3.04

Groundwater levels and quality should be maintained post-development wherever possible.

3.8.1 Groundwater levels

Monitoring showed groundwater was close to the surface across the site, with maximum recorded levels ranging from 0.32 m above ground level at BH2 in late July 2023 to 0.7 m Below Ground Level (BGL) at BH5 in early July 2023. Groundwater levels across the site generally fluctuated consistent with seasonal rainfall with the highest levels recorded from early July to early September, noting over double the average volume of rainfall was received in June 2023 and lower-than-average rainfall was recorded in October and September 2023. The groundwater levels recorded in the bores from early July to October 2023 are shown in Table 5. The highest recorded groundwater levels are also shown in Figure 6.

Table 6: Groundwater levels (Jul 23 - Oct 23)

Monitoring bore	Groundwater level (m BGL)				
	03/07/2023	24/07/2023	05/09/2023	26/09/2023	31/10/2023
BH1	0.05	0.09	0.06	0.96	Dry
BH2	0.26	-0.32*	0.34	1.30	Dry
BH3	0.64	1.01	0.38	2.59	Dry
BH4	0.09	0.16	0.31	2.49	Dry
BH5	0.70	1.84	2.37	3.15	Dry
BH6	0.21	0.31	0.40	1.38	Dry
BH7	0.42	0.49	0.34	2.38	Dry
BH8	0.28	0.19	0.08	0.82	Dry
BH9	0.24	0.14	0.08	0.94	1.6
BH10	0.40	0.36	0.42	1.02	1.46

Notes: * Groundwater level is above ground level.
Highest recorded groundwater level shaded pink.

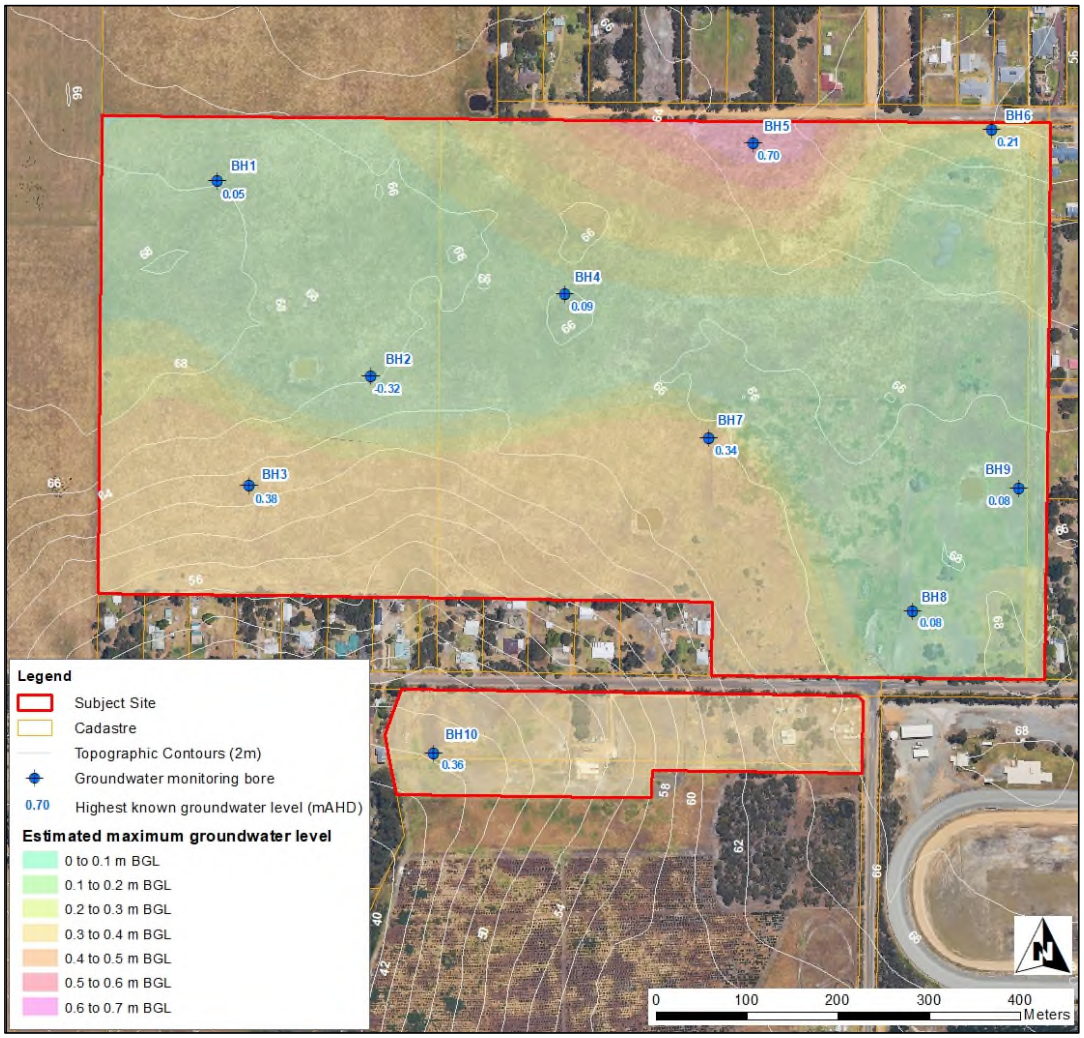

Figure 6: Groundwater levels

3.8.2 Groundwater Quality

In-situ and laboratory water quality testing was conducted at the 10 groundwater bores in early July 2023 and October 2023. In-situ analysis was conducted using a Horiba-50 Water Quality Meter and laboratory samples were sent to NATA accredited laboratory; MPL laboratories, for testing. BH1 to BH8 were found to be dry during the October 2023 monitoring event. Water quality testing results are shown in Appendix B and summarised in the following sections.

3.8.2.1 pH

The pH levels within the groundwater bores were found to be slightly acidic, with results being below the ANZECC and ARMCANZ (2000) lower trigger value for wetland ecosystems in the southwest of Australia (6.5) at each bore. The pH levels were found to be lower at BH10, which correlated with the differing soil type encountered here (deep sands). The pH level at BH9 was significantly lower in October 2023 (5.83) compared to that recorded in early July 2023 (6.29). The pH levels recorded at the bores during the two monitoring events are presented in Figure 7, with the pH data shown in Appendix B.

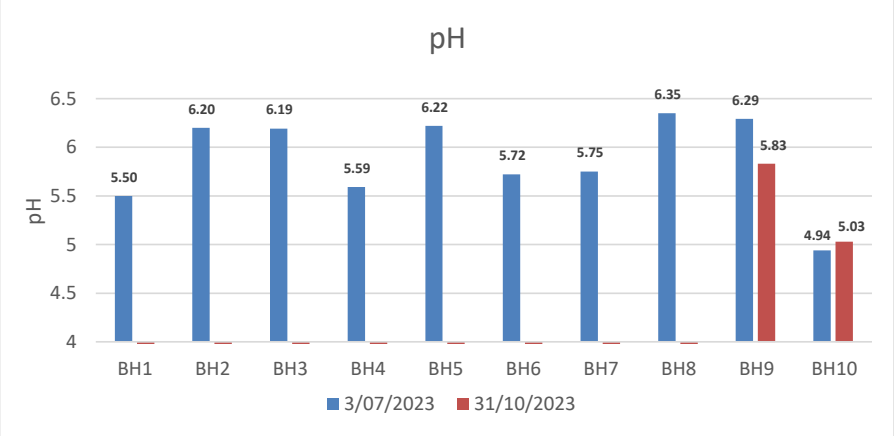

Figure 7: Groundwater pH

3.8.2.2 Electrical Conductivity

The Electrical Conductivity (EC) within the groundwater bores was generally low to moderate, with EC levels across the site below the ANZECC and ARMCANZ (2000) upper trigger value for wetlands in the Southwest of Australia (1500uS/cm). EC levels were found to be considerably higher at BH9 during the October 2023 monitoring round, with the EC level at BH10 during October 2023 also being considerably higher than that recorded during the July 2023 monitoring round. EC levels recorded at each of the bores during the two monitoring events are shown in Figure 8, with the EC data shown in Appendix B.

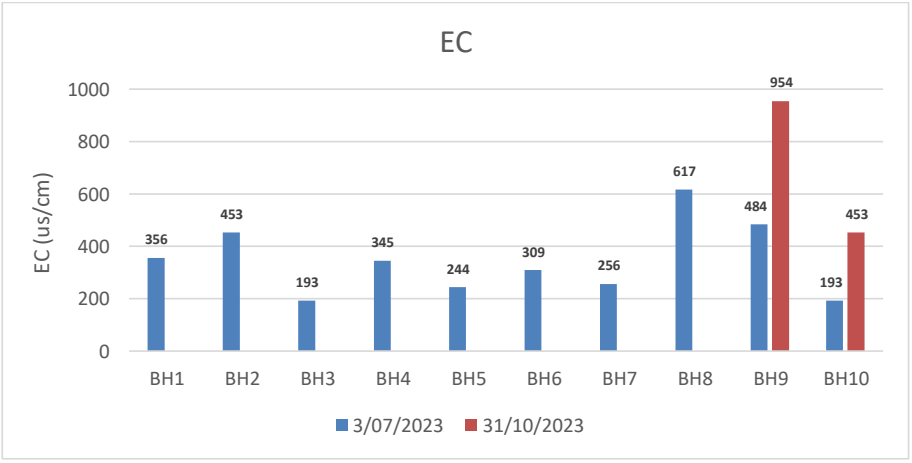

Figure 8: Groundwater EC

3.8.2.3 Total Dissolved Solids

The Total Dissolved Solids (TDS) at the groundwater bores was generally low to moderate, with TDS levels across the site below the ANZECC and ARMCANZ (2000) upper trigger value (1 mg/L). TDS levels were found to be considerably higher at BH9 during the October 2023 monitoring event consistent with the EC levels. TDS levels at BH10 recorded during Oct 23 (0.13 mg/L) were also found to be considerably higher compared to the July 2023 TDS levels (2.9 mg/L). TDS levels at each of the groundwater bores during the two monitoring events are shown in Figure 9, with the TDS data shown in Appendix B.

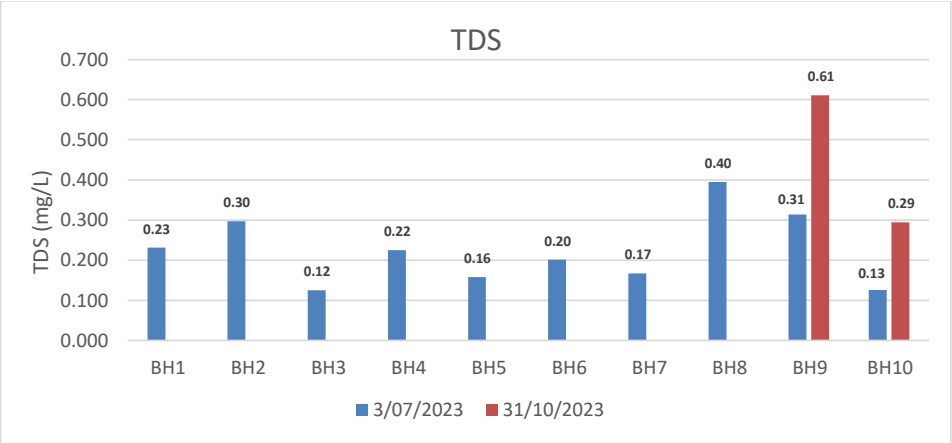

Figure 9: Groundwater TDS

3.8.2.4 Dissolved Oxygen

The Dissolved Oxygen (DO) levels recorded within the groundwater bores were generally low and below the ANZECC and ARMCANZ (2000) lower trigger value for wetlands in the southwest of Australia (90%). Groundwater typically has a much lower DO compared to that of surface water due to the decreased interface with the atmosphere. The DO levels recorded at each of the bores for the two monitoring events are shown in Figure 10, with the DO data shown in Appendix B.

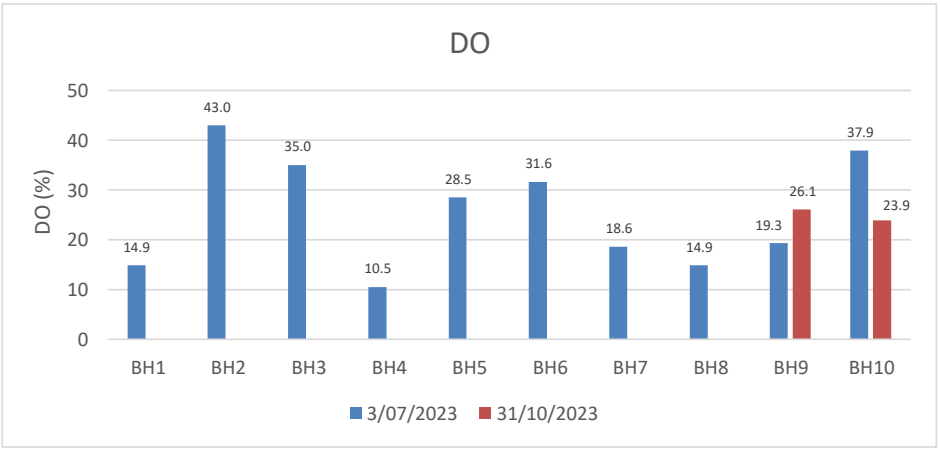

Figure 10: Groundwater DO

3.8.2.5 Nutrients

The Total Nitrogen (TN) levels within the groundwater varied from low to high, with half the results being above the ANZECC and ARMCANZ (2000) upper trigger value for wetlands in the southwest of Australia (1.5 mg/L). TN levels were slightly elevated at BH8 and BH9 (October 2023 only), high at BH10 (July 2023) and exceptionally high at BH10 (October 2023). Noting, at all bores except for BH10, the nitrogen was predominantly in the form of Total Kjeldahl Nitrogen (TKN) and therefore is likely to originate from an organic source. At BH10 over half of the TN was found to be in the form of nitrate, likely originating from an inorganic source i.e. fertiliser. The TN levels recorded at the bores for the two monitoring events is presented in Figure 11, with the nitrogen data shown in Appendix B.

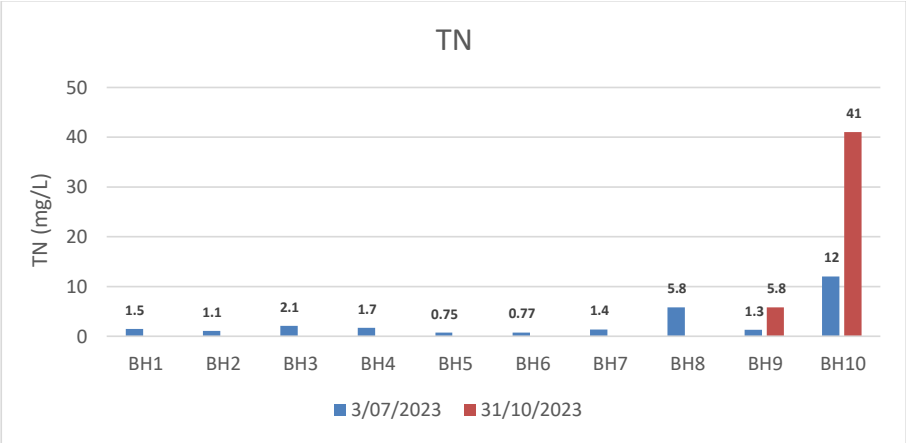

Figure 11: Surface water and groundwater TN

Total phosphorus (TP) levels were elevated and above the ANZECC and ARMCANZ (2000) trigger value (0.06 mg/L) at BH1, BH4, BH8, BH9 and BH10. TP levels were exceptionally high at BH8 and BH10 (October 2023 only). Phosphate (PO_4) levels were found to be low at all bores except BH10, indicating that most of the phosphorus detected is likely to be from an organic source at all bores except BH10. The TP levels recorded at the bores during the two monitoring events is presented in Figure 12, with the phosphorus data shown in Appendix B.

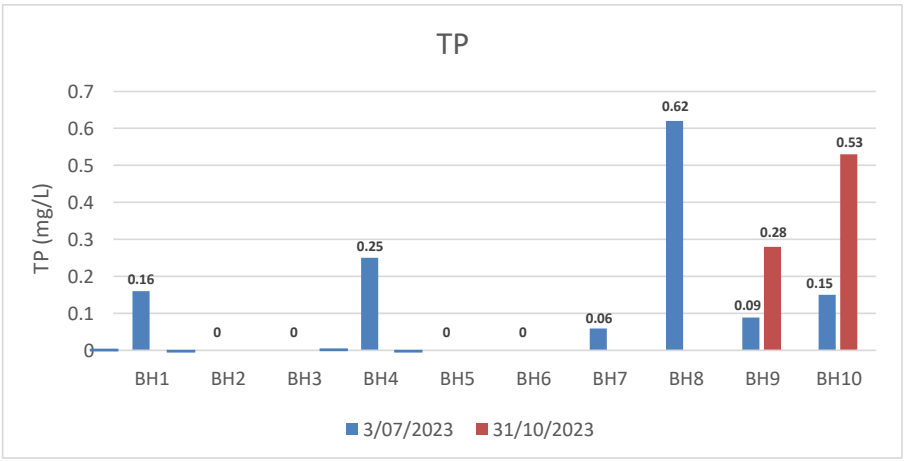

Figure 12: Surface water and groundwater TP

3.8.2.6 Dissolved Metals

Elevated levels of zinc were encountered at all groundwater monitoring bores with levels being above the ANZECC & ARMCANZ (2000) trigger values for toxicants in freshwater ecosystems at 95% level of protection. Elevated levels of copper were encountered at BH1, BH3, BH5, BH6, BH9 (July 2023 only) and BH10 and elevated levels of chromium were encountered at BH3, BH4, BH6, BH7, BH8, BH9 (July 2023 only) and BH10. Arsenic levels were elevated and above ANZECC & ARMCANZ (2000) trigger values at BH3, BH4, BH9 (October 2023 only) and BH10. Cadmium levels were elevated and above ANZECC & ARMCANZ (2000) trigger values at BH8 only. All other dissolved metal levels (mercury, nickel, lead) were found to be below laboratory detection limits. The dissolved metal results are shown in Appendix B.

3.8.2.7 Hydrocarbons

The Volatile Total Recoverable Hydrocarbons (TRH), Methyl tertiary-butyl ether, benzene, toluene, ethylbenzene, xylene and Naphthalene (MBTEXN), and Semi-volatile TRH laboratory results were generally found to be below the laboratory detection limit or very low for all parameters at all groundwater monitoring bores during both monitoring events, with the exception of the semi-volatile TRH levels encountered at BH9 in October 2023 which were found to be low to moderate. The TRH, MBTEXN and semi-volatile TRH levels at each monitoring bore for the two monitoring events are shown in Appendix B.

3.8.2.8 PAHs in Water

Polycyclic Aromatic Hydrocarbons (PAHs) laboratory results were found to be below laboratory detection limits at all groundwater bores during both monitoring events. The PAH levels at each monitoring site for the two monitoring events are shown in Appendix B.

3.8.2.9 Microbial

Thermotolerant Coliform (TC) and *E. coli* levels across the site varied from low to high. TC and *E. coli* levels were found to be below detection limits or very low at BH5, BH6, BH7, BH8, BH9 (July 2023 only) and BH10 (July 2023 only). TC and *E.coli* levels were found to be moderate (10 – 100 cfu/100 ml) at BH4 and BH10 (October 2023 only) and TC and *E.coli* levels were found to be high (>100 cfu/100ml) at BH1, BH2, BH3 and BH9 (October 2023 only). The TC and *E. coli* levels recorded at each bore for the two monitoring events are shown in Appendix B.

3.9 Public Drinking Water Source Area

The Subject Site is not located within a Public Drinking Water Source Area (PDWSA; DWER, 2018b). The nearest PDWSA is the South Coast Water Reserve and Limeburners Creek Catchment Area which is located approximately 3.0 km south-southwest of the Subject Site. The Subject Site does not form part of the South Coast Water Reserve and Limeburners Creek Catchment Area.

3.10 Wetlands and Environmentally Sensitive Areas

There are no South Coast Significant wetlands (DBCA, 2017) or Environmentally Sensitive Areas (ESA; DWER 2018c) within the Subject Site or within the vicinity of the Subject Site. The nearest South Coast Significant Wetland is the Seven Mile Creek wetland which is located ~2.7 km west of the Subject Site. Noting the Subject Site discharges downstream of the Seven Mile Creek significant wetland area. The nearest ESA is located ~4.0 km north-northeast of the Subject Site.

4 Local Water Management Strategy

4.1 Water Sustainability Initiatives

4.1.1 Water Supply

Water supply to households is to be via an extension of the Albany town scheme water system. The project civil engineer will negotiate the extension of the scheme water system with Water Corporation Western Australia.

4.1.2 Wastewater

The Subject Site is situated in an area that does not currently have reticulated sewerage. Reticulated sewerage to households is to be via an extension of the existing Albany town reticulated sewerage system. The project civil engineer will negotiate the extension of the sewerage system with Water Corporation Western Australia.

4.1.3 Water Efficiency Measures

To achieve water efficiency targets, households are to be built consistent with current BCA water efficiency standards. Water efficiency initiatives are proposed to reduce potable water demand for irrigation of residential lots. These include encouragement of:

- Selection of predominantly local native, drought tolerant plants;
- Use of waterwise plants and lawn varieties; and
- Retaining water onsite through soak wells and rainwater tanks as per the City of Albany requirements.

4.1.4 Public Open Space

Three POS and one Co-located Open Space adjacent to the Primry School (COS) areas are proposed within the Subject Site.

It is proposed that the POS in the northeast of the Subject Site co-located with the primary School will include a sports oval, associated amenities and stormwater storage areas for the northern portion of the Subject Site. The POS will predominantly be grassed with potential future tree plantings in the outer extents of the space. A groundwater production bore will be explored for irrigation of the sporting oval. According to the Water Information Reporting Tool (DWER, 2023) a reliable groundwater source has been encountered in the vicinity of the Subject Site between ~40 and 50 m depth. Further investigation is required to confirm the achievable flow rate and water quality of the groundwater supply for irrigation use at the DOS. If an adequate groundwater source is not available for irrigation of the POS, scheme water will be used exclusively or to supplement the groundwater supply.

The central north POS will include a playground, landscaping, hardscape path and some grassed areas (>50%).

The central southern POS will be utilised for stormwater storage and public use with a possible children's playground, grassed areas, and minor landscaping and hardscaping. Grassed areas will be limited to 50% of the total POS and landscaping will comprise of native trees, shrubs and grasses, with irrigation of landscaping limited to the establishment period (average of 2 years). A groundwater source shall also be investigated for irrigation of this POS, with scheme water used if a suitable groundwater source is not available.

The POS area in the south will include the establishment of a living stream, as discussed in more detail in Section 4.2.4 Drainage System Requirements. Irrigation of this POS will be minimal and limited to the establishment of plants (average of 2 years). Therefore, a permanent water supply to this POS is unnecessary

with irrigation for the establishment period sourced from the scheme water supply or the groundwater supply provided in the central south POS.

4.2 Stormwater Management

4.2.1 Design Capacity

The stormwater management system for the development has been designed in accordance with the guidelines of the DWER through the Better Urban Water Management framework and the requirements of the City of Albany. The stormwater drainage system has been designed using a major/minor approach.

The minor drainage system has capacity for frequent rainfall events up to the 20% AEP and includes the pipe drainage system, lot attenuation and bioretention storage areas. The minor drainage system is designed to also provide the structural controls for water quality treatment.

The major drainage system is designed to manage a range of rainfall events up to 1% AEP. The major drainage system is designed for rainfall events greater than the 20% AEP, up to the 1% AEP. The major system uses overland flow paths, which includes grading the road network to direct flow to the lowest point of the catchment for flood mitigation.

4.2.2 Runoff coefficients and Sub-catchments

A critical design criterion for the stormwater modelling includes the runoff coefficients for the site. The lot runoff coefficients take into consideration soil type, slope and proposed land use across the site. The pre-development and post-development runoff coefficients assumed for the Subject Site, are shown in Table 7.

Table 7: Runoff coefficients

Land Use	Runoff Coefficient		
	First 15mm	20% AEP	1% AEP
Residential Lots (R2.5)	0	0.30	0.35
Residential Lots (R5)	0	0.35	0.40
Residential Lots (R10-R15)	0	0.40	0.45
Residential (R20)	0	0.45	0.50
Road Reserve	0.80	0.80	0.90
POS/DOS	0.20	0.30	0.40
School	0.20	0.40	0.45
Agricultural land	0	0.20	0.30

For clarity the residential areas have been averaged in all following calculations. There are three post-development sub-catchments proposed, with the general pre-development hydrological regime (Figure 5) being maintained in the post-development scenario. The post-development sub-catchment areas are presented in Table 8 and the sub-catchment boundaries are shown in Figure 13.

Table 8: Post-development sub-catchment areas

Land Use	Landuse Areas		
	A	B	C
Residential	18.352	17.986	12.088
Road Reserve (ha)	8.378	4.664	2.421
POS/DOS/Drainage (ha)	3.052	2.5	0.525
School (ha)	3.51	0	0
Total Area (ha)	**33.292**	**25.15**	**15.034**

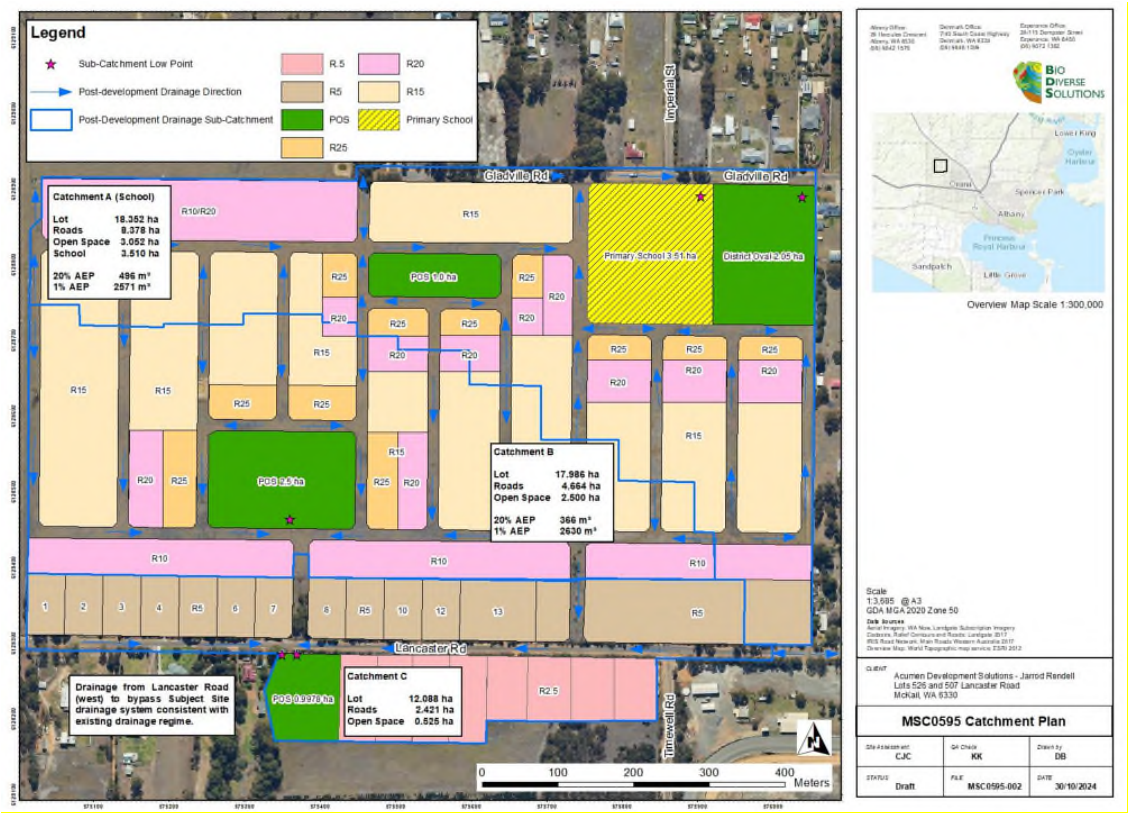

Figure 13: Post-development sub-catchment plan

Currently, drainage from Lancaster Road and the adjacent rural property to the west of the Subject Site discharges unattenuated to the creek line within the proposed POS in the south of the Subject Site, via a series of roadside swales and culverts within Lancaster Road reserve. The drainage strategy here will remain unaltered with any future proposed change in land use within the western adjacent property to attenuate

outflows consistent with estimated pre-development flow rates to ensure downstream flow rates within the Subject Site POS are maintained. The portion of Lancaster Road to the east of the road low point (far east portion) will also discharge to the POS within the south of the Subject Site unattenuated consistent with the existing hydrological regime. Any runoff through this area drains larger lots with a lower flow potential.

The majority of this catchment will be unaltered as part of development works, with the only alteration being the inclusion of two relatively small sections of road connecting to Lancaster Road. The downstream impact of the increased flow rate in the post-development scenario here will be minor. Additionally, the proposed improvements to the creek line into a living stream, as discussed in more detail in Section 4.2.4, will reduce the flow rate and velocity of the outflow from this sub-catchment and provide water quality improvement.

It is proposed the lots to the south of Lancaster Road within the Subject Site discharge unattenuated towards the neighbouring property to the south and the proposed living stream to the west of the lots. The lots to the south of Lancaster Road are proposed to be zoned R2.5, and it is assumed that the majority of the lot area will remain grassed or vegetated, with lot attenuation provided for buildings and hardstand areas. As such, the runoff from these lots will be relatively similar to that of the pre-development scenario.

Drainage sub-catchments A and B take into consideration the agricultural land/potential future developable land to the west discharging towards the Subject Site to allow for integration of future development and drainage systems. Noting, that any outflow discharging into the Subject Site shall be attenuated to pre-development flow rates.

Sub-catchment A accounts for runoff from the Co-located Open Space (COS) and the residential area in the north and east. Given drainage from both the residential area and COS areas will be managed in the future by the City of Albany combining the stormwater storage areas for both land uses here allows for the most efficient use of space within the low point of the sub-catchment.

Sub-catchment D is no longer recognised with the re-design but included a proposed Primary School. It is proposed the school retain its own drainage with outflows consistent with pre-development flow rates. The school shall also be responsible for maintenance of its own drainage system. This statement remains unchanged in effect noting that large volumes of runoff cannot be directed at these sites unattenuated.

4.2.4 Drainage System Requirements

Key elements of the proposed drainage system for the Subject Site are as follows:

Lot Attenuation

- It is the landowner's responsibility to manage stormwater runoff from buildings, hard stand (impervious) areas and gardens within the property boundary, consistent with the City of Albany lot attenuation guidelines. As a guide, 0.5m³ of storage is required per 100m² of impervious area. A good way of attenuation is to encourage the use of rainwater tanks which attenuate flows, store water and then re-use the water onsite during summer. The City of Albany can provide information regarding building and planning permissions.
- Soakwells should only be utilised where there is adequate separation to the peak annual water-table from the base of the soakwell (>300 mm), adequate gradient for graduated pipe overflow pipes, and where soils allow suitable infiltration rate (not suitable in medium to heavy clays). In areas with shallow depth to groundwater or medium to heavy clays, as encountered at the Subject Site, attenuation basins integrated into the garden landscaping or underground storage pits will provide the most effective attenuation mechanism. When designing lot stormwater management systems, overland and subsoil flow routes directing runoff away from buildings and adjoining properties shall be considered. Lot

stormwater management systems should be assessed and approved by the City of Albany upon Development Application.

- Many other authorities have useful information published such as *Drainage for Liveability – managing small rainfall events at source*, jointly published electronically by the Water Corporation and DWER.

Stormwater Conveyance

- Pit and pipe network installed within the road reserve sized to convey runoff from the Subject Site for storm events up to the critical 10% AEP.
- Lancaster Road drainage system will remain unaltered and maintain its roadside swales and culvert crossovers. Stormwater runoff from the Subject Site to Lancaster Road will remain relatively unchanged in the post-development scenario.
- Road drainage for storm events greater than the peak 10% AEP event, up to the peak 1% AEP event, will be directed to the lowest point in each catchment via overland flow along the road pavement. The ultimate road low point will be located adjacent to the stormwater storage in each sub-catchment.

Bio-retention and Stormwater Storage

In the original report the use of bio-retention storages was offered. In the strictest sense bio-retention storages rely upon subsoil drainage under an engineered filter to retain and release stormwaters. The basin depth and size is governed by the principle of retaining the first 15mm of collected stormwater in the basin whilst allowing overflow past this level during the event then a slower release through subsoil drainage. Outflow from the filtration is usually set at releasing 150mm of height per hour i.e. a basin with 600mm of depth should drain, filter and discharge within 4 hours, mimicking the pre-development outflows.

Typically, the base of the bio-retention storage shall be underlain with 0.4 m depth of amended soil, 0.15 m depth of a transition layer (coarse sand) and 0.15 m depth of a drainage layer with 100 mm (maximum) perforated collection pipes (subsoils). Bio-retention storages may be considered for a future design as originally proposed if the issues outlined can be overcome. These shall also be planted, the specifications for the amended soil and the planting are provided in Table 10.

In the case of the Lancaster Road subdivision the pure concept of bio-retention basins as discussed above may not be a suitable solution. The site is going to undergo significant earthworks as cut and fill which is likely to mobilise quantities of the clays underlying the site. From experience these clays readily suspend in any water available and hence move downslope into the drainage system before some settling action occurs once flow velocity drops. This would have the immediate effect of beginning to block the filtration layers, possibly rendering the basins increasingly ineffective overtime.

At some future time when the subdivision is completed and residential areas have been built this concept could be retrofitted to the proposed drainage basins.

Other means of localised attenuation such as verge plantings with drainage solutions are already used elsewhere and should strongly be considered here as it is a greenfields site. Such plantings provide traffic calming.

As a means of attenuation for the basin outflow, low maintenance engineering solutions are proposed in the form of either weirs or perforated plate systems, the latter being as simple as a perforated stormwater liner or liners. The drainage basins are still built to required capacities of the bio-retention basin but outflow is controlled by the design of structure itself whereas water rises it encountered more area to outflow volume. This provides a more natural flow using the following concepts;

- The major event stormwater storages will be designed to hold rainfall events greater than the first 15 mm up to the peak 1% AEP storm event. The stormwater storages shall be located in the low point of the sub-catchments and integrated into the POS/DOS with adequate access for maintenance. It is assumed the stormwater storage areas will remain dry for the majority of the year and therefore may be grassed or landscaped in the elevated areas. Subsoils may be required in the lower lying sections

of the storages to prevent waterlogging, so the bases of perforated plate design must meet the subsoil levels. The maximum side slopes for the stormwater storages are 1:6 and the storage shall have a minimum grade of 1:200 along its base to ensure stormwater is directed to the outlet. The stormwater storage requirements for each sub-catchment are shown in Table 9.

- Outflow from the major event stormwater storages shall be set at the lowest point of the storage with the outlet sized to match the peak pre-development outflow for the 1% AEP from each sub-catchment.
- Outflow from the stormwater storages in the north will be directed to the existing Gladville Road roadside swale. The outflow from the stormwater storage in sub-catchment B will be directed to the creek line/proposed living stream in the southern POS. Outflow from Stormwater Storage B will be via an outlet pipe that extends to Lancaster Road. Sub-catchment C discharge unattenuated towards the creek line/proposed living stream via existing culverts and roadside swales.
- A stabilised low point in the bank of the stormwater storage shall be provided at the 1% AEP top water level, located downstream in the storage so that stormwater is directed off site when/if the capacity of the storage is exceeded. This low point could take the form of a weir structure to further aid-controlled outflow.

Living Stream

- The POS proposed in Catchment C has potential for a living stream, as does to a lesser extent that in Catchments A and B. The resulting creek line shall be defined and stablised using rock pitching, stabilisation matting and plantings to minimise bank erosion. The plantings should include local native plantings and include both riparian and aquatic vegetation (reeds, grasses and shrubs) which will serve as a biological filter of organic and inorganic material and create habitat for native fauna. The creek line shall meander through the POS to reduce the velocity of the incoming flow and allow for the dropping out of sediment.

  If constructed these living streams will benefit the whole development in attenuating stormwater discharges and velocity, in addition to stripping nutrients, providing habitat and improving amenity.

Flood Protection

- All building pad finished levels shall have a minimum of 0.3 m separation above the estimated 1% AEP top water level in the stormwater storages and any nearby waterways and water bodies consistent with the Local Government Guidelines for Subdivisional Development (IPWEA, 2016).

4.2.5 Stormwater Modelling

Stormwater modelling has been conducted using the Ration Method. Multiple storm events have been modelled, as described in Australian Rainfall and Runoff (ARR) (Engineering Australia, 2001). Pre-development outflow rates have been calculated based upon peak flow stream discharge as determined by Section 1.4 of ARR.

Rainfall intensities for the various storm events and storm durations are calculated and provided by the Bureau of Meteorology (BoM) computerised design Intensity Frequency Duration (IFD) Data System (BoM, 2023). Calculations have been undertaken utilising up to date IFD charts.

The Boyd method has been utilised to calculate the stormwater storage volume required for all sub-catchments based on the post-development runoff from the site and the allowable outflows set for the stormwater storages, which are determined by the peak pre-development outflow rate. The Boyd method is considered a conservative estimate of stormwater storage volume calculation.

At the planning stage of a development many assumptions have to be made due to a number of engineering factors not usually being known until the subdivision design stage near the end of the planning process. Such matters as size of drainage infrastructure, how many nodes the system contains and slopes are present and

even the surface roughness of the internal pipe on long runs contribute. These calculations represent the best available estimate based on known and calculated information.

The basin volumes outlined in the original LWMS have been calculated using the Rational Method with a retention of the first 15mm internal to the basins using bioretention principles. The data presented here is calculated as a comparison by retaining the first 15mm on lots and infrastructure, including POS and not entering the storage basins in the first instance. This makes some difference in basin volume calculations because for a 20% AEP very small volumes actually should reach the basin if the 15% retention can be achieved. The 1%AEP will obviously produce much higher stormwater flows and the author has concerns about the assertion that 15% can be retained in the post development landscape, especially if soil moisture is already high prior to the event.

Allowable outflow rates are much higher but the infrastructure design should consider the potential for much higher flow rates.

Storages calculated in the original LWMS are a good response between storing and not storing this initial flow. The original LWMS also calculated allowable outflows and it is recommended that these figures are used to their maximum flow rates when designing outflow structures.

As part of the review the principle used for calculating basin size (based on the allowable outflow per hour) calculated for pre-development conditions and then worked backwards and compared the maximum storm volumes for each period and thence storage requirements.

These are somewhat dissimilar to the initial report before development as would be expected with the differences in storage but with the use of perforated plates design depths and earth construction do not become as critical as relying upon subsurface infiltration working as expected with the risk of overtopping.

In their basic form the drainage basins could be a simple bund on a large grassed area at the downslope end retaining the required volume which totally empties over a few hours period through the plate. Alternatively, part or all could be designed to fully retain a portion of the water in a nutrient stripping, planted basin which becomes an aesthetic, low maintenance water feature within the POS.

Table 9: Stormwater storage requirements

Stormwater storage requirements			
	A	B	
First 15mm - not to enter basins, onsite storage			
Runoff volume (m^3)	1997	1509	
Peak flow rate from sub-catchment (m^3/s)	0.20	0.18	
Allowable outflow from storage^ (m^3/s)	0.04	0.04	
20% AEP			
Critical storm duration (hours)	60 min	60 min	
Storm duration runoff volume (m^3)	730	547	
Peak flow rate from sub-catchment (m^3/s)	0.76	0.57	Q = 0.0028 x CiA
Total storage volume required (m^3)	496	366	Inflow - Outflow
Allowable outflow from storage (m^3/s)	0.32	0.33	
1 hr outfall max.	233.60	180.51	
1% AEP			
Critical storm duration (hours)	60 min	60 min	
Storm duration runoff volume (m^3)	3639	2402	
Peak flow rate from sub-catchment (m^3/s)	1.44	1.09	Q = 0.0028 x CiA
Total storage volume required (m^3)	2571	2630	Inflow - Outflow
Maximum ponding depth (m) (Design)	0.9	0.9	
Allowable outflow from storage (m^3/s)	0.63	0.56	
1 hr outfall max.	2293	1345	

Notes: * The total stormwater storage required minus the storage provided in the bio-retention storage.

Basin Depth 0.9m Max outflow 0.6, retain 0.3m

Land Use	Landuse Areas			Basin volume - A		Basin volume - B		Basin volume - C		Basin 15mm A		Basin 15mm - B		Basin 15mm- C	
	A	B	C	20% AEP	1% AEP	20% AEP	1% AEP	20% AEP	1% AEP	20% AEP	1% AEP	20% AEP	1% AEP	20% AEP	1% AEP
Residential	18.352	17.986	12.088	1310	2841	1284	2784	863	1871	297	1740	437	1918	294	1289
Road Reserve (ha)	8.378	4.664	2.421	1367	2918	761	1624	395	843	362	1588	105	459	105	459
POS/DOS/Drainage (ha)	3.052	2.5	0.525	187	1297	153	387	32	81	33	145	6	25	6	25
School (ha)	3.51	0	0	286	611	0	0	0	0	38	166	0	0	0	0
Total Area (ha)	**33.29**	**25.15**	**15.03**	*3151*	*7667*	*2198*	*4796*	*1290*	*2796*	730	3639	547	2402	404	1773

Excess over 15mm

20% AEP	20.4	mm/hr	5.4
1% AEP	38.7	mm/hr	23.7

Rainfall intensity - centered on development

DURATION	1	2	5	10	20	50	100
5 mins	46.2	62.8	89	109	136	177	213
6 mins	42.9	58.4	82.5	101	125	163	197
10 mins	34.3	46.2	64	77.2	95.1	122	146
20 mins	23.9	31.7	42.2	49.8	60.2	75.5	88.7
30 mins	18.9	24.8	32.4	37.8	45.2	56	65.1
1 hour	12.3	16	20.4	23.4	27.6	33.7	38.7
2 hours	7.95	10.3	12.9	14.7	17.2	20.8	23.7
3 hours	6.15	7.95	9.93	11.3	13.2	15.9	18.1
6 hours	3.97	5.12	6.38	7.22	8.43	10.1	11.6
12 hours	2.55	3.28	4.08	4.62	5.39	6.48	7.39
24 hours	1.59	2.05	2.56	2.89	3.37	4.06	4.62
48 hours	0.959	1.24	1.54	1.75	2.04	2.45	2.79
72 hours	0.701	0.901	1.12	1.27	1.49	1.8	2.05

4.3 Groundwater Management

The groundwater management objectives for the Subject Site are to:

- Manage groundwater levels to protect infrastructure and assets;
- Maintain groundwater regimes for the protection of groundwater dependent ecosystems;
- Protect the value of groundwater resources; and
- Adopt nutrient load reduction design objectives for discharges to groundwater.

The following strategies will be implemented for the proposed development of the Subject Site to ensure the above objectives are met:

- To protect infrastructure from high seasonal groundwater levels imported fill will be required to achieve the minimum separation of 2 metres between finished building level and the maximum ground water levels; and
- Where the road finished level is less than 2.0m above the average annual maximum groundwater level subsoil drains will be required.

Groundwater perching was evident across the Subject Site with groundwater encountered near surface across most of the site. Further detail on the use of fill and/or subsoil drains across the site shall be presented in the future Urban Water Management Strategy for the relevant subdivision stage. This shall include the location, depth and details of any fill and/or subsoil drains proposed at the site. Groundwater quality and levels shall be maintained or improved in the post-development scenario. Groundwater monitoring shall be conducted post-development, as discussed in Section 5.3, with results compared to pre-development quality and level results (presented in Section 3.9).

4.4 Water Quality Management

The effective implementation of the structural and non-structural controls as part of the development will enhance water quality from this site as a result of the land use change from agricultural to residential/rural residential.

The Subject Site uses a treatment train of structural and non-structural controls to treat and retain up to the first 15mm of rainfall from storm events. These bioretention storages will treat this first flush preferably prior to water entering the stormwater basins.

Structural controls include the use of:

- A living Stream, in which the creek line will be defined and stablised using rock pitching, stabilisation matting and plantings. The native plantings shall include riparian and aquatic vegetation (reeds, grasses and shrubs) which will serve as a biological filter of organic/inorganic material and create habitat for native fauna. The living stream shall meander through the road network and POS mimicking a natural waterway and allowing for the dropping out of sediment as the velocity of the flow is reduced.
- Bio-retention storages which will receive runoff from the development's internal road network. Bio-retention storages are designed to treat the first flush event. Bio-retention storages allow for infiltration at source, they will be underlain with amended soil where possible and planted to allow for plant root uptake of nutrients and contaminants. The minimum specifications for all bio-retention storages are presented in Table 10.

Table 10: Minimum requirements for bio-retention storages/swales

Item	Specification
Amended soil media	• Well graded sand. • Clay and silt content <3%. • Organic content between 3 and 5%. • Hydraulic Conductivity (sat) >150mm/hour. • Light compaction only. • Infiltration testing of material prior to installation and again once construction is complete. On-going testing as per the monitoring program.
Plant selection	• In accordance with Vegetation Guidelines for Stormwater Biofilters in the South-West of WA (Monash University, 2014). • Tolerant of periodic inundation and extended dry periods. • Spreading root system. • Preferential selection of endemic and local native species. • Planting to provide 70-80% coverage at plant maturity.
Planting density and distribution	• Planting density appropriate for species selection. • Even spatial distribution of plant species.

The bio-retention systems should be sized to function correctly with a hydraulic conductivity (K) (saturated) of at least 3 m/day. Research conducted by the Facility for Advancing Water Biofiltration (FAWB, 2008) indicates that the desired K_{sat} is in the range of 2.5 to 7 m/day, to fulfil the drainage requirements as well as retain sufficient moisture to support the vegetation. The FAWB (2008) research also specifies that for vegetated systems some clogging will occur in the first few years until the vegetation is established. Once the plants are established, the roots and associated biological activity maintain the conductivity of the soil media over time.

Non-structural source controls to reduce nutrient export from the Subject Site will focus on reducing the need for nutrient inputs into the landscape. The following strategies are proposed;

- The use of local plants within the Living Stream / Bioretention areas to increase the chances of survival and maximum plant density.
- Promotion of the use of local native plants for landscaping to new lot owners.
- The use of local native plants will reduce the need for fertilisers across the site.

5 Implementation

5.1 Construction Management

Any temporary stormwater storage required during construction should be built where the final storage area will be located. The temporary storage will be sized to contain the ultimate capacity of stormwater runoff from the connected area. Measures will be taken to prevent the transportation of sediment during the construction phase including infiltrating/retention of stormwater at source where possible and sand bagging/rock placement at the inlet of any pipe systems discharging outside the Subject Site. Remedial measures will be undertaken by the developer if any disturbances are caused downstream of the Subject Site during construction.

Early construction of the stormwater basins will assist in ameliorating any off site disturbance.

5.2 Maintenance of Drainage Systems

The bio-retention storage areas, stormwater storage areas and drainage system will require regular maintenance to ensure efficient operation. It is considered the following operating and maintenance practices will be required and undertaken by the proponent periodically until successful practical completion of the development and handover to the City of Albany. Following handover, it will be the City of Albany's responsibility to maintain drainage structures accordingly:

- Removal of debris to prevent blockages;
- Maintenance of vegetation in bio-retention systems/ storages; and
- Cleaning of sediment build up and litter layer on the bottom of storages.

5.3 Monitoring Program

The monitoring program has been designed to allow a quantitative assessment of hydrological impacts of the proposed development.

5.3.1 Hydraulic Performance Monitoring

The hydraulic performance monitoring aims to measure the movement of storm water through the stormwater storage structures to determine if stormwater conveyance is consistent with the intended design.

If amended soil profiles have been installed in any bio-retention storages or streamways, infiltration testing should be completed to test the hydraulic conductivity of the media. Testing should be repeated every 12 months to ensure clogging of the storages does not occur.

Water levels in the bioretention storages and principal stormwater storages shall be observed during significant storm events to ensure they are consistent with design and not overflowing in an uncontrolled manner. If this occurs then additional openings can be installed in the perforated plate.

5.3.2 Groundwater Monitoring

A series of groundwater monitoring bores (BH1-BH10) have been established across the Subject Site to determine pre-development groundwater levels and quality. If any are retained following development the continued monitoring should occur. Monitoring shall include groundwater level and groundwater quality monitoring, with groundwater quality analysis including the following parameters:

- In-situ: pH, EC and TDS;
- Thermotolerant coliforms & E. coli;
- Nutrient suite;
- Dissolved metals; and
- TRH (C6-C10), MBTEXN & PAH.

Water quality testing shall be conducted by a certified and NATA accredited laboratory.

5.3.3 Surface Water Monitoring

In addition to the post-development groundwater monitoring, surface water quality monitoring will also be conducted at the outlet pipe of the bio-retention storages in Sub-catchment A and B, and at the downstream end of the living stream. Pre-development surface water monitoring was not conducted at the Subject Site. However, post-development water quality results will be compared to relevant guidelines. Water quality parameters will include;

- In-situ: pH, EC and TDS;
- Thermotolerant coliforms & E. coli;
- Nutrient suite;
- Dissolved metals; and
- TRH (C6-C10), MBTEXN & PAH.

Water quality testing shall be conducted by a certified and NATA accredited laboratory.

If surface water quality results are found to exceed relevant guideline trigger values, a review of the drainage/development design and land use will be required and alterations/modifications will be conducted to reduce surface water quality parameters accordingly.

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Appendix A

Site Soil Investigation

(Great Southern Geotechnics, 2023)

Appendix B

Groundwater monitoring Results

TABEC
Civil Engineering Consultants

LOTS 507, 526 AND 300 LANCASTER ROAD, MCKAIL

Engineering Infrastructure Report

November 2024

CLIENT: VEGATE PTY LTD C/- ACUMEN

PROJECT: LOTS 507, 526 AND 300 LANCASTER ROAD, MCKAIL

TITLE: LOTS 507, 526 AND 300 LANCASTER ROAD, MCKAIL: ENGINEERING INFRASTRUCTURE REPORT

DOCUMENT REVIEW				
Revision	Date Issued	Written By	Reviewed By	Approved By
1	31/01/2024	JBSMALL	JBSMALL	CCBITMEAD
2	12/02/2024	JBSMALL	JBSMALL	CCBITMEAD
3	03/04/2024	JBSMALL	JBSMALL	CCBITMEAD
3	11/11/2024	JBSMALL	JBSMALL	CCBITMEAD

Note:

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1 INTRODUCTION

This report has been prepared by TABEC to provide broad servicing and infrastructure advice for the proposed subdivision of Lots 507, 526 and 300, on Lancaster Road in McKail, which is a suburb to the north-west of Albany in southern Western Australia. The site is therefore located in the City of Albany, approximately 6km from the town centre. The review is based on the subdivision concept plan prepared by Dynamic Planning dated November 2024.

This report addresses the civil engineering aspects required to deliver the proposed residential subdivision and summarises the location and capacity of existing infrastructure in the area.

The investigation and preparation of the report includes the advice from various service authorities, other consultants and includes guidance based on industry experience. The information is subject to update as further detail is resolved during the design phases, though is current as of November 2024.

Figure 1 illustrates the location of the location of Lots 507, 526 and 300 on the aerial image.

Figure 1 – Site location and aerial image (Nearmap)

2 THE STUDY AREA

The proposed development site, in total is 62.74ha across the three lots with most of the site located north of existing Lancaster Road. Only 5.24ha of the total area is south of Lancaster Road. Lot 507 is approximately 900m to the west of Albany Highway, along Gladville Road and is bounded by existing Morgan Road to the east. Lot 526 abuts existing undeveloped lots toward the west. There are 12 existing residential lots, generally about 4,000m2 in size along Lancaster Road which are excluded from this Local Structure Plan. There is also existing residential lots, as seen in Figure 1 over 1ha in size to the immediate north and east of the project area.

There is an existing road reserve with an unmade road providing access into Lot 526, between lots 7 and 8 along Lancaster Road.

Access into Lots 526 and 507, north of Lancaster Road is currently available from Gladville Road at the northern boundary, Morgan Road to the east and Lancaster Road to the south. Lot 300 directly fronts both Lancaster Road and Timewell Road.

The site has previously been largely cleared, however some vegetation remains in the south-western portion of Lot 507. There are also four small dams across the landholding. Similarly, Lot 300 has previously been largely cleared though some vegetation remains in pockets. There are only minor improvements on the site such as small sheds, fencing and other items. There are no houses currently on the site.

An extract from the current Subdivision Concept Plan is included in Figure 2. The current maximum estimated yield for the total development is up to approximately 570 lots, plus a POS, Primary School and District Oval. The lot mix includes R2.5 lots south of Lancaster Road and north of Lancaster Road zoning varying across R5 to R25. The majority of the yield is proposed as R15. It is noted the final lot yield is subject to progression of the planning and engineering design.

Figure 2 – Subdivision Concept Plan (Dynamic Planning)

2.1 Landform

Contour info has been sourced at 1.0m internals across the development area. The existing surface elevations shown as contour banding included in Figure 3.

The image shows the development site as generally being split into two catchments, with the northern portion of the site grading toward the north-east. And the southern portion of the site grading toward the existing unmade road between lots on Lancaster Road, and the Lot 300 then falls further toward the south-west.

There is a high-point on the site along the western boundary of Lot 526 at approximate elevation of 69.0mAHD. The lowest point in the landholding north of Lancaster Road is approximately 53.0mAHD, near where the POS has been proposed on the Subdivision Concept Plan, which is logical for drainage purposes. At the other natural low point in the north-eastern corner of Lot 507, the ground levels are about 58.0mAHD. The low points are not trapped lows, and the terrain remains 'on-grade' at these locations, further falling beyond the LSP boundaries. While the grades across the central and northern portions of Lots 507 and 526 are quite gentle, the steeper sections, as seen in Figure 3, natural grades closer to Lancaster Road exceed 6%.

In Lot 300, south of Lancaster Road, levels fall from Timewell Road, toward the west at a grade of approximately 5% from a high of 66.0mAHD down to 42mAHD.

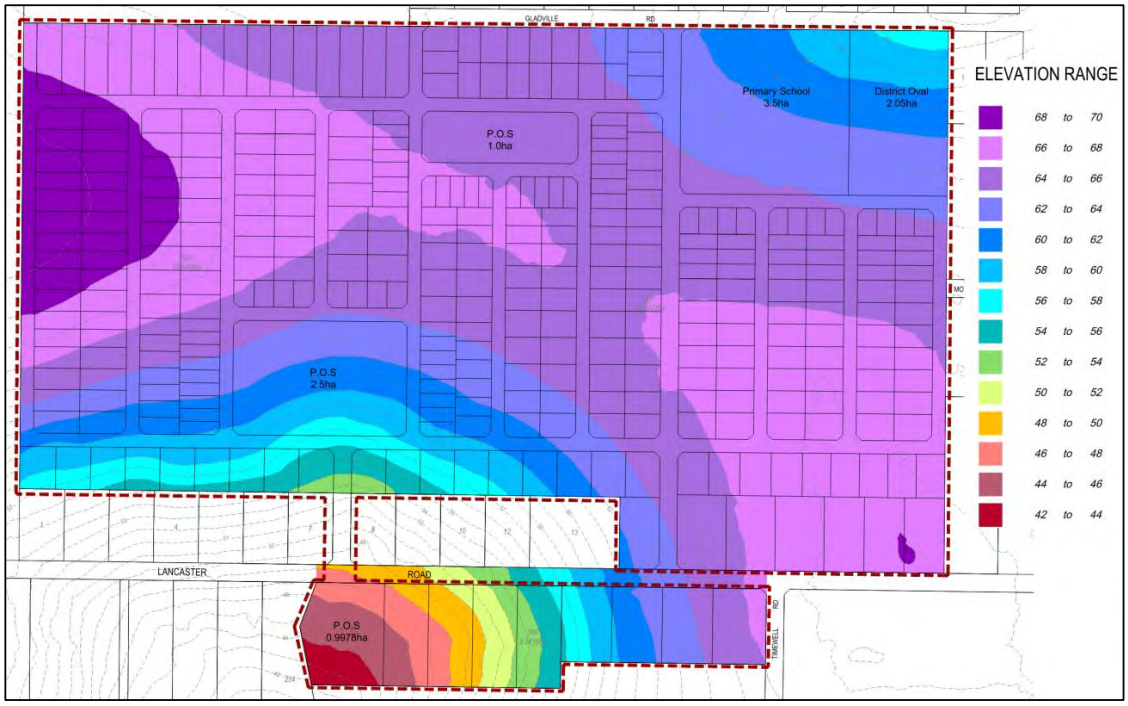

Figure 3 – Existing surface levels and contour banding (TABEC)

2.2 Groundwater

Groundwater monitoring has been undertaken by Bio Diverse Solutions with ten monitoring bores measured over an ongoing period.

Notwithstanding the site is elevated, and had quite reasonable natural grades, the results of the groundwater monitoring detailed in the Local Water Management Strategy (LWMS) outline that groundwater is close to the surface across the whole site, though fluctuates with seasonal rainfall.

It is recognised this is perched groundwater, resulting from the geology and soil systems as the ground conditions include silty sand topsoil over sandy gravel and sandy clay.

Due to the shallow perched groundwater water table at the top of the sandy clay layer, permeability over the site is also quite restricted.

Ordinarily, fill would be required to raise levels above groundwater levels, and subsoil drains included to provide protection to future developments. Further detailed assessments are therefore required to confirm how clearances to perched water will be achieved and managed.

2.3 Acid Sulphate Soils

The site is mapped as having no known risk of encountering potential acid sulphate soils. As indicated by Figure 4, higher risk areas are associated with lower-lying wetland types areas and mapping does not identify either Lots 507, 526 or 300.

Acid Sulfate Soils Dewatering Management Plans are therefore not anticipated.

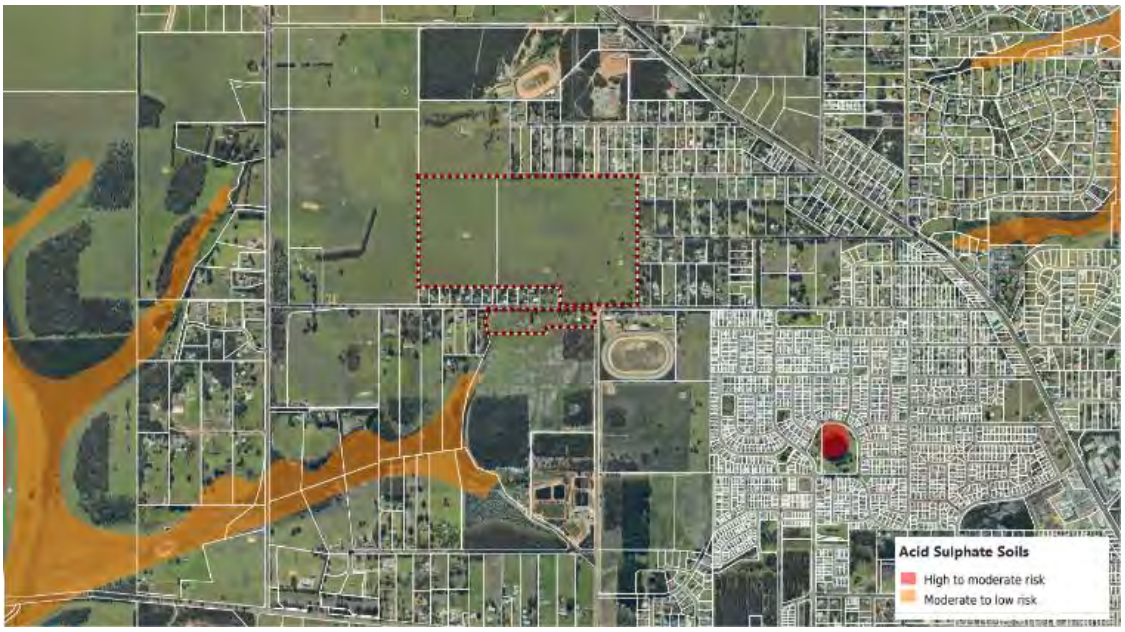

Figure 4 – Acid sulfate soil risk map (MNG Access)

3 SITEWORKS

To inform the site preparation requirements for intended urban development, Great Southern Geotechnics undertook a site investigation in July 2023, and assessment of the ground conditions by excavating a number of test pits.

It is reported that topsoil across the site varies in depth, and was recorded as being about 150mm depth on average, though varies between 80mm and 180mm. The topsoil will be stripped to remove any shallow organic and root matter from the site, as part of initial siteworks. Where necessary, areas will also be cleared of existing vegetation with grubbing out of the roots. Existing vegetation may be protected and retained where abutting existing residence at the site boundaries.

4 EARTHWORKS

4.1 Ground Conditions

Based on the geotechnical investigation, the ground conditions contain sand with silt, sandy gravels and sandy clays.

Generally, sandy silts occur near the surface up to about 400mm depth and are loose to medium dense. This overlies the sandy gravel which is generally medium dense generally up to about 700mm on average. Sandy clay is generally found beneath that depth.

Sandy-clay material is typically considered to be medium plasticity and contains cohesive soil properties. Given these ground conditions, further assessment of the California Bearing Ratios (CBR) at later design stage may be appropriate to ensure the pavements are adequately designed.

The sandy gravel material is expected to provide an adequate sub-base for road and services installation, potential weaker sandy-clay will have very low CBR value, and may be unsuitable for a road subgrade, service trench bedding or backfill material. In which case, adequate bedding and sub-base material would need to be included in the civil works construction.

A low CBR is not unexpected for clayey materials and options to increase the road subgrade strength will need to be considered. This may include importing gravels, over-excavating the clayey material and replacement with backfilling of structurally suitable sand for an improved compacted subbase, or increasing the pavement thickness to improve the strength over clay materials. Similarly, sand may need to be used for service trench backfilling to provide suitable compaction and pipe support, especially in trafficable locations.

Sandy clay generally has low permeability and infiltration will be restricted on this development site.

A concept earthworks design has been prepared, to address the proposed development form. Figure 5 illustrates the proposed depths of cut and fill.

4.2 Site Preparation

Other than the R20 lots fronting the primary school, the majority of proposed lots are R10, with a strip of R5 lots along Lancaster Road. To deliver 500m2 to 1,000m2 lots, recontouring of the site will be necessary to terrace the site and support the intended development form. In addition, urban road reserves will require shaping with standard verge grading throughout.

Generally, earthworks in the northern portion of the site will be minimised, given the naturally occurring landform has more gentles slopes. As seen in Figure 5, the proposed extent cut and fill is limited to about 1.0m in this area. A larger earthworks depression will be constructed in the central POS, to create a collection point for a drainage function.

Earthworks for lots south of Lancaster Road will be limited, with no major recontouring required and the natural fall of the land to remain.

Subject to further refinement in the geotechnical advice in relation to site preparation and intended lot classifications (in accordance with AS 2870-2011), sand may be imported over the lots to create stable building pads. A refinement to the earthworks design will be necessary, however the broad terracing of the site and consequent catchments boundaries that have been proposed, will remain.

It is anticipated that a depth of 0.5 m of medium dense or denser sand will be required below the below subgrade level for the road network. A compaction level of not less than 8 blows per 300 mm Perth sand penetrometer (PSP) penetration at least to a depth of 0.5m below standard pavements is a general recommendation. Due to the known presence of sandy clay material onsite, any areas that show signs of excessive deformation during compaction should be compacted until deformation ceases or, alternatively, the poor-quality material should be excavated and replaced with suitable structural filling and compacted.

Figure 5 – Proposed Depths of Cut and Fill (TABEC)

5 ROADWORKS

Currently, access is available to the development site from Gladville Road to the north, and Morgan Road at the east which are both considered Access Roads. Lancaster Road at the south is a Local Distributor, which also provides access to Lot 300. Both Gladville Road and Lancaster Road connect directly to Albany Highway, and are unkerbed with gravel shoulders, and provide access to existing landowners in the surrounding area.

The Subdivision Concept Plan proposes two access points onto Gladville Road and two points of access onto Lancaster Road. A road connection is also proposed with Morgan Road. The proposed road network to service the subdivision is illustrated in Figure 2, which contains 15m wide road reserves throughout, except for the north-south road along the western boundary of the primary school, which is shown with a 20m wide reserve.

There are two 4-way intersections shown on the Concept Plan, and controls are proposed by PJA, who has completed a Traffic Impact Assessment (TIA) in support of the development. Notwithstanding, the longer sections of road may include traffic calming devices mid-block.

At the 4-way intersection located in the northern portion of the LSP area, a restricted 4-way intersection is proposed which may include stop or give way signage. This would be subject to Main Roads WA signage and line marking approval. At the more southern 4-way intersection, as indicated in Figure 6, a roundabout may be considered, based on a turning movement demand analysis. As also advised in the TIA, there is no public transport route proposed within the development area.

An extract from the TIA, showing the proposed intersection controls is shown below in Figure 6.

Figure 6 – Proposed Intersection Controls (PJA)

Based on traffic modelling, the intersection formats and existing roads can cater for the expected traffic flows generated by the proposed development. In addition, the existing intersections with Albany Highway are not required to be upgraded. This is aided by the Albany Ring Road project which is expected to reduce the number of RAVs and heavy vehicles on Lancaster Road and the surrounding road network.

While there are no footpaths in the surrounding streets, the TIA recommends that footpaths be initially constructed around the school site, and provision be made for future 1.5m minimum width footpaths throughout the development, with pram ramps at intersections. Footpaths would cater for pedestrian traffic only, not cyclists.

Roads will be paved with asphalt and kerbed in accordance with the City of Albany and Institute of Public Works Engineers Australasia specifications. Alternate treatments, particularly at entry statements may be included in the engineering design. Construction of the roads will follow logical sequencing of the staging,

to ensure lots are provided with a full road frontage, and temporary facilities such as turning bulbs and access tracks may be constructed, as required.

6 STORMWATER DRAINAGE

Based on the concept earthworks plan which generally maintains the natural form of the site, the development area north of Lancaster Road will broadly be separated into two catchments, which are illustrated in Figure 7. Lot 300, south of Lancaster Road, will form a separate, smaller catchment.

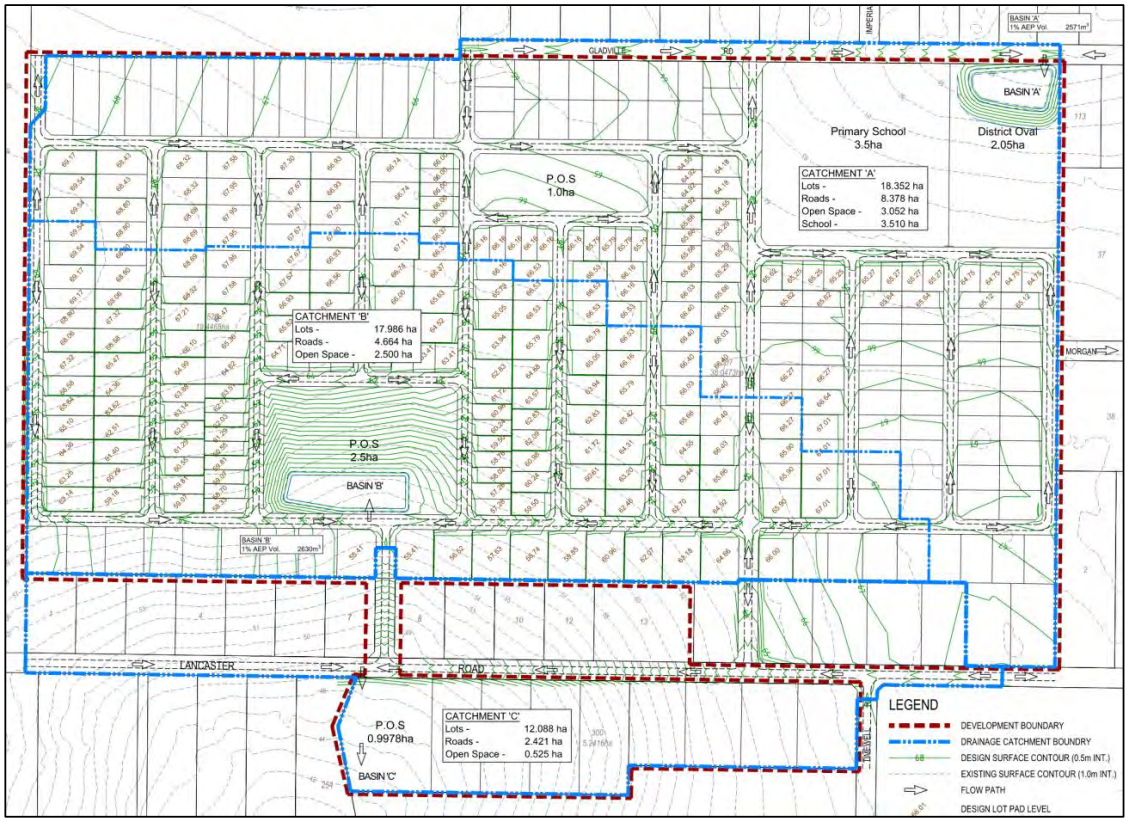

Figure 7 – Stormwater Drainage Catchment Plan (TABEC)

Since urban style roads are proposed, which includes kerbing, pit and piped drainage systems are proposed to capture and convey stormwater to low-points within each catchment. By collecting and conveying stormwater, formalised drainage basins will be required as part of the civil works to receive and detain flows. These drainage facilities will be constructed to City of Albany engineering requirements who will ultimately take ownership of the assets.

As identified in the LWMS, the pit and pipe network installed within the road reserve will be sized to convey runoff up to the critical 10%AEP. The ultimate low points, however, will be sized to cater for storm events up to the peak 1%AEP utilizing overland flow paths.

Modelling has been undertaken and documented by Bio Diverse Solutions which identifies the intended development area and in addition, also accommodates catchment areas beyond the site boundary which have a current contributing flow toward the proposed low points. Noting however that any future

stormwater flows discharging into the development site, shall be attenuated to pre-development conditions.

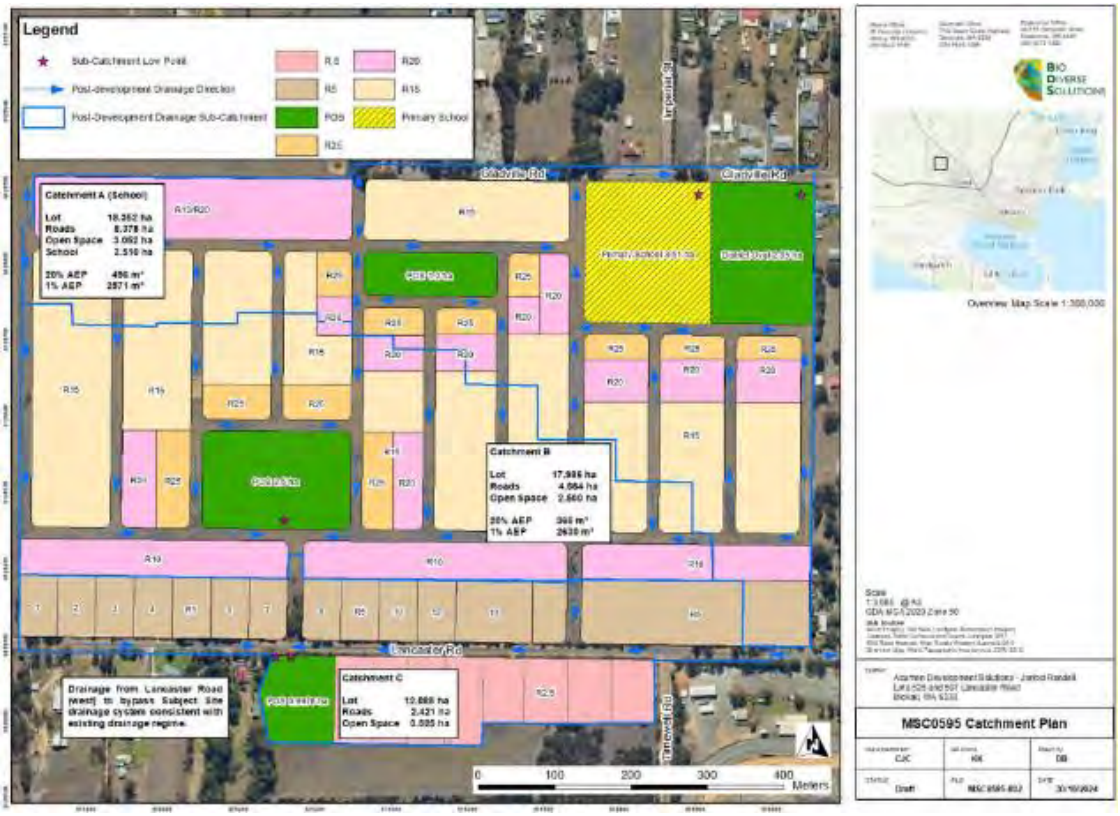

Figure 8 – LWMS Stormwater Modelling (Bio Diverse Solutions)

As identified in the LWMS, there is opportunity in the POS to the south of Lancaster Road (in Lot 300), for establishment of a living stream, in keeping with Water Sensitive Urban Design (WSUD) outcomes and maintaining upper reaches of the existing creek line, at that location. Overland flows generated from within Lot 300, is proposed to continue to grade toward the low point at the western boundary of Lot 300, unattenuated, as currently occurs. This is relevant given the majority of the lot areas will remain grassed or vegetated, similar to current conditions.

Drainage basins are not proposed to include separate bio-retention basins, given the low permeability of the natural soils at McKail, and rather, attenuation of minor events will be achieved within the larger basin facility. This is intended to produce a lower maintenance outcome for the City of Albany. The drainage basins will attenuate flows, and volumes through solutions such as either weirs or a perforated orifice plate, which is further described in the LWMS. The basins will still be constructed to manage outflows to the pre-development level. Bio Diverse Solutions has completed modelling and sized the drainage basins at maximum 900mm depths. These are illustrated in Figure 8.

Overflows from the drainage basins will be directed to the existing roadside swale in Gladville Road and the existing creek line/proposed living stream south of Lancaster Road for the northern and southern catchments respectively.

Within the proposed residential lots, soakwells will be utilised where there is adequate separate to the peak water table, and where ground conditions allow suitable infiltration. Localised infiltration is therefore a likely constraint, and detailed assessments of inclusion of on-lot attenuation basins or potentially lot connection pits may be necessary.

Biodiverse Solutions has undertaken preliminary hydrological modelling and provide advice on the likely sizing of these stormwater drainage facilities. Further information, to accompany detailed design will be included in an Urban Water Management Plan in due course.

7 WASTEWATER

Currently, there are no existing wastewater reticulation assets within the proposed development, or at the immediate site boundaries. There is however a gravity reticulation network approximately 360m to the east of Lot 507, servicing existing urban development fronting the southern side of Lancaster Road.

That area, as part of the Lancaster Green development falls into a sewer catchment, serviced by an existing Waste Water Pump Station (WWPS) located a further 500m to the east along Lancaster Road.

Existing residential properties along Gladville Road, Morgan Road and the existing properties at the southern boundary of Lot 526 are not serviced with a reticulated sewer connection and therefore have onsite treatment.

Within the proposed development site, there is an existing DN375mm Water Corporation pressure main, conveying treated wastewater along the eastern boundary of Lot 507, which is identified as the Timewell Road pressure main. This pressure main will need to be accommodated and protected within the subdivision plan and therefore easements will be necessary where it is not located in proposed road reserves.

Water Corporation has prepared scheme planning to demonstrate servicing strategies over the development site. An extract from the planning is demonstrated in Figure 9. Broadly following the natural catchments over the site, a Type 10 WWPS is proposed in the north-east of Lot 507, identified as Willyung PS C. An additional pump station is proposed in the south-west of Lot 300 to service the southern catchments of Lots 507, 526 and Lot 300, which is Type 40, identified as Willyung PS A.

The scheme planning also shows the northern portion of Lot 526 as being serviced by a third WWPS, proposed to be located at the northern boundary of Lot 124 (Willyung PS B). Based on the Subdivision Concept Plan, the full extent of Lot 526 is however able to be graded toward the north-east of Lot 507 and therefore the subdivision is not reliant on a third WWPS.

Currently, the scheme planning shows an ultimate scenario where the northern Willyung PS C, pumps to the central highpoint on Lot 526, before gravity feeding down to the Willyung PS A. Wastewater flows are then transferred to the Waste Water Treatment Plan on Timewell Road.

Based on intended development staging, if subdivision works commence along Gladville Road, a solution where flows are redirected to avoid Willyung PS A should be sought. In this case, a pressure main may be constructed from the north-east of Lot 507, south, to Lancaster Road where the high point in elevation of approximately 68mAHD. A gravity sewer could then be constructed to the WWTP on Timewell Road.

In the future, Willyung PS A, could be delivered independently to service southern catchment of the development plan, and would pump to a discharge location on Timewell Road.

WWPS sites will need to be accommodated in the subdivision plan, which will require vehicle access. The WWPS will typically carry a 30m buffer from the centre of the wet-well to residential lot boundaries. Given the land immediately south of Lot 300 is currently owned by Water Corporation, it is proposed that Willyung PS A be relocated to Lot 301 to avoid encumbering Lot 300 with various easements.

Water Corporation should be consulted on the proposed update to scheme planning to suit the ultimate development intentions.

Given the sewer strategy intends to deliver ultimate pump stations which conform to the scheme planning, it is intended that an application be made to Water Corporation, for inclusion in the 5-year capital works program for development reimbursements.

As development occurs, reticulated gravity mains will be constructed to provide lot connections throughout and the developer will be responsible for funding all construction works. Standard Water Corporation headworks contributions per lot will also apply.

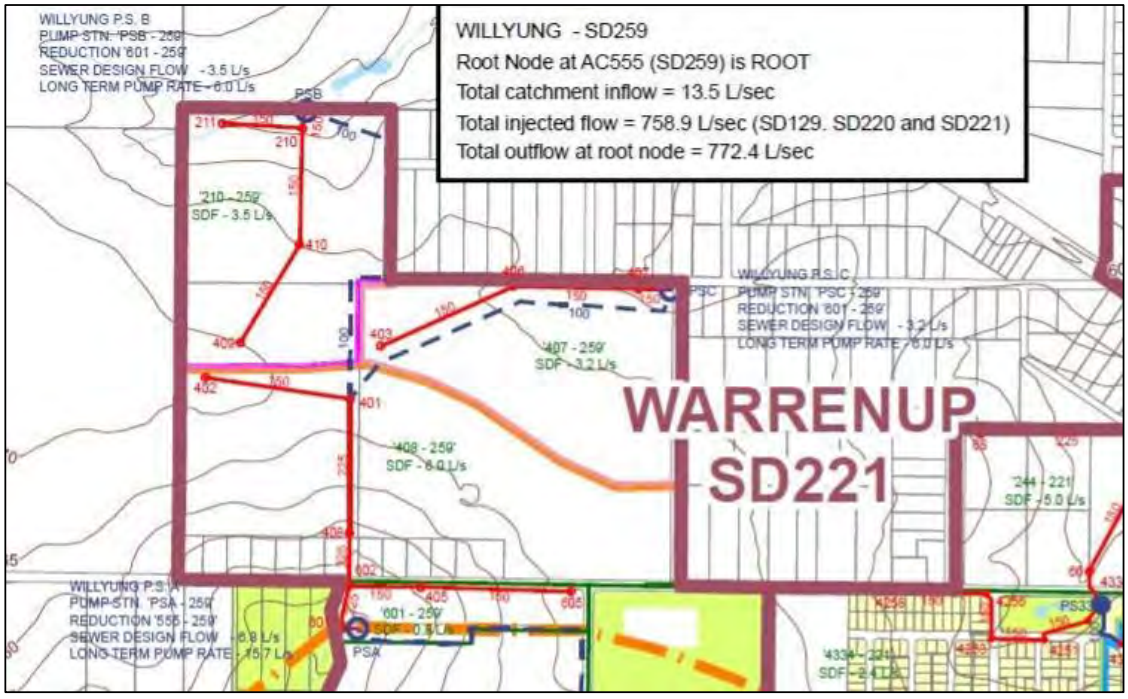

Figure 9 – Waste Water Planning (Water Corporation)

8 WATER SUPPLY

Currently, there are existing Water Corporation assets at the boundaries of the development sites. This includes a DN100mm main in the northern verge of Gladville Road, a small DN589mm main in the southern verge of Morgan Road and a DN200mm main in the southern verge of Lancaster Road. The water main in Lancaster Road converts to a DN100mm main, west of unmade road at the location of existing Lot 7. There is also an existing DN100mm main in the western verge of Timewell Road.

The existing water main in Gladville Road does not extend along the full boundary of Lot 507, as existing lots west of Imperial Street are serviced from a separate water main, further north in Federal Street.

Figure 10 – Existing Water Supply Services (Water Corporation)

The DN200mm main in Lancaster Road was constructed in 1976. Previous advice from Water Corporation is that an in order to service the development site, the water main in Lancaster Road would require an upgrade to a DN250mm, from the site boundary back to Albany Highway which is approximately 1.7km. However, that previous advice was based on a higher development yield.

In view of the updated development plan, and reduced yields, updated planning advice has been requested. This should also consider the proposed staging, as it is likely development will commence at the northern boundary of the site, with access from Gladville Road. It would be appropriate to consider the likely development timing in relation to offsite water main upgrades and extensions.

Water mains within the proposed subdivision are to be designed and constructed according to the Water Corporation specifications with installation funded by the developer based on the staged delivery of the subdivision. Standard infrastructure contributions will also be included.

Figure 10 shows the location of the existing water mains in relation to the development site.

9 POWER SUPPLY

Currently, there are two existing overhead Western Power feeders aligned north-south across Lot 507.

One is aligned on the eastern boundary, shown through the future District Oval, proposed road reserve and future Lots in the south-eastern corner. This line has a single phase HV tee-off, that runs east along Morgan Road and services a single-phase transformer and various houses. There are also three underground cables along the eastern boundary. These below-ground cables could remain in place, subject to City of Albany approval in the District Open Space through a 4m wide PAW to contain existing HV equipment to avoid relocation from future lots and District Oval.

The second line is shown through the future primary school, with an extension from Imperial Road through to Timewell Road. As this is shown through a future primary school, it will require relocation to align with new internal roads through the development. The existing overhead lines in Gladville Road would also be removed west of the proposed primary school.

Both existing overhead lines are arterial HV feeders, providing power from the existing zone substation, located on Federal Street, into the Albany townsite.

It is anticipated that two new underground power cables would be laid through initial stages of subdivision, before the existing overheads are removed.

Regarding the eastern overhead line and existing connection to Morgan Road, it would be advantageous to locate a new transformer and switchgear in the south-east corner of the District Open Space, to reconnect the Morgan HV supply. As part of interfacing with existing assets at Morgan Road, a new stay-pole in the front of existing Lot 38 will be required.

On Lancaster Road, there is a single-phase overhead spur line in the northern verge. Given the proposed lots fronting Lancaster Road are considered rural-residential, the developer is not compelled to remove the existing overheads because the frontages are greater than 30m.

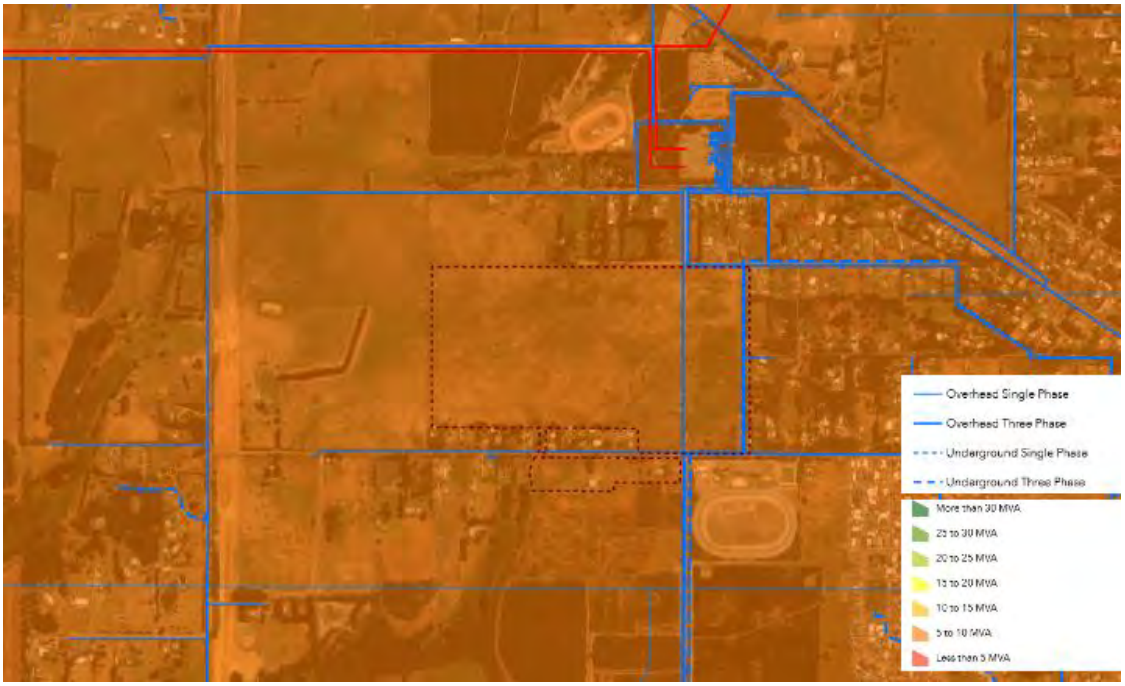

Figure 11 – Western Power Network Capacity Mapping Tool (Western Power)

A SWGR will also be required near the southern boundary of the project to supply single phase power back to the existing single phase.

To sufficiently service the proposed development, including the primary school site, HV power assets will require up to 4 transforms and 3 switchgears will be collated where appropriate. The total load expected to service the development will be in the order of 1.9MVA.

The Western Power network capacity mapping tool, as indicated in Figure 11, indicates a forecast available capacity of 5-10 MVA. Therefore, there are no capacity issues envisaged given, particularly given the proximity to the zone substation, on Federal Street.

Soil testing and Earth Potential Rise studies may be required to ensure risks are adequately mitigated. This would assess the existing and proposed HV equipment and consider all surrounding assets.

The subdivision will be serviced with underground power supplies to each lot, and street lighting to meet City of Albany's requirements will also be provided. Given the soil conditions, it is expected that sand bedding and backfill will be required for service trenches.

Lots over 1,000m2 are not covered by the HV pool, meaning the developer will ordinarily not be subject to the kVA charge and not be eligible for refund of the HV equipment installed.

To mitigate current Western Power time frames, it is recommended that a Design Information Package request be submitted to Western Power as early as possible, as this may take up to 12 months to receive.

10 COMMUNICATIONS

The proposed subdivision falls within NBN's rollout footprint. It is therefore expected NBN Co will extend its fixed line footprint to cover the proposed development providing Fibre to the Premises (FTTP) infrastructure. This will be resolved when a Developer Agreement application is submitted to NBN Co for detailed assessment.

In any case, the developer will be responsible for the installation of a fibre-ready pit and pipe system which is suitable and compliant with the NBN Co policy and design requirements.

Figure 12 – NBN Rollout Map for Denmark (NBN website)

As shown in Figure 12 above, the NBN rollout has substantially commenced in McKail.

NBN Co levy two infrastructure charges, a Deployment Charge of $600/dwelling for single residential services and often, a backhaul charge where there is insufficient infrastructure. Backhaul charges are not anticipated for the subdivision, given the proximity of existing network.

As part of the developer agreement conditions, NBN will take over ownership of the assets upon completion and ensure that fibre is ready 3 months prior to the first occupancy for a new development.

11 GAS RETICULATION

There are existing medium pressure gas mains in the vicinity of the site, as illustrated in Figure 13, approximately 350m east of the development boundary in Lancaster Road reserve. There are no existing gas mains in Morgan Road, or at the northern boundary of the site, in Gladville Road.

There is therefore a mix with some, though not all existing residents surrounding the site having access to reticulated gas supplies.

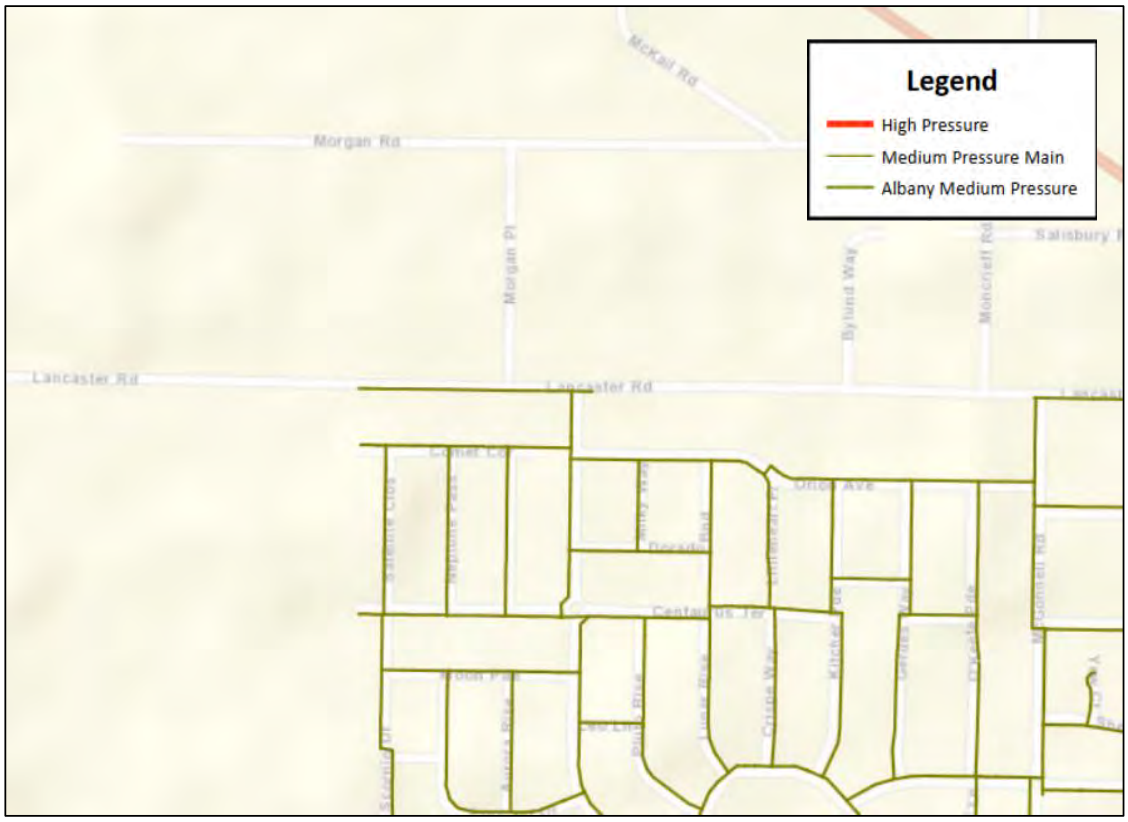

Figure 13 – Albany LPG Gas Distribution (ATCO)

If reticulated gas supplies to each lot are intended to be delivered by the developer, gas reticulation would be installed during subdivision works, with gas mains installed during the common trenching. This ordinarily incurs no cost to the developer, however off-site extensions may be required to connect to existing assets.

If staging were to commence at the northern boundary of the development along Gladville Road, a significant offsite extension would be necessary to provide reticulated gas supplies. Exploring the opportunity with ATCO for a cost share contribution may be considered. If staging commenced near the southern portions of the site, a connection to existing networks would be more readily achieved.

12 CONCLUSION

Based on the above review, there do not appear to be engineering related constraints which prevent development of the Lots 507, 526 and 300 Lancaster Road, McKail. There are servicing strategies over the site which support proposed urban development however, these will need to be updated to suit confirmed staging, and negotiated solutions confirmed which of the servicing Authorities.

Further refinement of the earthworks and ground preparation requirements, together with the drainage strategies will be a key consideration, given the clayey soils and low permeability onsite.

Following the submission of the Local Structure Plan, subdivision approval will be sought from the Western Australian Planning Commission. Formal detailed engineering design and approvals will be completed in order to satisfy the subdivision conditions that are anticipated to be issued.

As this report is based on the preliminary servicing advice and investigations completed to date, it is recommended that each Authority be kept informed as the planning progresses and concept engineering designs are refined. Communicating the proposed timeframes for the staged development is also important to inform and coordinate designs and approvals from all relevant Authorities.

13 REFERENCES

- ATCO Gas, Albany LPG Gas Distribution. January 2024
- Dynamic Planning, Subdivision Concept Plan, Lots 1-13, 507, 526 and 300 Lancaster Road, McKAil. November 2024
- Biodiverse Solutions, Local Water Management Strategy, Version 2. October 2024
- Great Southern Geotechnics. Site Investigation Report 8146/1. July 2023
- MNG Access, online map viewer. January 2024
- NBN Rollout Map, online Map Viewer. January 2024
- TABEC, Lots 507, 526 and 300, Lancaster Road, McKail. Existing Surface Elevation. 2532-SK-004 Revision D. November 2024
- TABEC, Lots 507, 526 and 300, Lancaster Road, McKail. Stormwater Drainage Catchments. 2532-SK-006 Revision A. June 2024
- TABEC, Lots 507, 526 and 300, Lancaster Road, McKail. Cut to Fill Depth Range. 2532-SK-007 Revision A. June 2024
- TABEC, Lots 507, 526 and 300, Lancaster Road, McKail. Earthworks Strategy. 2532-SK-008 Revision A. June 2024
- PJA, Lots 507, 526 and 300 Lancaster Road, McKail. Traffic Impact Assessment. Rev E. August 2024
- UPD, McKail Servicing Advice. December 2023
- WAPC, Liveable Neighbourhoods, Draft. 2015
- Water Corporation, ESInet mapping. January 2024
- Water Corporation, planning and infrastructure mapping. May 2023
- Western Power, Network Capacity Mapping Tool. January 2024

North McKail Structure Plan – Lancaster Road			
No	**Submitter/Address**	**Summary of Submission**	**City of Albany Response**
AGENCY			
1.	Public Transport Authority of Western Australia Infrastructure Planning and Land Services	The Public Transport Authority (PTA) has no objections to the above proposal.	The PTA has no objection. **Note PTA comment.** **No change recommended.**
2.	Department of Communities	The Department of Communities in principle objects to the amendment of the approved structure plan. The plan proposes changes to the densities that would ultimately see a reduction in the number of dwellings delivered and will restrict the ability to deliver diverse housing product in the area. The amended plan will only cater for larger family homes, and do not recognise the housing requirements of smaller families. The larger area is characterised by larger lots and the structure plan area is an opportunity to supplement the existing product with the inclusion of dwellings for diverse households. Higher densities can be delivered to support the surrounding use without detracting from or adversely impacting on the established areas. The amended plan does not appropriately respond to the open space and primary school provided for in the plan, typical catalysts for higher density outcome. The SP indicates that it is unclear when a school will be delivered, suggesting that this could be considered a reason for the increase in lot sizes and associated reduction in overall density and numbers. This argument/suggestion goes against basic planning principles and common practise and logic in forward planning for amenity and services and could not be supported. Larger lots are typically delivered at a higher cost than smaller lots. As such it will likely impact the affordability of dwellings that will build.	The DOC commented that the proposed reduction in density fails to deliver a diverse housing product and in particular affordable housing and housing for smaller families. **Uphold DOC recommendation for higher density and diverse housing product.** **Recommend modifying the structure plan to allow for higher density and diversity of housing product (e.g. grouped dwellings and 1 & 2 bedroom dwellings).** The City has had discussions with the proponent on this matter. The proponent has indicated willingness to change the density for some R15 areas to R20. The proponent would like to retain the proposed split coding of R10/R20. The interim R10 zoning provides for 1000sqm lots in this area that can be further subdivided once a frontage to a constructed Gladville Rd is provided by the adjoining landowner.
3.	Department of Primary Industries and Regional Development Agriculture Resource Management and Assessment Sustainability and Biosecurity	The Department of Primary Industries and Regional Development (DPIRD) does not object the new LSP for Lancaster Road, Mckail as this area is zoned 'Urban Development' in City of Albany LPS No. 2.	The DPIRD has no objection. **Note DPIRD comment.** **No change recommended.**
4.	Department of Planning, Lands and Heritage Aboriginal Heritage Conservation	A review of the Register of Places and Objects as well as the Department of Planning, Lands and Heritage (DPLH) Aboriginal Heritage Database concludes that the subject area does not intersect with any known Aboriginal heritage Places or Registered Sites.	The Aboriginal Heritage Conservation has no objection. **Note DPIRD comment.** **No change recommended.**
5.	Department of Biodiversity, Conservation and Attractions Parks and Wildlife Service, South Coast Region	DBCA notes that there is a high abundance of Western Grey Kangaroos Macropus fuliginosus (WGK) currently utilising Lots 300, 507 and 526 within the proposed Structure Plan. If not considered and managed appropriately, it is likely that the displaced resident population of WGK will move onto neighboring land, further exacerbating negative interactions with the local community. DBCA recommends a Fauna Management Plan be developed to guide management of WGK in the LSP area during construction and development and a broader strategy for managing WGK in areas of future urban expansion within the City of Albany. Should you have any queries regarding this advice, please contact me on 9842 4551 or at Mark.Blythman@dbca.wa.gov.au	The DBCA recommends a Fauna Management Plan be developed to guide management of Western Grey Kangaroos Macropus. **Uphold DBCA comment.** **Recommend including a notification in the structure plan requiring a Fauna Management Plan at the subdivision stage.**

6.	Main Roads WA Regional Management & Operations Directorate	Comments: • Main Roads comments provided reflect a 20 year timeframe and reinforce the message that local traffic is likely to escalate the priority for future road projects. • The State managed controlled roads likely to be affected by this proposal are Albany Highway and South Western Highway. • Albany Highway is a major inter-regional route and Main Roads has future plans to extend the existing dual carriageway from Le Grande Avenue to Federal Street. • The Albany Ring Road is a Heavy Haulage Route the provides unimpeded heavy vehicle access to the Albany Port and Main Roads has no plans to provide additional connectivity from the local road network. • Main Roads identifies Government priorities and funding constraints for road project going forward and expects where local developments require upgrades these will be funded by the developer under user pay policy adopted by the WA Planning Commission. • Main Roads provides advice on the threats to the classified road network from uncoordinated or inappropriate developments and considers it essential that development be supported with an appropriate traffic assessment to identify required road upgrading for the developer to complete. • Main Roads seeks to limit the number of connection and/or access points to State managed roads and highlights that traffic networks should not rely on using State managed roads as connectors and the existing intersections are impacted firstly from developments. • Main Roads advice shall be sought when any development will result in 100 total vehicle movements per hour (peak hour) or the volume of turning movements at any State managed road intersection increase by more than 10% to determine any upgrading requirements. • The WAPC Transport Assessment Guidelines sets the level of assessment necessary based on the expected traffic impact of the proposed development, under current guidelines the traffic impact of this development is considered “high” and the proponent is required to submit a TIA (Traffic Impact Assessment). • The TIA submitted seeks to demonstrate the proposed development of 570 residential lots, a 650 pupil primary school and public open space at Lots 507, 526 and 300 adjoining Lancaster Rd in McKail would:- *“Provide safe and efficient access for all modes, be well integrated with the surrounding land uses, not adversely impact the surrounding land uses, and not adversely impact the surrounding transport networks or the users of those networks”.* Summary: • Main Roads considers the development will adversely impact the surrounding transport networks. • Main Roads considers the development of a Primary School would generate in excess of the 20% external trip rates predicted in the submitted TIA. • Main Roads considers the development would adversely impact on the intersections of Lancaster Road and Gladville Road with Albany Highway and the upgrading of these intersections is necessary. • Main Roads considers the development would adversely impact Lancaster Road and Gladville Road and the upgrading of the surrounding path network to provide additional pedestrian and cyclist connectivity is necessary. • Main Roads considers the development would provide roundabouts at all 4 - way junctions. Recommendation: • Main Roads recommends further assessment of the Traffic Impacts of the development on the surrounding transport networks is required to identify upgrade requirements.	MRWA had some concerns regarding the proposed structure plan, including: • Adverse impact to surrounding transport networks, in-particular Lancaster Road and Gladville Road and the intersections of Lancaster Road and Gladville Road with Albany Highway. **Uphold MRWA comments.** **Recommend that the proponent provide further assessment of the Traffic Impacts of the development on the surrounding transport networks, to identify upgrade requirements.** **Recommend modifying the structure plan to include the following:** • **Financial contribution to:** o **The upgrading of Lancaster and Gladville Roads** o **Intersection treatments at Timewell Road and at Lancaster and Gladville Roads with Albany Highway.** o **Address recommendations from further assessment of the Traffic Impacts of the development on the surrounding transport networks** • **Roundabouts at all 4 - way junctions.** The City has had discussions with the proponent on this matter. The proponent has indicated willingness to include cross streets and direct linkage to Timewell Road.
7.	Department of Fire and Emergency Services Land Use Planning	Comments: The new *State Planning Policy 3.7 Bushfire* and associated *Planning for Bushfire Guidelines* were published on 24 September 2024 and became operational for applications lodged with decision makers from 18 November 2024. Notwithstanding, as this application was submitted to the decision maker prior to 18 November 2024, this advice relates only to the 2015 *State Planning Policy 3.7:*	The DFES stated: *The proposed LSP has not demonstrated compliance with Element 3: Vehicular Access.* *The LSP shows a no-through road at the northwestern corner of the subject site.*

<table>
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Planning in Bushfire Prone Areas (SPP 3.7) and 2021 Guidelines for Planning in Bushfire Prone Areas (version 1.4) (Guidelines).

It is the responsibility of the proponent to ensure the proposal complies with relevant planning and building requirements. This advice does not exempt the applicant/proponent from obtaining approvals that apply to the proposal including planning, building, health or any other approvals required by a relevant authority under written laws.

<u>Assessment</u>
• DFES acknowledges that the proposed LSP seeks to replace the existing McKail North
• Outline Development Plan (2015) and to guide staged subdivision of the land.
• The BMP refers to the 2021 version of the Map of Bushfire Prone Areas (the Map) and stated that the subject site was partially located within a bushfire prone area. However, DFES notes that the bushfire prone area designation now applies to the entire site according to the latest version of the Map that came into effect on 24 September 2024. Notwithstanding, as a transitional period of four months applies to the newly designated areas, DFES has assessed the subject site against the previous bushfire prone area designation.
• Further clarification and modification are required within the BMP of the requirements of
• SPP 3.7, and the supporting Guidelines as outlined in our assessment below.

1. Policy Measure 6.5 c) Compliance with the Bushfire Protection Criteria
<table>
<tr><th>Element</th><th>Assessment</th><th>Action</th></tr>
<tr><td>Vehicular Access</td><td>A3.3 – does not comply
The LSP shows a no-through road at the northwestern corner of the subject site.</td><td>Does not comply.</td></tr>
<tr><td></td><td>DFES acknowledges that the location of the proposed no- through road is not bushfire prone under the previous version of the Map, however, in accordance with Section 1.2 of the Guidelines, where only part of a lot is designated as bushfire prone, only certain development applications are exempt from the application of SPP 3.7and the Guidelines.</td><td></td></tr>
<tr><td></td><td>The structure plan stage is when to ensure that bushfire risk management is incorporated into the design landscape (Guidelines Section 2.1). In bushfire prone areas, a proposed LSP that incorporates no-through roads should be avoided.</td><td></td></tr>
<tr><td></td><td>A3.4a – does not comply</td><td></td></tr>
<tr><td></td><td>The proposed Stage 7 subdivision area within the LSP has a land area of approximately 5.24 hectares and is abutted by Class G Grassland and Class A Forest vegetation to the south.</td><td></td></tr>
<tr><td></td><td>As the future subdivision is expected to create 10 or more lots, a perimeter road is required in accordance with A3.4a to provide hazard separation especially from the Class A Forest vegetation.</td><td></td></tr>
</table>
<u>Recommendation – compliance with acceptable solutions not demonstrated – modifications required</u>
It is considered critical the bushfire management measures within the BMP are refined to ensure they are accurate and can be implemented to reduce the vulnerability of the development to bushfire. The proposed LSP has not demonstrated compliance with Element 3: Vehicular Access.
</td>
<td>
Note DFES comment.

A through road is provided at the north eastern and south eastern corners.
</td>
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<td>8.</td>
<td>Department of Education
Land Planning</td>
<td>Comments:
It is noted that a future public primary school site, McKail North Primary School (planning name) is earmarked in the Structure Plan. Therefore, the Department is to have due regard to the Western Australian Planning Commission's Operational Policy 2.4 – Planning for school sites (OP 2.4), Liveable Neighbourhoods and other states policies and guidelines.</td>
<td>
Uphold DoE comments.

Recommend modifying the structure plan to ensure:
• At least one road frontage to the school being a neighbourhood connector.
</td>
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		<u>Movement network</u> It is evident a 20m wide north/south road is proposed in the Structure Plan to the western side of the future primary school site, consistent with Liveable Neighbourhoods Access Street C. While all other lower order roads are proposed to be an Access D classification, 15m in width. As per OP 2.4, at least one frontage shall be a neighbourhood connector and the lesser order roads should be Access Road B classifications. Therefore, the Department requests the roads to be modified, with a minimum width of 17.9m. The Transport Impact Assessment (TIA) report indicates there are no nearby public transport services and therefore walking, cycling and wheeling are the only other modes of travel beyond the car. To facilitate active transport the Department requests pedestrian paths at a minimum of 1.5m in width be constructed on both sides of the street. Furthermore, it is noted a safe routes assessment in accordance with the WAPC TIA guidelines, section 10.10.9 has not been undertaken and the Department requests this occurs. **<u>Physical condition of school site</u>** ***Groundwater*** In the engineering report it states there is a shallow perched groundwater table which requires further investigation. It is also noted that within the Urban Water Management Plan, the Site Soil Investigation Appendix A and Groundwater Monitoring Results Appendix B have been omitted from the report. As per OP 2.4, school sites should be geotechnically sound to ensure they are suitable for development. It is unclear if the future school site will be subject to inundation or have restrictions within its developable footprint. ***Basin*** Basin A is depicted on the district open space adjacent to the future school site. This basin may impact the future playing field configurations. As per OP 2.4, it is imperative no encumbrances are proposed on the future school site. ***Waste Water Pumping Station*** In the engineering report it states a waste water pumping station (WWPS) is proposed in the north-east of Lot 507 and that a third WWPS is not required within Lot 526 as it can be graded toward the north-east of Lot 507. Further clarity on the positioning of the WWPS is required. ***Electrical network*** It is noted there are two existing overhead Western Power feeders aligned north-south across Lot 507, with one traversing through the future primary school site. The electrical infrastructure is not acceptable within the land area of the school site and must be removed. It is essential that the future public primary school remains unencumbered and that the elements of the OP 2.4 are incorporated into the design. The Department requests further clarification from the proponent to ensure these items are addressed prior to supporting the proposal, and welcomes discussions with both the proponent and the City of Albany.	• **Lesser order roads being Access Road B classifications (as per Liveable Neighbourhoods).** • **Roads modified, with a minimum width of 17.9m.** • **Pedestrian paths at a minimum of 1.5m.** • **At the time of subdivision, a geotechnically assessment being undertaken and any necessary work, to ensure the school site is suitable for development.** • **Include a notification within the structure plan stating:** o **no encumbrances (e.g. water management basins, waste water pumping station or electrical infrastructure) are to proposed on the future school site.**
9.	Department of Health Environmental Health Directorate	Comments: ***1. Drinking Water and Wastewater Management*** No objection subject to connection to drinking water and sewage services provided by a licensed service provider. Any non-drinking water (i.e., water that is not intended or suitable for drinking) must be managed to ensure it cannot be confused with or contaminate the drinking water supply. This requires satisfactory labelling of non-drinking water taps and, depending on system configuration suitable backflow prevention arrangements in accordance with Australian/New Zealand Standards AS3500 – Plumbing and Drainage.	The DoH has no objection subject to connection to drinking water and sewage services provided by a licensed service provider. **Note DoH comment. No change recommended. The structure plan requires that lots are appropriately served by a licensed provider.** The DoH identified the need for contamination assessments. The site may have localised contamination resulting from previous land uses. **Not uphold DoH comment. No change recommended. The agricultural land is not expected to be contaminated.**

		2. Chemical Hazards It is not clear whether any environmental health assessment has been conducted. This assessment is necessary because the site may have localised contamination resulting from previous land uses, including agricultural chemical use or poor demolition of potentially asbestos containing buildings. The documentation provided also indicates that odour from the Albany Wastewater Treatment Facility may impact parts of the site closest to it. This should be fully professionally assessed, and management measures instituted if necessary. ***3. Medical Entomology (Mosquito Management)*** It is the recommendation of the Department of Health that the proponents ensure proposed infrastructure and site works do not create additional mosquito breeding habitat as follows: • Changes to topography resulting from earthworks (e.g. the installation of pipelines, footpaths, roads etc) must prevent run-off from creating surface ponding as it may become mosquito breeding habitat; • Constructed water bodies (drainage infrastructure, infiltration basins and swales, settling ponds, wetlands, etc) must be located, designed and maintained so they do not create or contribute to mosquito breeding; and • Constructed water bodies (drainage infrastructure, infiltration basins and swales, settling ponds, wetlands, etc) may require regular monitoring and application of herbicides and/or removal of invasive vegetation to prevent the harbourage of mosquito larvae.	The DoH identified the need for proponents to ensure infrastructure and site works do not create additional mosquito breeding habitat. **Note DoH comment regarding mosquito breeding. The City of Albany Environmental Health Officers undertake a variety of management strategies, including removing breeding sites, chemical application, baiting and promoting community awareness.**
10.	Water Corporation Land Use Planning, Development Services	**New proposed LSP to replace existing LSP - Lancaster Rd, McKail** I refer to your letter of 26 November 2024 inviting comments on the proposed new LSP for this land. The Water Corporation has no objections to the proposed modified road layout, POS changes, lower density, school location etc. The TABEC Servicing Report accompanying the LSP outlines and summarizes the water and wastewater concept planning and issues affecting future staging and timing of development, for example the wastewater pump station locations, funding, and required upgrades to the water reticulation network. Prior to submitting any subdivision applications in the LSP area, the proponent should be advised to liaise further with the Water Corporation regarding several key issues including: • Intended spatial staging and timing of subdivision in the context of the Water Corporation's wastewater infrastructure planning for the area. • Adequate provision of land/sites within the LPS area to accommodate the three future wastewater pump stations ('A', 'B' and 'C) and their required odour buffers. The WWPS sites should ideally be co-located with POS and drainage areas. • Availability and timing of capital funding for the delivery of the wastewater pump stations noting that funding for WWPS 'A', 'B' and 'C' is currently outside the Corporation's 5 year Capital Investment Program. It is open to the proponent to make case by case application to the Corporation's Headworks Delivery team to modify the timing of capital projects using the application form at this link: Capital-investment-planning-checklist.pdf • Required developer upgrades to the water reticulation main on Lancaster Road and Morgan Street to service the LSP area.	The WC advised that the proponent should liaise with the Water Corporation at the subdivision state regarding staging and adequate provision of infrastructure and funding. **Uphold WC comments.** **Recommend including a commentary within the structure plan as follows:** ***Prior to submitting any subdivision applications in the LSP area, the proponent should liaise with the Water Corporation regarding:*** • ***Intended spatial staging and timing of subdivision in the context of the Water Corporation's wastewater infrastructure planning for the area.*** • ***Adequate provision of land/sites within the LPS area to accommodate the three future wastewater pump stations ('A', 'B' and 'C) and their required odour buffers. The WWPS sites should ideally be co-located with POS and drainage areas.*** • ***Availability and timing of capital funding for the delivery of the wastewater pump stations noting that funding for WWPS 'A', 'B' and 'C' is currently outside the Corporation's 5 year Capital Investment Program. It is open to the proponent to make case by case application to the Corporation's Headworks Delivery team to modify the timing of capital projects using the application form at this link: Capital-investment-planning-checklist.pdf*** • ***Required developer upgrades to the water reticulation main on Lancaster Road and Morgan Street to service the LSP area.***
11.	Department of Water and Environmental Regulation Environmental Noise Branch	Environmental Noise Branch (ENB) of DWER has reviewed the environmental noise assessment (ENA) in the context of the *Environmental Protection (Noise) Regulations 1997* (Noise Regulations), the proposed LSP and the City's planning scheme. **3.1. Modelling assumptions and results**	The DWER (Noise Branch) identified the need for detailed noise studies, to better quantify the levels and characteristic(s) of the noise received. **Uphold comment from the DWER (Noise branch).**

		The ENA prepared in support of the application uses acceptable algorithms, however lacks in some details to enable a wholistic technical review. Specifically, the ENA:
		
		• is not clear on the assumptions used in the noise modelling, including:
		  o The ground absorption factor(s) used,
		  o Spectral data for the noise source(s) are not presented, and
		  o The location of the noise sources, including their modelled height above ground, is not specified.
		• suggests that "*noise received at a location is dominated by noise emissions from one vehicle and not the accumulative effect of all vehicles racing*". Although there is a mention of "*measurements and observations on site*" these measurements and observations are not provided. Overall, this assumption is somewhat counter-intuitive since several cars are racing on a track which is relatively small compared to the source-receiver distances involved. Therefore, it is highly likely that the noise emissions from all the racing cars need considering, resulting in predicted noise levels higher than presented.
		• does not discuss intrusive characteristics such as tonality or modulation, which will likely aggravate any noise impacts received.
		
		Noise levels over 70 dB(A) were estimated by DWER at the proposed new northern Lots (R10/20 and R15) assuming a 10-car race with sprint cars. Other events with a lower number of vehicles and/or lower vehicle noise emissions would result in lower noise levels at the new receivers.
		
		3.2. Assessment and recommendations
		Considering the proximity of the proposed residential area to the speedway, significant exceedances of the assigned noise levels are expected. For races occurring on a Saturday during the day, the LA10 assigned noise level of 45 dB would be applicable, which is the least stringent. This still results in a 25 dB exceedance, noting that at these locations the noise emissions likely contain intrusive characteristics, therefore the exceedances are expected to be higher. Exceedances will be higher for races occurring after 7pm on any day, or a on a Sunday or public holiday during the day (9am-10pm).
		
		ENB notes the acoustic assessment refers to the City's Speedway Noise Buffer Area Policy, adopted in October 2004. However, following discussions with the City ENB understands this policy was superseded by the requirements of the special control area in the City's Local Planning Scheme No. 2 gazetted in February 2024.
		
		In any case, based the modelling results the ENA presents controls in the form of façade treatments to achieve internal noise levels criteria based on Australian Standard AS2107:2000. However, ENB notes that:
		
		• the nominated criteria are inconsistent with the assigned noise levels of the Noise Regulations,
		• such controls rely on the impacted residents to have to keep all the external operable glazing closed during events at the speedway, and
		• since the assigned noise levels apply outside the premises, noise levels in outdoor living area(s) and cases where external windows are left open (fully or partially) need to also be considered.
		
		3.3. ENB conclusions
		ENB notes that introducing over 570 new residents in the Atwell Park speedway noise buffer may be a significant risk to the speedway's operations over time given the predicted exceedences of the assigned noise levels. It must also be considered that while controls may reduce noise impacts on the new residents to some degree, expectations pertaining to the local soundscape between new and existing residents may differ.
		
		Therefore, given the speedway is currently operating, there is an opportunity to directly measure the noise received under conditions favourable for sound propagation at various locations across the LSP area, rather than rely on modelling alone. Detailed noise studies would better quantify the levels and characteristic(s) of the noise received. The results of these studies could inform further LSP design
			Recommend that the proponent provide detailed noise studies to better quantify the levels and characteristic(s) of the noise received.
			
			Recommend modifying the structure plan based on results of detailed noise studies. The results of these studies could inform further LSP design changes and identify noise mitigation requirements, both with the aim to reduce noise impacts on the new residents.

		changes and identify noise mitigation requirements, both with the aim to reduce noise impacts on the new residents. **4. Limitations** Technical expert advice in any field is subject to various limitations. Important limitations to the advice include: • Basic computer modelling was undertaken by ENB to verify the consultant's modelled results.	
12.	Department of Water and Environmental Regulation Planning Advice, South Coast Region	The Department of Water and Environmental Regulation (the department) has reviewed the Local Water Management Strategy (LWMS) dated 29 October 2024 for the New Local Structure Plan and provides the following comments: • Overall, the strategy reasonably captures the conceptual ideas required for the LWMS stage. However, the report lacks sufficient detail to include the water management requirements of an LWMS as outlined in the Draft SPP 2.9 Planning for Water Guidelines (WAPC, 2021). • I recommend including information as required by the Draft State Planning Policy 2.9 Planning for Water Guidelines. Section 5.4 Local Water Management Report and Appendix D Local Water Management Report of the Guidelines would be relevant to guide the level of information required to submit with the application (https://www.wa.gov.au/government/publications/state-planning-policy-29-water-resources). • It is recommended to include event plans for small, minor, and major rainfall events for the LWMS consistent with the requirements set by the Draft SPP 2.9 Planning for Water Guidelines. • The LWMS should at least include inflows and outflows; flood storage volume to be provided by the proposed detention basins integrated with the Public Open Space (POS), the living stream corridor, POS, and road reserves to protect surrounding and downstream properties from flooding and inundation; overland flow paths layouts and dimensions, including flood levels, flow depths, and velocities during major rainfall events; minimum road levels and minimum habitable floor levels of properties in relation to the 1% AEP flood levels; and longitudinal and cross-sections of the living stream and POS showing relevant details. • For guidance, the event plans and other figures from the Decision Process for Stormwater Management in Western Australia (DWER, 2017) (https://www.wa.gov.au/government/publications/decision-process-stormwater-management-western-australia) and the guidance notes 'Drainage for Liveability - Stormwater Integration into Open Space Areas' (https://www.wa.gov.au/government/publications/drainage-liveability-stormwater-integration-open-space-areas) can be used to present relevant information in the LWMS. • The LWMS has used the Rational Method for stormwater modelling (page 24, section 4.2.5). The current Australian Rainfall and Runoff (ARR) has identified several limitations of using the Rational Method. The document should clarify whether this method is appropriate for the site, considering the recommendations made by the current ARR. The document should also clarify the reasons for referencing the ARR 2001 rather than using the current version of the ARR (https://arr.ga.gov.au/). • Recommended design criterion for major rainfall events — flood protection (page 24) is: "Protect people and property from flooding by constructing residential, commercial, and industrial building habitable floor levels with the following minimum clearances above the 1 per cent annual exceedance probability (AEP) flood level: - Road drainage systems: 0.3 m - Terminal retention or detention areas with no overflow relief: 0.5 m - Major drainage system and waterways: 0.5 m. • An outdated reference is in the LWMS. Please replace the existing reference with "Stormwater Management Manual for Western Australia (DWER, 2022)" (https://www.wa.gov.au/government/document-collections/stormwater-management-manual-of-western-australia) and "Decision Process for Stormwater Management in Western Australia (DWER, 2017)" (page 5, Sections 1, 1.1, & 1.1.1). Updated references to the stormwater management manual should be applied to the entire document. • Please replace the existing reference with the "Draft State Planning Policy 2.9 Planning for Water Guidelines (WAPC, 2021) (page 5, section 1)".	The DWER (South Coast Branch) identified the need for additional detail and some modifications to the Local Water Management Strategy (LWMS), to present relevant information in the LWMS. **Uphold comment from the DWER.** **Recommend that the proponent provide the following additional Local Water Management information:** • **inflows and outflows;** • **flood storage volumes for proposed detention basins integrated with the Public Open Space (POS), the living stream corridor, POS, and road reserves to protect surrounding and downstream properties from flooding and inundation;** • **overland flow paths layouts and dimensions, including flood levels, flow depths, and velocities during major rainfall events;** • **minimum road levels and minimum habitable floor levels of properties in relation to the 1% AEP flood levels; and** • **longitudinal and cross-sections of the living stream and POS showing relevant details.** **Recommend modifying the structure plan based on results of further studies to address DWER comments.**

		• An outdated reference to the Facility for Advancing Water Biofiltration (FAWB, 2008) has been made (page 28). It is advised to use the latest reference 'Adoption Guidelines for Stormwater Biofiltration Systems 2015' by the Cooperative Research Centre for Water Sensitive Cities (https://watersensitivecities.org.au/content/stormwater-biofilter-design/).	
PUBLIC			
13.	C McDonald Lot 113, Gladville Road McKail	Please accept this as a formal objection to the plans as stated in your document, in particular the location of the school and the impact its location will have on the lifestyle of the current community, also the massive deviation from the original proposal dated 27 February 2013.	Objection to the proposed deviation from the current endorsed structure plan. **Note objection.** **No specific recommendation.**
14.	A Paulley 38 Parker Street, Lockyer	By far the most troubling aspect of the changes in the proposed new structure plan is the loss of 152 housing lots ! This will set a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximise the density of houses in all future developments. Failure to maximise building on existing cleared land will create further pressure to clear remnant native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. It is unacceptable to increase the size of lots. While the new LSP has a greater variety of R Code lots than the existing LSP, more than half of the proposed 570 lots are in the R15 category (295 lots with an average of 665m²). There are some R20 (average 450m²) and R25 (average 350m²) lots but none in the R30 and R40 categories. The developer needs to include a reasonable number of R30 (average 300m²) and R40 (average 220m²) lots, particularly around the primary school and a commercial centre, which needs to be reinstated and expanded in the LSP. There is a need to provide multi-storey and grouped housing which will help reduce urban sprawl. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This area will desperately need a commercial shopping precinct as more homes are built on other existing cleared land to the west, north-west and north of the Lancaster Road Local Structure Plan area. A commercial shopping precinct should be reinstated and expanded to provide employment opportunities for future new residents. Would like to see some social housing options in the LSP, particularly close to the primary school. The McKail North area is crying out for a district structure plan to achieve a more holistic guide for housing development. There are open paddocks to the west, north-west and north of the Lancaster Road site which are within the Albany Ring Road and will no doubt be earmarked for future development. I encourage the City of Albany to lobby the Dept of Planning, Lands and Heritage to create a district structure plan. **Recommendation** Urge the City of Albany Council to reject the Lancaster Road Local Structure Plan in its current form, and require the developer to create another new LSP which includes: • 722 lots or more. • Provides a substantial number of 1 and 2 bedroom units and houses. • Provides multi-storey, grouped housing and social housing.	Concerns were raised regarding the proposed reduced density and loss of commercial. Identified the need for a mixture of housing opportunities. Concerns were also raised around the road permeability and connectivity. Recommended modification to road layout, showing permeability and connectivity to adjacent areas. **Uphold comments.** **Recommend modifying the structure plan to:** • **increase density,** • **modify lot design to allow for diverse housing (grouped dwellings, 1-2 bedroom dwellings and apartments) and** • **show better road connectivity** **Note comment relating to commercial activity and the need for a district level assessment.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**

		• Reinstates and expands a commercial shopping centre. If the developer is not willing to create a new LSP which meets the needs of our community and maximises the use of existing cleared land, then I urge the council to reject the Lancaster Road LSP and actively pursue the creation of a McKail North District Structure Plan as a matter of urgency.	
15.	M Allen Unit 5/12 -14 Symers Street Mira Mar	Express concerns regarding the proposed revision to the Local Structure Plan (LSP) for Lancaster Road, McKail. Concerned by the proposed reduction in density coding, which represents a significant deviation from the approved densities under the current LSP. The applicant argues in their Revised LSP Report that reducing the number of lots will better align with market expectations and address local housing needs in the short term. However, I urge Council to adopt a long-term, strategic approach to planning and development—one that prioritises sustainability, community well-being, and environmental stewardship. Reducing urban sprawl is essential due to its profound environmental, social, and economic implications. Albany urgently needs greater housing diversity and more walkable neighbourhoods to effectively meet both immediate and future community needs. The revised LSP report cites a lack of local services and amenities—such as the distance to existing schools—as justification for reduced lot sizes. However, this reasoning is contradictory, given that the LSP itself includes a proposed primary school. A walkable, interactive neighbourhood centred around a future primary school would better align short-term planning decisions with medium and long-term objectives. The report also highlights a lack of public transport servicing the site but acknowledges that a school bus currently serves the area. I see this as an opportunity to not only better utilise the existing school bus but also an opportunity to reroute an existing bus service or create a new bus route altogether. Unfortunately, the proposed revised LSP would make it harder to justify a commercial case for providing a bus service—an outcome that is regrettable, given the future inclusion of a primary school on the site. The proposed revisions to the LSP also reduce the permeability of the area by eliminating a planned road connection from Lancaster Road through the LSP area to Lot 124 to the north, that would eventually link up to Federal Street. Removing this road undermines the integration and connectivity of future developments on Lot 124 and beyond, which is essential for cohesive urban planning. Furthermore, the site of the LSP falls inside of the urban growth boundary that was created by the new ring road. While this boundary is a positive development, it underscores the finite availability of cleared land for development within it. Albany's anticipated population growth necessitates higher density development in strategically located areas, such as this LSP site, particularly given its designation for a future primary school. Retaining the proposed commercial activity area, as outlined in the existing LSP, is also critical to ensuring a vibrant and self-sustaining neighbourhood. As Albany's population continues to grow, adhering to sound planning principles is vital for fostering smart, sustainable development. This includes prioritising housing diversity, minimising sprawl, and creating well-integrated neighbourhoods within the ring road. Urge Council to reject the proposed revised LSP for Lancaster Road, McKail, in its current form.	Concerns were raised regarding the proposed reduced density, loss of commercial, road permeability and creating well integrated neighbourhoods (e.g assessment at the district level). **Uphold comments.** **Recommend modifying the structure plan to:** o **increase density,** o **modify lot design to allow for diverse housing (grouped dwellings, 1-2 bedroom dwellings and apartments) and** o **show better road connectivity** **Note comment relating to commercial activity.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**
16.	S Leighton 177 Hare St, Albany WA	The illogical increase in the size of the lots being proposed to be released in the LSP leading to a decrease in the number of housing Lots available. This seems illogical when Albany is requiring more inner urban housing to be available for the rapidly rising population. Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximize the density of houses in all future developments. There is a need to provide multi-storey and grouped housing. More 1 and 2 bed units and houses	Concern raised regarding the proposed increase in lot size. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.**

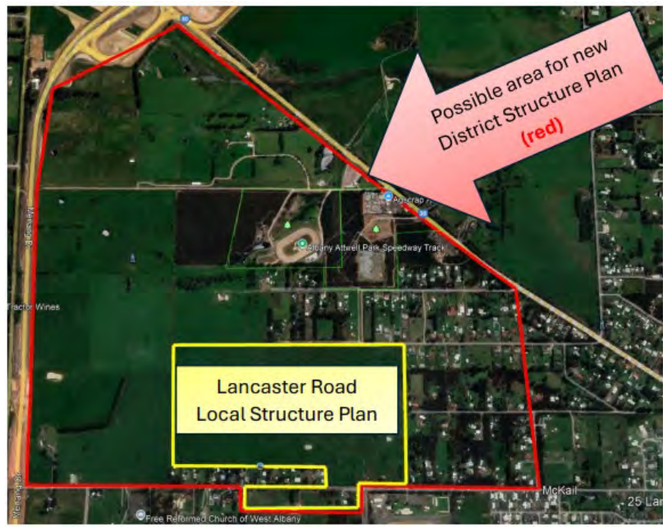
		would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl. This site is cleared land so highly suitable for housing. The City of Albany needs to encourage developments on sites like this instead of on precious native vegetation/wooded areas that are under ever increasing threat of being cleared for housing developments.	
17.	D Picton-King 7 Callistemon View, Yakamia	Object to the proposed Lancaster Road Local Structure Plan because: • The significant reduction in the overall number of housing lots by 152. This will set a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. This will create further pressure to clear remnant native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. • The unacceptable increase in the size of lots. Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximise the density of houses in all future developments. There is a need to provide multi-storey and grouped housing. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl.	Concern raised regarding the proposed increase in lot size. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.**
18.	K Hill 249 Lancaster Rd, McKail	Agree with new proposed LSP	**Note comment of support.** **No modification recommended.**
19.	E Verran 9 Reidy Drive, Spencer Park	Object to the proposed new Lancaster Road Local Structure Plan on the following points: There is a reduction in the overall number of housing lots by 152. We are in desperate need for housing lots across Albany. I strongly suggest these should be on already cleared land so that there is less pressure to clear native vegetation. The lots should not be increased in size, we need to make the most of existing cleared lots. There is a need for higher density housing to allow for smaller lots for new home buyers or older people who are looking to downsize. This would likely reduce urban sprawl. The deletion of a shopping precinct is a mistake because there will be an increased need for this to service areas to the west and north-west of Lancaster Road Local Structure Plan area. There is an increased need for social housing, particularly near the proposed primary school area as people on low incomes and families will have children who need to walk to school.	Concern raised regarding the proposed increase in lot size. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.**
20.	K Giblett Unit 1, 20 Wattle Way, Denmark, WA 6330	Object to the proposed new Lancaster Road Local Structure Plan because of: • The significant reduction in the overall number of housing lots, setting a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. This will create further pressure to clear remnant native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. • The unacceptable increase in the size of lots. Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany needs to ensure that developers maximise the density of houses in all future developments. There is a need to provide multi-story and grouped housing. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl. • The deletion of the commercial shopping precinct. This area will desperately need a commercial shopping precinct as more homes are built on other existing cleared land to the west, north-west and north of the Lancaster Road Local Structure Plan area. • Social Housing and R30 / R40 lots. It would be preferred if the developer partnered with a social housing association to provide some social housing options in the LSP, particularly close to the	Concern raised regarding the proposed increase in lot size and loss of commercial activities. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.** **Note comment relating to commercial activity.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**

		primary school. More R30 and R40 lots should be located close to the new primary school to encourage more students and families to walk to school.	
21.	M Bayliss 10 Francis Street, Lower King	Object to the proposed new Lancaster Road Local Structure Plan because of: • **The significant reduction in the overall number of housing lots by 152.** This will set a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. This will create further pressure to clear remnant native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. • **The unacceptable increase in the size of lots** Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximise the density of houses in all future developments. There is a need to provide multi-storey and grouped housing. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl. • **The deletion of the commercial shopping precinct** This area will desperately need a commercial shopping precinct as more homes are built on other existing cleared land to the west, north-west and north of the Lancaster Road Local Structure Plan area. • **Social Housing and R30 / R40 lots** It would be preferred if the developer partnered with a social housing association to provide some social housing options in the LSP, particularly close to the primary school. More R30 and R40 lots should be located close to the new primary school to encourage more students and families to walk to school.	Concern raised regarding the proposed increase in lot size and loss of commercial activities. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.** **Note comment relating to commercial activity.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**
22.	D Evers 58 Bindaree Road, Cuthbert	Object to the proposed new Lancaster Road Local Structure Plan because of: • The significant reduction in the overall number of housing lots by 152. This will set a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. This will create further pressure to clear remnant native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. • The unacceptable increase in the size of lots. We must stop urban sprawl. Make it easier for people to get to services without cars. • The deletion of the commercial shopping precinct Provide services near homes to reduce dependence on personal vehicles. This area will desperately need a commercial shopping precinct as more homes are built on other existing cleared land to the west, north-west and north of the Lancaster Road Local Structure Plan area. • Social Housing and R30 / R40 lots It would be preferred if the developer partnered with a social housing association to provide some social housing options in the LSP, particularly close to the primary school. More R30 and R40 lots should be located close to the new primary school to encourage more students and families to walk to school. • Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximise the density of houses in all future developments. There is a need to provide multi-storey and grouped housing. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl.	Concern raised regarding the proposed increase in lot size and loss of commercial activities. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.** **Note comment relating to commercial activity.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**
23.	R & D Bodey 104 Collingwood Road, Seppings	Object to the proposed new Lancaster Road Local Structure Plan because of: • **The significant reduction in the overall number of housing lots by 152.** This will set a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. This will create further pressure to clear remnant	Concern raised regarding the proposed increase in lot size and loss of commercial activities. Recommended making better use of the land, by maximising density. **Uphold comments.**

		native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. • **The unacceptable increase in the size of lots.** Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximise the density of houses in all future developments. There is a need to provide multi-storey and grouped housing. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl. • **The deletion of the commercial shopping precinct** This area will desperately need a commercial shopping precinct as more homes are built on other existing cleared land to the west, north-west and north of the Lancaster Road Local Structure Plan area. • **Social Housing and R30 / R40 lots** It would be preferred if the developer partnered with a social housing association to provide some social housing options in the LSP, particularly close to the primary school. More R30 and R40 lots should be located close to the new primary school to encourage more students and families to walk to school.	**Recommend increasing density on the structure plan map.** **Note comment relating to commercial activity.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**
24.	Keith Allen & Patricia Marie Unit 79/22 Wellington Street, Centennial Park	Object to the proposed Lancaster Road Structure Plan because of: The significant reduction in the number of lots by 152. Albany already has a severe housing shortage and this will set a precedent for other developers to increase land clearance of remnant native vegetation. All areas of native vegetation need to be retained for crucial wildlife habitation and for cooling of the environment. There is a finite amount of existing cleared land in and around Albany. We call on the Albany Council to ensure that developers maximise housing density and minimise land use. A need for multi-storey and grouped housing. 1 and 2 bed units are required. Reduce urban sprawl. A commercial shopping precinct is required especially when the other cleared lands around the Lancaster Road structure Plan are developed. Social Housing and R30/40 lots. It would be preferable for the developer to partner with a social housing association and locate these units close to the primary school.	Concern raised regarding the proposed increase in lot size and loss of commercial activities. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.**
25.	Rod Sawyer 27 Target Road, Yakamia 73 Hardie Road, Spencer Park	Object to the proposed new Lancaster Road Local Structure Plan because of: • The reduction in the overall number of housing lots by 152. This will set a dangerous precedent to other developers and could lead to a greater loss of housing lots across Albany in the future. This will create further pressure to clear remnant native vegetation to supply future housing needs. We need to retain all areas of native vegetation to cool our environment and provide crucial wildlife habitat. • The unacceptable increase in the size of lots. Albany only has a finite area of existing cleared land on which to build in the future. The City of Albany Council needs to ensure that developers maximise the density of houses in all future developments. There is a need to provide multi-storey and grouped housing. More 1 and 2 bed units and houses would help older residents downsize and increase the number of first home buyers getting on the housing ladder. This will help reduce urban sprawl.	Concern raised regarding the proposed increase in lot size, meaning reduction in number of lots. Recommended making better use of the land, by maximising density. **Uphold comments.** **Recommend increasing density on the structure plan map.**
26.	Emma Walker 32 Ardross Crescent, Collingwood Park	Our remnant vegetation in the suburban land and surrounding areas is vital to Albany and a prosperous future. While developing land is inevitable, very careful management and planning needs to occur. I do not believe this has happened here.	**Note comment of concern in relation to careful planning.** **No modifications recommended.**
27.	The Friends of Yakamia Forest Boodja c/o 38 Parker Street, Lockyer	As a group which has been campaigning for the retention of native vegetation and the need to grow Albany by only developing on existing cleared land, our members are extremely concerned that the new Lancaster Road Structure Plan will see an overall reduction in the number of lots from 722 to 570. That's a total reduction of 152 lots!	Concern regarding proposed reduction in density and lack of understanding for integration of roads, commercial and public open space with existing and future planned neighbourhoods. **Uphold comments.**

		In light of the fact that we are in a housing crisis and the cost of building materials and labour is significantly increasing, having 152 less lots available for a growing city is most objectionable. Allowing this developer to have 152 less lots will set an undesirable and unacceptable precedent which could lead to an even greater loss of lots across Albany. With the WA climate getting hotter and a population shift southwards to cooler temperatures, there is the potential for developers to run out of existing cleared land in Albany, and then they could seek to destroy native vegetation and critical wildlife habitats in their voracious desire for development. Albany must consistently maximise the density of housing on existing cleared land, both now and into the future. Comparison of lots sizes and numbers between the current and proposed new structure plans **Current Structure Plan** R Code / Average lot size / Number of lots R2.5 / 4,000m² / 12 R5 / 2,000m² / 0 R10 / 1,000m² / 0 R15 / 660m² / 0 R20 / 450m² / 430 R30 / 300m² / 280 R40 / 220m² / 0 **Total lots** / **722** **Proposed New Structure Plan** R Code / Average lot size / Number of lots R2.5 / 4,000m² / 10 R5 / 2,000m² / 12 R10 / 1,000m² / 81 R15 / 660m² / 295 R20 / 450m² / 81 R30 / 300m² / 91 R40 / 220m² / 0 **Total lots** / **570** There is a planning principle which provides for a variety of lot sizes within developments. While there is a greater variety of lot sizes in the proposed new local structure plan, more than half of the 570 lots are in the R15 code with an average lot size of 660m². We have been advised by City planners that there needs to be a minimum of two thirds of lots in the R20 code (average of 450m²), and there is a preference for more R30 and R40 lots, particularly near the primary school. These requirements are supported by our group. • Request for information: We would like a comprehensive explanation from the developer as to why he/she has made such a large cut in lot numbers. The proposed new local structure plan seeks to introduce the following: • Modified road layout to allow for east/west lot orientation (better solar access) Response: The desire to build a road layout to better facilitate solar access for houses is a positive and welcomed change. However, the familiar and often-used grid layout of roads in Albany housing developments is somewhat uninteresting and lacks creativity. As a way of improving liveability, it would be better if a holistic district structure plan could be created including a more organic road layout with curved streets that go beyond the boundaries of the Lancaster Road Local Structure Plan area. There are open paddocks to the west, northwest and north of the Lancaster Road site which are within the Albany Ring Road and will no doubt be earmarked for future housing development. Presumably, this is the McKail North area discussed in the Albany Local Planning Strategy 2019. Recommendation: • The group encourages the City of Albany to lobby the Dept of Planning, Lands and Heritage to create a district structure plan as a matter of urgency. • Consolidation of Public Open Space into larger areas Response: This is a positive change and gives future new residents access to passive recreation and exercise sites within easy walking and cycling distance.	**Recommend increasing density on the structure plan map.** **Note comment relating to commercial activity.** **The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.** **Note comment relating to the need for a district level assessment. The City propose to undertake a district level assessment to determine the appropriateness for commercial activity to support the North McKail neighbourhood.**

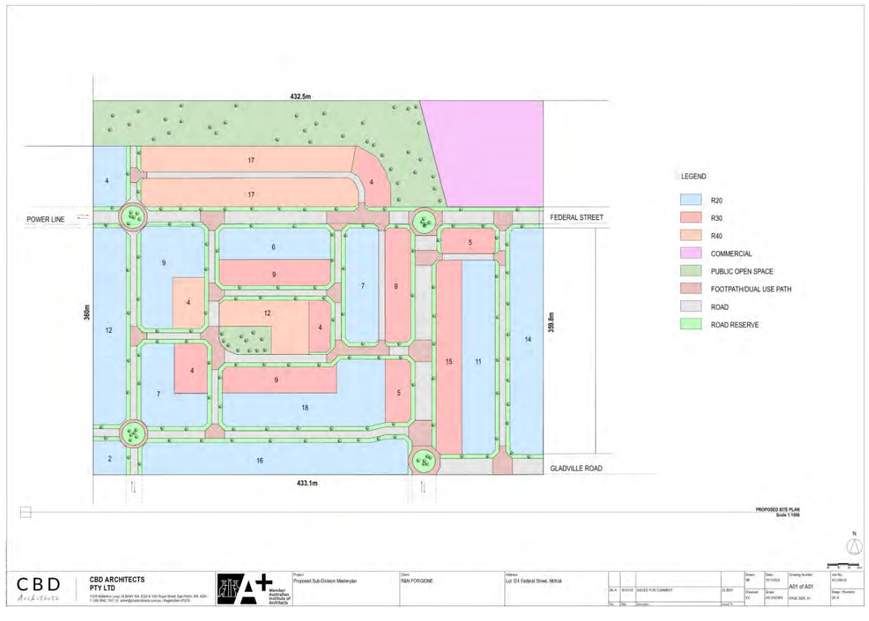
		Connection with nature is a vital ingredient for human well-being. There appears to be a lake identified in the POS of Stage 5 which is welcomed. The public open space in Stage 7, south of Lancaster Road, appears to be in a drainage line and might make an ideal site for a small, new wetland which would help cool the local climate and provide a wildlife sanctuary for local residents to enjoy. Request for information: Please confirm that the school oval will be accessible to the public as part of the overall POS. Recommendations: • We encourage the City of Albany to require the inclusion of large native tree species which will provide future shade in an increasingly hot climate. • Natural play equipment for children would be the best installation. • We encourage the creation of a small wetland in the public open space in Stage 7, south of Lancaster Road. • Larger lots in areas of steep topography Response: Albany has a plethora of high-density housing built on much steeper locations than exist at the Lancaster Road site and therefore, we refute the need to put larger lots on steep areas. We believe that the steep areas provide an opportunity to build multi-storey units or houses. Perhaps the bottom of slopes could have rows of two or three-storey 1 and 2 bed units, with a row of single or two storey units or houses mid-slope and single units or houses at the top of the slope. If designed correctly, all of these homes would have some rooms with a view which would improve the liveability of the area, a point mentioned in the WA Planning Commission's Liveable Neighbourhoods Policy. The most recent Census revealed that one third (⅓) of Albany's existing housing is made up of 3 and 4 bed houses with 1 or 2 people living in them. There is a clear need for more 1 and 2 bedroomed houses and units so that older residents can downsize and first home buyers can have a better chance of getting on the home-ownership ladder. Recommendation: • That the LSP be required to include multi-storey blocks of 1 and 2 bed units and houses, and grouped housing. • Variation to proposed school location Response: Our group approves of the proposal for a new primary school and its location next to a new oval / public open space. Hundreds, if not thousands, of new families will be living in this district of Albany in the future. They will value having a primary school nearby. Teachers would need 1 and 2 bed units / houses close to the school as well. • Deletion of commercial activities Response: This is a totally unacceptable change. Albany needs to create local activity centres to reduce the amount of traffic travelling into the city centre, thereby reducing congestion. This is another reason why a district structure plan would be beneficial. With 570 new housing lots, let alone 722 lots, and a primary school, this district is crying out for a commercial shopping centre which could be within easy walking and cycling distance from a significant number of houses. ALPS Activity Centres Local centres – McKail North (future) McKail North listed as a future Local Centre and discusses retail floor space supply being allocated to various Neighbourhood and Local Centres including McKail North (Local Centre). The strategy also talks about diversifying neighbourhood and local centres into true activity centres. Recommendation:	

		• That a district structure plan be created including a commercial shopping centre to service the needs of the thousands of new residents who will occupy new homes in this district in the future. Commercial centres will also provide employment opportunities. Further Request Social Housing It would be preferred if the developer partnered with a social housing association to provide some social housing options in the LSP, particularly close to the primary school. Further Recommendations: That the City of Albany Council: 1. Rejects the new Lancaster Road Local Structure Plan in its current format due to its restrictive design, the significant reduction in lot numbers (152 less than the current LSP) and the increase in lot sizes, and 2. Does not allow the Lancaster Road Local Structure Plan area to be developed until such time as a new district-wide structure plan has been created and approved, so that Council can achieve an improved and far more holistic development outcome on existing cleared land in this district. See map below.  Relevant Excerpts from ALPS • The Executive Summary states that the Strategy seeks to 'deliver a more compact city where residents will live closer to local shops, services and employment with easy access to public transport and greater ability to walk or cycle.' • Promotes urban consolidation by making better use of existing infrastructure and land. This will be achieved through ….. progressively moving the City's retail centric shopping centres towards true activity centres that meet the shopping, employment and recreational needs of the community. • The directions set out in this Strategy will be implemented through the City's Local Planning Scheme, further investigation in specific areas such as housing, preparation of local planning policies and structure plans, and through the management of subdivision and development. • Collaboration with State government agencies and other organisations will help to address cross-sectoral issues and will facilitate access to funding from both State and Federal government. Relevant Strategy Pillars Leadership - We will listen to our community and deliver outcomes that reflect their needs and expectations.	

		A Connected & Safe Built Environment - We will develop integrated precincts and neighbourhoods that allow for population growth and enhance the lifestyle of our residents. Relevant Strategy Objectives • Progressively move retail centric shopping centres towards true activity centres that meet the shopping, employment and recreation needs of the community. • Plan for a variety of housing types in close proximity to services and facilities, in particular affordable housing and one and two bedroom units that meet the needs of young people, retirees and the elderly. • Facilitate accessibility to services and facilities through integrated public transport linkages and cycle and pedestrian-friendly environments. • Enable people to make healthy choices through effective planning and urban design. • Provide an appropriate level of community facilities and services in existing and planned settlement areas. • Promote urban consolidation by making better use of existing zoned land and infrastructure. Housing • There is a clear need for more diverse housing product, including affordable one- and two bedroom units, apartments and smaller dwellings to meet the needs of the City's ageing population, retirees attracted to the City, the predicted increase in young adults and the retention of tertiary students. The Great Southern Housing Needs Analysis identified unmet demand for one and two bedroom dwellings in the region. A focus on smaller, high amenity housing close to services and employment will help to increase both the affordability and diversity of housing stock, as well as catering for the needs of the ageing population. Action under Public Transports, Walking and Cycling • Strategic direction: Improve public transport, walking and cycling opportunities. • Plan for the provision of efficient public transport and walking and cycling infrastructure that is directly accessible to residents, particularly around existing key employment areas and activity centres, in the preparation of local structure plans. Investigation Area 3 – Neighbourhood and Local Centres: Provide a strategic framework for the redevelopment and renewal of neighbourhood centres and local centres to improve the performance of the centre by: • diversifying land uses to meet the daily and weekly needs of residents, workers and visitors including community facilities; • providing a local community focus; • providing a local employment node centred around the service industry; • providing a focal point for public transport, walking and cycling networks for direct and convenient access; • accommodating adjacent high to medium density residential development within the centre's area of influence; and • providing high quality public realm improvements in small parks and within the street environment.	
28.	Albany Community Environment Centre 73 Hardie Road, Spencer Park	The reduced density code of the revised McKail North Local Structure Plan (MNLSP) contradicts the objectives of both the Albany Local Planning Strategy (ALPS) and the Liveable Neighbourhoods Policy. It therefore undermines social and ecological sustainability while failing to address the housing crisis. For these reasons, ACEC rejects the proposed revision. The existing endorsed McKail North Outline Development Plan (MNODP) indicates the potential for over 700 lots. The proposed replacement Lancaster Rd Local Structure Plan or McKail North Local Structure Plan (MNLSP) indicates the potential for around 570 lots, a reduction of at least 130 lots. This reduced density code contradicts the objectives of both the ALPS and the Liveable Neighbourhoods Policy. It therefore undermines social and ecological sustainability while failing to address the housing crisis. For these reasons, ACEC rejects the proposed revision.	Concerned that the reduced density will ultimately contribute to urban sprawl while the demand for housing continues to increase. The reduced density approach neglects Albany's need for housing diversity. Many single, couple occupants or families don't need, or cannot afford a detached 4x2 suburban house but have little choice about procuring other types of accommodation. Comments also mentioned the need for the structure plan to cover the wider area of cleared land and to create a and long term social and environmental sustainability "Liveable Neighbourhood".

		The report prepared by Dynamic Panning and Development for the developers refers to a list of objectives of the ALPS with claims that these have applied in designing the new MNLSP. ACEC asserts that the following important objectives are contradicted by the proposed changes: • *Contain urban development and rural living within the existing supply of land zoned and for settlement growth:* Albany's population is growing rapidly. Instead of containing urban development within existing zoned land, the reduced density code will ultimately contribute to urban sprawl while the demand for housing continues to increase. • *Provide an appropriate level of community cavities and services in existing and planned settlement areas* • *Facilitate accessibility to services and facilities through integrated public transport linkage and cycle an pedestrian-friendly environments.* • *Meet the service infrastructure needs for settlement growth.* Reduced density, results in distance to amenities, as is indicated by the removal of the commercial area in the revised MNSLP, and a of public transport. The inclusion of a future primary school and the existing school bus service is positive, but reduced density weakens the case for improved public transport and connectivity, thus reinforcing reliance on private car travel. • *Enable people to make healthy choices through effective planning and urban design* The reduced density code makes it more difficult for people make healthy lifestyle choices due to their reliance on car transport and the need to spend more time driving to work and amenities, rather having the time and ability to partake in active transport (walking and cycling) and recreation. • *Protect the City's pristine natural and coastal environments and other landscape qualities.* Reduced density in MNLSP places extra pressure on the natural environment rather contributes to protecting it. The MNLSP is a large pocket of cleared land but the development proposal does not maximise its urban zoning potential. Albany has less than 35% remnant native vegetation, compared to pre-colonisation. By failing to maximise the opportunity to address the current and future housing shortage through medium density development on **cleared land,** there will be more pressure for remnant vegetation to be cleared for future urban development. It sets a precent for other developers to follow suit with reduced density developments. The overall ALPS objective of "*a presumption of development on cleared land" h*as not been applied to the proposed MNLSP. The contradictions of the proposed MNLSP to the ALPS are reiterated in relation to the Liveable Neighbourhood Policy: "its primary objective is to promote the design of walkable neighbourhoods, places that support community and a sense of place, mixed use and active streets, accessible parking, energy efficient design, and housing choice". The reduced density approach neglects Albanys need for housing diversity. Many single, couple occupants or families don't need, or cannot afford a detached 4x2 suburban house but have little choice about procuring other types of accommodation. A positive aspect of the revised MNLSP is the increased area of green space. This is supported by ACEC, and we recommend that restoration and /or creation of biodiverse native vegetation and wetlands areas be developed with the possibility it could contribute to the establishment of a wildlife corridor in the long term. A revision of the existing MNODP should be based on a structure plan that facilitates the development of a Liveable Neighbourhood, address the housing shortage, need for housing diversity, and long term environmental sustainability.	**Uphold comments.** **Recommend increasing density on the structure plan map.** **Note comment relating to commercial activity.**

		ACEC calls for a more holistic structure plan which : • covers the wider area of cleared land of surrounding the MNLSP • protects existing remnant native vegetation within the structure plan area • provides for a mix of affordable housing types, including strata title style housing and other medium density housing options • includes social housing • includes public green spaces, biodiverse native vegetation, including wetlands, creation of a wild life corridor • ensures that urban development is contained. • "the City's pristine natural and coastal environments and landscapes" are protected. • creates a "Liveable Neighbourhood" and long term social and environmental sustainability. The proposal for the revised MNLSP should be rejected as it fails to comply with ALPS, Liveable Neighbourhood Policy, or meet the housing needs of the community and long term sustainability.	
29.	Paul Blyth 31 Morgan Place, McKail	Safety concerns of possible impacts of the proposed Lancaster Road, McKail subdivision and traffic flow. • Existing issues exacerbated by any increase traffic flow along Morgan Road and Morgan Place. • Both these roads currently have no pedestrian walk/cycle paths and is already quite dangerous for foot traffic, bike riding. • Concerned for children's safety walking or riding bikes along our local streets. • Existing issue is the traffic flow coming from McKail Road along Morgan Road and around Morgan Place corner. • Quite often this route is targeted by hoons, with frequent burnouts and high-speed racing around our corner and along our road. • Incidents reported to the authorities, with little to no affect. Concern any further increase in traffic flow will only make these matters worse. A few proposals options, considered in the new plan. 1. To close the access from McKail Road on to Morgan Road 2. Keep the top end of Morgan Road closed to the new subdivision. 3. If none of the top two suggestions are suitable. Put speed reduction humps or chicanes along Morgan Road to slow down the traffic. 4. Ad suitable cycleway/footpaths along Morgan Road and Morgan Place. Attached, photos to explain further my concerns and considerations. 	The landholder at 31 Morgan Place is concerned that Morgan Road is not suitably designed to accommodate additional through traffic. The landholder provided the following recommendations: 1) Closing the access from McKail Road on to Morgan Road or develop speed reduction humps or chicanes along Morgan Road to slow down the traffic. 2) Keep Morgan Road closed to the new subdivision or develop speed reduction humps or chicanes along Morgan Road to slow down the traffic. 3) Develop cycleway/footpaths along Morgan Road and Morgan Place. **Note concern relating to traffic movement and road upgrading.** **Recommend that the proponent provide further assessment of the Traffic Impacts of the development on the surrounding transport networks, to identify upgrade requirements and any necessary changes to the structure plan.**

		 Morgan Road looking West Morgan Place looking South Morgan Road looking East	
30.	Roberto Forgione Lot 124 Federal Street, McKail	Comments to the proposed modification. • Disagree with reducing the density. • Need activation of roads to adjoin my property. I am in the process of documenting a proposed LDP for Lot 124 Federal Street (below) Key areas of my proposal are as follows. 1. Higher Density. 2. Consolidated P.O.S 3. Commercial Centre (Medical, Childcare & small retail) 4. Activation of site to neighbouring Southern owner and Western Land for future development.  	Concern relating to the proposed reduction in density and poor integration with adjoining property. **Uphold concern.** **Recommend that density is increased and that the proponent provide further assessment of the Traffic Impacts of the development on the surrounding transport networks, to identify upgrade requirements and any necessary changes to the structure plan.**

Consultation – Key Themes

Key Themes	Number of Submissions	Summary of Submission	Local Government Response	Local Government Recommendation
District Level Assessment	13	Need for district level assessment relating to: • Road location, linkage and hierarchy • School location and type (high school?) • Type (passive, active), size (neighbourhood, district) and location of POS (opportunity for district POS) • Location and function of commercial (neighbourhood or local activity centre?) (noting commercial has been deleted from the current LSP)	The structure plan area falls within a larger area being considered for future development. A broader assessment is therefore recommended to determine the appropriate location and design of roads, schooling, public open space and commercial activities to service the wider district. District level assessment achieves the well-being of the entire population of the district in all respects. Until such time that the district level assessment is undertaken, structure planning for the subject land may be premature.	**The City propose to undertake a district level assessment to determine a need for connector roads and commercial activity to support the North McKail neighbourhood.**
Density	18	Concerns were raised about the proposed reduction in density. • The amended plan will only cater for larger family homes and does not recognise the housing requirements of smaller families. • Not supportive of the split zoning R10/20. This should be changed to R20. • The R15 density areas need to be changed to R20. This is reflective of State Planning Policy and the City's Local Planning Strategy for	The current structure plan, endorsed in 2015 proposes an urban density ranging upwards of R20 (20 dwellings per hectare). The new structure plan submitted to replace the existing is proposing a lower density of development (R15 for the majority) and an area of split coding (R10/20). Such a proposal is	**Recommend increasing density as follows:** • **The remaining split zoning R10/20 area should be changed to R20.**

		urban areas…maximising development potential – sustainable use of urban designated land. • The R20 and R25 areas depicted around the POS areas and school need to be changed to R30. • The plan needs to identify the opportunity to develop 1- and 2-bedroom dwellings (grouped dwelling and multiple storey developments) to support a high percent of aged persons and a low average number of persons per household (average persons per household 2.38). This will improve housing affordability with an increase in housing supply and dwelling size options.	not supported by the City's Local Planning Strategy 2019. The City's Local Planning Strategy is advocating for medium density options within structure plan areas to improve housing affordability with an increase in housing supply and smaller dwelling size options. An opportunity exists to develop more 1 and 2 bedroom dwellings (medium density development) to support a high percent of aged persons and a low average number of persons per household (average persons per household 2.38). Good structure planning design achieves a mix of dwelling types, which provides housing choice for different demographics, living needs and household budgets, and all ages and abilities. The R15 and R10/20 density areas should be changed to R20. This is reflective of State Planning Policy and the City's Local Planning Strategy for urban areas. The higher density maximises the development potential (sustainable use) of urban designated land. Following discussions with the applicant, an updated plan	

			submitted March 2025 incorporated majority of the R15 density areas being changed to R20.	
Traffic	12	• Concern relating to road permeability and connectivity. • Concern relating to the road layout pattern (grid pattern) and length of street block (should not exceed 240m). Consideration should be given to an organic road layout pattern (curved roads following contours), a hierarchy of roads and through roads linking to external areas. Good road design achieves an appealing sense of place and a mix of dwelling outcomes. • Main Roads considers the development will: o adversely impact the surrounding transport networks. o adversely impact on the intersections of Lancaster Road and Gladville Road with Albany Highway - upgrading of these intersections is necessary. o adversely impact Lancaster Road and Gladville Road. • Main Roads requires: o upgrading of intersections of Lancaster Road and Gladville Road with Albany Highway o upgrading of the surrounding path network to provide additional pedestrian and cyclist connectivity o the development to provide roundabouts at all 4 - way junctions.	Structure Planning should provide a network of interconnected streets based on function within attractive, safe and pedestrian friendly streetscapes, which facilitates accessibility for all users to, within and between neighbourhoods and activity centres. Streets play a key role in the creation of sustainable communities and places where people want to live, work and play. The Main Roads WA and members of the public commented that additional information should be provided to assess integration to external areas and contributions that may be required for upgrading existing roads and intersections to accommodate increases in vehicle movement. Existing roads (Gladville Road and Lancaster Road), will need to be upgraded to urban standards. Lancaster Road should be upgraded approximately 180m east. Gladville Rd needs to be extended. Consideration should be given to intersection treatments at Albany	**Need for updated traffic impact assessment and a contribution plan prepared to address the following:** • **The upgrading of Lancaster and Gladville Roads** • **Intersection treatments at Timewell Road and at Lancaster and Gladville Roads with Albany Highway**

		o further assessment of the Traffic Impacts of the development on the surrounding transport networks to identify upgrade requirements. • DFES: The proposed LSP has not demonstrated compliance with Element 3: Vehicular Access. • Concerns were raised about the suitability of through traffic on Morgan Road. • The DoE requires at least one frontage to the school to be a neighbourhood connector and the lesser order roads to be Access Road B classifications.	Highway and at Timewell Rd (roundabout).	
School Site	1	• The DoE requests further clarification from the proponent to ensure the following items are addressed: o Road hierarchy fronting the school o Location of pedestrian paths - minimum of 1.5m in width be constructed on both sides of the street. o A safe routes assessment is to be undertaken. o It is unclear if the future school site will be subject to inundation or have restrictions within its developable footprint. Imperative no water management encumbrances (basin) are proposed on the future school site. o Further clarity on the positioning of the WWPS is required.	The DoE commented that the future school is to remain unencumbered (e.g. from water and electrical infrastructure) and suitable road treatments are incorporated into the design. The Department requests further clarification to ensure compliance with the above.	**Recommend updating the structure plan to address DoE comments.**

		o Electrical infrastructure is not acceptable within the land area of the school site and must be removed?		
Potable Water Infrastructure	1	Water Corp commented: • Need info on intended spatial staging and timing of subdivision in the context of the Water Corporation's wastewater infrastructure planning for the area. • Need to identify adequate provision of land/sites within the LPS area to accommodate the three future wastewater pump stations ('A', 'B' and 'C) and their required odour buffers. The WWPS sites should ideally be co-located with POS and drainage areas. • Required developer upgrades to the water reticulation main on Lancaster Road and Morgan Street to service the LSP area. • Availability and timing of capital funding for the delivery of the wastewater pump stations noting that funding for WWPS 'A', 'B' and 'C' is currently outside the Corporation's 5 year Capital Investment Program. It is open to the proponent to make case by case application to the Corporation's Headworks Delivery team to modify the timing of capital projects using the application form at	Support the WC request for further consultation on servicing requirements.	**Recommend including a commentary within the structure plan as follows:** ***Prior to submitting any subdivision applications in the LSP area, the proponent should liaise with the Water Corporation regarding:*** • ***Intended spatial staging and timing of subdivision in the context of the Water Corporation's wastewater infrastructure planning for the area.*** • ***Adequate provision of land/sites within the LPS area to accommodate the three future wastewater pump stations ('A', 'B' and 'C) and their required odour buffers. The WWPS sites should ideally be co-located with POS and drainage areas.*** • ***Availability and timing of capital funding for the delivery of the wastewater pump stations noting that funding for WWPS 'A', 'B'***

		this link: Capital-investment-planning-checklist.pdf		***and 'C' is currently outside the Corporation's 5 year Capital Investment Program. It is open to the proponent to make case by case application to the Corporation's Headworks Delivery team to modify the timing of capital projects using the application form at this link: Capital-investment-planning-checklist.pdf*** • ***Required developer upgrades to the water reticulation main on Lancaster Road and Morgan Street to service the LSP area.***
Speedway Noise (DWER Noise Branch)	1	The DWER (Noise Branch) identified the need for detailed noise studies, to better quantify the levels and characteristic(s) of the noise received.	Support the DWER (Noise Branch) request for detailed noise data.	**Recommend that the proponent provide updated environmental noise assessment to better quantify the levels and characteristic(s) of the noise received.**
Local Water Management	3	The DWER (South Coast Branch) identified the need for additional detail and some modifications to the Local Water Management Strategy (LWMS), to present relevant information in the LWMS.	Support the DWER (South Coast Branch) request for additional info being provided in the LWMS.	**Recommend that the proponent update the Local Water Management Strategy to address comments as requested by the DWER.**

Mod #	City Proposed Modifications	Reason	WAPC Modification - Modified provisions	Reason
1)	**ADDITIONAL INFORMATION** **The following technical documents updated and additional information submitted and the structure plan report and plan updated to address outstanding recommendations in regards to the following:** **1) Local Water Management information to address DWER comments** **2) Detailed noise data to address DWER (noise branch) comments** **3) Assessment of the Traffic Impacts of the development on the surrounding transport networks, to identify upgrade requirements** **4) Bushfire Management Plan be updated to align with the recent version of the Planning for Bushfire Guidelines** **5) Proposed staging of subdivision and development** **6) Contribution plan to address existing infrastructure requiring upgrade** **7) Additional recommendations outlined below**	To address comments received from agencies.		
2)	**DENSITY** **1) Change the R10/20 density to R20**	To more closely align with the City's Local Planning Strategy.		
3)	**SUBDIVISION REQUIREMENTS** **1) Include the following within the structure plan text:** ***At the subdivision stage, a Fauna Management Plan is to be submitted to guide relocation of the Western Grey Kangaroos Macropus fuliginosus, during construction and development within the structure plan area.*** ***At the subdivision stage, a geotechnical report is to be submitted and any necessary work undertaken, to ensure the land is suitable for development.***	To address comment received from the DBCA and the DoE.		
4)	**CONTRIBUTION PLANNING** **1) Include within the structure plan text, contribution details for road and intersection treatments as follows:** • **The upgrading of Lancaster and Gladville Roads** • **Intersection treatments at Timewell Road and at Lancaster and Gladville Roads with Albany Highway.** • **Address recommendations from further assessment of the Traffic Impacts of the development on the surrounding transport networks**	To address comment received from the MRWA and City staff.		
5)	**ROAD LAYOUT** **1) Modify the structure plan map to show:** **(a) roundabouts at all 4 way intersections** **(b) direct linkage to Timewell Road** **(c) reduced street block lengths** **(d) extension of Gladville Road**	To address comment received from the MRWA and City staff.		
6)	**DEPARTMENT OF EDUCATION COMMENTS** **1) Modify the structure plan to address the following:** **(a) At least one road frontage to the school being a neighbourhood connector.** **(b) Lesser order roads being Access Road B classifications (as per Liveable Neighbourhoods).** **(c) Roads modified, with a minimum width of 17.9m.** **(d) Pedestrian paths at a minimum of 1.5m.** **(e) At the time of subdivision, a geotechnically assessment being undertaken and any necessary work, to ensure the school site is suitable for development.** **(f) Include a notification within the structure plan stating:**	To address comments received from the DoE.		

	• ***no encumbrances (e.g. water management basins, waste water pumping station or electrical infrastructure) are to be proposed on the future school site.***			
7)	**WATER CORPORATION COMMENTS** **1) Include the following within the structure plan text:** ***Prior to submitting any subdivision applications in the LSP area, the proponent should liaise with the Water Corporation regarding:*** • ***Intended spatial staging and timing of subdivision in the context of the Water Corporation's wastewater infrastructure planning for the area.*** • ***Adequate provision of land/sites within the LPS area to accommodate the three future wastewater pump stations ('A', 'B' and 'C) and their required odour buffers. The WWPS sites should ideally be co-located with POS and drainage areas.*** • ***Availability and timing of capital funding for the delivery of the wastewater pump stations noting that funding for WWPS 'A', 'B' and 'C' is currently outside the Corporation's 5 year Capital Investment Program. It is open to the proponent to make case by case application to the Corporation's Headworks Delivery team to modify the timing of capital projects using the application form at this link: Capital-investment-planning-checklist.pdf*** • ***Required developer upgrades to the water reticulation main on Lancaster Road and Morgan Street to service the LSP area.***	To address comments received from the WC.		

CITY OF ALBANY

PLANNING REPORT – MARCH

To : His Worship the Mayor and Councillors

From : Senior Information Officer – Development Services

Subject : Development Application Approvals

Date : 02 April 2025

The attached report shows Development Application Approvals issued under delegation by a planning officer for the month of March 2025.

Determination Details:

Approved Under Delegated Authority	Approved by Council	Refused	Total Determined
47			47

DEVELOPMENT APPLICATION APPROVALS ISSUED UNDER DELEGATED AUTHORITY

Applications Determined for March 2025

Application Number	Application Date	Street Address	Locality	Description of Application	Decision	Decision Date
P2250041	11/02/25	Cliff Way	Albany	Single House	Delegate Approved	17/03/25
P2250047	11/02/25	Spencer Street	Albany	Unhosted Short Term Rental Accommodation	Delegate Approved	14/03/25
P2250054	13/02/25	York Street	Albany	Section 40 - Restaurant/Cafe	Delegate Approved	05/03/25
P2250056	20/02/25	Grey Street East	Albany	Single House - Additions	Delegate Approved	19/03/25
P2240428	17/12/24	Spencer Street	Albany	Grouped Dwelling	Delegate Approved	31/03/25
P2250072	27/02/25	Anchorage Vista	Bayonet Head	Single House - Additions (Deck)	Delegate Approved	18/03/25
P2250076	05/03/25	Jandoo Court	Bayonet Head	Single House - Outbuilding	Delegate Approved	19/03/25
P2240288	17/09/24	Alison Parade	Bayonet Head	Development (Earthworks in excess of 500mm - Retaining Wall)	Delegate Approved	26/03/25
P2250061	21/02/25	Frenchman Bay Road	Big Grove	Single House - Outbuilding	Delegate Approved	25/03/25
P2250036	07/02/25	Bolitho Road	Bornholm	Grouped Dwelling (Existing Chalets)	Delegate Approved	24/03/25
P2250085	07/03/25	Prior Street	Centennial Park	Development - Retaining Wall	Delegate Approved	25/03/25
P2250001	06/01/25	Lower King Road	Collingwood Heights	Place of Worship - Additions	Delegate Approved	14/03/25
P2250111	24/03/25	Emu Point Drive	Collingwood Park	Section 40 - Restaurant & Micro Brewery (Tavern Licence)	Delegate Approved	26/03/25
P2250021	24/01/25	Rangatira Road	Drome	Single House	Delegate Approved	13/03/25
P2250032	04/02/25	Kitson Street	Gledhow	Warehouse - Additions (Outbuilding)	Delegate Approved	10/03/25

Application Number	Application Date	Street Address	Locality	Description of Application	Decision	Decision Date
P2250051	14/02/25	Walmsley Road	Gledhow	Outbuilding - Shipping Container	Delegate Approved	25/03/25
P2250052	18/02/25	Charles Street	Gledhow	Single House - Outbuilding	Delegate Approved	06/03/25
P2250100	18/03/25	Greyhound Circle	Gledhow	Single House	Delegate Approved	27/03/25
P2250062	24/02/25	Bluff Creek Road	Green Range	Agriculture - Extensive (Outbuilding)	Delegate Approved	26/03/25
P2250070	27/02/25	Glenelg Drive	Kalgan	Single House - Additions	Delegate Approved	11/03/25
P2250073	28/02/25	Watari Rise	Kalgan	Single House - Outbuilding	Delegate Approved	19/03/25
P2250038	07/02/25	Bay View Drive	Little Grove	Single House	Delegate Approved	07/03/25
P2250046	11/02/25	Laithwood Circuit	Marbelup	Single House - Addition (Patio)	Delegate Approved	11/03/25
P2250049	13/02/25	Berrima Road	Marbelup	Single House - Outbuilding	Delegate Approved	06/03/25
P2250083	06/03/25	Ajana Drive	Marbelup	Single House - Additions (Carport Storeroom & Porch)	Delegate Approved	19/03/25
P2250024	29/01/25	Beaudon Road	Mckail	Ancillary Dwelling	Delegate Approved	06/03/25
P2250030	31/01/25	Adelaide Crescent	Middleton Beach	Single House - Additions	Delegate Approved	05/03/25
P2250089	10/03/25	Garden Street	Middleton Beach	Club Premises - Additions (Patio)	Delegate Approved	24/03/25
P2250060	21/02/25	Rufus Street	Milpara	Single House - Addition (Water Tank)	Delegate Approved	19/03/25
P2250045	11/02/25	Cockburn Road	Mira Mar	Industry Light - 2 x Units	Delegate Approved	18/03/25
P2250050	14/02/25	Beresford Street	Mira Mar	Single House - Additions	Delegate Approved	06/03/25
P2250069	27/02/25	Nelson Street	Mira Mar	Single House - Outbuilding	Delegate Approved	21/03/25

Application Number	Application Date	Street Address	Locality	Description of Application	Decision	Decision Date
P2240191	11/07/24	Nelson Street	Mira Mar	Unhosted Short Term Rental Accommodation	Delegate Approved	20/03/25
P2250075	05/03/25	Munster Avenue	Mount Clarence	Single House	Delegate Approved	27/03/25
P2250040	10/02/25	Festing Street	Mount Melville	Single House - Additions	Delegate Approved	12/03/25
P2250098	14/03/25	Redmond-Hay River Road	Redmond	Agriculture Extensive - (Outbuilding)	Delegate Approved	27/03/25
P2250017	22/01/25	Frenchman Bay Road	Robinson	Bushfire Management Plan - Lot 114 (No. 142) Frenchman Bay Road Robinson	Delegate Approved	04/03/25
P2250055	20/02/25	Gledhow West Road	Robinson	Single House - Outbuilding	Delegate Approved	13/03/25
P2250071	28/02/25	Gledhow South Road	Robinson	Existing Development (Carport Earthworks Water Tank Outbuilding)	Delegate Approved	27/03/25
P2250042	11/02/25	Newbold Road	Torbay	Agriculture Extensive (Hay Shed)	Delegate Approved	05/03/25
P2250025	29/01/25	Whaling Station Road	Torndirrup	Development - Maintenance/Repair (Cheynes IV)	Delegate Approved	31/03/25
P2250010	15/01/25	Chester Pass Road	Walmsley	Single House - Outbuilding	Delegate Approved	14/03/25
P2250065	25/02/25	Kemal Court	Warrenup	Single House - Water Tank	Delegate Approved	12/03/25
P2250066	25/02/25	Bull Chase	Warrenup	Single House - Water Tank	Delegate Approved	18/03/25
P2250000	02/01/25	Thompson Road	Youngs Siding	Bushfire Management Plan - 567 Thompson Rd Youngs Siding	Delegate Approved	11/03/25
P2250067	26/02/25	Lilydale Road	Youngs Siding	Single House - Outbuilding	Delegate Approved	10/03/25
P2250081	06/03/25	Knapp Street	Youngs Siding	Single House - Outbuilding	Delegate Approved	24/03/25

CITY OF ALBANY

Building Report

To : His Worship the Mayor and Councillors

From : Information Officer - Development Services

Subject : Building Activity – March 2025

Date : 3 April 2025

Activity Month	# of Permits Issued	Total Value	# of Demolition Permits
10th	61	$10,224,193.00	2

It is brought to Council's attention that these figures include the following:

Permit #	Description	Estimated Value
168706	New Dwelling	$2,100,000.00

Please find attached:

1. Graph 1 – Compares the number of Decisions made
2. Graph 2 – Compares the value of activity
3. Graph 3 – Compares the number of dwellings and units
4. Building Activity Statistics – Provides a breakdown of building activity into various categories
5. Building Permit Detail – Permits Issued for the month of March – the 10th month of activity in the City of Albany financial year 2024/2025

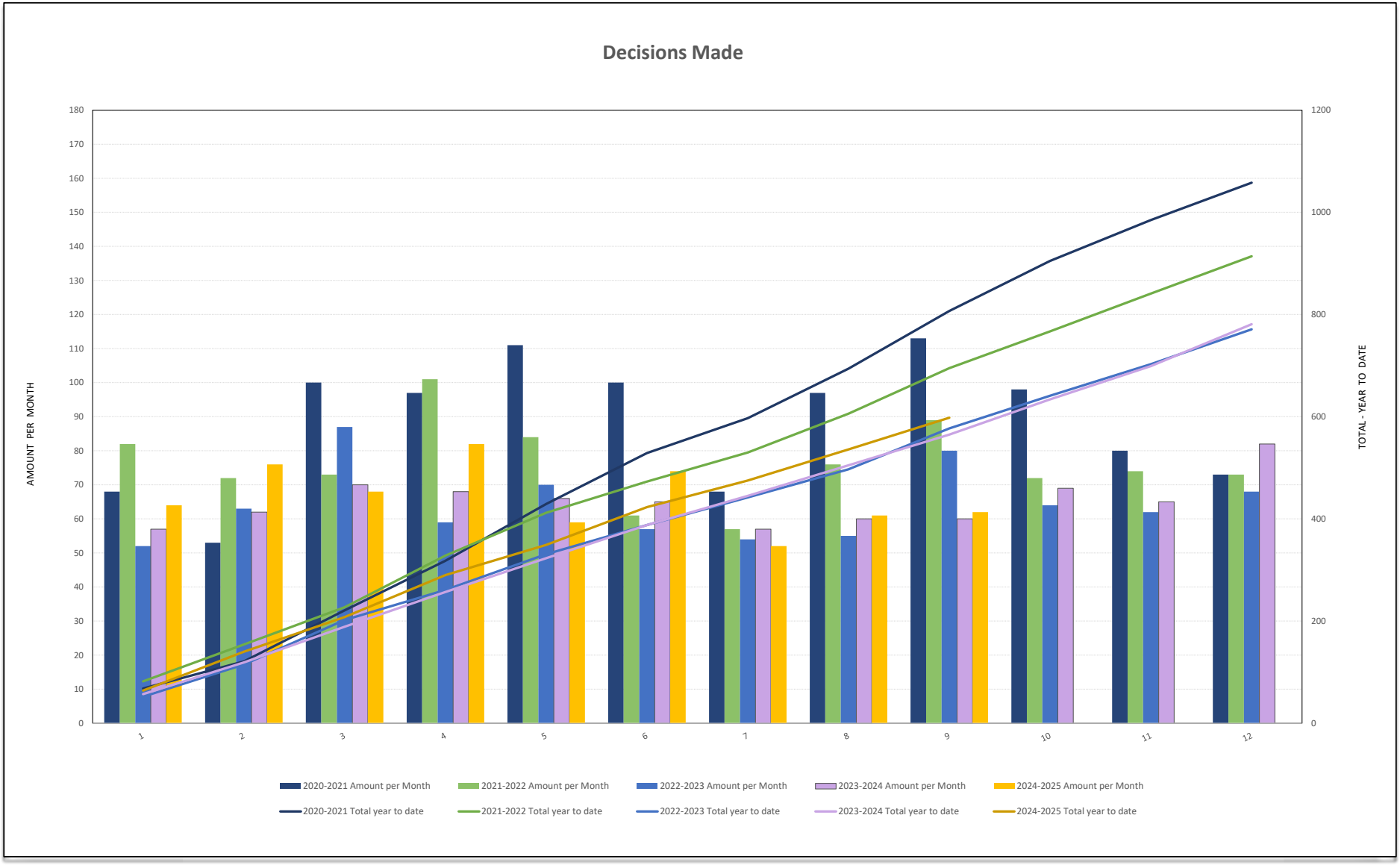
BUILDING, SIGN & DEMOLITION LICENCES ISSUED UNDER DELEGATED AUTHORITY

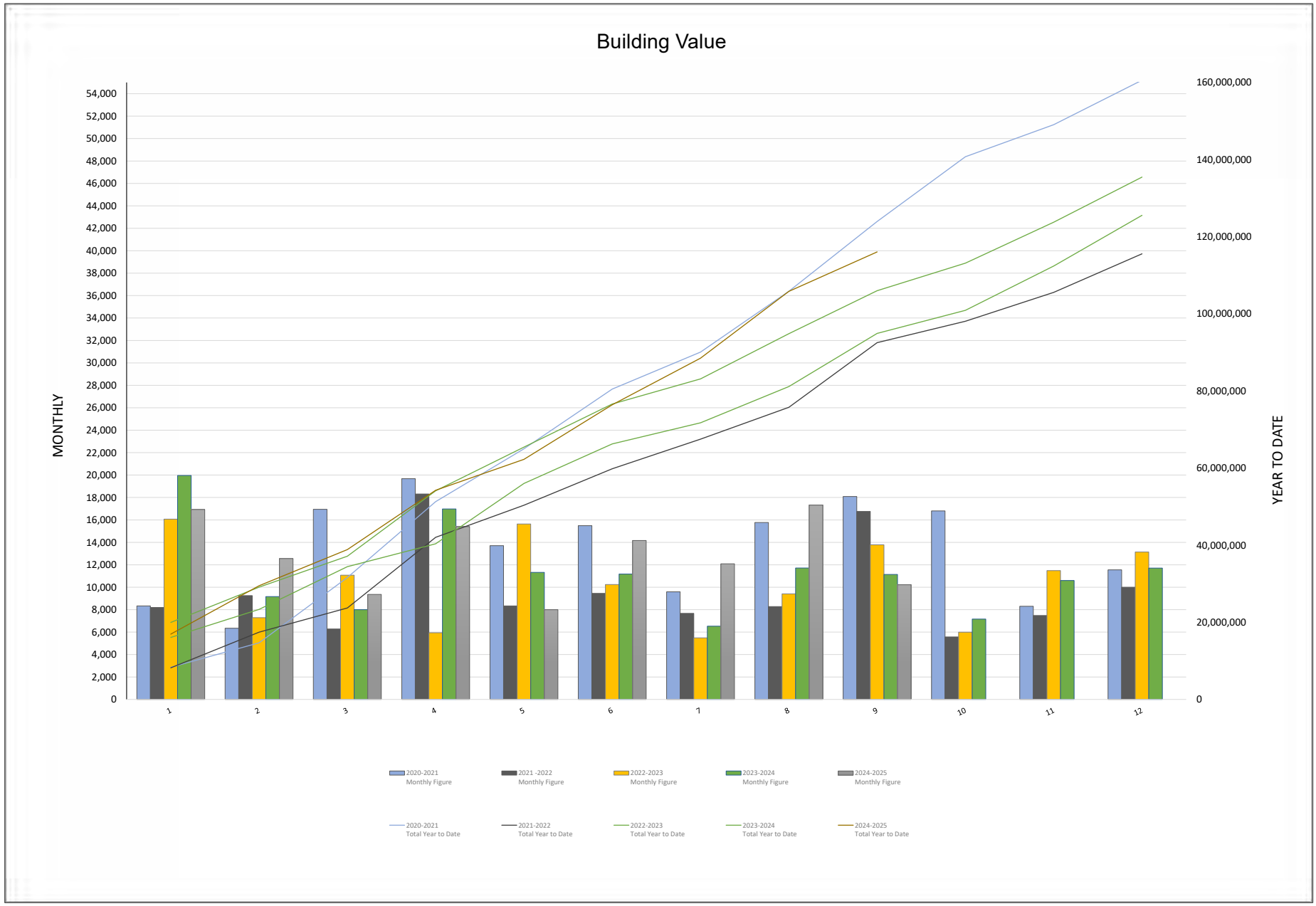
APPLICATIONS DETERMINED FOR MARCH 2025

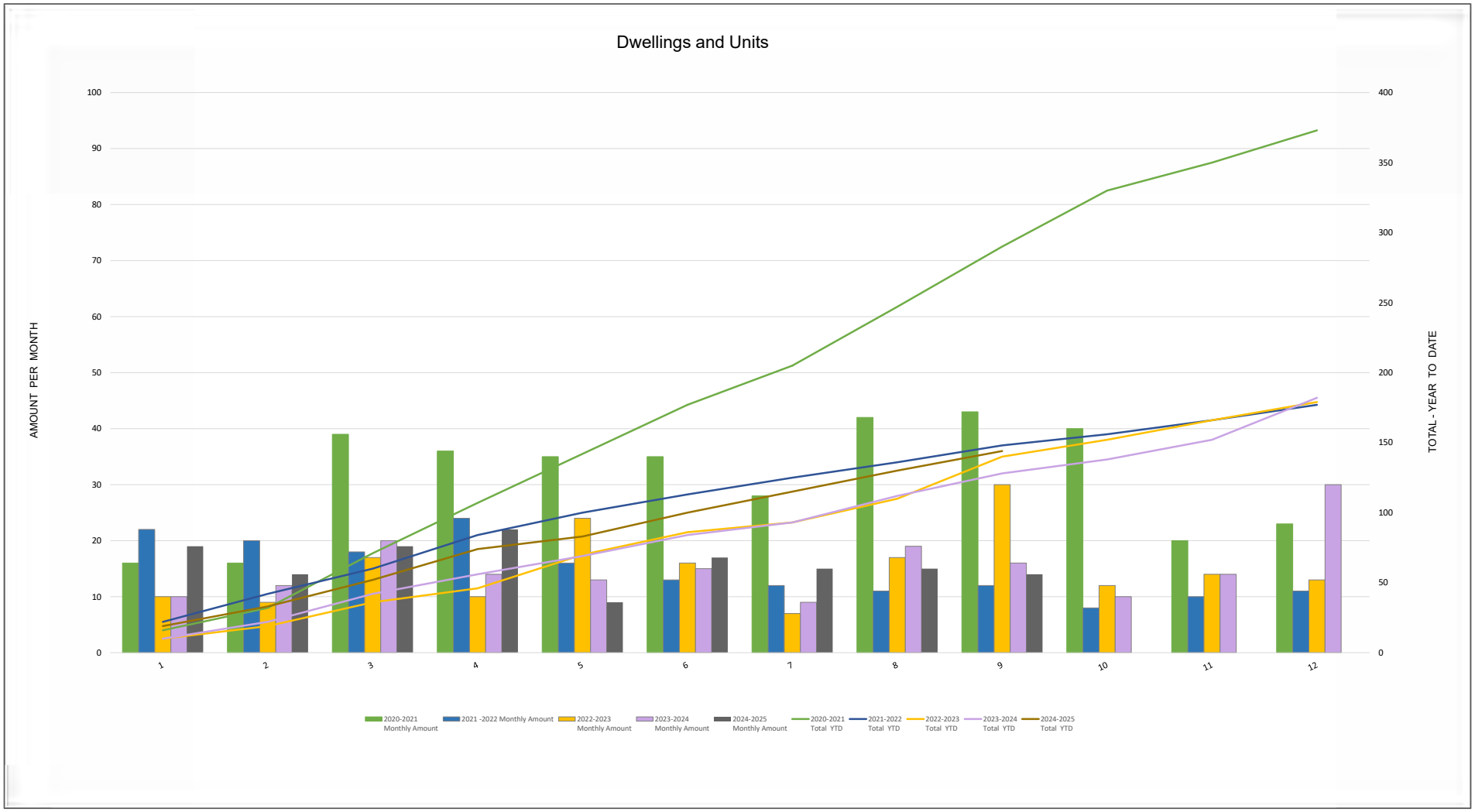
APPLICATION NUMBER	BUILDER	DESCRIPTION OF APPLICATION	STREET #	PROPERTY DESC (LOT #)	STREET ADDRESS	SUBURB
168685	BUILDING APPROVAL CERTIFICATE	CERTIFICATE OF DESIGN COMPLIANCE - SHOP FITOUT - BUTTERFLIES OP SHOP	126	200	LOCKYER AVENUE	CENTENNIAL PARK
168688	ALBANY SOLAR/HOWITT ELECTRICAL	SOLAR PANELS - CERTIFIED	137-139	21	YORK STREET	ALBANY
168689	RYDE BUILDING COMPANY PTY LTD	NEW DWELLING AND RETAINING WALLS - CERTIFIED	48A	150	WAKEFIELD COURT	MIRA MAR
168691	ALBANY HOSPICE - MARISA PAPALIA	SHOP FITOUT - BUTTERFLIES OP SHOP - CERTIFIED	126	200	LOCKYER AVENUE	CENTENNIAL PARK
168675	WA COUNTRY BUILDERS PTY LTD	NEW DWELLING - CERTIFIED	3	51	CLYDESDALE ROAD	MCKAIL
168684	DAVID CHRISTOPHERS	SHED - UNCERTIFIED	56	40	DAVID STREET	SPENCER PARK
168690	ALBANY SIGNS	SIGNS X 3 - UNCERTIFIED	13	72	STRANMORE BOULEVARD	BAYONET HEAD
168682	PETA MICHELE WOODHAMS	RELOCATED DWELLING - CERTIFIED	12	404	ENGLEHEART DRIVE	MCKAIL
168692	TURPS STEEL FABRICATIONS	SHED - UNCERTIFIED	90	219	RANGATIRA ROAD	DROME
168693	RANBUILD GREAT SOUTHERN	CARPORT - UNCERTIFIED	89	533	HOME ROAD	ROBINSON
168696	SMITH CONSTRUCTIONS WA	OCCUPANCY PERMIT - ALTERATIONS & ADDITIONS TO SURF LIFE SAVING CLUB - GROUND FLOOR EXTENSION OF STORAGE COMMUNITY ROOMS/CANTEEN & UPPER LEVEL BALCONY EXTENSION & EXTERNAL WORKS	10	1474	FLINDERS PARADE	MIDDLETON BEACH
168686	WA COUNTRY BUILDERS	NEW DWELLING - CERTIFIED	15	63	BOORARA WAY	MCKAIL
168687	CCS ASBESTOS REMOVAL & DEMOLITION PTY LTD	DEMOLITION PERMIT - REMOVAL OF ASBESTOS FENCE	9-15	9009 6 205 206	BEAUFORT ROAD	YAKAMIA
168694	KOSTER'S OUTDOOR PTY LTD	SHED - UNCERTIFIED	29	4	MYOLA DRIVE	KALGAN
168695	WA COUNTRY BUILDERS PTY LTD	NEW SINGLE STOREY DWELLING PORCH ALFRESCO AND GARAGE - CERTIFIED	18	648	MCCARDELL CRESCENT	BAYONET HEAD
168698	PHILIP BOWLER	POOL & POOL FENCE - UNCERTIFIED	102	3	HUNTON ROAD	KALGAN
168687	DUNKELD CONSTRUCTION PTY LTD	NEW SHED & WATER TANK - UNCERTIFIED	323	52	DEMPSTER ROAD	KALGAN
168700	AUSSIE BUSH CABINS PTY LTD	ANCILLARY DWELLING - CERTIFIED	77	25	BEAUDON ROAD	MCKAIL
168708	MATSON FABRICATIONS	PATIO (UNIT 20) - UNCERTIFIED	1	800 70 9	ULSTER ROAD	YAKAMIA
168707	WA COUNTRY BUILDERS PTY LTD	NEW DWELLING PORCH ALFRESCO AND GARAGE - CERTIFIED	17	62	BOORARA WAY	MCKAIL
168711	KOSTER'S OUTDOOR PTY LTD	SHED - UNCERTIFIED	8	20	CAMFIELD STREET	MOUNT MELVILLE
168712	KOSTERS STEEL CONSTRUCTIONS PTY LTD	DECK EXTENSION & NEW STAIRS - UNCERTIFIED	9	117	WAKEFIELD CRESCENT	MIRA MAR
168668	HOME GROUP WA GREAT SOUTHERN PTY LTD	NEW DWELLING - UNCERTIFIED	108	225	RANGATIRA ROAD	DROME
168680	BRADLEY DAVIS HOOK	PATIO - UNCERTIFIED	159	320	DELORAINE DRIVE	WARRENUP

APPLICATION NUMBER	BUILDER	DESCRIPTION OF APPLICATION	STREET #	PROPERTY DESC (LOT #)	STREET ADDRESS	SUBURB
168713	AUSPAN BUILDING SYSTEMS PTY LTD	FARM SHED EXTENSION - CERTIFIED	276	5987 2246 2245 1966 898 761 77 47 46	DAVY ROAD	REDMOND WEST
168717	AD CONTRACTORS PTY LTD	DEMOLITION PERMIT - SINGLE STOREY DWELLING & OUTBUILDINGS	608	31	CHESTER PASS ROAD	KING RIVER
168699	RYDE BUILDING COMPANY PTY LTD	NEW DWELLING - UNCERTIFIED	164B	2	MIDDLETON ROAD	MIRA MAR
168702	Daniel Thomas Stephenson	ADDITIONS - UNCERTIFIED	53	2	PARADE STREET	ALBANY
168709	GLIOSCA BUILDING PTY LTD	NEW MODULAR DWELLING (SITE 30) - CERTIFIED	33	734	BARKER ROAD	CENTENNIAL PARK
168719	JTC CONSTRUCTION (WA) PTY LTD	SHED - UNCERTIFIED	82	128	GLEDHOW WEST ROAD	ROBINSON
168704	MATSON FABRICATIONS	PATIO - UNCERTIFIED	Unit 6, 54	6	LION STREET	CENTENNIAL PARK
168715	BUILDING APPROVAL CERTIFICATE	BUILDING APPROVAL CERTIFICATE - SHED	Lot 189	189	LOWER DENMARK ROAD	BORNHOLM
168716	BUILDING APPROVAL CERTIFICATE	BUILDING APPROVAL CERTIFICATE - DECK INTERNAL WALL REMOVAL & RETAINING WALL	6	31	TAYLOR STREET	MIRA MAR
168718	MITCHELL POETT PTY LTD	PORCH AND RE-ROOF - UNCERTIFIED	6	31	TAYLOR STREET	MIRA MAR
168727	KOSTER'S OUTDOOR PTY LTD	PATIO - UNCERTIFIED	16	405	CATLING CLOSE	WARRENUP
168710	WALMSLEY BUILDING CO PTY LTD	PATIO - UNCERTIFIED	276-278	4428	MOORIALUP ROAD	NAPIER
168722	MATSON FABRICATIONS	CARPORT - UNCERTIFIED	1546	14	MILLBROOK ROAD	KING RIVER
168697	RYDE BUILDING COMPANY PTY LTD	NEW DWELLING - UNCERTIFIED	7A	2	BURVILL ROAD	GLEDHOW
168723	BOYD RAE	HAY SHED - UNCERTIFIED	123	13	NEWBOLD ROAD	TORBAY
168726	AARON VOSS	SPA AND FENCE - UNCERTIFIED	68	254	WARRENUP PLACE	WARRENUP
168728	ALBANY SIGNS	SIGN X 1 (UNIT 1) - UNCERTIFIED	91-97	35	ABERDEEN STREET	ALBANY
168729	SERENITAS COMMUNITIES HOLDINGS PTY LTD	VERANDAH - UNCERTIFIED SITE 198	Site 198, 20	501	ALISON PARADE	BAYONET HEAD
168730	SERENITAS COMMUNITIES HOLDINGS PTY LTD	CARPORT AND VERANDAH EXTENSION - UNCERTIFIED SITE 98	Site 98, 20	501	ALISON PARADE	BAYONET HEAD
168714	M & G GUNN PTY LTD	WAREHOUSE EXTENSION - CERTIFIED	128	10	CHESTER PASS ROAD	LANGE
168736	RANBUILD GREAT SOUTHERN	PATIO X 2 - UNCERTIFIED	9	126	LORENZO WAY	ORANA
168742	MR R J WIGNALL	SHED - UNCERTIFIED	448	50	CHESTER PASS ROAD	WALMSLEY
168739	HARWILL HOMES	ADDITIONS AND ALTERATIONS TO EXISTNG DWELLING - CERTIFIED	24	2 66	STIRLING TERRACE	ALBANY
168745	TOM PHILLIPS AND SOPHIE PHILLIPS	OCCUPANCY PERMIT - WORKSHOP / OFFICE - ADDITION	27	61	PENDEEN ROAD	WILLYUNG
168706	BRUCE TURNER	NEW DWELLING - UNCERTIFIED	Lot 237	237	EDEN ROAD	NULLAKI
168720	BUTTON BUILDING PTY LTD	NEW DWELLING - CERTIFIED	9	66	FESTING STREET	ALBANY
168731	RYDE BUILDING COMPANY PTY LTD	NEW DWELLING - UNCERTIFIED	47	123	DIAMOND STREET	LITTLE GROVE
168733	BUILDING APPROVAL CERTIFICATE	BAC - UNAUTHORISED WORKS TO DWELLING AND CARPORT	122	520	AJANA DRIVE	MARBELUP

APPLICATION NUMBER	BUILDER	DESCRIPTION OF APPLICATION	STREET #	PROPERTY DESC (LOT #)	STREET ADDRESS	SUBURB
168732	WA COUNTRY BUILDERS PTY LTD	NEW DWELLING - CERTIFIED	99	260	RANGATIRA ROAD	DROME
168740	WILDWOOD BUILDING COMPANY PTY LTD - WILDWOOD CARPENTRY & BUILDING	SHED - UNCERTIFIED	33	64	WATARI RISE	KALGAN
168741	PLUNKETT HOMES (1903) PTY LTD	NEW DWELLING - CERTIFIED	31	37	CLYDESDALE ROAD	MCKAIL
168752	JASON MCLEAN	RETAINING WALL - UNCERTIFIED	13	4	PRIOR STREET	CENTENNIAL PARK
168195	SERENITAS COMMUNITIES HOLDINGS PTY LTD	STAGE 4B & 5B - MORTARED ROCK PITCH BATTER - UNCERTIFIED	20	501	ALISON PARADE	BAYONET HEAD
168724	HOME GROUP WA GREAT SOUTHERN PTY LTD	NEW DWELLING - UNCERTIFIED	34	205	RANGATIRA ROAD	DROME
168743	WA COUNTRY BUILDERS PTY LTD	NEW DWELLING ANCILLARY DWELLING PORCH ALFRESCO AND GARAGE - CERTIFIED	25	58	BOORARA WAY	MCKAIL
168744	BUILDING APPROVAL CERTIFICATE	BUILDING APPROVAL CERTIFICATE - RETAINING WALL	45	234	LA PEROUSE ROAD	GOODE BEACH
168747	CHRISTOPHER BARKER	SHED - UNCERTIFIED	17	34	KNAPP STREET	YOUNGS SIDING
168750	OAKLEIGH CONSTRUCTION PTY LTD	GARAGE - UNCERTIFIED	36B	1	MCLEOD STREET	MIRA MAR


Decisions Made
AMOUNT PER MONTH
TOTAL - YEAR TO DATE
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
0
200
400
600
800
1000
1200
1
2
3
4
5
6
7
8
9
10
11
12
2020-2021 Amount per Month
2021-2022 Amount per Month
2022-2023 Amount per Month
2023-2024 Amount per Month
2024-2025 Amount per Month
2020-2021 Total year to date
2021-2022 Total year to date
2022-2023 Total year to date
2023-2024 Total year to date
2024-2025 Total year to date


Building Value
MONTHLY
YEAR TO DATE
54,000
52,000
50,000
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
32,000
30,000
28,000
26,000
24,000
22,000
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
160,000,000
140,000,000
120,000,000
100,000,000
80,000,000
60,000,000
40,000,000
20,000,000
0
1
2
3
4
5
6
7
8
9
10
11
12
2020-2021 Monthly Figure
2021 -2022 Monthly Figure
2022-2023 Monthly Figure
2023-2024 Monthly Figure
2024-2025 Monthly Figure
2020-2021 Total Year to Date
2021-2022 Total Year to Date
2022-2023 Total Year to Date
2023-2024 Total Year to Date
2024-2025 Total Year to Date


Dwellings and Units
AMOUNT PER MONTH
TOTAL - YEAR TO DATE
100
90
80
70
60
50
40
30
20
10
0
400
350
300
250
200
150
100
50
0
1
2
3
4
5
6
7
8
9
10
11
12
2020-2021 Monthly Amount
2021 -2022 Monthly Amount
2022-2023 Monthly Amount
2023-2024 Monthly Amount
2024-2025 Monthly Amount
2020-2021 Total YTD
2021-2022 Total YTD
2022-2023 Total YTD
2023-2024 Total YTD
2024-2025 Total YTD

CITY OF ALBANY
BUILDING CONSTRUCTION STATISTICS FOR 2024 - 2025

	SINGLE		GROUP			DOMESTIC/		ADDITIONS/		HOTEL/		NEW		ADDITIONS/		OTHER		TOTAL $
2024-2025	DWELLING		DWELLING		Total	OUTBLDGS		DWELLINGS		MOTEL		COMMERCIAL		COMMERCIAL				VALUE
	No	$ Value	No	$ Value		No	$ Value	No	$ Value	No	$ Value	No	$ Value	No	$ Value	No	$ Value	
JULY	12	6,330,906	7	7,512,621	19	7	293,644	6	544,763	0	0	0	0	14	1,440,484	16	808,359	16,930,777
AUGUST	12	6,694,568	2	444,788	14	14	509,783	6	722,367	0	0	3	1,120,000	6	2,446,493	12	616,615	12,554,614
SEPTEMBER	18	6,801,033	1	168,000	19	16	624,657	20	571,117	0	0	3	1,000,343	1	35,000	7	161,182	9,361,332
OCTOBER	21	8,450,350	1	490,417	22	15	1,217,750	23	825,766	0	0	3	4,010,967	1	1,000	13	410,033	15,406,283
NOVEMBER	9	4,093,899	0	0	9	16	637,732	13	797,425	0	0	4	922,047	3	303,000	10	1,243,682	7,997,785
DECEMBER	14	7,258,196	3	975,043	17	15	1,647,854	21	3,319,103	0	0	1	100,000	1	11,500	16	855,953	14,167,649
JANUARY	11	5,071,174	4	5,145,620	15	5	335,420	14	595,043	1	270,000	0	0	1	148,865	12	523,204	12,089,326
FEBRUARY	15	6,726,858	2	640,000	17	9	444,017	8	610,985	0	0	1	1,714,923	3	1,702,919	19	5,481,063	17,320,765
MARCH	14	6,104,291	0	0	14	12	526,891	18	835,220	0	0	1	425,000	5	1,212,997	7	60,218	9,164,617
APRIL					0													0
MAY					0													0
JUNE					0													0
TOTAL TO DATE	**126**	**57,531,275**	**20**	**15,376,489**	**146**	**109**	**6,237,748**	**129**	**8,821,789**	**1**	**270,000.00**	**16**	**9,293,280**	**35**	**7,302,258**	**112**	**10,160,309**	**114,993,148**