ATTACHMENTS

Development and Infrastructure Services Committee Meeting

15 August 2018

6.00pm

City of Albany Council Chambers

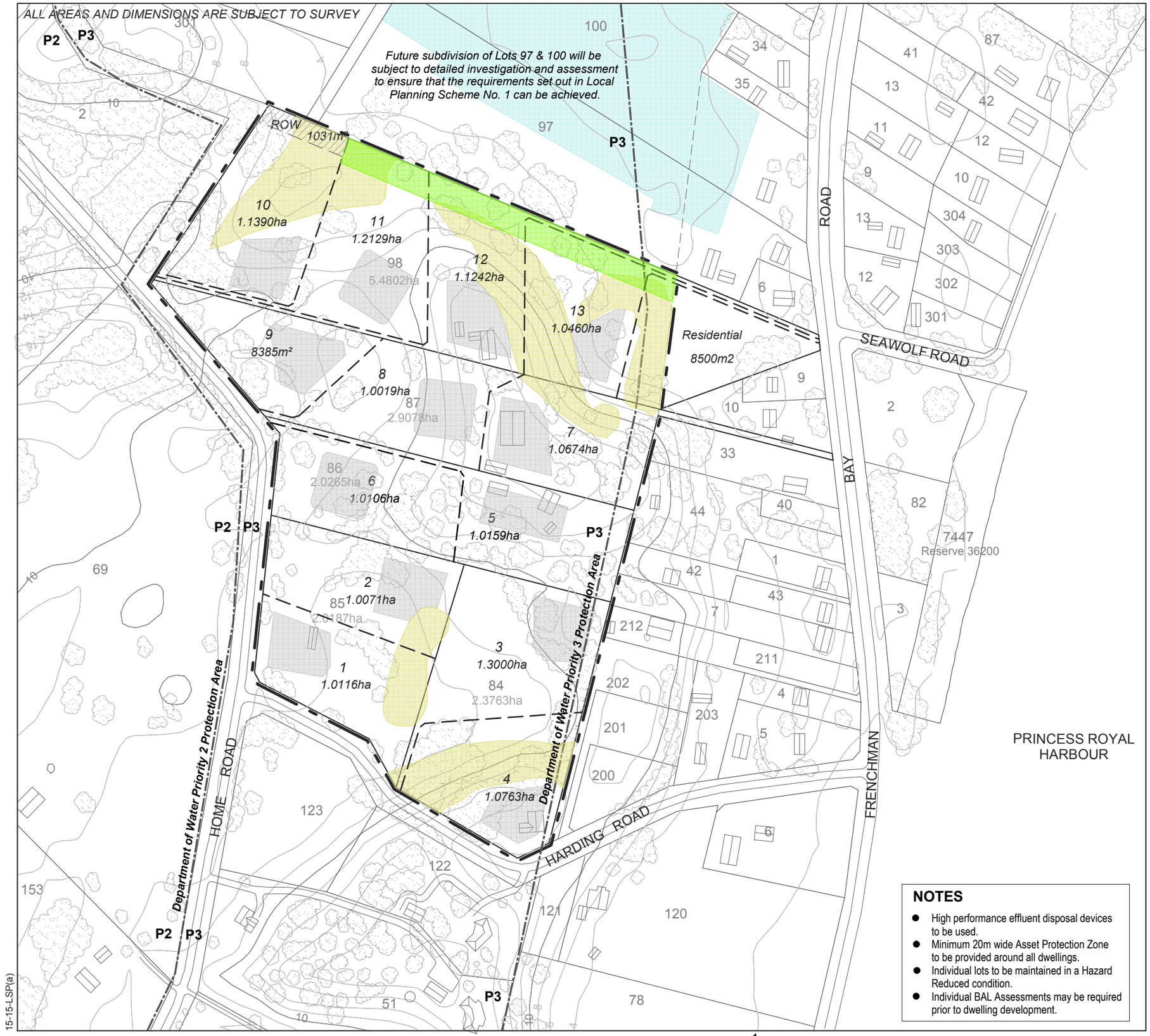
TABLE OF CONTENTS

REPORT ITEM DIS115 REFERS

Local Structure Plan

Frenchman Bay, Home & Harding Roads Rural Residential Area 43

Lots 84, 85 Harding Road & Lots 86, Pt87 & Pt98 Home Road Robinson, City of Albany



LEGEND

- Subject Land
- Existing Lot Boundaries
- Proposed Lot Boundaries
- Existing Vegetation
- Existing Buildings
- Vegetated Agricultural Buffer
- Effluent Disposal Exclusion Area
- Market Garden
- Indicative Building Envelope
  Max 2000m2
- P2 DoW Priority 2 Protection Area
- P3 DoW Priority 3 Protection Area

ORIG A3
SCALE 1:3000

Map Modification -	1a
Map Creator -	BQ/MRT
Copyright -	Ayton Baesjou Planning
Sources -	Landgate (Cadastre & Contours)
Datum -	AHD
Contact -	Ayton Baesjou Planning
Disclaimer -	Subject to Verification & Survey

0 15 30 45 60 75

NOTES

- High performance effluent disposal devices to be used.
- Minimum 20m wide Asset Protection Zone to be provided around all dwellings.
- Individual lots to be maintained in a Hazard Reduced condition.
- Individual BAL Assessments may be required prior to dwelling development.

AYTON BAESJOU
PLANNING
59 Peels Place
ALBANY WA 6330
Ph 9842 2304 Fax 9842 8494

15-15-LSP(a)

CITY OF ALBANY

LOCAL PLANNING SCHEME NO. 1

LOCAL STRUCTURE PLAN

RURAL RESIDENTIAL AREA NO. 43
FRENCHMAN BAY, HARDING & HOME ROADS
ROBINSON

AYTON BAESJOU
PLANNING

ABN: 15 061 140 172
59 Peels Place
Albany WA 6330
Ph 9842 2304 Fax 9842 8494

Endorsement

This structure plan is prepared under the provisions of the City of Albany Local Planning Scheme No. 1.

IT IS CERTIFIED THAT THIS STRUCTURE PLAN WAS APPROVED BY RESOLUTION OF THE WESTERN AUSTRALIAN PLANNING COMMISSION ON:

_____ Date

Signed for and on behalf of the Western Australian Planning Commission:

_____

an officer of the Commission duly authorised by the Commission pursuant to section 16 of the Planning and Development Act 2005 for that purpose, in the presence of:

_____ Witness

_____ Date

_____ Date of Expiry

Amendments:

Amendment No.	Summary of Amendment	Amendment Type	Date Approved (WAPC)

EXECUTIVE SUMMARY

This Local Structure Plan has been prepared to guide subdivision and development of Lots 84, 85, 86 and a portion of Lots 87 & 98 Home, Harding & Frenchman Bay Roads Robinson for Rural Residential purposes.

The land is located less than 5.5km from the Albany Central Area and is currently used for Rural Small Holding/ Rural Residential Purposes.

In accord with local and state policy promoting the efficient use of underutilised zoned and serviced land, the Local Structure Plan provides for the intensification of Rural Residential landuse to the density set and permitted in the locality and as established by local scheme and strategy.

Lot yield and arrangement is based on capability, site opportunities and constraints and is informed by specific site and fire assessments.

This Local Structure Plan should be read with and is adjunct to Local Planning Scheme No. 1 Amendment No. 27.

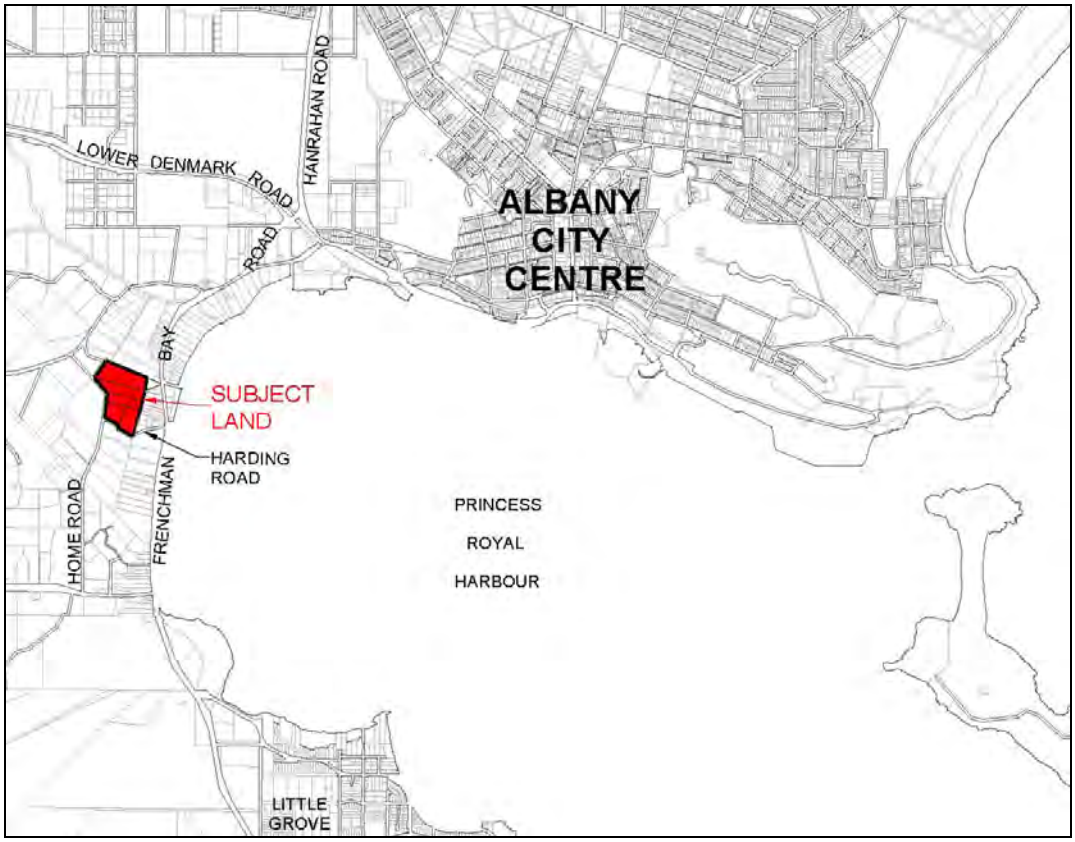
Local Structure Plan Summary Table:	
Total Area	14.05ha
Existing Lots	5
Lot Yield	13
Dwelling Density	1.05ha/Dw
Estimated Population	31pp
Estimated Additional Population	19pp
School Sites/ Other	NA

Contents

PART 1. – STATUTORY

1.0 Structure Plan Area

The Structure Plan covers Lots 84, 85, 86 and a portion of Lots 87 & 98 Home, Harding & Frenchman Bay Roads Robinson zoned Rural Residential and as shown below.



2.0 Content of Local Structure Plan

The Local Structure Plan comprises two parts being:

1. Statutory; Containing the Local Structure Plan Map (Following Page).
2. Explanatory; referring to the background for and issues inherent in the Local Structure Plan per Local Planning Scheme No. 1 Amendment No. 27.

3.0 Relationship to Local Planning Scheme No. 1

The requirements of the LSP apply as if they were part of the Scheme.
In any conflict between scheme clauses or provisions and the LSP, the provisions or clauses of the scheme shall prevail.
Words and expressions used in the LPS have the same meaning as given in Local Planning Scheme No. 1.
Pursuant to clause 27 Schedule 2 Part 4 of the Planning and Development (Local Planning Schemes) Regulations 2015, due regard is to be given to the requirements of the Local Structure Plan in any subdivision and development applications.

4.0 Operation

The LSP will come into effect following certification by the WA Planning Commission.

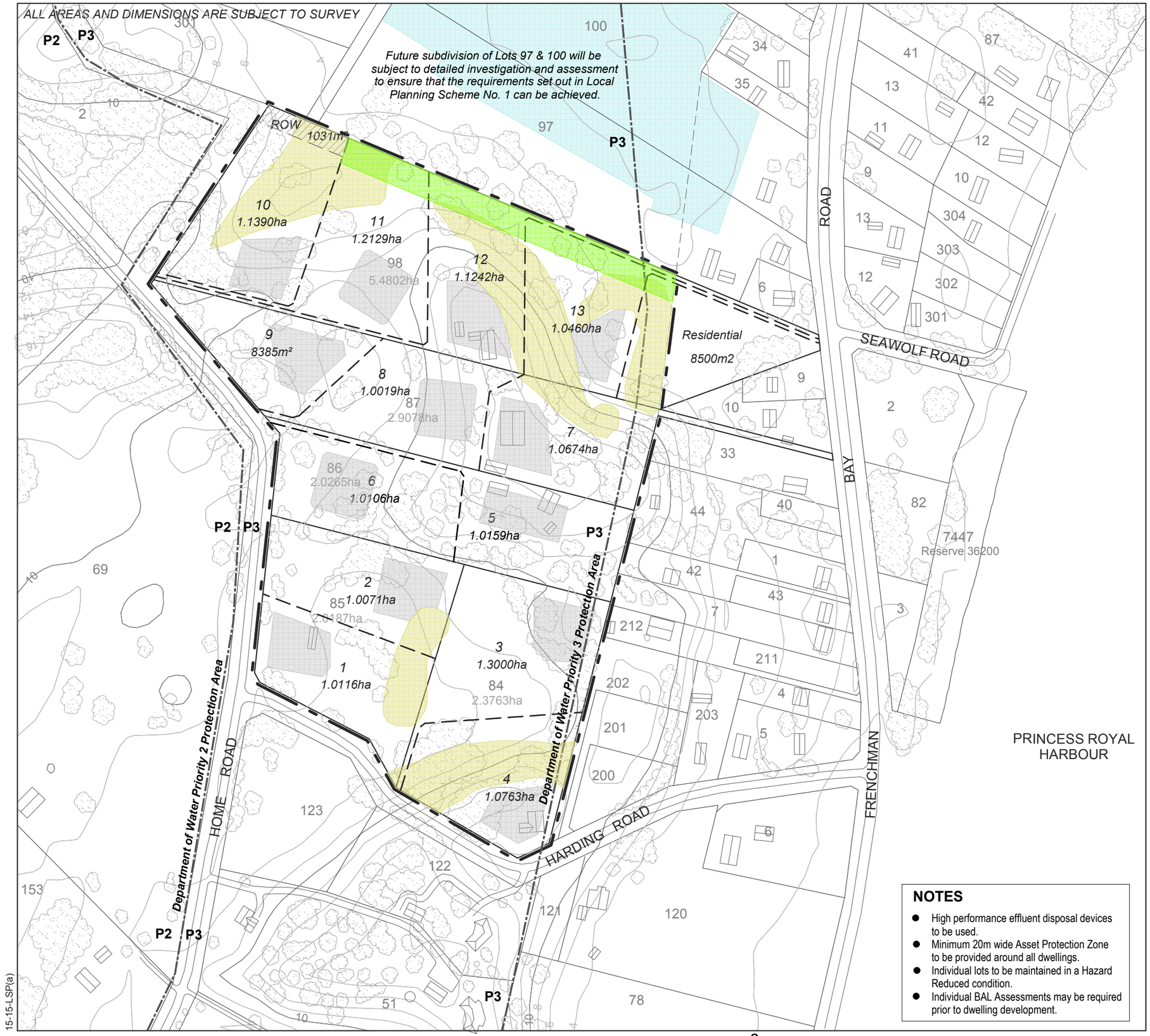
5.0 Subdivision and Development Conditions

In addition to the general clauses of the Scheme and the Special Provisions of Schedule 14 relating to Rural Residential Area No. 43, subdivision is to follow that shown on the LSP Map. Minor variations may be approved by the WA Planning Commission.

Local Structure Plan

Frenchman Bay, Home & Harding Roads Rural Residential Area 43

Lots 84, 85 Harding Road & Lots 86, Pt87 & Pt98 Home Road Robinson, City of Albany



LEGEND

- Subject Land
- Existing Lot Boundaries
- Proposed Lot Boundaries
- Existing Vegetation
- Existing Buildings
- Vegetated Agricultural Buffer
- Effluent Disposal Exclusion Area
- Market Garden
- Indicative Building Envelope (Max 2000m2)
- P2 — DoW Priority 2 Protection Area
- P3 — DoW Priority 3 Protection Area

ORIG A3
SCALE 1:3000

Map Modification -	1a
Map Creator -	BQ/MRT
Copyright -	Ayton Baesjou Planning
Sources -	Landgate (Cadastre & Contours)
Datum -	AHD
Contact -	Ayton Baesjou Planning
Disclaimer -	Subject to Verification & Survey

0 15 30 45 60 75

NOTES

- High performance effluent disposal devices to be used.
- Minimum 20m wide Asset Protection Zone to be provided around all dwellings.
- Individual lots to be maintained in a Hazard Reduced condition.
- Individual BAL Assessments may be required prior to dwelling development.

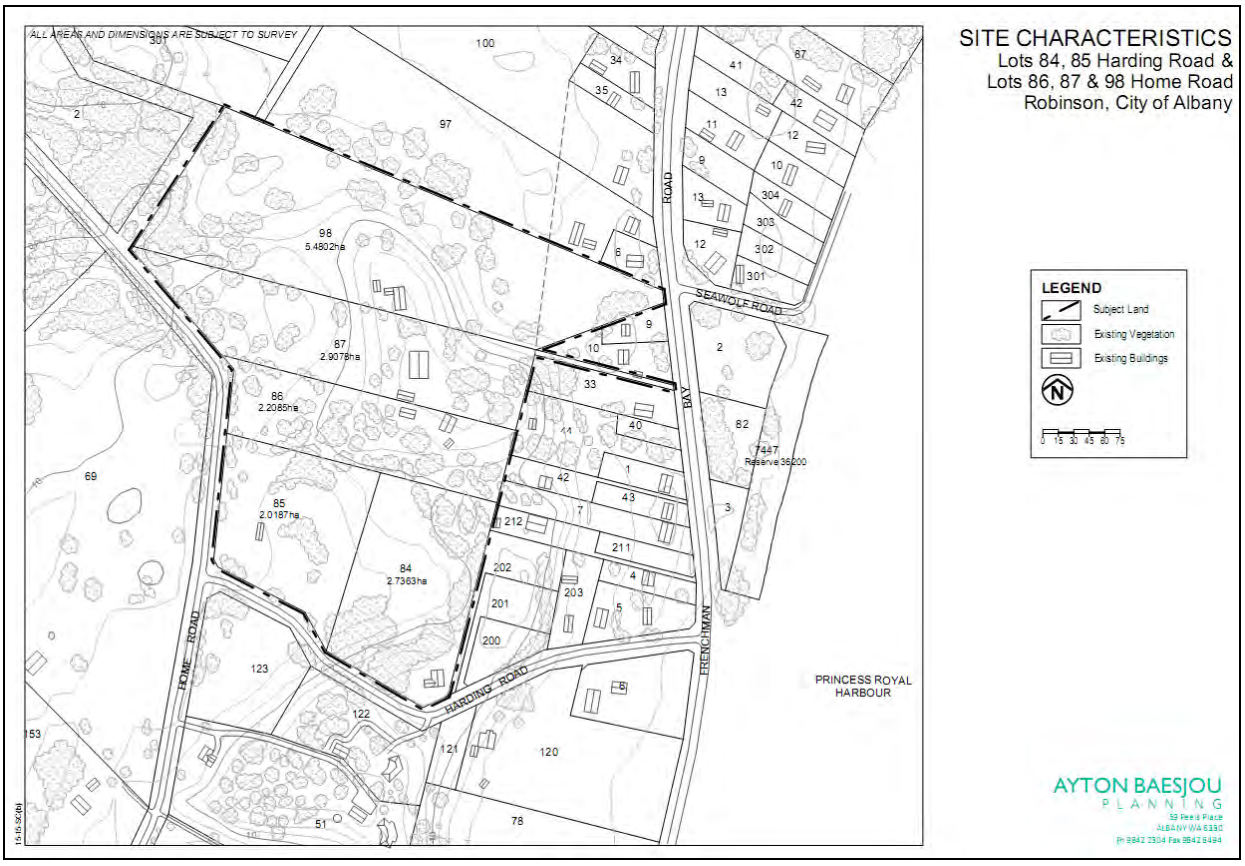
AYTON BAESJOU
PLANNING
59 Peels Place
ALBANY WA 6330
Ph 9842 2304 Fax 9842 8494

15-15-LSP(a)

PART 2 – EXPLANATORY

The land is located some 5.5km by road south west of the Albany City Centre (Princess Royal Drive and Frenchman Bay Road). The land has access to Frenchman Bay Road, Harding Road & Home Road.

Lot sizes range from 2ha to 5.4ha and are used for rural retreat or rural small holdings purposes. The land is in a precinct comprised of residential lots fronting and east of Frenchman Bay Road, rural residential and rural pursuits on the low flat land to the north with established rural residential estates to the south and west.



As a part of Amendment No. 27 to Local Planning Scheme No. 1 which seeks to transfer the land from Rural Residential Area No. 29 to Area No. 43, a Local Structure Plan (Map) is required. This plan identifies the future lot layout and associated spatial subdivision and development issues and requirements following on from the special provisions identified in Amendment 27 necessary to apply to the land.

As a result, reference should be made to the Amendment No. 27 reports and technical assessments covering site and capability, bushfire safety, existing provisions, servicing and the requirements for future subdivision.

The LSP depicts the general layout, outlines effluent disposal exclusion areas, indicative building envelopes, access arrangements and the other subdivisional components necessary to provide for development.

The plan is based on capability, site opportunities and constraints and is informed by specific site and fire assessments. Background and analysis including the site specific assessments carried out are included in the Amendment No. 27 documentation.

Supporting the LSP, Amendment No. 27 and the existing rural residential controls include measures to:

- Include the land within Rural Residential Area No. 43 and reference the LSP Map as the guide to future subdivision.
- Provide for subdivisional and development servicing as necessary.
- Provide for landowner notifications covering agricultural activities and bushfire safety.
- Include specific bushfire safety provisions.
- Provide prudent landuse control and approval requirements.
- Provide building envelope and effluent disposal location control.

Appendix C

Fire Assessment

RR 43 Home & Harding Road Precinct

Biodiverse Solutions Pty Ltd

AS 3959 Bushfire Attack Level (BAL) Contour Plan Report

Site Details			
Address:	Lots 84,85,87,98 Home and Harding Road		
Suburb:	Robinson	**State:**	W.A.
Local Government Area:	City of Albany		
Description of Building Works:	Building development		
Stage of WAPC Planning	WAPC Application		

Report Details			
Report / Job Number:	AB007	**Report Version:**	Final Ver 2
Assessment Date:	1st & 8th November 2016	**Report Date:**	20/2/2017

Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2017
Jurisdiction: Level 2 – WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Plot 1 Forest Type A >5 to 10 degrees downslope
Plot 2 Forest Type A >5 to 10 degrees downslope
Plot 3 Forest Type A >0 to 5 degrees downslope
Plot 4 Forest Type A upslope/flat
Plot 5 Scrub Type D upslope/flat
Plot 6 Forest Type A >0 to 5 degrees downslope
Plot 7 Forest Type A upslope/flat
Plot 8 Grassland Type G >15 to 20 degrees downslope
Plot 9 Woodland Type B >15 to 20 degrees downslope
Plot 10 Scrub Type D upslope/flat
Plot 11 Forest Type A >15 to 20 degrees downslope
Plot 12 Forest Type A upslope/flat
Plot 13 Woodland Type B upslope/flat
Plot 14 Grassland Type G upslope/flat
Plot 15 Woodland Type B upslope/flat
Plot 16 Forest Type A >10 to 15 degrees downslope
Plot 17 Forest Type A upslope/flat
Plot 18 Woodland Type B >5 to 10 degrees downslope
Plot 19 Forest Type A upslope/flat
Plot 20 Forest Type A upslope/flat
Plot 21 Woodland Type B upslope/flat
5.4802ha
2.9078ha
2.0265ha
2.9187ha
2.3763ha
HOME ROAD
HARDING ROAD
FRENCHMAN BAY ROAD

Legend

- Photo ID
- Subject Site
- 100m Assessment Boundary
- Cadastre
- 5m Contours
- Slope Degrees

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2
- Development Exclusion Area

Scale
1:3,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Ayton Baesjou
Lots 84, 85, 87, 98 Home and Harding Road
Albany, WA 6330

Vegetation Classes Map

STATUS	FILE	DATE
FINAL	AB007	16/12/2016

SECTION 1 - Vegetation Classification

All vegetation within 100m of the site / proposed development was classified in accordance with Table 2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Map page 2.

Plot	**1**	**Classification or Exclusion Clause**	**Forest Type A**
			Closed *Agonis flexuosa* forest. Multi-layered vegetation structure. Potential surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. External to site. Down slope-effective slope 7 degrees.
Photo 1-Photo ID 1-Looking north east from northern boundary. Boundary located on ridge running from east to west.			

Plot	**2**	**Classification or Exclusion Clause**	**Forest Type A**
			Closed *Agonis flexuosa* forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Upslope/downslope (straddles ridgline)-effective slope 8 degrees. Internal to site-APZ management can be applied.
Photo 2-Photo ID 2 –Photo looking south east from plot 1.			

Plot	3	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis flexuosa* forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Downslope-effective slope 3 degrees. External to site. Separation 10 metres.
Photo 3-Photo ID 3- View looking north along Home Road. Road cuts through original ridge line.			

Plot	4	Classification or Exclusion Clause	Forest Type A
			Closed Warren River Cedar Forest and Peppermint forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. External to site. Flat land. 0m separation to site.
Photo 4-Photo ID 4-View to the south east. Steep slopes are located further south.			

Plot	5	Classification or Exclusion Clause	Scrub Type D
			Pampas Grass to 3 metres in height growing on peat swamp. Potential Fuel Loading 25t/ha at maturity. >30% vegetative cover. Flat land. Internal and external to the site and contained within development exclusion area. Internal to site-APZ management can be applied.
Photo 5-Photo ID 5-View west towards plots 1 and 2. Heavy Pampas grass infestation.			

Plot	6	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis flexuosa* forest Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. External to site. Downslope-effective slope 4 degrees.
Photo 6-Photo ID 6-View to the north east. Heavy infestation of Arum Lilly and Dolichos			

Plot	7	Classification or Exclusion Clause	Forest Type A
			*Agonis flexuosa* forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Located external and external to site. Flat ground. Internal to site-APZ management can be applied.
Photo 7-Photo ID 7-Looking south towards adjoining property. Heavy pasture invasion in understory.			

Plot	8	Classification or Exclusion Clause	Grassland Type G
			Located with development exclusion area. Potential fuel load 3-4.5 t/ha. Down slope-effective slope 20 degrees to the east Internal to site. Mowing and slashing to meet APZ requirement. Internal to site-APZ management can be applied.
Photo 8-Photo ID 8-View to the south from driveway-height of grasses exceeds 300mm. Patchy understorey regeneration displays frequency of current management.			

Plot	9	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 9-10 metres with 10-30% foliage cover. Understory cleared-replaced by mixed unmanaged pasture-grasses 100-300mm. Not multi layered. Effective slope 20 degrees. Potential fuel loading 15-25 t/ha. Internal to site and located within development exclusion area. APZ management standards can be applied.
Photo 9-Photo ID 9-Looking north towards plot 6			

Plot	10	Classification or Exclusion Clause	Scrub Type D
			Located to the east-internal to subject site. Pampas grass infestation adjoining water hole. Currently grazed by goats. If grazing were discontinued the site would return to a state similar to plot 5. Potential fuel load 3-4.5 t/ha. Flat ground. Internal to site-APZ management can be applied.
Photo 10-Photo ID 10-View to the south east. Goats can just be seen in background.			

Plot	11	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Downslope-effective slope 20 degrees. Internal to site, within development exclusion area. APZ management can be applied.
Photo 11-Photo ID 11-Veiw to the west. Plot 8 located top right of photo.			

Plot	12	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Effective Slope – Upslope. Internal to site, within development exclusion area. APZ management can be applied.
Photo 12-Photo ID 12 View of forest Type A from the east (LHS of Phot)			

Plot	13	Classification or Exclusion Clause	Woodland Type B
			Karri woodland average height 15 metres with 10-30% foliage cover. Some over storey dying. Understory cleared-replaced by mixed unmanaged pasture-grasses 100-300mm. Not multi layered. Effective slope flat ground. Potential fuel loading 15-25 t/ha. Internal to site. APZ management standards can be applied.
Photo 13-Photo ID 13-View to the west adjacent to Lot 12. Heavy weed infestation present.			

Plot	14	Classification or Exclusion Clause	Grassland Type G
			Located western boundary-external to subject site. Currently grazed. Potential fuel load 3-4.5 t/ha. Effective slope - Upslope. Separation 11 metres.
Photo 14-Photo ID 14-view to the north west from home Road.			

Plot	15	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 6-8 metres with 10-30% foliage cover. Understory - unmanaged pasture-grasses 100-300mm. Not multi layered. Upslope-effective slope 0.8 degrees. External to site
Photo 15-Photo ID 15 View of Woodland Type B in private property to the south			

Plot	16	Classification or Exclusion Clause	Forest Type A
Photo not available, private property			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Down slope-Effective slope 15 degrees. External to site.

Plot	17	Classification or Exclusion Clause	Forest Type A
Photo not available, private property			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Upslope-effective slope 5 degrees. External to site.

Plot	18	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 6-8 metres with 10-30% foliage cover. Understory - unmanaged pasture-grasses 100-300mm.Scattered remnant natives Not multi layered. Down slope-effective slope 10 degrees to existing house. Upslope to lot internal areas. Internal to site-APZ management can be applied.
Photo 18-Photo ID 18-View of Woodland Type B north of existing house			

Plot	19	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Flat Ground. Internal and external to site. Internal to site-APZ management can be applied.
Photo 19-Photo ID 19-Looking west to Home Road of Plot 19 (RHS of photo)			

Plot	20	Classification or Exclusion Clause	Forest Type A
			*Agonis flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Upslope. External to site,
Photo 20-Photo ID 20-View to the south west from the north east of Plot 20.			

Plot	21	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 6-8 metres with 10-30% foliage cover. Understory - unmanaged pasture-grasses 100-300mm. Scattered remnant natives. Not multi layered. Upslope. External to site to the south east.
Photo 21-Photo ID 21 view of Woodland Type B to the south east of the subject site. View from the north to the south along Plot 21 in private property.			

SECTION 3: Potential Bushfire Impacts

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below and shown on the BAL Contour Page 16.

BE on lot	Vegetation Classification	Effective Slope	Separation (m) to lot	BAL
1	Forest Type A (Plot 19) Woodland Type B (Plot 15) Forest Type A (Plot 3)	Flat Land Flat Land Downslope>0 to 5 deg	0m 20m 10m	BAL 12.5 to existing house N/A overridden by Plot19 BAL 12.5 to existing house
2	Forest Type A (Plot 3)	Downslope>0 to 5 deg	10m	BAL 12.5 to BAL Low on BE
3	Forest Type A (Plot 17) Grassland Type G	Upslope Upslope	0m 10m	BAL 29 to BAL 12.5 BAL 12.5
4	Woodland Type B (Plot 18)	Upslope	0m	BAL19 and BAL 12.5 can apply to existing house
5	Forest Type A (Plot 17) Forest Type A (Plot 16)	Upslope Downslope>10 to 15 deg	0m 0m	N/A overridden by Plot 16 BAL 29 to BAL 12.5 can apply
6	Forest Type A (Plot 3)	Downslope>0 to 5 deg	10m	BAL 29 and 12.5 on BE
7	Forest Type A (Plot 16) Forest Type A (Plot 4)	Downslope>10 to 15 deg Flat Land	0m 0m	BAL 12.5 to BAL-Low can apply BAL 12.5 to BAL-Low can apply
8	N/A	N/A	>100m	BAL – Low can apply
9	Forest Type A (Plot 3)	Downslope>0 to 5 deg	10m	BAL 29 to BAL 12.5 can apply
10	Forest Type A (Plot 1)	Down slope>5 to 10 degrees	0 m	BAL 12.5, BAL 19 and BAL 29 can apply to BE
11	Forest Type A (Plot 6)	Downslope>0 to 5 deg	0m	BAL 12.5 and BAL Low to BE
12	Forest Type A (Plot 6)	Down slope>0 to 5 deg	0m	BAL 12.5 and BAL Low to BE
13	Forest Type A (Plot 6) Forest Type A (Plot 4)	Down slope>0 to 5 degrees Flat Land	0m 0m	BAL 12.5 and BAL Low to existing house in BE BAL 12.5 to BE
14	Forest Type A (Plot 7)	Flat Land	0m	BAL 12.5 to 29 can apply

COMMENTS ON BAL CALCULATIONS:

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- BAL Calculation was worked from external boundaries of the subject site, with the assumption that all internal areas of the lots will be maintained to APZ standards by the new owners;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2009) Simplified procedure was used for vegetation classification and BAL Assessment process;
- Vegetation was classified within 100m of the lot boundaries;
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps;
- The BAL Contour Plan was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD30794); and
- The BAL Contour Map has been prepared in accordance with Department of Planning (WAPC) Fact Sheet – BAL Contour Maps (Version 2, January 2016).

ASSUMPTIONS

- The lots and the Development Exclusion areas can be fuel reduced to meet APZ standards; and
- All other areas on the lots can be cleared or maintained to APZ standards as per AS3959-2009 Low fuel Exclusion 2.2.3.2 (f) and the Guidelines for Planning in Bushfire Prone Areas – APZ Standards (Appendix Four A 2.1 Version 1.1, February 2017).

Kathryn Kinneur, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2017
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS
Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- Proposed Building Envelope
- Cadastre

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5

Scale
1:2,250 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Ayton Baesjou
Lots 84, 85, 87, 98 Home and Harding Road
Albany, WA 6330

BAL Contour Plan

STATUS	FILE	DATE
FINAL	AB007	17/02/2017

AS3959-2009 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2009) 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. (AS3959, 2009)
Building to AS39590-2009 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.

SECTION 4: DISCLAIMER

The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), , WAPC Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015), and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling 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. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling 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 fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.

SECTION 7: 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 3959-2009 (Incorporating Amendment No's 1, 2 and 3).

SIGNED, ASSESSOR: .... DATE: 20/2/2017

Kathryn Kinnear, Bio Diverse Solutions
Accredited Level 1 BAL Assessor (Accreditation No: BPAD30794)
"Experienced" Level 2/3 Bushfire Practitioner pending accreditation.

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

References

Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas Version 1.1. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015 & 2016) map of Bushfire Prone Areas. Office of Bushfire Risk management (OBRM) data retrieved from:

Appendix 1: – Additional Information / Advisory Notes / Justifications Related to Assessment

Vegetation types analysed to A3959-2009 with the following justifications:

Forest type A

- Multi-layered vegetation structure;
- Surface fuels and could reach 25-35T/ha;
- 30-70% vegetative structure/cover; and
- Eucalypt Trees 10-30m.

Woodland Type B

- Not multi-layered vegetation structure;
- Available fuels and could reach 15-25T/ha;
- 10-<30% vegetative structure/cover;
- Eucalypt Trees 8-15m.

Scrub Type D:

- Maximum vegetation heights 4m;
- Occasional tree at 5m;
- >30% vegetative cover;
- Available Fuels 25T/ha; and
- Melaleuca, pampas grass and tea tree scrubs.

Grassland Type G

- Unmanaged grasslands – not regularly slashed or grazed;
- Average heights of grasses 100-400mm;
- Dominated by grass species; and potential fuel loading 4.5t/ha; and
- <10% tree/scrub species present.

Low Fuel and non-vegetated areas (AS3959-2009 2.2.3.2):

Clause (e) – Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.

- Footpaths;
- Buildings;
- Bare ground;
- Car parks; and
- Roads

Clause (f) – Low threat vegetation including managed grassland in minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated ornamental gardens, commercial nurseries, nature strips and wind breaks.

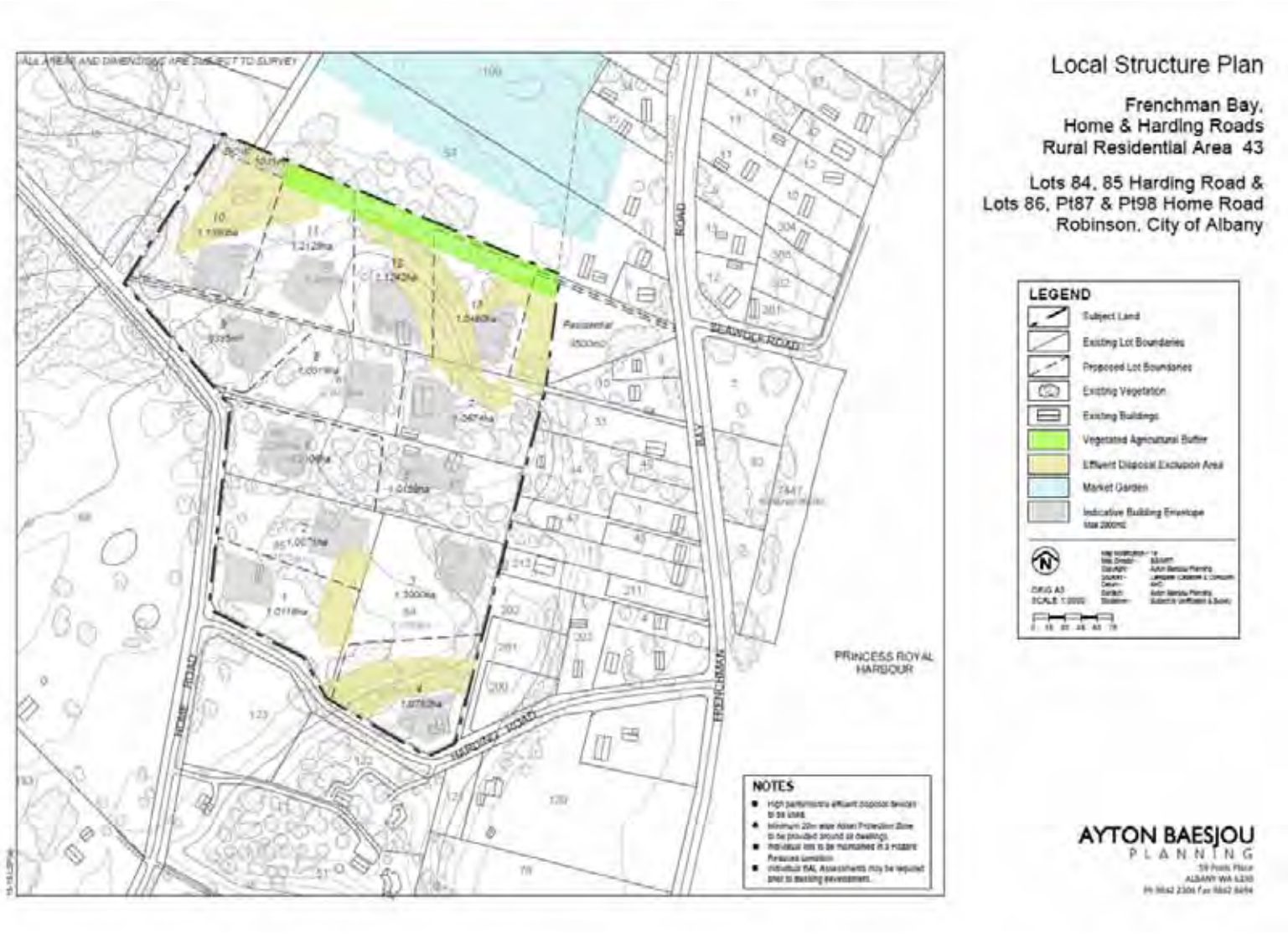
- Low fuel areas associated with managed grasslands, ornamental gardens in APZ areas of established buildings/dwellings; and
- Managed grasses <100mm in height, evidence of regular mowing.

BAL Assessment undertaken by an Experienced Level 2 Bushfire Practitioner. Method 1 AS3959-2009 applied for BAL Assessment.

Appendix 2 – OBRM Mapping

(SLIP, 2015 & 2016)

Appendix 3 – Local Structure Plan



Checklist for proposal compliance and justification to the Guidelines for Planning in Bushfire Prone Areas (2015))			
BDS Project Name	BAL Contour Plan		
BDS Job Number	AB007		
Date	20/2/17	**WAPC#**	N/A
Client name	Ayton Baesjou	**Condition #**	N/A
Bushfire Prone Area	Yes (see attached)	**Mapping**	Yes see attached
Planning proposal	WAPC subdivision	**Lots created**	14

1. Bushfire Protection Criteria Acceptable Solutions as defined by Guidelines for Planning for Bushfire Prone Areas (WAPC 2015).

Element	Compliant to Acceptable Solution– Yes/No	Justification
Element 1 – Location	No	Site has areas which are classified extreme and Low hazards. (Forest Type A, Woodland Type B, Scrub Type D, Grassland Type G). Proposed buildings can be in BAL 29 to BAL 12.5 zones and existing buildings in BAL 12.5 or BAL low. **Development is deemed to meet Acceptable Solutions for Element 1.**
Element 2 - Siting and design of development	Yes	A2.1: APZ can be achieved within the individual lots and a setback associated with BAL 29 or less. Fuel can be modified within the lots to meet APZ requirements. **Plan of subdivision is deemed to meet Acceptable Solutions for Element 2 with APZ's applied to BAL 29 or less to lots.**
Element 3 - Vehicular access	Yes	A3.1: Direct access onto Home and Harding Roads for most lots to separate destinations. A3.2 Public roads not proposed. A3.3 Cul-de-sacs not proposed. A3.4 Battle axes proposed, do not exceed 200m. A3.5 Private Driveways will meet minimum requirements. A3.6 No EAW proposed, use the existing road network. A3.7 No FSA proposed, use the existing road network. A3.8 Firebreaks compliant by current owner (s). **Deemed to meet Acceptable Solutions for Element 3.**
Element 4 – Water	Yes	Reticulated water. **Deemed to meet Acceptable Solutions for Element 4.**
Bushfire Hazard Assessment required	Yes	See Vegetation Classes Plan Page 2.
BAL Contour required	Yes	See BAL Contour Map Page 16.
BMP required	Yes	Extreme levels of fuel and slope exist within the properties. Application of APZ for BAL setbacks of BAL 29 or less is required.

2. Recommendations based on above checklist
1. Assessment indicates that the location has bushfire hazards of Forest Type A, Scrub Type D, Woodland Type B, Grassland Type G external and internal to site. Internal areas low fuel to be maintained by the developer/land owners. 2. BAL 12.5, BAL 19, BAL-29 can be achieved in newly created lots. Existing buildings can achieve BAL 29 or less. All new buildings to be placed in the BAL 29 or less contours in BE's. 3. Brief assessment to Guidelines indicated can meet the Elements by applying Acceptable Solutions can be achieved in the subsequent stages. 4. Detailed BMP required as a condition of subdivision. 5. Notification for condition of approval - building to AS3959-2009 to apply to any new dwellings. 6. Bushfire prone area mapping is correct as per the Map of Bush Fire Prone Areas identifying land falling within, or partially within, a bush fire prone area of Western Australia as designated by the Fire and Emergency Services (FES) Commissioner dated 8/12/2015 and 21/5/2016. Updates of this mapping will occur at the discretion of the FES Commissioner and the BAL Contour Mapping is considered valid for a period of 12 months from the date of production.

Prepared by:

Kathryn Kinnear, Bio Diverse Solutions

Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)

Appendix A

Land Capability Assessment

RR 43 Home & Harding Road Precinct

Land Assessment Pty Ltd

LAND CAPABILITY ASSESSMENT AND PRELIMINARY GEOTECHNICAL INVESTIGATION

- Lots 84, 85 Harding Road & Lots 86, 87 & 98 Home Road, Robinson, City of Albany

Prepared for

AYTON BAESJOU PLANNING

by

Land Assessment Pty Ltd

LA Report No 1512
11 January 2016

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CONTENTS

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ATTACHMENTS

CONTENTS (continued)

1.0 INTRODUCTION

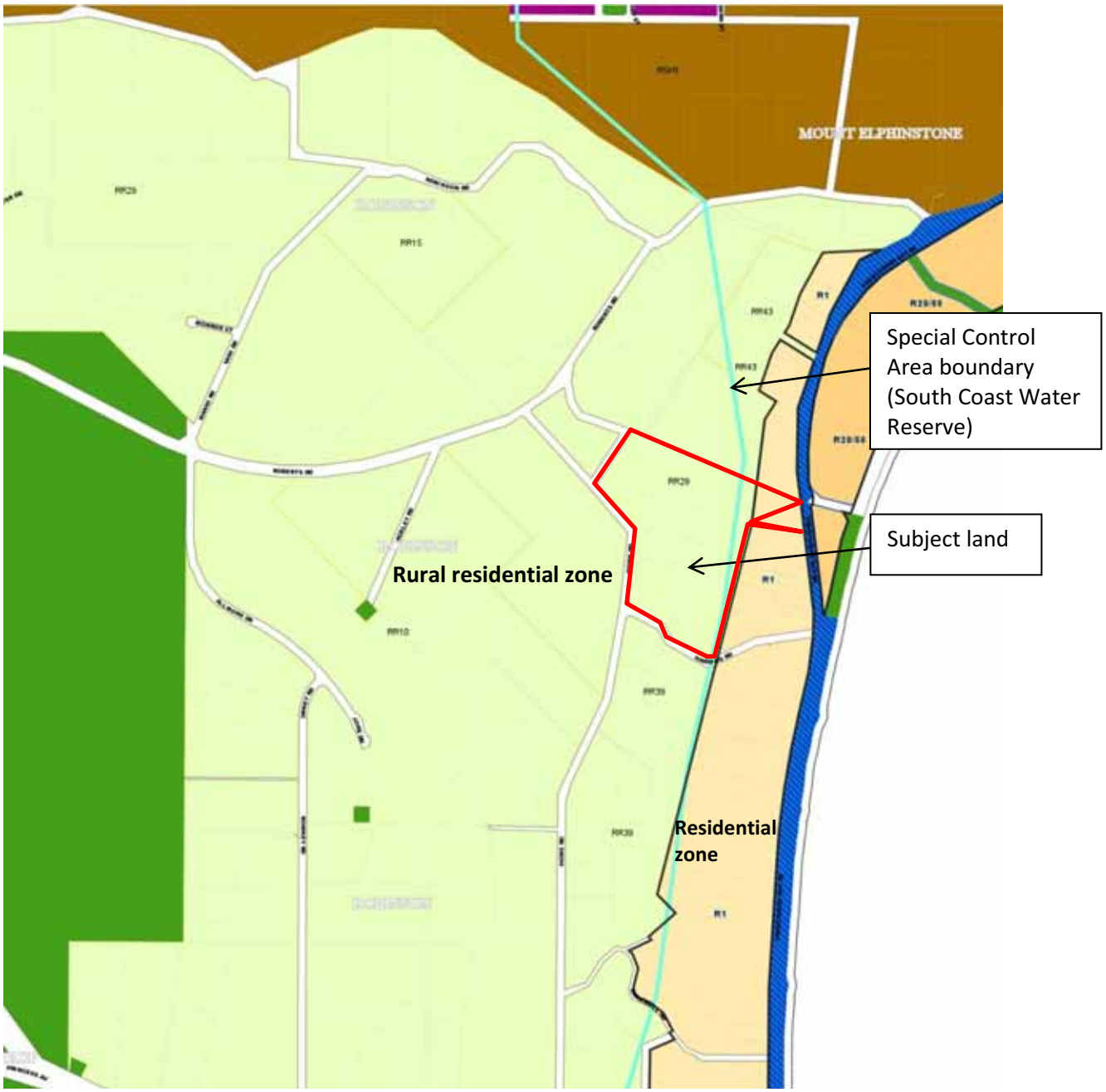
This report has been prepared at the request of Ayton Baesjou Planning to assist preparation of a Structure Plan for further subdivision of existing Lots 84, 85 Harding Road and Lots 86, 87 & 98 Home Road, within the Robinson locality of the City of Albany. Attachment A shows a base plan with site characteristics.

The subject land of approximately 15.3 ha is located on the southern side of Princess Royal Harbour, to the west of Frenchman Bay Road and approximately 3.5 km west-south-west of the Albany central business district. Figure 1 shows the study area is zoned 'Rural residential' (RR29) with the exception of the lower-lying eastern portion of Lot 98 and the battle-axe leg entrance to adjacent Lot 87, both of which are zoned 'Residential' (R1).

The land contains a mixture of cleared and vegetated areas and there is a residence on each of the five existing lots. There are no significant rural pursuits although portions of lots 85 and 98 are used for stabling and exercise of horses, and the eastern part of lot 98 is subject to grazing by goats.

As parts of the subject land are located on relatively low-lying terrain inland from Princess Royal Harbour, environmental assessment of the land needs to consider its capability to support on-site disposal of domestic effluent and wastewater, and to address the potential for further development to be affected by any Acid Sulfate Soil conditions.

FIGURE 1: LOCATION AND ZONING



Source: City of Albany Local Planning Scheme No 1 (District Scheme) Map 21.

2.0 POLICY CONTEXT

2.1 Local Planning Scheme (City of Albany 2014) and Policy

Rural Residential Zone (major portion)

It is understood from planners Ayton Baesjou that the possible minimum allowable average lot size within area RR29 is 1 ha. In relation to matters addressed by this report, relevant planning objectives for the Rural Residential Zone include;

Provide for residential and limited incidental land uses which:

> *(i) Are compatible with the preservation and protection of environmentally sensitive areas such as remnant vegetation and groundwater protection areas;*
>
> *(ii) Do not visually detract from the landscape and the visual amenity of the locality;*
>
> *(iii) Allow for uses and developments that are fit for purpose and minimise any on-site or off-site impacts such as soil erosion, nutrient loss, drainage and potential land use conflicts.*

Residential Zone (minor portion)

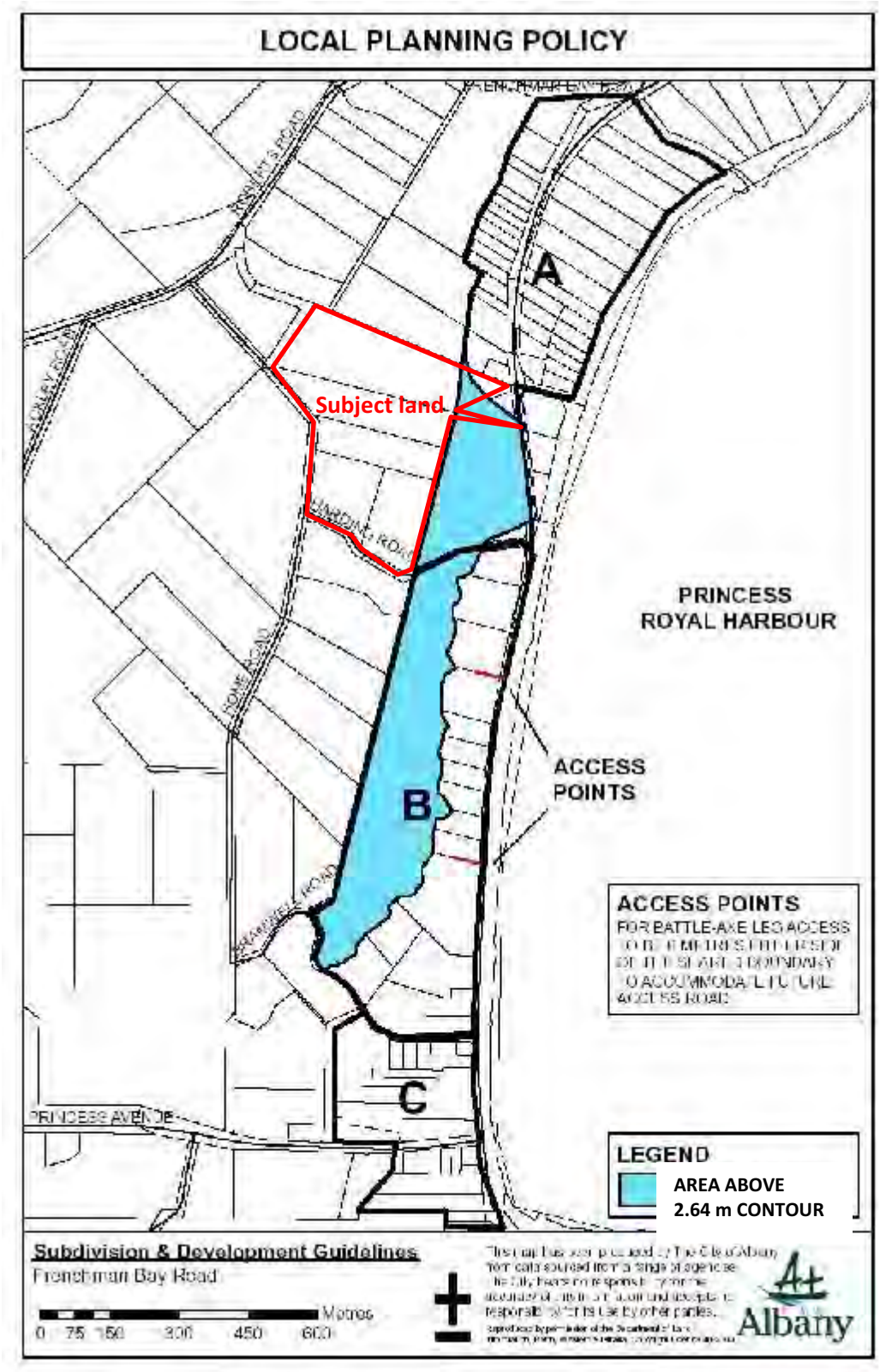
In relation to the Residential Zone portion encompassing the smaller eastern part of Lot 98, as well as the battle-axe entrance to adjacent Lot 87, it is understood from planners Ayton Baesjou that the minimum allowable lot size in this R1 designated area is 8500 sq m.

A Local Planning Policy for the Frenchman Bay Road Residential Development Area (City of Albany undated) addresses the effects of potential flooding or high ground water levels in this low lying area. It identifies this land as part of Precinct A with portions above and below a designated contour line at 2.64 m AHD (Figure 2).

The Local Planning Policy specifies that no subdivision proposals (within the Residential Zone) will be supported until such time as a conceptual local structure plan has been prepared for the portion of land above 2.64m AHD and, for the remaining lower lying area, until such time as infrastructure services (sewerage) have been extended to this locality.

For any subdivision of the Residential zoned land within the area above the 2.64m AHD contour, the policy also states that Council will require the resultant lots to utilise alternative effluent disposal systems, such as approved amended soil and/or aerobic systems.

FIGURE 2: FRENCHMAN BAY ROAD RESIDENTIAL DEVELOPMENT POLICY AREA



Source: City of Albany (undated) Policy - Frenchman Bay Road Residential Development Area

2.2 Local Planning Strategy (City of Albany 2010)

Rural residential zones are encompassed within a broad 'Rural Living' category where strategic objectives of Albany's Local Planning Strategy (ALPS) include

"In the long term encourage the efficient use of existing rural living areas, based on land capability to maximise their development potential."

The ALPS supports lot sizes from 1ha to 4ha in new Rural Residential areas subject to the provision of reticulated water and land capability analysis.

2.3 Special Control Area (South Coast Water Reserve)

As shown in Figure 1 the major part of the subject land is designated under the Local Planning Scheme as part of a Special Control Area (SCA) for the protection of public drinking water sources.

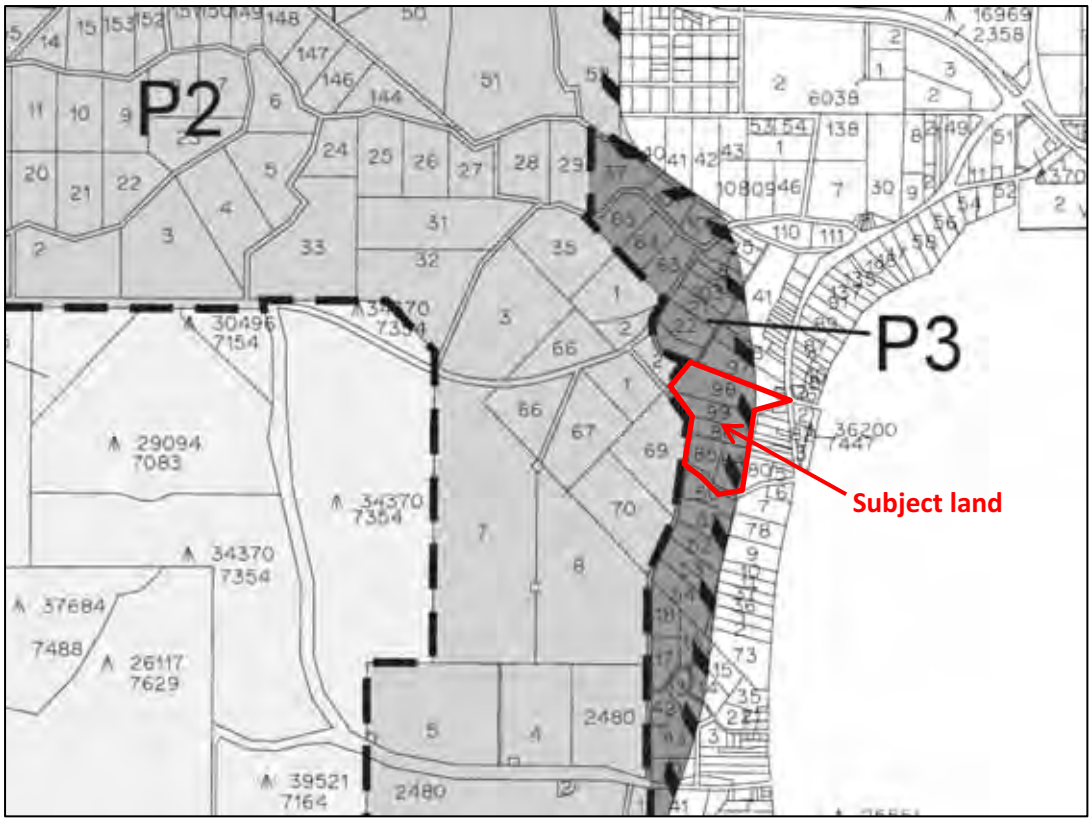
This particular SCA covers the South Coast Water Reserve, and the Planning Scheme reflects the objectives of the *South Coast Water Reserve and Limeburners Creek Catchment Area Water Source Protection Plan* (Water and Rivers Commission 2001) where the dominant 'rural-residential' portion of subject land is designated a Priority 3 (P3) category. The lesser 'residential' zoned area closest to Frenchman Bay Road is outside of the SCA (Figure 3).

Appendix 1 of the Water Source Protection Plan outlines the (now) Department of Water's guidelines on *Land Use Compatibility in Public Drinking Water Source Areas* (Department of Environment 2004). Under a P3 category, water supply sources need to co-exist with other land uses, and rural-residential subdivision to a lot size of between 1 and 2 hectares is considered 'compatible' with water source protection subject to the following conditions;

- *An average, rather than minimum, lot size may be accepted if the proponent can demonstrate that the water quality objectives of the source protection area are met, and caveats/memorials are placed on titles of specified blocks stating that further subdivision shall not occur.*

- *Lots should only be created where land capability assessment shows that effective on-site soakage of treated wastewater can be achieved. Conditions apply to siting of wastewater disposal systems in areas with poor land drainage and/ or a shallow depth to groundwater, animals are held or fertiliser is applied. Alternative wastewater treatment systems, where approved by the Department of Health, may be accepted with ongoing maintenance requirements.*

FIGURE 3: RELEVANT PORTION OF WATER SOURCE PROTECTION PLAN



Source: Water and Rivers Commission (2001) *South Coast Water Reserve and Limeburners Creek Catchment Area Water Source Protection Plan*

2.4 On-site Sewage Management

The following policies and guideline documents have been considered in relation to the capability of the subject land to support further un-sewered development;

- *Draft Country Sewerage Policy* (Government of Western Australia 1999 - as amended to 2003).
- *Code of Practice for Onsite Sewage Management* (Department of Health 2012) Consultation Draft November 2012
- *Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units (ATUs) Serving Single Households.* (Department of Health 2001).

These documents show the capability of land to accommodate an on-site effluent disposal system is influenced by a number of factors including system type, site drainage conditions, topography, soil depth, permeability, and depth to watertable.

Site requirements for on-site effluent disposal based on health criteria include the following specifications;

Gradient of the land - not to exceed one in five (i.e. not greater than 20% slope)

Site drainage – not subject to inundation or flooding at greater than once in 10 years

Depth to groundwater

- greater than 1.2 m from the underside of a wastewater disposal system prescribed under regulation 49 of the Regulations (*for example, leach drains associated with septic tanks*)
- as prescribed by Executive Director, Public Health for other approved wastewater disposal systems (*required separation from watertable varies with type and design of other approved systems – see DoH 2001 and DoH 2012 with the latter indicating a range 0.6 – 1.5 m is required above groundwater).*
- greater than 0.5 m from natural ground surface irrespective of type of system

Available area - unencumbered area of at least 150 m^2 required.

Soil depth - greater than 1.2 m depth to bedrock or impervious clay.

In addition to the requirements based on health criteria, the existing Government Sewerage Policy states; *the responsible authorities may require compliance with any special conditions of the* (then) *Department of Environment.*

The 'special conditions' based on environmental criteria relate to the protection of wetlands and watercourses, and are primarily expressed through setback distances as described in Appendix 2 of the *Draft Country Sewerage Policy* and reiterated in the City of Albany Local Planning Scheme (2014) as follows*;*

- Watercourses with permanent water – 50 metres;
- Seasonally flowing watercourses – 30 metres;
- Estuary or marine environment - 100 metres

The *Code of Practice for Onsite Sewage Management* (DoH 2012) also specifies setbacks from various types of effluent disposal systems for sub-soil or open drains as follows;

- Soil absorption systems (trenches, beds and mounds) – 6 metres;
- Dripper irrigation systems (associated with ATUs) - 3 metres
- Spray irrigation systems (associated with ATUs) - 6 metres.

Furthermore, in relation to dams or bores, the *Code of Practice for ATUs* (DoH 2001) specifies a 30 m setback where they are used or available for human or animal consumption. It has been assumed here that a 6 m setback is applicable where such water sources are precluded from human or animal consumption.

2.5 Acid Sulfate Soils

Acid sulfate soils (ASS) are wetland soils and unconsolidated sediments that contain iron sulfides which, when exposed to atmospheric oxygen in the presence of water, form sulfuric acid. This acid can mobilise or release heavy metals to the detriment of biota and built infrastructure in contact with drainage water.

ASS commonly occur in low-lying coastal lands such as marine or estuarine muds and sands that potentially underlie the surface soils within the eastern-most portion of the subject land. The City of Albany's *Local Planning Strategy* (2010) identifies lower lying portions of the Robinson locality as a high risk area.

The Western Australian Planning Commission's *Acid Sulfate Soils Planning Guidelines* (WAPC 2008) require a preliminary site assessment to be undertaken in 'at risk' areas, and wherever practicable to avoid disturbance of any subsequently identified acid sulfate soils. The potential for ASS is addressed in this report and an acid sulfate soils self-assessment form is included as Attachment E.

3.0 ENVIRONMENTAL SETTING

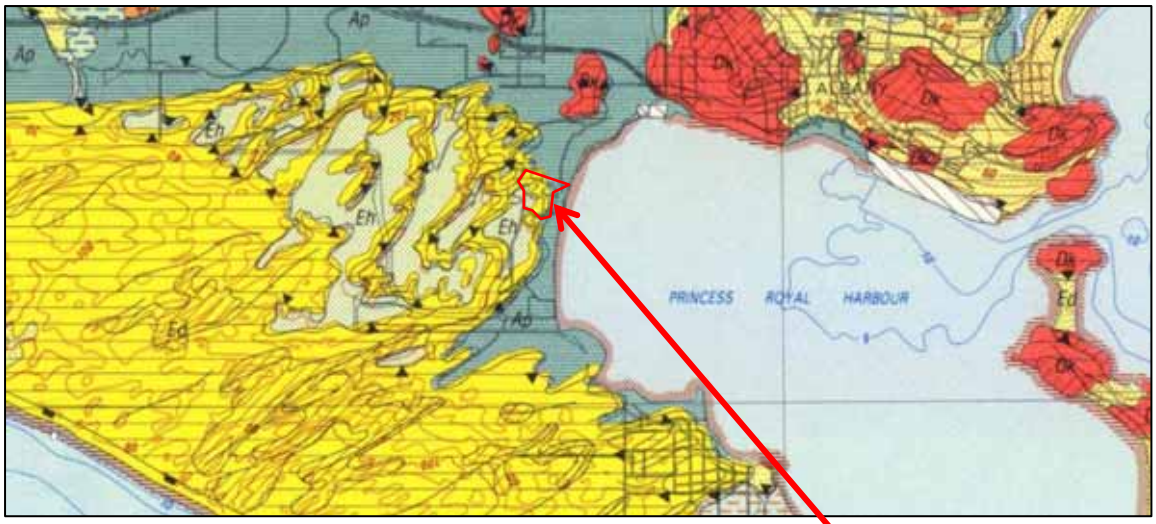
3.1 Geomorphology and Geology

The subject land predominantly encompasses an area of parabolic and nested parabolic dunes (and an associated deflation hollow) that extend over part of the estuarine plain fringing, and extending inland from, the western margins of Princess Royal Harbour (Figure 4).

The dunes are comprised of sands that are variably leached and have a core of calcareous limestone (aeolianite – LS_4) which is pale yellowish brown in colour and weakly cemented.

The underlying estuarine plain is exposed in the north eastern portion of the subject land as well as in the deflation hollow to the south west. The estuarine plain is reported by the Geological Survey of Western Australia to be overlain by predominantly siliceous, white to pale grey, alluvial sand (S_{14}) which, although being well drained (i.e. very permeable), is subject a high watertable and considered prone to flooding in part (Gozzard 1989).

FIGURE 4: GEOMORPHOLOGY & ENVIRONMENTAL GEOLOGY MAPPING



GEOMORPHOLOGICAL CLASSIFICATION

Ed	Parabolic and nested parabolic dunes, Quindalup Dune System	Ar	Estuarine beach ridges
Ed	Parabolic and nested parabolic dunes, Spearwood Dune System	At1-2	Estuarine terraces, where identified
Eh	Deflation hollow	Cs	Colluvial slope
Er	Relict foredunes	Dk	Granitic knolls, inselbergs and bornhardts
Ap	Estuarine/alluvial plain	Ds	Denudational slopes in Tertiary sediments

Subject land

GEOLOGY CLASSIFICATION

S_{14} SAND – white to pale grey (Quaternary Alluvium)

LS_4 LIMESTONE – pale yellowish brown, weakly cemented (Quaternary dunes over estuarine deposits).

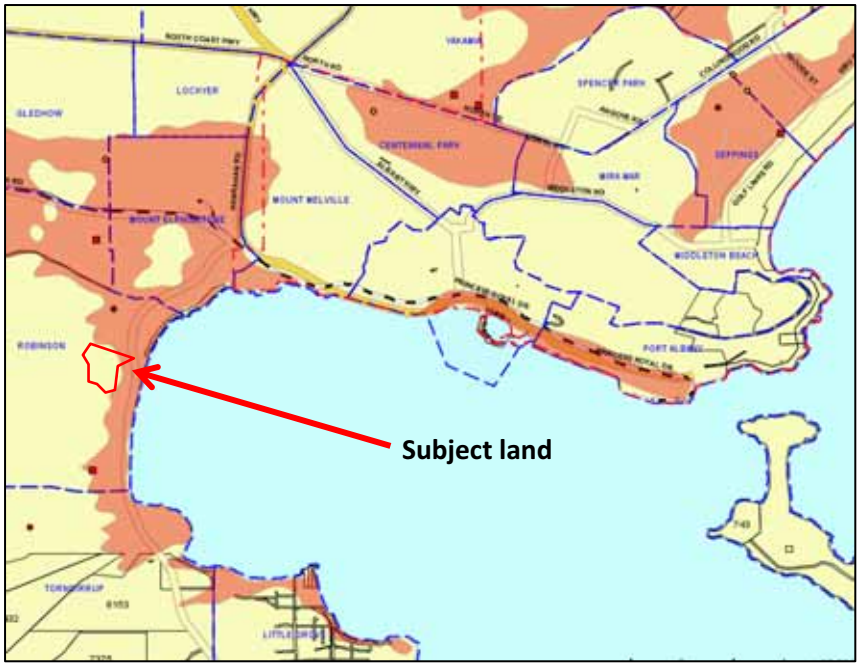
Sp1 PEATY SAND – (Quaternary lake and swamp deposits)

Source: Gozzard (1989).

3.2 Acid Sulfate Soil Risk Mapping

Acid Sulfate Soil Risk Maps are available online through the Landgate's WA Atlas portal https://www2.landgate.wa.gov.au/bmvf/app/waatlas/ Figure 5 shows the relevant portion of the Albany-Torbay map-sheet where the (former) Department of Environment and Conservation (DEC) has identified risk areas (in brown). The risk areas are based on the geomorphological classifications associated with the environmental geology mapping (Gozzard 1989) including the estuarine / alluvial plain areas (Ap in Figure 4).

FIGURE 5: ACID SULFATE SOIL RISK MAPPING



Source: Landgate WA Atlas recent online query.

3.3 Soil-landscape Mapping

CSIRO (Churchward et al 1988) have produced broad-scale mapping of the soils and landforms of the Albany region. This mapping has subsequently been incorporated into the soil-landscape mapping database of the Department of Agriculture and Food (DAFWA). Figure 6 shows the relevant portion, with the subject land forming part of the Meerup coastal dunes system, predominantly subsystem Mp which is described as; *Podzols over calcareous sand; banksia-bullich-yate woodland.*

* Podzols are siliceous sands with leached (light coloured) sandy topsoil over a stronger coloured sandy subsoil. Calcareous sands have an appreciable calcium carbonate content.

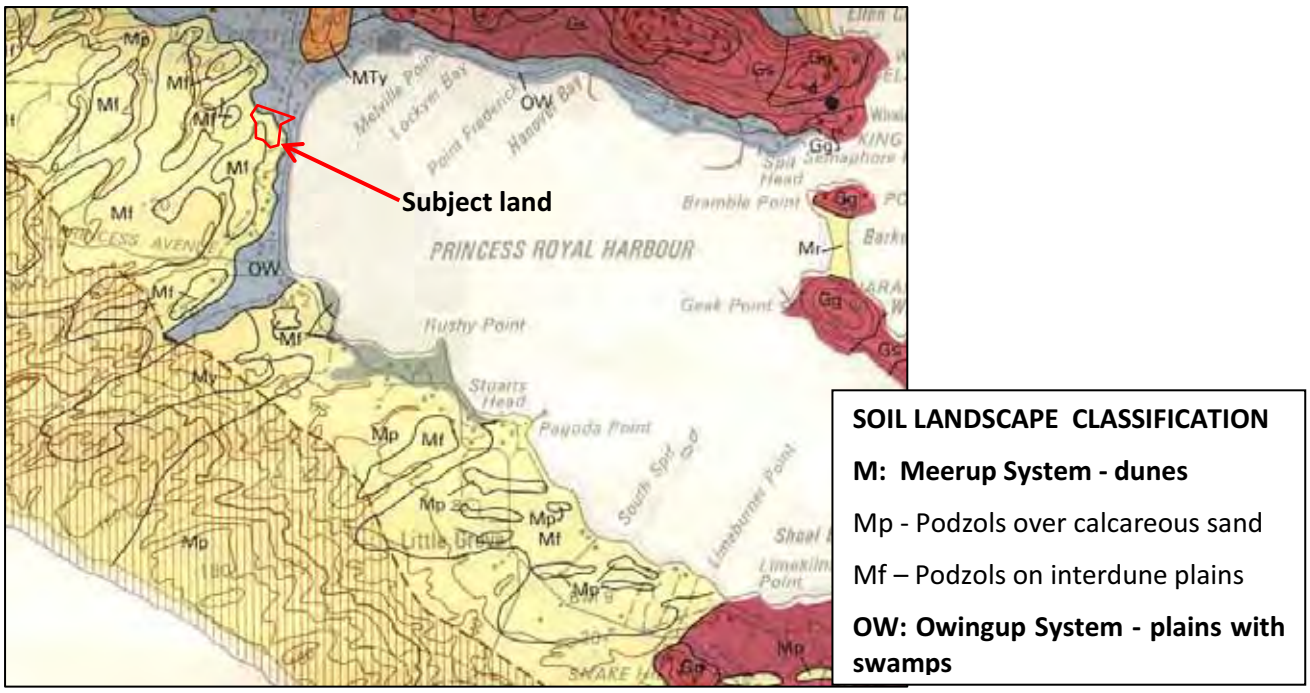


FIGURE 6: BROAD-SCALE SOIL LANDSCAPE MAPPING
Source: Churchward et al 1988).

3.4 Vegetation

As shown in the aerial image within Attachment A, the subject land contains a mixture of cleared and vegetated areas. It occurs inland from the western edge of Princess Royal Harbour although no portion is within 100 m of that waterbody.

The extent and nature of the remaining vegetation within the subject land is also indicated in Figure 7 sourced from the Albany Regional Vegetation Survey, ARVS (Sandiford and Barrett 2010).

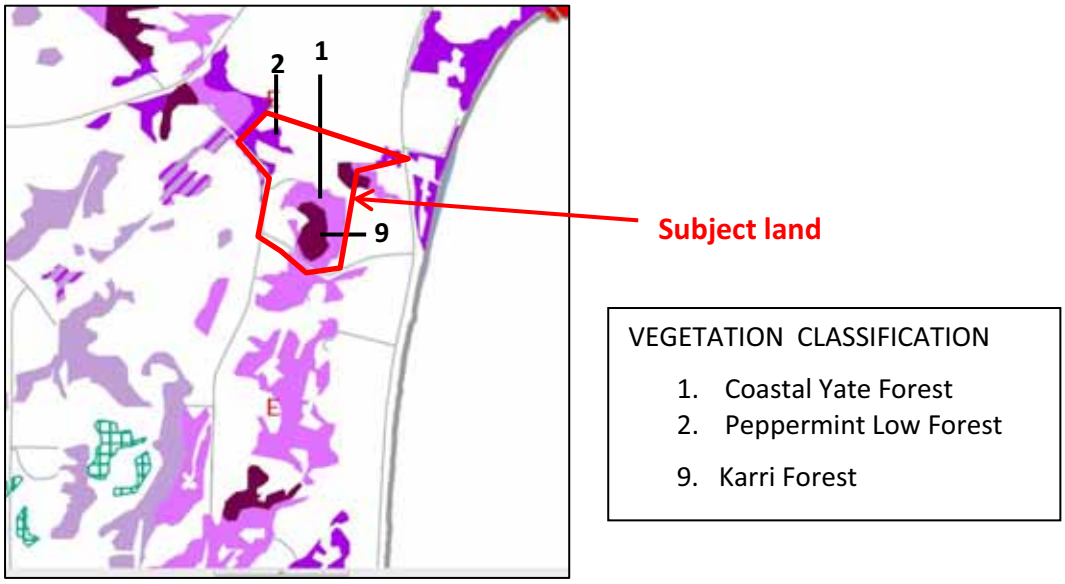
The ARVS mapping is relatively broad-scale and identifies most of the remaining vegetation within lots 84 – 86 as part of vegetation unit 1 (Coastal Yate Forest).

Vegetation unit 9 (Karri Forest) is shown as occurring on lower-lying terrain near the eastern end of Lot 87, and also within the deflation hollow in lots 84 and 85. In the latter area however examination of the aerial image in Attachment A shows that most of the Karri is no longer present.

Vegetation unit 2 (Peppermint Low Forest) is shown within the western portion of lot 98, and to a lesser extent within its central eastern portion.

Attachment B contains descriptions of each of these ARVS vegetation units.

FIGURE 7: VEGETATION MAPPING



Source: Sandiford and Barrett (2010).

Taking into account the known occurrences of these vegetation units (1, 2, and 9) within all types of reserves in the Albany region, only vegetation unit 9 (Karri Forest) might be considered in need of specific conservation measures.

Notwithstanding this, none of the three vegetation units occur at <30% of their pre-clearing extent, and further subdivision of the subject land in accordance with lot size allowed under its zoning category would not directly require any clearing of remnant vegetation to create additional house sites or property access ways.

3.5 Water Resources

Surface water

The subject land occurs inland from the margins of Princess Royal Harbour where the importance of protecting this waterbody from further addition of nutrients is recognised in both the Local Planning Scheme (City of Albany 2014) and the Albany Local Planning Strategy (City of Albany 2010) through the application of a general 100 m development setback.

As shown by the aerial image in Attachment A, all portions of the subject land occur at greater than 100 m from the margins of Princess Royal Harbour, and it contains no natural watercourses. A man-made drain does however run along the northern side of the entrance way into Lot 98 off Frenchman Bay Road. There are also a small number of wetland 'soaks' within Lots 98 and 85 that appear to have been excavated to facilitate earlier agricultural pursuits.

Groundwater

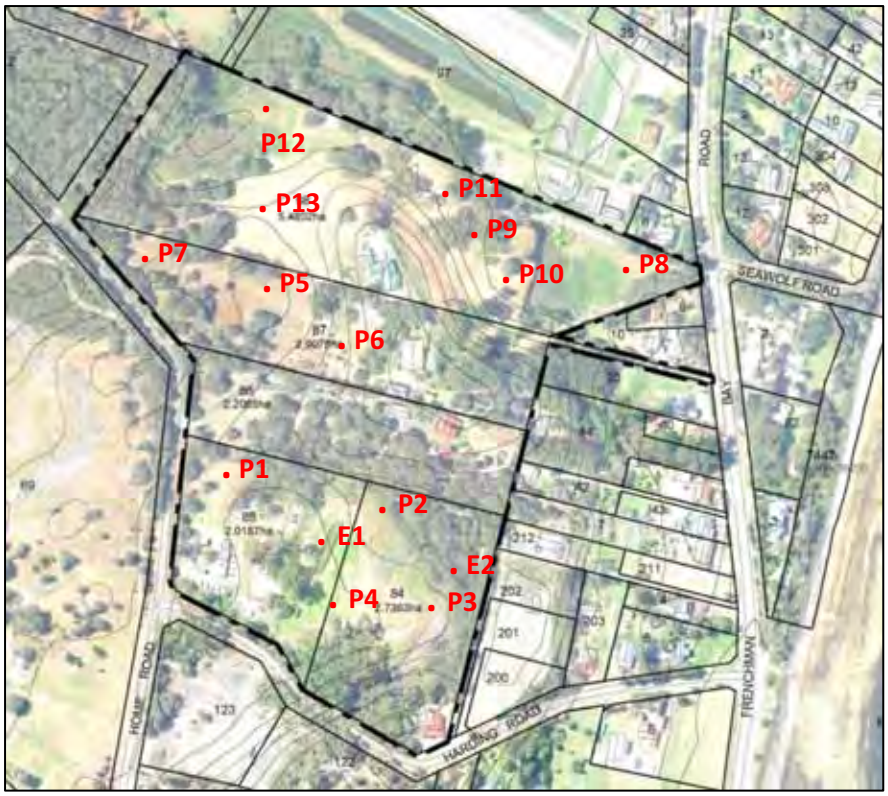
As part of Albany's water supply, groundwater is abstracted from borefields in the South Coast Water Reserve drawing from the Werillup Formation aquifer. The South Coast Water Reserve (Water and Rivers Commission 2001) encompasses most of the subject land which is part of the Priority 3 protection category for land-use planning purposes as discussed earlier in Section 2.3.

4.0 SITE ASSESSMENT

Given the broad scale of soil-landscape mapping depicted in Figure 6, some 'on-ground' variation can be expected in soil and landform conditions. Field obervations are therefore required to determine the capability of the land to support unsewered development and the actual presence or otherwise of acid sulfate soil.

Site assessment was undertaken during December 7 – 9. In addition to site traverses and associated photography, the field work involved description and sampling of soils from thirteen machine - excavated pits and two existing exposed cuttings. Figure 8 shows the location of the soil sites over an aerial image.

FIGURE 8: SOIL SITE LOCATIONS



Soil profile descriptions and photographs are contained within Attachment C.

4.1 Land Unit Mapping

Method

Soil and landform conditions within the subject land were surveyed in general accordance with the methodology outlined in Department of Agriculture and Food publications (van Gool et al 2005, Wells and King 1989). This involved examination of aerial photos followed by the field survey work during December.

The soils were classified in accordance with the WA Soil Group nomenclature (Schoknecht 2002) and consideration of the earlier Great Soil Group (Stace et al 1968) classification system used by Churchward et al (1988).

Site positions were recorded using a GPS unit and slope gradients were measured using a hand-held inclinometer correlated with the 2 m interval contour mapping shown on the base plan provided by Ayton Baesjou (refer Attachment A).

Results

A site results summary is provided in Table 1. In combination with aerial photo observations, the soil profile conditions were used to refine and subdivide the broad-scale soil landscape mapping (Meerup Mp & Mf, and Owingup) into eleven component 'land units'.

The resulting more-detailed 'land unit' mapping, shown in Figure 9, depicts areas of more homogeneous landform and soil conditions compared to the earlier soil landscape mapping unit (Figure 6). It therefore provides a more accurate spatial framework on which to assess the capability of the land and the suitability of a subdivision design.

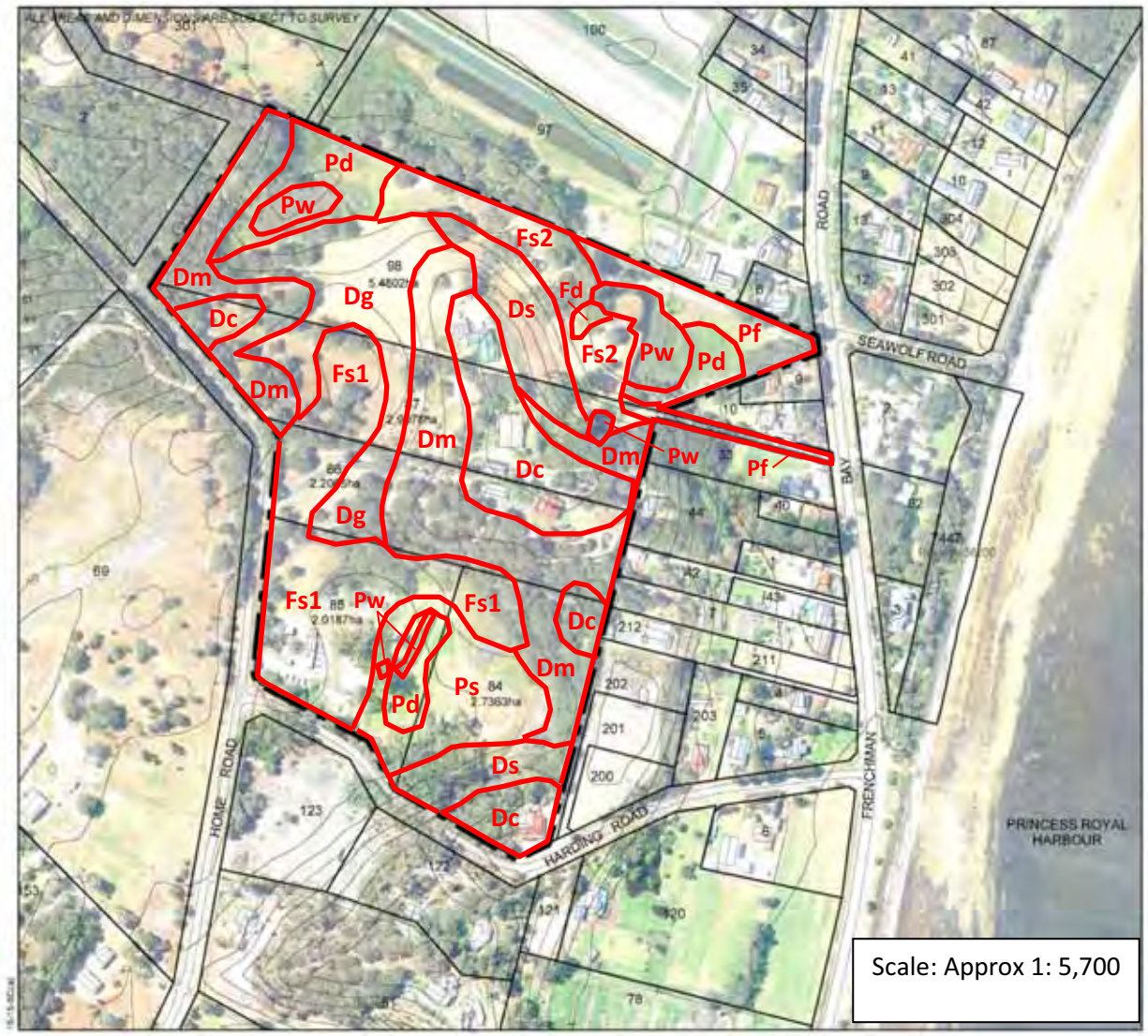
The land units are described in Table 2, and further appreciation of site conditions can be gained by reference to the property photographs which follow Table 2, and by reference to those accompanying the soil pit descriptions in Attachment C.

TABLE 1: SOIL SITE SUMMARY

Site *	Soil Classification**	Landform
P1	***Pale deep sand*** (Podzol; deep siliceous sand).	Well drained, low sandy rise over interdunal flats.
P2	***Pale deep sand*** (Podzol; deep siliceous sand).	Well drained sandplain at margin of interdunal flats or deflation basin.
P3	***Pale deep sand*** (Podzol; calcareous at depth).	Moderately well drained depression within interdunal flat or deflation basin.
P4	***Alkaline grey shallow sandy duplex*** (over calcareous sand).	Imperfectly drained interdunal flat or deflation basin.
P5	***Pale deep sand*** (Podzol; deep siliceous sand).	Well drained interdunal depression.
P6	***Pale deep sand*** (Podzol; calcareous at depth).	Rapidly drained sand dune (moderate sideslope).
P7	***Pale deep sand*** (Podzol; deep siliceous sand).	Rapidly drained sand dune (gentle upper slope).
P8	***Disturbed land*** *(Semi-wet soil* – siliceous sand mantled by loamy soil fill material)	Imperfectly drained estuarine plain with fill material.
P9	***Semi-wet soil*** (calcareous organic loam over siliceous sand)	Imperfectly drained depression within sandplain margin or footslope area.
P10	***Pale deep sand*** (Podzol; calcareous at depth).	Gently undulating, well drained sandplain margin or footslope area.
P11	***Pale deep sand*** (Podzol; calcareous at depth).	Gently undulating, well drained sandplain margin or footslope area.
P12	***Alkaline grey deep sandy duplex*** (over calcareous sand).	Imperfectly drained estuarine plain fringing wetland area.
P13	***Pale deep sand*** (Podzol; deep siliceous sand).	Gently undulating upland surface of well drained dunes.
E1	***Alkaline grey shallow loamy duplex*** (over calcareous sand).	Imperfectly drained interdunal flat or deflation basin.
E2	***Pale deep sand*** (Podzol; calcareous at depth).	Rapidly drained sand dune (moderate sideslope).

* Refer Figure 8 ** Classification in bold according to DAFWA system (Schoknecht 2002).

FIGURE 9: LAND UNIT MAPPING



Abbreviated Legend – see also Table 2

Dunes	
Dc Crests; pale deep sands.	**Dm** Moderate slopes; pale deep sands.
Ds Steep slopes; pale deep sands.	**Dg** Gentle slopes; pale deep sands.
Footslopes *(margins with plain)*	
Fs1 Sandplain; pale deep sands (siliceous).	**Fd** Depression; semi-wet organic soil.
Fs2 Sandplain; pale deep sands (subsoils calcareous).	
Plains *(estuarine plain and portions exposed within deflation basin)*	
Ps Pale deep sands (subsoils calcareous).	**Pd** Duplex soils with clayey marl / l'stone.
Pf Fill; semi-wet soil (loamy fill over sand).	**Pw** Wetland

TABLE 2. LAND UNIT DESCRIPTIONS

Unit	Description
Dunes *– Higher portions of the parabolic sand dunes of the Meerup system*	
Dc	Elevated crests with flat to gentle slopes (< 10 % gradient) and well drained pale deep sands. (Podzols - deep leached grey siliceous sand with yellowish brown sandy subsoil which may be calcareous at greater than 2m depth).
Ds	Steeply sloping dune areas (> 20 % gradient) with well drained pale deep sands similar to unit Dc.
Dm	Moderately sloping dune areas (10 - 20 % gradient) with well drained pale deep sands similar to unit Dc although subsoils may be calcareous at 1 – 2 m depth.
Dg	Gently sloping dune areas (3 – 10 % gradient) with well drained pale deep sands similar to unit Dc although subsoils may be calcareous at 1 – 2 m depth.
Footslopes *- Lower portions of the parabolic dunes and inter-dune sandplain of the Meerup system in proximity to adjacent areas of estuarine / alluvial plain.*	
Fs1	Well drained low sandy rises, inter-dune depressions or sandplain with pale deep sands (Podzols - deep grey siliceous sand with yellowish brown sandy subsoil)
Fs2	Gently undulating, well drained sandplain margin or footslope with pale deep sands similar to unit Fs1 although subsoils may be calcareous at 1 – 2 m depth.
Fd	Imperfectly drained depression within sandplain margin or footslope with semi-wet soil (calcareous organic loam over siliceous sand).
Plains *– Flat terrain forming part of the estuarine / alluvial plain (Owingup System) and including portions exposed by deflation hollows within the dunes (Meerup System)**.***	
Ps	Moderately well drained inter-dune flat or deflation basin with pale deep sands (Podzols - deep grey siliceous sand over a very weak iron-organic hardpan and calcareous yellowish brown sandy subsoil). Seasonally high groundwater levels likely to be at 1 – 2 m depth.
Pf	Imperfectly drained area of estuarine plain with semi-wet soil (siliceous sand mantled by loamy soil fill material). Seasonally high groundwater levels likely to be at 1 – 2 m depth.
Pd	Imperfectly drained area of deflation basin or estuarine plain with duplex soils (alkaline sandy or loamy surfaced duplex soils with clayey marl / limestone rubble subsoil layer over buried calcareous sand). Seasonally high groundwater levels likely to be at 1 – 2 m depth.
Pw	Wetland depressions and associated poor- very poorly drained wet soils.

Lot 98 – **Dg** gently undulating upland dune surface

Lot 97- Moderate slopes **Dm** and dune depression **Fs1**

Lot 98 – Peppermint low forest within moderately sloping dunes **Dm**

Lot 97 – **Ds** steep dune slope

Lot 98 –**Ds** leading to sandy footslopes **Fs2**

Lots 84 & 85 - **Ps** sandy deflation basin with wetland.

Lot 85 – Remnant area of Karri forest within unit **Ps**

Lot 98 – Plain unit **Pf** wetlands **Pw** and steep dunes **Ds**

Lot 98 – Wetland **Pw** within area of plain with duplex soils **Pd.**

4.2 Land Capability Assessment

'Land capability' is a term referring to the ability of land to support a proposed change in use with minimal risk of degradation to its soil and water resources. In this report, where the subject land is already zoned for rural-residential land use* the capability assessment relates only to the ability of the land to accommodate on-site effluent disposal systems associated with more intensive subdivision of existing lots.

The assessment is expressed in accordance with the DAFWA's five class system (ranging from very high to very low capability) as described by van Gool et al (2005) and Wells and King (1989), and is based on the methodology outlined in those publications. Site requirements relating to soil depth, permeability, and separation from groundwater and surface waterbodies under the *Draft Country Sewerage Policy* (Gov't of Western Australia 1999) and the more recent Department of Health (2001 & 2012) *Code of Practice* documents are also considered.

Figure 10 provides a qualitative assessment of the capability of the subject land based on this approach. Four colour-coded categories are shown as follows;

Green - **High capability** (land units Dc, Dg, Fs1 and Fs2)

- Very minor land use limitations and suitable for conventional on-site effluent disposal using septic tanks and leach drains.
- Free draining soils that are well elevated above water-table and deeper subsoil likely to have moderate nutrient retention ability (based on iron content and calcareousness) and these areas are generally not close to surface waterbodies.
- Within unit Fs2 consideration needs to be given adequate setback distance from nearby wetland areas.

Yellow - **Fair capability** (land units Ps, Pf and Dm).

- Dunal areas (unit Dm) are suitable for conventional on-site effluent disposal using septic tanks and leach drains, although gradients require cut and fill activity and areas left devoid of vegetative cover are subject wind erosion risk.
- Areas of the estuarine plain and deflation basin are constrained for on-site effluent disposal due to proximity to the seasonally high watertable but this can be addressed through use of partially inverted leach drains (within imported soil fill material).
- Alternative effluent disposal systems (with lesser minimum depth to water requirement, and greater nutrient retention ability) can also be used. Within the R1 residential zoned portion of the subject land, Alternative Treatment Units are mandatory under the local planning policy (City of Albany - undated) for areas above 2.64 m AHD (such as unit Ps).

* A minor portion of Lot 98 near Frenchman Bay Road is zoned Residential R1.

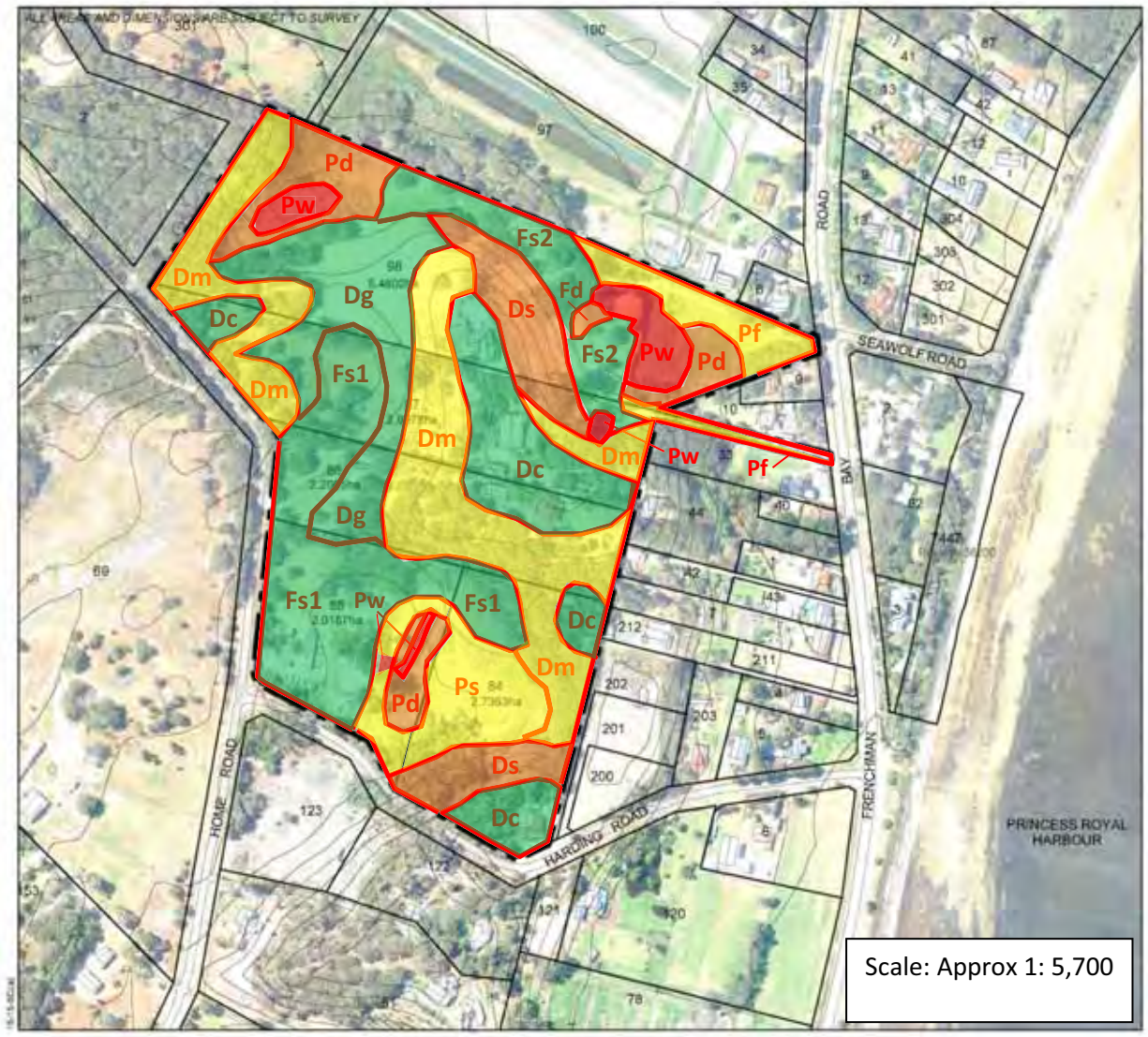
Orange - Low capability (land units Ds, Pd and Fd).

- Significant land use limitations.
- Dunal areas (Ds) are too steep for location of residences and associated on-site effluent disposal systems without significant engineering works, and areas left devoid of vegetative cover are subject to a high risk of slope instability and wind erosion.
- The duplex soil portions of the estuarine plain (Pd), and the organic soils within footslope depression area (Fd), are imperfectly drained and best avoided for on-site effluent disposal. Conventional septic tank systems would need fully inverted leach drains within imported soil fill material to achieve adequate separation from clayey subsoil within unit Pd.
- Setback requirements from nearby wetland areas also need to be considered for both Pd and Fd units, and their relatively limited extent suggests they would easily, and logically, be avoided when positioning building envelopes.
- If building envelope positioning is not able to be achieved outside of these areas (Pd and Fd), use of alternative treatment units should be mandatory.

Red - **Very low capability** (land unit Pw)

- Prohibitive land use limitations.
- Unsuitable for any form of on-site effluent disposal given the surface expression of the watertable and likely local conservation values.
- Underlying buried sediments of the estuarine plain potentially include acid sulfate soils which pose a risk to water quality if they are exposed through attempts to lower wetland watertable levels by drainage.
- Wetland areas (including excavated soaks) require a general 50 m minimum setback for conventional septic tank / leach drain systems, however this might be reduced to 30 m if alternative treatment units are used.
- Existing drains (such as the one along the northern side of the access route from Frenchman Bay Road into Lot 98) require a minimum 6 m setback in relation to positioning of any on-site effluent disposal systems within adjacent land units., (assuming that none of the water in such will be used for livestock consumption).

FIGURE 10: LAND CAPABILITY ASSESSMENT



High capability – Very minor limitations. Suitable for rural-residential development with conventional septic tanks and leach drains.

Fair capability – Moderate limitations associated with risk of wind erosion and need for cut and fill within dunes unit Dm, and need to address proximity to seasonally high groundwater levels within 'plain' units where on-site effluent disposal will require partially inverted leach drains (within imported soil fill material) or the use of alternative effluent disposal systems (with lesser minimum depth to water requirement). Unit Pf is within 'Residential zone R1 where Local Planning Policy mandates the use of alternative effluent disposal systems

Low capability – Significant limitations associated with steep slopes and erosion risk within dunes unit Ds, as well as either proximity to groundwater or wetlands, or slow subsoil permeability, within 'plain' unit Pd and footslope unit Fd. Generally areas that would be logically avoided for building envelopes.

Very low capability – Major limitations in terms of direct impacts of development. Unsuitable for any on-site effluent disposal given watertable exposure, and possible conservation values.

4.3 Testing for Acid Sulfate Soil

Testing of soil pH (1:5 water) for most layers of soil at each of the 13 pit and 2 existing exposure sites is reported within the description in Attachment C and shows predominantly neutral to alkaline soil pH and calcareous subsoil which is not suggestive of acid sulfate soil conditions.

Should the proposed subdivision of the land create additional residences within the estuarine plain portion where watertable proximity is a limiting factor, this can be addressed through partially inverted leach drains (Ps) or mandatory use of alternative treatment systems (as required for unit Pf) rather than any form of additional site drainage.

Notwithstanding this, two subsoil areas were sampled for Acid Sulfate Soil testing by the ChemCentre of WA. (Site 8 within estuarine plain land unit Pf, and site 9 within footslope depression land unit Fd).

The SPOCAS (complete suspension peroxide oxidation combined acidity and sulfur) analysis method was used. This is a standardized set of procedures recommended by the (former) Department of Environment and Conservation for assessing the potential for an acid sulfate soil problem in sandy soils in Western Australia.

The results are contained in Attachments D and E and show the buried soils within unit Pf are within action guideline limits and have high excess acid neutralizing capacity. However the result for the smaller area of highly organic soil within unit Fd is less clear-cut as indicated by the email correspondence copied below;

Copy of Email Communication from Chemistry Centre

The second sample (P9) was interesting. It appears to have a significant carbon content (black colour and sample tends to float on liquid). The ***TPA is very high but is not supported by the sulphide sulphur content (Spos).*** *Based on the Spos value a TPA of approximately 950 moles H^+/tonne would have been expected if all the sulphide was as FeS_2, a strongly acid producing sulfide. I* ***strongly suspect the additional acidity is due to the formation of organic acids from the oxidation of carbon/ carbon compounds.***

I feel this is supported by the pHox which at 3.4 is certainly acidic, but not as acidic as expected from the TPA value- organic acids tend to have higher pH values than mineral acids such as H2SO4 as they do not readily produce hydrogen ions in solution. Non sulfidic acidity can also come from reactions of iron and manganese compounds in solution but there appeared to be very little iron or manganese in this sample. I believe it ***unlikely that the non sulfidic acidity of this sample would be realized in practice*** *as the hydrogen peroxide oxidation used in the method is much more severe than aerial oxidation.*

It appears therefore that although the result for site 9 is not within the actionable guideline, it is considered likely to be the result of the oxidation of the atypically high soil organic matter content rather than an indication of acid sulphate soil conditions.

Notwithstanding the results which indicate Acid Sulfate Soils are not present beneath the subject land, it is relevant to point out that rural-residential development need not involve any form of deep excavation or drainage to expose or aerate previously buried waterlogged subsoils. Any impacts on the limited 'interesting area' of Fd / site 9 can also be easily avoided by appropriate positioning building envelopes.

5.0 CONCLUSIONS

5.1 Capability of the land to support more intensive subdivision

Figure 10 presents the results of land capability assessment for rural-residential development and provides a spatial framework for preparing a plan of subdivision that adequately responds to the nature and capability of the land.

Subject to the proposed pattern of subdivision enabling positioning of building envelopes for all 'new' lots within areas of either high (green) or fair (yellow) capability, the subject land is capable of supporting additional subdivision to the lot sizes permissible for the relevant land use zoning categories under the planning scheme (City of Albany 2014).

Comment in relation to on-site effluent disposal.

For the major portion of the subject land (elevated dunal areas) conventional son-site effluent disposal systems (septic tanks and leach drains) will be appropriate for un-sewered rural residential lots.

Should the plan of subdivision result in building envelopes being positioned within lower-lying portions where alternative treatment units are required, setback distances (both vertical and horizontal) are applicable to land application areas for effluent disposal.

Specific setbacks, and the required area for land application of treated effluent, can vary according to the type of system (i.e. a soil absorption system such as leach drains with amended soil, or an irrigation system associated with an aerobic treatment unit, ATU) and according to the method of any irrigation (i.e. surface sprays or drippers, or subsoil drippers).

Attachment F provides a list of alternative treatment systems approved for use in Western Australia. Subject to landowner choice of type of system, installers can determine specific setback requirements (vertical and horizontal) through reference

to the manufacturer's specifications, and the Department of Health's Code of Practice documents (DoH 2001, 2012).

5.2 Potential for further development to be affected by Acid Sulfate Soil

The Albany Local planning Strategy (City of Albany 2010) addresses acid sulphate soils as a land contamination issue and seeks to; *Ensure the suitability of land uses on existing or potential contaminated sites and require hazard reduction mechanisms to prevent harm to human health or the environment.*

A search has been conducted of the State Government's contaminated sites database by planners Ayton Baesjou, who report that there are no records of contaminated sites within the subject land.

Notwithstanding the absence of any need for deep excavation works associated with further subdivision and development of the land for rural-residential use, field survey observations and some laboratory testing of subsoil material within the estuarine plain portion, indicate acid sulfate soils are not present.

An acid sulfate soils self-assessment form is included here as Attachment E should it be considered necessary to refer this report to the Department of Environment Regulation in the context of assessing potential impacts of the proposed subdivision.

5.3 Protection of remnant vegetation

The proposed intensity of further subdivision should not require any significant clearing of the remaining native vegetation within the subject land.

Outside of the parkland cleared areas, where understorey species have been already been depleted, the more intact areas of remaining vegetation occur near the property fringes and are unlikely to be considered prospective sites for building envelopes given the proposed lot sizes.

Subject to site responsive subdivision design, the ALRS objective of protecting areas of remnant vegetation would not be compromised by the development proposal.

5.4 Protection of groundwater

The Local Planning Scheme (City of Albany 2014) takes into consideration the Water Source Protection Plan for the South Coast Water Reserve (Water and Rivers Commission 2001) via designation of a special control area which extends over most of the subject land.

Subject to the plan of subdivision responding to the land capability mapping through appropriate positioning of 'new' building envelopes, and the creation of lots of equal or greater size to those determined by the Water Source Protection Priority Code (P3 – with a possible minimum average of 1 ha), the proposed intensification of rural-residential development in this area should not jeopardize groundwater protection.

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ATTACHMENT A

SITE CHARACTERISTICS – BASE PLAN

SITE CHARACTERISTICS

Lots 84, 85 Harding Road & Lots 86, 87 & 98 Home Road Robinson, City of Albany

LEGEND

- Subject Land
- Existing Vegetation
- Existing Buildings

ORIG A3
SCALE 1:3000
0 15 30 45 60 75

AYTON BAESJOU
PLANNING
59 Peels Place
ALBANY WA 6330
Ph 9842 2304 Fax 9842 8494

15-15-SC(a)

ATTACHMENT B

ARVS VEGETATION UNIT DESCRIPTIONS

1 Coastal Yate Woodland.

No. of relevés 7 **Mean spp. richness** 11.7 **Area** 419 ha **% of Rem. Veg**. 0.9 **% in IUCN Reserve 1-IV** 21.4

Description

Coastal Yate Woodland is found along the coastal fringe in protected swales, slopes, crests and flats on grey sand. It is dominated by an upper canopy of *Eucalyptus cornuta* over a sparse secondary tree stratum of *Agonis flexuosa*. There is usually one shrub layer, a tall open scrub or open heath and common dominant shrubs include *Hibbertia furfuracea, Bossiaea linophylla* and *Spyridium globulosum.* Ground cover is frequently sparse and there is a high degree of variability in sedge dominance with *Desmocladus flexuosus* most common.

This unit is one of four units that equate to "Scrub heath on dunes" as mapped by Beard (1979), and described as "Peppermint Low Woodland and Scrub-heath". The other units are Peppermint Low Forest (2), Coastal Heath (3) and Limestone Coastal Heath (4). This unit shares many species with Peppermint Low Forest (2), with which it merges, but differs in the absence of *Adenanthos sericeus* and presence of *Hibbertia furfuracea*. It is usually found in more protected and damper sites. In some areas this unit merges with Karri Forest (9).

Comments

Infestations of **Dipogon lignosus* (Dolichos Pea) and **Zantedeschia aethiopicum* (Arum Lily) were observed within this unit in the Little Grove and Robinson areas. This unit is largely restricted to coastal and near coastal consolidated dunes with occasional occurrences along near coastal drainage lines, though one site near Bornholm was recorded on a hill top. The distribution of dominant understorey species suggest that this unit reaches it eastern limit just east of the survey area (the eastern limit of *Hibbertia furfuracea and Hardenbergia comptoniana*) and it probably extends to the west along the coastal fringe of the Warren Botanical District. Direct comparison with units described in the Walpole region by Wardell-Johnson and Williams (1996) is difficult, though it is likely that this unit falls within their community group A4.

This unit is naturally restricted to the coastal fringe. The only other *Eucalyptus cornuta* dominated unit within the survey area, Unit 24, is restricted to granite outcrops.

Floristic Summary

Lifeform	%cover	Species
Trees 10-30m	S-M	*Eucalyptus cornuta*
Trees <10m	V	*Agonis flexuosa*
Shrubs >2m	M	*Hibbertia furfuracea, Bossiaea linophylla, Spyridium globulosum*
Shrubs 1-2m		*Leucopogon obovatus, Hibbertia cuneiformis, Pimelea clavata*
Shrubs <1m		*Tremandra stelligera, Rhagodia baccata*
Sedges/rushes	Nil -V	*Desmocladus flexuosus, Lepidosperma densiflora, Lepidosperma densiflora* forma proliferous, *Lepidosperma effusum, Lepidosperma effusum* forma small, *Lepidosperma gladiatum, Ficinia nodosa*
Herbs		*Billardiera fusiformis, Clematis pubescens, Stylidium adnatum, Opercularia hispidula, Hardenbergia comptoniana*
Grasses		*Tetrarrhena laevis*

Key identifying Features

- Canopy of *Eucalyptus cornuta* above *Agonis flexuosa* and shrubland dominated by *Hibbertia furfuracea, Bossiaea linophylla* and *Spyridium globulosum.*
- Coastal distribution on sand.

Conservation species None recorded

2 Peppermint Low Forest

No. of relevés 10 **Mean spp. richness** 10 **Area** 1232 ha **% of Rem. Veg**. 2.8 **% in IUCN Reserve 1-IV** 23.0

Description
Peppermint Low Forest is restricted to the coastal dune system where it commonly occurs in swales and flats. A dense canopy of *Agonis flexuosa* (Peppermint) is characteristic of this unit with the structure varying from a closed heath on exposed coastal slopes to a low closed forest in swales with shrub species often sub or co-dominant in exposed areas. A tall shrubland of *Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla* and *Leucopogon obovatus* is usually present over an open or closed sedgeland with *Rhagodia baccata, Hardenbergia comptoniana* and *Clematis pubescens* common.

This unit forms a mosaic with Coastal Heath (3), Limestone Coastal Heath (5), Coastal *Banksia ilicifolia/*Peppermint Low Woodland (4) and Coastal Yate Woodland (1) and appears to be the climax of Coastal Heath (Beard 1979).

Three sub-units are described:

2a Peppermint Low Forest occurs on coastal dunes and swales and is described above.

2b Peppermint/*Eucalyptus megacarpa* Low Forest occurs along minor drainage lines on lower slopes of the coastal dunes. *Eucalyptus megacarpa* is co-dominant in the upper strata and *Lepidosperma effusum* and *Pteridium esculentum* are common.

2c Peppermint Low Forest/*Lepidosperma gladiatum* Sedgeland occurs in the swale behind the fore dune and occasionally in deep valleys on the inland dunes. *Lepidosperma gladiatum, Desmocladus flexuosus, Rhagodia baccata* and *Hardenbergia comptoniana* are prominent understorey species with *Hibbertia cuneiformis* and *Pimelea clavata* common shrubs.

Comments
This unit also includes *Agonis flexuosa* thickets that have invaded other units. In the Little Grove and Big Grove area, *A. flexuosa* is invading what was once *Banksia littoralis/*Woodland *Melaleuca incana* Shrubland (44) as indicated by the dead and dying *Banksia littoralis* and the presence of scattered species indicative of winter wet areas such as *Villarsia parnassiifolia, Sphenotoma gracilis* and *Melaleuca incana* under dense canopies of *A. flexuosa*. This invasion suggests that a significant and prolonged lowering of the water table may have occurred. Anecdotal evidence indicates that large areas of Little Grove and Big Grove were more swampy forty to fifty years ago (T. Allen, pers. comm.).

Many infestations of **Acacia longifolia* were observed within this unit, particularly in the Little Grove area. *Agonis flexuosa* occurs as a lower tree stratum or as a co-dominant in a number units (1, 4, 9 and 10) and where this species occurs as stands over pasture, identification of the unit has been based on the nearest intact vegetation.

Peppermint Low Forest is common along the south west coastline though those with *Adenanthos sericeus* in the understorey (2a) are restricted to areas around Albany as this species only occurs from the Nullaki Peninsula to Waychinnicup with an outlying population at Warriup. *Eucalyptus megacarpa* and *Hardenbergia comptoniana* reach their eastern limit near Mt Manypeaks and Cheyne Beach respectively (DEC 2009).

Floristic Summary

Lifeform	%cover	Species
Mallee/Tree <8m	M-D	*Agonis flexuosa +/-Eucalyptus megacarpa,+/-Hakea oleifolia*
Shrubs 1m to >2m	S	*Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla, Leucopogon obovatus, Hibbertia cuneiformis*
Shrubs 0.5-1m	V	*Rhagodia baccata*
Sedges/rushes	V-D	*Desmocladus flexuosus, Lepidosperma densiflora* forma proliferous, *Lepidosperma gladiatum, Lepidosperma effusum*
Herbs	V	*Hardenbergia comptoniana, Clematis pubescens, Opercularia hispidula, Billardiera fusiformis*

Key identifying Features
- Thickets with *Agonis flexuosa* dominant or co-dominant.
- Occurs on sand in coastal areas

Conservation species None recorded

9 Karri Forest

No. of relevés 11 **Mean spp. richness** 10.6 **Area** 885 ha **% of Rem. Veg**. 2.0 **% in IUCN Reserve 1-IV** 1.6

Description
Karri Forest is found in the southern and south western areas of the survey area with isolated pockets along the north-west boundary. It is distinguished by the dominance of *Eucalyptus diversicolor* (Karri) trees in the canopy. Three sub-units are described, differing in floristic composition, landform and soil type and distribution. However, two of these sub-units were poorly sampled and further survey is required to clarify floristic differences.

Sub-units:
9a Coastal Karri Forest is found in a scattered band on the flats and lower slopes north of the coastal hills from Goode Beach to Torbay Townsite, with isolated pockets occurring south of Manypeaks. It often occurs on grey sand often overlying limestone and typically it is an open forest, occasionally reaching > 30 m in height. *Eucalyptus cornuta* is often a sub-dominant canopy species and *Agonis flexuosa* forms an open secondary tree stratum. The understorey shrubs vary from a closed tall scrub on very moist sites to a tall open scrub or open heath over open sedgeland. Common species include *Chorilaena quercifolia, Trymalium odoratissimum, Thomasia solanacea, Hibbertia furfuracea, Bossiaea linophylla, Tremandra stelligera. Lepidosperma effusum, Ficinia nodosa, Gahnia sclerioides* and *Desmocladus flexuosus.* The climbers *Hardenbergia comptoniana, Clematis pubescens* and *Billardiera variifolia* are frequently prominent. This sub-unit often grades into *Eucalyptus cornuta* Open Forest on drier sites.

9b Karri Tall Open Forest
This sub-unit is found on the deep red Karri loams on the hills around Torbay, Bornholm and Torbay townsite. This unit was poorly sampled (1 relevé) and is differentiated from the Coastal Karri sub-unit by the presence and/or dominance of *Allocasuarina decussata* and/or *Acacia pentadenia* in the lower tree/upper shrub strata and the absence of *Thomasia solanacea* and *Templetonia retusa.* This sub-unit occasionally merges with sub-unit 9a on the lower slopes/flats of hills near Bornholm and Torbay townsite where colluvial sands occur. An unsurveyed pocket in the Goode Beach area also appears transitional with subunit 9a with *Acacia pentadenia* present (WA Herbarium records). Other common species include *Agonis flexuosa, Hibbertia furfuracea, Trymalium odoratissimum* and *Bossiaea linophylla.* This unit often occurs upslope of Marri/Jarrah Forest/Peppermint Woodland (10) and appears to have close floristic affinities with Karri forests in the Denmark Walpole/Manjimup area with *Allocasuarina decussata and Acacia pentadenia* in the understorey.

9c Redmond Karri Forest
This sub-unit was recorded on the north west boundary of the survey area along a broad valley on skeletal soils overlying a very dark exposed lateritic rock. All areas had been recently burnt (2002) and post fire opportunistic species including *Rulingia corylifolia, Acacia pulchella* and *Opercularia hispidula* were dominant beneath a *Bossiaea linophylla* Tall Open Scrub. Other species present were *Leucopogon obovatus, Cyathochaeta avenacea, Ficinia nodosa, Opercularia hispidula, Pteridium esculentum, Xanthosia candida* and *Tetrarrhena laevis.*

Comments
The Karri forests observed on several previously cleared remnants on the plains south of Manypeaks have regenerated well following fencing and the presence of *Chorilaena quercifolia* and *Templetonia retusa* suggest they belong to sub-unit 9a.

Karri forests are common throughout the Warren Botanical District with the eastern limit occurring on the slopes of Mt Manypeaks just east of the survey area. An outlying population occurs in the Porongurup Range north of the context area. The floristic similarity of Karri forests outside the study area to the sub-units recorded here has not been assessed. The occurrence of sub-unit 9c on skeletal dark lateritic soil may be unusual as Karri forests are typically found on deep loam or sand.

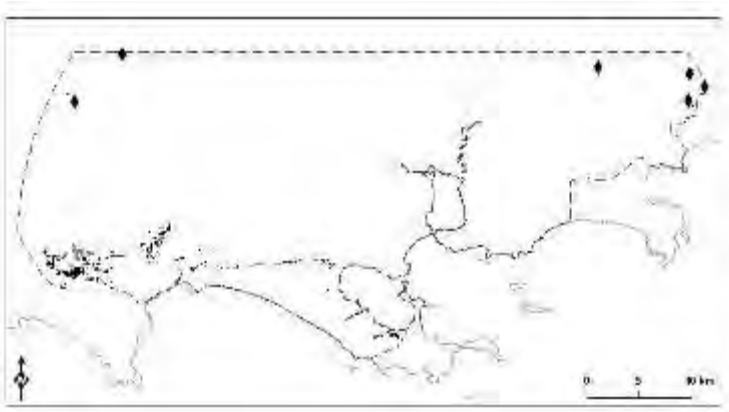
Floristic Summary

Lifeform	%cover	Species
Trees 10-30m	M	*Eucalyptus diversicolor, Eucalyptus cornuta*
Trees <10 m	V	*Agonis flexuosa, Allocasuarina decussata, Hakea oleifolia*
Shrubs >2m	S-M	*Trymalium odoratissimum, Chorilaena quercifolia, Thomasia solanacea, Hibbertia furfuracea, Bossiaea linophylla, Templetonia retusa, Acacia pentadenia, Rulingia corylifolia*
Shrubs <2m	V	*Acacia alata, Tremandra stelligera*
Sedges/rushes	V	*Lepidosperma effusum, Ficinia nodosa, Desmocladus flexuosus, Lepidosperma squamatum, Lepidosperma densiflora*
Herbs	V	*Opercularia hispidula, Hardenbergia comptoniana, Clematis pubescens, Billardiera variifolia, Lagenophora huegelii, Pteridium esculentum*
Grasses		*Tetrarrhena laevis, Poa porphyroclados, Microlaena stipoides*

Key identifying Features

- Canopy of *Eucalyptus diversicolor* (Karri).

Conservation species *Thomasia solanacea* P3, *Gahnia sclerioides* P3



Unit 9 Karri Forest

ATTACHMENT C

SOIL PROFILE DESCRIPTIONS AND PHOTOGRAPHS

Site Number: Pit 1 **Lot 85** 50 H 577015 m E; 6122659 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf	**Land unit: Fs1**

Landform: Well drained, low sandy rise (up to 6 % gradient) over interdunal flats.

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 – 45	Very dark grey (10YR 3/1) **loamy sand**, dry; clear boundary to;
45 - 90	Dark grey (10YR 4/1) **sand,** dry; clear boundary to;
90 - 140	Light grey (10YR 7/1) **sand**, dry, neutral (pH 7.3), non-saline (ECe 60 mS/m) clear boundary to;
140-180+	Dark brown (7.5YR 3/3) fine **sand,** (very weak pan), dry, slightly acid (pH 6.2), non-saline (ECe 77 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have limited nutrient retention ability but site is not close to water table or surface waterbodies).

Site Number: Pit 2 **Lot 84** 50 H 577130 m E; 6122649 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf	**Land unit: Fs1**

Landform: Well drained sandplain (< 2% gradient) at margin of interdunal flats or deflation basin.

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 - 25	Very dark grey (10YR 3/1) **loamy sand**, dry; clear boundary to;
25 - 50	Dark grey (10YR 4/1) **sand,** dry; clear boundary to;
50 - 95	Light grey (10YR 7/1) **sand**, dry, neutral (pH 7.3), non-saline (ECe 60 mS/m) clear boundary to;
95 – 180+	Dark brown (7.5YR 3/3) fine **sand,** dry.

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 2.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 3 **Lot 84** 50 H 577188 m E; 6122562 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf over Owingup flats OW	**Land unit: Ps**

Landform: Moderately well drained depression within interdunal flat or deflation basin.

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 – 10	Very dark grey (10YR 3/1) **loamy sand**, dry; clear boundary to;
10 – 25	Dark grey (10YR 4/1) **sand,** dry; clear boundary to;
25 – 95	Light grey (10YR 7/1) **sand**, dry, clear boundary to;
95 – 155	Dark brown (7.5YR 3/3) **sand,** (very weak pan), calcareous, dry, gradual boundary to;
155-180+	Dark brown (7.5YR 3/3) **sand,** calcareous, moist, moderately alkaline (pH 8.0), moderately saline (ECe 474 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: 180 cm.

Comment: Suitable for conventional on-site effluent disposal subject to use of partially inverted leach drains (within imported soil fill material) to achieve adequate separation from groundwater**.** Also suitable for alternative effluent disposal systems (with lesser minimum depth to water requirement).

Site Number: Pit 4 **Lot 85** 50 H 577095 m E; 6122557 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf over Owingup flats OW	**Land unit: Pd**

Landform: Imperfectly drained interdunal flat (**partly obscured at photo left**) or deflation basin.

WA Soil Group: ***Alkaline grey shallow sandy duplex*** - over buried calcareous sand.

Depth (cm)	**Description**
0 - 25	Very dark grey (10YR 3/1) **loamy sand**, calcareous, slightly moist; clear boundary to;
25 – 65	Light brownish grey (10YR 6/2) C**lay loam, sandy**, calcareous, slightly moist; moderately alkaline (pH 8.8), non-saline (ECe 116 mS/m); clear to;
65 - 80	Light yellowish brown (10YR 6/4) **sand,** with few black mottles (cutans), calcareous; slightly moist; gradual boundary to;
80 - 180	Greyish brown (10YR 5/2) **sand,** calcareous, with few black mottles (cutans), slightly moist; strongly alkaline (pH 9.0), non-saline (ECe 165 mS/m); gradual boundary to;
180-200+	Very dark greyish brown (10YR 3/2) **clayey sand**, calcareous, moist.

Indicative subsoil permeability and drainage class (at leach drain depth): 0.12 – 0.5 m/d (Imperfectly drained). **Depth to water**: 190 cm.

Comment: Best avoided as generally not suitable for conventional on-site effluent disposal due to need for fully inverted leach drains within imported soil fill material to achieve adequate separation from clayey subsoil near surface and need for setback from soakage dam. Possibly suitable for alternative effluent disposal systems (with lesser minimum depth to water requirement).

Site Number: Pit 5 **Lot 87** 50 H 577048 m E; 6122828 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf	**Land unit: Fs1**

Landform: Well drained interdunal depression (< 2% gradient).

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 – 20	Very dark grey (10YR 3/1) **loamy sand**, dry; strongly acid (pH 5.4), non-saline (ECe 110 mS/m); gradual boundary to;
20 - 100	Grey (10YR 5/1) **sand,** dry, moderately alkaline (pH 8.6), non-saline (ECe 111 mS/m); clear to;
100 –135	Very dark brown (7.5YR 2.5/2) **sand**, dry, neutral (pH 7.6), non-saline (ECe 56 mS/m); clear to;
135– 190+	Pale brown (10YR 6/3) **sand,** with few black mottles (cutans), slightly moist, neutral (pH 7.4), non-saline (ECe 87 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered here but > 3.0 m based on observation in adjacent excavated area.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 6 **Lot 87** 50 H 577101 m E; 6122786 m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dm**

Landform: Rapidly drained sand dune (moderate sideslope, 14 % gradient). Note Steeper bank is edge of excavated terrace

WA Soil Group: *Pale deep sand*
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 – 20	Dark grey (10YR 4/1) **sand**, dry; clear boundary to;
20 - 70	Light grey (10YR 7/2) **sand,** dry, clear boundary to;
70 – 120	Yellowish brown (10YR 5/6) **sand,** dry; moderately alkaline (pH 8.0), non saline (ECe 51 mS/m).); diffuse boundary to;
120 - 185	Yellowish brown (10YR 5/6) **sand,** with few bleached mottles, dry; gradual boundary to;
185–220+	Very pale brown (10YR 7/4) **sand,** calcareous, strongly alkaline (pH 9.2), non saline (ECe 99 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 7 **Lot 87** 50 H 576958 m E; 6122855m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dc**

Landform: Rapidly drained sand dune (gentle upper slope, 7 % gradient).

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 - 40	Dark grey (10YR 4/1) **sand**, dry, gradual boundary to;
40 – 110	Grey (10YR 5/1) **sand**, dry, moderately acid (pH 5.6), non-saline (ECe 56 mS/m); gradual boundary to;
110 - 165	Light grey (10YR 7/1) **sand**, dry; clear boundary to;
165–210+	Dark yellowish brown (10YR 4/4) **sand**, mottled, dry, slightly acid (pH 6.5), non-saline (ECe 48 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 8 **Lot 98** 50 H 577352 m E; 6122837 m N	**DAFWA Soil landscape mapping:** Owingup flats OW	**Land unit: Pf**

Landform: Imperfectly drained estuarine plain (< 2% gradient) with fill material.

WA Soil Group: Disturbed land / *Semi-wet soil* (Loamy fill material over siliceous sand)

Depth (cm)	**Description**
0 – 60	Brown (10YR 4/3/) **loamy sand**, with few ferruginous gravels, (fill material) dry, neutral (pH 7.2), non-saline (ECe 57 mS/m); clear boundary to;
60 - 105	Very dark greyish brown (10YR 3/2) **clay loam fine sandy**, (fill material) calcareous, dry, moderately alkaline (pH 8.4), non-saline (ECe 142 mS/m); clear boundary to;
105 -150	Dark grey (10YR 4/1) **sand**, (former land surface?) dry, moderately alkaline (pH 8.5), non-saline (ECe 132 mS/m); clear boundary to;
150 -170+	Grey (10YR 5/1) **clayey sand,** moist.

Indicative subsoil permeability and drainage class (at leach drain depth): 0.12 – 0.5 m/d (Imperfectly drained). **Depth to water:** 170 cm. **Estimated depth of fill**: 105 cm.

Comment: Fill material brings site above 2.64m AHD but not suitable for conventional on-site effluent disposal using septic tanks and leach drains due to policy requirements (City of Albany - Frenchman Bay Road Residential Development Area - undated local planning policy). Suitable for effluent disposal using Alternative Treatment Units subject to 6 m setback from drain on north side of property access way.

Site Number: Pit 9 **Lot 98** 50 H 577221 m E; 6122844 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup dunes Mp over Owingup flats OW	**Land unit: Fd**

Landform: Imperfectly drained depression within sandplain margin or footslope area.

WA Soil Group: ***Semi-wet soil***
(calcareous organic loam over siliceous sand)

Depth (cm)	**Description**
0 – 20	Black (10YR 2/1) **loamy sand**, dry; gradual boundary to;
20 - 80	Black (10YR 2/1) **loam fine sandy** calcareous, slightly moist, moderately alkaline (pH 8.6), moderately saline (ECe 699 mS/m); gradual boundary to;
80 – 140	Black (10YR 2/1) **clayey fine sand,** slightly moist; clear boundary to;
140 - 210	Black (10YR 2/1) **loamy fine sand**, moist (with some seepage inflow).

Indicative subsoil permeability and drainage class (at leach drain depth): 1.5 - 3.0 m/d (Moderately well drained). **Depth to water:** 210 cm (although gradual seepage inflow above).

Comment: Limited area, best avoided and generally not suitable for on-site effluent disposal systems.

Site Number: Pit 10 **Lot 98** 50 H 577248 m E; 6122827 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup dunes Mp over Owingup flats OW	**Land unit: Fs2**

Landform: Gently undulating, well drained sandplain margin or footslope area.

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 - 35	Dark grey (10YR 4/1) **sand**, dry, gradual boundary to;
35 - 80	Grey (10YR 5/1) **sand**, dry, neutral (pH 7.6), non-saline (ECe 57 mS/m); gradual boundary to;
80 - 85	Dark brown (10YR 3/3) **loamy sand**, dry; weak hardpan, neutral (pH 7.7), slightly-saline (ECe 228 mS/m); clear boundary to;
85 - 100	Very dark brown (7.5YR 2.5/2) **loamy sand** (with limestone / marl rubble); dry, clear to;
100-180+	Pale brown (10YR 6/3) **sand**, calcareous, dry, moderately alkaline (pH 9.0), non-saline (ECe 144 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.0 m based on topography and geomorphology.

Comment: Limited area, but suitable for conventional on-site effluent disposal using septic tanks and leach drains subject to adequate setback distance from nearby soakage dam.

Site Number: Pit 11 **Lot 98** 50 H 577190 m E; 6122929 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup dunes Mp over Owingup flats OW	**Land unit: Fs2**

Landform: Gently undulating, well drained sandplain margin or footslope area. (site on cleared area beyond access road)

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 - 35	Dark grey (10YR 4/1) **sand**, dry, slightly acid (pH 6.0), non-saline (ECe 69 mS/m); clear boundary to;
35 - 60	Grey (10YR 5/1) **sand**, clear boundary to;
60 – 90	Light yellowish brown (10YR 6/4) **sand,** dry, gradual boundary to;
90 - 130	Yellowish brown (10YR 5/4) **sand**, calcareous, dry, neutral (pH 6.9), non-saline (ECe 35 mS/m); gradual to;
130-180+	Very pale brown (10YR 7/4) **sand**, calcareous, dry, moderately alkaline (pH 9.0), non-saline (ECe 119 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 12 **Lot 98** 50 H 577052 m E; 6122975 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup over Owingup flats OW	**Land unit: Pd**

Landform: Imperfectly drained estuarine plain (< 1% gradient) fringing wetland area (at far left).

WA Soil Group: ***Alkaline grey deep sandy duplex*** - over buried calcareous sand.

Depth(cm)	**Description**
0 – 20	Very dark grey (10YR 3/1) **sand**, dry, gradual boundary to;
20 - 50	Dark grey (10YR 4/1) **sand**, dry, neutral (pH 6.7), non-saline (ECe 74 mS/m); clear boundary to;
50 – 60	Very dark brown (10YR2/2) **sand**, (weak hardpan); dry, clear boundary to;
60 - 80	Light brownish grey (10YR 6/2) C**lay loam, sandy**, calcareous with limestone / marl rubble, slightly moist; clear boundary to;
80 –150+	Pale brown (10YR 6/3) **sand**, calcareous, moist, with few black mottles (cutans**),** moderately alkaline (pH 8.2), slightly-saline (ECe 338 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): partly within rapidly drained sand (> 3.0 m/d) and imperfectly drained clay loam (0.12 – 0.5 m/d). **Depth to water**: 150 cm (although gradual seepage inflow above).

Comment: Best avoided as generally not suitable for conventional on-site effluent disposal due to need for partially inverted leach drains within imported soil fill material to achieve adequate separation from clayey subsoil and need for setback from nearby wetland.

Site Number: Pit 13 **Lot 98** 50 H 577055 m E; 6122889 m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dg**

Landform: Gently undulating upland surface of well drained dunes (4 – 5 % gradient).

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 – 20	Dark grey (10YR 4/1) **sand**, dry, neutral (pH 6.8), non-saline (ECe 87 mS/m); clear boundary to;
20 – 85	Grey (10YR 5/1) **sand**, dry, clear to;
85 - 105	Light grey (10YR 7/2) **sand**, dry; neutral (pH 7.1), non-saline (ECe 54 mS/m); clear boundary to;
105 –125	Pale brown (10YR 6/3) **sand**, dry, clear to;
125-150+	Strong brown (7.5YR 4/6) **sand**, with few bleached mottles, dry; neutral (pH 6.5), non-saline (ECe 68 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Exposure 1 **Lot 85** 50 H 577095 m E; 6122598 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf over Owingup flats OW	**Land unit: Pd/Pw**

Landform: Interdunal flat or deflation basin; Imperfectly drained (0 -1% gradient) and adjacent wetland (excavated soak).

WA Soil Group: ***Alkaline grey shallow loamy duplex*** (over buried calcareous sand)**.**

Depth (cm)	**Description**
0 - 15	Very dark grey (10YR 3/1) **clayey sand**, calcareous; dry, gradual boundary to;
15 - 30	Very dark brown (10YR 2/2) **sandy loam**; dry, clear boundary to;
30 - 55	**Limestone / marl, in clay loam** matrix; dry, clear boundary to;
55 - 90	Very pale brown (10YR 7/3) **sandy clay loam**, with calcareous rubble; dry, gradual boundary to;
90 – 120+	Pale brown (10YR 6/3) **sand**, calcareous; slightly moist.

Indicative subsoil permeability and drainage class (at leach drain depth): 0.5 – 1.5 m/d (Moderately well drained). **Depth to water**: 130 cm.

Comment: Possibly **s**uitable for conventional on-site effluent disposal (apart from need for setback from soakage dam) using partially inverted leach drains within imported soil fill material to achieve adequate separation from groundwater**.** Possible also suitable for alternative effluent disposal systems (with lesser minimum depth to water requirement).

Site Number: Exposure 2 **Lot 84** 50 H 577193 m E; 6122600 m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dm**.

Landform: Rapidly drained sand dune (moderate sideslope, 18 % gradient).

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth)

Depth (cm)	**Description**
0 - 50	Greyish brown (10YR 5/2) **sand**, dry, clear boundary to;
50 - 120	Light yellowish brown (10YR 6/4) **sand,** slightly calcareous; dry, gradual boundary to;
120–190+	Yellowish brown (10YR 5/4) **sand,**; with few bleached mottles; calcareous; dry, moderately alkaline (pH 8.7), non-saline (ECe 156 mS/m)

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have limited nutrient retention ability but site is not close to water table or surface waterbodies).

ATTACHMENT D

ACID SULFATE TEST RESULTS

ChemCentre

Inorganic Chemistry Section

Report of Examination

PO Box 1250, Bentley Delivery Centre
Bentley WA 6983
T +61 8 9422 9800
F +61 8 9422 9801
www.chemcentre.wa.gov.au
ABN 40 991 885 705

Purchase Order: 1512
Your Reference:
ChemCentre Reference: 15S1434 R1

Land Assessment Pty Ltd
PO Box 117
Subiaco WA 6008

Attention: Martin Wells

Final Report on 2 samples of soil received on 21/12/2015

LAB ID	Client ID and Description
15S1434 / 001	P8/4
15S1434 / 002	P9/4

Analyte		ANCe	pHkcl	pHox	Skcl	Sp	Spos
Method		iSPOCAS	iSPOCAS	iSPOCAS	iSPOCAS	iSPOCAS	iSPOCAS
Unit		moles H+/t			%	%	%
Lab ID	Client ID						
15S1434/001	P8/4	3.0	7.2	4.1	<0.01	0.02	0.02
15S1434/002	P9/4	<1.0	6.7	3.4	0.06	1.56	1.50

Analyte		Stones	TAA	TPA
Method		(>2mm)	iSPOCAS	iSPOCAS
Unit		%	moles H+/t	moles H+/t
Lab ID	Client ID			
15S1434/001	P8/4	0.7	<1.0	<1.0
15S1434/002	P9/4	33.7	<1.0	3200

REPORT ITEM DIS115 REFERS

Analyte	Method	Description
Stones	(>2mm)	Stones - sieved particles greater than 2 mm (sample preparation method manual 3.3.2)
TAA	iSPOCAS	Titratable Actual Acidity Method 23F
TPA	iSPOCAS	Titratable Peroxide Acidity
ANCe	iSPOCAS	Excess Acid Neutralisation Capacity (AS4969.3)
pHkcl	iSPOCAS	pH in a KCl soil extract (1:40 w/v)
pHox	iSPOCAS	pH in a soil suspension after 30% H2O2 digest
Skcl	iSPOCAS	Sulfur soluble in 1M KCl after TAA titration
Sp	iSPOCAS	Sulfur soluble in 1M KCl after 30%H2O2 digest and TPA titration
Spos	iSPOCAS	Sulfur oxidise by peroxide digest, calculated as S_P minus S_KCl

The results apply only to samples as received. This report may only be reproduced in full.

Unless otherwise advised, the samples in this job will be disposed of after a holding period of 30 days from the report date shown below.

Results for soil analysis are reported on an air-dry (40C) less than 2 mm basis, whereby stones are removed (material >2mm) by sieving.

When stone content is deemed significant the result is recorded and reported.

Unless otherwise specified, all analytes (except Stones) are reported in the listed concentrations and on a dry, less than 2 mm basis.

Stones are reported on a dry, whole sample basis.

Barry Price
Team Leader
Scientific Services Division
8-Jan-2016

ATTACHMENT E

ACID SULFATE SOILS: SELF-ASSESSMENT FORM

GOVERNMENT OF WESTERN AUSTRALIA

Acid Sulfate Soils Self-Assessment Form

Western Australian Planning Commission

Applicant

The applicant is the person with whom the WAPC will correspond and, if the application is approved, the person to whom the approval will be sent.

WAPC reference no	Not yet assigned
Full name	Martin Richard Wells (on behalf of landowners)
Postal address	P O Box 117 SUBIACO
Town / suburb	SUBIACO, PERTH WA
Postcode	6008
Email	landass@iinet.net.au
Phone number	9388 2427
Applicant signature	Mark Wells
Date	11/1/16
Application property details	Lots 84, 85 Harding Road and Lots 86, 87 & 98 Home Road, Robinson, City of Albany

Step 1

Assess the possibility of acid sulfate soils disturbance

Question 1: Are any dewatering or drainage works (either temporary or permanent) proposed to be undertaken? ☐ yes ☑ no

Question 2: Is excavation of 100 cubic metres or more of soil proposed? ☐ yes ☑ no
(In lay person's terms 100 cubic metres is about 10 standard-sized dump truck loads.)

If no to both question 1 and question 2 then no further investigation is required at this stage. Please sign this form and submit it, together with a completed 'Clearance of Conditions Request' form along with supporting documentation, to Department of Environment Regulation (DER).

If yes to either question 1 or question 2 go on to step 2.

Step 2

Conduct an acid sulfate soils investigation in accordance with DER's *Identification and Investigation of Acid Sulfate Soils* guideline

Question 3: Did the acid sulfate soils investigation indicate that there are acid sulfate soils present? ☐ yes ☑ no

If no to question 3, then no further investigation is required at this stage. Please sign this form and submit it, together with the written results of the investigation (in the form of an acid sulfate soils report) and a completed 'Clearance of Conditions Request' form and required information, to DER with a request for clearance of the acid sulfate soils condition.

If yes to question 3, please sign this form and submit it, together with the written results of the investigation (in the form of an acid sulfate soils report), an acid sulfate soils management plan and a copy of the approved subdivision plan, to DER with a request for approval of the management plan.

Note: After completion of site works in accordance with the approved management plan you will be required to submit a closure report, prepared in accordance with DER's acid sulfate soils guideline series, to DER together with a request for clearance of the acid sulfate soils condition.

Version: 1.0 (November 2012)

Tick box for attchments as appropriate

- ☐ Clearance of conditions request form
- ☐ Copy of approved subdivision plan
- ☐ Copy of approved development plan
- ☑ Acid Sulfate Soils investigation report
- ☐ Acid Sulfate Soils management plan

- Addressed as part of land capability report

Declaration

I declare that the information provided is true and correct to the best of my knowledge.

A completed 'Clearance of Conditions Request' form and required information is attached to this form (a copy can be downloaded from http://www.der.wa.gov.au/your-environment/acid-sulfate-soils/68-ass-forms)

Applicant signature: ..... Date: .....

Submit form to the
Department of Environment Regulation (DER)
Locked Bag 33
Cloisters Square, Perth WA 6850

If you have any questions relating to the Acid Sulfate Soils Self-Assessment form, please contact Acid Sulfate Soils Section (DER) on 1300 762 982 for assistance or email contaminated.sites@der.wa.gov.au.

Mark Wells

Land Assessment Pty Ltd

11/ 1 /16

ATTACHMENT F

ALTERNATIVE TREATMENT SYSTEMS

APPROVED FOR USE IN WA

Approved Aerobic Treatment Units

What are Aerobic Treatment Units (ATUs)?

Aerobic Treatment Units (ATUs) are small ('package') wastewater treatment plants. Due to the treatment and disinfection process, the treated wastewater from several systems may be used for garden irrigation. Some ATUs are also approved for Phosphorus removal. The listed systems have standard approval as domestic models (they may also be used in commercial situations). They are to be installed and operated in accordance with the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 and the **Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units (ATUs) Serving Single Dwellings.**

As the conditions of approval can vary between designs, persons interested in installing a particular ATU should confirm it meets their needs and discuss site requirements with the local government.

ATUs have regular service requirements (usually quarterly) and maintenance must be through an **Authorised person** or their staff/subcontractors.

More detailed information on ATUs is contained in the **Aerobic Treatment Units** pamphlet and the **Code of Practice**.

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Allied Pumps 2 Modal Crescent CANNING VALE WA 6155 Ph: 9350 1000 / 1800 447 777 Fax: 9356 5255 Website: www.aquanova.com.au Email: sms@alliedpumps.com.au	Everhard Aqua-Nova 2000 Model 80100	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	Global Certification PL No. 077 27/03/2017
Aquarius Wastewater Management Pty Ltd Unit 1/20 Abrams Street BALCATTA WA 6021 Ph: 9240 8545 Fax: 9240 8542 Website: www.aquariuswastewater.com.au Email: admin@aquariuswastewater.com.au	Aquarius O–3	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation. Capable of removing nutrients to the following concentrations: TP (% removal): <1 mg/L (98.5%) TN (% removal): <10 mg/L (97.8%)	SMKH21519 25/03/2018
	Aquarius O–2	Single dwelling units up to 10 person capacity.	Approved only for below ground disposal via sub-surface irrigation, leach drains, soak wells or AquaSafe Drains. The system does not include Alum Sulphate dosing and disinfection system. The system does not remove nutrients.	
	Aquarius O–2 NR	Single dwelling units up to 10 person capacity.	Approved only for below ground disposal via sub-surface irrigation, leach drains, soak wells or AquaSafe Drains. The system does not include disinfection system. Capable of removing nutrients to the following concentrations: TP (% removal): <1 mg/L (98.5%) TN (% removal): <10 mg/L (97.8%)	

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Biomax Pty Ltd PO Box 462 MIDLAND DC WA 6936 Ph: 9250 7733 Fax: 9250 5844 Website: www.biomax.com.au Email: biomax@iinet.net.au	BioMax P10-M (phosphorus removal) BioMax C–10	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	No AS1546.3 certification 30/06/2015
BioSeptic Pty Ltd Concrete Products WA Ph: 9274 6988 Fax: 9274 6939 Website: www.bioseptic.com.au Email: sales@bioseptic.com.au	Performa 2000	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	SMK02221 18/10/2015
BioSystems 2000 Pty Ltd 3 Carlow Circle WATERFORD WA 6152 Ph: 9450 2570 Fax: 9450 1635 Email: biosystems2000@yahoo.com.au	Biosystem 2000	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	No AS1546.3 certification 30/06/2015
Earthsafe Environmental Pty Ltd PO Box 605 WYONG NSW 2259 Ph: 1300 327 847 Email: steven@rivatec.com.au	Earthsage Environmental ES10PC	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	SMKH20612 27/08/2016

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Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Fuji Clean Australia Pty Ltd 5/520 Mulgrave Road Earlville, Cairns QLD 4870 Website: www.fujiclean.com.au WA Distributor Ecowater WA 37 Granite Place YANCHEP WA 6035 Ph: 0417 098 281 Email: ecowaterwa@bigpond.com	CE1200	Single dwelling units up to 8 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	No AS1546.3 certification 30/06/2015
	CE1500EX	Single dwelling units up to 10 person capacity or 1500L/day	Approved for sub-surface or sub-strata or above ground spray irrigation. Capable of removing nutrients to the following concentrations: TP (% removal): 1.3 mg/L (84%) TN (% removal): 21.0 mg/L (58%)	SMKH21993 09/05/2016
	CRX1500	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation. Capable of removing nutrients to the following concentrations: TP (% removal): 0.24 mg/L (97%) TN (% removal): 8.29 mg/L (82%)	No AS1546.3 certification 30/06/2015

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Galvin Concrete & Sheetmetal Pty Ltd Ph: 9302 2175 Website: www.galvins.com.au Email: csm@galvins.com.au WA Distributor Clearwater Domestic Sewerage 52 Railway Parade WELSHPOOL WA 6106 Ph: 9258 6933 Fax: 9258 6944 Email: naiquip@iinet.net.au	Clearwater 90 Compact	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation.	No AS1546.3 certification 30/06/2015
Icon-Septech Pty Ltd Lot 265 Valencia Way MADDINGTON WA 6109 Ph: (08) 9493 2352 or 1300 557 143 Fax: (08) 9493 2548 Website: www.icon-septech.com.au	Septech Turbojet 2000	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	SMK0239 13/11/2015
Jowa Group Pty Ltd 8 Lander Avenue SHEIDOW PARK SA 5158 Ph: (08) 8381 9100 Fax: (08) 8381 9116 Website: www.biocyclejowagroup.com.au Email: sales@biocyclejowagroup.com.au	Biocycle 5800	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	No AS1546.3 certification 30/06/2015

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Krystel Kleer Pty Ltd 59 Commerce Circuit Yatala QLD 4207 Ph: (07) 3382 7666 Website: www.qualitytanks.com.au Email: Nicole@qualitytanks.com.au	Krystal Kleer ADV5000 (Concrete and plastic models)	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	Cert No. 125 13/09/2014
Suncoast Waste Water Management 59 Industrial Avenue KUNDA PARK QLD 4556 Ph: 1800 450 767 Website: www.ozzikleen.com Email: info@ozzikleen.com	Ozzi Kleen RP10	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	SMK02608 14/08/2016

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Taylex Industries Pty Ltd 56 Prairie Road Ormeau QLD 4208 Ph: (07) 3441 5200 Fax: (07) 3287 4199 Email: Taylex@bigpond.com.au	Taylex DMS (Domestic Membrane System)	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation, sub-surface or sub-strata drip irrigation.	No AS1546.3 certification 30/06/2015
			Capable of removing nutrients to the following concentrations: TP (% removal): 0.29 mg/L (96%) TN (% removal): 6.19 mg/L (86%)	
	Taylex ABS (Advanced Blower System)	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation, sub-surface or sub-strata drip irrigation.	
	Taylex Poly ABS (Advanced Blower System)	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation, sub-surface or sub-strata drip irrigation.	

Produced by Environmental Health Directorate

Assessed and not approved OR Approval withdrawn

Manufacturer / Supplier	Brand name and model	Reason not approved / Further information
Biolytix Technologies PO Box 591 MALENY QLD 4552 Ph: (07) 5435 2700 Fax: (07) 5435 2701 Website: www.biolytix.com Email: info@biolytix.com	Biolytix BF–6 Aerated	Company liquidated. Biolytix units which have been issued a 'Permit to Use' by local government before 19 January 2011 can still be in use. For further information, visit the following webpage: www.lawlerpartners.com.au/creditor_reports/biolytix_group_of_companies/faqs
Water Gurus Pty Ltd 3/57 Inspiration Drive WANGARA WA 6065 Ph: 9302 6444 or 1800 043 956 Fax: 9302 6777 Website: www.watergurus.com.au	Novaclear	Company liquidated. For further information, visit the following webpage: http://www.asic.gov.au/

More information:

Water Unit
Environmental Health Directorate
Department of Health
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Telephone: 08 9388 4999
Facsimile: 08 9388 4910

This document is available in alternative formats on request for a person with a disability.

Government of Western Australia
Department of Health
Public Health

Approved Alternative Leach Drains

These phosphorus reducing systems have a conventional septic tank and leaching field (leach drain) arrangement. The leaching field is contained within an approved amended soil which binds phosphates from the effluent.

Manufacture / Supplier	Brand Name and Model	Comments and Restrictions	Approval Date
Filtrex Innovative Wastewater Solutions PO Box 5122 BUNBURY WA 6231 Ph: (08) 9726 0118 Fax: (08) 9726 0117 Website: www.filtrex.com.au Email: info@filtrex.com.au	Filtrex Split System	■ Leach drains (for blackwater) and subsurface irrigation (for greywater) only. ■ Minimum 600mm soil absorption from any ground or pooled waters at the wettest time of year	01/02/08
	Filtrex Phosphate and Nutrient Wastewater Irrigation System	■ Leach drains disposal only. ■ Minimum 600mm soil absorption from any ground or pooled waters at the wettest time of year	31/05/11
	Filtrex Leach Drain Cage	■ Has an infiltrative area of 0.9m^2 per metre length ■ Non-phosphorus retentive. ■ Install in accordance to Department of Health approval conditions	29/10/2008
	Filtrex Standard Leach Drain Cage SLD MK2	■ Has an infiltrative area of 1.5m^2 per metre length ■ Non-phosphorus retentive. ■ Install in accordance to Department of Health approval conditions	27/10/2009

More information

Water Unit
Environmental Health Directorate
Department of Health
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Telephone: (08) 9388 4999
Fax: (08) 9388 4910

Produced by Environmental Health Directorate

Appendix B

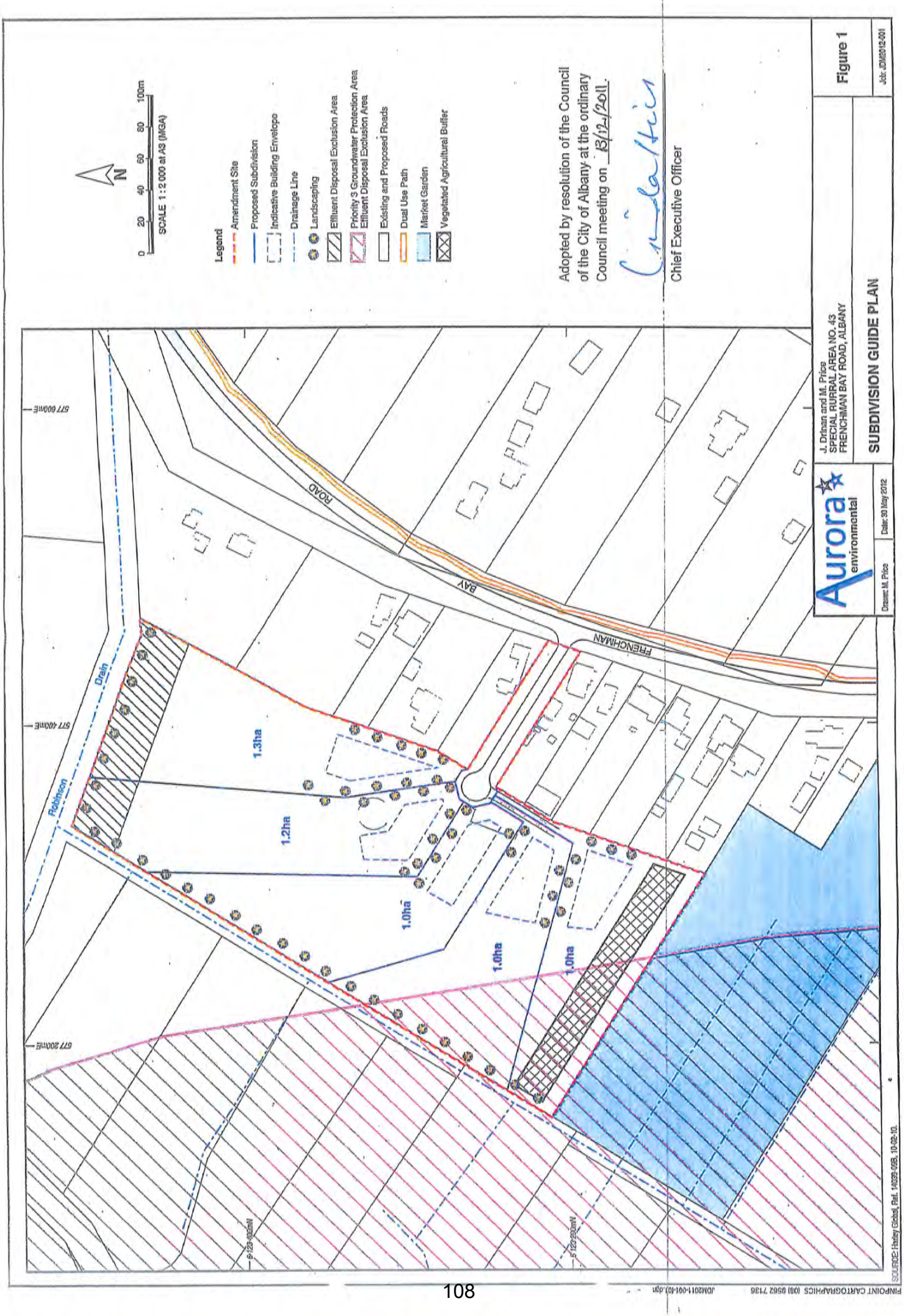
Existing Provisions & Subdivision Guide Plan

Local Planning Scheme No. 1

Rural Residential Area No. 43

No.	Specified Rural Residential Zone	Special Provisions Applying to Specified Rural Residential Zone
		the local government both prior to commencement of subdivision works and following completion of subdivision works. The report to provide adequate information proving that the land is suitable to accommodate future dwellings.
RR42	Little Grove Rural Residential zone	1. The minimum lot size shall be two hectares. 2. The following land uses are 'P' permitted uses— • Single House. 3. The following land uses are 'D' discretionary uses— • Ancillary Accommodation; • Bed and Breakfast/Farmstay; • Home Business; • Home Occupation; • Industry—Cottage; • Public Utility; and • Rural Pursuit (which shall be limited to existing cleared and pastured land only). 4. All buildings and structures shall be— (a) Located off any ridgeline as shown on the Subdivision Guide Plan as determined by the Local Government; (b) Located to retain the maximum amount of remnant vegetation on the site; and (c) Setback a minimum of 15 metres from any lot boundary.
RR43	Lot 114 Frenchman Bay Road, Robinson	**Plan of Subdivision** 1. Subdivision shall be generally in accordance with the adopted Subdivision Guide Plan *RR43*, as endorsed by the CEO. 2. The Western Australian Planning Commission may allow an alternative plan of subdivision, should it be satisfied that the plan of subdivision is consistent with the objectives and outcomes of the zone and Subdivision Guide Plan. 3. The Local Government will not generally recommend lots sizes less than one hectare. **Land Use** 4. Within Special Rural Zone Area No. 43 the following uses are permitted— • Single House 5. The following uses may be permitted subject to the special approval of the Local Government ('A')— • Home Occupation (cottage industry); • Public Utility; • Bed and Breakfast/Farmstay; • Holiday Accommodation; • Stables; • Home Office; • Home Business; and • Other non-defined or incidental activities considered appropriate by the Local Government which are consistent with the objectives of the zone. **Location of Buildings and Structures** 6. Any building on a lot must be constructed within a Building Envelope. Such Building Envelopes shall not exceed 2000m^2. Indicative building envelopes are shown on the subdivision guide plan. 7. Notwithstanding the requirement the Local Government may permit an alternative Building

No.	Specified Rural Residential Zone	Special Provisions Applying to Specified Rural Residential Zone
		Envelope location if it is shown to the satisfaction of the Local Government that— (a) The proposed location of the building envelope can achieve the setbacks established at 8; (b) All effluent disposal systems remain outside of the effluent disposal exclusion areas; and (c) That the necessary clearance to the ground water table can be achieved to support a suitable effluent disposal system. 8. All buildings are to be setback a minimum of 10 metres from all lot boundaries. **Water Supply** 9. All dwellings shall be required to provide a rainwater tank of not less than 50,000 litres capacity to harvest rainwater for household and garden use. **Effluent Disposal** 10. The Local Government shall require the use of amended soil type effluent disposal systems, such as EcoMax/ATU Systems. 11. Effluent disposal systems are to be located outside of the effluent disposal exclusion areas marked on the Subdivision Guide Plan. 12. No more than one effluent disposal system will be permitted on one lot. **Access** 13. Battleaxe legs are to be a minimum of 5 metres. Where access legs are to be co-located, their combined width may be reduced by 7.5 metres. 14. All driveways and underground infrastructure shall be designed and constructed so as to avoid erosion impacts and prevent unnecessary discharge of storm water. **Water Management** 15. The wastewater, stormwater and effluent disposal solutions documented in the *Local Water Management Strategy and Urban Water Management Plan Lot 114 (No. 142) Frenchman Bay Road, Robinson, City of Albany (April 2011)* shall form the basis for the detailed water management strategies. **Finished Floor Levels** 16. All buildings must achieve a minimum finished floor level of 2.64 metres AHD. **Notification of Prospective Owners** 17. The Local Government may require the subdivider to make arrangements satisfactory to the Local Government to ensure prospective purchasers are advised of the potential for nuisance impacts of odour, noise, dust and spray drift from the market garden located within 300 metres of the proposed development. **Agricultural Buffer** 18. A vegetated agricultural buffer is to be provided to the minimum width of 20 metres, plus a 10 metre setback for access from the south south-east boundary of the subject lot where the market garden adjoins, together with any required additional land for access for maintenance and firebreaks. 19. In relation to the 20 metre vegetated agricultural buffer to the existing market garden, species used in the closest 10 metre portion of the buffer shall not be capable of growing taller than 3 metres to prevent the incidence of overshadowing.
RR44	Torbay Hill, Kronkup Rural Residential zone	1. Subdivision of RR44 shall generally be in accordance with the Subdivision Guide Plan *RR44* endorsed by the CEO, with any minor


N
0 20 40 60 80 100m
SCALE 1 : 2 000 at A3 (MGA)
Legend
Amendment Site
Proposed Subdivision
Indicative Building Envelope
Drainage Line
Landscaping
Effluent Disposal Exclusion Area
Priority 3 Groundwater Protection Area
Effluent Disposal Exclusion Area
Existing and Proposed Roads
Dual Use Path
Market Garden
Vegetated Agricultural Buffer
Adopted by resolution of the Council of the City of Albany at the ordinary Council meeting on 13/12/2011.
Chief Executive Officer
Figure 1
Job: JDM2012-001
J. Drinan and M. Price
SPECIAL RURRAL AREA NO. 43
FRENCHMAN BAY ROAD, ALBANY
SUBDIVISION GUIDE PLAN
Aurora environmental
Drawn: M. Price
Date: 30 May 2012
FRENCHMAN BAY ROAD
Robinson Drain
1.3ha
1.2ha
1.0ha
1.0ha
1.0ha
577 600mE
577 400mE
577 200mE
6 123 400mN
6 123 200mN
SOURCE: Hartley Global, Ref. 14039-09B, 10-02-10.
PINPOINT CARTOGRAPHICS (08) 9562 7136
JDM2011-001(0).dgn

Schedule on Submissions and Recommendations Local Structure Plan No.4			
No.	**Address**	**Summary of comment**	**Proposed modifications to address issues raised in the submissions**
		UTILITIES	
1.	ATCO Gas	ATCO Gas does not have any comment or objection to the proposed Local Structure Plan.	Note comment relating to gas. No recommendation necessary.
2.	Water Corporation	The Water Corporation noted that: • Reticulation water main extensions will be required for the Lots created fronting Home and Harding Roads; • Contribution for Water, Sewerage and Drainage headworks may be required; and • Land may need to be ceded free of cost for works.	Note comment relating to reticulated water main extensions, contributions and ceding of land. Subdivision and development applications are referred to the Water Corporation for comment, at which time, requests can be made for contributions, infrastructure development and/or ceding of land. Not necessary to include a condition on the structure plan to address Water Corporation comments. No recommendation necessary.
3.	Telstra	At present, Telstra Corporation Limited has no objection	Note comment relating to power. No recommendation necessary.
		ENVIRONMENT	
4.	Environmental Protection Authority	The Environmental Protection Authority support the introduction of scheme provisions to ensure appropriate setbacks to horticultural activity and the retention of vegetation where possible.	Note comment relating to boundary setbacks and vegetation protection. A 20m wide 'Vegetated Agricultural Buffer' is shown on the submitted Local Structure Plan No. 4 to limit impact to a neighbouring horticulture activity and to protect vegetation. No recommendation necessary.
		SURROUNDING ACTIVITIES	
5.	Department of Mines, Industry, Regulations and Safety (DMIRS)	The Department of Mines, Industry, Regulations and Safety request that notifications are placed on any new lots created, alerting potential purchasers that sand extraction is taking place within 500m of the subject area and such activity may affect rural amenity.	Uphold comment relating to issues associated with neighbouring land uses. **It is recommended that the following text is included on the structure plan:** ***"At the time of subdivision, a Notification is to be placed on the certificate(s) of title of the proposed lot(s) advising of the existence of sand extraction and horticulture activity taking place within 500m and such activity may affect rural amenity."*** It is recommended that the concern relating to the potential for groundwater contamination, from effluent disposal systems be dismissed for lots proposed adjacent to the horticulture activity, with the exception of the proposed lot 'Residential'. A land evaluation assessment and site visit confirms that the proposed lots 10, 11, 12 and 13, located adjacent to the horticulture activity are capable of achieving development due to elevated areas and thus clearance to groundwater. The proposed Lot 'Residential', which is also located adjacent to the horticulture activity, is constrained due to extreme fire danger and water inundation. **Considering the land capability constraints for the proposed Lot 'Residential', it is recommended that the proposed Lot 'Residential' is amalgamated with the proposed Lot '13'.**
6.		Lots 97 and 100 Frenchman Bay Road neighbour the structure plan area. The Lots are used to grow crops (e.g. vegetables). Bore water is used to irrigate the crops. The owner of Lots 97 and 100 is concerned that additional subdivision/development may increase effluent, which may impact the quality of surface and groundwater and cause an unacceptable risk to food safety of vegetables being grown. Extra residences increases the chance of complaints though people not realising what a market garden entails. As we have historical use, it is unequitable that we should have our peace and enjoyment of our land altered.	
		LAND CAPABILITY ASSESSMENT	

7.	Department of Water and Environmental Regulation (DWER)	The Department of Water and Environmental Regulation noted that a soil assessment was undertaken for the subject area in early summer. The Department of Water and Environmental Regulation commented that the soil assessment should represent end of winter testing.	Dismiss comment relating to the request for end of winter soil testing. Common sense suggests that testing to determine the location of groundwater should occur in the wet (winter) months. However this is not necessarily the case. For determining approximate depth to water table, The Australian Standard 1547 suggests professional observation and interpretation of soil properties which include changes in soil colour, structure, and degree of mottling within the profile, as well as consideration of site indicators such as hydrophilic vegetation, data from any nearby bores, and anecdotal evidence from landholders on site drainage in the area. This can be done at any time of year. AS/NZS 1547 also states that the duration of a seasonal shallow water table is of much greater importance than its minimum depth at any one time. To alleviate any doubt on the matter, it is recommended that specialised effluent disposal systems are used to ensure pollutants do not enter the water table. **It is recommended that the following provision is included on the structure plan map:** ***a) To ensure nutrients are removed from effluent, the Local Government shall require the use of emended soil type effluent disposal systems, such as EcoMax/ATU Systems.***
		PROPOSED LOTS 10 AND 13	
8.	Department of Water and Environment Regulation (DWER)	The DWER has concerns with regard to the suitability for long-term on-site sewage disposal on proposed Lots 10 and 13. The DWER stated: Proposed lots 10 and 13 in the Local Structure Plan should not be supported given that: • The minimum requirements for onsite sewage disposal for Lot 13 would only be met if an unreasonable amount of fill was used. • On-site sewage disposal on Lot 13 is likely to have an adverse impact on the water quality of the PDWSA. There is a high risk that even with a large amount of fill, pathogens could still reach the groundwater water and thus impact Albany's drinking water supply. • Lot 13 is in a sewage-sensitive area where onsite sewage disposal and other uses of the lot are likely to have cumulative adverse impact on groundwater and other receiving water bodies; in this case Princess Royal Harbour. • It is considered that although phosphorus leaching could be potentially managed if high PRI fill was used then, nitrogen concentrations would still not be addressed under the nutrient concentration targets set for on-site sewage disposal within SSA.	Dismiss comment from the DWER relating to proposed Lots 10 and 13. As per a land evaluation assessment produced for the structure plan, there are areas within the proposed Lots 10 and 13, which are capable of servicing effluent disposal systems. The same cannot be said for the proposed Lot 'Residential' (portion of Lot 98), which is constrained due to: a) Poor drainage; b) A deflation basin; c) Seasonally high groundwater levels; and d) A higher than acceptable bushfire heat exposure rating of 40kw/m^2 (BAL40) and Flame Zone (FZ). Refer to the structure plan, which indicates a new proposed lot ('Residential') in the north eastern corner. City staff undertook a site visit to the subject lots 10, 13 and 'Residential'. It is obvious that proposed lots 10 and 13 have elevated areas and therefore suitable clearance to the groundwater. The proposed lot 'Residential, however, is low lying and subject to water inundation. Considering the constraints associated with the subject area, **it is recommended that the proposed Lot 'Residential' (portion of Lot 98) is amalgamated with the proposed Lot '13' and rezoned appropriately.** **It is recommended that the 'Total Area' and 'Lot Yield' data recorded in the 'Local Structure Plan Summary Table', at the 'Executive Summary' section of the structure plan document is amended to reflect the recommendation to amalgamate the proposed Lots "13" and "Residential".**
		PROPOSED LOT 10	
9.	Department of Water and Environment Regulation (DWER)	The building envelope for lot 10 is located in close proximity to the large soak/wetland (30 m or less). Although this lot is likely to meet the required 2m separation to highest groundwater level, the close proximity of the land application area to the soak/wetland provides the same risk to groundwater quality as Lot 13.	Note comment from DWER relating to proposed Lot 10. It is recommended that no modification is required for the following reason: • The proposed building envelope is positioned in a 'High capability' area with well drained pale deep sands (Gg land unit).

		LIVESTOCK	
10.	Department of Water and Environment Regulation (DWER)	DWER recommends that special provisions are used to restrict the keeping of horses within the zone. Nutrient load targets for the public drinking water source area are likely to be exceeded with livestock on 1 ha size lots. Department of Agriculture guidelines for stocking rates recommend a minimum of 1.7 ha/per horse.	Dismiss comment on livestock rates. In accordance with the City's Scheme (cl:5.5.13.2.8), the keeping of animals may be considered in the Rural Residential zone. The Department of Primary Industries and Regional Development – Agriculture and Food, govern the amount of livestock permitted on land. No recommendation necessary.
		VEGETATION	
11.	Department of Water and Environment Regulation (DWER)	Clearing of native vegetation immediately below the crest of a steep slope (e.g. on Lot 10) is not considered best practice as the land unit is highly susceptible to wind erosion. It is considered that the access road to the lot from Home Road, which will lead to further loss of vegetation will potentially increase risk of erosion and is not good management practice. It is preferable if an alternative is found to clearing which will avoid loss of native vegetation on the crest of the dune.	Uphold (in-part) comment relating to the protection of vegetation (proposed Lot 10). The vegetation at proposed Lot 10 is locally known as 'peppermint tree'. This type of vegetation is abundant in the locality and region. In accordance with the City's scheme, unless vegetation is classified as being threatened, vegetation may be cleared to accommodate development and access. **It is however recommended that the structure plan is amended to show vegetation protection areas, outside of development, access and asset protection areas.**
12.	Department of Biodiversity Conservation and Attractions (DBCA)	The DBCA noted that: • Much of the vegetation in the subject area is in degraded state with little understorey; and • Retention of mid to upper storey vegetation outside of building envelopes will assist in maintaining connectivity for the threatened Western Ringtail Possum. The DBCA recommended that a provision is included in the amendment to promote retention of native vegetation where possible.	
		STORM WATER MANAGEMENT	
13.	Department of Water and Environmental Regulation (DWER)	It is recommended that stormwater drainage should not be discharged off-site prior to treatment and detention. Water efficiency measures should be encouraged with dwellings to have domestic rainwater tanks plumbed into their water supply or to incorporate lot-level grey water systems. On site stormwater management should be designed in accordance with the '*Decision process for stormwater management in WA (DoW 2009*)' and the '*Stormwater Management Manual for Western Australia (DoW 2004–2007*)'. The stormwater management system should be to the satisfaction of the Local Government Authority, in consultation with the Department of Water. A stormwater management plan should be referred to the department at the subdivision application stage.	Uphold comment from DWER and dismiss comment from the Water Corporation, in relation to stormwater management. **It is recommended that the following notation is included on the structure plan:** ***On site stormwater management should be designed in accordance with the 'Decision process for stormwater management in WA (DoW 2009)' and the 'Stormwater Management Manual for Western Australia (DoW 2004–2007)'. The stormwater management system should be to the satisfaction of the Local Government Authority.***
14.	Water Corporation	Drainage and Water Management Plan needs to be completed and approved, by the Department of Water for this area, to set regional	

		drainage conditions for the subject and surrounding area as it is in a P3 Priority Protection Area. Developments within this catchment are required to contain the flows from a one in one hundred year storm event on site. Discharge to the Water Corporation drains must be compensated to pre-development levels.	
		BUSHFIRE	
15.	Department of Fire and Emergency Services.	The BAL Contour Plan (pg. 16) does not accurately reflect the BAL ratings of the lots and does not apply the correct methodology	Uphold request for accurate BAL Contour Plan. **It is recommended that the BAL Contour Plan is reviewed and updated to comply with the Commissions Guidelines for Planning in Bushfire Prone Areas.**
		The BMP assumes all areas within lots will be maintained to APZ standard with no further substantiation. However, the BMP provides no enforceable mechanism to ensure maintenance of this area to low threat as per AS3959 in perpetuity.	Uphold comment relating to asset protection areas. **It is recommended that the structure plan is modified to show asset and vegetation protection areas.**
		The BMP does not detail the upfront and ongoing tasks, responsibility and timeframe for implementation of measures to ensure the effectiveness of the BMP.	Uphold comment relating to responsibilities. **It is recommended that a table is included, within the Bushfire Management Plan, to indicate ongoing responsibilities for landholders, developer and local government.**
		Battle-axes should be avoided because they often do not provide two-way access and egress for residents or emergency services and may easily be blocked by falling trees or debris in an emergency. The Structure Plan proposes seven battle-axe lots out of a total of 14 lots. Evidence has not been provided to detail why this configuration cannot be avoided. The structure plan and subdivision design should optimise hazard separation through the provision of public roads/laneways between the bushfire hazard and proposed development. Furthermore, the provision of peripheral access improves vehicle access for emergency services by providing direct access to areas of extreme bushfire hazard during a bushfire event which alternatively would be restricted by private property.	It is recommended that the DFES comment pertaining to the creation of battle-axes lots is upheld in part. The DFES advised that battle-axe access legs should be avoided in bushfire prone areas and should only be considered where it is demonstrated that no alternative exists. **It is recommended that a 6m all weather access is developed between Home Road and Frenchman Bay Road, to provide access to proposed lots 10-13. This will overcome the need to develop battle axes for these lots.** It is recommended that the battle axes to proposed lots 5-9 remain. The alternative is long thin (30m width) lots fronting Home Road. This is a poor undevelopable alternative.

CITY OF ALBANY

LOCAL PLANNING SCHEME NO. 1

AMENDMENT NO. 27

AYTON BAESJOU
PLANNING
ABN: 15 061 140 172
59 Peels Place
Albany WA 6330
Ph 9842 2304 Fax 9842 8494

MINISTER FOR PLANNING

PROPOSAL TO AMEND A LOCAL PLANNING SCHEME

LOCAL AUTHORITY:	**CITY OF ALBANY**
DESCRIPTION OF LOCAL PLANNING SCHEME:	**LOCAL PLANNING SCHEME No. 1**
TYPE OF SCHEME:	**DISTRICT SCHEME**
SERIAL No. OF AMENDMENT:	**AMENDMENT No. 27**

PROPOSAL:

i. To transfer Lots 84, 85, 86 and portion of Lots 87 & 98 Home, Harding & Frenchman Bay Roads Robinson from Rural Residential Zone 29 within Schedule 14 to Rural Residential Zone 43.

ii. To modify existing and introduce new Special Provisions and reference the Frenchman Bay, Harding & Home Roads Local Structure Plan within Schedule 14 Rural Residential Zone 43.

LOCAL PLANNING SCHEME No. 1

AMENDMENT No. 27

CONTENTS

PLANNING AND DEVELOPMENT ACT 2005

RESOLUTION TO PREPARE AMENDMENT
TO LOCAL PLANNING SCHEME

CITY OF ALBANY

LOCAL PLANNING SCHEME No. 1

DISTRICT SCHEME

AMENDMENT No. 27

RESOLVED that the local government pursuant to Section 72 of the *Planning and Development Act 2005*, amend the above Local Planning Scheme by:

i. Transferring Lots 84, 85, 86 and portion of Lots 87 & 98 Home, Harding & Frenchman Bay Roads Robinson from Rural Residential Zone 29 within Schedule 14 to Rural Residential Zone 43.

ii. Modify existing and introduce new Special Provisions and reference the Frenchman Bay, Harding & Home Roads Local Structure Plan within Schedule 14 Rural Residential Zone 43.

The amendment is a Standard Amendment under the provisions of the *Planning and Development (Local Planning Schemes) Regulations 2015* for the following reasons.

- It is an amendment relating to a zone or reserve that is consistent with the objectives identified in the scheme for that zone or reserve;
- It is an amendment that is consistent with a local planning strategy for the scheme that has been endorsed by the Commission;
- It is an amendment that would have minimal impact on land in the scheme area that is not the subject of the amendment; and
- It is an amendment that does not result in any significant environmental, social, economic or governance impacts on land in the scheme area.

Dated this _____ day of _____ _____

_____
CHIEF EXECUTIVE OFFICER

CITY OF ALBANY

LOCAL PLANNING SCHEME NO. 1

AMENDMENT NO. 27

ADDITIONS TO
RURAL RESIDENTIAL ZONE NO. 43
HOME & HARDING ROAD PRECINCT

PLANNING REPORT

AYTON BAESJOU
PLANNING

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Contents

1. INTRODUCTION

It is proposed to transfer Lots 84, 85 & 86, as well as the Rural Residential zoned portions of Lots 87 & 98 Home & Harding Roads, Robinson, from Rural Residential Zone Area 29 to Area 43.

It is also proposed to make reference to a Local Structure Plan which covers the subject land and to modify a number of existing provisions to cater for the subdivision, development and ongoing use of the land.

With the exception of the areas of Lots 87 & 98 zoned Residential, the land forms a discrete precinct in the southern portion of the City of Albany's existing Rural Residential Zone No. 29.

The purpose of the amendment is:
a) To enable the subdivision of 5 existing lots, into 14 lots, with a minimum lot size of 1 hectare; and
b) To consistently reflect land use compatibility within the Priority 3 water source protection area.

Water Source Protection areas exist within Albany to establish compatible land uses. Three priority areas exist. The Priority 1 area exists to generally not permit development, the Priority 2 area exists to support development subject to limitations and the Priority 3 area exists over land where water supply sources need to co-exist with other land uses such as residential and commercial.

The Priority 2 and 3 areas exist over the Rural Residential No. 29 zone. The Priority 3 area exists over the Rural Residential No. 43 zone.

The transfer of lots zoned Rural Residential No. 29 and within the Priority 3 area, to the Rural Residential No. 43 zone, is a consistent reflection of land use compatibility for the Priority 3 area.

In accordance with the Draft Government Sewerage Policy, exemptions to the mandatory requirement for connection to reticulated sewerage may be considered for subdivision proposals for the creation of lots greater than one hectare in Priority 3 public drinking water source areas in rural residential/rural living zones.

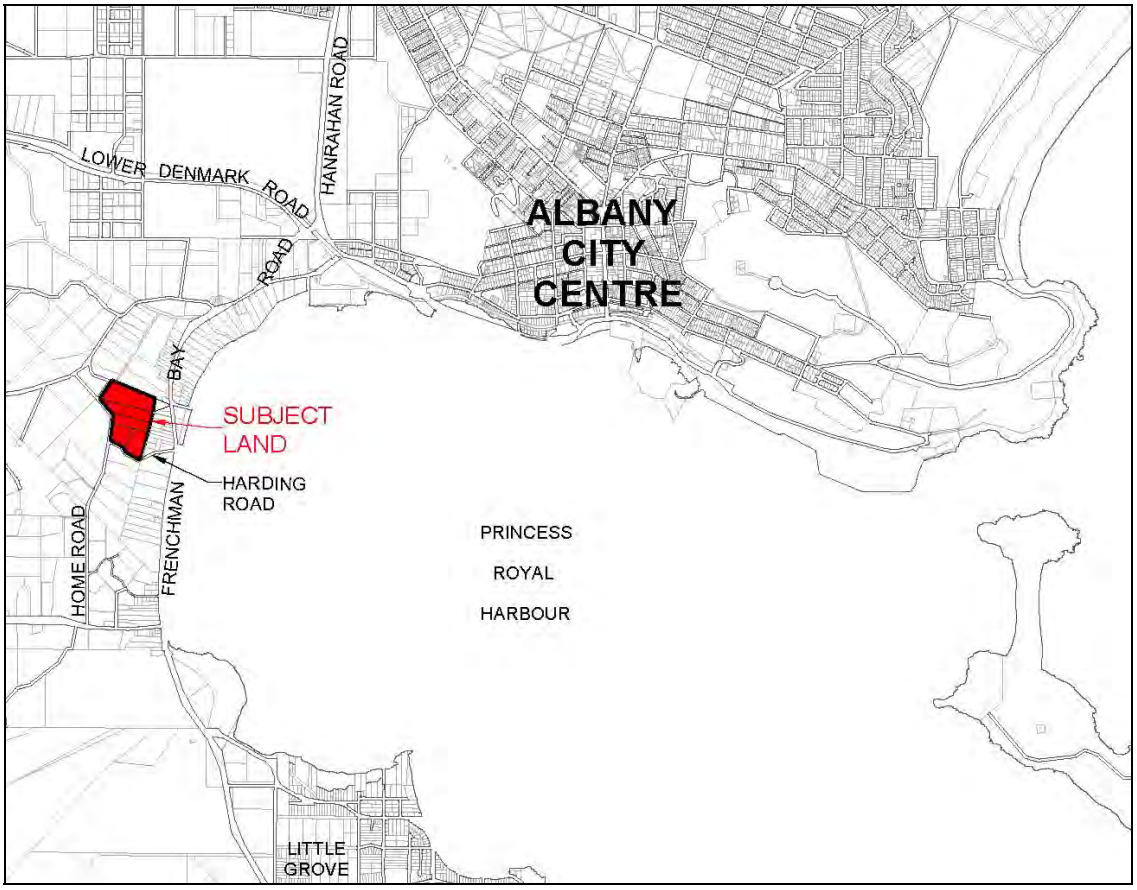
This proposal has been foreshadowed by the Albany Local Planning Strategy, strongly supporting more efficient use of existing zoned land and the Local Planning Scheme, requiring the preparation and adoption of a Structure Plan prior to the intensification of development, as well as background liaison with both Council and the Department for Planning.

This document supports and should be read with the Frenchman Bay, Harding & Home Roads Local Structure Plan and Map.

2. BACKGROUND

2.1 Location, Area & Zoning

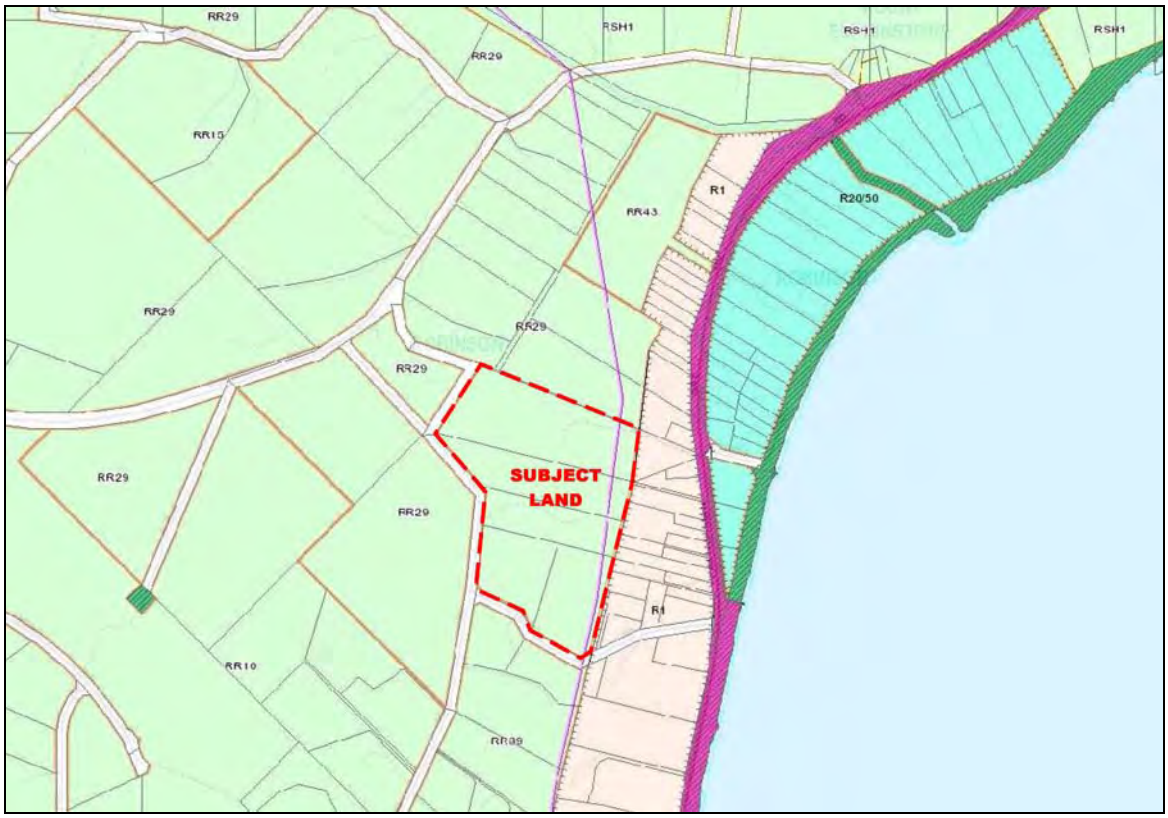
The precinct is located some 5.5km south west of the Albany City Centre and is accessed via Princess Royal Drive and Frenchman Bay Road.



Location Plan

Lot No.:	Lot Size:	Lot Access:
84	2.7363ha	Harding Road
85	2.0187ha	Harding & Home Roads
86	2.2085ha	Home Road
87	2.9078ha	Frenchman Bay & Home Roads
98	5.4802ha	Frenchman Bay & Home Roads

Apart from the area of Lot 98 fronting Frenchman Bay Road and the Lot 87 access leg, the land is zoned Rural Residential and is included in Area 29 of Local Planning Scheme No. 1. It is surrounded by existing Special Rural development (north and west), unsewered residential to the east and further east, the Princess Royal Harbour Foreshore (parks and recreation reserve). Currently there is no Local Structure Plan covering the Subject Land.



Extract from LPS 1 Scheme Map

2.2 Site Description

Land Assessment Pty Ltd has completed a land capability and geotechnical investigation of the subject land (see Appendix A). It describes the site as follows:

> *The land contains a mixture of cleared and vegetated areas and there is a residence on each of the five existing lots. There are no significant rural pursuits although portions of lots 85 and 98 are used for stabling and exercise of horses, and the eastern part of lot 98 is subject to grazing by goats.*
>
> *As parts of the subject land are located on relatively low-lying terrain inland from Princess Royal Harbour, environmental assessment of the land needs to consider its capability to support on-site disposal of domestic effluent and wastewater, and to address the potential for further development to be affected by any Acid Sulfate Soil conditions.*

The assessment found that none of the three vegetation types represented in the pockets on site occur at less than 30% of their pre clearing extent and none of the areas would require any significant to create additional house sites or access ways. Soils, site conditions, land capability, acid sulfate and other issues are discussed further in this report and in Appendix A.

2.3 Surrounding Land Use and Zoning

Immediately north of the subject land, Rural Residential Areas 29 & 43 continue and support lots down to 1ha in area. To the north east fronting Frenchman Bay Road are residential lots down to 2000m^2 in area. LPS1 has revised the minimum lot size in this area to 8500m^2. To the south is Rural Residential Area 39 with a minimum lot size of 1ha. To the south west is the Almore Park Rural Residential Estate. Almore Park, being within the Priority 2 area of the South Coast Groundwater Reserve, has a minimum Rural Residential lot size of 2ha.

Further north is Rural Residential Area 43 comprising 1ha lots on land currently used for grazing and stables. This area, being located on the lower flats, has requirements for a finished floor level of 2.74m and more tightly controlled building envelopes. Also being located immediately adjacent to small scale market garden activities, this area includes a 50m setback requirement incorporating a 20m wide vegetation buffer. The Provisions and Subdivision Guide Plan relating to Rural Residential Area 43 are included as Appendix B.

The subject land is therefore amongst the last land in the area capable of being developed to Rural Residential standards given groundwater protection controls and the prevailing planning context.

3. PLANNING CONTEXT

The key planning documents that relate to the subject land are the Lower Great Southern Strategy, the City of Albany's Local Planning Strategy (ALPS) and Local Planning Scheme No. 1 (LPSNo.1).

The Lower Great Southern Strategy (2015 – Draft) is soon to replace the 2007 Strategy. This is a regional strategy identifying regional level objectives and directions. It includes relevant nominated actions to:

- Provide efficiency in development form and servicing settlements.
- Carefully manage essential natural resources, particularly water supplies and agricultural land.
- Appropriately zone sufficient land for urban development and a variety of housing types, in accord with endorsed local planning strategies.
- Recognise public drinking water source areas in local planning strategies and protect them where appropriate in local planning schemes.

The strategy also notes that encouraging the provision of a range of residential living environments is a clear planning objective and that the location and amount of rural living land is to be determined through the Local Planning Strategy process.

The Albany Local Planning Strategy identifies the land within a Rural Residential and Residential R1 precinct and shows the land as suitable for accommodating some re-subdivision to provide more efficient and sustainable development.

Local Planning Scheme No. 1 identifies the land as "Rural Residential" and notes in cl4.2.17, the objectives to:

"(a) Create small rural land holdings for residents who wish to enjoy a residential lifestyle within a rural landscape and environment; and

(b) Provide for residential and limited incidental land uses which—

(i) Are compatible with the preservation and protection of environmentally sensitive areas such as remnant vegetation and groundwater protection areas;

(ii) Do not visually detract from the landscape and the visual amenity of the locality;

(iii) Allow for uses and developments that are fit for purpose and minimise any on-site or off-site impacts such as soil erosion, nutrient loss, drainage and potential land use conflicts; and

(iv) Are located in close proximity to existing urban areas and can enjoy appropriate urban servicing to the lots including rubbish disposal, reticulated water, community facilities and fire infrastructure."

Along with these documents some context is provided by the recent creation of Rural Residential Area No. 39 immediately south of the subject land. This Rural Residential area accommodates and provides for the form of subdivision and development covered in the current proposal.

The area is within the Department of Water South Coast Groundwater Reserve with a Priory 3 Coding. This coding provides for subdivision to a minimum average of 1ha where land is zoned and appropriate landuse controls apply, capability is acceptable and the land, such as the subject land, is situated beyond any wellhead protection zones.

Clearly the zoning, context and the objective of the current zone not only provides for the proposed development but both local and state strategies encourage it on efficiency and sustainability grounds.

As the land is already correctly zoned, the 2015 Planning Regulations and LPS1 requires the preparation, adoption by Council and endorsement by the WA Planning Commission, of a Local Structure Plan Map and the inclusion of relevant subdivision, development and land management provisions. Pursuant to the 2015 Planning Regulations, the process to achieve this is via the "Standard Amendment" and Local Structure Plan process.

While this document addresses the Local Planning Scheme Amendment issues, it also covers background and issues relevant to the Frenchman Bay, Harding & Home Roads Local Structure Plan and as a result, both documents should be read togather.

4. SITE ASSESSMENT

Land Assessment Pty Ltd has completed a detailed assessment of the site for Rural Residential development. This is attached in Appendix A.

Summary.

Subject to the proposed pattern of subdivision enabling positioning of building envelopes for all 'new' lots within areas of either high (green) or fair (yellow) capability, the subject land is capable of supporting additional subdivision to the lot sizes permissible for the relevant land use zoning categories under the planning scheme (City of Albany 2014).

On-site effluent disposal.

For the major portion of the subject land (elevated dunal areas) conventional on-site effluent disposal systems (septic tanks and leach drains) will be appropriate for unsewered rural residential lots.

Should the plan of subdivision result in building envelopes being positioned within lower-lying portions where alternative treatment units are required, setback distances (both vertical and horizontal) are applicable to land application areas for effluent disposal.

Specific setbacks, and the required area for land application of treated effluent, can vary according to the type of system (i.e. a soil absorption system such as leach drains with amended soil, or an irrigation system associated with an aerobic treatment unit, ATU) and according to the method of any irrigation (i.e. surface sprays or drippers, or subsoil drippers).

Acid Sulfate Soils.

A search has been conducted of the State Government's contaminated sites database by planners Ayton Baesjou, who report that there are no records of contaminated sites within the subject land.

Notwithstanding the absence of any need for deep excavation works associated with further subdivision and development of the land for rural-residential use, field survey observations and some laboratory testing of subsoil material within the estuarine plain portion, indicate acid sulfate soils are not present.

Remnant Vegetation.

The proposed intensity of further subdivision should not require any significant clearing of the remaining native vegetation within the subject land.

Outside of the parkland cleared areas, where understorey species have been already been depleted, the more intact areas of remaining vegetation occur near the property fringes and are unlikely to be considered prospective sites for building envelopes given the proposed lot sizes.

Subject to site responsive subdivision design, the ALRS objective of protecting areas of remnant vegetation would not be compromised by the development proposal.

Groundwater Protection.

The Local Planning Scheme (City of Albany 2014) takes into consideration the Water Source Protection Plan for the South Coast Water Reserve (Water and Rivers Commission 2001) via designation of a special control area which extends over most of the subject land.

Subject to the plan of subdivision responding to the land capability mapping through appropriate positioning of 'new' building envelopes, and the creation of lots of equal or greater size to those determined by the Water Source Protection Priority Code (P3 – with a possible minimum average of 1 ha), the proposed intensification of rural residential development in this area should not jeopardize groundwater protection.

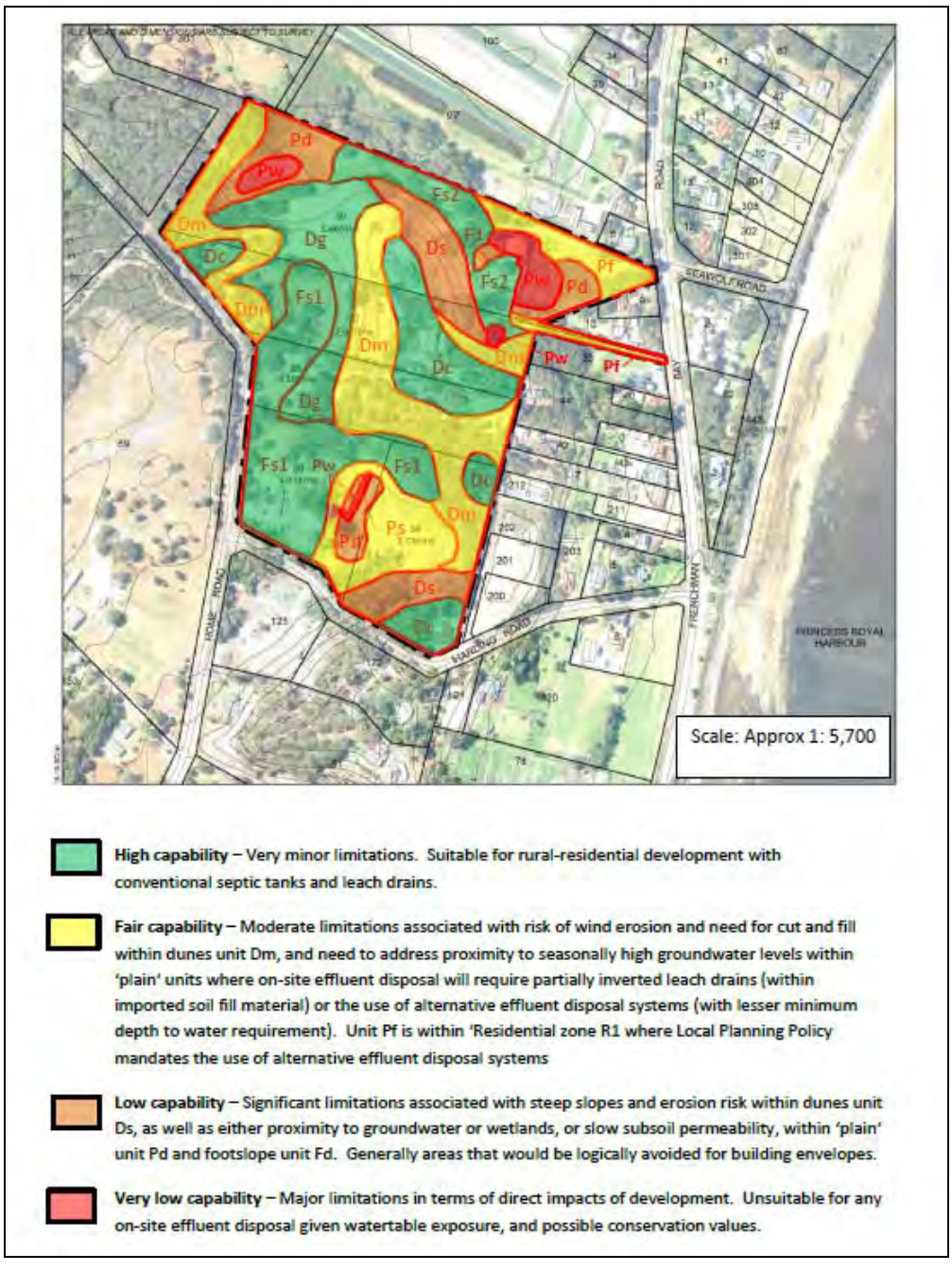
Surrounding Activities.

A small scale market garden is located some 50m to 80m north of the subject land. In other areas of Rural Residential Area No. 43, this activity is provided with 50m setback incorporating a 20m wide vegetated buffer.

In relation to the subject land however, this activity is buffered by an existing tree line some 20m to 50m wide. Internal setbacks to the northern boundary of an additional 20m are also available. This brings total setbacks to 70m to 100m incorporating a 20m to 50m vegetated buffer; well in excess of the established standard.

Land Capability.

The Land Capability Plan prepared by Land Assessment Pty Ltd shows the outcomes of the detailed assessment as below:



From this it can be seen that each existing lot has substantial areas of acceptable capability showing fair or high capability. Effluent disposal systems will need to avoid areas shown as low and very low.

5. SERVICES AND INFRASTRUCTURE

5.1 Roads & Access

In terms of access, Lot 84 has access to Harding Road, Lot 85 to both Harding and Home Roads, Lot 86 to Home Road and both Lots 87 and 98 access both Home and Frenchman Bay Road. For Lot 87 this is an established 5m wide battle-axe leg/ driveway to Frenchman Bay Road and for Lot 98 this is a driveway within a frontage of 12m widening to 100m.

5.2 Potable Water Supply

Reticulated water supplies are partially available in the locality.

5.3 Effluent Disposal

Disposal of effluent on the properties and in the wider area is by way of on-site effluent disposal systems. Scheme sewer is not available.

In accord with the land assessment, new development will be required to utilise high performance nutrient retaining systems and Effluent Disposal Exclusion Areas will be identified over land with poor capability.

As noted previously, Department of Water Groundwater Protection Controls restrict effluent disposal density in this Rural Residential zone to 1 unit per 1ha average. This proposal will meet this requirement by ensuring this density is not exceeded and systems will be restricted to capable areas.

5.4 Power & Telecommunication

The properties have access to power and telecommunication services which are partially underground.

5.5 Schools and Community Facilities

Local, Neighbourhood and Regional services and facilities are readily accessible and available in the Albany City Centre some 5.5km by road to the north east.

6. PLANNING

Clause 5.5.13.3 of Local Planning Scheme No.1 requires a number of issues to be addressed. These include:

- Land Capability and suitability assessment;
- Protection and enhancement of the natural environment;
- Protection and enhancement of visual amenity;
- Provision of infrastructure and services;
- Impacts on adjacent land uses;
- Any potential for site contamination;
- Effluent disposal;
- Location of building envelopes, development exclusion areas;
- Preparation of a Subdivision Guide Plan for the subdivision showing proposed roads and connectivity between proposed /future and existing developments, lots, recreation areas, location of building envelopes, as relevant.

These issues are addressed in this report and on the attached Local Structure Plan.

6.1 Local Structure Plan – Lot Layout & Subdivision

The subdivision layout is shown for the lots overleaf on the Local Structure Plan Map. This plan is undergoing review and endorsement via a separate but complementary process. The plan will be applied at the time of subdivision along with the relevant Scheme No. 1 General Clauses and Special Provisions to guide that subdivision and the future development of and on the land.

6.2 Access

Existing accesses are utilised wherever possible. Regarding each lot:

Lot 84: One new crossover is required to Harding Road for the northern lot.

Lot 85: The new lot out of Lot 85 may make use of one of the existing crossovers to Home Road.

Lot 86: One new crossover is required for the new lot. With this noted, reciprocal access could be established over the existing driveway such that both lots effectively use the existing driveway and cross over and thus remove the need for new physical access to be constructed.

Lot 87: The existing dwelling retains the existing battle-axe to Frenchman Bay Road. There is also the option that the two new lots in the west may share the existing crossover to Home Road. No construction or visibility issues present.

Lot 98: The existing access on Frenchman Bay Road is retained as a battle-axe to serve the existing house lot and a lot to its east. The two western lots share an historic access to Home Road to the south west. A Right of Way may also be provided in the north western corner of the land to provide alternate access to Lot 97 north should it be required. In accord with Scheme Requirements for the Residential zone, a lot of 8500m^2 is shown over the land zoned Residential with direct frontage to Frenchman Bay Road.

Local Structure Plan

Frenchman Bay, Home & Harding Roads Rural Residential Area 43

Lots 84, 85 Harding Road & Lots 86, Pt87 & Pt98 Home Road Robinson, City of Albany

ALL AREAS AND DIMENSIONS ARE SUBJECT TO SURVEY

Future subdivision of Lots 97 & 100 will be subject to detailed investigation and assessment to ensure that the requirements set out in Local Planning Scheme No. 1 can be achieved.

ROW 1031m²

10 1.1390ha
11 1.2129ha
12 1.1242ha
13 1.0460ha
9 8385m²
8 1.0019ha
7 1.0674ha
6 1.0106ha
5 1.0159ha
2 1.0071ha
1 1.0116ha
3 1.3000ha
4 1.0763ha
98 5.4802ha
87 2.9078ha
86 2.0265ha
85 2.0187ha
84 2.3763ha
Residential 8500m2
7447 Reserve 36200

HOME ROAD
HARDING ROAD
SEAWOLF ROAD
FRENCHMAN BAY ROAD
PRINCESS ROYAL HARBOUR

Department of Water Priority 2 Protection Area
Department of Water Priority 3 Protection Area

P2 P3

LEGEND

- Subject Land
- Existing Lot Boundaries
- Proposed Lot Boundaries
- Existing Vegetation
- Existing Buildings
- Vegetated Agricultural Buffer
- Effluent Disposal Exclusion Area
- Market Garden
- Indicative Building Envelope Max 2000m2
- P2 DoW Priority 2 Protection Area
- P3 DoW Priority 3 Protection Area

Map Modification -	1a
Map Creator -	BQ/MRT
Copyright -	Ayton Baesjou Planning
Sources -	Landgate (Cadastre & Contours)
Datum -	AHD
Contact -	Ayton Baesjou Planning
Disclaimer -	Subject to Verification & Survey

ORIG A3
SCALE 1:3000

0 15 30 45 60 75

NOTES

- High performance effluent disposal devices to be used.
- Minimum 20m wide Asset Protection Zone to be provided around all dwellings.
- Individual lots to be maintained in a Hazard Reduced condition.
- Individual BAL Assessments may be required prior to dwelling development.

15-15-LSP(a)

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Preference has been given to the continued use of existing and established crossovers. This provides that for the nine new lots only two new crossovers are required; both on the quiet local roads. With an allowance of approximately 5vpd per new lot, there will not be a significant impact on these existing access roads. Reciprocal rights of way are proposed over joint use battle-axe legs so as to minimise construction requirements and site disturbance.

The access to Frenchman Bay Road on Lots 87 & 98 allows for emergency access through to Home Road should it be required. In addition a Right of Way spur can be provided through to Lot 97 (offsite). This could provide alternate access for this lot should it be required if this land is considered for future development.

6.3 Landscape

The existing landscape character is small lot semi rural in nature with a mix of rural residential, horse based activities and small scale vegetable production on the low lying flats. Development fronting Frenchman Bay Road is residential in nature and will remain unchanged.

The amendment proposal and the Local Structure Plan Map retains these landscape qualities by ensuring rural residential/special rural lot sizes are maintained and by ensuring that no new development will be exposed to Frenchman Bay Road but is screened behind existing development. Home Road will retain its established semi rural character.

6.4 Capability and Site Assessment

A site and capability assessment is included within the Land Assessment Report (Appendix A). This assessment found minimal site constraints for the proposed limited rural residential development so long as development is confined to the capable and suitable areas shown, the setbacks to small scale vegetable production are retained and high performance onsite effluent disposal devices are utilised.

Each lot has access to capable and suitable house sites and is capable of supporting onsite effluent disposal. In accord with the findings of the Land Assessment report, areas of very low and low capability are shown as Development Exclusion.

In addition, the existing 50m – 80m vegetated setback to the small scale market garden will couple with the proposed 20m internal exclusion area to cater for development. This overall buffer significantly exceeds the standard applying in Rural Residential Area 43.

6.5 Servicing

Each lot is independently developable and will therefore need to support its own access construction as well as electrical and telecommunications connections. Services and connections are available generally in the area with no need for trunk extension.

Site conditions, soil permeability and the extremely low density of development allow for the continued use of swale & infiltration based storm water management for driveway and structure runoff.

Some rationalisation of internal services may also be required where existing domestic services conflict with new internal boundaries.

6.6 Fire Assessment

A fire hazard assessment and fire management proposals are included as Appendix B and satisfy State Planning Policy 3.7. This assessment ranks hazards and outlines requirements to be included in the development.

Requirements include:

- Preparation and implementation of a Bushfire Management Plan/s as a condition of subdivision.
- Notification to landowners of fire safety issues and individual responsibilities per the Bushfire Management Plan/s.
- Maintaining lots in a fuel reduced condition.
- Installing and maintaining Asset Protection Zones.
- Dwelling construction to specified fire safe standards.
- Modified perimeter fire break requirements.
- Access to existing street fire hydrants.

6.7 Existing Provisions

Rural Residential Area 43 has existing provisions in Schedule 14 to the Scheme. The provisions relate to the LSP Map, outline permissible landuses, the location of buildings, effluent disposal, access, landowner notification and provision of the agricultural buffer.

The adequately provide for the development of the subject land, the existing provisions will need to be modified to:

- Reference the LSP Map covering the new lots.
- Provide for potable water supplies for the new lots in the conventional manner whilst retaining the specific requirements necessary for the low laying land in the existing section of Rural Residential Area 43.
- Correct references to access leg widths.
- Provide for the new Vegetated Agricultural Buffer.

7. CONCLUSION

The Local Planning Scheme No. 1 Amendment and the Local Structure Plan Map proposal is a simple one providing for nine new lots within this contained & existing rural residential area.

The development of this structure plan and the limited resubdivision of the land is foreshadowed in the original zoning of the Rural Residential Area as well as efficiency and sustainability objectives within local and regional strategies. Planning satisfies cl 5.5.13.3k of the Scheme and provides for development already established and popular in the locality.

This is achieved whilst maintaining a low density of development and also providing for site sensitive development generally.

As a result, the proposal has clear merit and accords with the principals of orderly and proper planning.

Appendix A

Land Capability Assessment

RR 43 Home & Harding Road Precinct

Land Assessment Pty Ltd

LAND CAPABILITY ASSESSMENT AND PRELIMINARY GEOTECHNICAL INVESTIGATION

- Lots 84, 85 Harding Road & Lots 86, 87 & 98 Home Road, Robinson, City of Albany

Prepared for

AYTON BAESJOU PLANNING

by

Land Assessment Pty Ltd

LA Report No 1512
11 January 2016

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CONTENTS

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ATTACHMENTS

CONTENTS (continued)

1.0 INTRODUCTION

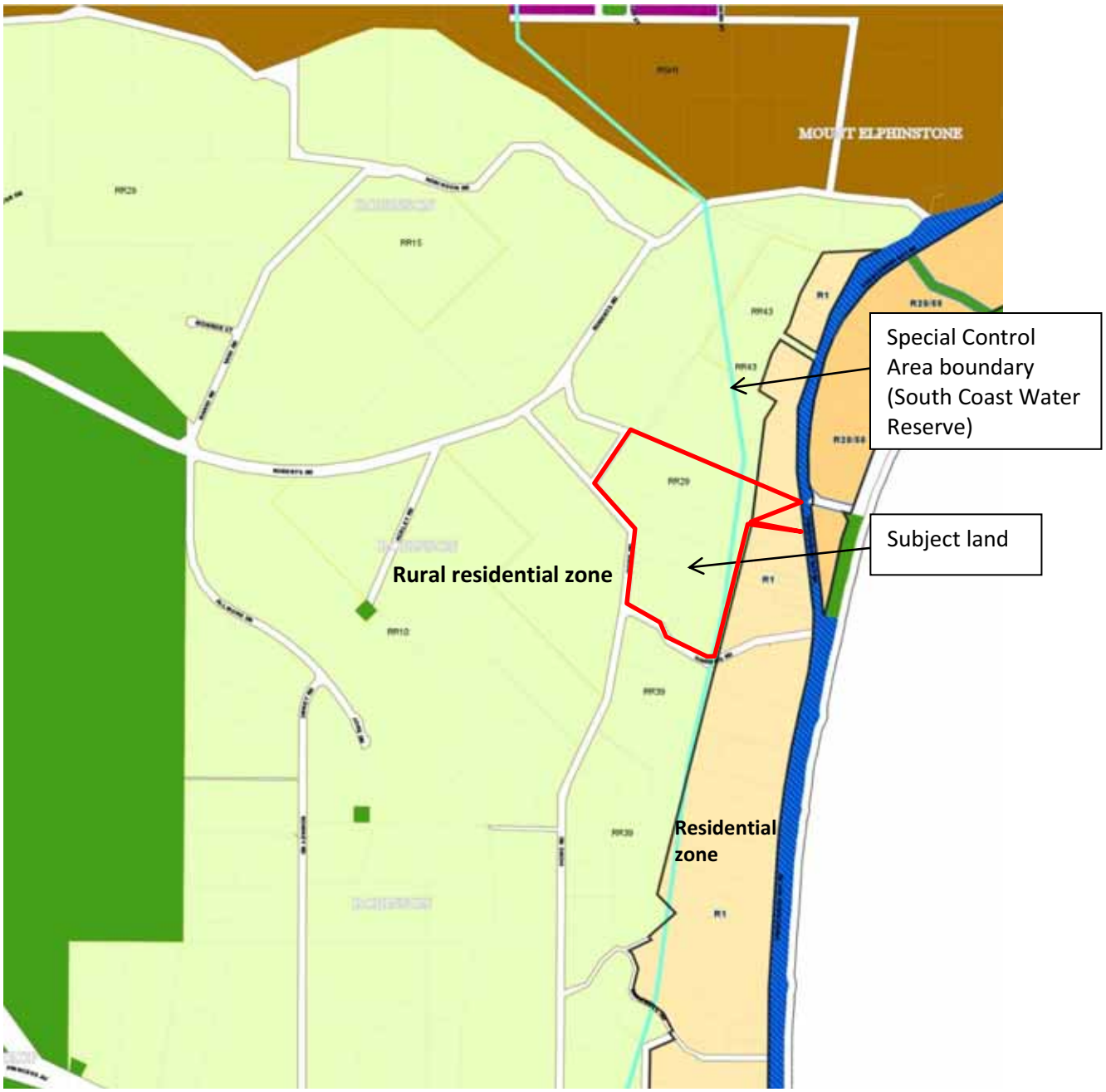
This report has been prepared at the request of Ayton Baesjou Planning to assist preparation of a Structure Plan for further subdivision of existing Lots 84, 85 Harding Road and Lots 86, 87 & 98 Home Road, within the Robinson locality of the City of Albany. Attachment A shows a base plan with site characteristics.

The subject land of approximately 15.3 ha is located on the southern side of Princess Royal Harbour, to the west of Frenchman Bay Road and approximately 3.5 km west-south-west of the Albany central business district. Figure 1 shows the study area is zoned 'Rural residential' (RR29) with the exception of the lower-lying eastern portion of Lot 98 and the battle-axe leg entrance to adjacent Lot 87, both of which are zoned 'Residential' (R1).

The land contains a mixture of cleared and vegetated areas and there is a residence on each of the five existing lots. There are no significant rural pursuits although portions of lots 85 and 98 are used for stabling and exercise of horses, and the eastern part of lot 98 is subject to grazing by goats.

As parts of the subject land are located on relatively low-lying terrain inland from Princess Royal Harbour, environmental assessment of the land needs to consider its capability to support on-site disposal of domestic effluent and wastewater, and to address the potential for further development to be affected by any Acid Sulfate Soil conditions.

FIGURE 1: LOCATION AND ZONING



Source: City of Albany Local Planning Scheme No 1 (District Scheme) Map 21.

2.0 POLICY CONTEXT

2.1 Local Planning Scheme (City of Albany 2014) and Policy

Rural Residential Zone (major portion)

It is understood from planners Ayton Baesjou that the possible minimum allowable average lot size within area RR29 is 1 ha. In relation to matters addressed by this report, relevant planning objectives for the Rural Residential Zone include;

Provide for residential and limited incidental land uses which:

> *(i) Are compatible with the preservation and protection of environmentally sensitive areas such as remnant vegetation and groundwater protection areas;*
>
> *(ii) Do not visually detract from the landscape and the visual amenity of the locality;*
>
> *(iii) Allow for uses and developments that are fit for purpose and minimise any on-site or off-site impacts such as soil erosion, nutrient loss, drainage and potential land use conflicts.*

Residential Zone (minor portion)

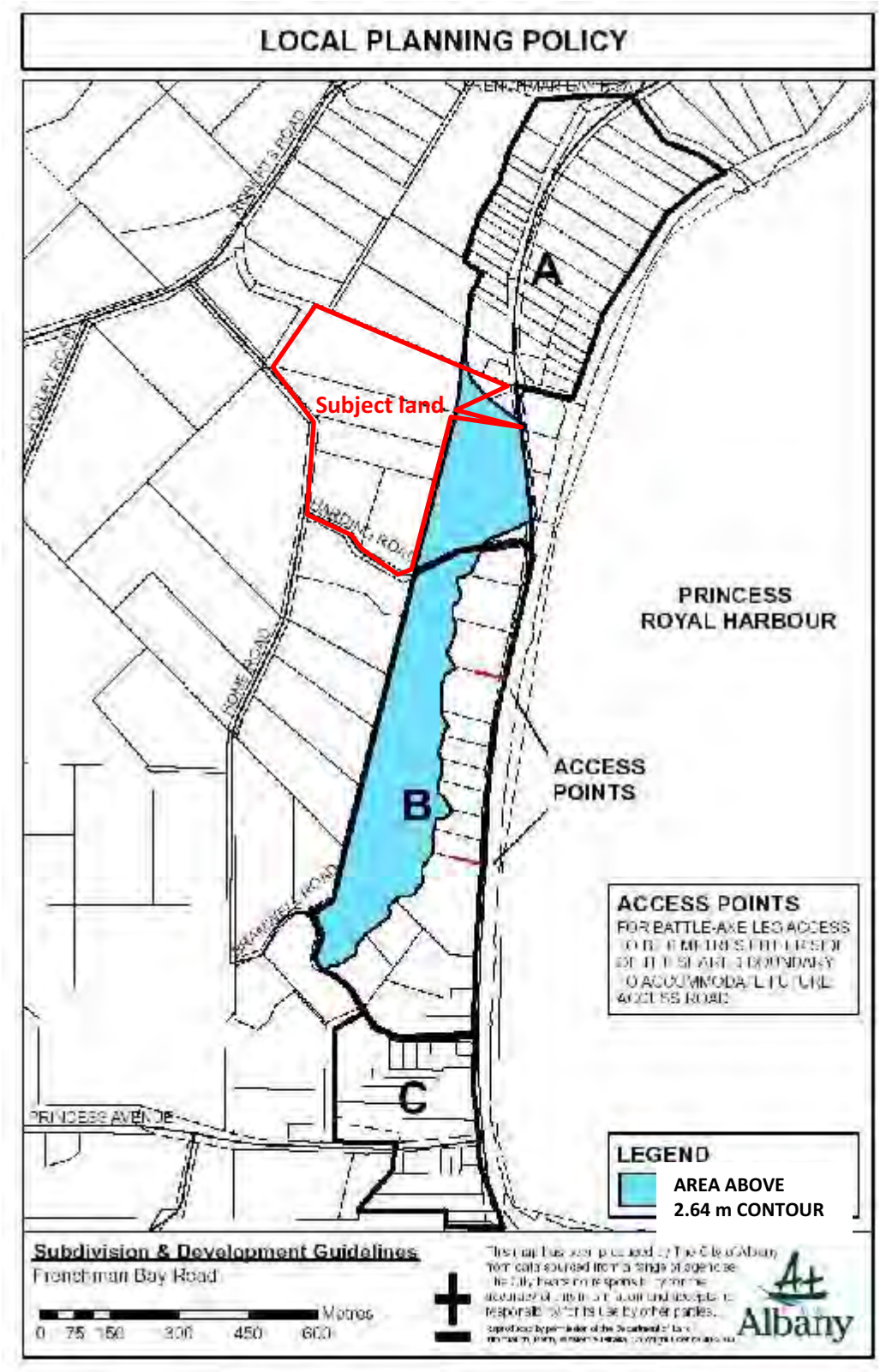
In relation to the Residential Zone portion encompassing the smaller eastern part of Lot 98, as well as the battle-axe entrance to adjacent Lot 87, it is understood from planners Ayton Baesjou that the minimum allowable lot size in this R1 designated area is 8500 sq m.

A Local Planning Policy for the Frenchman Bay Road Residential Development Area (City of Albany undated) addresses the effects of potential flooding or high ground water levels in this low lying area. It identifies this land as part of Precinct A with portions above and below a designated contour line at 2.64 m AHD (Figure 2).

The Local Planning Policy specifies that no subdivision proposals (within the Residential Zone) will be supported until such time as a conceptual local structure plan has been prepared for the portion of land above 2.64m AHD and, for the remaining lower lying area, until such time as infrastructure services (sewerage) have been extended to this locality.

For any subdivision of the Residential zoned land within the area above the 2.64m AHD contour, the policy also states that Council will require the resultant lots to utilise alternative effluent disposal systems, such as approved amended soil and/or aerobic systems.

FIGURE 2: FRENCHMAN BAY ROAD RESIDENTIAL DEVELOPMENT POLICY AREA



Source: City of Albany (undated) Policy - Frenchman Bay Road Residential Development Area

2.2 Local Planning Strategy (City of Albany 2010)

Rural residential zones are encompassed within a broad 'Rural Living' category where strategic objectives of Albany's Local Planning Strategy (ALPS) include

"In the long term encourage the efficient use of existing rural living areas, based on land capability to maximise their development potential."

The ALPS supports lot sizes from 1ha to 4ha in new Rural Residential areas subject to the provision of reticulated water and land capability analysis.

2.3 Special Control Area (South Coast Water Reserve)

As shown in Figure 1 the major part of the subject land is designated under the Local Planning Scheme as part of a Special Control Area (SCA) for the protection of public drinking water sources.

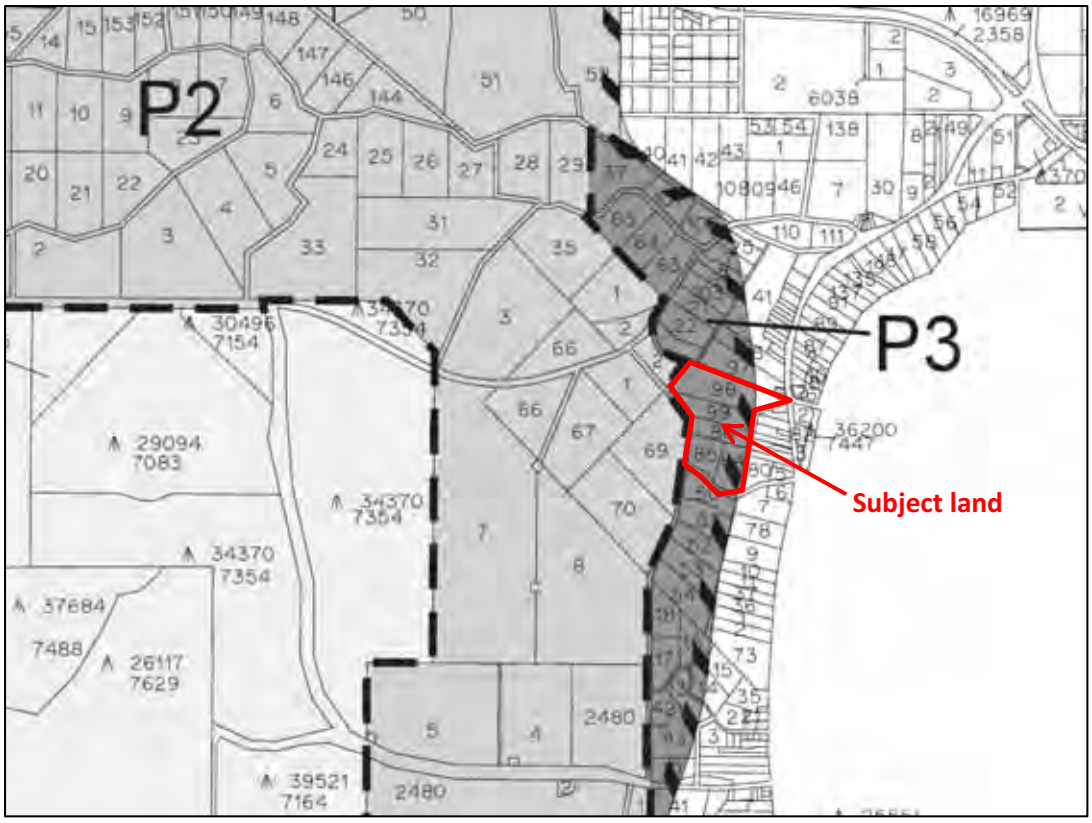
This particular SCA covers the South Coast Water Reserve, and the Planning Scheme reflects the objectives of the *South Coast Water Reserve and Limeburners Creek Catchment Area Water Source Protection Plan* (Water and Rivers Commission 2001) where the dominant 'rural-residential' portion of subject land is designated a Priority 3 (P3) category. The lesser 'residential' zoned area closest to Frenchman Bay Road is outside of the SCA (Figure 3).

Appendix 1 of the Water Source Protection Plan outlines the (now) Department of Water's guidelines on *Land Use Compatibility in Public Drinking Water Source Areas* (Department of Environment 2004). Under a P3 category, water supply sources need to co-exist with other land uses, and rural-residential subdivision to a lot size of between 1 and 2 hectares is considered 'compatible' with water source protection subject to the following conditions;

- *An average, rather than minimum, lot size may be accepted if the proponent can demonstrate that the water quality objectives of the source protection area are met, and caveats/memorials are placed on titles of specified blocks stating that further subdivision shall not occur.*

- *Lots should only be created where land capability assessment shows that effective on-site soakage of treated wastewater can be achieved. Conditions apply to siting of wastewater disposal systems in areas with poor land drainage and/ or a shallow depth to groundwater, animals are held or fertiliser is applied. Alternative wastewater treatment systems, where approved by the Department of Health, may be accepted with ongoing maintenance requirements.*

FIGURE 3: RELEVANT PORTION OF WATER SOURCE PROTECTION PLAN



Source: Water and Rivers Commission (2001) *South Coast Water Reserve and Limeburners Creek Catchment Area Water Source Protection Plan*

2.4 On-site Sewage Management

The following policies and guideline documents have been considered in relation to the capability of the subject land to support further un-sewered development;

- *Draft Country Sewerage Policy* (Government of Western Australia 1999 - as amended to 2003).
- *Code of Practice for Onsite Sewage Management* (Department of Health 2012) Consultation Draft November 2012
- *Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units (ATUs) Serving Single Households.* (Department of Health 2001).

These documents show the capability of land to accommodate an on-site effluent disposal system is influenced by a number of factors including system type, site drainage conditions, topography, soil depth, permeability, and depth to watertable.

Site requirements for on-site effluent disposal based on health criteria include the following specifications;

Gradient of the land - not to exceed one in five (i.e. not greater than 20% slope)

Site drainage – not subject to inundation or flooding at greater than once in 10 years

Depth to groundwater

- greater than 1.2 m from the underside of a wastewater disposal system prescribed under regulation 49 of the Regulations (*for example, leach drains associated with septic tanks*)
- as prescribed by Executive Director, Public Health for other approved wastewater disposal systems (*required separation from watertable varies with type and design of other approved systems – see DoH 2001 and DoH 2012 with the latter indicating a range 0.6 – 1.5 m is required above groundwater).*
- greater than 0.5 m from natural ground surface irrespective of type of system

Available area - unencumbered area of at least 150 m^2 required.

Soil depth - greater than 1.2 m depth to bedrock or impervious clay.

In addition to the requirements based on health criteria, the existing Government Sewerage Policy states; *the responsible authorities may require compliance with any special conditions of the* (then) *Department of Environment.*

The 'special conditions' based on environmental criteria relate to the protection of wetlands and watercourses, and are primarily expressed through setback distances as described in Appendix 2 of the *Draft Country Sewerage Policy* and reiterated in the City of Albany Local Planning Scheme (2014) as follows*;*

- Watercourses with permanent water – 50 metres;
- Seasonally flowing watercourses – 30 metres;
- Estuary or marine environment - 100 metres

The *Code of Practice for Onsite Sewage Management* (DoH 2012) also specifies setbacks from various types of effluent disposal systems for sub-soil or open drains as follows;

- Soil absorption systems (trenches, beds and mounds) – 6 metres;
- Dripper irrigation systems (associated with ATUs) - 3 metres
- Spray irrigation systems (associated with ATUs) - 6 metres.

Furthermore, in relation to dams or bores, the *Code of Practice for ATUs* (DoH 2001) specifies a 30 m setback where they are used or available for human or animal consumption. It has been assumed here that a 6 m setback is applicable where such water sources are precluded from human or animal consumption.

2.5 Acid Sulfate Soils

Acid sulfate soils (ASS) are wetland soils and unconsolidated sediments that contain iron sulfides which, when exposed to atmospheric oxygen in the presence of water, form sulfuric acid. This acid can mobilise or release heavy metals to the detriment of biota and built infrastructure in contact with drainage water.

ASS commonly occur in low-lying coastal lands such as marine or estuarine muds and sands that potentially underlie the surface soils within the eastern-most portion of the subject land. The City of Albany's *Local Planning Strategy* (2010) identifies lower lying portions of the Robinson locality as a high risk area.

The Western Australian Planning Commission's *Acid Sulfate Soils Planning Guidelines* (WAPC 2008) require a preliminary site assessment to be undertaken in 'at risk' areas, and wherever practicable to avoid disturbance of any subsequently identified acid sulfate soils. The potential for ASS is addressed in this report and an acid sulfate soils self-assessment form is included as Attachment E.

3.0 ENVIRONMENTAL SETTING

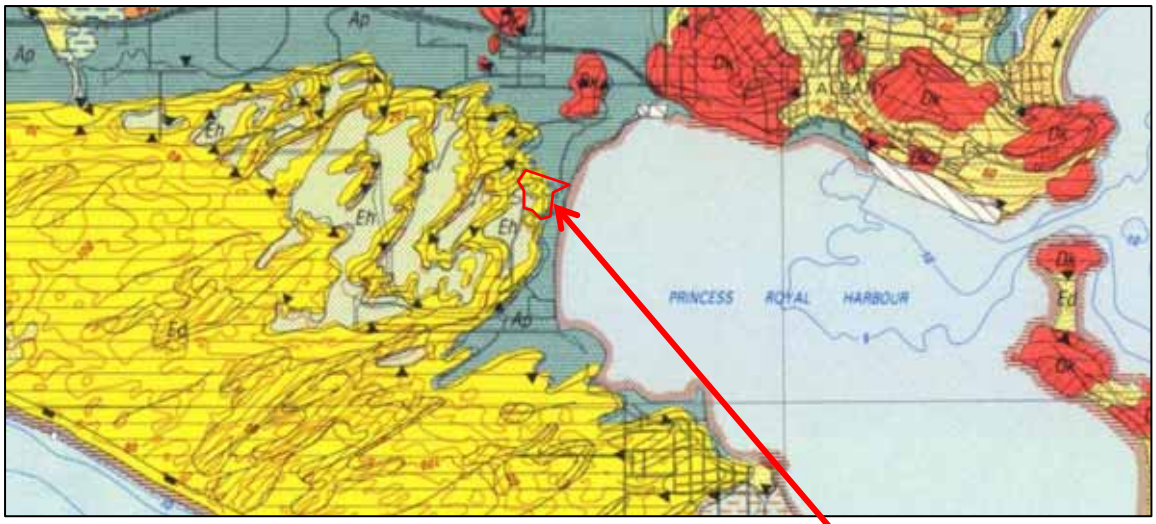
3.1 Geomorphology and Geology

The subject land predominantly encompasses an area of parabolic and nested parabolic dunes (and an associated deflation hollow) that extend over part of the estuarine plain fringing, and extending inland from, the western margins of Princess Royal Harbour (Figure 4).

The dunes are comprised of sands that are variably leached and have a core of calcareous limestone (aeolianite – LS_4) which is pale yellowish brown in colour and weakly cemented.

The underlying estuarine plain is exposed in the north eastern portion of the subject land as well as in the deflation hollow to the south west. The estuarine plain is reported by the Geological Survey of Western Australia to be overlain by predominantly siliceous, white to pale grey, alluvial sand (S_{14}) which, although being well drained (i.e. very permeable), is subject a high watertable and considered prone to flooding in part (Gozzard 1989).

FIGURE 4: GEOMORPHOLOGY & ENVIRONMENTAL GEOLOGY MAPPING



GEOMORPHOLOGICAL CLASSIFICATION

Ed	Parabolic and nested parabolic dunes, Quindalup Dune System	Ar	Estuarine beach ridges
Ed	Parabolic and nested parabolic dunes, Spearwood Dune System	At	Estuarine terraces, where identified
Eh	Deflation hollow	Cs	Colluvial slope
Er	Relict foredunes	Dk	Granitic knolls, inselbergs and bornhardts
Ap	Estuarine/alluvial plain	Ds	Denudational slopes in Tertiary sediments

Subject land

GEOLOGY CLASSIFICATION

S_{14} SAND – white to pale grey (Quaternary Alluvium)

LS_4 LIMESTONE – pale yellowish brown, weakly cemented (Quaternary dunes over estuarine deposits).

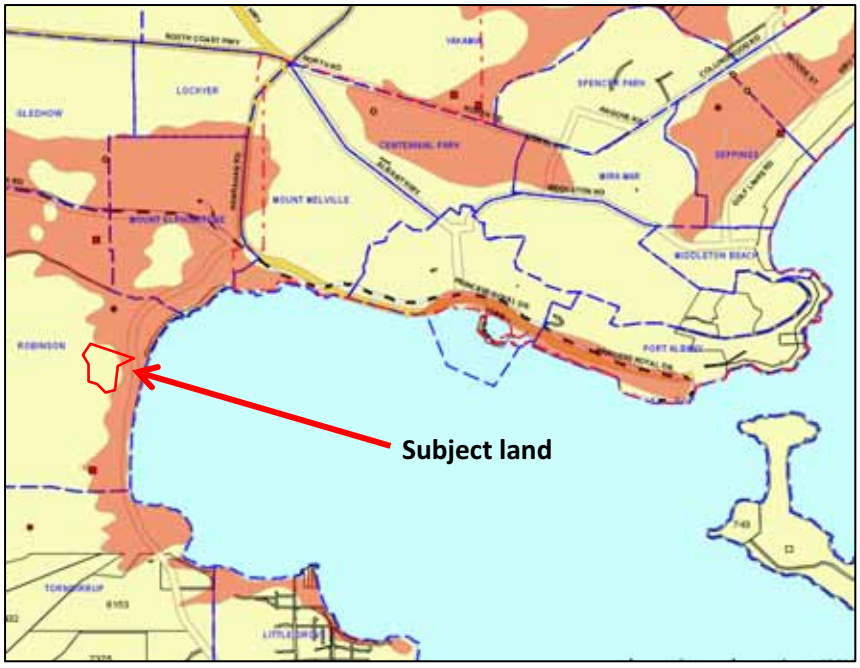
Sp1 PEATY SAND – (Quaternary lake and swamp deposits)

Source: Gozzard (1989).

3.2 Acid Sulfate Soil Risk Mapping

Acid Sulfate Soil Risk Maps are available online through the Landgate's WA Atlas portal https://www2.landgate.wa.gov.au/bmvf/app/waatlas/ Figure 5 shows the relevant portion of the Albany-Torbay map-sheet where the (former) Department of Environment and Conservation (DEC) has identified risk areas (in brown). The risk areas are based on the geomorphological classifications associated with the environmental geology mapping (Gozzard 1989) including the estuarine / alluvial plain areas (Ap in Figure 4).

FIGURE 5: ACID SULFATE SOIL RISK MAPPING



Source: Landgate WA Atlas recent online query.

3.3 Soil-landscape Mapping

CSIRO (Churchward et al 1988) have produced broad-scale mapping of the soils and landforms of the Albany region. This mapping has subsequently been incorporated into the soil-landscape mapping database of the Department of Agriculture and Food (DAFWA). Figure 6 shows the relevant portion, with the subject land forming part of the Meerup coastal dunes system, predominantly subsystem Mp which is described as; *Podzols over calcareous sand; banksia-bullich-yate woodland.*

* Podzols are siliceous sands with leached (light coloured) sandy topsoil over a stronger coloured sandy subsoil. Calcareous sands have an appreciable calcium carbonate content.

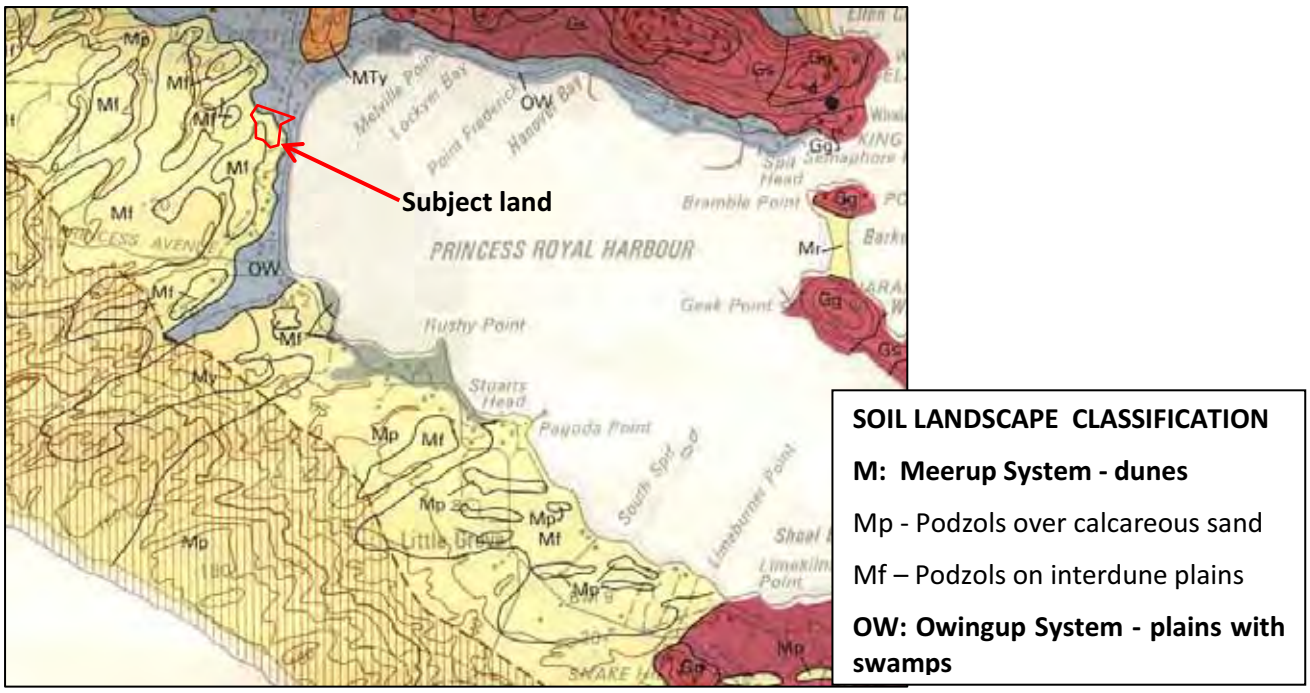


FIGURE 6: BROAD-SCALE SOIL LANDSCAPE MAPPING
Source: Churchward et al 1988).

3.4 Vegetation

As shown in the aerial image within Attachment A, the subject land contains a mixture of cleared and vegetated areas. It occurs inland from the western edge of Princess Royal Harbour although no portion is within 100 m of that waterbody.

The extent and nature of the remaining vegetation within the subject land is also indicated in Figure 7 sourced from the Albany Regional Vegetation Survey, ARVS (Sandiford and Barrett 2010).

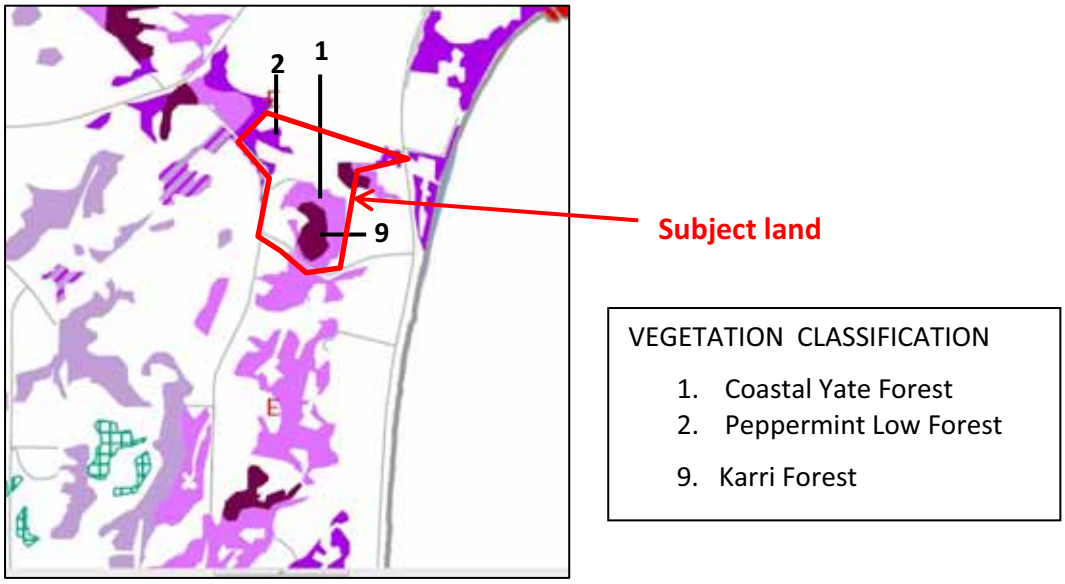
The ARVS mapping is relatively broad-scale and identifies most of the remaining vegetation within lots 84 – 86 as part of vegetation unit 1 (Coastal Yate Forest).

Vegetation unit 9 (Karri Forest) is shown as occurring on lower-lying terrain near the eastern end of Lot 87, and also within the deflation hollow in lots 84 and 85. In the latter area however examination of the aerial image in Attachment A shows that most of the Karri is no longer present.

Vegetation unit 2 (Peppermint Low Forest) is shown within the western portion of lot 98, and to a lesser extent within its central eastern portion.

Attachment B contains descriptions of each of these ARVS vegetation units.

FIGURE 7: VEGETATION MAPPING



Source: Sandiford and Barrett (2010).

Taking into account the known occurrences of these vegetation units (1, 2, and 9) within all types of reserves in the Albany region, only vegetation unit 9 (Karri Forest) might be considered in need of specific conservation measures.

Notwithstanding this, none of the three vegetation units occur at <30% of their pre-clearing extent, and further subdivision of the subject land in accordance with lot size allowed under its zoning category would not directly require any clearing of remnant vegetation to create additional house sites or property access ways.

3.5 Water Resources

Surface water

The subject land occurs inland from the margins of Princess Royal Harbour where the importance of protecting this waterbody from further addition of nutrients is recognised in both the Local Planning Scheme (City of Albany 2014) and the Albany Local Planning Strategy (City of Albany 2010) through the application of a general 100 m development setback.

As shown by the aerial image in Attachment A, all portions of the subject land occur at greater than 100 m from the margins of Princess Royal Harbour, and it contains no natural watercourses. A man-made drain does however run along the northern side of the entrance way into Lot 98 off Frenchman Bay Road. There are also a small number of wetland ‘soaks’ within Lots 98 and 85 that appear to have been excavated to facilitate earlier agricultural pursuits.

Groundwater

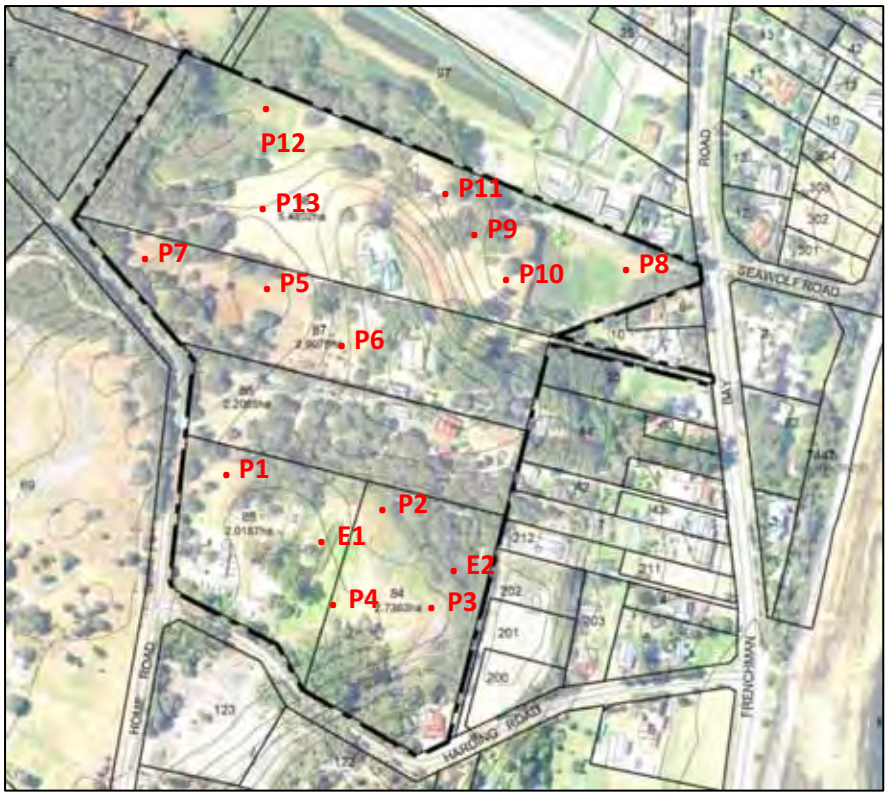
As part of Albany's water supply, groundwater is abstracted from borefields in the South Coast Water Reserve drawing from the Werillup Formation aquifer. The South Coast Water Reserve (Water and Rivers Commission 2001) encompasses most of the subject land which is part of the Priority 3 protection category for land-use planning purposes as discussed earlier in Section 2.3.

4.0 SITE ASSESSMENT

Given the broad scale of soil-landscape mapping depicted in Figure 6, some 'on-ground' variation can be expected in soil and landform conditions. Field obervations are therefore required to determine the capability of the land to support unsewered development and the actual presence or otherwise of acid sulfate soil.

Site assessment was undertaken during December 7 – 9. In addition to site traverses and associated photography, the field work involved description and sampling of soils from thirteen machine - excavated pits and two existing exposed cuttings. Figure 8 shows the location of the soil sites over an aerial image.

FIGURE 8: SOIL SITE LOCATIONS



Soil profile descriptions and photographs are contained within Attachment C.

4.1 Land Unit Mapping

Method

Soil and landform conditions within the subject land were surveyed in general accordance with the methodology outlined in Department of Agriculture and Food publications (van Gool et al 2005, Wells and King 1989). This involved examination of aerial photos followed by the field survey work during December.

The soils were classified in accordance with the WA Soil Group nomenclature (Schoknecht 2002) and consideration of the earlier Great Soil Group (Stace et al 1968) classification system used by Churchward et al (1988).

Site positions were recorded using a GPS unit and slope gradients were measured using a hand-held inclinometer correlated with the 2 m interval contour mapping shown on the base plan provided by Ayton Baesjou (refer Attachment A).

Results

A site results summary is provided in Table 1. In combination with aerial photo observations, the soil profile conditions were used to refine and subdivide the broad-scale soil landscape mapping (Meerup Mp & Mf, and Owingup) into eleven component 'land units'.

The resulting more-detailed 'land unit' mapping, shown in Figure 9, depicts areas of more homogeneous landform and soil conditions compared to the earlier soil landscape mapping unit (Figure 6). It therefore provides a more accurate spatial framework on which to assess the capability of the land and the suitability of a subdivision design.

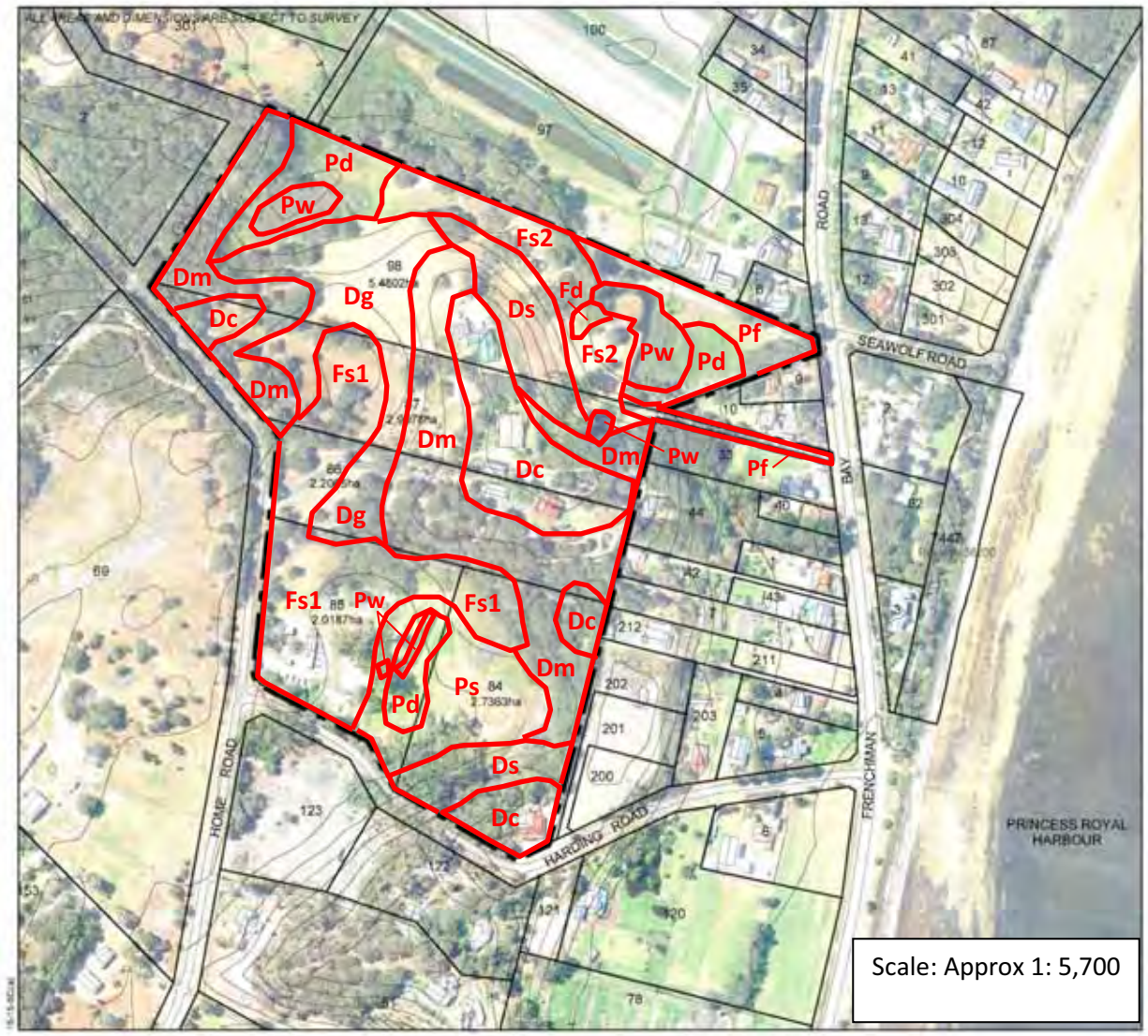
The land units are described in Table 2, and further appreciation of site conditions can be gained by reference to the property photographs which follow Table 2, and by reference to those accompanying the soil pit descriptions in Attachment C.

TABLE 1: SOIL SITE SUMMARY

Site *	Soil Classification**	Landform
P1	***Pale deep sand*** (Podzol; deep siliceous sand).	Well drained, low sandy rise over interdunal flats.
P2	***Pale deep sand*** (Podzol; deep siliceous sand).	Well drained sandplain at margin of interdunal flats or deflation basin.
P3	***Pale deep sand*** (Podzol; calcareous at depth).	Moderately well drained depression within interdunal flat or deflation basin.
P4	***Alkaline grey shallow sandy duplex*** (over calcareous sand).	Imperfectly drained interdunal flat or deflation basin.
P5	***Pale deep sand*** (Podzol; deep siliceous sand).	Well drained interdunal depression.
P6	***Pale deep sand*** (Podzol; calcareous at depth).	Rapidly drained sand dune (moderate sideslope).
P7	***Pale deep sand*** (Podzol; deep siliceous sand).	Rapidly drained sand dune (gentle upper slope).
P8	***Disturbed land*** *(Semi-wet soil* – siliceous sand mantled by loamy soil fill material)	Imperfectly drained estuarine plain with fill material.
P9	***Semi-wet soil*** (calcareous organic loam over siliceous sand)	Imperfectly drained depression within sandplain margin or footslope area.
P10	***Pale deep sand*** (Podzol; calcareous at depth).	Gently undulating, well drained sandplain margin or footslope area.
P11	***Pale deep sand*** (Podzol; calcareous at depth).	Gently undulating, well drained sandplain margin or footslope area.
P12	***Alkaline grey deep sandy duplex*** (over calcareous sand).	Imperfectly drained estuarine plain fringing wetland area.
P13	***Pale deep sand*** (Podzol; deep siliceous sand).	Gently undulating upland surface of well drained dunes.
E1	***Alkaline grey shallow loamy duplex*** (over calcareous sand).	Imperfectly drained interdunal flat or deflation basin.
E2	***Pale deep sand*** (Podzol; calcareous at depth).	Rapidly drained sand dune (moderate sideslope).

* Refer Figure 8 ** Classification in bold according to DAFWA system (Schoknecht 2002).

FIGURE 9: LAND UNIT MAPPING



Abbreviated Legend – see also Table 2

Dunes	
Dc Crests; pale deep sands.	**Dm** Moderate slopes; pale deep sands.
Ds Steep slopes; pale deep sands.	**Dg** Gentle slopes; pale deep sands.
Footslopes *(margins with plain)*	
Fs1 Sandplain; pale deep sands (siliceous).	**Fd** Depression; semi-wet organic soil.
Fs2 Sandplain; pale deep sands (subsoils calcareous).	
Plains *(estuarine plain and portions exposed within deflation basin)*	
Ps Pale deep sands (subsoils calcareous).	**Pd** Duplex soils with clayey marl / l'stone.
Pf Fill; semi-wet soil (loamy fill over sand).	**Pw** Wetland

TABLE 2. LAND UNIT DESCRIPTIONS

Unit	Description
Dunes *– Higher portions of the parabolic sand dunes of the Meerup system*	
Dc	Elevated crests with flat to gentle slopes (< 10 % gradient) and well drained pale deep sands. (Podzols - deep leached grey siliceous sand with yellowish brown sandy subsoil which may be calcareous at greater than 2m depth).
Ds	Steeply sloping dune areas (> 20 % gradient) with well drained pale deep sands similar to unit Dc.
Dm	Moderately sloping dune areas (10 - 20 % gradient) with well drained pale deep sands similar to unit Dc although subsoils may be calcareous at 1 – 2 m depth.
Dg	Gently sloping dune areas (3 – 10 % gradient) with well drained pale deep sands similar to unit Dc although subsoils may be calcareous at 1 – 2 m depth.
Footslopes *- Lower portions of the parabolic dunes and inter-dune sandplain of the Meerup system in proximity to adjacent areas of estuarine / alluvial plain.*	
Fs1	Well drained low sandy rises, inter-dune depressions or sandplain with pale deep sands (Podzols - deep grey siliceous sand with yellowish brown sandy subsoil)
Fs2	Gently undulating, well drained sandplain margin or footslope with pale deep sands similar to unit Fs1 although subsoils may be calcareous at 1 – 2 m depth.
Fd	Imperfectly drained depression within sandplain margin or footslope with semi-wet soil (calcareous organic loam over siliceous sand).
Plains *– Flat terrain forming part of the estuarine / alluvial plain (Owingup System) and including portions exposed by deflation hollows within the dunes (Meerup System)****.***	
Ps	Moderately well drained inter-dune flat or deflation basin with pale deep sands (Podzols - deep grey siliceous sand over a very weak iron-organic hardpan and calcareous yellowish brown sandy subsoil). Seasonally high groundwater levels likely to be at 1 – 2 m depth.
Pf	Imperfectly drained area of estuarine plain with semi-wet soil (siliceous sand mantled by loamy soil fill material). Seasonally high groundwater levels likely to be at 1 – 2 m depth.
Pd	Imperfectly drained area of deflation basin or estuarine plain with duplex soils (alkaline sandy or loamy surfaced duplex soils with clayey marl / limestone rubble subsoil layer over buried calcareous sand). Seasonally high groundwater levels likely to be at 1 – 2 m depth.
Pw	Wetland depressions and associated poor- very poorly drained wet soils.

Lot 98 – **Dg** gently undulating upland dune surface

Lot 97- Moderate slopes **Dm** and dune depression **Fs1**

Lot 98 – Peppermint low forest within moderately sloping dunes **Dm**

Lot 97 – **Ds** steep dune slope

Lot 98 –**Ds** leading to sandy footslopes **Fs2**

Lots 84 & 85 - **Ps** sandy deflation basin with wetland.

Lot 85 – Remnant area of Karri forest within unit **Ps**

Lot 98 – Plain unit **Pf** wetlands **Pw** and steep dunes **Ds**

Lot 98 – Wetland **Pw** within area of plain with duplex soils **Pd.**

4.2 Land Capability Assessment

'Land capability' is a term referring to the ability of land to support a proposed change in use with minimal risk of degradation to its soil and water resources. In this report, where the subject land is already zoned for rural-residential land use* the capability assessment relates only to the ability of the land to accommodate on-site effluent disposal systems associated with more intensive subdivision of existing lots.

The assessment is expressed in accordance with the DAFWA's five class system (ranging from very high to very low capability) as described by van Gool et al (2005) and Wells and King (1989), and is based on the methodology outlined in those publications. Site requirements relating to soil depth, permeability, and separation from groundwater and surface waterbodies under the *Draft Country Sewerage Policy* (Gov't of Western Australia 1999) and the more recent Department of Health (2001 & 2012) *Code of Practice* documents are also considered.

Figure 10 provides a qualitative assessment of the capability of the subject land based on this approach. Four colour-coded categories are shown as follows;

Green - **High capability** (land units Dc, Dg, Fs1 and Fs2)

- Very minor land use limitations and suitable for conventional on-site effluent disposal using septic tanks and leach drains.
- Free draining soils that are well elevated above water-table and deeper subsoil likely to have moderate nutrient retention ability (based on iron content and calcareousness) and these areas are generally not close to surface waterbodies.
- Within unit Fs2 consideration needs to be given adequate setback distance from nearby wetland areas.

Yellow - **Fair capability** (land units Ps, Pf and Dm).

- Dunal areas (unit Dm) are suitable for conventional on-site effluent disposal using septic tanks and leach drains, although gradients require cut and fill activity and areas left devoid of vegetative cover are subject wind erosion risk.
- Areas of the estuarine plain and deflation basin are constrained for on-site effluent disposal due to proximity to the seasonally high watertable but this can be addressed through use of partially inverted leach drains (within imported soil fill material).
- Alternative effluent disposal systems (with lesser minimum depth to water requirement, and greater nutrient retention ability) can also be used. Within the R1 residential zoned portion of the subject land, Alternative Treatment Units are mandatory under the local planning policy (City of Albany - undated) for areas above 2.64 m AHD (such as unit Ps).

* A minor portion of Lot 98 near Frenchman Bay Road is zoned Residential R1.

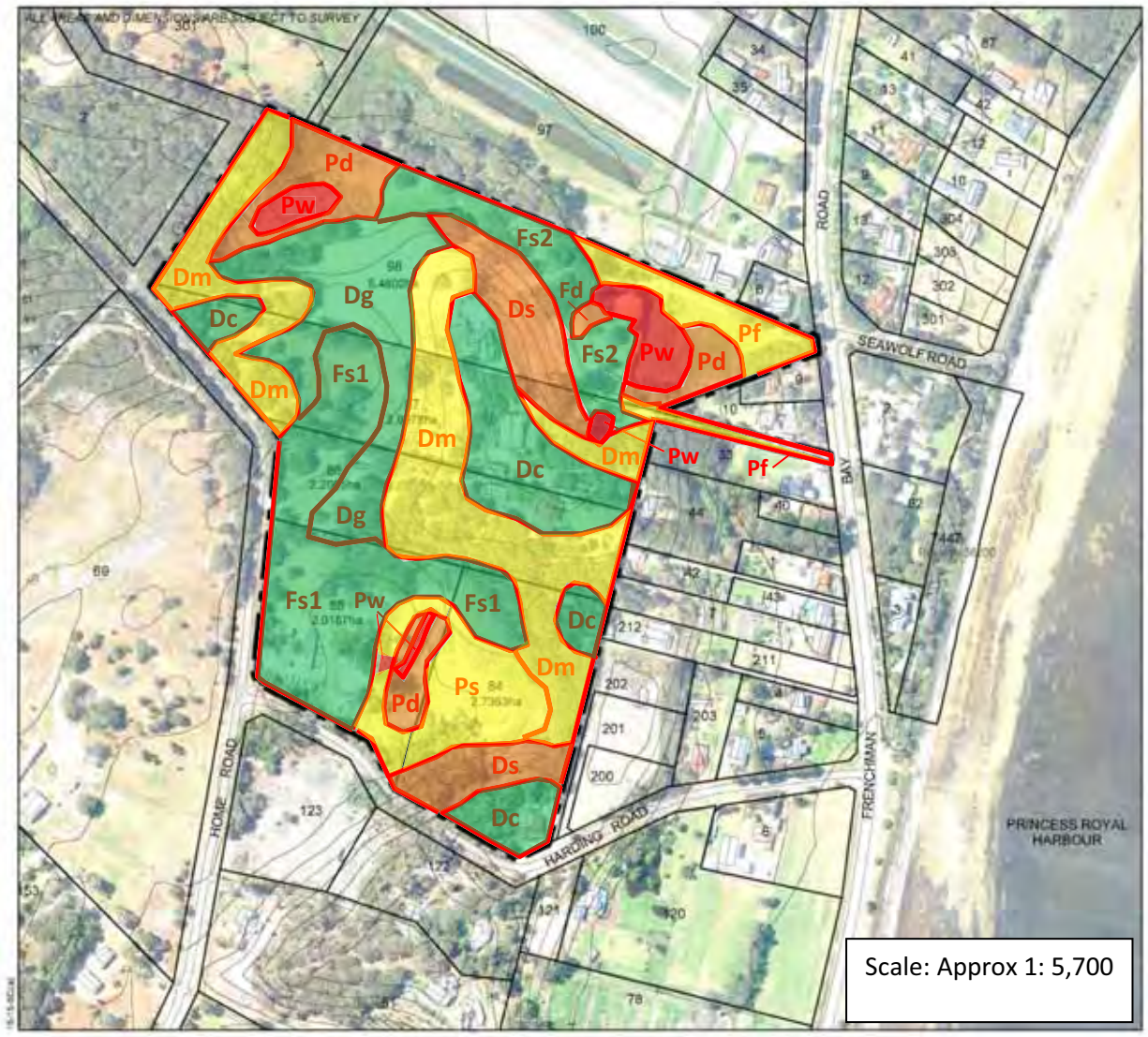
Orange - Low capability (land units Ds, Pd and Fd).

- Significant land use limitations.
- Dunal areas (Ds) are too steep for location of residences and associated on-site effluent disposal systems without significant engineering works, and areas left devoid of vegetative cover are subject to a high risk of slope instability and wind erosion.
- The duplex soil portions of the estuarine plain (Pd), and the organic soils within footslope depression area (Fd), are imperfectly drained and best avoided for on-site effluent disposal. Conventional septic tank systems would need fully inverted leach drains within imported soil fill material to achieve adequate separation from clayey subsoil within unit Pd.
- Setback requirements from nearby wetland areas also need to be considered for both Pd and Fd units, and their relatively limited extent suggests they would easily, and logically, be avoided when positioning building envelopes.
- If building envelope positioning is not able to be achieved outside of these areas (Pd and Fd), use of alternative treatment units should be mandatory.

Red - **Very low capability** (land unit Pw)

- Prohibitive land use limitations.
- Unsuitable for any form of on-site effluent disposal given the surface expression of the watertable and likely local conservation values.
- Underlying buried sediments of the estuarine plain potentially include acid sulfate soils which pose a risk to water quality if they are exposed through attempts to lower wetland watertable levels by drainage.
- Wetland areas (including excavated soaks) require a general 50 m minimum setback for conventional septic tank / leach drain systems, however this might be reduced to 30 m if alternative treatment units are used.
- Existing drains (such as the one along the northern side of the access route from Frenchman Bay Road into Lot 98) require a minimum 6 m setback in relation to positioning of any on-site effluent disposal systems within adjacent land units., (assuming that none of the water in such will be used for livestock consumption).

FIGURE 10: LAND CAPABILITY ASSESSMENT



High capability – Very minor limitations. Suitable for rural-residential development with conventional septic tanks and leach drains.

Fair capability – Moderate limitations associated with risk of wind erosion and need for cut and fill within dunes unit Dm, and need to address proximity to seasonally high groundwater levels within 'plain' units where on-site effluent disposal will require partially inverted leach drains (within imported soil fill material) or the use of alternative effluent disposal systems (with lesser minimum depth to water requirement). Unit Pf is within 'Residential zone R1 where Local Planning Policy mandates the use of alternative effluent disposal systems

Low capability – Significant limitations associated with steep slopes and erosion risk within dunes unit Ds, as well as either proximity to groundwater or wetlands, or slow subsoil permeability, within 'plain' unit Pd and footslope unit Fd. Generally areas that would be logically avoided for building envelopes.

Very low capability – Major limitations in terms of direct impacts of development. Unsuitable for any on-site effluent disposal given watertable exposure, and possible conservation values.

4.3 Testing for Acid Sulfate Soil

Testing of soil pH (1:5 water) for most layers of soil at each of the 13 pit and 2 existing exposure sites is reported within the description in Attachment C and shows predominantly neutral to alkaline soil pH and calcareous subsoil which is not suggestive of acid sulfate soil conditions.

Should the proposed subdivision of the land create additional residences within the estuarine plain portion where watertable proximity is a limiting factor, this can be addressed through partially inverted leach drains (Ps) or mandatory use of alternative treatment systems (as required for unit Pf) rather than any form of additional site drainage.

Notwithstanding this, two subsoil areas were sampled for Acid Sulfate Soil testing by the ChemCentre of WA. (Site 8 within estuarine plain land unit Pf, and site 9 within footslope depression land unit Fd).

The SPOCAS (complete suspension peroxide oxidation combined acidity and sulfur) analysis method was used. This is a standardized set of procedures recommended by the (former) Department of Environment and Conservation for assessing the potential for an acid sulfate soil problem in sandy soils in Western Australia.

The results are contained in Attachments D and E and show the buried soils within unit Pf are within action guideline limits and have high excess acid neutralizing capacity. However the result for the smaller area of highly organic soil within unit Fd is less clear-cut as indicated by the email correspondence copied below;

Copy of Email Communication from Chemistry Centre

The second sample (P9) was interesting. It appears to have a significant carbon content (black colour and sample tends to float on liquid). The ***TPA is very high but is not supported by the sulphide sulphur content (Spos).*** *Based on the Spos value a TPA of approximately 950 moles H^+/tonne would have been expected if all the sulphide was as FeS_2, a strongly acid producing sulfide. I* ***strongly suspect the additional acidity is due to the formation of organic acids from the oxidation of carbon/ carbon compounds.***

I feel this is supported by the pHox which at 3.4 is certainly acidic, but not as acidic as expected from the TPA value- organic acids tend to have higher pH values than mineral acids such as H2SO4 as they do not readily produce hydrogen ions in solution. Non sulfidic acidity can also come from reactions of iron and manganese compounds in solution but there appeared to be very little iron or manganese in this sample. I believe it ***unlikely that the non sulfidic acidity of this sample would be realized in practice*** *as the hydrogen peroxide oxidation used in the method is much more severe than aerial oxidation.*

It appears therefore that although the result for site 9 is not within the actionable guideline, it is considered likely to be the result of the oxidation of the atypically high soil organic matter content rather than an indication of acid sulphate soil conditions.

Notwithstanding the results which indicate Acid Sulfate Soils are not present beneath the subject land, it is relevant to point out that rural-residential development need not involve any form of deep excavation or drainage to expose or aerate previously buried waterlogged subsoils. Any impacts on the limited 'interesting area' of Fd / site 9 can also be easily avoided by appropriate positioning building envelopes.

5.0 CONCLUSIONS

5.1 Capability of the land to support more intensive subdivision

Figure 10 presents the results of land capability assessment for rural-residential development and provides a spatial framework for preparing a plan of subdivision that adequately responds to the nature and capability of the land.

Subject to the proposed pattern of subdivision enabling positioning of building envelopes for all 'new' lots within areas of either high (green) or fair (yellow) capability, the subject land is capable of supporting additional subdivision to the lot sizes permissible for the relevant land use zoning categories under the planning scheme (City of Albany 2014).

Comment in relation to on-site effluent disposal.

For the major portion of the subject land (elevated dunal areas) conventional son-site effluent disposal systems (septic tanks and leach drains) will be appropriate for un-sewered rural residential lots.

Should the plan of subdivision result in building envelopes being positioned within lower-lying portions where alternative treatment units are required, setback distances (both vertical and horizontal) are applicable to land application areas for effluent disposal.

Specific setbacks, and the required area for land application of treated effluent, can vary according to the type of system (i.e. a soil absorption system such as leach drains with amended soil, or an irrigation system associated with an aerobic treatment unit, ATU) and according to the method of any irrigation (i.e. surface sprays or drippers, or subsoil drippers).

Attachment F provides a list of alternative treatment systems approved for use in Western Australia. Subject to landowner choice of type of system, installers can determine specific setback requirements (vertical and horizontal) through reference

to the manufacturer's specifications, and the Department of Health's Code of Practice documents (DoH 2001, 2012).

5.2 Potential for further development to be affected by Acid Sulfate Soil

The Albany Local planning Strategy (City of Albany 2010) addresses acid sulphate soils as a land contamination issue and seeks to; *Ensure the suitability of land uses on existing or potential contaminated sites and require hazard reduction mechanisms to prevent harm to human health or the environment.*

A search has been conducted of the State Government's contaminated sites database by planners Ayton Baesjou, who report that there are no records of contaminated sites within the subject land.

Notwithstanding the absence of any need for deep excavation works associated with further subdivision and development of the land for rural-residential use, field survey observations and some laboratory testing of subsoil material within the estuarine plain portion, indicate acid sulfate soils are not present.

An acid sulfate soils self-assessment form is included here as Attachment E should it be considered necessary to refer this report to the Department of Environment Regulation in the context of assessing potential impacts of the proposed subdivision.

5.3 Protection of remnant vegetation

The proposed intensity of further subdivision should not require any significant clearing of the remaining native vegetation within the subject land.

Outside of the parkland cleared areas, where understorey species have been already been depleted, the more intact areas of remaining vegetation occur near the property fringes and are unlikely to be considered prospective sites for building envelopes given the proposed lot sizes.

Subject to site responsive subdivision design, the ALRS objective of protecting areas of remnant vegetation would not be compromised by the development proposal.

5.4 Protection of groundwater

The Local Planning Scheme (City of Albany 2014) takes into consideration the Water Source Protection Plan for the South Coast Water Reserve (Water and Rivers Commission 2001) via designation of a special control area which extends over most of the subject land.

Subject to the plan of subdivision responding to the land capability mapping through appropriate positioning of 'new' building envelopes, and the creation of lots of equal or greater size to those determined by the Water Source Protection Priority Code (P3 – with a possible minimum average of 1 ha), the proposed intensification of rural-residential development in this area should not jeopardize groundwater protection.

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ATTACHMENT A

SITE CHARACTERISTICS – BASE PLAN

REPORT ITEM DIS116 REFERS

SITE CHARACTERISTICS

Lots 84, 85 Harding Road & Lots 86, 87 & 98 Home Road Robinson, City of Albany

LEGEND

- Subject Land
- Existing Vegetation
- Existing Buildings

N

ORIG A3
SCALE 1:3000
0 15 30 45 60 75

15-15-SC(a)

AYTON BAESJOU
PLANNING
59 Peels Place
ALBANY WA 6330
Ph 9842 2304 Fax 9842 8494

ATTACHMENT B

ARVS VEGETATION UNIT DESCRIPTIONS

1 Coastal Yate Woodland.

No. of relevés 7 **Mean spp. richness** 11.7 **Area** 419 ha **% of Rem. Veg**. 0.9 **% in IUCN Reserve 1-IV** 21.4

Description

Coastal Yate Woodland is found along the coastal fringe in protected swales, slopes, crests and flats on grey sand. It is dominated by an upper canopy of *Eucalyptus cornuta* over a sparse secondary tree stratum of *Agonis flexuosa*. There is usually one shrub layer, a tall open scrub or open heath and common dominant shrubs include *Hibbertia furfuracea, Bossiaea linophylla* and *Spyridium globulosum.* Ground cover is frequently sparse and there is a high degree of variability in sedge dominance with *Desmocladus flexuosus* most common.

This unit is one of four units that equate to "Scrub heath on dunes" as mapped by Beard (1979), and described as "Peppermint Low Woodland and Scrub-heath". The other units are Peppermint Low Forest (2), Coastal Heath (3) and Limestone Coastal Heath (4). This unit shares many species with Peppermint Low Forest (2), with which it merges, but differs in the absence of *Adenanthos sericeus* and presence of *Hibbertia furfuracea*. It is usually found in more protected and damper sites. In some areas this unit merges with Karri Forest (9).

Comments

Infestations of **Dipogon lignosus* (Dolichos Pea) and **Zantedeschia aethiopicum* (Arum Lily) were observed within this unit in the Little Grove and Robinson areas. This unit is largely restricted to coastal and near coastal consolidated dunes with occasional occurrences along near coastal drainage lines, though one site near Bornholm was recorded on a hill top. The distribution of dominant understorey species suggest that this unit reaches it eastern limit just east of the survey area (the eastern limit of *Hibbertia furfuracea and Hardenbergia comptoniana*) and it probably extends to the west along the coastal fringe of the Warren Botanical District. Direct comparison with units described in the Walpole region by Wardell-Johnson and Williams (1996) is difficult, though it is likely that this unit falls within their community group A4.

This unit is naturally restricted to the coastal fringe. The only other *Eucalyptus cornuta* dominated unit within the survey area, Unit 24, is restricted to granite outcrops.

Floristic Summary

Lifeform	%cover	Species
Trees 10-30m	S-M	*Eucalyptus cornuta*
Trees <10m	V	*Agonis flexuosa*
Shrubs >2m	M	*Hibbertia furfuracea, Bossiaea linophylla, Spyridium globulosum*
Shrubs 1-2m		*Leucopogon obovatus, Hibbertia cuneiformis, Pimelea clavata*
Shrubs <1m		*Tremandra stelligera, Rhagodia baccata*
Sedges/rushes	Nil -V	*Desmocladus flexuosus, Lepidosperma densiflora, Lepidosperma densiflora* forma proliferous, *Lepidosperma effusum, Lepidosperma effusum* forma small, *Lepidosperma gladiatum, Ficinia nodosa*
Herbs		*Billardiera fusiformis, Clematis pubescens, Stylidium adnatum, Opercularia hispidula, Hardenbergia comptoniana*
Grasses		*Tetrarrhena laevis*

Key identifying Features

- Canopy of *Eucalyptus cornuta* above *Agonis flexuosa* and shrubland dominated by *Hibbertia furfuracea, Bossiaea linophylla* and *Spyridium globulosum.*
- Coastal distribution on sand.

Conservation species None recorded

2 Peppermint Low Forest

No. of relevés 10 **Mean spp. richness** 10 **Area** 1232 ha **% of Rem. Veg**. 2.8 **% in IUCN Reserve 1-IV** 23.0

Description
Peppermint Low Forest is restricted to the coastal dune system where it commonly occurs in swales and flats. A dense canopy of *Agonis flexuosa* (Peppermint) is characteristic of this unit with the structure varying from a closed heath on exposed coastal slopes to a low closed forest in swales with shrub species often sub or co-dominant in exposed areas. A tall shrubland of *Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla* and *Leucopogon obovatus* is usually present over an open or closed sedgeland with *Rhagodia baccata, Hardenbergia comptoniana* and *Clematis pubescens* common.

This unit forms a mosaic with Coastal Heath (3), Limestone Coastal Heath (5), Coastal *Banksia ilicifolia/*Peppermint Low Woodland (4) and Coastal Yate Woodland (1) and appears to be the climax of Coastal Heath (Beard 1979).

Three sub-units are described:

2a Peppermint Low Forest occurs on coastal dunes and swales and is described above.

2b Peppermint/*Eucalyptus megacarpa* Low Forest occurs along minor drainage lines on lower slopes of the coastal dunes. *Eucalyptus megacarpa* is co-dominant in the upper strata and *Lepidosperma effusum* and *Pteridium esculentum* are common.

2c Peppermint Low Forest/*Lepidosperma gladiatum* Sedgeland occurs in the swale behind the fore dune and occasionally in deep valleys on the inland dunes. *Lepidosperma gladiatum, Desmocladus flexuosus, Rhagodia baccata* and *Hardenbergia comptoniana* are prominent understorey species with *Hibbertia cuneiformis* and *Pimelea clavata* common shrubs.

Comments
This unit also includes *Agonis flexuosa* thickets that have invaded other units. In the Little Grove and Big Grove area, *A. flexuosa* is invading what was once *Banksia littoralis/*Woodland *Melaleuca incana* Shrubland (44) as indicated by the dead and dying *Banksia littoralis* and the presence of scattered species indicative of winter wet areas such as *Villarsia parnassiifolia, Sphenotoma gracilis* and *Melaleuca incana* under dense canopies of *A. flexuosa*. This invasion suggests that a significant and prolonged lowering of the water table may have occurred. Anecdotal evidence indicates that large areas of Little Grove and Big Grove were more swampy forty to fifty years ago (T. Allen, pers. comm.).

Many infestations of **Acacia longifolia* were observed within this unit, particularly in the Little Grove area. *Agonis flexuosa* occurs as a lower tree stratum or as a co-dominant in a number units (1, 4, 9 and 10) and where this species occurs as stands over pasture, identification of the unit has been based on the nearest intact vegetation.

Peppermint Low Forest is common along the south west coastline though those with *Adenanthos sericeus* in the understorey (2a) are restricted to areas around Albany as this species only occurs from the Nullaki Peninsula to Waychinnicup with an outlying population at Warriup. *Eucalyptus megacarpa* and *Hardenbergia comptoniana* reach their eastern limit near Mt Manypeaks and Cheyne Beach respectively (DEC 2009).

Floristic Summary

Lifeform	%cover	Species
Mallee/Tree <8m	M-D	*Agonis flexuosa +/-Eucalyptus megacarpa,+/-Hakea oleifolia*
Shrubs 1m to >2m	S	*Spyridium globulosum, Adenanthos sericeus, Bossiaea linophylla, Leucopogon obovatus, Hibbertia cuneiformis*
Shrubs 0.5-1m	V	*Rhagodia baccata*
Sedges/rushes	V-D	*Desmocladus flexuosus, Lepidosperma densiflora* forma proliferous, *Lepidosperma gladiatum, Lepidosperma effusum*
Herbs	V	*Hardenbergia comptoniana, Clematis pubescens, Opercularia hispidula, Billardiera fusiformis*

Key identifying Features
- Thickets with *Agonis flexuosa* dominant or co-dominant.
- Occurs on sand in coastal areas

Conservation species None recorded

9 Karri Forest

No. of relevés 11 **Mean spp. richness** 10.6 **Area** 885 ha **% of Rem. Veg**. 2.0 **% in IUCN Reserve 1-IV** 1.6

Description
Karri Forest is found in the southern and south western areas of the survey area with isolated pockets along the north-west boundary. It is distinguished by the dominance of *Eucalyptus diversicolor* (Karri) trees in the canopy. Three sub-units are described, differing in floristic composition, landform and soil type and distribution. However, two of these sub-units were poorly sampled and further survey is required to clarify floristic differences.

Sub-units:
9a Coastal Karri Forest is found in a scattered band on the flats and lower slopes north of the coastal hills from Goode Beach to Torbay Townsite, with isolated pockets occurring south of Manypeaks. It often occurs on grey sand often overlying limestone and typically it is an open forest, occasionally reaching > 30 m in height. *Eucalyptus cornuta* is often a sub-dominant canopy species and *Agonis flexuosa* forms an open secondary tree stratum. The understorey shrubs vary from a closed tall scrub on very moist sites to a tall open scrub or open heath over open sedgeland. Common species include *Chorilaena quercifolia, Trymalium odoratissimum, Thomasia solanacea, Hibbertia furfuracea, Bossiaea linophylla, Tremandra stelligera. Lepidosperma effusum, Ficinia nodosa, Gahnia sclerioides* and *Desmocladus flexuosus.* The climbers *Hardenbergia comptoniana, Clematis pubescens* and *Billardiera variifolia* are frequently prominent. This sub-unit often grades into *Eucalyptus cornuta* Open Forest on drier sites.

9b Karri Tall Open Forest
This sub-unit is found on the deep red Karri loams on the hills around Torbay, Bornholm and Torbay townsite. This unit was poorly sampled (1 relevé) and is differentiated from the Coastal Karri sub-unit by the presence and/or dominance of *Allocasuarina decussata* and/or *Acacia pentadenia* in the lower tree/upper shrub strata and the absence of *Thomasia solanacea* and *Templetonia retusa.* This sub-unit occasionally merges with sub-unit 9a on the lower slopes/flats of hills near Bornholm and Torbay townsite where colluvial sands occur. An unsurveyed pocket in the Goode Beach area also appears transitional with subunit 9a with *Acacia pentadenia* present (WA Herbarium records). Other common species include *Agonis flexuosa, Hibbertia furfuracea, Trymalium odoratissimum* and *Bossiaea linophylla.* This unit often occurs upslope of Marri/Jarrah Forest/Peppermint Woodland (10) and appears to have close floristic affinities with Karri forests in the Denmark Walpole/Manjimup area with *Allocasuarina decussata and Acacia pentadenia* in the understorey.

9c Redmond Karri Forest
This sub-unit was recorded on the north west boundary of the survey area along a broad valley on skeletal soils overlying a very dark exposed lateritic rock. All areas had been recently burnt (2002) and post fire opportunistic species including *Rulingia corylifolia, Acacia pulchella* and *Opercularia hispidula* were dominant beneath a *Bossiaea linophylla* Tall Open Scrub. Other species present were *Leucopogon obovatus, Cyathochaeta avenacea, Ficinia nodosa, Opercularia hispidula, Pteridium esculentum, Xanthosia candida* and *Tetrarrhena laevis.*

Comments
The Karri forests observed on several previously cleared remnants on the plains south of Manypeaks have regenerated well following fencing and the presence of *Chorilaena quercifolia* and *Templetonia retusa* suggest they belong to sub-unit 9a.

Karri forests are common throughout the Warren Botanical District with the eastern limit occurring on the slopes of Mt Manypeaks just east of the survey area. An outlying population occurs in the Porongurup Range north of the context area. The floristic similarity of Karri forests outside the study area to the sub-units recorded here has not been assessed. The occurrence of sub-unit 9c on skeletal dark lateritic soil may be unusual as Karri forests are typically found on deep loam or sand.

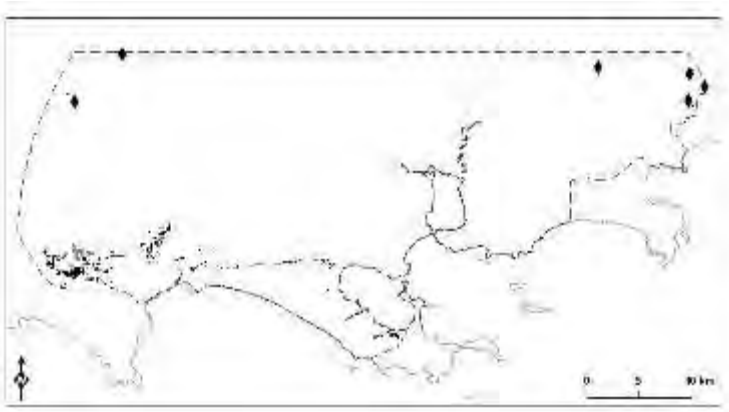
Floristic Summary

Lifeform	%cover	Species
Trees 10-30m	M	*Eucalyptus diversicolor, Eucalyptus cornuta*
Trees <10 m	V	*Agonis flexuosa, Allocasuarina decussata, Hakea oleifolia*
Shrubs >2m	S-M	*Trymalium odoratissimum, Chorilaena quercifolia, Thomasia solanacea, Hibbertia furfuracea, Bossiaea linophylla, Templetonia retusa, Acacia pentadenia, Rulingia corylifolia*
Shrubs <2m	V	*Acacia alata, Tremandra stelligera*
Sedges/rushes	V	*Lepidosperma effusum, Ficinia nodosa, Desmocladus flexuosus, Lepidosperma squamatum, Lepidosperma densiflora*
Herbs	V	*Opercularia hispidula, Hardenbergia comptoniana, Clematis pubescens, Billardiera variifolia, Lagenophora huegelii, Pteridium esculentum*
Grasses		*Tetrarrhena laevis, Poa porphyroclados, Microlaena stipoides*

Key identifying Features

- Canopy of *Eucalyptus diversicolor* (Karri).

Conservation species *Thomasia solanacea* P3, *Gahnia sclerioides* P3



Unit 9 Karri Forest

ATTACHMENT C

SOIL PROFILE DESCRIPTIONS AND PHOTOGRAPHS

Site Number: Pit 1 **Lot 85** 50 H 577015 m E; 6122659 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf	**Land unit: Fs1**

Landform: Well drained, low sandy rise (up to 6 % gradient) over interdunal flats.

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 – 45	Very dark grey (10YR 3/1) **loamy sand**, dry; clear boundary to;
45 - 90	Dark grey (10YR 4/1) **sand,** dry; clear boundary to;
90 - 140	Light grey (10YR 7/1) **sand**, dry, neutral (pH 7.3), non-saline (ECe 60 mS/m) clear boundary to;
140-180+	Dark brown (7.5YR 3/3) fine **sand,** (very weak pan), dry, slightly acid (pH 6.2), non-saline (ECe 77 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have limited nutrient retention ability but site is not close to water table or surface waterbodies).

Site Number: Pit 2 **Lot 84** 50 H 577130 m E; 6122649 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf	**Land unit: Fs1**

Landform: Well drained sandplain (< 2% gradient) at margin of interdunal flats or deflation basin.

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 - 25	Very dark grey (10YR 3/1) **loamy sand**, dry; clear boundary to;
25 - 50	Dark grey (10YR 4/1) **sand,** dry; clear boundary to;
50 - 95	Light grey (10YR 7/1) **sand**, dry, neutral (pH 7.3), non-saline (ECe 60 mS/m) clear boundary to;
95 – 180+	Dark brown (7.5YR 3/3) fine **sand,** dry.

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 2.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 3 **Lot 84** 50 H 577188 m E; 6122562 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf over Owingup flats OW	**Land unit: Ps**

Landform: Moderately well drained depression within interdunal flat or deflation basin.

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 – 10	Very dark grey (10YR 3/1) **loamy sand**, dry; clear boundary to;
10 – 25	Dark grey (10YR 4/1) **sand,** dry; clear boundary to;
25 – 95	Light grey (10YR 7/1) **sand**, dry, clear boundary to;
95 – 155	Dark brown (7.5YR 3/3) **sand,** (very weak pan), calcareous, dry, gradual boundary to;
155-180+	Dark brown (7.5YR 3/3) **sand,** calcareous, moist, moderately alkaline (pH 8.0), moderately saline (ECe 474 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: 180 cm.

Comment: Suitable for conventional on-site effluent disposal subject to use of partially inverted leach drains (within imported soil fill material) to achieve adequate separation from groundwater**.** Also suitable for alternative effluent disposal systems (with lesser minimum depth to water requirement).

Site Number: Pit 4 **Lot 85** 50 H 577095 m E; 6122557 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf over Owingup flats OW	**Land unit: Pd**

Landform: Imperfectly drained interdunal flat (**partly obscured at photo left**) or deflation basin.

WA Soil Group: ***Alkaline grey shallow sandy duplex*** - over buried calcareous sand.

Depth (cm)	**Description**
0 - 25	Very dark grey (10YR 3/1) **loamy sand**, calcareous, slightly moist; clear boundary to;
25 – 65	Light brownish grey (10YR 6/2) C**lay loam, sandy**, calcareous, slightly moist; moderately alkaline (pH 8.8), non-saline (ECe 116 mS/m); clear to;
65 - 80	Light yellowish brown (10YR 6/4) **sand,** with few black mottles (cutans), calcareous; slightly moist; gradual boundary to;
80 - 180	Greyish brown (10YR 5/2) **sand,** calcareous, with few black mottles (cutans), slightly moist; strongly alkaline (pH 9.0), non-saline (ECe 165 mS/m); gradual boundary to;
180-200+	Very dark greyish brown (10YR 3/2) **clayey sand**, calcareous, moist.

Indicative subsoil permeability and drainage class (at leach drain depth): 0.12 – 0.5 m/d (Imperfectly drained). **Depth to water**: 190 cm.

Comment: Best avoided as generally not suitable for conventional on-site effluent disposal due to need for fully inverted leach drains within imported soil fill material to achieve adequate separation from clayey subsoil near surface and need for setback from soakage dam. Possibly suitable for alternative effluent disposal systems (with lesser minimum depth to water requirement).

Site Number: Pit 5 **Lot 87** 50 H 577048 m E; 6122828 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf	**Land unit: Fs1**

Landform: Well drained interdunal depression (< 2% gradient).

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 – 20	Very dark grey (10YR 3/1) **loamy sand**, dry; strongly acid (pH 5.4), non-saline (ECe 110 mS/m); gradual boundary to;
20 - 100	Grey (10YR 5/1) **sand,** dry, moderately alkaline (pH 8.6), non-saline (ECe 111 mS/m); clear to;
100 –135	Very dark brown (7.5YR 2.5/2) **sand**, dry, neutral (pH 7.6), non-saline (ECe 56 mS/m); clear to;
135– 190+	Pale brown (10YR 6/3) **sand,** with few black mottles (cutans), slightly moist, neutral (pH 7.4), non-saline (ECe 87 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered here but > 3.0 m based on observation in adjacent excavated area.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 6 **Lot 87** 50 H 577101 m E; 6122786 m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dm**

Landform: Rapidly drained sand dune (moderate sideslope, 14 % gradient). Note Steeper bank is edge of excavated terrace

WA Soil Group: *Pale deep sand*
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 – 20	Dark grey (10YR 4/1) **sand**, dry; clear boundary to;
20 - 70	Light grey (10YR 7/2) **sand,** dry, clear boundary to;
70 – 120	Yellowish brown (10YR 5/6) **sand,** dry; moderately alkaline (pH 8.0), non saline (ECe 51 mS/m).); diffuse boundary to;
120 - 185	Yellowish brown (10YR 5/6) **sand,** with few bleached mottles, dry; gradual boundary to;
185–220+	Very pale brown (10YR 7/4) **sand,** calcareous, strongly alkaline (pH 9.2), non saline (ECe 99 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 7 **Lot 87** 50 H 576958 m E; 6122855m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dc**

Landform: Rapidly drained sand dune (gentle upper slope, 7 % gradient).

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 - 40	Dark grey (10YR 4/1) **sand**, dry, gradual boundary to;
40 – 110	Grey (10YR 5/1) **sand**, dry, moderately acid (pH 5.6), non-saline (ECe 56 mS/m); gradual boundary to;
110 - 165	Light grey (10YR 7/1) **sand**, dry; clear boundary to;
165–210+	Dark yellowish brown (10YR 4/4) **sand**, mottled, dry, slightly acid (pH 6.5), non-saline (ECe 48 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 8 **Lot 98** 50 H 577352 m E; 6122837 m N	**DAFWA Soil landscape mapping:** Owingup flats OW	**Land unit: Pf**

Landform: Imperfectly drained estuarine plain (< 2% gradient) with fill material.

WA Soil Group: Disturbed land / *Semi-wet soil* (Loamy fill material over siliceous sand)

Depth (cm)	**Description**
0 – 60	Brown (10YR 4/3/) **loamy sand**, with few ferruginous gravels, (fill material) dry, neutral (pH 7.2), non-saline (ECe 57 mS/m); clear boundary to;
60 - 105	Very dark greyish brown (10YR 3/2) **clay loam fine sandy**, (fill material) calcareous, dry, moderately alkaline (pH 8.4), non-saline (ECe 142 mS/m); clear boundary to;
105 -150	Dark grey (10YR 4/1) **sand**, (former land surface?) dry, moderately alkaline (pH 8.5), non-saline (ECe 132 mS/m); clear boundary to;
150 -170+	Grey (10YR 5/1) **clayey sand,** moist.

Indicative subsoil permeability and drainage class (at leach drain depth): 0.12 – 0.5 m/d (Imperfectly drained). **Depth to water:** 170 cm. **Estimated depth of fill**: 105 cm.

Comment: Fill material brings site above 2.64m AHD but not suitable for conventional on-site effluent disposal using septic tanks and leach drains due to policy requirements (City of Albany - Frenchman Bay Road Residential Development Area - undated local planning policy). Suitable for effluent disposal using Alternative Treatment Units subject to 6 m setback from drain on north side of property access way.

Site Number: Pit 9 **Lot 98** 50 H 577221 m E; 6122844 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup dunes Mp over Owingup flats OW	**Land unit: Fd**

Landform: Imperfectly drained depression within sandplain margin or footslope area.

WA Soil Group: ***Semi-wet soil***
(calcareous organic loam over siliceous sand)

Depth (cm)	**Description**
0 – 20	Black (10YR 2/1) **loamy sand**, dry; gradual boundary to;
20 - 80	Black (10YR 2/1) **loam fine sandy** calcareous, slightly moist, moderately alkaline (pH 8.6), moderately saline (ECe 699 mS/m); gradual boundary to;
80 – 140	Black (10YR 2/1) **clayey fine sand,** slightly moist; clear boundary to;
140 - 210	Black (10YR 2/1) **loamy fine sand**, moist (with some seepage inflow).

Indicative subsoil permeability and drainage class (at leach drain depth): 1.5 - 3.0 m/d (Moderately well drained). **Depth to water:** 210 cm (although gradual seepage inflow above).

Comment: Limited area, best avoided and generally not suitable for on-site effluent disposal systems.

Site Number: Pit 10 **Lot 98** 50 H 577248 m E; 6122827 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup dunes Mp over Owingup flats OW	**Land unit: Fs2**

Landform: Gently undulating, well drained sandplain margin or footslope area.

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 - 35	Dark grey (10YR 4/1) **sand**, dry, gradual boundary to;
35 - 80	Grey (10YR 5/1) **sand**, dry, neutral (pH 7.6), non-saline (ECe 57 mS/m); gradual boundary to;
80 - 85	Dark brown (10YR 3/3) **loamy sand**, dry; weak hardpan, neutral (pH 7.7), slightly-saline (ECe 228 mS/m); clear boundary to;
85 - 100	Very dark brown (7.5YR 2.5/2) **loamy sand** (with limestone / marl rubble); dry, clear to;
100-180+	Pale brown (10YR 6/3) **sand**, calcareous, dry, moderately alkaline (pH 9.0), non-saline (ECe 144 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.0 m based on topography and geomorphology.

Comment: Limited area, but suitable for conventional on-site effluent disposal using septic tanks and leach drains subject to adequate setback distance from nearby soakage dam.

Site Number: Pit 11 **Lot 98** 50 H 577190 m E; 6122929 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup dunes Mp over Owingup flats OW	**Land unit: Fs2**

Landform: Gently undulating, well drained sandplain margin or footslope area. (site on cleared area beyond access road)

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth).

Depth (cm)	**Description**
0 - 35	Dark grey (10YR 4/1) **sand**, dry, slightly acid (pH 6.0), non-saline (ECe 69 mS/m); clear boundary to;
35 - 60	Grey (10YR 5/1) **sand**, clear boundary to;
60 – 90	Light yellowish brown (10YR 6/4) **sand,** dry, gradual boundary to;
90 - 130	Yellowish brown (10YR 5/4) **sand**, calcareous, dry, neutral (pH 6.9), non-saline (ECe 35 mS/m); gradual to;
130-180+	Very pale brown (10YR 7/4) **sand**, calcareous, dry, moderately alkaline (pH 9.0), non-saline (ECe 119 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Pit 12 **Lot 98** 50 H 577052 m E; 6122975 m N	**DAFWA Soil landscape mapping:** Intergrade area Meerup over Owingup flats OW	**Land unit: Pd**

Landform: Imperfectly drained estuarine plain (< 1% gradient) fringing wetland area (at far left).

WA Soil Group: ***Alkaline grey deep sandy duplex*** - over buried calcareous sand.

Depth(cm)	**Description**
0 – 20	Very dark grey (10YR 3/1) **sand**, dry, gradual boundary to;
20 - 50	Dark grey (10YR 4/1) **sand**, dry, neutral (pH 6.7), non-saline (ECe 74 mS/m); clear boundary to;
50 – 60	Very dark brown (10YR2/2) **sand**, (weak hardpan); dry, clear boundary to;
60 - 80	Light brownish grey (10YR 6/2) C**lay loam, sandy**, calcareous with limestone / marl rubble, slightly moist; clear boundary to;
80 –150+	Pale brown (10YR 6/3) **sand**, calcareous, moist, with few black mottles (cutans**),** moderately alkaline (pH 8.2), slightly-saline (ECe 338 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): partly within rapidly drained sand (> 3.0 m/d) and imperfectly drained clay loam (0.12 – 0.5 m/d). **Depth to water**: 150 cm (although gradual seepage inflow above).

Comment: Best avoided as generally not suitable for conventional on-site effluent disposal due to need for partially inverted leach drains within imported soil fill material to achieve adequate separation from clayey subsoil and need for setback from nearby wetland.

Site Number: Pit 13 **Lot 98** 50 H 577055 m E; 6122889 m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dg**

Landform: Gently undulating upland surface of well drained dunes (4 – 5 % gradient).

WA Soil Group: ***Pale deep sand*** (Deep siliceous podzol)

Depth (cm)	**Description**
0 – 20	Dark grey (10YR 4/1) **sand**, dry, neutral (pH 6.8), non-saline (ECe 87 mS/m); clear boundary to;
20 – 85	Grey (10YR 5/1) **sand**, dry, clear to;
85 - 105	Light grey (10YR 7/2) **sand**, dry; neutral (pH 7.1), non-saline (ECe 54 mS/m); clear boundary to;
105 –125	Pale brown (10YR 6/3) **sand**, dry, clear to;
125-150+	Strong brown (7.5YR 4/6) **sand**, with few bleached mottles, dry; neutral (pH 6.5), non-saline (ECe 68 mS/m).

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have moderate nutrient retention ability and site is not close to water table or surface waterbodies).

Site Number: Exposure 1 **Lot 85** 50 H 577095 m E; 6122598 m N	**DAFWA Soil landscape mapping:** Meerup flats Mf over Owingup flats OW	**Land unit: Pd/Pw**

Landform: Interdunal flat or deflation basin; Imperfectly drained (0 -1% gradient) and adjacent wetland (excavated soak).

WA Soil Group: ***Alkaline grey shallow loamy duplex*** (over buried calcareous sand)**.**

Depth (cm)	**Description**
0 - 15	Very dark grey (10YR 3/1) **clayey sand**, calcareous; dry, gradual boundary to;
15 - 30	Very dark brown (10YR 2/2) **sandy loam**; dry, clear boundary to;
30 - 55	**Limestone / marl, in clay loam** matrix; dry, clear boundary to;
55 - 90	Very pale brown (10YR 7/3) **sandy clay loam**, with calcareous rubble; dry, gradual boundary to;
90 – 120+	Pale brown (10YR 6/3) **sand**, calcareous; slightly moist.

Indicative subsoil permeability and drainage class (at leach drain depth): 0.5 – 1.5 m/d (Moderately well drained). **Depth to water**: 130 cm.

Comment: Possibly **s**uitable for conventional on-site effluent disposal (apart from need for setback from soakage dam) using partially inverted leach drains within imported soil fill material to achieve adequate separation from groundwater**.** Possible also suitable for alternative effluent disposal systems (with lesser minimum depth to water requirement).

Site Number: Exposure 2 **Lot 84** 50 H 577193 m E; 6122600 m N	**DAFWA Soil landscape mapping:** Meerup dunes Mp	**Land unit: Dm**.

Landform: Rapidly drained sand dune (moderate sideslope, 18 % gradient).

WA Soil Group: ***Pale deep sand***
(Podzol; calcareous at depth)

Depth (cm)	**Description**
0 - 50	Greyish brown (10YR 5/2) **sand**, dry, clear boundary to;
50 - 120	Light yellowish brown (10YR 6/4) **sand,** slightly calcareous; dry, gradual boundary to;
120–190+	Yellowish brown (10YR 5/4) **sand,**; with few bleached mottles; calcareous; dry, moderately alkaline (pH 8.7), non-saline (ECe 156 mS/m)

Indicative subsoil permeability and drainage class (at leach drain depth): > 3.0 m/d (Rapidly drained).
Depth to water: Not encountered, likely to be > 3.5 m based on topography and geomorphology.

Comment: Suitable for conventional on-site effluent disposal using septic tanks and leach drains. (Subsoil likely to have limited nutrient retention ability but site is not close to water table or surface waterbodies).

ATTACHMENT D

ACID SULFATE TEST RESULTS

ChemCentre

Inorganic Chemistry Section

Report of Examination

PO Box 1250, Bentley Delivery Centre
Bentley WA 6983
T +61 8 9422 9800
F +61 8 9422 9801
www.chemcentre.wa.gov.au
ABN 40 991 885 705

Purchase Order: 1512
Your Reference:
ChemCentre Reference: 15S1434 R1

Land Assessment Pty Ltd
PO Box 117
Subiaco WA 6008

Attention: Martin Wells

Final Report on 2 samples of soil received on 21/12/2015

LAB ID	Client ID and Description
15S1434 / 001	P8/4
15S1434 / 002	P9/4

Analyte		ANCe	pHkcl	pHox	Skcl	Sp	Spos
Method		iSPOCAS	iSPOCAS	iSPOCAS	iSPOCAS	iSPOCAS	iSPOCAS
Unit		moles H+/t			%	%	%
Lab ID	Client ID						
15S1434/001	P8/4	3.0	7.2	4.1	<0.01	0.02	0.02
15S1434/002	P9/4	<1.0	6.7	3.4	0.06	1.56	1.50

Analyte		Stones	TAA	TPA
Method		(>2mm)	iSPOCAS	iSPOCAS
Unit		%	moles H+/t	moles H+/t
Lab ID	Client ID			
15S1434/001	P8/4	0.7	<1.0	<1.0
15S1434/002	P9/4	33.7	<1.0	3200

REPORT ITEM DIS116 REFERS

Analyte	Method	Description
Stones	(>2mm)	Stones - sieved particles greater than 2 mm (sample preparation method manual 3.3.2)
TAA	iSPOCAS	Titratable Actual Acidity Method 23F
TPA	iSPOCAS	Titratable Peroxide Acidity
ANCe	iSPOCAS	Excess Acid Neutralisation Capacity (AS4969.3)
pHkcl	iSPOCAS	pH in a KCl soil extract (1:40 w/v)
pHox	iSPOCAS	pH in a soil suspension after 30% H2O2 digest
Skcl	iSPOCAS	Sulfur soluble in 1M KCl after TAA titration
Sp	iSPOCAS	Sulfur soluble in 1M KCl after 30%H2O2 digest and TPA titration
Spos	iSPOCAS	Sulfur oxidise by peroxide digest, calculated as S_P minus S_KCl

The results apply only to samples as received. This report may only be reproduced in full.

Unless otherwise advised, the samples in this job will be disposed of after a holding period of 30 days from the report date shown below.

Results for soil analysis are reported on an air-dry (40C) less than 2 mm basis, whereby stones are removed (material >2mm) by sieving.

When stone content is deemed significant the result is recorded and reported.

Unless otherwise specified, all analytes (except Stones) are reported in the listed concentrations and on a dry, less than 2 mm basis.

Stones are reported on a dry, whole sample basis.

Barry Price
Team Leader
Scientific Services Division
8-Jan-2016

ATTACHMENT E

ACID SULFATE SOILS: SELF-ASSESSMENT FORM

Acid Sulfate Soils Self-Assessment Form

Western Australian Planning Commission

Applicant

The applicant is the person with whom the WAPC will correspond and, if the application is approved, the person to whom the approval will be sent.

WAPC reference no	Not yet assigned
Full name	Martin Richard Wells (on behalf of landowners)
Postal address	P O Box 117 SUBIACO
Town / suburb	SUBIACO, PERTH WA
Postcode	6008
Email	landass@iinet.net.au
Phone number	9388 2427
Applicant signature	Mark Wells
Date	11/1/16
Application property details	Lots 84, 85 Harding Road and Lots 86, 87 & 98 Home Road, Robinson, City of Albany

Step 1

Assess the possibility of acid sulfate soils disturbance

Question 1: Are any dewatering or drainage works (either temporary or permanent) proposed to be undertaken? ☐ yes ☑ no

Question 2: Is excavation of 100 cubic metres or more of soil proposed? ☐ yes ☑ no
(In lay person's terms 100 cubic metres is about 10 standard-sized dump truck loads.)

If no to both question 1 and question 2 then no further investigation is required at this stage. Please sign this form and submit it, together with a completed 'Clearance of Conditions Request' form along with supporting documentation, to Department of Environment Regulation (DER).

If yes to either question 1 or question 2 go on to step 2.

Step 2

Conduct an acid sulfate soils investigation in accordance with DER's *Identification and Investigation of Acid Sulfate Soils* guideline

Question 3: Did the acid sulfate soils investigation indicate that there are acid sulfate soils present? ☐ yes ☑ no

If no to question 3, then no further investigation is required at this stage. Please sign this form and submit it, together with the written results of the investigation (in the form of an acid sulfate soils report) and a completed 'Clearance of Conditions Request' form and required information, to DER with a request for clearance of the acid sulfate soils condition.

If yes to question 3, please sign this form and submit it, together with the written results of the investigation (in the form of an acid sulfate soils report), an acid sulfate soils management plan and a copy of the approved subdivision plan, to DER with a request for approval of the management plan.

Note: After completion of site works in accordance with the approved management plan you will be required to submit a closure report, prepared in accordance with DER's acid sulfate soils guideline series, to DER together with a request for clearance of the acid sulfate soils condition.

Version: 1.0 (November 2012)

Tick box for attchments as appropriate

- ☐ Clearance of conditions request form
- ☐ Copy of approved subdivision plan
- ☐ Copy of approved development plan
- ☑ Acid Sulfate Soils investigation report
- ☐ Acid Sulfate Soils management plan

- Addressed as part of land capability report

Declaration

I declare that the information provided is true and correct to the best of my knowledge.

A completed 'Clearance of Conditions Request' form and required information is attached to this form (a copy can be downloaded from http://www.der.wa.gov.au/your-environment/acid-sulfate-soils/68-ass-forms)

Applicant signature: ..... Date: .....

Submit form to the
Department of Environment Regulation (DER)
Locked Bag 33
Cloisters Square, Perth WA 6850

If you have any questions relating to the Acid Sulfate Soils Self-Assessment form, please contact Acid Sulfate Soils Section (DER) on 1300 762 982 for assistance or email contaminated.sites@der.wa.gov.au.

Mark Wells

Land Assessment Pty Ltd

11/ 1 /16

ATTACHMENT F

ALTERNATIVE TREATMENT SYSTEMS

APPROVED FOR USE IN WA

Approved Aerobic Treatment Units

What are Aerobic Treatment Units (ATUs)?

Aerobic Treatment Units (ATUs) are small ('package') wastewater treatment plants. Due to the treatment and disinfection process, the treated wastewater from several systems may be used for garden irrigation. Some ATUs are also approved for Phosphorus removal. The listed systems have standard approval as domestic models (they may also be used in commercial situations). They are to be installed and operated in accordance with the Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974 and the **Code of Practice for the Design, Manufacture, Installation and Operation of Aerobic Treatment Units (ATUs) Serving Single Dwellings.**

As the conditions of approval can vary between designs, persons interested in installing a particular ATU should confirm it meets their needs and discuss site requirements with the local government.

ATUs have regular service requirements (usually quarterly) and maintenance must be through an **Authorised person** or their staff/subcontractors.

More detailed information on ATUs is contained in the **Aerobic Treatment Units** pamphlet and the **Code of Practice**.

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Allied Pumps 2 Modal Crescent CANNING VALE WA 6155 Ph: 9350 1000 / 1800 447 777 Fax: 9356 5255 Website: www.aquanova.com.au Email: sms@alliedpumps.com.au	Everhard Aqua-Nova 2000 Model 80100	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	Global Certification PL No. 077 27/03/2017
Aquarius Wastewater Management Pty Ltd Unit 1/20 Abrams Street BALCATTA WA 6021 Ph: 9240 8545 Fax: 9240 8542 Website: www.aquariuswastewater.com.au Email: admin@aquariuswastewater.com.au	Aquarius O–3	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation. Capable of removing nutrients to the following concentrations: TP (% removal): <1 mg/L (98.5%) TN (% removal): <10 mg/L (97.8%)	SMKH21519 25/03/2018
	Aquarius O–2	Single dwelling units up to 10 person capacity.	Approved only for below ground disposal via sub-surface irrigation, leach drains, soak wells or AquaSafe Drains. The system does not include Alum Sulphate dosing and disinfection system. The system does not remove nutrients.	
	Aquarius O–2 NR	Single dwelling units up to 10 person capacity.	Approved only for below ground disposal via sub-surface irrigation, leach drains, soak wells or AquaSafe Drains. The system does not include disinfection system. Capable of removing nutrients to the following concentrations: TP (% removal): <1 mg/L (98.5%) TN (% removal): <10 mg/L (97.8%)	

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Biomax Pty Ltd PO Box 462 MIDLAND DC WA 6936 Ph: 9250 7733 Fax: 9250 5844 Website: www.biomax.com.au Email: biomax@iinet.net.au	BioMax P10-M (phosphorus removal) BioMax C–10	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	No AS1546.3 certification 30/06/2015
BioSeptic Pty Ltd Concrete Products WA Ph: 9274 6988 Fax: 9274 6939 Website: www.bioseptic.com.au Email: sales@bioseptic.com.au	Performa 2000	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	SMK02221 18/10/2015
BioSystems 2000 Pty Ltd 3 Carlow Circle WATERFORD WA 6152 Ph: 9450 2570 Fax: 9450 1635 Email: biosystems2000@yahoo.com.au	Biosystem 2000	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	No AS1546.3 certification 30/06/2015
Earthsafe Environmental Pty Ltd PO Box 605 WYONG NSW 2259 Ph: 1300 327 847 Email: steven@rivatec.com.au	Earthsage Environmental ES10PC	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	SMKH20612 27/08/2016

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Fuji Clean Australia Pty Ltd 5/520 Mulgrave Road Earlville, Cairns QLD 4870 Website: www.fujiclean.com.au WA Distributor Ecowater WA 37 Granite Place YANCHEP WA 6035 Ph: 0417 098 281 Email: ecowaterwa@bigpond.com	CE1200	Single dwelling units up to 8 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation.	No AS1546.3 certification 30/06/2015
	CE1500EX	Single dwelling units up to 10 person capacity or 1500L/day	Approved for sub-surface or sub-strata or above ground spray irrigation. Capable of removing nutrients to the following concentrations: TP (% removal): 1.3 mg/L (84%) TN (% removal): 21.0 mg/L (58%)	SMKH21993 09/05/2016
	CRX1500	Single dwelling units up to 10 person capacity.	Approved for sub-surface or sub-strata or above ground spray irrigation. Capable of removing nutrients to the following concentrations: TP (% removal): 0.24 mg/L (97%) TN (% removal): 8.29 mg/L (82%)	No AS1546.3 certification 30/06/2015

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Galvin Concrete & Sheetmetal Pty Ltd Ph: 9302 2175 Website: www.galvins.com.au Email: csm@galvins.com.au WA Distributor Clearwater Domestic Sewerage 52 Railway Parade WELSHPOOL WA 6106 Ph: 9258 6933 Fax: 9258 6944 Email: naiquip@iinet.net.au	Clearwater 90 Compact	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation.	No AS1546.3 certification 30/06/2015
Icon-Septech Pty Ltd Lot 265 Valencia Way MADDINGTON WA 6109 Ph: (08) 9493 2352 or 1300 557 143 Fax: (08) 9493 2548 Website: www.icon-septech.com.au	Septech Turbojet 2000	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	SMK0239 13/11/2015
Jowa Group Pty Ltd 8 Lander Avenue SHEIDOW PARK SA 5158 Ph: (08) 8381 9100 Fax: (08) 8381 9116 Website: www.biocyclejowagroup.com.au Email: sales@biocyclejowagroup.com.au	Biocycle 5800	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	No AS1546.3 certification 30/06/2015

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Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Krystel Kleer Pty Ltd 59 Commerce Circuit Yatala QLD 4207 Ph: (07) 3382 7666 Website: www.qualitytanks.com.au Email: Nicole@qualitytanks.com.au	Krystal Kleer ADV5000 (Concrete and plastic models)	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	Cert No. 125 13/09/2014
Suncoast Waste Water Management 59 Industrial Avenue KUNDA PARK QLD 4556 Ph: 1800 450 767 Website: www.ozzikleen.com Email: info@ozzikleen.com	Ozzi Kleen RP10	Single dwelling units up to 10 person capacity.	Approved for sub-surface or above ground spray irrigation.	SMK02608 14/08/2016

Produced by Environmental Health Directorate

Manufacturer or supplier	Brand name and model	Capacity	Comments and restrictions	AS certification & Approval Expiry Date
Taylex Industries Pty Ltd 56 Prairie Road Ormeau QLD 4208 Ph: (07) 3441 5200 Fax: (07) 3287 4199 Email: Taylex@bigpond.com.au	Taylex DMS (Domestic Membrane System)	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation, sub-surface or sub-strata drip irrigation.	No AS1546.3 certification 30/06/2015
			Capable of removing nutrients to the following concentrations: TP (% removal): 0.29 mg/L (96%) TN (% removal): 6.19 mg/L (86%)	
	Taylex ABS (Advanced Blower System)	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation, sub-surface or sub-strata drip irrigation.	
	Taylex Poly ABS (Advanced Blower System)	Single dwelling units up to 10 person capacity.	Approved for above ground spray irrigation, sub-surface or sub-strata drip irrigation.	

Produced by Environmental Health Directorate

Assessed and not approved OR Approval withdrawn

Manufacturer / Supplier	Brand name and model	Reason not approved / Further information
Biolytix Technologies PO Box 591 MALENY QLD 4552 Ph: (07) 5435 2700 Fax: (07) 5435 2701 Website: www.biolytix.com Email: info@biolytix.com	Biolytix BF–6 Aerated	Company liquidated. Biolytix units which have been issued a 'Permit to Use' by local government before 19 January 2011 can still be in use. For further information, visit the following webpage: www.lawlerpartners.com.au/creditor_reports/biolytix_group_of_companies/faqs
Water Gurus Pty Ltd 3/57 Inspiration Drive WANGARA WA 6065 Ph: 9302 6444 or 1800 043 956 Fax: 9302 6777 Website: www.watergurus.com.au	Novaclear	Company liquidated. For further information, visit the following webpage: http://www.asic.gov.au/

More information:

Water Unit
Environmental Health Directorate
Department of Health
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Telephone: 08 9388 4999
Facsimile: 08 9388 4910

This document is available in alternative formats on request for a person with a disability.

Government of Western Australia
Department of Health
Public Health

Approved Alternative Leach Drains

These phosphorus reducing systems have a conventional septic tank and leaching field (leach drain) arrangement. The leaching field is contained within an approved amended soil which binds phosphates from the effluent.

Manufacture / Supplier	Brand Name and Model	Comments and Restrictions	Approval Date
Filtrex Innovative Wastewater Solutions PO Box 5122 BUNBURY WA 6231 Ph: (08) 9726 0118 Fax: (08) 9726 0117 Website: www.filtrex.com.au Email: info@filtrex.com.au	Filtrex Split System	■ Leach drains (for blackwater) and subsurface irrigation (for greywater) only. ■ Minimum 600mm soil absorption from any ground or pooled waters at the wettest time of year	01/02/08
	Filtrex Phosphate and Nutrient Wastewater Irrigation System	■ Leach drains disposal only. ■ Minimum 600mm soil absorption from any ground or pooled waters at the wettest time of year	31/05/11
	Filtrex Leach Drain Cage	■ Has an infiltrative area of 0.9m^2 per metre length ■ Non-phosphorus retentive. ■ Install in accordance to Department of Health approval conditions	29/10/2008
	Filtrex Standard Leach Drain Cage SLD MK2	■ Has an infiltrative area of 1.5m^2 per metre length ■ Non-phosphorus retentive. ■ Install in accordance to Department of Health approval conditions	27/10/2009

More information

Water Unit
Environmental Health Directorate
Department of Health
PO Box 8172
PERTH BUSINESS CENTRE WA 6849

Telephone: (08) 9388 4999
Fax: (08) 9388 4910

Produced by Environmental Health Directorate

Appendix B

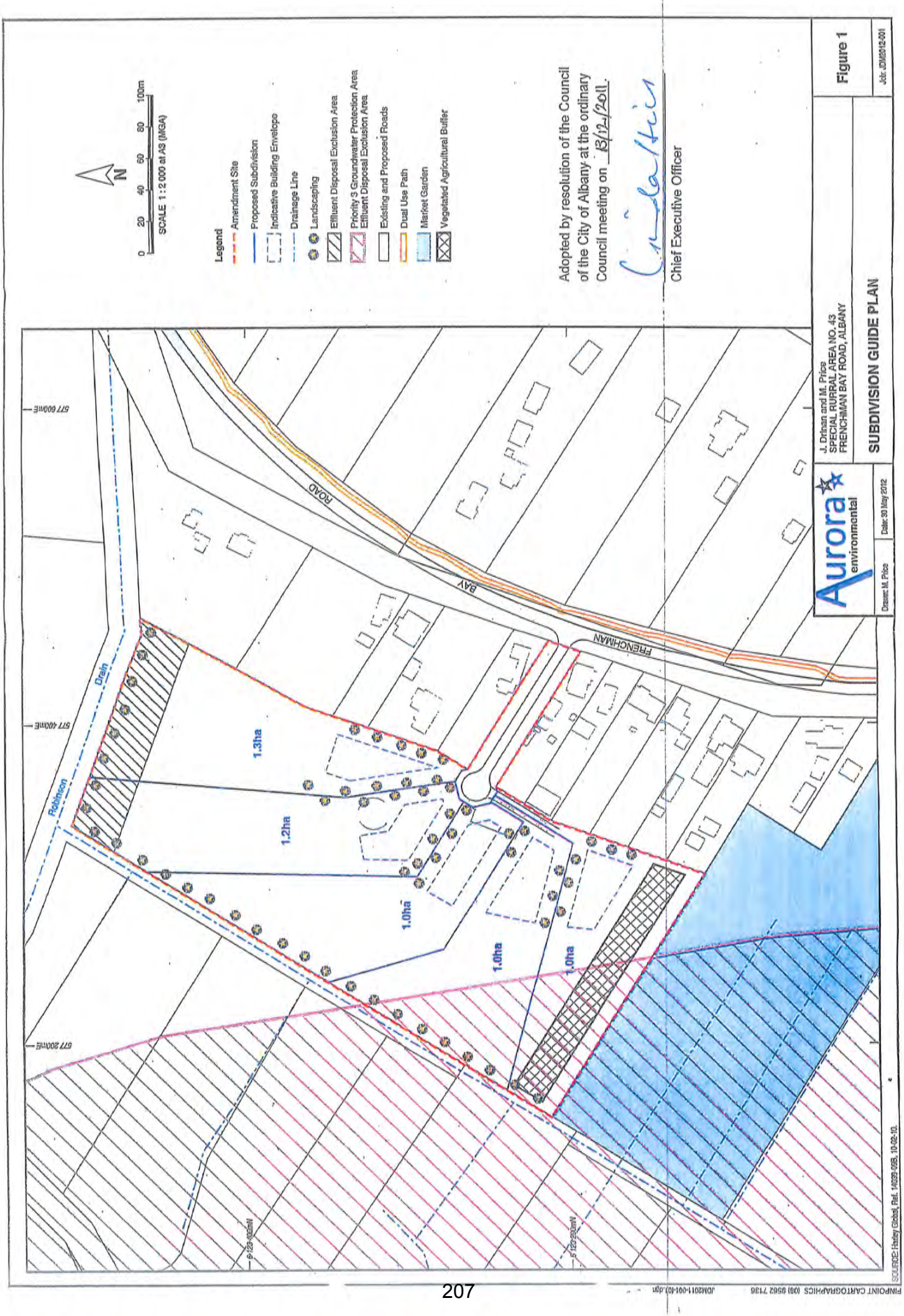
Existing Provisions & Subdivision Guide Plan

Local Planning Scheme No. 1

Rural Residential Area No. 43

No.	Specified Rural Residential Zone	Special Provisions Applying to Specified Rural Residential Zone
		the local government both prior to commencement of subdivision works and following completion of subdivision works. The report to provide adequate information proving that the land is suitable to accommodate future dwellings.
RR42	Little Grove Rural Residential zone	1. The minimum lot size shall be two hectares. 2. The following land uses are 'P' permitted uses— • Single House. 3. The following land uses are 'D' discretionary uses— • Ancillary Accommodation; • Bed and Breakfast/Farmstay; • Home Business; • Home Occupation; • Industry—Cottage; • Public Utility; and • Rural Pursuit (which shall be limited to existing cleared and pastured land only). 4. All buildings and structures shall be— (a) Located off any ridgeline as shown on the Subdivision Guide Plan as determined by the Local Government; (b) Located to retain the maximum amount of remnant vegetation on the site; and (c) Setback a minimum of 15 metres from any lot boundary.
RR43	Lot 114 Frenchman Bay Road, Robinson	**Plan of Subdivision** 1. Subdivision shall be generally in accordance with the adopted Subdivision Guide Plan *RR43*, as endorsed by the CEO. 2. The Western Australian Planning Commission may allow an alternative plan of subdivision, should it be satisfied that the plan of subdivision is consistent with the objectives and outcomes of the zone and Subdivision Guide Plan. 3. The Local Government will not generally recommend lots sizes less than one hectare. **Land Use** 4. Within Special Rural Zone Area No. 43 the following uses are permitted— • Single House 5. The following uses may be permitted subject to the special approval of the Local Government ('A')— • Home Occupation (cottage industry); • Public Utility; • Bed and Breakfast/Farmstay; • Holiday Accommodation; • Stables; • Home Office; • Home Business; and • Other non-defined or incidental activities considered appropriate by the Local Government which are consistent with the objectives of the zone. **Location of Buildings and Structures** 6. Any building on a lot must be constructed within a Building Envelope. Such Building Envelopes shall not exceed 2000m^2. Indicative building envelopes are shown on the subdivision guide plan. 7. Notwithstanding the requirement the Local Government may permit an alternative Building

No.	Specified Rural Residential Zone	Special Provisions Applying to Specified Rural Residential Zone
		Envelope location if it is shown to the satisfaction of the Local Government that— (a) The proposed location of the building envelope can achieve the setbacks established at 8; (b) All effluent disposal systems remain outside of the effluent disposal exclusion areas; and (c) That the necessary clearance to the ground water table can be achieved to support a suitable effluent disposal system. 8. All buildings are to be setback a minimum of 10 metres from all lot boundaries. **Water Supply** 9. All dwellings shall be required to provide a rainwater tank of not less than 50,000 litres capacity to harvest rainwater for household and garden use. **Effluent Disposal** 10. The Local Government shall require the use of amended soil type effluent disposal systems, such as EcoMax/ATU Systems. 11. Effluent disposal systems are to be located outside of the effluent disposal exclusion areas marked on the Subdivision Guide Plan. 12. No more than one effluent disposal system will be permitted on one lot. **Access** 13. Battleaxe legs are to be a minimum of 5 metres. Where access legs are to be co-located, their combined width may be reduced by 7.5 metres. 14. All driveways and underground infrastructure shall be designed and constructed so as to avoid erosion impacts and prevent unnecessary discharge of storm water. **Water Management** 15. The wastewater, stormwater and effluent disposal solutions documented in the *Local Water Management Strategy and Urban Water Management Plan Lot 114 (No. 142) Frenchman Bay Road, Robinson, City of Albany (April 2011)* shall form the basis for the detailed water management strategies. **Finished Floor Levels** 16. All buildings must achieve a minimum finished floor level of 2.64 metres AHD. **Notification of Prospective Owners** 17. The Local Government may require the subdivider to make arrangements satisfactory to the Local Government to ensure prospective purchasers are advised of the potential for nuisance impacts of odour, noise, dust and spray drift from the market garden located within 300 metres of the proposed development. **Agricultural Buffer** 18. A vegetated agricultural buffer is to be provided to the minimum width of 20 metres, plus a 10 metre setback for access from the south south-east boundary of the subject lot where the market garden adjoins, together with any required additional land for access for maintenance and firebreaks. 19. In relation to the 20 metre vegetated agricultural buffer to the existing market garden, species used in the closest 10 metre portion of the buffer shall not be capable of growing taller than 3 metres to prevent the incidence of overshadowing.
RR44	Torbay Hill, Kronkup Rural Residential zone	1. Subdivision of RR44 shall generally be in accordance with the Subdivision Guide Plan *RR44* endorsed by the CEO, with any minor


N
0 20 40 60 80 100m
SCALE 1 : 2 000 at A3 (MGA)
Legend
Amendment Site
Proposed Subdivision
Indicative Building Envelope
Drainage Line
Landscaping
Effluent Disposal Exclusion Area
Priority 3 Groundwater Protection Area
Effluent Disposal Exclusion Area
Existing and Proposed Roads
Dual Use Path
Market Garden
Vegetated Agricultural Buffer
Adopted by resolution of the Council of the City of Albany at the ordinary Council meeting on 13/12/2011.
Chief Executive Officer
Figure 1
Job: JDM2012-001
J. Drinan and M. Price
SPECIAL RURRAL AREA NO. 43
FRENCHMAN BAY ROAD, ALBANY
SUBDIVISION GUIDE PLAN
Aurora environmental
Drawn: M. Price
Date: 30 May 2012
ROAD
BAY
FRENCHMAN
Robinson Drain
1.3ha
1.2ha
1.0ha
1.0ha
1.0ha
577 600mE
577 400mE
577 200mE
6 123 400mN
6 123 200mN
PINPOINT CARTOGRAPHICS (08) 9562 7136
JDM2011-001(0).dgn
SOURCE: Harley Global, Ref. 14039-09B, 10-02-10.

Appendix C

Fire Assessment

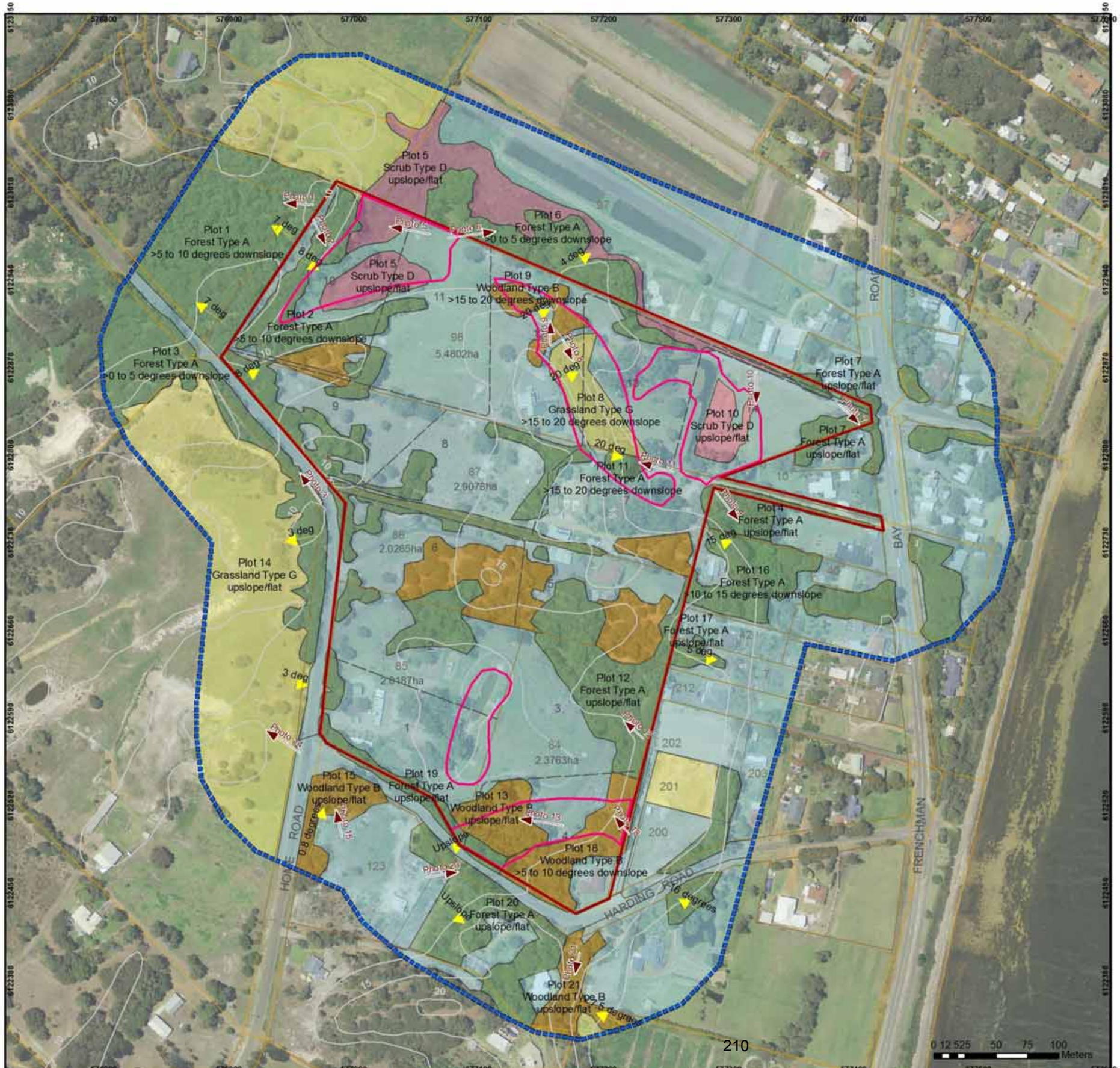
RR 43 Home & Harding Road Precinct

Biodiverse Solutions Pty Ltd

AS 3959 Bushfire Attack Level (BAL) Contour Plan Report

Site Details			
Address:	Lots 84,85,87,98 Home and Harding Road		
Suburb:	Robinson	**State:**	W.A.
Local Government Area:	City of Albany		
Description of Building Works:	Building development		
Stage of WAPC Planning	WAPC Application		

Report Details			
Report / Job Number:	AB007	**Report Version:**	Final Ver 2
Assessment Date:	1st & 8th November 2016	**Report Date:**	20/2/2017



Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2017
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS

Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Photo ID
- Subject Site
- 100m Assessment Boundary
- Cadastre
- 5m Contours
- Slope Degrees

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2
- Development Exclusion Area

Scale
1:3,000 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Ayton Baesjou
Lots 84, 85, 87, 98 Home and Harding Road
Albany, WA 6330

Vegetation Classes Map

STATUS	FILE	DATE
FINAL	AB007	16/12/2016

SECTION 1 - Vegetation Classification

All vegetation within 100m of the site / proposed development was classified in accordance with Table 2.3 of AS 3959-2009. Each distinguishable vegetation plot with the potential to determine the Bushfire Attack Level is identified below and shown on the Vegetation Classes Map page 2.

Plot	**1**	**Classification or Exclusion Clause**	**Forest Type A**
			Closed *Agonis flexuosa* forest. Multi-layered vegetation structure. Potential surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. External to site. Down slope-effective slope 7 degrees.
Photo 1-Photo ID 1-Looking north east from northern boundary. Boundary located on ridge running from east to west.			

Plot	**2**	**Classification or Exclusion Clause**	**Forest Type A**
			Closed *Agonis flexuosa* forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Upslope/downslope (straddles ridgline)-effective slope 8 degrees. Internal to site-APZ management can be applied.
Photo 2-Photo ID 2 –Photo looking south east from plot 1.			

Plot	3	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis flexuosa* forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Downslope-effective slope 3 degrees. External to site. Separation 10 metres.
Photo 3-Photo ID 3- View looking north along Home Road. Road cuts through original ridge line.			

Plot	4	Classification or Exclusion Clause	Forest Type A
			Closed Warren River Cedar Forest and Peppermint forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. External to site. Flat land. 0m separation to site.
Photo 4-Photo ID 4-View to the south east. Steep slopes are located further south.			

Plot	5	Classification or Exclusion Clause	Scrub Type D
			Pampas Grass to 3 metres in height growing on peat swamp. Potential Fuel Loading 25t/ha at maturity. >30% vegetative cover. Flat land. Internal and external to the site and contained within development exclusion area. Internal to site-APZ management can be applied.
Photo 5-Photo ID 5-View west towards plots 1 and 2. Heavy Pampas grass infestation.			

Plot	6	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis flexuosa* forest Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. External to site. Downslope-effective slope 4 degrees.
Photo 6-Photo ID 6-View to the north east. Heavy infestation of Arum Lilly and Dolichos			

Plot	7	Classification or Exclusion Clause	Forest Type A
			*Agonis flexuosa* forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Located external and external to site. Flat ground. Internal to site-APZ management can be applied.
Photo 7-Photo ID 7-Looking south towards adjoining property. Heavy pasture invasion in understory.			

Plot	8	Classification or Exclusion Clause	Grassland Type G
			Located with development exclusion area. Potential fuel load 3-4.5 t/ha. Down slope-effective slope 20 degrees to the east Internal to site. Mowing and slashing to meet APZ requirement. Internal to site-APZ management can be applied.
Photo 8-Photo ID 8-View to the south from driveway-height of grasses exceeds 300mm. Patchy understorey regeneration displays frequency of current management.			

Plot	9	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 9-10 metres with 10-30% foliage cover. Understory cleared-replaced by mixed unmanaged pasture-grasses 100-300mm. Not multi layered. Effective slope 20 degrees. Potential fuel loading 15-25 t/ha. Internal to site and located within development exclusion area. APZ management standards can be applied.
Photo 9-Photo ID 9-Looking north towards plot 6			

Plot	10	Classification or Exclusion Clause	Scrub Type D
			Located to the east-internal to subject site. Pampas grass infestation adjoining water hole. Currently grazed by goats. If grazing were discontinued the site would return to a state similar to plot 5. Potential fuel load 3-4.5 t/ha. Flat ground. Internal to site-APZ management can be applied.
Photo 10-Photo ID 10-View to the south east. Goats can just be seen in background.			

Plot	11	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Downslope-effective slope 20 degrees. Internal to site, within development exclusion area. APZ management can be applied.
Photo 11-Photo ID 11-Veiw to the west. Plot 8 located top right of photo.			

Plot	12	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Effective Slope – Upslope. Internal to site, within development exclusion area. APZ management can be applied.
Photo 12-Photo ID 12 View of forest Type A from the east (LHS of Phot)			

Plot	13	Classification or Exclusion Clause	Woodland Type B
			Karri woodland average height 15 metres with 10-30% foliage cover. Some over storey dying. Understory cleared-replaced by mixed unmanaged pasture-grasses 100-300mm. Not multi layered. Effective slope flat ground. Potential fuel loading 15-25 t/ha. Internal to site. APZ management standards can be applied.
Photo 13-Photo ID 13-View to the west adjacent to Lot 12. Heavy weed infestation present.			

Plot	14	Classification or Exclusion Clause	Grassland Type G
			Located western boundary-external to subject site. Currently grazed. Potential fuel load 3-4.5 t/ha. Effective slope - Upslope. Separation 11 metres.
Photo 14-Photo ID 14-view to the north west from home Road.			

Plot	15	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 6-8 metres with 10-30% foliage cover. Understory - unmanaged pasture-grasses 100-300mm. Not multi layered. Upslope-effective slope 0.8 degrees. External to site
Photo 15-Photo ID 15 View of Woodland Type B in private property to the south			

Plot	16	Classification or Exclusion Clause	Forest Type A
Photo not available, private property			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Down slope-Effective slope 15 degrees. External to site.

Plot	17	Classification or Exclusion Clause	Forest Type A
Photo not available, private property			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Upslope-effective slope 5 degrees. External to site.

Plot	18	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 6-8 metres with 10-30% foliage cover. Understory - unmanaged pasture-grasses 100-300mm.Scattered remnant natives Not multi layered. Down slope-effective slope 10 degrees to existing house. Upslope to lot internal areas. Internal to site-APZ management can be applied.
Photo 18-Photo ID 18-View of Woodland Type B north of existing house			

Plot	19	Classification or Exclusion Clause	Forest Type A
			Closed *Agonis Flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Flat Ground. Internal and external to site. Internal to site-APZ management can be applied.
Photo 19-Photo ID 19-Looking west to Home Road of Plot 19 (RHS of photo)			

Plot	20	Classification or Exclusion Clause	Forest Type A
			*Agonis flexuosa* Forest. Multi-layered vegetation structure. Potential Surface fuels 25-35T/ha. 30-70% vegetative structure/cover. Average tree height 8-13m. Upslope. External to site,
Photo 20-Photo ID 20-View to the south west from the north east of Plot 20.			

Plot	21	Classification or Exclusion Clause	Woodland Type B
			Peppermint woodland average height 6-8 metres with 10-30% foliage cover. Understory - unmanaged pasture-grasses 100-300mm. Scattered remnant natives. Not multi layered. Upslope. External to site to the south east.
Photo 21-Photo ID 21 view of Woodland Type B to the south east of the subject site. View from the north to the south along Plot 21 in private property.			

SECTION 3: Potential Bushfire Impacts

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below and shown on the BAL Contour Page 16.

BE on lot	Vegetation Classification	Effective Slope	Separation (m) to lot	BAL
1	Forest Type A (Plot 19) Woodland Type B (Plot 15) Forest Type A (Plot 3)	Flat Land Flat Land Downslope>0 to 5 deg	0m 20m 10m	BAL 12.5 to existing house N/A overridden by Plot19 BAL 12.5 to existing house
2	Forest Type A (Plot 3)	Downslope>0 to 5 deg	10m	BAL 12.5 to BAL Low on BE
3	Forest Type A (Plot 17) Grassland Type G	Upslope Upslope	0m 10m	BAL 29 to BAL 12.5 BAL 12.5
4	Woodland Type B (Plot 18)	Upslope	0m	BAL19 and BAL 12.5 can apply to existing house
5	Forest Type A (Plot 17) Forest Type A (Plot 16)	Upslope Downslope>10 to 15 deg	0m 0m	N/A overridden by Plot 16 BAL 29 to BAL 12.5 can apply
6	Forest Type A (Plot 3)	Downslope>0 to 5 deg	10m	BAL 29 and 12.5 on BE
7	Forest Type A (Plot 16) Forest Type A (Plot 4)	Downslope>10 to 15 deg Flat Land	0m 0m	BAL 12.5 to BAL-Low can apply BAL 12.5 to BAL-Low can apply
8	N/A	N/A	>100m	BAL – Low can apply
9	Forest Type A (Plot 3)	Downslope>0 to 5 deg	10m	BAL 29 to BAL 12.5 can apply
10	Forest Type A (Plot 1)	Down slope>5 to 10 degrees	0 m	BAL 12.5, BAL 19 and BAL 29 can apply to BE
11	Forest Type A (Plot 6)	Downslope>0 to 5 deg	0m	BAL 12.5 and BAL Low to BE
12	Forest Type A (Plot 6)	Down slope>0 to 5 deg	0m	BAL 12.5 and BAL Low to BE
13	Forest Type A (Plot 6) Forest Type A (Plot 4)	Down slope>0 to 5 degrees Flat Land	0m 0m	BAL 12.5 and BAL Low to existing house in BE BAL 12.5 to BE
14	Forest Type A (Plot 7)	Flat Land	0m	BAL 12.5 to 29 can apply

COMMENTS ON BAL CALCULATIONS:

- Distances from vegetation were made based on surface fuels to edge of lot (subject site) boundary;
- BAL Calculation was worked from external boundaries of the subject site, with the assumption that all internal areas of the lots will be maintained to APZ standards by the new owners;
- Effective slopes were measured in the field using a Nikon Forestry Pro and represented on the respective plots;
- Method 1 (AS3959-2009) Simplified procedure was used for vegetation classification and BAL Assessment process;
- Vegetation was classified within 100m of the lot boundaries;
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps;
- The BAL Contour Plan was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD30794); and
- The BAL Contour Map has been prepared in accordance with Department of Planning (WAPC) Fact Sheet – BAL Contour Maps (Version 2, January 2016).

ASSUMPTIONS

- The lots and the Development Exclusion areas can be fuel reduced to meet APZ standards; and
- All other areas on the lots can be cleared or maintained to APZ standards as per AS3959-2009 Low fuel Exclusion 2.2.3.2 (f) and the Guidelines for Planning in Bushfire Prone Areas – APZ Standards (Appendix Four A 2.1 Version 1.1, February 2017).

Kathryn Kinneur, Bio Diverse Solutions
Accreditation No: BPAD30794
Valid to: Feb 2017
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

BIO DIVERSE SOLUTIONS
Unit 5A, 209 Chester Pass Rd
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Subject Site
- 100m Assessment Boundary
- Proposed Building Envelope
- Cadastre

Vegetation

- Forest Type A
- Woodland Type B
- Shrubland Type C
- Scrub Type D
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5

Scale
1:2,250 @ A3
GDA MGA 94 Zone 50

Data Sources
Aerial Imagery: SLIP Virtual Mosaic WMS Service, Landgate 2016
Cadastre and Contours: Landgate 2016
Overview Map: World Topographic map service, ESRI 2012

CLIENT
Ayton Baesjou
Lots 84, 85, 87, 98 Home and Harding Road
Albany, WA 6330

BAL Contour Plan

STATUS	FILE	DATE
FINAL	AB007	17/02/2017

AS3959-2009 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2009) 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. (AS3959, 2009)
Building to AS39590-2009 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.

SECTION 4: DISCLAIMER

The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), , WAPC Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015), and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling 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. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling 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 fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.

SECTION 7: 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 3959-2009 (Incorporating Amendment No's 1, 2 and 3).

SIGNED, ASSESSOR: .... DATE: 20/2/2017

Kathryn Kinnear, Bio Diverse Solutions
Accredited Level 1 BAL Assessor (Accreditation No: BPAD30794)
"Experienced" Level 2/3 Bushfire Practitioner pending accreditation.

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

References

Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas Version 1.1. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2015 & 2016) map of Bushfire Prone Areas. Office of Bushfire Risk management (OBRM) data retrieved from:

Appendix 1: – Additional Information / Advisory Notes / Justifications Related to Assessment

Vegetation types analysed to A3959-2009 with the following justifications:

Forest type A

- Multi-layered vegetation structure;
- Surface fuels and could reach 25-35T/ha;
- 30-70% vegetative structure/cover; and
- Eucalypt Trees 10-30m.

Woodland Type B

- Not multi-layered vegetation structure;
- Available fuels and could reach 15-25T/ha;
- 10-<30% vegetative structure/cover;
- Eucalypt Trees 8-15m.

Scrub Type D:

- Maximum vegetation heights 4m;
- Occasional tree at 5m;
- >30% vegetative cover;
- Available Fuels 25T/ha; and
- Melaleuca, pampas grass and tea tree scrubs.

Grassland Type G

- Unmanaged grasslands – not regularly slashed or grazed;
- Average heights of grasses 100-400mm;
- Dominated by grass species; and potential fuel loading 4.5t/ha; and
- <10% tree/scrub species present.

Low Fuel and non-vegetated areas (AS3959-2009 2.2.3.2):

Clause (e) – Non-vegetated areas, including waterways, roads, footpaths, buildings and rocky outcrops.

- Footpaths;
- Buildings;
- Bare ground;
- Car parks; and
- Roads

Clause (f) – Low threat vegetation including managed grassland in minimal fuel condition, maintained lawns, golf courses, maintained public reserves and parklands, vineyards, orchards, cultivated ornamental gardens, commercial nurseries, nature strips and wind breaks.

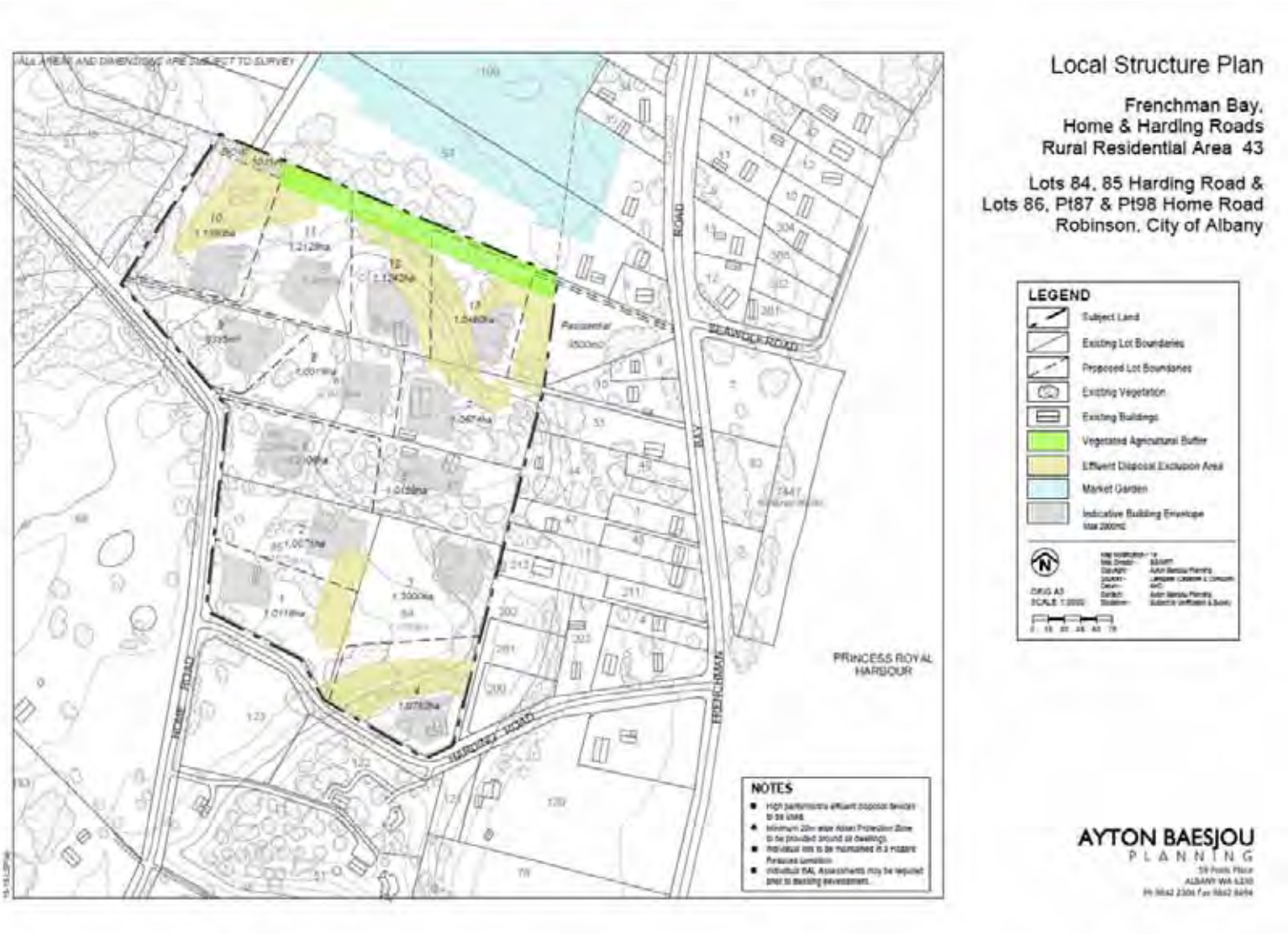
- Low fuel areas associated with managed grasslands, ornamental gardens in APZ areas of established buildings/dwellings; and
- Managed grasses <100mm in height, evidence of regular mowing.

BAL Assessment undertaken by an Experienced Level 2 Bushfire Practitioner. Method 1 AS3959-2009 applied for BAL Assessment.

Appendix 2 – OBRM Mapping

(SLIP, 2015 & 2016)

Appendix 3 – Local Structure Plan



Checklist for proposal compliance and justification to the Guidelines for Planning in Bushfire Prone Areas (2015))			
BDS Project Name	BAL Contour Plan		
BDS Job Number	AB007		
Date	20/2/17	**WAPC#**	N/A
Client name	Ayton Baesjou	**Condition #**	N/A
Bushfire Prone Area	Yes (see attached)	**Mapping**	Yes see attached
Planning proposal	WAPC subdivision	**Lots created**	14

1. Bushfire Protection Criteria Acceptable Solutions as defined by Guidelines for Planning for Bushfire Prone Areas (WAPC 2015).

Element	Compliant to Acceptable Solution– Yes/No	Justification
Element 1 – Location	No	Site has areas which are classified extreme and Low hazards. (Forest Type A, Woodland Type B, Scrub Type D, Grassland Type G). Proposed buildings can be in BAL 29 to BAL 12.5 zones and existing buildings in BAL 12.5 or BAL low. **Development is deemed to meet Acceptable Solutions for Element 1.**
Element 2 - Siting and design of development	Yes	A2.1: APZ can be achieved within the individual lots and a setback associated with BAL 29 or less. Fuel can be modified within the lots to meet APZ requirements. **Plan of subdivision is deemed to meet Acceptable Solutions for Element 2 with APZ's applied to BAL 29 or less to lots.**
Element 3 - Vehicular access	Yes	A3.1: Direct access onto Home and Harding Roads for most lots to separate destinations. A3.2 Public roads not proposed. A3.3 Cul-de-sacs not proposed. A3.4 Battle axes proposed, do not exceed 200m. A3.5 Private Driveways will meet minimum requirements. A3.6 No EAW proposed, use the existing road network. A3.7 No FSA proposed, use the existing road network. A3.8 Firebreaks compliant by current owner (s). **Deemed to meet Acceptable Solutions for Element 3.**
Element 4 – Water	Yes	Reticulated water. **Deemed to meet Acceptable Solutions for Element 4.**
Bushfire Hazard Assessment required	Yes	See Vegetation Classes Plan Page 2.
BAL Contour required	Yes	See BAL Contour Map Page 16.
BMP required	Yes	Extreme levels of fuel and slope exist within the properties. Application of APZ for BAL setbacks of BAL 29 or less is required.

2. Recommendations based on above checklist
1. Assessment indicates that the location has bushfire hazards of Forest Type A, Scrub Type D, Woodland Type B, Grassland Type G external and internal to site. Internal areas low fuel to be maintained by the developer/land owners. 2. BAL 12.5, BAL 19, BAL-29 can be achieved in newly created lots. Existing buildings can achieve BAL 29 or less. All new buildings to be placed in the BAL 29 or less contours in BE's. 3. Brief assessment to Guidelines indicated can meet the Elements by applying Acceptable Solutions can be achieved in the subsequent stages. 4. Detailed BMP required as a condition of subdivision. 5. Notification for condition of approval - building to AS3959-2009 to apply to any new dwellings. 6. Bushfire prone area mapping is correct as per the Map of Bush Fire Prone Areas identifying land falling within, or partially within, a bush fire prone area of Western Australia as designated by the Fire and Emergency Services (FES) Commissioner dated 8/12/2015 and 21/5/2016. Updates of this mapping will occur at the discretion of the FES Commissioner and the BAL Contour Mapping is considered valid for a period of 12 months from the date of production.

Prepared by:

Kathryn Kinnear, Bio Diverse Solutions

Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)

PLANNING AND DEVELOPMENT ACT 2005

CITY OF ALBANY

LOCAL PLANNING SCHEME No. 1

AMENDMENT No. 27

The City of Albany under and by virtue of the powers conferred upon it in that behalf by the Planning and Development Act 2005 hereby amends the above local planning scheme by:

i. Transferring Lots 84, 85 & 86 and portion of Lots 87& 98 from Schedule 14 Rural Residential Zone Area No. 29 to Rural Residential Zone Area No. 43.

ii. Renaming Schedule 14 Rural Residential Zone Area No. 43 Specified Rural Residential Zone from "Lot 114 Frenchman Bay Road Robinson" to "Frenchman Bay, Harding & Home Roads Rural Residential Area".

iii. Within Provisions 1, 2 & 11 of Schedule 14 Rural Residential Zone Area No. 43 replacing "Subdivision Guide Plan" with "Local Structure Plan".

iv. Replacing Provision 9 of Schedule 14 Rural Residential Zone Area No. 43 with the following:
"For the Lots applicable to a Local Structure Plan and which a reticulated water supply is provided, all dwellings shall be required to provide a rainwater tank of not less than 50,000 litres capacity to harvest rainwater for household and garden use. In other circumstances, clause 5.6.9 of the Scheme shall apply."

v. Within Provision 13 of Schedule 14 Rural Residential Zone Area No. 43 replacing "reduced by 7.5m" with "reduced to 7.5m".

vi. Replacing Provision 17 of Schedule 14 Rural Residential Zone Area No. 43 with the following: "The Local Government may require the subdivider to make arrangements satisfactory to the Local Government to ensure prospective purchasers are advised that a Bushfire Management Plan may apply to the land and that prospective purchasers are advised of the potential for nuisance impacts of odour, noise, dust and spray drift from agricultural activities undertaken in the locality."

vii. Replacing Provision 18 of Schedule 14 Rural Residential Zone Area No. 43 with the following: "Where shown on a Local Structure Plan a vegetated agricultural buffer is to be provided to the minimum width of 20 metres, plus where shown, a 10 metre setback for access.

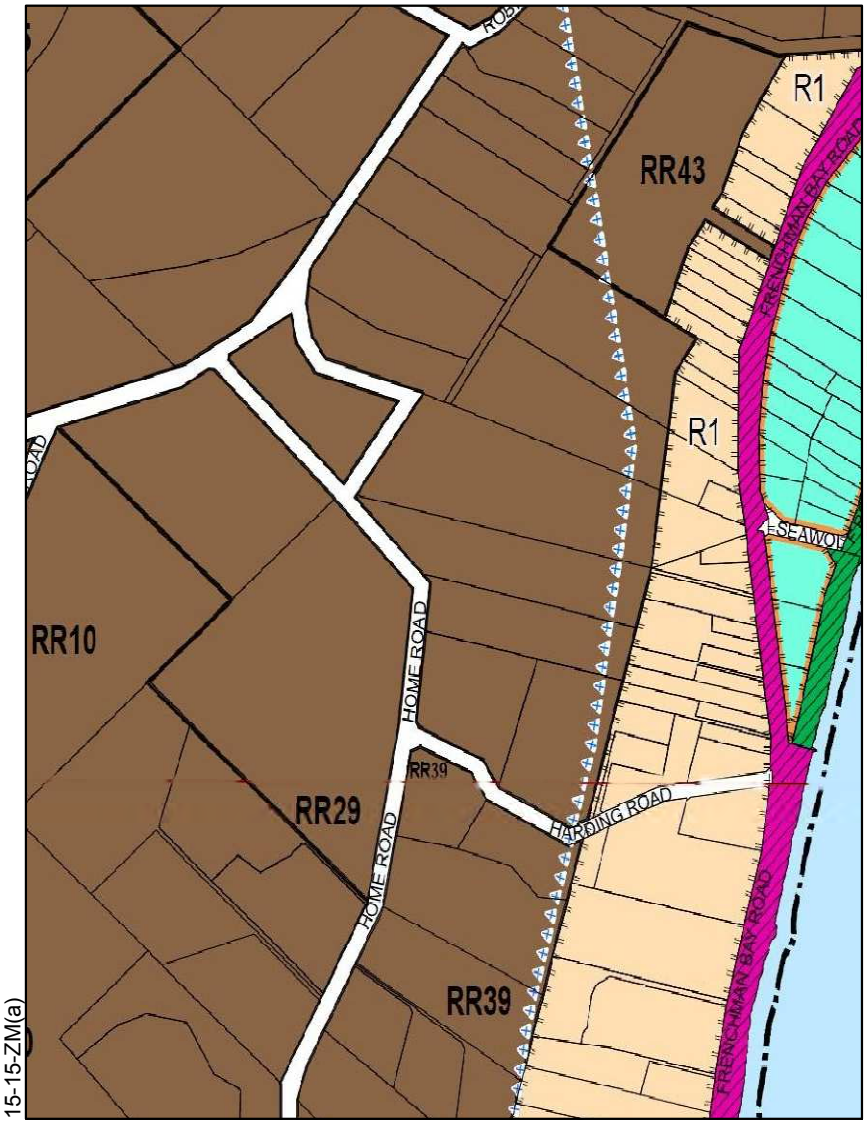
viii. Replacing Provision 19 of Schedule 14 Rural Residential Zone Area No. 43 with the following: "In relation to the 20 metre vegetated agricultural buffer to the north of the existing market garden, species used in the closest 10 metre portion of the buffer shall not be capable of growing taller than 3 metres to prevent the incidence of overshadowing."

ix. Including a Provision 20 within Schedule 14 Rural Residential Zone Area No. 43 as follows:
"**Bushfire Management**
20. The Local Government may request the Commission to impose a condition at the time of subdivision requiring the preparation and implementation of a Bushfire Management Plan in accord with SPP 3.7."

and

x. Updating the Scheme Maps accordingly.

Existing Zoning



LEGEND

LOCAL SCHEME RESERVES
(see scheme text for additional information)
- Local road
- Parks and recreation
- Priority road
- Waterbodies

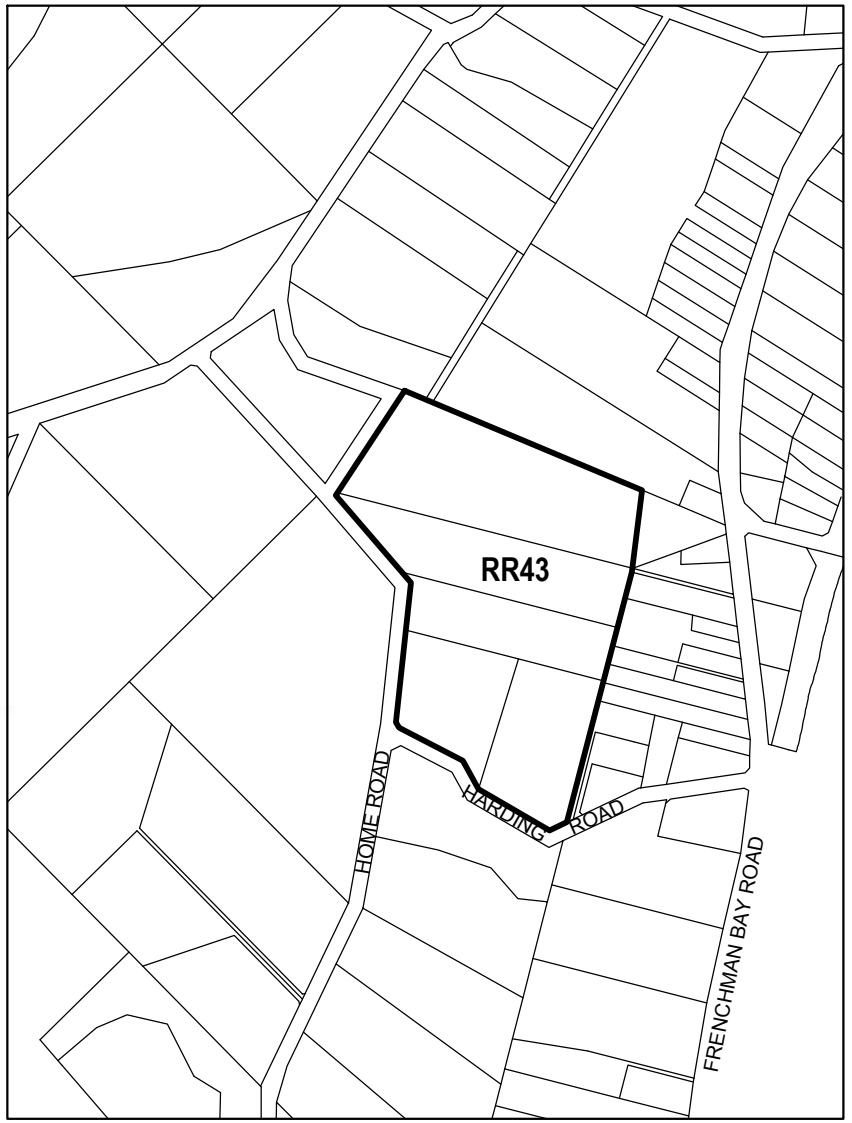
LOCAL SCHEME ZONES
(see scheme text for additional information)
- Residential
- Rural residential
- Tourist residential

OTHER CATEGORIES
(see scheme text for additional information)
- Scheme boundary
- R20 R Codes
- RR1 Rural residential area
- Public drinking water sources special control areas (see c.6.3)

N

ORIG A4
SCALE 1:10000
0 50 100 150 200 250

Proposed Zoning



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CITY OF ALBANY
LOCAL PLANNING SCHEME No. 1
AMENDMENT NUMBER 27

JANUARY 2017

ADOPTION

Adopted by resolution of the Council of the City of Albany at the Meeting of the Council held on the _____day of _____ 20_____

_____
Mayor

_____
Chief Executive Officer

FINAL APPROVAL

Adopted for final approval by resolution of the City of Albany at the 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

Recommended/Submitted for Final Approval

_____
Delegated Under S.16
of the PD Act 2005

_____
Date

Final Approval Granted

_____
Minister for Planning

_____
Date

CITY OF ALBANY

LOCAL PLANNING SCHEME NO. 1

AMENDMENT NO 33

AYTON BAESJOU
PLANNING
ABN: 15 061 140 172
59 Peels Place
Albany WA 6330
Ph 9842 2304 Fax 9842 8494

MINISTER FOR PLANNING

PROPOSAL TO AMEND A LOCAL PLANNING SCHEME

LOCAL AUTHORITY:	**CITY OF ALBANY**
DESCRIPTION OF LOCAL PLANNING SCHEME:	**LOCAL PLANNING SCHEME No. 1**
TYPE OF SCHEME:	**DISTRICT SCHEME**
SERIAL No. OF AMENDMENT:	**AMENDMENT No. 33**

PROPOSAL:

i. *Incorporating portion of Lot 1, Frenchman Bay Road within 'Additional Uses' site no. 33;*
ii. *Amending Schedule 2 – Additional Uses (CL 4.5) by including Lot 1 within the second column under 'Description of Land';*
iii. *Amending Condition II within the fourth column by replacing the R 30 code with the R 40 code; and*
iv. *amending the Scheme Maps accordingly.*

LOCAL PLANNING SCHEME No. 1

AMENDMENT No. 33

CONTENTS

PLANNING AND DEVELOPMENT ACT 2005

**RESOLUTION TO PREPARE AMENDMENT
TO LOCAL PLANNING SCHEME**

**CITY OF ALBANY
LOCAL PLANNING SCHEME No. 1**

DISTRICT SCHEME

AMENDMENT No. 33

RESOLVED that the local government pursuant to Section 72 of the *Planning and Development Act 2005*, amend the above Local Planning Scheme by:

i. *Incorporating portion of Lot 1, Frenchman Bay Road within 'Additional Uses' site no. 33;*
ii. *Amending Schedule 2 – Additional Uses (CL 4.5) by including Lot 1 within the second column under 'Description of Land';*
iii. *Amending Condition II within the fourth column by replacing the R 30 code with the R 40 code; and*
iv. *amending the Scheme Maps accordingly.*

The amendment is standard under the provisions of the *Planning and Development (Local Planning Schemes) Regulations 2015* for the following reason.

- The amendment is consistent with the Albany Local Planning Strategy, which sets a strategic objective to support urban infill development based on compatibility of land uses and infrastructure capacity;
- The amendment would have minimal impact on land in the scheme area that is not the subject of the amendment; and
- The amendment does not result in any significant environmental, social, economic or governance impacts on land in the scheme area.

Dated this _____day of _____ _____

_____
CHIEF EXECUTIVE OFFICER

CITY OF ALBANY

LOCAL PLANNING SCHEME NO. 1

AMENDMENT NO. 33

PLANNING REPORT

AYTON BAESJOU
PLANNING

ABN: 15 061 140 172

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Contents

1. INTRODUCTION

The Little Grove 'Local Centre' is located on Lots 1 and 312 on the corner of Frenchman Bay Road and Bay View Drive. As the centre is only located on a portion of Lot 1 and has limited further potential for additional retail floor space, a scheme amendment has recently been initiated to designate Lot 312 for 'Additional Uses' in order to allow for the option of developing residential and mixed use development.

The owner of Lot 1 now wishes to extend the 'Additional Uses' designation over the vacant portion of the property in order to also allow for the option of residential/mixed use development.

As the amendment relating to Lot 312 has been advertised and is awaiting final approval, a separate scheme amendment is required to extend the 'Additional Uses' designation.

The following report provides background information and justification for the proposed scheme amendment.

2. BACKGROUND

Lot 1 Frenchman Bay Road contains the Little Grove Local Centre on the corner of Frenchman Bay Road and Bay View Drive, which is located approximately 9km from the Albany Town Centre, Refer to Location Plan below.

LOCATION PLAN

Lot 1 is 3,197m^2 in area and approximately 2065m^2 or 65% of the site has been developed with a service station, convenience and liquor store, associated office space, storage, car parking and loading/service area. The balance of the site is 1132m^2 and is currently vacant and the owner of the property requests the flexibility to develop residential units and/or mixed uses on the site. Refer Site Plan.

It is proposed that this 'Additional Use' designation also be extended to Lot 1 so that the vacant portion of the site can be developed for the same purposes.

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SITE PLAN
Lot 1 Frenchman Bay Road
& Bay View Drive
Little Grove, City of Albany

3. PLANNING CONTEXT

The key planning document relating to the distribution and development of retail centres in Albany is the City of Albany's 'Activities Centre Planning Strategy' (ACPS) which was endorsed by the Council in June 2010.

The Strategy notes that Local Centres play an important role in Albany, providing a local convenience service. However, as the higher order services provided by the larger neighbourhood centres also provide a local convenience function, the need for future purely-local centres is considered limited.

Local Centres are allowed to develop Shop/Retail floorspace up to 600^2m, although the ACPS notes that most will probably remain smaller than this.

The Strategy recommends that Local Centres:

- Encourage and facilitate the development of other local-serving uses at an appropriate scale within local activity centres. Such uses could include some local offices and residential development.
- Where practicable, within a 100 metre radius of local centres, facilitate increased residential density of at least R30, preferably R40. This will enhance the commercial potential of these centres.
- Allow additional, appropriately sited, local activity centres to be planned in new urban areas as part of the structure planning process, to serve as (amongst other things) focal points for increased residential densities.

The first dot point is relevant to this amendment proposal as it encourages the development of residential development as well as other local servicing uses such as some local offices. While offices are a discretionary use within the 'Local Centre' zone, a single house, grouped dwelling and multiple dwelling are not permitted.

Other uses which may be considered within the 'Local Centre' zone include:

Amusement Parlour	Industry - service
Caretaker's Dwelling	Market
Child Care Premises	Medical Centre
Civic Use	Office
Club Premises	Restaurant
Community Purposes	Service Lunch Bar
Consulting Rooms	Service Station
Convenience Store	Shop
Dry Cleaning Premises	Small Bar
Exhibition Centre	Storage
Fast Food Outlet	Tavern
Industry – Cottage	Veterinary Service

While some of the above uses may not be suitable for particular locations, their retention will allow for their consideration in an appropriate situation without having to go through the process of a Scheme amendment.

Current practice generally excludes the development of a 'Single House' and most Schemes in WA encourage 'Grouped Housing' and 'Multiple Housing' within a 'Local Centre'.

With regard to proposed retail development in the locality, the only proposal is a 'Village Centre' associated with the Big Grove Outline Development Plan. The Village Centre is nominated for convenience shopping and commercial uses along with complimentary residential uses.

The size of the centre was not determined as it was considered outside the study time frame. However, it was noted that surrounding development potential could support a small to medium sized Neighbourhood Centre.

Within this context, the Little Grove Local Centre is likely to remain a local centre and will have the capacity to extend from 400m^2 Shop Retail to 600m^2 should demand increase pending the development of the Big Grove Centre.

This additional floor space can be accommodated by making more efficient use of the existing site or by extending into the vacant land remaining within Lot 1.

4. BUSH FIRE PLANNING

As the property is located within a bushfire prone area, a BAL Contour Plan and Bushfire Management Plan has been prepared and is attached in Appendix 'A'.

BAL 12.5 will apply to any future development of the vacant land and BAL 29 will apply to the existing building.

5. PROPOSED SCHEME AMENDMENT

In order to provide for the flexibility to develop residential and mixed use development on the vacant portion of Lot 1, it is proposed to incorporate the lot within the 'Additional Uses' site which is currently the subject of a Scheme Amendment relating to Lot 312 to the north.

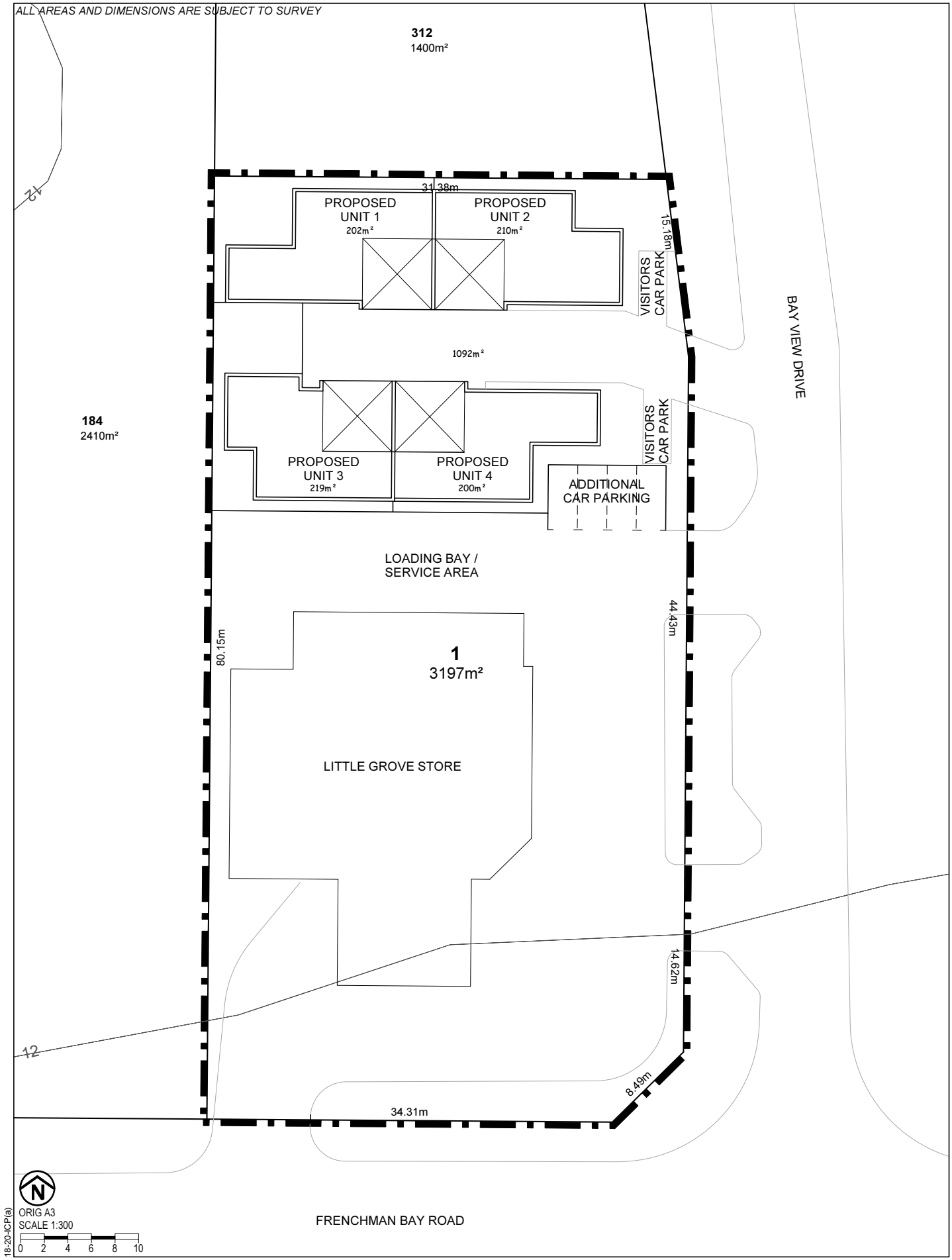
The 'Additional Uses' will allow 'Grouped Housing', Multiple Housing' and 'Mixed Use' to become discretionary ('A') uses.

This will allow for the flexibility for a number of development options ranging from commercial, residential or mixed use within the vacant land. The proponent's preference at this stage is to develop up to four residential units on the site which would also have potential to incorporate suitable commercial use such as a small scale office.

An Indicative Concept Plan has been prepared (refer over leaf) which illustrates how four units can be developed on the site with two visitor parking bays and an additional four car parking bays which are integrated with the local centre site. These bays could be used both for the local centre and possible commercial use(s) associated with the residential units.

While the 'Additional Uses' conditions associated with Lot 312 immediately to the north, designate an R30 density code, it is recommended that an R40 density code apply to both sites in order to allow greater scope for the possibility of mixed use development.

The Indicative Concept Plan demonstrates that the vacant portion of Lot 1 and Lot 312 can be developed independently. Lot 312 is larger in area and with two road frontages can be developed in a number of ways depending on the proposed use or mix of uses.



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INDICATIVE CONCEPT PLAN

Lot 1 Frenchman Bay Road
& Bay View Drive
Little Grove, City of Albany

6. CONCLUSION

This scheme amendment proposes to extend the 'Additional Uses' designation applying to Lot 312, within the Little Grove Local Centre zone, to the vacant portion of Lot 1, which is also zoned 'Local Centre'.

The proposal provides an opportunity to develop medium density housing in close proximity to the Local centre and meets Council's objective to encourage provision of a greater range of housing in an area which is still predominantly large lot single residential.

An R40 density code is recommended which will also provide greater scope for mixed use development.

PLANNING AND DEVELOPMENT ACT 2005

CITY OF ALBANY

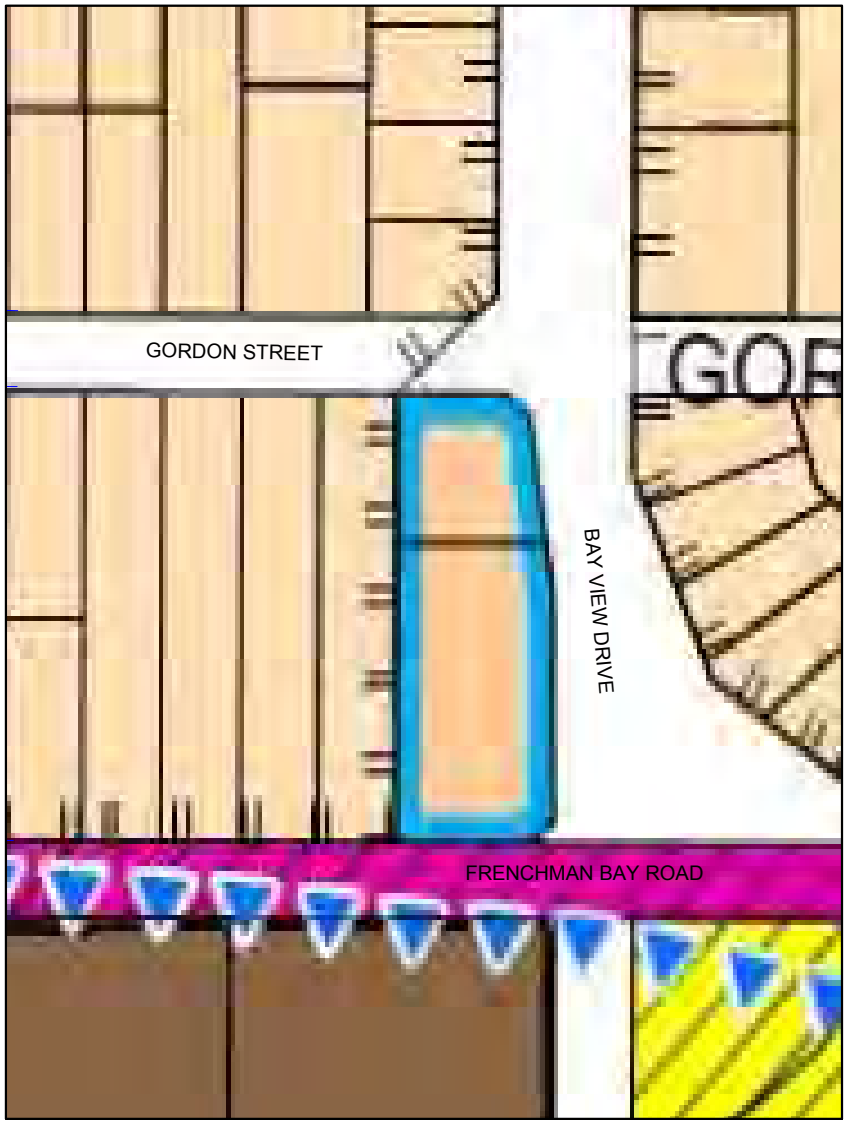
LOCAL PLANNING SCHEME No. 1

AMENDMENT No. 33

The City of Albany under and by virtue of the powers conferred upon it in that behalf by the Planning and Development Act 2005 hereby amends the above local planning scheme by:

i. *Incorporating portion of Lot 1, Frenchman Bay Road within 'Additional Uses' site no. 33;*
ii. *Amending Schedule 2 – Additional Uses (CL 4.5) by including Lot 1 within the second column under 'Description of Land';*
iii. *Amending Condition II within the fourth column by replacing the R 30 code with the R 40 code; and*
iv. *amending the Scheme Maps accordingly.*

Existing Zoning



LEGEND

LOCAL SCHEME RESERVES
(see scheme text for additional information)
- Local road
- Priority road
- Public use

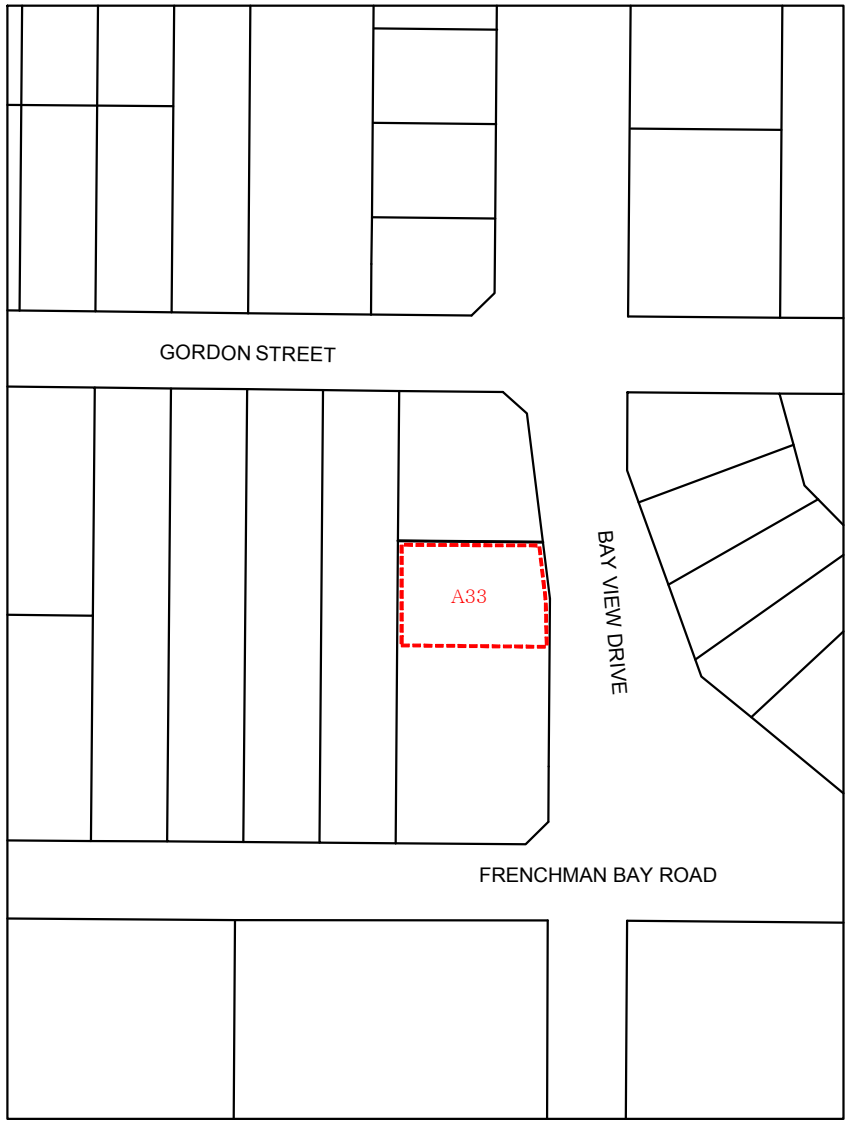
LOCAL SCHEME ZONES
(see scheme text for additional information)
- Local centre
- Residential
- Rural residential

OTHER CATEGORIES
(see scheme text for additional information)
- R20 R Codes
- A1 Additional uses
- Public drinking water sources special control areas (see c.6.3)

N

ORIG A4
SCALE 1:2000
0 10 20 30 40 50

Proposed Zoning



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CITY OF ALBANY
LOCAL PLANNING SCHEME 1
AMENDMENT NUMBER 33

18-20-ZM(a) May 2018

ADOPTION

Adopted by resolution of the Council of the City of Albany at the Meeting of the Council held on the _____day of _____ 20__ ____.

_____
Mayor

_____
Chief Executive Officer

FINAL APPROVAL

Adopted for final approval by resolution of the City of Albany at the 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

Recommended/Submitted for Final Approval

_____
Delegated Under S.16
of the PD Act 2005

_____
Date

Final Approval Granted

_____
Minister for Planning

_____
Date

APPENDIX A

BAL CONTOUR PLAN AND BUSHFIRE MANAGEMENT PLAN

BIO DIVERSE SOLUTIONS

JUNE 2018

BAL Contour Plan and Bushfire Management Plan (BMP)

Site Details			
Address:	Lot 1 Frenchman Bay Road		
Suburb:	Little Grove	**State:**	W.A.
Local Government Area:	City of Albany		
Description of Building Works:	N/A		
Stage of WAPC Planning	Rezoning		

BAL Contour Plan Details			
Report / Job Number:	AB0030	**Report Version:**	FINAL version 1
Assessment Date:	12/03/2018	**Report Date:**	20/06/2018
BPAD Practitioner	Kathryn Kinnear	**Accreditation No.**	BPAD30794

BIO DIVERSE SOLUTIONS

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

SECTION 1: Proposal details

Lot 1 Frenchman Bay Road is zoned 'Local Centre' and the purpose of the Scheme Amendment is to allow residential and mixed-use development by designating 'Grouped Housing and 'Multiple Housing' as discretionary uses within the zone. An R30 Density Code is proposed. These uses are currently not permitted in the zone. The City of Albany's 'Activities Centre Planning Strategy' (2010) recommends that Local Centres should be encouraged to include residential uses.

The subject site is located in the municipality of the City of Albany (CoA) in the locality of Little Grove. The northern portion of the site is undeveloped land/vacant land. The southern portion of the site has an existing shop/fuel station. Refer to the Site Plan Figure 1 and Locality Plan Figure 2. The subject site is located in the WA bushfire prone area mapping (SLIP, 2018), refer to Figure 3.

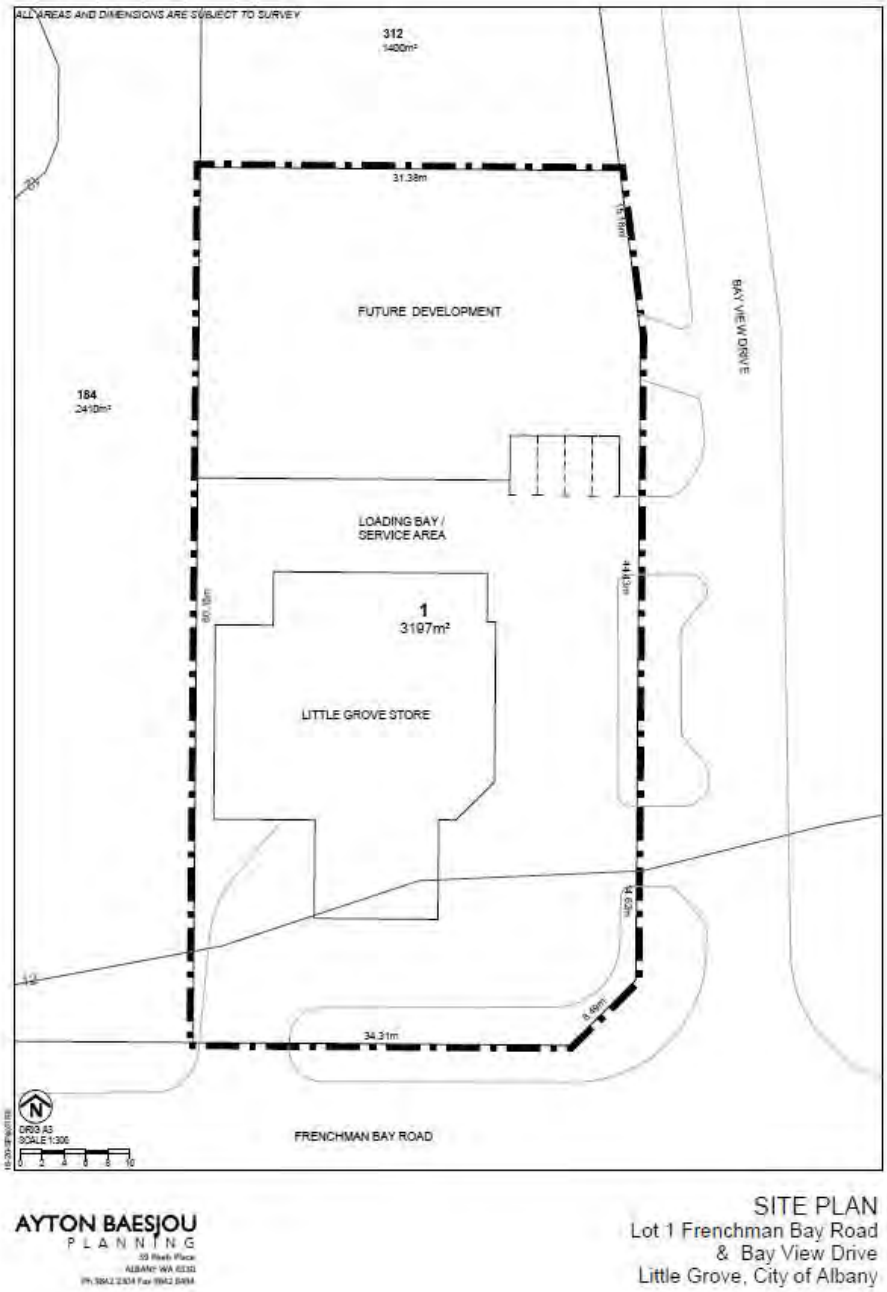

Figure 1: Site plan

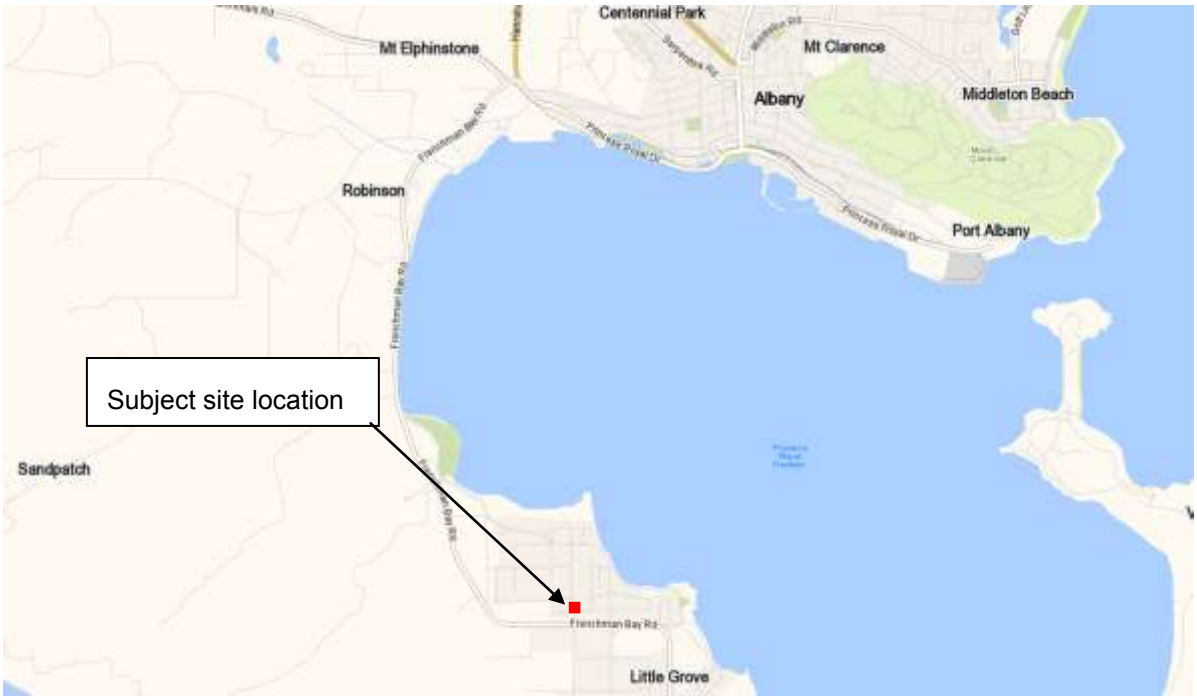

Figure 2: Location Plan

Figure 3: State Bushfire Prone Area Mapping (SLIP 2018)

SECTION 2: Environmental Considerations

Vegetation modification proposed: Vegetation clearing of the northern portion of the site is proposed to enable future site development/construction. The southern portion is cleared for buildings and parking.

Re-vegetation/landscape plans: No revegetation or landscaping plans are proposed for the proposal.

SECTION 3: Assessment Results

SECTION 3.1 – Assessment Inputs

Bushfire Assessment inputs for the site has been calculated using the Method 1 procedure as outlined in AS3959-2009. This incorporates the following factors:

- WA adopted Fire Danger Index (FDI), being FDI 80;
- Vegetation Classes;
- Slope under classified vegetation; and
- Distance between proposed development site and classified vegetation.

Vegetation Classification (Bushfire Fuels)

All vegetation within 150m of the site / proposed development was classified in accordance with Table 2.3 and Exclusion clauses 2.2.3.2 of AS 3959-2009. 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 (Figure 4) page 5.

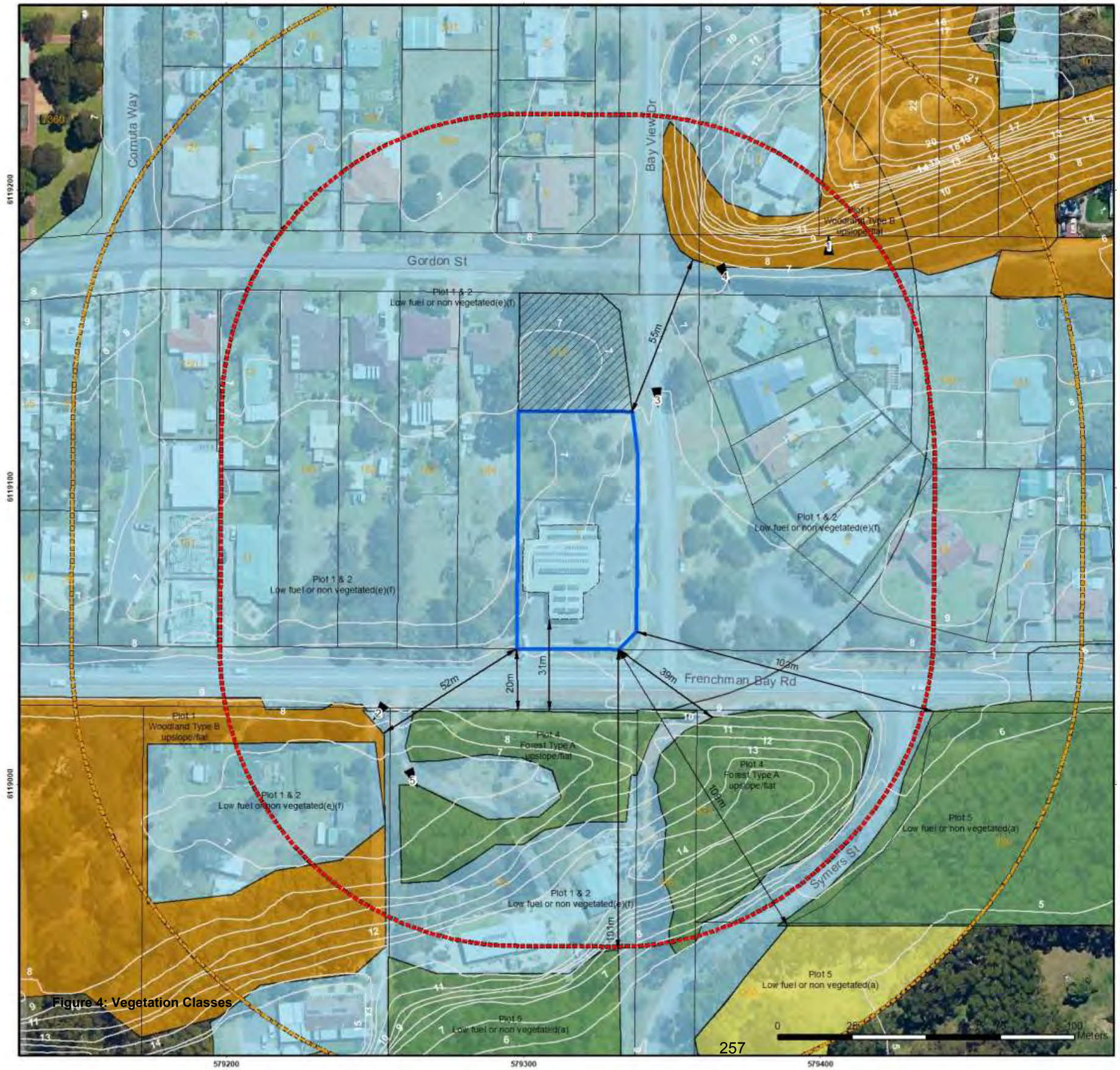

Figure 4: Vegetation Classes

This BAL Plan was prepared by
Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2
BIO DIVERSE SOLUTIONS
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Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Subject Site
- Existing Building
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre
- Photo Point
- 1m Contours
- Separation Distance
- Future Low Fuel

Vegetation

- Forest Type A
- Woodland Type B
- Grassland Type G
- Low fuel or non vegetated 2.2.3.2

Scale
1:1,250 @ 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
Nick Ayton
Ayton Baesjou Planning
Lot 1 Frenchman Bay Road
Little Grove, WA 6330

Vegetation Classes

BAL Assessor	QA Check	Drawn by
KK	KK	BT
STATUS	FILE	DATE
FINAL	AB0030	18/06/2018

Plot	1	Classification or Exclusion Clause	Woodland Type B
			**Location:** North east of the subject site near the Gordon Street and Bay View Drive intersection. **Separation distance:** 55m to the north east and 52m to the south west. **Dominant species & description:** Peppermint trees, with a small amount of coastal vegetation as understorey. **Average vegetation height:** 8m. **Vegetation Coverage:** 10-30%. **Available fuel loading:** 15-25t/ha. **Effective slope:** Upslope.

Photo Id 1: View looking north through Plot 1 to the north east of the subject site.

Plot	1	Classification or Exclusion Clause	Woodland Type B
			**Location:** South west along Frenchman Bay Road. **Separation distance:** 55m to the north east and 52m to the south west. **Dominant species & description:** Peppermint trees, with a small amount of coastal vegetation as understorey. **Average vegetation height:** 8m. **Vegetation Coverage:** 10-30%. **Available fuel loading:** 15-25t/ha. **Effective slope:** Upslope.

Photo Id 2: View looking into Woodland Type B situated to the south west (south of Frenchman Bay Road).

Plot	2	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (e)
			**Location:** Located to the east, north, west and south of the subject site in existing urban area. **Description:** All roads, driveways, buildings and other non-vegetated areas. As per AS3959-2009 exclusion clause 2.2.3.2 (e).
Photo Id 3: View looking south along Bay View Drive.			
Plot	**3**	**Classification or Exclusion Clause**	**Low fuel or non-vegetated areas exclusion 2.2.3.2 (f)**
			**Location:** Located to the east, north, west and south of the subject site in existing urban area. **Description**: Managed gardens, lawns and other low-threat fuel areas. As per AS3959-2009 exclusion clause 2.2.3.2 (f). **Available fuel loading:** <2t/ha.
Photo Id 4: View of maintained garden to the north east of the subject site.			

Plot	4	Classification or Exclusion Clause	Forest Type A
			**Location:** South of Frenchman Bay Road in private property. **Separation distance:** 20-39m. **Dominant species & description:** Peppermint trees and occasional Karri trees, Closed low forest. Mid and understorey of sedges, juvenile trees, herbs and grasses. **Average vegetation height:** 8-10m, occasional 15-20m (Karri). **Vegetation Coverage:** >30-70% foliage cover. **Available fuel loading:** 25-35t/ha. **Effective slope:** Upslope.
Photo Id 6: View of Forest Type A taken within private property to the south.			

Plot	5	Classification or Exclusion Clause	Low fuel or non-vegetated areas exclusion 2.2.3.2 (a)
No photo available			**Location:** Vegetation located south and south east of the subject site to the south of Frenchman Bay Road. **Separation distance:** 101-103m. **Description:** Areas of vegetation excluded as located >100m from subject site boundary as per exclusion clause 2.2.3.2 (a) of AS3959-2009.

COMMENTS ON VEGETATION CLASSIFICATIONS

- 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 (AS3959-2009) Simplified procedure was used for vegetation classification process;
- All vegetation was classified within the subject site and within 150m of the lot boundaries to Table 2.3 and Exclusions 2.2.3.2 (a-f) of AS3959; and
- The perimeter of the vegetation was measured using field GPS and notations on field GIS maps.

SECTION 3.2 Bushfire Assessment Outputs

The potential bushfire impact to the site / proposed development from each of the identified vegetation plots are identified below (Table 1) and shown on the BAL Contour Plan Page 10.

Table 1 - Potential Bushfire impacts to AS3959

Lot number	Vegetation Type (Table 2.3)	Slope (Table 2.4.3)	Separation distance to vegetation (m)	Highest BAL Contour	Modified BAL Contour
1	Woodland Type B (Plot 1)	Upslope	52m	BAL 12.5	BAL 12.5 can apply
	Forest Type A (Plot 4)	Upslope	20m	BAL 29	BAL 12.5 can apply
Existing Building	Forest Type A (Plot 4)	Upslope	31m	BAL 19	BAL 19 can apply

It is noted in Table 1 that where multiple BAL ratings apply - the highest BAL is always to apply. The final BAL allocation is dependent on final placement of the dwelling on the lot. BAL assessments may be considered on the lot by the new owners when dwelling design/placement is known and can be undertaken at building approval stages with the engagement of an Accredited Level 1 BAL Assessor.

NOTES ON BAL ASSESSMENT

- The BAL Contour Plan was prepared by an Accredited Level 2 Bushfire Planning Practitioner (BPAD30794); and
- The BAL Contour Map has been prepared in accordance with Department of Planning (WAPC) Guidelines for Planning in Bushfire Prone Areas Version 1.3 (WAPC, 2017);
- Subdivision based on plan of subdivision as supplied by Ayton Baesjou Planning, (Figure 1)
- Subject site is located in a Bushfire Prone Area; see Figure 3 (SLIP, 2017).
- APZ areas will be maintained in a Low Fuel state as per APZ standards in the Guidelines for Planning in Bushfire Prone Areas Version 1.3(WAPC, 2017) and CoA Fire Management Notice. Refer to Appendix A.
- All new buildings are to be placed in BAL 12.5 zones.

Figure 5: BAL Contour Plan

This BAL Plan was prepared by:
Kathryn Kinnear, Bio Diverse Solutions
Accreditation No: BPAD30794
Jurisdiction: Level 2 - WA

BPAD Bushfire Planning & Design Accredited Practitioner Level 2
BIO DIVERSE SOLUTIONS
29 Hercules Crescent
Albany, WA 6330
Australia
Tel: 08 9842 1575
Fax: 08 9842 1575

Overview Map Scale 1:100,000

Legend

- Subject Site
- Existing Building
- 100m Assessment Boundary
- 150m Assessment Boundary
- Cadastre

BAL Contours

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

Scale
1:1,250 @ 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
Nick Ayton
Ayton Baesjou Planning
Lot 1 Frenchman Bay Road
Little Grove, WA 6330

BAL Contour Plan

BAL Assessor	QA Check	Drawn by
KK	KK	BT
STATUS	FILE	DATE
FINAL	AB0030	18/06/2018

SECTION 4: Identification of Bushfire Impacts

The bushfire threats associated with the subject site are the continuous remnant Woodland vegetation located to the north east in Gordon Street Road Reserve and to the south west in private property located along Frenchman Bay Road. Continuous Woodland Type B vegetation occurs in this area which has been modified in the urban landscape, however is not managed. There is also continuous Forest Type A vegetation located to the south of the subject site situated to the south of Frenchman Bay Road.

To the north, south and west all properties have applied the CoA Fire Management Notice and fuel reduced their property. Continuous vegetation occurs linking along to Gordon Street to the east which can act as a "wick" into the Little Grove urban area. It is recommended for the safety of residents in the area, the CoA Fire Management Notice is applied in residential lots and fuel reduction occurs.

Surrounding the subject site to the north, south, east and west is existing residential area which is classified low fuel or non-vegetated areas as per exclusion clauses 2.2.3.2 of AS3959.

SECTION 5: ASSESSMENT TO GUIDELINES FOR PLANNING IN BUSHFIRE PRONE AREAS

The Bushfire Protection Criteria have been provided by WAPC in the "Guidelines for Planning in Bushfire Prone Areas" (WAPC, 2017) to assist the assessment of the proposal in bushfire prone areas. The BMP report assesses the proposal to the "Acceptable Solutions" of the four elements a summary of this assessment is outlined over the page (Table 2).

Table 2: Bushfire protection criteria applicable to the site

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 1 – Location	A1.1 Development Location	Yes	Compliant. BAL 12.5 will apply to any future buildings on site, BAL 29 applies to the existing building, meeting acceptable solution A1.1
Element 2 – Siting and Design	A2.1 Asset Protection Zone	Yes	Compliant. An APZ area will apply to the whole of the lot and will also utilise the surrounding existing low fuel areas of Bayview Drive and Gordon Street. APZ standards to be as per WAPC requirements, refer to Appendix A. An APZ area consistent with 12.5 will apply which is complaint to the WAPC guidelines.
Element 3 – Vehicular Access	A3.1 Two Access Routes	Yes	Compliant. Access is via future driveways onto Bay View Drive (north/south) where people can reach two separate destinations to the west and east and/or north and south depending on the bushfire attack direction. Access to the existing Little Grove Store is onto Bay View Drive (north/south) and Frenchman Bay Road (east/west). Although Frenchman Bay Road to the south is ultimately a dead-end road, this is deemed a legacy issue to the Little Grove suburb.
	A3.2 Public Road	No	No public roads are proposed. Not assessed to A3.2.
	A3.3 Cul-de-sacs	No	No cul-de-sacs are proposed. Not assessed to A3.3.
	A3.4 Battle axes	No	No battle axes are proposed. Not assessed to A3.4.

Table 2 cont.

Element	Acceptable Solution	Applicable or not Yes/No	Meets Acceptable Solution
Element 3 – Vehicular Access	A3.5 Private driveways	Yes	Compliant. A driveway is to be installed to 4m trafficable surface and 6m horizontal clearance. To be conditioned through the DA approvals process.
	A3.6 Emergency Access Ways	No	No EAWs proposed as the public road network will be utilised. Not assessed to A3.6.
	A3.7 Fire Service Access Ways	No	No FSA's proposed as the public road network will be utilised. Not assessed to A3.7.
	A3.8 Firebreaks	Yes	Firebreaks and fuel loads are to be compliant to CoA Fire Break Notice.
Element 4 – Water	A4.1 Reticulated areas	Yes	Not assessed to A4.1.
	A4.2 Non-reticulated areas	No	Not assessed to A4.2.
	A4.3 Individual lots in non-reticulated areas	No	Compliant. Water supply will be through the extension of the existing reticulated scheme water into the area. Connections are known to be available. Standards are to be as per WCWA and approval by the CoA.

SECTION 6: IMPLEMENTATION ACTIONS

The responsibilities of the developer(s), Landowners and local government are shown in Table 3.

Table 3 – Implementation Actions

Developer – Prior to issue of titles		
No	**Implementation Action**	
1	APZ areas to apply to the whole of the lot and to be maintained as per WAPC (Appendix A) and CoA requirements by the Developer until lots are relinquished to new owners.	☐
3	A driveway cross over to be designated/ installed off for access into subject site (min of 4m wide stabilised and 6m wide clearance).	☐
4	Reticulated water supplied to the site to WCWA requirements and to CoA approval.	☐

SECTION 7: DISCLAIMER

The recommendations and measures contained in this assessment report are based on the requirements of the Australian Standards 3959-2009 – Building in Bushfire Prone Areas, WAPC State Planning Policy 3.7 (WAPC, 2015), WAPC Guidelines for Planning in Bushfire Prone Areas (WAPC, 2015), and CSIRO's research into Bushfire behaviour. These are considered the minimum standards required to balance the protection of the proposed dwelling 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. All surveys and forecasts, projections and recommendations made in this assessment report and associated with this proposed dwelling 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 fire protection consultant has no control. Notwithstanding anything contained within, the fire consultant/s or local government authority will not, except as the law may require, be liable for any loss or other consequences (whether or not due to negligence of the fire consultant/s and the local government authority, their servants or agents) arising out of the services rendered by the fire consultant/s or local government authority.

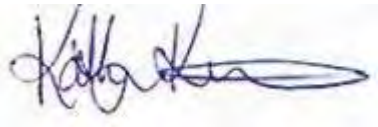
AS3959-2009 disclaimer: It should be borne in mind that the measures contained within this Standard (AS3959-2009) cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather condition.

Building to AS3959-2009 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, 2009)

SECTION 8: 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 3959-2009 (Incorporating Amendment Nos 1, 2 and 3) and the Guidelines for Planning in Bushfire Prone Areas Ver. 1.3 (WAPC, 2017).

SIGNED, ASSESSOR: ..  ..... DATE: 20/06/2018

Kathryn Kinnear, Bio Diverse Solutions
Accredited Level 2 Bushfire Practitioner (Accreditation No: BPAD30794)

BIO DIVERSE SOLUTIONS

BPAD Bushfire Planning & Design Accredited Practitioner Level 2

References

Western Australian Planning Commission (WAPC) (2017) Guidelines for Planning in Bushfire Prone Areas Version 1.3. Western Australian Planning Commission and Department of Planning WA, Government of Western Australia.

Western Australian Planning Commission (WAPC) (2015) State Planning Policy 3.2 Planning in Bushfire Prone Areas. Department of Planning WA and Western Australian Planning Commission.

State Land Information Portal (SLIP) (2018) Map of Bushfire Prone Areas. Office of Bushfire Risk Management (OBRM) data retrieved from:
https://maps.slip.wa.gov.au/landgate/bushfireprone/

REVISION RECORD

Revision	Summary	Revised By	Date
DRAFT ID 18/6/2018	Internal QA review	Bianca Theyer	18/6/2018
Issued to client as final		Bianca Theyer	20/6/2018

Appendix A

Standards for an Asset Protection Zone (APZ) (WAPC, 2017)

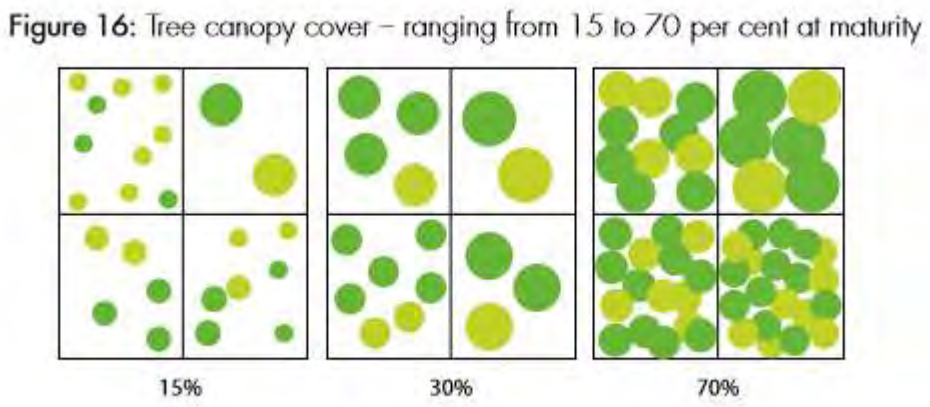
Fences: Within the APZ are constructed from non-combustible materials (e.g. iron, brick, limestone, metal post and wire). It is recommended that solid or slatted non-combustible perimeter fences are used.

Objects: Within 10 metres of a building, combustible objects must not be located close to the vulnerable parts of the building i.e. windows and doors.

Fine Fuel load: Combustible dead vegetation matter less than 6 millimetres in thickness reduced to and maintained at an average of two tonnes per hectare.

Trees (> 5 metres in height): Trunks at maturity should be a minimum distance of 6 metres from all elevations of the building, branches at maturity should not touch or overhang the building, lower branches should be removed to a height of 2 metres above the ground and or surface vegetation, canopy cover should be less than 15% with tree canopies at maturity well spread to at least 5 metres apart as to not form a continuous canopy. See Figure 2 (WAPC Figure 16, Appendix 4) below.

Figure 2 – Tree Canopy Cover



(WAPC, 2017)

Shrubs (0.5 metres to 5 metres in height): Should not be located under trees or within 3 metres of buildings, should not be planted in clumps greater than 5m2 in area, clumps of shrubs should be separated from each other and any exposed window or door by at least 10 metres. Shrubs greater than 5 metres in height are to be treated as trees.

Ground covers (<0.5 metres in height): Can be planted under trees but must be properly maintained to remove dead plant material and any parts within 2 metres of a structure, but 3 metres from windows or doors if greater than 100 millimetres in height. Ground covers greater than 0.5 metres in height are to be treated as shrubs.

Grass: Should be managed to maintain a height of 100 millimetres or less.