Albany Motorsport Park - Development Application

Environmental Management Plan

City of Albany

27 July 2021

→ The Power of Commitment

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Executive summary

The City of Albany (CoA) has engaged GHD to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure 1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

At full development, the proposed AMP will consist of:

– Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[1] and Motorcycling Australia (MA) *Track Guidelines*[2].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
– A motocross circuit designed and constructed in association with MA guidelines.
– An off-road four-wheel drive (4WD) and all-terrain vehicle (ATV) training area.
– Associated buildings and infrastructure.

Due to the scale and nature of the proposed development, the construction works have been broken down into two key stages which comprise of the following:

– Stage 1 (this Development Application):
  - Stage 1A: Construction of motocross track, 4WD driver training area, all-terrain vehicle (ATV) area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

A Master Plan, which illustrates the various aspects of the Site and staging areas, has been developed by the GSMG and CoA to support the Development Application for the AMP (Figure 2, Appendix A).

This overarching Environmental Management Plan (EMP) has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development, as a condition under Local Planning Scheme No. 1, Scheme Amendment No. 35 for rezoning of Lot 5780 Down Road South, from 'Priority Agriculture' zone to 'Special Use – SU26' zone.

The objective of this EMP is to minimise environmental impacts during construction and operation of the AMP so that environmental values are protected.

This EMP has been developed with reference to the following themes, factors and objectives, as outlined in the Environmental Protection Authority (EPA) *Statement of Environmental Principles, Factors and Objectives* (EPA, 2020), which are considered applicable to the Site:

– *To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
– *To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*
– *To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*
– *To maintain air quality and minimise emissions so that environmental values are protected.*
– *To protect social surroundings from significant harm.*

[1] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[2] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

Environmental management will be undertaken for the AMP as per strategies outlined in the following sub-plans which are appended to this EMP:

- Noise management plan
- Water management plan
- Hydrocarbon management plan
- Waste management plan
- Dust management plan
- Protected Exclusion Area management plan
- Decommissioning plan
- Construction management plan.

A Construction Management Plan has been included in this EMP however it is recommended that a site-specific Construction Environmental Management Plan (CEMP) is developed by the appointed contractor to prior to commencement of construction works.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.6 and the assumptions and qualifications contained throughout the Report.

Abbreviations

Term	Definition
AMP	Albany Motorsport Park
AMV Inc.	Albany Motorsport Venue Incorporated
ARVS	Albany Regional Vegetation Survey
ASS	Acid Sulfate Soil
ATV	All-terrain vehicle
BAM Act	*Biosecurity and Management Act 2007*
BGL	Below ground level
BC Act	*Biodiversity Conservation Act 2016*
CAMS	Confederation of Australian Motor Sport Limited
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
CoA	City of Albany
CoC	Chain of Custody
DBCA	Department of Biodiversity, Conservation and Attractions
DBH	Diameter at breast height
DFES	Department of Fire and Emergency Services
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FIA	Federation Internationale de l 'Automobile
FIM	Federation Internationale Motocyclisme
GoWA	Government of Western Australia
GSMG	Great Southern Motorplex Group Inc.
IBRA	Interim Biogeographic Regionalisation for Australia
JDAP	Joint Development Assessment Panel
LGA	Local Government Area
MA	Motorcycling Australia
PDWSA	Public drinking water source area
RIWI Act	*Rights in Water and Irrigation Act 1914*
TAA	Titratable Actual Acid
TPA	Total Peroxide Acidity
WARR Act	*Waste Avoidance and Resource Recovery Act 2007*
WSUD	Water sensitive urban design
WONS	Weeds of National Significance

Term	Definition
WQPN	Water quality protection note
WSUD	Water sensitive urban design
4WD	Four-wheel drive

Defined terms

Term	Definition
Albany Motorsport Park	At full development, the proposed AMP will consist of: – Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling: • Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[3] and Motorcycling Australia (MA) *Track Guidelines*[4]. • To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing). – A motocross circuit designed and constructed in association with MA guidelines. – An off-road four-wheel drive (4WD) and all-terrain vehicle (ATV) training area. – Associated buildings and infrastructure.
Clearing impact area	The clearing impact area (native vegetation) is 0.928 ha in size.
Conservation Category Wetland	Wetlands which support a high level of attributes and functions.
Development Exclusion Buffer	The Development Exclusion Buffer is a 50 m, low fuel buffer between the Protected Exclusion Area and AMP activity areas.
Federation Internationale de l 'Automobile	The world controlling body of four wheeled motor sport.
Federation Internationale Motocyclisme	The global governing/ sanctioning body of motorcycle racing.
Motorcycling Australia	Motorcycling Australia – The governing body of motorcycle sport in Australia
Motorsport Australia	The body appointed by the FIA to regulate motor sport in Australia.
Proponent/ Venue Manager	Great Southern Motorplex Group Inc. / Albany Motorsport Venue Incorporated (AMV Inc.)
Protected Exclusion Area	The Protected Exclusion Area comprises remnant native vegetation and the CCW Marbelup Flats within the AMP area.
Site	Lot 5780 Down Road South, Drome. – The Site is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. Lot 5780 includes the following areas: • 141.5 ha proposed AMP – Excluded from AMP: • 49.47 ha native vegetation at western end • 1.37 ha dam area sub-leased to Plantation Energy The AMP will also include 0.2 ha of crossovers onto Down Road South and is therefore 141.7 ha in size.
Staging	– Stage 1A: Construction of motocross track and 4WD driver training, ATV area and associated infrastructure. – Stage 1B: Construction of racetrack and associated infrastructure (subject to funding). – Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.
Venue Owner	Lot 5780 Down Road South, Drome and all permanent facilities and infrastructure will be owned by the City of Albany.
Venue Procedures Manual	Standard operating practices for operation of the AMP.

[3] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[4] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

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1. Introduction

1.1 Project description

The City of Albany (CoA) has engaged GHD to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure 1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

Lot 5780 Down Road South, Drome is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. The AMP comprises 141.7 ha (including 0.2 ha for crossovers) in the eastern portion of the Site. Two areas within Lot 5780 are excluded from the AMP development and include 49.47 ha at the western end of the Site which is covered with native vegetation and a dam area (1.37 ha) on the northern boundary which is subleased to Plantation Energy.

The Great Southern Motorplex Group Inc. (GSMG), the Proponent, in partnership with the City of Albany, intend to develop the site as a regional motorsport facility. In October 2018, the City of Albany Council resolved to purchase the site and settlement of the land purchase was concluded in 2019.

Once constructed, the AMP will be operated and managed by Albany Motorsport Venue Incorporated (AMV Inc.) as per the Governance model included in Appendix B.

The proposed AMP forms part of the CoA's strategy to expand upon its existing motorsports facilities within the greater Albany area. The AMP is to be the largest facility of its kind in Western Australia and will support the local economy.

At full development, the proposed AMP will consist of:

- Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[5] and Motorcycling Australia (MA) *Track Guidelines*[6].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing)
- A motocross circuit designed and constructed in association with MA guidelines.
- An off-road four-wheel drive (4WD) and all-terrain vehicle (ATV) training area.
- Associated buildings and infrastructure.

A Master Plan, which illustrates the various aspects of the Site and staging areas, has been developed by the GSMG and CoA to support the Development Application for the AMP (Figure 2, Appendix A).

1.2 Staging and timeframes

Due to the scale and nature of the proposed development, the construction works have been broken down into two key stages which comprise of the following:

- Stage 1 (this Development Application):
  - Stage 1A: Construction of motocross track and 4WD driver training, ATV area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
- Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

The areas for Stage 1A and Stage 1B have been shown on the Master Plan in Figure 2 (Appendix A).

[5] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[6] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

1.3 Purpose of this report

This overarching Environmental Management Plan (EMP) has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development, as a condition under Local Planning Scheme No. 1, Scheme Amendment No. 35 for rezoning of Lot 5780 Down Road South, from 'Priority Agriculture' zone to 'Special Use – SU26' zone.

The management strategies and procedures outlined within the EMP aim to achieve the AMP environmental objectives as defined in Section 1.4.

1.4 Objectives

The objective of the EMP is to minimise environmental impacts during construction and operation of the AMP so that environmental values are protected.

This EMP has been developed with reference to the following themes, factors and objectives, as outlined in the Environmental Protection Authority (EPA) *Statement of Environmental Principles, Factors and Objectives* (EPA, 2020), which are considered applicable to the Site (Table 1).

Table 1 EPA themes, factors and objectives (EPA, 2020)

Theme	Factor	Objectives
Land	Flora and Vegetation	*To protect flora and vegetation so that biological diversity and ecological integrity are maintained.*
	Terrestrial Fauna	*To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.*
Water	Inland Waters	*To maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.*
Air	Air Quality	*To maintain air quality and minimise emissions so that environmental values are protected.*
People	Social Surroundings	*To protect social surroundings from significant harm.*

1.5 Scope of works

The scope of works for this EMP includes the overarching requirements and a number of subplans to address specific aspects of the AMP. The EMP includes the following:

- Overarching EMP requirements (Sections 1, 2, 4 to 10)
- Assessment of impacts (Section 3)
  - Flora and vegetation
  - Terrestrial fauna
  - Inland waters
  - Air quality
  - Social surroundings
- Protected Exclusion Area management plan (Appendix C)
- Water management plan (Appendix D)
- Hydrocarbon management plan (Appendix E)
- Waste management plan (Appendix F)
- Noise management plan (Appendix G)
- Dust management plan (Appendix H)
- Decommissioning plan (Appendix I)
- Construction management plan (Appendix J).

1.6 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Compliance/ legal obligations register

A compliance/ legal obligations register will be developed for the AMP, and updated in this EMP in the next review, based on the outcomes of the Development Approval and conditions set for construction and operation of the Site. This will summarise the commitments to be undertaken to address each compliance or legal obligations to construct and operate the AMP including:

– Environmental aspects
– Legislation/ requirements
– Obligations
– Timing and period of obligations.

Compliance and other legal obligations will be reported on, to relevant approving authorities, as required.

3. Environmental impact assessment

3.1 Vegetation and flora

3.1.1 Receiving environment

3.1.1.1 Regional biography

The Site is located in the South West Botanical Province of Western Australia (Beard, 1990). The Southern Jarrah Forest Interim Biogeographic Regionalisation for Australia (IBRA) subregion is characterised by "*Jarrah-Marri forest on laterite gravels and, in the eastern part, by Wandoo - Marri woodlands on clayey soils. Eluvial and alluvial deposits support Agonis shrublands. In areas of Mesozoic sediments, Jarrah forests occur in a mosaic with a variety of species-rich shrublands*" (Hearn, Williams, Comer, & Beecham, 2002, p. 382).

Broad scale pre-European vegetation mapping of the Southern Jarrah Forest IBRA Region was completed by Beard (1979) at an association level. The mapping indicates that two vegetation associations are present within the Site and lie within the Albany System Association (Figure 3, Appendix A):

- Cyperaceae, Restionaceae, Juncaceae (mainly in the South-West) (association 51)
- Jarrah, Banksia or Casuarina *Eucalyptus marginata*, *Banksia* spp., *Allocasuarina* spp. (association 978)

The Albany Regional Vegetation Survey (ARVS) (Sandiford & Barrett, 2010) provides a local and regional overview of the native vegetation within a 124,415 ha area to the east, west and north of Albany. This survey described, mapped and assessed the conservation status of native vegetation within the ARVS area, which includes the Site.

The Sandiford and Barrett (2010) mapping indicates that three ARVS vegetation units mapped within the Site including vegetation unit 12, 13 and 47. The ARVS vegetation units mapped by Sandiford and Barrett (2010) for the Site and surrounds are presented in Figure 4, Appendix A.

3.1.1.2 Vegetation communities and condition

The majority of the Site has been previously cleared for agriculture with isolated stands of trees. Bio Diverse Solutions (2018) mapped six vegetation types within the Site. These vegetation types and their corresponding ARVS vegetation units are summarised in Table 2 and presented in Figure 5, Appendix A.

Table 2 Vegetation types mapped within the Site

Vegetation type	Corresponding ARVS Vegetation Unit name	Vegetation type summary	Corresponding ARVS vegetation unit	Extent (ha)
1	Jarrah/ Marri/ Sheoak Laterite Forest	Overstorey of *Eucalyptus marginata* and *Allocasuarina Fraseriana* wtih a relatively open and diverse shrub layer	ARVS 12	0.1
2	Jarrah/ Sheoak/ *Eucalyptus staeri* Sandy Woodland	Overstorey of *Eucalyptus marginata, Allocasuarina fraseriana, Eucalyptus staeri* and *Corymbia calophylla* with a relatively open and diverse shrub layer	ARVS 13	11.1
3	*Homalospermum firmum*/ *Callistemon glaucus* Peat Thicket	*Melaleuca preissiana, Callistemon glaucus, Homalospermum firmum* and *Banksia littoralis* over *Taxandria parviceps, Taxandria linearis* and *Acacia hastulata*	ARVS 47	5.0
4	*Melaleuca preissiana* Low Woodland	*Melaleuca preissiana* and *Psoralea pinnata** and occasional *Banksia littoralis* over *Taxandria linearis, Taxandria parviceps, Callistemon glaucus, Homalospermum firmum, Empodisma gracillimum* and *Holcus lanatus**	ARVS 49	0.9

Vegetation type	Corresponding ARVS Vegetation Unit name	Vegetation type summary	Corresponding ARVS vegetation unit	Extent (ha)
5	Miscellaneous Drainage Woodland/Shrubland	*Taxandria linearis* and *Acacia hastulata* over *Homalospermum firmum, Callistemon glaucus* and *Boronia molloyae*	ARVS 50	11.7
6	Grazed paddock areas/ agricultural land.	Grazed paddock areas / agricultural land.	NA	112.9
Total				141.7

The condition of vegetation within Lot 5780 varies from Pristine to Completely Degraded in the paddocks (Figure 6, Appendix A). The vegetation within Lot 5780 and adjacent road reserves was found to be in Excellent to Very Good condition (Bio Diverse Solutions, 2019).

3.1.1.3 Threatened and Priority Ecological Communities

Desktop searches by Bio Diverse Solutions (2019) identified potential for two Threatened or Priority Ecological Communities within 15 km of the Site, including:

- Subtropical and Temperate Coastal Salt Marsh – Priority 3 (WA); Vulnerable (EPBC Act)
- Proteaceae Dominated Kwongkan Shrublands of the Southeast Coastal Floristic Province of Western Australia - Priority 3 (WA); Endangered (EPBC Act)

One DBCA-listed Priority Ecological Community (PEC), "*Banksia coccinea* Shrubland/ *Eucalyptus staeri*/ Sheoak Open Woodland (ARVS Community type 14a)", was identified within a 5 km buffer of the Site in the ARVS mapping by Sandiford and Barrett (2010). This mapping identifies small populations to the south and west of the Site. The closest population is located approximately 800 m from the Site on the western side of the railway.

No Threatened or Priority Ecological Communities were identified within the Site during the field survey (Bio Diverse Solutions, 2019).

3.1.1.4 Flora diversity

Bio Diverse Solutions (2019) recorded 141 flora taxa (including subspecies and varieties), representing 41 families and 105 genera during the field survey of Lot 5780 and vegetation within adjacent road reserves on Down Road West and Down Road South. This total comprised 123 native taxa and 19 introduced taxa.

Dominant families recorded within the wider survey area included:

- Fabaceae (24 taxa including five introduced taxa)
- Proteaceae (15 taxa)
- Myrtaceae (13 taxa)
- Poaceae (nine taxa including eight introduced taxa)
- Cyperaceae (eight taxa).

3.1.1.5 Conservation significant flora

Desktop searches by Bio Diverse Solutions (2019) of the EPBC Act Protected Matters and DBCA NatureMap databases, identified potential presence of 58 conservation significant flora within the Site. The likelihood of occurrence for each species has been undertaken by Bio Diverse Solutions (2019) identified 36 species having potentially suitable habitat present within the survey area, including:

- 11 *Biodiversity Conservation Act 2016* (BC Act) priority listed species
- Two Priority 1 species
- Four Priority 2 species
- 10 Priority 3 species
- Nine Priority 4 species.

The spring survey did not identify any EPBC Act, BC Act or State Priority listed flora species within the survey area (Bio Diverse Solutions, 2019). The construction of the AMP is considered unlikely to impact on conservation significant flora species as it has been designed to lie predominantly within previously cleared agricultural land.

3.1.1.6 Introduced species

Nineteen introduced flora taxa were recorded during the field survey (Bio Diverse Solutions, 2019). None are listed as Declared Pests under the *Biosecurity and Management Act 2007* (BAM Act) and/ or as a Weeds of National Significance (WONS).

The introduced taxa are considered environmental weeds and all have been previously recorded in the local area.

3.1.1.7 Dieback

Phytophthora cinnamomi threatens over 2,300 different plant species in Western Australia. Once the pathogen infects the roots, the plant may begin to show symptoms of 'dying back', hence the common name used for the pathogen: Dieback. Dieback has a widespread but discontinuous range in areas with an annual rainfall above 400 mm (Dieback Working Group, 2016).

No site-specific dieback assessments or detailed mapping has been undertaken for the Site. However, the Site is considered to be a dieback susceptible area as it has water gaining areas and lies within the 600 – 800 mm rainfall zone (CALM, 2003), receiving a mean annual rainfall of 925.2 mm (BoM, 2021b). Given the level of previous disturbance it is expected that much of the Site would be dieback infested and/ or uninterpretable.

3.1.1.8 Regional significance – Vegetation association/ complexes

The pre-European vegetation mapping has been adapted and digitised (Shepherd, Beeston, & Hopkins, 2002). The extent of the vegetation associations (remaining uncleared) have been determined from the state-wide vegetation area calculations maintained by the DBCA (latest update March 2019) (GoWA, 2019).

As shown in Table 3, the current extents remaining of these vegetation associations are all greater than 30 per cent (%) of their pre-European extents at various levels (State, IBRA Bioregion, IBRA Subregion and Local Government Area (LGA)).

An assessment of the Department of Primary Industries and Regional Development (DPIRD) indicates that approximately 43 % of land within the local area (5 km buffer of the Site) is comprised of remnant vegetation (GoWA, 2021).

Table 3 Extent of pre-European vegetation associations within the Site

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Current extent remaining in all DBCA managed lands (proportion of current extent %)
Jarrah Forest IBRA Bioregion		4,506,660.26	2,399,838.15	53.25	69.74
51	State: Western Australia	59,085.59	33,057.98	55.95	68.81
	IBRA Bioregion: Jarrah Forest	19,962.06	7,187.97	36.01	32.26
	IBRA Subregion: Southern Jarrah Forest	19,899.01	7,124.92	35.81	31.66
	LGA: City of Albany	17,586.13	5,751.05	32.70	21.54
978	State: Western Australia	53,230.64	18,855.77	35.42	26.75
	IBRA Bioregion: Jarrah Forest	53,016.57	18,751.03	35.37	26.79

Vegetation association	Scale	Pre-European extent (ha)	Current extent (ha)	Remaining (%)	Current extent remaining in all DBCA managed lands (proportion of current extent %)
	IBRA Subregion: Southern Jarrah Forest	53,016.57	18,751.03	35.37	26.79
	LGA: City of Albany	52,154.39	18,719.90	35.89	26.94

3.1.1.9 Other significant vegetation

EPA guidance provides a definition of vegetation that may also be considered significant for reasons other than statutory listing. The vegetation within the Site meets the 'other significant vegetation' criteria for due to historical impact from threatening processes such as land clearing and grazing, Phytophthora dieback, weed invasion and fire (Sandiford & Barrett, 2010).

Bio Diverse Solutions (2019) found that the vegetation types identified within the Site were aligned with ARVS vegetation units 12, 13, 47, 49 and 50. The significance of these vegetation units was assessed by Sandiford and Barret (2010), at a local scale, and has been presented in Table 4. ARVS vegetation units 13, 47 and 49 appear to be restricted to the ARVS area and buffer. These vegetation units are considered likely to have less than 30% of pre-clearing extent remaining (Sandiford & Barrett, 2010).

Table 4 Local significance of ARVS vegetation units

ARVS Vegetation Unit name	ARVS Vegetation Unit Code	ARVS area				Riparian vegetation	Threats	
		Restricted ARVS	Range limit in ARVS	Rarity <1500 ha	< 10% in IUCN Reserves		Phytophthora dieback	Fire sensitive
Jarrah/ Marri/ Sheoak Laterite Forest	12	✓	+/- E		✓		✓	✓
Jarrah/ Marri/ *Eucalyptus staeri* Sandy Woodland	13	✓	+/- E				✓	✓
Homalospermum firmum/ *Callistemon glaucus* Peat Thicket	47					✓	✓	✓
Melaleuca preissiana Low Woodland	49	✓	+/- E	✓	✓	✓		✓
Miscellaneous Drainage Woodland/Shrubland	50	NA	NA	NA	NA	✓	NA	NA

Note: E – eastern extent; NA – not available

3.1.2 Potential impacts

The AMP has the potential to directly and indirectly impact on flora and vegetation during the construction and operational phases. The potential direct impacts include:

- Loss of to 0.928 ha of native vegetation
- The construction of the AMP is considered unlikely to impact on conservation significant flora species as it has been designed to be predominantly located within previously cleared agricultural land.

The construction of the AMP may also result in the following indirect impacts to native vegetation and flora:

- Increased edge-effect pressures and potentially a decline in condition of existing remnant vegetation
- Possible introduction and/ or spread of Dieback and weeds to adjacent vegetation

– Changes to vegetation structure and floristic composition in surrounding areas through altered surface water flows if not adequately managed
– Damage to surrounding vegetation through accidental generation of a bushfire.

The potential indirect impacts from surface water will be mitigated in accordance with procedures outlined in Section 3.3.4 and dust and bushfire mitigated in accordance with procedures outlined in Section 3.4.4.

3.1.3 Assessment of impacts

Construction of the AMP is expected to require the following:

– Clearing of 0.928 ha of Jarrah/ Sheoak/ *Eucalyptus staeri* Sandy Woodland
– Clearing of 0.928 ha of vegetation will not result in any of the mapped vegetation associations being reduced to less than 30 per cent (%) of their pre-European extents at various levels (State, IBRA Bioregion, IBRA Subregion and Local Government Area (LGA)).
– Clearing of 0.928 ha of native vegetation within the Site is unlikely to result in significant cumulative impacts given that approximately 43 % of land within the local area (5 km buffer of the Site) is comprised of remnant vegetation (GoWA, 2021).
– Construction of the AMP is considered unlikely to impact on conservation significant flora species as it has been designed to be predominantly located within previously cleared agricultural land.

3.1.4 Mitigation

Impacts to vegetation and flora will be minimised through the following measures:

– Avoidance through selection of the Site (i.e. clearing of native remnant vegetation was minimised through selection of the Site where the majority of land has been previously disturbed by agriculture).
– Development of an Environmental Management Plan (EMP) including Protected Exclusion Area Management Plan addressing management responsibilities, revegetation, vegetation condition and wetland water quality monitoring during construction and ongoing operation of the AMP.
– A Development Exclusion Buffer will be established to provide a 50 m wide buffer between the AMP activities and the Protected Exclusion Area (Figure 2, Appendix A).
– Revegetation, where required, of the Protected Exclusion Area with suitable native species, identified within the CCW including, ARVS Vegetation Units 13, 47 and 49.

3.1.5 Predicted outcomes

The residual impact of construction of the AMP is expected to be loss of up to 0.928 ha of:

– Jarrah/ Sheoak/ *Eucalyptus staeri* Sandy Woodland
– Clearing of 0.928 ha of native vegetation within the Site will not result in any of the mapped vegetation associations being reduced to less than 30 per cent (%) of their pre-European extents at various levels (State, IBRA Bioregion, IBRA Subregion and Local Government Area (LGA)).
– Clearing of 0.928 ha of native vegetation within the Site is unlikely to result in significant cumulative impacts given that approximately 43 % of land within the local area (5 km buffer of the Site) is comprised of remnant vegetation (GoWA, 2021).

3.2 Terrestrial fauna

3.2.1 Receiving environment

3.2.1.1 Fauna studies

A desktop assessment and initial site walkover was undertaken as a component of the initial AMP Site Feasibility Study (GHD, 2018).

A Level 1 Fauna Survey was completed for the Site in spring 2018 by Bio Diverse Solutions (2019). This survey included targeted assessment for fauna of conservation significance, listed under the BC Act and EPBC Act, outlined in Table 5.

Table 5 Targeted fauna species of conservation significance

Scientific name	Common name	BC Act status	EPBC Act status
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo	Vulnerable (VU)	VU
Calyptorhynchus baudinii	Baudin's Cockatoo	Endangered (EN)	EN
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	EN
Dasyurus geoffroii	Chuditch	VU	VU
Hydromys chrysogaster	Water Rat	Priority 4 (P4)	-
Falsistrellus mackenziei	Western False Pipistrelle	P4	-
Isoodon obesulus fusciventer	Quenda	P4	-
Notamacropus irma	Western Brush Wallaby	P4	-
Phascogale tapoatafa wambenger	Brush-tailed Phascogale	Conservation Dependent (CD)	-
Pseudocheirus occidentalis	Western Ringtail Possum	Critically Endangered (CR)	CR
Setonix brachyurus	Quokka	VU	VU
Zephyrarchaea mainae	Western Arachnid Spider	VU	-

3.2.1.2 Fauna habitat and value

The Bio Diverse Solutions (2019) field survey identified the following key aspects with regard to fauna habitat value within the Site (Figure 8, Appendix A):

- 112.8 ha (80%) of the Site has been cleared for agricultural purposes (highly modified/ cleared)
- The forest (Vegetation Type 1) and woodland (Vegetation Type 2) habitat types identified suitable foraging and potential Black Cockatoo breeding trees with a DBH of > 500 mm (Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo and Baudin's Cockatoo)
- The vegetation within the creek system (Vegetation Types 3, 4 and 5) has high habitat value for Quenda and Western Brush Wallaby
- There is suitable habitat present within the creek system for *Galaxiella munda* (Western Mud Minnow), *Galaxiella nigrostriata* (Black-stripe Minnow) (Endangered) and *Lepidogalaxis salamandroides* (Salamanderfish).

3.2.1.3 Ecological linkages

The Site lies within the "Marbelup Link" potential vegetation corridor and forms an important link connecting remnant vegetation to the northwest to Mount Lindsay and also connecting to the "Coastal Corridor" (Bio Diverse Solutions, 2019).

3.2.1.4 Fauna diversity

Bio Diverse Solutions (2019) completed a desktop review of relevant databases within 15 km of the survey area identified an inventory of 578 fauna species.

Forty fauna species were identified during the field survey including eight mammals (five native and three non-native), 29 birds, one reptile and two amphibians (Bio Diverse Solutions, 2019).

3.2.1.5 Conservation significant fauna

Desktop searches, undertaken by Bio Diverse Solutions (2019), of the EPBC Act Protected Matters and DBCA NatureMap databases, identified potential presence of 70 conservation significant flora within the Site. The likelihood of occurrence for each species has been undertaken by Bio Diverse Solution (2019) identified 21 species having potentially suitable habitat present within the survey area, including:

- 13 species listed under the EPBC Act and/or the *Biodiversity Conservation Act 2016* (BC Act)
- Two migratory birds protected under international agreement (Schedule 5)
- Six DBCA Priority listed species.

Four conservation significant species were directly and indirectly observed within the broader survey area by Bio Diverse Solutions (2019), including:

- Baudin's Cockatoo (*Calyptohynchus baudinii*) (Endangered)
- Forest Red-tailed Black Cockatoo (*Calyptohynchus banksia naso*) (Vulnerable)
- Western Brush Wallaby (*Notamacropus irma*) (Priority 4)
- Southern Brown Bandicoot, Quenda (Isoodon fusciventer) (Priority 4).

3.2.1.6 Black Cockatoo species

The Site provides areas of suitable foraging habitat with potential tree feed species for each of the three Black Cockatoo species (Carnaby's Cockatoo, Forest Red-tailed Black Cockatoo and Baudin's Cockatoo) present (Bio Diverse Solutions, 2019).

Evidence of feeding signs by Baudin's Cockatoo and Forest Red-tailed Black Cockatoo was recorded within the survey area. However, as the number of Black Cockatoo feeding sites within the survey area was relatively low it was considered by Bio Diverse Solutions (2019) that whilst the survey area contained high value foraging habitat it is not currently a favoured feeding area.

The field survey identified 678 potential Black Cockatoo breeding trees within the survey area, of which 92 had hollows. Of the existing hollows, based on their dimensions, 11 are either already suitable or have potential to develop into Black Cockatoo hollows (Bio Diverse Solutions, 2019).

3.2.1.7 Western Brush Wallaby

Western Brush Wallaby individuals were not recorded within the Site during the field survey undertaken by Bio Diverse Solutions (2019). However, this species is considered 'Likely to Occur' within the survey area, as defined runnels were observed within the creek line vegetation and scats detected in the creek line vegetation and stand of paddock trees in the eastern portion of Lot 5780.

3.2.1.8 Southern Brown Bandicoot, Quenda

Southern Brown Bandicoot individuals were not recorded within the Site during the field survey undertaken by Bio Diverse Solutions (2019). However, this species is considered 'Likely to Occur' within the Site as well-established runnels and diggings were observed in the western remnant vegetation and the creek line.

3.2.2 Potential impacts

The construction of the AMP will result in the direct loss of fauna habitat through clearing including:

- 0.928 ha of suitable Black Cockatoo foraging habitat
- 55 potential Black Cockatoo breeding trees with a DBH of > 500 mm, of which seven have hollows. The trees with hollows are located within paddocks (scattered remnant trees) and there was no clear evidence of use by Black Cockatoos for breeding.
- 0.928 ha of suitable habitat for Western Brush Wallaby
- 0.928 ha of suitable habitat for Southern Brown Bandicoot.

Other potential direct impacts to fauna during construction and operations may include death or displacement of native fauna species from vehicle movements.

Construction of the AMP may also result in incremental loss of fauna habitat such as fragmentation, barrier effects and edge effects (indirect impacts).

3.2.3 Assessment of impacts

3.2.3.1 Clearing and loss of habitat

Construction of the AMP may result in displacement, injury and death of native fauna species due to clearing of habitat (construction works and vehicle movements) however given the small amount and location of clearing this is unlikely to have a significant impact on fauna species.

3.2.3.2 Displacement of conservation significant fauna

3.2.3.2.1 Black cockatoo species

Construction of the AMP is considered to have a low risk of significant impacts on Black Cockatoo species based on the "*EPBC Act referral guidelines for three threatened black cockatoo species"* (SEWPAC, 2012) and the findings of the field survey (Bio Diverse Solutions, 2019) including:

- No known nesting trees are present with the proposed clearing area
- Less than 1 ha of Black Cockatoo foraging habitat will be cleared
- Whilst the proposed clearing includes potential Black Cockatoo foraging habitat the number of feeding sites across the survey area was relatively low and is likely to indicate that the Site is not currently a favoured feeding area
- The proposed clearing will not create a gap of greater than 4 km between patches of black cockatoo habitat (breeding, foraging or roosting)
- The proposed clearing equates to approximately 8% of potential Black Cockatoo breeding trees recorded within the survey area.

3.2.3.2.2 Western Brush Wallaby

Native vegetation proposed to be cleared within the Site (0.928 ha) is considered to be potential habitat for Western Brush Wallaby. However, no clearing is proposed in the creekline and only partial clearing of stands of paddock trees in the eastern portion of Lot 5780 therefore it is considered unlikely that construction of the AMP will have a significant impact on this species.

3.2.3.2.3 Southern Brown Bandicoot, Quenda

Native vegetation proposed to be cleared within the Site (0.928 ha) is considered to be potential habitat for Southern Brown Bandicoot. However, no clearing is proposed in the remnant vegetation in the western portion of Lot 5780 or in the creekline therefore it is considered unlikely that construction of the AMP will have a significant impact on this species.

3.2.3.3 Noise, vibration and dust

There will be an increased in secondary impacts on fauna such as noise, vibration and dust during construction and operation of the AMP. Increased noise, vibration and dust may result in fauna avoiding the area, however, this is unlikely to have a permanent impact on fauna species in the area as the construction will be temporary and motor sports events will be periodic.

3.2.3.4 Vehicle strike

Construction and operation of the AMP will result in an increase in traffic/ vehicle movements and therefore may result in a greater risk of fauna strike from vehicle movements. However, this is considered unlikely to have a significant impact on fauna species in the area as the construction will be temporary and motor sports events will be periodic.

3.2.3.5 Habitat fragmentation

Incremental reduction in fauna habitat has restricted the distribution of a number of conservation significant species known to occur within the Site. As habitat is cleared, patch sizes decrease and the impact of 'edge effect' increases with likely introduction of weeds and dieback, ultimately changing the species composition of the vegetation community and reducing suitability of habitat for local fauna species.

The Site has been largely cleared in the past for agriculture and general industry. This has resulted in previous fragmentation of both terrestrial and riparian/ wetland vegetation and ecological linkages, thereby reducing connectivity of fauna habitat.

It is considered unlikely that construction of the AMP will exacerbate the impact of fragmentation in the local area as proposed clearing will be limited to partial clearing of stands of paddock trees and vegetation on the edge of previously cleared paddocks. Vegetation will be retained in the western portion of Lot 5780 and the creek line.

3.2.4 Mitigation

Impacts on fauna will be minimised through the following measures:

– Avoidance through site selection and design within Lot 5780 which is largely situated in previously cleared paddocks and does not further fragment remnant vegetation patches.
– Clearing of fauna habitat has also been minimised through site selection within Lot 5780 and includes only clearing of stands of paddock trees and vegetation on the edge of previously cleared paddocks.
– There will be no storage of materials or parking under trees to be retained.
– Development of an EMP to define techniques to minimise risks to fauna and fauna habitat and provide monitoring during construction and operation of the AMP including:
    - Protected Exclusion Area Management Plan addressing management responsibilities, revegetation, vegetation condition and wetland water quality monitoring during construction and ongoing operation of the AMP.
– A Development Exclusion Buffer will be established to provide a 50 m wide buffer between the AMP activities and the Protected Exclusion Area (Figure 2, Appendix A).

3.2.5 Predicted outcomes

The predicted outcomes for fauna impacted by construction of the AMP include:

– Direct loss of 0.928 ha of Black Cockatoo habitat
– 55 potential Black Cockatoo breeding trees with a DBH of > 500 mm, of which seven have hollows. The trees with hollows are located within paddocks (scattered remnant trees) and there was no clear evidence of use by Black Cockatoos for breeding.

Construction of the AMP is considered to have a low risk of significant impacts on Black Cockatoo species and based on the mitigation measures above is unlikely to have significant residual impact on other fauna species.

3.3 Inland waters

3.3.1 Receiving environment

3.3.1.1 Topography

The surface elevation of the Site ranges from approximately 41 m AHD to 70 m AHD (Figure 8, Appendix A). The lowest elevation is on the southern boundary and extends through the centre of the Site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the Site (GoWA, 2021).

3.3.1.2 Regional geology

Reference to the 1:50,000 Environmental Geology series map (Albany sheet) and the 1:250,000 Geological Series map (Mt Barker – Albany sheet) indicates the Site is underlain by Cainozoic sand of colluvial origin – "*Czs: Sand, - white, grey or brown, commonly contains iron pisoliths and overlies laterite"* on the slopes and within the low lying areas of the Marbelup Brook "*QA – Clay, silt, sand and gravel in watercourses*" (Figure 9, Appendix A).

The sand is described as pale grey, fine to coarse, angular to sub-rounded quartz that is loose and moderately sorted and contains occasional pebbles of laterite. The thickness of the sand unit is not indicated on the maps, however the 1:250,000 map sheet indicates sand unit generally overlays laterite.

3.3.1.3 Local geology

The local geology is further delineated by DPIRD Soil Landscape Mapping identified in Table 6 and presented in Figure 10 (Appendix A).

Table 6 Soil map units within the Site (GoWA, 2021)

Map unit symbol	Name	Landform	Geology	Soil
242KgDMc	Dempster Crest phase	Broad convex crusts of sandy and lateritic spurs and ridges	Deeply weathered siltstone	Duplex sandy gravels; Grey deep sandy duplexes; Pale deep sand; Shallow gravels
242KgS7f	Minor Valleys S7 floor phase	Foot slopes and swampy valley floors of minor valleys	Colluvial and alluvial deposits over weathered sedimentary rocks	Wet and semi-wet soils; Pale deep sands; Grey deep sandy duplexes
242KgS7h	Minor Valleys S7 slope phase	Side slopes of minor valleys	Colluvium sedimentary rocks	Pale deep sands; Grey deep sandy duplexes
242ReDMc	Dempster Crest phase	Elongate crests	No information recorded	Sands and laterite

Site investigations were completed by Great Southern Geotechnics across the site in March 2021 to assess soil types and profiles (0 – 2.5 mBGL) and in-situ permeability (Appendix K). Eight test pits were completed, with soil types typically in agreement with DPIRD Soil Landscape Mapping. Gravels were identified on the western slope in the vicinity of the 4WD Driver Training and ATV Area, and deep sands present on the valley slopes and duplex soils in the valley floors.

In-situ soil permeability testing was completed for test pit locations TP4 to TP8, with saturated hydraulic conductivity ranging between 0.41 m/day (TP8) and 3.29 m/day (TP6 and TP7). Due to site conditions permeability testing was completed in the laboratory for TP3 for soil between 160 mm to 2100 mm BGL with a result of 2.7×10^{-11} (Appendix K).

The locations of the test pits are presented in Figure 11 (Appendix A), with a summary provided in Table 7 and soil logs and soil permeability provided in Appendix K.

Table 7 Summary of soil profiles

Test pit locations	Soil profile description	Water table intercepted Yes/No
TP1, TP2	Topsoil over SANDY gravel over sandy CLAY	No
TP3	Gravelly SAND with silt over FILL (sandy GRAVEL with clay) over SAND with silt	No
TP4, TP6	Topsoil over SAND with silt	No
TP7	Topsoil over SAND with silt over sandy GRAVEL over gravelly SAND with silt	No
TP5, TP8	Topsoil over SAND with silt over gravelly SAND with silt	No

3.3.1.4 Acid sulfate soil risk assessment

A review of the Department of Water and Environmental Regulation (DWER) Acid Sulfate Soil (ASS) risk mapping for Albany-Torbay indicates the Site is located outside of the boundary of this dataset. Tributaries of Marbelup Brook located approximately 750 m to the south of the Site are mapped within areas of "*Moderate to Low risk*" of ASS occurring within 3 m of the natural soil surface (GoWA, 2021). No "High to moderate ASS risk" areas appear to be mapped within the broader site setting further supporting the expected low risk of ASS onsite occurring (within 3 m of the natural soil surface).

However, given that tributaries of Marbelup Brook located approximately 750 m to the south of the site are mapped as "Moderate to Low risk" of ASS occurring (within 3 m of the natural soil surface), GHD has inferred that where these tributaries of Marbelup Brook extend into the site that they would also be considered to represent the same level of ASS risk (Figure 11, Appendix A). This is also consistent with the more broadly mapped risk areas where there are obvious low lying drainage lines, creeks and tributaries.

To more accurately inform the ASS risk onsite, a preliminary ASS investigation was completed as part of the onsite geotechnical investigation undertaken by Great Southern Geotechnics on the 25/03/2021. Samples were collected from eight test pits at every 500 mm depths from surface to end of hole (between 2 and 2.5 mBGL). The samples were frozen and then sent to NATA accredited laboratory Eurofins/MGT.

As per requirements of the DWER guidelines "*Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes*" (DER, 2015), all 48 samples were analysed for pH_F and pH_{FOX}. Of these, eight samples (approximately 20%) were selected for further laboratory analysis comprising Chromium Reducible Suite (S_{CR}) and Total Peroxide Acidity (TPA) analysis. Analysed samples were selected on the basis of the field test results, and to provide a good representation of the different geological units encountered and different depths.

A summary of pH screening results, laboratory Certificates of Analysis and chain of custody documentation are included in Appendix L.

Overall, the screening results indicated the following:

– pH_F values ranged between 5.5 and 8 (average of 6.3).
– pH_{FOX} values ranged between 3.4 and 6.4 (average of 5.0). Only one results out of the 48 samples was less than the ASS indicator criterion (pH 4) and this was recorded at TP02_0 m (surface)
– ΔpH, defined as pH_F minus pH_{FOX}, ranged between 0.5 and 2.4 (average of 1.2).
– The majority of the observed reaction rates were noted as 'No reaction to slight' (4) followed by 'moderate' (26) and 'strong' (18).

The field test results did not provide a clear indication of Actual ASS or Potential ASS to be present on site.

Results of the ASS confirmatory laboratory testing are summarised in Table 1, Appendix L and include the following:

– Out of the eight primary samples analysed for Titratable Actual Acid (TAA), three samples (TP02_0 m, TP06_2.0 m and TP08_2.5 m) recorded concentrations above the DWER ASS action criteria of 18 mol H^+/tonne (equivalent 0.03 %S).
– There were no recorded concentrations of $S_{CR,}$ above the laboratory limit of reporting (LOR) of <3 mol H^+/tonne.
– Titratable Peroxide Acidity (TPA) results were noted to be >18 mol H^+/tonne (equivalent 0.03 %S) for four of the eight samples analysed (TP02_0 m, TP04_0.5 m, TP06_2.0 m and TP08_2.5 m). The calculated Titratable Sulfidic Acidity (TSA) (i.e. TPA-TAA) was also >18 mol H^+/tonne for these four samples.
– Acid Neutralising Capacity (ANC) is a measure of the soils natural ability to buffer acidity and resist the lowering of the soil pH. ANC analysis was not completed as part of the acid-based accounting given that samples recorded pH_{KCL} values less than 6.5.

Whilst inorganic sulfidic acidity sources were not observed during the investigation (i.e. no S_{CR} concentrations measured), other forms of acidity (not necessarily sulfidic based) were present through actual (existing) acidity (as represented by low pH_{KCL} and TAA concentrations) and potential acidity (as represented by the calculated TSA concentrations). The application of the TSA results within acid-based accounting is recommended in the DWER ASS guidelines (DER 2015a) for situations where TSA is significantly higher than S_{CR}. DER (2015a) recommends that the net acidity calculation should substitute the S_{CR} value for the TSA i.e. Net Acidity = TSA + TAA – ANC.

Through substituting the S_{CR} concentrations for TSA concentrations into the net acidity calculation (i.e. using the TPA results), four out of the eight samples analysed exceed the DWER action criteria (18 mol H^+/tonne). Whilst the acidity measured within the TSA value is not considered to be rapidly released into the environment in the short term, the TSA values should not be disregarded from a long-term management perspective.

3.3.1.5 Groundwater and surface water

Desktop searches of the DWER hydrology layers (GoWA, 2021) were undertaken and are summarised in Table 8.

Table 8 DWER data queries within the Site

Aspect	Details	Result
Public Drinking Water Source Areas (PDWSA)	PDWSA is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the *Metropolitan Water Supply, Sewage and Drainage Act 1909* or the *Country Area Water Supply Act 1947*.	Site lies within the Priority 2 Marbelup Brook Catchment Area (Figure 12, Appendix A).
Groundwater Areas	Groundwater areas proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI).	Site lies within Albany Groundwater Area (Figure 12, Appendix A).
Surface Water Areas	Surface water areas proclaimed under the RIWI Act 1914.	None present.
Irrigation District	Irrigation Districts proclaimed under the RIWI Act 1914.	None present.
Rivers	Rivers proclaimed under the RIWI Act 1914.	None present.
Waterways Management Areas	Areas proclaimed under the *Waterway Conservation Act 1976*.	None present within the Site, however the Albany Waterways Management Area is located approx. 800 m to the north.
Clearing Control Catchments	*Country Area Water Supply Act 1947* Part 2A.	None present.

3.3.1.5.1 Groundwater

On a regional scale, the 250K Map Series – Hydrogeology identifies a "*sedimentary aquifer within intergranular porosity – extensive aquifers, major groundwater resources*" underlying the Site (DoW, 2002). Groundwater salinity in the local area is in the range of 500 – 1000 mg/L, which is considered to be marginal for productive uses (GoWA, 2021).

Bio Diverse Solutions (2018) installed 12 shallow monitoring bores within the Site. Groundwater was identified in boreholes drilled in lower lying areas, close to the watercourse which bisects the Site. When intersected the groundwater was generally observed to be between 0.0 m and 1.0 m below the existing surface. The information at this stage is limited by the shallow nature of the investigation (approx. 2 m depth), as summarised in Table 9.

Table 9 Site bores and groundwater levels

Bore ID	Easting (m)	Northing (m)	Ground level – est. RL (mAHD)	Depth to Groundwater (m BGL) Feb 2018	Depth to Groundwater (m BGL) May 2018	Depth to Groundwater (m BGL) Sep 2018
SB01	567179.967	6133615.868	58.4	> 2.0	> 2.0	> 2.0
SB02	567404.995	6133889.541	49.6	> 2.0	> 2.0	> 2.0
SB03	567519.139	6134401.422	56.8	> 2.0	> 2.0	1.21
SB04	567700.649	6134179.907	48.2	> 2.0	0.91	0.30
SB05 (not surveyed)	568056.306	6134636.37	60.0	> 2.0	> 2.0	> 2.0
SB06	568131.287	6134478.244	53.6	0.87	0.70	0.00
SB07	567939.672	6134264.362	51.6	0.64	0.54	0.44
SB08	568308.576	6134637.482	56.5	> 2.0	1.55	0.18
SB09	568032.238	6134141.798	50.3	0.66	0.57	0.44
SB10	567886.921	6133756.724	62.7	> 2.0	> 2.0	> 2.0
SB11 (not surveyed)	568314.202	6134267.661	68.6	> 2.0	> 2.0	> 2.0
SB12	568474.386	6134781.396	60.2	> 2.0	> 2.0	1.04

Notes: BGL – below ground level - Where results shown as "> 2.0", this means the groundwater table was not intersected by the shallow groundwater monitoring bore (being only 2 m deep)

A search of DWER's Water Information Reporting online system for available bore data (within a 3 km radius) revealed no other relevant time series data.

A conceptual model was developed for the site to gain an initial understanding of surface and groundwater water flows and potential linkages. The development of this model was limited to the first round of shallow bore data that was made available. Soil landscape mapping and regional geology mapping were used to infer geological units and soil types in the absence of deeper borehole data. Cross sections showing the conceptual site geology and flow directions are shown below in Plate 1 (across the valley) and Plate 2 (down the central waterway).

The following key hydrogeological features are noted in the conceptual model:

- The groundwater levels observed in the shallow bores indicate that groundwater is present in the lower lying areas nearer the creek and will be most likely be supplying the creek with groundwater inflow.
- The groundwater levels and gradient, inferred from topography, supports that groundwater discharges into the creek.
- Shallow/perched groundwater may discharge and resurface via sandier layers that sit on top of more impermeable lateritic, coffee rock or clay layers; especially when there is significant slope.

The discharging groundwater is either expressed as surface water or migrates within the deeper more permeable deposits.

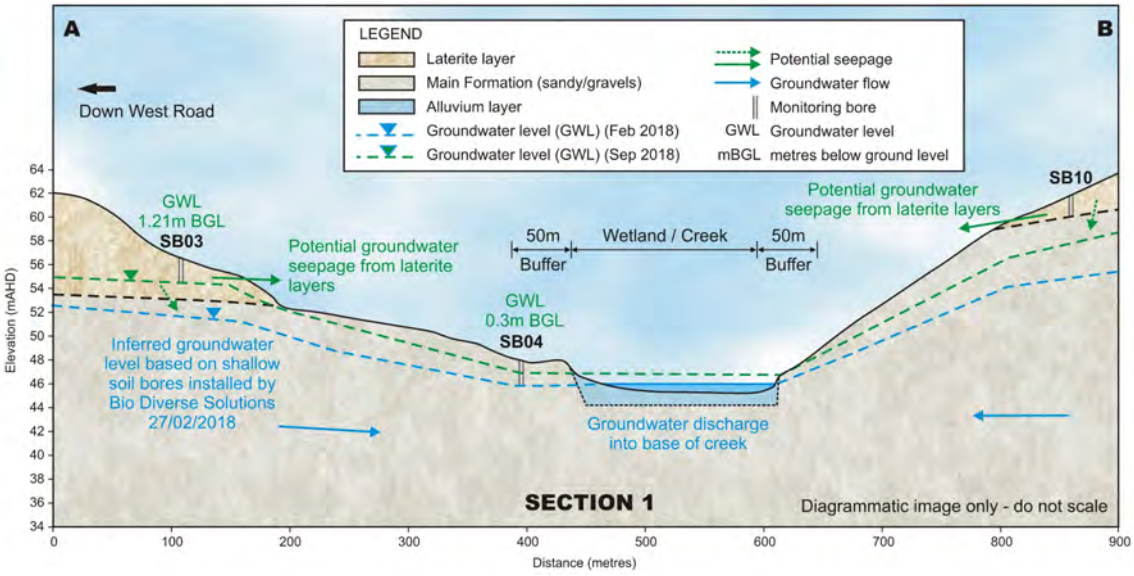


Plate 1 *Preliminary hydrogeological section 1 (A-B)*

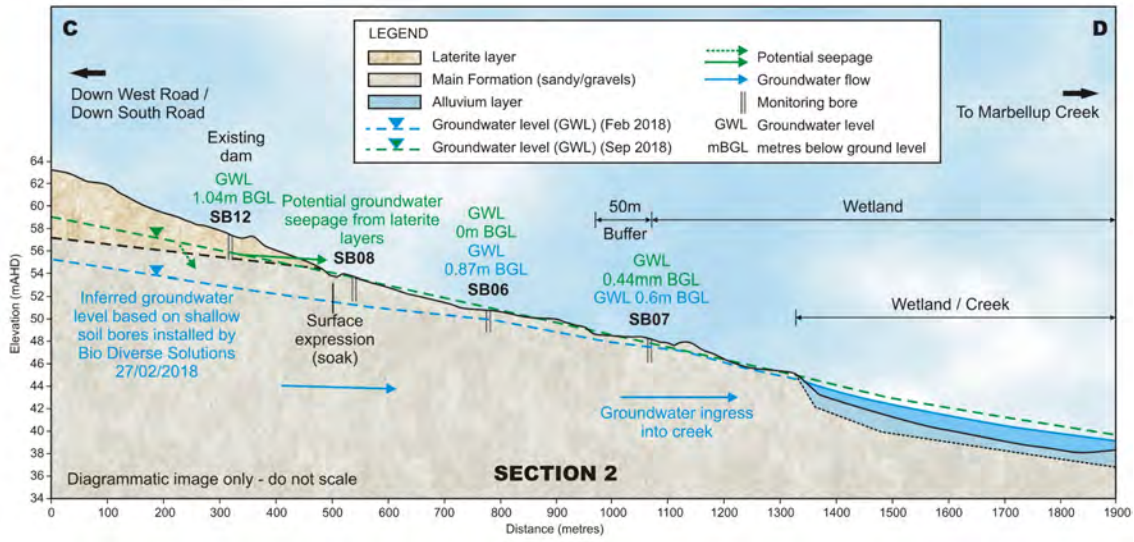


Plate 2 *Preliminary hydrogeological section 2 (C-D)*

3.3.1.5.2 Surface water and drainage

The Site lies in the Marbelup Brook sub-catchment which forms part of the wider Torbay Inlet Catchment in the Denmark Coast Basin within the South West Division (GoWA, 2021).

The entire Site and surrounds are located within the Marbelup Brook Surface Water Allocation Sub Area (SWASA), which is a sub area of the Albany Coast Surface Water Allocation Area (SWAA) (GoWA, 2021).

An unnamed water course is present within the Site, draining from the north-east and centre of the Site to the south across the southern boundary to the Marbelup Brook, which ultimately drains to Lake Powell. However, the natural drainage of the lower part of Marbelup Brook catchment has been modified which diverts the lower part of Marbelup Brook away from Lake Powell to the Torbay Inlet (DoW, 2007).

During the site visit the watercourse was observed to be in a modified state, with cattle currently having access to the watercourse. Erosion was evident, particularly in the eastern extent of the watercourse. This area was also mostly devoid of native vegetation, with the exception of some sedges (*Juncus* spp). The western section of the watercourse contains native shrubs/ sedges and had a defined bed/ banks.

3.3.1.6 Wetlands

3.3.1.6.1 International and nationally important wetlands

Desktop searches did not identify any internationally important (Ramsar) or Nationally Important listed wetlands within 5 km of the Site (GoWA, 2021).

3.3.1.6.2 South Coast Significant Wetlands

The unnamed water course located within the Site is a tributary of Marbelup Brook and is a Conservation Class wetland (Figure 11, Appendix A) (GoWA, 2021).

3.3.1.7 Public Drinking Water Source Area (PDWSA)

The Site is within a Priority 2 area of the Marbelup Brook PDWSA (Figure 12, Appendix A).

3.3.1.8 Contamination

A review of the DWER Contaminated Sites Database undertaken in August 2018 indicates there are no sites currently classified under the *Contaminated Sites Act 2003*, within 5 km of the Site (including the Site itself) (DWER, 2018).

It is understood that the Site has been used for agricultural/ grazing purposes since clearing of native vegetation, therefore the potential contaminating activities that have been observed from various site visits is in relation to the storage of farm/ plantation related waste materials and stockpiles of construction and demolition wastes.

All waste and stockpiled material will be removed during the construction phase and these materials will be validated and removed offsite to an appropriately licenced facility prior to the commencement of the development.

An unexpected finds protocol is included in the CMP to mitigate the risk associated with any unexpected finds with regards to contamination during construction.

3.3.2 Potential impacts

The potential direct impacts on inland waters during construction and operation of the AMP may include contamination of surface water (Marbelup Flats CCW) and/or groundwater (P2 Marbelup Brook PDWSA) as a result of the following potential impacts as outlined in DWER guidelines for "*Motor Sport Facilities Near Sensitive Waters"* (DoW, 2007):

- *Clearing of native vegetation*
- *Leaks or spills of chemicals or petroleum hydrocarbons from storage areas, mechanical servicing areas and on the racetracks*
- *Turbid or contaminated stormwater runoff*
- *Inappropriate containment or disposal of solid waste and wastewater from mechanical servicing and washdown areas*
- *Amenities for the congregation of large numbers of people.*

Construction activities may also impact on ASS present on site resulting in potential detrimental impact on soil, surface water and groundwater quality.

The potential indirect impacts on inland waters during construction and operation of the AMP include changes to vegetation structure and fauna habitat with in the CCW as a result of changes to hydrological regimes.

3.3.3 Assessment of impacts

3.3.3.1 Erosion and sedimentation

Clearing of vegetation, construction earthworks and altered surface water regimes have the potential to destabilise soils and, if unmanaged, result in erosion of the Site and sedimentation of surrounding vegetation, wetlands and ultimately Marbelup Brook.

3.3.3.2 Contamination of surface water and groundwater

Contamination of surface water and groundwater may result during the construction phase as a result of the unintended release of environmentally hazardous materials during onsite works (construction materials and hazardous materials stored onsite), runoff during stormwater events and contaminated sediment or settled dust.

Contaminated surface water and groundwater has the potential to impact sensitive receptors including neighbouring properties, vegetation, fauna, wetlands and waterways. Impacts can also manifest downstream as loss of benthic habitat, fish deaths and damage to vegetation health. Downstream sensitive receptors include the CCW – Marbelup Flats and Marbelup Brook.

Surface and/ or groundwater may also become contaminated through the exposure of ASS during construction (excavation). ASS disturbance may have a range of impacts including enhanced phosphorus leaching, death of vegetation irrigated with affected water, the smothering of benthic aquatic animals by the precipitation of iron, and metal bioaccumulation in aquatic plants and animals. However, based on the ASS assessments to date (refer to Section 0), inorganic sulfidic sources capable of rapid acid release upon disturbance were not observed. Other, more slow releasing acidity sources were observed in the ASS assessment and will require management if disturbed in volumes greater than 100 m^3.

Motor sports facilities also have the potential to contaminate surface water and groundwater during operational activities including hydrocarbons leaking from storage areas, race tracks and servicing areas, if not appropriately managed (DoW, 2007).

3.3.3.3 Risk assessment of PDWSA

A risk assessment for the proposed development was undertaken in accordance with the *Australian Drinking Water Guidelines* (ADWG) (NHMRC, NRMMC, 2011) and *Water Quality Protection Note 77: Risk Assessment of Public Drinking Water Source Areas* (DoE, 2005). The purpose of the risk assessment is to understand the hazards and events that could compromise drinking water quality and identify preventative measures to safeguard the future drinking water source.

The risk assessment identified that there is a Low to Medium risk of impact by construction and operation of the AMP on the P2 Marbelup Brook PDWSA (GHD, 2019).

3.3.4 Mitigation

Impacts of construction of the AMP on the Marbelup Flats CCW and P2 Marbelup Brook PDWSA will be minimised through implementation of a Construction Management Plan (Appendix J). A site-specific Construction Environmental Management Plan (CEMP) will also be developed and implemented by the appointed contractor.

Mitigation measures have been undertaken during the design phase of the AMP, as per the requirements of the DWER guideline (DoW, 2007) for "*Motor Sport Facilities Near Sensitive Waters",* so as to achieve a 50 m buffer around the Protected Exclusion Zone, refuelling and servicing areas will be 200 m from the wetland area and a minimum vertical separation distance of two m to the maximum groundwater table.

Neutralisation treatment and validation of soils will be required for silty sand soil units disturbed in the proximity of the watercourse area given that there are exceedances of the DWER action criteria (coarse textured soils) and if the proposed disturbance of greater than 100 m^3 of soil. An ASS management plan is required (in accordance with DWER guidelines) to enable to the effective excavation, treatment and disposal/reuse of the materials during construction works.

Soil excavations should only occur during the periods of the year where groundwater is at its lowest point (i.e. outside of winter and post-winter periods) to eliminate the need for temporarily lowering the groundwater table (dewatering). If dewatering is determined to be required, then site specific dewatering risk assessment, management strategies and criteria are required to be developed, approved and implemented.

Impacts from operation of the Site will be mitigated through implementation of this EMP including the following:

– Protected Exclusion Area Management Plan addressing management responsibilities, revegetation, vegetation condition and wetland water quality monitoring (Appendix C)
– A Development Exclusion Buffer will be established to provide a 50 m wide buffer between the AMP activities and the vegetation and CCW within the Protected Exclusion Area (Figure 2, Appendix A)
– Implement a Water Management Plan during detail design and development approval for construction and operation of the site which outlines mitigation measures for protection of surface water and groundwater quality and maintenance of predevelopment stormwater quantities (Appendix D)
– Maintain a minimum vertical separation distance of two metres to the maximum (wet season) groundwater table as per DWER guidelines (DoW, 2007)
– Hydrocarbon Management Plan (Appendix E)
– Waste Management Plan (Appendix F).

3.3.5 Predicted outcomes

Given the mitigation measures outlined above no significant residual impacts are expected for this aspect and the proposed AMP meets the EPA objective to maintain the hydrological regimes and quality of groundwater and surface water so that environmental values are protected.

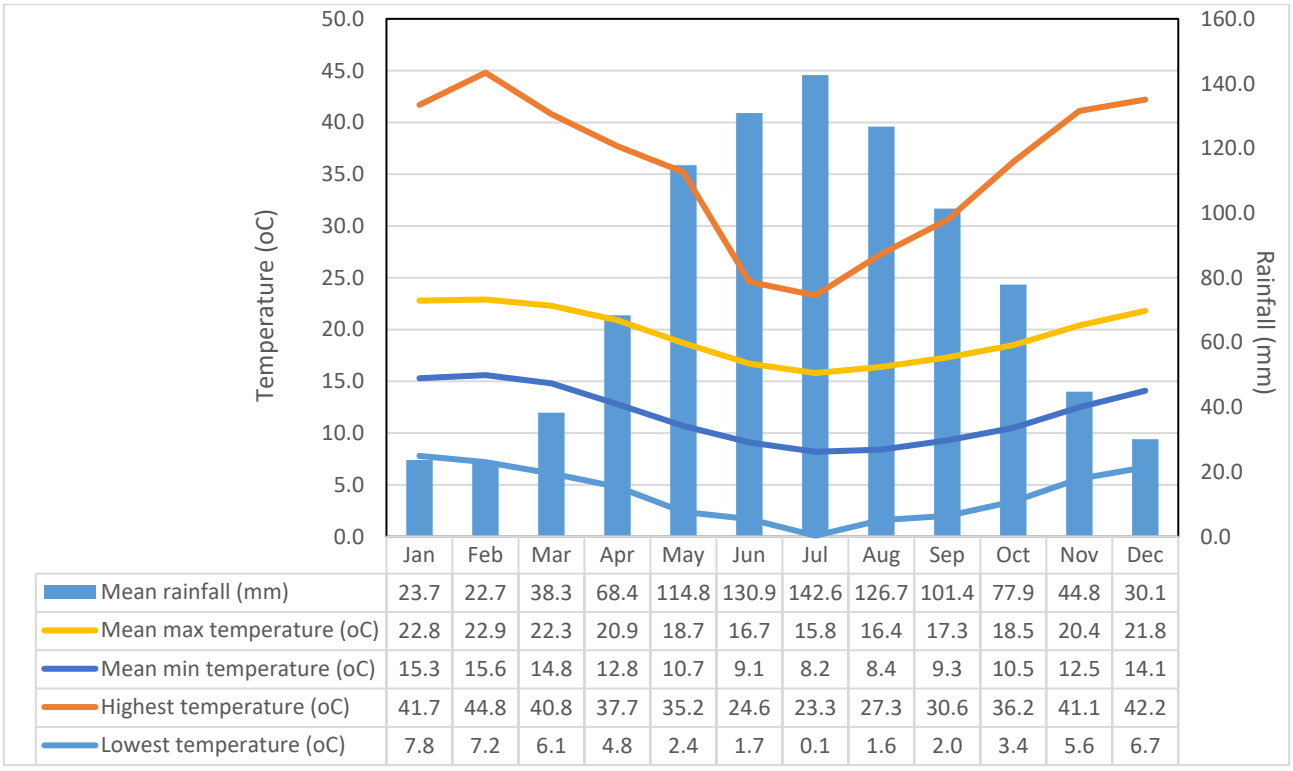
3.4 Air quality

3.4.1 Receiving environment

3.4.1.1 Climate

Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station is Albany weather station (Site number 9500). This station records temperature, rainfall, relative humidity, wind speed and direction and has data available dating back to 1877. (BoM, 2021b).

Plate 3 illustrates recorded average monthly meteorological data for the Albany (Site number 9500) weather station for years 1877 to 2020. Temperatures range from a mean maximum of 22.9 ºC in summer and drop to a mean maximum of 15.8 ºC in winter. Mean minimum temperatures follow a similar trend, reaching 15.6 ºC in summer and 8.2 ºC in winter. Rainfall is low throughout the summer months and peaks in July, with a monthly average of 142.6 mm. The mean annual rainfall is 925.2 mm, with approximately 103.1 rain days a year. Relative humidity at Albany reflects the Mediterranean climate, demonstrating drier summers and a comparatively high relative humidity of 82 percent in the morning in winter (BoM, 2021b).



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	23.7	22.7	38.3	68.4	114.8	130.9	142.6	126.7	101.4	77.9	44.8	30.1
Mean max temperature (oC)	22.8	22.9	22.3	20.9	18.7	16.7	15.8	16.4	17.3	18.5	20.4	21.8
Mean min temperature (oC)	15.3	15.6	14.8	12.8	10.7	9.1	8.2	8.4	9.3	10.5	12.5	14.1
Highest temperature (oC)	41.7	44.8	40.8	37.7	35.2	24.6	23.3	27.3	30.6	36.2	41.1	42.2
Lowest temperature (oC)	7.8	7.2	6.1	4.8	2.4	1.7	0.1	1.6	2.0	3.4	5.6	6.7

Plate 3 ***Mean rainfall and temperatures at the Albany weather station (Site No. 9500) (BoM, 2021b)***

3.4.1.2 Sensitive receptors

The AMP is located in a rural area and no sensitive air quality receptors are expected. The impacts resulting to air quality are expected to be minor and typically of short duration (i.e. dust from construction and events once constructed).

The AMP is also located within the General Industry buffer area surrounding the Mirambeena Timber Processing Precinct which lies to the north of the Site.

3.4.2 Potential impacts

Potential direct construction and operational impacts that may occur to air quality as a consequence of developing the AMP are:

– Dust generated from construction activities (vegetation clearing, earthworks, road construction, events on unsealed tracks and areas) and operation of the AMP (gravel roads and tracks)
– Accidental bushfire generated from construction activities and operation of the AMP.

Emissions from vehicles during the operational phase of the AMP are expected to be periodic and are considered unlikely to be significant given that the Site is located in a rural area.

Dust emissions, during construction and operation of the AMP, may indirectly impact on vegetation condition as result of smothering in areas adjacent to the AMP activities.

3.4.3 Assessment of impacts

3.4.3.1 Reduced air quality, and health and aesthetic impacts due to dust emissions

Construction works for the AMP will involve the operation of heavy machinery to undertake vegetation clearing, earthworks, construction of tracks (sealed and unsealed) and other associated infrastructure within the Site. There will also be miscellaneous vehicle movements around the Site as part of the construction works.

These activities can result in dust emissions due to:

– Movement of vehicles and heavy equipment on unsealed surfaces
– Excavating, spreading and compacting soils
– Wind erosion from exposed and disturbed soil surfaces

Dust emissions are not considered to represent a significant or long-lasting impact to air quality, health or aesthetics during the construction phase. Dust impacts will be managed as part of the EMP.

3.4.3.2 Reduced air quality due to bushfire

Construction and operational activities have the potential to ignite bushfires through hot work and vehicle movements, which could cause a temporary reduction in local air quality.

3.4.3.3 Reduced vegetation condition due to dust emissions

Dust emissions, generated during construction and operation activities within the Site, have the potential to reduce the quality of vegetation adjacent to these activities.

3.4.4 Mitigation

Impacts on air quality will be minimised through implementation of the following:

– Implementation of a Dust Management Plan (Appendix H) during construction and operational phases as per "*A Guideline for Managing the Impacts of Dust and Associated Contaminants from Land Development Sites, Contaminated Sites, Remediation and Other Related Activities*" (DEC, 2011).
– Implementation of a Construction Management Plan (Appendix J) and site-specific Construction Environmental Management Plan (CEMP) (to be developed by the appointed Construction Contractor).
– Implementation of a Bushfire Management Plan for Stage 1A and Stage 1B (Bio Diverse Solutions, 2021) to the satisfaction of the City of Albany, DPLH and the DFES.
– A Development Exclusion Buffer will be established to provide a 50 m wide low fuel buffer between the AMP activities and the vegetation and CCW within the Protected Exclusion Area (Figure 2, Appendix A).

3.4.5 Predicted outcomes

Given the proposed mitigation measures outlined above, no residual impacts area expected for this aspect and the AMP meets the EPA objective to maintain air quality and minimise emissions so that environmental values are protected.

3.5 Social surroundings

3.5.1 Receiving environment

3.5.1.1 Heritage

3.5.1.1.1 Aboriginal heritage

A search of the Aboriginal Heritage Inquiry System found that there are no Registered Sites of Aboriginal heritage significance within the Site or within a 5 km buffer of the Site. There are also no sites lodged as 'Other Heritage Places' which intersect the Site, however three 'Other Heritage Places' are located within 5 km of the Site.

The search of the Aboriginal Heritage Inquiry System provided the following information regarding Indigenous Land Use Agreements in the South West:

> *"On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).*
>
> *The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site"* (DPLH, 2018).

The AMP project does not impact upon any Registered sites of Aboriginal heritage significance. As part of the previous Feasibility Study investigations, the City of Albany liaised with the Department of Aboriginal Affairs and advised Wagyl Kaip and Southern Noongar Group regarding the AMP project.

At this stage, no further Aboriginal heritage investigations are seen to be necessary, however the Wagyl Kaip and Southern Noongar Working Party has reserved the right to request Aboriginal heritage survey if required (letter from South West Aboriginal Land and Sea Council dated 25 October 2018).

3.5.1.1.2 Heritage (non-indigenous)

A search of the EPBC Protected Matters Search Tool did not identify any Commonwealth listed heritage sites within, or within a 5 km buffer of the Site.

A search of the Western Australian State Heritage Office Inherit database did not identify any State Registered Places within the Site (DPLH, 2018). The closest known site of heritage significance (Albany Airfield and 'Sigint' Radar System Place No 15574) was identified approximately 4.5 km from the Site.

It is considered that there are not any non-Indigenous heritage sites likely to be impacted by construction of the AMP. As a result, no impacts were identified or recommendations warranted for this project factor.

3.5.1.2 Land use

3.5.1.2.1 Zoning and existing buffers

Under the City of Albany Local Planning Scheme No. 1 the Site has been rezoned from '*Priority Agriculture*' to '*Special Use'.* It is largely located within the existing Industrial Buffer Area (IA4BA) surrounding the Mirambeena Timber Processing Precinct (TPP – i.e. Albany Plantation Export Company (APEC) and Plantation Energy) to the north of Down Road West (DoP, 2014).

The land immediately adjacent to the Site is also predominantly zoned '*Priority Agriculture'* with the exception of the Albany Plantation Export Company (APEC) wood chip mill and Plantation Energy wood pellet production

facility, which are zoned '*General Industry'*. The western boundary of the Site lies adjacent to a local road reserve and railway line which is zoned '*Major road, Rail'*. Land to the south-west of the railway is zoned '*General Agriculture'* (DPLH, 2018).

Approximately 900 m to the south of the Site, the Down Road Nature Reserve (Lot 7388 on P091191 and Lot 7676 on P217695) is zoned '*Parks and Recreation'* (DPLH, 2018).

3.5.1.2.2 Surrounding land uses

The immediately surrounding land uses include a railway to the west of the Site, APEC and Plantation Energy to the north of Down Road West and '*Priority Agriculture*' to the south and east. The CBH Mirambeena grain storage facility is also north of the site, on Down Road.

Further afield land uses are also largely '*Priority Agriculture*', or '*General Agriculture*'. The Down Road Nature Reserve is located approximately 900 m to the south; and the Water Corporation's Gunn Road tree plantation is located approximately 2,500 m to the east. The Mirambeena Strategic Industrial Area (SIA) is located approximately 2,000 m to the east on Albany Highway.

There are no DBCA Legislated Lands and Waters intercepted by the Site. However, there are two nature reserves within 5 km of the Site including the following (GoWA, 2021):

– Down Road Nature Reserve located approximately 900 m to the south, and
– Phillips Brook Nature Reserve located approximately 4.4 km to the north east.

The unnamed water course located within the Site is a tributary of Marbelup Brook and is a Conservation Category Wetland (CCW) (Figure 11, Appendix A) (GoWA, 2021). As per DWER guidance (DER, 2014), a conservation category wetland is "*a defined wetland and the area within 50 m of the wetland"* and is declared to be an Environmentally Sensitive Area (ESA) under the *Environmental Protection Act 1986.*

There is one mapped ESA located within 5 km: approximately 4.7 km to the north-east of the Site (**Error! Reference source not found.**, Appendix A) (GoWA, 2021).

3.5.1.2.3 Existing and historical uses

The perimeter of the Site is entirely fenced and is currently used for the primary purpose of cattle grazing. Historically the Site is likely to also have been used mainly for the purpose of agriculture, as well some sand / gravel extraction. The western end of the property consists of 52 ha of native vegetation that will be retained. An unnamed creek line runs from the north-east corner of the property through to the south-west corner, from where it joins into Marbelup Brook. A number of small dams are located across the property for stock watering.

The Plantation Energy sub-leased area consists of a small retention basin, connected to their site drainage system on the other side of Down Road West. The sub-lease area is powered, and Plantation Energy operates a pump from the retention basin. This area is presently unfenced, although there is a locked access gate on the site perimeter fence, off Down Road West.

3.5.1.3 Dust

Refer to Section 3.4 for information regarding dust emissions during construction and operation of the AMP.

3.5.1.4 Noise

The Site is currently used predominantly for agricultural purposes with the main sources of noise being occasional vehicle traffic on farm roads, livestock (in the distance) and sounds of nature (birds, insects and wind in trees) (GHD, 2020).

The Mirambeena Timber Processing Precinct to the north is a 24 hour/ 7 day per week operation and therefore is considered likely to have levels of noise consistent with its zoning of "General Industry".

3.5.1.5 Visual amenity

The existing amenity of the Site includes remnant vegetation, agricultural areas, existing roads and railways and previously cleared areas.

3.5.1.6 Lighting

No lighting is currently located within the Site however the Mirambeena Timber Processing Precinct to the north is a 24 hour/ 7 day per week operation and therefore is lit at night-time.

3.5.2 Potential impacts

3.5.2.1 Aboriginal heritage

The location of the AMP does not directly impact upon any Registered Sites of Aboriginal heritage significance. However, as part of the consultation process, the City of Albany has liaised with the DPLH and advised Wagyl Kaip and Southern Noongar Group of the AMP project. Comments on the proposal have been invited.

At this stage, no further Aboriginal heritage investigations are seen to be necessary, however the Wagyl Kaip and Southern Noongar Working Party has reserved the right to request Aboriginal heritage survey if required (letter from South West Aboriginal Land and Sea Council dated 25 October 2018).

Due to the existing land use and the extent of earthworks required to complete the AMP, it is considered that there is low potential for sub-surface materials to be uncovered.

3.5.2.2 Heritage (non-indigenous)

No non-Indigenous heritage sites are considered likely to be directly impacted by the AMP. As a result, no impacts and mitigation measures are considered necessary for this factor.

3.5.2.3 Noise and vibration

Construction noise and vibration and operational noise impacts have been assessed in the Noise Assessment undertaken by GHD (2020) for the Site.

There are four sensitive receptor locations (residential dwellings) ranging from 1.12 km to 1.93 km from the Site.

3.5.2.4 Dust

Refer to Section 3.4 for information regarding dust emissions during construction and operation of the AMP.

3.5.2.5 Visual amenity

Construction and operation of the AMP has the potential to impact on the amenity of the local area as a consequence of vegetation clearing and visibility of the Site to residential dwellings, workers and livestock.

3.5.2.6 Lighting

Internal lighting will be used for AMP buildings and low-level outdoor lighting for user safety/ pedestrian access powered by generators and/ or solar panels and battery storage.

There is no flood lighting proposed for motocross, racetracks and surrounding areas in Stage 1 of the AMP development, therefore it is expected that mitigation measures will not be required to manage light spill.

However, if in the future activities/ events require lighting at night-time these would be on an intermittent basis and would require further assessment and approval.

No sensitive receptors are considered likely to be impacted by light spill from the AMP. As a result, no impacts and mitigation measures are considered necessary for this factor.

3.5.3 Assessment of impacts

3.5.3.1 Noise impacts

There are four residences in close proximity to the Site. The results of the Noise Assessment for operation of the AMP indicate that for some event combinations, there will be occasions when the predicted noise levels from the

Site exceed the assigned noise levels at existing residences or new residential areas within the surrounding area (GHD, 2020).

A construction noise assessment was also completed in September 2020 (GHD, 2020), which concluded:

> *The closest noise sensitive receptor to any potential noise source during construction is located approximately 1120 m from the AMP. Noise levels exceeding the day assigned level of 45 dBA are not expected to impact on the closest noise sensitive receptors, with the exception of noisy equipment with a sound power level (SWL) higher than 115 dBA.*

Accordingly, the construction noise impacts are considered negligible and able to be managed by adopting standard noise mitigation and management practices, as required.

3.5.3.2 Dust impacts

Refer to Section 3.4 for assessment of impacts regarding dust emissions during construction and operation of the AMP.

3.5.3.3 Visual amenity

Residual amenity impacts are expected to be permanent, however the nearest residence is 1.4 km from the Site. Native vegetation present on the east, west and north of the Site also provides an existing visual barrier on these sides. To the south lies agricultural land, with potential impacts to livestock and agricultural workers.

3.5.4 Mitigation

3.5.4.1 Noise impacts

It is expected that construction noise and vibration impacts will be managed through the implementation of the Noise Management Plan (Appendix G), Construction Management Plan (Appendix J) and site-specific CEMP developed by the appointed Construction Contractor. Construction noise and vibration impacts are expected to be limited to the construction phase of the AMP.

A Noise Management Plan (GHD, 2021) has been developed for operation of the Site (Appendix G). This plan includes:

– Types of racing activities and classes of vehicles
– Limitations on racing activities
– Measures to control noise emissions
– Notice of racing activities
– Complaint procedure
– Records
– Responsibilities.

3.5.4.2 Dust impacts

Refer to Section 3.4 for mitigation measures for dust emissions during construction and operation of the AMP.

3.5.4.3 Visual amenity

Management of visual amenity issues have been clearly defined through development of a Visual Impact Assessment to determine the appropriate physical treatments on the southern boundary to mitigate visual impact to Lot 5781 Down Road South, Drome (GHD, 2021).

A visual treatment (earthen bund, tree-lined shelter belt and 2 m high fence) will be established along the AMP southern boundary to mitigate visual impacts on workers and livestock in the adjacent property.

Additionally, tree plantings and water sensitive urban design (WSUD) measures (e.g. grassed swales) will be employed in the AMP car park areas to mitigate visual impacts.

3.5.5 Predicted outcomes

The results of the Noise Assessment (GHD, 2020) indicate that for some event combinations, there will be occasions when the predicted noise levels from the Site may exceed the assigned levels at existing residences. However, it is considered that, with the implementation of the Noise Management Plan (GHD, 2021) and noise mitigation measures both onsite and at impacted residential properties (where required), noise impacts can be minimised for the small number of sensitive receptors (Appendix G).

Refer to Section 3.4 for predicted outcomes regarding dust emissions during construction and operation of the AMP.

Residual amenity impacts are expected to be permanent, however it is considered that visual amenity impacts will be addressed by establishment of physical treatments on the southern boundary of the Site.

4. Environmental management subplans

Environmental management will be undertaken for the AMP as per strategies outlined in the following subplans:

- Protected Exclusion Area management plan (Appendix C)
- Water management plan (Appendix D)
- Hydrocarbon management plan (Appendix E)
- Waste management plan (Appendix F)
- Noise management plan (Appendix G)
- Dust management plan (Appendix H)
- Decommissioning plan (Appendix I)
- Construction management plan (Appendix J).

5. Roles and responsibilities

It is the responsibility of the AMV Inc. to implement this EMP for development approval of the AMP. The roles and responsibilities of the AMV Inc. and CoA are outlined in Table 10.

Table 10 Roles and responsibilities

Role	Actions	Key commitments
City of Albany (CoA)	Approving LGA	Review annual EMP report
Albany Motorsport Venue Incorporated (AMV Inc.) – Board of Directors and Chair of the Board	Responsible for marketing, management, programming and safe use of the AMP.	Endorsement of annual report
Operations Manager	Operation and maintenance of the AMP	Annual report Operation and maintenance of the AMP as per legal obligations and EMP requirements
Other staff (TBC)	Operation and maintenance of the AMP	Operation and maintenance of the AMP as per legal obligations and EMP requirements

The key emergency contacts responsible for managing environmental emergencies associated with the AMP are included in Table 11.

All spill/ pollution or incidents that are serious or have lasting environmental impacts shall be reported to DWER under the requirements of the *Environmental Protection Act 1986* and *Contaminated Sites Act 2003* as soon as practicable. Minor spills/ pollution and incidents shall be recorded, via the AMP Incident Register held by AMV Inc., in annual reporting to the CoA.

Table 11 Key emergency contacts

Key personnel	Role	Contact details
AMV Inv.	Board of Directors	To be confirmed
CoA	General enquiries	(08) 6820 3000 PO Box 484, ALBANY, WA 6331 102 North Road, Yakamia, WA 6330
After hours callouts and emergencies	For dog attacks, straying livestock or Ranger services affecting public safety	(08) 6820 3999 (Ranger)
	For flooded or blocked roads, or urgent safety concerns regarding Council buildings or properties	1800 633 000 (emergency line)
DWER	Life-threatening incident or pollution emergency	000 and ask for Fire Department of Fire and Emergency Services (DFES) will call out DWER for major pollution/ hazardous materials incidents.
	Pollution emergency that is not life-threatening	1300 784 782 DWER 24-hour Pollution Watch hotline
	Pollution incident (not life-threatening or an emergency)	1300 784 782 DWER 24-hour Pollution Watch hotline (08) 6364 7000 Monday to Friday 8:30 am – 5:00 pm

6. Environmental incidents, non-conformance and complaints

6.1 Environmental incidence and non-conformance

All environmental incidents a will be recorded in the AMP Incidents Register, held by AMV Inc., and in the event of a serious incident the AMV Inc. Operations Manager shall notify DWER and CoA as per Section 5.

Any non-conformance with development approval conditions, regulatory or other compliance obligation will be recorded in the AMP Incidents Register and investigated by the AMV Inc. Operations Manager to determine if corrective actions are required to mitigate any impact to environmental and/ or human health.

Where corrective actions are required to be implemented these shall be recorded in the AMP Corrective Action Register. Corrective actions may also be required to be updated in the relevant sub management plan and overarching EMP.

6.2 Complaint procedure

A sign shall be displayed at the entrance of the AMP with Site contact details. In the event of an environmental complaint, the AMV Inc. Operations Manager shall record it in the AMP Complaints Register. The AMV Inc. Operations Manager will investigate internally or liaise with CoA, where required, to determine what adjustments to Site operations will be required. As part of the AMP Complaints Register a Complaint and Corrective Action Form, held by AMV Inc., will be completed to record all reasonable and practicable measures undertaken to mitigate the issue. The AMV Inc. Operations Manager will follow up with the complainant to provide information regarding the measures taken and outcome of their complaint.

6.2.1 Normal working hours

In the event that environmental-related complaints are received, prompt follow-up will be required as follows:

– Immediate attention to urgent/critical issues: Complaints will be reported to the Approving Authority (and other relevant stakeholders) as soon as possible during normal working hours. Multiple complaints regarding the same issue will also be reported to the Approving Authority (and other relevant stakeholders) as soon as possible during normal working hours.
– Acknowledgment of contact: Each complaint received will be acknowledged within 24 hours of the initial contact and logged into the management system.
– Offered additional information: Each caller will be given the opportunity to be added to the project database, which is used to distribute project information and updates.
– Registration of noise complaint: Completed complaint form to be retained and made available to Approving Authority or an authorised DWER officer on request.
– Determine whether any unusual activities were taking place at the time of the complaint.
– Assessment of situation – complaint to be forwarded to Approving Authority. Conduct monitoring (e.g. noise, air quality etc.) at the location of the complainant (if required).
– Corrective action to mitigate the situation if found to be unreasonable using pre-determined mitigation measures.
– Reassessment at conclusion of works to ensure the implemented control procedure was successful.

Complaints received will be reported to the Approving Authority on a monthly basis. The complaint report will include: the location, date, time, issue summary, response from the contractor and action taken and resolution status.

6.2.2 Out of hours

In addition to the above, out of hours contacts and complaints will be made to the AMV Inc. Operations Manager. To assist in resolving complaints made directly to the Approving Authority outside of normal working hours, the mobile contact number for the AMV Inc. Operations Manager will be provided.

If work must continue outside of the approval conditions at short notice i.e. during the shift for safety reasons, the AMV Inc. will contact the Approving Authority as soon as possible the following morning.

Emergency issues outside normal working hours will be raised with the Approving Authority as soon as possible during the next business day.

7. Monitoring

Ongoing monitoring of environmental aspects within the AMP will be undertaken to ensure the continued success of any actions implemented in this EMP.

Monitoring against key outcome criteria and specific monitoring activities are outlined in each sub management plan in this overarching EMP.

Monitoring activities will be recorded as per Section 9.

8. Environmental training

All AMV Inc. members, volunteers and competitors shall undertake Site induction regarding general aspects of the AMP and specific environmental training as per the relevant sub-plans in this EMP.

All training activities shall be recorded in the AMP Training register, held by AMV Inc., for inclusion in annual reporting.

9. Reporting and control of environmental records

The AMV Inc. Operations Manager shall keep records of the following aspects relevant to the AMP Site:

– Standard operating procedures
– Material Safety Data Sheets (MSDS) for all chemicals kept on site
– Hazchem emergency information and spill clean-up procedures
– Training register
– Complaints register
– Incidents register
– Corrective actions register
– Waste volumes generated on site and removed off site.

The AMV Inc. Operations Manager shall, on an annual basis, report to the CoA CEO on activities undertaken during ongoing operation of the AMP.

Reporting shall include but may not be limited to:

– Review of environmental incidents
– Meeting environmental objectives and key performance criteria
– Compliance with this EMP and any other legal obligations.

10. EMP Review

The EMP and sub-management plans, will be reviewed and updated no later than annually and/ or in the case of significant changes within the Site. The review will include an assessment of the effectiveness of environmental strategies and performance against the plan's objectives.

A review may occur sooner if there is a material change in risk, legal requirements or an incident relevant to environmental management. Mitigation strategies will be reviewed for effectiveness and any corrective actions will be implemented.

11. References

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Appendix A

Figures

Figure 1	*Project site location*
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LEGEND

- Road
- Albany Motorsport Park
- Lot 5780 Down Road South
- Cadastre

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No.	6137331
Revision No.	0
Date	22/07/2021

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

p.o. box 1502, albany, western australia 6331
telephone: (08) 9841 5455
email: admin@rgarchitects.com.au

Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

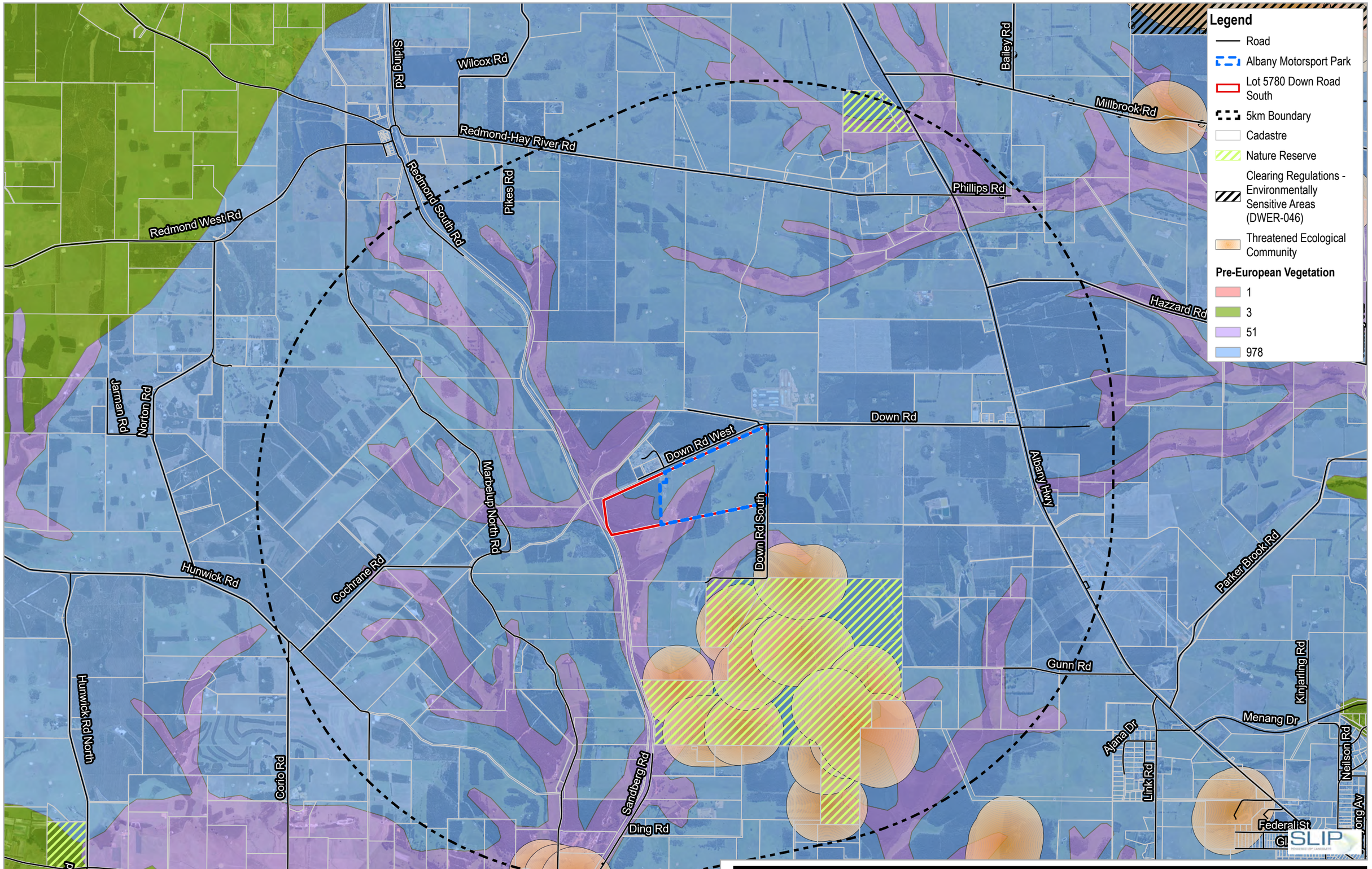
project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

Pre-European vegetation, ESAs, TEC & Reserves

Project No. **12546218**
Revision No. **0**
Date **22/07/2021**

Figure 3

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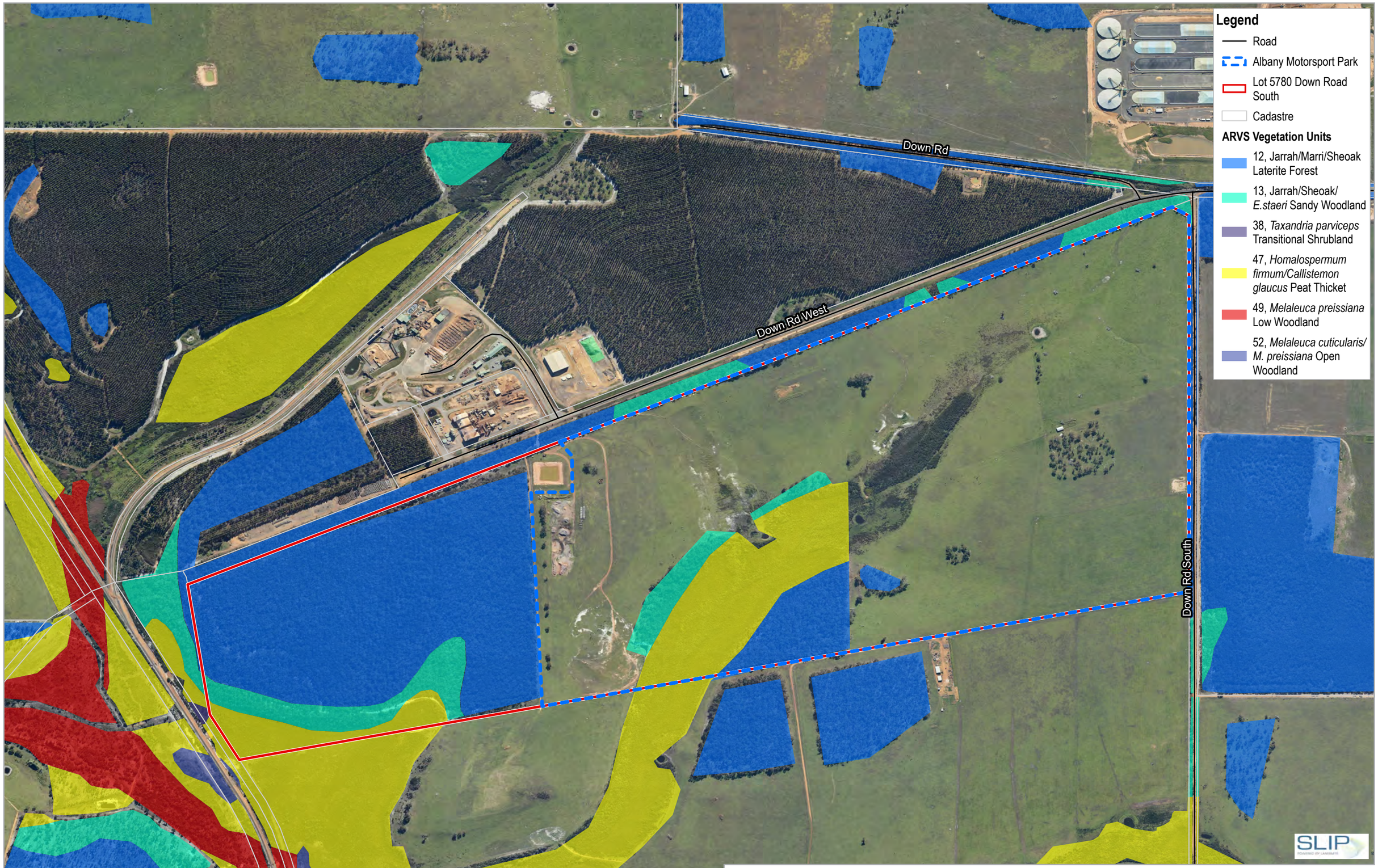

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Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

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GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

ARVS - Vegetation Units

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

Figure 4

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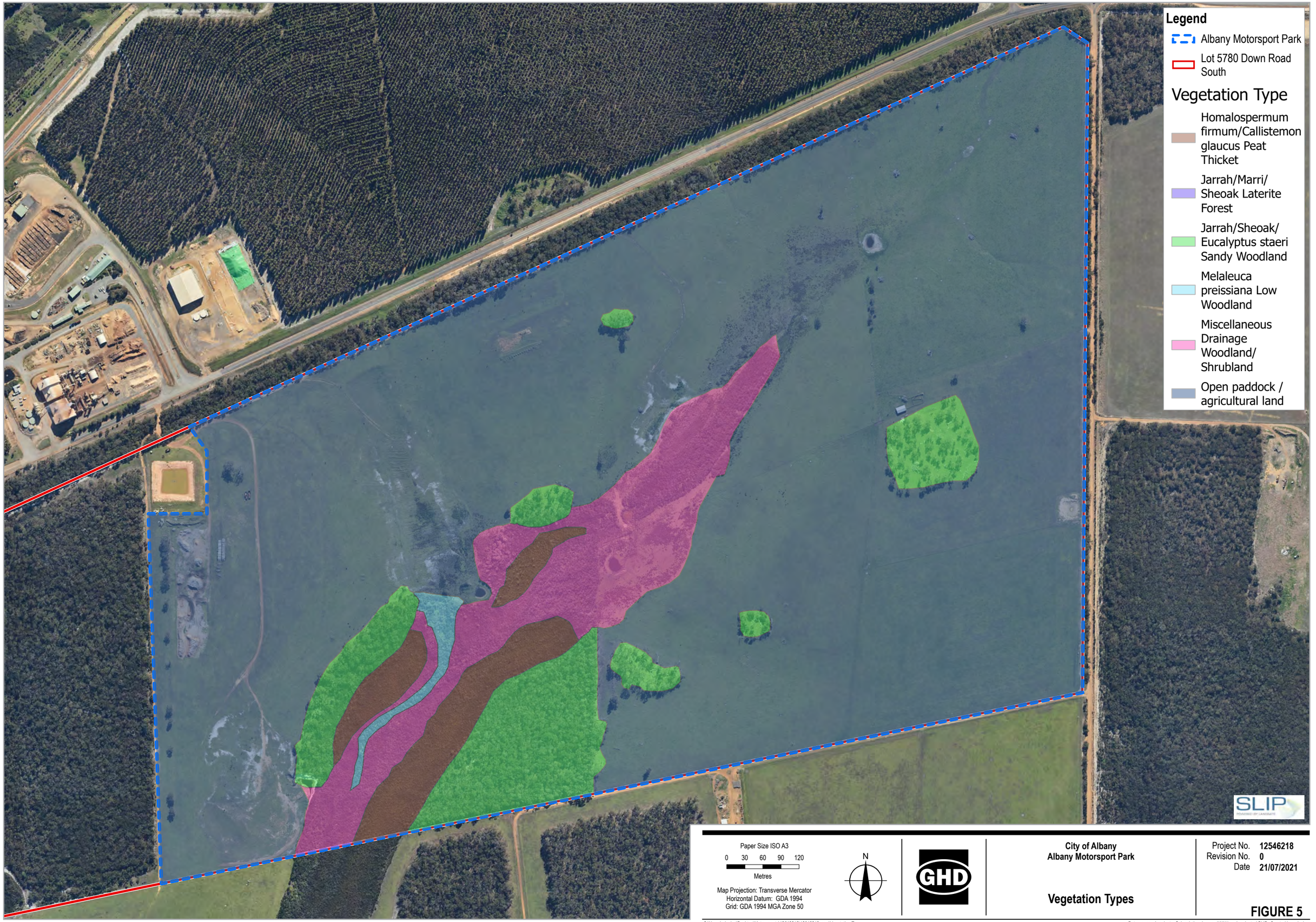

Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

Vegetation Types

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

FIGURE 5

C:\Users\vdavies\Desktop\Motor sports\12546218\12546218.aprx\Vegetation Types
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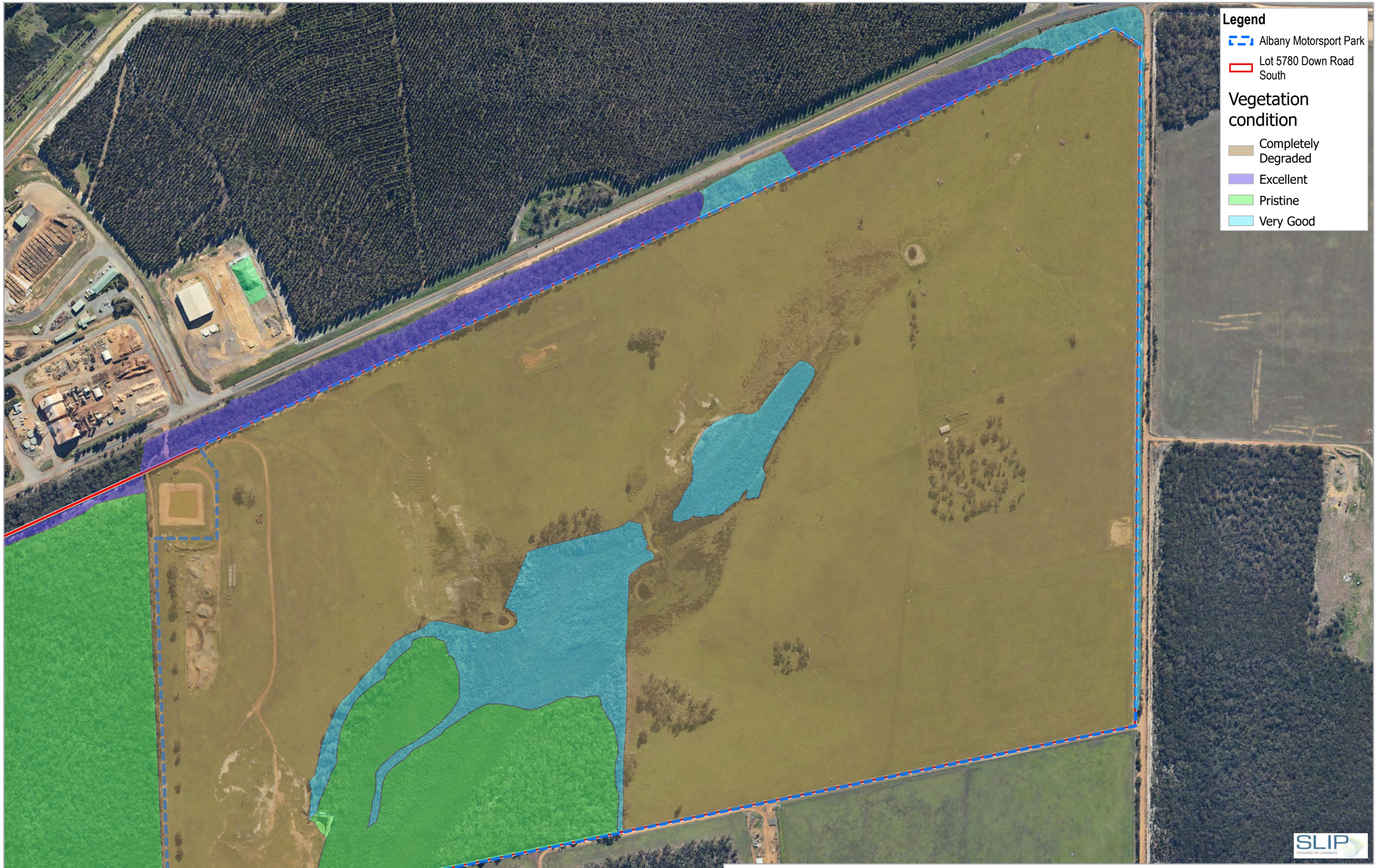

Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

Vegetation Condition

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

FIGURE 6

C:\Users\vdavies\Desktop\Motor sports\12546218\12546218.aprx\Vegetation Types
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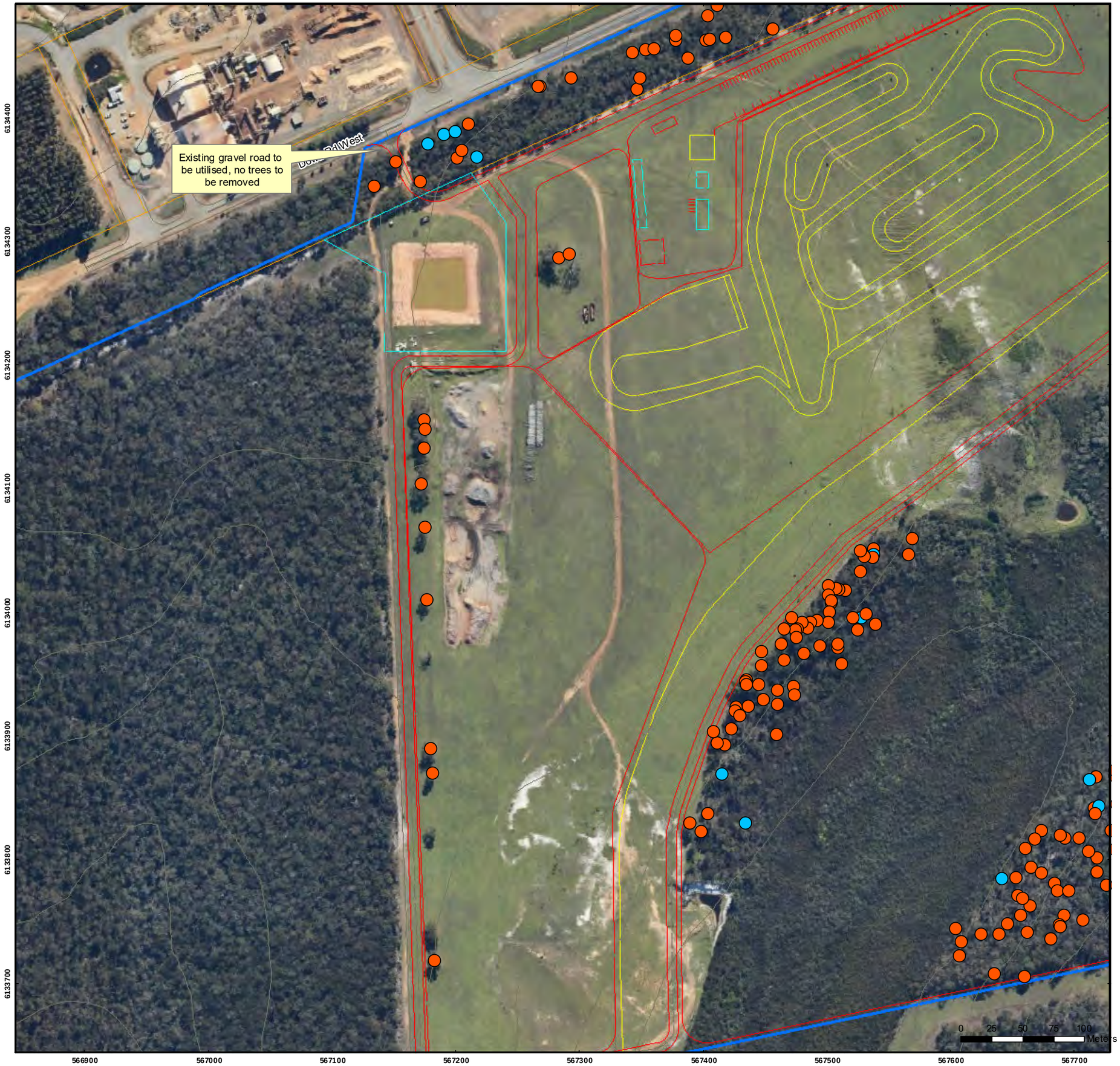

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Denmark Office:
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(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
Esperance, WA 6450

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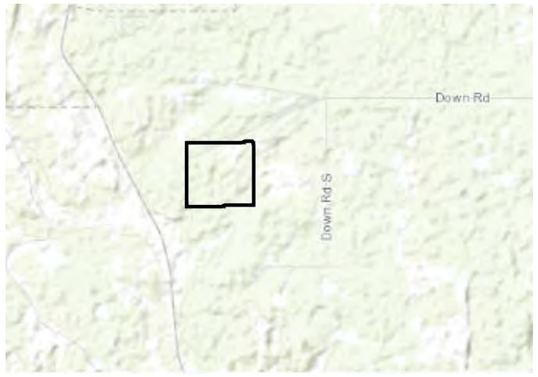

Overview Map Scale 1:100,000

Legend

- Subject Site - Fauna and Flora Survey
- Cadastre
- Vegetation to be Cleared (0.928ha)

Significant Trees to be Removed

Hollow, Occupant, Remove (No.)

- Y, Bird (Non Threatened), Remove (1)
- Y, Possum (Non-threatened), Remove (1)
- Y, Unclear Evidence of Occupancy, Remove (5)
- N, Bird (Non Threatened), Remove (1)
- N, Not Occupied, Remove (47)

Significant Trees to Remain

Hollow, Occupant, Remain (No.)

- Y, Bird (Non Threatened), Remain (11)
- Y, Feral Bees, Remain (4)
- Y, Welcome swallows, Remain (1)
- Y, Possum (Non Threatened), Remain (9)
- Y, Red-capped parrot, Remain (1)
- Y, Unclear Evidence of Occupancy, Remain (59)
- N, Termites, Remain (1)
- N, Not Occupied, Remain (535)
- N, Hollow forming, Remain (2)

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

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

CLIENT
City of Albany
Po Box 484
Albany, WA 6331

Map 1 Significant Trees - West

	QA Check	*Drawn by*
	KK	**BT**
STATUS	*FILE*	*DATE*
FINAL	**MSC0137-003**	**30/04/2021**

Albany Office:
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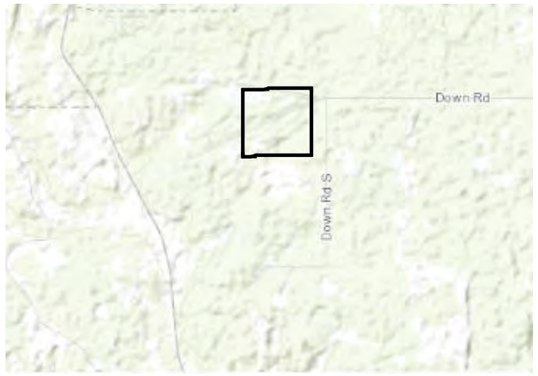

Legend Overview Map Scale 1:100,000

- Subject Site - Fauna and Flora Survey
- Cadastre
- Vegetation to be Cleared

Significant Trees to be Removed

Hollow, Occupant, Remove (No.)

- Y, Bird (Non Threatened), Remove (1)
- Y, Possum (Non-threatened), Remove (1)
- Y, Unclear Evidence of Occupancy, Remove (5)
- N, Bird (Non Threatened), Remove (1)
- N, Not Occupied, Remove (47)

Significant Trees to Remain

Hollow, Occupant, Remain (No.)

- Y, Bird (Non Threatened), Remain (11)
- Y, Feral Bees, Remain (4)
- Y, Welcome swallows, Remain (1)
- Y, Possum (Non Threatened), Remain (9)
- Y, Red-capped parrot, Remain (1)
- Y, Unclear Evidence of Occupancy, Remain (59)
- N, Termites, Remain (1)
- N, Not Occupied, Remain (535)
- N, Hollow forming, Remain (2)

Scale
1:3,150 @ 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

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City of Albany
Po Box 484
Albany, WA 6331

Map 2 Significant Trees - North Central

	QA Check	*Drawn by*
	KK	**BT**
STATUS **FINAL**	*FILE* **MSC0137-003**	*DATE* **30/04/2021**

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29 Hercules Crescent
Albany, WA 6330
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(08) 9848 1309

Esperance Office:
2A/113 Dempster Street
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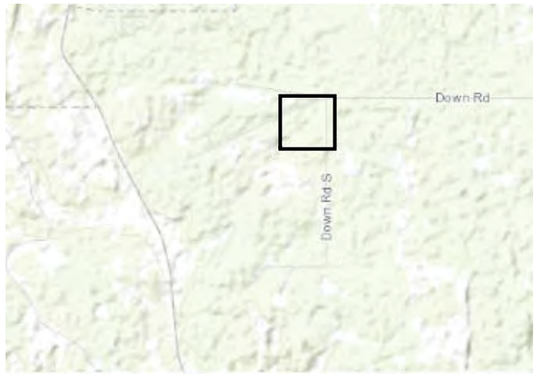
BIO DIVERSE SOLUTIONS



Legend Overview Map Scale 1:100,000

- Subject Site - Fauna and Flora Survey
- Cadastre
- Vegetation to be Cleared

Significant Trees to be Removed

Hollow, Occupant, Remove (No.)

- Y, Bird (Non Threatened), Remove (1)
- Y, Possum (Non-threatened), Remove (1)
- Y, Unclear Evidence of Occupancy, Remove (5)
- N, Bird (Non Threatened), Remove (1)
- N, Not Occupied, Remove (47)

Significant Trees to Remain

Hollow, Occupant, Remain (No.)

- Y, Bird (Non Threatened), Remain (11)
- Y, Feral Bees, Remain (4)
- Y, Welcome swallows, Remain (1)
- Y, Possum (Non Threatened), Remain (9)
- Y, Red-capped parrot, Remain (1)
- Y, Unclear Evidence of Occupancy, Remain (59)
- N, Termites, Remain (1)
- N, Not Occupied, Remain (535)
- N, Hollow forming, Remain (2)

Scale
1:2,500 @ A3
GDA MGA 94 Zone 50

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

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City of Albany
Po Box 484
Albany, WA 6331

Map 3 Significant Trees - North East

	QA Check	*Drawn by*
	KK	**BT**
STATUS	*FILE*	*DATE*
FINAL	**MSC0137-003**	**30/04/2021**

Albany Office:
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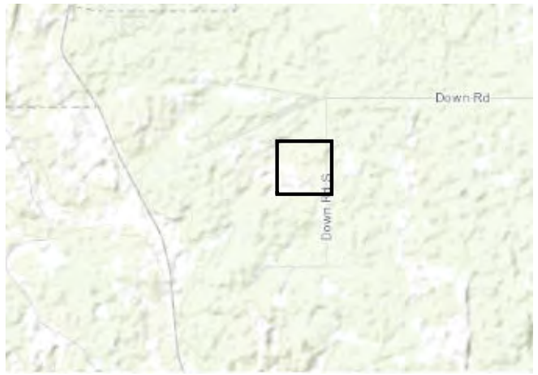
BIO DIVERSE SOLUTIONS



Overview Map Scale 1:100,000

Legend

- Subject Site - Fauna and Flora Survey
- Cadastre
- Vegetation to be Cleared

Significant Trees to be Removed

Hollow, Occupant, Remove (No.)

- Y, Bird (Non Threatened), Remove (1)
- Y, Possum (Non-threatened), Remove (1)
- Y, Unclear Evidence of Occupancy, Remove (5)
- N, Bird (Non Threatened), Remove (1)
- N, Not Occupied, Remove (47)

Significant Trees to Remain

Hollow, Occupant, Remain (No.)

- Y, Bird (Non Threatened), Remain (11)
- Y, Feral Bees, Remain (4)
- Y, Welcome swallows, Remain (1)
- Y, Possum (Non Threatened), Remain (9)
- Y, Red-capped parrot, Remain (1)
- Y, Unclear Evidence of Occupancy, Remain (59)
- N, Termites, Remain (1)
- N, Not Occupied, Remain (535)
- N, Hollow forming, Remain (2)

Scale
1:2,500 @ A3
GDA MGA 94 Zone 50

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

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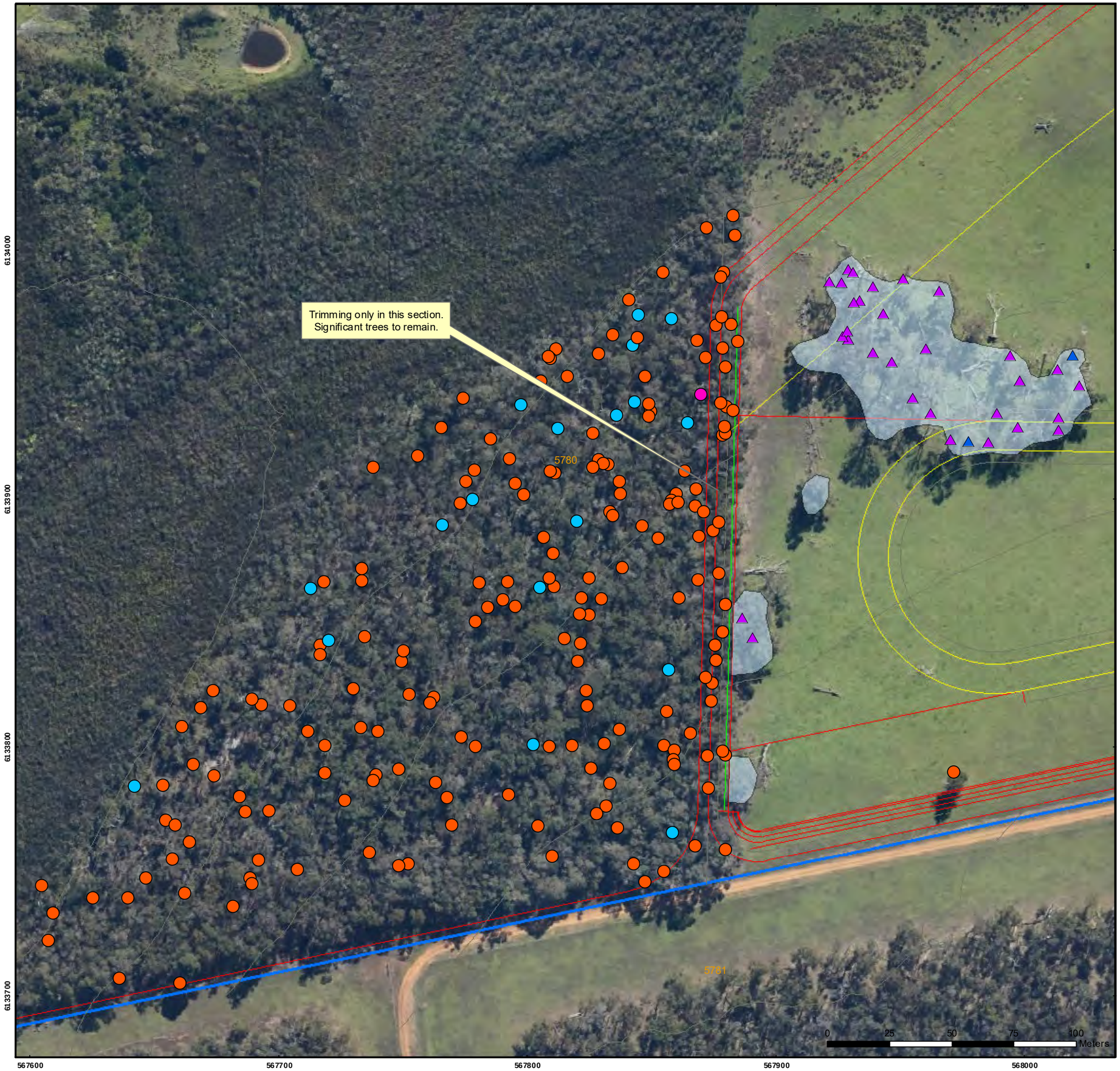
Albany, WA 6331

Map 4 Significant Trees - South East

	QA Check	*Drawn by*
	KK	**BT**
STATUS	*FILE*	*DATE*
FINAL	**MSC0137-003**	**30/04/2021**



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Denmark, WA 6333
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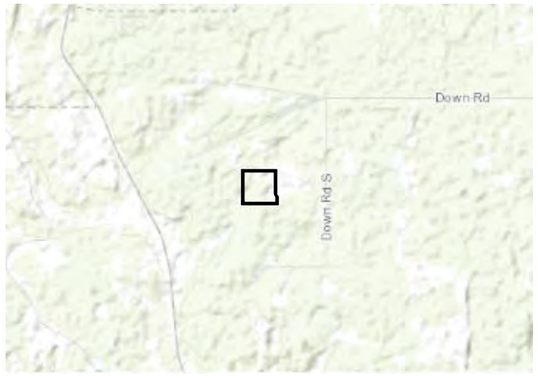
Esperance, WA 6450

BIO DIVERSE SOLUTIONS



Legend Overview Map Scale 1:100,000

- Subject Site - Fauna and Flora Survey
- Cadastre
- Vegetation to be Cleared

Significant Trees to be Removed

Hollow, Occupant, Remove (No.)

- Y, Bird (Non Threatened), Remove (1)
- Y, Possum (Non-threatened), Remove (1)
- Y, Unclear Evidence of Occupancy, Remove (5)
- N, Bird (Non Threatened), Remove (1)
- N, Not Occupied, Remove (47)

Significant Trees to Remain

Hollow, Occupant, Remain (No.)

- Y, Bird (Non Threatened), Remain (11)
- Y, Feral Bees, Remain (4)
- Y, Welcome swallows, Remain (1)
- Y, Possum (Non Threatened), Remain (9)
- Y, Red-capped parrot, Remain (1)
- Y, Unclear Evidence of Occupancy, Remain (59)
- N, Termites, Remain (1)
- N, Not Occupied, Remain (535)
- N, Hollow forming, Remain (2)

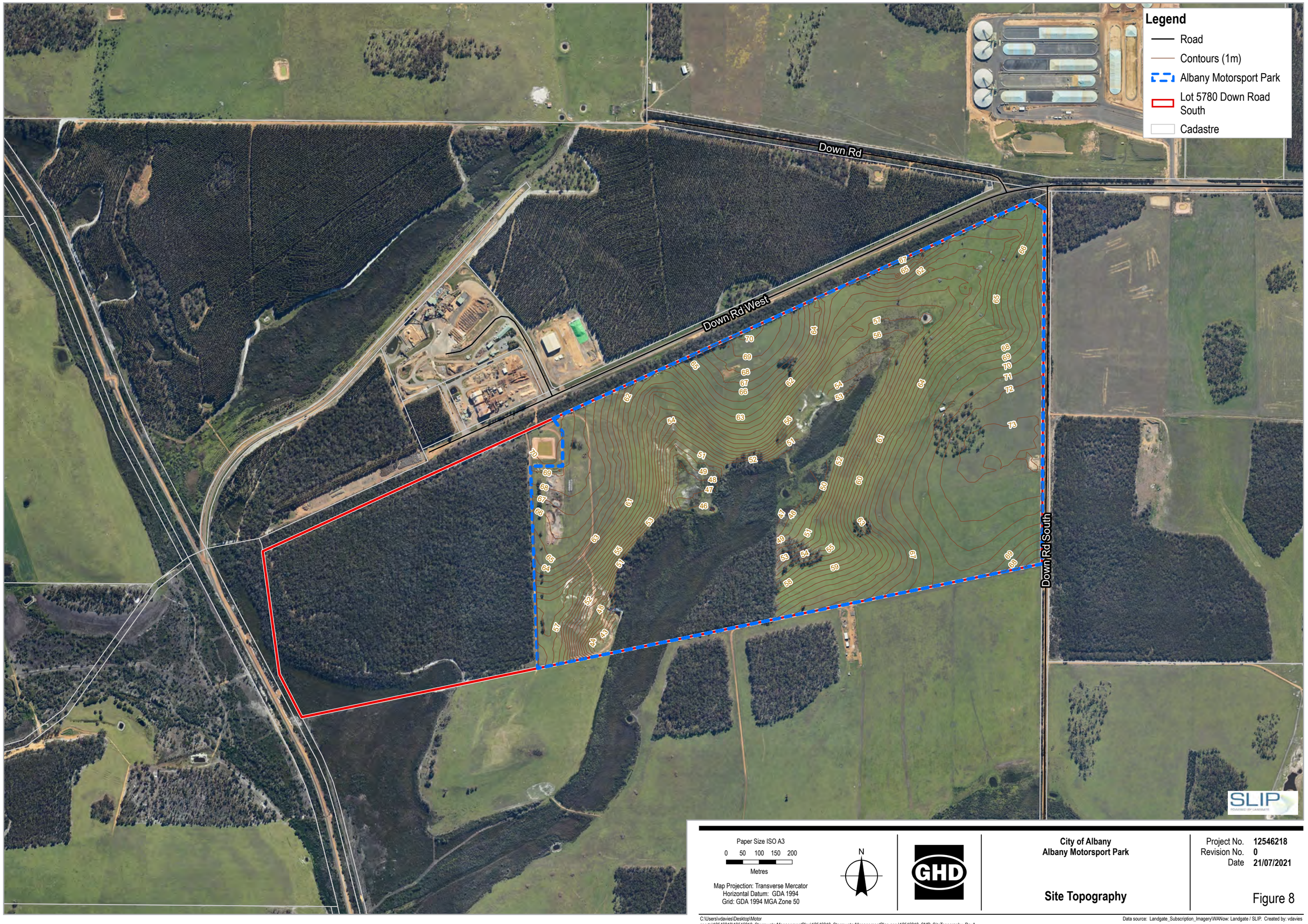
Scale
1:1,500 @ A3
GDA MGA 94 Zone 50

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

CLIENT
City of Albany
Po Box 484
Albany, WA 6331

Map 5 Significant Trees - South Central

	QA Check	Drawn by
	KK	BT
STATUS	FILE	DATE
FINAL	MSC0137-003	30/04/2021



Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

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City of Albany
Albany Motorsport Park

Site Topography

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

Figure 8

C:\Users\vdavies\Desktop\Motor sports\12546218\12546218_StormwaterManagementPlan\12546218_StormwaterManagementPlan.aprx\12546218_SMP_SiteTopography_RevA
Print date: 21 Jul 2021 - 17:48

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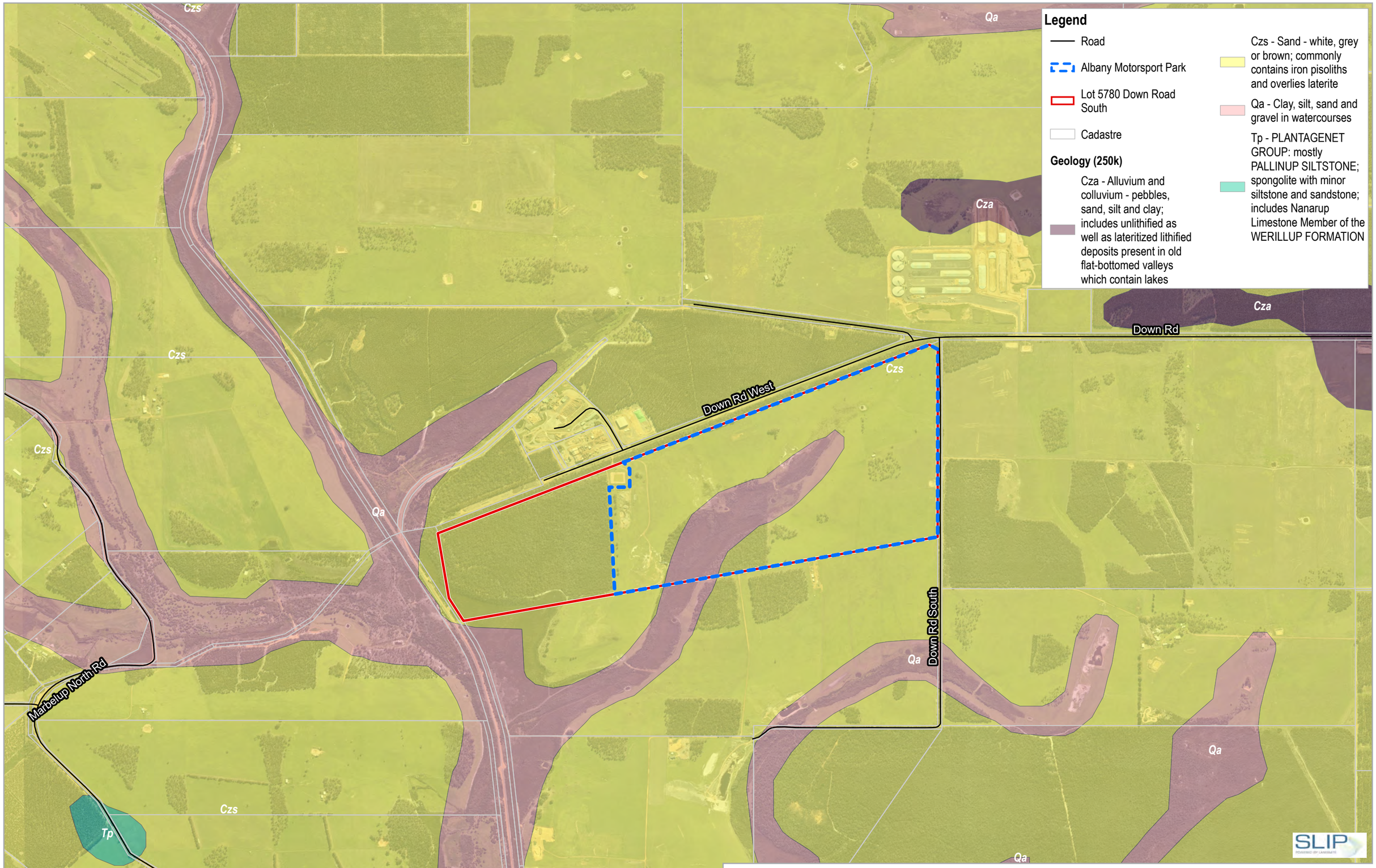

Paper Size ISO A3

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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

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City of Albany
Albany Motorsport Park
Environmental Management Plan

Geology (250k)

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

Figure 9

N:
\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_EnvironmentalManagementPlan\12546218_EnvironmentalManagementPlan.aprx\1254
Print date: 21 Jul 2021 - 14:04

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Soil Landscape

242KgDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.

242KgS7f - Footslopes and swampy valley floors of minor valleys

242KgS7h - Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.

242ReDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.

242ReRD - Broadly undulating plateau; scattered lakes and depressions. Yellow duplex soils and laterite on plains. Marri-Jarrah-Albany Blackbutt forest. Yellow solonetzic soils in depressions; Paperbark woodland.

LEGEND

Cadastre

Lot 5780 Down Road South

242ReRD

Down Rd

242ReDMc

Down West Rd

242KgS7h

242KgDMc

242KgS7h

242KgS7f

242KgS7h

242KgDMc

Down South Rd

242KgDMc

242KgS7h

SLIP

Paper Size ISO A3

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

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City of Albany
Albany Motorsport Park
Environmental Management Plan

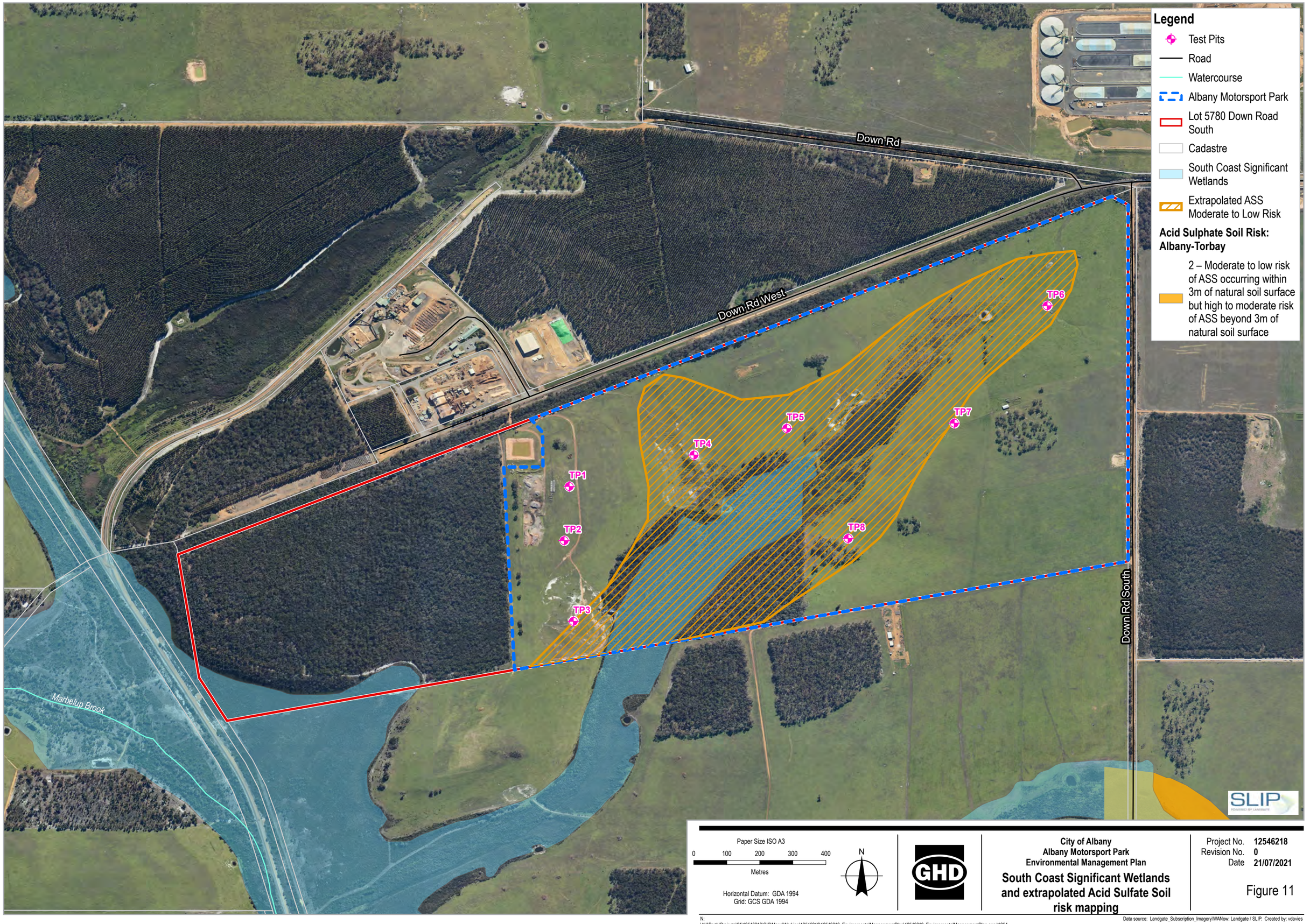
DPIRD Soil Landscape Mapping Units

Project No. 61-37331
Revision No. 0
Date 21/07/2021

FIGURE 10

C:\Users\vdavies\Desktop\Motorsports\Data\61373331_003_Fig10_SoilLandscapeMapping_Rev0.mxd
Print date: 21 Jul 2021 - 20:35

Data source: GHD: Project Site - 20180702; Landgate: Imagery (Feb 2016), Cadastre, Roads - 20180709; DPIRD: Soil Landscape Mapping (Best Available) - 20171220. Created by: vdavies



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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

South Coast Significant Wetlands and extrapolated Acid Sulfate Soil risk mapping

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

Figure 11

N:
\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_EnvironmentalManagementPlan\12546218_EnvironmentalManagementPlan.aprx\1254
Print date: 21 Jul 2021 - 13:43

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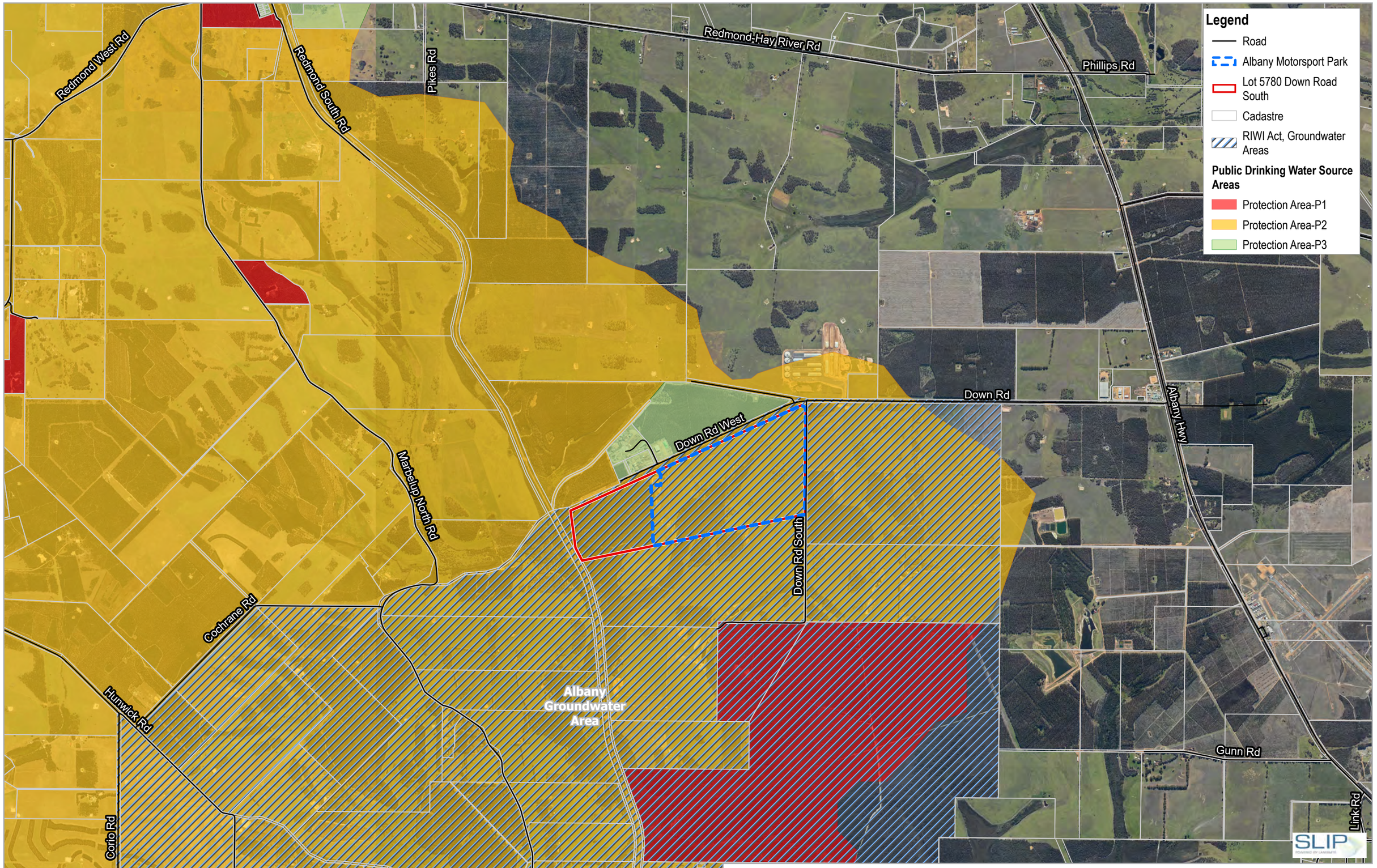

Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

PDWSA and Water Management Areas

Project No. **12546218**
Revision No. **0**
Date **23/07/2021**

Figure 12

N:
\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_StormwaterManagementPlan\12546218_StormwaterManagementPlan.aprx\12546218
Print date: 23 Jul 2021 - 11:25

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Appendix B

Albany Motorsport Venue Inc. – Governance model

DRAFT GOVERNANCE MODEL

1. **VENUE**
   Albany Motorsport Park

2. **LOCATION**
   Lot 5780 Down Road, DROME, Western Australia

3. **LAND OWNER**
   City of Albany
   owns the land (LOCATION)
   approving Authority for any modifications

4. **VENUE OWNER**
   Albany Motorsport Venue Incorporated (AMV Inc.)
   leases land from the LAND OWNER
   owns and maintains the facilities and infrastructure

5. **THE BOARD**
   VENUE OWNER's board of 7 Directors
   responsible for management and operation of the VENUE

6. **OCCUPIER**
   The VENUE OWNER

7. **AFFILIATIONS**
   Confederation of Australian Motor Sport Limited, trading as Motorsport Australia
   Motorcycling Australia Ltd

8. **VENUE MAP**
   Albany Motorsport Park Masterplan

9. **OWNERSHIP & OPERATION**
   - Ownership of the land (The Land) is and will remain owned by the City of Albany.
   - Post construction by the City of Albany, ownership of all facilities and infrastructure (will be transferred to the Albany Motorsport Venue Incorporated (AMV Inc.) by written agreement.
   - The Land (not the Venue) will be leased by the City of Albany to the AMV Inc.
   - The AMV Inc. will be responsible for the operation, maintenance and repair of the Venue.

10. **AMV INC. BOARD GOVERNANCE**
   - AMV Inc. is to be established as a not for profit association incorporated in accordance with the Associations Incorporation Act 2015.
   - Noting it is acceptable for an association to trade with the public so long as the profits from those transactions are used to promote the objects and purposes of the association and members do not profit from the activities.
   - AMV Inc. will consist of a Board of Directors (the **Board**).
   - The Directors will be paid a remuneration agreed annually.

11. **THE BOARD**

11.1 The Board may have up to seven (7) Directors, who shall comprise:

   - Two (2) community representatives recommended by the City of Albany for the Board's consideration.

- One (1) representing Motorsport Australia;
- One (1) representing Motorcycling Western Australia (MWA);
- One (1) representing 4-wheel racing clubs;
- One (1) representing 2-wheel racing (motorcycle road racing) clubs;
- One (1) representing motocross clubs;

11.2 The Chairman of the Board will be elected by the Directors.

11.3 Appointments are to be up to a two-year term, with skills determined by the Board.

11.4 The Directors shall meet monthly or on more occasions if the need dictates.

11.5 The Board to employ an Operations Manager and any other staff deemed necessary to ensure the safe and compliant Venue.

11.6 The Board shall lease the Land from the City of Albany.

11.7 A Lease Agreement shall be prepared by the City of Albany and approved by the City of Albany Council.

11.8 The Board shall be responsible for the insurance of the tracks, roads and any other permanent buildings and fixtures on the Venue.

11.9 The Board is responsible for the development of an Albany Motorsport Park Strategic Development Plan and overseeing the implementation of the strategies and supporting policies.

11.10 The Board is responsible for the development and implementation of systems to enable it to comply with its legal and policy obligations, adhering to accounting standards and ensuring the Venue assets are protected through appropriate risk management.

11.11 The Board is responsible for the marketing, management, programming and the safe use of the Venue.

12. **VENUE OWNER**

12.1 The Venue Owner shall carry out:

- marketing the Venue;
- hiring of facilities to various users and user groups;
- programme the hiring and events held at the Venue;
- ensure the hirer has the appropriate permit for the event being conducted;
- ensure the hirer has the appropriate event insurance in place;
- adherence to the Motorsport Australia “Track Operations Safety Guide”;
- adherence to the Motorcycling Australia “Track Standards” and current “Manual of Motorcycle Sport”;
- management and maintenance of the infrastructure;
- establish and maintain an ongoing maintenance (sinking) fund;
- ensure the Venue is cost-effective, that is, income is equal to or greater than expenses;
- adherence to the Bushfire Management Plan;

- adherence to the Noise Management Plan;
- adherence to the Water Management Plan;
- adherence to the Hydrocarbon Management Plan;
- adherence to the Dust Management Plan; and
- present an annual report to the City of Albany.

12.2 Produce and administer a “Venue Procedures Manual”.

12.3 Produce and administer a “Code of Conduct Manual”.

12.4 Ensure the tracks are certified and sanctioned by Motorsport Australia and Motorcycling Australia on an annual basis.

12.5 Ensure users of the Venue have the appropriate training and qualifications and operate in accordance with the relevant governing motorsport organisation.

12.6 Purchase and have available the required safety equipment.

12.7 Purchase and have available the required maintenance equipment.

12.8 Ensure grounds maintenance is carried out by trained employees and/or trained volunteers.

Revision History

Author	Version Description	Date Completed
Great Southern Motorplex Group Inc.	Draft prepared for review by City of Albany	26/04/2021
City of Albany	Reviewed and marked up by City of Albany. Changes review to compared document.	27/04/2021
City of Albany / Great Southern Motorplex Group Inc.	Amended post meeting held on 4 May 2021. Agreed amended marked up in RED.	04/05/2021
City of Albany	Changes accepted	06/05/2021
City of Albany	Amendment to Item 11	13/05/2021

Appendix C

Protected Exclusion Area Management Plan

Albany Motorsport Park – Development Application

Protected Exclusion Area Management Plan

City of Albany

27 July 2021

→ The Power of Commitment

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Printed date	27/07/2021 2:35:00 PM
Last saved date	27 July 2021
File name	https://projectsportal.ghd.com/sites/pp18_05/albanymotorsportpark/ProjectDocs/Environmental Management Plan/12546218-REP-0_Albany Motorsport Park_Protected Exclusion Area Management Plan.docx
Author	Vicki Davies
Project manager	Vicki Davies
Client name	City of Albany
Project name	Albany Motorsport Park - Development Application
Document title	Albany Motorsport Park – Development Application | Protected Exclusion Area Management Plan
Revision version	Rev 0
Project number	12546218

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	V. Davies	J. Cramer		J. Foley		18/05/21
S3	B	V. Davies					22/06/21
S4	0	V. Davies	J. Cramer		J. Foley	Jeff Foley 2021.07.30 11:13:16 +08'00'	

Executive summary

The purpose of this Protected Exclusion Area Management Plan is to minimise environmental impact on ecological values within the Protected Exclusion Area during the operation of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A).

The Protected Exclusion Area comprises remnant native vegetation and the Conservation Category Wetland (CCW) Marbelup Flats within the AMP area. The Protected Exclusion Area is also surrounded by a 50 m wide, low fuel Development Exclusion Buffer. The location of the Protected Exclusion Area is presented in Figure 2 (Appendix A).

This Protected Exclusion Area Management Plan is appended to the overarching Environmental Management Plan (EMP) which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

The objective of this management plan is to protect and maintain biological diversity and ecological integrity within the Protected Exclusion Area.

If potentially polluting activities are not appropriately managed, during operation of the AMP, the following impacts/ risks may occur in the Protected Exclusion Area:

– Contamination of surrounding soil, groundwater, and surface water
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Bushfire
– Community and stakeholder dissatisfaction.

Measures to mitigate environmental impacts on the Protected Exclusion Area, during the construction of the AMP, have been included in the Construction Management Plan, which is also appended to the overarching EMP.

It is the responsibility of Albany Motorsport Venue Incorporated (AMV Inc.) to implement this Protected Exclusion Area Management Plan during operation of the AMP.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

Contents

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- 1.1 Purpose of this report 1
- 1.2 Objectives 1
- 1.3 Legislation and guidelines 1
- 1.4 Limitations 1

2. Potential environmental impacts **2**

3. Management strategies, actions, timeframes and responsibilities **3**

4. Monitoring **5**

5. Review **6**

6. References **7**

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Appendices

Appendix A Figures
Appendix B Revegetation species list

1. Introduction

1.1 Purpose of this report

The purpose of this Protected Exclusion Area Management Plan is to minimise environmental impact on ecological values within the Protected Exclusion Area during the operation of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A).

The Protected Exclusion Area comprises remnant native vegetation and the Conservation Category Wetland (CCW) Marbellup Flats within the AMP area. This area is also surrounded by a 50 m wide, low fuel Development Exclusion Buffer as per the requirements of WQPN 100 Motor sport facilities near sensitive waters (DoW, 2007). The location of the Protected Exclusion Area is presented in Figure 2 (Appendix A).

This Protected Exclusion Area Management Plan is appended to the overarching EMP which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

Measures to mitigate environmental impacts on the Protected Exclusion Area, during the construction of the AMP, have also been included in the Construction Management Plan (Appendix J of the EMP).

1.2 Objectives

The objective of this management plan is to protect and maintain biological diversity and ecological integrity within the Protected Exclusion Area.

1.3 Legislation and guidelines

Legislation and guidelines applicable to the Protected Exclusion Area include the following, but may not be limited to:

- *Biosecurity and Agriculture Management Act 2007*
- *Biodiversity Conservation Act 2016*
- *Environmental Protection Act 1986*
- *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
- *Environmental Protection Regulations 1987*
- *Rights in Water and Irrigation Act 1914.*

1.4 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Potential environmental impacts

If potentially polluting activities are not appropriately managed, during operation of the AMP, the following impacts/ risks may occur in the Protected Exclusion Area:

– Contamination of surrounding soil, groundwater, and surface water
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Bushfire
– Community and stakeholder dissatisfaction.

3. Management strategies, actions, timeframes and responsibilities

Broad management strategies have been developed to minimise potential impacts associated with the Protected Exclusion Area. The management strategies, timing and responsibilities to minimise environmental impacts on the Protected Exclusion Area within the AMP are outlined in Table 1.

It is the responsibility of the Operations Manager of the AMV Inc. to implement this Protected Exclusion Area Management Plan during operation of the AMP.

Table 1 Protected Exclusion Area management strategies, actions, timeframes and responsibilities

Management Strategies	Actions	Timeframes	Responsibility
Site induction	Site induction includes the following specific management components: – Location of the Protected Exclusion Area – What can and can't be done within the Protected Exclusion Area. – What to do with injured fauna, if any.	On entry to site	All personnel (AMV Inc. Operations Manager, volunteers and competitors)
	All responsible persons to undertake the necessary training on the requirements of the Protected Exclusion Area within the AMP.	Site induction	AMV Inc. Operations Manager
Minimise impact on native vegetation	Demarcate approved clearing area to restrict clearing of native vegetation to the approved clearing area only. Any clearing outside the approved area to be recorded in the AMP Incident Register and reported to DWER as required.	At all times	AMV Inc. Operations Manager
	All plant and vehicle movement and access areas will be limited to the Stage 1A and Stage 1B areas only. No vehicle movement within the Protected Exclusion Area.		
	Maintain fencing around Development Exclusion Buffer (Figure 2, Appendix A).		
	Revegetation and weed control, where required, of the Protected Exclusion Area with suitable native species, identified within the CCW including, ARVS Vegetation Units 13, 47 and 49 (Appendix B). A revegetation plan shall be developed to identify sources of commercially available tubestock/ seed, areas of wetland and upland vegetation type planting, weed control, completion criteria and monitoring timeframes. Revegetation and weed cover will be monitored against adopted completion criteria to determine success of revegetation works. Monitoring will be undertaken until adopted completion criteria are met. If revegetation does not meet completion criteria further remedial works will be undertaken to ensure success of revegetation works.	As required	AMV Inc. operating manager

Management Strategies	Actions	Timeframes	Responsibility
Minimise impact on native fauna	Check tracks for presence of native fauna prior to commencement of AMP activity. If native fauna is disturbed during clearing it should be allowed to make its own way to adjacent vegetation. Any native fauna injured as a result of the AMP operation will be taken to a designated veterinary clinic or a DBCA nominated wildlife carer. All native fauna injuries and deaths to be recorded in the AMP Incident Register and reported as required. Maintain fencing around Development Exclusion Buffer.	At all times	AMV Inc. Operations Manager
Minimise impact to groundwater and surface water quality and quantity	No dewatering or disposal of dewatering effluent onsite due to drawn down of groundwater and ASS “moderate to low” risk area in the Protected Exclusion Area. Undertake waste management as per the Waste Management Plan. Undertake hydrocarbon management as per the Hydrocarbon Management Plan. Implement Water Management Plan.	At all times	AMV Inc. Operations Manager
Minimise erosion and sedimentation	Surface water drains and discharge locations to be positioned so that they have minimal impact on native vegetation.	Detailed design phase	AMV Inc. Operations Manager /contractors
	Install erosion and sediment control structures downstream of AMP activity areas and construct final landforms to be stable. Maintain erosion control structures and clean out on a regular basis to prevent erosion and sedimentation in the Protected Exclusion Area.	As required	AMV Inc. Operations Manager /contractors
Minimise disturbance of ASS	No soil disturbance within the Protected Exclusion Area. No dewatering or disposal of dewatering effluent onsite due to drawn down of groundwater and ASS “moderate to low” risk area in the Protected Exclusion Area. Any bore water drawdown onsite for water use should not encroach on the ASS risk area identified onsite.	At all times	AMV Inc. Operations Manager
Minimise risk of bushfire	Maintain 50 m wide, low fuel Development Exclusion Buffer around the Protected Exclusion Area (Figure 2, Appendix A). Undertake maintenance activities within the AMP as per the Addendum to the Bushfire Management Plan for Stage 1A and 1B (Bio Diverse Solutions, 2021).	As required	AMV Inc. Operations Manager
Onsite green waste reuse	Vegetation waste shall not be reused within the Protected Exclusion Area or Development Exclusion Buffer.	As required	AMV Inc. Operations Manager
Promote a high standard of housekeeping, thereby minimising litter and vermin attraction and infestation	Ensure domestic waste bins are lidded to minimise litter and vermin attraction and infestation.	At all times	AMV Inc. Operations Manager
	Manual litter sweep/ pick-up of the site to collect any windblown waste.	Weekly	AMV Inc. Operations Manager

4. Monitoring

Monitoring of the Site will be undertaken, by the AMV Inc. Operations Manager, so as to meet the following performance criteria:

– No impact on ecological values within the Protected Exclusion Area i.e. no clearing of native vegetation, increase in weed cover (density/ species composition), spread of Dieback or fauna deaths etc.
– No impact on surface water and groundwater quantity and quality compared to baseline monitoring levels.
– No erosion and sediment run-off to the Protected Exclusion Area.
– No soil disturbance within the Protected Exclusion Area.
– No dewatering or disposal of dewatering effluent onsite due to drawn down of groundwater and ASS “moderate to low” risk area in the Protected Exclusion Area. Any bore water drawdown onsite for water use should not encroach on the ASS risk area identified onsite.
– Successful revegetation results within the Protected Exclusion Area when measured against adopted performance criteria.
– No complaints received regarding operational activities and their impact on the Protected Exclusion Area.

5. Review

The Protected Exclusion Area Management Plan will be reviewed and updated no later than annually. A review may occur sooner if there is a material change in risk, legal requirements or an incident relevant to management of the Protected Exclusion Area. Mitigation strategies will be reviewed for effectiveness and any corrective actions will be implemented.

6. References

Bio Diverse Solutions. (2021). *Albany Motorsport Park, Lot 5780 Down Road, Drome, Bushfire Management Plan, Addendum Report.* Unpublished report prepared for GHD.

DoW. (2007). *Water Quality Protection Note 100: Motor sport facilities near sensitive water.* Perth: Department of Water.

Roberts Gardiner Architects . (2021). *Albany Motorsport Park Masterplan - Stage 1.* Unpublished masterplan for City of Albany.

Appendix A

Figures

Figure 1 *Project site location*

Figure 2 *Master plan*

Pikes Rd
Redmond - Hay River Rd
Phillips Rd
REDMOND
Hazzard Rd
Down Rd
Marbelup Rd
Down West Rd
Albany Hwy
Down South Rd
DROME
Cochrane Rd
Hunwick Rd
Gunn Rd
TORBAY
Corio Rd
Boccomazzo Rd
Sandberg Rd
Ding Rd

LEGEND
- Road
- Albany Motorsport Park
- Lot 5780 Down Road South
- Cadastre

SLIP

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. 6137331
Revision No. 0
Date 22/07/2021

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E

Appendix B

Revegetation species list

Upland vegetation type	Common Name	Commercial availability
ARVS 13/ Vegetation Type 2 (Bio Diverse Solutions 2019) -		
Jarrah/Sheoak/Eucalyptus staeri Sandy Woodland		
Overstorey		
Eucalyptus marginata	Jarrah	Yes
Allocasuarina fraseriana	Sheoak	Yes
Eucalyptus staeri		Yes
Corymbia calophylla	Marri	Yes
Shrub layer		
Banksia grandis	Bull Banksia	Yes
Pimelea imbricata		Seed
Hakea amplexicaulis	Prickly Hakea	Seed
Leucopogon verticillatus	Tassel Flower	Unlikely
Dasypogon bromeliifolius	Pineapple Bush	Seed
Leucopogon distans		Unlikely
Boronia crenulata	Aniseed Boronia	Unlikely
Xanthosia rotundifolia	Southern Cross	Yes
Gompholobium ovatum	Bold Beauty	Seed
Sedges and herb layer		
Anarthria prolifera		Unlikely
Cyathochaeta equitans		Seed
Desmocladus fasciculatus		Unlikely
Patersonia occidentalis	Purple Flag	Yes
Lindsaea linearis	Screw Fern	Unlikely
Dampiera pedunculata		Unlikely
Lepidosperma squamatum		Possible
Wetland vegetation types		
ARVS 47/ Vegetation Type 3 (Bio Diverse Solutions 2019) -		
Homalospermum firmum/Callistemon glaucus Peat Thicket		
Shrub layer		
Melaleuca preissiana	Moonah	Yes
Callistemon glaucus		Yes
Homalospermum firmum		Seed
Banksia littoralis	Swamp Banksia	Yes
Over		
Taxandria parviceps		Yes
Taxandria linearifolia		Yes
Acacia hastulata		Seed
Sedges and herb layer		
Empodisma gracillimum		Unlikely
Gymnoschoenus anceps		Unlikely
Dampiera leptoclada	Slender-shooted Dampiera	Unlikely

Upland vegetation type	Common Name	Commercial availability
ARVS 49/ Vegetation Type 4 (Bio Diverse Solutions 2019)		
Melaleuca preissiana Low Woodland		
Shrub layer		
Melaleuca preissiana	Moonah	Yes
Banksia littoralis	Swamp Banksia	Yes
Over		
Callistemon glaucus		Yes
Empodisma gracillimum		Unlikely
Homalospermum firmum		Seed
Taxandria parviceps		Yes
Taxandria linearifolia		Yes

ghd.com

→ The Power of Commitment

Appendix D

Water Management Plan

Albany Motorsport Park – Development Application

Water Management Plan

City of Albany

16 August 2021

→ The Power of Commitment

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Abbreviations

Term	Definition
AHD	Australian Height Datum
AMP	Albany Motorsport Park
AMV Inc.	Albany Motorsport Venue Incorporated
ASS	Acid Sulfate Soil
ATV	All-terrain vehicle
BGL	Below ground level
BMP	Best management practices
BoM	Bureau of Meteorology
CAMS	Confederation of Australian Motor Sport Limited
CEMP	Construction Environmental Management Plan
CEO	Chief Executive Officer
CoA	City of Albany
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environmental Regulation
EMP	Environmental Management Plan
ESA	Environmentally Sensitive Areas
FIA	Federation Internationale de l ’Automobile
FIM	Federation Internationale Motocyclisme
GIS	Geographic information system
GoWA	Government of Western Australia
GSMG	Great Southern Motorplex Group Inc.
JDAP	Joint Development Assessment Panel
LGA	Local Government Area
LWMS	Local Water Management Strategy
LGSTWSS	Lower Great Southern Towns Water Supply Scheme
MA	Motorcycling Australia
PDWSA	Public drinking water source area
RIWI Act	*Rights in Water and Irrigation Act 1914*
SMP	Stormwater Management Plan
TN	Total Nitrogen
TP	Total Phosphorus
WQPN	Water quality protection note
WSUD	Water sensitive urban design
4WD	Four-wheel drive

1. Introduction

1.1 Project description

The City of Albany (CoA) has engaged GHD Pty Ltd (GHD) to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure 1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

At full development, the proposed AMP will consist of:

– Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[1] and Motorcycling Australia (MA) *Track Guidelines*[2].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
– A motocross circuit designed and constructed in association with MA guidelines.
– An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area.
– Associated buildings and infrastructure.

Due to the scale and nature of the complex, the works have been broken down into two key stages which comprise of the following:

– Stage 1 (this Development Application):
  - Stage 1A: Construction of motocross track, 4WD driver training area, all-terrain vehicle (ATV) area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

A Master Plan, which illustrates the various aspects of the Site and staging areas, has been developed by the GSMG and CoA to support the Development Application for the AMP (Figure 2,Appendix A).

Once operational the AMP will be operated by Albany Motorsport Venue Incorporated (AMV Inc.).

1.2 Site location

Lot 5780 Down Road South, Drome is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. The AMP comprises 141.7 ha (including 0.2 ha for crossovers) in the eastern portion of the Site. Two areas within Lot 5780 are excluded from the AMP development and include 49.47 ha at the western end of the Site which is covered with native vegetation and a dam area (1.37 ha) on the northern boundary which is subleased to Plantation Energy.

The site is zoned 'Special Use – SU26' under City of Albany Local Planning Scheme No. 1.

The Site is bounded by Down Road West to the north, Down Road South to the east, Lot 5781 Down Road South to the south (privately owned) and a local road reserve and the Avon-Albany rail reserve to the west. The Site is located adjacent to the Mirambeena Timber Processing Precinct and sits within the industrial buffer area.

[1] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[2] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

1.3 Purpose of this report

This Water Management Plan (WMP) has been prepared to support the Application for Planning Approval. The WMP identifies the principles, criteria and water management strategies to manage water across the Site during construction and operational phases.

1.4 Albany Motorsport Park design

1.4.1 Events and usage

For the purposes of sizing facilities and infrastructure GSMG have provided conceptual usage of the AMP, with an assumed typical /frequent site attendance of 300 persons for the Motocross Precinct and 500 persons for the Race Track Precinct (i.e. competitors + officials + spectators). This was determined through discussion with the GSMG on the nature and size of expected typical events. For special events that anticipate a greater number of site attendees, additional water servicing management measures will need to be implemented (e.g. drinking water carts, port-a-loos).

1.4.2 Elements of AMP design

Key elements of the track design and consideration for Water Sensitive Urban Design (WSUD) are summarised in Table 1.

Table 1 Key AMP design elements and WSUD considerations

Track element	Description	WSUD considerations
AMP facilities	Includes the following: – Facility buildings (clubrooms, first aid, toilets, storage sheds) – Carpark (competitor and spectator) – Pit and garage areas – Refueling area	Considered impervious areas contributing surface runoff. To be protected from flood events. Pit and garage areas and refueling areas are key water quality treatment areas.
Access roads	Entry and exit roads consisting of 7 m wide gravel road, with 2 m wide grassed verges either side.	Road and verge have limited permeability.
Overflow parking	Grassed overflow parking	Considered pervious.
Race Track pavement	The Race Track pavement consists of 12 m wide track.	Considered impervious areas contributing surface runoff.
Race Track verge	The Race Track verge is predominantly grass and gravel with limited asphalt on T11.(recovery area)	Gravel verge is considered permeable.
Run-off areas	Run-off areas occur around the Race Track to enable drivers to dissipate speed during a race. Run-off areas are composed of loose gravel underlain by compacted pavement material.	Pavement layer underneath is considered impervious.
Motocross Track	Compacted clay and sand Motocross track.	Limited permeability.
4WD Driver Training and ATV Precinct	4WD and ATV area comprises finished natural surface after removal of some gravel, sand and clay to build the Motocross track.	Limited permeability.

1.5 Previous studies

Numerous studies and investigations have been undertaken to support development planning for the Albany Motorsports Complex. A summary of key documents of relevance to integrated water management of the Site is provided below:

- **Pavement Investigation Report 4212/1 Albany Motorsport Park Development** (Great Southern Geotechics , 2021)
  - A geotechnical investigation was completed for the proposed Albany Motorsport Park Development including assessment of soil types and profiles, characteristics of selected soil samples and completion of in-situ permeability testing at selected locations.
- **Albany Motorsport Park Local Water Management Strategy** (GHD, 2021)
  - A Local Water Management Strategy (LWMS) was prepared (as part of the Scheme Amendment) that identified the key water management principles, design criteria, and strategies for the proposed development of the Albany Motorsport Park. The water management strategies in the LWMS were developed with reference to the concept track design and with regard to the site characteristics.
- **Albany Motorsport Park Site Feasibility Study – Lot 5780 Down Road South, Drome** (GHD, 2018)
  - A site feasibility assessment was completed as part of preliminary planning investigations for the proposed Albany Motorsport Park. The feasibility assessment included a range of desktop technical investigations including review of servicing requirements and traffic impact assessment, and desktop geotechnical, hydrogeological, noise and water management planning. The feasibility assessment further included a preliminary risk assessment of the key issues identified and identified a suite of recommended remedial actions based on a hierarchy of controls. A number of recommended remedial and control actions were outlined to provide guidance for the various stages of the development.
- **Albany hinterland prospective groundwater resources map; Explanatory notes** (DWER, 2017)
  - Hydrogeological report and map for the Albany hinterland developed by the Department of Water and Environmental Regulation (DWER) as part of the Royalties for Regions South Coast Groundwater Investigation project. The Albany hinterland area in the South Coast is known as an important resource for water supply in the Great Southern region. In 2013, DWER undertook some hydrogeological (surface water and groundwater) investigations (as part of South Coast groundwater investigation by Western Australian Government on groundwater availability) and mapped prospective groundwater resources in the Albany hinterland region in order to support regional developments.
  - The report and map were used to develop a conceptual hydrogeological model for the Site as part of the LWMS, in order to understand the groundwater and surface water sources and pathways.
- **Motorplex Development, Down Road Surface and Groundwater Monitoring 2018 Summary Report** (Bio Diverse Solutions, 2018)
  - Summary reporting of shallow groundwater monitoring bore monitoring program. Monitoring of shallow groundwater bores installed across the Site commenced in February 2018. The 2018 report summarises preliminary results for the 2018 monitoring period, with additional monitoring completed up to November 2019 which were included in the LWMS.
- **Proposed Motorsport Park, Lot 5780 Down Road, Drome Reconnaissance Flora and Level 1 Fauna Survey Report** (Bio Diverse Solutions, 2019)
  - Bio Diverse Solutions completed a desktop assessment and reconnaissance flora survey and Level 1 Fauna survey of the Project Site in Spring 2018. The survey included identification of habitat trees and threatened fauna dependent hollows, and mapping of vegetation communities (GIS mapping, vegetation condition mapping, fauna habitat types and condition).

1.6 Scope and limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.3 of this report. GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

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2. Existing environment

This section summarises key information relating to catchment characteristics for the Site. The LWMS (GHD, 2021) provides a comprehensive overview of environmental characteristics.

2.1 Existing activities

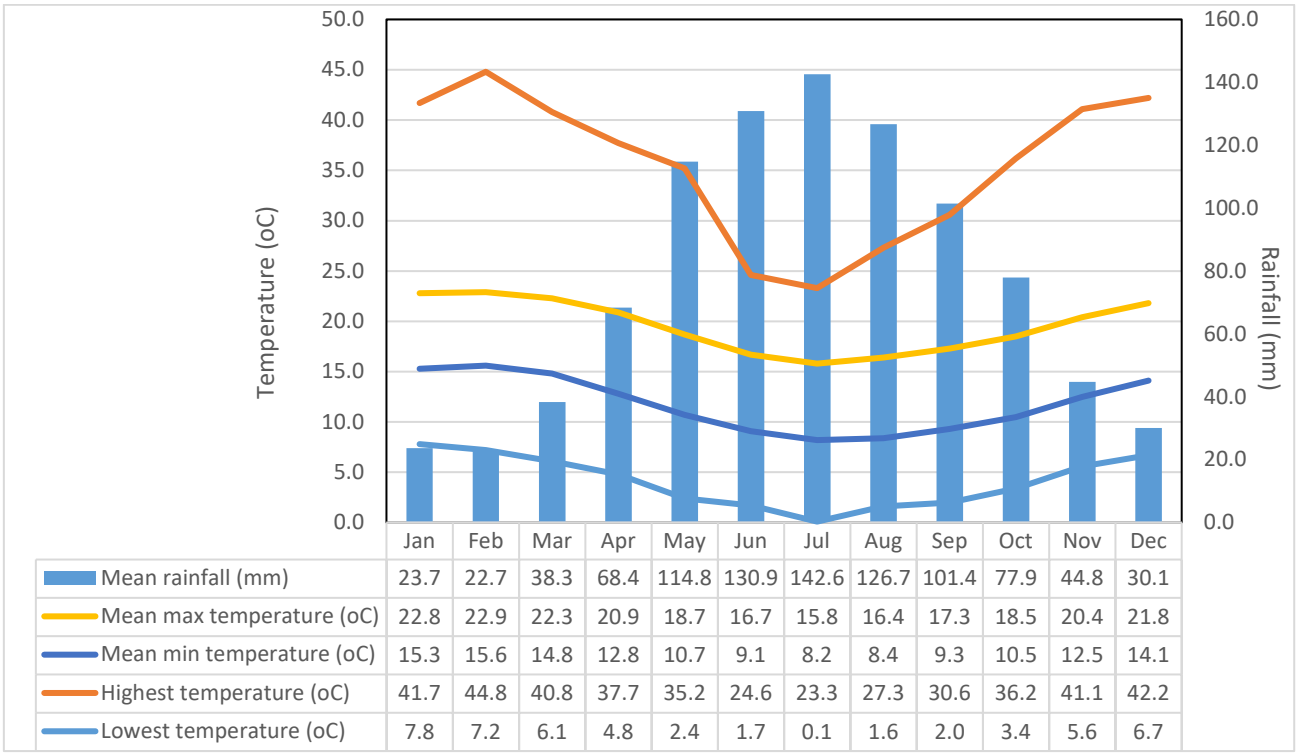
The perimeter of the site is entirely fenced and is currently used for the primary purpose of cattle grazing. Historically the site is likely to also have been used mainly for the purpose of agriculture, as well as some limited resource extraction (sand and gravel). The western end of the site consists of 52 ha of native vegetation that will be retained. A number of small dams are located across the site for stock watering. These will be retained and maintained for the AMP.

2.2 Climate

Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station is Albany Airport (Station No. 9500). This station records temperature, rainfall, relative humidity, wind speed and direction and has data available dating back to 1877. Table 2 illustrates recorded average monthly meteorological data for the Bunbury AWS BoM station for years 1877 to 2020 (BoM, 2020).

Temperatures range from a mean maximum of 22.9 °C in summer and drop to a mean maximum of 15.8 °C in winter. Mean minimum temperatures follow a similar trend, reaching 15.6 °C in summer and 8.2 °C in winter. Rainfall is low throughout the summer months and peaks in July, with a monthly average of 142.6 mm. The mean annual rainfall is 925.2 mm, with approximately 103.1 rain days a year. Relative humidity at Albany reflects the Mediterranean climate, demonstrating drier summers and a comparatively high relative humidity of 82 % in the morning in winter (BoM, 2020).

Table 2 Mean rainfall and temperatures in the Albany region (Site No. 9500) (BoM, 2020)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	23.7	22.7	38.3	68.4	114.8	130.9	142.6	126.7	101.4	77.9	44.8	30.1
Mean max temperature (oC)	22.8	22.9	22.3	20.9	18.7	16.7	15.8	16.4	17.3	18.5	20.4	21.8
Mean min temperature (oC)	15.3	15.6	14.8	12.8	10.7	9.1	8.2	8.4	9.3	10.5	12.5	14.1
Highest temperature (oC)	41.7	44.8	40.8	37.7	35.2	24.6	23.3	27.3	30.6	36.2	41.1	42.2
Lowest temperature (oC)	7.8	7.2	6.1	4.8	2.4	1.7	0.1	1.6	2.0	3.4	5.6	6.7

2.3 Topography, landform and soils

2.3.1 Topography

The surface elevation of the site ranges from approximately 41 m AHD to 73 m AHD (GoWA, 2021). The lowest elevation is on the southern boundary and extends through the center of the site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the site.

2.3.2 Surface soils and geology

Regional geology is described with reference to the 1:50,000 Environmental Geology series map (Albany sheet) and the 1:250,000 Geological Series map (Mt Barker – Albany sheet). These indicate the site is underlain by Cainozoic sand of colluvial origin – "*Qc: Colluvium – Sand, silt and clay*" on the slopes and within the low-lying areas of the Marbelup Brook "*QA – Clay, silt, sand and gravel in watercourses*" (Allen & Sofoulis, 1984). The sand is described as pale grey, fine to coarse, angular to sub-rounded quartz that is loose and moderately sorted and contains occasional pebbles of laterite. The thickness of the sand unit is not indicated on the maps, however the 1:250,000 map sheet indicates sand unit generally overlays laterite.

Local soils and geology are further delineated by Department of Primary Industries and Regional Development (DPIRD) Soil Landscape Mapping as summarized in Table 3 and presented in Figure 3 (Appendix A).

Site investigations were completed by Great Southern Geotechnics across the site in March 2021 to assess soil types and profiles and in-situ permeability. Eight test pits were completed, with soil types typically in agreement with DPIRD Soil Landscape Mapping. Gravels were identified on the western slope in the vicinity of the 4WD Driver Training and ATV Area, and deep sands present on the valley slopes and duplex soils in the valley floors.

In-situ soil permeability testing was completed for test pit locations TP4 to TP8, with saturated hydraulic conductivity ranging between 0.41 m/day (TP8) and 3.29 m/day (TP6 and TP7).

The locations of the test pits, soil logs and soil permeability results provided in Appendix B.

Table 3 Soil map units within the Project Site (GoWA, 2021)

Map unit symbol	Name	Landform	Geology	Soil
242KgDMc	Dempster Crest phase	Broad convex crests of sandy and lateritic spurs and ridges	Deeply weathered siltstone	Duplex sandy gravels; Grey deep sandy duplexes; Pale deep sand; Shallow gravels
242KgS7f	Minor Valleys S7 floor phase	Foot slopes and swampy valley floors of minor valleys	Colluvial and alluvial deposits over weathered sedimentary rocks	Wet and semi-wet soils; Pale deep sands; Grey deep sandy duplexes
242KgS7h	Minor Valleys S7 slope phase	Side slopes of minor valleys	Colluvium sedimentary rocks	Pale deep sands; Grey deep sandy duplexes
242ReDMc	Dempster Crest phase	Elongate crests	No information recorded	Sands and laterite

2.3.3 Acid sulfate soils risk mapping

An overlay of the site onto the DWER ASS risk mapping for the Albany-Torbay region (GoWA, 2021) is presented as Figure 4 (Appendix A), which identifies that the site is located outside of the boundary extent of the mapped areas.

Given that tributaries of Marbelup Brook located approximately 750 m to the south of the site are mapped as "Moderate to Low Risk" of ASS occurring, GHD has inferred that where these tributaries of Marbelup Brook extend into the site that they would also be considered to represent the same level of ASS risk. This is also consistent with the more broadly mapped risk areas where there are obvious low lying drainage lines, creeks and tributaries.

To more accurately inform the ASS risk onsite, a preliminary ASS investigation was completed as part of the onsite geotechnical investigation undertaken by Great Southern Geotechnics on 25 March 2021. Based on the ASS assessments to date, inorganic sulfidic sources capable of rapid acid release upon disturbance were not observed. Other, more slow releasing acidity sources were observed in the ASS assessment and will require management if disturbed in volumes greater than 100 m^3.

Any impacts associated with dewatering (if required) during construction will need to be considered in the ASS management plan. Further detail is captured in the associated AMP Environmental Management Plan.

2.4 Hydrology

A summary of desktop searches related to hydrology datasets is provided in Table 4. Further detail is provided in the following sections where relevant.

Table 4 Summary of hydrology dataset queries within the Project Site

Dataset	Details	Result
Public Drinking Water Source Areas (PDWSA)	PDWSA is a collective term used for the description of Water Reserves, Catchment Areas and Underground Pollution Control Areas declared (gazetted) under the provisions of the *Metropolitan Water Supply, Sewage and Drainage Act 1909* or the *Country Area Water Supply Act 1947*.	Site lies within the Priority 2 Marbelup Brook Catchment Area (Section 2.4.1).
Groundwater Areas	Groundwater areas proclaimed under the *Rights in Water and Irrigation Act 1914* (RIWI).	Site lies within Albany Groundwater Area (Section 2.4.2, Figure 5).
Surface Water Areas	Surface water areas proclaimed under the RIWI Act 1914.	None present.
Irrigation District	Irrigation Districts proclaimed under the RIWI Act 1914.	None present.
Rivers	Rivers proclaimed under the RIWI Act 1914.	None present.
Waterways Management Areas	Areas proclaimed under the *Waterway Conservation Act 1976*.	None present within the Site; however, the Albany Waterways Management Area is located approx. 800 m to the north.
Clearing Control Catchments	Country Area Water Supply Act 1947 Part 2A.	None present.
South Coast Significant Wetlands	Represents the regionally significant wetlands of the South Coast.	Site contains the Marbelup Flats, a conservation class wetland (Section 2.4.3).

2.4.1 Public drinking water source area

The site is located within a Priority 2 (P2) area of the Marbelup Brook public drinking water source area (PDWSA) (GoWA, 2021). This PDWSA is gazetted under the *Country Areas Water Supply Act 1947*, however is currently not used. It has been identified as a potential future water source option in the *Great Southern Regional Water Supply Strategy 2014* (DoW, 2014).

The Minister for Water has formally provided advice to the City of Albany (Kelly, 2018) that while a motorsport facility is incompatible with a P2 PDWSA (DoW, 2016), "*there are measures that can be put in place to protect water quality should the City proceed to approve the development*". These measures are further discussed in Section 4.2 (Wastewater servicing), Section 5.2 (Stormwater quantity management), Section 5.3 (Stormwater quality management) and Section 6 (Construction management) and Section 7 (Monitoring).

2.4.2 Groundwater conditions

On a regional scale, the 250K Map Series – Hydrogeology identifies a "*sedimentary aquifer within intergranular porosity – extensive aquifers, major groundwater resources*" underlying the Site (DoW, 2002). Groundwater salinity in the local area is in the range of 500 – 1000 mg/L, which is considered to be marginal for productive uses (GoWA, 2021).

A review of the DWER Water Information Reporting database identified no publicly available groundwater level or groundwater quality data within 2 km from the Site.

2.4.3 Wetlands and groundwater dependent ecosystems

Desktop searches identified no internationally important (Ramsar) or Nationally Important listed wetlands within 5 km of the Site (GoWA, 2021).

The South Coast Significant Wetlands dataset (DBCA-018) identifies the unnamed water course located within the Site as the Marbelup Flats, part of the King River Suite, and a Conservation Class wetland (Figure 4, Appendix A) (GoWA, 2021).

2.4.4 Surface water features

An unnamed creek line runs from the north-east corner of the site through to the south-west corner, from where it joins into Marbelup Brook located approximately 800 m west of the site boundary.

During a site visit (June 2018) the watercourse was observed to be in a modified state, with cattle currently having access to the watercourse. Erosion was evident, particularly in the eastern extent of the watercourse. This area was also mostly devoid of native vegetation, with the exception of some sedges (*Juncus* spp) (GHD, 2018). The western section of the watercourse contains native shrubs / sedges and had a defined bed / banks.

Plate 1 *Eastern extent of the watercourse showing evidence of erosion and cattle access*

2.4.5 Summary of pre-development monitoring (Bio Diverse Solutions)

Bio Diverse Solutions completed quarterly monitoring of surface water and groundwater at the Project Site for the period February 2018 to November 2019. An overview of the key results is provided in the following sections with sampling locations, the 2018 summary report and baseline water quality results for surface water and groundwater provided in Appendix C.

2.4.5.1 Surface water

Field records indicate two surface water sample locations within the unnamed watercourse were flowing for all monitoring dates in 2018 (Feb, May< Sep, Nov 2018), with flow at the downstream site (CS01) on all dates in 2019 (Feb, May, Aug, Nov).

An overview of key surface water quality data include:

- Surface water pH is moderately acidic, ranging from 4.46 to 6.85.
- Total nitrogen (TN) concentrations were typically higher at the upstream surface water location CS02 (TN range of 2 mg/L to 6.5 mg/L) compared to the downstream location CS01 (TN range from 0.5 mg/L to 2 mg/L)
- Total phosphorus (TP) concentrations were higher at the upstream surface water location CS02 (TP range from 0.22 mg/L to 0.55 mg/L) reflecting the TP concentration of bores in proximity to CS02. TP concentrations were typically below detection levels at the downstream surface water location CS01.
- Dissolved metals parameters including aluminium, iron and zinc were elevated in several samples at downstream surface water location CS01. Site CS02 reported isolated elevated aluminium, iron and zinc.
- MBTEXN parameters reported below detection in all surface water samples.
- TRH fractions were detected in some surface water samples.
- PAH parameters reported below detection in all surface water samples.
- Microbial testing detected microbial parameters in the majority of surface water samples.

2.4.5.2 Ground water

A summary of groundwater level records is provided in Table 5.

Table 5 Groundwater levels

Bore ID	Easting (m)	Northing (m)	Ground level – est. RL (mAHD)	Depth to Groundwater (mBGL)							
				Feb 2018	May 2018	Sep 2018	Nov 2018	Feb 2019	May 2019	Aug 2019	Nov 2019
SB01	567179	6133615	58.4	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB02	567404	6133889	49.6	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB03	567519	6134401	56.8	> 2.0	> 2.0	1.21	1.93	> 2.0	> 2.0	1.45	> 2.0
SB04	567700	6134179	48.2	> 2.0	0.91	0.30	1.07	1.66	1.11	0.37	1.48
SB05	568056	6134636	60.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB06	568131	6134478	53.6	0.87	0.70	0.00	0.59	1.03	0.73	0.06	0.73
SB07	567939	6134264	51.6	0.64	0.54	0.44	0.64	0.95	0.58	0.52	0.64
SB08	568308	6134637	56.5	> 2.0	1.55	0.18	1.27	1.58	1.42	0.38	1.29
SB09	568032	6134141	50.3	0.66	0.57	0.44	0.78	0.98	0.87	0.61	0.99
SB10	567886	6133756	62.7	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB11	568314	6134267	68.6	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0	> 2.0
SB12	568474	6134781	60.2	> 2.0	> 2.0	1.04	> 2.0	> 2.0	> 2.0	1.1	> 2.0
DB01	-	-	-	-	-	-	-	-	7.10	6.95	6.97
Notes	BGL – below ground level - Where results shown as "> 2.0", this means the groundwater table was not intersected by the shallow groundwater monitoring bore (being only 2 m deep)										
	Results shown in red font - groundwater table was intersected by the groundwater monitoring bore.										
	Deep bore (DB01) monitoring only commenced from May 2019.										

An overview of key groundwater quality data include:

- Groundwater pH is moderately acidic, typically ranging from 3.82 to 7.52. pH at SB06 and SB07 (2.5 and 2.8) were significantly lower in February 2018 sampling event.
- Total nitrogen (TN) concentrations were typically elevated across the Site (range from 2 mg/L to 28 mg/L), which may be attributed to the historic and current farming practices. Significantly elevated TN at some bores (SB06, SB07 and SB08) coincided with sampling following peak groundwater levels. Exceptionally elevated TN concentrations reported in bore SB08 in February and May 2019 (110 and 79 mg/L), and additional sampling is recommended to confirm concentrations.
- Total phosphorus (TP) concentrations were typically elevated in some bores (SB06, SB07 and SB08).
- Dissolved metals parameters including aluminium, iron and zinc were elevated in the majority of samples in all bores, suggesting background concentrations of these metals are elevated due to the local soil and geological profile. Dissolved chromium was also elevated above the default trigger value in some bores.
- With the exception of toluene MBTEXN parameters reported below detection in the majority of groundwater samples. Toluene was detected in bore SB04 on all sampling occasions, and in bores SB06, SB07, SB08, SB09 in some sampling occasions. Toluene was elevated above the ANZG (2018) default toxicant guideline value in samples from SB07 (770 ug/L) and SB08 (210 ug/L, 310 ug/L, 980 ug/L).
- TRH fractions were detected in some groundwater samples. Particularly elevated TRH fractions were reported for bore SB07 and SB08 in February 2019. It is recommended that additional TRH samples are collected, with silica gel cleanup requested from the laboratory where elevated samples are identified.
- With the exception of a single detection for Naphthalene (SB06, Sept 2019) PAH parameters reported below detection in all groundwater samples.
- Microbial testing detected microbial parameters in some groundwater samples at all bores

2.4.6 Conceptual hydrogeological model

A conceptual hydrogeological model was developed for the site to gain an initial understanding of surface and groundwater water flows and potential linkages. Soil landscape mapping and regional geology mapping were used to infer geological units and soil types in the absence of deeper borehole data. The outcomes of the model (see Appendix D) noted:

– The groundwater levels observed in the shallow bores indicate that groundwater is present in the lower lying areas nearer the creek and will be most likely be supplying the creek with groundwater inflow.
– The groundwater levels and gradient, inferred from topography, supports that groundwater discharges into the creek.
– Shallow/perched groundwater may discharge and resurface via sandier layers that sit on top of more impermeable lateritic, coffee rock or clay layers; especially when there is significant slope.
– The discharging groundwater either expresses as surface water, or migrates within the deeper more permeable deposits.

2.4.7 Existing hydrological regime

2.4.7.1 Pre-development hydrology

A catchment analysis was completed using CatchmentSIM to delineate pre-development catchments for the entire site, including upstream areas. Refer to Figure 6 in Appendix A.

A one-dimensional DRAINS model with ILSAX hydrology was used for calculation of runoff. Model parameters included:

– Paved (impervious) area depression storage = 1 mm
– Supplementary area depression storage = 1 mm
– Grassed (pervious) area depression storage = 5 mm
– Soil Type 3 (slow infiltration rates).

The assessment was determined in accordance with Australian Rainfall and Runoff (ARR) 2016 (Geoscience Australia, 2016), with design rainfall data from the ARR 2016 data hub and the Bureau of Meteorology (BoM, 2018). The estimated peak flows for pre-development from various catchments are shown below in Table 6. Further assessment of specific areas impacted by the project works are further detailed in section 5.2.5. These focus on predevelopment areas surrounding the western motocross development and the eastern race track development, where the majority of the changes to the site occur.

Table 6 Estimates of peak flows pre-development

Catchment	Area (ha)	Impervious fraction (%)	Peak flows (m^3/s)			
			1EY (1 yr ARI)	0.5 EY (2 yr ARI)	10% AEP (10 yr ARI)	1% AEP (100 yr ARI)
E1	19.8	3	0.06	0.08	0.43	2.44
E2	17.4	3	0.08	0.10	0.39	2.24
E3	15.3	3	0.01	0.02	0.36	1.97
E4	13.9	0	0.00	0.00	0.45	2.27
E5	36.4	60	0.00	0.00	0.00	0.67
E6	17.4	0	0.00	0.00	0.33	1.81
S1	14.1	0	0.00	0.00	0.31	1.64
S2	23.4	0	0.00	0.00	0.57	3.30
S3	41.6	0	0.00	0.00	1.02	6.07
S4	33.6	0	0.00	0.00	0.65	3.64

Catchment	Area (ha)	Impervious fraction (%)	Peak flows (m^3/s)			
			1EY (1 yr ARI)	0.5 EY (2 yr ARI)	10% AEP (10 yr ARI)	1% AEP (100 yr ARI)
S5	25.1	0	0.00	0.00	0.90	4.18
TOTAL	262.7	-	0.03	0.03	1.82	17.0
Note:	*E denotes an external catchment, S denotes a catchment within the site or with a significant portion of the catchment within the site.*					
	TOTAL denotes the flows leaving the site via the creek/wetland which may be different to the individual catchments due to routing and storage within the site/model.					

2.4.7.2 Flood modelling

To inform the design of site infrastructure, a site-wide modelling of the existing (or pre-development) flood conditions was undertaken. This entailed simulating the 1% AEP storm event over the site using TUFLOW (Build 2020-10-AA), which is a program for simulating depth-averaged, one and two-dimensional free surface flows (such as occurs from floods and tides). Calibration of the model was not performed, as there are no operational streamflow gauges in vicinity and/or relevant to the site.

2.4.7.2.1 Model setup and assumptions

Modelling was done using a 'rainfall-on-grid' approach, in which the design rainfall hyetograph is applied directly to a Digital Elevation Model (DEM) that describes the site topography. The DEM was generated with a 5 m cell resolution using 1 m surface contours from Landgate, which is the finest available topography data that is publicly available for the site.

Routing of surface runoff over the DEM is influenced by the surface roughness, which is characterised by assigning Manning's roughness values to each DEM cell. Characterisation of the surface roughness was done through manual interpretation of the latest aerial imagery, with each identified surface type assuming the roughness values listed in Table 7.

Table 7 Adopted surface roughness values in flood modelling

Surface type	Manning's roughness n*
Cleared and grassed	0.050
Forested	0.070
Bare earth	0.040
Paved/roof areas	0.020

* Note: Values determined based on Table 6.2.2 in Book 6 of ARR 2019.

Catchment hydrological losses were simulated using an initial and continuing loss approach. With the exception of existing impervious areas, an initial and continuing loss values of 27 mm and 3.4 mm/hour were globally applied to the model domain. For paved and roofed areas, the initial loss was set to 1 mm and no continuing loss was applied. The effects of rainfall pre-burst are also accounted for in modelling by subtracting the median pre-burst depths (extracted from the ARR Data Hub) from the initial loss value.

Culverts across Down Road West were simulated as one-dimensional elements within the greater two-dimensional model. In the absence of detailed survey information, the culvert sizes were determined based on manual measurements taken by the Great Southern Motorplex Group on 17 June 2021; whilst culvert levels were set the same as the topographical low spots. Only two of the three culverts identified along the road were modelled. The culvert near the northeast corner of the site (i.e., Culvert E on Figure 7) could not be modelled due to the coarse resolution of the topography dataset, which did not accurately reflect the road geometry and adjacent table drains.

An open flow boundary is assumed along the perimeter of the model domain. This effectively simulates free discharge of flood waters out of the model and towards low lying areas external to the domain.

2.4.7.2.2 Modelling outcomes

The simulated maximum flood depths and flow velocities for the 1% AEP storm event are provided in Figure 7 and Figure 8 in Appendix A. The results demonstrate that majority of the site drains to the central creek line via overland sheet flow and has very shallow or negligible flood depths; other than in obvious gullies or valleys.

Elevated floodwaters are simulated along the main creek that traverses the site, with localised spots where the flood depth and flow velocities exceed 1 m or 1 m/s in the 1% AEP storm event. Nevertheless, the simulated creek flood extents are largely contained within the proposed Protected Exclusion Area (which will be fenced off) and not expected to interfere with future site operations.

Concentrated flows are expected to occur across the centre of the motocross track, as well as the northern and southern portions of the multi-use racetrack. The simulated flood depths at these areas are generally less than 200 mm but will require provisioning of culverts and/or floodways to mitigate standing water on tracks.

Some flooding is simulated at two low spots north of Down Road West, with flood depths of up to 0.6 m at the western low spot and as high as 0.9 m at the eastern one in the 1% AEP storm event. Both low spots are drained via cross-carriageway culverts that discharge directly to the northern boundary of the site. In particular, the western culvert (i.e., Culvert W) discharges directly towards the proposed motocross track and diversion of these flows will need to be considered as part of this site's stormwater management. This is further discussed in Section 5.

Table 8 summarises the simulated flows and velocities through each culvert.

Table 8 Simulated 1% AEP culvert flows and velocities

Culvert details	Culvert W	Culvert C	Culvert E
Diameter (mm)	750	900	1050
Flow (m^3/s)	0.48	1.07	3.54*
Velocity (m/s)	2.04	2.61	NA

* Note: Culvert not modelled. Overland surface flow used as proxy for culvert flow.

Some external catchment runoff from the CBH Mirambeena grain receival site is also expected to flow across Down Road and into the site from the north-east corner, partially through Culvert E. The natural flow path of this external flow cuts across the northern tip of the multi-use track and will need to be diverted accordingly.

2.5 Water users

2.5.1 Surface water

Review of aerial photography identifies numerous small dams located within Marbelup Brook and riparian zone (as demarcated by the DWER South Coast Significant Wetlands coverage), and one potential surface water abstraction (pumping) site downstream of the Site. These locations are summarised in Appendix E.

2.5.2 Groundwater

Groundwater allocation in Western Australia is regulated by DWER. The DWER Water Register notes one groundwater license for the Site and five groundwater licenses downgradient / downstream of the Site along the Marbelup Brook. The groundwater licences are summarised in Appendix E.

2.6 Environmentally sensitive areas

2.6.1 DWER Environmentally sensitive areas

The DWER maintains a dataset of Environmentally Sensitive Areas (ESA). ESAs are areas of land deemed to support conservation, heritage or ecological value, or an area protected through existing State Policy. There are no mapped Environmentally Sensitive Areas (ESA) within 5 km of the Project Site (DWER-046).

As per DWER guidance (DER 2014) a conservation category wetland is "*a defined wetland and the area within 50 m of the wetland"* and is declared to be an ESA under the *Environmental Protection Act 1986.* The Conservation Class wetland within the Project Site (Section 2.4.3, Figure 4) is identified as an ESA.

2.6.2 Groundwater dependent ecosystems

A search of the online *Groundwater Dependent Ecosystems (GDE) Atlas* (BoM 2020) does not identify any terrestrial or aquatic groundwater dependent ecosystems within the Project Site boundary.

2.6.3 Flora and fauna

Bio Diverse Solutions (2019) completed a Level 1 Fauna Survey and a reconnaissance level flora survey in spring 2018. The reconnaissance level flora survey did not identify any EPBC Act, BC Act or State Priority listed flora species within the Project Site.

The Level 1 fauna survey observed four conservation significant fauna species directly and indirectly within the broader survey area including:

– Baudin's Cockatoo (*Calyptohynchus baudinii*) (Vulnerable, Schedule 2)
– Forest Red-tailed Black Cockatoo (*Calyptohynchus banksia naso*) (Vulnerable, Schedule 3)
– Western Brush Wallaby (*Notamacropus irma*) (Priority 4)
– Southern Brown Bandicoot, Quenda (Isoodon fusciventer) (Priority 4).

Marbelup Brook was identified to have high aquatic fauna species richness from monitoring for the study *Ecological values of waterways in the south coast region, Western Australia* (Cook, Janicke, & Maughan, 2008). The high aquatic fauna species richness was partly attributed to the high number of samples collected, comprising 28 sites including three sites (MAR07, MAR08 and MAR09) located within and immediately downstream of the Site.

2.7 Sewage sensitive areas

The Department of Planning Lands and Heritage Map of Sewage Sensitive Areas identifies that the majority of the site is located within a sewage sensitive area (within 1 km of significant wetlands).

3. Design criteria and objectives

This section outlines the design criteria and objectives that the Water Management Plan (WMP) for the site must achieve. The design criteria have been developed with reference to the principles and objectives and guidance in the following:

– AMP Feasibility Study (GHD, 2018)
– *Stormwater Management Manual for Western Australia* (DoW, 2007)
– *Decision process for stormwater management in Western Australia* (DWER 2017)
– *Subdivision and Development Guidelines 2018* (CoA, 2018)
– *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007)
– *WQPN 28: Mechanical servicing and workshops* (DoW, 2013)
– *WQPN 52: Stormwater management at industrial sites* (DoW, 2006).

Water and wastewater supply and servicing

This WMP proposes the following water supply design criteria for the site:

– Criteria WS1: Potable water will be supplied through collection and treatment of rainwater to potable standard. Non-potable water will be supplied via bore, site dam and rainwater tanks.
– Criteria WS2: Shortfalls in potable water supply will be imported to the site.

Further detail is provided in Section 4.1.

The wastewater management strategy proposes the following design criteria for the site:

– Criteria WW1 (Stage 1A): Domestic wastewater will be serviced using a combination of transportable toilets (with waste disposal managed by a waste management contractor) and a permanent on-site treatment and disposal system, in accordance with the *Government Sewerage Policy* (DoH, DPLH, DWER, 2019) for a PDWSA and Sewage Sensitive Area.
– Criteria WW1 (Stage 1B): Domestic wastewater will be serviced using transportable toilets (with waste disposal managed by a waste management contractor)
– Criteria WW2: Wastewater from vehicle maintenance, refuelling and washdown areas will be managed in accordance with WQPN 28.

Further detail of domestic wastewater servicing is provided in Section 4.2.1, with detail of vehicular maintenance servicing areas provided in Section 4.2.2.

Stormwater management

This WMP proposes the following stormwater design criteria for the site:

– Criteria SW1: Maintain the hydrological regime of the site and surrounds.
– Criteria SW2: Maintain serviceability of motorsport tracks for the 10% AEP event.
– Criteria SW3: Provide adequate drainage to achieve 300 mm separation from the 1% AEP event for key infrastructure (e.g. vehicle maintenance areas, buildings, wastewater facilities).

Water quality management

This WMP proposes the following water quality design criteria for the site:

– Criteria WQ1: Manage stormwater from the Site to ensure no deterioration in surface and groundwater quality.
– Criteria WQ2: Retain and treat stormwater runoff from constructed impervious surfaces generated by the first 15 mm of rainfall at source, prior to discharge or disposal to groundwater.
– Criteria WQ3: Manage stormwater quality from the Site in accordance with WQPN 100, WQPN 28 and WQPN 52.

4. Water supply and servicing

4.1 Water supply

4.1.1 Potable water

The Water Corporation's Lower Great Southern Towns Water Supply Scheme (LGSTWSS) runs along Albany Highway, with the nearest connection point approximately 4 km to the east at 66 Down Road (fertiliser distribution warehouse) (Water Corporation, 2018). Hence, it is proposed to service Site drinking water needs through a combination of collected rainwater and water carts.

Uncontaminated rainwater from the Site roof runoff (AMP buildings) will be collected in standard 110,000 litre rainwater tanks. At source treatment by household-scale filtration and ultraviolet disinfection will be undertaken. This will allow a safe drinking water supply to the AMP facilities (i.e. clubrooms, canteen, etc.) and ablutions.

A preliminary water balance for the site suggests that rainfall alone will be insufficient to meet expected demand for regular attendance of 500 people. Where there is a shortfall, the venue operator will purchase and cart water to the Site. Similarly for large-scale events, additional potable water will need to be carted to site.

4.1.2 Non-potable

Water demands for other external, non-potable uses (i.e. garden irrigation, toilet flushing, vehicle washdown, dust suppression, etc.) will be met from Site bore, dams and rainwater tanks (where possible). The GSMG is negotiating with Plantation Energy for access to their 4,000 kL Bremer West superficial groundwater allocation (licence number 168308).

4.1.3 Fire water

Fire water supply will be through on-site resources via bore extraction to tank storage and pumped to facilities around the site. Storage of water dedicated for firefighting will be located in the north and the eastern precincts and tanks are to be a minimum of 110,000 L (as shown on Masterplan).

4.2 Wastewater servicing

4.2.1 Domestic wastewater

The Water Corporation's Albany sewerage scheme is not in close proximity to the Site, with the nearest connection point being at Lancaster Road, McKail (being some 10 km distant).

Stage 1A of the development will be serviced by a combination of transportable toilet units (Plate 2) and permanent toilets in the multi-purpose building (sized for 300 patrons). The permanent toilets are connected to an on-site treatment and disposal system, designed in accordance with the *Government Sewerage Policy* (DoH, DPLH, DWER, 2019) for a PDWSA and Sewage Sensitive Area. A full site and soil evaluation report is attached in Appendix H. The transportable toilet units will be maintained and regularly serviced by a local waste disposal contractor. For large-scale events additional portable hire toilet units will be used to accommodate peaks in wastewater production.

Stage 1B of the development will be serviced by transportable toilet units only (Plate 2). The transportable toilet units will be maintained and regularly serviced by a local waste disposal contractor. For large-scale events additional portable hire toilet units will be used to accommodate peaks in wastewater production.

Plate 2 *Example portable toilet unit*

4.2.2 Vehicular maintenance wastewater

The Site is proposed to be used for motor sport activities. All vehicle maintenance and servicing including vehicle washdown and refueling, will be undertaken in dedicated refueling and pit areas.

To minimise the risk of contamination to sensitive receptors the refueling and pit areas will be designed and constructed in accordance with WQPN 100 and WQPN 28, including the following attributes:

– Have a low permeability sealed concrete pad to minimise seepage and assist cleanup of spills.
– Will be covered and weatherproofed to prevent stormwater intrusion.
– Designed with floors graded to a pit and pipe network that will be serviced by a sediment trap and oil water separator, to ensure stormwater and wastewater are managed separately from other parts of the Site.
– Be double bunded to contain water and spills within the internal drainage network.
– No fuel or combustible chemicals will be stored on-site.

On-site personnel will complete regular inspection and maintenance of the vehicle maintenance areas wastewater infrastructure to ensure they are operating as required.

Sediment from the sediment trap will be removed as required and disposed of at a registered waste facility. Any hydrocarbons removed from the oil water separator will collected and stored within appropriate sealed containers for disposal at a registered waste facility.

Spill kits will be held at the vehicle maintenance areas in the event of any hydrocarbon spill. When spill kits are used the material will be disposed of at a registered waste facility.

On-site personnel will be trained in the use and disposal of spill kits.

A separate Hydrocarbon Management Plan is included as part of the Environmental Management Plan.

5. Stormwater management plan

5.1 Overview

Stormwater management across the Site has been developed based on an understanding of the key site risks. The design of the Site and stormwater management elements has been iterative and developed with regard to key site characteristics including nature of the proposed activities, external catchment flows, steep terrain over parts of the Site, shallow groundwater conditions over parts of the Site, high surface/groundwater connectivity and downstream receptors and water users.

The key components of the Stormwater Management Plan for the site include:

– Flows that originate upstream of the site will be diverted around motorsport park infrastructure to maintain pre-development hydrology, and to keep externally generated flows separated from stormwater runoff from the motorsport park infrastructure.
– The Site has been designed to ensure key infrastructure (vehicle maintenance areas, buildings, bioretention basins) are sited outside of the modelled 1% AEP flood area (Section 2.4.7.2).
– Key stormwater management controls and best management practices have been considered for various parts of the Site infrastructure to reduce or minimise risk to surface and groundwater quality.
– Stormwater generated from areas considered to have a higher risk of discharging potential contaminants of concern (vehicle maintenance areas) will be managed separate to stormwater runoff from the remainder of the site.
– The first 15 mm of runoff generated from car parking, hardstand areas, motocross track and race track will be treated in bioretention areas.
– Runoff generated from Site buildings will be directed to rainwater tanks, with overflow infiltrated close to source or diverted to swales.

The following sections provide a further detail of the design of the stormwater management system for Stage 1A and 1B of the proposal, with Section 5.2 detailing the management of stormwater quantity and Section 5.3 detailing the management of stormwater quality.

5.2 Stormwater quantity

5.2.1 Principles and objectives

The management of stormwater quantity is proposed in accordance with the principles and objectives of the technical feasibility study (GHD, 2018), the *Stormwater Management Manual for Western Australia* (DoW, 2007); the *Decision Process for Stormwater Management in Western Australia* (DoW 2017), WQPN and the *Subdivision and Development Guidelines 2018* (CoA, 2018).

For vehicle maintenance areas (refueling, washdown and pit areas) stormwater and wastewater generated in these areas for all events up to the 1% AEP will be managed internally as detailed in Section 4.2.2. The stormwater system within this area is further described in Section 5.2.3.2. Vehicle maintenance areas will not be used during events exceeding the 10 year ARI event (10% AEP).

For all other parts of the Site the following principles apply with detail provided for Stage 1A in Section 5.2.2 and Stage 1B in 5.2.3.

1-year ARI event and smaller (1EY)

To retain and treat the 1-year ARI (1EY) event:

– Runoff from impervious areas will be managed via a range of measures including:
    - Small event runoff from impervious areas will be directed to bioretention basins for treatment, prior to infiltration where there is sufficient separation to groundwater.

- Targeted rainwater (roof water only) capture for potable (i.e. drinking) and non-potable water supply (refer Section 4.1). Overflow from rainwater tanks will be infiltrated close to source using soakage pits or infiltration galleries, or directed to swales.

– Drainage swales will be sited downstream of the tracks, conveying stormwater to bioretention basins and allowing stormwater infiltration as close to source as practical, in accordance with WSUD principles. Vegetation, rock weirs and/or check dams (in steep sloped areas) will slow flows and contribute to achieving WSUD objectives. Culverts will be installed to allow crossings of access tracks, carparking (where required) and racetrack pavement, with some piped sections where site topography doesn't allow overland flow.
– Direction of runoff to bioretention basins targeting peak flow management to pre-development levels, where possible.
– Where possible, bioretention basins are positioned to ensure 2 m vertical clearance from the maximum groundwater level. Where bioretention basins are located within 2 m vertical clearance from maximum groundwater level the base of the basin will be lined with local clay to reduce permeability, with subsoil drains installed to provide drainage function.

10-year ARI event (10% AEP)

To maintain site serviceability in the 10-year ARI (10% AEP) event:

– Drainage swales will convey stormwater to bioretention basins and will allow stormwater to be infiltrated as close to source as practical in accordance with WSUD principles. Vegetation and check dams (in steep sloped areas) will slow flows and contribute to achieving WSUD objectives. Culverts will be installed to allow crossings of access tracks and raceway pavements.
– The bioretention basins are designed to compensate peak flows to pre-development levels, and maximise opportunities for infiltration prior to discharge from the site.
– Appropriate erosion control and energy dissipation will be implemented at the outlet of piped drainage structures.

100-year ARI event (1% AEP)

To protect from flooding in the 100-year ARI (1% AEP) event:

– Key site infrastructure (vehicle maintenance areas, habitable buildings) are sited outside the 1% AEP flood area (Section 2.4.7.2). A minimum freeboard of 300 mm is provided to prevent ingress of water.
– Stormwater flows will exceed the capacity of the internal drainage swales, but will be contained within the swale freeboard, or via overload flow along roadways or grassed flow paths.
– The bioretention basins will compensate peak flows to levels that will not adversely impact the downstream receiving areas, and maximise opportunities for infiltration prior to discharge from the site.
– Overland flow paths are provided to minimise the potential for exposure of publicly accessible areas to flood waters.
– Basins will be designed with appropriate emergency overflow weirs and structures to ensure controlled discharge wherever possible.

5.2.2 Stage 1A

Stage 1A of the Albany Motorsport Park comprises the motocross track and 4WD driver training, ATV area and associated infrastructure. Figure 9 in Appendix A presents the proposed stormwater management plan for Stage 1A. An overview of key stormwater management infrastructure is described in the following sections. Details of the hydraulic and hydrologic modelling, including sizing of key stormwater infrastructure are provided in Section 5.2.4.

5.2.2.1 Diversion of external flows

Flood modelling of the site (Section 2.4.7.2) has identified external flows generated from the catchment of the Albany Plantation Export Company (APEC) site to the north of the Stage 1A area. Under current conditions it is assumed that stormwater runoff passes through existing culverts along Down Road West (refer Table 8), with occasional overtopping of the road in larger events and sheeting across the road verge and down into the existing valley.

It is proposed to divert flow from this external catchment via a vegetated diversion drain that traverses around the western edge of the motocross track. Culverts will be located to convey flows under the carpark area and under the motocross track where required.

A second diversion drain is sited along the central hillslope, on the eastern side of the motocross track, as a cut off drain to divert any flows from the hillslope area away from the track.

It is proposed to direct flows from the diversion drains to the central creekline along gently sloping areas. A level spreader weir is proposed to dissipate flows as sheetflow over a vegetated overland pathway. Where slopes are steep or level spreader weirs are not used, the base of swales will be rock protected and feature regular rock weirs and/or check dams to reduce velocity.

Diversion drains have been sized to manage all runoff from the external catchments in accordance with pre-development discharge.

5.2.2.2 Refuelling and washdown area

All servicing, washdown and refuelling associated with the motocross track will be completed within the designated refuelling and washdown area. This area will be a covered concrete area with double perimeter bund and internally draining pit and pipe network. The pit and pipes will direct all water to a sediment trap and an oil water separator, as described in Section 4.2.2.

Treated water from the oil water separator will be directed into the stormwater drainage system.

5.2.2.3 Access road and carpark

In small runoff events stormwater runoff generated from the access roads and carparks will be directed towards distributed bioretention basins to treat stormwater, and infiltrate where possible. Flow in excess of the capacity of the bioretention basins will connect to surface drainage (e.g. diversion drain, swale drainage).

5.2.2.4 Motocross track

The motocross track is sited across the northern valley of the Site. Fill sourced from the Site is used to provide adequate separation (≥ 2.0 m) of the track from the maximum groundwater level. The track is constructed using locally sourced sandy/clay. Refer to the motocross track drawings (plan and longitudinal sections in Appendix F).

Stormwater runoff from the motocross track is directed to a series of vegetated drainage swales that capture and convey stormwater flows to distributed bioretention basins.

Swale dimensions are summarised in Section 5.2.4.

5.2.2.5 4WD driver training and ATV area

The location of the 4WD driver training and ATV area has been identified as a local source of sand/clay and gravel, which will be used for the construction of the motocross track, access road, carparking areas and race track at the Site.

Following removal of sand/clay and gravel the 4WD driver training and ATV area will comprise the natural surface. No formal stormwater management is proposed in this area. Stormwater runoff from this area will be directed to a bioretention basin at the natural low point to aid settling of sediment, with flow in excess of the bioretention basin volume directed via a vegetated overland flowpath towards the central creekline.

5.2.3 Stage 1B

Stage 1B of the Albany Motorsport Park comprises the race track and associated infrastructure. Figure 10 in Appendix A presents the proposed stormwater management plan for Stage 1B. An overview of key stormwater management infrastructure is described in the following sections. Details of the hydraulic and hydrologic modelling, including sizing of key stormwater infrastructure are provided in Section 5.2.4.

5.2.3.1 Diversion of external flows

Flood modelling of the site (Section 2.4.7.2) has identified external flows generated from the north-east catchment, with flows crossing Down Road West from the APEC site to the north, the CBH Mirambeena site to the north-east, and agricultural land to the east of the Stage 1B area.

Flows from part of the northern part of this external catchment accumulate in a roadside drain on the north side of Down Road West, and flow via a culvert (1050 mm dia.) under Down Road West to the Site. External flows originating along the northern boundary of Stage 1B will follow their natural flowpaths with minor culvert crossings (300 mm culvert) provided under access roads where required. A culvert crossing of the Down Road West roadside drain will be provided at the entry to the Site.

External flow originating from the eastern agricultural land will follow its natural flowpath, with minor culvert crossings provided under the access road and race track where required. This diversion drain will also receive some race track stormwater runoff, and flows will be directed to a bioretention basin prior to discharge from the Site.

The flows originating from the north-east (CBH site) will be diverted around the race track using a cut off drain, with minor culvert crossings provided under the access road and race track where required.

Where slopes are steep or level spreader weirs are not used, the base of swales shall be rock protected and feature regular rock weirs and/or check dams to reduce velocity and provide water treatment.

Diversion drains are sized to manage all runoff from the external catchments in accordance with pre-development discharge.

5.2.3.2 Pit area

All servicing, washdown and refuelling associated with the race track will be completed within the designated pit area. The pit area will be covered and weatherproofed to prevent stormwater intrusion, with an impervious perimeter bund and floors graded to an internally draining pit and pipe network. The pit and pipe drainage network in this area may comprise perimeter trench drains with trafficable covers located within the perimeter bund to prevent egress of any surface water drainage or spills generated within this area.

The pit and pipe drainage network will direct all water to a sediment trap and an oil water separator, as described in Section 4.2.2. Treated water from the oil water separator will be directed into the stormwater drainage system.

5.2.3.3 Access road, spectator carpark, competitor carpark and emergency muster area

Runoff from these areas will be managed as follows:

– Access roads and tracks – stormwater runoff generated from the access roads will drain to vegetated areas alongside the roads. Where this cannot occur, roadside drains will be implemented which will feature regularly spaced rock weirs/check dams to slow flows and promote sedimentation. Where required, suitable culvert pipes or overflow points either under the roadway or over the roadway will be provided to target controlled discharge to the surrounding environment.
– Spectator carpark – small event stormwater runoff generated from carpark area will be directed towards the bioretention swales distributed throughout the carpark. These will be connected via minor culverts under the carpark to the adjacent drainage swales.
– Competitor parking and marshalling area – it is proposed that the emergency muster area will feature a crest to direct stormwater runoff to vegetated swale drains located around the perimeter of the competitor carpark and marshalling area. The southern and eastern portions of the carpark and emergency muster area will be

designed to direct flows to a bioretention basin in the south-east corner of the Site. The north-western portion of the carpark and emergency muster area will divert flows to drainage swales and bioretention basins located to the north and south of the Pit area.

5.2.3.4 Race track

Runoff from the race track is designed to capture and convey stormwater flows in a series of shallow vegetated swales (1V:6H) sited downstream of race track cross-fall (assumed on inside of corners). The shallow vegetated swales will feature regularly spaced interceptor traps, and will convey flows to bioretention basins.

5.2.4 Hydrologic and hydraulic assessment

Sizing of key stormwater infrastructure for Stage 1A and Stage 1B including diversion drains, swales and bioretention basins was completed through development of a post-development hydrologic and hydraulic model, using inputs from the existing site hydrology (Section 2.4.7) and the Site infrastructure plans (Figure 2 in Appendix A).

5.2.4.1 Diversion drains

Design of the diversion drains is based on the following:

– Where space and topography permit the drainage swales will be broad and shallow. Side slopes of 1V:6H are proposed to ensure safe vehicle run-off in proximity to the motocross track and race track, as well as ease of maintenance.
– Maximum side slopes of 1V:3H may be required in areas restricted by space or topography.
– Diversion drains will have a freeboard of 0.3 m (over the 10% AEP design event level) to allow additional storage and conveyance to distributed bioretention basins.
– Drains with typical slopes that are greater than 3% longitudinal grade will require erosion protection surfacing either in the form of rock lining or other similar measures.

Typical diversion drain dimensions are summarised in Table 9. Further information on drains with similar requirements are detailed on Figure 9 and Figure 10.

Table 9 Diversion drain dimensions

Swale example	Shape and side slope (V/H)	Average slope (%)	Max depth* (m)	Length (m)	10% AEP flow (m^3/s)
Stage 1A					
W-EXT02	1:6 swale	0.38	0.542	140	0.172
W-EXT04	1:6 swale	1.56	1.423	100	0.186
Stage 1B					
E-B9-07	1:4 swale	1.64	0.781	350	0.072
E-B9-08	1:4 swale	0.94	0.781	120	0.024

* The max. depth is driven by providing adequate freeboard for the 10% AEP event while also considering the depths in the 1% AEP event. The depth varies along the drain and would generally increase from a minimum depth of 300 mm at the upstream end, unless receiving water from upstream drains or culverts.

5.2.4.2 Drainage swales

Design of the drainage swales is based on the following:

– Where space and topography permit the drainage swales will be broad and shallow. Side slopes of 1V:6H are proposed to ensure safe vehicle run-off in proximity to the motocross track and race track, as well as ease of maintenance.

– Maximum side slopes of 1V:3H may be required in areas restricted by space or topography.
– Drainage swales will have a freeboard of 0.3 m (over the 10% AEP design event level) to allow additional storage and conveyance to distributed bioretention basins.
– Drains with typical slopes that are greater than 3% longitudinal grade will require erosion protection surfacing either in the form of rock lining or other similar measures.

Key swale dimensions are summarised in Table 10, while the modelling results for each swale drain are contained in Appendix G.

Table 10 Swale dimensions

Swale example	Shape and side slope (V/H)	Average slope (%)	Max depth*** (m)	Length (m)	10% AEP flow (m^3/s)
Stage 1A					
W-B4-01	1:6 swale	1.80	0.909	170	0.088
W-B4-02	1:6 swale	4.81	0.909	200	0.110
W-B5-04	1:6 swale	3.00	0.811	40	0.188
W-B5-05	1:6 swale	4.89	0.798	45	0.018
W-S1	1:6 swale	5.07	0.478	300	0.265
Stage 1B					
E-B4-01*	K300**, 0.4 m deep	0.50	0.57	150	0.090
E-B4-02	1:4 swale	0.90	0.586	220	0.248
E-B6-01	1:6 swale	3.87	0.699	150	0.094
E-B9-01	1:6 swale	3.60	0.447	160	0.129

* Further development in detail design will likely require a pit and pipe system to be installed in combination with this trench drain.

** K300 is an assumed 300 mm wide with varying depth Class D Covered Trench Drain

*** The max. depth is driven by providing adequate freeboard for the 10% AEP event while also considering the depths in the 1% AEP event. The depth varies along the drain and would generally increase from a minimum depth of 300 mm at the upstream end, unless receiving water from upstream drains or culverts.

5.2.4.3 Culverts

Different crossing locations were determined to manage discharge to the surrounding environment. Preliminary sizing of proposed culverts was done using DRAINS software and results are shown in Table 11. Further assessment of these culverts are suggested in future design stages to determine structural suitability, should there be reduced cover as limited by resulting earthworks.

Table 11 Culvert dimensions

Culverts	Length (m)	Slope (%)	No. of barrels	Diam (mm)
Stage 1A				
W-B1-CULV1	30	1.17	1	450
W-B5-CULV1	13	2.00	1	450
W-B5-CULV2	12.5	3.00	1	450
W-B5-CULV3	19.2	1.56	2	450
W-B5-CULV4	14.5	2.76	1	450

Culverts	Length (m)	Slope (%)	No. of barrels	Diam (mm)
W-B5-CULV5	12.6	7.06	1	450
W-B5-CULV6	20	1.00	1	450
W-EXT-CULV	150	2.13	1	450
W-EXT-CULV1	20	0.50	1	450
Stage 1B				
E-B5-CULV1	15	6.07	1	450
E-B7-CULV1	55.2	2.55	1	450
E-B7-CULV2	13.4	3.06	1	450
E-B7-CULV3	97.1	0.50	1	450
E-B9-CULV1	13.7	7.30	1	450
E-B9-CULV2	28.3	3.22	1	450
E-B9-CULV3	49	1.86	1	450

5.2.4.4 Bioretention basins

A series of shallow distributed bioretention basins are sited to provide both water quality treatment as well as stormwater compensation/detention/infiltration throughout the Site.

The bioretention basins are sized such that the total post-development flow off the site was equal to or less than the pre-development flow for the minor (10% AEP) design event and targeted appropriate compensation and management of major storms (i.e. the 1% AEP or 100 year ARI). Bioretention basin parameters included:

– Sited outside the 1% AEP event from the major creek through the site.
– Construction should use the natural topography of the Site where possible.
– Basin base levels set to be 2 m above the assumed groundwater level when used for infiltration. If within 2 m of the groundwater the base of the basin is to be lined to prevent infiltration; these basins will require the implementation of a subsoil drainage system.
– Basins equipped with low flow outlet/s (pipe/orifice), high flow bypass pit and a mortared/rock protected overflow spillway that has sufficient capacity to handle 1% AEP flow, where possible.
– Nominal depths ranging from 0.35 m to 1.2 m to spillway levels; and 0.5 m to 1.5 m to top of wall.
– 1V:6H side slopes where space permits to allow for vegetation to stabilise side slopes and reduce erosion risk. Where geotechnical conditions permit, basin side slopes may be increased a max. of 1V:3H to facilitate increased base infiltration surface (may require fencing and/or signage for safety where fencing is not appropriate).
– An average 2 m/day infiltration rate has assumed, noting that testing has found varying rates of between 0.41 and 3.29 m/day across the site. Detailed design of each basin should be informed by the site-specific permeability test results in Appendix B.
– Bioretention basins feature a low flow piped discharge, designed to be:
    - Set above the peak 1EY basin water level, such that no discharge occurs for water quality management, where possible (basins requiring lining will need to discharge the 1EY event).
    - Set and sized so as to ensure that the basin overflow spillway does not activate in events up to and including the 10% AEP.
    - Contributing catchments would be directed into each of the basins as detailed in Section 5.2.2 and Section 5.2.3.
– Post development flows are those of the combined catchment areas that contribute to the basin location and are shown in Appendix G.
– The results of the bioretention basin sizing for Stage 1A and Stage 1B are summarised in Table 12.

*Table 12 Bioretention basin sizing **

Basin	Slope (1V:_H)	Base Elevation (m)	Base Area (m^2)	Top Elevation (m)	Top Surface Area (m^2)	Depth (m)	Max Volume (m^3)	By-pass level (m)	Low Flow Outlet	Overflow weir level (m)
Stage 1A										
West-B1	3	66.0	90	67.0	265	1.0	170	66.60	N/A	66.75
West-B2	6	62.0	150	62.5	640	0.5	180	62.35	3 x 70	62.35
West-B3	3	62.5	160	64.0	475	1.5	450	63.20	N/A	63.70
West-B4	6	59.0	100	60.5	450	1.5	400	59.50	2 x 70, 1 x 100	59.60
West-B5	3	53.5	105	54.5	260	1.0	175	54.00	3 x 90	54.25
West-B6	6	58.0	100	59.0	500	1.0	275	58.50	N/A	58.75
West-B7	3	51.5	430	52.5	980	1.0	700	52.20	3 x 70	52.50
Stage 1B										
East-B1	6	58.0	145	59.5	950	1.5	750	58.75	1 x 90	59.50
East-B2	6	57.0	500	58.0	1150	1.0	800	57.50	1 x 90	57.75
East-B3	6	70.0	350	71	950	1.0	625	70.60	3 x 100	71.00
East-B4	6	71.0	250	71.5	550	0.5	200	71.25	N/A	71.38
East-B5	6	66.0	300	67.5	1300	1.5	1100	67.00	2 x 80, 1 x 100	67.20
East-B6	6	61.0	600	61.5	1000	0.5	400	61.20	3 x 90	61.50
East-B7	6	65.0	300	66.0	850	1.0	550	65.50	180, 1 x 90, 1 x 90	65.75
East-B8	6	70.5	250	71.5	750	1.0	475	71.00	N/A	71.25
East-B9	6	63.0	950	64.0	1800	1.0	1350	63.50	N/A	64.00
East-B10	6	62.0	430	62.5	800	0.5	300	62.25	3 x 110	62.50

* The levels detailed in the above table are subject to change during detailed design however base areas and volumes will need to be generally achieved.

5.2.5 Pre- and post-development discharge

The outlet locations to the downstream watercourse were determined, and the contributing catchments from Stage 1 works assessed for the treatment and management of stormwater runoff within the site. Due to the proposed layout of the tracks, minor changes in catchment areas were present when comparing both pre-development and post-development scenarios. A summary of this comparison is shown in Table 13.

All outlet locations on Stage 1B are shown discharging on a 1EY event and must be treated within the basin prior to discharge, to mitigate any adverse water quality outcomes. The modelling determined it is impractical to manage some flows to below pre-development discharge (i.e. East-3 and East 4) for the 10% AEP. However overall the post-development discharge from all eastern catchments is below pre-development discharge. For the western catchments, the total post-development discharge is only 0.007 m^3/s above pre-development, which is only 1.5% and considered insignificant.

Table 13 Combined site discharge

Discharge location	Pre-development flows (m3/s)				Post Development flows (m3/s)			
	Area (ha)	1EY	10% AEP	1% AEP	Area (ha)	1EY	10% AEP	1% AEP
Stage 1A								
West-1	14.10	0	0.270	1.64	14.10	0	0.263	1.600
West-2	11.17	0	0.214	1.36	6.86	0	0.132	0.286
*West-3	*	*	*	*	4.31	0.013	0.096	0.498
TOTAL	**25.27**	**0**	**0.484**	**3.00**	**25.27**	**0.013**	**0.491**	**2.384**
Stage 1B								
East-1	12.13	0	0.244	1.58	11.04	0.020	0.158	0.450
East-2	13.30	0	0.296	1.83	15.53	0.016	0.290	1.080
East-3	9.76	0	0.177	1.06	10.28	0.031	0.193	0.919
East-4	7.35	0	0.118	0.65	5.72	0.021	0.174	0.494
TOTAL	**42.54**	**0**	**0.835**	**5.12**	**42.57**	**0.088**	**0.815**	**2.943**

**additional outlet location taken from West-2*

5.3 Stormwater quality

5.3.1 Overview

The hydrogeological conceptual model (Appendix D) indicates high surface/ groundwater connectivity within the Site, with potential for impacted groundwater to migrate towards the creekline and off-site towards the major drainage in the area, the Marbelup Brook. If not responsibly managed, the development has the potential to negatively affect stormwater quality discharging from the catchment and impact on the potential receptors and water users.

Based on the proposed site activities the key stormwater quality issues requiring management include:

- **Sediment load**: Erosion caused by high flow velocity can result in a loss of soil, damage to drainage swales, and increased sediment load to the receiving water body.
- **Nutrient load**: Increased nutrient loading to the receiving water body may result from over- application of fertilisers to landscaped areas.
- **Gross pollutants**: Suspended and dissolved pollutants, and rubbish.
- **Toxicants**: Key pollutants associated with motor sport facilities include leaks and spills of chemical or petroleum hydrocarbons from vehicle maintenance areas, hydrocarbon storage areas and racetracks. Other potential toxicants of concern include dissolved metals and pesticides.

5.3.2 Best management practices

Management of stormwater quality is focused on providing appropriate treatment of stormwater runoff generated by the various parts of the Site based on an understanding of the key site risks. A range of key controls and best management practice WSUD elements will be utilised to manage stormwater quality across the site.

Best management practices (BMPs) are design strategies targeted to manage total suspended solids, gross pollutants, nutrients (TP and TN) within stormwater discharged from urban catchments (DoW, 2007). Frequently occurring rainfall events are targeted, using source, in-transit and end-of-pipe controls to improve water quality. BMPs considered appropriate for the Site include:

– The Site stormwater drainage system has been designed to separate good quality stormwater from potentially contaminated stormwater.
– Flows generated from external catchments will be diverted around the Site infrastructure, with external drainage separated from Site drainage where possible.
– Stormwater runoff from hydrocarbon-impacted areas including the refuelling and washdown area (Stage 1A) and pit (Stage 1B) will be isolated from stormwater generated for other parts of the Site. These areas are covered, double bunded, with internal stormwater pit and pipe network connected to sediment trap and oil water separator.
– Maximising infiltration by adopting a stormwater retention system to contain, and as a minimum, treat the first 15 mm of rainfall on site.
– Flows generated from Site buildings are considered to be uncontaminated and will be diverted to rainwater tanks for reuse as discussed in Section 4.1.1, or infiltrated at source.
– Use of suitable soils within swales and compensation basins that target the uptake of nutrients.
– Construction of combined bioretention and compensation basins to allow water quality treatment of small events (including metals and hydrocarbons), encourage infiltration and reduce peak flow rates.
– Swale drains shall be planted with grass for filtering of particulates and uptake of dissolved nutrients. Grass will be mowed with clippings removed from site.
– Additional sediment management measures include regularly spaced interceptor traps on swale drains, with check dams and rock protection used on steeper slopes where required.
– First-flush diversion will be installed for the pit area as well as the adjacent extensive hardstand area of the competitor parking and marshalling area, to capture initial stormwater run-off after an extended dry period.

5.3.3 Spill control and pollution management

To achieve spill control and pollution management in the high risk areas of the AMP, the following practices from WQPN 28: *Mechanical workshops and servicing* (DoW, 2013), *WQPN 52: Stormwater management at industrial sites* (DoW, 2006) and *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) will be implemented:

– Separation of uncontaminated stormwater from potentially contaminated stormwater (particularly roof water from other trafficked hardstands).
– Fuel / chemical handling areas (i.e. pits and maintenance areas) shall be located within secondary containment areas that allow maximum recovery of any spilt materials.
– Paved areas exposed to rainfall where dust, litter or spilt substances accumulate will be regularly cleaned by AMV Inc. personnel with methods that prevent fluid drainage or leaching into the surrounding environment.
– Oil and sediment traps (as appropriate to the site) will be installed at vehicle maintenance areas, and managed by AMV Inc. personnel (Section 4.2.2). First-flush water diversion to be installed for the pit area as well as the adjacent extensive hardstand area of the competitor parking and marshalling area to capture initial stormwater run-off after any extended dry period.
– Wash down of vehicles to occur in vehicle maintenance areas only. These areas feature a bunded impervious pad that is weatherproof to minimise stormwater access. Chemical solvents and non-degradable detergents used to clean equipment or pavements should not be released into stormwater systems. High pressure, steam cleaning, scrubbing or quick break detergents are the preferred methods of cleaning vehicles.

– Spill kits (permanent and mobile) will be located throughout the Site, comprising absorbent materials. AMV Inc. personnel will have necessary training on the handling of, and disposal of, hydrocarbons and spill kits. Any fuel/ chemical spills will be contained and remediated in accordance with the management strategies and actions outlined in the Hydrocarbon Management Plan prepared for the Site (GHD, 2021).

Water contamination barriers

The following water contamination barriers are proposed, to prevent any loss of hydrocarbons and chemicals from the site:

– A 50 m grassed buffer (Development Exclusion Buffer) from the unnamed watercourse and Conservation Class wetland.
– A 200 m buffer from the unnamed water course and Conservation Class wetland to vehicle maintenance areas (as per DoW *WQPN 100*).

  No permanent fuel, oil or chemical storage will occur on the Site. Temporary storage of fuel, oil and chemical solvents within the Site will occur within the bunded vehicle maintenance areas / pits.
– Covered, double bunded impervious vehicle maintenance areas with spill controls in place for hydrocarbon management. Runoff from these areas will be internally draining to a pit and pipe network connected to treatment devices including a sediment trap and pol water separator. Treated water shall outlet to the Site drainage network of swales and bioretention basins. Wastes and oily residue will be disposed to an approved off-site location (Section 4.2.2).
– Interceptor traps shall be installed and maintained throughout the swale network for treatment of track stormwater runoff.

It is noted that a swale exists within 200 m of the vehicle pits in the south-east of the site. Whilst water conveyance through the swale will improve water quality when compared to piped conveyance, it can also be considered a direct connection to the watercourse. It is proposed that all runoff from the pits and maintenance areas in this location should pass through an oil/water separator to remove contaminants before they enter the watercourse. Furthermore, the runoff from this area will pass through a compensating basin before entering the watercourse. This retarding effect on the runoff will allow a chance for the contaminants to settle and/or break down.

5.3.4 Emergency response plan

In the event of a vehicle crash and/or fire, first response extinguishment will be via standard, portable dry chemical fire extinguishers (ABE type). The multipurpose ABE powder is a versatile extinguishant, which is used to extinguish Class A (carbonaceous), Class B (flammable liquid) and Class E (electrical) fires. When dry, the powder may be cleaned up with a vacuum cleaner, or similar. No larger firefighting apparatus are proposed for the AMP, and no firefighting foams are proposed.

As part of Motorsports Australia Regulations, each flag point (attended by a trained marshal) on a racetrack is required to have 2 × 9 kg fire extinguishers available. The AMP racetrack will likely have 5-6 flag points.

In the case of an emergency in the high risk areas of the AMP, the following actions from *WQPN 100: Motor sport facilities near sensitive waters* (DoW, 2007) will be implemented:

– A contingency plan shall be developed before the operational phase and be available on the Site in order to address emergency situations such as accidents, fires and chemical spills that could put local water resources including surface water and groundwater at risk. Relevant AMV Inc. personnel and contractors shall be familiar with the Site emergency response procedures.
– During larger events (potentially up to 20,000 for national race events), adequate emergency response services (e.g. firefighting, security, communications, medical personnel and emergency vehicle access) shall be provided.
– Portable spill kits and containment booms (land socks or similar) shall be kept at various locations, including flag points within the Site with absorbent material to soak up spilt oil, chemicals and/or fuel. Additionally, sand bags or coir logs will be used in the case of a vehicle accident to block flow to drains.

– The plan should be submitted to Water Corporation, City of Albany and Department of Fire and Emergency Services for advice before implementing.

5.3.5 Non-structural measures

There are a number of temporary and non-structural measures are also key management measures for the development and operation of the Site.

Construction

Construction sites can be a major source of silt and other pollutants. Proponents and builders shall be encouraged to undertake good practice on building sites through preparation of a site-specific Construction Environmental Management Plan (Section 6).

A separate Construction Management Plan is also included the in the AMP Environmental Management Plan.

Maintenance

Regular maintenance of the Site drainage system shall be undertaken prior to the start of the wet season. Cleaning of the drainage system, including base of swale drains, interceptor traps in swale drains and bioretention basins will provide an opportunity to remove gross pollutants and silt build up that may enter the receiving water bodies after heavy rainfall. Any vegetation disturbed in the swales and bioretention basins will be re-established to ensure water quality treatment.

In addition to transporting pollutants, drains with accumulated pollutants may also overflow, leading to localised flooding and erosion, and risks to human safety and constructed assets. Maintenance may also include erosion control measures such as rock pitching if required.

Revegetation and landscape management

– Revegetation of the Protected Exclusion Area (Figure 2), which encompasses the Conservation Class wetland and creek line, shall be undertaken as part of the development. Revegetation shall comprise suitable wetland species identified by Bio Diverse Solutions (2019), including Unit 13, Unit 47 and Unit 49 from the *Albany Regional Vegetation Survey Extent* (Sandiford & Barrett, 2010). The proposed native wetland revegetation species will assist in uptake of nutrients and trap sediment in surface runoff and shallow groundwater discharging to the wetland area. These native species include *Baumea juncea* and *Baumea rubiginosa* which are frequently used in bioretention areas for their nutrient uptake abilities.
– A 50 m wide, low fuel 'Development Exclusion Buffer' comprising a managed grass area will provide a further buffer for stormwater runoff from the development, and any overflow from bioretention basins. The managed grass buffer will assist to filter and trap sediments and nutrients in overland flow discharged to the unnamed creek line / wetland.
– Use of pesticides and fertilisers shall be limited, and completely excluded within the Protected Exclusion Area and Development Exclusion Buffer. Refer to the Protected Exclusion Area Management Plan in the AMP Environmental Management Plan. Use of herbicides shall be in accordance with the *Use of herbicides in water catchment areas* (Circular No: PSCBB, Department of Health).

Erosion and sediment control

A range of measures will be implemented throughout the Site to minimise erosion and prevent sediment loss from the Site impacting on downstream receptors. Erosion and sediment control measures during construction are detailed in Section 6.

During operation of the Site the erosion and sediment control measures include:

– Sediment traps installed in vehicle maintenance areas.
– Drainage swales that convey stormwater runoff will be vegetated with grass to promote sedimentation and feature regularly spaced interceptor traps.
– The base of drainage swales and diversion drains in higher slope areas will be rock protected and feature regular rock weirs and/or check dams to reduce flow velocity.

6. Construction management

Potential impacts to water resources during construction activities include:

– Soil erosion – construction would result in the exposure of the natural ground surface and subsurface through the removal of vegetation, and excavation and landforming works within the Site which may increase the potential for soil erosion to occur. There is further potential for mobilisation of dust associated with the construction works.
– Surface water quality – construction of the project has the potential to impact surface water quality through the pollution of runoff with sediments, fuel and other hazardous materials from the construction site.
– Disturbance of acid sulfate soils – potential for construction activities to disturb acid sulfate soils.

6.1 Construction Environmental Management Plan

The AMP Environmental Management Plan includes a specific Construction Management Plan, which outlines objectives, broad strategies and actions required to minimise environmental impacts associated with construction of the AMP. The Construction Management Plan applies to the GSMG and all appointed contractors during the construction of the AMP.

It is recommended that a site-specific Construction Environmental Management Plan (CEMP) be prepared for the Site that addresses the management of construction works to ensure no detrimental impacts to the receptors. The CEMP should be referred to DWER for approval. The CEMP shall be maintained during the construction period and Site establishment period and include:

– Temporary bunds, coir logs and silt fences to prevent silt runoff into the drainage system
– Litter and waste storage bins to prevent litter to be blown by wind or washed by rainfall
– Establishing a washing-down area behind the bund or silt fence
– Provide a stabilised entry and exit point to prevent vehicle tracking of soil from the building site onto roads
– Position stockpiles of sand and soil stockpiles to prevent material being tracked, washed, of blown into roads, and then into existing surface drainage or constructed stormwater systems.

6.2 Acid Sulfate Soil Management Plan

Surface and/ or groundwater may also become contaminated through the exposure of ASS during construction (excavation). ASS disturbance may have a range of impacts including enhanced phosphorus leaching, death of vegetation irrigated with affected water, the smothering of benthic aquatic animals by the precipitation of iron, and metal bioaccumulation in aquatic plants and animals. However, based on the ASS assessments to date (refer to Section 2.3.3), inorganic sulfidic sources capable of rapid acid release upon disturbance were not observed. Other, more slow releasing acidity sources were observed in the ASS assessment and will require management if disturbed in volumes greater than 100 m^3.

The following ASS management recommendations are made with regards to the proposed redevelopment:

– Topsoil (0-300 mm) appears acceptable to be stripped and stockpiled for reuse without treatment (pH on average above 4 across the site).
– Neutralisation treatment and validation of soils *will be required* for silty sand soil units disturbed in the proximity of the watercourse area given that there are exceedances of the DWER action criteria (coarse textured soils) *and* if the proposed disturbance of greater than 100 m^3 of soil.
– An ASS management plan will be required (in accordance with DWER guidelines) to enable to the effective excavation, treatment and disposal/reuse of the materials during construction works.
– Soil excavations should only occur during the periods of the year where groundwater is at its lowest point (i.e. outside of winter and post-winter periods) to eliminate the need for temporarily lowering the groundwater table (dewatering). If dewatering is determined to be required, then site specific dewatering risk assessment, management strategies and criteria are required to be developed, approved and implemented.

7. Monitoring

7.1 Monitoring requirements

The objective of the surface water and groundwater monitoring is to assess the operation of the Site against the design criteria (Section 3) and baseline water quality (Section 2.4.5).

Monthly monitoring of surface and groundwater conditions will be completed during the construction and operational period. The monitoring data will be compared to baseline data (Section 2.4.5) to ensure no adverse impacts from construction and operation of the Site on the surface water and groundwater quality and levels.

Event based monitoring will be completed at key locations of drainage infrastructure (bioretention basins) to assess stormwater drainage performance in improving stormwater quality. It is assumed the first flush events will have the highest level of nutrients and chemicals, therefore sampling should occur at the time/after the first significant rainfall event of each wet season, and after extended dry periods. Field notes should include details of the rainfall events, site conditions, time of sampling and time of sample testing.

Additional sampling should also be undertaken in response to any spill events.

A summary of the proposed surface water monitoring program is provided in Table 14. The proposed groundwater monitoring program is provided in Table 15, and the groundwater monitoring sites are shown on Figure 6.

Table 14: Summary of surface water monitoring

Site	Frequency	Duration	Parameters
Surface water - Upstream of the site (TBC) - Mid-stream (CS02) - Downstream of the site (CS01)	Monthly	On-going, with annual reporting	In-situ: pH, EC, temperature Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, TRH, PAH, BTEXN, surfactants, microbial analysis Filtered sample: Filtered total nitrogen and filtered total phosphorus (to quantify organic component), NO_2/NO_3, PO_4, dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)
Compensating basin - Inlet (6 No.) and Outlet (6 No.) West-B1 West–B7 East-B3 East-B5 East-B6 East-B10 **Sub-catchment Inlets and Outlets** West 1 Outlet Only (4WD training area) West 3 (DS Culvert W-EXT-CULV & DS Culvert W-CULV1) East 3 Outlet East 1 Outlet (DS of East-E9)	3-4 events per year following 1EY rainfall events or greater		

Table 15: Summary of groundwater monitoring program

Site	Frequency	Duration	Parameters
Monitoring bores (up to 6 bores across the site locations to be confirmed) To include SB04, SB03, SB08, SB09 and 2 others Production bore/s (location to be confirmed)	Monthly	On-going, with annual reporting	Water level In-situ: pH, EC, temperature Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, TRH, PAH, BTEXN, surfactants, microbial analysis Filtered sample: Filtered total nitrogen and filtered total phosphorus (to quantify organic component), NO_2/NO_3, PO_4, dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)

7.2 Quality assurance and quality control

A surface and groundwater monitoring plan will be prepared to support ongoing monitoring of the Site for submission and approval by DWER and Water Corporation.

Monitoring will be completed in accordance with the requirements of the *Australian and New Zealand guidelines for fresh and marine water quality* (ANZECC, 2018). Sample collection, processing, transportation, storage, preservation and labelling of water samples will be conducted in accordance with the appropriate industry standards and general water sampling guidance (AS/NZS 5667.1:1998), with collected samples analysed in a NATA accredited laboratory.

Post-development, permanent groundwater monitoring bore locations and sites should be identified and constructed in accordance with industry standards (ASTM D5092/ D5092-16, *Standard practice for design and installation of groundwater monitoring bores*).

7.3 Contingency plan

Should monitoring of groundwater and/ or surface water identify that water quality objectives are not being met the following contingency measures will be implemented:

– Investigate the source or cause of elevated contaminants through site investigation and/or additional monitoring if required.
– Review installation of stormwater management BMPs to ensure they are designed, installed and maintained as required.
– Review implementation of Site procedures for incident management to ensure appropriate measures are undertaken to respond to incidents such as spills and accidents.
– Should further monitoring identify that water quality objectives are not being met, AMV Inc. will notify DWER and the City of Albany to determine requirements further site investigation or remediation actions.

A water quality response and contingency plan will be developed in consultation with the Water Corporation, City of Albany and DWER. The water quality response and contingency plan shall be included in the surface and groundwater monitoring plan.

7.4 Reporting

The AMV Inc. will prepare an annual water quality monitoring report for submission to the DWER and Water Corporation. The annual water monitoring report will summarise surface water and groundwater monitoring results for the calendar year, including comparison to baseline data and previous years of monitoring. The annual report will include summary reporting of any water quality exceedance, including parameters exceeding water quality objectives, measures taken to investigate exceedances, results of additional monitoring and any further actions undertaken.

8. References

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Appendices

Appendix A

Figures

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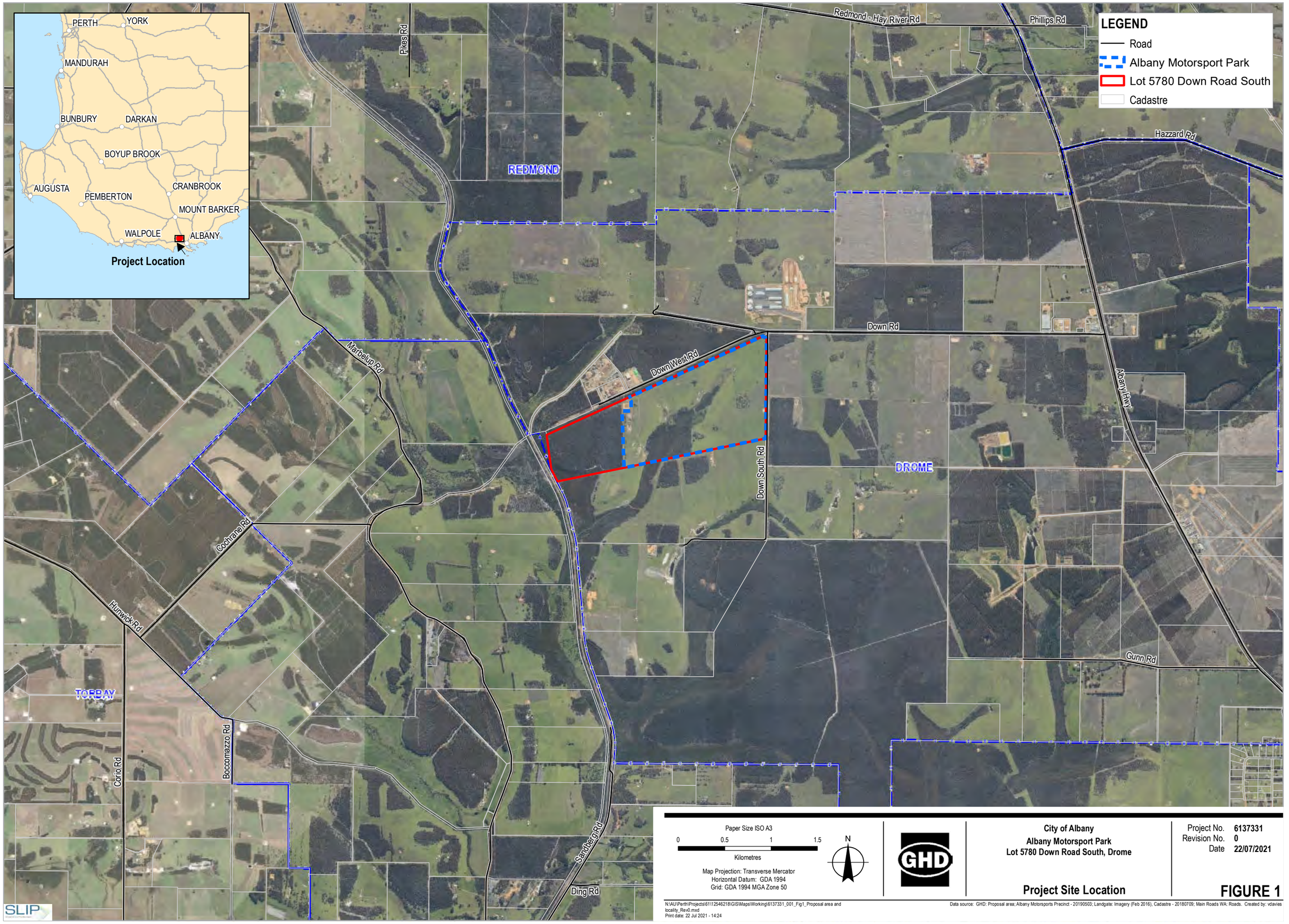
Figure 2	*Master Plan*
Figure 3	*DPIRD soil landscape mapping*
Figure 4	*South Coast Significant Wetlands and extrapolated ASS risk mapping*
Figure 5	*PDWSA and Water Management Areas*
Figure 6	*Pre-development catchment plan*
Figure 7	*1% AEP pre-development maximum flood depths*
Figure 8	*1% AEP pre-development maximum flow velocities*
Figure 9	*Stormwater Management Plan – Stage 1A*
Figure 10	*Stormwater Management Plan – Stage 1B*



Paper Size ISO A3

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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. **6137331**
Revision No. **0**
Date **22/07/2021**

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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telephone: (08) 9841 5455
email: admin@rgarchitects.com.au

Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E

Soil Landscape

- 242KgDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
- 242KgS7f - Footslopes and swampy valley floors of minor valleys
- 242KgS7h - Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.
- 242ReDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.
- 242ReRD - Broadly undulating plateau; scattered lakes and depressions. Yellow duplex soils and laterite on plains. Marri-Jarrah-Albany Blackbutt forest. Yellow solonetzic soils in depressions; Paperbark woodland.

LEGEND

- Cadastre
- Lot 5780 Down Road South

242ReRD
Down Rd
242ReDMc
Down West Rd
242KgS7h
242KgDMc
242KgS7h
Down South Rd
242KgS7f
242KgDMc
242KgS7h
242KgS7h
242KgDMc

SLIP

Paper Size ISO A3

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

DPIRD Soil Landscape Mapping Units

Project No. **61-37331**
Revision No. **0**
Date **21/07/2021**

FIGURE 3

C:\Users\vdavies\Desktop\Motorsports\Data\61\37331_003_Fig10_SoilLandscapeMapping_Rev0.mxd
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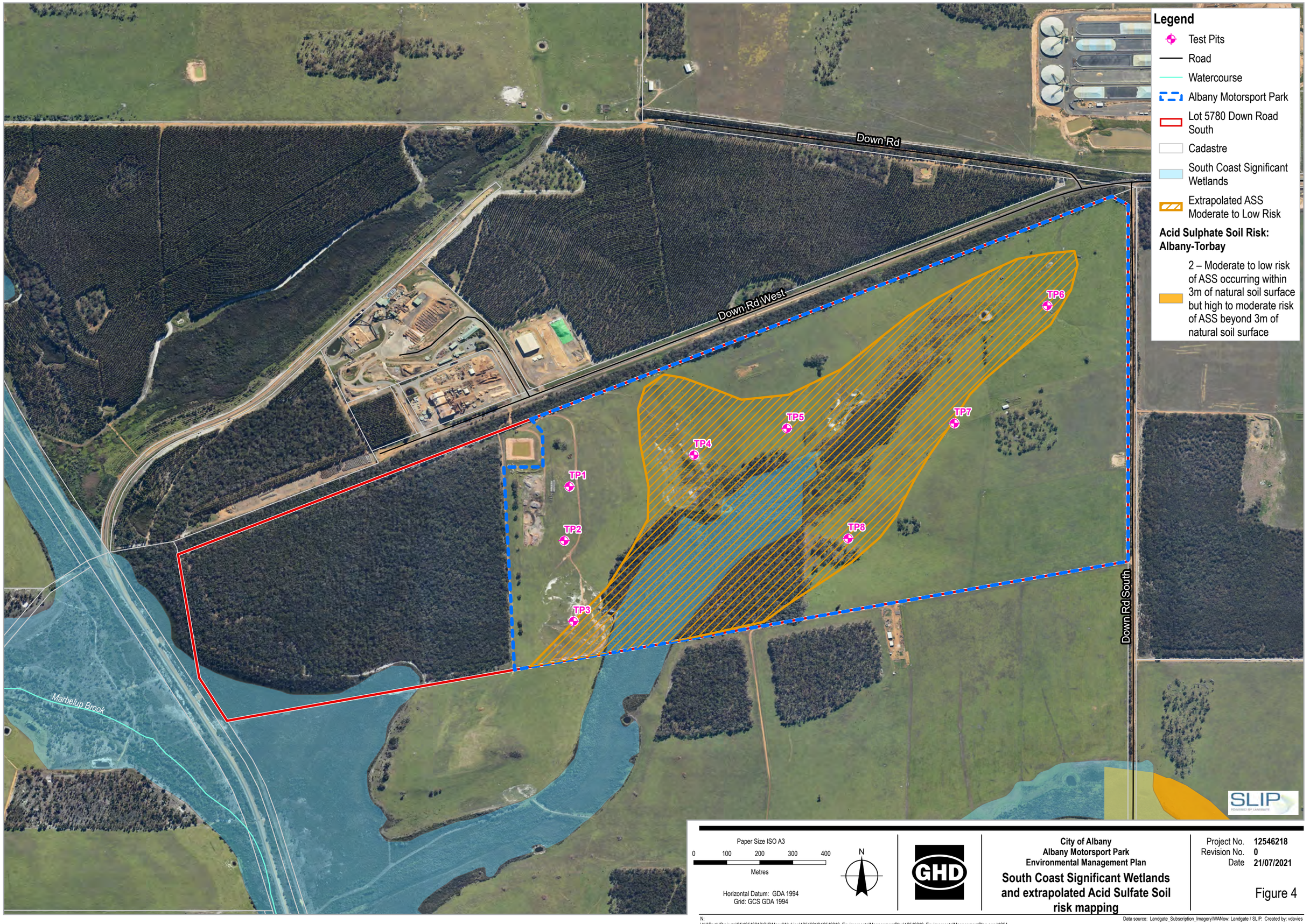
Data source: GHD: Project Site - 20180702; Landgate: Imagery (Feb 2016), Cadastre, Roads - 20180709; DPIRD: Soil Landscape Mapping (Best Available) - 20171220. Created by: vdavies



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GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

South Coast Significant Wetlands and extrapolated Acid Sulfate Soil risk mapping

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

Figure 4

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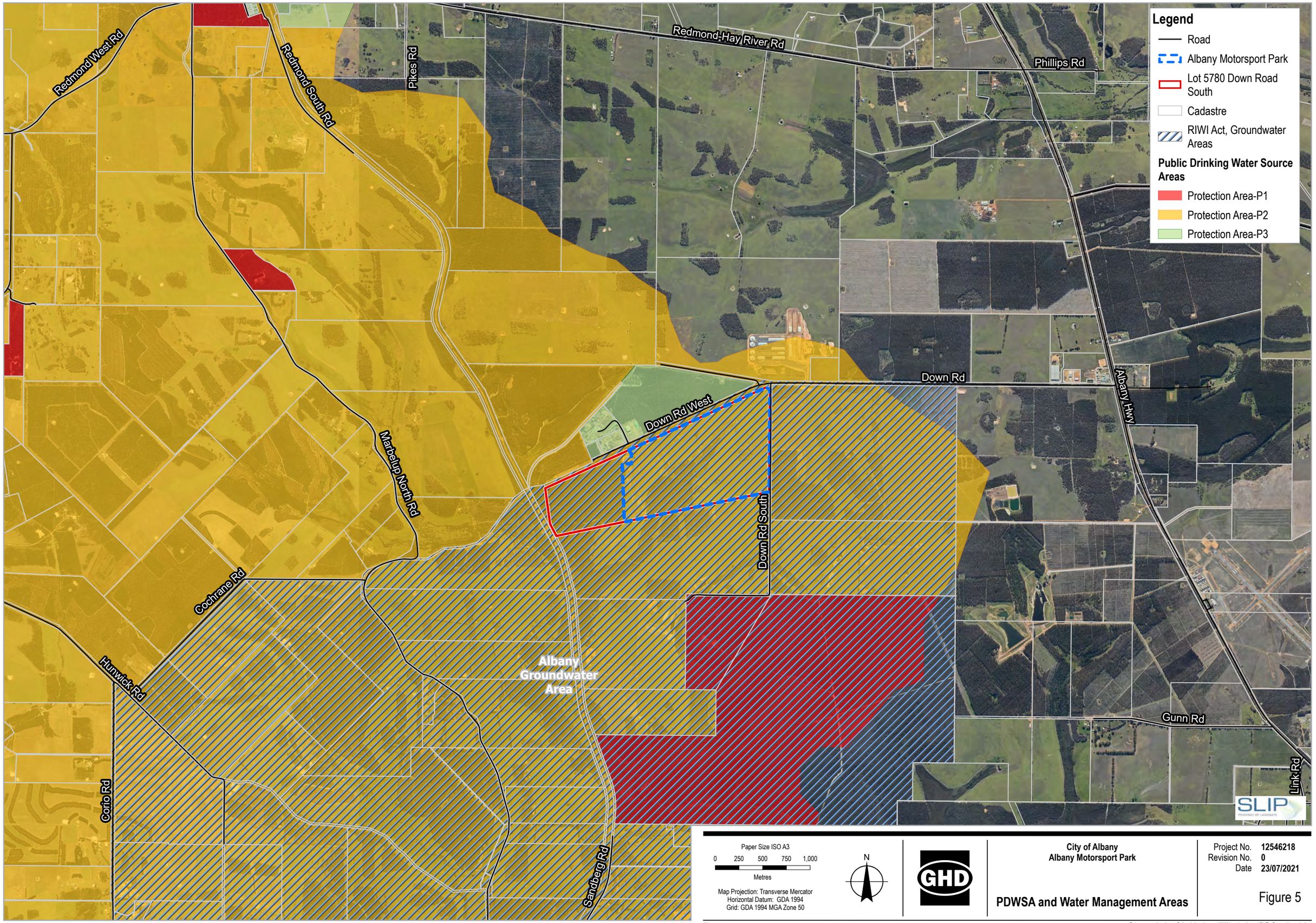

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Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

PDWSA and Water Management Areas

Project No. **12546218**
Revision No. **0**
Date **23/07/2021**

Figure 5

N:
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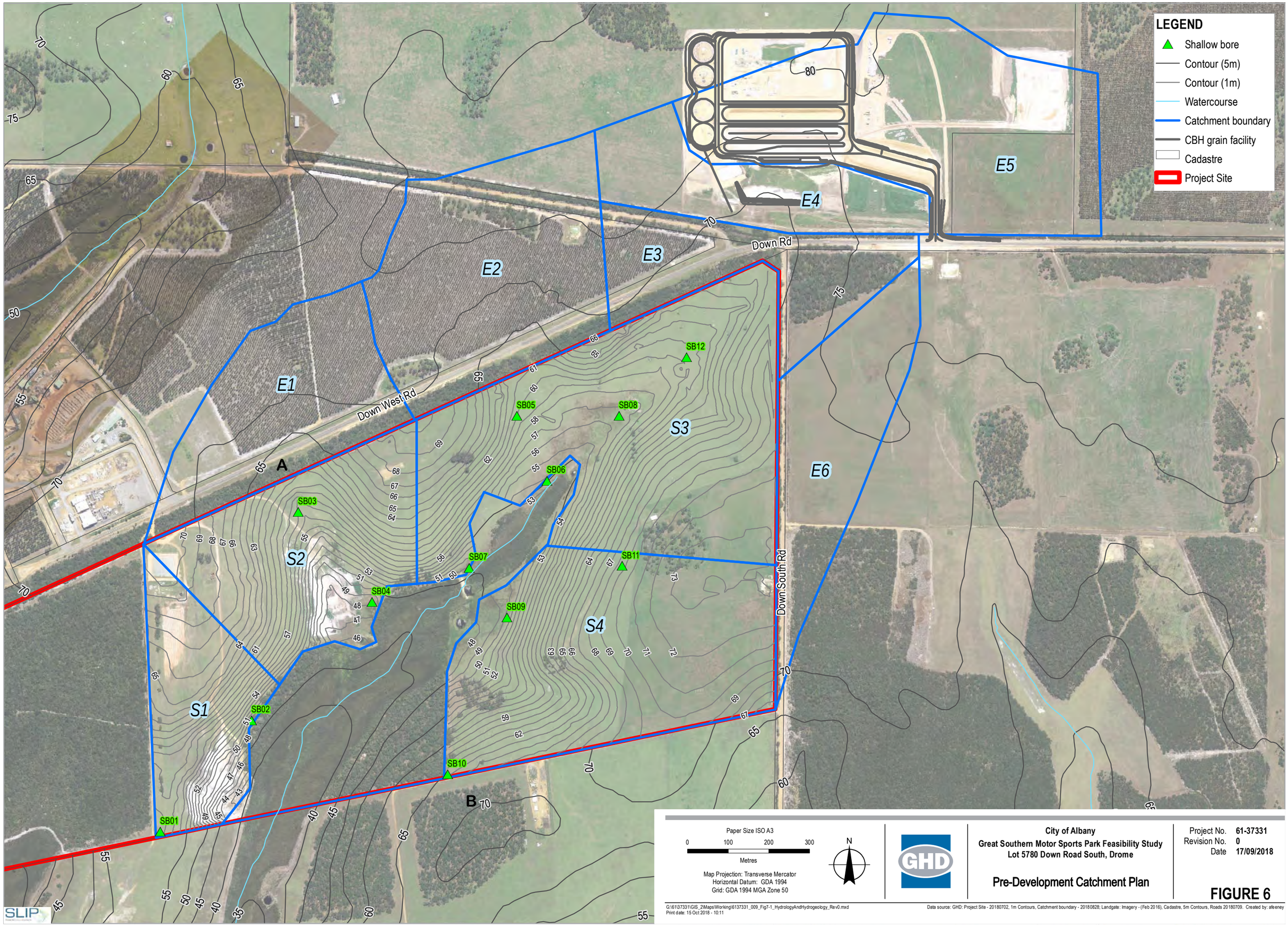

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Great Southern Motor Sports Park Feasibility Study
Lot 5780 Down Road South, Drome

Pre-Development Catchment Plan

Project No. **61-37331**
Revision No. **0**
Date **17/09/2018**

FIGURE 6

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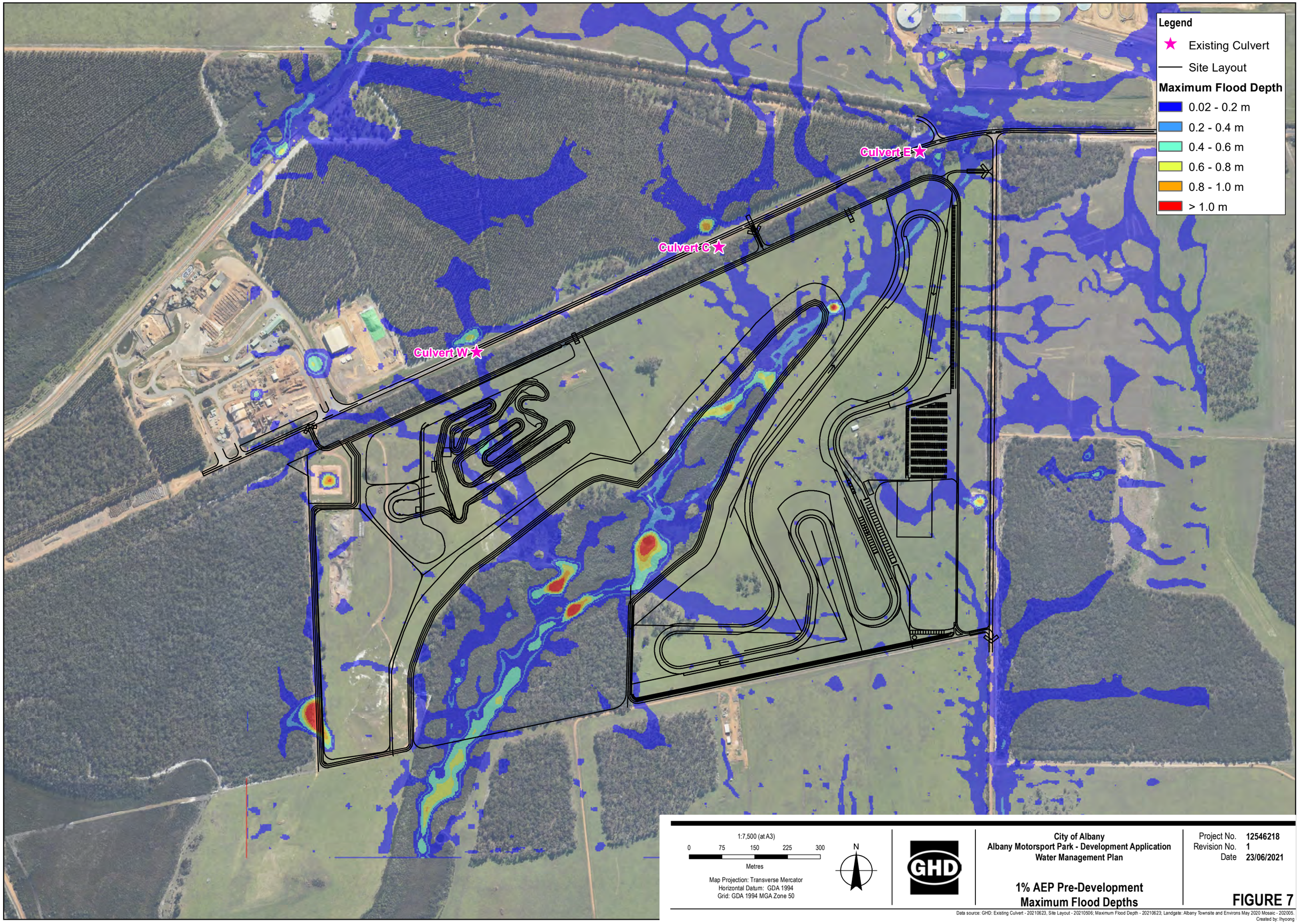
Data source: GHD: Project Site - 20180702, 1m Contours, Catchment boundary - 20180828; Landgate: Imagery - (Feb 2016), Cadastre, 5m Contours, Roads 20180709. Created by: afeeney



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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

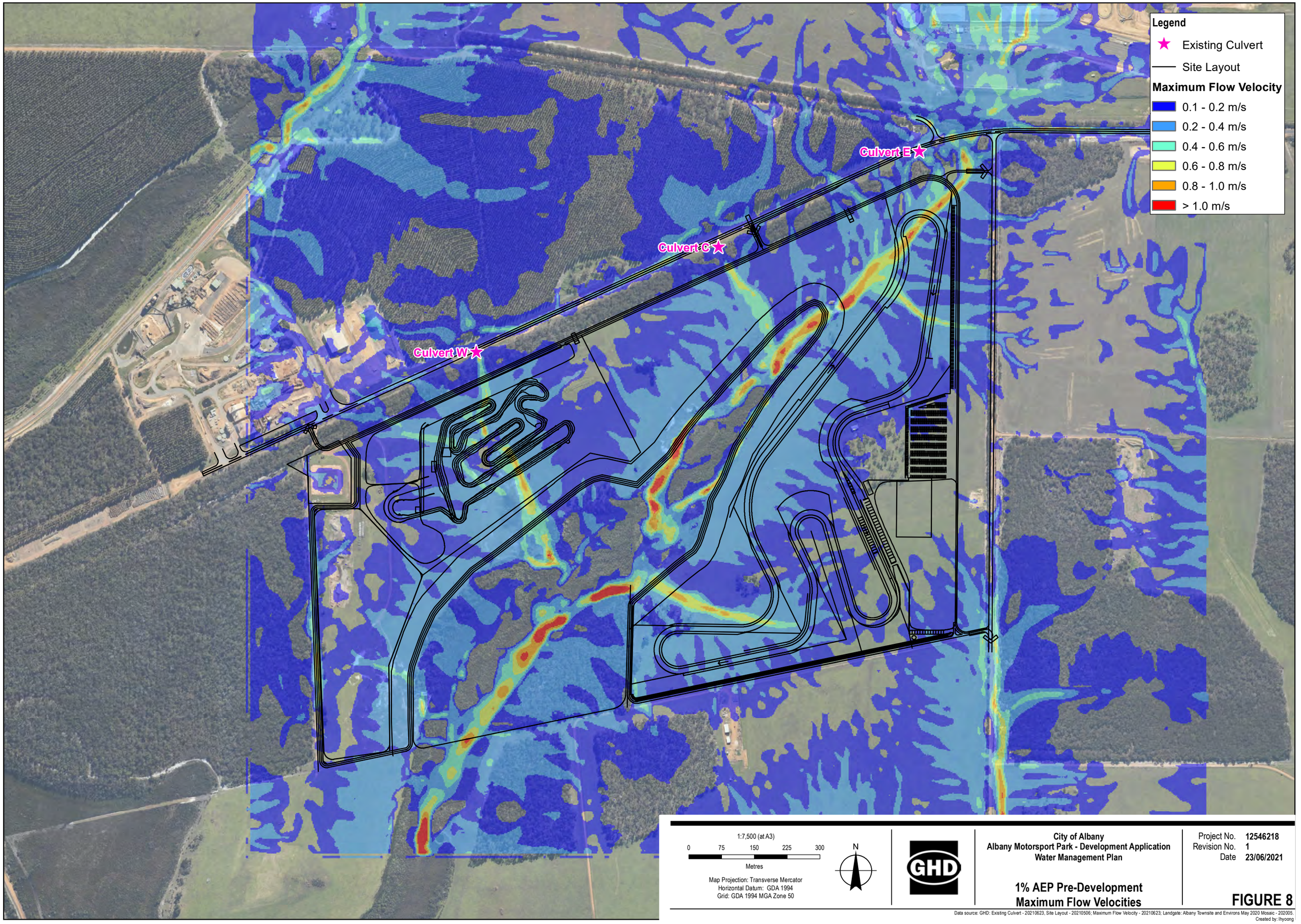
City of Albany
Albany Motorsport Park - Development Application
Water Management Plan

1% AEP Pre-Development Maximum Flood Depths

Project No. **12546218**
Revision No. **1**
Date **23/06/2021**

FIGURE 7

Data source: GHD: Existing Culvert - 20210623, Site Layout - 20210506; Maximum Flood Depth - 20210623; Landgate: Albany Townsite and Environs May 2020 Mosaic - 202005.
Created by: lhyoong



1:7,500 (at A3)

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Metres

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 50

N

GHD

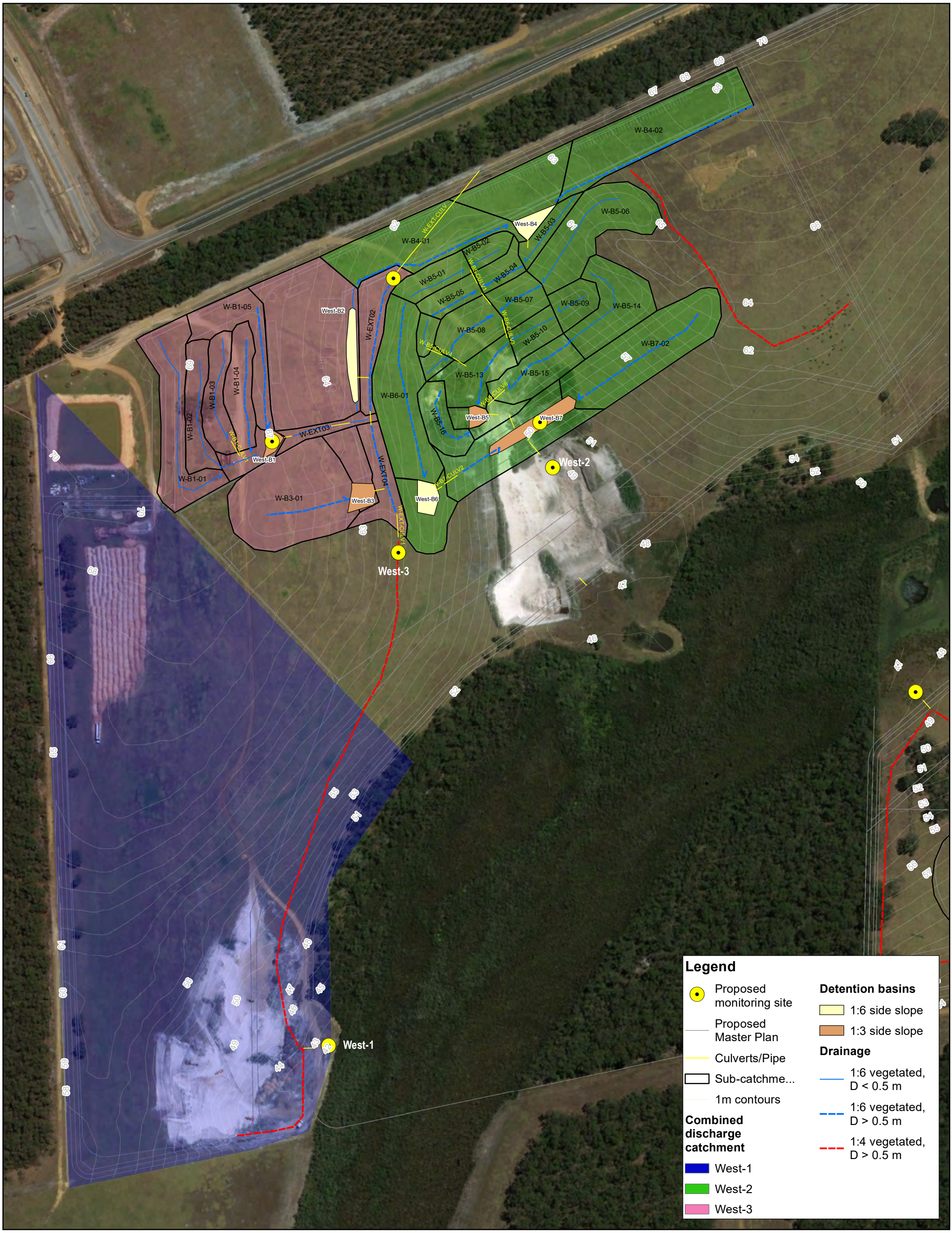
City of Albany
Albany Motorsport Park - Development Application
Water Management Plan

1% AEP Pre-Development
Maximum Flow Velocities

Project No. 12546218
Revision No. 1
Date 23/06/2021

FIGURE 8

Data source: GHD: Existing Culvert - 20210623, Site Layout - 20210506; Maximum Flow Velocity - 20210623; Landgate: Albany Townsite and Environs May 2020 Mosaic - 202005.
Created by: lhyoong



Paper Size ISO A3

0 20 40 60 80

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

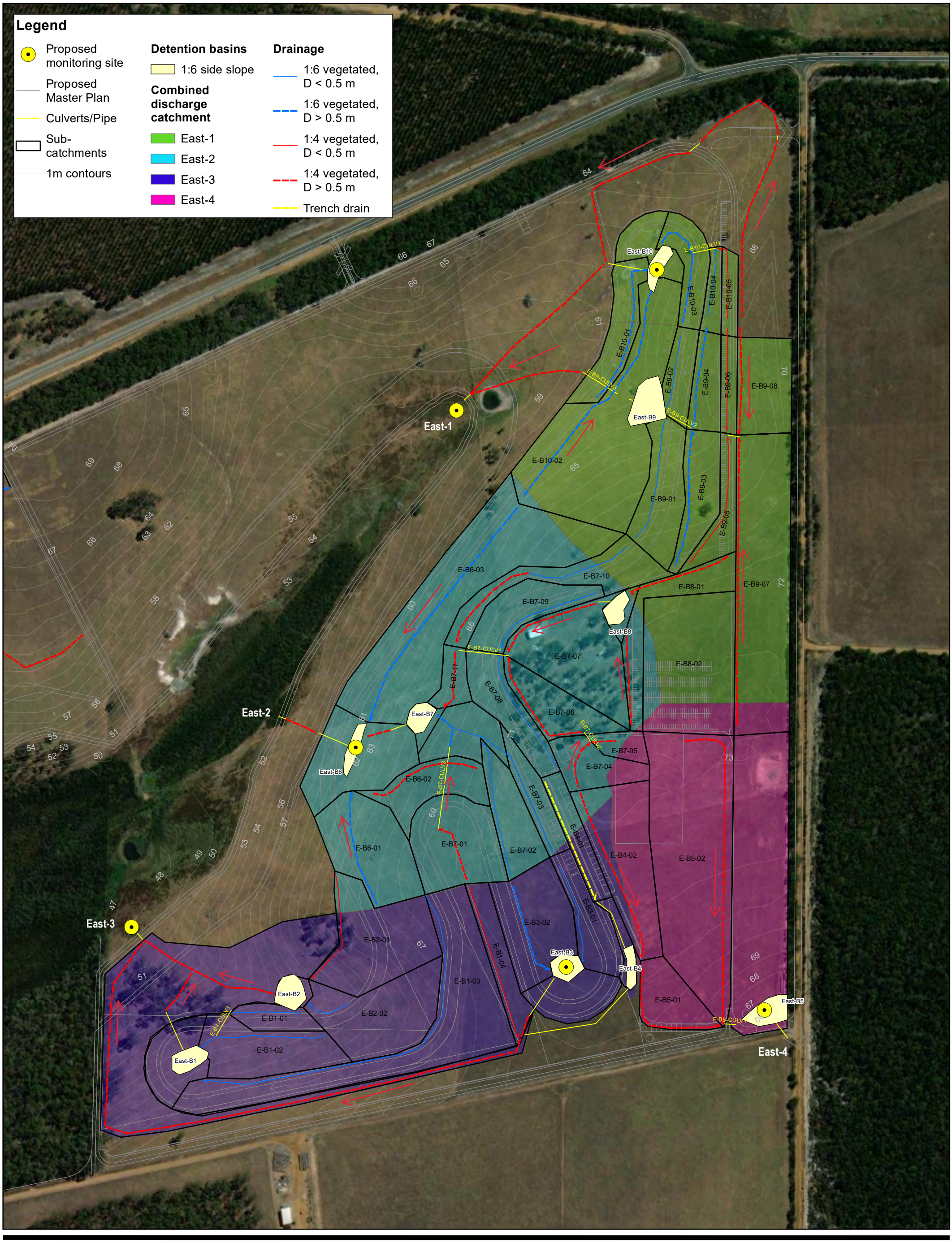
Stage 1A
Drainage Management Plan

Project No. 12546218
Revision No. A
Date 16/07/2021

FIGURE 9

G:\71\14118\12546218 - Albany\GIS\12546218_Fig9_SWMP-Stage1A.mxd
Print date: 22 Jul 2021 - 17:00

Data source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: bchernandez



Paper Size ISO A3

0 25 50 75 100

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

Stage 1B
Drainage Management Plan

Project No. **12546218**
Revision No. **A**
Date **16/07/2021**

FIGURE 10

G:\71\14118\12546218 - Albany\GIS\12546218_Fig10_SWMP-Stage1B.mxd
Print date: 22 Jul 2021 - 17:27

Appendix B

Albany Motorsport Park Development, Pavement Investigation (Great Southern Geotechics , 2021)

GREAT SOUTHERN GEOTECHNICS

CONSTRUCTION MATERIALS TESTING

Pavement Investigation

Report 4212/1

Friday, 9 April 2021

GHD

Albany Motorsport Park Development

GREAT SOUTHERN GEOTECHNICS

1.0 INTRODUCTION

As authorised by GHD
an ivestigation for the proposed Albany Motorsport Park Development adjacent to Down Rd, Mirambeena
was performed on the 25/03/2021

2.0 GENERAL

The intent of the investigation was to determine the following:

- Soil types and profiles.
- Characteristics of soil properties on select samples including Particle Size and Consistency Limits. (Liquid Limit, Plastic Limit, Plasticity Index & Linear Shrinkage).
- In Situ pearmeability rates. (Where applicable)
- Groundwater levels at time of investigation.

3.0 SITE INVESTIGATION

Site conditions and test pit locations were recorded and are displayed in Appendix A - Maps.
Test pits logs various materials types are noted in Appendix B - Test Pit Logs

The field investigation consisted of 8 Boreholes excavated on-site to depths of up to 2.5 meters using a Kubota KX41-3V mini excavator with a 300mm Auger.

Test pits were spread across the extent of the proposed development and locations were predetermined by GHD.
All soil layers encountered were visually assessed and classified on-site.

Samples gathered from site were the taken back to Great Southern Geotechnics Albany Laboratory For further processing and analysis.

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

4.0 LABORATORY TESTING

Results of any relevant Laboratory testing preformed are shown in Appendix C. (Test Results Report 4212/2)

Appendix A

Maps

Figure 1

Test Pits 1 to 8

Test Pit Locations

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 4212
Client: GHD
Project: Albany Motorsport Park Development

Appendix B

Test Pit Logs

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet			
4212	1	4212G1	1	of	16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'58.4"S 117°44'13.1"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	MD				
200 - 550	350	**SANDY gravel:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
550 - 2500	1950	**Sandy CLAY:** Low to medium plasticity, light brown/orange mottled red.	M	F				
		Fine to medium grained sand.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet
N/A - Not Applicable
N/D - Not Determined

Test Pit No.1

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 2 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet			
4212	2	4212G2	Sheet	3	of	16

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°56'03.7"S 117°44'12.6"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 100	100	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	MD				
100 - 500	400	**SANDY gravel:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
500 - 2500	2000	**Sandy CLAY:** Low to medium plasticity, light brown/orange mottled red.	M	F				
		Fine to medium grained sand.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.2

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 4 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	3	4212G3	5		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°56'11.6"S 117°44'13.5"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 160	160	**(Topsoil) Gravelly SAND with silt:** Grey/brown, fine to medium.	DM	L-MD				
		Fine to medium, sub-rounded to sub-angular, gravel.						
160 - 2100	1940	**(FILL) Sandy GRAVEL with clay**: Low to medium plasticity, brown/red	M	MD				
		Fine to coarse, sub-rounded to sub-angular gravel. Fine to medium grained sand.						
2100 - 2500	400	**SAND with silt:** White, fine.	M	L-MD				

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.3

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 6 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	4	4212G4	7		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'55.3"S 117°44'25.3"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
0 - 50	50	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	L		No water table encountered.		
50 - 850	800	**SAND with silt:** Light grey/white, fine to medium.	D-M	L-MD				
850 - 2500	1650	**SAND with silt:** Brown, fine to medium.	M	D	WC			

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.4

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 8 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		
4212	5	4212G5	9	of	16

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°55'52.7"S 117°44'34.4"E	M.Coffey	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 240	240	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	L-MD				
240 - 1100	860	**SAND with silt:** Light grey/white, fine to medium.	M	L-MD				
1100 - 2500	1400	**Gravelly SAND with silt:** Light brown, fine to medium.	M	MD	PC			
		Fine to medium, sub-rounded to sub-angular gravel.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.5

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 10 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	6	4212G6	11		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'40.7"S 117°44'59.9"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt: Grey, fine to medium. Roots and root fibres.**	M	L-MD				
180 - 1400	1220	**SAND with silt:** Light grey/white, fine to medium.	M	L-MD				
1400 - 2500	1100	**SAND with silt:** Light brown, fine to medium.	M	MD-D	MC			

***Cobbles noted on outer edge of test pit in shoulder.**

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.6

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 12 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	7	4212G7	13		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'52.2"S 117°44'50.8"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 170	170	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	MD				
170 - 450	280	**SAND with silt:** Light grey, fine to medium.	D	L-MD				
450 - 2100	1650	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	D	MD-D				
		Fine to medium grained sand.						
2100 - 2500	400	**Gravelly SAND with silt:** Light brown, fine to medium.	D	MD				
		Fine to medium, sub-rounded to sub-angualr gravel.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.7

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 14 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	8	4212G8	15		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°56'03.5"S 117°44'40.4"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	MD				
200 - 950	750	**SAND with silt:** Light grey, fine to medium.	D	MD				
950 - 2500	1550	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	D	MD-D				
		Fine to medium grained sand.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.8

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 16 **of** 16

Appendix C

Test Results

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 4

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G9

Saturated Hydraulic Conductivity (cm/min)	0.0913
Saturated Hydraulic Conductivity (m/day)	1.31
Saturated Hydraulic Conductivity (m/sec)	1.52E-05

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 5

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G10

Saturated Hydraulic Conductivity (cm/min)	0.0342
Saturated Hydraulic Conductivity (m/day)	0.49
Saturated Hydraulic Conductivity (m/sec)	5.70E-06

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 6

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G11

Saturated Hydraulic Conductivity (cm/min)	0.2282
Saturated Hydraulic Conductivity (m/day)	3.29
Saturated Hydraulic Conductivity (m/sec)	3.80E-05

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 7

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G12

Saturated Hydraulic Conductivity (cm/min)	0.2282
Saturated Hydraulic Conductivity (m/day)	3.29
Saturated Hydraulic Conductivity (m/sec)	3.80E-05

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 8

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G13

Saturated Hydraulic Conductivity (cm/min)	0.0285
Saturated Hydraulic Conductivity (m/day)	0.41
Saturated Hydraulic Conductivity (m/sec)	4.75E-06

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

COLOURS

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

MOISTURE CONDITION OF SOIL

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

PARTICLE SHAPES

ANGULAR	SUB-ANGULAR	SUB-ROUNDED	ROUNDED

PARTICLE SIZES

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

GRAIN SIZE

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

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

CLASSIFICATION CHART

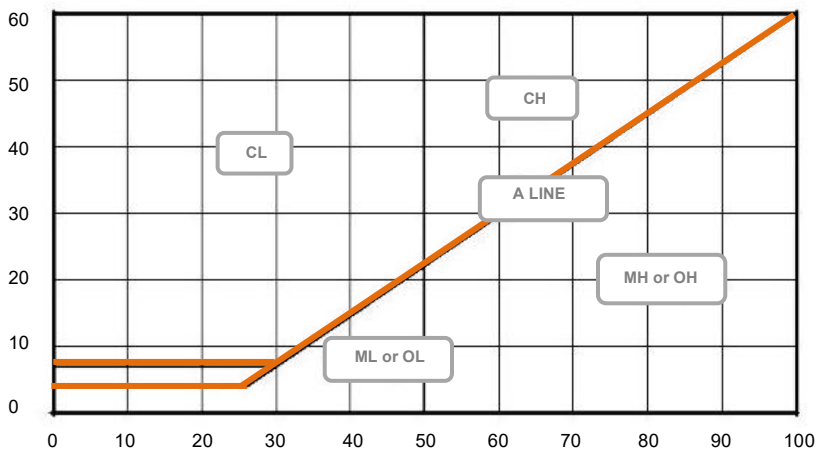
FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60mm and basing fractions on estimated mass)				GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% of material less than 63 mm is larger than 0.075 mm	GRAVELS More than 50% of coarse fraction is larger than 2.36mm	CLEAN GRAVELS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

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

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

PLASTICITY CHART

For laboratory classification of fine grained soils



GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

PLASTICITY

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

DESCRIPTION OF ORGANIC OR ARTIFICIAL MATERIALS

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

CONSISTENCY - Cohesive soils

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

CONSISTENCY - Non-cohesive soils

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

MINOR COMPONENTS

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

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

GEOLOGICAL ORIGIN

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

STRENGTH OF ROCK MATERIAL

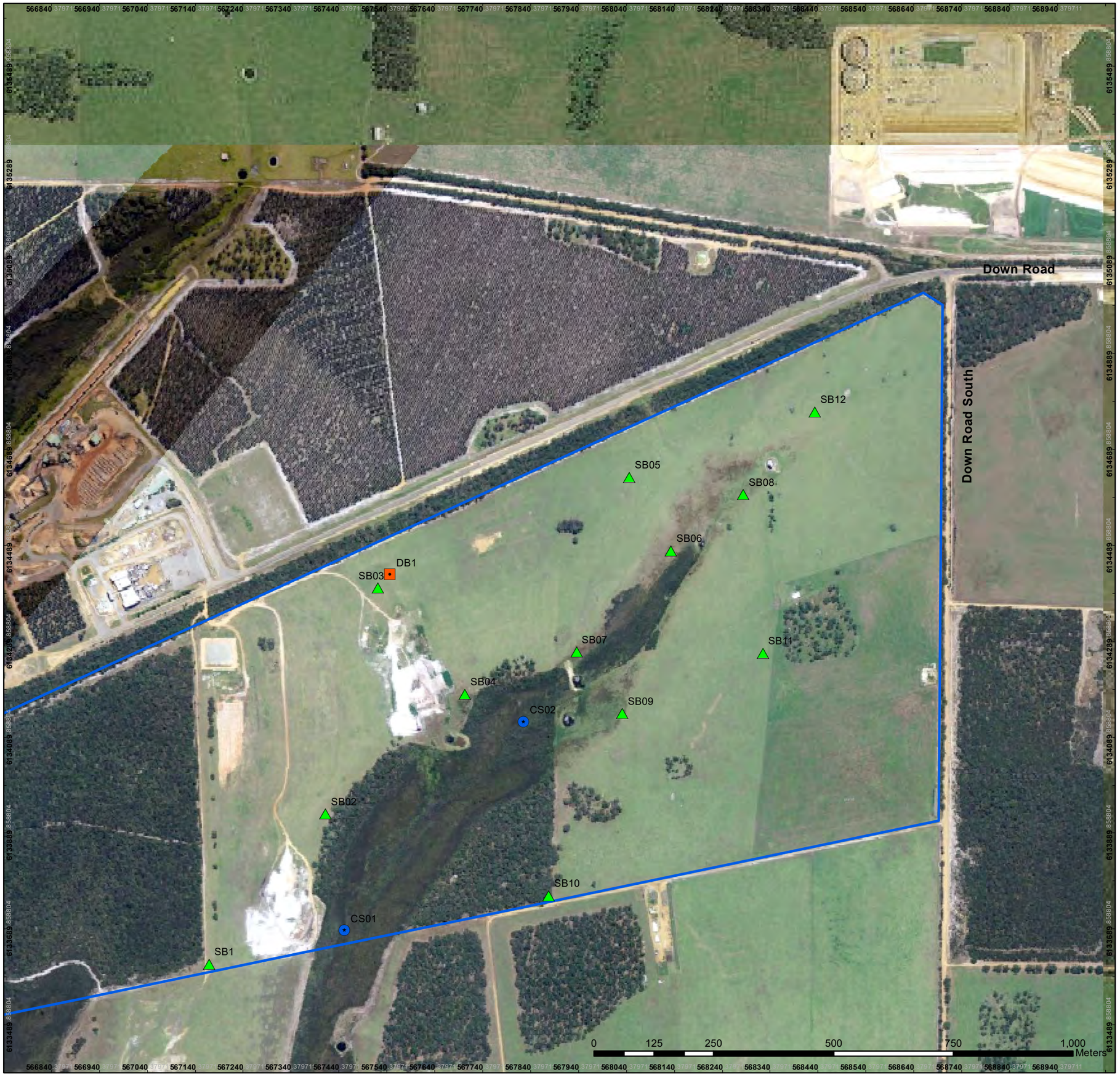
TERM	SYMBOL	IS(50)	(MPA)	FIELD GUIDE TO STRENGTH
Extremely Low	EL	≤0.03		Easily remoulded by hand to a material with soil properties.
Very Low	VL	>0.03	≤0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxle sample by hand. Pieces up to 3 cm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

ROCK MATERIAL WEATHERING CLASSIFICATION

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

Appendix C

Bio Diverse Solutions monitoring



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
- Cadastre
- 5m Contours
- Deep Bore
- Shallow Bore
- Creek Sample
- 50m Buffer

Scale
1:7,882 @ 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
City of Albany
Lot 5780 Down Road
Drome, WA 6330

Monitoring Plan

STATUS	*FILE*	*DATE*
FINAL	**MSC0137**	**28/02/2019**

29 Hercules Cres
Albany WA 6330
98421575
kath@biodiversesolutions.com.au
ABN 48 138 824 272

21st March 2018

Great Southern Motorplex
PO Box 1905
Albany, WA 6330

Lot 5780 Down Road, Drome WA 6330
Water Quality Monitoring

Dear Great Southern Motorplex Group,

On the 27th February 2018 the shallow monitoring bores were installed at Lot 5780 Down Road, Drome. A total of 12 sampling bores were installed to a depth of 2m as per the DoW Approved Monitoring Plan.

A copy of details relating to this supplied:

- Field test bore logs;
- MPL Laboratory results; and
- BDS Field and Laboratory summary sheets.

Preliminary analysis of the land from the site soil testing indicates that the majority of the land will be sand over gravels/laterite rock. Low lying areas adjacent to the creek will have silty sands with coffee rock and will generally be waterlogged. Water table was only encountered at the lower lying bores of SB06, SB07 and SB09 which I would expect in summer conditions this to prevail. The creek was running albeit at a very low level which indicates there is groundwater movement into the creek system year round.

I am expecting given the soil results, that there will be limited groundwater in test pits SB11, SB03, SB02, SB05, and SB10 through the year. Marginal groundwater will most likely appear in SB04, SB08 and SB12. Refer to finalised Test Pit locations mapping.

Due to limited funds available the deep water bore is yet to be done but recommend this is done as soon as the full quote is approved.

Field analysis of the WQ at the creek indicates the creek is gaining acidity through the catchment. A higher pH in the upper reaches with a pH 6.34 at CS02 and lower (more acidic) pH in the lower catchment CS01 of 4.46, which is to be expected when cattle are entering the system to feed, water and defecating (generally disturbing the upper catchment).

Laboratory testing results are partially available, we are still waiting Salinity, hardness/alkalinity. Biological analytes are not available this round. Full analysis has not been undertaken of the laboratory results as yet.

This information is provided as preliminary, if you have any queries regarding this matter, please feel free to contact me via email on kath@biodiversesolutions.com.au or phone/fax on 9842 1575.

Kind regards,

Kathryn Kinnear
Director,
Bio Diverse Solutions

Soil Profile Sampling

BIO DIVERSE SOLUTIONS

Location: Lot 5780 Down Road

Date tested: 27/02/2018

Sampled by: Kathryn Kinnear

Weather: Windy, cool 21 degrees Overcast

Location	Site description	Depth of profile (mm)	Soil Description
SB1	South west corner Open Paddock	0-150 150-300 300-500 500-1200 1200-1500 1500-2000	Dark grey sandy top soil, veg matter. Grey silty sand. Orange, light brown sandy gravel pebbles 10-30mm. Laterite rock . Light brown pebbles 10-30mm, orange sandy silty gravel. Light brown sandy clay, slightly moist. No WT.
SB02	Paddock near creek west side Jarrah/Cas/Marri Forrest adjacent	0-50 50-200 200-800 800-1200 1200-1500 1500-2000 2000-2500	Dark grey sandy top soil, veg matter. Grey sandy silt. Light grey sandy silt, slightly moist. Cream sandy silt, slightly moist Laterite rock. Moist light brown orange sandy silt gravel, pebbles 10-30mm, minor clay. Light grey silty sand. No WT.
SB03	Open paddock North in minor Drainage swale	0-50 50-500 500-1000 1000-1200 1200-1600 1600-1800 1800-2000	Light brown slightly moist silty sand top soil, veg matter. Light brown silty gravel, pebbles 5-10mm. Brown silty gravel pebbles 20-30mm. Dark brown gravelly silt pebbles 20-30mm. Grey silty sand. Light grey moist silty sand. Light brown/orange silty sand, gravel pebbles 10-30mm. No WT.
SB04	Paddock near Creek in Depression area.	0-50 50-200 700-900 900-1300 1300-1500 1500-1800 1800-2000	Dark brown peaty organic matter. Dark grey silty sand slightly moist. Light grey silty sand moist. Laterite rock, moist dark brown gravelly silt (coffee rock) mottled orange. Light brown silty clay wet. Light grey moist clay. White clay not wet. No WT.
SB05	North paddock Area	0-50 50-200 200-700 700-900 900-1500 1500-1800 1800-1900 1900-2000	Slightly moist dark brown peaty sandy silt top soil, veg matter. Dry dark grey silty sand. Dry light grey silty sand. Dry gravelly silty sand orange pebbles. Dry cream quartz gravelly silty sand pebbles 30-50mm. Pink/orange silty sand gravel, cemented compacted gavel pebbles 10-30mm. Moist dark clayey sand. Dry compacted silty gravel orange/pink. No WT.

Location	Site description	Depth of profile (mm)	Soil Description
SB06	Near creek North side In reed beds	0-100 100-400 400-700 700-1800 1800-2000	Dark brown peaty organic matter moist. Dark grey silty sand moist. Grey silty sand moist. Light grey slty sand wet (smell). Wet brown silty sand (smell) WT 870mm BGL
SB07	Near creek Crossing North side	0-200 200-400 400-600 600-1800 1800-2000	Dark brown/black peaty moist. Black/dark grey peaty sand moist. Dark grey silty sand moist. Light brown silty sand smell. Cream wet silty sand smell. WT 640mm BGL
SB08	Mid creek near dam	0-50 50-200 200-500 500-900 900-1200 1200-1400 1400-1800 1800-2000	Slightly moist dark brown peaty silt, veg matter. Dark brown sandy peaty silt moist. Dark grey silty sand moist. Grey slightly moist silty sand. Dark brown cemented silt, coffee rock. Dark grey moist to wet silty sand. Grey silty sand wet. Dark brown silt minor pebbles 10mm. No WT.
SB09	South side of creek	0-50 50-200 200-600 600-700 700-1100 1100-1300 1300-2000	Dark brown peaty organic matter moist. Dark grey silty sand. Grey silty sand. Light brown gravelly silt. Laterite rock. Wet silt pebbles 30-40mm. White moist clayey silt. WT 660mm BGL
SB010	South boundary east of bush line in paddock	0-50 50-300 300-500 500-1200 1200-2000	Brown silty sand organic matter dry. Brown silty sand gravels 40-50mm, boulders 200mm Laterite, dry. Brown/orange silty sandy gravel cemented Laterite. Light brown/orange cemented silt. White mottles sandstone dry. Light brown/orange cemented silt. White mottles sandstone dry. No WT.
SB011	Mid paddock, top of hill eastern side of site	0-50 50-300 300-400 400-1200 1200-1800 1800-2000	Dark brown silty sand dry. Grey silty sand dry. Light brown silty gravel pebble 30-50mm. Light brown cemented silt Laterite. Light brown, mottles pink * white clay dry. Orange mottled red dry clay. No WT.
SB012		0-400 400-1000 1000-1500 1500-1800 1800-2000	Grey sandy silt organic matter dry. Light grey silty sand. Cream silty sand slightly moist. Dark brown sandy silt, slightly moist gravel minor pebbles. Light brown silty clayey slightly moist boulder Laterite gravels 40mm. No WT.

Groundwater Monitoring Data Record Sheet

Date 30/05/2018 Name of recorder Kathryn Kinnear / Bianca Theyer

Location Down Road Project No. MSC0137

BIO DIVERSE SOLUTIONS

Test ID	Time	BCH	WD	WD-BCH	CW	pH	EC	DO	Temp	TDS	Additional Information
SB09	9:15	932	1500	568	N/A	6.28	0.25	4.84	18.13	0.161	Slight smell
SB10	8:30				N/A						Dry
SB11	8:35				N/A						Dry
SB12	8:50				N/A						Dry
SB08	9:45	930	2480	1550	N/A	4.56	0.217	4.68	18.33	0.14	Sediment, tannins and smell
SB06	10:00	955	1653	698	N/A	4.78	0.321	2.24	17.48	0.208	Sediment, tannins and smell
SB07	10:25	965	1500	535	N/A	4.77	0.28	5.34	19.89	0.181	Smell, coloured
SB05	9:22				N/A						Dry
SB04	10:52	920	1830	910	N/A	5.9	0.242	4.79	17.37	0.157	Slight colouration and smell
CS02	10:55				40cm	5.78	1.05	4.66	14.22	0.675	20cm water depth, clear some sediments when disturbed
SB01	10:10				N/A						Dry
SB02	10:20				N/A						Dry
CS01	11:20				1.5m	6.09	0.923	9.54	11.93	0.59	30cm Clear, slight tannin, flowin

BCH = Bore Casing Height WD = Water Depth below casing WD-BCH = Groundwater level BGL

CW = Creek width

Notes:

Groundwater Monitoring Data Record Sheet

Date 27/02/2018 Name of recorder Kathryn Kinnear

Location Down Road Project No. MSC0137

Test ID	Time	BCH	WD	WD-BCH	pH	EC	DO	Temp	TDS	Additional Information
C502	1:10	N/A	N/A	N/A	6.34	0.623	5.14	21.89	0.4	10cm Depth running water.
SB09	1:35	1.0m	1660	660	4.03	0.296	2.22	19.87	0.192	
SB06	3:00	1.0m	1870	870	2.5	0.311	4.53	19.57	0.203	Coloured
SB07	3:10	1.0m	1640	640	2.82	0.337	3.9	19.69	0.224	Smell, coloured
C501	3:30	N/A	N/A	N/A	4.46	0.897	8.78	16.6	0.574	25cm Depth running water, clea

BCH = Bore Casing Height WD = Water Depth below casing WD-BCH = Groundwater level BGL

Notes:

Envirolab Services (WA) Pty Ltd trading as MPL Laboratories
ABN 53 140 099 207
16-18 Hayden Court Myaree WA 6154
ph 08 9317 2505 fax 08 9317 4163
lab@mpl.com.au
www.mpl.com.au

CERTIFICATE OF ANALYSIS 207409

Client Details

Client	Biodiverse Solutions
Attention	Kathyrn Kinnear
Address	

Sample Details

Your Reference	**Biodiverse Solutions**
Number of Samples	5 Water
Date samples received	01/03/2018
Date completed instructions received	01/03/2018

Analysis Details

Please refer to the following pages for results, methodology summary and quality control data.

Samples were analysed as received from the client. Results relate specifically to the samples as received.

Results are reported on a dry weight basis for solids and on an as received basis for other matrices.

Please refer to the last page of this report for any comments relating to the results.

Report Details

Date results requested by	09/03/2018
Date of Issue	12/03/2018

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Accredited for compliance with ISO/IEC 17025 - Testing. **Tests not covered by NATA are denoted with ***

Results Approved By
Joshua Lim, Operations Manager
Michael Kubiak, Organics Supervisor

Authorised By

Todd Lee, Laboratory Manager

Nutrients in Water							
Our Reference			207409-1	207409-2	207409-3	207409-4	207409-5
Your Reference	UNITS	PQL	CS01	CS02	SB09	SB06	SB07
Date Sampled			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
Type of sample			Surface Water	Surface Water	Groundwater	Groundwater	Groundwater
Date prepared	-		08/03/2018	02/03/2018	02/03/2018	02/03/2018	02/03/2018
Date analysed	-		08/03/2018	08/03/2018	08/03/2018	08/03/2018	02/03/2018
Total Nitrogen	mg/L	0.1	1.0	3.0	1.1	0.2	0.3
Nitrate as N	mg/L	0.005	0.26	0.007	<0.005	0.024	0.27
Nitrite as N	mg/L	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ammonia as N	mg/L	0.005	<0.005	<0.005	0.11	0.70	0.22
Total Phosphorus	mg/L	0.05	<0.05	0.26	<0.05	1.3	0.65
Phosphate as P	mg/L	0.005	<0.005	<0.005	<0.005	1.1	0.52

Dissolved Metals in Water							
Our Reference			207409-1	207409-2	207409-3	207409-4	207409-5
Your Reference	UNITS	PQL	CS01	CS02	SB09	SB06	SB07
Date Sampled			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
Type of sample			Surface Water	Surface Water	Groundwater	Groundwater	Groundwater
Date prepared	-		07/03/2018	07/03/2018	07/03/2018	07/03/2018	07/03/2018
Date analysed	-		07/03/2018	07/03/2018	07/03/2018	07/03/2018	07/03/2018
Aluminium-Dissolved	mg/L	0.01	0.06	0.46	1.2	1.8	0.86
Arsenic-Dissolved	mg/L	0.001	<0.001	0.013	0.006	<0.001	<0.001
Cadmium-Dissolved	mg/L	0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002
Chromium-Dissolved	mg/L	0.001	<0.001	0.002	0.003	0.002	0.002
Copper-Dissolved	mg/L	0.001	<0.001	<0.001	0.002	<0.001	0.002
Iron-Dissolved	mg/L	0.01	0.86	40	2.8	0.90	1.1
Mercury-Dissolved	mg/L	0.00005	<0.00005	<0.00005	<0.00005	<0.00005	<0.00005
Manganese-Dissolved	mg/L	0.005	<0.005	<0.005	0.007	0.01	0.009
Nickel-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	0.003	<0.001
Lead-Dissolved	mg/L	0.001	<0.001	<0.001	<0.001	0.006	0.001
Zinc-Dissolved	mg/L	0.001	0.008	0.002	0.069	0.097	0.065

vTRH(C6-C10)/MBTEXN in water							
Our Reference			207409-1	207409-2	207409-3	207409-4	207409-5
Your Reference	UNITS	PQL	CS01	CS02	SB09	SB06	SB07
Date Sampled			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
Type of sample			Surface Water	Surface Water	Groundwater	Groundwater	Groundwater
Date analysed	-		02/03/2018	02/03/2018	02/03/2018	02/03/2018	02/03/2018
TRH C_6 - C_9	µg/L	10	<10	<10	<10	<10	<10
TRH C_6 - C_{10}	µg/L	10	<10	<10	<10	<10	<10
TRH C_6-C_{10} less BTEX (F1)	µg/L	10	<10	<10	<10	<10	<10
MTBE	µg/L	1	<1	<1	<1	<1	<1
Benzene	µg/L	1	<1	<1	<1	<1	<1
Toluene	µg/L	1	<1	<1	<1	<1	<1
Ethylbenzene	µg/L	1	<1	<1	<1	<1	<1
m+p-xylene	µg/L	2	<2	<2	<2	<2	<2
o-xylene	µg/L	1	<1	<1	<1	<1	<1
Naphthalene	µg/L	1	<1	<1	<1	<1	<1
Surrogate Dibromofluoromethane	%		111	110	114	106	112
Surrogate toluene-d8	%		107	103	105	99	105
Surrogate 4-BFB	%		98	97	96	97	96

svTRH(C10-C40) in water							
Our Reference			207409-1	207409-2	207409-3	207409-4	207409-5
Your Reference	UNITS	PQL	CS01	CS02	SB09	SB06	SB07
Date Sampled			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
Type of sample			Surface Water	Surface Water	Groundwater	Groundwater	Groundwater
Date extracted	-		02/03/2018	02/03/2018	02/03/2018	02/03/2018	02/03/2018
Date analysed	-		06/03/2018	06/03/2018	06/03/2018	06/03/2018	06/03/2018
TRH C_{10} - C_{14}	µg/L	50	<50	<50	<50	<50	<50
TRH C_{15} - C_{28}	µg/L	100	<100	<100	<100	<100	<100
TRH C_{29} - C_{36}	µg/L	100	<100	<100	<100	110	330
TRH >C_{10} - C_{16}	µg/L	50	<50	<50	<50	<50	<50
TRH >C_{10} -C_{16} less N (F2)	µg/L	50	<50	<50	<50	<50	<50
TRH >C_{16} - C_{34}	µg/L	100	<100	<100	<100	140	280
TRH >C_{34} - C_{40}	µg/L	100	<100	<100	<100	<100	220
Surrogate o-Terphenyl	%		84	85	94	37	19

PAHs in Water							
Our Reference			207409-1	207409-2	207409-3	207409-4	207409-5
Your Reference	UNITS	PQL	CS01	CS02	SB09	SB06	SB07
Date Sampled			27/02/2018	27/02/2018	27/02/2018	27/02/2018	27/02/2018
Type of sample			Surface Water	Surface Water	Groundwater	Groundwater	Groundwater
Date extracted	-		02/03/2018	02/03/2018	02/03/2018	02/03/2018	02/03/2018
Date analysed	-		07/03/2018	07/03/2018	07/03/2018	07/03/2018	07/03/2018
Naphthalene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Fluoranthene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(b,j+k)fluoranthene	µg/L	0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Benzo(a)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo(a,h)anthracene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(g,h,i)perylene	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Benzo(a)pyrene TEQ	µg/L	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total +ve PAH's	µg/L	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Surrogate p-Terphenyl-D_{14}	%		78	76	88	24	14

Method ID	Methodology Summary
INORG-055	Nitrite - determined colourimetrically. Soils are analysed from a water extract.
INORG-055	Nitrate - determined colourimetrically. Soils are analysed from a water extract.
INORG-055	Total Nitrogen by colourimetric analysis based on APHA 4500-P J, 4500-NO3 F.
INORG-057	Ammonia by colourimetric analysis based on APHA latest edition 4500-NH3 F.
INORG-060	Phosphate- determined colourimetrically. Soils are analysed from a water extract.
METALS-020	Metals in soil and water by ICP-OES.
METALS-021	Determination of Mercury by Cold Vapour AAS.
METALS-022	Determination of various metals by ICP-MS.
ORG-003	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-FID. F2 = (>C10-C16)-Naphthalene as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater (HSLs Tables 1A (3, 4)). Note Naphthalene is determined from the VOC analysis.
ORG-004	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
ORG-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS.
ORG-012	Soil samples are extracted with Dichloromethane/Acetone and waters with Dichloromethane and analysed by GC-MS. Benzo(a)pyrene TEQ as per NEPM draft B1 Guideline on Investigation Levels for Soil and Groundwater.
ORG-016	Soil samples are extracted with methanol and spiked into water prior to analysing by purge and trap GC-MS. Water samples are analysed directly by purge and trap GC-MS. F1 = (C6-C10)-BTEX as per NEPM B1 Guideline on Investigation Levels for Soil and Groundwater.

QUALITY CONTROL: Nutrients in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date prepared	-			02/03/2018					02/03/2018	
Date analysed	-			02/03/2018					02/03/2018	
Total Nitrogen	mg/L	0.1	INORG-055	<0.1					96	
Nitrate as N	mg/L	0.005	INORG-055	<0.005					116	
Nitrite as N	mg/L	0.005	INORG-055	<0.005					117	
Ammonia as N	mg/L	0.005	INORG-057	<0.005					100	
Total Phosphorus	mg/L	0.05	METALS-020	<0.05					103	
Phosphate as P	mg/L	0.005	INORG-060	<0.005					92	

QUALITY CONTROL: Dissolved Metals in Water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	207409-2
Date prepared	-			07/03/2018	1	07/03/2018	07/03/2018		07/03/2018	07/03/2018
Date analysed	-			07/03/2018	1	07/03/2018	07/03/2018		07/03/2018	07/03/2018
Aluminium-Dissolved	mg/L	0.01	METALS-022	<0.01	1	0.06	0.06	0	109	77
Arsenic-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	103	108
Cadmium-Dissolved	mg/L	0.0001	METALS-022	<0.0001	1	<0.0001	<0.0001	0	104	109
Chromium-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	105	104
Copper-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	103	99
Iron-Dissolved	mg/L	0.01	METALS-022	<0.01	1	0.86	0.87	1	105	#
Mercury-Dissolved	mg/L	0.00005	METALS-021	<0.00005	1	<0.00005	<0.00005	0	102	104
Manganese-Dissolved	mg/L	0.005	METALS-022	<0.005	1	<0.005	<0.005	0	108	107
Nickel-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	103	98
Lead-Dissolved	mg/L	0.001	METALS-022	<0.001	1	<0.001	<0.001	0	101	101
Zinc-Dissolved	mg/L	0.001	METALS-022	<0.001	1	0.008	0.008	0	103	104

QUALITY CONTROL: vTRH(C6-C10)/MBTEXN in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date analysed	-			02/03/2018					02/03/2018	
TRH C_6 - C_9	µg/L	10	ORG-016	<10					95	
TRH C_6 - C_{10}	µg/L	10	ORG-016	<10					95	
MTBE	µg/L	1	ORG-016	<1						
Benzene	µg/L	1	ORG-016	<1					110	
Toluene	µg/L	1	ORG-016	<1					103	
Ethylbenzene	µg/L	1	ORG-016	<1					89	
m+p-xylene	µg/L	2	ORG-016	<2					86	
o-xylene	µg/L	1	ORG-016	<1					87	
Naphthalene	µg/L	1	ORG-016	<1						
Surrogate Dibromofluoromethane	%		ORG-016	109					106	
Surrogate toluene-d8	%		ORG-016	107					105	
Surrogate 4-BFB	%		ORG-016	99					105	

QUALITY CONTROL: svTRH(C10-C40) in water						Duplicate			Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			02/03/2018	2	02/03/2018	02/03/2018		02/03/2018	
Date analysed	-			06/03/2018	2	06/03/2018	06/03/2018		06/03/2018	
TRH C_{10} - C_{14}	µg/L	50	ORG-003	<50	2	<50	<50	0	73	
TRH C_{15} - C_{28}	µg/L	100	ORG-003	<100	2	<100	<100	0	88	
TRH C_{29} - C_{36}	µg/L	100	ORG-003	<100	2	<100	<100	0	81	
TRH >C_{10} - C_{16}	µg/L	50	ORG-003	<50	2	<50	<50	0	78	
TRH >C_{16} - C_{34}	µg/L	100	ORG-003	<100	2	<100	<100	0	88	
TRH >C_{34} - C_{40}	µg/L	100	ORG-003	<100	2	<100	<100	0	75	
Surrogate o-Terphenyl	%		ORG-003	97	2	85	101	17	80	

QUALITY CONTROL: PAHs in Water					Duplicate				Spike Recovery %	
Test Description	Units	PQL	Method	Blank	#	Base	Dup.	RPD	LCS-1	[NT]
Date extracted	-			02/03/2018	2	02/03/2018	02/03/2018		02/03/2018	
Date analysed	-			07/03/2018	2	07/03/2018	07/03/2018		07/03/2018	
Naphthalene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	94	
Acenaphthylene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Acenaphthene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Fluorene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	108	
Phenanthrene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	115	
Anthracene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Fluoranthene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	114	
Pyrene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	112	
Benzo(a)anthracene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Chrysene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	100	
Benzo(b,j+k)fluoranthene	µg/L	0.2	ORG-012	<0.2	2	<0.2	<0.2	0		
Benzo(a)pyrene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0	72	
Indeno(1,2,3-c,d)pyrene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Dibenzo(a,h)anthracene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Benzo(g,h,i)perylene	µg/L	0.1	ORG-012	<0.1	2	<0.1	<0.1	0		
Surrogate p-Terphenyl-D_{14}	%		ORG-012	91	2	76	77	1	74	

Result Definitions

NT	Not tested
NA	Test not required
INS	Insufficient sample for this test
PQL	Practical Quantitation Limit
<	Less than
>	Greater than
RPD	Relative Percent Difference
LCS	Laboratory Control Sample
NS	Not specified
NEPM	National Environmental Protection Measure
NR	Not Reported

Quality Control Definitions

Blank	This is the component of the analytical signal which is not derived from the sample but from reagents, glassware etc, can be determined by processing solvents and reagents in exactly the same manner as for samples.
Duplicate	This is the complete duplicate analysis of a sample from the process batch. If possible, the sample selected should be one where the analyte concentration is easily measurable.
Matrix Spike	A portion of the sample is spiked with a known concentration of target analyte. The purpose of the matrix spike is to monitor the performance of the analytical method used and to determine whether matrix interferences exist.
LCS (Laboratory Control Sample)	This comprises either a standard reference material or a control matrix (such as a blank sand or water) fortified with analytes representative of the analyte class. It is simply a check sample.
Surrogate Spike	Surrogates are known additions to each sample, blank, matrix spike and LCS in a batch, of compounds which are similar to the analyte of interest, however are not expected to be found in real samples.

Australian Drinking Water Guidelines recommend that Thermotolerant Coliform, Faecal Enterococci, & E.Coli levels are less than 1cfu/100mL. The recommended maximums are taken from "Australian Drinking Water Guidelines", published by NHMRC & ARMC 2011.

Laboratory Acceptance Criteria

Duplicate sample and matrix spike recoveries may not be reported on smaller jobs, however, were analysed at a frequency to meet or exceed NEPM requirements. All samples are tested in batches of 20. The duplicate sample RPD and matrix spike recoveries for the batch were within the laboratory acceptance criteria.

Filters, swabs, wipes, tubes and badges will not have duplicate data as the whole sample is generally extracted during sample extraction.

Spikes for Physical and Aggregate Tests are not applicable.

For VOCs in water samples, three vials are required for duplicate or spike analysis.

Duplicates: <5xPQL - any RPD is acceptable; >5xPQL - 0-50% RPD is acceptable.

Matrix Spikes, LCS and Surrogate recoveries: Generally 70-130% for inorganics/metals; 60-140% for organics (+/-50% surrogates) and 10-140% for labile SVOCs (including labile surrogates), ultra trace organics and speciated phenols is acceptable.

In circumstances where no duplicate and/or sample spike has been reported at 1 in 10 and/or 1 in 20 samples respectively, the sample volume submitted was insufficient in order to satisfy laboratory QA/QC protocols.

When samples are received where certain analytes are outside of recommended technical holding times (THTs), the analysis has proceeded. Where analytes are on the verge of breaching THTs, every effort will be made to analyse within the THT or as soon as practicable.

Where sampling dates are not provided, Envirolab are not in a position to comment on the validity of the analysis where recommended technical holding times may have been breached.

Measurement Uncertainty estimates are available for most tests upon request.

Report Comments

#4,5 - PAH: Surrogate recovery was low due to sample emulsifying during extraction

Percent recovery not available due to the analyte signal being much greater than the spike amount. An acceptable recovery was achieved for the LCS.

#4,5 for Nox PQL raised due to sample matrix. Very dark samples

Groundwater Monitoring Data Record Sheet

Date 4/09/2018 Name of recorder Bianca Theyer / Chiquita Cramer

Location Down Road Project No. MSC0137

Test ID	Time	BCH (cm)	WD (cm)	WD-BCH (cm)	pH	EC (mg/cm)	DO (mg/L)	Temp (C°)	TDS	Additional Information
SB9	9:35	92.7	136.8	44.1	5.86	0.389		17.2	0.253	Lightly coloured brown
SB12	10:28	85	189	104	7.52	0.077		16.55	0.05	Lots of sediment, lightly coloured brown
SB8	10:48	95	113	18	4.41	1.2	2.57	15.86	0.768	Moderate amount of sediment, brown in colou
SB6	11:17	93	93	0	4.16	1.07	8.95	14.23	0.686	Moderate amount of sediment, brown in colou
SB7	11:35	91	135	44	4.5	0.211		15.55	0.137	Moderate to high amount of sediment, brown in colour
CS1	12:02	N/A	10	N/A	5.68	0.885	3.93	14.91	0.566	Clear water, creek flowing
SB3	12:29	92	213	121	6.09	0.963	2.07	16.73	0.616	Lightly coloured brown
SB4	12:35	90.6	121	30.4	5.38	0.328	1.93	16.12	0.213	Lightly coloured brown
CS2	12:48	N/A	20	N/A	6.09	0.659	7.83	12.35	0.422	clear water, creek flowing

BCH = Bore Casing Height WD = Water Depth below casing WD-BCH = Groundwater level BGL

CW = Creek width

Notes:

Appendix D

Conceptual hydrogeological model

A-4 Conceptual hydrogeological model

A Conceptual Site Model was completed to assess the connectivity between shallow and deeper hydrogeological features of the Site and surrounds, and to identify key pathways for transport of potential contaminants in surface and groundwater, and potential receptors based on site

A-4-1 Sources of information

- Local shallow soil setting from Motorplex Development, Down Road Surface and Groundwater Monitoring 2018 Summary Report (Bio Diverse Solutions 2018)
- Regional hydrogeological setting from Albany hinterland prospective groundwater resources map (Ryan, Yesertener, Maughan, & Thornton, 2017)
- Shallow soil profile descriptions
- Deep groundwater bore

A-4-2 Local shallow hydrogeology

The typical local surficial geology is presented in Plate 3, and shows the following features:

- A thin shallow sandy/silty layer up to 1 meter thick overlies the Pallinup formation in areas leading to the creek, while on the upper-slopes lateritic gravels/cobbles predominate.
- Underlying the sandy/silty layer, the Pallinup formation comprises silty clays which appears to extend to 25 meters blow the ground level.
- Although not tested, the permeability of the upper sandy/silt is likely higher than the underlying Pallinup Formation (silty clays) which may result in temporary perching of shallow groundwater in the sandy/silt (particularly during winter rainfall).
- Shallow groundwater levels derived from the monitoring of the shallow bores indicates that the levels appear to vary seasonally up to 1 meter.
- Shallow groundwater flow within the sandy/silty layer (and upper parts of the Pallinup Formation) are inferred as towards the creek line where groundwater is inferred to discharge.

A-4-3 “Deeper” hydrogeology

The deeper hydrogeology setting is presented on the cross section and shows the following features:

- The site (shallow hydrogeology) is underlain by approximately 25 metres of the Pallinup formation, deemed to comprise silt, sand and clay (Ryan *et al*. 2017). The Pallinup aquifer is inferred to contain minor water resources and exhibits a low permeability.
- The Pallinup Formation is underlain by the Werillup Aquitard described as comprising clay, silt and sand and which is deemed to hydraulically separate the overlying Pallinup Formation with underling units (Ryan et al, 2017). The drilling logs indicates that the thickness of the Werillup aquitard is 31 meters and comprises predominantly clay. Based on map notes (Ryan *et al*. 2017) the Werillup aquitard is inferred as extensive throughout the King River area and likely lies below all areas of the site and beyond.
- Werillup aquitard is probably underlain by granite, based on evidence of minor cuttings returned to the surface exhibiting angular quartz and some mica.
- The groundwater levels of the Pallinup formation appears to be similar to the shallow groundwater levels. That is to say that, excluding times when winter rainfall may perch shallow groundwater, the shallow sandy silts are probably hydraulically connected with the Pallinup Formation.
- The groundwater flow direction of the Pallinup Formation is not well known, however, beneath the Site groundwater it is likely to follow the regional topography, and flow towards the south west where groundwater is likely to discharge into the rivers and creeks, such as dominant surface water feature in areas close to the Site - Marbelup Brook.

A-4-4 Discussion/interpretations on pathway

The hydrogeological setting indicates the following Conceptual Site Model:

- The depth to groundwater plan indicates that in areas adjacent to the surface water creek/ feature, the depth to groundwater is less than 2 metres. In these areas, it is considered that there is an increased risk of impacts to groundwater from surface contaminants and spills given the thin geological profile (e.g. low adsorptive capacity).
- The shallow groundwater migration direction (shallow sands/silt and Pallinup Formation) indicates that any Site based groundwater impacts should migrate towards the creek line (on Site) where groundwater (and any impacted groundwater) is inferred to discharge. Any impacted surface water will migrate towards areas off-site and discharge into the major drainage of the area, the Marbelup Brook.
- Any Site based groundwater impacts should preferentially migrate within shallow sands/silts (towards the creek lines) and not migrate downwards into the deeper levels of the Pallinup Formation given the similar groundwater levels between the Pallinup Formation and the overlying shallow sandy silts, and that the shallow sandy silts have a higher permeability than the Pallinup Formation
- Given the low permeability of the Pallinup Formation, any Site based groundwater impacts, which may migrate downwards into the Pallinup formation should be subject to attenuation processes, which should limit the extent and migration rate of the any impacts.
- It appears from the limited drilling information (one monitoring well) that the Pallinup Formation is underlain by the Werillup Aquitard and granite, which should constrain any potential groundwater impacts to the Pallinup Formation.

A-4-5 Potential receptors

The Conceptual Site Model indicates that Site groundwater impacts will migrate towards the on-site creek, the receptors comprise the following:

- the environment of the onsite creek (flora and fauna)
- creek systems down-gradient of the site (flora and fauna)
- groundwater bore users - where bores are located close to, and are in hydraulic connection, with the creek system
- surface water users/abstraction of surface water; and
- livestock accessing creek.

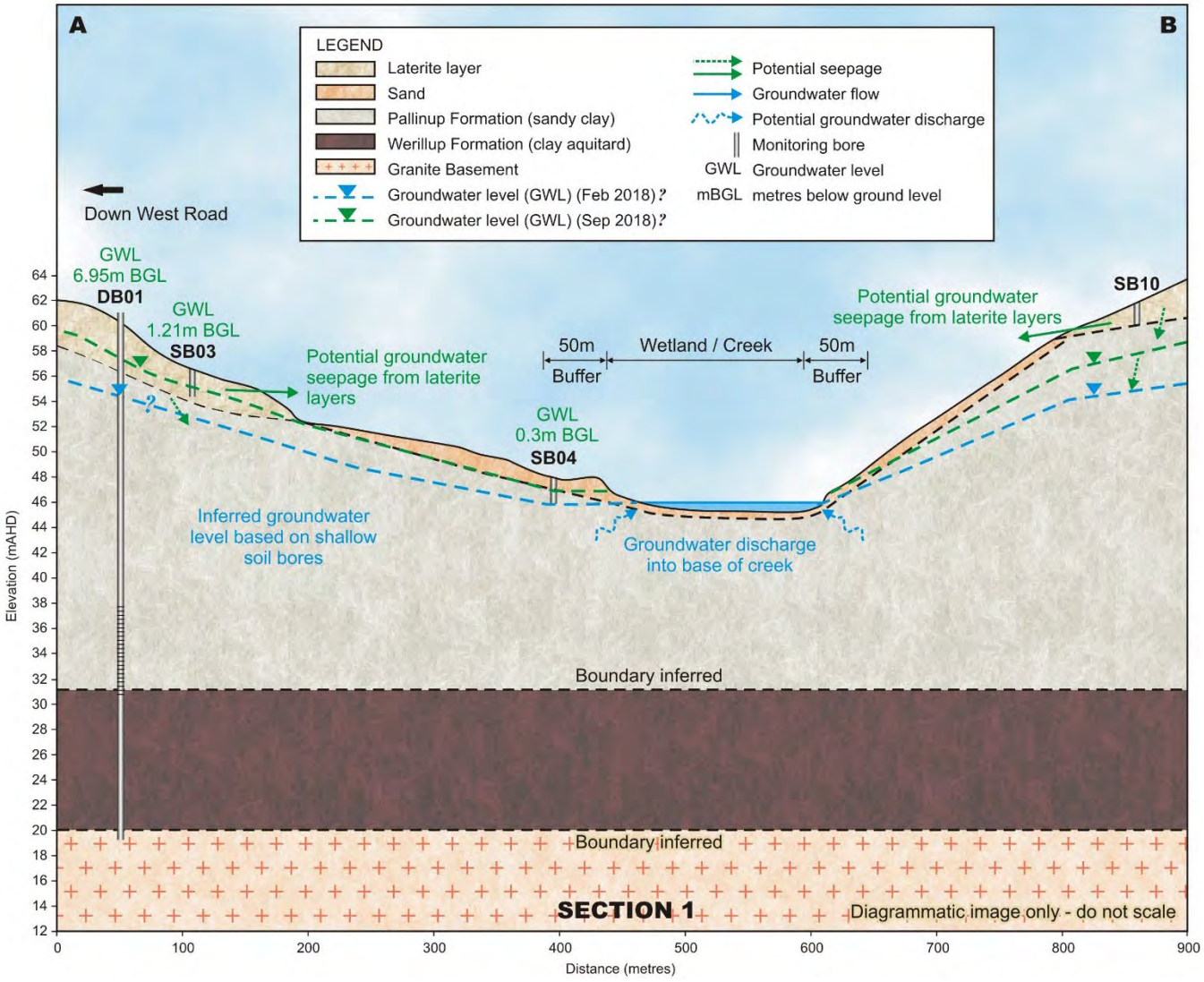


Plate 3 *Preliminary hydrogeological section 1 (A-B)*

Appendix E

Potential water users

Figure E.1 Potential surface water users

Table E.1 Licensed groundwater abstractions

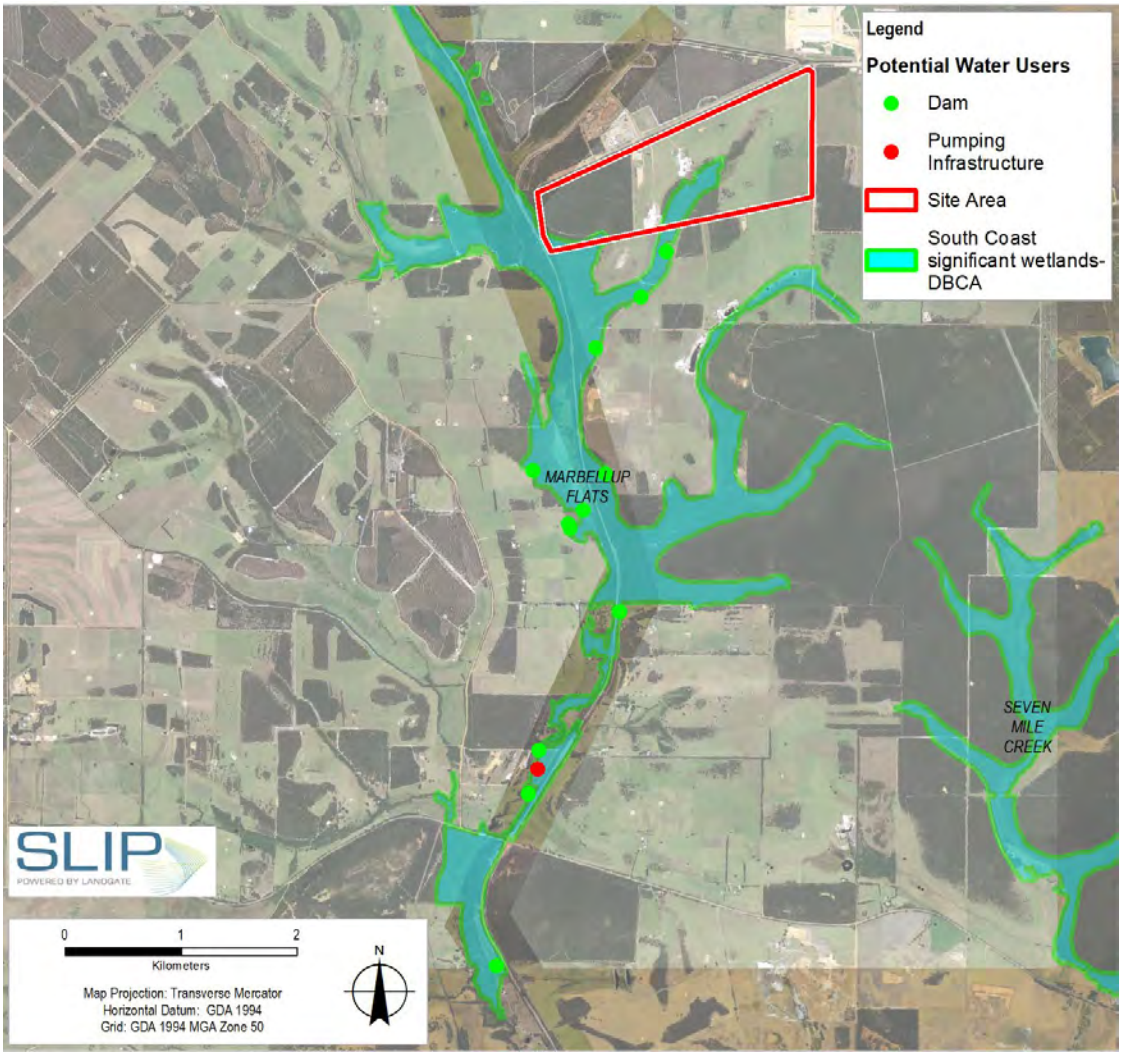


Figure E.1 Potential surface water users

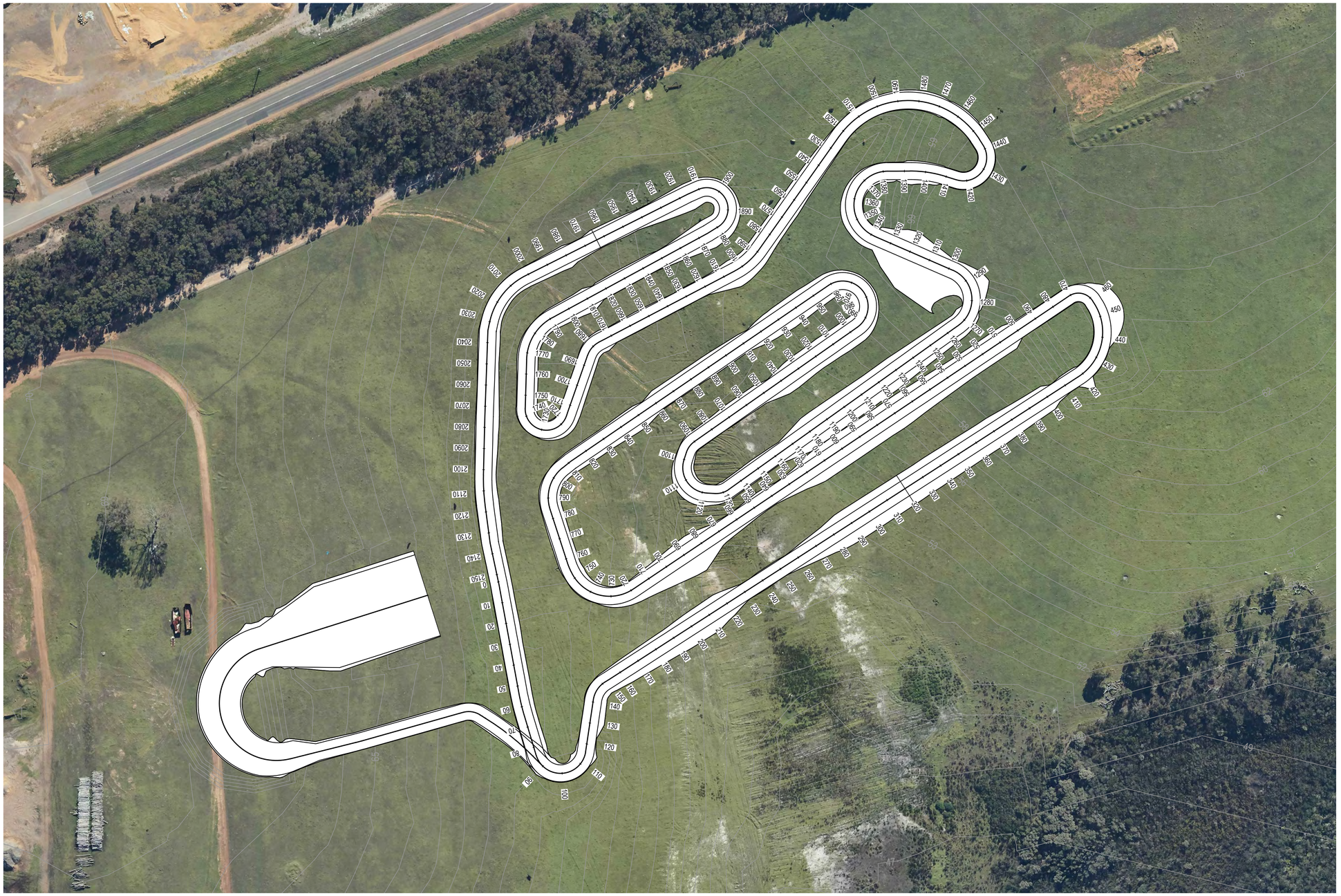
Table E.1 Licensed groundwater abstractions

Licence No.	Licence allocation (kL/yr)	Expiry date	Location	Aquifer
168308	4000	31/8/2028	Project Site Lot 5780 Down Road, Drome	168308
156374	1400	30/09/2024	Lot 7235 Marbelup ~3.5 km downgradient	156374
76457	33200	8/04/2020	Lot 500 Marbelup ~6.5 km downgradient	76457
160280	1000	13/05/2026	Lot 86 Elleker Crown Reserve ~8 km downgradient	Bremer West – Superficial
155130	26000	20/10/2022	Lot 200 Lower Denmark Rd Elleker ~9.5 km downgradient	Bremer West – Sedimentary
173352	2100	16/05/2021	Wilgie Rd, Torbay	Bremer West – Superficial

Appendix F

Motocross track drawings

N



PLAN
SCALE 1:1000

Rev	Description	Checked	Approved	Date

Author B SHAW **Drafting Check**
Designer B SHAW **Design Check**

0 10 20 30 40 50m
SCALE 1:1000 AT ORIGINAL SIZE

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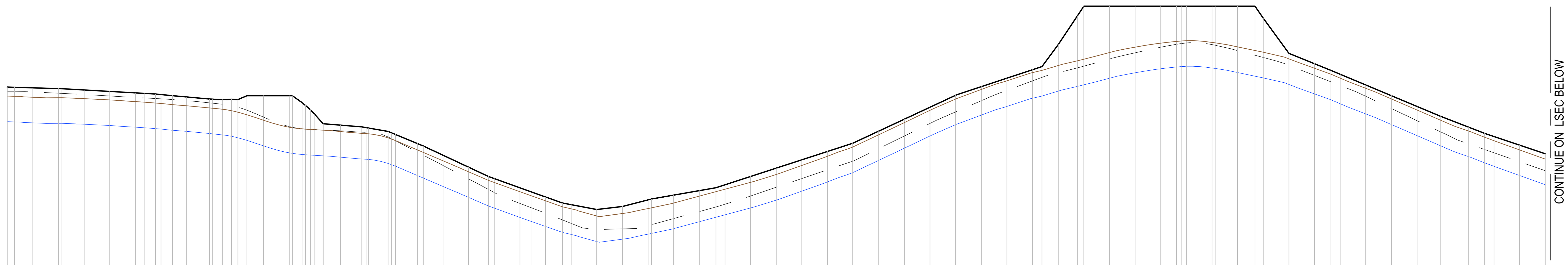
Project No.

Client CITY OF ALBANY
Project ALBANY MOTORSPORTS PARK MX TRACK
Status PRELIMINARY
Status Code

Drawing Title PLAN
Size A1
Drawing No. 12546218-C001
Rev

Plot Date: 12 August 2021 - 1:34 PM Plotted by: Bradley Shaw File Name: C:\12d\SW\data\P-00-12D-001\61-12546218 - Albany Motorsport Park DA_1367\CADD\Drawings\12546218-C001.dwg

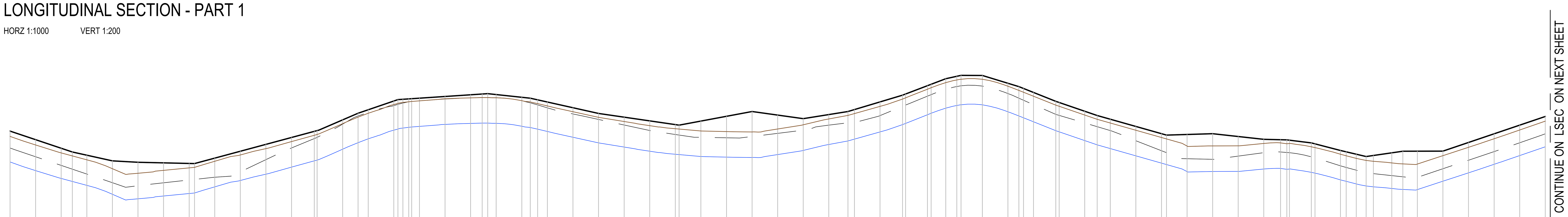


DATUM RL. 45.00

CHAINAGE	EXISTING SURFACE LEVEL	TRACK DESIGN SURFACE LEVEL	LEVEL DIFFERENCE CUT - / FILL +	BULK EARTHWORKS SURFACE LEVEL	GROUNDWATER
0.00	60.31	60.681	0.37	59.98	57.98
2.83	60.31	60.664	0.35	59.96	57.96
10.00	60.30	60.620	0.32	59.89	57.89
20.00	60.20	60.559	0.36	59.85	57.85
21.33	60.19	60.551	0.36	59.85	57.85
30.00	60.10	60.452	0.35	59.78	57.78
40.00	59.98	60.339	0.36	59.68	57.68
50.00	59.87	60.225	0.36	59.55	57.55
53.43	59.83	60.186	0.36	59.50	57.50
57.85	59.79	60.136	0.34	59.44	57.44
60.00	59.77	60.096	0.33	59.40	57.40
64.48	59.71	60.012	0.31	59.31	57.31
70.00	59.62	59.912	0.29	59.22	57.22
78.89	59.45	59.751	0.30	59.05	57.05
80.00	59.42	59.739	0.31	59.03	57.03
83.88	59.34	59.699	0.36	58.95	56.95
87.50	59.23	59.736	0.51	58.84	56.84
90.00	59.11	59.709	0.60	58.72	56.72
93.53	58.88	60.000	1.12	58.52	56.52
100.00	58.33	60.000	1.67	58.09	56.09
110.00	57.60	60.000	2.40	57.54	55.54
111.25	57.54	60.000	2.46	57.50	55.50
115.00	57.42	59.467	2.05	57.42	55.42
116.32	57.40	59.247	1.85	57.40	55.40
118.27	57.38	58.921	1.54	57.37	55.37
120.00	57.36	58.538	1.17	57.35	55.35
123.27	57.33	57.814	0.48	57.31	55.31
130.00	57.27	57.704	0.44	57.21	55.21
138.34	57.16	57.569	0.41	57.07	55.07
140.00	57.14	57.512	0.37	57.05	55.05
141.02	57.13	57.476	0.34	57.03	55.03
148.57	56.78	57.217	0.43	56.72	54.72
150.00	56.65	57.099	0.45	56.62	54.62
151.44	56.50	56.980	0.48	56.50	54.50
160.00	55.60	56.272	0.67	55.78	53.78
162.32	55.36	56.080	0.72	55.58	53.58
170.00	54.56	55.360	0.80	54.92	52.92
180.00	53.51	54.423	0.91	54.06	52.06
187.69	52.69	53.703	1.01	53.40	51.40
190.00	52.45	53.536	1.09	53.23	51.23
200.00	51.60	52.813	1.22	52.51	50.51
204.71	51.24	52.473	1.23	52.17	50.17
210.00	50.83	52.099	1.27	51.80	49.80
216.60	50.31	51.633	1.32	51.33	49.33
220.00	50.04	51.503	1.46	51.17	49.17
229.98	49.58	51.120	1.54	50.62	48.62
240.00	49.61	51.361	1.75	50.81	48.81
250.00	49.87	51.873	2.00	51.20	49.20
251.38	49.94	51.944	2.00	51.25	49.25
260.00	50.42	52.244	1.83	51.63	49.63
270.00	50.96	52.593	1.63	52.17	50.17
276.51	51.32	52.820	1.50	52.52	50.52
280.00	51.53	53.048	1.51	52.71	50.71
290.00	52.17	53.700	1.53	53.25	51.25
300.00	52.86	54.352	1.49	53.86	51.86
310.00	53.54	55.005	1.46	54.56	52.56
320.00	54.23	55.657	1.43	55.28	53.28
329.84	54.89	56.298	1.40	56.00	54.00
340.00	55.88	57.246	1.37	56.96	54.96
350.00	56.86	58.178	1.32	57.91	55.91
360.00	57.84	59.110	1.27	58.87	56.87
370.00	58.75	60.043	1.30	59.75	57.75
380.00	59.62	60.715	1.10	60.49	58.49
390.00	60.43	61.377	0.95	61.17	59.17
400.00	61.17	62.038	0.87	61.81	59.81
403.68	61.44	62.281	0.84	61.98	59.98
410.00	61.80	64.000	2.20	62.36	60.36
417.45	62.18	66.235	4.06	62.73	60.73
420.00	62.31	67.000	4.69	62.85	60.85
430.00	62.88	67.000	4.12	63.37	61.37
440.00	63.36	67.000	3.64	63.80	61.80
450.00	63.79	67.000	3.21	64.11	62.11
456.14	64.02	67.000	2.98	64.25	62.25
457.98	64.08	67.000	2.92	64.28	62.28
460.00	64.13	67.000	2.87	64.31	62.31
470.00	64.00	67.000	3.00	64.17	62.17
471.24	63.95	67.000	3.05	64.13	62.13
480.00	63.53	67.000	3.47	63.82	61.82
486.78	63.16	67.000	3.84	63.53	61.53
490.00	62.99	66.063	3.07	63.40	61.40
500.00	62.38	63.315	0.94	62.88	60.88
510.00	61.59	62.506	0.92	62.15	60.15
516.40	61.09	61.988	0.90	61.69	59.69
520.00	60.80	61.686	0.88	61.38	59.38
530.00	59.96	60.847	0.89	60.58	58.58
540.00	59.01	60.008	1.00	59.76	57.76
550.00	58.06	59.168	1.11	58.89	56.89
559.02	57.20	58.412	1.21	58.11	56.11
570.00	56.25	57.558	1.31	57.26	55.26
576.39	55.80	57.061	1.26	56.76	54.76
580.00	55.55	56.818	1.27	56.49	54.49
590.00	54.85	56.145	1.30	55.77	53.77
600.00	54.15	55.471	1.32	55.06	53.06

LONGITUDINAL SECTION - PART 1

HORZ 1:1000 VERT 1:200



DATUM RL. 47.00

CHAINAGE	EXISTING SURFACE LEVEL	TRACK DESIGN SURFACE LEVEL	LEVEL DIFFERENCE CUT - / FILL +	BULK EARTHWORKS SURFACE LEVEL	GROUNDWATER
600.00	54.15	55.471	1.32	55.06	53.06
610.00	53.46	54.798	1.33	54.38	52.38
620.00	52.79	54.125	1.34	53.77	51.77
624.32	52.50	53.833	1.34	53.53	51.53
630.00	52.11	53.584	1.47	53.23	51.23
640.00	51.44	53.143	1.71	52.53	50.53
650.00	51.20	53.037	1.84	52.18	50.18
660.00	51.42	52.990	1.57	52.40	50.40
670.00	51.64	52.942	1.30	52.59	50.59
672.11	51.69	52.932	1.24	52.63	50.63
680.00	51.86	53.357	1.49	53.11	51.11
690.00	52.29	53.896	1.61	53.61	51.61
700.00	53.24	54.435	1.20	54.10	52.10
710.00	54.15	54.973	0.82	54.65	52.65
718.89	54.89	55.452	0.56	55.14	53.14
720.00	54.98	55.512	0.53	55.20	53.20
730.00	56.01	56.350	0.34	56.06	54.06
736.00	56.66	56.866	0.21	56.57	54.57
740.00	56.94	57.141	0.20	56.87	54.87
750.00	57.48	57.826	0.35	57.55	55.55
751.59	57.57	57.935	0.37	57.64	55.64
753.55	57.66	57.961	0.30	57.71	55.71
755.81	57.76	57.991	0.23	57.77	55.77
756.97	57.78	58.007	0.22	57.79	55.79
760.00	57.83	58.047	0.21	57.84	55.84
770.00	57.98	58.179	0.20	58.00	56.00
780.00	58.07	58.311	0.24	58.07	56.07
784.51	58.10	58.371	0.27	58.10	56.10
786.67	58.11	58.399	0.29	58.10	56.10
790.00	58.09	58.329	0.24	58.08	56.08
800.00	57.84	58.119	0.28	57.85	55.85
803.33	57.68	58.048	0.37	57.75	55.75
806.18	57.52	57.920	0.40	57.62	55.62
810.00	57.29	57.749	0.46	57.44	55.44
820.00	56.81	57.299	0.49	56.99	54.99
830.00	56.39	56.849	0.46	56.55	54.55
840.00	55.95	56.558	0.61	56.22	54.22
850.00	55.52	56.267	0.75	55.90	53.90
860.00	55.21	55.976	0.77	55.66	53.66
861.46	55.17	55.934	0.77	55.63	53.63
870.00	54.98	56.255	1.27	55.48	53.48
880.00	54.95	56.630	1.68	55.44	53.44
890.00	55.05	57.006	1.96	55.40	53.40
900.00	55.30	56.724	1.43	55.64	53.64
910.00	55.54	56.442	0.90	55.96	53.96
920.00	55.94	56.762	0.82	56.42	54.42
927.49	56.12	57.002	0.88	56.70	54.70
930.00	56.19	57.152	0.97	56.84	54.84
940.00	56.68	57.751	1.07	57.41	55.41
948.83	57.41	58.280	0.87	57.98	55.98
950.00	57.50	58.369	0.87	58.07	56.07
958.53	58.20	59.020	0.81	58.75	56.75
960.00	58.32	59.132	0.81	58.87	56.87
965.71	58.74	59.567	0.83	59.27	57.27
970.00	58.96	59.756	0.80	59.48	57.48
971.67	59.02	59.830	0.81	59.53	57.53
980.00	58.99	59.825	0.83	59.52	57.52
990.00	58.41	59.215	0.80	58.98	56.98
994.29	58.04	58.953	0.91	58.65	56.65
996.07	57.89	58.811	0.93	58.51	56.51
1000.00	57.54	58.498	0.96	58.20	56.20
1008.71	56.78	57.804	1.02	57.50	55.50
1010.00	56.70	57.715	1.01	57.42	55.42
1020.00	56.11	57.027	0.92	56.73	54.73
1024.86	55.82	56.692	0.87	56.39	54.39
1030.00	55.52	56.401	0.88	56.10	54.10
1040.00	54.72	55.835	1.11	55.53	53.53
1050.00	53.93	55.268	1.33	54.97	52.97
1051.95	53.78	55.158	1.38	54.86	52.86
1060.00	53.31	55.206	1.90	54.30	52.30
1070.00	53.26	55.265	2.00	54.31	52.31
1080.00	53.52	55.047	1.53	54.32	52.32
1090.00	53.79	54.829	1.04	54.51	52.51
1096.55	53.84	54.795	0.96	54.55	52.55
1098.99	53.80	54.782	0.98	54.48	52.48
1100.00	53.78	54.757	0.97	54.50	52.50
1108.57	53.46	54.545	1.08	54.25	52.25
1110.00	53.38	54.472	1.09	54.18	52.18
1119.95	52.76	53.960	1.20	53.66	51.66
1122.19	52.63	53.853	1.23	53.54	51.54
1126.12	52.41	53.665	1.25	53.34	51.34
1130.00	52.23	53.480	1.25	53.18	51.18
1132.83	52.15	53.562	1.42	53.11	51.11
1140.00	51.99	53.769	1.78	52.99	50.99
1144.32	51.89	53.894	2.00	52.91	50.91
1150.00	51.84	53.899	2.05	52.89	50.89
1160.00	52.53	53.907	1.38	53.55	51.55
1170.00	53.20	54.584	1.39	54.21	52.21
1180.00	53.87	55.261	1.39	54.87	52.87
1190.00	54.56	55.938	1.38	55.56	53.56
1200.00	55.26	56.614	1.35	56.25	54.25

LONGITUDINAL SECTION - PART 2

HORZ 1:1000 VERT 1:200

Rev	Description	Checked	Approved	Date

Author B SHAW Drafting Check

Designer B SHAW Design Check

VERTICAL 1:200 AT ORIGINAL SIZE 0 2 4 6 8 10m

HORIZONTAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m

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Project No.

Client CITY OF ALBANY

Project ALBANY MOTORSPORTS PARK MX TRACK

Status PRELIMINARY Status Code

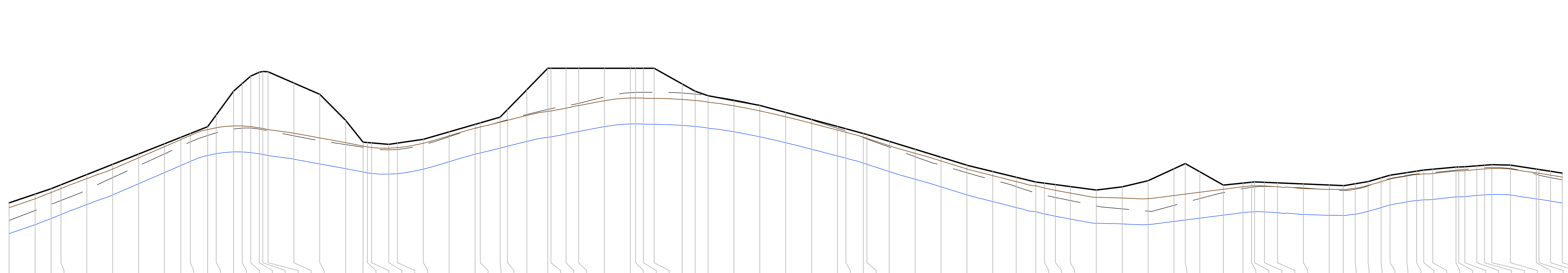
Drawing Title LONGITUDINAL SECTION SHEET 1 OF 2

Size A1

Drawing No. 12546218-C002

Rev

Plot Date: 12 August 2021 - 11:46 AM Plotted by: Bradley Shaw File Name: C:\12d\SW\data\P-00-12D-001\61-12546218 - Albany Motorsport Park DA_1367\CADD\Drawings\12546218-C002.dwg

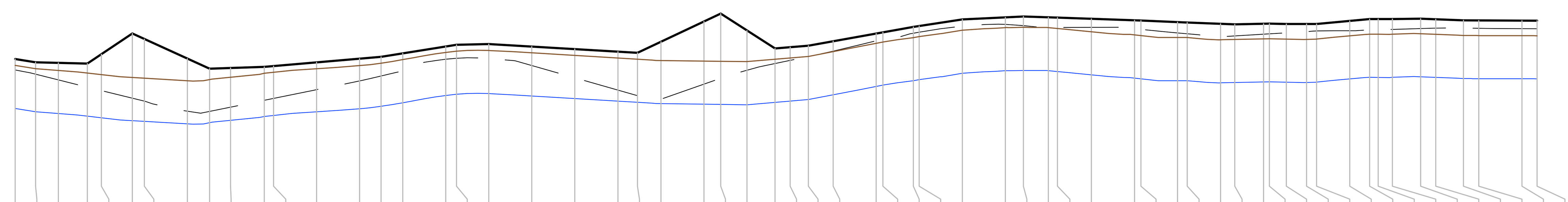

CONTINUE ON LSEC BELOW

DATUM RL. 51.00

CHAINAGE	GROUNDWATER	BULK EARTHWORKS SURFACE LEVEL	LEVEL DIFFERENCE CUT - / FILL +	TRACK DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
1200.00	54.25	56.25	1.35	56.614	55.26
1210.00	54.94	56.94	1.26	57.291	56.03
1216.19	55.41	57.41	1.20	57.710	56.51
1220.00	55.72	57.72	1.21	58.011	56.80
1230.00	56.49	58.49	1.18	58.802	57.62
1240.00	57.23	59.23	1.03	59.593	58.56
1250.00	58.09	60.09	0.90	60.384	59.48
1260.00	58.95	60.95	0.78	61.175	60.40
1266.30	59.50	61.50	0.70	61.673	60.97
1270.00	59.82	61.82	0.65	61.966	61.32
1276.67	60.27	62.27	0.67	62.493	61.82
1280.00	60.41	62.41	1.38	63.404	62.02
1286.67	60.55	62.55	2.91	65.225	62.31
1290.00	60.55	62.55	3.43	65.812	62.38
1293.33	60.50	62.50	4.01	66.400	62.39
1296.67	60.40	62.40	4.39	66.695	62.31
1297.98	60.35	62.35	4.49	66.752	62.26
1300.00	60.27	62.27	4.55	66.726	62.18
1310.00	59.99	61.99	4.07	65.859	61.79
1320.00	59.62	61.62	3.58	64.992	61.41
1330.00	59.26	61.26	1.87	62.981	61.11
1336.70	59.00	61.00	0.39	61.300	60.91
1338.41	58.94	60.94	0.41	61.271	60.86
1340.00	58.89	60.89	0.44	61.245	60.81
1346.67	58.83	60.83	0.43	61.133	60.71
1350.00	58.87	60.87	0.49	61.229	60.74
1360.00	59.22	61.22	0.42	61.517	61.10
1370.00	59.79	61.79	0.37	62.093	61.72
1380.00	60.37	62.37	0.31	62.669	62.36
1382.02	60.47	62.47	0.32	62.786	62.46
1389.67	60.84	62.84	0.36	63.226	62.87
1392.52	60.99	62.99	0.78	63.811	63.03
1400.00	61.36	63.36	1.91	65.343	63.43
1408.09	61.67	63.67	3.17	67.000	63.83
1409.32	61.70	63.70	3.12	67.000	63.88
1415.14	61.92	63.92	2.90	67.000	64.10
1420.00	62.12	64.12	2.71	67.000	64.29
1430.00	62.50	64.50	2.21	67.000	64.79
1440.00	62.70	64.70	1.88	67.000	65.12
1441.97	62.71	64.71	1.86	67.000	65.14
1445.03	62.70	64.70	1.85	67.000	65.15
1449.19	62.68	64.68	1.85	67.000	65.15
1460.00	62.59	64.59	0.70	65.788	65.09
1465.00	62.51	64.51	0.22	65.227	65.01
1470.00	62.39	64.39	0.00	64.878	64.88
1480.00	62.10	64.10	-0.06	64.508	64.57
1490.00	61.71	63.71	-0.00	64.139	64.14
1500.00	61.26	63.26	-0.01	63.596	63.61
1510.00	60.75	62.75	0.05	63.054	63.00
1520.00	60.23	62.23	0.14	62.511	62.37
1523.28	60.06	62.06	0.15	62.334	62.18
1530.00	59.68	61.68	0.31	61.969	61.66
1531.40	59.59	61.59	0.34	61.893	61.55
1540.00	59.03	61.03	0.45	61.366	60.92
1550.00	58.44	60.44	0.57	60.754	60.18
1560.00	57.85	59.85	0.61	60.142	59.53
1570.00	57.23	59.23	0.59	59.529	58.94
1580.00	56.71	58.71	0.65	59.036	58.39
1589.06	56.25	58.25	0.73	58.597	57.87
1596.63	55.93	57.93	0.84	58.230	57.39
1600.00	55.76	57.76	0.92	58.139	57.22
1604.18	55.58	57.58	0.99	58.027	57.03
1610.00	55.37	57.37	1.08	57.871	56.79
1620.00	55.04	57.04	1.22	57.603	56.38
1630.00	54.99	56.99	1.70	57.854	56.16
1640.00	54.95	56.95	2.35	58.324	55.98
1650.00	55.18	57.18	2.83	59.250	56.42
1654.34	55.29	57.29	3.00	59.652	56.65
1660.00	55.44	57.44	2.06	59.013	56.95
1669.09	55.67	57.67	0.58	57.987	57.41
1676.67	55.87	57.87	0.42	58.141	57.72
1680.00	55.93	57.93	0.39	58.208	57.82
1681.14	55.94	57.94	0.39	58.231	57.84
1684.96	55.92	57.92	0.31	58.200	57.89
1690.00	55.86	57.86	0.31	58.159	57.85
1700.00	55.72	57.72	0.31	58.078	57.77
1710.00	55.66	57.66	0.36	57.996	57.63
1715.39	55.65	57.65	0.39	57.952	57.56
1720.00	55.74	57.74	0.43	58.094	57.66
1725.00	55.96	57.96	0.34	58.263	57.92
1730.00	56.25	58.25	0.26	58.552	58.29
1733.48	56.46	58.46	0.26	58.753	58.49
1740.00	56.69	58.69	0.21	58.952	58.74
1743.74	56.80	58.80	0.22	59.066	58.85
1746.51	56.85	58.85	0.25	59.151	58.90
1750.00	56.88	58.88	0.25	59.215	58.96
1758.97	57.08	59.08	0.24	59.380	59.14
1760.00	57.08	59.08	0.23	59.386	59.16
1762.39	57.10	59.10	0.20	59.399	59.20
1767.00	57.19	59.19	0.19	59.471	59.29
1770.00	57.24	59.24	0.19	59.517	59.33
1772.80	57.26	59.26	0.22	59.560	59.34
1780.00	57.23	59.23	0.25	59.527	59.28
1790.00	56.93	58.93	0.40	59.222	58.82
1791.02	56.90	58.90	0.43	59.191	58.76
1795.50	56.75	58.75	0.49	59.055	58.57
1800.00	56.61	58.61	0.51	58.908	58.39

LONGITUDINAL SECTION - PART 3

HORZ 1:1000 VERT 1:200



DATUM RL. 52.00

CHAINAGE	GROUNDWATER	BULK EARTHWORKS SURFACE LEVEL	LEVEL DIFFERENCE CUT - / FILL +	TRACK DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
1800.00	56.61	58.61	0.51	58.908	58.39
1804.71	56.45	58.45	0.55	58.754	58.20
1810.00	56.37	58.37	0.79	58.726	57.94
1816.76	56.25	58.25	1.09	58.689	57.60
1820.00	56.18	58.18	1.68	59.124	57.44
1827.18	56.05	58.05	3.00	60.087	57.09
1830.00	56.01	58.01	2.88	59.830	56.95
1840.00	55.90	57.90	2.44	58.921	56.48
1845.14	55.95	57.95	1.98	58.454	56.47
1850.00	56.06	58.06	1.81	58.487	56.67
1857.84	56.24	58.24	1.55	58.541	56.99
1860.00	56.29	58.29	1.50	58.578	57.08
1870.00	56.46	58.46	1.27	58.750	57.48
1880.00	56.60	58.60	1.03	58.922	57.89
1885.00	56.71	58.71	0.89	59.008	58.12
1890.00	56.87	58.87	0.82	59.168	58.35
1900.00	57.21	59.21	0.59	59.487	58.90
1902.50	57.27	59.27	0.63	59.567	58.94
1910.00	57.30	59.30	0.67	59.602	58.93
1920.00	57.19	59.19	0.88	59.484	58.60
1930.00	57.07	59.07	1.33	59.366	58.03
1940.00	56.95	58.95	1.78	59.249	57.46
1944.53	56.90	58.90	1.99	59.195	57.21
1950.00	56.83	58.83	2.67	59.708	57.04
1960.00	56.81	58.81	2.91	60.645	57.74
1963.87	56.80	58.80	3.00	61.008	58.01
1970.00	56.78	58.78	1.84	60.225	58.39
1976.51	56.89	58.89	0.70	59.393	58.70
1980.00	56.95	58.95	0.61	59.452	58.84
1984.26	57.02	59.02	0.50	59.524	59.02
1990.00	57.25	59.25	0.46	59.730	59.27
2000.00	57.63	59.63	0.34	60.088	59.75
2001.56	57.69	59.69	0.32	60.144	59.83
2008.64	57.90	59.90	0.29	60.398	60.10
2010.00	57.94	59.94	0.29	60.439	60.15
2020.00	58.24	60.24	0.32	60.741	60.42
2030.00	58.36	60.36	0.32	60.835	60.51
2034.20	58.37	60.37	0.42	60.874	60.46
2040.00	58.36	60.36	0.47	60.836	60.36
2042.10	58.32	60.32	0.46	60.822	60.36
2050.00	58.17	60.17	0.39	60.768	60.37
2060.00	58.02	60.02	0.39	60.699	60.31
2061.49	57.99	59.99	0.41	60.688	60.28
2070.00	57.90	59.90	0.50	60.618	60.12
2072.26	57.90	59.90	0.52	60.600	60.08
2080.00	57.80	59.80	0.60	60.539	59.94
2083.31	57.81	59.81	0.54	60.514	59.98
2090.00	57.84	59.84	0.48	60.541	60.06
2091.36	57.85	59.85	0.47	60.547	60.07
2095.26	57.83	59.83	0.41	60.530	60.12
2100.00	57.82	59.82	0.35	60.530	60.18
2102.29	57.83	59.83	0.33	60.531	60.20
2110.00	57.98	59.98	0.45	60.671	60.22
2114.62	58.06	60.06	0.51	60.755	60.25
2116.61	58.05	60.05	0.49	60.755	60.26
2119.92	58.05	60.05	0.48	60.754	60.28
2126.49	58.08	60.08	0.46	60.779	60.32
2130.00	58.05	60.05	0.41	60.750	60.34
2136.41	58.00	60.00	0.36	60.698	60.34
2140.00	57.99	59.99	0.37	60.694	60.33
2150.00	57.99	59.99	0.37	60.685	60.31
2153.54	57.98	59.98	0.37	60.684	60.31

LONGITUDINAL SECTION - PART 4

HORZ 1:1000 VERT 1:200

Rev	Description	Checked	Approved	Date

Author B SHAW Drafting Check
Designer B SHAW Design Check

VERTICAL 1:200 AT ORIGINAL SIZE 0 2 4 6 8 10m
HORIZONTAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m

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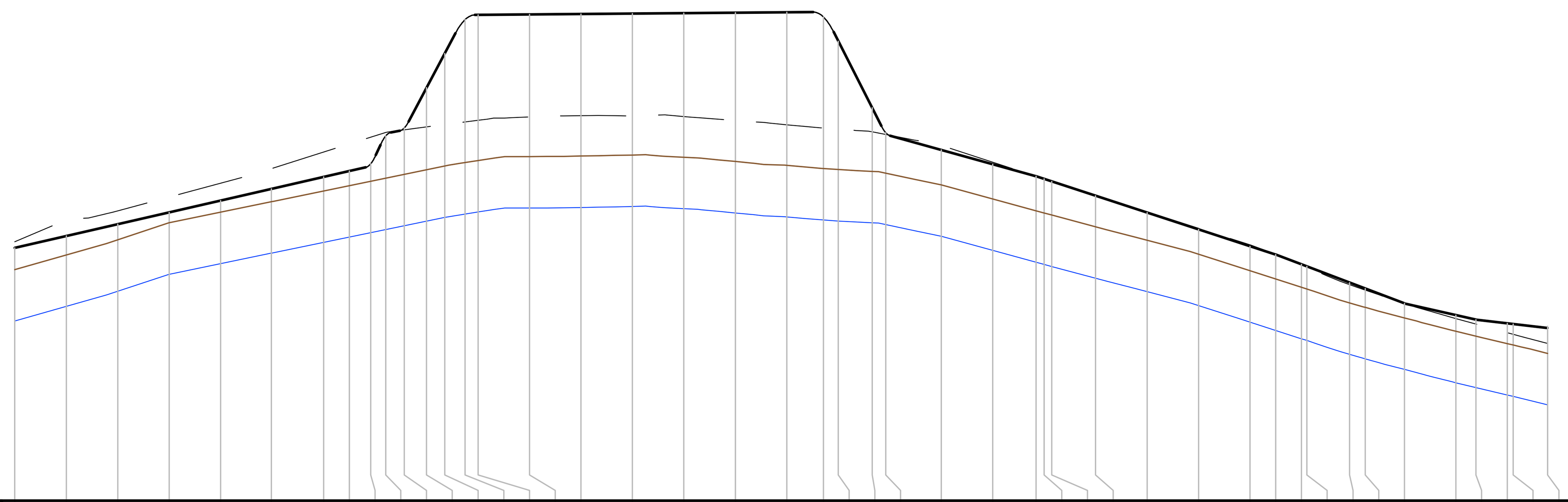
Project No.

Client CITY OF ALBANY
Project ALBANY MOTORSPORTS PARK MX TRACK
Status PRELIMINARY Status Code

Drawing Title PLAN LONGITUDINAL SECTION SHEET 2 OF 2
Size A1
Drawing No. 12546218-C003
Rev

Plot Date: 12 August 2021 - 11:46 AM Plotted by: Bradley Shaw
File Name: C:\12d\SW\data\P-00-12D-001\61-12546218 - Albany Motorsport Park DA_1367\CADD\Drawings\12546218-C003.dwg



DATUM RL. 53.00

CHAINAGE	GROUNDWATER	BULK EARTHWORKS SURFACE LEVEL	LEVEL DIFFERENCE CUT - / FILL +	TRACK DESIGN SURFACE LEVEL	EXISTING SURFACE LEVEL
0.00	59.98	61.98	-0.24	62.830	63.07
10.00	60.55	62.55	-0.62	63.290	63.91
20.00	61.14	63.14	-0.52	63.750	64.27
30.00	61.80	63.80	-0.59	64.210	64.80
40.00	62.22	64.22	-0.67	64.670	65.34
49.84	62.62	64.62	-0.79	65.122	65.91
60.00	63.04	65.04	-0.96	65.590	66.55
65.00	63.25	65.25	-1.05	65.820	66.87
69.15	63.42	65.42	-1.03	66.098	67.13
72.05	63.54	65.54	-0.14	67.176	67.31
75.65	63.69	65.69	0.07	67.490	67.42
80.00	63.86	65.86	1.53	69.056	67.53
83.53	64.01	66.01	2.76	70.385	67.62
87.50	64.14	66.14	3.98	71.706	67.72
90.00	64.22	66.22	4.10	71.886	67.79
100.00	64.38	66.38	3.98	71.903	67.92
110.00	64.40	66.40	3.95	71.920	67.97
120.00	64.44	66.44	3.97	71.937	67.96
130.00	64.35	66.35	4.02	71.954	67.94
140.00	64.19	66.19	4.19	71.971	67.78
150.00	64.03	66.03	4.38	71.988	67.61
157.11	63.91	65.91	4.32	71.805	67.48
160.00	63.87	65.87	3.42	70.865	67.44
166.58	63.80	65.80	0.94	68.278	67.34
169.23	63.73	65.73	0.07	67.307	67.24
180.00	63.28	65.28	-0.17	66.637	66.81
190.00	62.73	64.73	-0.08	66.082	66.16
198.41	62.27	64.27	-0.00	65.614	65.61
200.00	62.18	64.18	-0.00	65.511	65.51
201.47	62.10	64.10	-0.00	65.414	65.42
210.00	61.65	63.65	-0.01	64.856	64.87
220.00	61.12	63.12	-0.03	64.201	64.23
230.00	60.58	62.58	-0.04	63.546	63.59
240.00	59.94	61.94	-0.05	62.891	62.94
245.00	59.62	61.62	-0.00	62.564	62.56
250.00	59.29	61.29	0.03	62.185	62.15
251.05	59.23	61.23	0.04	62.105	62.07
259.33	58.69	60.69	0.08	61.478	61.40
262.39	58.51	60.51	0.06	61.245	61.19
270.00	58.10	60.10	0.00	60.669	60.67
280.00	57.58	59.58	0.14	60.213	60.08
283.88	57.39	59.39	0.17	60.037	59.86
290.00	57.10	59.10	0.36	59.893	59.53
291.13	57.05	59.05	0.40	59.866	59.47
297.81	56.72	58.72	0.67	59.780	59.11

LONGITUDINAL SECTION - MX ENTRY STAGE

HORZ 1:1000 VERT 1:200

Rev	Description	Checked	Approved	Date

Author B SHAW Drafting Check
Designer B SHAW Design Check

VERTICAL 1:200 AT ORIGINAL SIZE 0 2 4 6 8 10m
HORIZONTAL 1:1000 AT ORIGINAL SIZE 0 10 20 30 40 50m

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Project No.

Client CITY OF ALBANY
Project ALBANY MOTORSPORTS PARK MX TRACK
Status PRELIMINARY Status Code
Drawing Title LONGITUDINAL SECTION MX ENTRY STAGE
Size A1
Drawing No. 12546218-C005
Rev

Plot Date: 12 August 2021 - 11:46 AM Plotted by: Bradley Shaw File Name: C:\12d\SW\data\P-00-12D-001\61-12546218 - Albany Motorsport Park DA_1367\CADD\Drawings\12546218-C005.dwg

Appendix G

DRAINS modelling results schematics

Summary of DRAINS Results

Basin	Peak Water Level			Peak Inflow			Peak Outflow			Peak Stored Vol			Critical Duration		
	1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP
East-B1	58.78	58.88	59.06	0.052	0.225	0.635	0.032	0.196	0.464	231	278	385	6hr	2hr	30min
East-B2	57.22	57.55	57.65	0.054	0.241	0.655	0.006	0.055	0.254	121	362	446	9hr	3hr	1hr
East-B3	70.27	70.56	70.75	0.072	0.272	0.647	0	0.031	0.282	110	277	410	3hr	1hr	1hr
East-B4	71.18	71.34	71.41	0.227	0.729	1.088	0	0.111	0.201	53	117	150	25min	25min	15min
East-B5	66.82	67.1	67.23	0.24	0.335	0.792	0.021	0.174	0.464	417	666	791	3hr	2hr	1hr
East-B6	61.19	61.4	61.61	0.032	0.534	1.834	0.018	0.405	0.628	127	300	516	6hr	2hr	30min
East-B7	65.53	65.66	65.97	0.329	0.386	1.241	0.04	0.287	0.679	223	298	528	6hr	2hr	9hr
East-B8	70.58	70.77	71.03	0.024	0.069	0.2	0	0	0.02	21	81	191	1hr	3hr	9hr
East-B9	63.02	63.3	63.65	0.042	0.163	0.499	0	0	0.255	18	314	788	2hr	3hr	2hr
East-B10	62.14	62.36	62.52	0.04	0.286	0.977	0.02	0.189	0.55	64	198	320	2hr	2hr	30min
West-B1	66.21	66.69	66.7	0.014	0.115	0.32	0	0.083	0.113	22	97	100	9hr	9hr	9hr
West-B2	62.3	62.39	62.43	0.137	0.269	0.435	0.014	0.047	0.116	79	121	144	1hr	45min	15min
West-B3	62.91	63.25	63.31	0.057	0.145	0.269	0	0.038	0.146	79	168	186	3hr	3hr	30min
West-B4	59.53	59.61	59.68	0.086	0.198	0.401	0.044	0.173	0.361	77	93	109	1hr	30min	15min
West-B5	53.92	54.13	54.25	0.057	0.296	0.641	0.029	0.242	0.582	55	94	118	3hr	1hr	30min
West-B6	58	58.42	58.57	0	0.044	0.158	0	0	0.069	0	67	106	-	3hr	2hr
West-B7	51.85	52.3	52.44	0.056	0.326	0.724	0	0.138	0.529	181	500	627	6hr	3hr	2hr

Drains/swales	Shape	Slope	Depth	Length	10% flow	Flow			Water Depth					
						1EY	10% AEP	1% AEP	1EY	10% AEP	1% AEP			
E-B1-01	1:6 swale	0.51	0.406	83	0.037	0.01	0.037	0.092	0.065	0.106	0.144			
E-B1-02A	1:6 swale	0.54	0.448	130.5	0.052	0.003	0.052	0.212	0.052	0.148	0.244			
E-B1-02B	1:6 swale	2.78	0.41	28.8	0.057	0.005	0.057	0.233	0.045	0.11	0.186			
E-B1-03A	1:6 swale	2.1	0.501	142.8	0.189	0.077	0.189	0.352	0.149	0.201	0.253			
E-B1-03B	1:6 swale	2.08	0.474	312.1	0.17	0.047	0.17	0.431	0.108	0.174	0.247			
E-B1-04	1:4 swale	0.54	0.44	184.8	0.024	0	0.024	0.104	0	0.14	0.23			
E-B1-04-CONNECT	Dummy OF	3.25	0.428	92.4	0.02	0	0.02	0.077	0	0.128	0.201			
E-B2-01	1:4 swale	4.23	0.459	142	0.125	0.027	0.125	0.338	0.089	0.159	0.231			
E-B2-02	1:6 swale	5.28	0.428	56.8	0.116	0.027	0.116	0.317	0.074	0.128	0.185			
E-B3-01	1:6 swale	1.26	0.437	118.7	0.067	0.023	0.067	0.171	0.092	0.137	0.249			
E-B3-02	1:6 swale	0.53	0.861	112.9	0.132	0.051	0.132	0.291	0.265	0.561	0.749			
E-B4-01	K300, 0.4m deep	0.5	0.57	150.2	0.09	0.046	0.09	0.15	0.161	0.27	0.405			
E-B4-02	1:4 swale	0.9	0.586	211.6	0.248	0.113	0.248	0.436	0.228	0.286	0.348			
E-B5-01	1:4 swale	2.56	1.291	159.6	0.113	0.057	0.113	0.228	0.574	0.991	1.247			
E-B5-02	1:4 swale	1.49	1.291	375.5	0.53	0.256	0.53	0.946	0.574	0.991	1.247			
E-B6-01	1:6 swale	3.87	0.699	142	0.094	0.007	0.094	0.32	0.19	0.399	0.614			
E-B6-02	1:4 swale	5.3	0.699	158.6	0.051	0.005	0.051	0.18	0.19	0.399	0.614			
E-B6-03	1:6 swale	0.8	0.699	310.6	0.158	0.011	0.158	0.655	0.19	0.399	0.614			
E-B7-01	1:4 swale	0.67	0.508	74.5	0.098	0.023	0.098	0.285	0.092	0.208	0.304			
E-B7-02	1:6 swale	0.62	0.408	160.6	0.025	0	0.025	0.128	0	0.108	0.195			
E-B7-03	1:6 swale	1.16	0.435	129.3	0.06	0.021	0.06	0.127	0.091	0.135	0.174			
E-B7-04	1:4 swale	0.97	0.685	61	0.101	0.052	0.101	0.164	0.285	0.385	0.524			
E-B7-05	1:4 swale	1.92	0.685	30.7	0.042	0.022	0.042	0.063	0.287	0.385	0.524			
E-B7-06	1:4 swale	2.67	0.854	149.8	0.13	0.065	0.13	0.289	0.226	0.365	0.854			
E-B7-07	1:4 swale	1.57	0.832	127.4	0.033	0	0.033	0.192	0	0.395	0.832			
E-B7-08	1:6 swale	2.66	0.446	153.8	0.115	0.054	0.115	0.222	0.113	0.146	0.179			
E-B7-09	1:6 swale	1.45	0.463	144.6	0.113	0.053	0.113	0.222	0.128	0.163	0.203			
E-B7-10A	1:6 swale	1.97	0.446	126.8	0.054	0.004	0.054	0.174	0.049	0.146	0.226			
E-B7-10B	1:4 swale	1.12	0.581	133.8	0.05	0.002	0.05	0.193	0.185	0.281	0.431			
E-B7-11	1:4 swale	0.01	0.773	73.1	0.227	0.077	0.227	0.579	0.412	0.473	0.691			
E-B8-01A	1:4 swale	0.56	0.569	126.1	0.037	0.013	0.037	0.113	0.108	0.269	0.53			
E-B8-01B	1:4 swale	2.08	0.569	120.2	0.032	0.011	0.032	0.087	0.083	0.269	0.53			
E-B9-01	1:6 swale	3.6	0.447	152.7	0.129	0.034	0.129	0.255	0.093	0.147	0.211			
E-B9-02	1:6 swale	1.57	0.441	95.6	0.059	0.015	0.059	0.115	0.077	0.141	0.211			
E-B9-03	1:6 swale	3.65	0.802	167	0.03	0	0.03	0.163	0	0.388	0.802			
E-B9-04	1:6 swale	1.85	0.802	113.2	0.019	0	0.019	0.105	0	0.388	0.802			
E-B9-05	1:4 swale	2.78	0.416	165.1	0.04	0.012	0.04	0.132	0.08	0.116	0.203			
E-B9-06	1:4 swale	1.37	0.405	116.3	0.023	0.007	0.023	0.073	0.069	0.105	0.206			
E-B9-07	1:4 swale	1.64	0.781	341.3	0.072	0	0.072	0.402	0	0.322	0.781			
E-B9-08	1:4 swale	0.94	0.781	115.5	0.024	0	0.024	0.125	0	0.322	0.781			
E-B10-01	1:6 swale	0.55	0.658	182.6	0.042	0.005	0.042	0.15	0.135	0.358	0.521			
E-B10-02	1:6 swale	0.49	0.658	306.3	0.181	0.026	0.181	0.617	0.135	0.358	0.521			
E-B10-03A	1:6 swale	3.09	0.41	83.7	0.041	0.012	0.041	0.095	0.062	0.11	0.176			
E-B10-03B	1:6 swale	1.69	0.658	54	0.064	0.01	0.064	0.21	0.135	0.358	0.521			
E-B10-04	1:6 swale	2.44	0.475	82	0.017	0	0.017	0.059	0	0.175	0.319			
E-B10-05	1:4 swale	3.18	0.475	94.3	0.027	0	0.027	0.061	0	0.175	0.319			
W-B1-01	1:6 swale	0.67	0.438	178.5	0.051	0.009	0.051	0.145	0.074	0.138	0.201			
W-B1-02	1:6 swale	0.85	0.417	100	0.029	0.006	0.029	0.073	0.069	0.117	0.178			
W-B1-03	1:6 swale	0.52	0.458	96.6	0.026	0.005	0.026	0.068	0.071	0.158	0.252			
W-B1-04	1:6 swale	0.91	1.003	109.3	0.464	0.001	0.464	0.473	0.248	0.703	0.707			
W-B1-05	1:6 swale	0.35	1.003	140.9	0.721	0.001	0.721	0.725	0.248	0.703	0.707			
W-B3-01	1:6 swale	5.88	1.047	80	0.145	0.057	0.145	0.269	0.41	0.747	0.808			
W-B4-01	1:6 swale	1.8	0.909	166.8	0.088	0.038	0.088	0.183	0.533	0.609	0.684			
W-B4-02	1:6 swale	4.81	0.909	197.5	0.11	0.048	0.11	0.22	0.533	0.609	0.684			
W-B5-01	1:6 swale	4.3	0.473	59.8	0.022	0.002	0.022	0.052	0.055	0.173	0.29			
W-B5-02	1:6 swale	3.34	0.473	32	0.013	0.002	0.013	0.03	0.055	0.173	0.29			
W-B5-03	1:6 swale	9	0.34	77.8	0.005	0	0.005	0.029	0	0.04	0.075			
W-B5-04	1:6 swale	3	0.811	40	0.188	0.044	0.188	0.574	0.224	0.511	0.763			
W-B5-05	1:6 swale	4.89	0.798	45	0.018	0.003	0.018	0.04	0.266	0.498	0.763			
W-B5-06 07	1:6 swale	5.8	0.695	150	0.104	0.025	0.104	0.235	0.218	0.395	0.649			
W-B5-08	1:6 swale	2.01	0.695	59.7	0.038	0.009	0.038	0.082	0.218	0.395	0.649			
W-B5-09	1:6 swale	4.63	0.479	80	0.044	0.01	0.044	0.093	0.153	0.179	0.291			
W-B5-11	1:6 swale	1.85	0.345	27.1	0.004	0	0.004	0.018	0	0.045	0.077			
W-B5-12	1:6 swale	5.19	0.347	28.9	0.007	0.001	0.007	0.016	0.027	0.047	0.063			
W-B5-13A	1:6 swale	1.01	0.935	79.3	0.359	0.054	0.359	0.552	0.419	0.635	0.753			
W-B5-13B	1:6 swale	1.75	0.935	51.9	0.143	0.007	0.143	0.18	0.419	0.635	0.753			
W-B5-16	1:6 swale	3.8	0.935	79	0.021	0	0.021	0.054	0	0.635	0.753			
W-B5-CULV14 15	1:6 swale	4.38	0.665	164.5	0.087	0.015	0.087	0.196	0.124	0.365	0.643			
W-B6-01	1:6 swale	0.69	0.717	175	0.041	0	0.041	0.159	0	0.417	0.569			
W-B7-01	1:6 swale	6.52	0.996	60	0	0	0	0.069	0	0	0.996			
W-B7-02	1:6 swale	7.82	1.101	140.7	0.12	0.031	0.12	0.24	0.354	0.801	0.94			
W-EXT02	1:6 swale	0.38	0.542	132.4	0.172	0.014	0.172	0.524	0.095	0.242	0.363			
W-EXT03	1:6 swale	4.92	0.488	71.1	0.067	0	0.067	0.149	0	0.188	0.293			
W-EXT04	1:6 swale	1.56	1.423	89.7	0.186	0.013	0.186	0.463	0.13	0.538	1.423			
W-S1	1:6 swale	5.07	0.478	296	0.265	0	0.265	1.604	0	0.178	0.341			

Stage 1A (WEST) DRAINS Input Data

PIT / NODE DETAILS

Name	Type	Family	Version 15 Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Loss	Inflow Hydrograph	Pit is	Internal Width (mm)	Inflow is Misaligned	Minor Safe Pond Depth (m)	Major Safe Pond Depth (m)
dummy1	Node					9		0		567155.35	6133586.62		97367		No					
DUMMY-SCALE2	Node					10.5		0		568871.27	6134218.26		97701		No					
DUMMY-SCALE1	Node					8		0		568934.44	6134070.09		97702		No					
dummy2	Node					9		0		568634.09	6134965.18		1941132		No					
W1-B1-01-US	Node					69		0		567247.6	6134351.25		1941140		No					
W-B1-02-US	Node					68.65		0		567283.36	6134333.08		1941145		No					
W-B1-03-US	Node					68.65		0		567303.68	6134352.02		1941147		No					
W-B1-04-US	Node					67		0		567325.19	6134350.64		1941151		No					
W-B1-05-US	Node					66.5		0		567327.41	6134390.57		1941172		No					
W- B4-01-US	Node					62		0		567425.09	6134403.04		1941186		No					
W-B4-02-US	Node					68.5		0		567753.47	6134550.36		1941189		No					
W-B5-CULV1-HW	Headwall				0.5	57		0		567523.91	6134412.52		1941194							
W-B5-CULV1-DS	Node					56.8		0		567529.43	6134400.71		1941542		No					
W-B5-CULV2-HW	Headwall				0.5	56.5		0		567534	6134391.99		1941195							
W-B5-CULV2-DS	Node					56.3		0		567541.62	6134382.01		1941539		No					
W-B5-CULV3-HW	Headwall				0.5	55.5		0		567550.93	6134370.37		1941196							
W-B5-CULV3-DS	Node					55		0		567555.97	6134352.01		1941462		No					
W-B5-CULV4-HW	Headwall				0.5	58		0		567484.78	6134342.78		1941206							
W-B5-CULV4-DS	Node					57		0		567497.96	6134337.03		1941603		No					
W-B5-CULV5-HW	Headwall				0.5	56.5		0		567508.55	6134334.28		1941207							
W-B5-CULV5-DS	Node					55.5		0		567519.05	6134327.35		1941525		No					
W-B7-CULV2-HW	Headwall				0.5	57		0		567500.04	6134222.19		1941208							
W-B7-CULV2-DS	Node					56.5		0		567512.13	6134230.34		1941585		No					
W-B5-CULV6-HW	Headwall				0.5	53		0		567554.09	6134306.26		1941209							
N87219	Node					52.5		0		567555.25	6134294.11		1942013		No					
W-B1-CULV1-HW	Headwall				0.5	69		0		567311.44	6134260.22		1941258							
W1-01-DS	Node					68		0		567303.57	6134230.49		1941137		No					
N87159	Node					67		0		567351.95	6134262.91		1941612		No					
N87076	Node					65		0		567365.69	6134265.48		1941301		No					
N87168	Node					62.5		0		567431.93	6134391.24		1941676		No					
W-EXT02-US	Node					61		0		567457.51	6134408.33		1941306		No					
W-EXT	Node					60.5		0		567435.24	6134280.49		1941293		No					
W-EXT-CULV1-HW	Headwall				0.5	60.5		0		567458.76	6134194.67		1941315							
W-EXT-CULV1-DS	Node					59.5		0		567459.76	6134172.16		1941324		No					
N87207	Node					63.5		0		567436.12	6134209.03		1941920		No					
N87255	Node					62		0		567445.17	6134204.06		1942245		No					
W-EXT-HW	Headwall				0.5	65		0		567558.06	6134515.78		1941343							
N87181	Node					59.75		0		567578.47	6134448.85		1941726		No					
W-B5-03-DS	Node					57.5		0		567570.59	6134416.59		1941395		No					
W-B5-03-US	Node					62		0		567616.63	6134478.88		1941385		No					
W-B5-06-US	Node					63.5		0		567655.66	6134475.63		1941404		No					
W-B5-01-US	Node					60		0		567469.81	6134388.44		1941414		No					
W-B5-02-US	Node					57.8		0		567549.87	6134430.56		1941417		No					
W-B5-05-US	Node					58		0		567489.72	6134372.11		1941429		No					
W-B5-08-US	Node					56		0		567506.92	6134337.57		1941446		No					
W-B5-09-US	Node					58		0		567625.04	6134389.22		1941468		No					
W-B5-11-US	Node					58		0		567486.18	6134369.22		1941477		No					
W-B5-12-US	Node					57.5		0		567484.87	6134320.15		1941481		No					
N87237	Node					59		0		567488.62	6134214.46		1942096		No					
N87238	Node					58		0		567493.98	6134217.84		1942097		No					
W-B6-01-US	Node					59.2		0		567466.77	6134383.56		1941496		No					
N87225	Node					55		0		567536.39	6134283.98		1942020		No					
N87218	Node					54		0		567542.68	6134283.98		1941998		No					
W-B5-16-US	Node					56.5		0		567497.29	6134305.51		1941508		No					
W-B5-CULV14-US	Node					59.2		0		567629.76	6134409.12		1941554		No					
W-B7-CULV1-HW	Headwall				0.5	53		0		567557.65	6134284.02		1941567							
N87244	Node					51		0		567569.55	6134263.03		1942154		No					
N87245	Node					50		0		567584.56	6134249.28		1942155		No					
W-B7-02-US	Node					62.5		0		567725.21	6134373.43		1941569		No					
HW12	Headwall				0.5	54		0		567468.08	6134017.14		1941577							
N87149	Node					53		0		567471.06	6134003.96		1941579		No					
HW13	Headwall				0.5	48		0		567616.86	6134144.41		1941578							
N87150	Node					47.5		0		567627.43	6134132		1941580		No					
W-B3-01-US	Node							0		567343.78	6134195.82		1941588		No					
N87210	Node					51.5		0		567473.85	6133993.89		1941949		No					
N87250	Node					46.5		0		567640.51	6134115.25		1942192		No					
S1_US	Node					57.5		0		567422.52	6134010.55		2256528		No					
S1	Node					42.5		0		567390.42	6133727.68		2256531		No					

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Type	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Length(m)	id
WEST-B1	66	90		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567344.53	6134261.74	No			1941275
	67	265													
WEST-B2	62	150		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567415.19	6134384.1	No			1941280
	62.5	640													
WEST-B3	62.5	160		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567429.26	6134213.14	No			1941336
	64	475													
WEST-B4	59	100		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567579.28	6134458.86	No			1941374
	60.5	450													
WEST-B6	58	100		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567483.55	6134211.27	No			1941489
	59	500													
WEST-B5	53.5	105		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567532.81	6134283.91	No			1941502
	54.5	260													
WEST-B7	51.5	430		Pit/Sump				MR High Flow Catchpit, 3% sideslope, 0.5% grade	WA Main Roads High Flow Catchpit with Single Grate	567565.04	6134266.11	No			1941561
	52.5	980													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFactor	Rainfall Multiplier
W-B5-CULV1-CAT	W-B5-CULV1-HW	0.246	0	60	40	0	0	0	-1	16.5	16.5	-1	6.667	6.667	-1	0.05	0.016	0				1
W-B5-CULV2-CAT	W-B5-CULV2-HW	0.221	0	55	45	0	0	0	-1	25	25	-1	6	6	-1	0.05	0.016	0				1
W-B5-CULV3-CAT	W-B5-CULV3-HW	0.934	0	50	50	0	0	0	-1	17	17	-1	6	6	-1	0.05	0.016	0				1
W-B5-CULV3-DS-CAT	W-B5-CULV3-DS	0.266	0	50	50	0	0	0	-1	12	12	-1	7	7	-1	0.05	0.016	0				1
W-B5-CULV4-CAT	W-B5-CULV4-HW	0.058	0	100	0	0	0	0	-1	6	-1	-1	5	-1	-1	0.05	-1	0				1
W-B5-CULV5-CAT	W-B5-CULV5-HW	0.048	0	50	50	0	0	0	-1	15	15	-1	8	8	-1	0.05	0.016	0				1
W-B5-CULV6-CAT	W-B5-CULV6-HW	0.635	0	55	45	0	0	0	-1	14.5	14.5	-1	8.9	8.9	-1	0.05	0.016	0				1
W-B1-03-CAT	W-B1-CULV1-HW	0.219	0	50	50	0	0	0	-1	7	7	-1	2.857	2.857	-1	0.05	0.016	0				1
W-B1-01-CAT	W1-01-DS	0.737	0	50	50	0	0	0	-1	12	12	-1	2.778	2.778	-1	0.05	0.016	0				1
WEST-B1-CAT	WEST-B1	0.682	0	60	40	0	0	0	-1	35	35	-1	4.167	4.167	-1	0.05	0.016	0				1
WEST-B2-CAT	WEST-B2	1.127	100	0	0	0	0	0	75	-1	-1	5.33	-1	-1	0.013	-1	-1	0				1
W-EXT-CAT	W-EXT	0.351	0	100	0	0	0	0	-1	12	-1	-1	7.857	-1	-1	0.05	-1	0				1
W-EXT04-CAT	W-EXT-CULV1-HW	0.218	0	90	10	0	0	0	-1	10	10	-1	10	10	-1	0.05	0.016	0				1
WEST-B3-CAT	WEST-B3	0.979	0	20	80	0	0	0	-1	32	32	-1	1.563	1.563	-1	0.05	0.016	0				1
CulvW_ext	W-EXT-HW	10.5	0	95	5	5	75	2										0				1
WEST-B4-CAT	WEST-B4	1.704	80	20	0	0	0	0	90.5	90.5	-1	5	5	-1	0.013	0.05	-1	0				1
W-B5-03-CAT	W-B5-03-DS	0.106	0	100	0	0	0	0	-1	10	-1	-1	5	-1	-1	0.05	-1	0				1
WEST-B6-CAT	WEST-B6	0.869	0	75	25	0	0	0	-1	20	20	-1	7.8	7.8	-1	0.05	0.016	0				1
WEST-B5-CAT	WEST-B5	0.497	0	70	30	0	0	0	-1	21.3	21.3	-1	8.19	8.19	-1	0.05	0.016	0				1
W-B7-01-CAT	W-B7-CULV1-HW	0.061	0	100	0	0	0	0	-1	16	-1	-1	6.25	-1	-1	0.05	-1	0				1
WEST-B7-CAT	WEST-B7	1.214	0	40	60	0	0	0	-1	23	23	-1	5.217	5.217	-1	0.05	0.016	0				1
S1_catch	S1	14.1	0	100	0	0	0	0	-1	341	-1	-1	3.519	-1	-1	0.05	-1	0				1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	RI (m)	Chg (m)	RL (m)	etc (m)
DUMMY-SCALE	DUMMY-SCALE2	DUMMY-SCALE1	161.044	10	8	1.24	uPVC, under roads, 1% minimum slope	150	154	0.012	New	1	DUMMY-SCALE2	0					
Pipe20525	W-B7-CULV1-HW	WEST-B7	12.2	51.561	51.5	0.5	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	2	W-B7-CULV1-HW	0					
Pipe20526	HW12	N87149	13.2	52.91	51.91	7.58	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	HW12	0					
Pipe20527	HW13	N87150	10	47	46.8	2	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	HW13	0					
Pipe20528	W-B7-CULV2-HW	W-B7-CULV2-DS	15	55.91	55.41	3.33	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B7-CULV2-HW	0					
Pipe20532	WEST-B1	N87159	2	65.25	65.15	5	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	WEST-B1	0					
Pipe20533	N87159	N87076	8	65.15	64.75	5	Concrete, under roads, 0.5% minimum slope	450	450	0.013	New	1	N87159	0					
Pipe20566	WEST-B2	N87168	2	61.3	61.24	3	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	WEST-B2	0					
Pipe20567	N87168	W-EXT02-US	8	61.24	61	3	Concrete, under roads, 0.5% minimum slope	450	450	0.013	New	1	N87168	0					
Pipe20591	WEST-B4	N87181	2	58.3	58.14	8	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	WEST-B4	0					
Pipe20597	N87181	W-B5-03-DS	8	58.14	57.5	8	Concrete, under roads, 0.5% minimum slope	450	450	0.013	New	1	N87181	0					
Pipe20702	WEST-B3	N87207	2	61.75	61.65	5	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	WEST-B3	0					
Pipe20716	N87207	N87255	13	61.65	61	5	Concrete, under roads, 0.5% minimum slope	450	450	0.013	New	1	N87207	0					
Pipe20745	WEST-B5	N87225	2	52.7	52.63	3.5	Concrete, under roads, 0.5% minimum slope	600	600	0.013	NewFixed	1	WEST-B5	0					
Pipe20746	N87225	N87218	8	52.63	52.35	3.5	Concrete, under roads, 0.5% minimum slope	600	600	0.013	New	1	N87225	0					
Pipe20785	WEST-B6	N87237	2	57.3	57.26	2	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	WEST-B6	0					
Pipe20790	N87237	N87238	8	57.26	57.1	2	Concrete, under roads, 0.5% minimum slope	450	450	0.013	New	1	N87237	0					
Pipe20821	WEST-B7	N87244	2	49.3	49.24	3	Concrete, under roads, 0.5% minimum slope	600	600	0.013	NewFixed	1	WEST-B7	0					
Pipe20830	N87244	N87245	8	49.24	49	3	Concrete, under roads, 0.5% minimum slope	600	600	0.013	New	1	N87244	0					
W-B1-CULV1	W-B1-CULV1-HW	W1-01-DS	30	68.15	67.8	1.17	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B1-CULV1-HW	0					
W-B5-CULV1	W-B5-CULV1-HW	W-B5-CULV1-DS	13	56.43	56.17	2	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B5-CULV1-HW	0					
W-B5-CULV2	W-B5-CULV2-HW	W-B5-CULV2-DS	12.5	55.8	55.425	3	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B5-CULV2-HW	0					
W-B5-CULV3	W-B5-CULV3-HW	W-B5-CULV3-DS	19.2	54.8	54.5	1.56	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	2	W-B5-CULV3-HW	0					
W-B5-CULV4	W-B5-CULV4-HW	W-B5-CULV4-DS	14.5	56.91	56.51	2.76	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B5-CULV4-HW	0					
W-B5-CULV5	W-B5-CULV5-HW	W-B5-CULV5-DS	12.6	55.3	54.41	7.06	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B5-CULV5-HW	0					
W-B5-CULV6	W-B5-CULV6-HW	N87219	20	52	51.8	1	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-B5-CULV6-HW	0					
W-EXT-CULV	W-EXT-HW	W-EXT02-US	150	64.2	61	2.13	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-EXT-HW	0					
W-EXT-CULV1	W-EXT-CULV1-HW	W-EXT-CULV1-DS	20	59.1	59	0.5	Concrete, under roads, 0.5% minimum slope	450	450	0.013	NewFixed	1	W-EXT-CULV1-HW	0					

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	Chg (m)	Bottom Elev (m)	Height of Service (m)	etc etc

CHANNEL DETAILS

Name	From	To	Type	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Base Width (m)	L.B. Slope (1:?)	R.B. Slope (1:?)	Manning n	Depth (m)	Roofed

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Depth Major Storms (m)	SafeDepth Minor Storms (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %		id	U/S IL	D/S IL	Length (m)
OF76225	W1-01-DS	WEST-B1	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	3.91	0		1941169	67.8	66	46
OF76315	W-EXT-CULV1-DS	HW12	1.1				Swale with 1:4 sideslopes	0.45	0.3	1	3.9	0		1941583	59	52.9	156.1
OF76316	W-B7-CULV2-DS	WEST-B7	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	6.52	0		1941587	55.41	51.5	60
OF76323	WEST-B1	N87076	0.1	66.75	5	1.45	4 m wide pathway	0.3	0.15	0.4	20	0		1941648	66.75	65	10
OF76327	WEST-B2	W-EXT02-US	0.1	62.35	5	1.45	Dummy OF	0.3	0.3	0.6	13.5	0		1941663	62.35	61	10
OF76345	WEST-B4	W-B5-03-DS	0.1	59.6	5	1.45	4 m wide pathway	0.3	0.15	0.4	21	0		1941745	59.6	57.5	10
OF76352	W-B5-CULV1-HW	W-B5-CULV1-DS	0.2	57	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	1.54	0		1941774	57	56.8	13
OF76354	W-B5-CULV1-DS	W-B5-CULV2-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	3.78	0		1941776	56.17	55.8	9.8
OF76357	W-B5-CULV2-HW	W-B5-CULV2-DS	0.2	56.5	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	1.6	0		1941788	56.5	56.3	12.5
OF76359	W-B5-CULV2-DS	W-B5-CULV3-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	4.19	0		1941795	55.425	54.8	14.9
OF76363	W-B5-CULV4-HW	W-B5-CULV4-DS	0.1	58	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	6.9	0		1941822	58	57	14.5
OF76364	W-B5-CULV4-DS	W-B5-CULV5-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	4.68	0		1941849	56.51	56	10.9
OF76369	W-B5-CULV5-HW	W-B5-08-US	0.1	56.5	15	1.45	Dummy OF	0.3	0.3	0.6	10	0		1941855	56.5	56	5
OF76373	WEST-B3	N87255	0.1	63.7	5	1.45	4 m wide pathway	0.3	0.15	0.4	16.33	0		1941917	63.7	61.3	15
OF76375	W-EXT-CULV1-HW	W-EXT-CULV1-DS	0.2	60.5	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	5	0		1941944	60.5	59.5	20
OF76377	HW12	N87149	0.1	54	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	7.52	0		1941959	54	53	13.5
OF76384	N87149	N87210	0.1				Dummy OF	0.3	0.3	0.6	4.14	0		1941970	51.91	51.5	9.9
OF76391	WEST-B5	N87218	0.1	54.25	5	1.45	4 m wide pathway	0.3	0.15	0.4	8.33	0		1941989	54.25	53	15
OF76405	N87218	W-B7-CULV1-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	5.3	0		1942057	52.35	51.6	14.9
OF76407	N87219	W-B7-CULV1-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	2.33	0		1942059	51.8	51.6	10.3
OF76410	W-B7-CULV1-HW	WEST-B7	0.1	53	15	1.45	Dummy OF1	0.3	0.3	0.6	12.3	0		1942082	53	51.5	12.2
OF76413	W-B5-CULV6-HW	N87219	0.3	53	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	2.5	0		1942089	53	52.5	20
OF76415	W-B5-CULV3-HW	W-B5-CULV3-DS	0.3	55.5	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	2.6	0		1942091	55.5	55	19.2
OF76418	WEST-B6	N87238	0.1	58.75	5	1.45	4 m wide pathway	0.3	0.15	0.4	16.5	0		1942118	58.75	57.1	10
OF76420	N87238	W-B7-CULV2-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	11.9	0		1942121	57.1	55.9	10
OF76424	W-B7-CULV2-HW	W-B7-CULV2-DS	0.2	57	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	3.33	0		1942146	57	56.5	15
OF76426	WEST-B7	N87245	0.1	52.5	15	1.45	Dummy OF1	0.3	0.3	0.6	25	0		1942172	52.5	50	10
OF76429	N87245	HW13	1.6				Swale with 1:6 sideslopes	0.3	0.2	1	1.74	0		1942179	49	47	115
OF76432	N87150	N87250	0.1				Dummy OF	0.3	0.3	0.6	3	0		1942193	46.8	46.5	10
OF76434	HW13	N87150	0.2	48	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	3.33	0		1942196	48	47.5	15
OF76436	W-B1-CULV1-HW	W1-01-DS	0.4	69	15	1.45	Overflow across road low point - parabola x = 15, y = 0.3	0.05	0	0.6	3.33	0		1942204	69	68	30
OF76444	W-EXT-HW	WEST-B4	0.3	65	15	1.45	Dummy OF	0.3	0.3	0.6	10	0		1942230	65	59	60
OF76451	N87255	W-EXT-CULV1-HW	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	12.67	0		1942264	61	59.1	15
W-B1-01	W1-B1-01-US	W1-01-DS	3.9				Swale with 1:6 sideslopes	0.3	0.2	1	0.67	69.2		1941163	69	67.8	178.5
W-B1-02	W-B1-02-US	W1-01-DS	1.9				Swale with 1:6 sideslopes	0.3	0.2	1	0.85	30.8		1941164	68.65	67.8	100
W-B1-03	W-B1-03-US	W-B1-CULV1-HW	2.4				Swale with 1:6 sideslopes	0.3	0.2	1	0.52	100		1941168	68.65	68.2	96.6
W-B1-04	W-B1-04-US	WEST-B1	2				Swale with 1:6 sideslopes	0.3	0.2	1	0.91	34.6		1941170	67	66	109.3
W-B1-05	W-B1-05-US	WEST-B1	4.3				Swale with 1:6 sideslopes	0.3	0.2	1	0.35	46.77		1941171	66.5	66	140.9
W-B3-01	W-B3-01-US	WEST-B3	0.6				Swale with 1:6 sideslopes	0.3	0.2	1	5.88	83.66		1941591	67.2	62.5	80
W-B4-01	W- B4-01-US	WEST-B4	2.2				Swale with 1:6 sideslopes	0.3	0.2	1	1.8	35.04		1941711	62	59	166.8
W-B4-02	W-B4-02-US	WEST-B4	1.6				Swale with 1:6 sideslopes	0.3	0.2	1	4.81	41.02		1941185	68.5	59	197.5
W-B5-01	W-B5-01-US	W-B5-CULV1-HW	0.5				Swale with 1:6 sideslopes	0.3	0.2	1	4.3	63.41		1941419	59	56.4	59.8
W-B5-02	W-B5-02-US	W-B5-CULV1-HW	0.3				Swale with 1:6 sideslopes	0.3	0.2	1	3.34	36.59		1941422	57.5	56.4	32
W-B5-03	W-B5-03-US	W-B5-03-DS	0.5				Swale with 1:6 sideslopes	0.3	0.2	1	9	100		1941387	62	57.5	77.8
W-B5-04	W-B5-03-DS	W-B5-CULV2-HW	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	3	46.61		1941426	57	55.8	40
W-B5-05	W-B5-05-US	W-B5-CULV2-HW	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	4.89	53.39		1941431	58	55.8	45
W-B5-06 07	W-B5-06-US	W-B5-CULV3-HW	1.1				Swale with 1:6 sideslopes	0.3	0.2	1	5.8	74.2		1941443	63.5	54.8	150
W-B5-08	W-B5-08-US	W-B5-CULV3-HW	0.8				Swale with 1:6 sideslopes	0.3	0.2	1	2.01	25.8		1941448	56	54.8	59.7
W-B5-09 10	W-B5-09-US	W-B5-CULV3-DS	0.7				Swale with 1:6 sideslopes	0.3	0.2	1	4.63	100		1941471	58	54.3	80
W-B5-11	W-B5-11-US	W-B5-CULV4-HW	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	1.85	100		1941479	58	57.5	27.1
W-B5-12	W-B5-12-US	W-B5-CULV5-HW	0.2				Swale with 1:6 sideslopes	0.3	0.2	1	5.19	100		1941484	57.5	56	28.9
W-B5-13A	W-B5-CULV3-DS	WEST-B5	1.4				Swale with 1:6 sideslopes	0.3	0.2	1	1.01	31.11		1941514	54.3	53.5	79.3
W-B5-13B	W-B5-CULV5-DS	WEST-B5	0.7				Swale with 1:6 sideslopes	0.3	0.2	1	1.75	20		1941517	54.41	53.5	51.9
W-B5-16	W-B5-16-US	WEST-B5	0.7				Swale with 1:6 sideslopes	0.3	0.2	1	3.8	36.42		1941510	56.5	53.5	79
W-B5-CULV14 15	W-B5-CULV14-US	W-B5-CULV6-HW	1.4				Swale with 1:6 sideslopes	0.3	0.2	1	4.38	100		1941556	59.2	52	164.5
W-B6-01	W-B6-01-US	WEST-B6	3.8				Swale with 1:6 sideslopes	0.3	0.2	1	0.69	70.89		1941499	59.2	58	175
W-B7-02	W-B7-02-US	WEST-B7	0.9				Swale with 1:6 sideslopes	0.3	0.2	1	7.82	56.92		1941572	62.5	51.5	140.7
W-EXT02	W-EXT02-US	W-EXT	3.8				Swale with 1:6 sideslopes	0.3	0.2	1	0.38	72.36		1941308	61	60.5	132.4
W-EXT03	N87076	W-EXT	0.6				Swale with 1:6 sideslopes	0.3	0.2	1	4.92	27.64		1941303	64	60.5	71.1
W-EXT04	W-EXT	W-EXT-CULV1-HW	1.3				Swale with 1:6 sideslopes	0.3	0.2	1	1.56	100		1941321	60.5	59.1	89.7
W-S1	S1_US	S1	2.3				Swale with 1:6 sideslopes	0.3	0.2	1	5.07	100		2256533	57.5	42.5	296

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cover (m)	Cover (m)	
DUMMY-SCALE	uPVC, under roads, 1% minimum slope	154	0.5	-0.16	Unsafe
W-B5-CULV1	Concrete, under roads, 0.5% minimum slope	450	0.6	0.08	Unsafe
W-B5-CULV2	Concrete, under roads, 0.5% minimum slope	450	0.6	0.21	Unsafe
W-B5-CULV3	Concrete, under roads, 0.5% minimum slope	450	0.6	0.01	Unsafe
W-B5-CULV4	Concrete, under roads, 0.5% minimum slope	450	0.6	0	Unsafe
W-B5-CULV5	Concrete, under roads, 0.5% minimum slope	450	0.6	0.6	
Pipe20528	Concrete, under roads, 0.5% minimum slope	450	0.6	0.6	
W-B5-CULV6	Concrete, under roads, 0.5% minimum slope	450	0.6	0.21	Unsafe
W-B1-CULV1	Concrete, under roads, 0.5% minimum slope	450	0.6	-0.29	Unsafe
Pipe20532	Concrete, under roads, 0.5% minimum slope	450	0.6	0.26	Unsafe
Pipe20533	Concrete, under roads, 0.5% minimum slope	450	0.6	-0.24	Unsafe
Pipe20566	Concrete, under roads, 0.5% minimum slope	450	0.6	0.21	Unsafe
Pipe20567	Concrete, under roads, 0.5% minimum slope	450	0.6	-0.49	Unsafe
W-EXT-CULV1	Concrete, under roads, 0.5% minimum slope	450	0.6	0.01	Unsafe
Pipe20702	Concrete, under roads, 0.5% minimum slope	450	0.6	0.26	Unsafe
Pipe20716	Concrete, under roads, 0.5% minimum slope	450	0.6	0.51	Unsafe
W-EXT-CULV	Concrete, under roads, 0.5% minimum slope	450	0.6	-0.49	Unsafe
Pipe20591	Concrete, under roads, 0.5% minimum slope	450	0.6	0.21	Unsafe
Pipe20597	Concrete, under roads, 0.5% minimum slope	450	0.6	-0.49	Unsafe
Pipe20785	Concrete, under roads, 0.5% minimum slope	450	0.6	0.21	Unsafe
Pipe20790	Concrete, under roads, 0.5% minimum slope	450	0.6	0.41	Unsafe
Pipe20745	Concrete, under roads, 0.5% minimum slope	600	0.6	0.15	Unsafe
Pipe20746	Concrete, under roads, 0.5% minimum slope	600	0.6	1.01	
Pipe20525	Concrete, under roads, 0.5% minimum slope	450	0.6	-0.49	Unsafe
Pipe20821	Concrete, under roads, 0.5% minimum slope	600	0.6	1.11	
Pipe20830	Concrete, under roads, 0.5% minimum slope	600	0.6	0.35	Unsafe
Pipe20526	Concrete, under roads, 0.5% minimum slope	450	0.6	0.6	
Pipe20527	Concrete, under roads, 0.5% minimum slope	450	0.6	0.21	Unsafe

These pipes have non-return valves: Pipe20532, Pipe20566, Pipe20591, Pipe20785

Stage 1A (WEST) DRAINS Results								
DRAINS results prepared from Version 2020.036								
1EY								
PIT / NODE DETAILS				Version 8				
Name	Max HGL	Max Pond	Max Surface	Max Pond	Min	Overflow	Constraint	
		HGL	Flow Arriving	Volume	Freeboard	(cu.m/s)		
			(cu.m/s)	(cu.m)	(m)			
DUMMY-SCALE2	10		0					
DUMMY-SCALE1	8		0					
W1-B1-01-US	69		0					
W-B1-02-US	68.65		0					
W-B1-03-US	68.65		0					
W-B1-04-US	67		0					
W-B1-05-US	66.5		0					
W- B4-01-US	62		0					
W-B4-02-US	68.5		0					
W-B5-CULV1-HW	56.49		0.008		0.51	0	None	
W-B5-CULV1-DS	56.2		0					
W-B5-CULV2-HW	56.02		0.115		0.48	0	None	
W-B5-CULV2-DS	55.52		0					
W-B5-CULV3-HW	54.97		0.112		0.53	0	None	
W-B5-CULV3-DS	54.43		0.013					
W-B5-CULV4-HW	56.91		0		1.09	0	None	
W-B5-CULV4-DS	56.51		0					
W-B5-CULV5-HW	55.35		0.002		1.15	0	None	
W-B5-CULV5-DS	54.44		0					
W-B7-CULV2-HW	55.92		0		1.08	0	None	
W-B7-CULV2-DS	55.42		0					
W-B5-CULV6-HW	52.12		0.028		0.88	0	None	
N87219	51.86		0					
W-B1-CULV1-HW	68.22		0.011		0.78	0	None	
W1-01-DS	67.87		0.032					
N87159	65.15		0					
N87076	64.01		0					
N87168	61.29		0					
W-EXT02-US	61.09		0.002					
W-EXT	60.57		0.016					
W-EXT-CULV1-HW	59.23		0.016		1.27	0	None	
W-EXT-CULV1-DS	59.07		0					
N87207	61.65		0					
N87255	61.01		0					
W-EXT-HW	64.2		0		0.8	0	None	
N87181	58.21		0					
W-B5-03-DS	57.1		0					
W-B5-03-US	62		0					
W-B5-06-US	63.5		0					
W-B5-01-US	59		0					
W-B5-02-US	57.5		0					
W-B5-05-US	58		0					
W-B5-08-US	56		0					
W-B5-09-US	58		0					
W-B5-11-US	58		0					
W-B5-12-US	57.5		0					
N87237	57.26		0					
N87238	57.1		0					
W-B6-01-US	59.2		0					
N87225	52.7		0					
N87218	52.42		0					
W-B5-16-US	56.5		0					
W-B5-CULV14-US	59.2		0					
W-B7-CULV1-HW	51.85		0.093		1.15	0	None	
N87244	49.24		0					
N87245	49.01		0					
W-B7-02-US	62.5		0					
HW12	53.04		0.016		0.96	0	None	
N87149	51.91		0					
HW13	47.01		0.009		0.99	0	None	
N87150	46.8		0					
W-B3-01-US	67.2		0					
S1_US	57.5		0					
SUB-CATCHMENT DETAILS								
Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm	
	Flow Q	Max Q	Max Q	Tc	Tc	Tc		
	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	(min)		
W-B5-CULV1-CAT	0.007	0	0.007	0	6.1	2.97	1EY AEP, 2 hour burst, Storm 2	
W-B5-CULV2-CAT	0.008	0	0.008	0	8.08	3.94	1EY AEP, 2 hour burst, Storm 3	
W-B5-CULV3-CAT	0.038	0	0.038	0	5.22	2.54	1EY AEP, 1 hour burst, Storm 1	
W-B5-CULV3-DS-CAT	0.012	0	0.012	0	4.04	1.97	1EY AEP, 1 hour burst, Storm 1	
W-B5-CULV4-CAT	0	0	0	0	1.98	0	1EY AEP, 10 min burst, Storm 5	
W-B5-CULV5-CAT	0.002	0	0.002	0	4.6	2.24	1EY AEP, 1 hour burst, Storm 9	
W-B5-CULV6-CAT	0.025	0	0.025	0	5.18	2.52	1EY AEP, 2 hour burst, Storm 3	
W-B1-03-CAT	0.01	0	0.01	0	3.83	1.87	1EY AEP, 1 hour burst, Storm 1	
W-B1-01-CAT	0.03	0	0.03	0	5.33	2.6	1EY AEP, 1 hour burst, Storm 1	
WEST-B1-CAT	0.012	0	0.012	0	11.03	5.38	1EY AEP, 2 hour burst, Storm 3	
WEST-B2-CAT	0.137	0.137	0	3.8	0	0	1EY AEP, 10 min burst, Storm 10	
W-EXT-CAT	0	0	0	0	2.62	0	1EY AEP, 10 min burst, Storm 5	
W-EXT04-CAT	0	0	0	0	2.18	1.06	1EY AEP, 10 min burst, Storm 5	
WEST-B3-CAT	0.066	0	0.066	0	8.4	4.1	1EY AEP, 15 min burst, Storm 1	
CulvW_ext	0	0	0	5	75	2	1EY AEP, 10 min burst, Storm 5	
WEST-B4-CAT	0.161	0.161	0	4.34	10.08	0	1EY AEP, 10 min burst, Storm 4	
W-B5-03-CAT	0	0	0	0	2.69	0	1EY AEP, 10 min burst, Storm 5	
WEST-B6-CAT	0	0	0	0	3.56	1.74	1EY AEP, 10 min burst, Storm 5	
WEST-B5-CAT	0	0	0	0	3.65	1.78	1EY AEP, 10 min burst, Storm 5	
W-B7-01-CAT	0	0	0	0	3.33	0	1EY AEP, 10 min burst, Storm 5	
WEST-B7-CAT	0.065	0	0.065	0	4.8	2.34	1EY AEP, 15 min burst, Storm 1	
S1_catch	0	0	0	0	24.81	0	1EY AEP, 10 min burst, Storm 5	
PIPE DETAILS								
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm			
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)				
DUMMY-SCALE	0	0	10	8	1EY AEP, 10 min burst, Storm 5			
W-B5-CULV1	0.002	0.47	56.485	56.199	1EY AEP, 2 hour burst, Storm 9			
W-B5-CULV2	0.042	1.84	56.024	55.515	1EY AEP, 1 hour burst, Storm 1			
W-B5-CULV3	0.05	1.46	54.974	54.574	1EY AEP, 2 hour burst, Storm 3			
W-B5-CULV4	0	0	56.91	56.51	1EY AEP, 10 min burst, Storm 5			
W-B5-CULV5	0.001	0.31	55.347	54.44	1EY AEP, 2 hour burst, Storm 2			
Pipe20528	0	0	55.913	55.416	1EY AEP, 10 min burst, Storm 5			
W-B5-CULV6	0.012	0.87	52.121	51.862	1EY AEP, 2 hour burst, Storm 4			
W-B1-CULV1	0.004	0.23	68.22	67.869	1EY AEP, 2 hour burst, Storm 4			
Pipe20532	0	0	65.25	65.152	1EY AEP, 10 min burst, Storm 5			

Pipe20533	0	0	65.152	64.75	1EY AEP, 10 min burst, Storm 5			
Pipe20566	0	0	61.3	61.294	1EY AEP, 10 min burst, Storm 5			
Pipe20567	0.014	1.3	61.294	61.093	1EY AEP, 1 hour burst, Storm 1			
W-EXT-CULV1	0.013	0.81	59.229	59.072	1EY AEP, 3 hour burst, Storm 7			
Pipe20702	0	0	61.75	61.652	1EY AEP, 10 min burst, Storm 5			
Pipe20716	0	0	61.652	61.005	1EY AEP, 10 min burst, Storm 5			
W-EXT-CULV	0	0	64.2	61.093	1EY AEP, 10 min burst, Storm 5			
Pipe20591	0.02	1.23	58.397	58.211	1EY AEP, 1 hour burst, Storm 1			
Pipe20597	0.044	3.05	58.211	57.566	1EY AEP, 1 hour burst, Storm 1			
Pipe20785	0	0	57.303	57.263	1EY AEP, 10 min burst, Storm 5			
Pipe20790	0	0	57.263	57.105	1EY AEP, 10 min burst, Storm 5			
Pipe20745	0	0	52.7	52.695	1EY AEP, 10 min burst, Storm 5			
Pipe20746	0.029	1.72	52.695	52.425	1EY AEP, 3 hour burst, Storm 6			
Pipe20525	0.032	0.15	51.854	51.854	1EY AEP, 3 hour burst, Storm 6			
Pipe20821	0	0	49.3	49.242	1EY AEP, 10 min burst, Storm 5			
Pipe20830	0	0	49.242	49.008	1EY AEP, 10 min burst, Storm 5			
Pipe20526	0.013	1.58	53.037	51.956	1EY AEP, 3 hour burst, Storm 7			
Pipe20527	0	0	47.003	46.8	1EY AEP, 9 hour burst, Storm 3			
CHANNEL DETAILS								
Name	Max Q	Max V			Due to Storm			
	(cu.m/s)	(m/s)						
OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
O134039	0.009	0	12.141	3	0	32	0	1EY AEP, 3 hour burst, Storm 6
O134055	0.009	0	12.141	3	0	32	0	1EY AEP, 3 hour burst, Storm 6
O137112	0.005	0	12.141	3	0	32	0	1EY AEP, 1 hour burst, Storm 1
O137116	0.005	0	12.141	3	0	32	0	1EY AEP, 1 hour burst, Storm 1
O137914	0.006	0	12.141	3	0	32	0	1EY AEP, 1 hour burst, Storm 1
O137918	0.012	0	12.141	3	0	32	0	1EY AEP, 1 hour burst, Storm 1
O90392	0	0	12.141	0	0	0	0	
O90396	0	0	12.141	0	0	0	0	
OF76225	0.016	0.016	0.338	0.248	0.04	2.97	0.57	1EY AEP, 2 hour burst, Storm 3
OF76315	0.014	0.014	0.656	0.127	0.05	1.02	0.69	1EY AEP, 3 hour burst, Storm 6
OF76316	0	0	0.436	0	0	0	0	
OF76323	0	0	1.311	0	0	0	0	
OF76327	0	0	19.113	0	0	0	0	
OF76345	0	0	1.305	0	0	0	0	
OF76352	0	0	0	0	0	0	0	
OF76354	0.002	0.002	0.332	0.266	0.01	3.19	0.38	1EY AEP, 2 hour burst, Storm 9
OF76357	0	0	0	0	0	0	0	
OF76359	0.042	0.042	0.35	0.174	0.08	2.09	0.86	1EY AEP, 1 hour burst, Storm 1
OF76363	0	0	0	0	0	0	0	
OF76364	0	0	0.369	0	0	0	0	
OF76369	0	0	19.201	0	0	0	0	
OF76373	0	0	1.322	0	0	0	0	
OF76375	0	0	0	0	0	0	0	
OF76377	0	0	0	0	0	0	0	
OF76384	0.013	0.013	19.15	0.003	0	32	0.13	1EY AEP, 3 hour burst, Storm 7
OF76391	0	0	1.379	0	0	0	0	
OF76405	0.029	0.029	0.393	0.294	0.06	3.53	0.85	1EY AEP, 3 hour burst, Storm 6
OF76407	0.012	0.012	0.261	0.294	0.03	3.53	0.5	1EY AEP, 2 hour burst, Storm 4
OF76410	0	0	19.24	0	0	0	0	
OF76413	0	0	0	0	0	0	0	
OF76415	0	0	0	0	0	0	0	
OF76418	0	0	1.329	0	0	0	0	
OF76420	0	0	0.589	0	0	0	0	
OF76424	0	0	0	0	0	0	0	
OF76426	0	0	19.114	0	0	0	0	
OF76429	0	0	0.225	0	0	0	0	
OF76432	0	0	19.225	0	0	0	0	
OF76434	0	0	0	0	0	0	0	
OF76436	0	0	0	0	0	0	0	
OF76444	0	0	19.201	0	0	0	0	
OF76451	0	0	0.608	0	0	0	0	
W-B1-01	0	0.009	0.14	0.074	0.02	0.89	0.32	1EY AEP, 2 hour burst, Storm 3
W-B1-02	0	0.006	0.157	0.069	0.01	0.83	0.19	1EY AEP, 2 hour burst, Storm 3
W-B1-03	0	0.005	0.123	0.071	0.01	0.86	0.17	1EY AEP, 2 hour burst, Storm 3
W-B1-04	0	0.001	0.163	0.248	0	2.97	0	1EY AEP, 2 hour burst, Storm 9
W-B1-05	0	0.001	0.101	0.248	0	2.97	0	1EY AEP, 9 hour burst, Storm 6
W-B2-O1	0.005	0	12.141	3	0	32	0	1EY AEP, 1 hour burst, Storm 1
W-B3-01	0	0.057	0.414	0.41	0.06	4.92	0.63	1EY AEP, 15 min burst, Storm 1
W-B4-01	0	0.038	0.229	0.533	0.04	6.4	0.43	1EY AEP, 15 min burst, Storm 1
W-B4-02	0	0.048	0.375	0.533	0.06	6.4	0.68	1EY AEP, 15 min burst, Storm 1
W-B4-O1	0.006	0	12.141	3	0	32	0	1EY AEP, 1 hour burst, Storm 1
W-B5-01	0	0.002	0.354	0.055	0.01	0.66	0.13	1EY AEP, 2 hour burst, Storm 9
W-B5-02	0	0.002	0.312	0.055	0.01	0.66	0.09	1EY AEP, 2 hour burst, Storm 9
W-B5-03	0	0	0.512	0	0	0	0	
W-B5-04	0.044	0.044	0.296	0.224	0.07	2.69	0.76	1EY AEP, 1 hour burst, Storm 1
W-B5-05	0	0.003	0.378	0.266	0.01	3.19	0.26	1EY AEP, 2 hour burst, Storm 9
W-B5-06 07	0	0.025	0.411	0.218	0.05	2.62	0.65	1EY AEP, 2 hour burst, Storm 9
W-B5-08	0	0.009	0.242	0.218	0.02	2.62	0.27	1EY AEP, 2 hour burst, Storm 9
W-B5-09 10	0	0.01	0.367	0.153	0.02	1.83	0.36	1EY AEP, 2 hour burst, Storm 9
W-B5-11	0	0	0.232	0	0	0	0	
W-B5-12	0	0.001	0.389	0.027	0.01	0.32	0.4	1EY AEP, 2 hour burst, Storm 2
W-B5-13A	0.055	0.054	0.172	0.419	0.07	5.03	0.53	1EY AEP, 2 hour burst, Storm 3
W-B5-13B	0.001	0.007	0.226	0.419	0.04	5.03	1.72	1EY AEP, 9 hour burst, Storm 6
W-B5-16	0	0	0.333	0	0	0	0	
W-B5-CULV14 15	0	0.015	0.357	0.124	0.03	1.49	0.45	1EY AEP, 2 hour burst, Storm 9
W-B5-O1	0.009	0	12.141	3	0	32	0	1EY AEP, 3 hour burst, Storm 6
W-B6-01	0	0	0.142	0	0	0	0	
W-B7-02	0	0.031	0.478	0.354	0.04	4.25	0.47	1EY AEP, 1 hour burst, Storm 9
W-B7-O1	0	0	12.141	0	0	0	0	
W-EXT02	0.014	0.014	0.105	0.095	0.03	1.14	0.45	1EY AEP, 3 hour burst, Storm 6
W-EXT03	0	0	0.379	0	0	0	0	
W-EXT04	0.013	0.013	0.213	0.13	0.03	1.56	0.44	1EY AEP, 3 hour burst, Storm 6
W-S1	0	0	0.385	0	0	0	0	
DETENTION BASIN DETAILS								
Name	Max WL	MaxVol	Max Q	Max Q	Max Q			
			Total	Low Level	High Level			
WEST-B1	66.25	26.5	0	0	0			
WEST-B2	62.3	78.6	0.014	0	0.014			
WEST-B3	62.91	79.4	0	0	0			
WEST-B4	59.53	77.4	0.043	0.02	0.023			
WEST-B6	58	0	0	0	0			
WEST-B5	53.92	55.4	0.028	0	0.028			
WEST-B7	51.85	181.3	0	0	0			
Run Log for 12546218_AlbanyMotorPark_west run at 14:33:26 on 14/7/2021 using version 2020.036								
The maximum flow in these overflow routes is unsafe: OF76444, OF76410, OF76407, OF76405, OF76377, OF76354, W-B4-01, W-B3-01, OF76316, W-B7-02, W-B5-13B, W-B5-13A, W-B5-16, W-B5-(								

Stage 1A (WEST) DRAINS Results

DRAINS results prepared from Version 2020.036

10% AEP

PIT / NODE DETAILS — Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
DUMMY-SCALE2	10		0				
DUMMY-SCALE1	8		0				
W1-B1-01-US	69		0				
W-B1-02-US	68.65		0				
W-B1-03-US	68.65		0				
W-B1-04-US	67		0				
W-B1-05-US	66.64		0				
W- B4-01-US	62		0				
W-B4-02-US	68.5		0				
W-B5-CULV1-HW	56.6		0.028		0.4	0	None
W-B5-CULV1-DS	56.31		0				
W-B5-CULV2-HW	56.3		0.314		0.2	0	None
W-B5-CULV2-DS	55.59		0				
W-B5-CULV3-HW	55.19		0.29		0.31	0	None
W-B5-CULV3-DS	54.53		0.032				
W-B5-CULV4-HW	56.98		0.006		1.02	0	None
W-B5-CULV4-DS	56.55		0				
W-B5-CULV5-HW	55.39		0.012		1.11	0	None
W-B5-CULV5-DS	54.47		0				
W-B7-CULV2-HW	55.92		0		1.08	0	None
W-B7-CULV2-DS	55.42		0				
W-B5-CULV6-HW	52.37		0.074		0.63	0	None
N87219	52.36		0				
W-B1-CULV1-HW	68.31		0.026		0.69	0	None
W1-01-DS	67.92		0.087				
N87159	65.27		0				
N87076	64.13		0				
N87168	61.33		0				
W-EXT02-US	61.24		0.093				
W-EXT	60.69		0.371				
W-EXT-CULV1-HW	59.64		0.372		0.86	0	None
W-EXT-CULV1-DS	59.19		0				
N87207	61.73		0				
N87255	61.07		0				
W-EXT-HW	64.63		0.26		0.37	0	None
N87181	58.28		0				
W-B5-03-DS	57.16		0.038				
W-B5-03-US	62		0				
W-B5-06-US	63.5		0				
W-B5-01-US	59		0				
W-B5-02-US	57.5		0				
W-B5-05-US	58		0				
W-B5-08-US	56		0				
W-B5-09-US	58		0				
W-B5-11-US	58		0				
W-B5-12-US	57.5		0				
N87237	57.26		0				
N87238	57.1		0				
W-B6-01-US	59.2		0				
N87225	52.82		0				
N87218	52.52		0				
W-B5-16-US	56.5		0				
W-B5-CULV14-US	59.2		0				
W-B7-CULV1-HW	52.36		0.379		0.64	0	None
N87244	49.39		0				
N87245	49.17		0				
W-B7-02-US	62.5		0				
HW12	53.44		0.317		0.56	0	None
N87149	51.93		0				
HW13	47.42		0.239		0.58	0	None
N87150	46.81		0				
W-B3-01-US	67.2		0				
S1_US	57.5		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
W-B5-CULV1-CAT	0.04	0	0.04	0	2.63	1.28	10% AEP, 10 min burst, Storm 5
W-B5-CULV2-CAT	0.035	0	0.035	0	3.48	1.69	10% AEP, 10 min burst, Storm 7
W-B5-CULV3-CAT	0.169	0	0.169	0	2.76	1.34	10% AEP, 10 min burst, Storm 5
W-B5-CULV3-DS-CAT	0.053	0	0.053	0	2.14	1.04	10% AEP, 10 min burst, Storm 4
W-B5-CULV4-CAT	0.007	0	0.007	0	1.56	0	10% AEP, 10 min burst, Storm 3
W-B5-CULV5-CAT	0.009	0	0.009	0	2.35	1.14	10% AEP, 10 min burst, Storm 5
W-B5-CULV6-CAT	0.118	0	0.118	0	2.23	1.09	10% AEP, 10 min burst, Storm 5
W-B1-03-CAT	0.044	0	0.044	0	2.02	0.99	10% AEP, 10 min burst, Storm 4
W-B1-01-CAT	0.132	0	0.132	0	2.82	1.37	10% AEP, 10 min burst, Storm 5
WEST-B1-CAT	0.103	0	0.103	0	4.75	2.31	10% AEP, 10 min burst, Storm 3
WEST-B2-CAT	0.269	0.269	0	3	0	0	10% AEP, 10 min burst, Storm 1
W-EXT-CAT	0.043	0	0.043	0	2.06	0	10% AEP, 10 min burst, Storm 3
W-EXT04-CAT	0.029	0	0.029	0	1.72	0.84	10% AEP, 10 min burst, Storm 9
WEST-B3-CAT	0.175	0	0.175	0	6.04	2.94	10% AEP, 10 min burst, Storm 9
CulvW_ext	0.142	0	0.142	5	75	2	10% AEP, 3 hour burst, Storm 6
WEST-B4-CAT	0.335	0.322	0.013	3.42	7.95	0	10% AEP, 10 min burst, Storm 4
W-B5-03-CAT	0.013	0	0.013	0	2.12	0	10% AEP, 10 min burst, Storm 3
WEST-B6-CAT	0.124	0	0.124	0	2.81	1.37	10% AEP, 10 min burst, Storm 9
WEST-B5-CAT	0.073	0	0.073	0	2.88	1.4	10% AEP, 10 min burst, Storm 9
W-B7-01-CAT	0.007	0	0.007	0	2.63	0	10% AEP, 10 min burst, Storm 6
WEST-B7-CAT	0.225	0	0.225	0	3.45	1.68	10% AEP, 10 min burst, Storm 5
S1_catch	0.27	0	0.27	0	39.9	0	10% AEP, 3 hour burst, Storm 2

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
DUMMY-SCALE	0	0	10	8	10% AEP, 10 min burst, Storm 5
W-B5-CULV1	0.025	0.57	56.603	56.313	10% AEP, 15 min burst, Storm 6
W-B5-CULV2	0.209	2.98	56.12	55.63	10% AEP, 30 min burst, Storm 5
W-B5-CULV3	0.249	2.03	55.046	54.684	10% AEP, 30 min burst, Storm 5
W-B5-CULV4	0.004	0.64	56.982	56.545	10% AEP, 2 hour burst, Storm 3
W-B5-CULV5	0.007	0.61	55.393	54.465	10% AEP, 10 min burst, Storm 3
Pipe20528	0	0	55.913	55.416	10% AEP, 10 min burst, Storm 5
W-B5-CULV6	0.064	0.46	52.365	52.363	10% AEP, 30 min burst, Storm 7
W-B1-CULV1	0.02	0.58	68.308	67.923	10% AEP, 30 min burst, Storm 5
Pipe20532	0.091	2.66	65.459	65.27	10% AEP, 9 hour burst, Storm 5

	Pipe20533	0.101	3.1	65.27	64.866	10% AEP, 9 hour burst, Storm 5			
	Pipe20566	0.029	1.23	61.417	61.333	10% AEP, 45 min burst, Storm 8			
	Pipe20567	0.047	1.95	61.333	61.242	10% AEP, 45 min burst, Storm 8			
	W-EXT-CULV1	0.215	1.75	59.55	59.324	10% AEP, 3 hour burst, Storm 2			
	Pipe20702	0.037	2.08	61.882	61.726	10% AEP, 3 hour burst, Storm 2			
	Pipe20716	0.037	2.33	61.726	61.07	10% AEP, 3 hour burst, Storm 2			
	W-EXT-CULV	0.141	1.62	64.469	61.242	10% AEP, 3 hour burst, Storm 6			
	Pipe20591	0.148	3.44	58.568	58.282	10% AEP, 30 min burst, Storm 7			
	Pipe20597	0.173	4.09	58.282	57.64	10% AEP, 30 min burst, Storm 7			
	Pipe20785	0	0	57.303	57.263	10% AEP, 10 min burst, Storm 5			
	Pipe20790	0	0	57.263	57.105	10% AEP, 15 min burst, Storm 10			
	Pipe20745	0.206	2.72	52.993	52.818	10% AEP, 1 hour burst, Storm 6			
	Pipe20746	0.242	3.26	52.818	52.535	10% AEP, 1 hour burst, Storm 6			
	Pipe20525	0.249	0.78	52.338	52.301	10% AEP, 1 hour burst, Storm 1			
	Pipe20821	0.131	2.33	49.533	49.392	10% AEP, 3 hour burst, Storm 2			
	Pipe20830	0.15	2.66	49.392	49.17	10% AEP, 3 hour burst, Storm 2			
	Pipe20526	0.209	4.16	53.23	52.069	10% AEP, 3 hour burst, Storm 2			
	Pipe20527	0.138	2.28	47.259	46.982	10% AEP, 3 hour burst, Storm 2			
	CHANNEL DETAILS								
	Name	Max Q	Max V			Due to Storm			
		(cu.m/s)	(m/s)						
	OVERFLOW ROUTE DETAILS								
	Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
	O134039	0.012	0	12.141	3	0	32	0	10% AEP, 1 hour burst, Storm 6
	O134055	0.012	0	12.141	3	0	32	0	10% AEP, 1 hour burst, Storm 6
	O137112	0.006	0	12.141	3	0	32	0	10% AEP, 45 min burst, Storm 8
	O137116	0.006	0	12.141	3	0	32	0	10% AEP, 45 min burst, Storm 8
	O137914	0.006	0	12.141	3	0	32	0	10% AEP, 30 min burst, Storm 7
	O137918	0.013	0	12.141	3	0	32	0	10% AEP, 30 min burst, Storm 7
	O90392	0.006	0	12.141	3	0	32	0	10% AEP, 3 hour burst, Storm 2
	O90396	0.006	0	12.141	3	0	32	0	10% AEP, 3 hour burst, Storm 2
	OF76225	0.092	0.092	0.338	0.703	0.13	8.44	1.02	10% AEP, 30 min burst, Storm 5
	OF76315	0.204	0.204	0.656	0.533	0.27	4.27	1.4	10% AEP, 3 hour burst, Storm 2
	OF76316	0	0	0.436	0	0	0	0	
	OF76323	0	0	1.311	0	0	0	0	
	OF76327	0.06	0.06	19.113	0.209	0	32	0.33	10% AEP, 45 min burst, Storm 8
	OF76345	0.006	0.006	1.305	0.003	0.03	0.35	9.26	10% AEP, 30 min burst, Storm 7
	OF76352	0	0	0	0	0	0	0	
	OF76354	0.026	0.026	0.332	0.511	0.03	6.13	0.21	10% AEP, 30 min burst, Storm 7
	OF76357	0	0	0	0	0	0	0	
	OF76359	0.199	0.199	0.35	0.398	0.21	4.77	1.27	10% AEP, 30 min burst, Storm 7
	OF76363	0	0	0	0	0	0	0	
	OF76364	0.003	0.003	0.369	0.038	0.01	0.45	0.39	10% AEP, 2 hour burst, Storm 2
	OF76369	0	0	19.201	0	0	0	0	
	OF76373	0	0	1.322	0	0	0	0	
	OF76375	0	0	0	0	0	0	0	
	OF76377	0	0	0	0	0	0	0	
	OF76384	0.204	0.204	19.15	0.017	0.01	32	0.38	10% AEP, 3 hour burst, Storm 2
	OF76391	0	0	1.379	0	0	0	0	
	OF76405	0.242	0.242	0.393	0.803	0.24	9.64	1.47	10% AEP, 1 hour burst, Storm 6
	OF76407	0.155	0.155	0.261	0.803	0.05	9.64	0.08	10% AEP, 6 hour burst, Storm 6
	OF76410	0	0	19.24	0	0	0	0	
	OF76413	0	0	0	0	0	0	0	
	OF76415	0	0	0	0	0	0	0	
	OF76418	0	0	1.329	0	0	0	0	
	OF76420	0	0	0.589	0	0	0	0	
	OF76424	0	0	0	0	0	0	0	
	OF76426	0	0	19.114	0	0	0	0	
	OF76429	0.148	0.146	0.225	0.423	0.15	5.07	0.86	10% AEP, 3 hour burst, Storm 2
	OF76432	0.138	0.138	19.225	0.015	0	32	0.29	10% AEP, 3 hour burst, Storm 2
	OF76434	0	0	0	0	0	0	0	
	OF76436	0	0	0	0	0	0	0	
	OF76444	0	0	19.201	0	0	0	0	
	OF76451	0.037	0.037	0.608	0.538	0.09	6.45	1.25	10% AEP, 3 hour burst, Storm 2
	W-B1-01	0	0.051	0.14	0.138	0.07	1.66	0.56	10% AEP, 30 min burst, Storm 5
	W-B1-02	0	0.029	0.157	0.117	0.04	1.41	0.35	10% AEP, 15 min burst, Storm 6
	W-B1-03	0	0.026	0.123	0.158	0.03	1.89	0.17	10% AEP, 15 min burst, Storm 6
	W-B1-04	0	0.464	0.163	0.703	1.3	8.44	22.89	10% AEP, 9 hour burst, Storm 5
	W-B1-05	0.011	0.721	0.101	0.703	0.31	8.44	0.84	10% AEP, 9 hour burst, Storm 5
	W-B2-O1	0.006	0	12.141	3	0	32	0	10% AEP, 45 min burst, Storm 8
	W-B3-01	0	0.145	0.414	0.747	0.12	8.97	0.88	10% AEP, 10 min burst, Storm 9
	W-B4-01	0	0.088	0.229	0.609	0.08	7.31	0.55	10% AEP, 10 min burst, Storm 3
	W-B4-02	0	0.11	0.375	0.609	0.11	7.31	0.86	10% AEP, 10 min burst, Storm 9
	W-B4-O1	0.006	0	12.141	3	0	32	0	10% AEP, 30 min burst, Storm 7
	W-B5-01	0	0.022	0.354	0.173	0.03	2.07	0.45	10% AEP, 10 min burst, Storm 3
	W-B5-02	0	0.013	0.312	0.173	0.02	2.07	0.38	10% AEP, 10 min burst, Storm 9
	W-B5-03	0	0.005	0.512	0.04	0.02	0.48	0.56	10% AEP, 2 hour burst, Storm 2
	W-B5-04	0.179	0.188	0.296	0.511	0.18	6.13	1.1	10% AEP, 30 min burst, Storm 7
	W-B5-05	0	0.018	0.378	0.498	0.03	5.98	0.47	10% AEP, 10 min burst, Storm 9
	W-B5-06 07	0	0.104	0.411	0.395	0.11	4.74	0.92	10% AEP, 10 min burst, Storm 3
	W-B5-08	0	0.038	0.242	0.395	0.04	4.74	0.39	10% AEP, 10 min burst, Storm 9
	W-B5-09 10	0	0.044	0.367	0.179	0.05	2.15	0.53	10% AEP, 10 min burst, Storm 9
	W-B5-11	0	0.004	0.232	0.045	0.02	0.54	0.43	10% AEP, 2 hour burst, Storm 3
	W-B5-12	0	0.007	0.389	0.047	0.03	0.56	0.58	10% AEP, 10 min burst, Storm 3
	W-B5-13A	0.139	0.359	0.172	0.635	0.31	7.62	1.7	10% AEP, 9 hour burst, Storm 1
	W-B5-13B	0.004	0.143	0.226	0.635	0.43	7.62	8.42	10% AEP, 9 hour burst, Storm 1
	W-B5-16	0	0.021	0.333	0.635	0.03	7.62	0.38	10% AEP, 10 min burst, Storm 3
	W-B5-CULV14 15	0	0.087	0.357	0.365	0.09	4.39	0.76	10% AEP, 10 min burst, Storm 3
	W-B5-O1	0.012	0	12.141	3	0	32	0	10% AEP, 1 hour burst, Storm 6
	W-B6-01	0	0.041	0.142	0.417	0.02	5.01	0.13	10% AEP, 1 hour burst, Storm 4
	W-B7-02	0	0.12	0.478	0.801	0.1	9.62	0.77	10% AEP, 10 min burst, Storm 9
	W-B7-O1	0.006	0	12.141	3	0	32	0	10% AEP, 3 hour burst, Storm 2
	W-EXT02	0.172	0.172	0.105	0.242	0.16	2.9	0.84	10% AEP, 3 hour burst, Storm 2
	W-EXT03	0.099	0.067	0.379	0.188	0.12	2.25	0.97	10% AEP, 9 hour burst, Storm 5
	W-EXT04	0.185	0.186	0.213	0.538	0.16	6.45	0.87	10% AEP, 9 hour burst, Storm 10
	W-S1	0	0.265	0.385	0.178	0.25	2.13	1.4	10% AEP, 3 hour burst, Storm 2
	DETENTION BASIN DETAILS								
	Name	Max WL	MaxVol	Max Q	Max Q	Max Q			
				Total	Low Level	High Level			
	WEST-B1	66.7	100.5	0.091	0.091	0			
	WEST-B2	62.39	121.3	0.106	0.029	0.077			
	WEST-B3	63.25	167.8	0.037	0.037	0			
	WEST-B4	59.61	92.9	0.179	0.148	0.031			
	WEST-B6	58.42	67	0	0	0			
	WEST-B5	54.13	93.8	0.242	0.206	0.037			
	WEST-B7	52.3	504.5	0.15	0.131	0.019			
	Run Log for 12546218_AlbanyMotorPark_west run at 13:48:04 on 14/7/2021 using version 2020.036								
)8, W-B5-0	The maximum flow in these overflow routes is unsafe: OF76451, OF76444, OF76429, OF76410, OF76407, OF76405, OF76377, OF76359, OF76354, W-B4-01, W-B3-01, OF76316, OF76315, W-								

Stage 1A (WEST) DRAINS Results

DRAINS results prepared from Version 2020.036

1% AEP

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
DUMMY-SCALE2	10		0				
DUMMY-SCALE1	8		0				
W1-B1-01-US	69		0				
W-B1-02-US	68.65		0				
W-B1-03-US	68.65		0				
W-B1-04-US	67		0				
W-B1-05-US	66.71		0				
W- B4-01-US	62		0				
W-B4-02-US	68.5		0				
W-B5-CULV1-HW	56.72		0.05		0.28	0	None
W-B5-CULV1-DS	56.57		0				
W-B5-CULV2-HW	56.56		0.789		-0.06	0.243	Headwall height/system capacity
W-B5-CULV2-DS	55.66		0.471				
W-B5-CULV3-HW	55.45		0.864		0.05	0	None
W-B5-CULV3-DS	54.61		0.317				
W-B5-CULV4-HW	57.06		0.011		0.94	0	None
W-B5-CULV4-DS	56.57		0				
W-B5-CULV5-HW	55.5		0.032		1	0	None
W-B5-CULV5-DS	54.51		0				
W-B7-CULV2-HW	56.2		0.148		0.8	0	None
W-B7-CULV2-DS	55.51		0				
W-B5-CULV6-HW	52.64		0.129		0.36	0	None
N87219	52.62		0				
W-B1-CULV1-HW	68.4		0.045		0.6	0	None
W1-01-DS	67.98		0.151				
N87159	65.29		0				
N87076	64.14		0.032				
N87168	61.39		0				
W-EXT02-US	61.36		0.252				
W-EXT	60.79		0.912				
W-EXT-CULV1-HW	60.52		1.092		-0.02	0.051	Headwall height/system capacity
W-EXT-CULV1-DS	59.26		0.321				
N87207	61.8		0				
N87255	61.12		0				
W-EXT-HW	65.04		0.694		-0.04	0.176	Headwall height/system capacity
N87181	58.35		0				
W-B5-03-DS	57.25		0.239				
W-B5-03-US	62		0				
W-B5-06-US	63.5		0				
W-B5-01-US	59		0				
W-B5-02-US	57.5		0				
W-B5-05-US	58		0				
W-B5-08-US	56		0				
W-B5-09-US	58		0				
W-B5-11-US	58		0				
W-B5-12-US	57.5		0				
N87237	57.39		0				
N87238	57.19		0				
W-B6-01-US	59.2		0				
N87225	52.93		0				
N87218	52.63		0.134				
W-B5-16-US	56.5		0				
W-B5-CULV14-US	59.2		0				
W-B7-CULV1-HW	52.62		1.016		0.38	0	None
N87244	49.54		0				
N87245	49.27		0.121				
W-B7-02-US	62.5		0				
HW12	54.03		0.745		-0.03	0.107	Headwall height/system capacity
N87149	51.94		0.373				
HW13	48.04		0.805		-0.04	0.153	Headwall height/system capacity
N87150	46.83		0.448				
W-B3-01-US	67.2		0				
S1_US	57.5		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
W-B5-CULV1-CAT	0.082	0	0.082	0	2.33	1.13	1% AEP, 15 min burst, Storm 8
W-B5-CULV2-CAT	0.074	0	0.074	0	2.82	1.37	1% AEP, 10 min burst, Storm 4
W-B5-CULV3-CAT	0.319	0	0.319	0	2.45	1.19	1% AEP, 15 min burst, Storm 4
W-B5-CULV3-DS-CAT	0.091	0	0.091	0	1.9	0.92	1% AEP, 15 min burst, Storm 4
W-B5-CULV4-CAT	0.018	0	0.018	0	1.38	0	1% AEP, 15 min burst, Storm 8
W-B5-CULV5-CAT	0.016	0	0.016	0	2.08	1.01	1% AEP, 15 min burst, Storm 4
W-B5-CULV6-CAT	0.215	0	0.215	0	1.98	0.96	1% AEP, 15 min burst, Storm 8
W-B1-03-CAT	0.075	0	0.075	0	1.79	0.87	1% AEP, 15 min burst, Storm 4
W-B1-01-CAT	0.252	0	0.252	0	2.5	1.22	1% AEP, 15 min burst, Storm 4
WEST-B1-CAT	0.211	0	0.211	0	3.84	1.87	1% AEP, 10 min burst, Storm 4
WEST-B2-CAT	0.435	0.435	0	2.43	0	0	1% AEP, 10 min burst, Storm 4
W-EXT-CAT	0.107	0	0.107	0	1.83	0	1% AEP, 15 min burst, Storm 8
W-EXT04-CAT	0.068	0	0.068	0	1.53	0.74	1% AEP, 15 min burst, Storm 8
WEST-B3-CAT	0.324	0	0.324	0	4.89	2.38	1% AEP, 10 min burst, Storm 4
CulvW_ext	0.479	0	0.479	5	75	2	1% AEP, 3 hour burst, Storm 8
WEST-B4-CAT	0.589	0.516	0.082	3.03	7.05	0	1% AEP, 15 min burst, Storm 8
W-B5-03-CAT	0.032	0	0.032	0	1.88	0	1% AEP, 15 min burst, Storm 8
WEST-B6-CAT	0.281	0	0.281	0	2.49	1.22	1% AEP, 15 min burst, Storm 8
WEST-B5-CAT	0.162	0	0.162	0	2.55	1.24	1% AEP, 15 min burst, Storm 8
W-B7-01-CAT	0.018	0	0.018	0	2.13	0	1% AEP, 10 min burst, Storm 4
WEST-B7-CAT	0.427	0	0.427	0	2.79	1.36	1% AEP, 10 min burst, Storm 4
S1_catch	1.641	0	1.641	0	19.68	0	1% AEP, 25 min burst, Storm 8

PIPE DETAILS

Name	Max Q (cu.m/s)	Max V (m/s)	Max U/S HGL (m)	Max D/S HGL (m)	Due to Storm
DUMMY-SCALE	0	0	10	8	1% AEP, 10 min burst, Storm 5
W-B5-CULV1	0.069	0.71	56.696	56.566	1% AEP, 15 min burst, Storm 8
W-B5-CULV2	0.286	3.27	56.204	55.668	1% AEP, 15 min burst, Storm 1
W-B5-CULV3	0.517	2.46	55.197	54.783	1% AEP, 30 min burst, Storm 3
W-B5-CULV4	0.017	1.24	57.056	56.575	1% AEP, 15 min burst, Storm 8
W-B5-CULV5	0.033	1.31	55.496	54.507	1% AEP, 15 min burst, Storm 8
Pipe20528	0.069	2.46	56.107	55.515	1% AEP, 2 hour burst, Storm 10
W-B5-CULV6	0.163	1.03	52.637	52.624	1% AEP, 15 min burst, Storm 8
W-B1-CULV1	0.053	0.9	68.389	67.978	1% AEP, 15 min burst, Storm 1
Pipe20532	0.143	3.23	65.513	65.295	1% AEP, 2 hour burst, Storm 10

	Pipe20533	0.143	3.27	65.295	64.894	1% AEP, 2 hour burst, Storm 10				
	Pipe20566	0.097	2.12	61.516	61.388	1% AEP, 15 min burst, Storm 1				
	Pipe20567	0.115	2.53	61.388	61.36	1% AEP, 15 min burst, Storm 1				
	W-EXT-CULV1	0.418	2.72	60.157	59.416	1% AEP, 2 hour burst, Storm 7				
	Pipe20702	0.146	3.12	62.016	61.801	1% AEP, 30 min burst, Storm 5				
	Pipe20716	0.146	3.28	61.801	61.145	1% AEP, 30 min burst, Storm 5				
	W-EXT-CULV	0.303	2.22	64.851	61.36	1% AEP, 3 hour burst, Storm 8				
	Pipe20591	0.334	4.55	58.69	58.351	1% AEP, 15 min burst, Storm 8				
	Pipe20597	0.362	4.94	58.351	57.711	1% AEP, 15 min burst, Storm 8				
	Pipe20785	0.069	1.89	57.482	57.387	1% AEP, 2 hour burst, Storm 10				
	Pipe20790	0.069	1.98	57.387	57.222	1% AEP, 2 hour burst, Storm 10				
	Pipe20745	0.542	3.79	53.181	52.933	1% AEP, 30 min burst, Storm 8				
	Pipe20746	0.583	4.08	52.933	52.652	1% AEP, 30 min burst, Storm 8				
	Pipe20525	0.49	1.54	52.55	52.44	1% AEP, 30 min burst, Storm 8				
	Pipe20821	0.506	3.6	49.764	49.539	1% AEP, 2 hour burst, Storm 2				
	Pipe20830	0.528	3.75	49.539	49.299	1% AEP, 2 hour burst, Storm 2				
	Pipe20526	0.362	4.84	53.309	52.125	1% AEP, 2 hour burst, Storm 7				
	Pipe20527	0.346	2.82	47.498	47.124	1% AEP, 1 hour burst, Storm 6				
	CHANNEL DETAILS									
	Name	Max Q	Max V			Due to Storm				
		(cu.m/s)	(m/s)							
	OVERFLOW ROUTE DETAILS									
	Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm	
	O134039	0.014	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8	
	O134055	0.014	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8	
	O137112	0.006	0	12.141	3	0	32	0	1% AEP, 15 min burst, Storm 1	
	O137116	0.006	0	12.141	3	0	32	0	1% AEP, 15 min burst, Storm 1	
	O137914	0.007	0	12.141	3	0	32	0	1% AEP, 15 min burst, Storm 8	
	O137918	0.014	0	12.141	3	0	32	0	1% AEP, 15 min burst, Storm 8	
	O90392	0.007	0	12.141	3	0	32	0	1% AEP, 2 hour burst, Storm 2	
	O90396	0.007	0	12.141	3	0	32	0	1% AEP, 2 hour burst, Storm 2	
	OF76225	0.255	0.255	0.996	0.707	0.24	8.48	1.34	1% AEP, 15 min burst, Storm 8	
	OF76315	0.469	0.469	1.729	1.124	0.45	8.99	1.7	1% AEP, 2 hour burst, Storm 7	
	OF76316	0.069	0.069	1.286	0.996	0.11	11.96	1.14	1% AEP, 2 hour burst, Storm 10	
	OF76323	0	0	1.311	0	0	0	0		
	OF76327	0.173	0.173	19.113	0.348	0.01	32	0.51	1% AEP, 15 min burst, Storm 1	
	OF76345	0.164	0.164	1.305	0.025	0.1	4	3.93	1% AEP, 15 min burst, Storm 8	
	OF76352	0	0	0.357	0	0	0	0		
	OF76354	0.095	0.095	0.979	0.778	0.04	9.34	0.09	1% AEP, 15 min burst, Storm 9	
	OF76357	0.243	0.243	0.364	0.042	0.03	10.86	0.82	1% AEP, 15 min burst, Storm 1	
	OF76359	0.527	0.527	1.031	0.649	0.38	7.79	1.62	1% AEP, 15 min burst, Storm 1	
	OF76363	0	0	0.757	0	0	0	0		
	OF76364	0.017	0.017	1.089	0.065	0.04	0.78	0.7	1% AEP, 15 min burst, Storm 8	
	OF76369	0	0	19.201	0	0	0	0		
	OF76373	0	0	1.322	0	0	0	0		
	OF76375	0.051	0.051	0.644	0.017	0.01	6.66	0.74	1% AEP, 2 hour burst, Storm 7	
	OF76377	0.107	0.107	0.79	0.021	0.02	7.52	1.07	1% AEP, 2 hour burst, Storm 7	
	OF76384	0.469	0.469	19.15	0.028	0.01	32	0.53	1% AEP, 2 hour burst, Storm 7	
	OF76391	0.001	0.001	1.379	0.001	0	0.13	0	1% AEP, 30 min burst, Storm 8	
	OF76405	0.583	0.583	1.159	1.064	0.36	12.77	1.3	1% AEP, 30 min burst, Storm 8	
	OF76407	0.243	0.243	0.769	1.064	0.05	12.77	0.06	1% AEP, 9 hour burst, Storm 10	
	OF76410	0	0	19.24	0	0	0	0		
	OF76413	0	0	0.455	0	0	0	0		
	OF76415	0	0	0.464	0	0	0	0		
	OF76418	0	0	1.329	0	0	0	0		
	OF76420	0.069	0.069	1.737	0.288	0.13	3.45	1.43	1% AEP, 2 hour burst, Storm 10	
	OF76424	0	0	0.526	0	0	0	0		
	OF76426	0	0	19.114	0	0	0	0		
	OF76429	0.528	0.517	0.664	1.046	0.32	12.56	1.18	1% AEP, 2 hour burst, Storm 2	
	OF76432	0.499	0.499	19.225	0.032	0.02	32	0.49	1% AEP, 1 hour burst, Storm 6	
	OF76434	0.153	0.153	0.526	0.029	0.03	9.12	0.92	1% AEP, 1 hour burst, Storm 6	
	OF76436	0	0	0.526	0	0	0	0		
	OF76444	0.176	0.176	19.201	0.684	0.01	32	0.47	1% AEP, 3 hour burst, Storm 8	
	OF76451	0.146	0.146	1.792	1.423	0.21	17.07	1.77	1% AEP, 30 min burst, Storm 5	
	W-B1-01	0	0.145	0.412	0.201	0.14	2.41	0.76	1% AEP, 15 min burst, Storm 8	
	W-B1-02	0	0.073	0.464	0.178	0.07	2.13	0.39	1% AEP, 15 min burst, Storm 8	
	W-B1-03	0	0.068	0.363	0.252	0.05	3.03	0.28	1% AEP, 15 min burst, Storm 8	
	W-B1-04	0	0.473	0.48	0.707	1.17	8.48	19.49	1% AEP, 9 hour burst, Storm 2	
	W-B1-05	0.012	0.725	0.298	0.707	0.29	8.48	0.79	1% AEP, 9 hour burst, Storm 2	
	W-B2-O1	0.006	0	12.141	3	0	32	0	1% AEP, 15 min burst, Storm 1	
	W-B3-01	0	0.269	1.221	0.808	0.18	9.7	1.04	1% AEP, 10 min burst, Storm 4	
	W-B4-01	0	0.183	0.676	0.684	0.13	8.21	0.72	1% AEP, 10 min burst, Storm 6	
	W-B4-02	0	0.22	1.104	0.684	0.18	8.21	1.07	1% AEP, 10 min burst, Storm 10	
	W-B4-O1	0.007	0	12.141	3	0	32	0	1% AEP, 15 min burst, Storm 8	
	W-B5-01	0	0.052	1.044	0.29	0.06	3.47	0.61	1% AEP, 15 min burst, Storm 8	
	W-B5-02	0	0.03	0.92	0.29	0.04	3.47	0.48	1% AEP, 15 min burst, Storm 8	
	W-B5-03	0	0.029	1.511	0.075	0.07	0.89	0.88	1% AEP, 15 min burst, Storm 1	
	W-B5-04	0.551	0.574	0.872	0.763	0.37	9.15	1.45	1% AEP, 15 min burst, Storm 8	
	W-B5-05	0	0.04	1.113	0.763	0.05	9.15	0.59	1% AEP, 15 min burst, Storm 8	
	W-B5-06 07	0	0.235	1.213	0.649	0.19	7.79	1.19	1% AEP, 15 min burst, Storm 8	
	W-B5-08	0	0.082	0.714	0.649	0.04	7.79	0.42	1% AEP, 15 min burst, Storm 8	
	W-B5-09 10	0	0.093	1.083	0.291	0.09	3.49	0.72	1% AEP, 10 min burst, Storm 4	
	W-B5-11	0	0.018	0.685	0.077	0.04	0.92	0.59	1% AEP, 15 min burst, Storm 8	
	W-B5-12	0	0.016	1.147	0.063	0.04	0.75	0.73	1% AEP, 15 min burst, Storm 8	
	W-B5-13A	0.548	0.552	0.506	0.753	0.3	9.03	0.96	1% AEP, 30 min burst, Storm 8	
	W-B5-13B	0.005	0.18	0.666	0.753	0.18	9.03	1.24	1% AEP, 9 hour burst, Storm 5	
	W-B5-16	0	0.054	0.982	0.753	0.06	9.03	0.55	1% AEP, 10 min burst, Storm 4	
	W-B5-CULV14 15	0	0.196	1.054	0.643	0.16	7.72	1	1% AEP, 10 min burst, Storm 9	
	W-B5-O1	0.014	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8	
	W-B6-01	0	0.159	0.418	0.569	0.07	6.82	0.37	1% AEP, 15 min burst, Storm 8	
	W-B7-02	0	0.24	1.408	0.94	0.16	11.28	0.97	1% AEP, 10 min burst, Storm 4	
	W-B7-O1	0.007	0	12.141	3	0	32	0	1% AEP, 2 hour burst, Storm 2	
	W-EXT02	0.521	0.524	0.31	0.363	0.31	4.36	1.1	1% AEP, 30 min burst, Storm 8	
	W-EXT03	0.143	0.149	1.117	0.293	0.17	3.52	1.23	1% AEP, 2 hour burst, Storm 10	
	W-EXT04	0.59	0.463	0.629	1.423	0.34	17.07	1.16	1% AEP, 1 hour burst, Storm 7	
	W-S1	0	1.604	1.134	0.341	0.78	4.1	2.3	1% AEP, 20 min burst, Storm 4	
	DETENTION BASIN DETAILS									
	Name	Max WL	MaxVol	Max Q	Max Q	Max Q				
				Total	Low Level	High Level				
	WEST-B1	66.71	101.3	0.143	0.143	0				
	WEST-B2	62.43	143.9	0.289	0.097	0.192				
	WEST-B3	63.31	186.2	0.146	0.146	0				
	WEST-B4	59.68	109.3	0.526	0.334	0.192				
	WEST-B6	58.57	106.2	0.069	0.069	0				
	WEST-B5	54.25	118.1	0.584	0.542	0.041				
	WEST-B7	52.44	628.9	0.528	0.506	0.022				
	Run Log for 12546218_AlbanyMotorPark_west run at 15:24:01 on 14/7/2021 using version 2020.036									
B7-02, W-B	The maximum flow in these overflow routes is unsafe: W-S1, OF76451, OF76444, OF76429, OF76410, OF76407, OF76405, OF76359, OF76354, W-B4-01, OF76327, W-B3-01, OF76316, OF76315, W-B									

i7-02, W-B5-CULV14 15, W-B5-13B, W-B5-13A, W-B5-16, W-B6-01, W-B5-08, W-B5-06 07, W-B5-05, W-B5-04, W-EXT04, W-EXT02, W-B4-02, W-B1-05, W-B1-04, OF76225

Stage 1B (EAST) DRAINS Inout Data

PIT / NODE DETAILS — Version 15

Name	Type	Family	Size	Ponding Volume (cu.m)	Pressure Change Coeff. Ku	Surface Elev (m)	Max Pond Depth (m)	Base Inflow (cu.m/s)	Blocking Factor	x	y	Bolt-down lid	id	Part Full Shock Los	Inflow Hydrograph	Pit is	Internal Width (mm)	Inflow is Misaligned	Minor Safe Pond Dep (m)	Major Safe Pond Depth (m)
E-B2-02-US	Node					60.5		0		568175	6133948		97325		No					
dummy1	Node					9		0		567155	6133587		97367		No					
N57	Node					58		0		568106	6133961		97505		No					
N58	Node					56		0		568093	6133965		97516		No					
E-B2-01-US	Node					63.5		0		568158	6134105		97469		No					
E-B5-CULV1-HW	Headwall				0.5	68		0		568616	6133924		97687							
N61643	Node					67.5		0		568663	6133920		1336024		No					
N302	Node					64.5		0		568673	6133907		99131		No					
DUMMY-SCALE2	Node					10.5		0		568871	6134218		97701		No					
DUMMY-SCALE1	Node					8		0		568934	6134070		97702		No					
E-B5-01-US	Node					71		0		568522	6133990		97795		No					
E-B5-02-US	Node					72.5		0		568572	6134258		97815		No					
E-B7-CULV2-HW	Headwall				0.5	73.5		0		568460	6134257		97829							
E-B7-CULV2-DS	Node					72		0		568452	6134269		97831		No					
E-B7-04-US	Node					73		0		568445	6134203		97846		No					
E-B7-05-US	Node					73		0		568490	6134258		97849		No					
E-B9-CULV1-HW	Headwall				0.5	68.5		0		568636	6134618		97880							
E-B9-CULV1-DS	Node					67.5		0		568622	6134619		97882		No					
E-B9-07-US	Node					73		0		568632	6134277		97904		No					
E-B9-08-US	Node					68.5		0		568636	6134734		97910		No					
E-B9-05-US	Node					71		0		568577	6134468		97923		No					
E-B9-06-US	Node					68		0		568622	6134735		97926		No					
E-B9-CULV2-HW	Headwall				0.5	66		0		568578	6134629		97939							
E-B9-CULV2-DS	Node					64		0		568547	6134645		97960		No					
E-B9-03-US	Node					71		0		568560	6134465		97945		No					
E-B9-04-US	Node					67		0		568596	6134741		97951		No					
E-B9-01-US	Node					69.5		0		568513	6134498		97977		No					
E-B9-02-US	Node					65.5		0		568566	6134737		97985		No					
N306	Node					61.5		0		568167	6134243		99152		No					
N297	Node					57		0		568128	6134265		99115		No					
E-B7-07-US	Node					70		0		568465	6134420		98259		No					
N296	Node					62.225		0		568511	6134661		99112		No					
N305	Node					59.5		0		567984	6133886		99135		No					
N304	Node					53.5		0		567968	6133945		99134		No					
N61649	Node					66		0		568245	6134283		1337247		No					
N298	Node					63		0		568227	6134274		99116		No					
N367	Node					62.5		0		568520	6134829		100059		No					
N294	Node					61		0		568485	6134822		99109		No					
E-B9-CULV3-HW	Headwall				0.5	62		0		568491	6134668		98030							
E-B9-CULV3-DS	Node					60		0		568450	6134694		98032		No					
E-B10-01-US	Node					63		0		568467	6134664		98042		No					
E-B10-02-US	Node					63.5		0		568382	6134548		98052		No					
E-B10-03-US	Node					65.5		0		568569	6134752		98066		No					
E-B10-CULV1-HW	Headwall				0.5	65.5		0		568607	6134840		98068							
E-B10-CULV1-DS	Node					64		0		568579	6134834		98071		No					
E-B10-04-US	Node					67		0		568598	6134759		98119		No					
E-B10-05-US	Node					68		0		568622	6134757		98121		No					
E-B6-01-US	Node					66.5		0		568208	6134064		98149		No					
E-B6-02-US	Node					69.5		0		568325	6134226		98154		No					
E-B6-03-US	Node					63.5		0		568373	6134534		98192		No					
E-B7-01-US	Node					69.5		0		568313	6134095		98206		No					
E-B7-02-DS	Node					69.5		0		568333	6134256		98218		No					
E-B7-03-DS	Node					70.5		0		568362	6134242		98221		No					
E-B7-02-US	Node					70.5		0		568365	6134100		98223		No					
E-B7-03-US	Node					72		0		568416	6134125		98225		No					
E-B7-B	Node					68		0		568366	6134360		98245		No					
E-B7-CULV1-HW	Headwall				0.5	69		0		568363	6134359		98248							
Pit1448	Sag	MR High R	WA Main I	0.5	1.5	67.91	0.5	0	0	568360	6134359	No	183745	1 x Ku	No	New	1050	Yes	0.3	0.5
E-B7-CULV1-DS	Node					65.5		0		568305	6134365		98277		No					
E-B7-08-US	Node					72		0		568418	6134228		98287		No					
E-B7-09-US	Node					70		0		568466	6134433		98294		No					
E-B7-10-US	Node					69.5		0		568503	6134488		98311		No					
E-B7-11-DS	Node					65.1		0		568287	6134298		98326		No					
E-B3-02-US	Node					70.6		0		568368	6134088		98339		No					
E-B3-01-US	Node					72		0		568422	6134111		98341		No					
E-B4-01-DS	Node					71.25		0		568469	6134074		98364		No					
E-B4-01-US	Node					72		0		568406	6134211		98367		No					
E-B4-02-DS	Node					71.1		0		568518	6134004		98381		No					
E-B4-02-US	Node					73		0		568448	6134198		98384		No					
E-B1-01-US	Node					58.5		0		568117	6133936		98398		No					
E-B1-CULV1-DS	Node					58		0		568017	6133910		98405		No					
E-B1-02-US	Node					60.5		0		568147	6133911		98415		No					
E-B1-03-SPLIT	Node					65.5		0		568286	6133938		98443		No					
E-B1-03-US	Node					68.5		0		568265	6134075		98448		No					
E-B1-04-DS	Node					68.5		0		568373	6133909		98452		No					
E-B1-04-US	Node					69.5		0		568317	6134086		98455		No					
Pit8	Sag	MR High R	WA Main I	20	1.5	69	0.5	0	0	568280	6134154	No	98537	1 x Ku	No	New	1050	No	0.15	0.3
E-B7-CULV3-DS	Node					67		0		568293	6134250		98138		No					
N266	Node					66.75		0		568298	6134276		98633		No					
E-B2-02-DS DUMMY	Node					58		0		568127	6133951		98869		No					
E-B8-01A-US	Node					71.2		0		568622	6134476		98976		No					
E-B8-01B-US	Node					73		0		568508	6134277		98979		No					
N388	Node					56		0		568035	6133940		100415		No					
N511	Node					67		0		568387	6134457		101985		No					
N539	Node					51.5		0		567984	6133984		102852		No					
Pit1296	Sag	MR High R	WA Main I	0.25	1.5	71.8	0.4	0	0	568465	6134072	No	171193	1 x Ku	No	New	1050	No	0.3	0.3
N61629	Node					71		0		568423	6133978		1334698		No					
N299	Node					68		0		568372	6133891		99125		No					
N38859	Node					64		0		568694	6133865		807388		No					
N38868	Node					47		0		567911	6134045		807705		No					
HW1478	Headwall				0.5	49.5		0		567937	6134017		807769							
N59	Node					48.5		0		567924	6134032		97518		No					
N38875	Node					50		0		568077	6134294		807976		No					
HW1479	Headwall				0.5	53		0		568107	6134281		807978							
N38873	Node					52		0		568094	6134287		807973		No					
HW1480	Headwall				0.5	57.5		0		568328	6134678		808445							
N38880	Node					56.5		0		568308	6134661		808406		No					
N38884	Node					55		0		568292	6134645		808616		No					

DETENTION BASIN DETAILS

Name	Elev	Surf. Area	Not Used	Outlet Typ	K	Dia(mm)	Centre RL	Pit Family	Pit Type	x	y	HED	Crest RL	Crest Lend	id
EAST-B2	57	500		Pit/Sump				MR High R	WA Main I	568120	6133959	No			97460
	58	1150													
EAST-B5	66	300		Pit/Sump				MR High R	WA Main I	568660	6133924	No			97684
	67.5	1300													
EAST-B6	61	600		Pit/Sump				MR High R	WA Main I	568174	6134240	No			97995
	61.5	1000													
EAST-B8	70.5	250		Pit/Sump				MR High R	WA Main I	568489	6134412	No			97998
	71.5	750													
EAST-B9	63	950		Pit/Sump				MR High R	WA Main I	568527	6134653	No			98000
	64	1800													
EAST-B1	58	145		Pit/Sump				MR High R	WA Main I	567988	6133871	No			98006
	59.5	950													
EAST-B7	65	300		Pit/Sump				MR High R	WA Main I	568250	6134286	No			98017
	66	850													
EAST-B10	62	430		Pit/Sump				MR High R	WA Main I	568527	6134830	No			98023
	62.5	800													
Bio-retention	73.1	490		None						568542	6134333	No			98744
	73.5	1750													
EAST-B4	71	250		Pit/Sump				MR High R	WA Main I	568509	6133989	No			98013
	71.5	550													
EAST-B3	70	350		Pit/Sump				MR High R	WA Main I	568430	6133991	No			98011
	71	950													

SUB-CATCHMENT DETAILS

Name	Pit or Node	Total Area (ha)	Paved Area %	Grass Area %	Supp Area %	Paved Time (min)	Grass Time (min)	Supp Time (min)	Paved Length (m)	Grass Length (m)	Supp Length (m)	Paved Slope(%)	Grass Slope %	Supp Slope %	Paved Rough	Grass Rough	Supp Rough	Lag Time or Factor	Gutter Length (m)	Gutter Slope %	Gutter FlowFacto	Rainfall Multiplier
EAST-B2-CAT	EAST-B2	2.568	20	50	30	0		0	0	117.12	117.12	5.746	5.746	5.746	0.013	0.053	0.016	0				1
E-B5	E-B5-CULV1-HW	3.378	100	0	0	0		0	0	93.095	-1	-1	3.37	-1	0.013	-1	-1	0				1
EAST-B5-CAT	EAST-B5	2.338	0	100	0	0		0	0	-1	295.09	-1	-1	2.37	-1	-1	0.053	-1	0			1
E-B7-A	E-B7-CULV2-HW	0.664	100	0	0	0		0	0	64.619	-1	-1	0.889	-1	0.013	-1	-1	0				1
E-B9-A	E-B9-CULV1-HW	3.022	0	100	0	0		0	0	-1	75.763	-1	-1	1.105	-1	-1	0.053	-1	0			1
E-B9-B	E-B9-CULV1-DS	0.63	30	70	0	0		0	0	17.65	17.65	-1	4.27	4.27	-1	0.013	0.053	-1	0			1
E-B9-C	E-B9-CULV2-HW	0.982	0	100	0	0		0	0	-1	33.011	-1	-1	1.795	-1	-1	0.053	-1	0			1
E-B9-D	E-B9-CULV2-DS	1.097	35	30	35	0		0	0	39.502	39.502	39.502	5.326	5.326	5.326	0.013	0.053	0.016	0			1
EAST-B6-CAT	EAST-B6	5.475	10	80	10	0		0	0	64.734	64.734	64.734	7.72	7.72	7.72	0.013	0.053	0.016	0			1
EAST-B8-CAT	EAST-B8	0.838	40	60	0	0		0	0	13.81	13.81	-1	3.32	3.32	-1	0.013	0.053	-1	0			1
EAST-B9-CAT	EAST-B9	0.116	0	100	0	0		0	0	-1	16.962	-1	-1	5.9	-1	-1	0.053	-1	0			1
EAST-B1-CAT	EAST-B1	1.9121	50	40	10	0		0	0	46.71	46.71	46.71	3.178	3.178	3.178	0.013	0.053	0.016	0			1
EAST-B7-CAT	EAST-B7	0.33	0	100	0	0		0	0	-1	103.06	-1	-1	4.85	-1	-1	0.053	-1	0			1
EAST-B10-CAT	EAST-B10	3.7674	20	70	10	0		0	0	31.74	31.74	31.74	4.69	4.69	4.69	0.013	0.053	0.016	0			1
E-B10-A	E-B10-CULV1-HW	0.381	0	80	20	0		0	0	17.21	17.21	17.21	4.238	4.238	4.238	0.013	0.053	0.016	0			1
E-B10-03-CATA	E-B10-CULV1-DS	0.2796	40	50	10	0		0	0	24.61	24.61	24.61	6.095	6.095	6.095	0.013	0.053	0.016	0			1
E-B7-02-CAT	E-B7-02-DS	0.594	0	100	0	0		0	0	-1	46.395	-1	-1	2.155	-1	-1	0.053	-1	0			1
E-B7-03-CAT	E-B7-03-DS	0.384	60	20	20	0		0	0	33.111	33.111	33.111	1.51	1.51	1.51	0.013	0.053	0.016	0			1
E-B7-B-CAT	E-B7-CULV1-HW	1.809	0	100	0	0		0	0	-1	129.98	-1	-1	1.734	-1	-1	0.053	-1	0			1
E-B7-C	Pit1448	1.255	82.5	10	7.5	0		0	0	35.342	35.342	35.342	1.448	1.448	1.448	0.013	0.053	0.016	0			1
E-B7-10-CATB	E-B7-CULV1-DS	0.1624	0	100	0	0		0	0	50.268	50.268	50.268	1.989	1.989	1.989	0.013	0.053	0.016	0			1
E-B7-11-CAT	E-B7-11-DS	0.236	0	100	0	0		0	0	-1	23.373	-1	-1	2.139	-1	-1	0.053	-1	0			1
E-B4-02-CAT	E-B4-02-DS	1.245	100	0	0	0		0	0	67.914	-1	-1	0.736	-1	-1	0.013	-1	-1	0			1
E-B1-02-CATA	E-B1-CULV1-DS	0.8109	10	80	10	0		0	0	40.879	40.879	40.879	4.892	4.892	4.892	0.013	0.053	0.016	0			1
E-B1-03-US-CAT	E-B1-03-SPLIT	1.056	50	10	40	0		0	0	58.809	58.809	58.809	3.401	3.401	3.401	0.013	0.053	0.016	0			1
E-B1-04-CAT	E-B1-04-DS	0.474	0	100	0	0		0	0	-1	19.545	-1	-1	5.116	-1	-1	0.053	-1	0			1
E-B7-01-CAT	Pit8	1.026	20	60	20	0		0	0	50.013	50.013	50.013	1.999	1.999	1.999	0.013	0.053	0.016	0			1
Cat314	N266	0.33	0	100	0	0		0	0	-1	103.06	-1	-1	4.85	-1	-1	0.053	-1	0			1
E-B8-02	Bio-retention	1.772	0	100	0	0		0	0	-1	173.62	-1	-1	1.152	-1	-1	0.053	-1	0			1
E-B1-01-CAT	N388	0.274	40	50	10	0		0	0	34.788	34.788	34.788	5.749	5.749	5.749	0.013	0.053	0.016	0			1
E-B7-10-CATA	N511	0.6496	10	70	20	0		0	0	50.268	50.268	50.268	1.989	1.989	1.989	0.013	0.053	0.016	0			1
E-B4-01-CAT	Pit1296	0.384	100	0	0	0		0	0	21.961	-1	-1	2.277	-1	-1	0.013	-1	-1	0			1
EAST-B4-CAT	EAST-B4	0.182	50	50	0	0		0	0	57.265	57.265	57.265	0.87	0.87	0.87	0.013	0.053	0.016	0			1
EAST-B3-CAT	EAST-B3	2.133	50	40	10	0		0	0	39.23	39.23	39.23	2.2	2.2	2.2	0.013	0.053	0.016	0			1

PIPE DETAILS

Name	From	To	Length (m)	U/S IL (m)	D/S IL (m)	Slope (%)	Type	Dia (mm)	I.D. (mm)	Rough	Pipe Is	No. Pipes	Chg From	At Chg	Chg (m)	Rl (m)	Chg (m)	RL (m)	etc (m)
DUMMY-SCALE	DUMMY-SCALE2	DUMMY-S	161.044	10	8	1.24	uPVC, under roads, 1% minimum	150	154	0.012	New	1	DUMMY-S	0					
E-B5-CULV1	E-B5-CULV1-HW	EAST-B5	15	66.91	66	6.07	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B5-CUL	0					
E-B7-CULV1	Pit1448	E-B7-CUL	55.2	66.91	65.5	2.55	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	Pit1448	0					
E-B7-CULV2	E-B7-CULV2-HW	E-B7-CUL	13.4	72.41	72	3.06	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B7-CUL	0					
E-B7-CULV3	Pit8	E-B7-CUL	97.1	67.485	67	0.5	Concrete, under roads, 1% minimu	450	450	0.013	New	1	Pit8	0					
E-B9-CULV1	E-B9-CULV1-HW	E-B9-CUL	13.7	67.41	66.41	7.3	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B9-CUL	0					
E-B9-CULV2	E-B9-CULV2-HW	E-B9-CUL	28.3	64.91	64	3.22	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B9-CUL	0					
E-B9-CULV3	E-B9-CULV3-HW	E-B9-CUL	49	60.91	60	1.86	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B9-CUL	0					

P13783	EAST-B3	N61629	2	69.3	69.233	3.35	Concrete, under roads, 0.5% minii	600	600	0.013	NewFixed	1	EAST-B3	0
P13826	EAST-B5	N61643	1.5	65.3	65.24	4	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	EAST-B5	0
P13854	EAST-B7	N61649	2	64.3	64.17	6.5	Concrete, under roads, 0.5% minii	600	600	0.013	NewFixed	1	EAST-B7	0
P21	N57	N58	8.5	56.255	56	3	Concrete, under roads, 1% minimu	450	450	0.013	New	1	N57	0
P3176	E-B7-CULV1-HW	Pit1448	5	68	66.91	21.8	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B7-CUL	0
Pipe10	EAST-B2	N57	1.5	56.3	56.255	3	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	EAST-B2	0
Pipe122	E-B10-CULV1-HW	E-B10-CU	29.4	64.41	62.91	5.1	Concrete, under roads, 1% minimu	450	450	0.013	NewFixed	1	E-B10-CU	0
Pipe177	N61629	N299	58	69.233	68	2.13	Concrete, under roads, 0.5% minii	600	600	0.013	NewFixed	1	N61629	0
Pipe178	EAST-B4	EAST-B3	79.8	70.4	70	0.5	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	EAST-B4	0
Pipe179	N61643	N302	18.5	65.24	64.5	4	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	N61643	0
Pipe182	N61649	N298	18	64.17	63	6.5	Concrete, under roads, 0.5% minii	600	600	0.013	NewFixed	1	N61649	0
Pipe183	N306	N297	38	60.155	55.5	12.25	Concrete, under roads, 0.5% minii	600	600	0.013	New	1	N306	0
Pipe184	EAST-B8	E-B7-07-U	10	70.05	70	0.5	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	EAST-B8	0
Pipe185	EAST-B9	N296	15	62.3	62.225	0.5	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	EAST-B9	0
Pipe186	N367	N294	48	61.268	60.5	1.6	Concrete, under roads, 0.5% minii	600	600	0.013	New	1	N367	0
Pipe213	EAST-B1	N305	1.5	57	56.915	5.67	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	EAST-B1	0
Pipe220	N305	N304	60	56.915	53.5	5.69	Concrete, under roads, 0.5% minii	450	450	0.013	New	1	N305	0
Pipe283	EAST-B6	N306	2	60.4	60.155	12.25	Concrete, under roads, 0.5% minii	600	600	0.013	NewFixed	1	EAST-B6	0
Pipe2927	Pit1296	EAST-B4	95.2	71.4	71	0.42	Concrete, under roads, 0.5% minii	375	375	0.013	NewFixed	1	Pit1296	0
Pipe349	EAST-B10	N367	2	61.3	61.268	1.6	Concrete, under roads, 0.5% minii	600	600	0.013	NewFixed	1	EAST-B10	0
Pipe8633	HW1478	N59	20	48.41	47.41	5	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	HW1478	0
Pipe8646	HW1479	N38873	15	51.91	50.91	6.67	Concrete, under roads, 0.5% minii	900	900	0.013	NewFixed	1	HW1479	0
Pipe8668	HW1480	N38880	25	56.41	55.41	4	Concrete, under roads, 0.5% minii	450	450	0.013	NewFixed	1	HW1480	0

DETAILS of SERVICES CROSSING PIPES

Pipe	Chg	Bottom	Height of S	Chg	Bottom	Height of S	Chg	Bottom	Height of S	etc
	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	(m)	Elev (m)	(m)	etc

CHANNEL DETAILS

Name	From	To	Type	Length	U/S IL	D/S IL	Slope	Base Widt	L.B. Slope	R.B. Slope	Manning	Depth	Roofed
				(m)	(m)	(m)	(%)	(m)	(1:?)	(1:?)	n	(m)	

OVERFLOW ROUTE DETAILS

Name	From	To	Travel Time (min)	Spill Level (m)	Crest Length (m)	Weir Coeff. C	Cross Section	Safe Deptl Major Stor (m)	SafeDepth Minor Stor (m)	Safe DxV (sq.m/sec)	Bed Slope (%)	D/S Area Contributing %		id	U/S IL	D/S IL	Length (m)
E-B10-01	E-B10-01-US	EAST-B10	4.4				Swale with 1:6 sideslopes	0.3	0.2	1	0.55	16.11		98059	63	62	182.6
E-B10-02	E-B10-02-US	EAST-B10	7.8				Swale with 1:6 sideslopes	0.3	0.2	1	0.49	69.04		98055	63.5	62	306.3
E-B10-03A	E-B10-03-US	E-B10-CU	0.9				Swale with 1:6 sideslopes	0.3	0.2	1	3.09	100		99062	65.5	62.91	83.7
E-B10-03B	E-B10-CULV1-DS	EAST-B10	0.7				Swale with 1:6 sideslopes	0.3	0.2	1	1.69	4.95		99069	62.91	62	54
E-B10-04	E-B10-04-US	E-B10-CU	0.9				Swale with 1:6 sideslopes	0.3	0.2	1	2.44	49		98124	67	64.41	82
E-B10-05	E-B10-05-US	E-B10-CU	0.7				Swale with 1:4 sideslopes	0.45	0.3	1	3.18	51		98125	68	64.41	94.3
E-B1-01	E-B1-01-US	N388	2.1				Swale with 1:6 sideslopes	0.3	0.2	1	0.51	100		98401	58.5	55.5	83
E-B1-02A	E-B1-02-US	E-B1-CUL	3.2				Swale with 1:6 sideslopes	0.3	0.2	1	0.54	100		98420	60.5	59.8	130.5
E-B1-02B	E-B1-CULV1-DS	EAST-B1	0.3				Swale with 1:6 sideslopes	0.3	0.2	1	2.78	4.7		98819	59.8	59	28.8
E-B1-03A	E-B1-03-US	E-B1-03-S	1.8				Swale with 1:6 sideslopes	0.3	0.2	1	2.1	100		98463	68.5	65.5	142.8
E-B1-03B	E-B1-03-SPLIT	EAST-B1	3.9				Swale with 1:6 sideslopes	0.3	0.2	1	2.08	66.3		98467	65.5	59	312.1
E-B1-04	E-B1-04-US	E-B1-04-D	3.5				Swale with 1:4 sideslopes	0.45	0.3	1	0.54	100		98459	69.5	68.5	184.8
E-B1-04-CONNECT	E-B1-04-DS	E-B1-03-S	0.7				Dummy OF	0.3	0.3	0.6	3.25	0		98876	68.5	65.5	92.4
E-B2-01	E-B2-01-US	EAST-B2	1				Swale with 1:4 sideslopes	0.45	0.3	1	4.23	50.08		97461	63.5	57.5	142
E-B2-02	E-B2-02-US	EAST-B2	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	5.28	45.25		98482	60.5	57.5	56.8
E-B3-01	E-B3-01-US	EAST-B3	1.9				Swale with 1:6 sideslopes	0.3	0.2	1	1.26	25.69		98348	72	70.5	118.7
E-B3-02	E-B3-02-US	EAST-B3	2.8				Swale with 1:6 sideslopes	0.3	0.2	1	0.53	47.07		98344	70.6	70	112.9
E-B4-01	E-B4-01-US	Pit1296	2.2				K300, 0.4m deep, wall on one side	0.3	0.2	0.6	0.5	100		98369	72.6	71.8	150.2
E-B4-02	E-B4-02-US	E-B4-02-D	3.1				Swale with 1:4 sideslopes	0.45	0.3	1	0.9	100		98386	73	71.1	211.6
E-B5-01	E-B5-01-US	E-B5-CUL	1.4				Swale with 1:4 sideslopes	0.45	0.3	1	2.56	15.7		97787	71	66.91	159.6
E-B5-02	E-B5-02-US	E-B5-CUL	4.2				Swale with 1:4 sideslopes	0.45	0.3	1	1.49	84.3		97818	72.5	66.91	375.5
E-B6-01	E-B6-01-US	EAST-B6	1.3				Swale with 1:6 sideslopes	0.3	0.2	1	3.87	19.7		98156	66.5	61	142
E-B6-02	E-B6-02-US	EAST-B6	1				Swale with 1:4 sideslopes	0.45	0.3	1	5.3	11.25		98164	69.5	61	158.6
E-B6-03	E-B6-03-US	EAST-B6	6.2				Swale with 1:6 sideslopes	0.3	0.2	1	0.8	49.41		98198	63.5	61	310.6
E-B7-01	E-B7-01-US	Pit8	1.3				Swale with 1:4 sideslopes	0.45	0.3	1	0.67	100		98209	69.5	69	74.5
E-B7-02	E-B7-02-US	E-B7-02-D	3.6				Swale with 1:6 sideslopes	0.3	0.2	1	0.62	100		98229	70.5	69.5	160.6
E-B7-03	E-B7-03-US	E-B7-03-D	2.1				Swale with 1:6 sideslopes	0.3	0.2	1	1.16	100		98233	72	70.5	129.3
E-B7-04	E-B7-04-US	E-B7-CUL	0.9				Swale with 1:4 sideslopes	0.45	0.3	1	0.97	70.93		97862	73	72.41	61
E-B7-05	E-B7-05-US	E-B7-CUL	0.3				Swale with 1:4 sideslopes	0.45	0.3	1	1.92	29.07		97866	73	72.41	30.7
E-B7-06	E-B7-CULV2-DS	E-B7-CUL	1.3				Swale with 1:4 sideslopes	0.45	0.3	1	2.67	32.5		98251	72	68	149.8
E-B7-07	E-B7-07-US	E-B7-CUL	1.4				Swale with 1:4 sideslopes	0.45	0.3	1	1.57	67.5		98258	70	68	127.4
E-B7-08	E-B7-08-US	Pit1448	1.7				Swale with 1:6 sideslopes	0.3	0.2	1	2.66	49.8		98290	72	67.91	153.8
E-B7-09	E-B7-09-US	Pit1448	2.1				Swale with 1:6 sideslopes	0.3	0.2	1	1.45	50.2		98296	70	67.91	144.6
E-B7-10A	E-B7-10-US	N511	1.6				Swale with 1:6 sideslopes	0.3	0.2	1	1.97	100		102058	69.5	67	126.8
E-B7-10B	N511	E-B7-CUL	1.7				Swale with 1:4 sideslopes	0.45	0.3	1	1.12	100		102051	67	65.5	133.8
E-B7-11	E-B7-CULV1-DS	E-B7-11-D	10.1				Swale with 1:4 sideslopes	0.45	0.3	1	0.01	100		98325	65.5	65.1	73.1
E-B8-01A	E-B8-01A-US	EAST-B8	2.3				Swale with 1:4 sideslopes	0.45	0.3	1	0.56	41.89		98986	71.2	70.5	126.1
E-B8-01B	E-B8-01B-US	EAST-B8	1.1				Swale with 1:4 sideslopes	0.45	0.3	1	2.08	31.15		99000	73	70.5	120.2
E-B9-01	E-B9-01-US	E-B9-CUL	1.4				Swale with 1:6 sideslopes	0.3	0.2	1	3.6	68.8		97981	69.5	64	152.7
E-B9-02	E-B9-02-US	E-B9-CUL	1.4				Swale with 1:6 sideslopes	0.3	0.2	1	1.57	31.2		97987	65.5	64	95.6
E-B9-03	E-B9-03-US	E-B9-CUL	1.6				Swale with 1:6 sideslopes	0.3	0.2	1	3.65	60.9		97947	71	64.91	167
E-B9-04	E-B9-04-US	E-B9-CUL	1.5				Swale with 1:6 sideslopes	0.3	0.2	1	1.85	39.1		97956	67	64.91	113.2
E-B9-05	E-B9-05-US	E-B9-CUL	1.4				Swale with 1:4 sideslopes	0.45	0.3	1	2.78	64.3		97929	71	66.41	165.1
E-B9-06	E-B9-06-US	E-B9-CUL	1.4				Swale with 1:4 sideslopes	0.45	0.3	1	1.37	35.7		97933	68	66.41	116.3
E-B9-07	E-B9-07-US	E-B9-CUL	3.7				Swale with 1:4 sideslopes	0.45	0.3	1	1.64	75.8		97897	73	67.41	341.3
E-B9-08	E-B9-08-US	E-B9-CUL	1.6				Swale with 1:4 sideslopes	0.45	0.3	1	0.94	24.2		97909	68.5	67.41	115.5
OF139	Pit8	EAST-B6	1.7				Dummy OF	0.05	0	0.6	7.54	0		98548	69.5	61	111.4
OF144	E-B7-03-DS	E-B7-02-D	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	2.83	100		98593	70.5	69.5	35.3
OF153	E-B7-02-DS	N266	0.3				Swale with 1:6 sideslopes	0.3	0.2	1	6.01	50		98614	69.5	66.75	41.6
OF159	E-B7-CULV3-DS	N266	0.5				Swale with 1:6 sideslopes	0.3	0.2	1	0.94	50		98625	67	66.75	26.7
OF165	N266	EAST-B7	0.3				Swale with 1:6 sideslopes	0.3	0.2	1	5	75		98649	66.75	65	40
OF18	N58	N539	0.8				Dummy OF	0.3	0.3	0.6	4.05	0		97517	56	51.5	111.2
OF22	EAST-B2	N58	0.1	57.75	5	1.45	4 m wide pathway	0.3	0.15	0.4	17.5	0		97566	57.75	56	10
OF226	E-B4-02-DS	EAST-B4	0.1				Dummy OF	0.3	0.3	0.6	10	0		98909	71.1	71	1
OF244	E-B7-11-DS	EAST-B7	0.1				Dummy OF	0.3	0.3	0.6	10	0		98967	65.1	65	1
OF262	Pit1296	EAST-B4	1.4				Dummy OF	0.3	0.3	0.6	0.72	0		99025	72.2	71	90
OF266	E-B9-CULV1-DS	E-B9-CUL	0.4				Swale with 1:6 sideslopes	0.3	0.2	1	3.3	0		99033	66.41	64.91	45.4
OF293	Bio-retention	E-B8-01B-	0.2	73.5	4.5	1.45	Dummy OF	0.3	0.3	0.6	2.5	0		99188	73.5	73	20
OF309	N388	N539	0.5				Dummy OF	0.3	0.3	0.6	5.67	0		99431	55.5	51.5	70.6
OF311	EAST-B1	N304	0.4	59.5	15	1.45	Overflow across road low point - pa	0.05	0	0.6	9.76	0		99450	59.5	53.5	61.5
OF315	EAST-B4	N299	0.4	71.5	5	1.45	4 m wide pathway	0.3	0.15	0.4	4.22	0		99544	71.375	68	80
OF320	EAST-B3	N299	0.6	71	15	1.45	Overflow across road low point - pa	0.05	0	0.6	5	0		99564	71	68	60
OF32192	N302	N38859	1.7				Swale with 1:4 sideslopes	0.12	0.05	1	1	0		807389	64.5	64	50
OF32197	N299	HW1478	14.8				Swale with 1:4 sideslopes	0.12	0.05	1	2.69	0		807590	68	48.41	727.8
OF322	EAST-B5	N302	0.1	67.2	5	1.45	4 m wide pathway	0.3	0.15	0.4	13.5	0		99574	67.2	64.5	20
OF32200	N539	HW1478	0.8				Swale with 1:4 sideslopes	0.12	0.05	1	5.7	0		807624	51.5	48.41	54.2
OF32206	HW1478	N59	0.2	49.5	15	1.45	Overflow across road low point - pa	0.05	0	0.6	5	0		807871	49.5	48.5	20
OF32209	N59	N38868	0.2				Dummy OF	0.3	0.3	0.6	2.05	0		807940	47.41	47	20
OF32213	N297	HW1479	0.2				Dummy OF	0.3	0.3	0.6	11.97	0		808322	55.5	51.91	30
OF32216	HW1479	N38873	0.1	53	15	1.45	Overflow across road low point - pa	0.05	0	0.6	6.67	0		808355	53	52	15
OF32218	N38873	N38875	0.3				Swale with 1:4 sideslopes	0.12	0.05	1	4.55	0		808389	50.91	50	20
OF32220	E-B9-CULV3-DS	HW1480	2.5				Swale with 1:4 sideslopes	0.12	0.05	1	2.87	0		808409	60	56.41	125
OF32222	N294	HW1480	5.2				Swale with 1:4 sideslopes	0.12	0.05	1	1.91	0		808427	60.5	56.41	214.1
OF32227	HW1480	N38880	0.3	57.5	15	1.45	Overflow across road low point - pa	0.05	0	0.6	4	0		808567	57.5	56.5	25
OF32229	N38880	N38884	0.5				Swale with 1:4 sideslopes	0.12	0.05	1	2.05	0		808633	55.41	55	20
OF324	EAST-B10	N294	0.6	62.5	15	1.45	Overflow across road low point - pa	0.05	0	0.6	4	0		99602	62.5	60.5	50
OF326	N298	EAST-B6	0.2				Swale with 1:4 sideslopes	0.45	0.3	1	5.71	0		99704	63	61	35
OF330	EAST-B7	N298	0.1	65.75	5	1.45	4 m wide pathway	0.3	0.15	0.4	13.75	0		99715	65.75	63	20
OF334	EAST-B6	N297	0.2	61.5	15	1.45	Overflow across road low point - pa	0.05	0	0.6	15	0		99758	61.5	55.5	40
OF336	E-B5-CULV1-HW	EAST-B5	0.1	68	5	1.45	4 m wide pathway	0.3	0.15	0.4	6.67	0		99781	68	67	15
OF339	E-B7-CULV2-HW	E-B7-CUL	0.1	73.5	5	1.45	4 m wide pathway	0.3	0.15	0.4	11.19	0		99796	73.5	72	13.4
OF341	Pit1448	E-B7-CUL	0.9				Dummy OF	0.05	0	0.6	6.34	0		99806	69	65.5	55.2
OF343	E-B9-CULV2-DS	EAST-B9	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	8.77	0		99836	64	63	11.4
OF345	N296	E-B9-CUL	0.1				Swale with 1:6 sideslopes	0.3	0.2	1	6.32	0		99846	62.225	60.91	20.8
OF351	EAST-B8	E-B7-07-U	0.1	71.25	5	1.45	4 m wide pathway	0.3	0.15	0.4	12.5	0		99919	71.25	70	10
OF360	EAST-B9	N296	0.1	64	5	1.45	4 m wide pathway	0.3	0.15	0.4	11.83	0		99974	64	62.225	15
OF363	E-B9-CULV2-HW	E-B9-CUL	0.2	66	15	1.45	Overflow across road low point - pa	0.05	0	0.6	7.07	0		100011	66	64	28.3
OF365	E-B9-CULV1-HW	E-B9-CUL	0.1	68.5	5	1.45	Overflow across road low point - pa	0.05	0	0.6	15.26	0		100021	68.5	66.41	13.7
OF367	E-B9-CULV3-HW	E-B9-CUL	0.5	62	5	1.45	Overflow across road low point - pa	0.05	0	0.6	4.08	0		100034	62	60	49
OF369	E-B10-CULV1-HW	E-B10-CU	0.4	65.5	5	1.5	Overflow across road low point - pa	0.05	0	0.6	3.4	0		100044	65	64	29.4
OF526	N304	N539	0.3				Swale with 1:4 sideslopes	0.45	0.3	1	4.58	0		102855	53.5	51.5	43.7
OF53403	E-B7-CULV1-HW	Pit1448	0.1	69	5	1.45	4 m wide pathway	0.3	0.15	0.4	21.8	0		1339109	69	67.91	5

PIPE COVER DETAILS

Name	Type	Dia (mm)	Safe Cove	Cover (m)	
Pipe10	Concrete, under roads	450	0.6	0.21	Unsafe
P21	Concrete, under roads	450	0.6	-0.49	Unsafe
E-B5-CULV1	Concrete, under roads	450	0.6	-0.49	Unsafe
P13826	Concrete, under roads	450	0.6	0.21	Unsafe
Pipe179	Concrete, under roads	450	0.6	-0.49	Unsafe
DUMMY-SCALE	uPVC, under roads, 1	154	0.5	-0.16	Unsafe
E-B7-CULV2	Concrete, under roads	450	0.6	-0.49	Unsafe
E-B9-CULV1	Concrete, under roads	450	0.6	0.6	
E-B9-CULV2	Concrete, under roads	450	0.6	-0.49	Unsafe
Pipe283	Concrete, under roads	600	0.6	-0.05	Unsafe
Pipe183	Concrete, under roads	600	0.6	0.7	
Pipe184	Concrete, under roads	450	0.6	-0.49	Unsafe
Pipe185	Concrete, under roads	450	0.6	-0.49	Unsafe
Pipe213	Concrete, under roads	450	0.6	0.51	Unsafe
Pipe220	Concrete, under roads	450	0.6	-0.49	Unsafe
P13854	Concrete, under roads	600	0.6	0.06	Unsafe
Pipe182	Concrete, under roads	600	0.6	-0.65	Unsafe
Pipe349	Concrete, under roads	600	0.6	0.06	Unsafe
Pipe186	Concrete, under roads	600	0.6	-0.15	Unsafe
E-B9-CULV3	Concrete, under roads	450	0.6	-0.49	Unsafe
Pipe122	Concrete, under roads	450	0.6	0.6	
P3176	Concrete, under roads	450	0.6	0.51	Unsafe
E-B7-CULV1	Concrete, under roads	450	0.6	-0.49	Unsafe
E-B7-CULV3	Concrete, under roads	450	0.6	-0.49	Unsafe
Pipe2927	Concrete, under roads	375	0.6	-0.41	Unsafe
Pipe178	Concrete, under roads	450	0.6	-0.49	Unsafe
P13783	Concrete, under roads	600	0.6	0.06	Unsafe
Pipe177	Concrete, under roads	600	0.6	-0.64	Unsafe
Pipe8633	Concrete, under roads	450	0.6	0.6	
Pipe8646	Concrete, under roads	900	0.6	0.12	Unsafe
Pipe8668	Concrete, under roads	450	0.6	0.6	

These pipes have non-return valves: Pipe10, P13826, Pipe283, Pipe213, P13854, Pipe349, P13783

Stage 1B (EAST) DRAINS Results								
DRAINS results prepared from Version 2020.036								
1EY								
PIT / NODE DETAILS				Version 8				
Name	Max HGL	Max Pond	Max Surface	Max Pond	Min	Overflow	Constraint	
		HGL	Flow Arriving	Volume	Freeboard	(cu.m/s)		
			(cu.m/s)	(cu.m)	(m)			
E-B2-02-US	60.5		0					
N57	56.3		0					
N58	56		0					
E-B2-01-US	63.5		0					
E-B5-CULV1-HW	67.48		0.22		0.52	0	Headwall height/system capacity	
N61643	65.3		0					
N302	64.61		0					
DUMMY-SCALE2	10		0					
DUMMY-SCALE1	8		0					
E-B5-01-US	71		0					
E-B5-02-US	72.5		0					
E-B7-CULV2-HW	72.69		0.041		0.81	0	Headwall height/system capacity	
E-B7-CULV2-DS	72.14		0					
E-B7-04-US	73		0					
E-B7-05-US	73		0					
E-B9-CULV1-HW	67.41		0		1.09	0	Headwall height/system capacity	
E-B9-CULV1-DS	66.47		0.014					
E-B9-07-US	73		0					
E-B9-08-US	68.5		0					
E-B9-05-US	71		0					
E-B9-06-US	68		0					
E-B9-CULV2-HW	65.01		0.016		0.99	0	Headwall height/system capacity	
E-B9-CULV2-DS	64.1		0.041					
E-B9-03-US	71		0					
E-B9-04-US	67		0					
E-B9-01-US	69.5		0					
E-B9-02-US	65.5		0					
N306	60.2		0					
N297	55.5		0					
E-B7-07-US	70.01		0					
N296	62.23		0					
N305	56.98		0					
N304	53.59		0					
N61649	64.24		0					
N298	63.09		0					
N367	61.33		0					
N294	60.59		0					
E-B9-CULV3-HW	60.92		0		1.08	0	Headwall height/system capacity	
E-B9-CULV3-DS	60.01		0					
E-B10-01-US	63		0					
E-B10-02-US	63.5		0					
E-B10-03-US	65.5		0					
E-B10-CULV1-HW	64.41		0.003		1.09	0	None	
E-B10-CULV1-DS	62.97		0.008					
E-B10-04-US	67		0					
E-B10-05-US	68		0					
E-B6-01-US	66.5		0					
E-B6-02-US	69.5		0					
E-B6-03-US	63.5		0					
E-B7-01-US	69.5		0					
E-B7-02-DS	69.56		0.027					
E-B7-03-DS	70.57		0.017					
E-B7-02-US	70.5		0					
E-B7-03-US	72		0					
E-B7-CULV1-HW	68.23		0.068		0.77	0	None	
Pit1448	67.18	68	0.077	0	0.73	0	Inlet Capacity	
E-B7-CULV1-DS	65.68		0.007					
E-B7-08-US	72		0					
E-B7-09-US	70		0					
E-B7-10-US	69.5		0					
E-B7-11-DS	65.52		0.109					
E-B3-02-US	70.6		0					
E-B3-01-US	72		0					
E-B4-01-US	72		0					
E-B4-02-DS	71.18		0.075					
E-B4-02-US	73		0					
E-B1-01-US	58.5		0					
E-B1-CULV1-DS	59.83		0.006					
E-B1-02-US	60.5		0					
E-B1-03-SPLIT	65.59		0.05					
E-B1-03-US	68.5		0					
E-B1-04-DS	68.5		0					
E-B1-04-US	69.5		0					
Pit8	67.6	69.04	0.015	0.6	1.4	0	Inlet Capacity	
E-B7-CULV3-DS	67.09		0					
N266	66.83		0.049					
E-B8-01A-US	71.2		0					
E-B8-01B-US	73		0					
N388	55.5		0.008					
N511	67.05		0.005					
N539	51.59		0.056					
Pit1296	71.6	71.86	0.029	0	0.2	0	Inlet Capacity	
N61629	69.24		0					
N299	68		0					
HW1478	48.6		0.044		0.9	0	None	
N59	47.42		0					
HW1479	52.04		0.138		0.96	0	None	
N38873	50.98		0					
HW1480	56.56		0.026		0.94	0	None	
N38880	55.5		0					
SUB-CATCHMENT DETAILS								
Name	Max	Paved	Grassed	Paved	Grassed	Supp.	Due to Storm	
	Flow Q	Max Q	Max Q	Tc	Tc	Tc		
	(cu.m/s)	(cu.m/s)	(cu.m/s)	(min)	(min)	(min)		
EAST-B2-CAT	0.062	0	0	4.85	11.28	5.5	1EY AEP, 10 min burst, Storm 10	
E-B5	0.409	0	0	4.96	0	0	1EY AEP, 10 min burst, Storm 10	
EAST-B5-CAT	0	0	0	0	25.62	0	1EY AEP, 10 min burst, Storm 5	
E-B7-A	0.078	0	0	5.95	0	0	1EY AEP, 10 min burst, Storm 10	
E-B9-A	0	0	0	0	14.24	0	1EY AEP, 10 min burst, Storm 5	
E-B9-B	0.023	0	0	1.7	3.96	0	1EY AEP, 10 min burst, Storm 9	
E-B9-C	0	0	0	0	5.97	0	1EY AEP, 10 min burst, Storm 5	
E-B9-D	0.06	0	0	2.59	6.01	2.93	1EY AEP, 10 min burst, Storm 7	
EAST-B6-CAT	0.066	163.253	0.255	3.11	7.23	3.53	1EY AEP, 10 min burst, Storm 9	
EAST-B8-CAT	0.041	0	0	1.59	3.69	0	1EY AEP, 10 min burst, Storm 9	
EAST-B9-CAT	0	-9999	0	0	3.51	0	1EY AEP, 10 min burst, Storm 5	
EAST-B1-CAT	0.116	0	0	3.34	7.76	3.78	1EY AEP, 10 min burst, Storm 9	
EAST-B7-CAT	0	0.178	0	0	10.99	0	1EY AEP, 10 min burst, Storm 5	
EAST-B10-CAT	0.091	0	0	2.36	5.48	2.67	1EY AEP, 10 min burst, Storm 9	
E-B10-A	0	0	0	1.68	3.91	1.91	1EY AEP, 10 min burst, Storm 5	
E-B10-03-CATA	0.014	0	0	1.87	4.35	2.12	1EY AEP, 10 min burst, Storm 9	
E-B7-02-CAT	0	0	0	0	8.69	0	1EY AEP, 10 min burst, Storm 5	
E-B7-03-CAT	0.029	0	0	3.4	7.89	3.85	1EY AEP, 10 min burst, Storm 9	
E-B7-B-CAT	0	0	0	0	17.2	0	1EY AEP, 10 min burst, Storm 5	
E-B7-C	0.125	0	0	3.58	8.31	4.05	1EY AEP, 10 min burst, Storm 9	
E-B7-10-CATB	0	0	0	4.02	9.34	4.55	1EY AEP, 10 min burst, Storm 5	
E-B7-11-CAT	0	0	0	0	5.77	0	1EY AEP, 10 min burst, Storm 5	
E-B4-02-CAT	0.144	0	0	6.48	0	0	1EY AEP, 10 min burst, Storm 10	
E-B1-02-CATA	0.01	0	0	2.71	6.3	3.07	1EY AEP, 10 min burst, Storm 9	
E-B1-03-US-CAT	0.086	0	0	3.76	8.73	4.26	1EY AEP, 10 min burst, Storm 7	
E-B1-04-CAT	0	0	0	0	3.99	0	1EY AEP, 10 min burst, Storm 5	
E-B7-01-CAT	0.025	0	0	4	9.29	4.53	1EY AEP, 10 min burst, Storm 9	

Cat314	0	0	0	0	10.99	0	1EY AEP, 10 min burst, Storm 5	
E-B8-02	0	0	0	0	23.14	0	1EY AEP, 10 min burst, Storm 5	
E-B1-01-CAT	0.013	0	0	2.34	5.44	2.65	1EY AEP, 10 min burst, Storm 9	
E-B7-10-CATA	0.008	0	0	4.02	9.34	4.55	1EY AEP, 10 min burst, Storm 9	
E-B4-01-CAT	0.047	0	0	2.35	0	0	1EY AEP, 10 min burst, Storm 9	
EAST-B4-CAT	0.011	0	0	5.57	12.94	6.31	1EY AEP, 10 min burst, Storm 10	
EAST-B3-CAT	0.129	0	0	3.36	7.81	3.8	1EY AEP, 10 min burst, Storm 9	
PIPE DETAILS								
Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm			
	(cu.m/s)	(m/s)	HGL (m)	HGL (m)				
Pipe10	0	0	56.303	56.295	1EY AEP, 10 min burst, Storm 5			
P21	0.006	1.09	56.295	56.033	1EY AEP, 9 hour burst, Storm 6			
E-B5-CULV1	0.24	1.51	67.395	66.848	1EY AEP, 15 min burst, Storm 1			
P13826	0	0	65.3	65.3	1EY AEP, 10 min burst, Storm 5			
Pipe179	0.021	1.72	65.3	64.606	1EY AEP, 3 hour burst, Storm 9			
DUMMY-SCALE	0	0	10	8	1EY AEP, 10 min burst, Storm 5			
E-B7-CULV2	0.067	1.66	72.617	72.136	1EY AEP, 10 min burst, Storm 7			
E-B9-CULV1	0	0	67.41	66.471	1EY AEP, 10 min burst, Storm 5			
E-B9-CULV2	0.007	0.29	65.006	64.096	1EY AEP, 1 hour burst, Storm 1			
Pipe283	0	0	60.4	60.202	1EY AEP, 10 min burst, Storm 5			
Pipe183	0.018	3.15	60.202	55.531	1EY AEP, 6 hour burst, Storm 7			
Pipe184	0	0	70.053	70.009	1EY AEP, 10 min burst, Storm 5			
Pipe185	0	0	62.303	62.225	1EY AEP, 10 min burst, Storm 5			
Pipe213	0.021	1.41	57.098	56.981	1EY AEP, 6 hour burst, Storm 1			
Pipe220	0.032	2.18	56.981	53.593	1EY AEP, 6 hour burst, Storm 1			
P13854	0.014	0.85	64.376	64.236	1EY AEP, 6 hour burst, Storm 7			
Pipe182	0.04	2.3	64.237	63.094	1EY AEP, 6 hour burst, Storm 7			
Pipe349	0	0	61.741	61.338	1EY AEP, 10 min burst, Storm 5			
Pipe186	0.02	1.15	61.335	60.591	1EY AEP, 2 hour burst, Storm 8			
E-B9-CULV3	0	0	60.916	60.006	1EY AEP, 10 min burst, Storm 5			
Pipe122	0	0	64.41	62.973	1EY AEP, 10 min burst, Storm 5			
P3176	0.046	0.59	68.223	67.175	1EY AEP, 15 min burst, Storm 1			
E-B7-CULV1	0.117	1.79	67.148	65.693	1EY AEP, 15 min burst, Storm 1			
E-B7-CULV3	0.024	0.93	67.598	67.098	1EY AEP, 10 min burst, Storm 4			
Pipe2927	0.044	0.76	71.596	71.279	1EY AEP, 10 min burst, Storm 4			
Pipe178	0	0	70.4	70.265	1EY AEP, 10 min burst, Storm 5			
P13783	0	0	69.3	69.236	1EY AEP, 10 min burst, Storm 5			
Pipe177	0	0	69.236	68	1EY AEP, 2 hour burst, Storm 10			
Pipe8633	0.031	2.32	48.601	47.473	1EY AEP, 6 hour burst, Storm 1			
Pipe8646	0.016	0.66	52.036	50.983	1EY AEP, 6 hour burst, Storm 9			
Pipe8668	0.02	0.87	56.562	55.5	1EY AEP, 2 hour burst, Storm 8			
CHANNEL DETAILS								
Name	Max Q	Max V			Due to Storm			
	(cu.m/s)	(m/s)						
OVERFLOW ROUTE DETAILS								
Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
Basin 1	0.006	0	12.141	3	0	32	0	1EY AEP, 9 hour burst, Storm 6
EAST-B10-O	0.007	0	12.141	3	0	32	0	1EY AEP, 2 hour burst, Storm 8
EAST-B1-O	0.011	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 1
EAST-B6-0	0.006	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 7
E-B10-01	0	0.005	0.127	0.135	0.01	1.62	0.09	1EY AEP, 1 hour burst, Storm 1
E-B10-02	0	0.026	0.12	0.135	0.03	1.62	0.24	1EY AEP, 30 min burst, Storm 8
E-B10-03A	0	0.012	0.3	0.062	0.03	0.74	0.55	1EY AEP, 10 min burst, Storm 7
E-B10-03B	0.01	0.01	0.222	0.135	0.03	1.62	0.51	1EY AEP, 30 min burst, Storm 6
E-B10-04	0	0	0.267	0	0	0	0	
E-B10-05	0	0	0.592	0	0	0	0	
E-B1-01	0	0.01	0.122	0.065	0.03	0.78	0.56	1EY AEP, 15 min burst, Storm 1
E-B1-02A	0	0.003	0.126	0.052	0.01	0.62	0.41	1EY AEP, 1 hour burst, Storm 1
E-B1-02B	0.002	0.005	0.285	0.045	0.02	0.54	1.28	1EY AEP, 10 min burst, Storm 7
E-B1-03A	0	0.077	0.247	0.149	0.1	1.79	0.79	1EY AEP, 15 min burst, Storm 1
E-B1-03B	0.03	0.047	0.246	0.108	0.07	1.3	0.71	1EY AEP, 2 hour burst, Storm 4
E-B1-04	0	0	0.244	0	0	0	0	
E-B1-04-CONNECT	0	0	19.197	0	0	0	0	
E-B2-01	0	0.027	0.683	0.089	0.08	0.71	0.85	1EY AEP, 10 min burst, Storm 7
E-B2-02	0	0.027	0.392	0.074	0.06	0.88	0.84	1EY AEP, 10 min burst, Storm 4
E-B3-01	0	0.023	0.192	0.092	0.05	1.1	0.62	1EY AEP, 15 min burst, Storm 1
E-B3-02	0	0.051	0.124	0.265	0.03	3.18	0.22	1EY AEP, 10 min burst, Storm 7
E-B4-01	0	0.046	0.059	0.161	0.13	0.29	0.8	1EY AEP, 10 min burst, Storm 10
E-B4-02	0	0.113	0.315	0.228	0.16	1.83	0.92	1EY AEP, 10 min burst, Storm 7
E-B5-01	0	0.057	0.531	0.574	0.08	4.59	0.66	1EY AEP, 10 min burst, Storm 7
E-B5-02	0	0.256	0.405	0.574	0.22	4.59	0.85	1EY AEP, 10 min burst, Storm 7
E-B6-01	0	0.007	0.336	0.19	0.01	2.28	0.17	1EY AEP, 30 min burst, Storm 5
E-B6-02	0	0.005	0.764	0.19	0.02	1.52	0.33	1EY AEP, 15 min burst, Storm 1
E-B6-03	0	0.011	0.153	0.19	0.01	2.28	0.17	1EY AEP, 1 hour burst, Storm 1
E-B7-01	0	0.023	0.272	0.092	0.04	0.74	0.43	1EY AEP, 10 min burst, Storm 4
E-B7-02	0	0	0.134	0	0	0	0	
E-B7-03	0	0.021	0.184	0.091	0.05	1.09	0.61	1EY AEP, 15 min burst, Storm 1
E-B7-04	0	0.052	0.327	0.285	0.06	2.28	0.38	1EY AEP, 10 min burst, Storm 4
E-B7-05	0	0.022	0.46	0.287	0.04	2.29	0.41	1EY AEP, 10 min burst, Storm 10
E-B7-06	0.066	0.065	0.542	0.226	0.12	1.81	0.9	1EY AEP, 10 min burst, Storm 7
E-B7-07	0	0	0.416	0	0	0	0	
E-B7-08	0	0.054	0.279	0.113	0.06	1.35	0.54	1EY AEP, 10 min burst, Storm 7
E-B7-09	0	0.053	0.206	0.128	0.04	1.53	0.33	1EY AEP, 10 min burst, Storm 7
E-B7-10A	0	0.004	0.24	0.049	0.01	0.59	0.24	1EY AEP, 30 min burst, Storm 8
E-B7-10B	0.003	0.002	0.351	0.185	0.01	1.48	0.29	1EY AEP, 1 hour burst, Storm 1
E-B7-11	0.068	0.077	0.033	0.412	0.11	3.3	0.67	1EY AEP, 3 hour burst, Storm 9
E-B7-O1	0.009	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 7
E-B8-01A	0	0.013	0.248	0.108	0.04	0.87	0.53	1EY AEP, 10 min burst, Storm 7
E-B8-01B	0	0.011	0.479	0.083	0.04	0.67	0.47	1EY AEP, 10 min burst, Storm 7
E-B9-01	0	0.034	0.324	0.093	0.07	1.11	0.77	1EY AEP, 15 min burst, Storm 1
E-B9-02	0	0.015	0.214	0.077	0.03	0.93	0.44	1EY AEP, 15 min burst, Storm 1
E-B9-03	0	0	0.326	0	0	0	0	
E-B9-04	0	0	0.232	0	0	0	0	
E-B9-05	0	0.012	0.554	0.08	0.04	0.64	0.59	1EY AEP, 10 min burst, Storm 7
E-B9-06	0	0.007	0.389	0.069	0.03	0.55	0.49	1EY AEP, 15 min burst, Storm 1
E-B9-07	0	0	0.425	0	0	0	0	
E-B9-08	0	0	0.322	0	0	0	0	
low-.25	0.009	0	12.141	3	0	32	0	1EY AEP, 3 hour burst, Storm 9
low0.5	0.008	0	12.141	3	0	32	0	1EY AEP, 3 hour burst, Storm 9
O22992	0.007	0	12.141	3	0	32	0	1EY AEP, 2 hour burst, Storm 8
O23058	0.007	0	12.141	3	0	32	0	1EY AEP, 2 hour burst, Storm 8
O29065	0.008	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 7
O29069	0.008	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 7
O31534	0	0	12.141	0	0	0	0	
O31545	0	0	12.141	0	0	0	0	
O31559	0	0	12.141	0	0	0	0	
O72267	0.006	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 7
O72283	0.006	0	12.141	3	0	32	0	1EY AEP, 6 hour burst, Storm 7
O9296	0.004	0	12.141	3	0	32	0	1EY AEP, 3 hour burst, Storm 9
OF139	0	0	0	0	0	0	0	
OF144	0.02	0.021	0.287	0.081	0.05	0.98	0.63	1EY AEP, 15 min burst, Storm 1
OF153	0.019	0.018	0.419	0.08	0.05	0.96	0.82	1EY AEP, 15 min burst, Storm 1
OF159	0.021	0.022	0.166	0.094	0.05	1.13	0.61	1EY AEP, 10 min burst, Storm 7
OF165	0.031	0.032	0.382	0.529	0.07	6.35	0.82	1EY AEP, 25 min burst, Storm 5
OF18	0.006	0.006	19.227	0.081	0	32	0.09	1EY AEP, 9 hour burst, Storm 6
OF22	0	0	1.333	0	0	0	0	
OF226	0.227	0.227	19.201	0.18	0.01	32	0.09	1EY AEP, 30 min burst, Storm 6
OF244	0.315	0.315	19.201	0.537	0.01	32	0.02	1EY AEP, 3 hour burst, Storm 6
OF262	0	0	10.302	0	0	0	0	
OF266	0.013	0.013	0.31	0.096	0.03	1.15	0.55	1EY AEP, 30 min burst, Storm 8
OF293	0	0	19.196	0	0	0	0	
OF309	0.007	0.007	19.13	0.02	0	32	0.11	1EY AEP, 30 min burst, Storm 6
OF311	0	0	0	0	0	0	0	
OF315	0	0	1.403	0	0	0	0	
OF320	0	0	0	0	0	0	0	

OF32192	0.021	0.021	0.003	0.117	0.05	0.94	0.47	1EY AEP, 3 hour burst, Storm 9
OF32197	0	0	0.005	0	0	0	0	
OF322	0	0	1.333	0	0	0	0	
OF32200	0.031	0.031	0.007	0.191	0.09	1.53	1	1EY AEP, 6 hour burst, Storm 1
OF32206	0	0	0	0	0	0	0	
OF32209	0.031	0.031	17.383	0.007	0	32	0.14	1EY AEP, 6 hour burst, Storm 1
OF32213	0.018	0.018	19.179	0.128	0	32	0.2	1EY AEP, 6 hour burst, Storm 7
OF32216	0	0	0	0	0	0	0	
OF32218	0.016	0.016	0.006	0.073	0.06	0.59	0.77	1EY AEP, 6 hour burst, Storm 9
OF32220	0	0	0.005	0	0	0	0	
OF32222	0.02	0.02	0.004	0.152	0.05	1.22	0.6	1EY AEP, 2 hour burst, Storm 8
OF32227	0	0	0	0	0	0	0	
OF32229	0.02	0.02	0.004	0.093	0.05	0.75	0.61	1EY AEP, 2 hour burst, Storm 8
OF324	0	0	0	0	0	0	0	
OF326	0.037	0.037	0.793	0.19	0.1	1.52	1.06	1EY AEP, 6 hour burst, Storm 7
OF330	0	0	1.345	0	0	0	0	
OF334	0	0	0	0	0	0	0	
OF336	0	0	1.393	0	0	0	0	
OF339	0	0	1.337	0	0	0	0	
OF341	0	0	0	0	0	0	0	
OF343	0.045	0.045	0.506	0.094	0.18	1.12	4.36	1EY AEP, 1 hour burst, Storm 5
OF345	0	0	0.429	0	0	0	0	
OF351	0	0	1.347	0	0	0	0	
OF360	0	0	1.343	0	0	0	0	
OF363	0	0	0	0	0	0	0	
OF365	0	0	0	0	0	0	0	
OF367	0	0	0	0	0	0	0	
OF369	0	0	0	0	0	0	0	
OF526	0.031	0.031	0.711	0.093	0.08	0.75	0.89	1EY AEP, 6 hour burst, Storm 1
OF53403	0	0	1.291	0	0	0	0	
DETENTION BASIN DETAILS								
Name	Max WL	MaxVol	Max Q	Max Q	Max Q			
			Total	Low Level	High Level			
EAST-B2	57.22	0	0.006	0	0.006			
EAST-B5	66.82	0	0.021	0	0.021			
EAST-B6	61.19	0	0.018	0	0.018			
EAST-B8	70.58	0	0	0	0			
EAST-B9	63.02	0	0	0	0			
EAST-B1	58.78	0	0.031	0.021	0.011			
EAST-B7	65.53	0	0.039	0.014	0.025			
EAST-B10	62.14	0	0.02	0	0.02			
Bio-retention	73.1	0	0	0	0			
EAST-B4	71.18	0	0	0	0			
EAST-B3	70.27	0	0	0	0			
Run Log for 12546218_AlbanyMotorPark_east run at 02:44:15 on 13/7/2021 using version 2020.036								
No water upwelling from any pit. Freeboard was adequate at all pits.								
The maximum flow in these overflow routes is unsafe: OF32229, OF32222, OF32220, OF32218, OF32200, OF32197, OF32192, OF367, OF365, OF363, OF341, OF334, OF324, OF320, OF311, OF244, OF165, OF139, E-B3-02, E-B								

Stage 1B (EAST) DRAINS Results

DRAINS results prepared from Version 2020.036

10% AEP

PIT / NODE DETAILS

Version 8

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
E-B2-02-US	60.5		0				
N57	56.37		0				
N58	56.01		0				
E-B2-01-US	63.5		0				
E-B5-CULV1-HW	67.9		0.48		0.1	0	None
N61643	65.41		0				
N302	64.74		0				
DUMMY-SCALE2	10		0				
DUMMY-SCALE1	8		0				
E-B5-01-US	71		0				
E-B5-02-US	72.5		0				
E-B7-CULV2-HW	72.8		0.091		0.7	0	None
E-B7-CULV2-DS	72.17		0				
E-B7-04-US	73		0				
E-B7-05-US	73		0				
E-B9-CULV1-HW	67.73		0.099		0.77	0	None
E-B9-CULV1-DS	66.54		0.055				
E-B9-07-US	73		0				
E-B9-08-US	68.5		0				
E-B9-05-US	71		0				
E-B9-06-US	68		0				
E-B9-CULV2-HW	65.27		0.204		0.73	0	None
E-B9-CULV2-DS	64.15		0.122				
E-B9-03-US	71		0				
E-B9-04-US	67		0				
E-B9-01-US	69.5		0				
E-B9-02-US	65.5		0				
N306	60.37		0				
N297	55.52		0.039				
E-B7-07-US	70.01		0				
N296	62.23		0				
N305	57.08		0				
N304	53.7		0				
N61649	64.34		0				
N298	63.2		0				
N367	61.47		0				
N294	60.71		0				
E-B9-CULV3-HW	60.92		0		1.08	0	None
E-B9-CULV3-DS	60.01		0				
E-B10-01-US	63		0				
E-B10-02-US	63.5		0				
E-B10-03-US	65.5		0				
E-B10-CULV1-HW	64.59		0.038		0.91	0	None
E-B10-CULV1-DS	63.02		0.03				
E-B10-04-US	67		0				
E-B10-05-US	68		0				
E-B6-01-US	66.5		0				
E-B6-02-US	69.5		0				
E-B6-03-US	63.5		0				
E-B7-01-US	69.5		0				
E-B7-02-DS	69.6		0.071				
E-B7-03-DS	70.61		0.042				
E-B7-02-US	70.5		0				
E-B7-03-US	72		0				
E-B7-CULV1-HW	68.36		0.149		0.64	0	None
Pit1448	67.36	68.06	0.154	0.1	0.55	0	Inlet Capacity
E-B7-CULV1-DS	65.79		0.073				
E-B7-08-US	72		0				
E-B7-09-US	70		0				
E-B7-10-US	69.5		0				
E-B7-11-DS	65.66		0.319				
E-B3-02-US	70.6		0				
E-B3-01-US	72		0				
E-B4-01-US	72		0				
E-B4-02-DS	71.34		0.168				
E-B4-02-US	73		0				
E-B1-01-US	58.5		0				
E-B1-CULV1-DS	59.91		0.054				
E-B1-02-US	60.5		0				
E-B1-03-SPLIT	65.64		0.115				
E-B1-03-US	68.5		0				
E-B1-04-DS	68.51		0.038				
E-B1-04-US	69.5		0				
Pit8	67.73	69.08	0.063	1.7	1.27	0	Inlet Capacity
E-B7-CULV3-DS	67.16		0				
N266	66.9		0.22				
E-B8-01A-US	71.2		0				
E-B8-01B-US	73		0				
N388	55.51		0.026				
N511	67.15		0.034				
N539	51.67		0.341				
Pit1296	71.69	71.88	0.055	0	0.11	0	Inlet Capacity
N61629	69.31		0				
N299	68.1		0				
HW1478	48.93		0.286		0.57	0	None
N59	47.43		0				
HW1479	52.4		0.637		0.6	0	None
N38873	51.12		0				
HW1480	56.87		0.343		0.63	0	None
N38880	55.61		0				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
EAST-B2-CAT	0.264	0.031	0.021	3.83	8.9	4.34	10% AEP, 10 min burst, Storm 3
E-B5	0.807	216.25	52.036	3.92	0	0	10% AEP, 10 min burst, Storm 1
EAST-B5-CAT	0.045	0	0.02	0	41.19	0	10% AEP, 3 hour burst, Storm 2
E-B7-A	0.157	50.983	0	4.69	0	0	10% AEP, 10 min burst, Storm 4
E-B9-A	0.099	0	0	0	20.71	0	10% AEP, 2 hour burst, Storm 2
E-B9-B	0.08	56.562	0	1.34	3.12	0	10% AEP, 10 min burst, Storm 3
E-B9-C	0.067	0	0	0	5.16	0	10% AEP, 15 min burst, Storm 7
E-B9-D	0.192	0	0	2.04	4.74	2.31	10% AEP, 10 min burst, Storm 8
EAST-B6-CAT	0.493	0	61.741	2.46	5.71	2.78	10% AEP, 10 min burst, Storm 3
EAST-B8-CAT	0.119	0	0	1.25	2.91	0	10% AEP, 10 min burst, Storm 9
EAST-B9-CAT	0.013	0.037	0	0	2.77	0	10% AEP, 10 min burst, Storm 6
EAST-B1-CAT	0.275	0	0	2.63	6.12	2.98	10% AEP, 10 min burst, Storm 7
EAST-B7-CAT	0.014	0	0	0	15.98	0	10% AEP, 2 hour burst, Storm 2
EAST-B10-CAT	0.47	0	0	1.86	4.32	2.11	10% AEP, 10 min burst, Storm 3
E-B10-A	0.052	0	0	1.33	3.08	1.5	10% AEP, 10 min burst, Storm 8
E-B10-03-CATA	0.045	0	0	1.48	3.43	1.67	10% AEP, 10 min burst, Storm 9
E-B7-02-CAT	0.028	57.217	118.72	0	7.5	0	10% AEP, 15 min burst, Storm 4
E-B7-03-CAT	0.068	0	0	2.68	6.23	3.03	10% AEP, 10 min burst, Storm 7
E-B7-B-CAT	0.049	0	1.489	0	25.01	0	10% AEP, 2 hour burst, Storm 2
E-B7-C	0.27	8	0	2.82	6.56	3.2	10% AEP, 10 min burst, Storm 4
E-B7-10-CATB	0.008	0	0	3.47	8.06	3.93	10% AEP, 15 min burst, Storm 1
E-B7-11-CAT	0.016	60.92	67.598	0	4.98	0	10% AEP, 15 min burst, Storm 1
E-B4-02-CAT	0.292	0	0	5.11	0	0	10% AEP, 10 min burst, Storm 4
E-B1-02-CATA	0.082	0	0	2.14	4.97	2.42	10% AEP, 10 min burst, Storm 3
E-B1-03-US-CAT	0.198	0	0	2.96	6.89	3.36	10% AEP, 10 min burst, Storm 9
E-B1-04-CAT	0.046	0	0	0	3.15	0	10% AEP, 10 min burst, Storm 7
E-B7-01-CAT	0.106	0.006	0	3.15	7.33	3.57	10% AEP, 10 min burst, Storm 3

	Cat314	0.014	64.335	0.139	0	15.98	0	10% AEP, 2 hour burst, Storm 2	
	E-B8-02	0.036	0	0	0	37.2	0	10% AEP, 3 hour burst, Storm 8	
	E-B1-01-CAT	0.042	65.004	0.099	1.85	4.29	2.09	10% AEP, 10 min burst, Storm 9	
	E-B7-10-CATA	0.059	0	0	3.47	8.06	3.93	10% AEP, 15 min burst, Storm 7	
	E-B4-01-CAT	0.092	56	0	1.85	0	0	10% AEP, 10 min burst, Storm 1	
	EAST-B4-CAT	0.023	0.076	0	4.39	10.2	4.97	10% AEP, 10 min burst, Storm 5	
	EAST-B3-CAT	0.307	0.409	73	2.65	6.16	3	10% AEP, 10 min burst, Storm 7	
	PIPE DETAILS								
	Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm			
		(cu.m/s)	(m/s)	HGL (m)	HGL (m)				
	Pipe10	0.043	1.37	56.928	56.369	10% AEP, 3 hour burst, Storm 4			
	P21	0.055	2.24	56.369	56.095	10% AEP, 3 hour burst, Storm 4			
	E-B5-CULV1	0.335	2.11	67.696	67.105	10% AEP, 15 min burst, Storm 7			
	P13826	0.138	2.5	66.175	65.411	10% AEP, 2 hour burst, Storm 5			
	Pipe179	0.174	3.1	65.412	64.735	10% AEP, 2 hour burst, Storm 5			
	DUMMY-SCALE	0	0	10	8	10% AEP, 10 min burst, Storm 5			
	E-B7-CULV2	0.121	2.19	72.652	72.17	10% AEP, 10 min burst, Storm 7			
	E-B9-CULV1	0.089	2.39	67.617	66.538	10% AEP, 2 hour burst, Storm 2			
	E-B9-CULV2	0.105	2.13	65.135	64.156	10% AEP, 2 hour burst, Storm 2			
	Pipe283	0.377	4.15	60.884	60.369	10% AEP, 2 hour burst, Storm 8			
	Pipe183	0.405	5.99	60.369	55.673	10% AEP, 2 hour burst, Storm 8			
	Pipe184	0	0	70.053	70.008	10% AEP, 10 min burst, Storm 5			
	Pipe185	0	0	62.303	62.225	10% AEP, 10 min burst, Storm 5			
	Pipe213	0.184	3.48	57.978	57.08	10% AEP, 2 hour burst, Storm 2			
	Pipe220	0.196	3.66	57.082	53.705	10% AEP, 2 hour burst, Storm 2			
	P13854	0.258	3.8	64.999	64.344	10% AEP, 2 hour burst, Storm 3			
	Pipe182	0.287	4.22	64.344	63.204	10% AEP, 2 hour burst, Storm 3			
	Pipe349	0.146	1.75	61.914	61.47	10% AEP, 2 hour burst, Storm 8			
	Pipe186	0.189	2.27	61.47	60.712	10% AEP, 2 hour burst, Storm 8			
	E-B9-CULV3	0	0	60.916	60.006	10% AEP, 10 min burst, Storm 5			
	Pipe122	0.026	0.81	64.585	63.025	10% AEP, 30 min burst, Storm 5			
	P3176	0.118	0.86	68.363	67.363	10% AEP, 15 min burst, Storm 2			
	E-B7-CULV1	0.282	2.4	67.282	65.812	10% AEP, 15 min burst, Storm 6			
	E-B7-CULV3	0.098	1.29	67.718	67.217	10% AEP, 15 min burst, Storm 8			
	Pipe2927	0.087	1.08	71.657	71.342	10% AEP, 10 min burst, Storm 5			
	Pipe178	0.111	0.7	71.012	70.616	10% AEP, 25 min burst, Storm 10			
	P13783	0	0	69.923	69.31	10% AEP, 10 min burst, Storm 5			
	Pipe177	0.031	1.47	69.309	68.1	10% AEP, 1 hour burst, Storm 4			
	Pipe8633	0.194	3.47	48.718	47.582	10% AEP, 2 hour burst, Storm 8			
	Pipe8646	0.29	2.5	52.266	51.124	10% AEP, 2 hour burst, Storm 8			
	Pipe8668	0.158	2.33	56.687	55.609	10% AEP, 2 hour burst, Storm 3			
	CHANNEL DETAILS								
	Name	Max Q	Max V			Due to Storm			
		(cu.m/s)	(m/s)						
	OVERFLOW ROUTE DETAILS								
	Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
	Basin 1	0.011	0	12.141	3	0	32	0	10% AEP, 3 hour burst, Storm 4
	EAST-B10-O	0.015	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 8
	EAST-B1-O	0.012	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 2
	EAST-B6-0	0.009	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 8
	E-B10-01	0	0.042	0.127	0.358	0.03	4.3	0.18	10% AEP, 15 min burst, Storm 5
	E-B10-02	0	0.181	0.12	0.358	0.1	4.3	0.41	10% AEP, 15 min burst, Storm 6
	E-B10-03A	0	0.041	0.3	0.11	0.06	1.32	0.57	10% AEP, 10 min burst, Storm 3
	E-B10-03B	0.05	0.064	0.222	0.358	0.07	4.3	0.67	10% AEP, 15 min burst, Storm 6
	E-B10-04	0	0.017	0.267	0.175	0.02	2.1	0.31	10% AEP, 15 min burst, Storm 6
	E-B10-05	0	0.027	0.592	0.175	0.05	1.4	0.55	10% AEP, 10 min burst, Storm 3
	E-B1-01	0	0.037	0.122	0.106	0.07	1.27	0.79	10% AEP, 10 min burst, Storm 3
	E-B1-02A	0	0.052	0.126	0.148	0.08	1.77	0.73	10% AEP, 15 min burst, Storm 10
	E-B1-02B	0.052	0.057	0.285	0.11	0.09	1.32	0.79	10% AEP, 15 min burst, Storm 5
	E-B1-03A	0	0.189	0.247	0.201	0.17	2.41	0.96	10% AEP, 10 min burst, Storm 3
	E-B1-03B	0.096	0.17	0.246	0.174	0.16	2.09	0.93	10% AEP, 1 hour burst, Storm 1
	E-B1-04	0	0.024	0.244	0.14	0.06	1.12	0.68	10% AEP, 2 hour burst, Storm 3
	E-B1-04-CONNECT	0.022	0.02	19.197	0.128	0	32	0.14	10% AEP, 2 hour burst, Storm 3
	E-B2-01	0	0.125	0.683	0.159	0.2	1.27	1.25	10% AEP, 15 min burst, Storm 7
	E-B2-02	0	0.116	0.392	0.128	0.15	1.53	1.21	10% AEP, 10 min burst, Storm 3
	E-B3-01	0	0.067	0.192	0.137	0.09	1.64	0.77	10% AEP, 10 min burst, Storm 3
	E-B3-02	0	0.132	0.124	0.561	0.04	6.74	0.23	10% AEP, 10 min burst, Storm 9
	E-B4-01	0	0.09	0.059	0.27	0.25	0.29	0.92	10% AEP, 10 min burst, Storm 4
	E-B4-02	0	0.248	0.315	0.286	0.26	2.29	1.08	10% AEP, 10 min burst, Storm 7
	E-B5-01	0	0.113	0.531	0.991	0.13	7.92	0.74	10% AEP, 10 min burst, Storm 5
	E-B5-02	0	0.53	0.405	0.991	0.31	7.92	0.94	10% AEP, 10 min burst, Storm 9
	E-B6-01	0	0.094	0.336	0.399	0.08	4.78	0.66	10% AEP, 15 min burst, Storm 7
	E-B6-02	0	0.051	0.764	0.399	0.09	3.19	0.8	10% AEP, 15 min burst, Storm 8
	E-B6-03	0	0.158	0.153	0.399	0.1	4.78	0.5	10% AEP, 20 min burst, Storm 5
	E-B7-01	0	0.098	0.272	0.208	0.08	1.66	0.36	10% AEP, 15 min burst, Storm 7
	E-B7-02	0	0.025	0.134	0.108	0.05	1.29	0.5	10% AEP, 2 hour burst, Storm 3
	E-B7-03	0	0.06	0.184	0.135	0.09	1.62	0.75	10% AEP, 10 min burst, Storm 3
	E-B7-04	0	0.101	0.327	0.385	0.08	3.08	0.41	10% AEP, 10 min burst, Storm 1
	E-B7-05	0	0.042	0.46	0.385	0.03	3.08	0.31	10% AEP, 10 min burst, Storm 1
	E-B7-06	0.121	0.13	0.542	0.365	0.18	2.92	1.04	10% AEP, 10 min burst, Storm 5
	E-B7-07	0	0.033	0.416	0.395	0.05	3.16	0.41	10% AEP, 2 hour burst, Storm 2
	E-B7-08	0	0.115	0.279	0.146	0.1	1.75	0.69	10% AEP, 10 min burst, Storm 5
	E-B7-09	0	0.113	0.206	0.163	0.07	1.96	0.43	10% AEP, 10 min burst, Storm 7
	E-B7-10A	0	0.054	0.24	0.146	0.06	1.75	0.44	10% AEP, 15 min burst, Storm 5
	E-B7-10B	0.051	0.05	0.351	0.281	0.09	2.24	0.61	10% AEP, 15 min burst, Storm 4
	E-B7-11	0.233	0.227	0.033	0.473	0.2	3.78	0.67	10% AEP, 25 min burst, Storm 8
	E-B7-O1	0.01	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 3
	E-B8-01A	0	0.037	0.248	0.269	0.03	2.15	0.22	10% AEP, 10 min burst, Storm 3
	E-B8-01B	0	0.032	0.479	0.269	0.04	2.15	0.4	10% AEP, 10 min burst, Storm 3
	E-B9-01	0	0.129	0.324	0.147	0.15	1.76	1.07	10% AEP, 10 min burst, Storm 3
	E-B9-02	0	0.059	0.214	0.141	0.07	1.69	0.5	10% AEP, 10 min burst, Storm 3
	E-B9-03	0	0.03	0.326	0.388	0.04	4.66	0.54	10% AEP, 2 hour burst, Storm 3
	E-B9-04	0	0.019	0.232	0.388	0.02	4.66	0.28	10% AEP, 2 hour burst, Storm 3
	E-B9-05	0	0.04	0.554	0.116	0.09	0.93	0.8	10% AEP, 10 min burst, Storm 3
	E-B9-06	0	0.023	0.389	0.105	0.06	0.84	0.58	10% AEP, 10 min burst, Storm 3
	E-B9-07	0	0.072	0.425	0.322	0.1	2.58	0.65	10% AEP, 2 hour burst, Storm 2
	E-B9-08	0	0.024	0.322	0.322	0.03	2.58	0.31	10% AEP, 2 hour burst, Storm 2
	low-.25	0.011	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 5
	low0.5	0.011	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 5
	O22992	0.015	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 8
	O23058	0.015	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 8
	O29065	0.01	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 3
	O29069	0.01	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 3
	O31534	0.01	0	12.141	3	0	32	0	10% AEP, 1 hour burst, Storm 4
	O31545	0.01	0	12.141	3	0	32	0	10% AEP, 1 hour burst, Storm 4
	O31559	0.01	0	12.141	3	0	32	0	10% AEP, 1 hour burst, Storm 4
	O72267	0.009	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 8
	O72283	0.009	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 8
	O9296	0.013	0	12.141	3	0	32	0	10% AEP, 2 hour burst, Storm 5
	OF139	0	0	0	0	0	0	0	
	OF144	0.059	0.082	0.287	0.129	0.11	1.55	0.88	10% AEP, 15 min burst, Storm 6
	OF153	0.061	0.064	0.419	0.148	0.11	1.78	1.12	10% AEP, 10 min burst, Storm 3
	OF159	0.096	0.1	0.166	0.164	0.11	1.97	0.76	10% AEP, 15 min burst, Storm 5
	OF165	0.161	0.173	0.382	0.656	0.18	7.88	1.23	10% AEP, 15 min burst, Storm 6
	OF18	0.054	0.053	19.227	0.158	0	32	0.22	10% AEP, 3 hour burst, Storm 4
	OF22	0	0	1.333	0	0	0	0	
	OF226	0.729	0.729	19.201	0.342	0.02	32	0.09	10% AEP, 10 min burst, Storm 7
	OF244	0.794	0.794	19.201	0.656	0.02	32	0.04	10% AEP, 2 hour burst, Storm 3
	OF262	0	0	10.302	0	0	0	0	
	OF266	0.094	0.094	0.31	0.357	0.12	4.28	0.96	10% AEP, 2 hour burst, Storm 2
	OF293	0	0	19.196	0	0	0	0	
	OF309	0.031	0.029	19.13	0.067	0	32	0.19	10% AEP, 15 min burst, Storm 6
	OF311	0	0	0	0	0	0	0	
	OF315	0	0	1.403	0	0	0	0	
	OF320	0	0	0	0	0	0	0	

	OF32192	0.174	0.174	0.003	0.241	0.18	1.93	0.78	10% AEP, 2 hour burst, Storm 5
	OF32197	0.03	0.03	0.005	0.517	0.07	4.14	0.75	10% AEP, 1 hour burst, Storm 4
	OF322	0	0	1.333	0	0	0	0	
	OF32200	0.174	0.174	0.007	0.518	0.26	4.14	1.52	10% AEP, 2 hour burst, Storm 3
	OF32206	0	0	0	0	0	0	0	
	OF32209	0.193	0.193	17.383	0.02	0.01	32	0.3	10% AEP, 2 hour burst, Storm 8
	OF32213	0.404	0.404	19.179	0.488	0.01	32	0.69	10% AEP, 2 hour burst, Storm 8
	OF32216	0	0	0	0	0	0	0	
	OF32218	0.29	0.29	0.006	0.217	0.34	1.73	1.58	10% AEP, 2 hour burst, Storm 8
	OF32220	0	0	0.005	0	0	0	0	
	OF32222	0.182	0.181	0.004	0.458	0.21	3.67	1.01	10% AEP, 2 hour burst, Storm 8
	OF32227	0	0	0	0	0	0	0	
	OF32229	0.158	0.158	0.004	0.199	0.2	1.59	1	10% AEP, 2 hour burst, Storm 3
	OF324	0	0	0	0	0	0	0	
	OF326	0.282	0.282	0.793	0.402	0.35	3.22	1.7	10% AEP, 2 hour burst, Storm 3
	OF330	0	0	1.345	0	0	0	0	
	OF334	0	0	0	0	0	0	0	
	OF336	0	0	1.393	0	0	0	0	
	OF339	0	0	1.337	0	0	0	0	
	OF341	0	0	0	0	0	0	0	
	OF343	0.163	0.163	0.506	0.296	0.19	3.55	1.29	10% AEP, 15 min burst, Storm 7
	OF345	0	0	0.429	0	0	0	0	
	OF351	0	0	1.347	0	0	0	0	
	OF360	0	0	1.343	0	0	0	0	
	OF363	0	0	0	0	0	0	0	
	OF365	0	0	0	0	0	0	0	
	OF367	0	0	0	0	0	0	0	
	OF369	0	0	0	0	0	0	0	
	OF526	0.19	0.19	0.711	0.189	0.26	1.51	1.42	10% AEP, 2 hour burst, Storm 3
	OF53403	0	0	1.291	0	0	0	0	
	DETENTION BASIN DETAILS								
	Name	Max WL	MaxVol	Max Q	Max Q	Max Q			
				Total	Low Level	High Level			
	EAST-B2	57.55	0	0.055	0.043	0.011			
	EAST-B5	67.1	0	0.174	0.138	0.036			
	EAST-B6	61.4	0	0.405	0.377	0.028			
	EAST-B8	70.77	0	0	0	0			
	EAST-B9	63.3	0	0	0	0			
	EAST-B1	58.88	0	0.196	0.184	0.012			
	EAST-B7	65.66	0	0.288	0.258	0.03			
	EAST-B10	62.36	0	0.189	0.146	0.044			
	Bio-retention	73.1	0	0	0	0			
	EAST-B4	71.34	0	0.111	0.111	0			
	EAST-B3	70.56	0	0.031	0	0.031			
	Run Log for 12546218_AlbanyMotorPark_east run at 03:08:44 on 13/7/2021 using version 2020.036								
	No water upwelling from any pit.								
7-11, E-B5-	Freeboard was less than 0.15m at Pit1296								
	The maximum flow in these overflow routes is unsafe: OF32229, OF32222, OF32220, OF32218, OF32213, OF32200, OF32197, OF32192, OF367, OF365, OF363, OF343, OF341, OF339, OF334, OF326, OF324, OF320, OF311								

Stage 1B (EAST) DRAINS Results

DRAINS results prepared from Version 2020.036

1% AEP

PIT / NODE DETAILS

Name	Max HGL	Max Pond HGL	Max Surface Flow Arriving (cu.m/s)	Max Pond Volume (cu.m)	Min Freeboard (m)	Overflow (cu.m/s)	Constraint
E-B2-02-US	60.5		0				
N57	56.49		0				
N58	56.02		0				
E-B2-01-US	63.5		0				
E-B5-CULV1-HW	68.16		0.761		-0.16	0.406	Headwall height/system capacity
N61643	65.55		0				
N302	64.85		0.176				
DUMMY-SCALE2	10		0				
DUMMY-SCALE1	8		0				
E-B5-01-US	71		0				
E-B5-02-US	72.5		0				
E-B7-CULV2-HW	72.93		0.15		0.57	0	None
E-B7-CULV2-DS	72.21		0				
E-B7-04-US	73		0				
E-B7-05-US	73		0				
E-B9-CULV1-HW	68.19		0.317		0.31	0	None
E-B9-CULV1-DS	66.62		0.125				
E-B9-07-US	73		0				
E-B9-08-US	68.5		0				
E-B9-05-US	71		0				
E-B9-06-US	68		0				
E-B9-CULV2-HW	65.71		0.49		0.29	0	None
E-B9-CULV2-DS	64.21		0.227				
E-B9-03-US	71		0				
E-B9-04-US	67		0				
E-B9-01-US	69.5		0				
E-B9-02-US	65.5		0				
N306	60.42		0				
N297	55.54		1.878				
E-B7-07-US	70.1		0				
N296	62.39		0				
N305	57.19		0				
N304	53.78		0				
N61649	64.45		0				
N298	63.35		1.119				
N367	61.64		0				
N294	60.83		0.33				
E-B9-CULV3-HW	61.52		0.332		0.48	0	None
E-B9-CULV3-DS	60.22		0				
E-B10-01-US	63		0				
E-B10-02-US	63.5		0				
E-B10-03-US	65.5		0				
E-B10-CULV1-HW	64.73		0.074		0.77	0	None
E-B10-CULV1-DS	63.09		0.057				
E-B10-04-US	67		0				
E-B10-05-US	68		0				
E-B6-01-US	66.5		0				
E-B6-02-US	69.5		0				
E-B6-03-US	63.5		0				
E-B7-01-US	69.57		0				
E-B7-02-DS	69.66		0.146				
E-B7-03-DS	70.65		0.078				
E-B7-02-US	70.5		0				
E-B7-03-US	72		0				
E-B7-CULV1-HW	68.83		0.372		0.17	0	None
Pit1448	68.18	68.3	0.267	0.4	0	0	Outlet System
E-B7-CULV1-DS	65.94		0.213				
E-B7-08-US	72		0				
E-B7-09-US	70		0				
E-B7-10-US	69.5		0				
E-B7-11-DS	65.92		0.628				
E-B3-02-US	70.75		0				
E-B3-01-US	72		0				
E-B4-01-US	72		0				
E-B4-02-DS	71.41		0.277				
E-B4-02-US	73		0				
E-B1-01-US	58.5		0				
E-B1-CULV1-DS	59.98		0.156				
E-B1-02-US	60.5		0				
E-B1-03-SPLIT	65.7		0.266				
E-B1-03-US	68.5		0				
E-B1-04-DS	68.51		0.09				
E-B1-04-US	69.5		0				
Pit8	68.57	69.17	0.173	3.5	0.43	0	Inlet Capacity
E-B7-CULV3-DS	67.25		0				
N266	66.99		0.654				
E-B8-01A-US	71.2		0				
E-B8-01B-US	73		0				
N388	55.51		0.056				
N511	67.23		0.107				
N539	51.79		0.876				
Pit1296	72.06	72.16	0.087	0.2	0	0	Outlet System
N61629	69.47		0				
N299	68.23		0				
HW1478	49.6		1.196		-0.1	0.545	Headwall height/system capacity
N59	47.46		0.801				
HW1479	52.97		2.531		0.03	0	None
N38873	51.27		1.1				
HW1480	57.53		0.878		-0.03	0.088	Headwall height/system capacity
N38880	55.7		0.383				

SUB-CATCHMENT DETAILS

Name	Max Flow Q (cu.m/s)	Paved Max Q (cu.m/s)	Grassed Max Q (cu.m/s)	Paved Tc (min)	Grassed Tc (min)	Supp. Tc (min)	Due to Storm
EAST-B2-CAT	0.71	0	-0.013	3.1	7.2	3.51	1% AEP, 10 min burst, Storm 2
E-B5	1.304	0	0	3.17	0	0	1% AEP, 10 min burst, Storm 4
EAST-B5-CAT	0.264	0	0	0	19.2	0	1% AEP, 20 min burst, Storm 7
E-B7-A	0.256	0	0	3.8	0	0	1% AEP, 10 min burst, Storm 4
E-B9-A	0.602	0	0	0	9.96	0	1% AEP, 15 min burst, Storm 5
E-B9-B	0.206	0	0	1.19	2.77	0	1% AEP, 15 min burst, Storm 8
E-B9-C	0.297	0	0	0	4.18	0	1% AEP, 15 min burst, Storm 8
E-B9-D	0.384	0	0	1.65	3.84	1.87	1% AEP, 10 min burst, Storm 4
EAST-B6-CAT	1.694	0	824.713	2.18	5.06	2.47	1% AEP, 15 min burst, Storm 1
EAST-B8-CAT	0.28	0	443.483	1.11	2.58	0	1% AEP, 15 min burst, Storm 8
EAST-B9-CAT	0.035	0	0	0	2.24	0	1% AEP, 10 min burst, Storm 4
EAST-B1-CAT	0.646	0.023	0	2.13	4.96	2.42	1% AEP, 10 min burst, Storm 10
EAST-B7-CAT	0.078	61.47	0	0	7.02	0	1% AEP, 10 min burst, Storm 10
EAST-B10-CAT	1.225	0	0	1.65	3.83	1.87	1% AEP, 15 min burst, Storm 8
E-B10-A	0.122	0.362	60.712	1.07	2.5	1.22	1% AEP, 10 min burst, Storm 4
E-B10-03-CATA	0.095	1108.18	72	1.31	3.04	1.48	1% AEP, 15 min burst, Storm 8
E-B7-02-CAT	0.155	0.011	57.552	0	6.08	0	1% AEP, 15 min burst, Storm 1
E-B7-03-CAT	0.133	0	63.5	2.17	5.04	2.46	1% AEP, 10 min burst, Storm 9
E-B7-B-CAT	0.298	0.113	0.121	0	12.03	0	1% AEP, 15 min burst, Storm 7
E-B7-C	0.455	73	0	2.5	5.81	2.83	1% AEP, 15 min burst, Storm 9
E-B7-10-CATB	0.041	10	0	2.81	6.53	3.18	1% AEP, 15 min burst, Storm 1
E-B7-11-CAT	0.071	0	0	0	4.04	0	1% AEP, 15 min burst, Storm 8
E-B4-02-CAT	0.48	0.137	0.023	4.14	0	0	1% AEP, 10 min burst, Storm 4
E-B1-02-CATA	0.256	0	0	1.89	4.4	2.15	1% AEP, 15 min burst, Storm 8
E-B1-03-US-CAT	0.356	0.105	0	2.4	5.58	2.72	1% AEP, 10 min burst, Storm 6
E-B1-04-CAT	0.144	70.769	0.145	0	2.55	0	1% AEP, 10 min burst, Storm 4
E-B7-01-CAT	0.29	56.369	0.054	2.55	5.94	2.89	1% AEP, 10 min burst, Storm 2

	Cat314	0.078	0	0	0	7.02	0	1% AEP, 10 min burst, Storm 10	
	E-B8-02	0.222	0	0.493	0	17.34	0	1% AEP, 20 min burst, Storm 5	
	E-B1-01-CAT	0.093	62.358	71.342	1.64	3.81	1.86	1% AEP, 15 min burst, Storm 8	
	E-B7-10-CATA	0.182	0.174	0	2.57	5.96	2.91	1% AEP, 10 min burst, Storm 2	
	E-B4-01-CAT	0.148	0.101	0.02	1.5	0	0	1% AEP, 10 min burst, Storm 4	
	EAST-B4-CAT	0.05	0	68	3.56	8.26	4.03	1% AEP, 10 min burst, Storm 6	
	EAST-B3-CAT	0.72	0	0.024	2.15	4.99	2.43	1% AEP, 10 min burst, Storm 10	
	PIPE DETAILS								
	Name	Max Q	Max V	Max U/S	Max D/S	Due to Storm			
		(cu.m/s)	(m/s)	HGL (m)	HGL (m)				
	Pipe10	0.241	2.81	57.071	56.494	1% AEP, 1 hour burst, Storm 10			
	P21	0.254	3.13	56.494	56.228	1% AEP, 1 hour burst, Storm 10			
	E-B5-CULV1	0.386	2.43	67.978	67.238	1% AEP, 15 min burst, Storm 6			
	P13826	0.424	3.65	66.388	65.548	1% AEP, 1 hour burst, Storm 7			
	Pipe179	0.464	3.97	65.55	64.847	1% AEP, 1 hour burst, Storm 7			
	DUMMY-SCALE	0	0	10	8	1% AEP, 10 min burst, Storm 5			
	E-B7-CULV2	0.214	3.02	72.734	72.206	1% AEP, 10 min burst, Storm 3			
	E-B9-CULV1	0.29	4.01	67.785	66.619	1% AEP, 30 min burst, Storm 8			
	E-B9-CULV2	0.295	3.38	65.375	64.242	1% AEP, 2 hour burst, Storm 5			
	Pipe283	0.592	4.87	61.018	60.422	1% AEP, 30 min burst, Storm 2			
	Pipe183	0.628	6.51	60.422	55.724	1% AEP, 30 min burst, Storm 2			
	Pipe184	0.024	0.88	70.56	70.103	1% AEP, 2 hour burst, Storm 3			
	Pipe185	0.255	1.9	63.117	62.579	1% AEP, 2 hour burst, Storm 3			
	Pipe213	0.45	4.38	58.124	57.192	1% AEP, 30 min burst, Storm 8			
	Pipe220	0.464	4.52	57.192	53.781	1% AEP, 30 min burst, Storm 8			
	P13854	0.663	5.09	65.212	64.452	1% AEP, 30 min burst, Storm 8			
	Pipe182	0.702	5.38	64.452	63.352	1% AEP, 30 min burst, Storm 8			
	Pipe349	0.496	2.66	62.083	61.644	1% AEP, 30 min burst, Storm 8			
	Pipe186	0.55	3.01	61.644	60.87	1% AEP, 30 min burst, Storm 8			
	E-B9-CULV3	0.249	2.63	61.333	60.258	1% AEP, 2 hour burst, Storm 3			
	Pipe122	0.086	1.51	64.614	63.085	1% AEP, 15 min burst, Storm 1			
	P3176	0.301	1.89	68.741	68.187	1% AEP, 15 min burst, Storm 6			
	E-B7-CULV1	0.479	3.03	67.487	65.942	1% AEP, 15 min burst, Storm 8			
	E-B7-CULV3	0.284	2.02	68.38	67.373	1% AEP, 15 min burst, Storm 1			
	Pipe2927	0.137	1.24	71.973	71.424	1% AEP, 10 min burst, Storm 4			
	Pipe178	0.201	1.26	71.099	70.758	1% AEP, 10 min burst, Storm 7			
	P13783	0.241	2.37	70.108	69.466	1% AEP, 1 hour burst, Storm 2			
	Pipe177	0.282	2.77	69.466	68.233	1% AEP, 1 hour burst, Storm 2			
	Pipe8633	0.374	4.24	48.975	47.655	1% AEP, 1 hour burst, Storm 6			
	Pipe8646	1.207	5.03	52.521	51.272	1% AEP, 1 hour burst, Storm 6			
	Pipe8668	0.362	3.31	57.08	55.702	1% AEP, 2 hour burst, Storm 1			
	CHANNEL DETAILS								
	Name	Max Q	Max V			Due to Storm			
		(cu.m/s)	(m/s)						
	OVERFLOW ROUTE DETAILS								
	Name	Max Q U/S	Max Q D/S	Safe Q	Max D	Max DxV	Max Width	Max V	Due to Storm
	Basin 1	0.012	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 10
	EAST-B10-O	0.018	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	EAST-B1-O	0.014	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	EAST-B6-0	0.012	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 2
	E-B10-01	0	0.15	0.373	0.521	0.06	6.26	0.29	1% AEP, 15 min burst, Storm 9
	E-B10-02	0	0.617	0.352	0.521	0.22	6.26	0.59	1% AEP, 15 min burst, Storm 1
	E-B10-03A	0	0.095	0.885	0.176	0.09	2.11	0.66	1% AEP, 10 min burst, Storm 9
	E-B10-03B	0.161	0.21	0.655	0.521	0.15	6.26	0.87	1% AEP, 15 min burst, Storm 1
	E-B10-04	0	0.059	0.787	0.319	0.06	3.83	0.59	1% AEP, 10 min burst, Storm 9
	E-B10-05	0	0.061	1.746	0.319	0.08	2.56	0.7	1% AEP, 10 min burst, Storm 9
	E-B1-01	0	0.092	0.36	0.144	0.13	1.73	1.04	1% AEP, 10 min burst, Storm 9
	E-B1-02A	0	0.212	0.37	0.244	0.18	2.92	0.97	1% AEP, 15 min burst, Storm 8
	E-B1-02B	0.212	0.233	0.84	0.186	0.21	2.23	1.13	1% AEP, 15 min burst, Storm 1
	E-B1-03A	0	0.352	0.73	0.253	0.26	3.03	1.14	1% AEP, 10 min burst, Storm 6
	E-B1-03B	0.265	0.431	0.726	0.247	0.29	2.96	1.18	1% AEP, 30 min burst, Storm 8
	E-B1-04	0	0.104	0.719	0.23	0.15	1.84	0.91	1% AEP, 15 min burst, Storm 1
	E-B1-04-CONNECT	0.09	0.077	19.197	0.201	0	32	0.24	1% AEP, 15 min burst, Storm 8
	E-B2-01	0	0.338	1.685	0.231	0.37	1.85	1.59	1% AEP, 10 min burst, Storm 2
	E-B2-02	0	0.317	1.157	0.185	0.29	2.22	1.54	1% AEP, 10 min burst, Storm 2
	E-B3-01	0	0.171	0.565	0.249	0.11	2.99	0.5	1% AEP, 15 min burst, Storm 8
	E-B3-02	0.01	0.291	0.367	0.749	0.06	8.99	0.1	1% AEP, 10 min burst, Storm 6
	E-B4-01	0	0.15	0.099	0.405	0.41	0.54	1.02	1% AEP, 10 min burst, Storm 4
	E-B4-02	0	0.436	0.929	0.348	0.36	2.79	1.21	1% AEP, 10 min burst, Storm 4
	E-B5-01	0	0.228	1.566	1.247	0.2	9.97	1.11	1% AEP, 10 min burst, Storm 8
	E-B5-02	0	0.946	1.195	1.247	0.43	9.97	1.04	1% AEP, 10 min burst, Storm 7
	E-B6-01	0	0.32	0.991	0.614	0.18	7.37	0.93	1% AEP, 15 min burst, Storm 8
	E-B6-02	0	0.18	1.569	0.614	0.21	4.91	1.19	1% AEP, 15 min burst, Storm 8
	E-B6-03	0	0.655	0.45	0.614	0.26	7.37	0.76	1% AEP, 15 min burst, Storm 8
	E-B7-01	0.003	0.285	0.801	0.304	0.15	2.43	0.51	1% AEP, 15 min burst, Storm 1
	E-B7-02	0	0.128	0.396	0.195	0.13	2.34	0.83	1% AEP, 15 min burst, Storm 8
	E-B7-03	0	0.127	0.542	0.174	0.14	2.09	0.91	1% AEP, 10 min burst, Storm 6
	E-B7-04	0	0.164	0.964	0.524	0.08	4.19	0.34	1% AEP, 10 min burst, Storm 9
	E-B7-05	0	0.063	1.356	0.524	0.03	4.19	0.19	1% AEP, 10 min burst, Storm 9
	E-B7-06	0.207	0.289	1.599	0.854	0.27	6.83	1.21	1% AEP, 15 min burst, Storm 8
	E-B7-07	0.024	0.192	1.226	0.832	0.14	6.66	0.63	1% AEP, 15 min burst, Storm 6
	E-B7-08	0	0.222	0.821	0.179	0.17	2.14	0.92	1% AEP, 10 min burst, Storm 9
	E-B7-09	0	0.222	0.606	0.203	0.12	2.44	0.59	1% AEP, 15 min burst, Storm 9
	E-B7-10A	0	0.174	0.707	0.226	0.13	2.71	0.61	1% AEP, 15 min burst, Storm 9
	E-B7-10B	0.169	0.193	1.036	0.431	0.19	3.45	0.82	1% AEP, 15 min burst, Storm 8
	E-B7-11	0.592	0.579	0.098	0.691	0.34	5.53	0.8	1% AEP, 15 min burst, Storm 8
	E-B7-O1	0.012	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	E-B8-01A	0	0.113	0.732	0.53	0.06	4.24	0.29	1% AEP, 15 min burst, Storm 8
	E-B8-01B	0	0.087	1.412	0.53	0.09	4.24	0.6	1% AEP, 10 min burst, Storm 9
	E-B9-01	0	0.255	0.955	0.211	0.2	2.53	1.05	1% AEP, 10 min burst, Storm 9
	E-B9-02	0	0.115	0.631	0.211	0.09	2.53	0.51	1% AEP, 10 min burst, Storm 9
	E-B9-03	0	0.163	0.962	0.802	0.14	9.62	0.89	1% AEP, 15 min burst, Storm 8
	E-B9-04	0	0.105	0.685	0.802	0.07	9.62	0.5	1% AEP, 15 min burst, Storm 8
	E-B9-05	0	0.132	1.632	0.203	0.16	1.62	0.83	1% AEP, 15 min burst, Storm 8
	E-B9-06	0	0.073	1.146	0.206	0.09	1.65	0.47	1% AEP, 15 min burst, Storm 9
	E-B9-07	0	0.402	1.254	0.781	0.29	6.25	0.99	1% AEP, 15 min burst, Storm 6
	E-B9-08	0	0.125	0.949	0.781	0.05	6.25	0.27	1% AEP, 10 min burst, Storm 10
	low-.25	0.012	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 7
	low0.5	0.012	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 7
	O22992	0.018	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	O23058	0.018	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	O29065	0.013	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	O29069	0.014	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 8
	O31534	0.013	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 2
	O31545	0.013	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 2
	O31559	0.013	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 2
	O72267	0.012	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 2
	O72283	0.012	0	12.141	3	0	32	0	1% AEP, 30 min burst, Storm 2
	O9296	0.016	0	12.141	3	0	32	0	1% AEP, 1 hour burst, Storm 7
	OF139	0	0	1.7	0	0	0	0	
	OF144	0.131	0.282	0.847	0.201	0.24	2.41	1.19	1% AEP, 15 min burst, Storm 1
	OF153	0.239	0.277	1.234	0.242	0.26	2.9	1.57	1% AEP, 15 min burst, Storm 1
	OF159	0.284	0.319	0.488	0.248	0.22	2.98	0.94	1% AEP, 10 min burst, Storm 2
	OF165	0.592	0.837	1.126	0.972	0.54	11.67	2.2	1% AEP, 15 min burst, Storm 1
	OF18	0.253	0.252	19.227	0.286	0.01	32	0.41	1% AEP, 1 hour burst, Storm 10
	OF22	0	0	1.333	0	0	0	0	
	OF226	0.953	0.953	19.201	0.413	0.03	32	0.1	1% AEP, 10 min burst, Storm 2
	OF244	1.294	1.294	19.201	0.972	0.04	32	0.05	1% AEP, 30 min burst, Storm 3
	OF262	0	0	10.302	0	0	0	0	
	OF266	0.36	0.36	0.915	0.802	0.29	9.62	1.37	1% AEP, 30 min burst, Storm 9
	OF293	0	0	19.196	0	0	0	0	
	OF309	0.089	0.085	19.13	0.206	0	32	0.29	1% AEP, 15 min burst, Storm 9
	OF311	0	0	0.9	0	0	0	0	
	OF315	0	0	1.403	0	0	0	0	
	OF320	0	0	0.644	0	0	0	0	

	OF32192	0.494	0.494	0.029	0.347	0.36	2.78	1.03	1% AEP, 1 hour burst, Storm 7
	OF32197	0.264	0.266	0.047	1.189	0.29	9.51	1.28	1% AEP, 1 hour burst, Storm 2
	OF322	0.03	0.03	1.333	0.347	0.06	4	5.34	1% AEP, 1 hour burst, Storm 7
	OF32200	0.706	0.706	0.069	1.189	0.62	9.51	2.17	1% AEP, 1 hour burst, Storm 2
	OF32206	0.545	0.545	0.644	0.046	0.07	11.31	1.57	1% AEP, 1 hour burst, Storm 6
	OF32209	0.919	0.919	17.383	0.051	0.03	32	0.56	1% AEP, 1 hour burst, Storm 6
	OF32213	1.385	1.385	19.179	1.041	0.04	32	1.12	1% AEP, 30 min burst, Storm 2
	OF32216	0	0	0.744	0	0	0	0	
	OF32218	1.183	1.183	0.062	0.351	0.84	2.81	2.41	1% AEP, 1 hour burst, Storm 6
	OF32220	0.244	0.243	0.049	1.122	0.28	8.98	1.29	1% AEP, 2 hour burst, Storm 3
	OF32222	0.58	0.579	0.04	1.122	0.44	8.98	1.35	1% AEP, 30 min burst, Storm 8
	OF32227	0.088	0.088	0.576	0.022	0.02	7.74	0.82	1% AEP, 2 hour burst, Storm 1
	OF32229	0.45	0.45	0.041	0.292	0.38	2.34	1.32	1% AEP, 2 hour burst, Storm 1
	OF324	0.045	0.039	0.576	0.328	0.01	31.6	0.66	1% AEP, 30 min burst, Storm 8
	OF326	1.224	1.224	1.533	0.614	0.87	4.91	2.48	1% AEP, 9 hour burst, Storm 10
	OF330	0.497	0.497	1.345	0.352	0.17	4	3.21	1% AEP, 9 hour burst, Storm 10
	OF334	0.759	0.759	1.115	0.043	0.11	10.95	2.9	1% AEP, 30 min burst, Storm 2
	OF336	0.406	0.406	1.393	0.228	0.14	4	2.31	1% AEP, 15 min burst, Storm 6
	OF339	0	0	1.337	0	0	0	0	
	OF341	0	0	1.559	0	0	0	0	
	OF343	0.499	0.499	1.491	0.655	0.39	7.86	1.87	1% AEP, 15 min burst, Storm 1
	OF345	0.255	0.255	1.266	0.609	0.26	7.31	1.58	1% AEP, 2 hour burst, Storm 3
	OF351	0	0	1.347	0	0	0	0	
	OF360	0	0	1.343	0	0	0	0	
	OF363	0	0	0.766	0	0	0	0	
	OF365	0	0	1.125	0	0	0	0	
	OF367	0	0	0.582	0	0	0	0	
	OF369	0	0	0.531	0	0	0	0	
	OF526	0.484	0.484	1.639	0.28	0.45	2.24	1.66	1% AEP, 30 min burst, Storm 2
	OF53403	0	0	1.291	0	0	0	0	
	DETENTION BASIN DETAILS								
	Name	Max WL	MaxVol	Max Q	Max Q	Max Q			
				Total	Low Level	High Level			
	EAST-B2	57.65	0	0.254	0.241	0.012			
	EAST-B5	67.23	0	0.494	0.424	0.07			
	EAST-B6	61.61	0	1.387	0.592	0.794			
	EAST-B8	71.04	0	0.024	0.024	0			
	EAST-B9	63.65	0	0.255	0.255	0			
	EAST-B1	59.06	0	0.464	0.45	0.014			
	EAST-B7	65.97	0	1.199	0.663	0.535			
	EAST-B10	62.52	0	0.595	0.496	0.098			
	Bio-retention	73.19	0	0	0	0			
	EAST-B4	71.41	0	0.201	0.201	0			
	EAST-B3	70.75	0	0.281	0.241	0.04			
	Run Log for 12546218_AlbanyMotorPark_east run at 03:50:40 on 13/7/2021 using version 2020.036								
, E-B10-03	The maximum water level in these storages exceeds the maximum elevation you specified: EAST-B10, EAST-B6.								
	DRAINS has extrapolated the Elevation vs Storage table to a higher Elevation. Please provide accurate values for higher elevations.								
	No water upwelling from any pit.								
	Freeboard was less than 0.15m at Pit1448, Pit1296								
	The maximum pond depth in these sag pits is unsafe: Pit1296								
	Peak water levels spilled in these Overflow Routes: OF324 spilled. You cannot rely on these results. You really MUST specify data for higher levels for these cross sections.								
	IGNORE THESE WARNINGS AT YOUR OWN PERIL.\cf1								

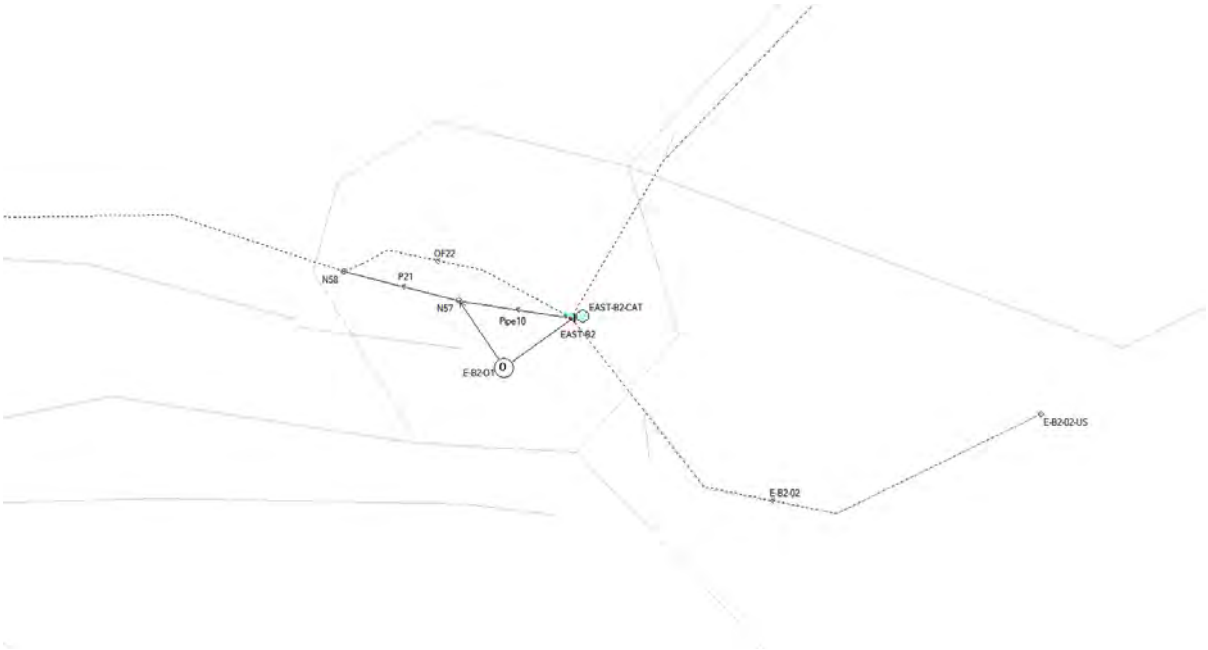

Figure G.1 Typical basin set-up

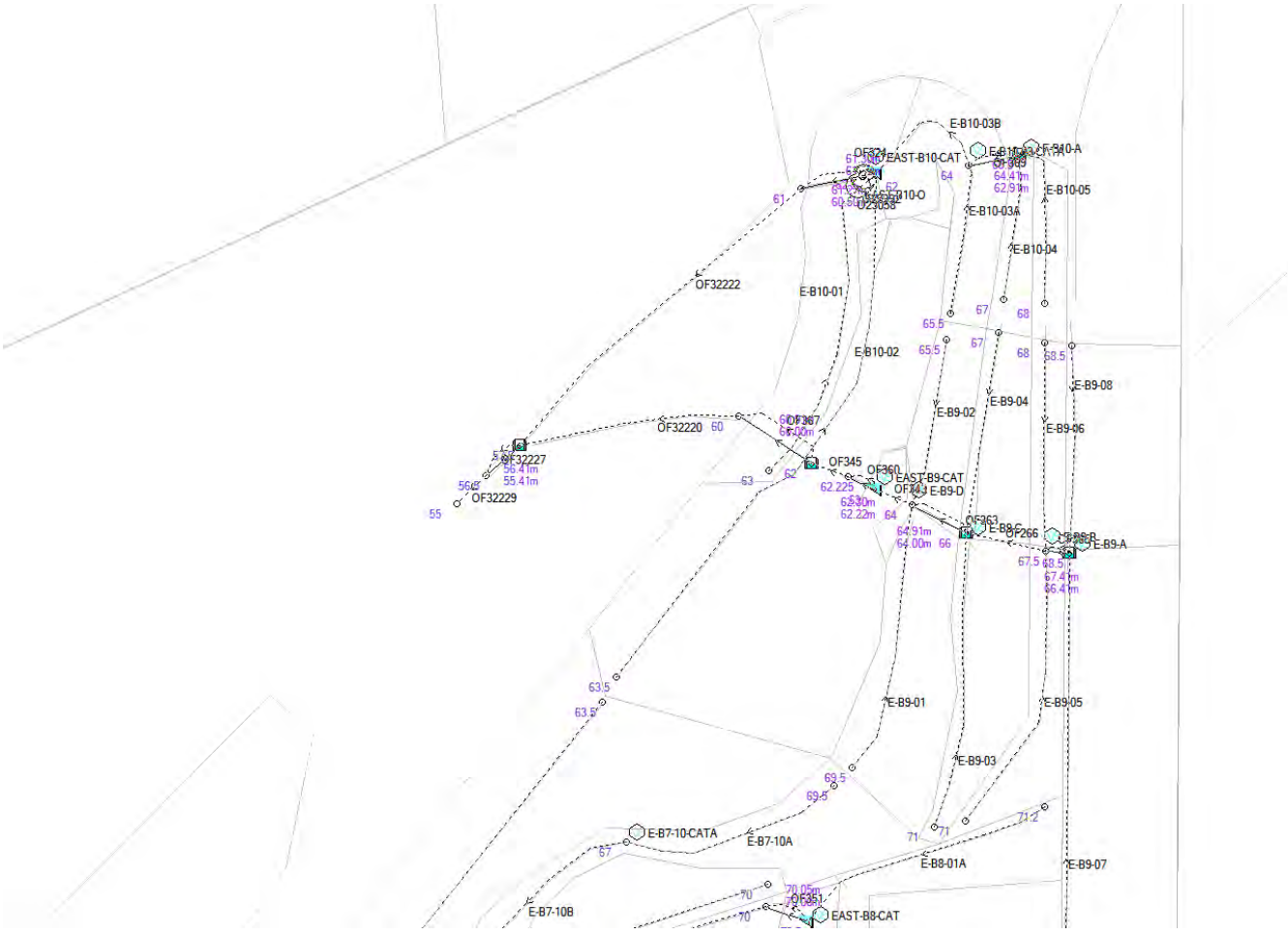

Figure G.2 East-1 schematic diagram

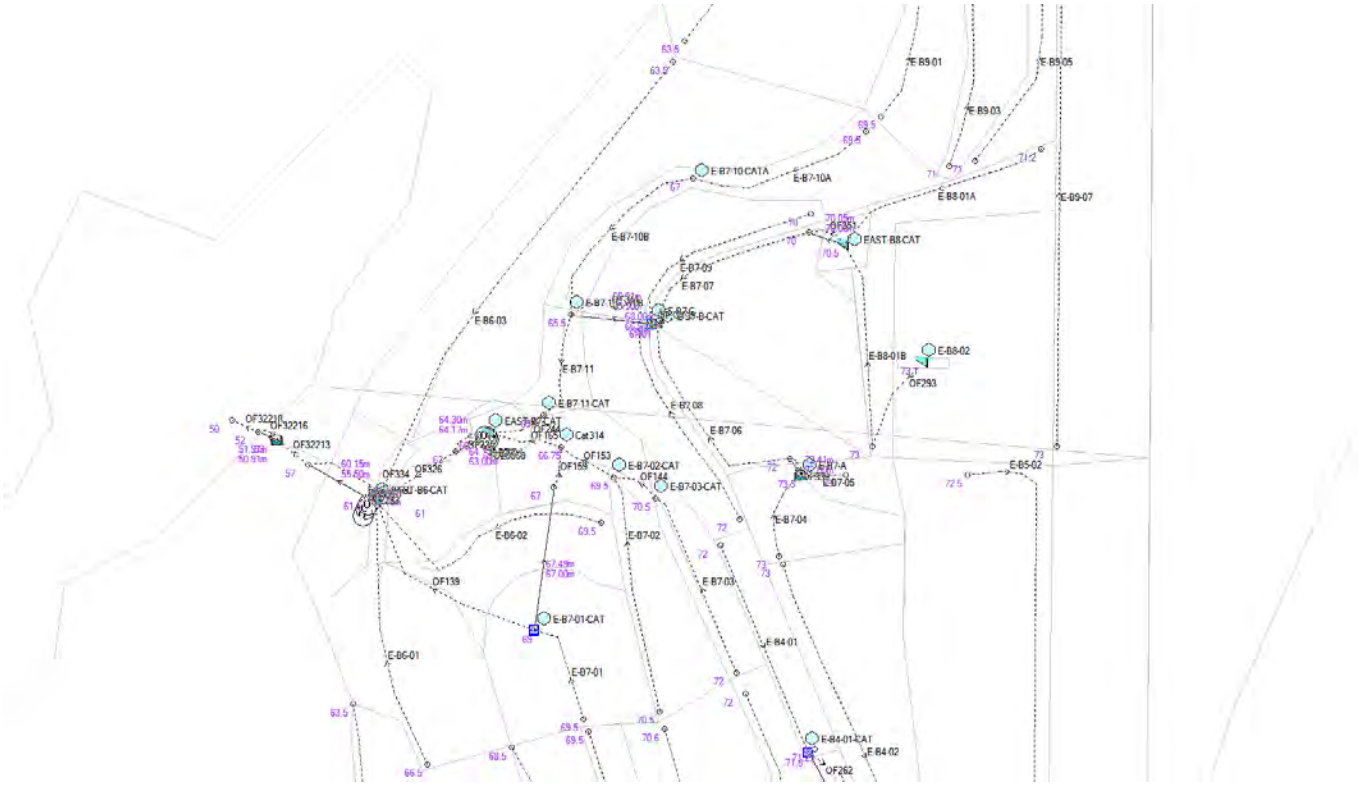

Figure G.3 East-2 schematic diagram

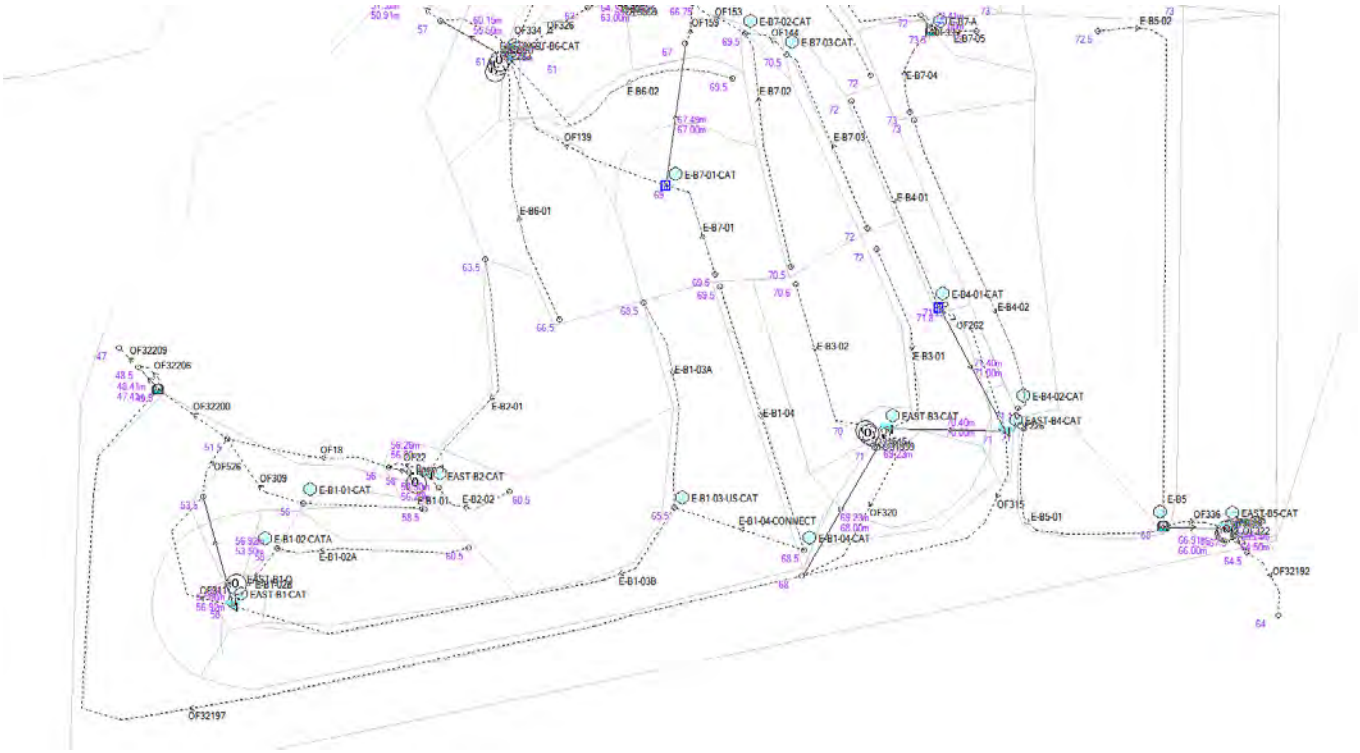

Figure G.4 East-3 and East-4 schematic diagram

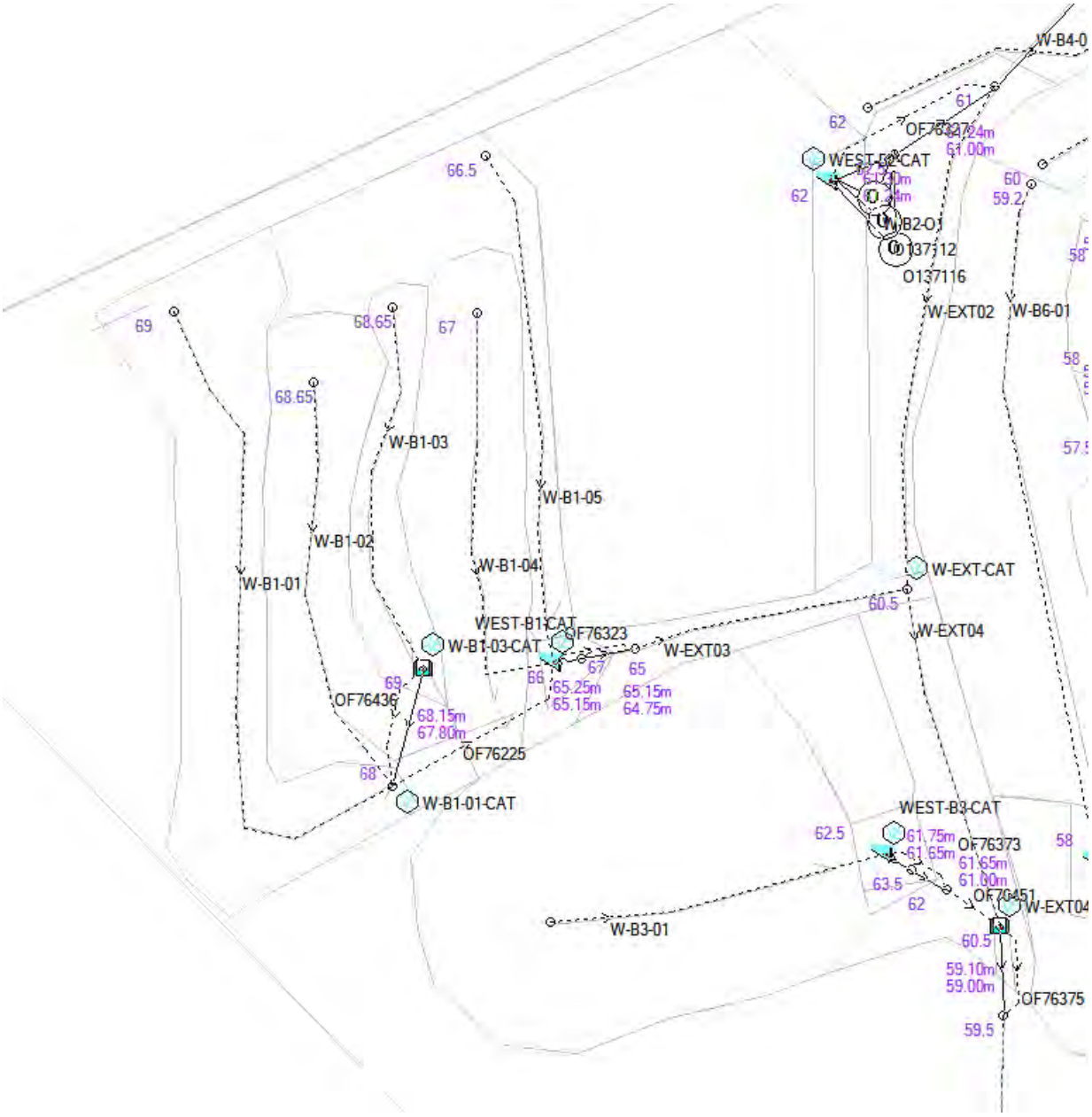

Figure G.5 West-3 schematic diagram

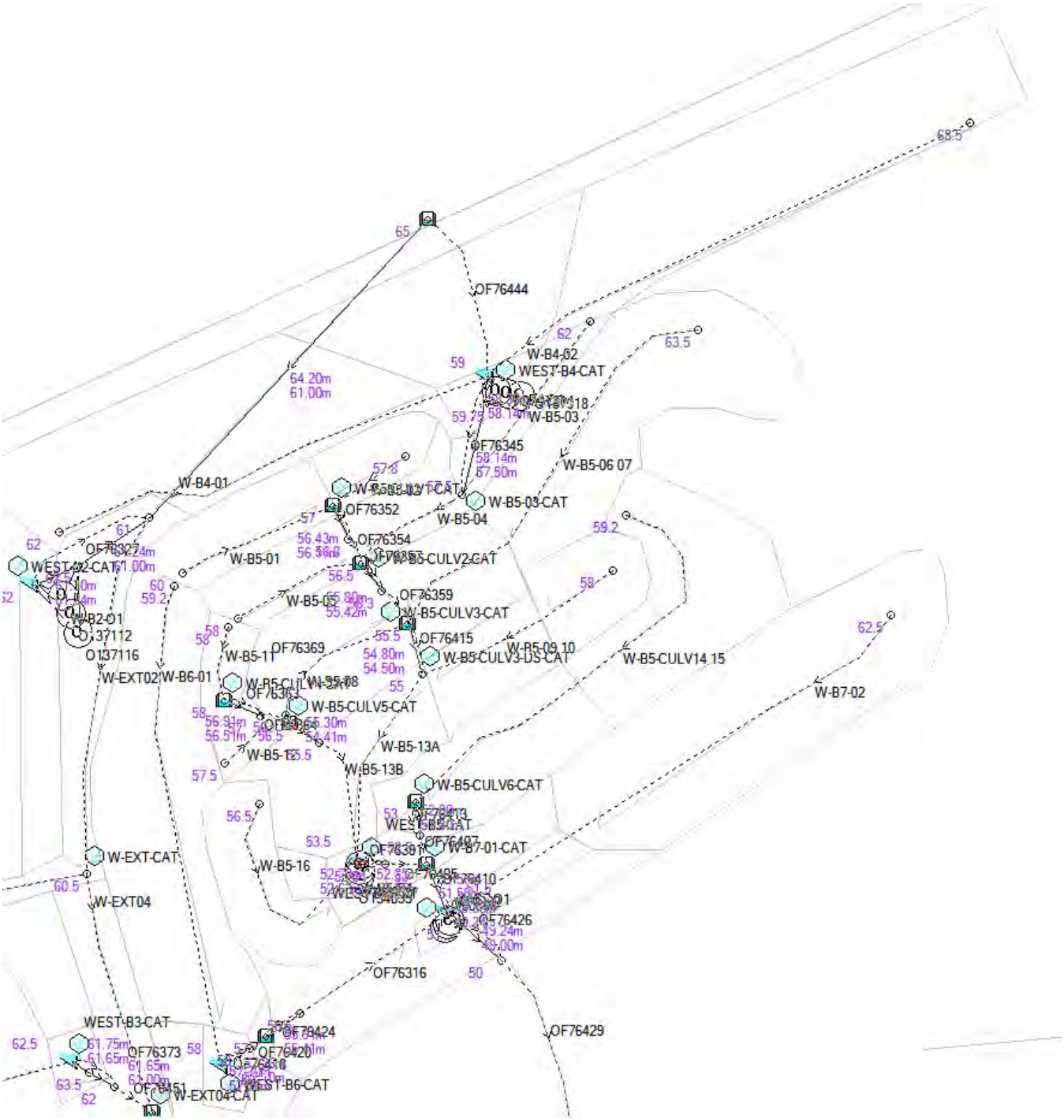

Figure G.6 West-2 schematic diagram

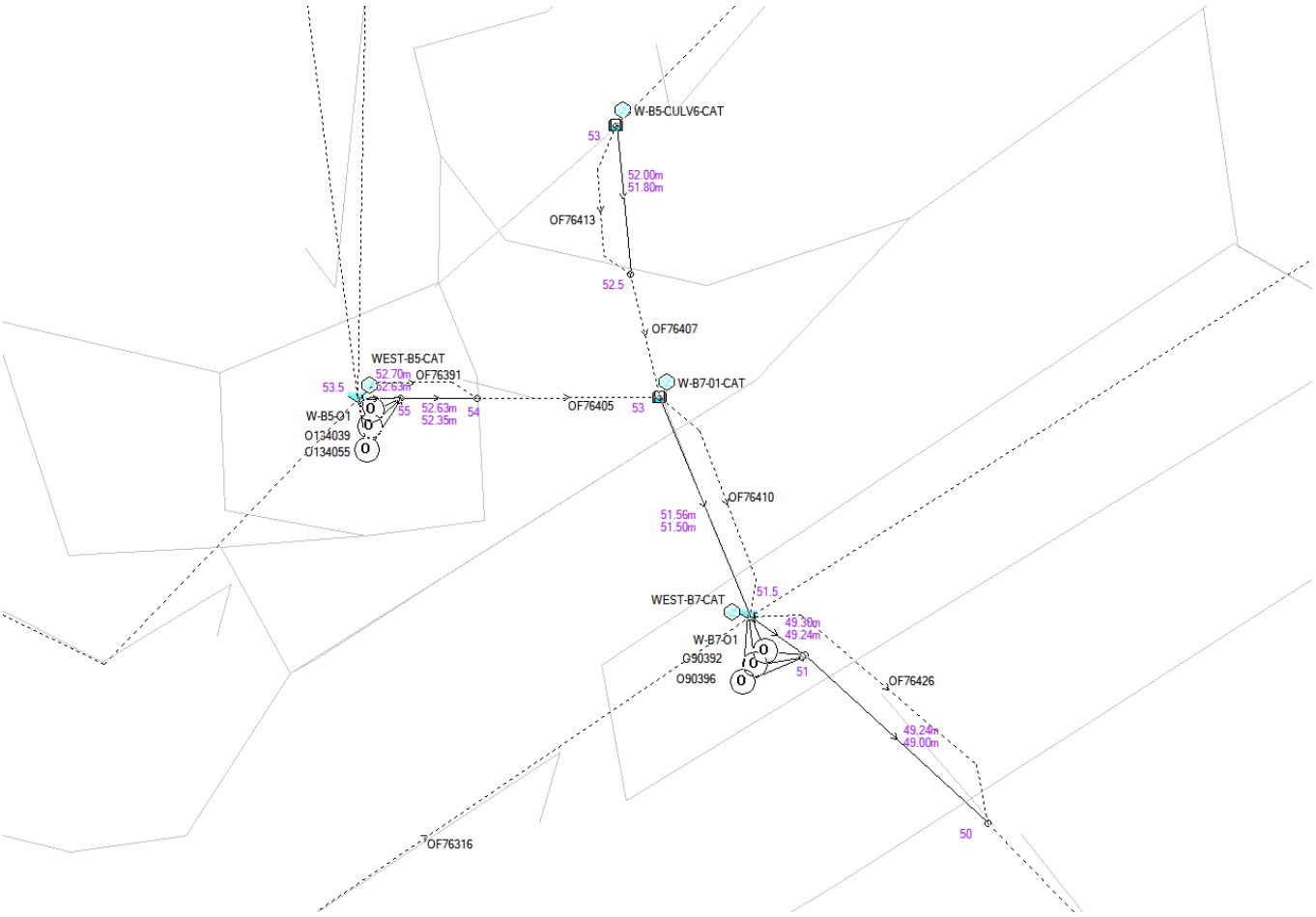

Figure G.7 West-B7 schematic diagram

Appendix H

Site and soil evaluation for onsite wastewater management

Albany Motorsport Park – Development Application

Site and Soil Evaluation for Onsite Wastewater Management

City of Albany

19 August 2021

→ The Power of Commitment

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Executive summary

The City of Albany (CoA) has engaged GHD to prepare a Site and Soil Evaluation for Onsite Wastewater Management report for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure 1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

Due to the scale and nature of the proposed development, the works have been broken down into two key stages which comprise the following:

– Stage 1:
  - Stage 1A: Construction of motocross track and 4WD driver training, ATV area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

This Site and Soil Evaluation for Onsite Wastewater Management report has been developed as per the Department of Health, Western Australia (DOHWA) template report based on the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*, Government Sewerage Policy 2019, State Planning Policy 2.9, AS/NZS 1547 and other supporting documentation (DOHWA, 2021).

The purpose of this Site and Soil Evaluation (SSE) report is to outline the site, soil and groundwater conditions at the proposed AMP site with regarding to suitability for onsite effluent disposal during operation of the AMP. This report provides supporting information for the Development Application for the Stage 1 of the Site.

Based on an assessment of the soil physical and chemical results for the six test pit locations, it is recommended that the LAAs for the Race Track Precinct and Motocross Precinct are located at TP01 and TP06, respectively. The sizing for a wastewater treatment system and LAA has been developed in this SSE report for Stage 1A in the Motocross Precinct only.

The proposed clubhouse within the Motocross Precinct will be constructed in Stage 1A of the development. It is anticipated that this will be an unlicenced facility (15 L/ person/ day) however provision has been made for anticipated wastewater volumes for a licenced facility (35 L/ person/ day), to allow for possible increased loading at the site if it were to become a licenced facility.

The Motocross Precinct clubhouse is expected to have intermittent use throughout the Motocross season and on a weekly basis, with up to 300 patrons on Sunday or Saturday followed by minimal usage during the week and off-season downtime. Therefore, for the purpose of calculating anticipated wastewater volumes it is assumed that there is an average of 100 people/ day.

In order to accommodate spikes in wastewater volumes on event days when there is up to 300 patrons using the Motocross Precinct clubhouse facilities, it is proposed to install a 15,000 L holding tank, to balance storage over the course of a typical week.

The results of a water balance for the Motocross Precinct, for an average of 100 persons/day, indicate that 1,100 m^2 will be required for the sub-soil irrigation area. There is adequate area of land available within the vicinity of TP01 to accommodate the site of the required LAA.

As per the requirements of the Department of Water *WQPN 100* (DoW, 2007) and the *Government Sewerage Policy* (DPLH, 2019) a ‘Secondary’ wastewater treatment plant, with engineering certification to meet effluent quality of Biological Oxygen Demand (BOD) < 20 mg/L; Total Suspended Solids (TSS) < 30 mg/L; Total Nitrogen (TN) < 10 mg/L; Total Phosphorus (TP) < 1 mg/L; and *Escherichia coli* < 10 cfu/100mL is required in a Priority 2 PDWSA.

It is recommended that a DOHWA approved ‘Secondary’ treatment system, certified to AS1546.3:2008, is selected and installed for the Motocross Precinct during Stage 1A of development.

At time of writing, an onsite effluent disposal system was not proposed to be installed in the Race Track Precinct. All liquid waste from transportable buildings, toilets and washdown facilities is proposed to be removed offsite, as required, by an approved contractor. If onsite effluent disposal is proposed in the future is it expected a similar system, with holding tank, will be utilised to manage spikes in wastewater volumes for events and off-season downtime.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.2 and the assumptions and qualifications contained throughout the Report.

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Appendices

Appendix A	Figures
Appendix B	Water balance
Appendix C	GHD Pty Ltd Professional Indemnity Insurance Certificate
Appendix D	Albany Motorsport Park Development - Site Investigation Report 4626/1 (Great Southern Geotechnics, 2021)
Appendix E	Laboratory results
Appendix F	Aquarius Wastewater Systems Pty Ltd

1. Introduction

1.1 Background

The City of Albany (CoA) has engaged GHD to prepare a Site and Soil Evaluation for Onsite Wastewater Management report for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure 1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

The Great Southern Motorplex Group Inc. (GSMG), the Proponent, in partnership with the City of Albany, intend to develop the site as a regional motorsport facility. In October 2018, the City of Albany Council resolved to purchase the site and settlement of the land purchase was concluded in 2019. Once constructed, the AMP will be operated and managed by Albany Motorsport Venue Incorporated (AMV Inc.).

The proposed AMP forms part of the CoA's strategy to expand upon its existing motorsports facilities within the greater Albany area. The AMP is to be the largest facility of its kind in Western Australia and will support the local economy.

1.2 Purpose of this report

This Site and Soil Evaluation for Onsite Wastewater Management report has been developed as per the Department of Health, Western Australia (DOHWA) template report based on the *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*, Government Sewerage Policy 2019, State Planning Policy 2.9, AS/NZS 1547 and other supporting documentation (DOHWA, 2021).

The purpose of this Site and Soil Evaluation (SSE) report is to outline the site, soil and groundwater conditions at the proposed AMP site with regarding to suitability for onsite effluent disposal during operation of the AMP. This report provides supporting information for the Development Application for the Stage 1 of the Site.

1.3 Evaluator's qualifications, experience and professional indemnity

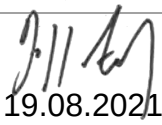
The SSE has been undertaken by Dr Jeff Foley who is a Chemical Engineer with 20 years' technical experience specialising in the areas of wastewater treatment and recycling and integrated water management. His involvement in water cycle projects has ranged from policy and planning, concept design and process modelling, through to detailed design, construction, commissioning and process optimisation.

GHD's site evaluation has been supported in the field by Great Southern Geotechnics (GSG), who specialise in high-quality testing of construction materials and consultancy services to the civil construction, agriculture, environmental, mining and resources industries across WA's Great Southern region. GSG operates an independent NATA Accredited Construction Materials Testing Laboratory, in compliance with AS ISO/IEC 17025 and ISO 9001.

Dr Foley is suitably qualified to provide interpretation of site, soil and climate conditions, undertake water balances, selection and design of appropriate wastewater treatment systems, disposal and reuse options. A summary of the Dr Foley's site evaluator details has been provided in Table 1 and a copy of his CV and qualifications can be provided on request.

A copy of GHD's Professional Indemnity Insurance certificate is included in Appendix C.

Table 1 Site Evaluator Details

Site evaluator details	
Name Company	Dr Jeff Foley, Technical Director – Wastewater process engineering GHD Pty Ltd
Phone Email	(08) 9840 5101 Jeff.Foley@ghd.com
Qualification Knowledge, skills and practical experience	MIEAust, BE(Chem) (Hons I), BA, PhD (UQ) – *Life cycle assessment of wastewater treatment systems* Employed as a wastewater process designer (inc. on-site systems) by GHD 2001 – 2021.
Date of site assessment	16/08/2021
Signature Date	 19.08.2021

1.4 Scope and limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Site development description

The AMP is proposed to be developed at Lot 5780 Down Road South, Drome which is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. The AMP comprises 141.7 ha (including 0.2 ha for crossovers) in the eastern portion of the Site. Two areas within Lot 5780 are excluded from the AMP development and include 49.47 ha at the western end of the Site which is covered with native vegetation and a dam area (1.37 ha) on the northern boundary which is subleased to Plantation Energy.

The Site is zoned as 'Special Use – SU26' under Local Planning Scheme No. 1, Scheme Amendment No. 35.

At full development, the proposed AMP will consist of:

- Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide* (CAMS, 2012) and Motorcycling Australia (MA) *Track Guidelines* (MA, 2011)
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing)
- A motocross circuit designed and constructed in association with MA guidelines.
- An off-road four-wheel drive (4WD) and all-terrain vehicle (ATV) training area.
- Associated buildings and infrastructure.

2.1 Staging of the development

Due to the scale and nature of the proposed development, the works have been broken down into two key stages which comprise the following:

- Stage 1:
  - Stage 1A: Construction of motocross track and 4WD driver training, ATV area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
- Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

A Master Plan, which illustrates the various aspects of the Site and staging areas, has been developed by the GSMG and CoA to support the Development Application for the AMP (Figure 2, Appendix A).

2.2 Anticipated wastewater volumes

The proposed clubhouse within the Motocross Precinct will be constructed in Stage 1A of the development. It is anticipated that this will initially be an unlicenced facility (15 L/ person/ day) however provision has been made for anticipated wastewater volumes for a licenced facility (35 L/ person/ day), to allow for possible increased loading at the site if it were to become a licenced facility.

The Motocross Precinct clubhouse is expected to have intermittent use throughout the Motocross season (approx. March to October) and on a weekly basis, with up to 300 patrons on Sunday or Saturday followed by minimal usage (max. 20 persons per day) during the week and off-season downtime. Therefore, for the purpose of calculating anticipated wastewater volumes (Table 2) it is assumed that there is an average of 100 people/ day (Appendix B).

In order to accommodate spikes in wastewater volumes on event days when there is up to 300 patrons using the Motocross Precinct clubhouse facilities, it is proposed to install a 15,000 L holding tank, to balance out wastewater flows over the course of a typical week. The holding tank will also help store effluent during the off-season period.

At this stage, an onsite effluent disposal system is not proposed to be installed in the Race Track Precinct. All liquid waste from transportable buildings, toilets and washdown facilities is proposed to be removed offsite, as required, by an approved contractor. If onsite effluent disposal is proposed in the future is it expected a similar system, with holding tank, will be utilised to manage spikes in wastewater volumes for events and off-season downtime.

Table 2 Anticipated wastewater volumes

Type	Input volume	Load per person	Daily flow (L/day)
Stage 1A – Motocross Precinct			
Permanent building (5 x sinks, 4 x toilet pans, urinal)	Up to 300 persons (average 100 persons/day)	35 L/person/day	3,500 L/day (average)
Transportable toilets	One permanent block and additional transportables for special events	35 L/person/day	Liquid waste to be removed offsite by an approved contractor, as required
Washdown area	Variable	-	
Total			**3,500 L/day (average)**
Stage 1B – Racetrack Precinct			
Transportable building	500 persons	35 L/person/day	Liquid waste to be removed offsite by an approved contractor, as required
Transportable toilets	Special events	35 L/person/day	
Washdown area	Variable	-	
Total			

2.3 Site development description

The AMP site development description is outlined in Table 3.

Table 3 Description of the development

Development characteristic	Description		
Site address	Lot 5780 (No. 54) Down Road South, Drome		
Owner/ developer	City of Albany		
Proponent	Great Southern Motorplex Group (GSMG)		
Postal address	PO Box 484, ALBANY WA 6331		
Contact for SSE	Ph: 9840 5101	Mob: 0410 541 971	Email: jeff.foley@ghd.com
Date of field work	25 June 2021		
Local Government	City of Albany		
Zoning	Special Use		
Lot size	192.34 ha		
Proposal	Albany Motorsport Park		
Water supply	Bore and rainwater		
Availability of sewer	Unavailable		
Development located within:	Public drinking water source area: Yes – Priority 2 PDWSA	Sewage sensitive areas Yes – Sewerage Category (f) Within 1 km of significant wetlands	
Anticipated wastewater volume:	Sewage (L): Motocross Precinct 3,500 L/day (average)	Trade waste (L): Zero	

3. Site and soil assessment

3.1 Site assessment

GHD have undertaken a number of site walkovers for the AMP site from 2018 to 2021 and are very familiar with the existing site conditions. In addition, an intrusive field investigation was undertaken, by Great Southern Geotechnics, on 25 June 2021. This investigation involved excavating six test pits to a depth of 2500 mm below ground level (bgl), using a mini excavator with a 300 mm auger. Soil types, profiles and groundwater levels were then visually assessed and recorded onsite at time of site investigation, as per the DOHWA (2021) SSE template guidelines (Great Southern Geotechnics, 2021).

The findings of the desktop and field assessment, level of constraint and proposed mitigation measures, for the proposed Motocross Precinct and Race Track Precinct onsite effluent disposal locations, have been summarised in Table 4.

Table 4 Key site characteristics, level of constraint and proposed mitigation measures for the proposed Motocross Precinct and Race Track Precinct effluent disposal areas

<table>
<tr><th>Site characteristics</th><th>Investigations and reporting</th><th>Level of constraint</th><th>Mitigation measures</th></tr>
<tr><td>Climate</td><td>Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station that has mean daily evaporation data (1968 to 2012) is the Albany Airport Comparison weather station (Site number 9741) (BoM, 2021).
Mean monthly rainfall levels at the Albany Airport Comparison weather station (BoM, 2021) and pan evaporation data (DPIRD, 1987) are presented below. This shows that mean monthly evaporation exceeds mean monthly rainfall for seven months of the year, from November to April.
<table>
<tr><th>Month</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>Mean Rainfall (mm)</td><td>23.6</td><td>22.3</td><td>33.6</td><td>61.3</td><td>89.8</td><td>108.0</td><td>119.3</td><td>106.3</td><td>88.5</td><td>70.8</td><td>47.0</td><td>27.8</td></tr>
<tr><td>Evap. (mm)</td><td>220</td><td>171</td><td>150</td><td>91</td><td>63</td><td>47</td><td>49</td><td>67</td><td>84</td><td>106</td><td>150</td><td>199</td></tr>
<tr><td>Evap. Exceeds Rainfall</td><td>Yes</td><td>Yes</td><td>Yes</td><td>Yes</td><td>No</td><td>No</td><td>No</td><td>No</td><td>No</td><td>Yes</td><td>Yes</td><td>Yes</td></tr>
</table>
</td><td>High</td><td>Divert stormwater from upslope around sub-soil irrigation area</td></tr>
<tr><td>Exposure</td><td>The proposed Land Application Areas (LAA) within the Race Track and Motocross Precincts have a high exposure to sun, with no shade cover and good ventilation.</td><td>Nil to Low</td><td>Not required</td></tr>
</table>

Site characteristics	Investigations and reporting	Level of constraint	Mitigation measures
Vegetation	The majority of the Site has been previously cleared for agriculture with isolated stands of trees (112.9 ha). The proposed Land Application Area (LAA) is open grassland. Refer to site photographs in the Great Southern Geotechnics (2021) Site Investigation report (Appendix D).	Nil to Low	Maintain grassed area within the LAA
Landform and drainage	The Site is mapped as the following Department of Primary Industries and Regional Development (DPIRD) landscape mapping units (Figure 3, Appendix A): TP01-TP03 – 242KgDMc Sands on laterite on elongate crests. TP04-TP05 – 242ReDMc Sands on laterite on elongate crests. TP06 – Broad valleys in sedimentary in sedimentary rocks; 30 m relief, smooth slopes. Deep sands and iron podzols on slopes.	Nil to Low	Not required
Slope	Slope of land within the site investigation areas for the Race Track Precinct and Motocross Precinct is approximately 6% (Figure 4, Appendix A).	Nil to Low	Diversion of stormwater from upslope around sub-soil irrigation area proposed
Fill (imported)	No imported fill was encountered during the site investigation	Nil to Low	Not required
Surface gravel and rock outcrops	During the Site Investigation, the soil profile (to 2500 mm blg) was generally found to have Topsoil over Sandy GRAVEL over Sandy CLAY. No rock outcrops were observed within the test pit location areas and gravel soils had approximately 10% coarse fragments (Great Southern Geotechnics, 2021)	Nil to Low	Not required
Erosion potential	The water erosion risk mapped by DPIRD indicates that for test pit locations TP01 – TP05 "*<3% of map unit has a high to extreme water erosion risk*". TP06 is mapped as "*3-10% of map unit has a high to extreme water erosion risk*" (Figure 5, Appendix A). The test pit locations within the Site are currently grassed and considered likely to be Nil or low if sub-soil irrigation is installed and grassed surface is maintained. Refer to photos in the Site Investigation report (Appendix D).	Nil to Low	Maintain as grassed area and divert stormwater from upslope around sub-soil irrigation area to maintain Nil or Low risk rating
Separation from groundwater	During the Site Investigation, undertaken in late June (Appendix D), ground water was not intercepted at 2500 mm bgl at any of the six test pit locations (Figure 4, Appendix A). These locations meet the vertical separation of greater than 2 m separation to groundwater in PDWSA.	Nil to Low	Not required
Public Drinking Water Source Area (PDWSA) and Sewage Sensitive Area (SSA)	The Site is located in a Priority 2 PDWSA – Marbellup Brook Catchment Area and SSA (<1 km from conservation category wetland) (Figure 4, Appendix A).	High	Maintain >2 m vertical separation to groundwater

Site characteristics	Investigations and reporting	Level of constraint	Mitigation measures
Surface waters and separation from water resources	All sub-soil irrigation areas will be located >100 m to Protected Exclusion Area and Marbelup Flats (Conservation Class wetland) (Figure 3, Appendix A).	Nil to Low	Not required
Rainfall run-off and seepage	The test pit location areas, in both the Race Track Precinct and Motocross Precinct, are located on waxing upperslope (UX) (National Committee on Soil and Terrain, 2009). No evidence of evidence of water pooling on the surface or seepage was observed during the Site Investigation (Great Southern Geotechnics, 2021) or during site walkovers undertaken by GHD.	Nil to Low	Diversion of stormwater from upslope around sub-soil irrigation area proposed
Flood potential	The flood erosion risk mapped by DPIRD indicates that test pit locations TP01 – TP05 that "*<3% of map unit has a moderate to high flood risk*". TP06 is mapped as "*3-10% of map unit has a moderate to high flood risk*" (Figure 9, Appendix A).	Nil to Low	Not required
Horizontal setback distances	All sub-soil irrigation areas will be setback >100 m to site boundaries, Protected Exclusion Area and Marbelup Flats (Conservation Class wetland) (Figure 3, Appendix A).	Nil to Low	Not required
Available Land Application Area (LAA)	Sufficient land is available within the Race Track and Motocross Precinct area for sub-soil irrigation of wastewater.	Nil to Low	Not required

3.2 Soil assessment

During the Site Investigation, undertaken by Great Southern Geotechnics, three test pits were excavated in each of the Motocross Track Area and Race Track Area. Table 5 includes a summary of the soil physical and chemical characteristics (Appendix E) for SSE at the six test pit locations.

Table 5 Summary of soil physical and chemical characteristics for SSE of the AMP site

Location	Layer depth (mm)	Sample depth (mm)	Soil strata	Depth to GW	Coarse fragments (%)	Soil colour & mottling	Soil field texture	Soil structure	Indicative soil permeability (m/d) (Ksa^{-1})	Design loading rate (DLR) (mm/d) Trenches and beds			pH	EC (dS/m)	Sodicity (ESP) (%)	Phosphate Sorption Capacity (mg P sorbed/kg)
										Primary treated effluent		Secondary treated effluent				
										Conservative rate	Maximum rate					
Race Track Precinct																
TP01	0-180		(Topsoil) SAND with silt	Not intercepted	Roots and root fibres	Dark grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	-	-	-	-
TP01	180-490		Sandy GRAVEL		Contains approximately 10% Cobbles and Boulders in excess of 250 mm diameter	Brown	Gravel and sand - Fine to coarse, sub-rounded to sub-angular, (F:20% / M:20% / C:15%)	Structureless	>3.0	20	35	50	-	-	-	-
TP01	550-2500	900-1100	Sandy CLAY		NA	Brown/red mottled Light brown/orange (40%)	Light Clay - Low to medium plasticity	Massive	<0.06	NA	NA	8	6.1	0.022	5.8	688
TP02	0-140		(Topsoil) SAND with silt	Not intercepted	Roots and root fibres	Dark grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	-	-	-	-
TP02	140-400		Sandy GRAVEL		Contains approximately 10% Cobbles and Boulders in excess of 400 mm diameter	Brown	Gravel and sand - Moderately cemented - Fine to coarse, sub-rounded to sub-angular, (F:20% / M:20% / C:15%)	Structureless	>3.0	20	35	50	-	-	-	-
TP02	400-1400	500-900	Sandy CLAY		NA	Light brown	Low to medium plasticity	Massive	<0.06	NA	NA	8	6.1	0.025	4.8	1650
TP02	1400-2500		Sandy CLAY		NA	Brown/red mottled Light brown/orange (40%)	Low to medium plasticity	Massive	<0.06	NA	NA	8	-	-	-	-
TP03	0-250		(Topsoil) SAND with silt	Not intercepted	Roots and root fibres	Dark grey to grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	-	-	-	-
TP03	250-830	300-600	Sandy GRAVEL		Contains approximately 10% Cobbles and Boulders in excess of 400 mm diameter	Brown	Gravel and sand - Fine to medium, sub-rounded to sub-angular, (F:30% / M:30%)	Structureless	>3.0	20	35	50	5.7	0.028	5.7	3660
TP03	830-1600		Sandy CLAY		NA	Light brown	Low to medium plasticity	Massive	<0.06	NA	NA	8	-	-	-	-
TP03	1600-2500		Sandy CLAY		NA	Brown/red mottled Light brown/grey (30%)	Low to medium plasticity	Massive	<0.06	NA	NA	8	-	-	-	-

Location	Layer depth (mm)	Sample depth (mm)	Soil strata	Depth to GW	Coarse fragments (%)	Soil colour & mottling	Soil field texture	Soil structure	Indicative soil permeability (m/d) (Ksa^{-1})	Design loading rate (DLR) (mm/d) Trenches and beds			pH	EC (dS/m)	Sodicity (ESP) (%)	Phosphate Sorption Capacity (mg P sorbed/kg)
										Primary treated effluent		Secondary treated effluent				
										Conservative rate	Maximum rate					
Motocross Precinct																
TP04	0-220		(Topsoil) SAND with silt	Not intercepted	Roots and root fibres	Dark grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	-	-	-	-
TP04	220-1250	400-800	Sandy GRAVEL		Contains approximately 10% Cobbles and Boulders in excess of 400 mm diameter	Brown	Gravel and sand - Fine to coarse, sub-rounded to sub-angular, (F:25% / M:20% / C:10%)	Structureless	>3.0	20	35	50	5.8	0.028	6.2	3000
TP04	1250-1750		Sandy CLAY		NA	Light brown/ orange	Low to medium plasticity	Massive	<0.06	NA	NA	8	-	-	-	-
TP04	1750-2500		Sandy CLAY		NA	Grey mottled red (30%) & orange (10%).	Low to medium plasticity	Massive	<0.06	NA	NA	8	-	-	-	-
TP05	0-230		(Topsoil) SAND with silt	Not intercepted	Roots and root fibres	Dark grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	-	-	-	-
TP05	230-880	400-800	SAND with silt		NA	Grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	5.4	0.004	<0.1	<250
TP05	880-2500		Sandy GRAVEL		Contains approximately 10% Cobbles and Boulders in excess of 400 mm diameter	Brown	Gravel and sand - Fine to coarse, sub-rounded to sub-angular, (F:15% / M:30% / C:10%).	Structureless	>3.0	20	35	50	-	-	-	-
TP06	0-350		(Topsoil) SAND with silt	Not intercepted	Roots and root fibres	Dark grey	Sand - Fine to medium	Structureless	>3.0	20	35	50	-	-	-	-
TP06	350-1200	500-800	Sandy GRAVEL		Contains approximately 10% Cobbles and Boulders in excess of 400 mm diameter	Brown	Gravel and sand - Fine to coarse, sub-rounded to sub-angular, (F:20% / M:20% / C:10%)	Structureless	>3.0	20	35	50	5.9	0.02	1.4	966
TP06	1200-1800		Sandy GRAVEL			Brown	Gravel and sand - Fine to coarse, sub-rounded to sub-angular, (F:20% / M:30% / C:10%)	Structureless	>3.0	20	35	50	-	-	-	-
TP06	1800-2500		Sandy GRAVEL			Brown	Gravel and sand - Fine to coarse, sub-rounded to sub-angular, (F:40% / M:20%)	Structureless	>3.0	20	35	50	-	-	-	-

3.3 Site assessment results

Based on an assessment of the soil physical and chemical results for the six test pit locations in Table 5, it is recommended that the LAAs for the Race Track and Motocross Precincts are located at TP01 and TP06, respectively.

– Motocross Precinct (TP06):
  - AS1547 soil type = Gravel
  - Indicative soil permeability (Ksat) = > 3.0 m/d
  - Design irrigation rate = 5 mm/d
– Race Track Precinct (TP01):
  - AS1547 soil type = Light clay
  - Indicative soil permeability (Ksat) = < 0.06 m/d
  - Design irrigation rate = 3 mm/d

As per the DOHWA (2021) guidance, a Level of Constraint (Low, Moderate or High) is determined by applying a risk assessment to each site characteristic and the following mitigation measures may be applied:

– Nil or Low
  - *If all constraints are Low, standard designs are generally satisfactory and no mitigation measures are required.*
– Moderate
  - *For each Moderate constraint an appropriate mitigation measure or design modification over and above that of a standard design, should be outlined.*
– High
  - *Any High constraint might prove an impediment to successful on-site wastewater management, or alternatively will require in-depth investigation and incorporation of sophisticated mitigation measures in the design to permit compliant onsite wastewater management.*

A summary of site assessment results, including the level of constraint for each characteristic, within the Motocross Precinct in Table 6 and Race Track Precinct is outlined in Table 7.

3.3.1 Motocross Precinct

A summary of site assessment results for SSE for the recommended LAA within the Motocross Precinct (TP06) has been provided in Table 6.

Table 6 Summary of site assessment results for SSE of the proposed LAA within the Motocross Precinct (TP06)

Characteristic	Level of Constraint			Results for TP06	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
General Characteristics					
Climate (difference between average annual rainfall and average pan evaporation, mm/year)	Excess of evaporation over rainfall in the wettest months	Rainfall approximates to evaporation	Excess of rainfall over evaporation in the wettest months	Rainfall in excess of evaporation from May to September	**High**
Exposure to sun and wind	Full sun and/or high wind or minimal shading and North / North-East	Dappled light East / West / South-East / South-West aspect	Limited patches of light and little wind to heavily shaded all day and South aspect	Full sun	**Nil or Low**

Characteristic	Level of Constraint			Results for TP06	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
	/North-West aspect				
Vegetation coverage over the site	Plentiful vegetation with healthy growth and good potential for nutrient uptake Turf or pasture	Limited variety of vegetation	Sparse vegetation or no vegetation, dense forest with little understorey	Good cover of existing pasture	**Nil or Low**
Landslip (or landslip potential)	Nil	Low to moderate	High or Severe	No landslip evident	**Nil or Low**
Slope Form (affects water shedding ability)	Hill crests, convex or divergent side-slopes and plains	Straight side-slopes and footslopes	Floodplains, concave or convergent side-slopes and incised channels	Straight waxing upperslope (UX)	**Moderate**
Site Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness Moist soil but no standing water in soil pit	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface	No visible signs or likelihood of dampness, even in wet season	**Nil or Low**
Slope gradient (%)					
(a) for absorption trenches and beds	<5%	5-15%	>15%	Approximately 6%	**Moderate**
(b) for surface/ subsurface irrigation	<10%	10-20%	>20%	Approximately 6%	**Nil or Low**
Erosion (or potential for erosion)	Nil or Low	Moderate	Severe	Good cover of existing pasture, upslope stormwater diversion and sub-surface irrigation proposed	**Nil or Low**
Fill (imported)	No fill at present or fill is good quality topsoil or minimal fill required	Moderate coverage and good quality fill	Extensive poor-quality fill and variable quality fill	No fill at present	**Nil or Low**
Flood frequency (AEP)	Less than 1 in 100 years	Between 100 and 20 years	More than 1 in 20 years	Less than 1 in 100 years	**Nil or Low**
Private bore used for household/drinking water purposes	No bores onsite or on neighbouring properties	>30 m to the nearest private bore	<30 m to the nearest private bore	APEC bores located >30 m	**Moderate**
Proximity to water resources	>100 m	<100 m but reduced setback is supported (refer to Section 5.2.2 of the GSP)	<100 m and reduced setback is not supported (refer to Section 5.2.2 of the GSP)	>100 m to Protected Exclusion Area and Marbellup Flats	**Nil or Low**

Characteristic	Level of Constraint			Results for TP06	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
Public Drinking Water Source Areas (PDWSA) and Sewage Sensitive Areas (SSA)	Site not located within a PDWSA or SSA	Site located within a PDWSA or SSA	Site located within both a PDWSA and SSA	Priority 2 PDWSA – Marbellup Brook Catchment Area SSA (<1 km from conservation category wetland)	**High**
Groundwater (wettest time of the year)	>2 m	2.0 – 0.6 m need for fill to achieve setbacks listed in Appendix 1	<0.6 m fill is not practical to achieve setbacks listed in Appendix 1	Groundwater not intercepted >2.5 m	**Nil or Low**
Land area available for LAA	Exceeds the minimum required LAA size of AS1547 or Schedule 2 of the GSP	Meets the minimum required LAA size of AS1547 or Schedule 2 of the GSP	Insufficient area available for LAA as per AS1547 or Schedule 2 of the GSP	550 m^2 available for sub-surface irrigation	**Nil or Low**
Rock outcrops (% of surface)	<10%	10-20%	>20%	No rock outcrops observed	**Nil or Low**
Site Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness Moist soil but no standing water in soil pit.	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface	No visible signs or likelihood of dampness, even in wet season	**Nil or Low**
Stormwater run-on/run-off	Low likelihood of stormwater run-on/run-off	Moderate likelihood of stormwater run-on/run-off, need for diversionary structures	High likelihood of inundation by stormwater run-on/run-off, diversion not practical	Upslope stormwater diversion proposed	**Nil or Low**
Soil profile characteristics					
Soil permeability Category (AS1547)	2 and 3	4 and 5	1 and 6	1	**High**
Profile depth	>2 m	2.0-1.0	< 1.0 m	2.5 m bgl	**Nil or Low**
Hardpan or bedrock	>1.5 m	1.5-0.6 m Special design requirements and distribution techniques or soil modification will be necessary, depends on quality of treated wastewater and type of LAS	<0.6 m	Sandy GRAVEL encountered to 2.5 m bgl	**Nil or Low**
Presence of mottling	None	Moderate	Extensive	None	**Nil or Low**
Coarse fragments	< 10%	10-40%	>40%	10% Cobbles and boulders in excess of 400 mm diameter	**Nil or Low**

Characteristic	Level of Constraint			Results for TP06	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
pH	6.0 - 8.0	4.5 – 6.0	<4.5, >8	5.9 - pH between <5 and >8 therefore likely to be suitable for plant growth	**Moderate**
Electrical Conductivity (ECe)(dS/m)	<0.3	0.3 - 2	>2	0.02	**Nil or Low**
Sodicity ESP%	<3	3.0 - 8.0	>8	1.4	**Nil or Low**
Phosphorus adsorption (mg/kg)	>500	200-500	<200	966	**Nil or Low**

3.3.2 Race Track Precinct

A summary of site assessment results for SSE for the recommended LAA within the Race Track Precinct (TP01) has been provided in Table 7.

Table 7 Summary of site assessment results for SSE of the proposed LAA within the Race Track Precinct (TP01)

Characteristic	Level of Constraint			Results for TP01	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
General Characteristics					
Climate (difference between average annual rainfall and average pan evaporation, mm/year)	Excess of evaporation over rainfall in the wettest months	Rainfall approximates to evaporation	Excess of rainfall over evaporation in the wettest months	Rainfall in excess of evaporation from May to September	**High**
Exposure to sun and wind	Full sun and/or high wind or minimal shading and North / North-East /North-West aspect	Dappled light East / West / South-East / South-West aspect	Limited patches of light and little wind to heavily shaded all day and South aspect	Full sun	**Nil or Low**
Vegetation coverage over the site	Plentiful vegetation with healthy growth and good potential for nutrient uptake Turf or pasture	Limited variety of vegetation	Sparse vegetation or no vegetation, dense forest with little understorey	Good cover of existing pasture	**Nil or Low**
Landslip (or landslip potential)	Nil	Low to moderate	High or Severe	No landslip evident	**Nil or Low**
Slope Form (affects water shedding ability)	Hill crests, convex or divergent side-slopes and plains	Straight side-slopes and footslopes	Floodplains, concave or convergent side-slopes and incised channels	Straight waxing upperslope (UX)	**Moderate**

Characteristic	Level of Constraint			Results for TP01	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
Site Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness Moist soil but no standing water in soil pit	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface	No visible signs or likelihood of dampness, even in wet season	**Nil or Low**
Slope gradient (%)					
(a) for absorption trenches and beds	<5%	5-15%	>15%	Approximately 6%	**Moderate**
(b) for surface/ subsurface irrigation	<10%	10-20%	>20%	Approximately 6%	**Nil or Low**
Erosion (or potential for erosion)	Nil or Low	Moderate	Severe	Good cover of existing pasture, upslope stormwater diversion and sub-surface irrigation proposed	**Nil or Low**
Fill (imported)	No fill at present or fill is good quality topsoil or minimal fill required	Moderate coverage and good quality fill	Extensive poor-quality fill and variable quality fill	No fill at present	**Nil or Low**
Flood frequency (AEP)	Less than 1 in 100 years	Between 100 and 20 years	More than 1 in 20 years	Less than 1 in 100 years	**Nil or Low**
Private bore used for household/drinking water purposes	No bores onsite or on neighbouring properties	>30 m to the nearest private bore	<30 m to the nearest private bore	APEC bores located >30 m	**Moderate**
Proximity to water resources	>100 m	<100 m but reduced setback is supported (refer to Section 5.2.2 of the GSP)	<100 m and reduced setback is not supported (refer to Section 5.2.2 of the GSP)	>100 m to Protected Exclusion Area and Marbellup Flats	**Nil or Low**
Public Drinking Water Source Areas (PDWSAs) and Sewage Sensitive Areas (SSA)	Site not located within a PDWSA or SSA	Site located within a PDWSA or SSA	Site located within both a PDWSA and SSA	Priority 2 PDWSA – Marbellup Brook Catchment Area and SSA (<1 km from conservation category wetland)	**High**
Groundwater (wettest time of the year)	>2 m	2.0 – 0.6 m need for fill to achieve setbacks listed in Appendix 1	<0.6 m fill is not practical to achieve setbacks listed in Appendix 1	Groundwater not intercepted >2.5 m	**Nil or Low**
Land area available for LAA	Exceeds the minimum required LAA size of AS1547 or Schedule 2 of the GSP	Meets the minimum required LAA size of AS1547 or Schedule 2 of the GSP	Insufficient area available for LAA as per AS1547 or Schedule 2 of the GSP	Sufficient area available for sub-surface irrigation	**Nil or Low**
Rock outcrops (% of surface)	<10%	10-20%	>20%	No rock outcrops observed	**Nil or Low**

Characteristic	Level of Constraint			Results for TP01	Assessed Level of Constraint for Site
	Nil or Low	Moderate	High		
Site Drainage (qualitative)	No visible signs or likelihood of dampness, even in wet season	Some signs or likelihood of dampness Moist soil but no standing water in soil pit.	Wet soil, moisture-loving plants, standing water in pit; water ponding on surface	No visible signs or likelihood of dampness, even in wet season	**Nil or Low**
Stormwater run-on/run-off	Low likelihood of stormwater run-on/run-off	Moderate likelihood of stormwater run-on/run-off, need for diversionary structures	High likelihood of inundation by stormwater run-on/run-off, diversion not practical	Upslope stormwater diversion proposed	**Nil Low**
Soil profile characteristics					
Soil permeability Category (AS1547)	2 and 3	4 and 5	1 and 6	5	**Moderate**
Profile depth	>2 m	2.0-1.0	< 1.0 m	2.5 m bgl	**Nil or Low**
Hardpan or bedrock	>1.5 m	1.5-0.6 m Special design requirements and distribution techniques or soil modification will be necessary, depends on quality of treated wastewater and type of LAS	<0.6 m	Sandy CLAY intercepted at 550 mm bgl	**High**
Presence of mottling	None	Moderate	Extensive	Sandy CLAY mottled	**Moderate**
Course fragments	< 10%	10-40%	>40%	10% Cobbles and boulders in excess of 250 mm diameter	**Nil or Low**
pH	6.0 - 8.0	4.5 – 6.0	<4.5, >8	6.1	**Nil or Low**
Electrical Conductivity (ECe)(dS/m)	<0.3	0.3-2	>2	0.022	**Nil or Low**
Sodicity Exchangeable sodium percentage (ESP%)	<3	3.0 - 8.0	>8	5.8 – no evidence of dispersion, slaking, or structural decline	**Moderate**
Phosphorus adsorption (mg/kg)	>500	200-500	<200	688	**Nil or Low**

3.3.3 Mitigation measures

The majority of constraints assessed in 3.3.1 and 3.3.1 were found to be Nil or Low, however several key constraints were found to be High or Moderate. Proposed mitigation measures for the aspects which are considered to have a High or Moderate constraint within the Race Track Precinct and Motocross Precinct are included in Table 8.

Table 8 Proposed mitigation measures for High and Moderate constraints

Constraints		
Race Track Precinct	**Motocross Precinct**	**Proposed mitigation measures**
High		
Climate - Rainfall in excess of evaporation from May to September		Diversion of stormwater from upslope around sub-soil irrigation area
Priority 2 PDWSA – Marbellup Brook Catchment Area and SSA (<1 km from conservation category wetland)		The proposed LAA achieves a 2 m vertical separation to groundwater
Hardpan or bedrock <0.6 m - Sandy CLAY intercepted at 550 mm bgl	-	Amend soils in LAA
-	Soil permeability Category (AS1547) – (1) Gravels and sands	Accommodate permeability via Design Loading Rates (DLRs) and Design Irrigation Rates (DIRs)
Moderate		
Slope Form (affects water shedding ability) – Straight waxing upperslope		Diversion of stormwater from upslope around sub-soil irrigation area
Slope gradient (%) (a) for absorption trenches and beds – 5-15%		No absorption trenches or beds proposed
APEC bores located >30 m		APEC bore located 250 m away – no modification considered necessary
Presence of mottling - Sandy CLAY mottled	-	Amend soils in potential LAA
Soil permeability Category (AS1547) – (5) Light clay	-	Accommodate permeability via Design Loading Rates (DLRs) and Design Irrigation Rates (DIRs)
Sodicity ESP – 5.8%	-	No evidence of dispersion, slaking or structural decline in the soils on or near the potential LAA
-	pH 5.9	No evidence of scald or bare areas on or near the potential LAA

4. Wastewater management system type and design

4.1 Specific assessment SSE – Sizing for treatment system and land application area

The sizing for a wastewater treatment system and LAA has been developed in this SSE report for Stage 1A in the Motocross Precinct only.

As per the requirements of the Department of Water *WQPN 100* (DoW, 2007) and the *Government Sewerage Policy* (DPLH, 2019) a 'Secondary' wastewater treatment plant, with engineering certification to meet effluent quality of Biological Oxygen Demand (BOD) < 20 mg/L; Total Suspended Solids (TSS) < 30 mg/L; Total Nitrogen (TN) < 10 mg/L; Total Phosphorus (TP) < 1 mg/L; and *Escherichia coli* < 10 cfu/100mL is required in a Priority 2 PDWSA.

It is recommended to install a 'Secondary' treatment system, with nutrient removal such as Aquarius Wastewater Systems Pty Ltd, which provide DOHWA approved systems. An example of the type of system that would meet the requirement of a 'Secondary' treatment system is provided in Appendix F. These systems have a nutrient reduction capability of which includes reduction of TN to < 10 mg/L and TP to < 1 mg/L and are certified to AS1546.3:2008.

4.1.1 Water balance

A water balance has been developed for the operation of the wastewater system, as per the water balance in the DOHWA (2021) guidance, for Stage 1A of the AMP development in the Motocross Precinct and included in Appendix B.

The water balance has been developed based on the following:

- A design wastewater flow of 3,500 L/day (average of 100 persons and 15,000 L storage tank)
- Design irrigation rate for sub-surface irrigation of 5.0 mm/day
- Rainfall run-off factor of 0.9
- Mean monthly rainfall levels at the Albany Airport Comparison weather station (BoM, 2021)
- Pan evaporation data (DPIRD, 1987)

The results of the water balance for the Motocross Precinct, for an average of 100 persons/day, indicate that 1,100 m^2 will be required for the sub-soil irrigation area. There is adequate area of land available within the vicinity of TP06 to accommodate the site of the required LAA.

4.2 Siting and configuration of the Land Application Area

4.2.1 Setback distances

Based on an assessment of the soil physical and chemical results for the six test pit locations in Table 5, it is recommended that the LAAs for the Race Track and Motocross Precincts are located at TP01 and TP06, respectively.

All sub-soil irrigation areas will be located >100 m to Protected Exclusion Area and Marbelup Flats (Conservation Class wetland) (Figure 3, Appendix A).

The sub-soil irrigation area will be fenced and will be separate from the activities within the Precinct to maintain public amenity.

4.2.2 Stormwater management

Stormwater management will include diversion drains, water treatment areas and attenuation basins to control stormwater across the Race Track Precinct and Motocross Precinct as per the Stormwater Management Plan (GHD, 2021) prepared for the Development Application for the AMP.

5. Monitoring, operation and maintenance

Baseline groundwater and surface water quality sampling of the Site was undertaken by Bio Diverse Solutions in 2018 and 2019 (Bio Diverse Solutions, 2018). DWER has been consulted during the development of the Site Local Water Management Strategy (LWMS) (GHD, 2021) as part of the Scheme Amendment process. The following surface and groundwater pre-development, construction and post-development monitoring is outlined as per the approved LWMS.

5.1 Surface water monitoring

5.1.1 Pre-development and construction monitoring

Ongoing quarterly monitoring of existing Site surface water conditions shall be continued prior to development, and during construction of the AMP as per the Local Water Management Strategy approved by DWER as part of the Scheme Amendment process.

In combination with the existing 2018 and 2019 data, the ongoing monitoring will be used as a baseline for ongoing assessment of the potential impact of the development on shallow groundwater and surface water quality. Additionally, pre-development water monitoring data will be used to identify water quality trigger levels at which a response is required.

For surface water monitoring during the construction phase of the development, a CEMP shall be prepared by the Contractor which will include erosion and sedimentation control measures, as well as drainage and dewatering systems (if required) in order to minimise potential pollution impacts and prevent contamination to surface water and groundwater.

5.1.2 Post-development monitoring

Ongoing monthly monitoring of surface water conditions shall be continued post-development (for the duration of the operation of the facility), with continued monitoring at sites CS01 and CS02, and establishment of a new upstream monitoring location. Additional sampling shall also be undertaken in response to any spill events.

The post-development monitoring program will also involve the collection of grab samples from the compensating basins. Sampling of basins should comprise 3-4 events per year, during or immediately following significant rainfall events (1EY, 1 year ARI event). It is assumed the first flush events will have the highest level of nutrients and chemicals, therefore sampling should occur at the time/after the first significant rainfall event of each wet season, and after extended dry periods. Field notes should include details of the rainfall events, site conditions, time of sampling and time of sample testing.

Monitoring of the compensation basin inlet and outlet water quality will be used to assess performance of the basins in improving stormwater quality.

Annual water monitoring reports shall be submitted to DWER and the Water Corporation. A water quality response and contingency plan will be prepared and provided to the Water Corporation, City of Albany and DWER for advice.

5.1.3 Monitoring program summary

The recommended monitoring parameters for the ongoing pre-development, construction and post-development monitoring program are outlined in Table 9.

Table 9 Summary of surface water monitoring

Site	Frequency	Duration	Parameters
Surface water - Upstream of the site (TBC) - Mid-stream (CS02) - Downstream of the site (CS01)	Monthly	Ongoing, with annual reporting	In-situ: pH, EC, temperature Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, TRH, PAH, BTEXN, Surfactants, microbial analysis Filtered sample: Filtered total nitrogen and filtered total phosphorus (to quantify organic component), NO_2/NO_3, PO_4, dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)
Compensating basin - Inlet (4 No.) - Outlet (4 No.)	3-4 events per year following 1EY rainfall events		

5.2 Groundwater monitoring

5.2.1 Pre-development and construction monitoring

Ongoing monitoring of existing Project Site shallow groundwater conditions shall be continued prior to development, and during construction of the AMP. In combination with the existing 2018 and 2019 data, the ongoing monitoring will be used as a baseline for ongoing assessment of the potential impact of the development on shallow groundwater and surface water quality.

Additionally, pre-development water monitoring data will be used to identify water quality trigger levels at which a response is required.

5.2.2 Post-development monitoring

A groundwater monitoring network should be established post development, the locations of which will be based on groundwater monitoring strategy.

Ongoing monitoring of the groundwater monitoring bores shall be conducted for the duration of the operation of the facility and in accordance with the groundwater monitoring program in Table 10.

Annual water monitoring reports will be submitted to DWER and the Water Corporation.

A water quality response and contingency plan will be prepared and provided to the Water Corporation, City of Albany and DWER for advice.

In addition if the development proposal seeks a licence to take water and approval to install a production bore for abstraction of groundwater as a water supply source for the development, then six-monthly groundwater monitoring for water levels and salinity will be a required.

5.2.3 Monitoring program summary

The program and parameters outlined in Table 10 will provide a suitable representation of groundwater quality at the site. The groundwater bores established for pre-development monitoring will be used for construction phase and incorporated into the post-development monitoring network.

Table 10 Summary of groundwater monitoring

Site	Frequency	Duration	Parameters
Monitoring bores Production bore	Monthly	Pre-development, during construction, on-going throughout the life of development.	Water level
			In-situ: pH, EC, temperature Unfiltered sample: pH, EC, TN, FRP, TKN, ammonia, TP, TRH, PAH, BTEXN, Surfactants, microbial analysis Filtered sample: Filtered total nitrogen and filtered total phosphorus (to quantify organic component), NO_2/NO_3, PO_4, dissolved heavy metals (As, Cd, Cr, Cu, Pb, Ni, Zn, Hg)

5.2.4 Contingency measures

Pre-development water monitoring data shall be used to identify water quality trigger levels at which a management response is required. A water quality response and contingency plan shall be included in the surface and groundwater monitoring plans.

In the event of a major water quality incident at the Site, it is recommended that increased monitoring be undertaken to quantify if there is any impact to surface and groundwater quality. Contingency monitoring and response measures shall be developed in consultation with DWER and documented in the post-development monitoring program.

Potential incidents due to system failure and/ or mechanical breakdown during operation and maintenance of the installed system shall be addressed, as required, as per the manufacturer and installation instructions.

6. Conclusion and recommendations

The SSE report for the AMP site involved evaluation of site and soil, physical and chemical properties, to identify appropriate onsite effluent disposal LAAs within the Race Track Precinct and Motocross Precinct. Based on an assessment of the soil physical and chemical results for the six test pit locations, it is recommended that the LAAs for the Race Track Precinct and Motocross Precinct are located at TP01 and TP06, respectively.

The sizing for a wastewater treatment system and LAA has been developed in this SSE report for Stage 1A in the Motocross Precinct only.

The proposed clubhouse within the Motocross Precinct will be constructed in Stage 1A of the development. It is anticipated that this will be an unlicenced facility (15 L/ person/ day) however provision has been made for anticipated wastewater volumes for a licenced facility (35 L/ person/ day), to allow for possible increased loading at the site if it were to become a licenced facility.

The Motocross Precinct clubhouse is expected to have intermittent use throughout the Motocross season and on a weekly basis, with up to 300 patrons on Sunday or Saturday followed by minimal usage during the week and off-season downtime. Therefore, for the purpose of calculating anticipated wastewater volumes it is assumed that there is an average of 100 people/ day.

In order to accommodate spikes in wastewater volumes on event days when there is up to 300 patrons using the Motocross Precinct clubhouse facilities, it is proposed to install a 15,000 L holding tank, to balance storage over the course of a typical week.

The results of a water balance for the Motocross Precinct, for an average of 100 persons/day, indicate that 1,100 m^2 will be required for the sub-soil irrigation area. There is adequate area of land available within the vicinity of TP06 to accommodate the site of the required LAA.

As per the requirements of the Department of Water *WQPN 100* (DoW, 2007) and the *Government Sewerage Policy* (DPLH, 2019) a 'Secondary' wastewater treatment plant, with engineering certification to meet effluent quality of Biological Oxygen Demand (BOD) < 20 mg/L; Total Suspended Solids (TSS) < 30 mg/L; Total Nitrogen (TN) < 10 mg/L; Total Phosphorus (TP) < 1 mg/L; and *Escherichia coli* < 10 cfu/100mL is required in a Priority 2 PDWSA.

It is recommended that a DOHWA approved 'Secondary' treatment system, certified to AS1546.3:2008, is selected and installed for the Motocross Precinct during Stage 1A of development.

At time of writing, an onsite effluent disposal system was not proposed to be installed in the Race Track Precinct. All liquid waste from transportable buildings, toilets and washdown facilities is proposed to be removed offsite, as required, by an approved contractor. If onsite effluent disposal is proposed in the future is it expected a similar system, with holding tank, will be utilised to manage spikes in wastewater volumes for events and off-season downtime.

In addition it is recommended, as per the DOHWA (2021) guidelines, that the following is undertaken:

- *Have a suitably qualified maintenance contractor service the secondary and advanced secondary treatment system every three months, as required by Council under the approval to operate.*
- *Annual inspections should be undertaken on treatment tanks and desludging undertaken on annual, two yearly or four yearly cycles depending on the size of the tank installed.*
- *All land application systems should be sited in an area that will not be frequented by vehicle or foot traffic or will not be built on or covered with paved over.*
- *Any subsurface irrigation areas should be vegetated (i.e. with grass that can be mown regularly) to encourage growth and maximise nutrient uptake.*
- *Irrigation lines should be maintained as per manufacturer's instructions (e.g. flushing).*
- *Stormwater and surface run-on should be diverted around, or away from, land application areas.*

- *Landowners should be cognisant of the operation of their system and monitor the treatment and land application area to identify any potential issues (e.g. insufficient septic treatment, clogging of the system, pooling of treated effluent).*
- *The volume of wastewater produced should remain the same and not exceed the operational capacity of the system, it will ensure the effective long-term operation of the systems*
- *Chemicals, large quantities of cleaning products, fats, oils and grease, and food scraps should not be discharged to the wastewater treatment and disposal system, as they risk overloading or interfering with the functioning of the system.*

7. References

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Appendix A

Figures

Figure 1 *Project Site Location*

Figure 2 *Albany Motorsport Park Master Plan – Stage 1 (Roberts Gardiner Architects, 2021)*

Figure 3 *DPIRD Soil Landscape Mapping Units and Test Pit Locations*

Figure 4 *Groundwater Conditions, Topography and Test Pit Locations*

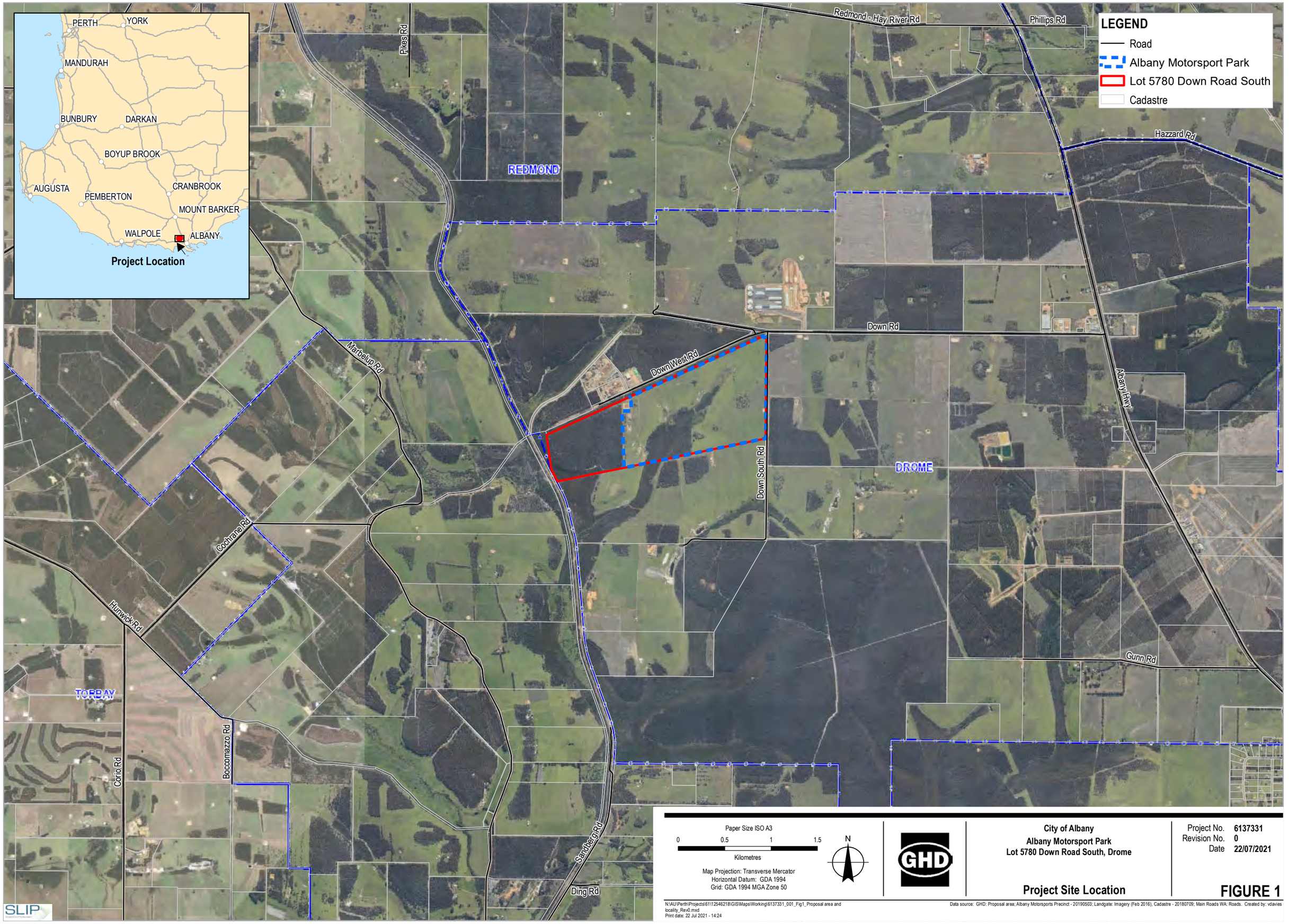
Figure 5 *Water Erosion Risk (DPIRD-013)*

Figure 6 *Hydrology and Hydrogeology*

Figure 7 *PDWSA and Water Management Areas*

Figure 8 *Master Plan – 100 m Setback to Protected Exclusion Area and Marbellup Flats (Conservation Class)*

Figure 9 *Flood Risk (DPIRD-007)*



Paper Size ISO A3

0 0.5 1 1.5

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. **6137331**
Revision No. **0**
Date **22/07/2021**

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

p.o. box 1502, albany, western australia 6331
telephone: (08) 9841 5455
email: admin@rgarchitects.com.au

Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E

Soil Landscape Mapping

242KgDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.

242KgS7f - Footslopes and swampy valley floors of minor valleys

242KgS7h - Broad valleys in sedimentary rocks; 30 m relief; smooth slopes. Deep sands and iron podzols on slopes; Albany Blackbutt-jarrah-sheoak woodland. Podzols and yellow duplex soils on floors; paperbark woodland, teatree heath.

242ReDMc - Sands and laterite on elongate crests; Jarrah-Albany Blackbutt-Marri forest.

242ReRD - Broadly undulating plateau; scattered lakes and depressions. Yellow duplex soils and laterite on plains. Marri-Jarrah-Albany Blackbutt forest. Yellow solonetzic soils in depressions; Paperbark woodland.

LEGEND

- Project Site
- Cadastre
- Test Pit Locations

242ReRD

Down Rd

242ReDMc

Down West Rd

242KgS7h

242KgDMc

TP04

TP05

TP06

TP01

TP02

TP03

Down South Rd

242KgS7h

242KgS7h

242KgS7f

242KgS7h

242KgDMc

SLIP

Paper Size ISO A3

0 100 200 300

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

DPIRD Soil Landscape Mapping Units and Test Pit Locations

Project No. **12546218**
Revision No. **0**
Date **02/08/2021**

FIGURE 3

Data source: GHD: Project Site - 20180702; Landgate: Imagery (Feb 2016), Cadastre, Roads - 20180709; DPIRD: Soil Landscape Mapping (Best Available) - 20171220. Created by: vdavies

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

Groundwater Conditions, Topography and Test Pit Locations

Project No. **12546218**
Revision No. **0**
Date **2/08/2021**

FIGURE 4

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_Effluent disposal.aprx\12546218_SMP_GroundwaterConditions_RevA
Print date: 02 Aug 2021 - 23:41

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

City of Albany
Albany Motorsport Park

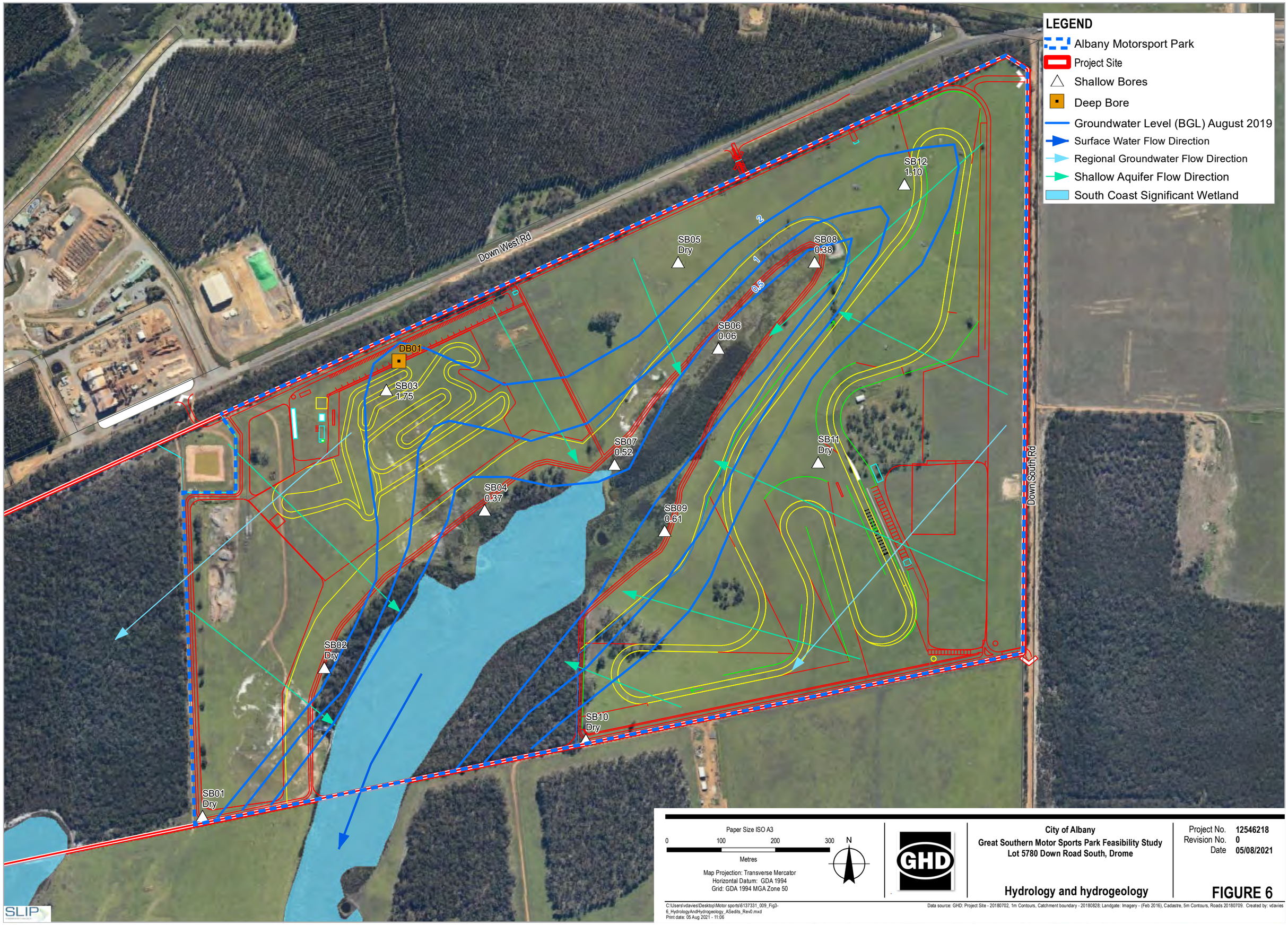
Water Erosion Risk (DPIRD-013)

Project No. **12546218**
Revision No. **0**
Date **4/08/2021**

Figure 5

C:\Users\vdavies\Desktop\Motor sports\12546218_Effluent disposal.aprx\12546218_SMP_SSE_Water Erosion Risk_Rev0
Print date: 04 Aug 2021 - 22:41

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies



Paper Size ISO A3

0 100 200 300

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

City of Albany
Great Southern Motor Sports Park Feasibility Study
Lot 5780 Down Road South, Drome

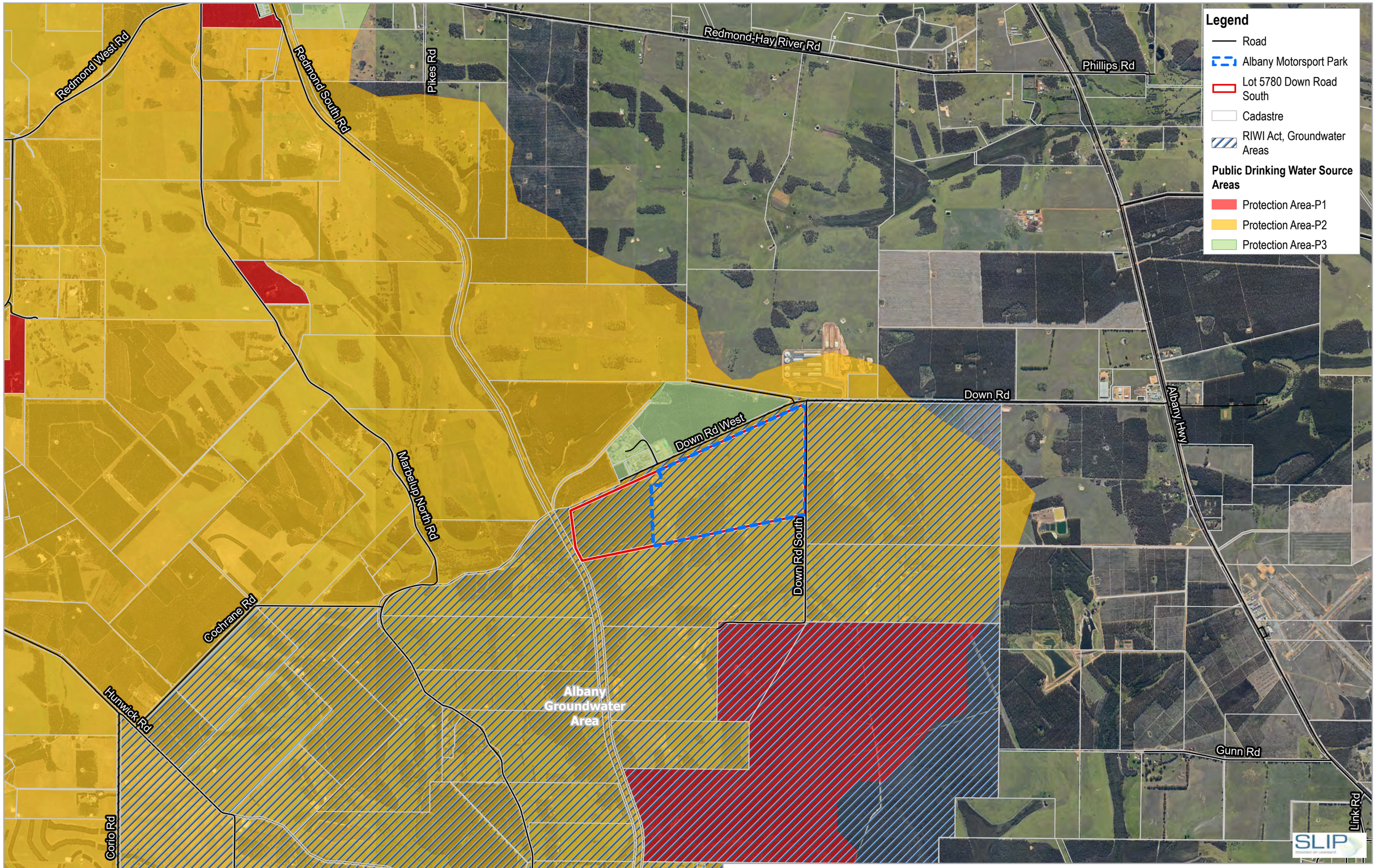
Project No. **12546218**
Revision No. **0**
Date **05/08/2021**

Hydrology and hydrogeology

FIGURE 6

C:\Users\vdavies\Desktop\Motor sports\6137331_009_Fig3-6_HydrologyAndHydrogeology_ASedits_Rev0.mxd
Print date: 05 Aug 2021 - 11:06

Data source: GHD: Project Site - 20180702, 1m Contours, Catchment boundary - 20180828; Landgate: Imagery - (Feb 2016), Cadastre, 5m Contours, Roads 20180709. Created by: vdavies



Paper Size ISO A3

0 250 500 750 1,000

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

PDWSA and Water Management Areas

Project No. **12546218**
Revision No. **0**
Date **23/07/2021**

FIGURE 7

N:
\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_StormwaterManagementPlan\12546218_StormwaterManagementPlan.aprx\12546218
Print date: 23 Jul 2021 - 11:25

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park

Master Plan - 100 m setback to Protected Exclusion Area and Marbellup Flats (Conservation Class)

Project No. **12546218**
Revision No. **0**
Date **5/08/2021**

FIGURE 8

C:\Users\vdavies\Desktop\Motor sports\12546218_Effluent disposal.aprx\12546218_SMP_SSE_Setbacks_RevA
Print date: 05 Aug 2021 - 09:37

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Paper Size ISO A3

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

City of Albany
Albany Motorsport Park

Flood Risk (DPIRD-007)

Project No. **12546218**
Revision No. **0**
Date **4/08/2021**

FIGURE 9

C:\Users\vdavies\Desktop\Motor sports\12546218_Effluent disposal.aprx\12546218_SMP_SSE_Flood Risk_Rev0
Print date: 04 Aug 2021 - 22:35

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Appendix B

Water balance

Albany Motorsport Park

Motocross - Effluent Disposal Water Balance

Hydraulic loading: 35 L/person/d

Section 29 of *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*

Activity	**Mon**	**Tues**	**Wed**	**Thu**	**Fri**	**Sat**	**Sun**			
Training - attendees	20	20	20	20	20					
Club event - attendees						300	300			
Flow	700	700	700	700	700	10500	10500	**24,500**	L/week (total)	
								3,500	L/d (average)	
									100	persons
Cum. IN	700	1400	2100	2800	3500	14000	24500			
Cum. OUT	3,500	7,000	10,500	14,000	17,500	21,000	24,500			
	11,200	8,400	5,600	2,800	0	7,000	14,000		Tank size:	14,000

Water Balance for Zero Storage

Site Address:	**Lot 5780 Down Road South, Drome**		
Date:	Thursday, 12 August 2021	**Assessor:**	Jeff Foley

INPUT DATA

Design Wastewater Flow	Q	3,500	L/day	Based on maximum potential occupancy and derived from the Supplement to Regulation 29 and Schedule 9 - Wastewater system loading rates
Design Irrigation Rate	DIR	5.0	mm/day	Based on soil texture class/permeability and derived from Table M1 of AS/NZS 1547:2012
Nominated Land Application Area	L	1100	m^2	[1]
Crop Factor	C	0.8-1.0	unitless	Estimates evapotranspiration as a fraction of pan evaporation; varies with season and crop type[2]
Rainfall Runoff Factor	RF	0.9	untiless	Proportion of rainfall that remains onsite and infiltrates, allowing for any runoff
Mean Monthly Rainfall Data	om.gov.au/climate/averages/tables/cw_009			BoM Station and number
Mean Monthly Pan Evaporation Data	Albany - Agric reference			BoM Station and number or data from the Evaporation Data for Western Australia Report (https://researchlibrary.agric.wa.gov.au/cgi/viewcontent.cgi?article=1058&context=rmtr

Parameter	Symbol	Formula	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Days in month	D		days	31	28	31	30	31	30	31	31	30	31	30	31	**365**
Rainfall	R		mm/month	23.6	22.3	33.6	61.3	89.8	108	119.3	106.8	88.5	70.8	47	27.8	**798.8**
Evaporation	E		mm/month	220	171	150	91	63	47	59	67	84	106	150	199	**1407**
Crop Factor	C		unitless	1.00	1.00	0.90	0.90	0.80	0.80	0.80	0.80	0.90	1.00	1.00	1.00	
OUTPUTS																
Evapotranspiration	ET	ExC	mm/month	220	171	135	82	50	38	47	54	76	106	150	199	**1327.3**
Percolation	B	DIRxD	mm/month	155.0	140	155.0	150.0	155.0	150.0	155.0	155.0	150.0	155.0	150.0	155.0	**1825.0**
Outputs		ET+B	mm/month	375.0	311	290.0	231.9	205.4	187.6	202.2	208.6	225.6	261.0	300.0	354.0	**3152.3**
INPUTS																
Retained Rainfall	RR	RxRF	mm/month	20.06	18.955	28.56	52.105	76.33	91.8	101.405	90.78	75.225	60.18	39.95	23.63	**678.98**
Applied Effluent	W	(QxD)/L	mm/month	98.6	89.1	98.6	95.5	98.6	95.5	98.6	98.6	95.5	98.6	95.5	98.6	**1161.4**
Inputs		RR+W	mm/month	118.7	108.0	127.2	147.6	175.0	187.3	200.0	189.4	170.7	158.8	135.4	122.3	**1840.3**
STORAGE CALCULATION																
Storage remaining from previous month			mm/month	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Storage for the month	S	(RR+W)-(ET+B)	mm/month	-256.3	-203.0	-162.8	-84.3	-30.4	-0.3	-2.2	-19.2	-54.9	-102.2	-164.6	-231.7	
Cumulative Storage	M		mm	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
Maximum Storage for Nominated Area	N		mm	0.00												
	V	NxL	L	0												
LAND AREA REQUIRED FOR ZERO STORAGE			m^2	306	336	415	584	841	1096	1076	921	698	540	404	328	

MINIMUM AREA REQUIRED FOR ZERO STORAGE: **1097** m^2

CELLS

	Please enter data in blue cells
XX	Enter available Land Application Area
XX	Data in yellow cells is calculated by the spreadsheet, DO NOT ALTER THESE CELLS

NOTES

[1] This value should be the largest of the following: land application area required based on the most limiting nutrient balance or minimum area required for zero storage

[2] Values selected are suitable for grass in WA

Appendix C

GHD Pty Ltd Professional Indemnity Insurance Certificate

Willis Towers Watson

Telephone: +61 2 9285 4000
Fax: +61 2 9995 7297
Website: www.willistowerswatson.com.au
Direct Line: +61 2 9285 4060
Email: tanya.stevenson@willistowerswatson.com

Issue Date: 24 November 2020

To Whom It May Concern

Certificate of Placement – Professional Indemnity

In our capacity as Insurance Broker to the Named Insured shown below, we confirm having arranged the following insurance, the details of which are correct as at the Issue Date:

Named Insured:	GHD Group Limited and Subsidiaries including GHD Pty Ltd
Form:	Civil Liability Wording which includes coverage for the Trade Practices Act and the Competition and Consumer Act
Policy Number:	B080113856P20
Limit of Indemnity:	AUD2,000,000 any one claim and in the aggregate
Period of Insurance:	1 December 2020 at 4.00pm to 1 December 2021 at 4.00pm
Insurer:	Certain Underwriters at Lloyd's of London

Signed for and on behalf of
Willis Australia Ltd ("Willis Towers Watson")

Willis Australia Limited
ABN 90 000 321 237
AFSL No: 240600
Version 2016 1.0 18 Apr 2016

Appendix D

Albany Motorsport Park Development - Site Investigation Report 4626/1 (Great Southern Geotechnics, 2021)

GREAT SOUTHERN GEOTECHNICS

CONSTRUCTION MATERIALS TESTING

Site Investigation

Report 4626/1

Monday, 28 June 2021

GHD

Albany Motorsport Park Development

GREAT SOUTHERN GEOTECHNICS

1.0 INTRODUCTION

As authorised by GHD
an investigation for the proposed Albany Motorsport Park Development adjacent to Down Rd, Mirambeena was performed on the 25/06/2021

2.0 GENERAL

The intent of the investigation was to determine the following:

- Soil types and profiles.
- Groundwater levels at time of investigation.

3.0 SITE INVESTIGATION

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

The field investigation consisted of 6 Boreholes excavated on-site to depths of up to 2.5 meters using a Kubota KX41-3V mini excavator with a 300mm Auger.

Test pits were spread across the extent of the proposed development and locations were predetermined by GHD.
All soil layers encountered were visually assessed and classified on-site.

Samples gathered from site were the taken back to Great Southern Geotechnics Albany Laboratory then

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

4.0 LABORATORY TESTING

No laboratory testing have been undertaken at Great southern Geotechnics laboratory.
Sampled taken have been transported by freight to Eurofins Scientific for further analysis.
Testing requirements will be confirmed by GHD post review of investigation findings.

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

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

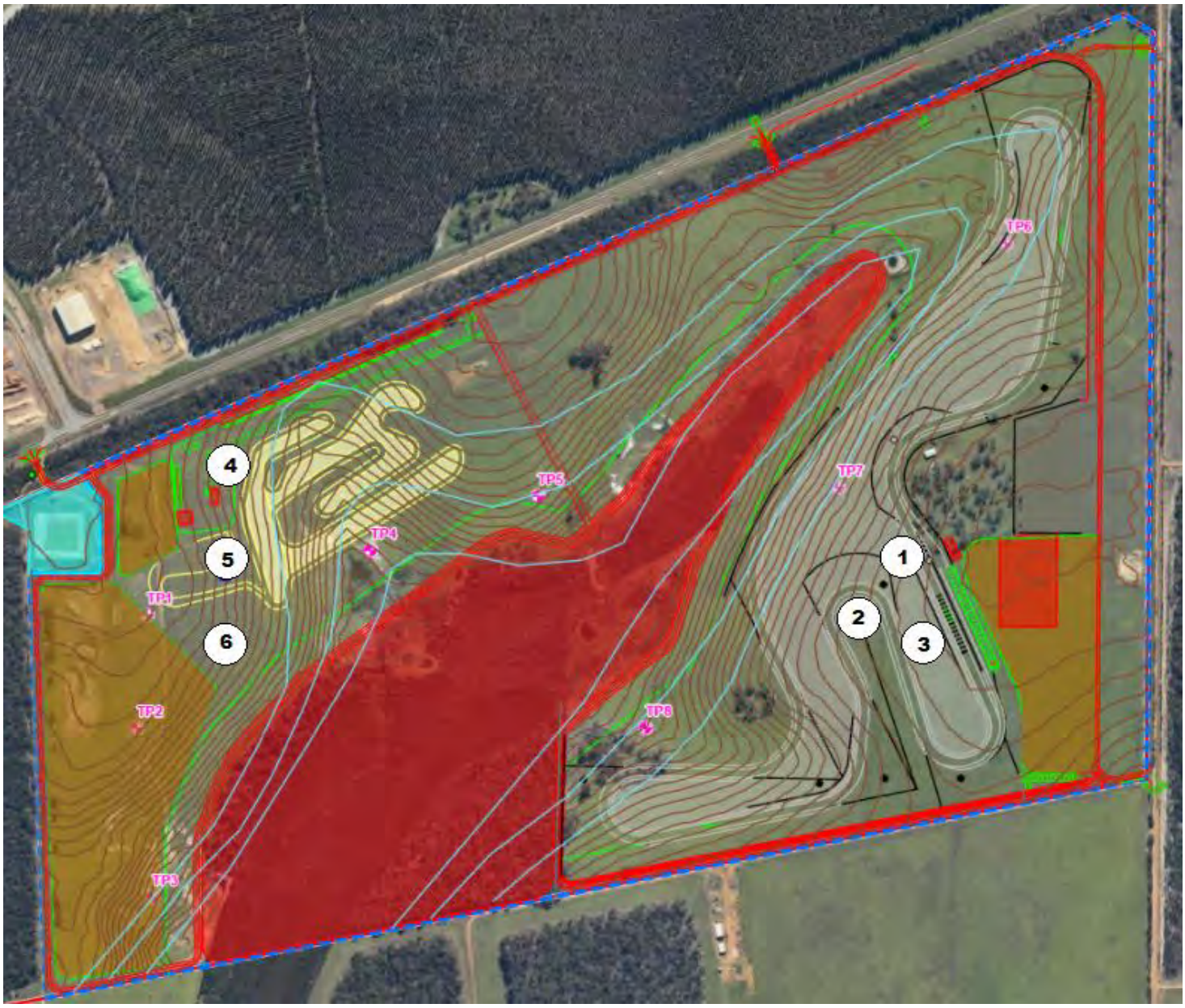
Appendix A

Maps

Figure 1

Test Pits 1 to 6

Test Pit Locations



Appendix B

Test Pit Logs

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet			
4626	1	4626G1	Sheet	1	of	12

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/06/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	QU-0498	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'55.6"S 117°44'53.0"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	L-MD				
180 - 490	310	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular,	M	MD-D				#
		(F:20% / M:20% / C:15%). Fine to medium grained sand.						
		Contains approximately 10% Cobbles & Boulders in excess of 250mm diameter.						
550 - 2500	1950	**Sandy CLAY:** Low to medium plasticity, Brown/red mottled Light brown/orange (40%).	M	F				#
		Fine to medium grained sand.						

Samples Taken	Target Depth	✓	2500
TP1 - 180mm to 490mm	Cave In		
TP1 - 900mm to 1100mm	Refusal		
	Near Refusal		
	Flooding		
	Lack of Reach		

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

General

D - Dry M - Moist W - Wet
N/A - Not Applicable
N/D - Not Determined

Test Pit No.1

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4626 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 2 **of** 12

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		
4626	2	4626G2	3	of	12

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	25/06/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0498	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°55'58.3"S 117°44'50.2"E	M.Coffey	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 140	140	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	L-MD				
140 - 400	260	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular,	M	VD	MC			
		(F:20% / M:20% / C:15%). Fine to medium grained sand.						
		Contains approximately 10% Cobbles & Boulders in excess of 400mm diameter.						
400 - 1400	1000	**Sandy CLAY:** Low to medium plasticity, Light brown.	M	F				#
		Fine to medium grained sand.						
1400 - 2500	1100	**Sandy CLAY:** Low to medium plasticity, Brown/red mottled Light brown/orange (40%).	M	F				#
		Fine to medium grained sand.						

Samples Taken			
TP2 - 500mm to 900mm	Target Depth	✓	2500
TP2 - 1700mm to 2000mm	Cave In		
	Refusal		
	Near Refusal		
	Flooding		
	Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.2

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		
4626	3	4626G3	5	of	12

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	25/06/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0498	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°55'59.6"S 117°44'56.4"E	M.Coffey	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 250	250	**(Topsoil) SAND with silt:** Dark grey to grey, fine to medium. Roots and root fibres.	M	L-MD				
250 - 830	580	**Sandy GRAVEL:** Brown, fine to medium, sub-rounded to sub-angular**,**	M	MD-D				#
		(F:30% / M:30%). Fine to medium grained sand.						
		Contains approximately 10% Cobbles & Boulders in excess of 400mm diameter.						
830 - 1600	770	**Sandy CLAY:** Low to medium plasticity, Light brown.	M	F				#
		Fine to medium grained sand.						
1600 - 2500	900	**Sandy CLAY:** Low to medium plasticity, Brown/red mottled Light brown/grey (30%).	M	F				#
		Fine to medium grained sand.						

Samples Taken		
TP3 - 300mm to 600mm		
TP3 - 900mm to 1200mm		
TP3 - 1600mm to 2000mm		

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.3

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4626 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 6 **of** 12

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		
4626	4	4626G4	7	of	12

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	25/06/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0498	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°55'51.5"S 117°44'17.6"E	M.Coffey	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 220	220	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	L-MD				
220 - 1250	1030	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular,	M	D				#
		(F:25% / M:20% / C:10%). Fine to medium grained sand.						
		Contains approximately 10% Cobbles & Boulders in excess of 400mm diameter.						
1250 - 1750	500	**Sandy CLAY:** Low to medium plasticity, Light brown/orange.	M	F				#
		Fine to medium grained sand.						
1750 - 2500	750	**Sandy CLAY:** Low to medium plasticity, grey mottled red (30%) & orange (10%).	M	F				#
		Fine to medium grained sand.						

Samples Taken			
TP4 - 400mm to 800mm			
TP4 - 1350mm to 1650mm			
TP4 - 1800mm to 2200mm			

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.4

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No** 4626	**Test Pit No.** 5	**Sample No.** 4626G5	**Sheet** 9 **of** 12

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	25/06/2021	**Equipment type:**	Kubota KX41-3V
Project No.	QU-0498	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°55'55.6"S 117°44'17.5"E	M.Coffey	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 230	230	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	L-MD				
230 - 880	650	**SAND with silt:** Grey, fine to medium.	M	MD				#
880 - 2500	1620	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular,	M	MD-D				#
		(F:15% / M:30% / C:10%). Fine to medium grained sand.						
		Contains approximately 10% Cobbles & Boulders in excess of 400mm diameter.						

Samples Taken			
TP5 - 400mm to 800mm			
TP5 - 1200mm to 1500mm			

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.5

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4626	6	4626G6	11		12	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/06/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	QU-0498	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'59.9"S 117°44'17.4"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 350	350	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	L-MD				
350 - 1200	850	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular,	M	D-VD				#
		(F:20% / M:20% / C:10%). Fine to medium grained sand.						
		Contains approximately 10% Cobbles & Boulders in excess of 400mm diameter.						
1200 - 1800	600	**Sandy GRAVEL:** Light brown, fine to coarse, sub-rounded to sub-angular,	M	D				#
		(F:20% / M:30% / C:10%). Fine to medium grained sand.						
1800 - 2500	700	**Sandy GRAVEL:** Brown/orange, fine to medium, sub-rounded to sub-angular,	M	MD-D				#
		(F:40% / M:20%). Fine to medium grained sand.						

Samples Taken			
TP6 - 500mm to 800mm			
TP6 - 1300mm to 1600mm			
TP6 - 2000mm to 2300mm			

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.6

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4626 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 12 **of** 12

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

COLOURS

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

MOISTURE CONDITION OF SOIL

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

PARTICLE SHAPES

ANGULAR	SUB-ANGULAR	SUB-ROUNDED	ROUNDED

PARTICLE SIZES

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

GRAIN SIZE

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

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

CLASSIFICATION CHART

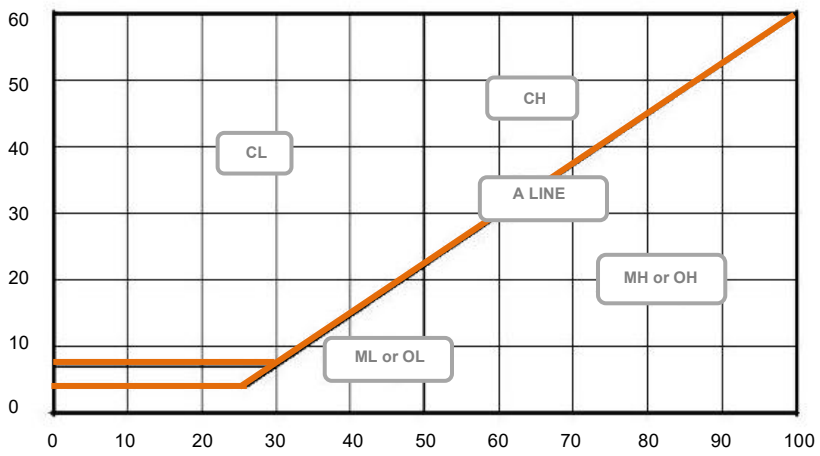
FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60mm and basing fractions on estimated mass)				GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% of material less than 63 mm is larger than 0.075 mm	GRAVELS More than 50% of coarse fraction is larger than 2.36mm	CLEAN GRAVELS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

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

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

PLASTICITY CHART

For laboratory classification of fine grained soils



GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

PLASTICITY

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

DESCRIPTION OF ORGANIC OR ARTIFICIAL MATERIALS

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

CONSISTENCY - Cohesive soils

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

CONSISTENCY - Non-cohesive soils

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

MINOR COMPONENTS

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

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

GEOLOGICAL ORIGIN

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

STRENGTH OF ROCK MATERIAL

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

ROCK MATERIAL WEATHERING CLASSIFICATION

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

Appendix E

Laboratory results

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EP2107544**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS VICKI DAVIES	Contact	: Nick Courts
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: 12546218 Albany Motorsports Park DA	Date Samples Received	: 01-Jul-2021 13:30
Order number	: 12546218	Date Analysis Commenced	: 02-Jul-2021
C-O-C number	: ----	Issue Date	: 13-Jul-2021 13:47
Sampler	: ----		
Site	: ----		
Quote number	: EP/444/21		
No. of samples received	: 15		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- Phosphorus Sorption Index + Capacity conducted by ALS Sydney, NATA accreditation no. 825, site no 10911.
- ED007 and ED008: When Exchangeable Al is reported from these methods, it should be noted that Rayment & Lyons (2011) suggests Exchange Acidity by 1M KCl - Method 15G1 (ED005) is a more suitable method for the determination of exchange acidity (H+ + Al3+).

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP1 - 900mm to 1100mm	TP2 - 500mm to 900mm	TP3 - 300mm to 600mm	TP4 - 400mm to 800mm	TP5 - 400mm to 800mm
			Sampling date / time	25-Jun-2021 00:00	25-Jun-2021 00:00	25-Jun-2021 00:00	25-Jun-2021 00:00	25-Jun-2021 00:00
Compound	CAS Number	LOR	Unit	EP2107544-002	EP2107544-003	EP2107544-005	EP2107544-008	EP2107544-011
				Result	Result	Result	Result	Result
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**6.1**	**6.1**	**5.7**	**5.8**	**5.4**
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**22**	**25**	**28**	**24**	**4**
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**0.8**	**0.8**	**1.6**	**0.8**	<0.1
Exchangeable Magnesium	----	0.1	meq/100g	**0.5**	**1.0**	**0.2**	**0.2**	<0.1
Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	<0.1	<0.1	<0.1
Exchangeable Sodium	----	0.1	meq/100g	<0.1	<0.1	**0.1**	<0.1	<0.1
Cation Exchange Capacity	----	0.1	meq/100g	**1.4**	**1.9**	**2.0**	**1.1**	**0.1**
Exchangeable Sodium Percent	----	0.1	%	**5.8**	**4.8**	**5.7**	**6.2**	<0.1
EK072: Phosphate Sorption Capacity								
Phosphate Sorption Capacity	----	250	mg P sorbed/kg	**688**	**1650**	**3660**	**3000**	<250
Phosphate Sorption Index	----	1	mgkg-1/log10 ugL-1	**60**	**157**	**289**	**244**	<1

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Sample ID	TP6 - 500mm to 800mm	----	----	----	----
			Sampling date / time	25-Jun-2021 00:00	----	----	----	----
Compound	CAS Number	LOR	Unit	EP2107544-013	--------	--------	--------	--------
				Result	----	----	----	----
EA002: pH 1:5 (Soils)								
pH Value	----	0.1	pH Unit	**5.9**	----	----	----	----
EA010: Conductivity (1:5)								
Electrical Conductivity @ 25°C	----	1	µS/cm	**20**	----	----	----	----
ED007: Exchangeable Cations								
Exchangeable Calcium	----	0.1	meq/100g	**1.0**	----	----	----	----
Exchangeable Magnesium	----	0.1	meq/100g	**0.2**	----	----	----	----
Exchangeable Potassium	----	0.1	meq/100g	<0.1	----	----	----	----
Exchangeable Sodium	----	0.1	meq/100g	<0.1	----	----	----	----
Cation Exchange Capacity	----	0.1	meq/100g	**1.3**	----	----	----	----
Exchangeable Sodium Percent	----	0.1	%	**1.4**	----	----	----	----
EK072: Phosphate Sorption Capacity								
Phosphate Sorption Capacity	----	250	mg P sorbed/kg	**966**	----	----	----	----
Phosphate Sorption Index	----	1	mgkg-1/log10 ugL-1	**62**	----	----	----	----

Inter-Laboratory Testing

Analysis conducted by ALS Sydney, NATA accreditation no. 825, site no. 10911 (Chemistry) 14913 (Biology).

(SOIL) EK072: Phosphate Sorption Capacity

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **EP2107544**	Page	: 1 of 3
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS VICKI DAVIES	Contact	: Nick Courts
Address	: 999 HAY STREET PERTH WA, AUSTRALIA 6000	Address	: 26 Rigali Way Wangara WA Australia 6065
Telephone	: ----	Telephone	: +61-8-9406 1301
Project	: 12546218 Albany Motorsports Park DA	Date Samples Received	: 01-Jul-2021
Order number	: 12546218	Date Analysis Commenced	: 02-Jul-2021
C-O-C number	: ----	Issue Date	: 13-Jul-2021
Sampler	: ----		
Site	: ----		
Quote number	: EP/444/21		
No. of samples received	: 15		
No. of samples analysed	: 6		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted, unless the sampling was conducted by ALS. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Method Blank (MB) and Laboratory Control Spike (LCS) Report; Recovery and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Ankit Joshi	Inorganic Chemist	Sydney Inorganics, Smithfield, NSW
Chris Lemaitre	Laboratory Manager (Perth)	Perth Inorganics, Wangara, WA

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Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis. Where the LOR of a reported result differs from standard LOR, this may be due to high

Key : Anonymous = Refers to samples which are not specifically part of this work order but formed part of the QC process lot
CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
RPD = Relative Percentage Difference
# = Indicates failed QC

Laboratory Duplicate (DUP) Report

The quality control term Laboratory Duplicate refers to a randomly selected intralaboratory split. Laboratory duplicates provide information regarding method precision and sample heterogeneity. The permitted ranges for the Relative Percent Deviation (RPD) of Laboratory Duplicates are specified in ALS Method QWI-EN/38 and are dependent on the magnitude of results in comparison to the level of reporting: Result < 10 times LOR: No Limit; Result between 10 and 20 times LOR: 0% - 50%; Result > 20 times LOR: 0% - 20%.

Sub-Matrix: **SOIL**

				Laboratory Duplicate (DUP) Report					
Laboratory sample ID	*Sample ID*	*Method: Compound*	*CAS Number*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD (%)*	*Acceptable RPD (%)*
EA002: pH 1:5 (Soils) (QC Lot: 3770355)									
EP2107544-002	TP1 - 900mm to 1100mm	EA002: pH Value	----	0.1	pH Unit	6.1	6.1	0.0	0% - 20%
EA010: Conductivity (1:5) (QC Lot: 3770356)									
EP2107544-002	TP1 - 900mm to 1100mm	EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	22	22	0.0	0% - 20%
ED007: Exchangeable Cations (QC Lot: 3780436)									
EP2107521-057	Anonymous	ED007: Exchangeable Sodium Percent	----	0.1	%	2.9	3.0	3.6	0% - 20%
		ED007: Exchangeable Calcium	----	0.1	meq/100g	16.8	14.7	13.3	0% - 20%
		ED007: Exchangeable Magnesium	----	0.1	meq/100g	0.4	0.4	0.0	No Limit
		ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	<0.1	0.0	No Limit
		ED007: Exchangeable Sodium	----	0.1	meq/100g	0.5	0.5	0.0	No Limit
		ED007: Cation Exchange Capacity	----	0.1	meq/100g	17.8	15.6	13.1	0% - 20%
EK072: Phosphate Sorption Capacity (QC Lot: 3776718)									
EP2107544-002	TP1 - 900mm to 1100mm	EK072: Phosphate Sorption Capacity	----	250	mg P sorbed/kg	688	409	50.9	No Limit
		EK072: Phosphate Sorption Index	----	1	mgkg-1/log10ug L-1	60	60	0.0	0% - 20%

Method Blank (MB) and Laboratory Control Sample (LCS) Report

The quality control term Method / Laboratory Blank refers to an analyte free matrix to which all reagents are added in the same volumes or proportions as used in standard sample preparation. The purpose of this QC parameter is to monitor potential laboratory contamination. The quality control term Laboratory Control Sample (LCS) refers to a certified reference material, or a known interference free matrix spiked with target analytes. The purpose of this QC parameter is to monitor method precision and accuracy independent of sample matrix. Dynamic Recovery Limits are based on statistical evaluation of processed LCS.

Sub-Matrix: **SOIL**

				Method Blank (MB) Report	Laboratory Control Spike (LCS) Report			
					Spike	Spike Recovery (%)	Acceptable Limits (%)	
Method: Compound	CAS Number	LOR	Unit	Result	Concentration	LCS	Low	High
EA002: pH 1:5 (Soils) (QCLot: 3770355)								
EA002: pH Value	----	----	pH Unit	----	4 pH Unit	100	70.0	130
				----	7 pH Unit	100	70.0	130
EA010: Conductivity (1:5) (QCLot: 3770356)								
EA010: Electrical Conductivity @ 25°C	----	1	µS/cm	<1	1412 µS/cm	99.6	93.6	106
ED007: Exchangeable Cations (QCLot: 3780436)								
ED007: Exchangeable Calcium	----	0.1	meq/100g	<0.1	21.6 meq/100g	91.0	82.9	117
ED007: Exchangeable Magnesium	----	0.1	meq/100g	<0.1	1.76 meq/100g	91.3	78.4	119
ED007: Exchangeable Potassium	----	0.1	meq/100g	<0.1	1 meq/100g	107	87.9	129
ED007: Exchangeable Sodium	----	0.1	meq/100g	<0.1	0.9 meq/100g	103	92.9	132
ED007: Cation Exchange Capacity	----	0.1	meq/100g	<0.1	25.3 meq/100g	92.0	84.7	117
ED007: Exchangeable Sodium Percent	----	0.1	%	<0.1	----	----	----	----

Matrix Spike (MS) Report

The quality control term Matrix Spike (MS) refers to an intralaboratory split sample spiked with a representative set of target analytes. The purpose of this QC parameter is to monitor potential matrix effects on analyte recoveries. Static Recovery Limits as per laboratory Data Quality Objectives (DQOs). Ideal recovery ranges stated may be waived in the event of sample matrix interference.

- **No Matrix Spike (MS) or Matrix Spike Duplicate (MSD) Results are required to be reported.**

ALS Environmental

QA/QC Compliance Assessment to assist with Quality Review

Work Order	: **EP2107544**	Page	: 1 of 4
Client	: **GHD PTY LTD**	Laboratory	: Environmental Division Perth
Contact	: MS VICKI DAVIES	Telephone	: +61-8-9406 1301
Project	: 12546218 Albany Motorsports Park DA	Date Samples Received	: 01-Jul-2021
Site	: ----	Issue Date	: 13-Jul-2021
Sampler	: ----	No. of samples received	: 15
Order number	: 12546218	No. of samples analysed	: 6

This report is automatically generated by the ALS LIMS through interpretation of the ALS Quality Control Report and several Quality Assurance parameters measured by ALS. This automated reporting highlights any non-conformances, facilitates faster and more accurate data validation and is designed to assist internal expert and external Auditor review. Many components of this report contribute to the overall DQO assessment and reporting for guideline compliance.

Brief method summaries and references are also provided to assist in traceability.

Summary of Outliers

Outliers : Quality Control Samples

This report highlights outliers flagged in the Quality Control (QC) Report.

- **NO Method Blank value outliers occur.**
- **NO Duplicate outliers occur.**
- **NO Laboratory Control outliers occur.**
- **NO Matrix Spike outliers occur.**
- **For all regular sample matrices, NO surrogate recovery outliers occur.**

Outliers : Analysis Holding Time Compliance

- **NO Analysis Holding Time Outliers exist.**

Outliers : Frequency of Quality Control Samples

- **NO Quality Control Sample Frequency Outliers exist.**

Analysis Holding Time Compliance

If samples are identified below as having been analysed or extracted outside of recommended holding times, this should be taken into consideration when interpreting results.

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times (referencing USEPA SW 846, APHA, AS and NEPM) based on the sample container provided. Dates reported represent first date of extraction or analysis and preclude subsequent dilutions and reruns. A listing of breaches (if any) is provided herein.

Holding time for leachate methods (e.g. TCLP) vary according to the analytes reported. Assessment compares the leach date with the shortest analyte holding time for the equivalent soil method. These are: organics 14 days, mercury 28 days & other metals 180 days. A recorded breach does not guarantee a breach for all non-volatile parameters.

Holding times for ***VOC in soils*** vary according to analytes of interest. Vinyl Chloride and Styrene holding time is 7 days; others 14 days. A recorded breach does not guarantee a breach for all VOC analytes and should be verified in case the reported breach is a false positive or Vinyl Chloride and Styrene are not key analytes of interest/concern.

Matrix: **SOIL**

Evaluation: × = Holding time breach ; ✓ = Within holding time.

Method / Container / Client Sample ID(s)	Sample Date	Extraction / Preparation			Analysis		
		Date extracted	Due for extraction	Evaluation	Date analysed	Due for analysis	Evaluation
EA002: pH 1:5 (Soils)							
Snap Lock Bag (EA002)							
TP3 - 300mm to 600mm, TP4 - 400mm to 800mm, TP5 - 400mm to 800mm, TP6 - 500mm to 800mm	**25-Jun-2021**	**02-Jul-2021**	02-Jul-2021	✓	**02-Jul-2021**	02-Jul-2021	✓
Soil Glass Jar - Unpreserved (EA002)							
TP1 - 900mm to 1100mm, TP2 - 500mm to 900mm	**25-Jun-2021**	**02-Jul-2021**	02-Jul-2021	✓	**02-Jul-2021**	02-Jul-2021	✓
EA010: Conductivity (1:5)							
Snap Lock Bag (EA010)							
TP3 - 300mm to 600mm, TP4 - 400mm to 800mm, TP5 - 400mm to 800mm, TP6 - 500mm to 800mm	**25-Jun-2021**	**02-Jul-2021**	02-Jul-2021	✓	**02-Jul-2021**	30-Jul-2021	✓
Soil Glass Jar - Unpreserved (EA010)							
TP1 - 900mm to 1100mm, TP2 - 500mm to 900mm	**25-Jun-2021**	**02-Jul-2021**	02-Jul-2021	✓	**02-Jul-2021**	30-Jul-2021	✓
ED007: Exchangeable Cations							
Snap Lock Bag (ED007)							
TP3 - 300mm to 600mm, TP4 - 400mm to 800mm, TP5 - 400mm to 800mm, TP6 - 500mm to 800mm	**25-Jun-2021**	**08-Jul-2021**	23-Jul-2021	✓	**08-Jul-2021**	23-Jul-2021	✓
Soil Glass Jar - Unpreserved (ED007)							
TP1 - 900mm to 1100mm, TP2 - 500mm to 900mm	**25-Jun-2021**	**08-Jul-2021**	23-Jul-2021	✓	**08-Jul-2021**	23-Jul-2021	✓
EK072: Phosphate Sorption Capacity							
Soil Glass Jar - Unpreserved (EK072)							
TP1 - 900mm to 1100mm, TP2 - 500mm to 900mm, TP3 - 300mm to 600mm, TP4 - 400mm to 800mm, TP5 - 400mm to 800mm, TP6 - 500mm to 800mm	**25-Jun-2021**	**----**	----	----	**06-Jul-2021**	22-Dec-2021	✓

Quality Control Parameter Frequency Compliance

The following report summarises the frequency of laboratory QC samples analysed within the analytical lot(s) in which the submitted sample(s) was(were) processed. Actual rate should be greater than or equal to the expected rate. A listing of breaches is provided in the Summary of Outliers.

Matrix: **SOIL**

Evaluation: × = Quality Control frequency not within specification ; ✓ = Quality Control frequency within specification.

Quality Control Sample Type		Count		Rate (%)			Quality Control Specification
Analytical Methods	*Method*	*QC*	*Regular*	***Actual***	***Expected***	*Evaluation*	
Laboratory Duplicates (DUP)							
Electrical Conductivity (1:5)	EA010	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	8	**12.50**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
P Sorption Index & P Sorption Capacity	EK072	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	1	6	**16.67**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Laboratory Control Samples (LCS)							
Electrical Conductivity (1:5)	EA010	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
pH (1:5)	EA002	2	6	**33.33**	**10.00**	✓	NEPM 2013 B3 & ALS QC Standard
Method Blanks (MB)							
Electrical Conductivity (1:5)	EA010	1	6	**16.67**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard
Exchangeable Cations	ED007	1	8	**12.50**	**5.00**	✓	NEPM 2013 B3 & ALS QC Standard

Brief Method Summaries

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the US EPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by client request. The following report provides brief descriptions of the analytical procedures employed for results reported in the Certificate of Analysis. Sources from which ALS methods have been developed are provided within the Method Descriptions.

Analytical Methods	Method	Matrix	Method Descriptions
pH (1:5)	EA002	SOIL	In house: Referenced to Rayment and Lyons 4A1 and APHA 4500H+. pH is determined on soil samples after a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Electrical Conductivity (1:5)	EA010	SOIL	In house: Referenced to Rayment and Lyons 3A1 and APHA 2510. Conductivity is determined on soil samples using a 1:5 soil/water leach. This method is compliant with NEPM Schedule B(3).
Exchangeable Cations	ED007	SOIL	In house: Referenced to Rayment & Lyons Method 15A1. Cations are exchanged from the sample by contact with Ammonium Chloride. They are then quantitated in the final solution by ICPAES and reported as meq/100g of original soil. This method is compliant with NEPM Schedule B(3).
P Sorption Index & P Sorption Capacity	EK072	SOIL	In house: Referenced to Rayment & Lyons Method 9H1 & 9I1 Soil is bought to equilibrium with a solution of P at known concentration. P absorbed, released is determined by FIA analysis of the final solution.

Preparation Methods	Method	Matrix	Method Descriptions
Exchangeable Cations Preparation Method	ED007PR	SOIL	In house: Referenced to Rayment & Lyons method 15A1. A 1M NH4Cl extraction by end over end tumbling at a ratio of 1:20. There is no pretreatment for soluble salts. Extracts can be run by ICP for cations.
1:5 solid / water leach for soluble analytes	EN34	SOIL	10 g of soil is mixed with 50 mL of reagent grade water and tumbled end over end for 1 hour. Water soluble salts are leached from the soil by the continuous suspension. Samples are settled and the water filtered off for analysis.

CHAIN OF CUSTORDY RECORD AND ANALYSIS REQUEST

GHD House 999
Hay Street PO Box Y3106 Telephone 08 6222 8222 Facsimile 08 6222
Perth WA 6000 Perth WA 6832 8555

COC No.

Project Albany Motorsports Park DA		Laboratory: ~~Eurofins | mgt~~ redirected to ALS	
Client City of Albany	**Job No.** 12546218	Address: ~~46-48 Banksia Road, WELSHPOOL, WA 6106~~	
		Laboratory Contact:	
Laboratory Quote No. EP/444/21	**Turnaround Time** Standard		
Job Manager (Invoice) Vicki.Davies@ghd.com & GHD accounts	**Email Address (Results)** Vicki.Davies@ghd.com		

Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: pH plus EC (1:5)	Analyses: CEC/ Exchangeable Cations (ED007) - Default Parameters	Analyses: P Sorption Index & P Sorption Capacity	Analyses: HOLD	Remarks
TP1 - 180mm to 490mm	1	25/06/2021		S								✔	
TP1 - 900mm to 1100mm	2	25/06/2021		S					✔	✔	✔		
TP2 - 500mm to 900mm	3	25/06/2021		S					✔	✔	✔		
TP2 - 1700mm to 2000mm	4	25/06/2021		S								✔	
TP3 - 300mm to 600mm	5	25/06/2021		S					✔	✔	✔		
TP3- 900mm to 1200mm	6	25/06/2021		S								✔	
TP3 - 1600mm to 2000mm	7	25/06/2021		S								✔	
TP4 - 400mm to 800mm	8	25/06/2021		S					✔	✔	✔		
TP4 - 1350mm to 1650mm	9	25/06/2021		S								✔	
TP4 - 1800mm to 2200mm	10	25/06/2021		S								✔	
TP5 - 400mm to 800mm	11	25/06/2021		S					✔	✔	✔		
TP5 - 1200mm to 1500mm	12	25/06/2021		S								✔	
TP6 - 500mm to 800mm	13	25/06/2021		S					✔	✔	✔		
TP6 - 1300mm to 1600mm	14	25/06/2021		S								✔	
TP6 - 2000mm to 2300mm	15	25/06/2021		S								✔	
				S									
				S									
				S									

Sampled by: Great Southern Geotechnics	Date/Time:		Relinquished by: Great Southern Geotechnics	Date/ Time:
Received by:	Date/Time:		Relinquished by:	Date/ Time:
Received by Lab: SP	Date/Time: 1630 1/7/21		Courier/ Transport Company:	
Sample Conditions:	Remarks:			

Environmental Division
Perth
Work Order Reference
EP2107544

Telephone : +61-8-9406 1301

Appendix F

Aquarius Wastewater Systems Pty Ltd

AQUARIUS® Systems

1 – 5 Bedrooms	O-3 ATU	O-2 NR ATU	O-2 ATU
6 – 9 Bedrooms	O-3 3KL ATU	O-2 NR 3KL ATU	O-2 3KL ATU
Commercial	AQUARIUS® Standard or Custom Designed Commercial Systems Please speak to our Sales Consultant		

Specifications

	O-3	**O-2 NR**	**O-2**
<u>System Features</u> Poly/Duralen Plastic or Concrete Tank Construction	✓	✓	✓
Nutrient Retentive (Phosphorous removal)	✓	✓	
Ozone Disinfection	✓		
Recycles all wastewater through irrigation into gardens, orchards, etc.	✓	✓	✓
Supplied complete with irrigation components, electrical components and pumps	✓	✓	✓
Footprint required approx 6m x 2.5m x 2m**	✓	✓	✓
Low Energy use	✓	✓	✓
<u>Irrigation Area</u> Above Ground Dripper Irrigation Sub-Surface Dripper Irrigation Irrigation area in sandy soil conditions – *150m^2	 ✓ ✓ ✓	 ✓ ✓	 ✓ ✓
<u>Other Disposal options</u> Leach Drains / Soakwells / Aquasafe Drains	✓	✓	✓
<u>Maintenance</u> Service calls per year as per DoH WA requirements	2	2	2
<u>Manufacturers Warranties</u> Poly/Duralen Plastic Tanks 15 years Orange Pumps 1 year Irrigation and Electrical components 1 year	 ✓ ✓ ✓	 ✓ ✓ ✓	 ✓ ✓ ✓
<u>Approvals</u> Fully approved by the WA Department of Health	✓	✓	✓
Australian Standards approved AS/NZS 1546.3	✓	✓	✓
<u>Why choose Aquarius</u> Wholly owned West Australian Company	✓	✓	✓
Manufactured in Western Australia	✓	✓	✓
Extensive Support Network covering all of WA	✓	✓	✓
Local Agents fully trained and registered with Department of Health WA	✓	✓	✓

*Subject to local authority approval

**Subject to configuration of ATU

Treatment Process

	O-3	O-2 NR	O-2
Primary Tank Retains the solids and uses aerobic and anaerobic bacteria to breakdown the BOD_5 levels in the sewage.	✓	✓	✓
Alum Tank Doses the Clarifying chamber of the Treatment tank with Alum. Alum acts as a flocculent to remove the nutrients and suspended solids and settle them to the bottom of the tank for further aerobic bacteria breakdown.	✓	✓	
Treatment Tank **Secondary / Aeration Chamber** Incorporates aeration to further break down BOD_5 and nitrates.	✓	✓	✓
Clarifying Chamber The Clarifying Chamber provides a settling and clarifying period for the water prior to discharge.	✓	✓	✓
Discharge Chamber The Discharge chamber contains the Discharge Pump to pump the treated water out to irrigation or other disposal methods.	✓	✓	✓
Ozonation Pump Ozone is a powerful disinfectant, many times more effective than chlorine and kills all bacteria.	✓		
DoH WA ATU Water Quality Criteria			
<20mg/L BOD_5	✓	✓	✓
<30mg/L suspended solids	✓	✓	✓
<10 E.coli/100ml	✓		
>3mg/L Ozone concentration	✓		
<1mg/L (98.5%) TP (% removal)	✓	✓	
<10mg/L (97.8%) TN (% removal)	✓	✓	✓

ghd.com

→ The Power of Commitment

Appendix E

Hydrocarbon Management Plan

Albany Motorsport Park - Development Application

Hydrocarbon Management Plan

City of Albany

27 July 2021

→ **The Power of Commitment**

GHD Pty Ltd | ABN 39 008 488 373
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Author	Vicki Davies
Project manager	Vicki Davies
Client name	City of Albany
Project name	Albany Motorsport Park - Development Application
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Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	V. Davies	J. Cramer		J. Foley		17/05/21
S4	0	V. Davies	J. Cramer		J. Foley	 Jeff Foley 2021.07.30 11:10:47 +08'00'	

Executive summary

The purpose of this Hydrocarbon Management Plan is to minimise environmental impact due to potential hydrocarbon spills or inappropriate disposal during the operation of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A). The Hydrocarbon Management Plan has been created to minimise potential impacts to the environment and/or human health from hydrocarbon waste.

This Hydrocarbon Management Plan is appended to the overarching Environmental Management Plan (EMP) which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

Measures to mitigate environmental impacts, due to potential hydrocarbon spills or inappropriate disposal, during the construction of the AMP have been included in the Construction Management Plan (Appendix J of the EMP).

The objectives of this management plan are to ensure:

– Hydrocarbons are used and managed appropriately on the site
– Hydrocarbon waste is disposed of appropriately
– All hydrocarbon spill kits, disposal areas/ containers are supplied, managed and maintained
– All accidental or uncontrolled release of hydrocarbons to the environment are reported and remediated to protect environmental/ health values and maintain biological diversity and ecological integrity of the Site
– All responsible persons are appropriately trained and responsibilities are assigned for implementing these measures.

If hydrocarbons and hydrocarbon waste is not appropriately managed within the AMP the following potential impacts/ risks may occur:

– Contamination of surrounding soil, groundwater, and surface water
– Contaminated of air quality due to vapor generation
– Potential ignition source for fire
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Community and stakeholder dissatisfaction.

Measures to mitigate environmental impacts, due to potential hydrocarbon spills or inappropriate disposal, during the construction of the AMP have also been included in the Construction Management Plan (Appendix J of the EMP).

It is the responsibility of Albany Motorsport Venue Incorporated (AMV Inc) to implement this Hydrocarbon Management Plan during operation of the AMP.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

Contents

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- 1.1 Purpose of this report 1
- 1.2 Objectives 1
- 1.3 Legislation and guidelines 1
- 1.4 Limitations 1

2. Potential environmental impacts **3**

3. Management strategies, actions, timeframes and responsibilities **4**

4. Monitoring **6**

5. Review **7**

6. References **8**

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Appendices

Appendix A Figures

1. Introduction

1.1 Purpose of this report

The purpose of this Hydrocarbon Management Plan is to minimise environmental impact due to potential hydrocarbon spills or inappropriate disposal during the operation of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A). The Hydrocarbon Management Plan has been created to minimise potential impacts to the environment and/ or human health from hydrocarbon waste.

Measures to mitigate environmental impacts, due to potential hydrocarbon spills or inappropriate disposal, during the construction of the AMP have also been included in the Construction Management Plan (Appendix J of the EMP).

1.2 Objectives

The objectives of this management plan are to ensure:

– Hydrocarbons are used and managed appropriately on the site
– Hydrocarbon waste is disposed of appropriately
– All hydrocarbon spill kits, disposal areas/ containers are supplied, managed and maintained
– All accidental or uncontrolled release of hydrocarbons to the environment are reported and remediated to protect environmental/ health values and maintain biological diversity and ecological integrity of the Site
– All responsible persons are appropriately trained and responsibilities are assigned for implementing these measures.

1.3 Legislation and guidelines

Legislation and guidelines associated with hydrocarbon use and disposal include, but may not be limited to the following:

– *Environmental Protection Act 1986*
– *Environmental Protection Regulations 1987*
– *Dangerous Goods Safety Act 2004*
– *Contaminated Sites Act 2003*
– *AS1940:2004 – The Storage and Handling of Combustible Liquids*
– Water Quality Protection Note (WQPN) 100: Motor sport facilities near sensitive waters (DoW, 2007).

1.4 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible. The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect. GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Potential environmental impacts

Operation of the AMP is considered likely to generate hydrocarbons, via the following sources:

– Hydrocarbons (fuel, oil, grease, etc.) being brought to site by competitors.
– There are to be no above or below ground bulk fuel storage tanks located onsite. All competitors will bring their own fuel and remove all hydrocarbon waste offsite at the completion of each event.
– Spills on the tracks.
– Spills in the concrete bunded, covered, hardstand areas.

It is expected that all competitors will remove their own hydrocarbon wastes, such as fuel, grease, oil etc. at the completion of each event and dispose of at an appropriately licenced facility.

The AMP operators will store small quantities of hydrocarbons on-site for use in maintenance machinery only (e.g. lawn mowers, etc.).

If hydrocarbons and hydrocarbon waste is not appropriately managed within the AMP the following potential impacts/ risks may occur:

– Contamination of surrounding soil, groundwater, and surface water
– Contaminated of air quality due to vapor generation
– Potential ignition source for fire
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Community and stakeholder dissatisfaction.

3. Management strategies, actions, timeframes and responsibilities

Broad management strategies have been developed to minimise potential impacts associated with hydrocarbons. The management strategies, timing and responsibilities are outlined in Table 1.

It is the responsibility of the Operations Manager of the AMV Inc. to implement this Hydrocarbon Management Plan during operation of the AMP.

Table 1 Hydrocarbon management strategies, actions, timeframes and responsibilities

Management Strategies	Actions	Timeframes	Responsibility
Site induction	Site induction includes the following specific hydrocarbon management components: – Spill kit locations and instructions for use – Location of hardstand areas for vehicle refuelling and minor servicing activities – Each competitor will remove their own hydrocarbon wastes, such as fuel, grease, oil etc at the completion of each event and disposal of at an appropriately licenced facility.	On entry to site	All personnel (AMV Inc. Operations Manager, volunteers and competitors)
	All responsible persons to undertake the necessary training on the handling of, and disposal of, hydrocarbons and spill kits used at the AMP.	Site induction	AMV Inc. Operations Manager
Refuelling and minor servicing in self-bunded designated areas only	Refuelling and minor servicing of vehicles will be undertaken on designated bunded hardstand areas with wastewater trap to contain hydrocarbon contaminated water (Figure 2, Appendix A). All refuelling and minor servicing must be not be carried out without a fully stocked spill kit available. Bunding will be designed as per requirements of AS1940-2004. No refuelling or hydrocarbon storage shall occur within 200 m of the Protected Exclusion Area.	At all times	All personnel
No major servicing onsite	No major servicing of vehicles will be permitted onsite. Minor servicing, refuelling and wash down may occur in the designated concrete bunded, covered, hardstand areas with wastewater trap to contain hydrocarbon contaminated water (Figure 2, Appendix A).	At all times	All personnel
No above or below ground fuel tanks onsite	No permanent above or below ground bulk fuel storage tanks will be installed onsite. Fuel for generators will be stored in drums on a designated concrete bunded, covered, hardstand area with wastewater trap to contain hydrocarbon contaminated water (Figure 2, Appendix A).	At all times	All personnel
Containment of spills	Appropriately located and stocked Spill Kits will be held on site (wheelie bin or similar) to assist with containment of minor spills.	At all times	AMV Inc. Operations Manager
	A mobile Spill Kit and fire-fighting unit (trailer/ ute mounted, or similar) will be used on site to move to various parts of the Site in the event of a hydrocarbon spill in an area which does not have a permanent spill kit i.e. racetrack.	At all times	AMV Inc. Operations Manager

Management Strategies	Actions	Timeframes	Responsibility
	Fuel and oil Containment Booms (Land Socks), or similar, to be held on site in the event of a serious hydrocarbon spill resulting in surface runoff. Containment Booms are to be placed around the perimeter of a spill in order to contain the liquid spilled and assist with stopping its spread.	At all times	AMV Inc. Operations Manager
Remediation of spills	All minor spills shall be remediated immediately by using a Spill Kit and disposing of contaminated material to an appropriately licensed facility. In the event of a serious/ major spill, it will be contained using appropriate Spill Kit and relevant specialists contacted regarding soil and ground water testing/ determine if further remediation is required.	As required	AMV Inc. Operations Manager / Licensed contractor
Storage of waste hydrocarbons	No bulk hydrocarbon storage shall occur on the site. Small quantities for hydrocarbons (for site maintenance machinery) shall not be stored within 200 m of the Protected Exclusion Area. All hydrocarbons will be stored in concrete bunded, covered, hardstand area (Figure 2, Appendix A).	At all times	All personnel
Offsite disposal of waste hydrocarbons	Wastewater traps/ storage areas in the self-bunded areas, such as the washdown bays, refuelling and minor servicing areas, will be maintained and regularly inspected. Hydrocarbon contaminated wastewater traps will be emptied as required by a licensed waste oil/ separator contractor	Monthly or as required	Licensed contractor
	All waste oils and oily materials, including oil filters and rags, used spill kit materials will be collected and stored in properly labelled containers at the waste oil storage area until they are collected by the waste oil recycler for disposal or recycling according to the relevant legislation and guidelines.	Monthly or as required	Licensed contractor

4. Monitoring

Monitoring of the Site will be undertaken, by the AMV Inc., so as to meet the following performance criteria:

– All spill kits placed in appropriate locations and checked on a weekly basis or after an incident to ensure they are present and adequate materials are available for potential hydrocarbon spills
– No major accidental or uncontrolled release of hydrocarbons to the surrounding environment
– All minor releases of hydrocarbons to be managed, remediated and reported in the AMP Incidents Register
– All hydrocarbon wastes stored appropriately onsite and removed offsite to appropriately approved disposal locations on an as required basis
– All waste hydrocarbon volumes being transported off-site recorded for inclusion in annual reporting
– No detrimental impact to surface water and groundwater quality compared to baseline water quality records
– No hydrocarbons stored onsite following an event
– No complaints relating to hydrocarbon waste storage or handling.

Any incidents identified during Site inspections, which have not met the performance criteria, will be documented and corrective actions raised to mitigate these issues. These will be entered into the AMP Incident Register to track and monitor completion of corrective actions.

Where a hydrocarbon related pollution incident is a life-threatening incident or pollution emergency it will be reported to Department of Fire and Emergency Services (DFES) by calling 000. DFES will call out Department of Water and Environmental Regulation (DWER) for major pollution/ hazardous materials incidents.

Where a hydrocarbon related pollution incident occurs, which causes or threatens to cause a pollution emergency, that is not life-threatening it will be reported to DWER via the 24-hour Pollution Watch hotline as soon as practicable.

5. Review

The Hydrocarbon Management Plan will be reviewed and updated no later than annually. A review may occur sooner if there is a material change in risk, legal requirements or an incident relevant to hydrocarbon management. Management strategies will be reviewed for effectiveness and any corrective actions will be implemented.

6. References

DoW. (2007). *Water Quality Protection Note 100: Motor sport facilities near sensitive water.* Perth: Department of Water.

Roberts Gardiner Architects . (2021). *Albany Motorsport Park Masterplan - Stage 1.* Unpublished masterplan for City of Albany.

Appendix A

Figures

Figure 1 *Project site location*

Figure 2 *Master plan*

Pikes Rd
Redmond - Hay River Rd
Phillips Rd
REDMOND
Hazzard Rd
Down Rd
Marbelup Rd
Down West Rd
Albany Hwy
Down South Rd
DROME
Cochrane Rd
Hunwick Rd
Gunn Rd
TORBAY
Corio Rd
Boccomazzo Rd
Sandberg Rd
Ding Rd

LEGEND
- Road
- Albany Motorsport Park
- Lot 5780 Down Road South
- Cadastre

SLIP

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. 6137331
Revision No. 0
Date 22/07/2021

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E

ghd.com

→ The Power of Commitment

Appendix F

Waste Management Plan

Albany Motorsport Park – Development Application

Waste Management Plan

City of Albany

27 July 2021

→ The Power of Commitment

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File name	https://projectsportal.ghd.com/sites/pp18_05/albanymotorsportpark/ProjectDocs/Environmental Management Plan/12546218_REP_0- Albany Motorsport Park Waste Management Plan.docx
Author	Vicki Davies
Project manager	Vicki Davies
Client name	City of Albany
Project name	Albany Motorsport Park - Development Application
Document title	Albany Motorsport Park – Development Application | Waste Management Plan
Revision version	Rev 0
Project number	12546218

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	V. Davies	J. Cramer		J. Foley		17/05/2021
S4	0	V. Davies	J. Cramer		J. Foley		

Executive summary

The purpose of this Waste Management Plan is to ensure the safe and responsible segregation and disposal of waste materials generated during the operation of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A). The Waste Management Plan has been developed to minimise potential impacts to the environment and/or human health from waste generation.

This Waste Management Plan is appended to the overarching Environmental Management Plan (EMP) which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

The objectives of this management plan are to ensure:

– All waste is identified and characterises all potential waste streams
– Waste is stored and disposed of appropriately
– Disposal areas are managed and maintained
– A waste recycling program is in place to foster the “Reduce, Reuse and Recycle” philosophy.

The management of hydrocarbon storage and wastes are captured under the separate Hydrocarbon Management Plan (Appendix E of the EMP).

If waste is not appropriately managed within the AMP the following potential impacts/ risks may occur:

– Contamination of surrounding soil, groundwater, and surface water
– On-site waste category segregation to avoid cross-contamination not practiced
– Introduction and/ or spread of weeds
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Community and stakeholder dissatisfaction.

Measures to mitigate environmental impacts, due to inappropriate waste characterisation and disposal, during the construction of the AMP have also been included in the Construction Management Plan (Appendix J of the EMP).

It is the responsibility of Albany Motorsport Venue Incorporated (AMV Inc) to implement this Waste Management Plan during operation of the AMP.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

Contents

1. Introduction **1**
- 1.1 Purpose of this report 1
- 1.2 Objectives 1
- 1.3 Legislation and guidelines 1
- 1.4 Limitations 1

2. Waste sources and potential environmental impacts **3**
- 2.1 Waste hierarchy 3
- 2.2 Waste categories 3
  - 2.2.1 Non-hazardous waste 3
  - 2.2.2 Hazardous waste 3
  - 2.2.3 Recyclables 4
  - 2.2.4 Liquid waste 4
- 2.3 Waste sources 4
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5. Review **8**

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Appendix A Figures

1. Introduction

1.1 Purpose of this report

The purpose of this Waste Management Plan is to ensure the safe and responsible segregation and disposal of waste materials generated during the operation of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A). The Waste Management Plan has been developed to minimise potential impacts to the environment and/ or human health from waste generation.

This Waste Management Plan is appended to the overarching EMP which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

Measures to mitigate environmental impacts, due to inappropriate waste characterisation and disposal, during the construction of the AMP have also been included in the Construction Management Plan (Appendix J of the EMP).

1.2 Objectives

The objectives of this management plan are to ensure:

– All waste is identified and characterises all potential waste streams
– Waste is stored and disposed of appropriately
– Disposal areas are managed and maintained
– A waste recycling program is in place to foster the “Reduce, Reuse and Recycle” philosophy.

The management of hydrocarbon storage and wastes are captured under the separate Hydrocarbon Management Plan (Appendix E of the EMP).

1.3 Legislation and guidelines

Waste and recycling activities are legislated under the following, but may not be limited to:

– *Contaminated Sites Act 2003*
– *Dangerous Goods Safety Act 2004*
– *Environmental Protection Act 1986*
– *Environmental Protection Regulations 1987*
– *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*
– *Waste Reduction and Recycling Act 2011*
– *Waste Avoidance and Resource Recovery Act 2007.*

1.4 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Waste sources and potential environmental impacts

2.1 Waste hierarchy

The waste hierarchy is set out in the *Waste Avoidance and Resource Recovery Act 2007* (WARR Act), which ranks waste management options in order of most preferred to least preferred (Plate 1).

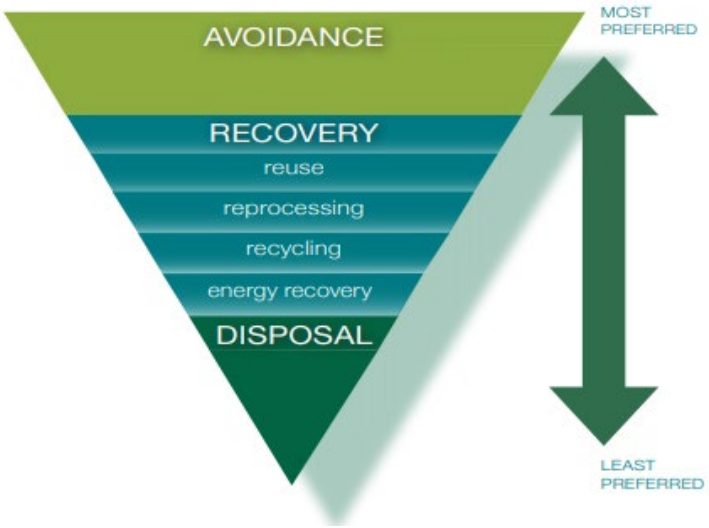

Plate 1 ***Waste hierarchy based on the WARR Act (Waste Authority, 2013)***

2.2 Waste categories

Waste has the potential to impact human health and/ or the surrounding environment. The Waste Management Plan has been developed to provide a framework for waste management at the AMP. This management includes storage, handling and disposal requirements.

Waste in the context of this Waste Management Plan refers to all substances requiring recycling or disposal generated by the operation of the AMP, with the exception of the hydrocarbons, which are covered in the Hydrocarbon Management Plan (Appendix E of the EMP).

2.2.1 Non-hazardous waste

Non-hazardous wastes are wastes composed of, or containing, materials which are not harmful to humans and which would not have a serious impact on the environment. Non-hazardous wastes can include putrescible solids and liquids, inert solids, food waste, domestic waste, plastics and concrete

2.2.2 Hazardous waste

Hazardous wastes are defined by the "*Landfill Waste Classification and Waste Definitions (December 2019)*" (DWER, 2019) as "*the component of the waste stream which by its characteristics poses a threat or risk to public health, safety or the environment (includes substances which are toxic, infectious, mutagenic, carcinogenic, teratogenic, explosive, flammable, corrosive, oxidising and radioactive)*".

Hazardous waste which may be used within the Site can include batteries, engine coolants and glycols, flammable liquids (hydrocarbons and fuels), fluorescent tubes, gas cylinders, cleaning chemicals, pesticides, herbicides, paint, solvents etc.

Hazardous waste, with the exception of hydrocarbons, will be addressed in this Waste Management Plan. Strategies for management and disposal of hydrocarbons will be addressed separately in the Hydrocarbon Management Plan (Appendix E of the EMP).

2.2.3 Recyclables

Recycle/recovery is the conversion of wastes into usable materials and/or extraction of energy or materials from wastes. Recyclable materials can include paper, cardboard, plastics, glass, metal, wood, tyres, vegetation and organic matter.

2.2.4 Liquid waste

For the purposes of this management plan liquid waste will include all effluent and grey water from transportable buildings. This plan excludes management of hydrocarbons which are addressed in Appendix E of the EMP.

2.3 Waste sources

Operation of the AMP is considered likely to generate wastes, excluding hydrocarbons, via the following sources:

- Putrescible waste from canteen, competitors and spectators
- Paper, plastic and printer cartridge waste through office use
- Recyclables such as, but not limited to, cardboard, aluminium cans, bottles, plastics etc from canteen, competitors and spectators
- Inert waste such as tyres from competitors
- Hazardous wastes such as, but not limited to, batteries, engine coolants and glycols, flammable liquids (hydrocarbons and fuels), fluorescent tubes, gas cylinders, cleaning chemicals, pesticides, herbicides, paint, solvents from competitors and site maintenance.
- Liquid waste from transportable toilet facilities.

It is expected that all competitors will remove their own hazardous wastes, such as coolant and other chemicals, tyres, batteries etc at the completion of each event and dispose of them at an appropriately licenced facility.

2.4 Potential environmental impacts

If waste is not appropriately managed within the AMP the following potential impacts/ risks may occur:

- Contamination of surrounding soil, groundwater, and surface water
- On-site waste category segregation to avoid cross-contamination not practiced
- Introduction and/or spread of weeds
- Reduction in biodiversity value due to inability to replace lost habitat and communities
- Poor visual amenity and landscape value
- Community and stakeholder dissatisfaction.

3. Management strategies, actions, timeframes and responsibilities

Broad management strategies have been developed to minimise potential impacts associated with waste. The management strategies, timing and responsibilities are outlined in Table 1.

It is the responsibility of the Operations Manager of the AMV Inc. to implement this Waste Management Plan during operation of the AMP.

Table 1 Waste management strategies, actions, timeframes and responsibilities

Management Strategies	Actions	Timeframes	Responsibility
Site induction	Site induction includes the following specific waste management components: – Waste hierarchy – Identification of waste types and associated disposal requirements – All waste/items removed from Site for appropriate disposal – Each competitor will remove their own waste offsite and dispose to an appropriately licensed facility.	On entry to site	All personnel (AMV Inc. Operations Manager, volunteers and competitors)
	All responsible persons to undertake the necessary training on the handling of, and disposal of, waste material types generated at the AMP.	Site induction	AMV Inc. Operations Manager
Offsite disposal	Wherever practical and economically viable, all waste materials will be recycled.	At all times	All personnel
	Separation of waste for disposal, recycling and recovery.	At all times	All personnel
	Putrescible water will be collected and disposed of at a designated landfill site.	As required	All personnel
	Collection areas and bins will be appropriately maintained.	At all times	All personnel
	Provision of the appropriate number and types of bins on site for each of the different types of waste. Bins will be clearly marked and monitored for cross-contamination of wastes	As required	AMV Inc. Operations Manager
	For office waste, providing receptacles or processes for recycling (as a minimum), paper, general waste, aluminium cans, and bottles, batteries and fluorescent lighting tubes	As required	AMV Inc. Operations Manager
	Batteries, tyres, scrap metal, recycled materials and putrescible waste, hazardous waste and liquid waste from transportable toilets (Figure 2, Appendix A), will be transported off-site for disposal to appropriately licensed facilities.	As required	Licensed contractor
	Hazardous waste or materials shall be stored onsite in a covered, lockable, self-bunded building prior to either use onsite (i.e. pesticides, herbicides, paints) or removal offsite.	As required	AMV Inc. Operations Manager/ Licensed contractor

Management Strategies	Actions	Timeframes	Responsibility
Onsite reuse	Vegetation waste (weed free) will be managed on site through reuse for ground surface stabilisation and rehabilitation. Vegetation waste shall not be reused within the Protected Exclusion Area or Development Exclusion Buffer.	As required	AMV Inc. Operations Manager
Promote a high standard of housekeeping, thereby minimising litter and vermin attraction and infestation	Ensure domestic waste bins are lidded to minimise litter and vermin attraction and infestation	At all times	All personnel
Inspection and monitoring	Litter sweep of the site on weekly intervals required to collect any windblown waste	Weekly	AMV Inc. Operations Manager

4. Monitoring

All waste types and volumes generated on-site and being transported off-site will be recorded for the purpose of annual reporting.

Monitoring of the Site will be undertaken, by the AMV Inc., so as to meet the following performance criteria:

– Waste collections sites containing wastes with limited interaction with vermin/ pests
– No cross contamination of waste disposal bins
– All non-hazardous, recyclable, hazardous and liquid wastes removed offsite to appropriately approved disposal locations on an as required basis
– Identifying locations where additional bins may be required
– Presence of litter and windblown waste around the Site cleaned up on a weekly basis
– Record waste types and volumes generated on-site and being transported off-site.

Any waste incidents identified during Site inspections, which have not met the performance criteria, will be documented and corrective actions raised to correct these issues. These will be entered into the AMP Incident Register to track and monitor completion of corrective actions.

Where a waste related pollution incident is a life-threatening incident or pollution emergency it will be reported to Department of Fire and Emergency Services (DFES) by calling 000. DFES will call out Department of Water and Environmental Regulation (DWER) for major pollution/ hazardous materials incidents.

Where a waste related pollution incident occurs, which causes or threatens to cause a pollution emergency, that is not life-threatening it will be reported to DWER via the 24-hour Pollution Watch hotline as soon as practicable.

Nuisance issues and minor waste discharges will be reported to the City of Albany.

5. Review

This Waste Management Plan will be reviewed and updated no later than annually. A review may occur sooner if there is a material change in risk, legal requirements or an incident relevant to waste management. Management strategies will be reviewed for effectiveness and any corrective actions will be implemented.

6. References

DWER. (2019). *Landfill Waste Classifications and Waste Definitions 1996 (As amended 2019).* Perth: Department of Water and Environmental Regulation.

Roberts Gardiner Architects . (2021). *Albany Motorsport Park Masterplan - Stage 1.* Unpublished masterplan for City of Albany.

Waste Authority. (2013). *Waste Authority Communication on the Waste Hierarchy.* Government of Western Australia.

Appendix A

Figures

Figure 1 *Project site location*

Figure 2 *Master plan*

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. **6137331**
Revision No. **0**
Date **22/07/2021**

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

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4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

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OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

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FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE-1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

GRASSED AREA - LOW FUEL MAINTAINED

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

GRAVEL BED RUN-OFF

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRASSED AREA - LOW FUEL MAINTAINED

MB

RACE TRACK PRECINCT

CONCRETE BARRIER & SAFETY FENCE

TURN 9

TURN 8

TURN 10

TURN 11

TURN 7

TURN 2

TURN 3

TURN 6

TURN 5

TURN 4

TURN 1

3.5km x 12m RACE TRACK

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCED)

DOWN ROAD SOUTH (GRAVEL)

GRAVEL BED RUN-OFF

EMERGENCY MUSTER AREA (BITUMEN)

DRIFT TRAINING AREA

COMPETITOR PARKING / MARSHALLING

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

COVERED PIT LANE STRUCTURE & HARD STAND

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB | project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01 | rev. E

ghd.com

→ The Power of Commitment

Appendix G

Noise Management Plan

Albany Motorsport Park - Development Application

Noise Management Plan

City of Albany

27 July 2021

→ The Power of Commitment

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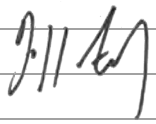
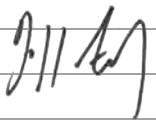
S4	0	J Forrest	J Foley		J Foley		03.08.2021

Executive summary

The City of Albany (CoA) has engaged GHD Pty Ltd (GHD) to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure A.4.1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

At full development, the proposed AMP will consist of:

– Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[1] and Motorcycling Australia (MA) *Track Guidelines*[2].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
– A motocross circuit designed and constructed in association with MA guidelines.
– An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area.
– Associated buildings and infrastructure.

Due to the scale and nature of the proposed development, the construction works have been broken down into two key stages which comprise of the following:

– Stage 1 (this Development Application):
  - Stage 1A: Construction of motocross track, 4WD driver training area, all-terrain vehicle (ATV) area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

The purpose of this Noise Management Plan (NMP) is to provide guidance on the management of construction and operational noise from the proposed Albany Motorsport Park.

– The construction NMP outlines noise standards, site wide noise control measures and a complaints procedure. Adoption of such measures will lead to construction noise meeting required noise standards.
– The operational NMP has been developed to allow the AMP to exceed the assigned noise levels in the *Environmental Protection (Noise) Regulations 1997*, provided motor racing activities are carried out in accordance with the operational NMP. This operational NMP outlines the noise control requirements and measures to achieve operational noise objectives.

As AMP is a new facility, it is recommended that GSMG undertake a noise monitoring program to measure levels of noise associated with the loudest motorsport events at AMP. Monitoring should take place on at least three occasions per 12 month period at the four closest noise sensitive premises at times corresponding to the worst case meteorological conditions for sound propagation to that premises.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the report.

[1] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[2] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

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Glossary of acronyms and terms

AMP	Albany Motorsport Park
AMV	Albany Motorsport Venues Inc.
ATV	All-terrain vehicle
CEO	Chief Executive Officer
CoA	City of Albany
DWER	Department of Water and Environmental Regulation
FIA	Fédération Internationalé de l'Automobile
FIM	Fédération Internationalé Motocyclisme
GHD	GHD Pty Ltd
GSMG	Great Southern Motorplex Group Inc.
MA	Motorcycling Australia
NMP	Noise Management Plan
SPL	Sound pressure level
SWL	Sound power level
4WD	Four wheel drive

1. Introduction

1.1 Project description

The City of Albany (CoA) has engaged GHD Pty Ltd (GHD) to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure A.4.1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

Lot 5780 Down Road South, Drome is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. The AMP comprises 141.7 ha (including 0.2 ha for crossovers) in the eastern portion of the Site. Two areas within Lot 5780 are excluded from the AMP development and include 49.47 ha at the western end of the Site which is covered with native vegetation and a dam area (1.37 ha) on the northern boundary which is subleased to Plantation Energy.

At full development, the proposed AMP will consist of:

– Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[3] and Motorcycling Australia (MA) *Track Guidelines*[4].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
– A motocross circuit designed and constructed in association with MA guidelines.
– An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area.
– Associated buildings and infrastructure.

Due to the scale and nature of the complex, the works have been broken down into two key stages which comprise of the following:

– Stage 1 (this Development Application):
  - Stage 1A: Construction of motocross track, 4WD driver training area, all-terrain vehicle (ATV) area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

A Master Plan, which illustrates the various aspects of the Site and staging areas, has been developed by the GSMG and CoA to support the Development Application for the AMP (Figure A.4.2, Appendix A).

1.2 Purpose of this report

The purpose of this Noise Management Plan (NMP) is to provide guidance on the management of construction and operational noise from the proposed Albany Motorsport Park at Lot 5780 Down Road South, Drome (the Site).

An operational NMP has been developed to allow the AMP to exceed the assigned noise levels in the *Environmental Protection (Noise) Regulations 1997*, provided motor racing activities are carried out in accordance with the operational NMP.

[3] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[4] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

1.3 Scope of work

The following scope has been completed:

– Introduction and site characteristics relevant to the management of noise from the AMP.
– A noise management plan for construction noise impacts during development of the AMP.
– An operational noise management plan for the AMP, to the satisfaction of the Department of Water and Environmental Regulation (DWER) and the Chief Executive Officer (CEO) of the City of Albany.

1.4 Limitations

This report has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section(s) 1.3 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

2. Site characteristics

2.1 Existing site

Lot 5780 Down Road South, Drome is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. The AMP comprises 141.7 ha (including 0.2 ha for crossovers) in the eastern portion of the Site. Two areas within Lot 5780 are excluded from the AMP development and include 49.47 ha at the western end of the Site which is covered with native vegetation and a dam area (1.37 ha) on the northern boundary which is subleased to Plantation Energy.

The site is zoned 'Special Use – SU26' under City of Albany Local Planning Scheme No. 1.

2.2 Surrounding land use

Surrounding land use is shown in Figure A.4.3, Appendix A and summarised below:

– North: The site is bound to the north by Down Road West. The land is zoned 'General industry' directly adjacent to Down Road West, where the Mirambeena Timber Processing Precinct is located. Beyond this the land is within the industrial buffer area (IA4BA) within approximately 1000 m of the site and then zoned 'Priority Agriculture' beyond.
– East: The site is bound to the east by Down Road South, with land within the industrial buffer area within approximately 500 m of the site and then zoned 'Priority Agriculture' beyond.
– South: The site is bound to the south by the land within the industrial buffer area within approximately 500 m of the site and then zoned 'Priority Agriculture' beyond.
– West: The site is bound to the south by the land within the industrial buffer area within approximately 500 m of the site and then zoned 'Priority Agriculture' beyond.

2.3 Sensitive receptors

A number of residential receptors were identified in proximity to the AMP, as listed in Table 2.1 and shown in Figure A.4.4, Appendix A.

Table 2.1 Sensitive receptor locations

ID	Location (MGA94)		Distance from nearest AMP boundary (m)	Worst case wind direction (°)
	Easting	Northing		
SR01	569713	6133385	1150	310
SR02	567355	6132573	1120	10
SR03	564483	6133265	1930	80
SR04	565029	6134675	1920	100

The AMP is wholly located within the 'General industry' buffer area surrounding the Mirambeena Timber Processing Precinct which lies to the north of the Site (Figure A.4.4, Appendix A).

2.4 Topography

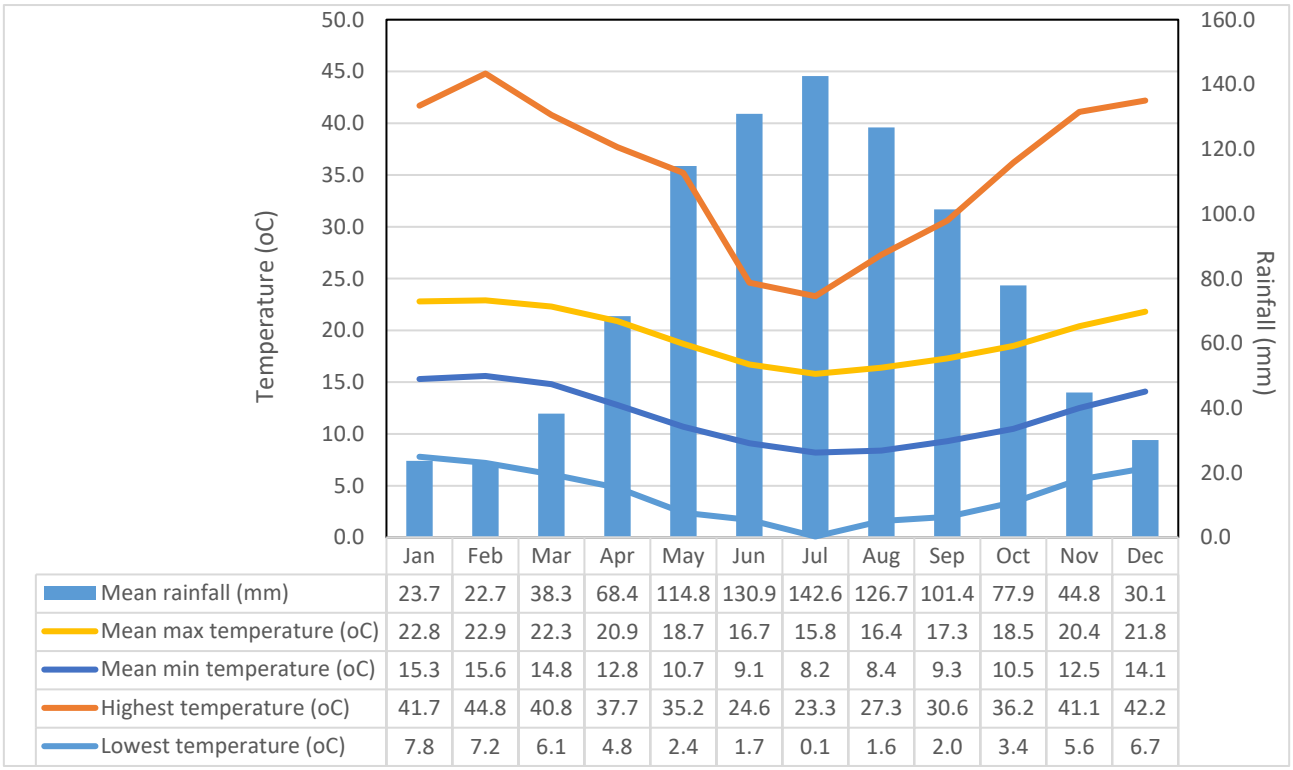
The surface elevation of the Site ranges from approximately 41 m AHD to 73 m AHD. The lowest elevation is on the southern boundary and extends through the centre of the Site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the Site[5].

[5] GoWA. (2021). www.data.gov.wa.au. Retrieved from http://www.data.wa.gov.au

2.5 Climate

Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station is Albany (Station No. 9500). This station records temperature, rainfall, relative humidity, wind speed and direction and has data available dating back to 1877. Figure 2.1 illustrates recorded average monthly meteorological data for the Albany AWS BoM station for years 1877 to 2020[6].

Temperatures range from a mean maximum of 22.9 ºC in summer and drop to a mean maximum of 15.8 ºC in winter. Mean minimum temperatures follow a similar trend, reaching 15.6 ºC in summer and 8.2 ºC in winter. Rainfall is low throughout the summer months and peaks in July, with a monthly average of 142.6 mm. The mean annual rainfall is 925.2 mm, with approximately 103.1 rain days a year. Relative humidity at Albany reflects the Mediterranean climate, demonstrating drier summers and a comparatively high relative humidity of 82 percent in the morning in winter[6].



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	23.7	22.7	38.3	68.4	114.8	130.9	142.6	126.7	101.4	77.9	44.8	30.1
Mean max temperature (oC)	22.8	22.9	22.3	20.9	18.7	16.7	15.8	16.4	17.3	18.5	20.4	21.8
Mean min temperature (oC)	15.3	15.6	14.8	12.8	10.7	9.1	8.2	8.4	9.3	10.5	12.5	14.1
Highest temperature (oC)	41.7	44.8	40.8	37.7	35.2	24.6	23.3	27.3	30.6	36.2	41.1	42.2
Lowest temperature (oC)	7.8	7.2	6.1	4.8	2.4	1.7	0.1	1.6	2.0	3.4	5.6	6.7

Figure 2.1 Mean rainfall and temperatures in the Albany region (Site No. 9500)

Figure 2.2 presents the seasonal and annual day time wind roses for Albany for the period from 2001 to 2019. As only day time events are scheduled at AMP, wind roses only include day time winds.

Review of the wind roses provides an indication of how often worst case noise levels may occur at each receptor, with wind speeds up to 4 m/s (yellow and light green categories on the wind roses) representing worst case wind speed during the day period. The prevalence of worst case wind conditions at each sensitive receptor is as follows:

– SR01 – Worst case wind direction is a north-westerly, which is likely to occur approximately five percent of day time hours (between 7:00 am and 7:00 pm) (219 hours per year).
– SR02 – Worst case wind direction is a northerly, which is likely to occur approximately three percent of day time hours (132 hours per year).

[6] BoM. (2020). *Climate statistics for Australian locations.* Retrieved from Bureau of Meteorology: http://www.bom.gov.au/climate/averages/tables/cw_009500_All.shtml

– SR03 – Worst case wind direction is an easterly, which is likely to occur approximately two percent of day time hours (88 hours per year).
– SR04 – Worst case wind direction is a south-easterly, which is likely to occur approximately two percent of day time hours (88 hours per year).

For each sensitive receptor, worst case wind conditions are most likely to occur during autumn and winter, rather than spring and summer. Events will conclude earlier in autumn and winter as it is darker earlier, therefore being less intrusive than events which potentially conclude later during spring and summer.

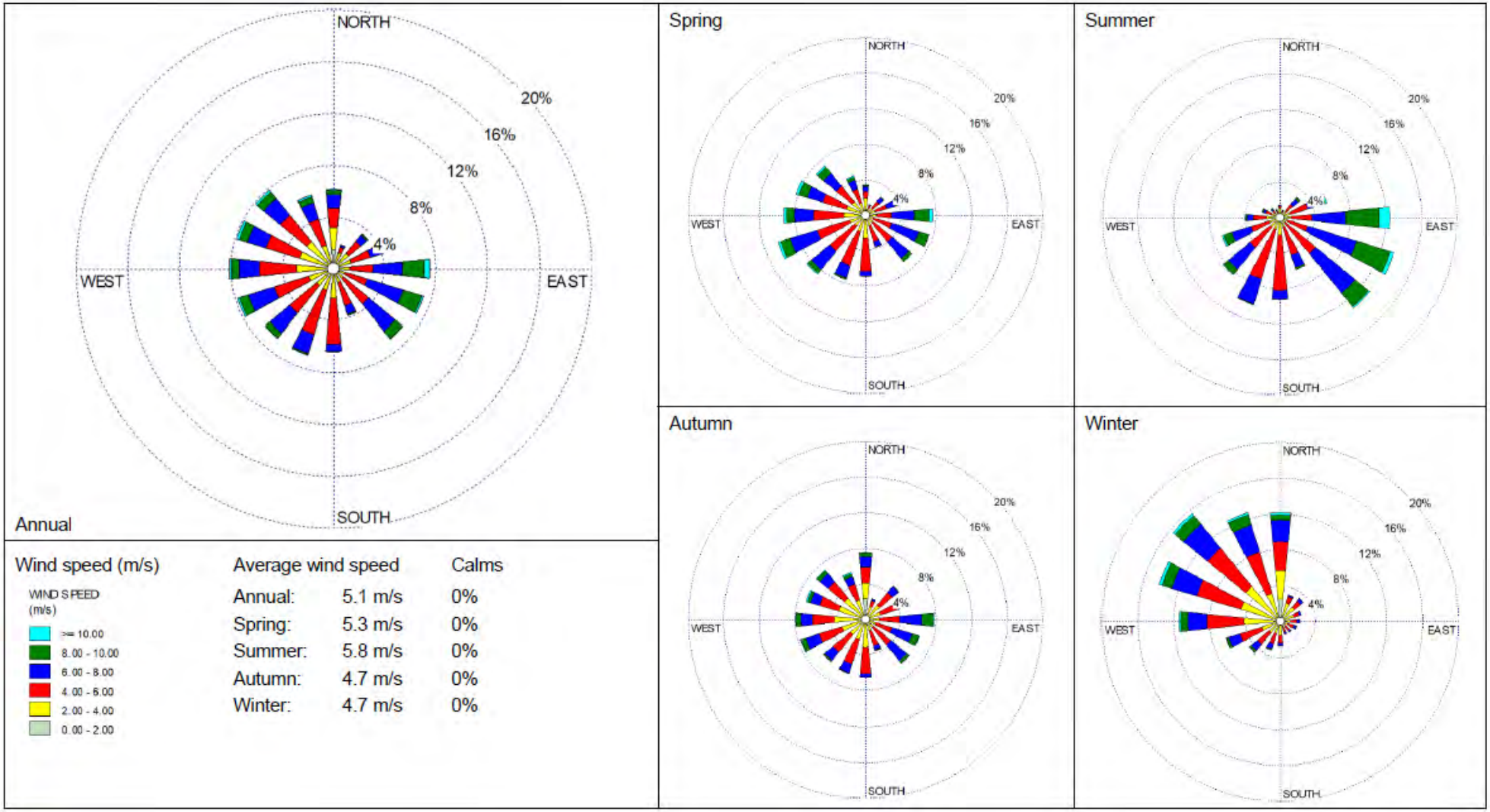


Figure 2.2 Annual and seasonal day time wind roses for observed meteorological data at Albany Airport

3. Construction noise management plan

3.1 Construction noise standards

Environmental noise is managed through the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The Regulations specify requirements for construction activities.

The Regulations state that for construction work carried out between 7.00 am and 7.00 pm on any day which is not a Sunday or public holiday:

– Construction work must be carried out in accordance with control of environmental noise practices set out in Section 6 of *AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* (AS 2436-2010).
– The equipment used for construction must be the quietest reasonably available.
– The Chief Executive Officer (CEO) of the Department of Water and Environmental Regulation (DWER) may request that a noise management plan be submitted for the construction work at any time and complied with during construction activities.

For construction work done outside these hours:

– The construction work must be carried out in accordance with control of environmental noise practices set out in Section 6 of AS 2436-2010.
– The equipment used for construction must be the quietest reasonably available.
– The contractor must advise all nearby sensitive receptors likely to receive noise levels which fail to comply with the assigned levels under Regulation 8 of the work to be done at least 24 hours before it commences.
– The contractor must show that it was reasonably necessary for the work to be done out of hours.
– The contractor must submit to the CEO a noise management plan at least seven days prior to the commencement of out of hours work and the plan must be approved by the CEO before work commences. The plan must include details of:
    - Reasons for the construction work needing to be completed out of hours.
    - Details of activities which are likely to result in noise emissions that lead to exceedance of assigned levels.
    - Predictions of the noise emissions on the site.
    - Details of measures used to control noise (including vibration) emissions.
    - Procedures to be adopted for monitoring noise (including vibration) emissions.
    - Complaint response procedures to be adopted.

Construction works are due to commence as soon as all relevant approvals and permits are obtained (likely to be late 2021 / early 2022) and are expected to occur over a 18 to 24 month period.

Construction activities expected to be undertaken include earthworks, road and race track construction, building construction, waste removal and materials transfer.

Construction activities will occur during normal construction hours (7.00 am and 7.00 pm Monday to Saturday). Work outside these times would only occur if required for special tasks or to recover lost time due to project delays. Where possible, activities that could result in elevated noise levels will be scheduled during normal construction hours.

A construction noise assessment was completed in September 2020[1], provided in Appendix C, which concluded:

[1] GHD, 2020., *Albany Motorsport Park - Noise Assessment*, Prepared for City of Albany, September 2020.

The closest noise sensitive receptor to any potential noise source during construction is located approximately 1120 m from the AMP. Noise levels exceeding the day assigned level of 45 dBA are not expected to impact on the closest noise sensitive receptors, with the exception of noisy equipment with a sound power level (SWL) higher than 115 dBA.

Accordingly, the construction noise impacts are considered negligible and able to be managed by adopting standard noise mitigation and management practices, as outlined in the following section, where required.

3.2 Site wide noise control

The Regulations require that construction work be carried out in accordance with Section 6 of *AS 2436:2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*. AS 2436 outlines a series of measures which should be undertaken in order to manage noise emissions such that they result in the lowest practicable impact to neighbours.

These mitigation measures are applicable to both day and out of hours construction works. There is more importance placed on out of hours activities as these are generally more sensitive for residences.

3.2.1 Selection of alternate equipment or process

Where a particular item of equipment or activity is found to generate noise levels that exceed the assigned noise levels, it may be possible to select alternate equipment or approaches to reduce noise levels.

For example, smaller, quieter front end loaders will be used onsite rather than larger equipment, where operationally practicable.

3.2.2 Acoustic barriers

Barriers or screens may be effective in reducing noise levels from work sites, when located at either the source or receptors. Barriers at the source generally only reduce noise levels from static equipment. The extent of noise reduction achieved is dependent on the degree to which the line of sight is blocked. If receptor is totally shielded, noise reduction of up 15 dBA is possible, whereas, partial obstruction may only achieve noise reduction of 7 to 10 dBA.

3.2.3 Silencing

Where processes or equipment are noisy, the use of additional silencing may be required. This can be in the form of engine shrouding or residential grade exhaust silencers.

Due to the distance to the nearest sensitive receptors, this measure is considered unlikely to be required.

3.2.4 Establishment of site practices

Establishment of site practices involves formulation of work practices to reduce noise exposure to nearby sensitive receptors. The following management and mitigation measures are available to ameliorate noise impacts as far as practicable:

– All plant and equipment should be selected to minimise noise emissions, maintained in good repair and operated in accordance with the manufacturer's instructions. All engine covers should be kept closed while equipment is operating.
– All combustion engine plant, such as generators, compressors and welders should be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers.
– Fixed equipment (i.e. pumps, generators and air compressors) should be located as far as practicable from noise sensitive receptors and locations of equipment rotated to provide respite to receptors.
– Where practical, machines will be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods.
– Machines found to produce excessive noise compared to industry best practice will be removed from the site or stood down until repairs or modifications can be made.

– Where practical, impact wrenches will be used sparingly within close proximity to sensitive receptors, with hand tools or quiet hydraulic torque units preferred. Metal to metal contact on material should be avoided where practical.
– Whenever possible, loading and unloading areas should be located as far as practicable from the noise sensitive receptors.
– Materials dropped from heights into or out of trucks should be minimised. Care will be taken when loading or unloading to avoid noise resulting from material being dropped or thrown into the tray of trucks.
– Vehicles will be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes will be eliminated, where practicable.
– Minimise reversing. The preference will be for broadband (croaker) reversing alarms to be installed onsite equipment, subject to meeting occupational health and safety requirements.
– Where practical, vehicular movements to and from the construction site should be undertaken during normal working hours. Information to be provided to truck drivers outlining designated vehicle routes, parking locations and delivery hours.
– Vehicle routes to and from site will be selected to minimise impact to neighbours, by following major roads where possible. Truck drivers will also be advised of using good techniques when driving through residential areas, in particular to limit engine braking.

3.2.5 Strategic positioning of processes onsite

Strategic positioning of processes onsite may involve changing the location of particular processes or activities such that direct line of site to the receptor is obstructed.

3.2.6 Site induction

All site managers and workers should be made aware of the noise limits established for the site and noise control measures to be implemented. Site managers to review daily expected noise emission from activities and prepare options for noise control and providing respite to specific residential areas.

Prior to commencing any new activity, determine the likely effect on adjoining properties. Where the level of noise is likely to be high, carry out the following procedure:

– Decide if alternate methods are available for the specific situation.
– Implement necessary procedures to minimise the effect on adjoining properties.
– Advise the nominated contact in sufficient time to allow a minimum of 24 hours' notice to be given to neighbours.

In addition, all site workers should be sensitised to the potential for noise impacts and encouraged to take practical and reasonable measures to minimise the impact during the course of their activities, including:

– No radios are to be played during the night in work areas.
– Two-way radios, public address systems or other methods of site communication are also to be limited so as to not affect residents.
– Plant and equipment will be regularly inspected and maintained to minimise noise levels.

3.3 Complaints procedure

Two weeks before construction activity is to begin all noise sensitive residents within 2 km of the AMP boundary are to be provided with contact details for the direction of noise complaints related to construction work. Such information will also be provided on signage at the entrance of the site.

3.3.1 Normal working hours

In the event that noise complaints are received, prompt follow-up will be required as follows:

– Immediate attention to urgent/critical issues: Complaints will be reported to the Approving Authority (and other relevant stakeholders) as soon as possible during normal working hours. Multiple complaints regarding the same issue will also be reported to the Approving Authority (and other relevant stakeholders) as soon as possible during normal working hours.
– Acknowledgment of contact: Each complaint received will be acknowledged within 24 hours of the initial contact and logged into the management system.
– Offered additional information: Each caller will be given the opportunity to be added to the project database, which is used to distribute project information and updates.
– Registration of noise complaint: Completed complaint form to be retained and made available to Approving Authority or an authorised DWER officer on request.
– Determine whether any unusual activities were taking place at the time of the complaint that may have generated higher noise levels than usual.
– Assessment of noise level if above the assigned noise level – complaint to be forwarded to Approving Authority. Conduct noise monitoring at the location of the complainant (if required).
– Corrective action to mitigate noise emission if found to be unreasonable using pre-determined mitigation measures.
– Reassessment at conclusion of works to ensure the implemented noise control procedure was successful.

Complaints received will be reported to the Approving Authority on a monthly basis. The complaint report will include: the location, date, time, issue summary, response from the contractor and action taken and resolution status.

3.3.2 Out of hours

In addition to the above, out of hours contacts and complaints will be received as follows:

– All calls will be made to the contractor's Site Manager.
– The Site Manager will provide further information to resolve the enquiry and if required, contact the site Night Shift Supervisor to further investigate the complaint.

To assist in resolving complaints made directly to the Approving Authority outside of normal working hours, the mobile contact number for the Site Manager will be provided.

If work must continue outside of the approval conditions at short notice i.e. during the shift for safety reasons, the Night Shift Supervisor will contact the Approving Authority as soon as possible the following morning.

Emergency issues outside normal working hours will be raised with the Approving Authority as soon as possible during the next business day.

4. Operational noise management plan

An operational NMP has been developed to allow the AMP to exceed the assigned noise levels in the *Environmental Protection (Noise) Regulations 1997*, provided motor racing activities are carried out in accordance with the operational NMP.

This operational NMP, provided at Appendix B, outlines the noise control requirements and measures to achieve operational noise objectives.

Appendices

Appendix A

Figures

Figure A.4.1 *Project site location*

Figure A.4.2 *Master plan*

Figure A.4.3 *City of Albany Local Planning Scheme*

Figure A.4.4 *Sensitive receptor locations*

Redmond - Hay River Rd
Phillips Rd
Pikes Rd
REDMOND
Hazzard Rd
Down Rd
Marbelup Rd
Down West Rd
Albany Hwy
Down South Rd
DROME
Cochrane Rd
Hunwick Rd
Gunn Rd
TORBAY
Corio Rd
Boccomazzo Rd
Sandberg Rd
Ding Rd

LEGEND
- Road
- Albany Motorsport Park
- Lot 5780 Down Road South
- Cadastre

SLIP

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. 6137331
Revision No. 0
Date 22/07/2021

FIGURE **A.4.1**

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

p.o. box 1502, albany, western australia 6331
telephone: (08) 9841 5455
email: admin@rgarchitects.com.au

Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

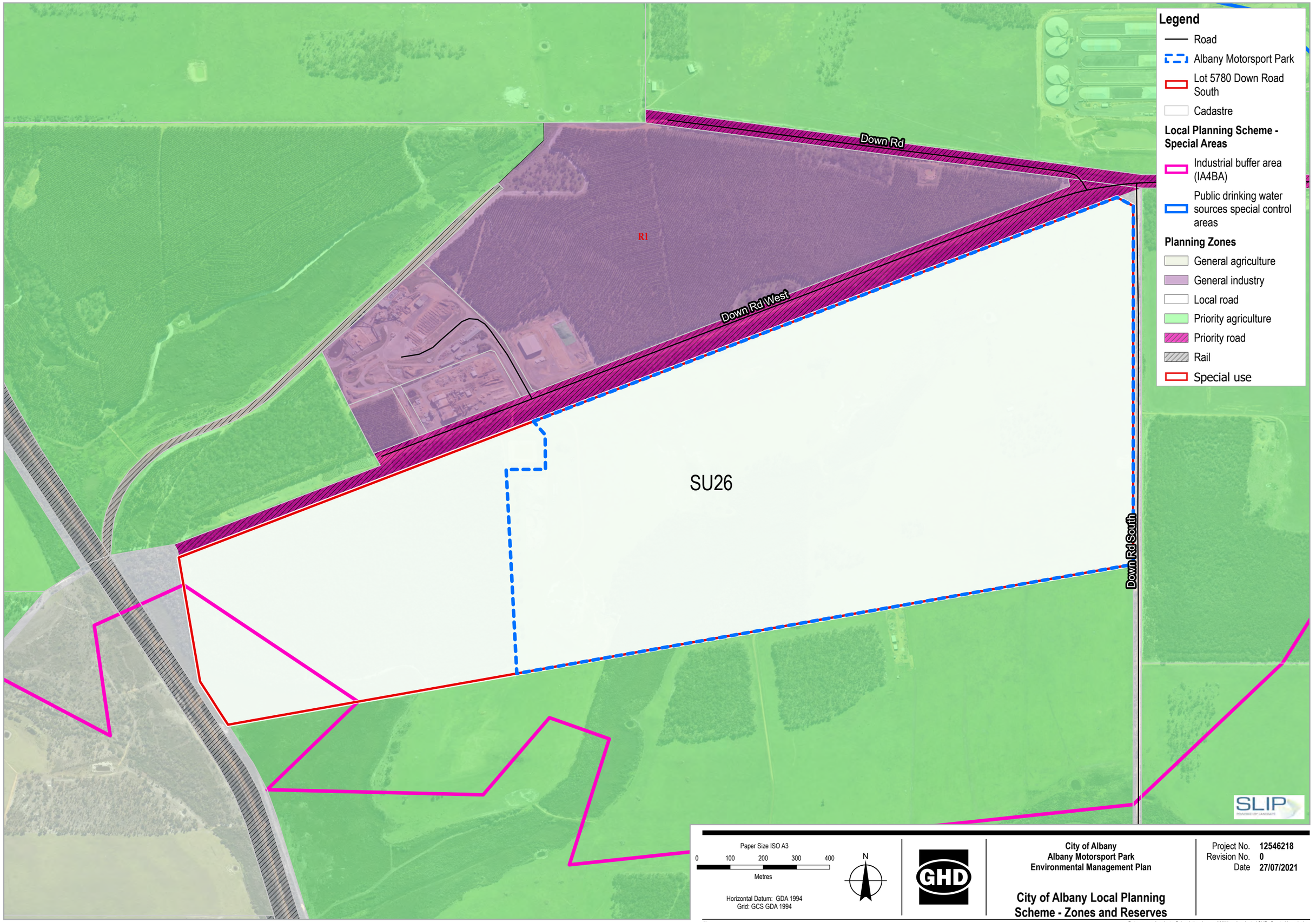
project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E



Paper Size ISO A3

0 100 200 300 400

Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

N

GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

City of Albany Local Planning Scheme - Zones and Reserves

Project No. **12546218**
Revision No. **0**
Date **27/07/2021**

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_EnvironmentalManagementPlan\12546218_EnvironmentalManagementPlan.aprx\1254
Print date: 27 Jul 2021 - 14:03

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP. Created by: vdavies

Paper Size ISO A3

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

Sensitive Receptor Locations

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

FIGURE A.4.4

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\12546218\12546218_EnvironmentalManagementPlan\12546218_EnvironmentalManagementPlan.aprx\12546218_EMP_DustNoise_RevA
Print date: 21 Jul 2021 - 14:28

Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP GHD: Sensitive Receptors - 20210505. Created by: vdavies

Appendix B

Operational Noise Management Plan

ALBANY MOTORSPORT VENUE INC.

NOISE MANAGEMENT PLAN

ALBANY MOTORSPORT PARK

This noise management plan ('the NMP') has been approved by the Chief Executive Officer (CEO) of the City of Albany ('the CEO') for the purposes of Division 3 of the Environmental Protection (Noise) Regulations 1997.

1. Definitions

Definition	
Race	A specific race held within an Event.
Event	A discrete group of races making up a racing program to be held at the AMP in any day or consecutive days. Races in which only muffled road going vehicles compete or make use of the Venue will not be classed as an Event.
Major Event	May include State, National or International championships or be an event with a significant feature attraction.
State Events	An event that may be conducted over one to three days; and is associated with a State motor sports body.
National Events	An event that may be conducted over one to four days; and is associated with a National motor sport body.
International Event	An event that may be conducted over one to four days; and is associated with an International motor sport body.
Special Event	An event that is to be open to the public is proposed to be held at the venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions. The Occupier is to apply to the CEO for approval of the event under Regulation 18.
Event Duration	The period of time from the scheduled start time of the first race or practice session to the scheduled finish time of the last race in the event.
Media Session	Demonstration by racing vehicles or exhibition vehicles for media or corporate purposes. Media Sessions do not constitute events or practice sessions.
Race Track	The multi-use sealed track designed to Motorsport Australia and Motorcycling Australia specifications for car and motorcycle racing, learner, emergency services and commercial driver training.
Motocross Track	The sandy/clay circuit designed to Motorcycling Australia specifications for off-road motorcycles. This includes a Junior Motocross Track and Trials area.
4WD Training Precinct	An area designed for four wheel drive and all-terrain vehicle training.

2. Venue details

Venue details	
Name of venue	Albany Motorsport Park (the Park)
Location of venue	Lot 5780 Down Road South, Drome
Occupier and Manager of venue	Albany Motorsport Venue Inc. (AMV)
Affiliations	Motorsport Australia and Motorcycling Australia
Venue maps	Attachment 1 – Map of venue showing facilities

3. Application

The NMP applies:

1. While the Occupier is the leaseholder of the Park
2. To racing activities at the Park organised by the Occupier
3. To the emission of noise during a racing activity at the Park
4. From the date of approval by the CEO for a period of three years

Regulation 7 of the *Environmental Protection (Noise) Regulations 1997* does not apply to noise emitted from the Park during a racing activity if the activity is conducted in accordance with the NMP. Predicted noise impacts from the operating Park are presented in the *Albany Motorsport Park - Noise Assessment*[1].

The Occupier must ensure that the conditions and ancillary measures designated as such in the CEO's approval notice are implemented.

4. Classes of vehicles

The following classes of vehicles which may compete in events at this venue may include but is not limited to:

– Various classes of cars including street cars, Formula Vee, Formula Classic, Formula Ford, HQ Holden sedans, saloon cars, sports sedans, production sports cars and marque sports cars, historic touring cars, improved production cars, Formula 1000 and Excel Cup.
– Various drift cars
– Various classes of motorcycles including historic, 125 cc, 250 cc, 500 cc, Grand Prix, Superbikes, solo and sidecar bikes
– Various classes of motocross bikes including junior, senior, 50 cc, 65 cc, 85 cc, 125 cc, 250 cc and 450 cc
– Various other vehicles of smaller engine capacity, including road registered vehicles

5. Types of racing activities

The types of racing events covered by this Noise Management Plan include:

– Car test and tune and practice days, coaching and driver assessment
– Car speed events (Club, State, National and International)
– Motorcycle test and tune days, coaching and rider assessment
– Motorcycle speed events (Club, State, National and International)
– Motocross training, coaching and rider assessment
– Motocross events including Junior, Trial and Minikhana events (Club, State and National)

[1] GHD, 2020., *Albany Motorsport Park - Noise Assessment*, Prepared for City of Albany, September 2020.

– Drifting days (Club and State)
– Motorkhana events (Club)
– Special Events

6. Duration and timings of events

Duration of racing events covered by this Noise Management Plan as outlined below.

Driver and rider training with road registered cars and motorcycles

Includes commercial and emergency services driver training			
Type	**Day(s)**	**Time**	**How often**
Driver training (road registered)	Monday - Friday	10:00 am to 4:00 pm	Not when circuit allocated for test and tune.

Driver and rider test and tune with road registered and speed vehicles

Includes coaching clinics and driver/rider assessment **Includes vehicle scrutineering** **Cars and motorcycles on the same day but do not share the track** **No more than six vehicles permitted on the track at the same time (as per track permits)** **This includes drifting test, tune and training** **Multiple vehicle disciplines may not be using the track at the same time**			
Type	**Day(s)**	**Time**	**Comment**
Car test and tune on race circuit	Friday	12:00 pm to 4:00 pm	Once per fortnight
Motorcycle test and tune on race circuit	Friday	12:00 pm to 4:00 pm	Once per fortnight
Drifting test and tune at race circuit	Friday	12:00 pm to 4:00 pm	Once per fortnight
Motocross	Tuesday and Thursday	3:00 pm to 6:00 pm	Weekly

Club speed/competition events

No performance vehicle engines permitted to be started before 8:00 am or 9:00 am on Sundays and public holidays or after 6:00 pm all days **Motocross includes main track, junior track, trials and minikhana events** **Additional race circuit events can be held if motocross is not being conducted** **Additional motocross events can be held if race circuit events are not being conducted** **Motocross is generally a seasonal sport conducted during the cooler damp months of May to October**			
Type	**Day(s)**	**Time**	**How often**
Car speed events	Saturday and Sunday	9:00 am to 6:00 pm	Once per month
Motorcycle speed events	Saturday and Sunday	9:00 am to 6:00 pm	Once per month
Drifting events	Saturday and Sunday	9:00 am to 6:00 pm	Once per month
Motorkhana events	Saturday and Sunday	9:00 am to 6:00 pm	Once per month
Motocross events	Saturday and Sunday	9:00 am to 6:00 pm	Once per month

In addition to the above:

– The 4WD Precinct may be used any day of the week between the hours of 9:00 am to 6:00 pm with road registered vehicles only, and with quadbikes and all-terrain vehicles.
– All events must have a Motorsport Australia, Motorcycling Australia or Motorcycling Western Australia permit and hence comply with the relevant sound emissions specification.
– Drivers and riders in events, including test and tune, must be registered with the appropriate governing motor sport body.
– State events in all disciplines are conducted the same as club events but will attract more entrants and spectators. State events will replace a club event and follow the same format.
– National events in all disciplines are conducted under the control of the relevant national body and will be classified as Major events. These events have a long lead time allowing the community to be well informed.
– International events in all disciplines are conducted under the control of the relevant international body and will be classified as Major events. These events have a long lead time allowing the community to be well informed.
– Special event is an event that is to be open to the public that is proposed to be held at the venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions. The Occupier is to apply to the CEO for approval of the event under Regulation 18.

7. Limitations on racing activities

The following limits apply to scheduled race meetings and practice sessions:

– Race Events on the multi-use track may not coincide with events on the motocross tracks.
– State Events may be conducted on one to three days between the hours of 8:00 am to 6:00 pm on Monday to Saturday and 9:00 am and 6:00 pm on Sunday and public holidays.
– National Events may be conducted on one to four days between the hours of 8:00 am to 6:00 pm on Monday to Saturday and 9:00 am and 6:00 pm on Sunday and public holidays.
– International Events may be conducted on one to four consecutive days between the hours of 8:00 am to 6:00 pm on Monday to Saturday and 9:00 am and 6:00 pm on Sunday and public holidays.
– Special Events – A significant event approved by the CEO of CoA of which those living within the noise buffer area must be notified not less than 28 days in advance.
– Where a Special Event that is to be open to the public is proposed to be held at the Venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions, the Venue Manager is to apply to the CEO of CoA for approval of the event under Regulation 18.

8 Noise emissions - General

8.1 Access to venue

In order to prevent noise emissions due to unauthorised use of the race track or motocross tracks by racing vehicles, the gates to these precincts are to remain locked at all times other than:

1. In preparation for and during race meetings and practice sessions approved by the Venue Manager
2. In preparation for and during Special Events as approved by the CEO of the City of Albany
3. During maintenance or improvement of the precinct facilities
4. Driver and rider training on the race track

8.2 Responsibility for noise measurement and record keeping

The Venue Manager will ensure that only persons nominated by the Club as their Sound Control Officer (SCO) and competent in utilising equipment conforming to the requirements of Section 9.3 and Section 10.3 are engaged as required to assess compliance. Also, that all noise measurements, testing requirements and record keeping are met for Venue events under the control of the Venue Manager to the requirements of the CEO of CoA.

9 Noise emissions from car events

Each car that is to use the Venue must have a record of test indicating that its noise level does not exceed a noise limit of 95 dBA ('noise limit') when tested at 30 m from the vehicle in accordance with the noise test procedure (Section 9.1). Racing car sound emissions and sound testing will comply with the current Motorsport Australia specification on noise emission.

Vehicles that have been measured in accordance with accepted measurement procedures (Section 9.1) at another racing venue are deemed to have complied with the requirement for testing of noise emissions providing the measurements have been conducted by a nominated Sound Control Officer.

If the exhaust system or engine of a racing vehicle is modified or replaced after the level of noise emitted by the vehicle had been measured, the Venue Manager is to ensure that the level of noise emitted by the vehicle is measured again and the vehicle complies before the vehicle is raced at an event.

Noise test results are valid for 24 months only.

Information shall be recorded as part of normal vehicle scrutineering and shall include:

1. Details of the racing vehicle tested including make, model and exhaust type
2. The racing vehicle's owner
3. The date and location of testing
4. Make, model, serial number and copies of calibration certificate of the sound level meter used for measurement
5. Name and signature of the Sound Control Officer measuring noise levels
6. Measured sound pressure (noise) level

Records of tests are to be provided to the Venue Manager who will provide them to the CEO CoA on request.

9.1 Noise test procedure

The level of noise emitted by a racing vehicle (the tested vehicle) is to be measured with the sound level meter/microphone fixed on a tripod, in the horizontal position, 30 m from the edge of the track at a high speed point with the measuring microphone not less than 1.2 m or more than 1.4 m above the ground plane.

Tests will be carried out as requested by the Sound Control Office and can be repeated at random.

9.2 Instruments

Instruments used to measure noise emissions shall:

1. Be calibrated in accordance with and otherwise comply with Schedule 4 of the *Environmental Protection (Noise) Regulations 1997.*
2. Be operated by a Sound Control Officer who is approved by the Venue Manager.
3. Set to fast response, A weighted and high 80-130 dB range.
4. Meet or exceed the relevant performance requirements of a Class 2 sound level meter.

10 Noise emissions from motorcycle events

Each motorcycle that is to use the Venue must have a record of test indicating that its noise level does not exceed the permissible sound emission level specified in the current Motorcycling Australia *Manual of Motorcycle Sport Appendix C: Sound Emissions and Fuel* when tested in accordance with that Manual.

Motorcycling Australia sound emission limits and test methods

	Road Race	Historic Road Race	Motocross and Supercross	Classic MX and Classic Dirt Track	Trial	Minikhana
Sound emission limit, dBA	95	95	112	95	112	112
Method	A	A	B	A	B	B

Vehicles that have been measured in accordance with accepted measurement procedures (Section 10.1) at another racing venue are deemed to have complied with the requirement for testing of noise emissions providing the measurements have been conducted by a nominated Sound Control Officer.

If the exhaust system or engine of a racing vehicle is modified or replaced after the level of noise emitted by the vehicle had been measured, the Venue Manager is to ensure that the level of noise emitted by the vehicle is measured again and the vehicle complies before the vehicle is raced at an event.

Noise test results are valid for 24 months only.

Information shall be recorded as part of normal vehicle scrutineering and shall include:

1. Details of the racing vehicle tested including make, model, and exhaust type
2. The racing vehicle's owner
3. The date and location of testing
4. Make, model, serial number and copies of calibration certificate of the sound level meter used for measurement
5. Name and signature of the Sound Control Officer measuring noise levels
6. Measured sound pressure (noise) level

Records of tests are to be provided to the Venue Manager who will provide them to the CEO CoA on request.

10.1 Noise test procedure

Tests will be carried out as requested by the Sound Control Office and can be repeated at random.

10.1.1 Method A – 30 m ride by test (road race, historic road race and classic MX and classic dirt track)

The sound levels will be measured with the sound level meter/microphone fixed on a tripod, in the horizontal position, 30 m from the edge of the track at a high speed point with the measuring microphone not less than 1.2 m or more than 1.4 m above the ground plane.

10.1.2 Method B – 2 metre maximum method (motocross and supercross, trial and minikhana)

The level of noise emitted by a racing motorcycle (the tested vehicle) is by using a sound level meter (2 m maximum method) with the motorcycle on its wheels or on a stand with a hot engine in accordance with *Appendix C: Sound Emission and Fuel* of the Motorcycling Australia *Manual of Motorcycle Sport* (Attachment 2).

10.3 Instruments

Instruments used to measure noise emissions shall:

1. Be calibrated in accordance with and otherwise comply with Schedule 4 of the *Environmental Protection (Noise) Regulations 1997.*
2. Be operated by a Sound Control Officer who is approved by the Venue Manager.
3. Set to fast response, A weighted and high 80-130 dB range.
4. Meet or exceed the relevant performance requirements of a Class 2 sound level meter.
5. Copies of the calibration certificates must be provided to the CEO CoA on request.

11 Scrutiny of racing vehicles

1. An Accredited Scrutineer or Sound Control Officer shall be designated for the duration of a race meeting and practice session to evaluate noise emissions from race vehicles.
2. The Accredited Scrutineer or Sound Control Officer may require a new test where a racing vehicle has been modified to the extent that the previous record of noise test is no longer representative of noise emission from the vehicle.
3. If a racing vehicle at the event emits a level of noise that is conspicuously louder than that of the other racing vehicles in the same class at the meeting, the Accredited Scrutineer or Sound Control Officer may require that vehicle to immediately cease racing and may prevent that vehicle from further racing at the Venue until that vehicle's noise level has been shown to comply with the noise limit.

12 Public address system

There will be no permanent public address (PA) system installed. A temporary PA system consisting of loudspeaker towers placed around the track, facing towards the track and angled down towards the track will be installed as required.

The loudspeakers are not to be moved or adjusted by any person without the approval of the Venue Manager.

Sound emissions from the public address system at the Venue are to be under the control of the Venue Manager, who is to designate persons who are authorised to use the system.

The public address system controls are to be set to provide a suitable audience sound level during the preliminary meeting each year, with the assistance of such persons as the Venue Manager requires, ensuring the minimum practicable 'spill' of sound into nearby noise sensitive areas.

The public address cabinet is to be locked for access only by the Venue Manager and his authorised assistants at all other times.

The public address system will only be used during race meetings; it is not to be used during practice sessions or at any other time except in the case of an emergency.

13 Recording and reporting

The Venue Manager is to make a record of all racing vehicles that have been required to cease racing by the Accredited Scrutineer or Sound Control Officer under Section 11 and retain that record for two years in a form that shows:

1. Details of the racing vehicle required to cease racing
2. The racing vehicle's owner
3. The date and time at which the request to cease racing occurred
4. The action taken by the driver of the racing vehicle following the request

5. The action taken by the owner of the racing vehicle to remedy the excessive noise emissions

If requested to do so in writing by the CEO CoA, the Venue Manager is to forward a copy of all or any of the records made under Section 13 within 21 days of the request.

14 Information to public

The times and dates on which it is proposed to hold events at the Venue will be made publicly available via the Venue website and through social media channels before the start of each season. Should this program be changed for any reason during the season, the details of the changes will be made publicly available via the Venue website and social media channels before the changes occur.

A schedule of programmed events, regularly updated, including test and tune, practice sessions and media sessions (where possible), is to be publicly available at all times on the Venue website.

Notice of the program for racing activities for a season is to be published and distributed to members of the public as follows:

1. The notice is to be published on the Venue website, showing proposed dates of racing activities (where known) for the coming season and the telephone number for noise complaints.
2. In addition to (1), the notice is to be delivered to the address of each noise sensitive premises at locations within 5 km of the venue.
3. The notice is to be published and delivered during the month of the year in which the season starts.
4. A change to the racing program is to be published on the Venue website and a notice provided in accordance with (2) above within four weeks before the changed meeting is to occur.
5. Notice of a Special Event approved by the CEO is to be given in accordance with the conditions of the approval.

15 Complaint procedure

1. A designated telephone number will be manned during racing activities for the receipt of noise complaints.
2. A complaint received will be recorded on the noise complaint form (Attachment 3), including the source of the complaint (excessive vehicle noise, PA system noise, etc.
3. All complaints will be treated with due consideration and investigated and responded to as appropriate.
4. The Venue Manager will as far as practicable provide advice to the complainant within 48 hours as to the outcomes of the investigation and where appropriate, any proposed modifications to operations.
5. The results of complaint investigations, details of measures taken or considered to reduce noise emissions under Sections 8, 9, 10, 11 and 12 and an outline of the responses given to the complainant shall be recorded on the noise complaint form (Attachment 3).
6. Completed noise complaint forms will be retained at the Venue for the period of the approval and made available to the CEO of CoA on request.
7. Noise complaint details are to be provided to the CoA on the next business day following receipt of the complaint.

16 Monitoring and validation

AMV is to retain the services of a suitably qualified person to develop and undertake a noise monitoring program to measure noise levels of noise associated with the loudest motorsport events at AMP. Monitoring is to take place on at least three occasions per 12 month period at the four closest noise sensitive premises at times corresponding to the worst case meteorological conditions for sound propagation to that premises.

17 Responsibilities

Responsibilities	
Occupier / Venue Manager	Implementation of this Albany Motorsport Park - Noise Management Plan Implementation of Albany Motorsport Park - Code of Conduct Implementation of Albany Motorsport Park - Safety and Emergency Procedures Control of public address system Development of program for scheduled use of the Venue
Club Committees	Appointment of Accredited Event Scrutineer Development of program for scheduled race meetings Appointment of an experienced Sound Control Officer Designation of Accredited event marshals and stewards
Event Scrutineer	Scrutiny of racing vehicles in accordance with the relevant governing agency
Sound Control Officer:	Measure and management of sound emission from racing vehicles

Attachment 1

Map of venue showing facilities

Master Plan

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

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SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

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WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

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EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E

Attachment 2

Appendix C: Sound Emission and Fuel of the Motorcycling Australia Manual of Motorcycle Sport

	Road Race	Historic Road Racing	Motocross & Supercross	Classic MX & Classic Dirt Track	Enduro	ATV (MX, SX & Enduro)	ATV (Speedway, Dirt Track & Track)	Speedway	Dirt Track & Track	Supermoto	Trial	Minikhana	Record Attempts
Sound Emissions LIMIT dB(A)	95	95	112	95	112	112	115	115	115	112	112	112	No Limit
Sound Emissions Allowance dB(A)	NA	NA	2 Pre-Race 1 Post-Race	NA	2 Pre-Race 3 Post-Race	4	3	3	3	4	4	4	NA
Sound Emissions Method for Testing	A	A	B	A	B	B	B	B	B	B	B	B	NA
Fuel All Machines	A	C	A	D	A	A	A	A	A	A	A	A	-
Fuel Exceptions	A / C[1]	B[1]	D	NA	NA	D	D	B[1]	B[1] / D	NA	C[1]	NA	-

Road Race notes:
1. 125cc & 250GP 2-stroke machines only

Historic RR notes:
1. Excludes Period 5 and Period 6 Solo machines

Speed-way notes:
1. Senior, Classic and 250cc/ 350cc Junior classes only

Dirt Track & Track notes:
1. Senior and Classic classes only

Trial notes:
1. Classic classes only

1 SOUND EMISSIONS: METHOD FOR TESTING

A	30 Metre Ride-By Test The sound levels will be measured with the sound meter/microphone fixed on a tripod, in the horizontal position, 30 metres from the edge of the track at a high speed point.
B	2 Metre Max Method Refer to Appendix C: 1.4 Use of Sound Level Meters: 2 Metre Max Method

1.1 Sound Testing: General

1.1.1 Sound testing must be carried out at all permitted events however it is not mandatory to test all machines

1.1.2 Where government regulations or planning orders exist in relation to lower sound emissions or where a venue has lower sound emission requirements as part of the hire contract, the sound emission required will prevail over Appendix C.

1.2 Sound Control during Competition

1.2.1 The Sound Control Officer (SCO) must arrive in sufficient time for discussions with the Clerk of the Course and other Technical Officials in order that a suitable test site and testing policy can be agreed.

1.2.2 Machines can be tested before, or after competing in an event, chosen by ballot, or as required by a Steward, Clerk of Course or SCO.

1.2.3 Sound testing apparatus must:

a) Comply with International standard IEC 651, Type 1 or Type 2.

b) Include a compatible calibrator, which must be used immediately before testing begins and always just prior to a re-test if a disciplinary sanction may be imposed.

1.2.4 Sound testing apparatus must be set to:

a) 'Fast response',

b) 'A' weighted,

c) Select range High 80~130 dB,

d) Activate the function MAX MIN - set on MAX.

1.3 Machine Testing

1.3.1 No person may compete in any event on a machine whose sound emissions exceed the prescribed levels.

1.3.2 If a machine fails, it can be represented for re-testing.

1.3.3 A machine which does not comply with the sound limits can be presented several times.

1.3.4 Provided sound emission levels are not exceeded, exhaust systems may operate without silencers

1.3.5 Tests shall not take place in the rain

1.4 Use of Sound Level Meters: 2 Metre Max Method

1.4.1 Set up of the sound meter and the motorcycle:

a) The sound levels will be measured with the sound meter/microphone fixed on a tripod, in the horizontal position, at the rear of the motorcycle.

b) For the place and position of the motorcycle, ensure that there are no solid obstacles within a 10 metre radius of the microphone.

c) The sound meter will be positioned at a distance of two metres behind the motorcycle, with an angle of 45° away from the centerline, on the exhaust side and at a height of 1.35 metres above the ground, with the sound meter level.

d) The two metre distance is measured from the point where the centre of rear tyre touches the ground.

e) It is preferred that the tests are conducted on soft ground, to prevent reverberation, for example, grass or fine gravel.

f) In other than moderate wind, machines should face forward in to the wind direction.

g) The ambient sound level must remain lower than 100 dB/A.

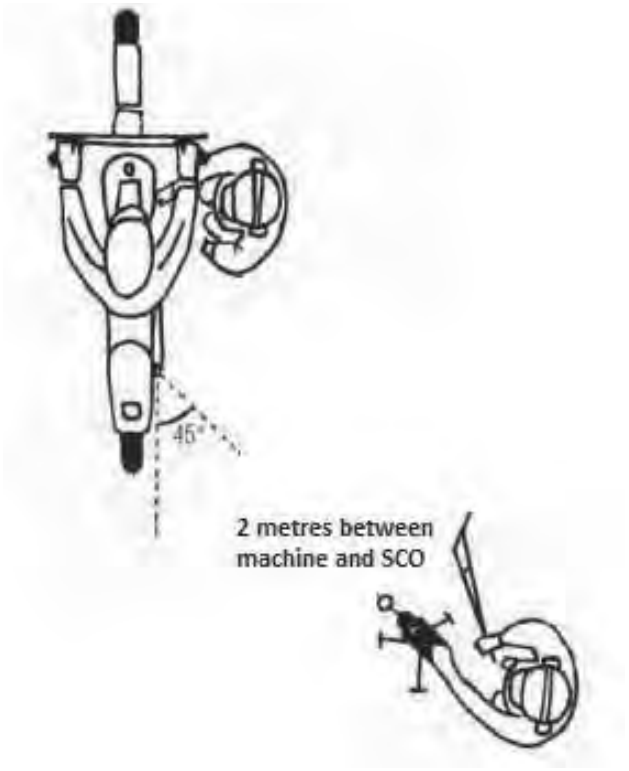
1.4.2 Positioning of the motorcycle:

The reference points:

a) For a motorcycle: the contact point of the rear wheel on the ground.

b) For motorcycles fitted with two exhaust outputs, the measurement will be made on the side of the air intake. If a central positioned air intake is used, both sides will be tested.

c) For Sidecars: the contact point of the



side wheel on the ground.

1.4.3 Testing method:

a) The measurement can be made with the motorcycle on its wheels or on a stand, with a hot engine.

b) During a sound test, machines not equipped with a gear box neutral must be placed on a stand.

c) The SCO should stand beside the motorcycles, opposite the microphone and not screen or stand between the bike and the microphone. An assistant, placed on the left side of the motorcycle, shall disengage the clutch.

d) The SCO shall open the throttle as fast as possible until full open throttle (instantly, within 0.3 seconds) and keep at max engine 'rpm' for at least one second. *To end, the SCO will release the throttle quickly*.

e) If the result exceeds the limit, including 'after fire', the Inspector shall test the motorcycle a maximum of two more times.

f) For motorcycles equipped with an engine rpm limiter, opening the throttle will be made - instantly, within 0.3 seconds - and kept open until at least one second has evolved and/or when there is an audible sign of over revving the engine.

g) For motorcycles without an engine 'rpm' limiter, the opening of the throttle will have to be lower than two seconds and/or when there is an audible sign of over-revving the engine.

h) If the engine tends to suffocate, close the throttle slightly and re-open the throttle.

i) If detonations appear, the measurement must be started again.

j) The numbers obtained from the test shall not be rounded down.

k) For the sound level measurement, the handling of the throttle is limited only to the SCO, who shall open the throttle themselves in order to minimize the influence by another operator (for that, it is helpful to have the microphone equipped with an extension cable to the sound meter).

l) The motorcycle may be tested in gear.

m) Exhaust system damage during the race: silencers fitted with removable end cap/adapters/inserts to reduce sound must be securely mounted. If removable end cap/adapters/inserts become separated from the silencer during practice, qualifying or race and the machine exceeds posted sound limits, the silencer will be deemed modified and a penalty will apply. Motorcycle exhaust systems sustaining damage during the race must meet post-race sound limits.

n) Any competitor whose machine is tested post-race and found to exceed the maximum allowed post-race sound limit will be relegated three finishing positions for the previous race. Post-qualifying, the riders' best lap will be removed from the results.

o) Machines found to be using lower RPM limits for the static sound test than what is used on track will be immediately excluded from the previous race. This may be verified by the use of a tachometer. For machines fitted with map select switches, all switch positions may be tested.

p) Motorcycles that do not comply with sound test limits pre-race will not be permitted to enter the course.

1.4.4 Post-race testing protocol:

a) Immediately after each race, motorcycles selected for sound testing must proceed directly to the sound testing area.

b) Only two crew members per machine including the rider are permitted in the sound testing area at any one time.

c) Where a competitor's machine does not proceed directly to the sound testing area, the competitor will be subject to a three position relegation.

d) Machines selected for post-race sound testing must not be adjusted or interfered with until sound test is completed. A three position relegation will apply for non-compliance.

2 FUEL

A	Must be Unleaded, fuel available on demand from a bowser at five separate service stations in any five Australian states or territories and i) No more than 100 RON, ii) Contain no additives other than those added at the point of manufacture except for lubricating oils for 2 - stroke machines iii) Be readily available in Australia and, iv) Comply with the "Fuel Quality Standards Act 2000"
	Be a brand of fuel homologated by MA.
B	Level A Fuel, or
	Pure Methanol
C	Level A Fuel, or
	Homologated substitute for Leaded Fuel can be found on the MA Website.
D	Level A Fuel
	Pure Methanol, or
	Homologated substitute for Leaded Fuel (Substitute Fuels can be found on the MA Website).

3 FUEL EXCEPTIONS

A	Moto2 and Moto3 GP machines may use fuel in accordance with the FIM Technical Regulations
B	May use Pure Methanol
C	May use homologated substitute for Leaded Fuel (Substitute Fuels can be found on the MA Website).
D	May use upper Cylinder lubricant in 4-Stroke engines

4 FUEL: GENERAL

4.1 Fuel Warning

4.1.1 Fuels and lubricants are highly specialised substances and participants must be aware they may contain substances that are extremely dangerous to human health if misused, inhaled or allowed to contact skin.

4.1.2 Some of the components of fuel and lubricants are suspected of having the potential to cause cancer in rare circumstances.

4.1.3 The use of petrol as a general cleaning and washing agent is a common misuse of a potentially dangerous substance.

4.1.4 Fuels should be used and stored with extreme care and in accordance with the manufacturer's instructions.

4.2 Fuel Testing

4.2.1 For any event, **meeting or series** the Relevant Controlling Body may direct that no fuels other than fuels of prescribed specifications and from a prescribed source may be used.

a) Tests to ensure that only prescribed fuels are used in an event, meeting or series may be administered at any time and place during the course of the same,

b) The Clerk of Course, Race Director or Chief Scrutineer may direct the administration of fuel tests.

4.2.2 Fuel tests must comply with the following procedures:

a) All containers for holding samples must be clean and constructed of robust non-reactive impermeable material, must be sealable, and must have provision for identification,

b) Equipment used for the extraction of fuel from machines must be clean and constructed of fuel non-reactive material,

c) **Fuel testing must be conducted by an MA approved fuel screening company using an infared fuel analysis spectrometer.** ~~All samples must be divided into two lots (Sample A and Sample B) of not less than 5ml each, which must be placed in separate containers,~~

~~d) Once samples are placed in~~

~~containers, the containers must immediately be sealed and identified by reference to the machine from which the sample was taken. This information must be entered on a fuel sample certificate which must certify the date, place and time of taking the sample, the identity of the machine from which the sample was taken and the identity of the rider,~~

~~e) Both samples must remain in the control of the official who administered the test.~~

~~f) The rider or the representative must sign the fuel sample certificate acknowledging samples have been taken and are sealed,~~

~~g) All samples held by the official must be delivered as soon as practicable after the competition to the relevant controlling body which must deliver the Sample A as soon as practicable to a laboratory approved by MA where they must be tested for content and quality in accordance with standard scientific procedures,~~

~~h) The relevant controlling body must as soon as practicable after receipt of the results notify the rider or rider's team representative and MA,~~

~~i) If the rider is dissatisfied with the test result of sample A, they may request sample B be tested at an MA approved laboratory in their presence.~~

4.2.3 Where onsite fuel testing is provided by the promoter or RCB and is conducted at any MA permitted event by an MA approved fuel screening company using an infrared fuel analysis spectrometer the following will apply;

a) Competitors motorcycle being tested in this manner must remain in Parc Ferme/Impound area under the control of technical officials until the result of the test is known,

b) Where a sample has been taken from a competitors motorcycle and the sample of fuel is outside the prescribed specifications as contained within the GCRs or SRs this is referred to as a positive result,

c) Where a positive sample has been taken from a competitors motorcycle, a second sample must then be taken and tested to confirm the initial positive result,

d) Penalties and/or sanctions listed in these GCRs can be applied based on a positive result of the second sample taken,

e) If a competitor wishes to protest a positive result of the onsite test the secondary testing procedure will apply and;

i) The machine must not have left the confines of the Parc Ferme/ Impound area and still be under control of the technical officials,

ii) If the machine is removed from Parc Ferme/Impound area before the secondary testing procedure is implemented, the secondary testing procedure cannot take place and consequently, the results from the original test sample will stand and all penalties will apply.

4.2.4 Where fuel testing is required and an onsite fuel testing service is not provided by the promoter or RCB the secondary testing procedure may be applied.

4.2.5 Secondary testing procedure;

a) Two samples (Sample A and Sample B) of not less than 250ml each or where the quantity of fuel available in the machine is less than 2 x 250ml, then as much fuel as is available will be taken and divided evenly between the two samples. These samples must be taken whilst the machine is still in Parc Ferme/Impound area and must be placed in separate containers,

b) Once samples are placed in containers, the containers must immediately be sealed and identified by reference to the motorcycle from which the sample was taken. This information must be entered on a fuel sample certificate which must certify the date, place and time of taking

the sample, the itentity of the motorcycle from which the sample was taken and the identity of the rider,

c) Both samples must remain in the control of the official who administered the test,

d) The rider or the representative must sign the fuel sample certificate acknowledging samples have been taken and are sealed,

e) All samples held by the official must be delivered as soon as practiable after the event to the RCB which must deliver the Sample A as soon as practicable to a labratory approved by MA where they must be tested for content and quality in accordance with standard scientific procedures,

f) The RCB must as soon as practicable after receipt of the results notify the rider or rider's team representative and MA,

g) If the rider is dissatisfied with the test result of Sample A, they may, at the rider's cost, request Sample B be tested at an MA approved labratory in their presence.

4.3 Sanctions

4.3.1 Where a competitor has been found to have used a fuel which is outside of the prescribed specifications, **a positive result,** contained within the **GCRs** ~~rules~~, **the following sanctions will apply**,

a) The competitor will be excluded from the results of the event where the samples were obtained, and excluded from all events the competitor participated in prior to the sampling at that event,

b) All costs associated with **an individual competitors** laboratory testing of fuel samples will be borne by the competitor,

c) Fines in addition to any other sanctions may also be applied for this breach of the **GCRs** ~~rules~~.

4.3.2 The laboratory tests are considered to be "judge of fact" and the penalties, as applied, are mandatory and not open to protest or appeal.

4.3.3 If the outcome of the labratory test returns a negative result, the cost of the secondary testing will be borne by the promoter or RCB.

4.4 Refuelling

4.4.1 During refuelling, each machine must be stationary with the engine stopped.

4.4.2 Refuelling will be deemed to have commenced when the fuel tank has been opened and completed when the tank is closed.

4.4.3 Smoking is strictly prohibited in areas where refuelling is permitted.

4.4.4 Riders are liable for exclusion from an event for failing to adhere to GCR 4.4.3, and are responsible for the actions of their mechanics and support team members.

4.5 Homologation of Fuel

4.5.1 Unleaded fuel produced by an oil company for sale in the Australian general transport fuel market through retail petrol pumps in at least five States does not have to be homologated. For the avoidance of doubt this means the fuel must be available for sale on demand from a roadside bowser outlet at each of at least five separate service stations in each of at least five Australian States or Territories.

4.5.2 Organisations seeking homologation of fuel must provide MA with:

a) 2 one-litre sealed containers of the fuel for analysis,

b) Details of the fuels characteristics,

c) The distribution network,

d) The price structure,

e) A homologation fee of $2,500 in the first year and $2,000 per year thereafter.

4.5.3 Fuels approved under this GCR will be published at www.ma.org.au.

Attachment 3

Noise complaint form

ALBANY MOTORSPORT PARK

NOISE COMPLAINT FORM

To be completed by Operations Manager or delegate

Date:		File no.:	
Event type (race meeting, practice session, other event):			

Complainant details

Name:			
Address:			
Phone (Home):		Phone (Work):	
Phone (Mobile):		Facsimile:	
Email:			

Nature of complaint:

Type of noise, description of noise heard by complainant	
Time of complaint:	
Duration of noise:	

Response (actions taken during race meeting or practice session)

Excessively noisy vehicle removed from track, PA system volume adjusted, complaint filed with no immediate action

Follow up (actions taken following race meeting)

Vehicle noise tested and mitigation prior to allowing to resume racing

Resolution

Noise complaint resolved:	YES / NO		
IF NO, outstanding actions to be taken			
Date:		Time:	
Speedway Manager:			

Appendix C

Albany Motorsport Park – Noise Assessment

Prepared for City of Albany, September 2020

City of Albany

Albany Motorsport Park
Noise Assessment

September 2020

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Appendices

Appendix A - Glossary of noise terminology

Appendix B – Monitoring results

Appendix C – Example Noise Management Plan

Glossary of acronyms and terms

4WD	Four wheel drive
ADR	Australian Design Rule
AMP	Albany Motorsport Park
AS	Australian Standard
ATV	All-terrain vehicle
BoM	Bureau of Meteorology
CadnaA	Computer Aided Noise Abatement software used for calculating predicted noise emissions
CAMS	Confederation of Australian Motor Sports
CEO	Chief Executive Officer
CONCAWE	Conservation of Clean Air and Water in Europe
DWER	Department of Water and Environmental Regulation
FIA	Fédération Internationalé de l'Automobile
FIM	Fédération Internationalé Motocyclisme
GHD	GHD Pty Ltd
GSMG	Great Southern Motorplex Group Inc.
IF	Influencing Factor
MA	Motorcycling Australia

Note: Refer to Appendix A for an explanation of the noise terminology used throughout this report.

1. Introduction

1.1 Project background

Participation in motorsports is a popular recreational activity for many Australians, including residents in Albany and the Great Southern region. By one estimate, motorsport is the fourth most watched sport in Australia, with over 150,000 participants across the country[1]. Anecdotally, motorsport in Albany and the surrounding areas is already known to be popular, with several well organised clubs, a national-level venue for speedway, a state-level venue for go-karts and widely recognised events such as the Albany Classic, Show 'n Shine and Race Wars at Albany Airport. However, some motorsport disciplines lack suitable facilities in the region. In particular, the closure of Albany Motorcycle Club's facility at Roberts Road in 2011 has meant that motocross and enduro motorcycle riders currently lack a permanent formalised facility to pursue their sport in the lower Great Southern region.

By their nature, motorsports are very capital intensive, requiring significant investment in equipment and facilities by participants, clubs and supporting organisations such as local and state governments. Recently, an independent proposal has been advanced by the Great Southern Motorplex Group Inc. (GSMG) to develop a multi-use Albany Motorsport Park (AMP) near the Mirambeena timber processing precinct on Down Road. This proposal aims to:

- Promote and facilitate multiple motorsports on a club and state level in Albany and the Great Southern region.
- Provide a safe environment and venue for multiple motorsports clubs (and other compatible sports, such as cycling).
- Provide a venue to promote and facilitate commercial driver education and training.
- Provide a safe environment for companies to test and tune their vehicles.
- Promote Albany and the Great Southern region by attracting participants and tourists.
- Boost the regional economy through increased visitors, funding and sponsorship for events.

1.2 Project description

The concept design for the Albany Motorsport Park has been developed by the not-for-profit Great Southern Motorplex Group (GSMG) and Roberts Gardiner Architects. The GSMG has undertaken significant research into the requirements for track licensing by the Confederation of Australian Motor Sport (CAMS) and the specifications of:

- Fédération Internationalé de l'Automobile (FIA)
- Fédération Internationalé Motocyclisme (FIM)
- Motorcycling Australia (MA)

The proposed AMP will consist of:

1. Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:

   – Designed to comply with CAMS' *Track Operator's Safety Guide*[2] and MA's *Track Guidelines*[3].

[1] CAMS. (2014). *Economic contribution of the Australian motor sport industry*. Malvern East: Confederation of Australian Motor Sport.
[2] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[3] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

– To be licensed by CAMS for FIA Grade 2 and FIM Grade B (i.e. up to second-tier international motor racing).

2. A motocross circuit designed and constructed in association with MA guidelines.
3. An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area

At full development, the AMP will also include associated facilities, such as:

- Toilets
- Manager's office
- Medical / first aid station
- Meeting / briefing room
- Kitchen / canteen
- Storage / grounds maintenance workshop
- Vehicle scrutineers' workshop
- Control tower
- Spectators viewing areas
- Grassed spectators' picnic area with shade and BBQs
- Competitors parking
- Spectators parking

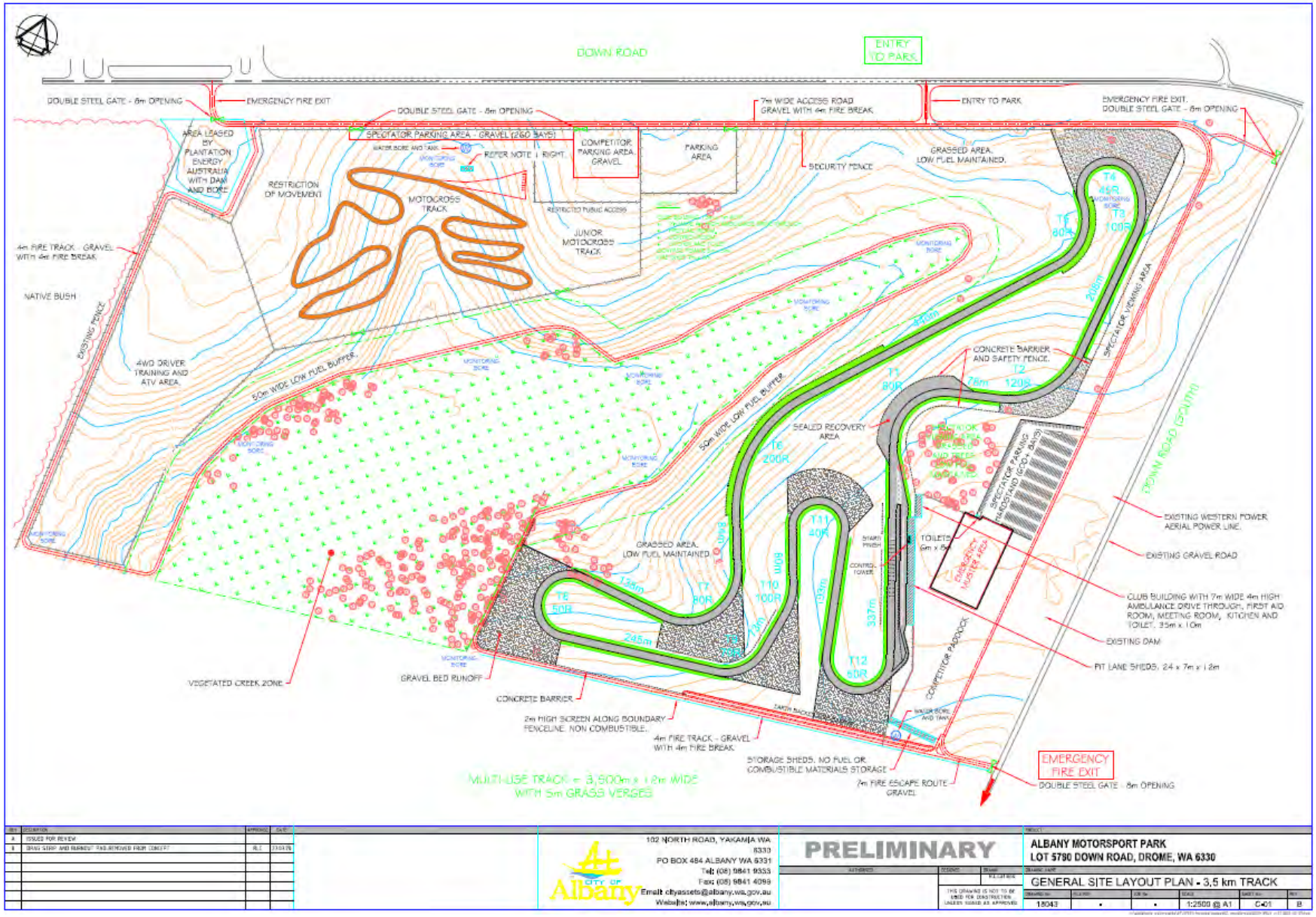


Figure 1-1 Albany Motorsport Park general site layout plan

1.3 Scope of work

GHD Pty Ltd (GHD) was commissioned by City of Albany to prepare planning approvals documentation for the proposed Albany Motorsport Park. As part of this commission, GHD was required to assess the potential acoustic impacts for the construction and operation of AMP.

This report assesses the potential noise and vibration impacts from construction and operation of AMP. The report's scope is to:

- Identify noise sensitive locations potentially impacted by the construction and operation of AMP.
- Describe the existing noise environment at noise sensitive locations potentially impacted by the construction and operation of AMP.
- Identify noise and vibration sources associated with construction and operation of AMP.
- Develop an environmental noise model to predict noise impacts from the operation of AMP using CadnaA noise modelling software, for a variety of proposed motorsport events.
- Assess the potential noise impacts on nearby noise sensitive receptors and compare the impacts with assigned noise levels.
- Identify opportunities for attenuation and management of noise impacts from AMP on noise sensitive areas should predicted noise impacts exceed the assigned noise levels.

1.4 Approach

The approach adopted by GHD for the assessment of noise impacts from the Albany Motorsport Park is summarised in the following points. Each point is described in detail in the subsequent sections of this report.

- Outline of AMP, including proposed events and anticipated operational noise sources (Section 2).
- Identification of the relevant noise criteria and guidelines applicable to AMP assessment (Section 3).
- Investigation of the existing noise environment, including identification of sensitive receptors, noise logging and assessment of noise monitoring to determine background and various time related noise levels (Section 4).
- Desktop assessment of construction noise and vibration (Section 5).
- Noise modelling for the assessment of predicted noise impacts during operation of AMP (Section 6).
- Recommend in-principle noise mitigation measures for construction and operational noise sources (Section 7).
- Conclusions drawn from the above assessment (Section 8, subject to the scope of works (Section 1.3) and Limitations (Section 1.5).

1.5 Limitations

This report has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and the City of Albany as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD accepts no responsibility for the integrity of the software coding of the approved noise model (CadnaA) used.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of insects and other noise sources) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.

2. Noise sources

2.1 Events and usage

Outlined in Table 2-1 is the expected usage of the Albany Motorsport Park, as conceptualised by the GSMG. For the purposes of sizing facilities and servicing infrastructure, a typical / frequent site attendance of 500 persons has been assumed (i.e. competitors, officials and spectators). This was determined through discussion with the GSMG on the nature and size of expected typical events.

Table 2-1 Indicative AMP event profile

Use	Level	Frequency	Duration	Entrants	Spectators
Driver training, schools, manufacturer testing		Week days	Day	50	0
Car test and tune day	Club	4 week days / month	Day	30	30
Car speed events	Club	1 weekend / month	Day	100	200 – 500
Car speed events	State	1 weekend / month	Day	100 – 200	200 – 1000
Car speed events	National	1 weekend / year	Day	200 – 300	2000 – 5000
Motorkhana	Club	1 day / month	Day	50	200
Supercars events	National	1 × 3 day weekend / year	Day	200 – 300	10,000 – 20,000
Bike test and tune day	Club	4 week days / month	Day	50	50
Bike speed events	Club	1 weekend / month	Day	100	200 – 500
Bike speed events – Champions Ride Day	State	1 weekend / month	Day	100	200 – 1000
Bike speed events	National	1 weekend / year	Day	200	1000 – 5000
Motocross events	Club	3 days / week training 4 single days / month	Day	100 – 200	200 – 400
Motocross events	State	1 weekend / month	Day	200 – 300	500 – 1000
Drifting day	Club	2 days / month	Day and evening	30	30
Drifting day	State	1 weekend / month	Day and evening	50	200 – 500

Duration of events:

- Typical day operation is 8:00 am to 6:00 pm, Monday to Saturday, 9:00 am to 6:00 pm on Sunday and public holidays. No evening (after 7:00 pm) or night (after 10:00 pm) events will be scheduled.
- No events occurring on the multi-use track and motocross track at the same time.
- The 4WD training area and multi-use track are expected to be in operation year round, taking advantage of Albany's cooler summer climate.
- In addition to driver and 4WD training, it is expected there will be motorsports club training sessions on every weekday. No evening sessions will be scheduled.
- At full development, it is likely there will be a motorsport event almost every weekend of the year. The cost of lighting for the motocross track and multi-use track is too high to contemplate evening events.

2.2 Noise sources

Noise sources from Albany Motorsport Park will be primarily from vehicles competing and preparing for various motorsport events, spectators and the public address system. A summary of each major noise source is presented below, with detailed information on assessment of each noise source provided in Section 6.

- Noise levels at residences due to the operation of the public address (PA) system will depend strongly on the design of the system, including number of speakers, directionality and orientation. With appropriate design, noise from this source should be controllable to less than 40 dBA at residences, and would generally not be audible.
- Driver training, schools and manufacturer testing, to be held during the day on the multi-use track – Vehicles will be road registered and comply with Australia Design Rule (ADR) requirements for vehicle noise emissions.
- Multi-use track events, such as car test and tune days, car speed events, supercars events, bike test and tune days, bike speed events, motorkhana events and drifting days, to be held during the day only. Noise impacts assessed based on vehicles competing in such events meeting the maximum CAMS noise level requirement of 95 dBA at a distance of 30 m.
- Motocross events, to be held during the day only on the motocross track. Noise impacts assessed based on noise levels from senior class motocross bikes.
- 4WD and all-terrain vehicle (ATV) off road training, to be held during the day only. Noise levels based on road registered 4WD vehicles.

It is important to note that no events are proposed to occur during the evening period (7:00 pm to 10:00 pm) and night period (between 10:00 pm to 7:00 am Monday to Saturday and 9:00 am on Sunday and public holidays).

3. Noise criteria

Environmental noise is managed through the *Environmental Protection (Noise) Regulations 1997* (the Regulations). The Regulations specify maximum allowable external noise levels at noise sensitive, commercial and industrial premises.

3.1 Construction noise

The Regulations state that for construction work carried out between 7.00 am and 7.00 pm on any day which is not a Sunday or public holiday:

- Construction work must be carried out in accordance with control of environmental noise practices set out in Section 6 of Australian Standard (*AS) 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*.
- The equipment used for construction must be the quietest reasonably available.
- The Chief Executive Officer (CEO) (of the Department of Water and Environmental Regulation (DWER)) may request that a noise management plan be submitted for the construction work at any time and complied with during construction activities.

For construction work done outside these hours:

- The construction work must be carried out in accordance with control of environmental noise practices set out in Section 6 of *AS 2436-2010*.
- The equipment used for construction must be the quietest reasonably available.
- The contractor must advise all nearby sensitive receptors likely to receive noise levels which fail to comply with the assigned levels under Regulation 8 (Table 3-1) of the work to be done at least 24 hours before it commences.
- The contractor must show that it was reasonably necessary for the work to be done out of hours.
- The contractor must submit to the CEO a noise management plan at least seven days prior to the commencement of out of hours work and the plan must be approved by the CEO before work commences. The plan must include details of:
  - Reasons for the construction work needing to be completed out of hours.
  - Details of activities which are likely to result in noise emissions that lead to exceedance of assigned levels.
  - Predictions of the noise emissions on the site.
  - Details of measures used to control noise (including vibration) emissions.
  - Procedures to be adopted for monitoring noise (including vibration) emissions.
  - Complaint response procedures to be adopted.

3.2 Operational noise

The Regulations (Regulation 7) define prescribed standards for noise emissions as follows:

> *7. (1) Noise emitted from any premises or public place when received at other premises –*
>
> > *(a) Must not cause or significantly contribute to, a level of noise which exceeds the assigned level in respect of noise received at premises of that kind*

(b) Must be free of –

(i) Tonality (e.g. whining or droning)

(ii) Impulsiveness (e.g. sirens)

(iii) Modulation (e.g. banging or thumping)

The assigned levels for noise sensitive premises (Regulation 8) are shown in Table 3-1.

Assigned noise levels (Table 3-1) are set differently for noise sensitive, commercial and industrial and utility premises. For noise sensitive premises an influencing factor (IF) is incorporated into the assigned noise levels. IF depends on land use zonings within circles of 100 m and 450 m radius from the noise receiver, including:

- Proportion of industrial land use zonings
- Proportion of commercial zonings
- Presence of major roads (more than 15,000 vehicles per day) or secondary (6,000 to 15,000 vehicles per day)

For this assessment, it has been assumed that IF will be zero (based on the absence of major and secondary roads). The resultant assigned levels used for this assessment of the AMP are shown in Table 3-3.

As motorsport events are scheduled to occur during the day period (refer Table 2-1), including Sundays after 9:00 am, the L_{A10} assigned level of 40 dBA day has been used in this assessment.

Table 3-1 Assigned noise levels (dBA)

Type of premise receiving noise	Time of day	Assigned level		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ Max}$
Noise sensitive[4]	7.00 am to 7.00 pm Monday to Saturday (Day)	45 + IF	55 + IF	65 + IF
	9.00 am to 7.00 pm Sunday and public holidays (Sunday)	40 + IF	50 + IF	65 + IF
	7.00 pm to 10.00 pm all days (Evenings)	40 + IF	50 + IF	55 + IF
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays (Night)	35 + IF	45 + IF	55 + IF
Noise sensitive[5]	All hours	60	75	80

IF = influencing factor

Tonality, impulsiveness and modulation are defined in Regulation 9. Noise is to be taken to be free of these characteristics if:

a. The characteristics cannot be reasonably and practicably removed by techniques other than attenuating the overall level of noise emission.

b. The noise emission complies with the standard after the adjustments of Table 3-2 are made to the noise emission as measured at the point of reception.

[4] Highly sensitive areas include a building, or a part of a building, on the premises that is used for a noise sensitive purpose and any other part of the premises within 15 metres of that building or that part of the building.
[5] Any area other than highly sensitive area.

Table 3-2 Adjustment for intrusive or dominant noise characteristics[6]

Tonality[7]	Impulsiveness[7]	Modulation[7]
+5 dB	+5 dB	+5 dB

Table 3-3 Assigned noise levels (dBA) for AMP

Type of premise receiving noise	Time of day	Assigned level		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive	7.00 am to 7.00 pm Monday to Saturday (Day)	45	55	65
	9.00 am to 7.00 pm Sunday and public holidays (Sunday)	40	50	65
	7.00 pm to 10.00 pm all days (Evenings)	40	50	55
	10.00 pm on any day to 7.00 am Monday to Saturday and 9.00 am Sunday and public holidays (Night)	35	45	55

3.3 Noise sensitive receptors

A number of residential receptors were identified in proximity to the AMP, as listed in Table 3-4 and shown in Figure 3-1.

Table 3-4 Receptor locations

ID	Location (MGA 94)		Distance from nearest AMP boundary (m)	Worst case wind direction (°)
	Easting (m)	Northing (m)		
SR01	569713	6133385	1150	310
SR02	567355	6132573	1120	10
SR03	564483	6133265	1930	80
SR04	565029	6134675	1920	100

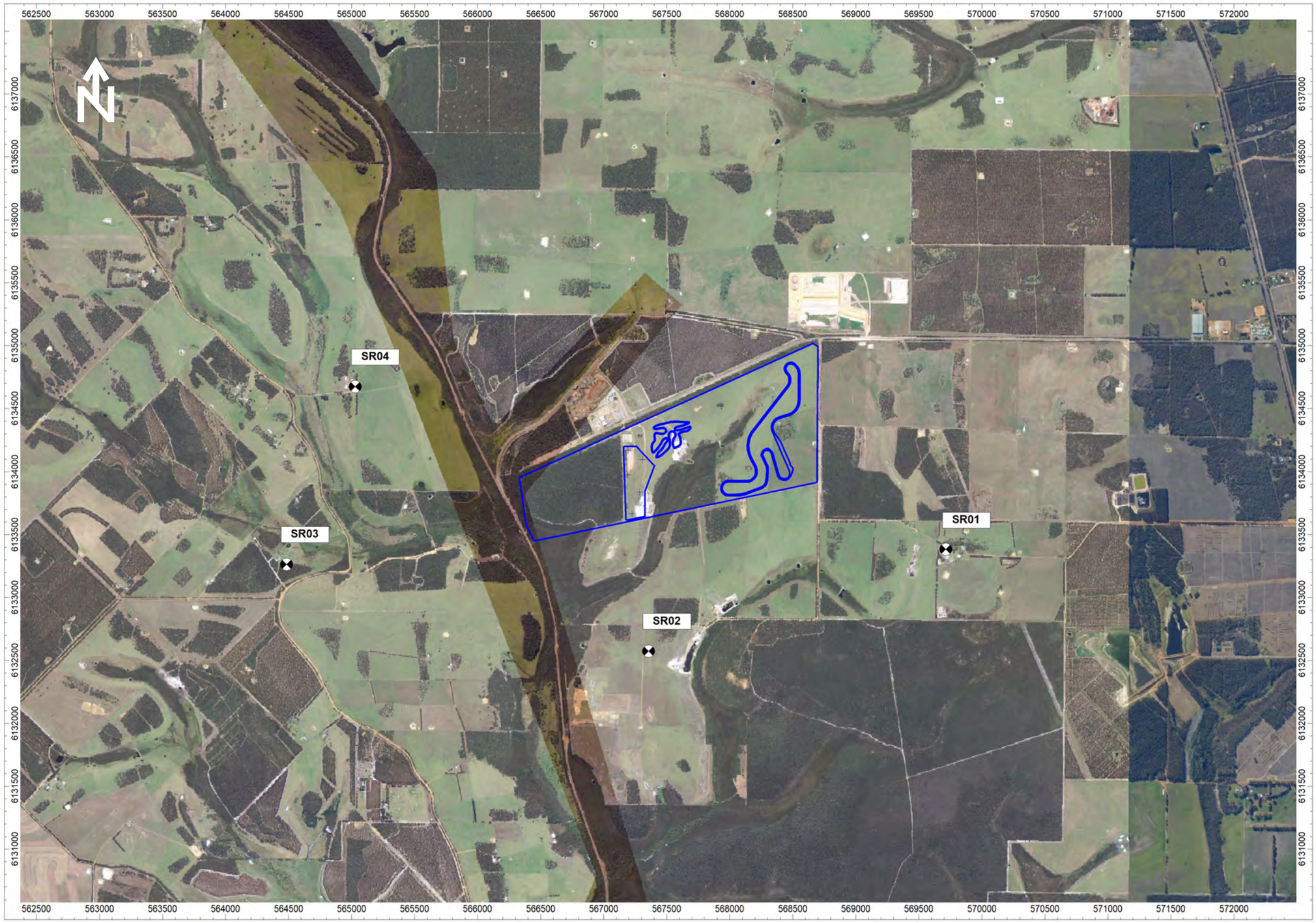
[6] Adjustment applies where noise emission is not music.
[7] Adjustments are cumulative to a maximum of 15 dB.

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Development area boundary



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
GRID:	Map Grid of Australia 1994, Zone 50

DATE	FILE LOCATION
10.08.2020	N:\AU\Albany WA\Projects\61\37331\Technical\Noise

REVISION	DRAWING NO.
2	

ALBANY MOTORSPORT PARK

NOISE SENSITIVE RECEPTOR LOCATIONS

Noise Assessment

FIGURE 3-1

GHD CLIENTS | PEOPLE | PERFORMANCE

4. Noise monitoring

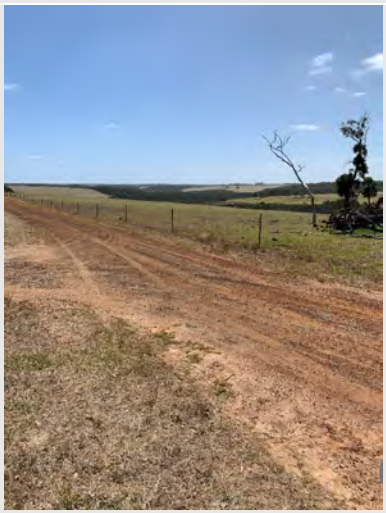
4.1 Noise monitoring locations

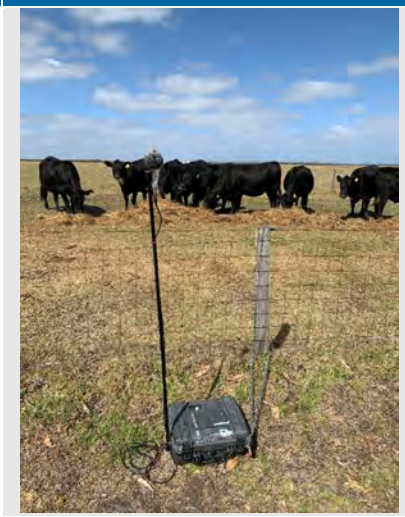
Noise monitoring was used to measure existing noise levels experienced by receptors located within the project area. Unattended noise monitoring was undertaken at three sites within the vicinity of the proposed Albany Motorsport Park.

Monitoring locations were chosen so as to be located at existing residential locations which are considered will be most affected by the Project. The monitoring locations were also identified as being safe and secure for unattended equipment, minimising the risk of theft or vandalism. In each case, the loggers were located as close as possible to the most effected facade, and were located to not be influenced by pumps, air conditioner compressors etc.

A summary of relevant information such as site coordinates, distance to the nearest boundary of the site and a photo of noise logger setup is provided in Table 4-1. The three monitoring locations are shown in Figure 4-1.

Table 4-1 Noise monitoring location summary

Site ID	Address	Easting (m)	Northing (m)	Distance of logger to AMP (m)	Noise logger setup
Site A (SR 01)	35552 Albany Hwy, DROME WA 6330	569713	6133385	1150	
Site B (SR 02)	114 Down Rd South, DROME WA 6330	567355	6132573	1120	

Site ID	Address	Easting (m)	Northing (m)	Distance of logger to AMP (m)	Noise logger setup
Site C (SR 04)	727 Marbelup North Rd, MARBELUP WA 6330	565029	6134675	1920	

4.2 Unattended noise monitoring methodology

Unattended noise logging for Sites A, B, and C was conducted from 5 to 14 March 2019. The instruments were programmed to accumulate environmental noise data (L_{Aeq}, L_{Amin} and L_{Amax}) continuously over sampling periods of 15-minutes for the entire monitoring period. Details of the noise logger setup are as follows:

– Model – Svan 955

– Type – Type 1

– Time interval – 15 minutes

– Frequency weighting – A weighted

Prior to deployment and at monitoring completion, the loggers were calibrated with a sound pressure level of 94 dB at 1 kHz using a Larson Davis CAL200 sound level calibrator. The data collected by the loggers was downloaded and analysed and any invalid data removed.

All noise sampling activities were undertaken with consideration to the specifications outlined in *AS 1055-1997 - Description and Measurement of Environmental Noise*.

4.3 Noise monitoring results

Sampled noise levels for the monitoring period are provided graphically in Appendix B along with the corresponding meteorological conditions obtained from the nearest Bureau of Meteorology automatic weather station at Albany Airport, including precipitation and wind speed and direction for each site. Data excluded during filtering for sample periods of rainfall of > 0.2 mm and/or wind speed > 18 km/h at the noise logger have been highlighted in Appendix B.

Review of the noise monitoring data plots (Appendix B) demonstrates time periods where monitoring locations appear to be influenced by unknown noise, and hence required filtering to remove such anomalous results:

- Site B
  - Saturday 9 March 2019 23:00 to Sunday 10 March 07:15
  - Sunday 10 March 2019 14:00 to 16:00
- Site C
  - Monday 11 March 2019 10:30 to 10:45

– Tuesday 12 March 2019 12:00 to 17:00

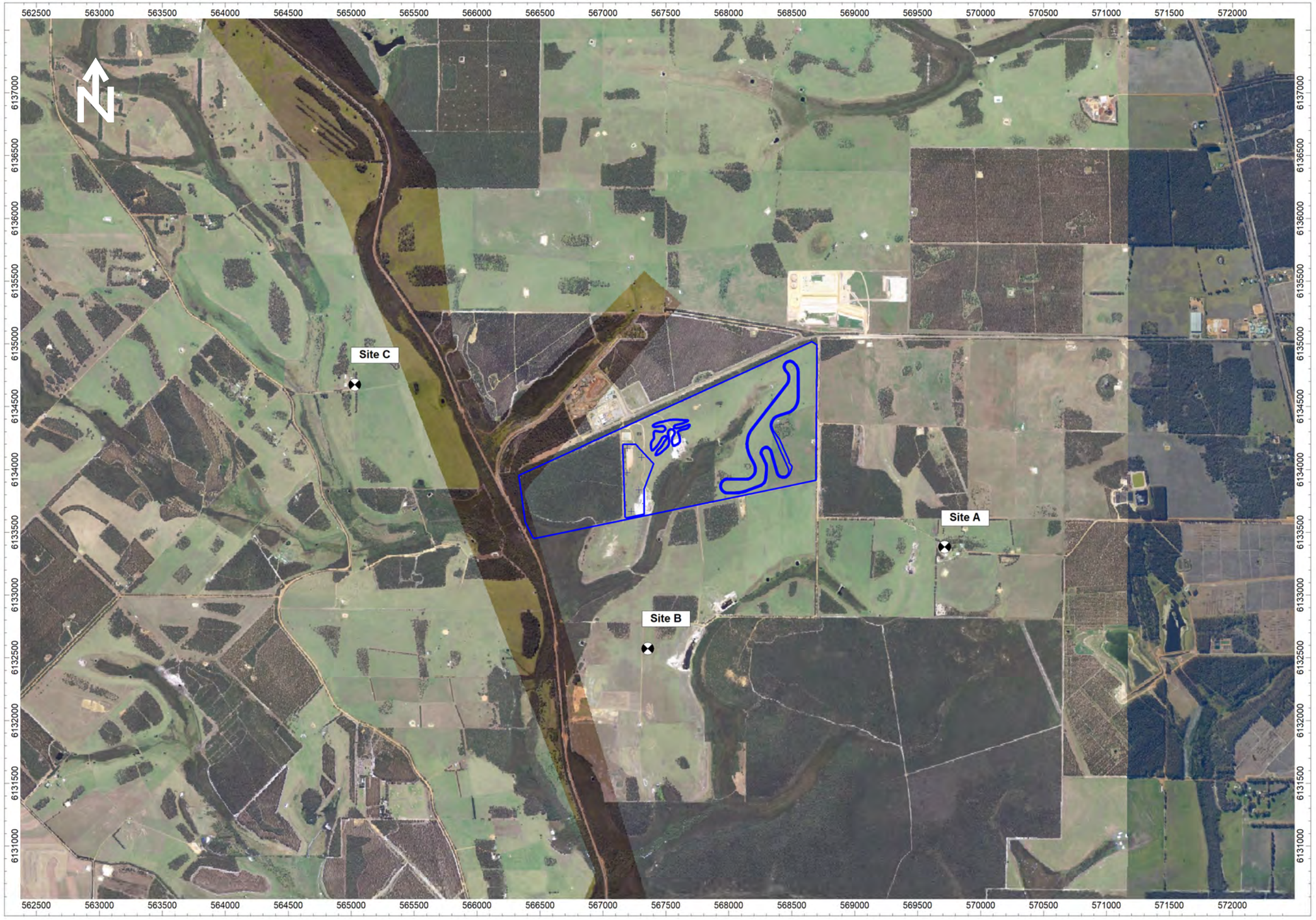
Daily noise monitoring results for each site are shown in Table 4-2, with entries significantly affected by meteorological conditions and anomalous results in the time periods above, removed.

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Development area boundary



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
GRID:	Map Grid of Australia 1994, Zone 50

DATE	FILE LOCATION
10.08.2020	N:\AU\Albany WA\Projects\61\37331\Technical\Noise

REVISION	DRAWING NO.
2	

ALBANY MOTORSPORT PARK

NOISE MONITORING LOCATIONS

Noise Assessment

FIGURE 4-1

GHD CLIENTS | PEOPLE | PERFORMANCE

Table 4-2 Daily L_{A90} noise levels, dBA

Site ID	Site A (SR01)			Site B (SR02)			Site C (SR04)		
Date	L_{A90} day	L_{A90} evening	L_{A90} night	L_{A90} day	L_{A90} evening	L_{A90} night	L_{A90} day	L_{A90} evening	L_{A90} night
Tuesday 5 March 2019	37.7	28.5	28.8	33.2	18.8	26.9	44.7	23.8	27.3
Wednesday 6 March 2019	39.8	31.8	27.2	32.4	25.9	20.0	42.2	30.9	22.2
Thursday 7 March 2019	32.5	27.2	28.8	28.8	17.1	19.1	36.3	23.0	28.6
Friday 8 March 2019	36.9	28.5	28.0	47.8	18.7	18.0	39.1	26.3	24.9
Saturday 9 March 2019	33.9	28.1	28.5	[8]	[8]	24.5	32.1	29.2	23.0
Sunday 10 March 2019	34.0	28.1	28.6	34.5	18.4	18.5	31.0	20.7	21.1
Monday 11 March 2019	33.9	27.4	29.5	40.5	15.1	23.4	32.7	24.5	28.9
Tuesday 12 March 2019	33.3	27.2	27.2	27.7	18.7	17.6	39.4	31.0	28.4
Wednesday 13 March 2019	32.0	-	-	25.7					
Average	*35.7*	*28.6*	*28.4*	*39.5*	*19.8*	*22.3*	*39.6*	*27.6*	*26.5*

L_{A90} values were not recorded during noise monitoring due to incorrect monitor setup. L_{Amin} values were recorded and have been adjusted to provide L_{A90} values. DWER have advised, based on a previous ambient measurements in a rural area, L_{Amin} values would be less than or equal to the L_{A90} levels and on average, the L_{A90} levels (15-minute duration) were less than 1 dB above the L_{Amin} for the logged period for night time and less than 3 dB above the L_{Amin} for the logged period for day time. These adjustments have been applied to the L_{Amin} values recorded.

[8] Filtering to remove anomalous noise monitoring results in no valid data

Table 4-3 provides the rating background level (RBL) for each location. The RBL is defined as:

The overall single figure background level representing each assessment period (day/evening/night) over the whole monitoring period, defined as the median value of:

- *All the day assessment background levels over the monitoring period for the day (7.00 am to 7.00 pm).*
- *All the evening assessment background levels over the monitoring period for the evening (7.00 pm to 10.00 pm).*
- *All the night assessment background levels over the monitoring period for the night (10.00 pm to 7.00 am).*

Table 4-3 Overall L_{A90} noise levels, dBA

Site ID	L_{A90} day	L_{A90} evening	L_{A90} night
Site A (SR01)	33.9	28.1	28.6
Site B (SR02)	32.4	18.6	19.5
Site C (SR04)	37.7	25.4	26.1

Noise monitoring and observations indicate a noise environment for each location as follows:

- **Site A: 35552 Albany Hwy, DROME WA 6330** – A rural environment with the main sources of noise occasional vehicle traffic on farm roads, livestock (in the distance) and sounds of nature (birds, insects and wind in trees). The APEC wood chip mill was in operation during the noise monitoring but was not audible. The Plantation Energy pellet facility was not in operation during the noise monitoring.
- **Site B: 114 Down Rd South, DROME WA 6330** – A rural environment with the main sources of noise occasional vehicle traffic on farm roads, livestock and sounds of nature (birds, insects and wind in trees). Elevated noise levels during the day and night period are most likely due to vehicle traffic on farm roads, such as tractors and quad bikes, and livestock. The APEC wood chip mill was in operation during the noise monitoring but was not audible. The Plantation Energy pellet facility was not in operation during the noise monitoring.
- **Site C: 727 Marbelup North Rd, MARBELUP WA 6330** – A rural environment with the main sources of noise occasional vehicle traffic on farm roads, livestock and sounds of nature (birds, insects and wind in trees). Elevated noise levels during all periods is most likely due to vehicle traffic on farm roads, such as tractors and quad bikes, and livestock, which was located close to the noise logger location. The APEC wood chip mill was in operation during the noise monitoring but was not audible. The Plantation Energy pellet facility was not in operation during the noise monitoring.

Noise monitoring at sensitive receptors in the vicinity of the Albany Motorsport Park indicates there were no existing noise sources, operating at the time of the noise monitoring, which need to be considered as ‘significantly contributing’. On this basis, the assessment has been completed for noise impacts from the Albany Motorsport Park in isolation.

5. Construction noise and vibration assessment

5.1 Construction noise

Construction noise impacts associated with the Albany Motorsport Park were estimated using the following distance attenuation relationship:

$$SPL = SWL - 20\log(d) + 10\log(Q) - 11$$

where: *d* = Distance between the source and receptor (m)
Q = Directivity index (2 for a flat surface)
SPL = Sound pressure level at the distance from the source (dB)
SWL = Sound power level of the source (dB)

Typical noise levels produced by construction plant anticipated to be used on-site were sourced from *AS 2436 –2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites*.

Propagation calculations take into account sound intensity losses due to spherical spreading, with additional minor losses such as atmospheric absorption, directivity and ground absorption ignored in the calculations. As a result, predicted received noise levels are expected to slightly overstate actual received levels and thus provide a measure of conservatism.

Received noise produced by anticipated activities during the construction of the AMP are shown in Table 5-1 for a variety of distances, with no noise barriers or acoustic shielding in place and with each plant item operating at full power. The sound pressure levels shown are maximum levels produced when machinery is operated under full load.

The magnitude of off-site noise impact associated with construction will be dependent upon a number of factors:

- The intensity and location of construction activities
- The type of equipment used
- Existing local noise sources
- Intervening terrain
- The prevailing weather conditions

Construction machinery will move about the AMP site area, altering the directivity of the noise source with respect to individual receptors. During any given period the machinery items used in the AMP area will operate at maximum sound power levels for only brief times. At other times the machinery may produce lower sound levels while carrying out activities not requiring full power. It is unlikely that all construction equipment would be operating at their maximum sound power levels at any one time. Finally, certain types of construction machinery will be present in the AMP area for only brief periods during construction.

Table 5-1 Predicted plant activity noise levels (dBA)

Plant	Estimated SWL (dBA)	Estimated SPL (dBA) at distance (m)						
		50	250	500	750	1000	2000	3000
Backhoe	104	62	48	42	39	36	30	26
Backhoe (with auger)	106	64	50	44	41	38	32	28
Bulldozer	108	66	52	46	43	40	34	30
Compactor	113	71	57	51	48	45	39	35
Compressor (silenced)	101	59	45	39	36	33	27	23
Concrete agitator truck	109	67	53	47	44	41	35	31
Concrete pump truck	108	66	52	46	43	40	34	30
Concrete saw	117	75	61	55	52	49	43	39
Concrete vibratory screed	115	73	59	53	50	47	41	37
Crane (mobile)	104	62	48	42	39	36	30	26
Excavator	107	65	51	45	42	39	33	29
Front end loader	113	71	57	51	48	45	39	35
Generator (diesel)	104	57	43	37	34	31	25	21
Grader	110	68	54	48	45	42	36	32
Hand tools (electric)	102	60	46	40	37	34	28	24
Hand tools (pneumatic)	116	74	60	54	51	48	42	38
Jack hammers	121	79	65	59	56	53	47	43
Rock breaker	118	76	62	56	53	50	44	40
Roller (vibratory)	108	66	52	46	43	40	34	30
Scraper	116	74	60	54	51	48	42	38
Truck (>20 tonnes)	107	65	51	45	42	39	33	29
Truck (dump)	117	75	61	55	52	49	43	39
Truck (water cart)	107	65	51	45	42	39	33	29
Vehicle (commercial, 4WD)	106	64	50	44	41	38	32	28
Welder	105	63	49	43	40	37	31	27

The closest noise sensitive receptor to any potential noise source during construction of the plant is located approximately 1120 m from the AMP. From Table 5-1, noise levels exceeding the day L_{A10} assigned level of 45 dBA are not expected to impact on the closest noise sensitive receptors, with the exception of noisy equipment with a sound power level (SWL) higher than 115 dBA.

In line with the Regulations, construction will be carried out in accordance with control of environmental noise practices set out in Section 6 of Australian Standard (*AS) 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* and equipment used will be the quietest reasonably available (basis for numbers in Table 5-1).

5.2 Construction vibration

Vibration impacts discussed essentially focus on potential structural damage to properties in close proximity of the AMP area and/or potentially affected by construction activities. The separation distance between construction activities and the potentially most impacted sensitive receptors is 1120 m.

The nature and levels of vibration from the site will vary with the activities being carried out on site. Table 5-2 outlines typical vibration levels for different plant activities that may be generated on the site, sourced from the NSW Roads and Traffic Authority (RTA) *Environmental Noise Management Manual*[9].

[9] Roads and Traffic Authority (RTA), 2001. *Environmental Noise Management Manual*. Sydney, December 2001.

Table 5-2 Typical vibration levels for construction equipment

Plant item	Peak particle velocity at 10 m (mm/s)
Backhoe	1.0
Bulldozer	2.5-4.0
Compactor (7 tonne)	5.0-7.0
Front end loader	6.0-8.0
Jack hammer	0.5
Roller (15 tonne)	7.0-8.0

Construction activity may result in varying degrees of ground vibration depending on the equipment used and methods employed. Operation of construction equipment causes ground vibration which spreads through the ground and diminishes in strength with distance. Buildings founded on the soil in the vicinity of the construction site respond to these vibrations with varying outcomes.

From Table 5-2, equipment proposed for site preparation and construction of the AMP will generate low levels of vibration which are unlikely to result in any vibration risks to structures. The lower limit for vibrations resulting in building damage (5 mm/s) is normally not exceeded by general construction activities at distances greater than 20 m from the nearest sensitive receptor.

Given the distances involved between site works and the nearest receptors, vibrations affecting human comfort and building integrity are not expected to be an issue.

6. Operational noise assessment

6.1 Noise model objective

The objective of noise modelling is to determine the noise impact at the nearest noise sensitive receptors resulting from Albany Motorsport Park during events and practice, under both neutral and adverse weather conditions.

Noise modelling was undertaken using Computer Aided Noise Abatement (CadnaA) to predict the effects of noise generated by motorsport events.

6.2 Noise modelling software package

CadnaA, by Datakustik, is a computer program for the calculation, assessment and prognosis of noise exposure. CadnaA calculates environmental noise propagation according to the CONCAWE algorithm.

CONCAWE is a mathematical model developed to predict community noise levels from petrochemical and industrial plant for a range of meteorological conditions. A full description of the mathematical model is provided in the report prepared for the Conservation of Clean Air and Water in Europe (CONCAWE)[10] The CONCAWE prediction method is widely used in a range of environmental scenarios for predicting noise impacts of industrial facilities.

CadnaA considers local characteristics, site sources and the location of the receptor areas to predicted noise levels. The method specified consists of octave band algorithms (with nominal mid band frequencies from 31.5 Hz to 8 kHz) for calculating the attenuation of sound. The algorithms used in this model account for the following physical features:

- Geometrical divergence,
- Atmospheric absorption,
- Ground effect,
- Reflection from surfaces, and
- Screening by obstacles.

In assessing meteorological conditions, the CONCAWE method has been applied instead of ISO 9613-2 weather correction. Modelling results are based on available information provided and should only be used as a guide for comparative purposes.

6.3 Noise model configuration

6.3.1 Proposed plant layout

The noise model developed for this assessment was based on the project layout of the AMP as provided (see Figure 1-1).

6.3.2 Topography and ground absorption effects

In line with the proposed location of the AMP, the site and surrounding ground topography was included in the modelled using 1 m ground contours.

Ground absorption was taken into account in the calculations. A general ground absorption coefficient of 0.7 was used throughout the model to represent the surrounding ground type

[10] Manning, 1991. *CONCAWE Report No. 4/81 – The propagation of noise from petroleum and petrochemical complexes to neighbouring communities.*

mainly comprising of mixed vegetation and soil. A ground absorption coefficient of 0 was used for paved areas such as the multi-use track and associated hardstand areas.

6.3.3 Meteorological conditions

The meteorological conditions selected for the model can have a significant effect on the result. As such, EPA requires compliance with the assigned noise levels to be demonstrated for 98% of the time, during day and night periods, for the month of the year in which the worst case weather conditions prevail[11]. EPA specifies the use of the meteorological conditions outlined in Table 6-1.

Table 6-1 Meteorological conditions for noise modelling

Meteorology	Calm	Worst case	
	Day and night	Day	Evening / Night
Wind speed	0 m/s	4 m/s	3 m/s
Stability	D-class	E-class	F-class
Temperature	20°C	20°C	15°C
Relative humidity	70%	50%	50%

As sensitive receptors are located in several directions from the AMP, assessment under worst case wind direction for each receptor has been undertaken.

6.3.4 Model output conversion

CadnaA calculates L_{Aeq} predicted noise levels at discrete sensitive receptors and across the modelling grid. Predicted noise levels are converted to L_{A10} predicted noise levels, for the purpose of assessing against the assigned noise levels, by applying a correction of +3 dBA to the predicted L_{Aeq} values.

6.4 Noise sources

A summary of expected motorsport events is provided in Section 2. Corresponding noise levels for various event types are outlined in Table 6-2. Sound power levels for the various vehicle types are provided in Table 6-3.

Table 6-2 Event type and vehicle sound power levels

Event type	Worst case sound power level	Operating time
Driving training, school and manufacturer testing	109 dBA	Day
Multi-use track events – Car and bike events	133 dBA	Day
Motocross events	133 dBA	Day
4WD off road training	109 dBA	Day

Table 6-3 Sound power levels (dBA)

Vehicle type	Sound power level (dBA)								
	63	125	250	500	1000	2000	4000	8000	dBA
Road registered car or motorbike	73	77	84	98	104	105	98	88	109
Multi-use track – CAMS approved vehicles	102	126	126	121	127	123	119	119	133

[11] EPA (Environmental Protection Authority), 2007. *Guidance for the Assessment of Environmental Factors – No. 8 - Environmental Noise – Draft*, Perth, May 2007.

Vehicle type	Sound power level (dBA)								
	63	125	250	500	1000	2000	4000	8000	dBA
Motocross bike (senior class)	100	116	127	112	122	129	125	116	133
4WD off road	73	77	84	98	104	105	98	88	109

6.4.1 Driving training school and manufacturer testing

Noise modelling has been conducted for driver training, driver school and manufacturer testing, with 20 cars or motorbikes operating simultaneously with noise sources spaced around the multi-use track.

Noise levels from road registered cars and motorbikes are assumed to comply with Australia Design Rule (ADR) requirements for vehicle noise emissions and have been assigned a sound power level of 109 dBA[12].

The duration of noise generation from driver training, school and manufacturer testing is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against L_{A10} assigned levels.

6.4.2 Multi-use track events – Car and bike events, including drifting and motorkhana events

Noise modelling has been conducted for multi-use track events for cars or motorbikes, with 20 cars or motorbikes operating simultaneously with noise sources spaced around the multi-use track.

Noise levels which meet CAMS requirements have been assumed, equating to a sound power level of 132.5 dBA.

The duration of noise generation these events is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against L_{A10} assigned levels.

6.4.3 Motocross events

Noise modelling has been conducted for a Senior Open race event, with 16 motocross bikes operating simultaneously with noise sources spaced around the motocross track and modelled heights of either 0.5 m, 2.5 m and 5.0 m to represent course terrain and jumps.

Noise levels from senior class motocross bikes have been assumed as a sound power level of 132.7 dBA.

The duration of noise generation these events is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against L_{A10} assigned levels. As noise from motocross bikes typically exhibits tonal characteristics where audible, a 5 dB penalty has been applied to motocross events during this assessment.

6.4.4 4WD off road training

Noise modelling has been conducted for 4WD off road driver training, with five 4WD vehicles operating simultaneously with noise sources spaced around the 4WD training area. Noise levels from road registered 4WD vehicles have been assumed as a sound power level of 109 dBA.

[12] ADR83/00 requirement of complying with 83 dBA at 7.5 m, equivalent to sound power level of 109 dBA.

The duration of noise generation from 4WD off road training is unlikely to be continuous, with an assumed duration of no longer than 30 minutes in any hour. Noise impacts from this source have been assessed against L_{A10} assigned levels.

6.5 Noise modelling results

The calculated noise levels at the nearest noise sensitive premises were assessed to determine if predicted noise emissions complied with the appropriate day L_{A10} assigned noise level.

There are four residences within close proximity to Albany Motorsport Park. For the purpose of this assessment, it has been assumed that if compliance is achieved at the nearest residences, compliance would be achieved further away.

6.5.1 Neutral meteorological conditions

Predicted day noise levels from various motorsport events under neutral meteorological conditions are presented in Table 6-4. Table 6-4 shows predicted exceedance of the day assigned noise level as red text.

Table 6-4 Predicted day L_{A10} noise levels – Neutral meteorological conditions, dBA

Event	Assigned noise level	SR01	SR02	SR03	SR04
Background noise level, L_{A90}[13]		32	26	31[14]	31
Driver training school, manufacturer testing (DT)	40	27	21	10	16
Multi-use track events (MUT)	40	**54**	**51**	**42**	**46**
Motocross events (MX)[15]	40	**49**	**57**	40	**46**
4WD training (4WD)	40	15	28	14	17

From Table 6-4:

- Driver training school, manufacturer testing and 4WD training events are predicted to comply with the assigned levels and to not be audible over background noise levels at all sensitive receptors.
- Multi-use track events are predicted to exceed assigned levels and to be audible over background noise levels at all sensitive receptors for multi-use track events.
- Motocross events, inclusive of 5 dB penalty for tonality, are predicted to comply with assigned levels at SR03 and exceed assigned levels at SR01, SR02 and SR04. Noise levels are predicted to be audible over background noise levels at all sensitive receptors for motocross events.

Predicted day noise level contours for each single event type are presented in Figure 6-1 to Figure 6-4.

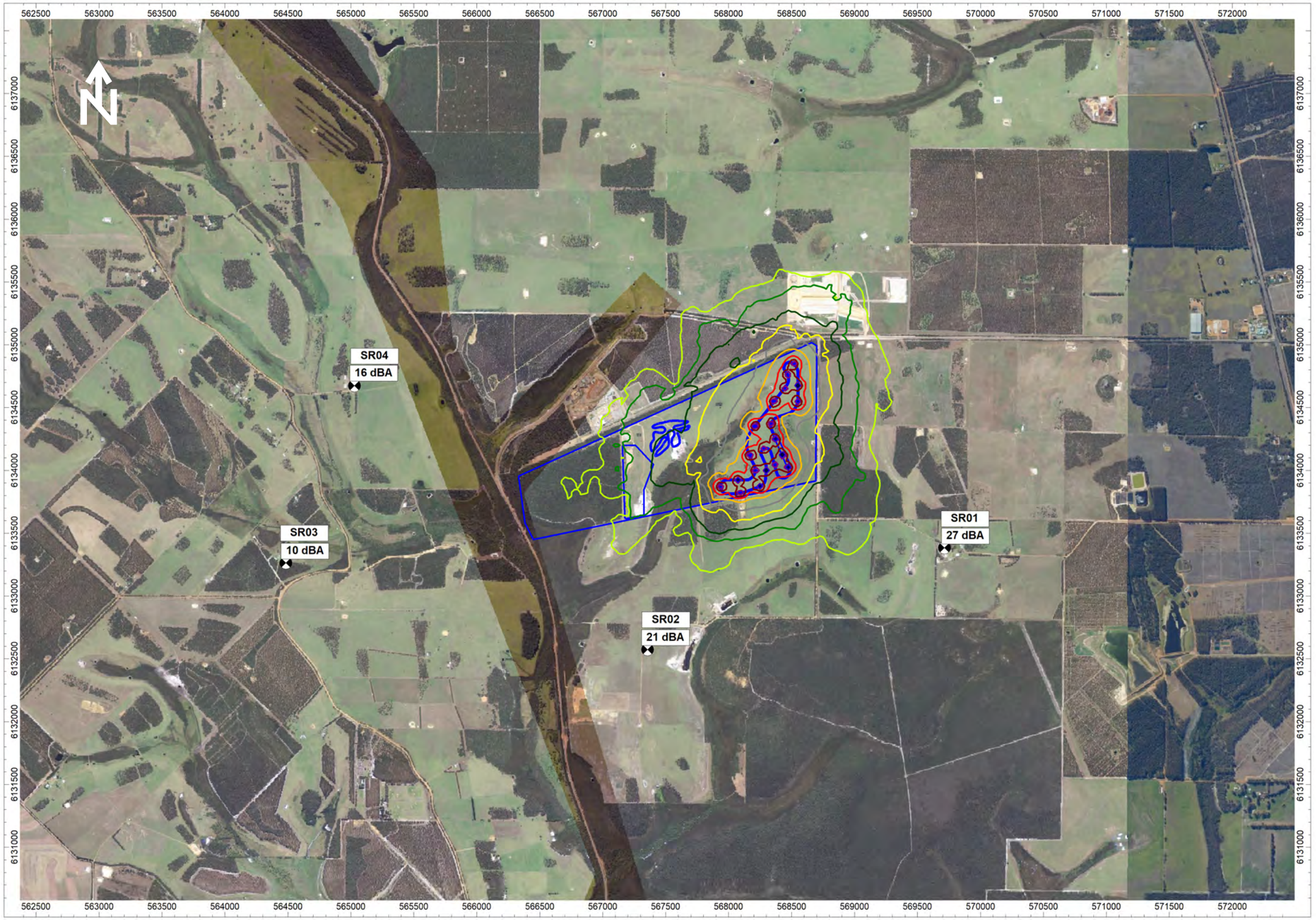
[13] Background noise level conservatively taken as lowest measured background noise level during monitoring
[14] Noise monitoring not completed at SR03, background noise assumed to be same as SR04
[15] Inclusive of 5 dB penalty for tonality

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
GRID:	Map Grid of Australia 1994, Zone 50

DATE	FILE LOCATION
10.08.2020	N:\AU\Albany WA\Projects\61\37331\Technical\Noise
REVISION	**DRAWING NO.**
2	

ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
DRIVER TRAINING

Noise contours: L_{A10}
Grid height: 1.4 m
Neutral meteorological conditions

FIGURE 6-1

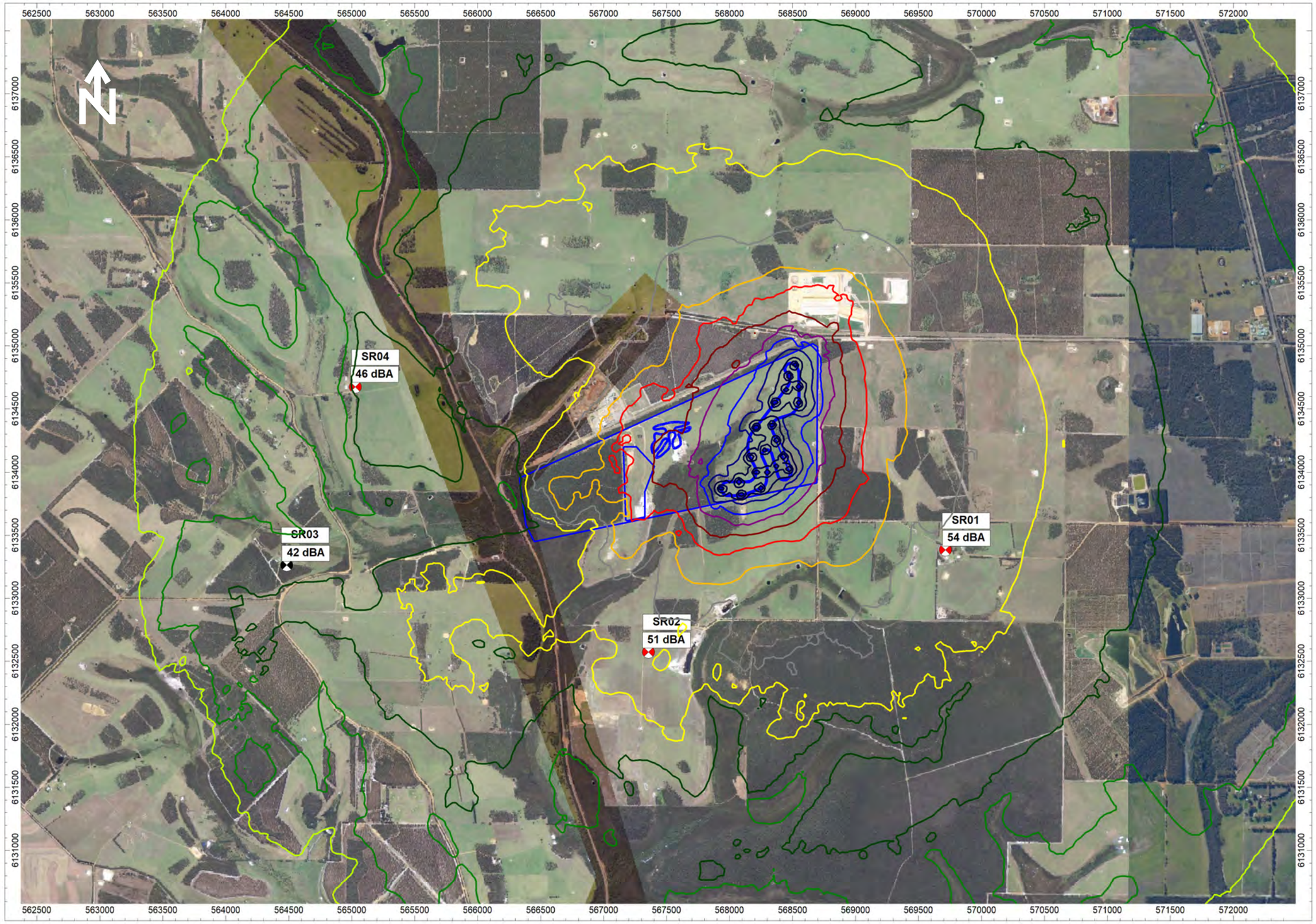
GHD CLIENTS | PEOPLE | PERFORMANCE

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

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Metres (at A3)

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HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
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DATE	FILE LOCATION
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REVISION	**DRAWING NO.**
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ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
MULTI-USE TRACK EVENT

Noise contours: L_{A10}
Grid height: 1.4 m
Neutral meteorological conditions

FIGURE 6-2

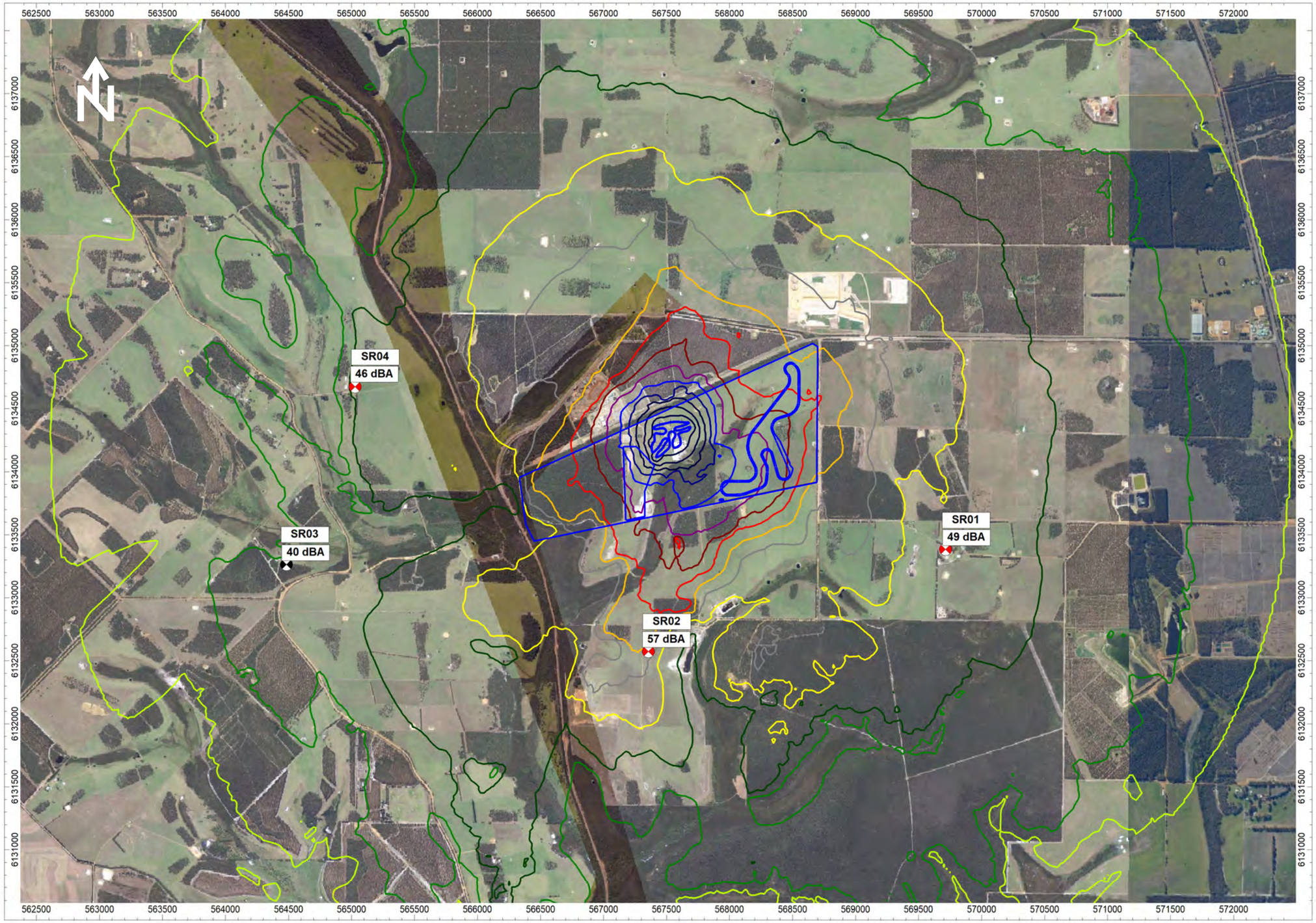
GHD CLIENTS | PEOPLE | PERFORMANCE

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
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MAP PROJECTION:	Universal Transverse Mercator
HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
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ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
MOTOCROSS EVENT

Noise contours: L_{A10}
Grid height: 1.4 m
Neutral meteorological conditions

FIGURE 6-3

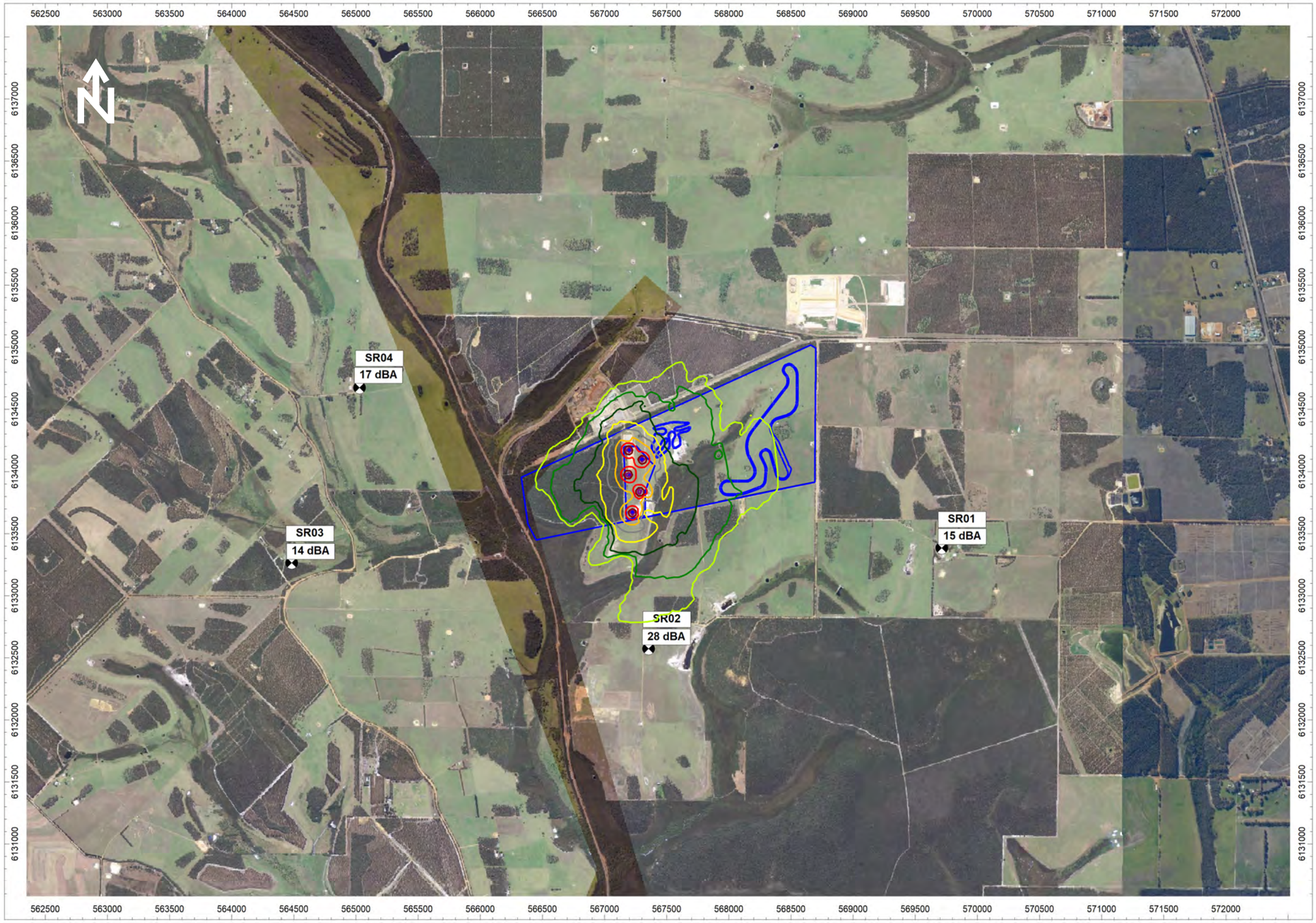
GHD CLIENTS | PEOPLE | PERFORMANCE

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



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Metres (at A3)

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GRID:	Map Grid of Australia 1994, Zone 50

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ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
4WD TRAINING

Noise contours: L_{A10}
Grid height: 1.4 m
Neutral meteorological conditions

FIGURE 6-4

GHD CLIENTS | PEOPLE | PERFORMANCE

6.5.2 Worst case meteorological conditions

Predicted day noise levels from various motorsport events under worst case meteorological conditions are presented in Table 6-5. Table 6-5 shows predicted exceedance of the day assigned noise level as red text.

Table 6-5 Predicted day L_{A10} noise levels – Worst case meteorological conditions, dBA

Event	Assigned noise level	SR01	SR02	SR03	SR04
Worst case wind direction (°)		310	10	80	100
Background noise level, L_{A90}[13]		32	26	31[14]	31
Driver training, school, manufacturer testing (DT)	40	33	28	18	23
Multi-use track events (MUT)	40	**59**	**56**	**47**	**51**
Motocross events (MX)[15]	40	**55**	**62**	**46**	**52**
4WD training (4WD)	40	22	34	21	24

From Table 6-5:

- Driver training school, manufacturer testing and 4WD training events are predicted to comply with the assigned levels and to not be audible over background noise levels at all sensitive receptors.
- Multi-use track events are predicted to exceed assigned levels and to be audible over background noise levels at all sensitive receptors.
- Motocross events are predicted exceed assigned levels and to be audible over background noise levels at all sensitive receptors.

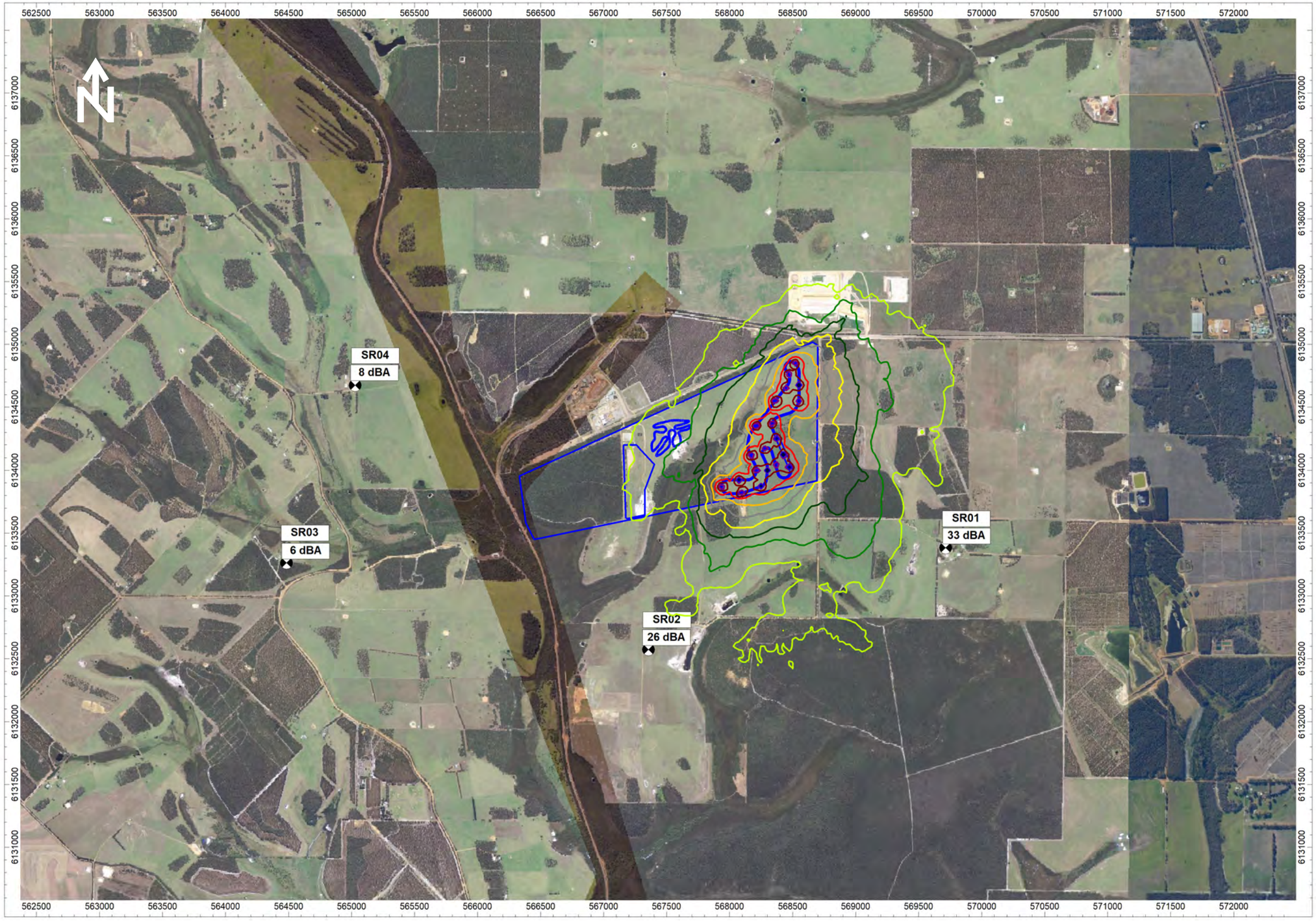
Predicted day noise level contours for each event type are presented in Figure 6-5 to Figure 6-8. In each figure, worst case wind direction is presented for the most impacted receptor.

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

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Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
GRID:	Map Grid of Australia 1994, Zone 50

DATE	FILE LOCATION
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ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
DRIVER TRAINING

Noise contours: L_{A10}
Grid height: 1.4 m
Worst case meteorological conditions

FIGURE 6-5

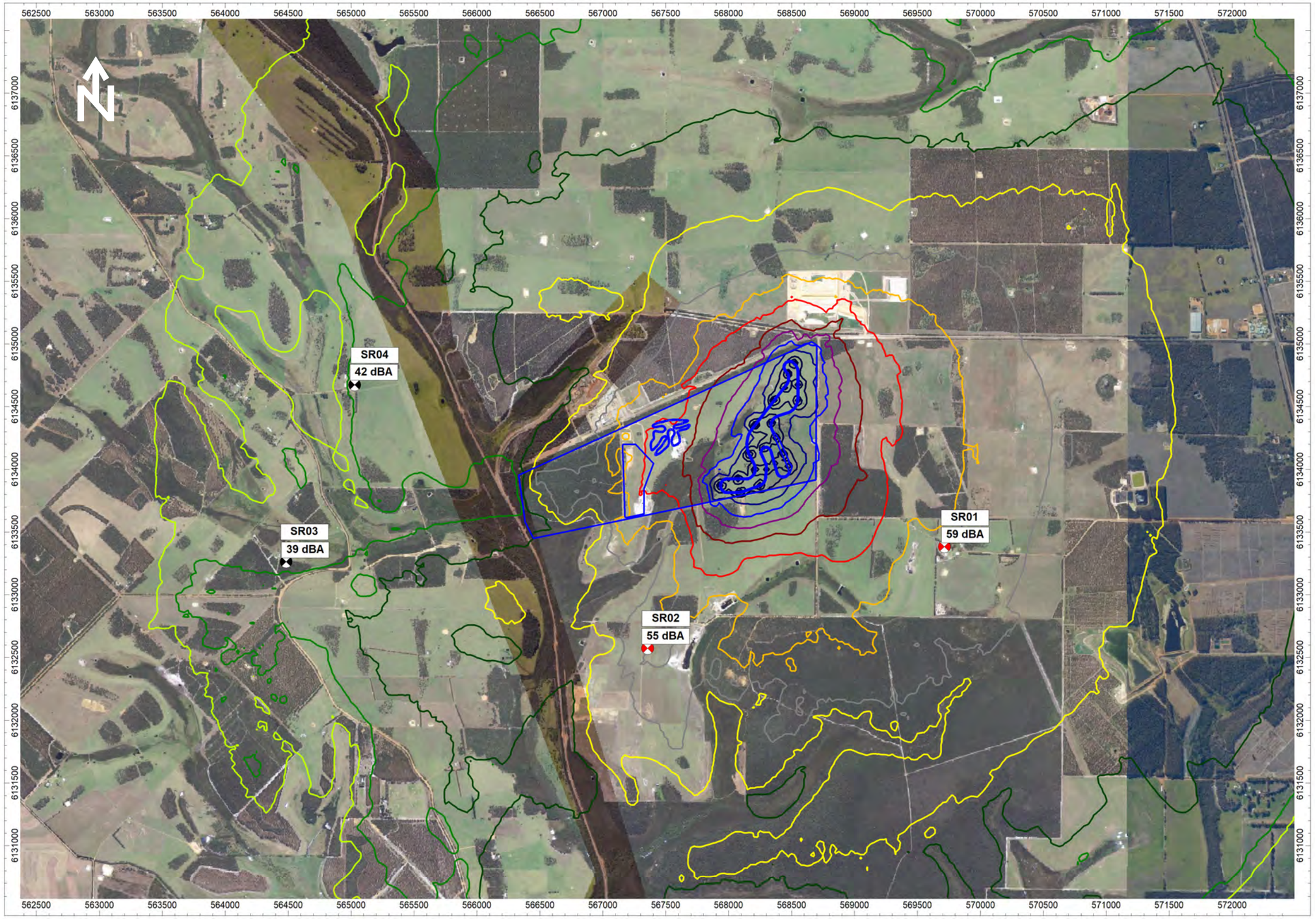
GHD CLIENTS | PEOPLE | PERFORMANCE

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
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REVISION	**DRAWING NO.**
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ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
MULTI-USE TRACK EVENTS

Noise contours: L_{A10}
Grid height: 1.4 m
Worst case meteorological conditions

FIGURE 6-6

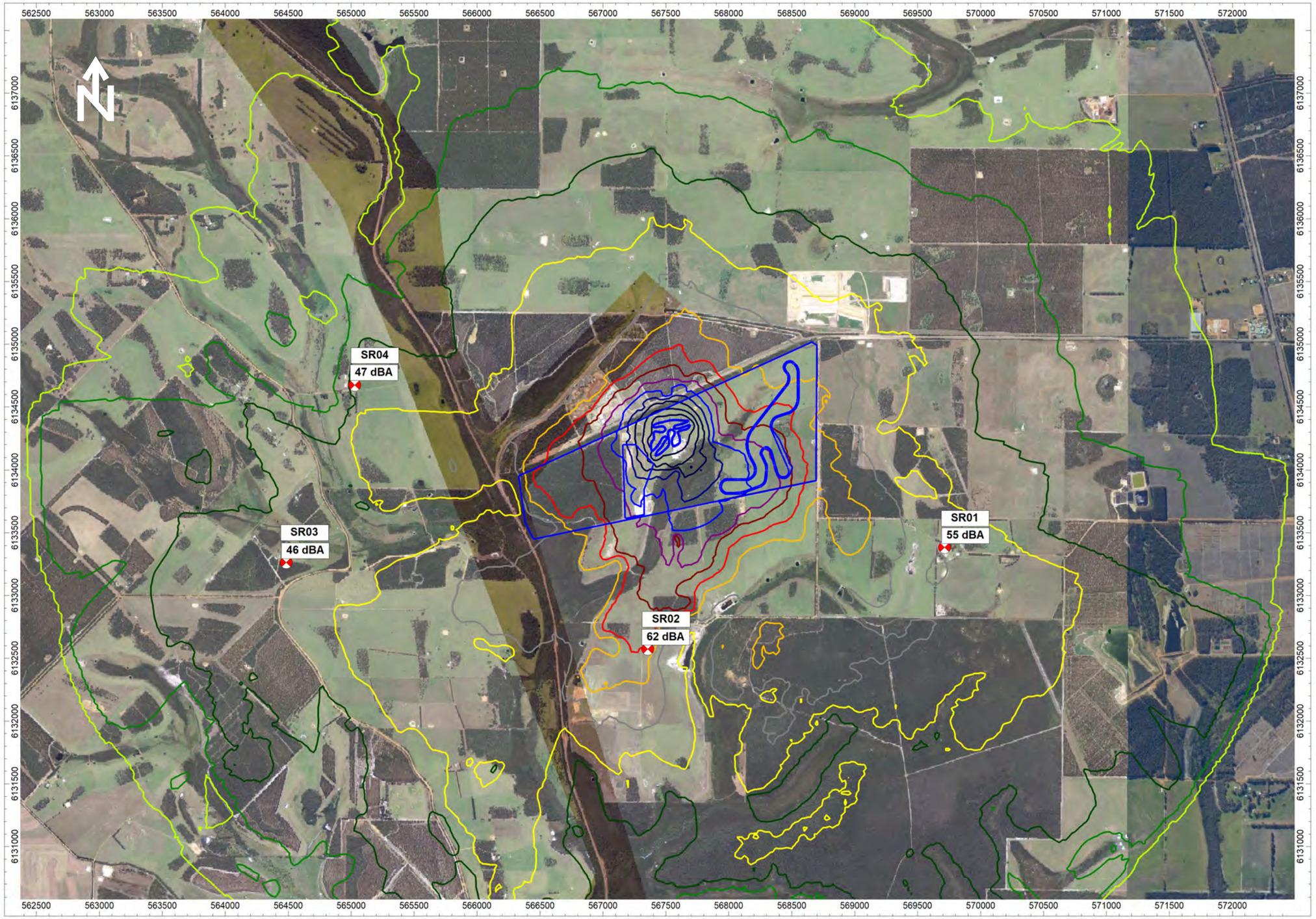
GHD CLIENTS | PEOPLE | PERFORMANCE

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

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Metres (at A3)

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JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
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GRID:	Map Grid of Australia 1994, Zone 50

DATE	FILE LOCATION
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REVISION 2	DRAWING NO.

ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
MOTOCROSS EVENT

Noise contours: L_{A10}
Grid height: 1.4 m
Worst case meteorological conditions

FIGURE 6-7

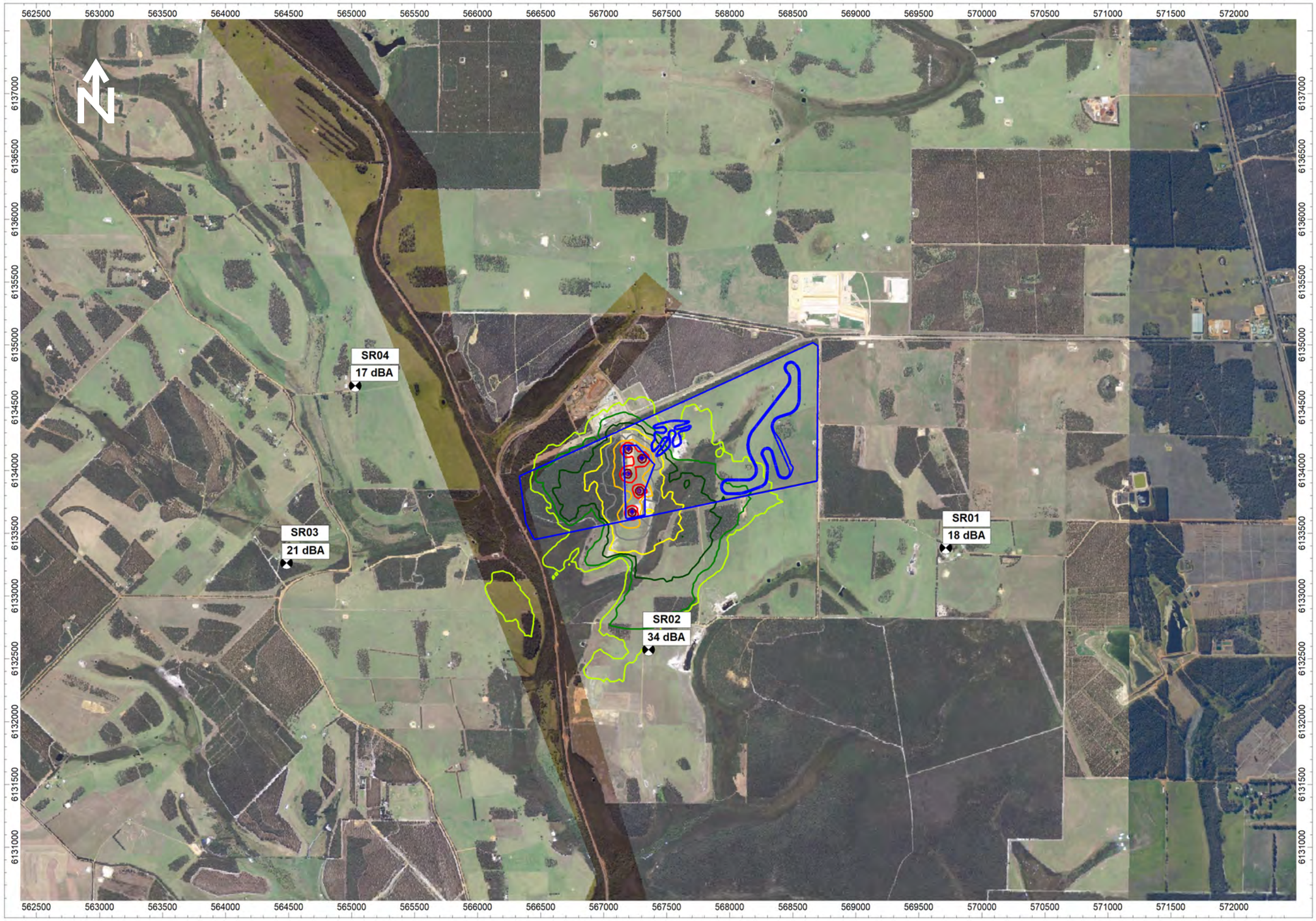
GHD CLIENTS | PEOPLE | PERFORMANCE

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
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DATE	FILE LOCATION
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REVISION	DRAWING NO.
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ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
4WD TRAINING

Noise contours: L_{A10}
Grid height: 1.4 m
Worst case meteorological conditions

FIGURE 6-8

GHD CLIENTS | PEOPLE | PERFORMANCE

6.5.3 Summary and discussion

A summary of predicted noise levels assessed against assigned noise levels for both neutral and worst case meteorological conditions is presented in Table 6-6, with negative noise levels indicating compliance with assigned noise levels and positive indicating exceedance.

Table 6-6 Exceedance of assigned L_{A10} noise levels - Neutral/worst case meteorological conditions, dBA

Receptor	SR01	SR02	SR03	SR04
Driver training, school, manufacturer testing (DT)	-13/-7	-19/-12	-30/-22	-24/-17
Multi-use track events (MUT)	+14/+19	+11/+16	+2/+7	+6/+11
Motocross events (MX)[15]	+9/+15	+17/+22	0/+6	+6/+12
4WD training (4WD)	-25/-18	-12/-6	-26/-19	-23/-16

The results presented in Table 6-6 demonstrate that for multi-use track and motocross events, there are occasions when the predicted noise levels from Albany Motorsport Park exceed the assigned noise levels.

As events are only planned during the day time period, predicted noise levels will not lead to sleep disturbance, and therefore will be less intrusive. As day time only events are scheduled, worst case conditions are only likely to occur due to wind direction, with no effect due to stability class (Table 6-1). Figure 6-9 presents the seasonal and annual day time wind roses for Albany for the period from 2001 to 2019.

Review of the wind roses provides an indication of how often worst case noise levels may occur at each receptor, with wind speeds up to 4 m/s (yellow and light green categories on the wind roses) representing worst case wind speed during the day period. The prevalence of worst case wind conditions at each sensitive receptor is as follows:

- SR01 – Worst case wind direction is a north-westerly, which is likely to occur approximately five percent of day time hours (between 7:00 am and 7:00 pm) (219 hours per year).
- SR02 – Worst case wind direction is a northerly, which is likely to occur approximately three percent of day time hours (132 hours per year).
- SR03 – Worst case wind direction is an easterly, which is likely to occur approximately two percent of day time hours (88 hours per year).
- SR04 – Worst case wind direction is a south-easterly, which is likely to occur approximately two percent of day time hours (88 hours per year).

For each sensitive receptor, worst case wind conditions are most likely to occur during autumn and winter, rather than spring and summer. Events will conclude earlier in autumn and winter as it is darker earlier, and lighting is not available, therefore being less intrusive than events which potentially conclude later during spring and summer.

Comparison of predicted noise levels against monitored background noise levels is presented in Table 6-7, showing the emergence above background for neutral and worst case meteorological conditions.

Table 6-7 Emergence above background noise L_{A90} noise levels - Neutral/worst case meteorological conditions, dBA

Receptor	SR01	SR02	SR03	SR04
	32	26	31	30, 31
Driver training, school, manufacturer testing (DT)	-5/+1	-5/+2	-21/-13	-15/-8
Multi-use track events (MUT)	+22/+27	+25/+30	+11/+16	+15/+20
Motocross events (MX)[15]	+17/+23	+31/+36	+9/+15	+15/+18
4WD training (4WD)	-16/-10	+2/+8	-17/-10	-14/-7

Table 6-7 indicates that noise levels from multi-use track and motocross events are predicted to be clearly audible at all sensitive receptors.

Based on the above analysis of wind conditions, during the day time period for the majority of events, predicted noise levels are likely to be as per neutral conditions, rather than worst case conditions, typically up to 6 dB quieter than for worst case conditions.

Nevertheless, appropriate mitigation measures have been recommended in Section 7 in order to reduce the impact on existing and future sensitive receptors due to the motorsport facility.

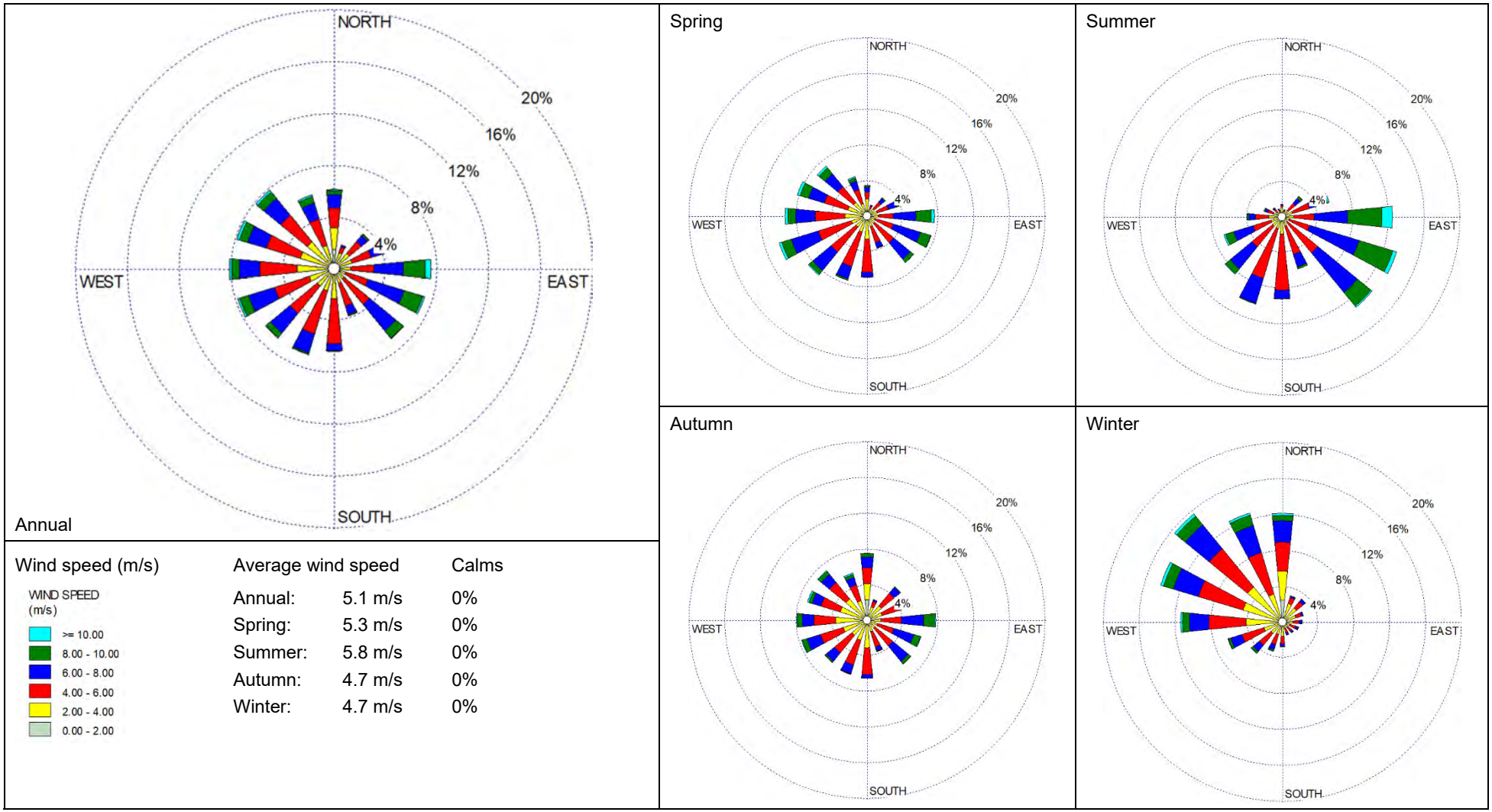


Figure 6-9 Annual and seasonal day time wind roses for observed meteorological data at Albany Airport

7. Managing noise impacts

The results presented in Section 6 for neutral and worst case meteorological conditions demonstrate that for some events, namely multi-use track and motocross events, there will be occasions when the predicted noise levels from Albany Motorsport Park exceed the day assigned noise levels at the nearest sensitive receptors.

As such, it is recommended that appropriate management and mitigation measures are implemented for the project.

7.1 Regulation – Approved noise management plan

The *Environmental Protection (Noise) Regulations 1997* set assigned (allowable) noise levels for various types of premises that receive noise from other premises. There are many activities that occur in the community that cannot, however, reasonably and practicably meet those assigned levels, but retain a degree of acceptance, either because of the temporary nature of the activity or the perceived community benefit.

In the case of a motor sport venue, good land use planning may be able to avoid noise problems in the first place – this may involve selection of a site for a new venue that is well away from sensitive receivers, or preventing encroachment by new residences into the noise-affected area around the venue.

Where a motor sport venue cannot practicably comply with the assigned noise levels, Division 3 of the Regulations allows the venue occupier to apply for a special approval. Under this approval the noise emissions from the venue are permitted to exceed the assigned levels in the Regulations provided the venue operates in accordance with an approved noise management plan (NMP) for the venue.

Regulation 16 of the *Environmental Protection (Noise) Regulations 1997* allows the Chief Executive Officer (CEO) of DWER (or delegated power such as local government CEO) to request preparation and submission of a NMP for a motor sport venue (that belongs to a recognised motor sports organisation[16].

Regulation 16 includes the following:

- CEO to approve or refuse the NMP, but before approving it must seek comment from the affected residents within a kilometre of the venue and other local governments likely to be affected.
- NMP must contain certain elements:
  - A map of the venue and area
  - Description of the types of races
  - Maximum number of race meetings and practice sessions and times of the day
  - Measures to control noise emissions
  - How the community is to be informed of the race meeting program
  - Who is responsible for implementing the NMP
  - Complaints response procedure
- The CEO is be able to require the noise certification of race vehicles (if appropriate for that venue).

[16] *Guide to Management of Noise from Motor Sport Venues - Environmental Protection (Noise) Regulations 1997, Department of Environment Regulation*, 168 St Georges Terrace, Perth, Western Australia, July 2014.

- The CEO is able to charge fees to cover the cost of assessing the application and for noise monitoring and also to waive or reduce the fees payable.
- The CEO is able to amend or revoke the NMP, after consultation.

The status of the NMP would be that the normal assigned levels do not apply to the noise emissions as long as the venue operates as per the NMP. If the emissions were outside the NMP, for example a meeting went outside the nominated hours, the noise emissions have to comply with Regulation 7 and the normal enforcement measures under the *Environmental Protection Act 1986* would apply.

Whilst the introduction of a formal NMP may not reduce noise levels from Albany Motorsport Park, such measures will prevent noise impacts increasing due to increased number of events etc. without consultation with affected residents.

An example Noise Management Plan, prepared in line with requirements outlined in *Guide to Management of Noise from Motor Sport Venues*, has been provided in Appendix B.

7.2 Mitigation measures

As previously outlined, model predicted noise levels from operation of Albany Motorsport Park exceed assigned levels within the surrounding area.

As discussed above, introduction of a requirement for Albany Motorsport Park to operate according to a noise management plan provides a mechanism to prevent further increase of events without consulting residents, but may not reduce noise levels from proposed operations.

On-site mitigation measures to reduce noise levels at source from Albany Motorsport Park are limited and include:

- Scheduling of events and practice to minimise noise impacts on the existing residents. Future events scheduling at Albany Motorsport Park will take into consideration predicted noise impacts. Typical day operation is 8:00 am to 6:00 pm, Monday to Saturday, 9:00 am to 6:00 pm on Sunday and public holidays. No evening (after 7:00 pm) or night (after 10:00 pm) events will be scheduled.
- Construction of a barrier(s) (earth bund, noise walls or similar) along the boundaries of the AMP venue (primarily southern and eastern boundaries) to reduce noise levels at local residents. Based on the distance between the facility and the nearby sensitive receptors, noise barriers are only likely to lead to slight reductions in noise levels, by up to 3-5 dBA, depending on location and height. In this regard, other mitigation measures have been outlined.

Further mitigation measures are able to be implemented at existing properties and during any future residential development in the area. Mitigation measures in place or available for consideration include:

- Provision of at property treatments to maintain suitable acoustic amenity at existing noise sensitive receptors in the vicinity of AMP. Such requirements for outdoor area screening and provision of insulation packages (see below) will be assessed by completion of at property inspections, in order to provide recommended acoustic treatments. In addition, as events are only planned during the day time period, predicted noise levels will not lead to sleep disturbance, and therefore will be less intrusive.
- The existing Mirambeena Strategic Industrial Area buffer (Figure 7-1) in the vicinity to the proposed Albany Motorsport Park prevents the construction of any habitable dwellings on properties immediately adjacent, reducing the likelihood of sensitive receptors being developed in an area impacted by noise from motorsport activities in the future.

- Additional planning controls to establish a *Special Use* zone, with an associated *Special Control Area* to prevent further residential development, unless specific planning and building controls are implemented. Such planning controls would usually entail:
  - Reducing outdoor levels by implementing 'quiet house' design measures outlined in SPP 5.4[17] relating to screening of outdoor areas with the residence itself (building orientation considerations) or screen walls. Refer to Section 7.2.1.
  - Reducing internal noise levels by implementing 'deemed to comply packages' outlined in SPP 5.4 relating to improving noise insulation of residences. Refer to Section 7.2.1.
  - Providing information to new residents within the development of the potential noise impacts from motorsport events (notifications on titles). Refer to Section 7.2.2.

7.2.1 Reducing outdoor and indoor noise levels through building design

Noise levels resulting from Albany Motorsport Park are predicted to exceed assigned noise levels at existing residences or new residential areas within the vicinity. Noise mitigation measures outlined in SPP 5.4 pertain to reducing transport noise resulting from major roads and railways. In determining the required level of mitigation to maintain outdoor and indoor amenity, assessment has been made against outdoor and indoor criteria established by SPP 5.4, outlined in Table 7-1. Assessment has been made against predicted L_{A10} noise levels, as L_{A10} noise levels are considered to most closely represent L_{Aeq} criteria specified in SPP 5.4.

This approach has been reviewed and agreed to by DWER Noise Branch during previous assessments for motorsport facilities.

Table 7-1 Outdoor and indoor noise criteria, dBA

Time of day	Outdoor noise criteria	Indoor noise criteria
Day (6:00 am to 10:00 pm)	55	40
Night (10:00 pm to 6:00 am)	50	35

Reducing outdoor noise levels by screening outdoor areas

Outdoor noise levels are reduced by 5-10 dBA by screening outdoor areas such that the building forms a barrier between the noise from motorsport events. Such screening is achieved by either:

- Locating outdoor living areas so as to maximise the screening effects of buildings and any barrier walls.
- Designing walls to screen part or all of the affected property.

To ensure an appropriately sized outdoor area is adequately screened may require designated building envelopes to be specified for each lot.

Evening and night time outdoor levels are not predicted to be affected as events conclude by 7:00 pm.

Reducing indoor noise levels by improving noise insulation of buildings

With regard to indoor noise levels, a typical residence would see indoor levels approximately 15 dBA lower than outdoor levels (a predicted outdoor level of 65 dBA will result in indoor noise level approximately 50 dBA).

[17] Department of Planning, 2014, *Implementation Guidelines for State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning,* December 2014.

Indoor noise levels are reduced by increasing insulation to reduce noise levels within a residence. SPP 5.4 outlines two 'deemed to comply' packages for residential development, Package A and Package B, as outlined in Table 7-2. A reduction of approximately 5 dBA is typically achieved by implementing design Package A and approximately 10 dBA reduction for implementing design Package B.

Table 7-2 Package A and B noise insulation measures outlined in SPP 5.4

Area type	Orientation	Package A measures
Bedrooms	Facing venue	6 mm laminated glazing Casement or awning windows No external doors Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm laminated glazing Closed eaves Mechanical ventilation/air conditioning
Living and work areas	Facing venue	6 mm laminated glazing Casement or awning windows 35 mm (minimum) solid core external doors with acoustic seals Sliding doors must be fitted with acoustic seals Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm glazing Closed eaves Mechanical ventilation/air conditioning
Area type	**Orientation**	**Package B measures**
Bedrooms	Facing venue	10 mm laminated glazing Casement or awning windows No external doors Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm laminated glazing Casement or awning windows Closed eaves Mechanical ventilation/air conditioning
Living and work areas	Facing venue	10 mm laminated glazing Casement or awning windows 40 mm (minimum) solid core external doors with acoustic seals Sliding doors must be fitted with acoustic seals Closed eaves No vents to outside walls/eaves Mechanical ventilation/air conditioning
	Side on to venue	6 mm laminated glazing Casement or awning windows Closed eaves Mechanical ventilation/air conditioning

Noise levels under worst case meteorological conditions are predicted to exceed day assigned levels by up to 19 dBA at SR01, up to 22 dBA at SR02, up to 7 dBA at SR03 and up to 12 dBA at SR04.

Suitable screening of outdoor areas may be required at SR01, SR02 and SR04, in order to provide one outdoor area of suitable acoustic amenity.

Package A insulation measures may be required at SR01, SR02 and SR04, with Package B requirements at SR03.

Such requirements for outdoor area screening and provision of insulation packages will be assessed by completion of an at property inspection, in order to provide recommended acoustic treatments.

7.2.2 Special Control Area

A *Special Control Area* provides for a noise buffer to protect Albany Motorsport Park from incompatible residential encroachment, with development approval only provided when minimum house design treatments to mitigate noise are implemented.

The Local Planning Scheme could be amended to include a new *Special Control Area*, through rezoning the Albany Motorsport Park site from '*Priority Agriculture*' to '*Special Use*'. The new *Special Control Area* for Albany Motorsport Park would then be added to existing *Special Control Areas*, established in Part 5 of the Local Planning Scheme.

Further updates to the Scheme would be made to establish the purpose of the *Albany Motorsport Park Noise Special Control Area* and requirements of proposed residential development:

a. Allow for the ongoing operations of the Albany Motorsport Park and require the operators to incorporate additional noise attenuation measures (e.g. earthen bunds, noise walls) to reduce noise egress into adjoining sensitive premises; including operating under an approved Noise Management Plan.

b. Ensure that new noise sensitive developments within the *Special Control Area* incorporate design criteria in accordance with the *AS/NZS 2107:2000 Acoustics – Recommended design sound levels and reverberation times for building interiors,* to reduce noise impacts from the Albany Motorsport Park.

c. No dwelling or other noise-sensitive development within the *Special Control Area* shall be approved until such time as Local Government is satisfied that the design complies with the Package A or B (as appropriate) house insulation measures specified in the Implementation Guidelines for State Planning Policy 5.4.

d. The Local Government may grant approval for noise sensitive premises and impose conditions on the approval to require the applicant to incorporate design and construction methods/materials to reduce noise impacts into the dwelling.

e. The Local Government shall request the Commission impose a condition on the approval for the creation of any new lots created as a result of subdivision within the *Albany Motorsport Park Noise Special Control Area* be required to have a memorial placed on the Certificate of Title stating that the land may be subject to temporary high noise levels from activities conducted at the Albany Motorsport Park.

Special Control Area extent

The extent of the Special Control Area has been guided by the completion of noise modelling for a typical event to be held at AMP, with a race meeting consisting of a multi-use track event considered a typical event.

Outdoor noise levels are reduced by 5-10 dBA by screening outdoor areas such that the building forms a barrier between noise from motorsport events.

Based on the daytime outdoor noise criterion outlined in Table 7-1 and the reduction of up to 10 dBA achieved through building screening:

- Development areas with predicted L_{A10} noise levels below 55 dBA will require no additional mitigation. Only notifications on the title advising of possible noise impacts from a nearby motorsport venue would be required.
- Development areas with predicted L_{A10} noise levels between 55 dBA and 65 dBA would require building screening (building envelopes) or fencing in order to meet an outdoor noise level of 55 dBA.
- Development areas predicted to exceed L_{A10} noise levels of 65 dBA will remain development free.

With regard to indoor noise levels, a typical residence would see indoor levels approximately 15 dBA lower than outdoor levels. Indoor noise levels are reduced by increasing insulation. SPP 5.4 outlines two ‘deemed to comply’ packages for residential development, Package A and Package B (refer to Table 7-2).

Based on daytime indoor noise criterion outlined in Table 7-1 and the reduction achieved by implementing design Package A (approximately 5 dBA) and Package B (approximately 10 dBA):

- Development areas with predicted daytime L_{A10} noise levels below 55 dBA will require no additional noise insulation. Only notifications on the title advising of possible noise impacts from a nearby motorsport venue would be required.
- Development areas with predicted daytime L_{A10} noise levels between 55 dBA and 60 dBA will require Package A noise insulation.
- Development areas with predicted daytime L_{A10} noise levels between 60 dBA and 65 dBA will require Package B noise insulation, in order to meet an internal noise level of 40 dBA.
- Development areas predicted to exceed L_{A10} noise levels of 65 dBA will remain development free.

Based on the above, the special control area would extend from the 65 dBA contour (red contour shown on Figure 7-1) to the 50 dBA (yellow) contour. From Figure 7-1, the northern quadrant from the western boundary to the eastern boundary of AMP is within the existing Mirambeena Strategic Industrial Area buffers.

Requirements to inform the special control area are as follows:

- Areas between the site boundary and the 65 dBA (red) contour would remain residence free. From Figure 7-1, the proposed residence free area only marginally extends beyond the existing Mirambeena Strategic Industrial Area buffers to the south-east of AMP.
- Areas between the 65 dBA (red) and 60 dBA (orange) contours would have conditions requiring Package B noise insulation and building screening (building envelopes) or fencing in order to meet outdoor noise levels.

- Areas between the 60 dBA (orange) and 55 dBA (grey) contours would have conditions requiring Package A noise insulation and building screening (building envelopes) or fencing in order to meet outdoor noise levels.
- Areas between the 55 dBA (grey) and 50 dBA (yellow) contours would have no screening or insulation requirements, just a requirement for notifications on the title advising of possible noise impacts from a nearby motorsport venue.

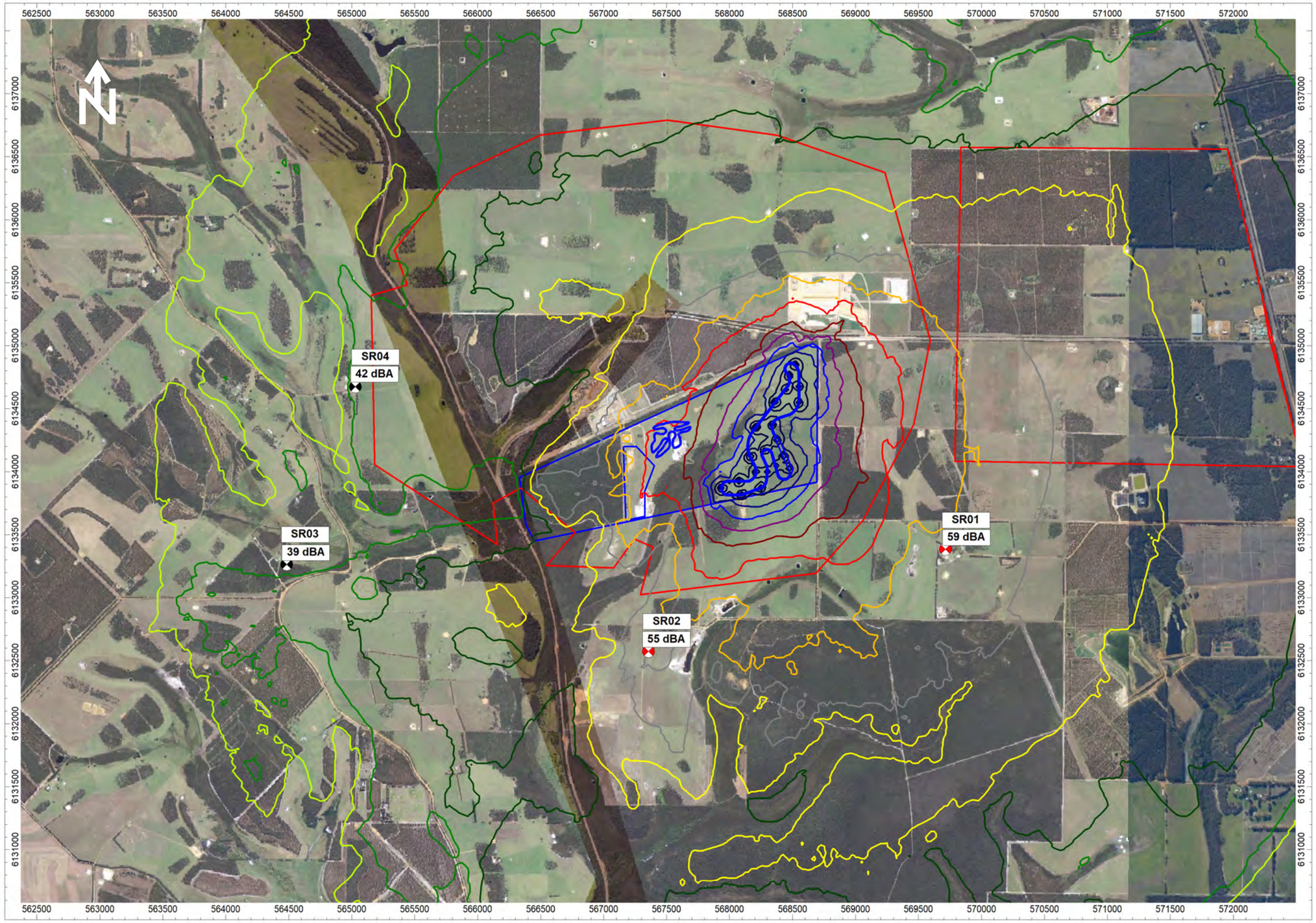
In each case, closest cadastral boundaries should be used to define the Special Control Area, informed by the noise modelling results presented in Figure 7-1.

PREDICTED NOISE LEVELS

- 35 dBA
- 40 dBA
- 45 dBA
- 50 dBA
- 55 dBA
- 60 dBA
- 65 dBA
- 70 dBA
- 75 dBA
- 80 dBA
- 85 dBA
- 90 dBA

LEGEND

- Noise sensitive receptor
- Line noise source
- Point noise source
- Development area boundary
- Day assigned level (45 dBA)
- Existing Mirambeena Strategic Industrial Area buffer



SCALE

0 500 1000 1500

Metres (at A3)

CREATED	CHECKED	APPROVED
JF	JF	JF

MAP PROJECTION:	Universal Transverse Mercator
HORIZONTAL DATUM:	Geocentric Datum of Australia (GDA)
GRID:	Map Grid of Australia 1994, Zone 50

DATE	FILE LOCATION
10.08.2020	N:\AU\Albany WA\Projects\61\37331\Technical\Noise

REVISION	DRAWING NO.
2	

ALBANY MOTORSPORT PARK

Noise Assessment

PREDICTED DAY NOISE LEVELS
MULTI-USE TRACK EVENT

Noise contours: L_{A10}
Grid height: 1.4 m
Worst case meteorological conditions

FIGURE 7-1

GHD CLIENTS | PEOPLE | PERFORMANCE

8. Conclusions

The results presented in this assessment demonstrate that for some events, namely multi-use track and motocross events, there will be occasions when the predicted noise levels from Albany Motorsport Park exceed the assigned noise levels at the nearest sensitive receptors.

As such, it is recommended that appropriate management and mitigation measures are implemented for the project.

Noise from the Albany Motorsport Park is able to be reduced at source by including noise bunds or similar to screen noise from the closest existing sensitive receptors. Based on the distance between the facility and the nearby sensitive receptors, noise barriers are only likely to lead to slight reductions in noise levels, by up to 3-5 dBA, depending on location and height. In this regard, other mitigation measures have been outlined.

Provision of at property treatments to maintain suitable acoustic amenity at existing noise sensitive receptors in the vicinity of AMP. Such requirements for outdoor area screening and provision of insulation packages will be assessed by completion of at property inspections, in order to provide recommended acoustic treatments. In addition, as events are only planned during the day time period, predicted noise levels will not lead to sleep disturbance, and therefore will be less intrusive.

The existing industrial buffer in the vicinity to the proposed Albany Motorsport Park prevents the construction of any habitable dwellings, reducing the likelihood of sensitive receptors being developed in an area impacted by noise from motorsport activities in the future.

Additional planning controls to establish a *Special Use Zone* with an associated *Special Control Area* should be implemented to prevent further residential development, unless specific planning and building controls are implemented.

This assessment predicts exceedance of the assigned noise levels during certain event types is likely. As such consideration will be made to the preparation of a Noise Management Plan, prepared in line with requirements outlined in this report, as the project progresses.

Appendices

Appendix A - Glossary of noise terminology

Term	Definition
Ambient noise	Level of noise from all sources, including background noise from near and far and the source of interest
A-weighted	A-weighted noise level has been filtered in such a way as to represent the way in which the human ear perceives sound. This weighting reflects the fact that the human ear is not as sensitive to lower frequencies as it is to higher frequencies. A-weighted sound level is described as LA dB.
Background noise	Noise level from sources other than the source of concern.
dB	Decibel is the unit that describes the sound pressure and sound power levels of a noise source. It is a logarithmic scale referenced to the threshold of hearing.
Hz	Units for frequency are known as Hertz.
Impulsive noise	An impulsive noise source has a short-term banging, clunking or explosive sound. The quantitative definition of impulsiveness is: “A variation in the emission of a noise where the difference between L_{Apeak} and $L_{Amax, slow}$ is more than 15 dB when determined for a single representative event”.
L_{Aslow}	This is the noise level in decibels, obtained using A-weighting and S time weighting as specified in AS1259.1-1990. Unless assessing modulation, all measurements use the slow time weighting characteristic.
L_{Afast}	This is the noise level in decibels, obtained using A-weighting and F time weighting as specified in AS1259.1-1990. This is used when assessing the presence of modulation only.
L_{Apeak}	This is the maximum reading in decibels using A-weighting and P time weighting as specified in S1259.1-1990.
L_{Amax}	L_{Amax} level is the maximum A-weighted noise level during a particular measurement.
L_{A1}	L_{A1} level is the A-weighted noise level which is exceeded for 1% of the measurement period and is considered to represent the average of the maximum noise levels measured.
L_{A10}	L_{A10} level is the A-weighted noise level which is exceeded for 10% of the measurement period and is considered to represent the intrusive noise level.
L_{A90}	L_{A90} level is the A-weighted noise level which is exceeded for 90% of the measurement period and is considered to represent the background noise level.
L_{Aeq}	The equivalent steady state A-weighted sound level (‘equal energy’) in decibels which, in a specified time period, contains the same acoustic energy as the time-varying level during the same period. It is considered to represent the average noise level.
L_{Amax} assigned level	Means an assigned level which, measured as a L_{Aslow} value, is not to be exceeded at any time.
L_{A1} assigned level	Means an assigned level which, measured as a L_{Aslow} value, is not to be exceeded for more than 1% of the representative assessment period.
L_{A10} assigned level	Means an assigned level which, measured as a L_{Aslow} value, is not to be exceeded for more than 10% of the representative assessment period.
Linear	Sound levels measured without any weightings are referred to as ‘linear’ and the units are expressed as dB(lin).
L linear, peak	Maximum reading in decibels obtained using P-time-weighting characteristic as specified in AS 1259.1-1990.
Maximum design sound level	The level of noise above which most people occupying the space start to become dissatisfied with the level of noise.
Modulating noise	A modulating source is regular, cyclic and audible and is present for at least 10% of the measurement period. The quantitative definition of modulation is: Is more than 3 dB L_{Afast} or is more than 3 dB L_{Afast} in any one-third octave band Is present for at least 10% of the representative assessment period Is regular, cyclic and audible

Term	Definition
One-third octave band	Means a band of frequencies spanning one-third of an octave and having a centre frequency between 25 Hz and 20,000 Hz inclusive.
Representative assessment period	Means a period of time not less than 15 minutes and not exceeding four hours, determined by an inspector or authorised person to be appropriate for the assessment of a noise emission, having regard to the type and nature of the noise emission.
Reverberation time	Of an enclosure, for a sound of a given frequency or frequency band, the time that would be required for the reverberantly decaying sound pressure level in the enclosure to decrease by 60 decibels.
RMS	Root mean square level; used to represent the average level of a wave form such as vibration.
Satisfactory design sound level	The level of noise that has been found to be acceptable by most people for the environment in question and also to be not intrusive.
Sound pressure level (SPL)	The sound pressure level of a noise source is dependent upon its surroundings (influenced by distance, ground absorption, topography, meteorological conditions etc.) and is what the human ear actually hears. Noise modelling predicts the sound pressure level from the sound power levels taking into account ground absorption, barrier effects, distance etc.
Sound power level (SWL)	Under normal conditions, a given sound source will radiate the same amount of energy, irrespective of its surroundings, being the sound power level. The sound power level of a noise source cannot be directly measured using a sound level meter but is calculated based on measured sound pressure levels at known distances. Noise modelling incorporates source sound power levels as part of the input data.
Specific noise	Relates to the component of the ambient noise that is of interest. This can be referred to as the noise of concern or the noise of interest
Tonal noise	A tonal noise source can be described as a source that has a distinctive noise emission in one or more frequencies. An example would be whining or droning. The quantitative definition of tonality is: The presence in the noise emission of tonal characteristics where the difference between - The A-weighted sound pressure level in any one-third octave band The arithmetic average of the A-weighted sound pressure levels in the two adjacent one-third octave bands is greater than 3 dB when the sound pressure levels are determined as $L_{Aeq,T}$ levels where the time period T is greater than 10% of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as L_{Aslow} levels. This is relatively common in most noise sources.

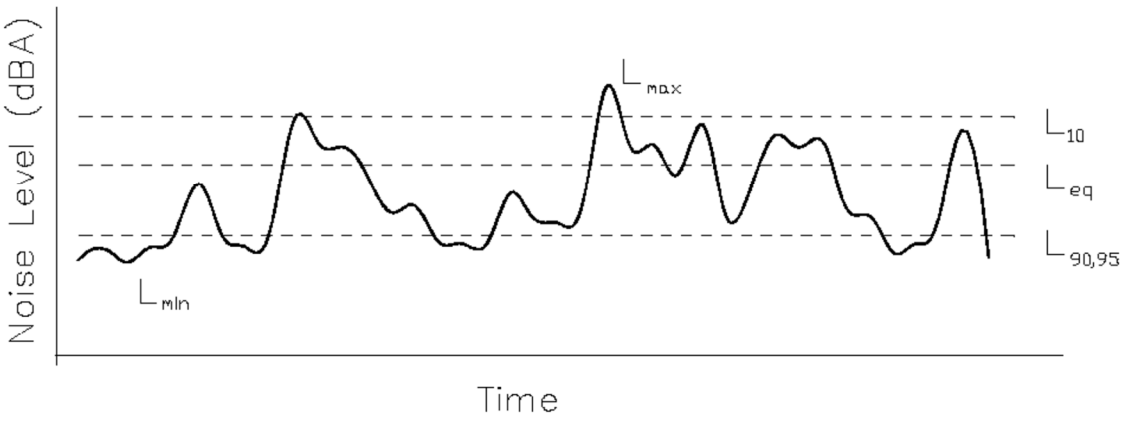
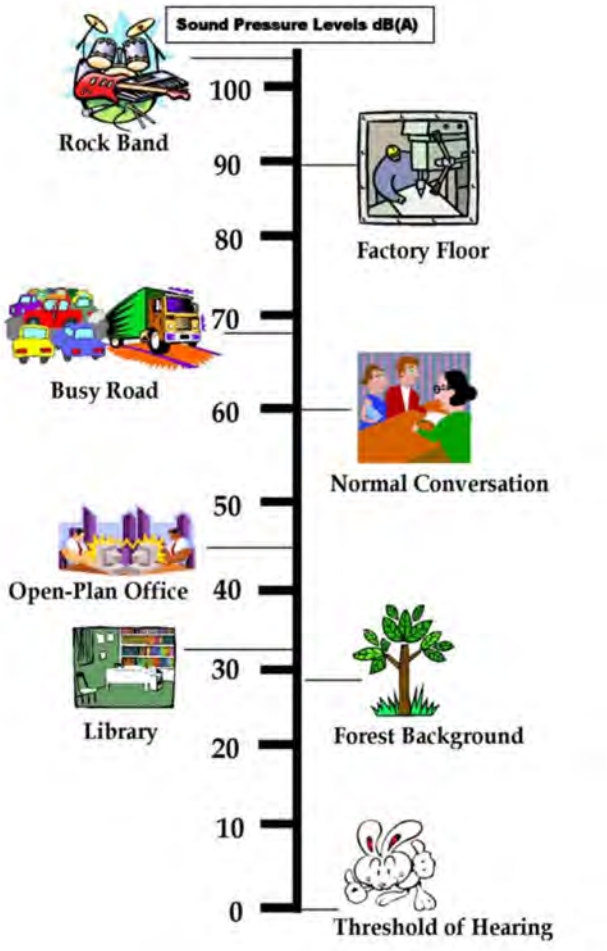


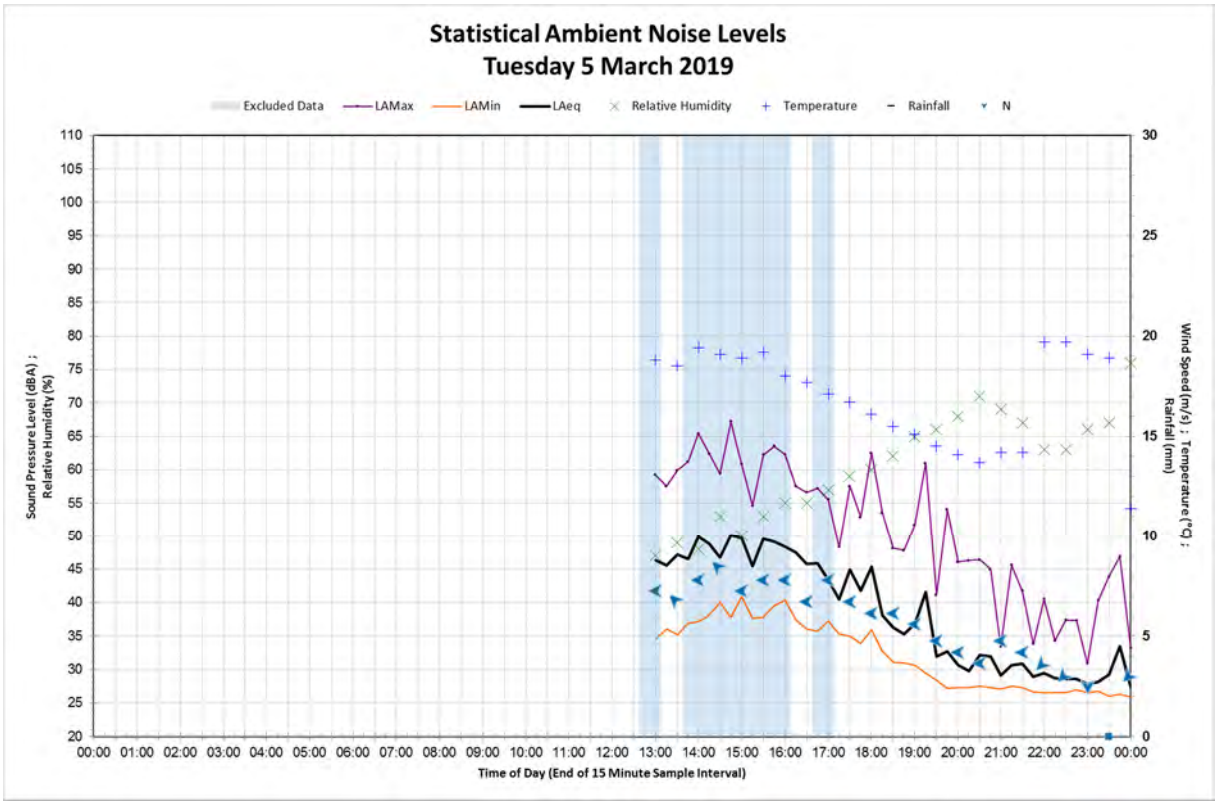
Chart of Noise Level Descriptors

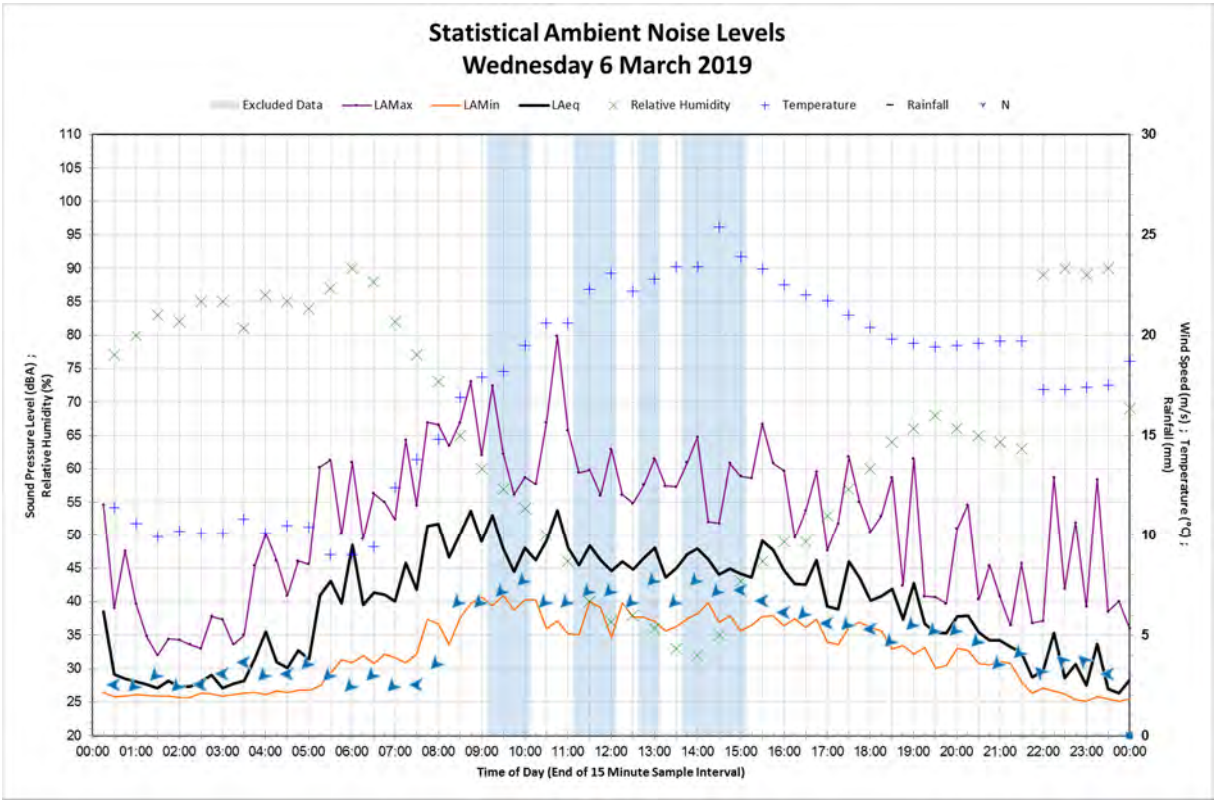


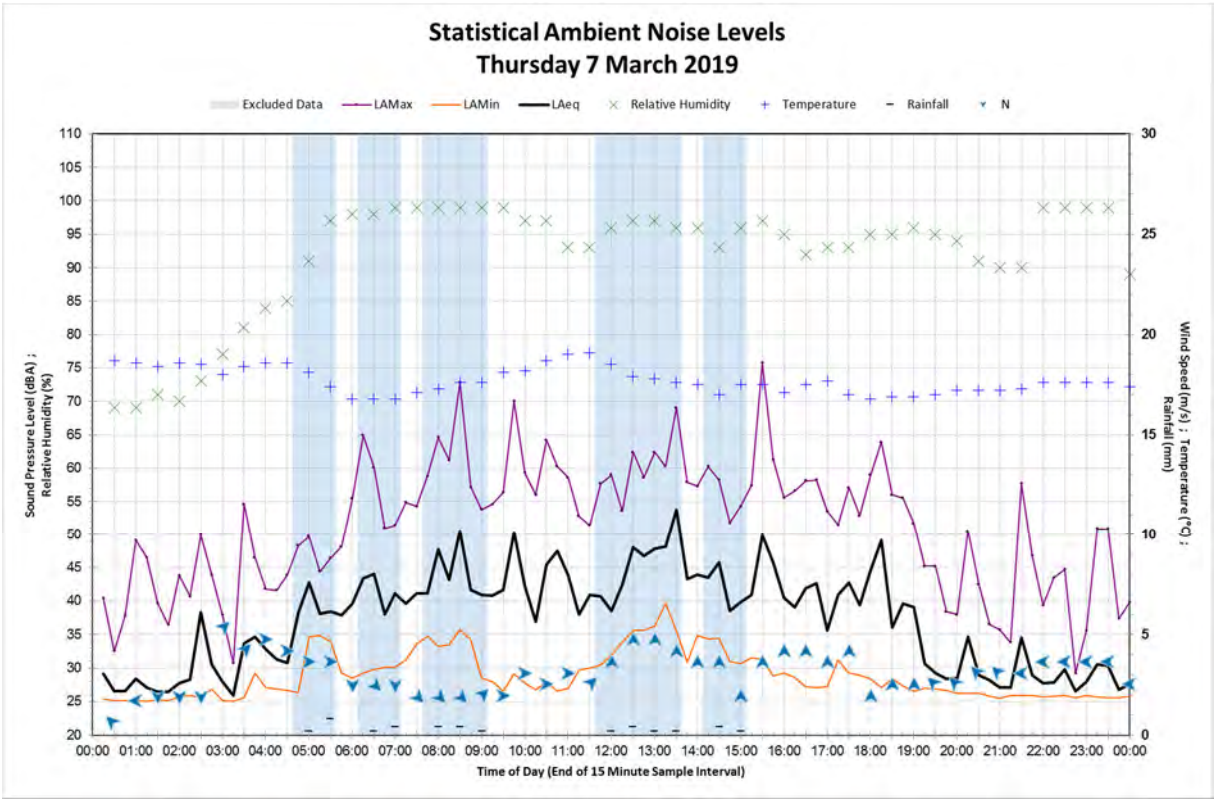
Typical Noise Levels

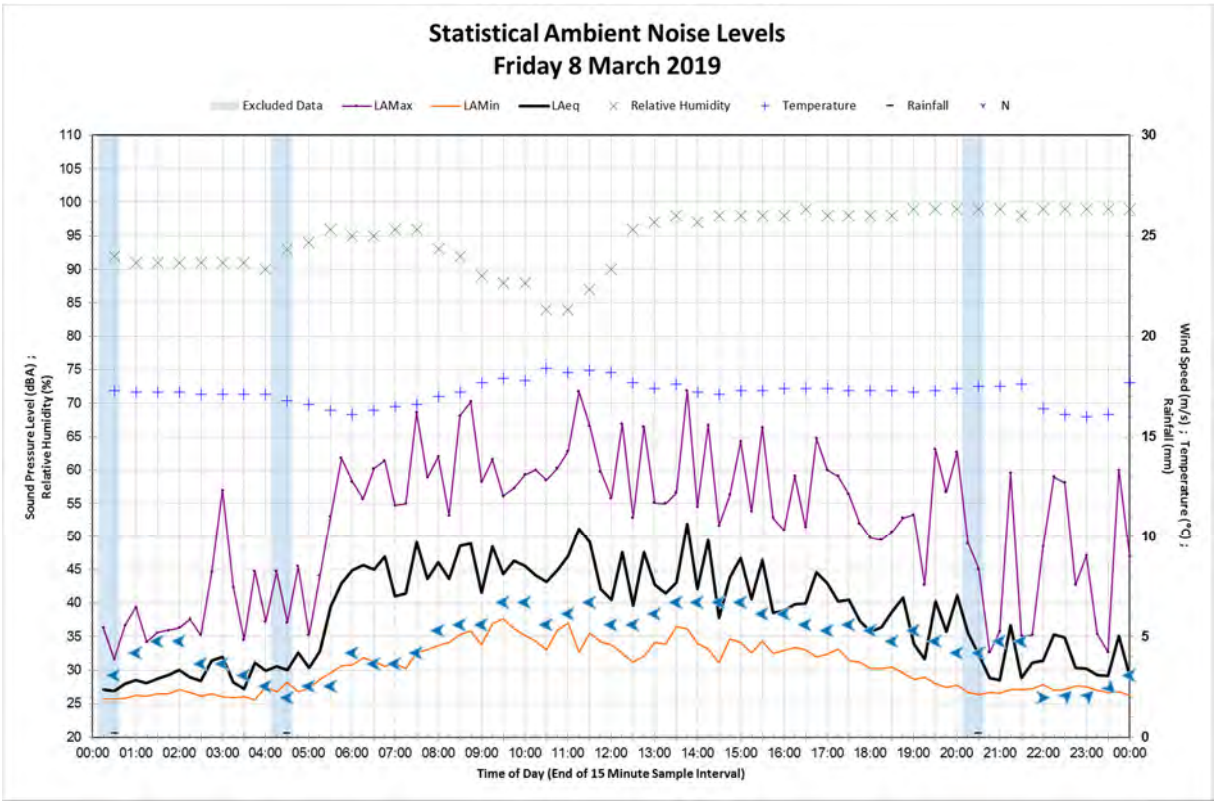
Appendix B – Monitoring results

Site A - 35552 Albany Highway DROME WA 6330






Statistical Ambient Noise Levels
Thursday 7 March 2019
Excluded Data
LAMax
LAMin
LAeq
Relative Humidity
Temperature
Rainfall
N
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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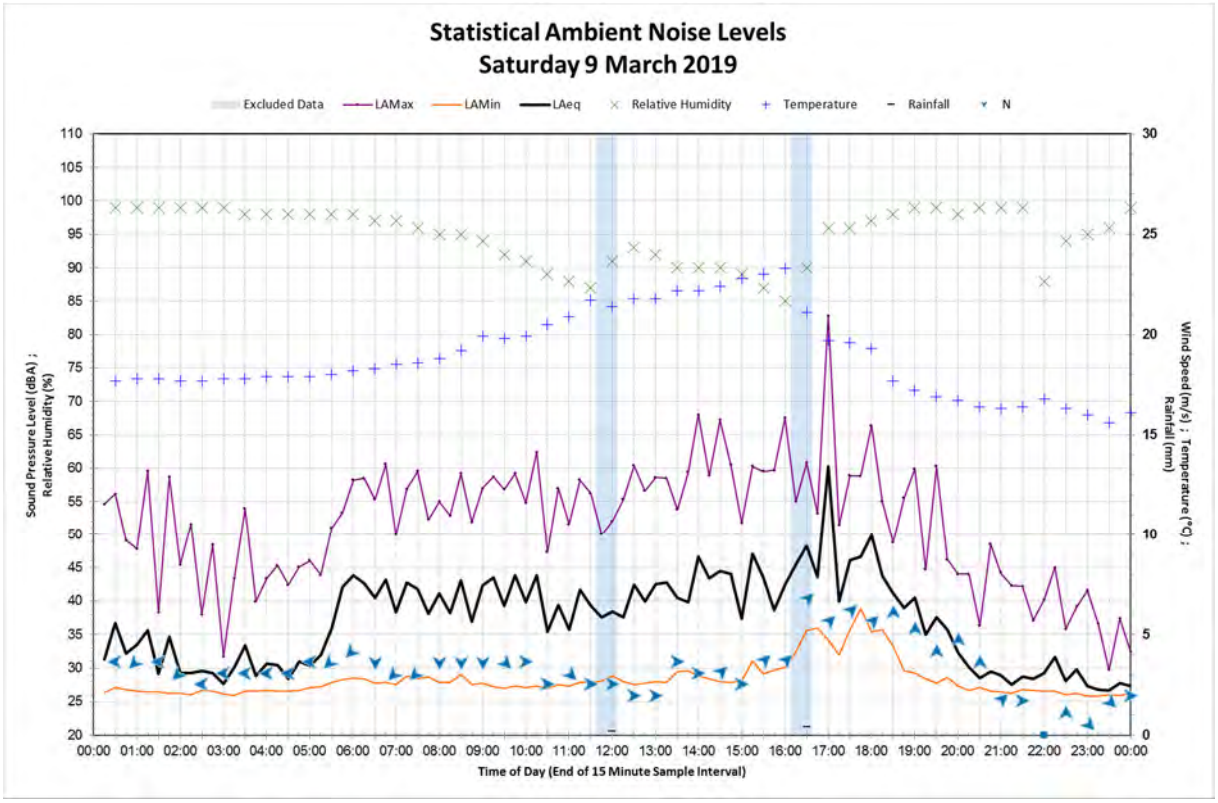
Excluded Data
LAMax
LAMin
LAeq
Relative Humidity
Temperature
Rainfall
N
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Excluded Data
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LAMin
LAeq
Relative Humidity
Temperature
Rainfall
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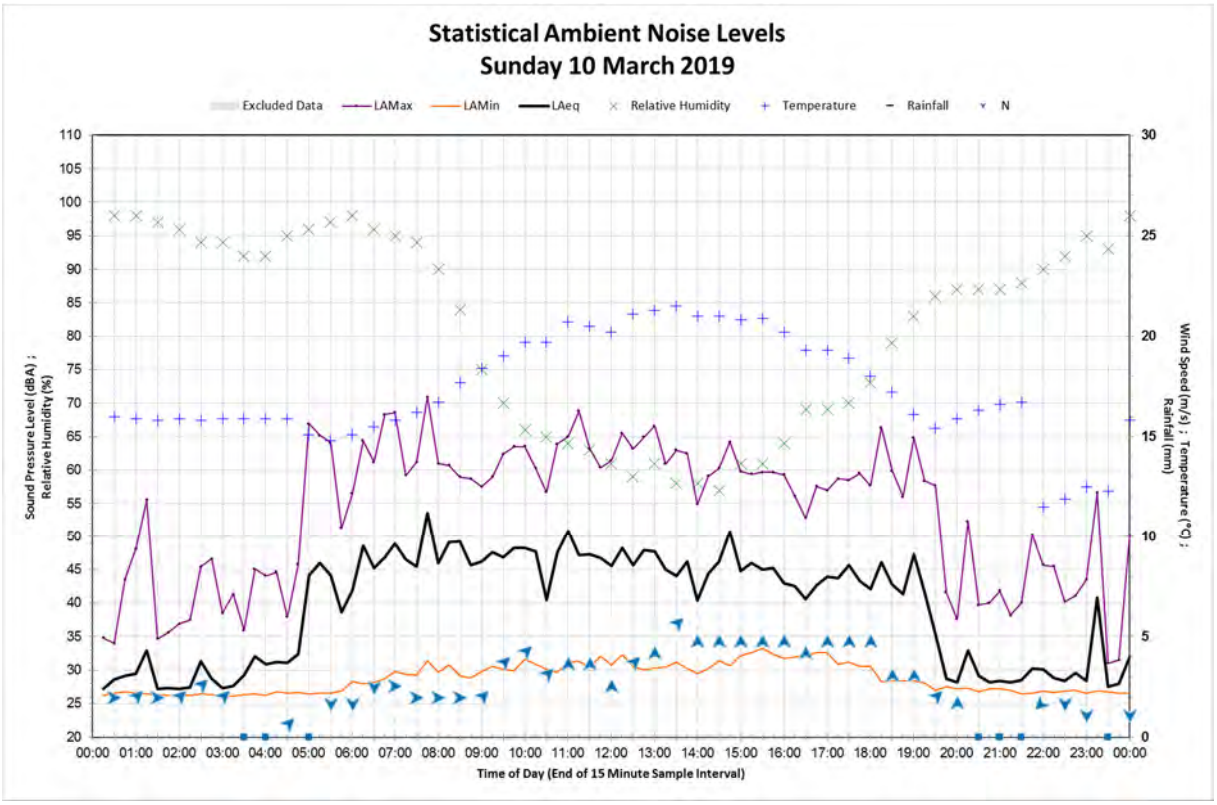
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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LAeq
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Temperature
Rainfall
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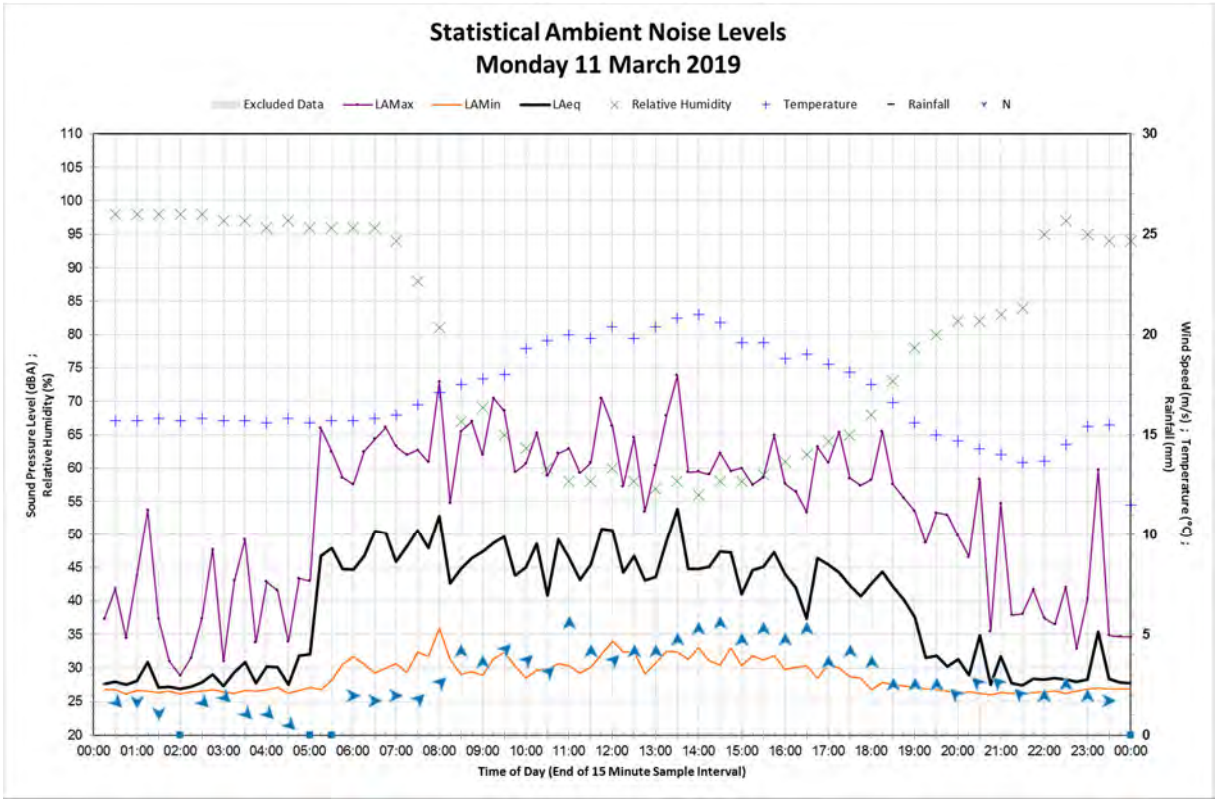
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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LAMin
LAeq
Relative Humidity
Temperature
Rainfall
N
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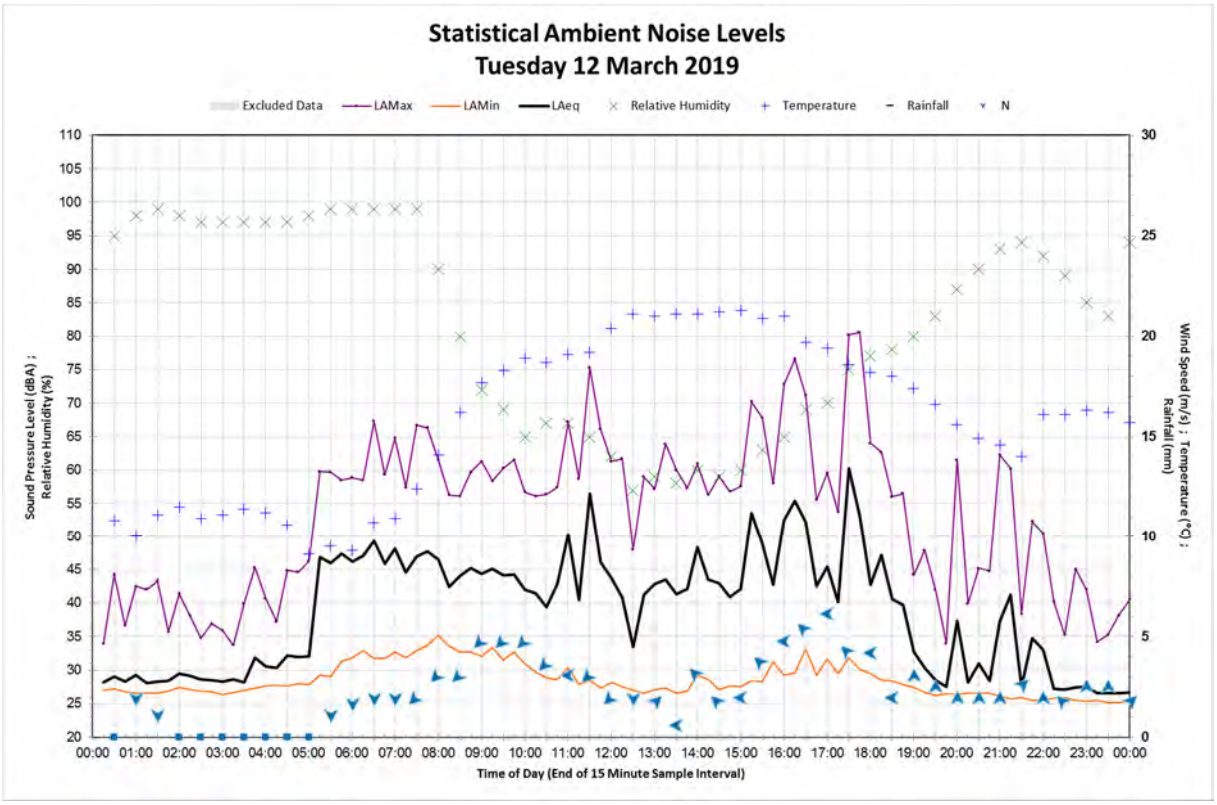
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)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Excluded Data
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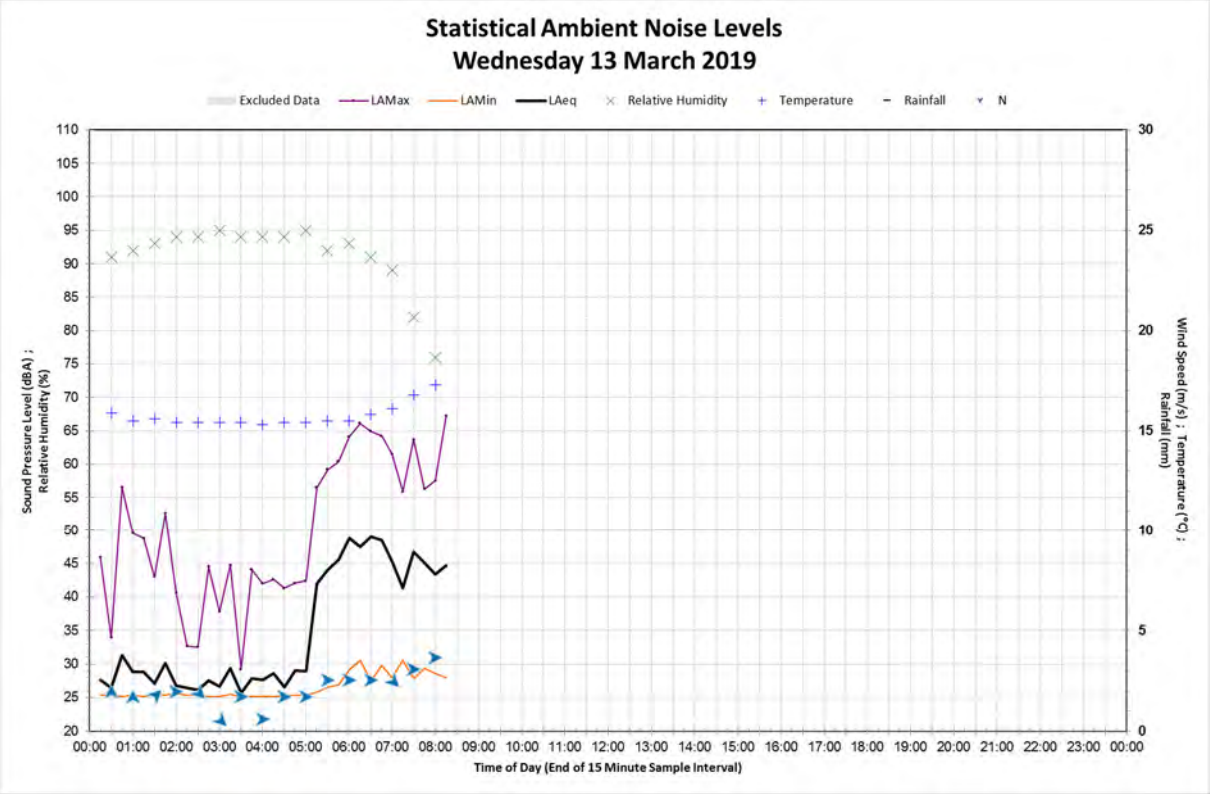
LAMin
LAeq
Relative Humidity
Temperature
Rainfall
N
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)


Statistical Ambient Noise Levels
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LAMax
LAMin
LAeq
Relative Humidity
Temperature
Rainfall
N
Sound Pressure Level (dBA) ; Relative Humidity (%)
Wind Speed (m/s) ; Temperature (°C) ; Rainfall (mm)
Time of Day (End of 15 Minute Sample Interval)

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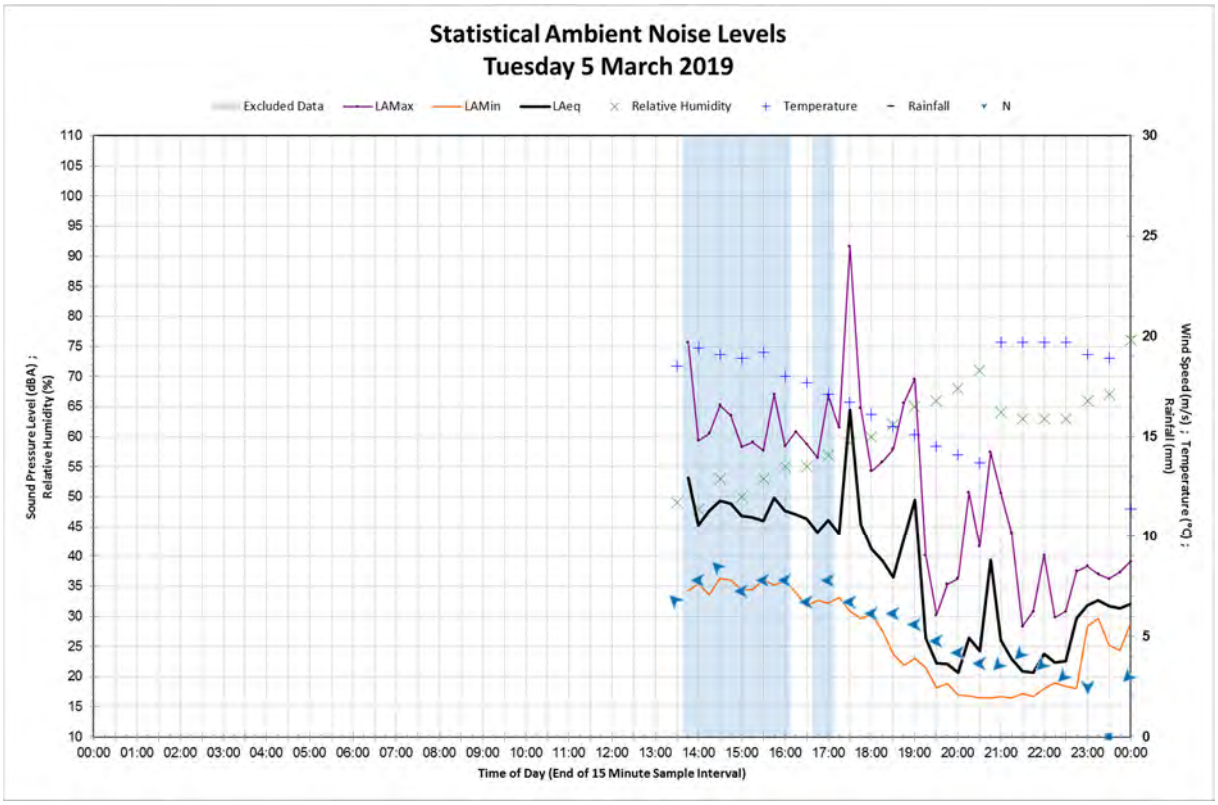

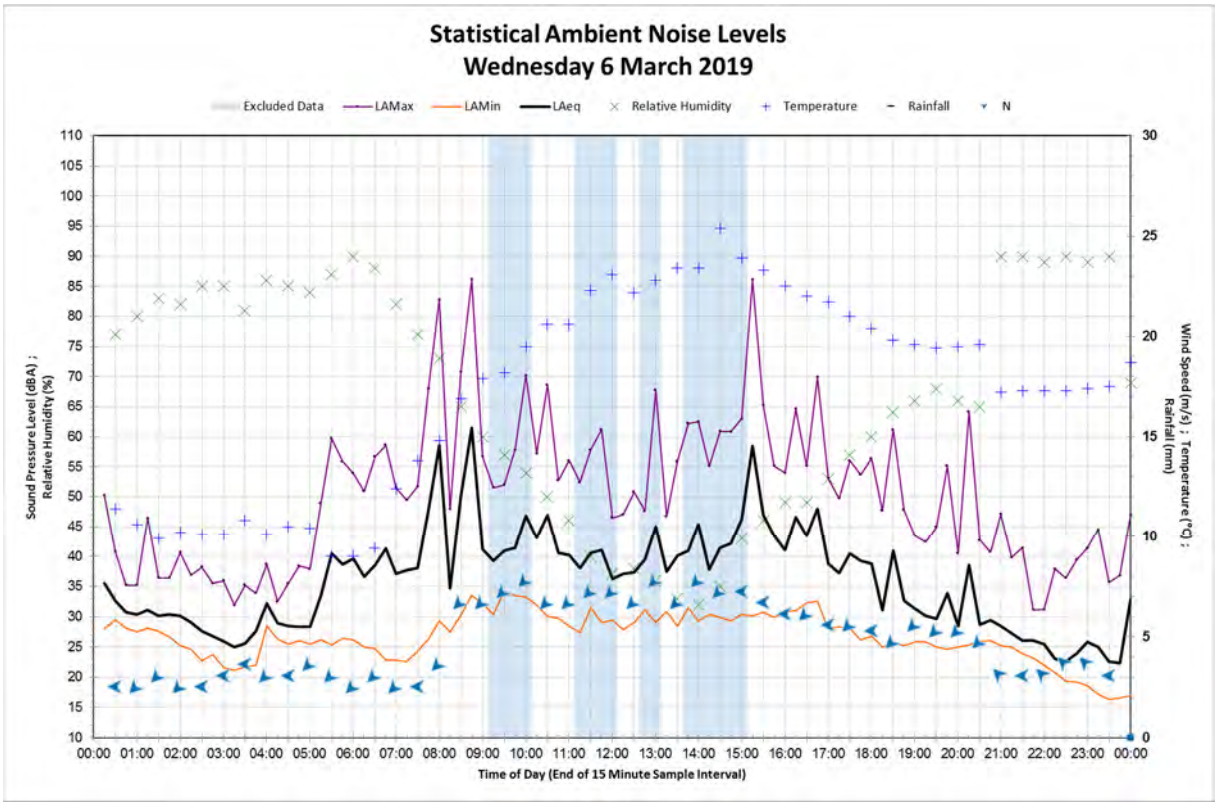

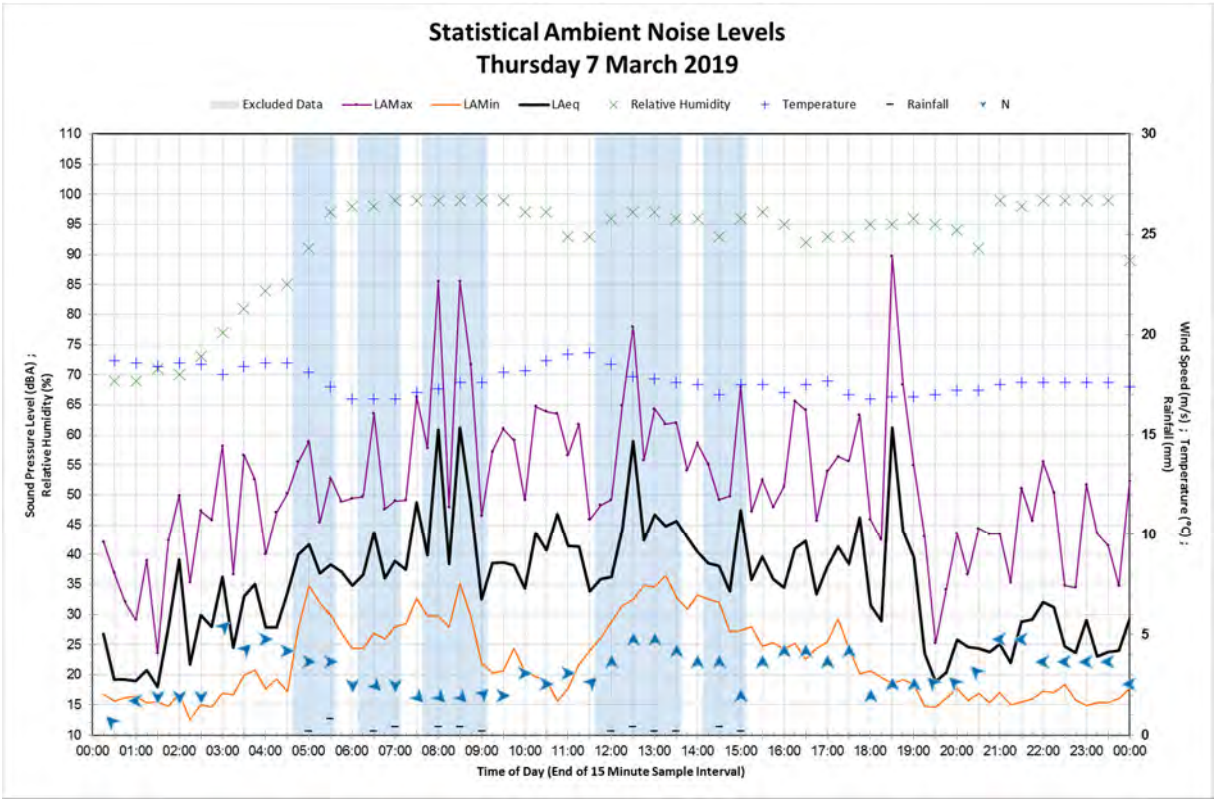
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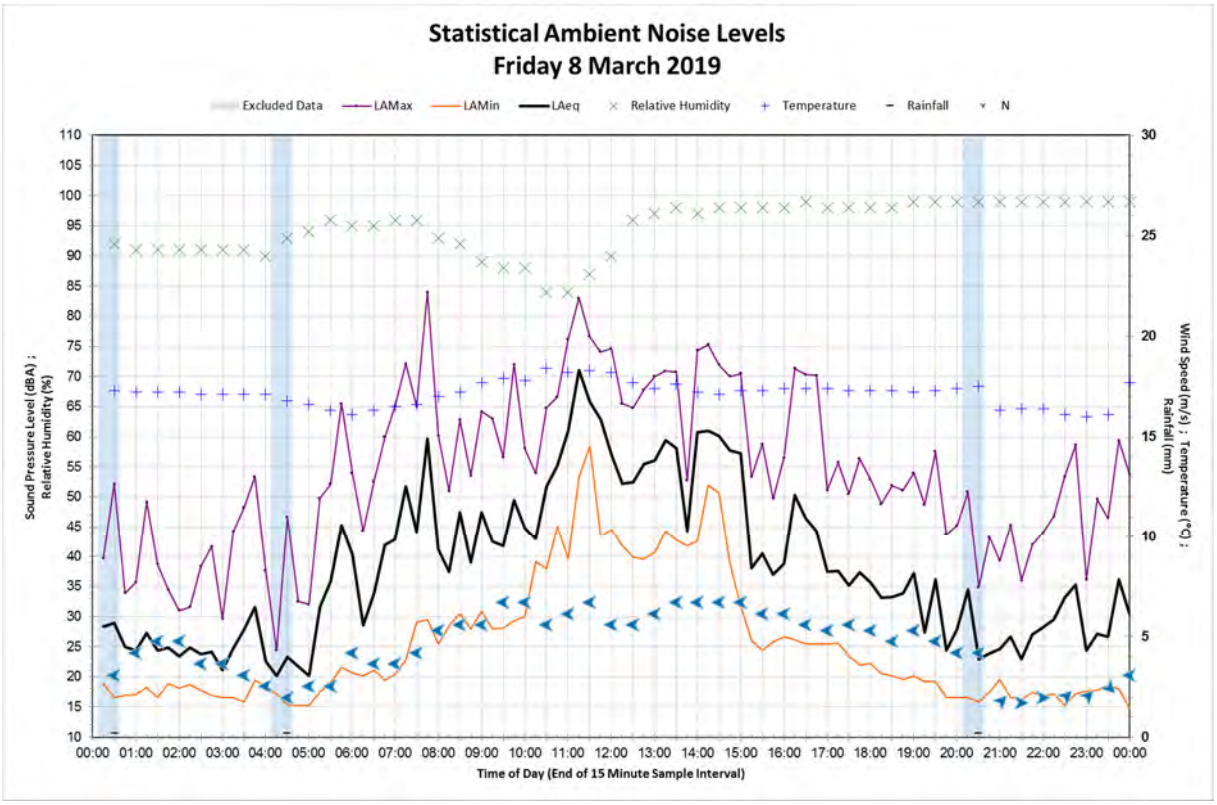
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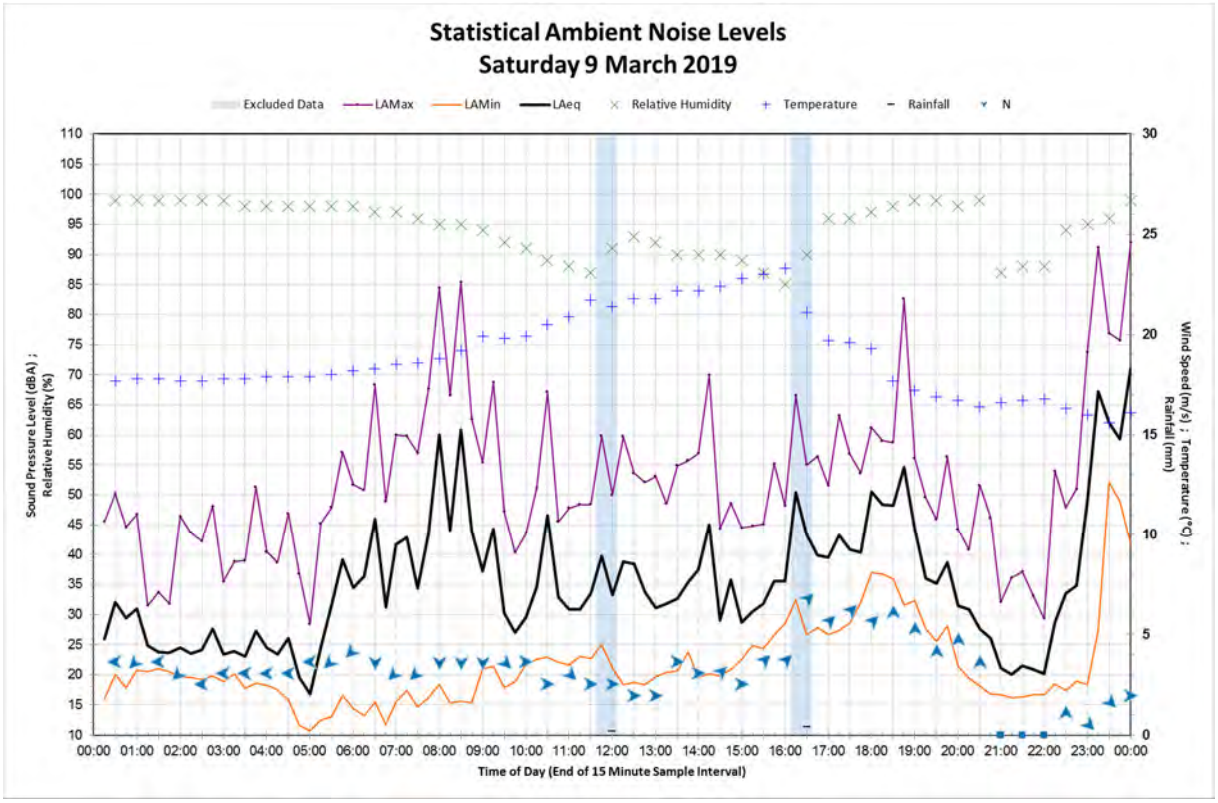
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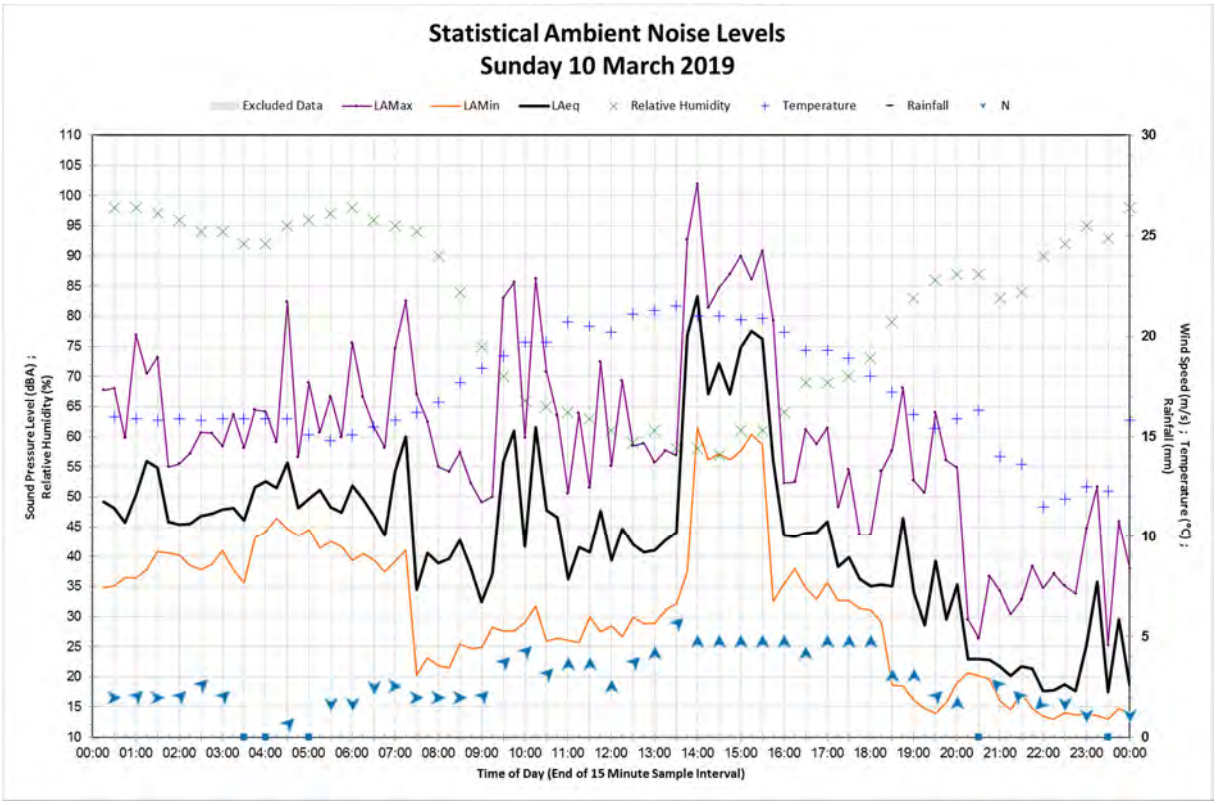
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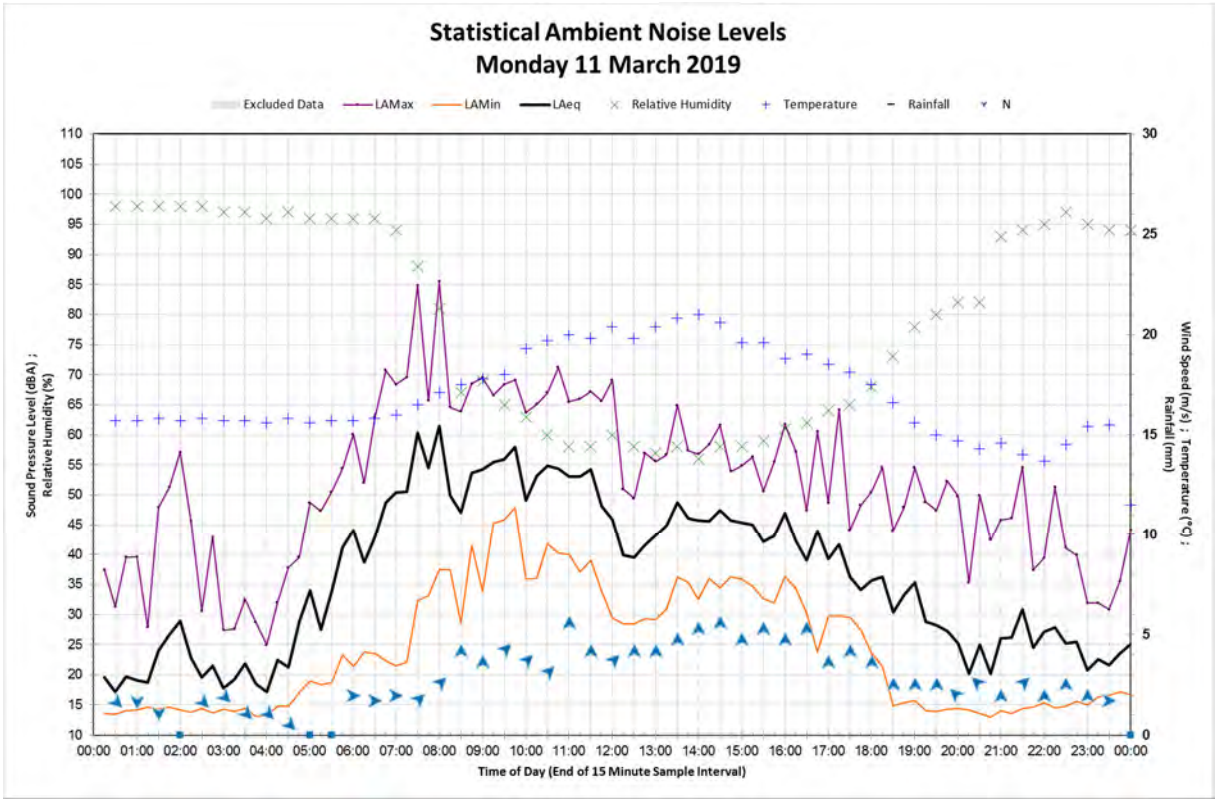
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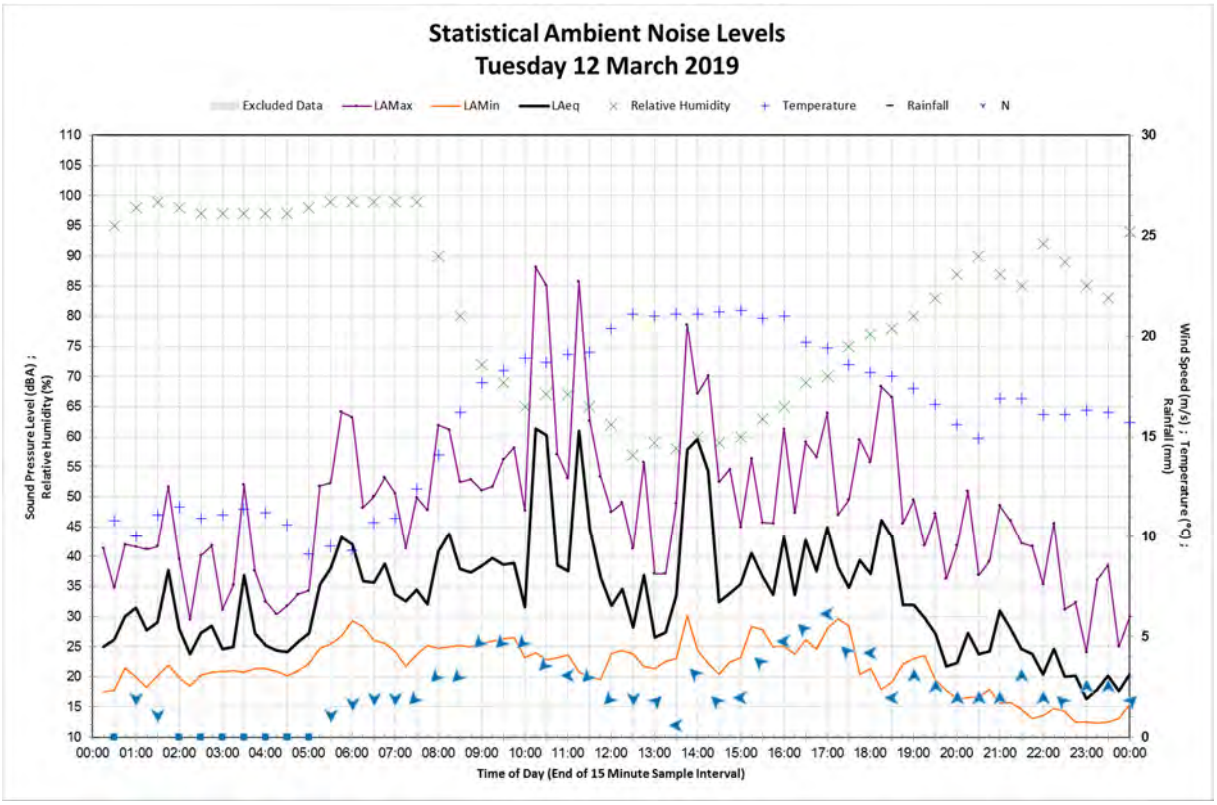
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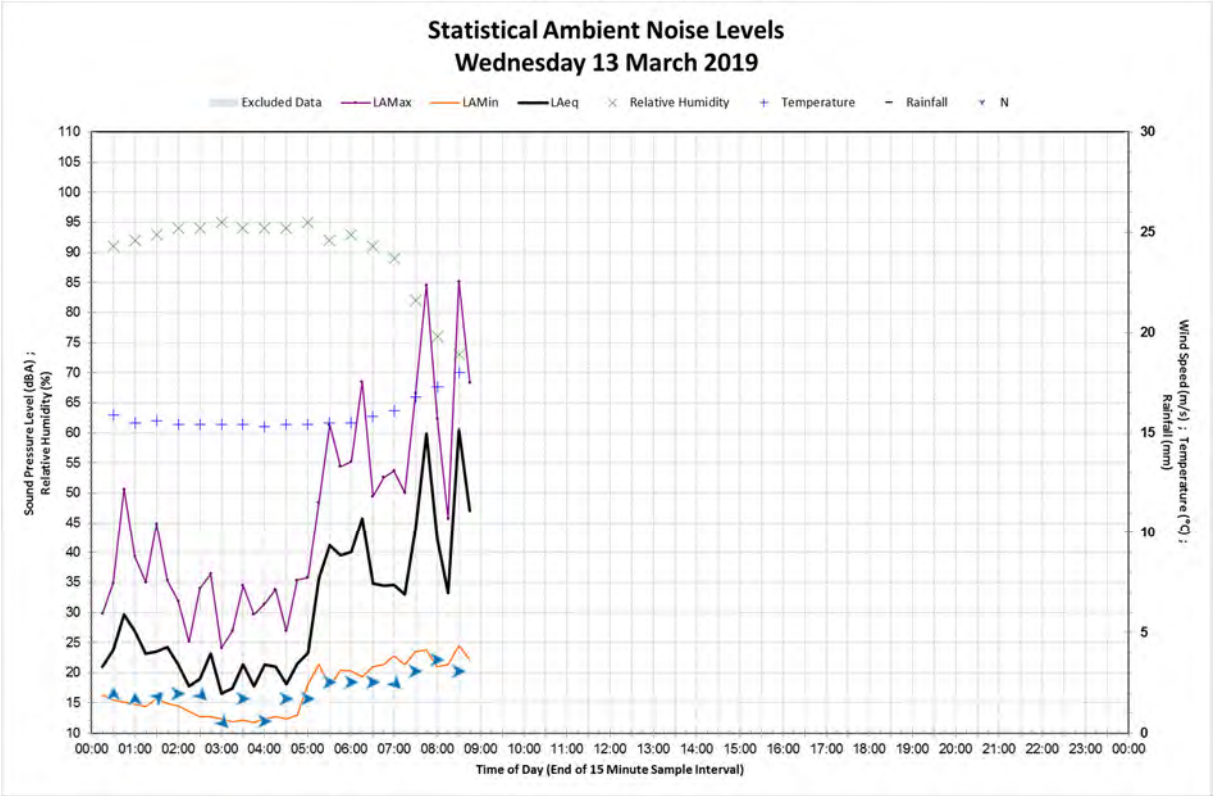
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Time of Day (End of 15 Minute Sample Interval)

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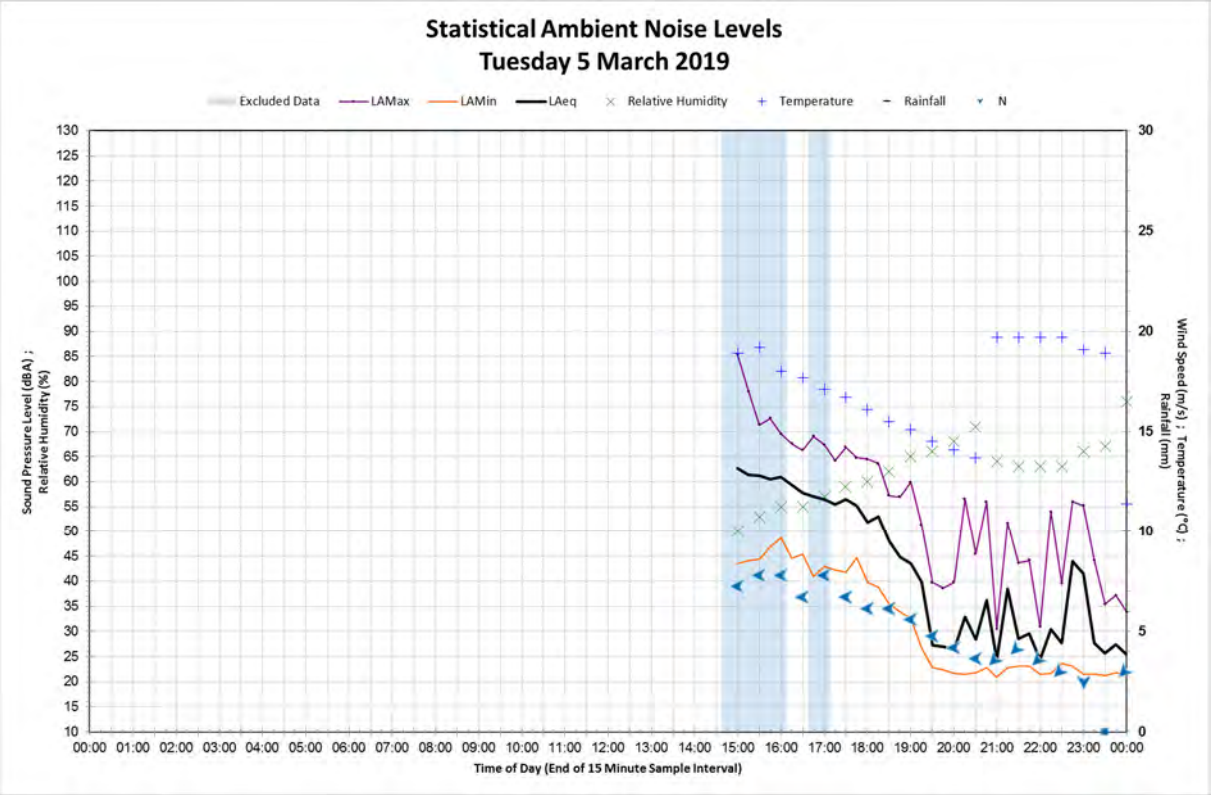

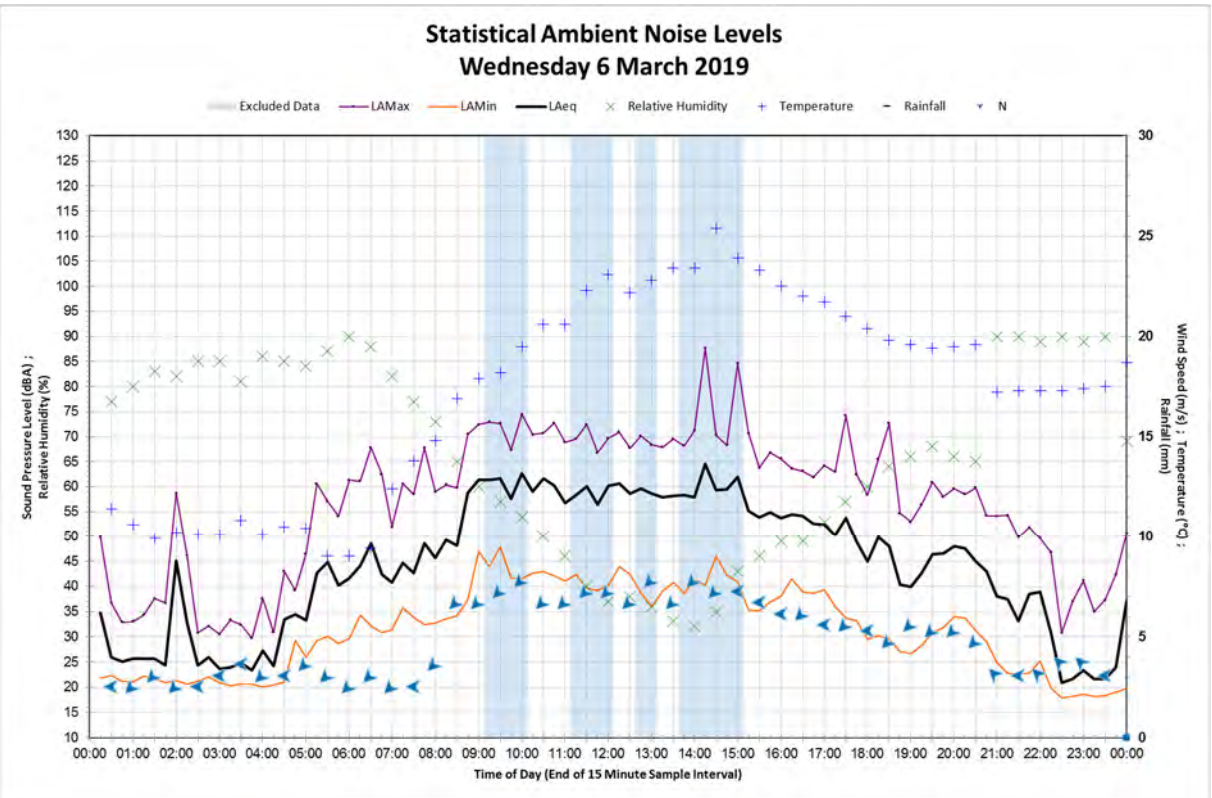

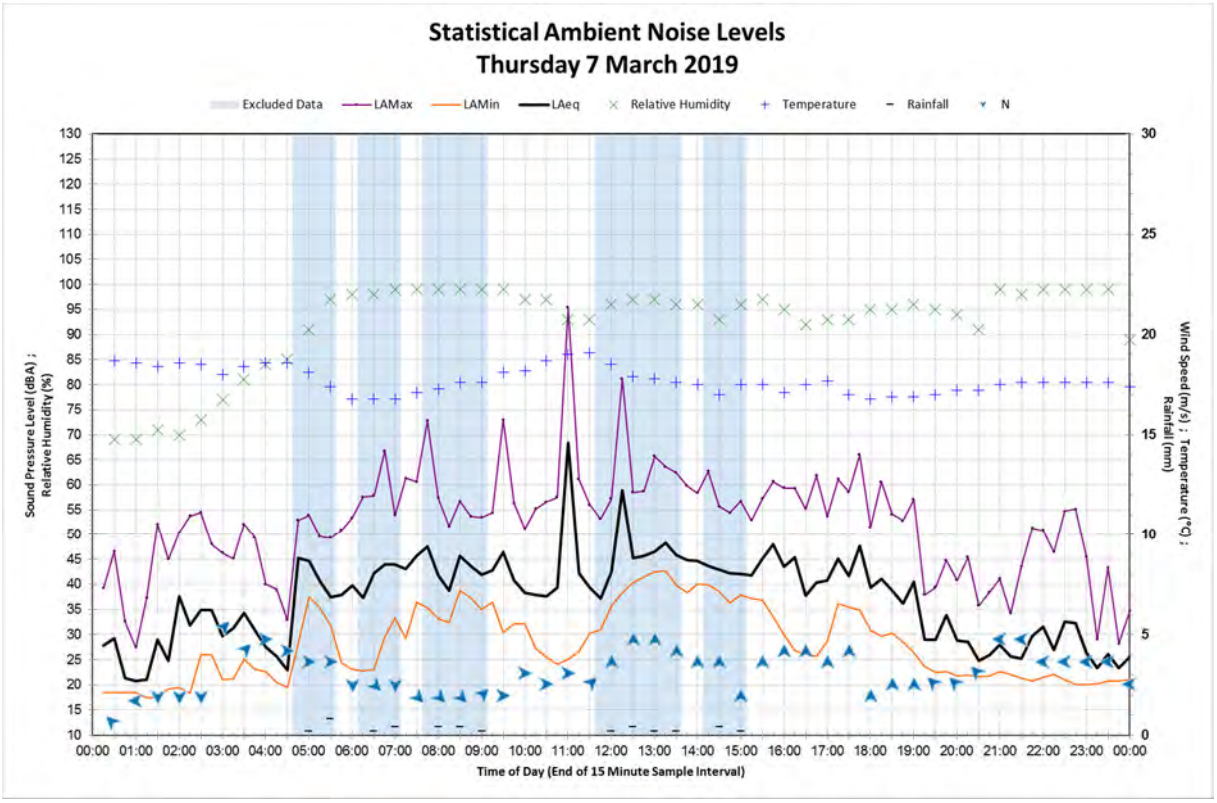
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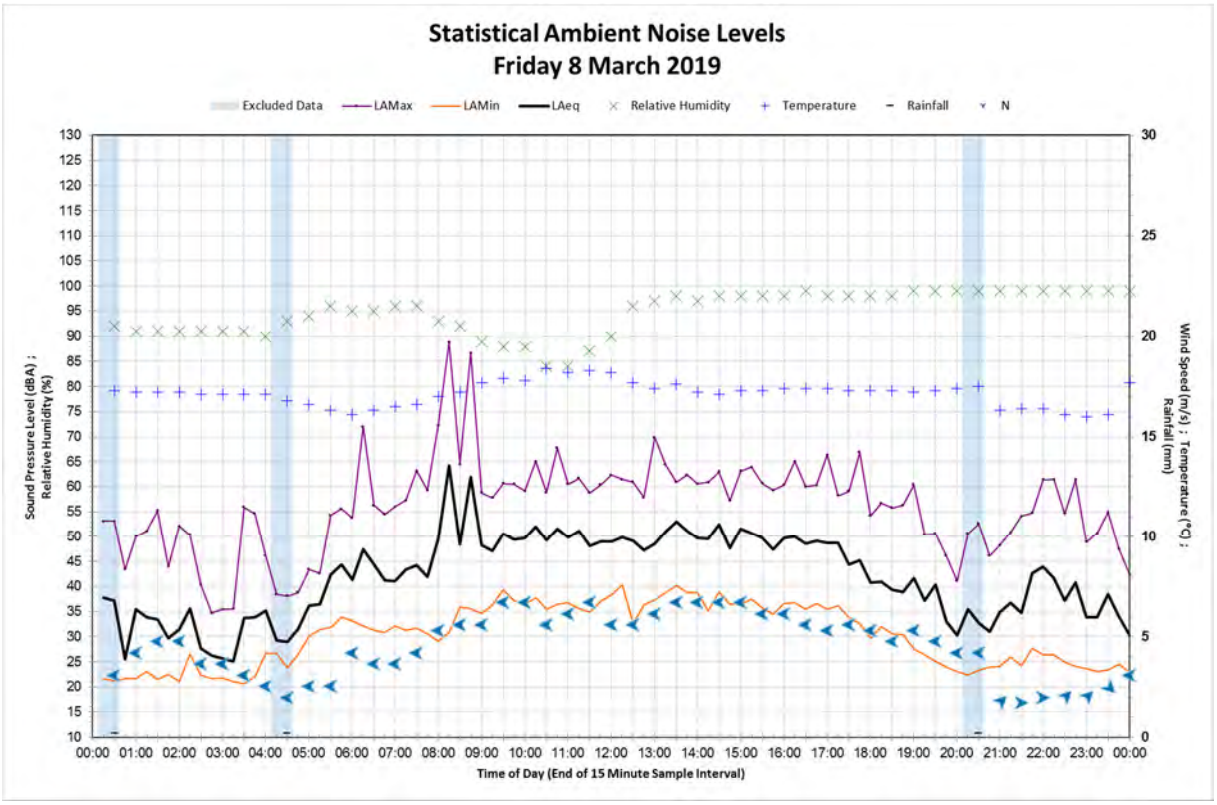
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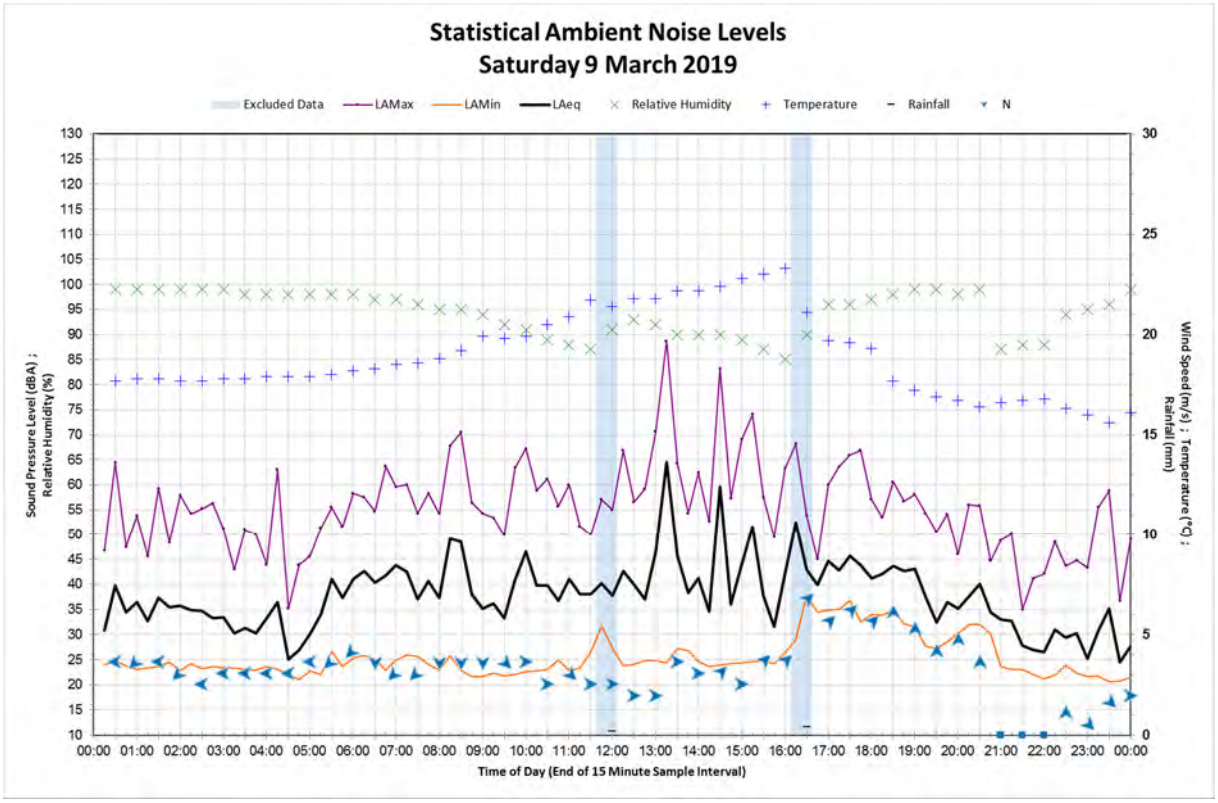
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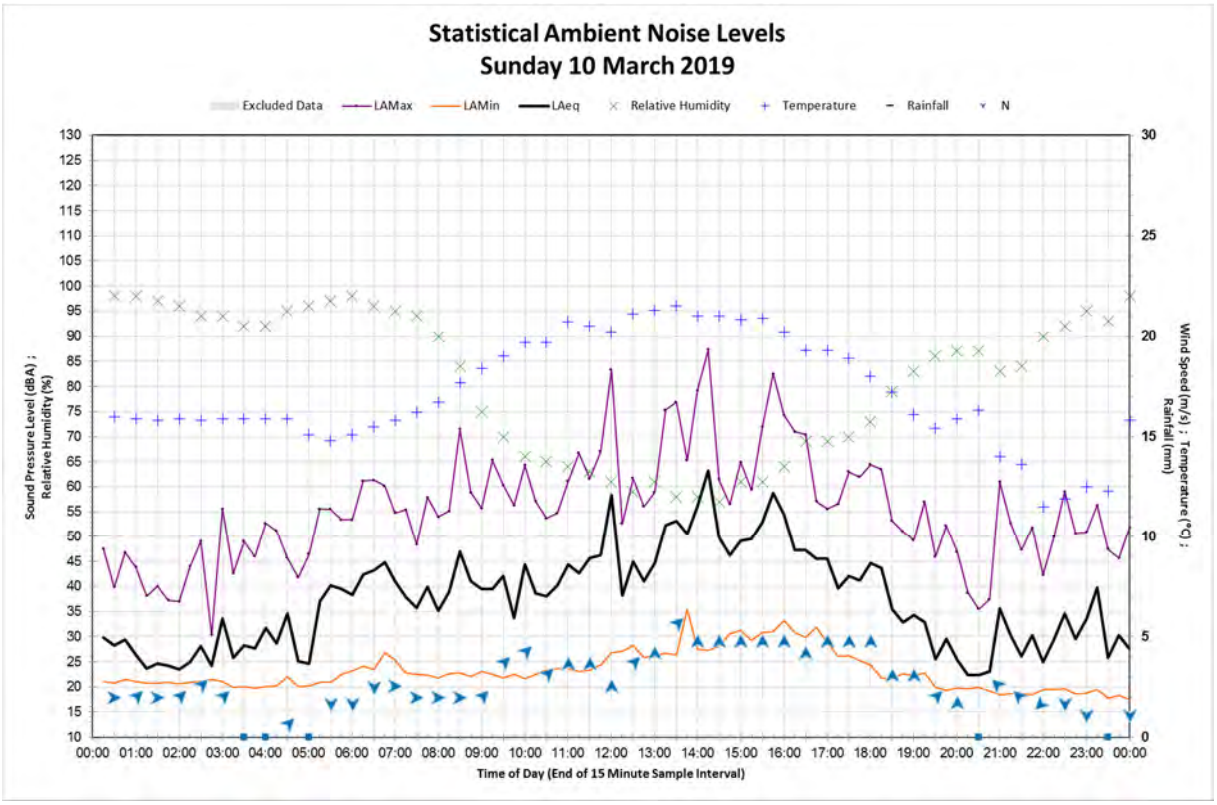
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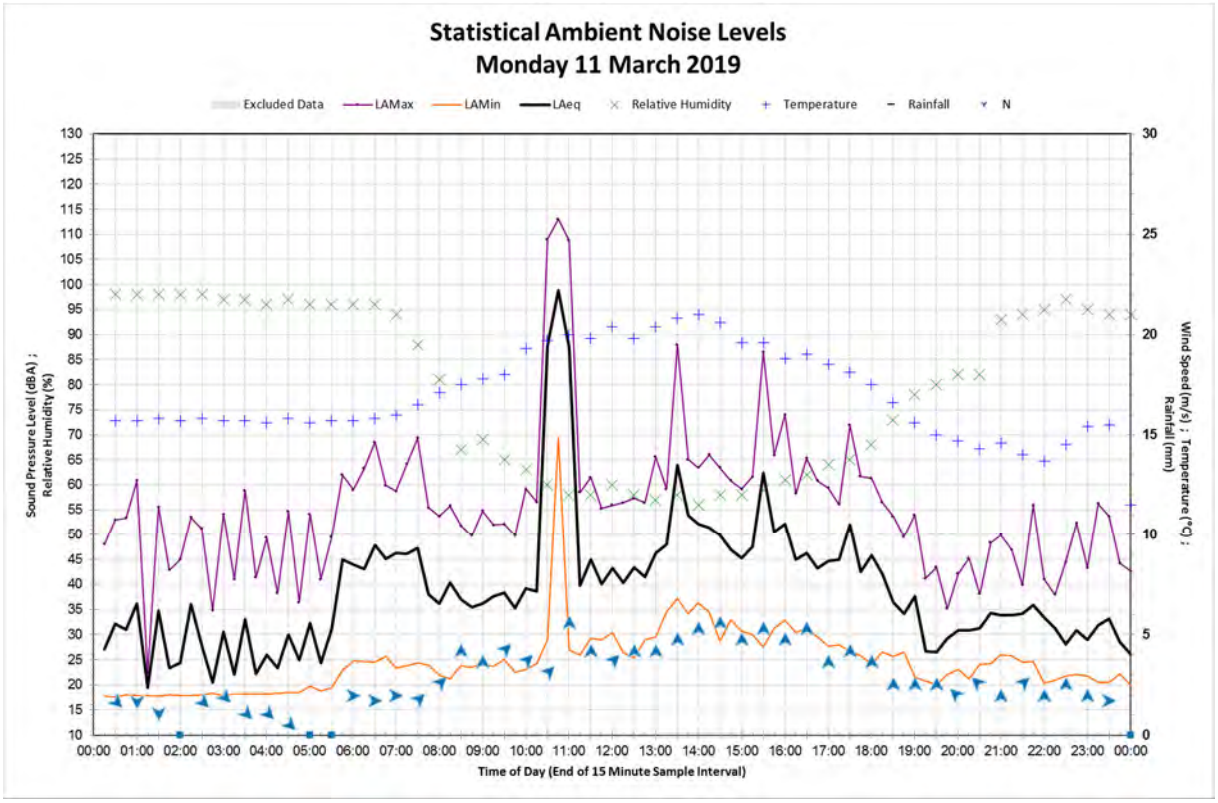
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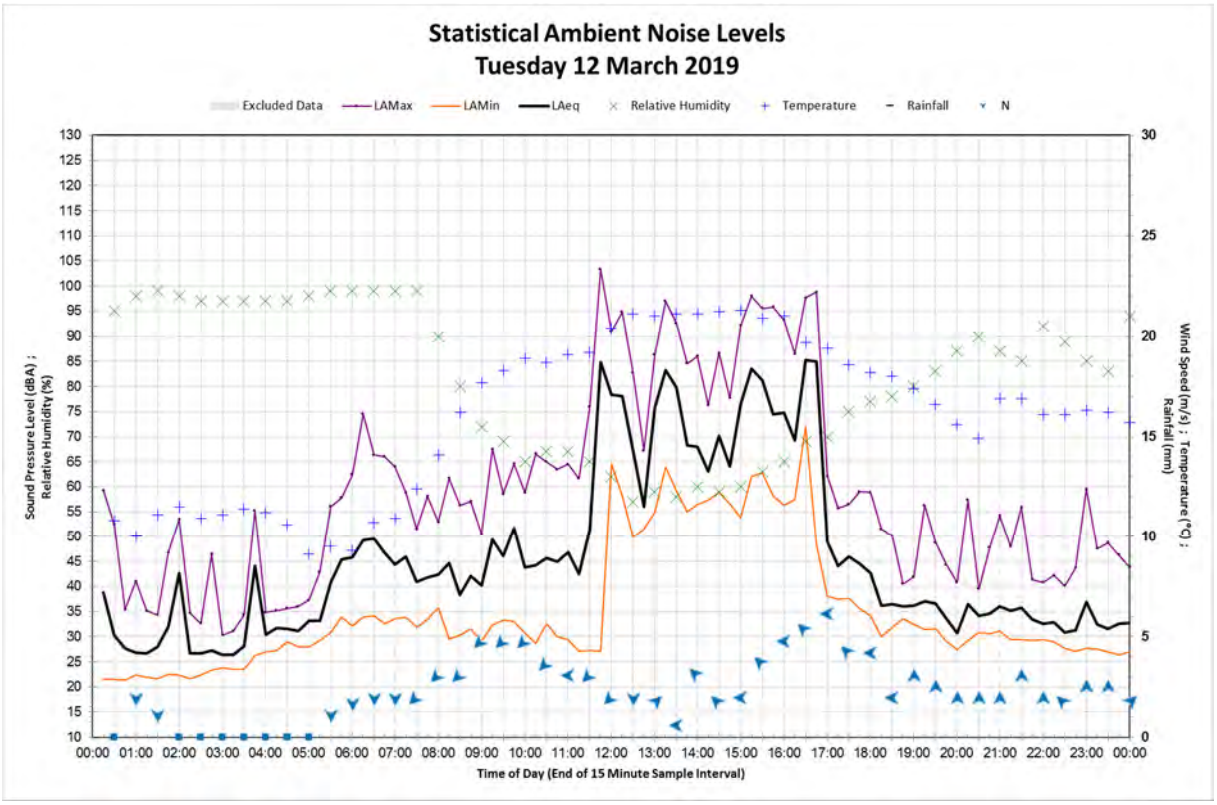
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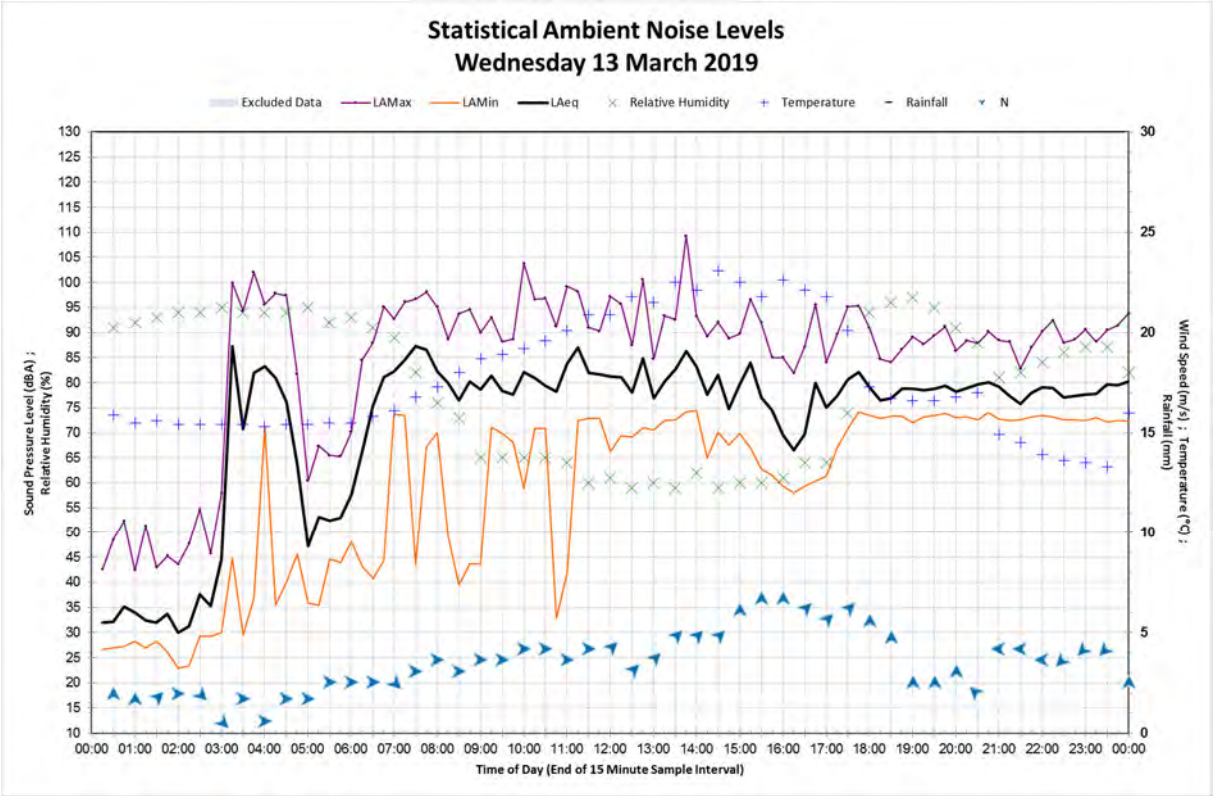
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Appendix C – Example Noise Management Plan

GREAT SOUTHERN MOTORPLEX GROUP

NOISE MANAGEMENT PLAN – ALBANY MOTORSPORT PARK

This noise management plan ('the NMP') has been approved by the Chief Executive Officer (CEO) of the City of Albany ('the CEO') for the purposes of Division 3 of the *Environmental Protection (Noise) Regulations 1997.*

1. VENUE DETAILS

Name of venue	Albany Motorsport Park ('the venue')
Location of venue	Down Road DROME WA
Occupier of venue	Great Southern Motorplex Group ('the occupier')
Affiliations	Confederation of Australian Motor Sports (CAMS) Fédération Internationalé de l'Automobile (FIA) Fédération Internationalé Motocyclisme (FIM) Motorcycling Australia (MA)
Venue maps	**Attachment 1** – Map of venue showing facilities

2. APPLICATION

The NMP applies:

1. While the occupier is the leaseholder of the venue
2. To racing activities at the venue organised by the occupier.
3. To the emission of noise during a racing activity at the venue.
4. From the date of approval by the CEO until the expiration of the approval.

Regulation 7 of the *Environmental Protection (Noise) Regulations 1997* does not apply to noise emitted from the venue during a racing activity if the activity is conducted in accordance with the NMP.

The occupier must ensure that the conditions and ancillary measures designated as such in the CEO's approval notice are implemented.

3. TYPES OF RACING ACTIVITIES AND CLASSES OF VEHICLES

3.1 Types of racing activities covered by the NMP

- Car test and tune days
- Car speed events (Club, State and National)
- Supercars event (National)
- Bike test and tune days
- Bike speed events (Club, State and National)
- Motocross training

- Motocross events (Club and State)
- Drifting days (Club and State)
- Motorkhana events (Club)
- Special events

3.2 Classes of vehicles

The following classes of vehicles may compete in events at this venue:

- Various classes of cars including street cars, Formula Vee, Formula Classic, Formula Ford, HQ Holden sedans, saloon cars, sports sedans, production sports cars and marque sports cars, historic touring cars, improved production cars, Formula 1000 and Excel Cup.
- Various drift cars
- Various classes of motorcycles including historic, 125 cc, 250 cc, 500 cc, Grand Prix, Superbikes, solo and sidecar bikes
- Various classes of motocross bikes including junior, senior, 65 cc, 85 cc, 125 cc
- Special exhibition vehicles
- Various other vehicles of smaller engine capacity, including road registered vehicles

4. LIMITATIONS ON RACING ACTIVITIES

4.1 Scheduled race meetings and practice sessions

The following limits apply to scheduled race meetings and practice sessions at the venue:

1. Motorsport racing and practice may occur year round, within the limitations established by this noise management plan.
2. Racing can only take place at a race meeting or practice session.
3. Racing vehicles are not to be operated at the venue at any time other than a race meeting, practice session or tuning day.
4. No more than XX race meetings are to be held during a year.
5. In addition to the XX race meetings per season, a preliminary meeting may be held to conduct tests on racing vehicles to establish their compliance with this Noise Management Plan.
6. Races at a race meeting can only take place within a eight hour period on any one day.
7. The eight hour period must be between 8:00 am to 6:00 pm, Monday to Saturday, 9:00 am to 6:00 pm on Sunday and public holidays. No evening (after 7:00 pm) or night (after 10:00 pm) events will be scheduled.

4.2 Special events

Where a special event that is to be open to the public is proposed to be held at the venue, but the event cannot be conducted within the limits for scheduled race meetings and practice sessions, the occupier is to apply to the CEO for approval of the event under Regulation 18.

5. MEASURES TO CONTROL NOISE EMISSIONS

5.1 Access to race track

In order to prevent noise emissions due to unauthorised use of the race track by racing vehicles, the gates to the race track are to remain locked at all times other than:

1. In preparation for and during race meetings, practice sessions and special events approved by the CEO.
2. During maintenance or improvement of venue facilities.

5.2 Certification of racing vehicles

Each <<vehicle type>> that is to race at a race meeting at the venue must have a current certificate indicating that its noise level does not exceed a noise limit of $L_{A\ slow}$ 95 dBA ('noise limit') when tested in accordance with the noise test procedure.

For all other class of vehicle that is to race at a race meeting at the venue must have a current certificate indicating that its noise level does not exceed a noise limit of $L_{A\ slow}$ 90 dBA ('noise limit') when tested in accordance with the noise test procedure.

The noise level for a racing vehicle is to be obtained at or before the first meeting of the season at which that racing vehicle is entered to race.

Vehicles that have been measured in accordance with accepted measurement procedures (Section 5.3) at another racing venue are deemed to have complied with the requirement for certification and testing for noise emissions providing the measurements have been conducted by a competent person.

If the exhaust system or engine of a racing vehicle is modified or replaced after the level of noise emitted by the vehicle had been measured, the occupier is to ensure that the level of noise emitted by the vehicle is measured again and the vehicle complies before the vehicle is raced at an event.

Certification is valid for 12 months only.

Information provided in the certificate shall include:

1. Engine and chassis identification number
2. Exhaust type
3. Owner of vehicle
4. Date and location of testing
5. Individual and average measured sound pressure level

5.3 Noise test procedure

5.3.1 Measuring individual racing vehicles

The level of noise emitted by a racing vehicle (the tested vehicle) is to be measured while the tested vehicle completes three consecutive laps of the venue within a period that is not greater than four times the average lap time record.

Average lap times are to be calculated during the previous racing season for races at the speedway in the class of racing vehicle to which the vehicle belongs.

1. The measurements shall be made at a point that is:

- Inside the inner boundary of the venue track in use by the vehicle racing
- Not less than 29 metres and not more than 31 metres from the inner boundary
- On, or as close as practicable to, the shorter axis of the track

2. With the measuring microphone not less than 1.2 m or more than 1.4 m above the ground plane.

5.3.2 Calculation of average noise level

The level of noise emitted by a racing vehicle is taken to be the level obtained by:

1. Adding together the maximum level of noise measured for the vehicle on each of the laps referred to in Section 5.3.1.
2. Dividing the total resulting from that addition by three

5.3.3 Instruments

Instruments used to measure noise emissions shall:

1. Be calibrated in accordance with and otherwise comply with Schedule 4 of the *Environmental Protection (Noise) Regulations 1997*
2. Be operated by a person who is approved by the CEO
3. Preferably be a Type 1, although Type 2 instruments are acceptable provided allowance is made for their measurement tolerances.
4. Copies of the calibration certificates must be provided to the CEO on request.

5.4 Responsibility for noise measurement and certification

The Venue Manager will ensure that only competent persons utilising equipment conforming to the requirements of Section 5.3.3 are engaged as required to assess compliance. Also, that all noise measurements, calculation, certification and testing requirements are met for venue events under the control of occupier to the requirements of the CEO.

5.5 Record of tests

The operator is to record all results from tests carried and retain those results in a form that shows (for each test):

1. Details of the racing vehicle tested, including engine and chassis identification number and exhaust type
2. The racing vehicle's owner
3. The date and location of the test
4. The calculated lap time
5. The actual time for the three laps of the test
6. The point of measurement
7. The measured noise levels
8. The signature of the noise test operator

Records of tests are to be provided to the CEO on request.

5.6 Scrutiny of racing vehicles

1. A Chief Steward shall be designated for the duration of a race meeting and practice session to verify noise certificates and to evaluate noise emissions from race vehicles.
2. The Chief Steward may reject a certificate and require a new test if not satisfied with the noise test on which the certificate is based or if he considers that a racing vehicle has been modified to the extent that the certificate is no longer representative of noise emission from the vehicle.
3. If a racing vehicle at the speedway emits a level of noise that is conspicuously louder than that of the other racing vehicles in the same class at the meeting, the Chief Steward may require that vehicle to immediately cease racing and may prevent that vehicle from further racing at the speedway until that vehicle's noise level has been shown to comply with the noise limit.

5.7 Public address system noise

The public address (PA) system consists of loudspeaker towers placed around the track, facing towards the track and angled down towards the track.

The loudspeakers are not to be moved or adjusted by any person without the approval of the Chief Steward.

Noise emissions from the public address system at the venue are to be under the control of the Chief Steward, who is to designate persons who are authorised to use the system.

The public address system controls are to be set to provide a suitable audience sound level during the preliminary meeting each year, with the assistance of such persons as the Chief Steward requires, ensuring the minimum practicable 'spill' of sound into nearby noise sensitive areas.

The public address cabinet is to be locked for access only by the Chief Steward and his authorised assistants at all other times.

The public address system will only be used during race meetings; it is not to be used during practice sessions or at any other time except in the case of an emergency.

5.8 Review of racing activities in response to noise complaint

If complaints are made during a racing activity the occupier will review racing activities to reduce noise where practicable for the remainder of that event.

5.9 Written instruction to members

The club management committee shall provide all club members with a written instruction explaining the noise issues and the members' responsibility to maintain the noise limitation requirements.

6. NOTICE OF RACING ACTIVITIES

Notice of the program for racing activities for a season is to be published and distributed to members of the public as follows:

1. The notice is to be published in the local newspaper, showing proposed dates of racing activities (where known) for the coming season and the telephone number for noise complaints.
2. In addition to (1), the notice is to be delivered to the address of each noise sensitive premises at locations within 5 km of the venue.
3. The notice is to be published and delivered during the month of the year in which the season starts.
4. A change to the racing program is to be published in the local newspaper and a notice provided in accordance with (2) above within four weeks before the changed meeting is to occur.
5. Notice of a special event approved by the CEO is to be given in accordance with the conditions of the approval.

7. COMPLAINT PROCEDURE

1. A designated telephone line will be manned during racing activities for the receipt of noise complaints.
2. A complaint received will be recorded on the noise complaint form.
3. All complaints will be treated with due consideration and investigated and responded to as appropriate.
4. The occupier will as far as practicable provide advice to the complainant within 48 hours as to the outcomes of the investigation and where appropriate, any proposed modifications to operations.
5. The results of complaint investigations, details of measures taken or considered to reduce noise emissions under Measure 5.5 and an outline of the responses given to the complainant shall be recorded on the noise complaint form.
6. Completed noise complaint forms will be retained at the motorsport park for the period of the approval and made available to the CEO on request.
7. Noise complaint details are to be provided to the City of Albany on the next business day following receipt of the complaint.

8. RECORDS

8.1 Record of vehicle tests

The occupier is to retain records of all tests of race vehicles under Measure 5.2 for a period of two years.

8.2 Record of loud racing vehicles

The occupier is to make a record of all racing vehicles that have been required to cease racing by the steward under Measure 5.4 (Item 3) and retain that record for two years in a form that shows:

1. Details of the racing vehicle required to cease racing.
2. The racing vehicle's owner.
3. The date and time at which the request to cease racing occurred.
4. The action taken by the driver of the racing vehicle following the request.
5. The action taken by the owner of the racing vehicle to remedy the excessive noise emissions.

8.3 Records to be forwarded on request

If requested to do so in writing by the CEO, the occupier is to forward a copy of all or any of the records made under Measure 8.2 within 21 days of the request.

9. RESPONSIBILITIES

Club Committee:	Appointment of Chief Steward
	Development of program for scheduled race meetings
Chief Steward:	Implementation of this Noise Management Plan
	Designation and training of stewards
	Control of public address system
Head Scrutineer:	Scrutiny of racing vehicles

GHD

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6137331-37108-94/
https://projects.ghd.com/oc/WesternAustralia1/albanymotorsportspar/Delivery/Documents/613733101-REP_Albany Motorsport Park_Noise Assessment_23Sept2020.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
Rev0	J Forrest	J Foley		J Foley		13/5/2019
Rev1	J Forrest	J Foley		J Foley		18/12/2019
Rev2	J Forrest	J Foley		J Foley		10/8/2020
Rev3	J Forrest	J Foley		J Foley		24/9/2020

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→ The Power of Commitment

Appendix H

Dust Management Plan

Albany Motorsport Park - Development Application

Dust Management Plan

City of Albany

27 July 2021

→ The Power of Commitment

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Perth, Western Australia 6000, Australia
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Last saved date	03 August 2021
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Author	James Forrest
Project manager	Vicki Davies
Client name	City of Albany
Project name	Albany Motorsport Park - Development Application
Document title	Albany Motorsport Park - Development Application | Dust Management Plan
Revision version	Rev 0
Project number	12546218

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
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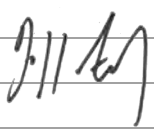
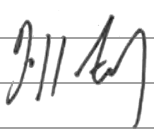
S3	B	J Forrest	V Davies		J Foley		29/06/2021
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Executive summary

The City of Albany (CoA) has engaged GHD Pty Ltd (GHD) to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure A.4.1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

At full development, the proposed AMP will consist of:

– Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[1] and Motorcycling Australia (MA) *Track Guidelines*[2].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
– A motocross circuit designed and constructed in association with MA guidelines.
– An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area.
– Associated buildings and infrastructure.

Due to the scale and nature of the proposed development, the construction works have been broken down into two key stages which comprise of the following:

– Stage 1(this Development Application):
  - Stage 1A: Construction of motocross track, 4WD driver training area, all-terrain vehicle (ATV) area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

The purpose of this Dust Management Plan (DMP) is to ensure that human health and amenity is not unacceptably impacted by dust emissions during site development and operation, by providing a framework for the management of dust associated with the proposed Albany Motorsport Park.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 1.4 and the assumptions and qualifications contained throughout the report.

[1] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[2] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

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Glossary of acronyms and terms

AMP	Albany Motorsport Park
AMV	Albany Motorsport Venues Inc.
ATV	All-terrain vehicle
CEO	Chief Executive Officer
CoA	City of Albany
DMP	Dust Management Plan
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
FIA	Fédération Internationalé de l'Automobile
FIM	Fédération Internationalé Motocyclisme
GHD	GHD Pty Ltd
GSMG	Great Southern Motorplex Group Inc.
TSP	Total suspended particulates
4WD	Four wheel drive

1. Introduction

1.1 Project description

The City of Albany (CoA) has engaged GHD Pty Ltd (GHD) to prepare an Application for Planning Approval for the staged construction of the Albany Motorsport Park (AMP) at Lot 5780 (No. 54) Down Road South, Drome (the Site) (Figure A.4.1, Appendix A). The project Proponent is the Great Southern Motorplex Group Inc. (GSMG).

At full development, the proposed AMP will consist of:

– Sealed, configurable multi-use track (3.5 km long × 12 m wide) for motor car racing, motorcycle racing, drifting, driver training and cycling:
  - Designed to comply with Motorsport Australia *Track Operator's Safety Guide*[3] and Motorcycling Australia (MA) *Track Guidelines*[4].
  - To be licensed by Motorsport Australia for Fédération Internationalé de l'Automobile (FIA) Grade 2 and Fédération Internationalé Motocyclisme (FIM) Grade B (i.e. up to second-tier international motor racing).
– A motocross circuit designed and constructed in association with MA guidelines.
– An off-road four wheel drive (4WD) and all-terrain vehicle (ATV) training area.
– Associated buildings and infrastructure.

Due to the scale and nature of the complex, the works have been broken down into two key stages which comprise of the following:

– Stage 1 (this Development Application):
  - Stage 1A: Construction of motocross track, 4WD driver training area, all-terrain vehicle (ATV) area and associated infrastructure.
  - Stage 1B: Construction of racetrack and associated infrastructure (subject to funding).
– Future Development: Construction and replacement of final permanent structures to support the function of the motorsports complex (subject to funding). Stage 2 will be addressed as a separate Development Application.

A Master Plan, which illustrates the various aspects of the Site and staging areas, has been developed by the GSMG and CoA to support the Development Application for the AMP (Figure A.4.2, Appendix A).

1.2 Purpose of this report

The purpose of this Dust Management Plan (DMP) is to ensure that human health and amenity is not unacceptably impacted by dust emissions during site development and operation, by providing a framework for the management of dust associated with the proposed Albany Motorsport Park at Lot 5780 Down Road South, Drome (the Site).

1.3 Scope of work

The following scope is considered suitable to meet this objective:

– Perform a risk assessment to determine the risk potential of the site
– Devise suitable dust management actions to minimise the escape of wind borne dust from the site
– Outline a monitoring program for monitoring dust levels at the site

[3] CAMS. (2012). *Track Operator's Safety Guide*. Malvern East: Confederation of Australian Motor Sports.
[4] MA. (2011). *Track Guidelines*. South Melbourne: Motorcycling Australia.

The management of dust emissions is governed by the *Environmental Protection Act (1986)*. A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities[5] provides requirements for the management of dust on development sites.

The scope outlined above shall be undertaken in accordance with this guidance.

1.4 Limitations

This report has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in Section 1.3 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

[5] Department of Environment and Conservation (DEC), 2011. *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*. March 2011.

2. Site characteristics

2.1 Existing site

Lot 5780 Down Road South, Drome is located approximately 20 km to the north of the Albany CBD and is 192.34 ha in size. The AMP comprises 141.7 ha (including 0.2 ha for crossovers) in the eastern portion of the Site. Two areas within Lot 5780 are excluded from the AMP development and include 49.47 ha at the western end of the Site which is covered with native vegetation and a dam area (1.37 ha) on the northern boundary which is subleased to Plantation Energy.

The site is zoned 'Special Use – SU26' under City of Albany Local Planning Scheme No. 1.

2.2 Surrounding land use

Surrounding land use is shown in Figure A.4.3, Appendix A and summarised below:

– North: The site is bound to the north by Down Road West. The land is zoned 'General industry' directly adjacent to Down Road West, where the Mirambeena Timber Processing Precinct is located. Beyond this the land is within the industrial buffer area (IA4BA) within approximately 1000 m of the site and then zoned 'Priority Agriculture' beyond.
– East: The site is bound to the east by Down Road South, with land within the industrial buffer area within approximately 500 m of the site and then zoned 'Priority Agriculture' beyond.
– South: The site is bound to the south by the land within the industrial buffer area within approximately 500 m of the site and then zoned 'Priority Agriculture' beyond.
– West: The site is bound to the south by the land within the industrial buffer area within approximately 500 m of the site and then zoned 'Priority Agriculture' beyond.

2.3 Sensitive receptors

A number of residential receptors were identified in proximity to the AMP, as listed in Table 2.1 and shown in Figure A.4.4, Appendix A.

Table 2.1 Sensitive receptor locations

ID	Location (MGA94)		Distance from nearest AMP boundary (m)	Worst case wind direction (°)
	Easting	Northing		
SR01	569713	6133385	1150	310
SR02	567355	6132573	1120	10
SR03	564483	6133265	1930	80
SR04	565029	6134675	1920	100

The AMP is also located within the 'General industry' buffer area surrounding the Mirambeena Timber Processing Precinct which lies to the north of the Site (Figure A.4.3, Appendix A).

2.4 Geology

Reference to the 1:50,000 Environmental Geology series map (Albany sheet) and the 1:250,000 Geological Series map (Mt Barker – Albany sheet) indicates the Site is underlain by Cainozoic sand of colluvial origin – "Qc: Colluvium – Sand, silt and clay" on the slopes and within the low lying areas of the Marbelup Brook "QA – Clay, silt, sand and gravel in watercourses"[6].

The sand is described as pale grey, fine to coarse, angular to sub-rounded quartz that is loose and moderately sorted and contains occasional pebbles of laterite. The thickness of the sand unit is not indicated on the maps, however the 1:250,000 map sheet indicates sand unit generally overlays laterite.

Site investigations were completed by Great Southern Geotechnics across the site in March 2021 to assess soil types and profiles. Eight test pits were completed, with soil types typically in agreement with DPIRD Soil Landscape Mapping. Gravels were identified on the western slope in the vicinity of the 4WD Driver Training and ATV Area, and deep sands present on the valley slopes and duplex soils in the valley floors.

2.5 Topography

The surface elevation of the Site ranges from approximately 41 m AHD to 73 m AHD. The lowest elevation is on the southern boundary and extends through the centre of the Site within a gully (a tributary to Marbelup Brook) that lies in a north-easterly direction. The highest elevation occurs on the eastern boundary of the Site[7].

2.6 Contamination level

2.6.1 Acid sulphate soils

A review of acid sulphate soils (ASS) risk mapping for the site was undertaken and is presented in Section 2.3.1.4 of the *Albany Motorsport Park – Development Application - Environmental Management Plan*.

As a result of the ASS investigation, the following management recommendations with regards to the proposed redevelopment are presented and have been considered as part of this DMP:

– Topsoil (0-300 mm) appears acceptable to be stripped and stockpiled for reuse without treatment.
– Neutralisation treatment and validation of soils ***will be required*** for silty sand soil units disturbed in the proximity of the watercourse area if the proposed disturbance of greater than 100 m^3 of soil.
– An ASS management plan is required to enable to the effective excavation, treatment and disposal/reuse of the materials during construction works.
– Soil excavations should only occur during the periods of the year where groundwater is at its lowest point (i.e. outside of winter and post-winter periods) to eliminate the need for temporarily lowering the groundwater table (dewatering). If dewatering is determined to be required, then site specific dewatering risk assessment, management strategies and criteria are required to be developed, approved and implemented.

2.6.2 Contaminated sites

A review of the DWER Contaminated Sites Database undertaken in August 2018 indicates there are no sites currently classified under the *Contaminated Sites Act 2003*, within 5 km of the Site (including the Site itself)[8].

Potentially contaminating activities undertaken within the Site, as observed during the site walkover, include the following:

– A portion of the Site is currently leased by Plantation Energy for the purpose of a retention dam however it is understood that no water is discharged from this dam onto the Site.

[6] Allen, A., & Sofoulis, J. (1984). 1:250,000 Geological Series Map, Mount Barker – Albany, WA Sheet SI 50-11 and part of Sheet SI 50-15. Perth: Government of Western Australia.
[7] GoWA. (2021). www.data.gov.wa.au. Retrieved from http://www.data.wa.gov.au
[8] DWER. (2018, July 30). *Contaminated Sites Database*. Retrieved from https://dow.maps.arcgis.com/apps/webappviewer/index.html?id=c2ecb74291ae4da2ac32c441819c6d47

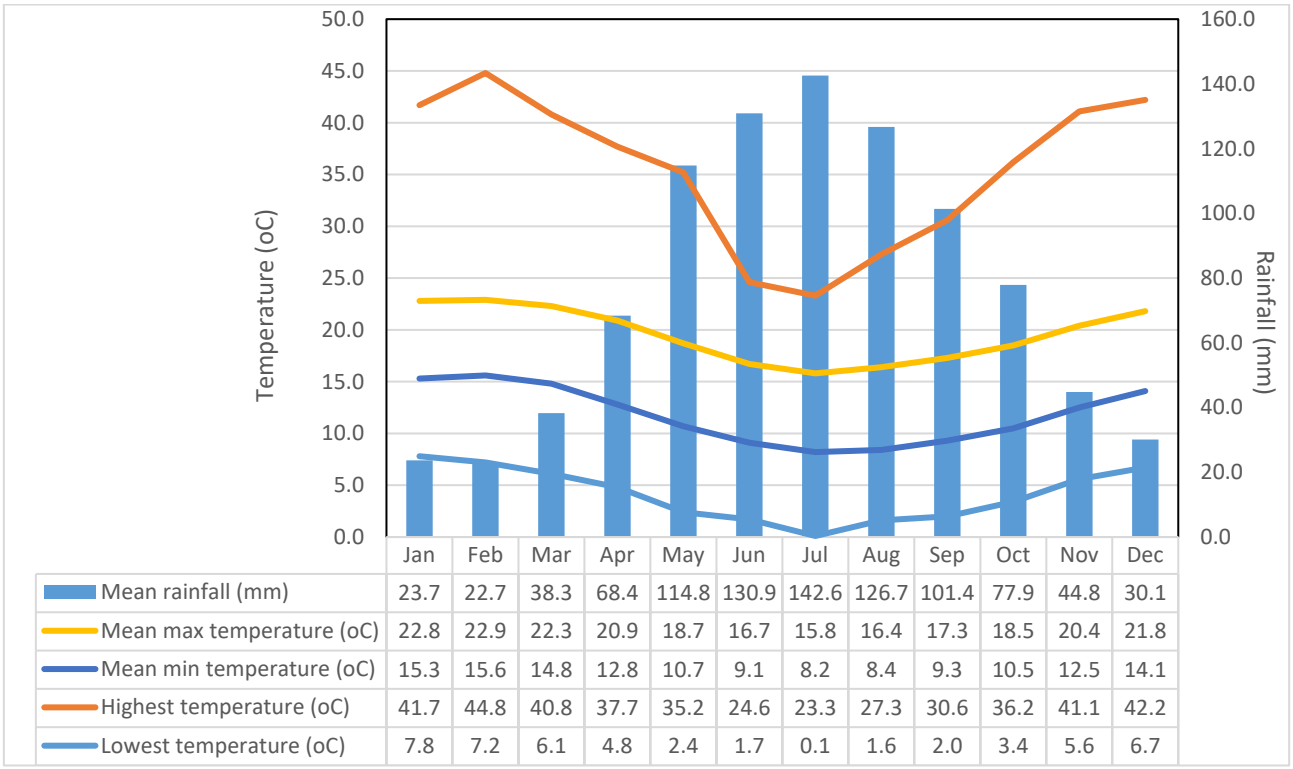
– Storage/ dumping of materials was noted during the site visit; this includes used chemical drums and equipment.
– Stockpiling of wood chips
– Dumping of waste materials such as building rubble and possibly a risk of asbestos containing materials in previously excavated areas within the Site.

It is understood that the Site will be cleaned up by City of Albany, prior to development commencing.

2.7 Climate

Albany is located on the south coast of Western Australia and the climate is broadly described as Mediterranean, with warm dry summers and mild wet winters. The nearest Bureau of Meteorology (BoM) official recording station is Albany (Station No. 9500). This station records temperature, rainfall, relative humidity, wind speed and direction and has data available dating back to 1877. Figure 2.1 illustrates recorded average monthly meteorological data for the Albany AWS BoM station for years 1877 to 2020[9].

Temperatures range from a mean maximum of 22.9 ºC in summer and drop to a mean maximum of 15.8 ºC in winter. Mean minimum temperatures follow a similar trend, reaching 15.6 ºC in summer and 8.2 ºC in winter. Rainfall is low throughout the summer months and peaks in July, with a monthly average of 142.6 mm. The mean annual rainfall is 925.2 mm, with approximately 103.1 rain days a year. Relative humidity at Albany reflects the Mediterranean climate, demonstrating drier summers and a comparatively high relative humidity of 82 percent in the morning in winter[9].



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean rainfall (mm)	23.7	22.7	38.3	68.4	114.8	130.9	142.6	126.7	101.4	77.9	44.8	30.1
Mean max temperature (oC)	22.8	22.9	22.3	20.9	18.7	16.7	15.8	16.4	17.3	18.5	20.4	21.8
Mean min temperature (oC)	15.3	15.6	14.8	12.8	10.7	9.1	8.2	8.4	9.3	10.5	12.5	14.1
Highest temperature (oC)	41.7	44.8	40.8	37.7	35.2	24.6	23.3	27.3	30.6	36.2	41.1	42.2
Lowest temperature (oC)	7.8	7.2	6.1	4.8	2.4	1.7	0.1	1.6	2.0	3.4	5.6	6.7

Figure 2.1 Mean rainfall and temperatures in the Albany region (Site No. 9500)

[9] BoM. (2020). *Climate statistics for Australian locations.* Retrieved from Bureau of Meteorology: http://www.bom.gov.au/climate/averages/tables/cw_009500_All.shtml

3. Proposed works and potential impacts

3.1 Proposed works and dust sources

3.1.1 Proposed works

As the proposed construction works are being determined in parallel with this DMP, it is noted that:

– Works for Stage 1A will commence in late 2021 / early 2022 and will be completed by April 2022.
– Commencement of works for Stage 1B is not determined but will not occur at the same time as Stage 1A. Commencement of Stage 1B would be between October and April to allow for optimum weather conditions for pavement laying.

Operational dust management will be a continuation of construction dust management, with permanent dust mitigation (i.e. access to water carts) in place where required.

3.1.2 Dust sources

Potential dust sources during construction activities are:

– Mechanical dust – dust generated from clearing, transport, stockpiling and levelling activities
– Wind generated dust – dust generated from wind erosion of stockpiles or cleared areas

Mechanical dust is a constant dust source during works at the site, whereas wind generated dust has the potential to range from negligible to high, depending upon weather conditions, the amount of the cleared area and management of the area.

During operation, dust sources are expected to be unsealed areas onsite (such as parking areas) and the motocross circuit.

3.2 Health and amenity impact of dust

Studies have demonstrated a relationship between exposure to particles below a diameter of PM_{10} and a range of health impacts including respiratory ailments. The majority of dust emissions associated with construction activities are expected to be the larger total suspended particulate (TSP) and are more closely linked to nuisance problems. These include reductions in amenity and decreased visibility for road traffic, which can cause unsafe driving conditions.

3.3 Site risk assessment

The proposed site development underwent a risk assessment process to determine the level of dust management required for a site generating uncontaminated dust. Table 3.1 shows the site risk assessment chart as provided in *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*[5], with an additional column providing justification for each risk potential ranking.

The overall risk potential of the site is **low risk**.

Table 3.1 Site risk assessment for activities generating uncontaminated dust

Item	Score options				Justification	Allocated score
Part A – Nature of site						
Nuisance potential of soil, when disturbed	Very low	Low	Medium	High	Medium to coarse grained sand	4
Topography and protection provided by undisturbed vegetation	Sheltered and screened	Medium screening	Little screening	Exposed and wind prone	Moderate exposed areas at any one time	12
Area of site disturbed by the works	Less than 1 ha	Between 1 and 5 ha	Between 5 and 10 ha	More than 10 ha	It is assumed that the site will be cleared and prepared in stages	9
Type of work being done	Roads or shallow trenches	Roads, drains and medium depth sewers	Roads, drains, sewers and partial earthworks	Bulk earthworks and deep trenches	Partial earthworks will be required for the motocross, with fill material needed for track construction. Fill material will likely be harvested from other areas of the site.	6
					Total score for Part A	**31**
Part B – Proximity of site to other land uses						
Distance of other land uses from site	More than 1 km	Between 1 km and 500 m	Between 100 m and 500 m	Less than 100 m	Existing closest sensitive receptors approximately 1100 m to the south and south-east and 1900 m to the west and north-west	1
Effect of prevailing wind direction (at time of construction) on other land uses	Not affected	Isolated land uses affected by one wind direction	Dense land uses affected by one wind direction	Dense/sensitive land uses highly affected by prevailing winds	Conservatively assessed as affected by one wind direction	6
					Total score for Part B	**7**
					Site classification score (A x B)	**217**

As outlined in the *A guideline for managing the impacts of dust and associated contaminants from land development sites, contaminated sites remediation and other related activities*[5], the following minimum dust control measures, contingency actions and monitoring requirements are required for this site with a low dust risk potential:

Provisions

– The developer shall supply a contingency plan to the local government, which shall detail the activities to be undertaken should dust impacts occur.

Contingency measures

– Include an allowance for water cart operation, wind fencing and surface stabilisation during the construction period for the purposes of dust suppression.
– All areas of disturbed land should be stabilised to ensure that the disturbed area exposed at any time is kept to a practical minimum.
– The 4WD training area will not be stabilised; a water cart will be available onsite for dust mitigation when required.

Monitoring requirements

– Complaints management system in place (complaints recorded and acted on promptly).
– Notice to be erected at the site, providing contact details of the person to be contacted and a program of works.

Each of the above are detailed further in the following sections.

4. Dust management and monitoring strategy

4.1 Dust management actions

Strategies regarding the management of dust are focused on reducing dust generation and avoiding potential impacts in nearby areas. The actions required to manage dust emissions are summarised in Table 4.1.

Table 4.1 Dust management actions

Action	Responsibility
Construction	
The extent of disturbed surfaces will be kept to the minimum possible by: – Only clearing where required for construction operation – Conducting vegetation clearing, levelling and rehabilitation in stages when required – Clearly marking or fencing off any natural vegetation not to be cleared to prevent accidental clearing – Revegetating exposed soil as soon as practicable according to the Landscape Plan	Foreman / Site Manager
Time the works to minimise dust emissions by: – If possible, scheduling major works that produce high levels of dust outside of the dust season (dust season is October to March) – Monitoring wind and weather forecasts and delaying dust generating activities when conditions are unfavourable	Foreman / Site Manager
Maintaining natural wind and dust barriers by avoiding the removal of tree/vegetation shelter belts alongside boundaries whilst major clearing works are underway at the site	Foreman / Site Manager
Managing earth moving activities by: – Not clearing areas unless they are able to be levelled and stabilised immediately – Observing weather conditions and not commencing or continuing works during unsuitable conditions	Foreman / Site Manager
Managing stockpiles by locating stockpiles in sheltered areas and cover when they are to be left for longer than 24 hours	Foreman / Site Manager
Apply water/dust suppressant to: – Exposed areas when strong winds are expected – Areas scheduled for disturbance	Foreman / Site Manager
Maintaining dust management should be undertaken by: – Nominating one person to be responsible for dust management at the site – Educating all site workers on how dust is generated and methods of reducing dust generation	Foreman / Site Manager
Operational	
Monitoring site dust generation by visual observation, and where required, applying suitable mitigation	Venue Manager
Water cart available to apply water to open areas (4WD training area, car parks, etc.) when strong winds are expected or during periods of high dust generation	Venue Manager
Sprinklers available to apply water to motocross track when strong winds are expected or during periods of high dust generation	Venue Manager

4.2 Dust monitoring

The site risk assessment (Section 3.3) has classified the site as a low risk, indicating that a dust monitoring program is not considered necessary. The following provisions have been outlined for when earthworks are taking place in closer proximity to the existing industrial facilities, to the north of the site.

Dust monitoring is not considered to be required during operation of the AMP. Visual observation for excessive dust should be maintained by site staff and reported to the Venue Manager, as required.

The monitoring program for dust will inform site management such that management actions are sufficient to achieve environmental objectives. Responsibility for construction-phase monitoring will largely be assigned to the Foreman / Site Manager. They will be responsible for the implementation of management actions on a daily basis based on the dust management strategy. However, all staff and sub-contractors will have some responsibility for the management of dust generation onsite.

4.2.1 Onsite dust monitoring

Onsite dust monitoring during construction is intended to indicate where corrective action is required immediately. Monitoring is over a short averaging period such as 15 minutes and when a trigger level is exceeded, work stoppages and corrective dust management is undertaken. This monitoring is intended to identify and prevent any potential offsite dust exceedances caused by the site.

Performance criteria

Measurements taken onsite should be for TSP over a 15-minute averaging period. The site should aim to keep dust emissions to below 500 µg/m^3 TSP when measured at the closest site boundary.

A portable dust monitor (DustTrak™, or similar) will be used to measure dust concentrations. The dust monitor should be placed within the site boundary, downwind of any works that are taking place.

During times where work has stopped due to windy conditions, the monitor should be placed on the downwind boundary of the site to ensure there is no major dust lift off from cleared areas.

4.3 Reporting

Records should be kept of all onsite dust measurements, and a summary of these measurements provided to the relevant regulatory authority at the completion of the project.

Where an exceedance has occurred, the relevant authority should be contacted within 24-hours and a letter explaining the exceedance level, the resulting investigation and actions undertaken to resolve issues should be provided within seven days of the incident.

4.4 Signage and complaints register

4.4.1 Signage

A notice should be placed at the entrance to the site to provide contact details of a suitable site representative to receive complaints or answer queries in regard to activities at the site.

4.4.2 Complaints register

A complaints management system should be in place to record complaints and act promptly in resolving them. All complaints shall be logged, investigated and the outcome of the investigation recorded. All logs should be made to relevant authorities upon request. Appendix B includes the sample complaint form.

4.5 Stakeholder consultation

Residents and businesses occupying locations near to the development site will be notified of the likely timing and potential effects of construction activities taking place onsite. These residents shall also be provided with a contact number in case of issues.

4.6 Dust management contingency

It is possible that dust emissions may be generated from the site in windy conditions. In order to ensure that dust emissions do not cause unacceptable impacts, contingency actions (Table 4.2) will be enacted in the event that monitoring indicates that environmental objectives will not be achieved.

Table 4.2 Dust management contingency actions

Trigger	Action	Responsibility
No trigger required, to be available at all times	Make a water cart available at site in case contingency actions are required.	Foreman / Site Manager
Visible dust plumes are seen moving towards sensitive receptors	– Wind barriers shall be erected or all dust generating works shall cease.	Foreman / Site Manager
Performance criteria exceeded	– Work stoppage to identify cause of dust, and if dust is thought to be from the site, take immediate action to eliminate or reduce magnitude of dust generation using dust suppression. – Should these techniques be inadequate, activities will be modified to minimise dust generation. – Review dust management strategy and inform staff/contractors of any changes in procedures to prevent reoccurrence.	Foreman / Site Manager
Complaints received regarding dust levels	– Respond to complainant – Identify cause of complaint – Implement mitigation measures – Review dust management strategy and inform staff/contractors of any changes to prevent reoccurrence – Record complaint, outcomes of investigation and mitigation measures that were applied.	Foreman / Site Manager

Appendices

Appendix A

Figures

Figure A.4.1 *Project site location*

Figure A.4.2 *Master plan*

Figure A.4.3 *City of Albany Local Planning Scheme*

Figure A.4.4 *Sensitive receptor locations*

Redmond - Hay River Rd
Phillips Rd
Pikes Rd
REDMOND
Hazzard Rd
Down Rd
Marbelup Rd
Down West Rd
Albany Hwy
Down South Rd
DROME
Cochrane Rd
Hunwick Rd
Gunn Rd
TORBAY
Corio Rd
Boccomazzo Rd
Sandberg Rd
Ding Rd

LEGEND
- Road
- Albany Motorsport Park
- Lot 5780 Down Road South
- Cadastre

SLIP

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. 6137331
Revision No. 0
Date 22/07/2021

FIGURE **A.4.1**

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

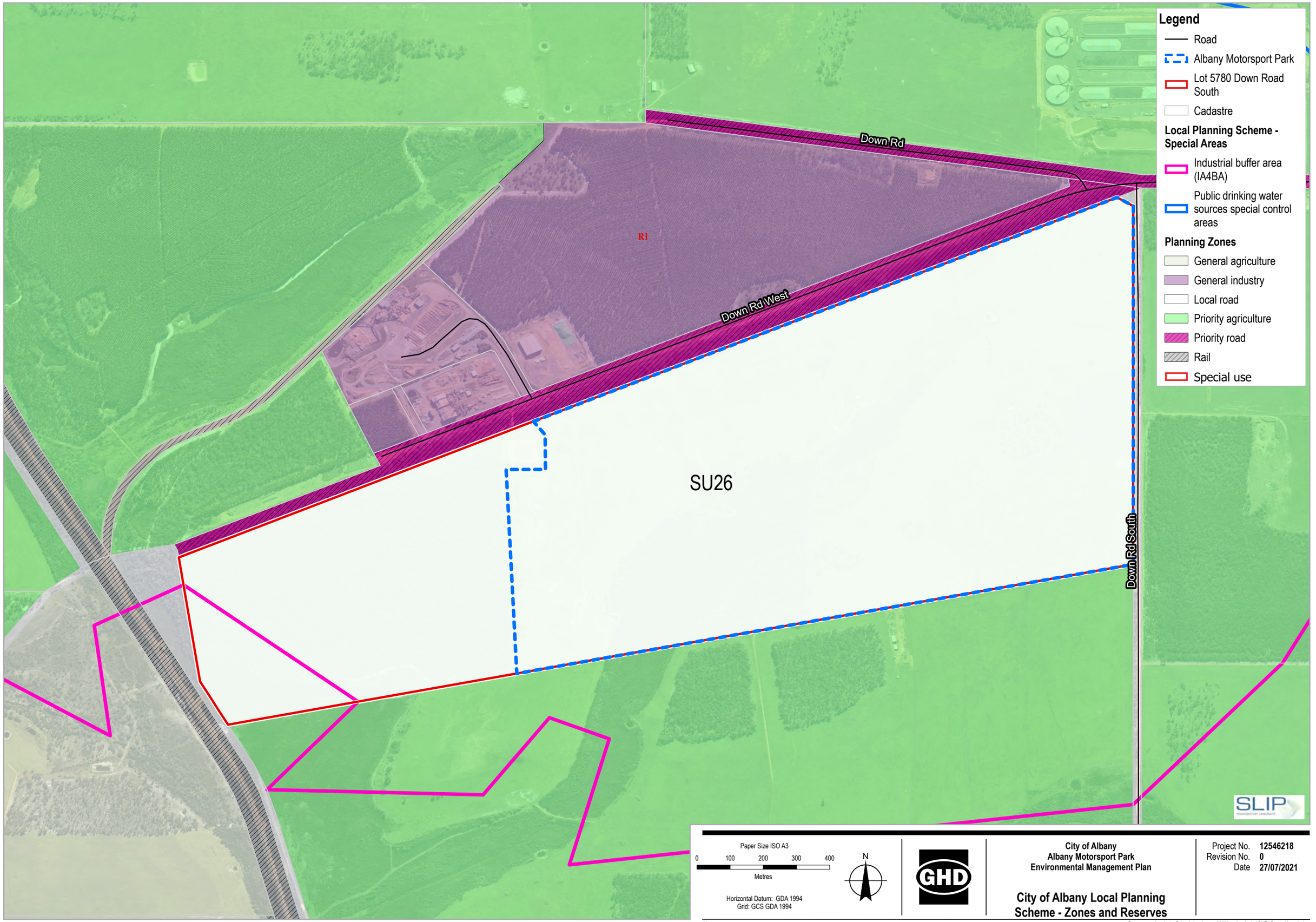
project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E



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Grid: GCS GDA 1994

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City of Albany
Albany Motorsport Park
Environmental Management Plan

City of Albany Local Planning Scheme - Zones and Reserves

Project No. **12546218**
Revision No. **0**
Date **27/07/2021**

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Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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City of Albany
Albany Motorsport Park
Environmental Management Plan

Sensitive Receptor Locations

Project No. **12546218**
Revision No. **0**
Date **21/07/2021**

FIGURE A.4.4

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Data source: Landgate_Subscription_Imagery\WANow: Landgate / SLIP GHD: Sensitive Receptors - 20210505. Created by: vdavies

Appendix B

Sample complaint form

Date: Date on which the complaint was received	Time: Time the complaint was received	Received by: Name of the person receiving the complaint
Name: Name of the person making the complaint Address: Address of the person making the complaint Phone: Telephone number of the person making the complaint		
Municipality: Name of the local government where the site is located		
Complaint details (effect/frequency)		
Referred to: Name of local government Environmental Health Officer, DOH or DEC officer if this complaint has been referred. Date: Date of referral to local government officer, DOH or DEC officer		
Possible causes and actions taken: Actions taken to eliminate pollution		
Recorded by: Name of the person completing the form Date: Date on which the form was completed		

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→ The Power of Commitment

Appendix I

Decommissioning Plan

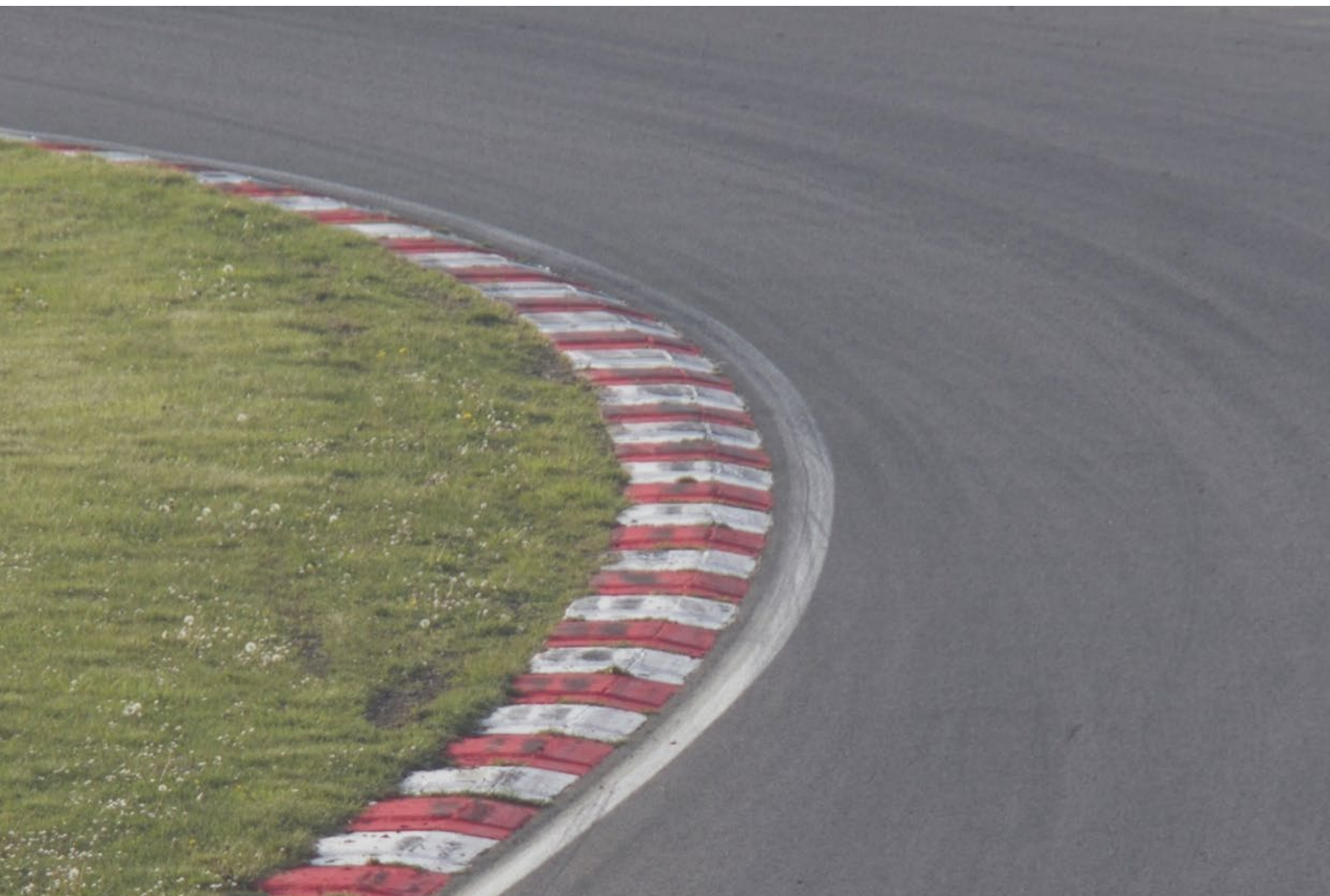
Albany Motorsport Park – Development Application

Decommissioning Plan

City of Albany

27 July 2021

→ The Power of Commitment



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Last saved date	27 July 2021
File name	https://projectsportal.ghd.com/sites/pp18_05/albanymotorsportpark/ProjectDocs/Environmental Management Plan/12546218-REP-0_Albany Motorsport Park Decommissioning Plan.docx
Author	Vicki Davies
Project manager	Vicki Davies
Client name	City of Albany
Project name	Albany Motorsport Park - Development Application
Document title	Albany Motorsport Park – Development Application | Decommissioning Plan
Revision version	Rev 0
Project number	12546218

Document status

Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	V. Davies	A. Rafty/ E. Heymann		J. Foley		18/05/21
S4	0	V. Davies	A. Rafty/ E. Heymann		J. Foley		

Executive summary

The purpose of this decommissioning plan is to describe the decommissioning and rehabilitation objectives, broad strategies and actions that would be required to ensure the land is left in a condition that is suitable and capable of accommodating agricultural land use, should the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A) cease operations. The strategies outlined are designed to ensure the Site could return to pre-existing environmental conditions, as near as practical, while minimising potential erosion and dust emissions prior to any future redevelopment.

This Decommissioning Plan is appended to the overarching Environmental Management Plan (EMP) which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

The objectives for decommissioning of the Site would be to:

– Ensure that all infrastructure is removed from Site and the AMP area is rehabilitated to a stable and self-sustaining environment as close to the original landscape, as far as practicable
– Meet all relevant guidelines, approvals and regulatory requirements
– Ensure that, as far as practicable, the needs of stakeholders are met
– The Site will not be the cause of any environmental or public safety liability
– Future land use of the Site is not restricted.

The proponent will relinquish lease of the Site to the City of Albany (owner).

If the Site is not appropriately decommissioned and rehabilitated, or there is insufficient allocation of funds/ resources for decommissioning and rehabilitation, the following potential impacts/ risks may occur:

– Failure to achieve zero-energy status prior to the commencement of demolition activities
– Presence of unknown buried services
– Contamination of surrounding soil, groundwater, and surface water
– On-site waste category segregation to avoid cross-contamination not practised
– Water and wind erosion, and associated impacts on neighbours
– Dust generation during demolition and rehabilitation activities
– Introduction and/ or spread of weeds
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Loss of socio-economic benefits
– Community and stakeholder dissatisfaction.

Overall, decommissioning and rehabilitation objectives and strategies developed for the Site are expected to be adequate to address potential impacts and risks.

This preliminary decommissioning plan is considered a ‘live’ document and will be reviewed and updated prior to decommissioning and rehabilitation. Therefore, it is possible the rehabilitation strategies may be amended and set out in more detail in the future. These changes would occur to address circumstances at the time of the decommissioning and rehabilitation periods.

If the AMP ceases operations it is the responsibility of the City of Albany and Albany Motorsport Venue Incorporated (AMV Inc) to implement this Decommissioning Plan.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.5 and the assumptions and qualifications contained throughout the Report.

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1.3 Legislation and guidelines 1
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Figure 2 City of Albany Local Planning Scheme

Appendices

Appendix A Figures

1. Introduction

1.1 Purpose of this report

The purpose of this decommissioning plan is to describe the decommissioning and rehabilitation objectives, broad strategies and actions that would be required to ensure the land is left in a condition that is suitable and capable of accommodating agricultural land use, should the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (the Site) (Figure 1, Appendix A) cease operations. The strategies outlined are designed to ensure the Site could return to pre-existing environmental conditions, as near as practical, while minimising potential erosion and dust emissions prior to any future redevelopment.

This Decommissioning Plan is appended to the overarching EMP which has been developed for operation and construction works associated with Stage 1A and 1B of the proposed AMP development.

As the Site has recently been re-zoned from 'Priority Agriculture' to 'Special Use' the existing land use is pasture for cattle grazing. The Site is adjacent to land zoned as General Industry (Figure 2, Appendix A). It is anticipated that, if the AMP was to be decommissioned, the final land use for the Site would be suitable for agriculture i.e. pasture paddock.

A detailed decommissioning plan will be developed at least two years prior to closure. The plan will detail how AMP's infrastructure will be decommissioned, resale or repurposing of any infrastructure with value, disposal of hazardous waste, remediation of contaminated sites. High-level requirements to be addressed in detail in the decommissioning plan are discussed below.

Prior to decommissioning and rehabilitation activities occurring on site, all relevant approvals for Site decommissioning and rehabilitation will need to be obtained.

1.2 Objectives

The objectives for decommissioning of the Site would be to:

– Ensure that all infrastructure is removed from Site and the AMP area is rehabilitated to a stable and self-sustaining environment as close to the original landscape, as far as practicable
– Meet all relevant guidelines, approvals and regulatory requirements
– Ensure that, as far as practicable, the needs of stakeholders are met
– The Site will not be the cause of any environmental or public safety liability
– Future land use of the Site is not restricted.

The proponent will relinquish lease of the Site to the City of Albany (owner).

1.3 Legislation and guidelines

Legislation and guidelines associated with decommissioning activities includes, but may not be limited to the following:

– *Contaminated Sites Act 2003*
– *Dangerous Goods Safety Act 2004*
– *Environmental Protection Act 1986*
– *Environmental Protection Regulations 1987.*

1.4 Stakeholder consultation

Stakeholder engagement is considered integral to effective decommissioning and rehabilitation planning and will be undertaken during the life of the AMP. Targeted consultation regarding site decommissioning and rehabilitation will be conducted at key junctures during AMP construction and operation, notably prior to decommissioning and rehabilitation activities commencing within the Site.

The stakeholder consultation program will be required to:

– Make stakeholders aware of relevant information regarding planning, construction and operations
– Identify and record any stakeholder concerns, issues and recommendations
– Address identified issues and incorporate feedback into planning where practicable
– Maintain an open and ongoing dialogue.

Identified relevant stakeholders include, but not limited, to:

– City of Albany
– AMV Inc
– Adjacent land holders
– Department of Water and Environmental Regulation (DWER)
– Department of Planning, Lands and Heritage (DPLH)
– Main Roads WA
– Western Power
– Water Corporation.

As the decommissioning plan matures, stakeholder input will be used to refine and if necessary, revise decommissioning and rehabilitation planning as appropriate.

1.5 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Potential environmental impacts

If the Site is not appropriately decommissioned and rehabilitated, or there is insufficient allocation of funds/ resources for decommissioning and rehabilitation, the following potential impacts/ risks may occur:

– Failure to achieve zero-energy status prior to the commencement of demolition activities
– Presence of unknown buried services
– Contamination of surrounding soil, groundwater, and surface water
– On-site waste category segregation to avoid cross-contamination not practised
– Water and wind erosion, and associated impacts on neighbours
– Dust generation during demolition and rehabilitation activities
– Introduction and/or spread of weeds
– Reduction in biodiversity value due to inability to replace lost habitat and communities
– Poor visual amenity and landscape value
– Loss of socio-economic benefits
– Community and stakeholder dissatisfaction.

Overall, decommissioning and rehabilitation objectives and strategies developed for the Site are expected to be adequate to address potential impacts and risks.

This preliminary decommissioning plan is considered a ‘live’ document and will be reviewed and updated prior to decommissioning and rehabilitation. Therefore, it is possible the rehabilitation strategies may be amended and set out in more detail in the future. These changes would occur to address circumstances at the time of the decommissioning and rehabilitation periods.

3. Management strategies, actions and timeframes

3.1 Decommissioning and demolition sequencing

An infrastructure inventory will be prepared to identify and list all assets including building, tracks (sealed and unsealed) and other associated AMP infrastructure. The infrastructure inventory will include the quantities of all AMP infrastructure. Location plans will be developed to identify the assets and work scopes will be developed for decommissioning and demolition activities with associated cost estimates.

An initial review of major laydown areas for material and equipment storage will be conducted to assess the requirements for material sorting, processing and disposal. The proposed approach to decommissioning and demolition for all buildings and infrastructure will follow a specific sequence of events. This will involve the deployment of specialised teams equipped with appropriate demolition and processing equipment to isolate, confirm a zero-energy state, structurally demolish, remove foundations, process waste streams and grade the site to a self-draining condition for future revegetation. Consideration must also be given to site services that will be impacted during the decommissioning and demolition. Specific tasks will include:

- Delineation of specific work areas (e.g. fencing) to provide a working environment delineated from the other site activities
- Removal of dangerous goods and flammable liquids (fuels, greases and oils) which may be used for other purposes, resold back to the provider or disposed at licensed waste facilities
- Removal of salvageable materials
- Removal of other contents that could be reused or sold
- Ensuring each area is in a zero-energy condition through positioning equipment in a zero potential energy state, electrical service isolation and air-gapping of in-feed conductors at transformers, switch gear and/or pull boxes outboard of the work scope
- Cutting and capping of water services and onsite wastewater storage tanks
- Isolation of stormwater management infrastructure around the project/work scope
- Removal/ isolation of communications networks
- Removal of inert interior contents from buildings prior to demolition without damaging or disturbing potential asbestos containing materials (if applicable) or other designated substances identified
- Removal of all hazardous materials once inert materials have been removed
- Executing structural demolition of buildings and structures using cranes or excavators
- Removal/ demolition of slabs, foundations, tracks (sealed and unsealed) to a depth of 500 mm to allow for backfilling and grading of the site to a self-draining condition to minimise the risk of long-term ponding and compaction post-closure.
- Final clean-up by removal of any debris before revegetation commences
- Amelioration of dust generation during demolition and rehabilitation activities.

3.2 Decommissioning

In the event that the Site is not required for the intended AMP purposes, decommissioning activities will commence. If the AMP ceases operations it is the responsibility of the City of Albany and Albany Motorsport Venue Incorporated (AMV Inc) to implement this Decommissioning Plan.

3.2.1 Waste Management, disposal and transport

A waste management, disposal and transport strategy will be prepared to account for the waste resulting from the demolition of infrastructure associated with the AMP closure. Waste streams will be segregated at the site of each demolition to facilitate management and/or disposal. All waste categories that have been deemed not feasible to recycle shall be disposed of as non-recyclable wastes.

It is anticipated that all categories of waste are likely to be generated throughout the demolition of the AMP. It is also anticipated that waste transportation and segregation shall occur throughout this work and that stockpiling of waste will be temporary and minimised. The sequencing of the demolition activities and handling of resultant waste materials will be carefully planned to maximise productivity and minimise overall costs.

3.2.2 Hazardous materials assessment

A hazardous materials (HAZMAT) assessment will be conducted at decommissioning to determine if there are any hazardous materials such as lead paint, poly-chlorinated biphenyls, ozone depleting substances, radioactive components within smoke alarms, used transformers and asbestos. If required a HAZMAT register will be prepared to confirm location and volumes of hazardous materials to confirm suitability of proposed demolition methodologies and waste strategies.

3.2.3 Contaminated areas

It is anticipated that construction and operation of the AMP will present a low risk of contamination. Possible contamination of land can result from handling, storage and transfer of oil, fuel and chemicals during construction and operation of the AMP. Following removal of infrastructure and materials from Site, experienced and qualified personnel will evaluate the area for the potential risk of contamination within the area.

Where contamination or potential contamination of land is thought to have occurred, a site contamination assessment of the land will be conducted following DWER guidelines to identify, characterise and delineate contamination in soil and groundwater associated with areas of environmental concern. The assessment will determine the risk to human health and the environment, detailing remediation requirements. Results of the assessment will be detailed in a report and distributed to relevant stakeholders prior to further rehabilitation activities occurring on the Site.

3.2.4 Demolition

Connections to services such as water, power and wastewater shall be disconnected by appropriately qualified and experienced personnel prior to removal of infrastructure occurring.

All buildings, servicing infrastructure, roads, concrete and fences will be removed from Site by competent personnel. The decommissioning approach is to follow the waste hierarchy, with a priority to deconstruct and reuse as much of the AMP infrastructure and materials as possible and recycle the remainder.

To prevent the introduction and spread of weed species throughout the Site and surrounding environment, all earthmoving machinery entering and leaving Site will be inspected by a competent person to ensure no visible signs of soil and vegetation.

3.3 Rehabilitation

Site rehabilitation aims to restore all disturbed areas caused through the construction and operation of the AMP, leaving a safe, stable and self-sustaining environment that reflects the surrounding landscape. This section of the plan outlines the rehabilitation methodology to be implemented.

3.3.1 Environmental setting

Non-native vegetation species present a risk to the surrounding areas of native vegetation and agricultural properties, therefore all non-native species, with the exclusion of turf, shall be removed from Site. Weed species will be removed and disposed of at a licensed waste facility. Native vegetation remaining with the Site shall not be disturbed.

Any fill/ soil transported to the Site during construction and operation of the AMP is either reused in the process of re-shaping the final, agreed upon, landforms or removed from site. Underground voids or excavations are required to be backfilled with appropriate material to surface level. Fill material will be appropriately compacted to prevent slumping in the future. Any fill material brought to the Site during the decommissioning and rehabilitation phases will be free of weeds, including seeds.

Dust emissions may occur at any point where soil, fill, earthen material or similar are removed, disturbed, traversed or exposed to windy conditions. Every reasonable effort will be made to mitigate the impact of dust emission during decommissioning and rehabilitation activities. Such measures may include dust suppression with water trucks or similar equipment.

The AMP drainage network will remain in place. There should be no requirement for ongoing maintenance and management of the drainage network system following site rehabilitation.

3.3.2 Re-shaping

Any areas of land within the Site that have been significantly altered from the existing topography will be reshaped to appropriately designed and approved landforms. Once infrastructure is removed from Site, strategic surface water management strategies must be implemented to ensure erosion is minimised and the landscape is stable. Works will include re-contouring of the land to facilitate water movement throughout the Site, allowing the area to be free draining of stormwater, minimise erosion scouring and prevent ponding. Drainage will continue to be directed off site as per existing contours.

3.3.3 Ripping

Deep ripping will alleviate soil compaction, providing loose soil surfaces for the establishment of plant germination and growth. Ripping will also allow for aeration of soil and reduce runoff and the risk of erosion. Deep ripping, approximately 1 m in depth, is required on soils that have been compacted during construction and operation of the AMP.

The remaining areas onsite will be shallow ripped prior to application of soil stabilisation product and topsoil. Shallow rip to a depth of 30 to 50 cm shall be applied throughout the area. Rip lines will follow natural contours to reduce peak water flow while maintaining soil structure and preventing potential erosion.

3.3.4 Soil stabilisation

Appropriate erosion and dust control measures should be employed to protect exposed soils and minimise erosion. A suitable soil stabilisation product is required at a depth suitable to improve stabilisation, permeability and strength of soils.

The type and amount of soil stabilisation product to be applied to the Site will be determined prior to decommissioning and rehabilitation and included in the updated decommissioning plan.

3.3.5 Topsoil, weed control and seeding

Retain areas of existing native vegetation in the Protected Exclusion Area and western portion of Lot 5780.

Grassed (pasture) vegetation cover shall be re-established, through the use of seeding, as soon as possible after site preparation activities to ensure successful rehabilitation.

Any stockpiled topsoil, previously stripped from the AMP Site, shall be re-spread over the Site to an approximate depth of 100 mm. Any areas of land within the Site that have had topsoil removed shall have a layer of topsoil applied. Where topsoil is in deficit, alternative material may be used.

Some topsoil can be detrimental to rehabilitation due to the presence of weeds. A visual assessment by a competent person will be undertaken prior to topsoil application. Topsoil containing weeds are to undergo appropriate weed management practices such as mechanical removal and/or the application of approved herbicides. A further assessment post weed management practices will determine the effectiveness of weed control and whether to use the topsoil for rehabilitation purposes.

Following completion of rehabilitation, areas will be adequately signed and isolated from vehicle access until pasture grass has established.

4. Monitoring

Monitoring of the Site will assist in deciding whether the rehabilitation strategies are working and if the decommissioning plan objectives have been met. Land rehabilitation performance will be monitored on an annual basis, to ensure vegetation is establishing to an acceptable level and the landform is in a stable condition, to the satisfaction of the City of Albany. The monitoring frequency will depend on the developmental progress of the rehabilitation and will likely become less frequent following establishment of ground cover and safe and stable landforms.

Monitoring will be based on the Site's characteristics and the adjacent landscapes. Annual monitoring will determine the need for any maintenance and or contingency measures. The maintenance of rehabilitation will include:

– Early rectification of any erosion occurrences
– Application of weed control when required.

In disturbed areas which become dominated by weed species not previously evident in the surrounding area, weed control will be undertaken but should ensure that soil stability is maintained.

Annual rehabilitation monitoring reports will present results and interpretation of site rehabilitation performance. The reports will be made available to relevant stakeholders annually.

The Site will be relinquished to the City of Albany once the Site has been rehabilitated to their satisfaction.

5. Review

This preliminary Decommissioning Plan will be reviewed and updated prior to decommissioning and rehabilitation activities and/ or in the case of significant changes within the Site. The review will include an assessment of the effectiveness of rehabilitation strategies and performance against the plan's objectives.

Reviewing and/or updating the plan prior to decommissioning and rehabilitation activities will include the following tasks:

– Consultation to confirm post-closure land use objectives
– Establish responsibilities and timing for the decommissioning and rehabilitation phases
– Revise all parts of the Site decommissioning plan and update, incorporating stakeholder feedback, to develop final rehabilitation and decommissioning plan.

Circulate updated decommissioning plan to all relevant stakeholders and authorities.

Appendix A

Figures

Figure 1 *Project site location*

Figure 2 *City of Albany Local Planning Scheme*

Paper Size ISO A3

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Kilometres

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Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. **6137331**
Revision No. **0**
Date **22/07/2021**

FIGURE 1

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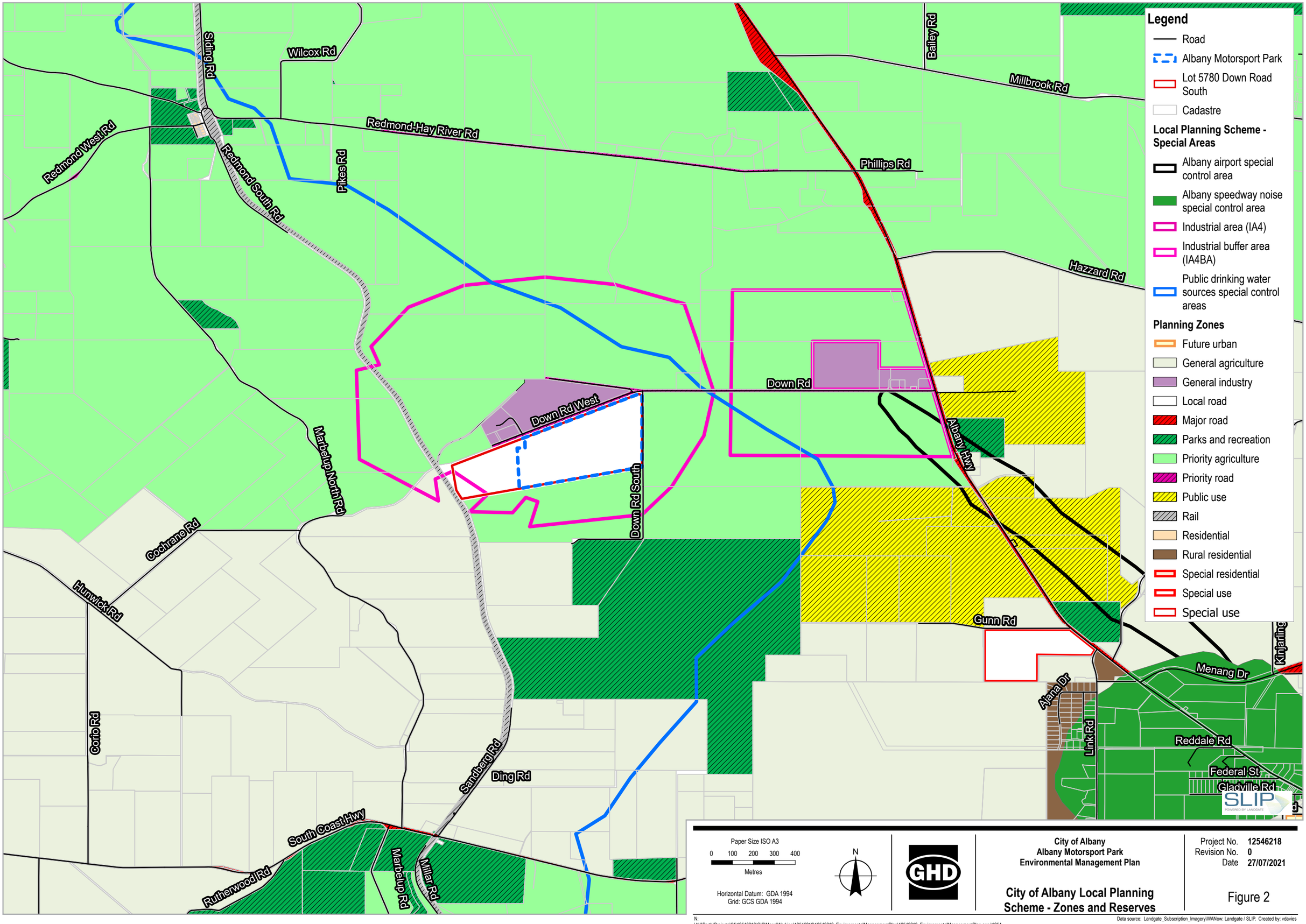

Paper Size ISO A3

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Metres

Horizontal Datum: GDA 1994
Grid: GCS GDA 1994

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GHD

City of Albany
Albany Motorsport Park
Environmental Management Plan

City of Albany Local Planning Scheme - Zones and Reserves

Project No. **12546218**
Revision No. **0**
Date **27/07/2021**

Figure 2

N:
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Print date: 27 Jul 2021 - 14:56

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→ The Power of Commitment

Appendix J

Construction Management Plan

Albany Motorsport Park – Development Application

Construction Management Plan

City of Albany

27 July 2021

→ The Power of Commitment

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Author	Vicki Davies
Project manager	Vicki Davies
Client name	City of Albany
Project name	Albany Motorsport Park - Development Application
Document title	Albany Motorsport Park – Development Application | Construction Management Plan
Revision version	Rev 0
Project number	12546218

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Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
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S4	0	V. Davies	A. Rafty	pp	J. Foley	Jeff Foley 2021.07.29 16:16:13 +08'00'	

Executive summary

The purpose of this Construction Management Plan is to outline objectives, broad strategies and actions required to minimise environmental impacts associated with construction of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (Figure 1, Appendix A).

This Construction Management Plan is appended to the overarching Environmental Management Plan (EMP) which has been developed for construction works associated with Stage 1A and 1B of the proposed AMP development.

This Construction Management Plan applies to the City of Albany (CoA), Great Southern Motorplex Group (GSMG) and all appointed contractors during the construction of the AMP.

It is recommended that a site-specific Construction Environmental Management Plan (CEMP) is developed by the appointed contractor. The CEMP will expand on the outlined management measures and identify measures for the works to comply with environmental laws and regulations.

The main objectives of this construction management plan, for Stage 1A and 1B of the AMP, include the following:

– Comply with all environmental legislation, statutory and development approval obligations
– Minimise environmental impact on ecological values within the Protected Exclusion Area
– Minimise offsite environmental and social impacts as a result of construction of the AMP.

Construction of the AMP has the potential to result in the following:

– Impacts on native vegetation communities and flora due to changes in surface hydrology, hydrogeological changes, erosion or sedimentation
– Impacts on native vegetation communities and flora due to “dust smothering” leading to decreased photosynthetic capacity
– Impact of native vegetation communities due to spread of *Phytophthora* dieback and weeds
– Disturbance of fauna from construction related noise, dust and uncontrolled fires
– Loss of fauna due to vehicle strike
– Impact on surface water quality including the Conservation Category Wetland (CCW) Marbelup Flats (which ultimately leads to the Marbelup Brook) located within the Protected Exclusion Area
– Impact on groundwater quality in a Priority 2 Public Drinking Water Source Area (PDWSA) – Marbelup Brook Catchment Area
– Visual impact.

It is the responsibility of CoA to implement this Construction Management Plan during construction of the AMP.

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.4 and the assumptions and qualifications contained throughout the Report.

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1. Introduction

1.1 Purpose of this report

The purpose of this Construction Management Plan is to outline objectives, broad strategies and actions required to minimise environmental impacts associated with construction of the Albany Motorsport Park (AMP) at Lot 5780 Down Road South, Drome (Figure 1, Appendix A).

This Construction Management Plan applies to the CoA, GSMG and all appointed contractors during the construction of the AMP.

It is recommended that a site-specific Construction Environmental Management Plan (CEMP) is developed by the appointed contractor. The CEMP will expand on the outlined management measures and identify measures for the works to comply with environmental laws and regulations. The CEMP will provide site specific information for works undertaken during construction such as laydown areas for materials, erosion control infrastructure including soil stabilisation spray and silt fences etc.

Construction works are due to commence as soon as all relevant approvals and permits are obtained and are expected to occur over an 18 to 24 month period.

Construction activities expected to be undertaken include earthworks, road and racetrack construction, building construction, waste removal and materials transfer.

1.2 Objectives

The main objectives of this construction management plan, for Stage 1A and 1B of the AMP, include the following:

– Comply with all environmental legislation, statutory and development approval obligations
– Minimise environmental impact on ecological values within the Protected Exclusion Area
– Minimise offsite environmental and social impacts as a result of construction of the AMP.

1.3 Legislation and guidelines

Legislation and guidelines associated with construction activities include, but may not be limited to the following:

– *Aboriginal Heritage Act 1972*
– *AS 1940:2004 – The Storage and Handling of Combustible Liquids*
– *AS 2436-2010 Guide to Noise and Vibration Control on Construction, Demolition and Maintenance Sites* (AS 2436-2010)
– *Biosecurity and Agriculture Management Act 2007*
– *Biodiversity Conservation Act 2016*
– *Environmental Protection Act 1986*
– *Environmental Protection and Biodiversity Conservation Act 1999* (Commonwealth)
– *Environmental Protection and Biodiversity Conservation Regulations 2000* (Commonwealth)
– *Environmental Protection (Noise) Regulations 1997*
– *Environmental Protection Regulations 1987*
– *Contaminated Sites Act 2003*
– *Dangerous Goods Safety Act 2004*
– *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*
– *Heritage of Western Australia Act 1990*
– *Rights in Water and Irrigation Act 1914*
– *Waste Reduction and Recycling Act 2011*
– *Waste Avoidance and Resource Recovery Act 2007*

– Water Quality Protection Note (WQPN) 100: Motor sport facilities near sensitive waters (DoW, 2007)
– *Wildlife Conservation Act 1950.*

1.4 Limitations

This report: has been prepared by GHD for City of Albany and may only be used and relied on by City of Albany for the purpose agreed between GHD and City of Albany as set out in section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than City of Albany arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by City of Albany and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

2. Potential environmental impacts

Construction of the AMP has the potential to result in the following:

– Impacts on native vegetation communities and flora due to changes in surface hydrology, hydrogeological changes, erosion or sedimentation
– Impacts on native vegetation communities and flora due to “dust smothering” leading to decreased photosynthetic capacity
– Impact of native vegetation communities due to spread of *Phytophthora* dieback and weeds
– Disturbance of fauna from construction related noise, dust and uncontrolled fires
– Loss of fauna due to vehicle strike
– Impact on surface water quality including the Conservation Category Wetland (CCW) Marbelup Flats (which ultimately leads to the Marbelup Brook) located within the Protected Exclusion Area
– Impact on groundwater quality in a Priority 2 Public Drinking Water Source Area (PDWSA) – Marbelup Brook Catchment Area
– Visual impact.

3. Management strategies, actions, timeframes and responsibilities

Broad management strategies have been developed to minimise potential impacts associated with construction of Stage 1A and 1B of the AMP. The management strategies, timing and responsibilities are outlined in Table 1.

Table 1 Construction management strategies, actions, timeframes and responsibilities

Management Strategies	Actions	Timeframes	Responsibility
Site induction	All site workers will undertake an induction, which includes information about this CMP and the CEMP including environmental management requirements, for construction of the AMP.	On site entry	CoA/ GSMG/ contractors
Minimise impact on native vegetation	Demarcate approved clearing area to restrict clearing of native vegetation to the approved clearing area only. Any clearing outside the approved area to be recorded in the AMP Incident Register and reported to DWER as required.	Construction period	CoA/ GSMG/ contractors
	Surface water drains and discharge locations to be positioned so that they have minimal impact on native vegetation.	Detailed design phase	CoA/ GSMG/ contractors
	Implement hygiene management measures to minimise risk of spread of dieback.	Construction period	CoA/ GSMG/ contractors
	Ensure weeds do not establish on stockpiles or are moved around site, particularly when in seed.	Construction period	CoA/ GSMG/ contractors
Minimise impact on native fauna	Demarcate approved clearing area to restrict clearing of native vegetation to the approved clearing area only.	Construction period	CoA/ GSMG/ contractors
	Undertake a fauna clearance survey, by a suitably qualified person, to check for fauna prior to clearing vegetation. If animals are located within the construction area, stop works and allow them to move on before recommencing works. Any native fauna injured as a result of the AMP construction will be taken to a designated veterinary clinic or a DBCA nominated wildlife carer. All native fauna injuries and deaths to be recorded in the AMP Incident Register and reported as required.		
	Wherever practical clearing should be undertaken on one front only to provide an opportunity for fauna to move out of the construction area		
	Clearing to be timed to minimise impacts on native fauna, particularly Black Cockatoos (i.e. clearing will be avoided during spring).		
	If native fauna is disturbed during clearing it should be allowed to make its own way to adjacent vegetation.		
	Should trenches be constructed, which native fauna are unable to escape from, they will be inspected by a “fauna spotter” on a regular basis (dawn, midday and prior to sunset). If trenches are left open overnight, ramps will be established to permit native fauna to escape.		
	No pets, such as dogs or cats, permitted on site.		
	All putrescible waste bins to be lidded so as to avoid encouraging vermin.		
	Install and maintain fencing around Development Exclusion Buffer.		

Management Strategies	Actions	Timeframes	Responsibility
Minimise risk of contamination from waste to the surrounding environment and detrimental impacts on human health	Apply the waste management hierarchy (avoidance, recovery, disposal) to manage waste streams.	Construction period	CoA/ GSMG/ contractors
	All putrescible waste bins to be lidded so as to avoid windblown waste. Regular checks within and off site for windblown waste and removal as required.		
	Refuelling or servicing of plant and equipment on site will be undertaken on a designated bunded area. All minor spills shall be remediated immediately by using a Spill Kit and disposing of contaminated material to an appropriately licensed facility. In the event of a serious/ major spill, it will be contained using appropriate Spill Kit and relevant specialists contacted regarding soil and ground water testing/ determine if further remediation is required.		
	Where waste cannot be reused or recycled it will be removed offsite and disposed of to an appropriately licensed facility.		
	Chemical, hydrocarbon and other hazardous waste will be collected in an appropriate manner to minimise risk of contamination and disposed of to an appropriately licensed facility.		
Minimise disturbance of ASS	No dewatering or disposal of dewatering effluent onsite due to draw down of groundwater and ASS “moderate to low” risk area in the Protected Exclusion Area. Construction will be undertaken during a period when water table will not be intercepted i.e. summer months. An ASS management plan will be required if greater than 100 m^3 of soil is disturbed and/ or dewatering is required.	Construction period	CoA/ GSMG/ contractors
Manage dust emissions such that they result in the lowest practicable impact to sensitive receptors	The extent of disturbed surfaces will be kept to the minimum possible by: – Only clearing where required for construction operation – Conducting vegetation clearing, levelling and rehabilitation in stages when required – Clearly marking or fencing off any natural vegetation not to be cleared to prevent accidental clearing – Revegetating exposed soil as soon as practicable	Construction period	CoA/ GSMG/ contractors
	Time the works to minimise dust emissions by: – If possible, scheduling major works that produce high levels of dust outside of the dust season (dust season is October to March) – If this is not possible dust monitoring may be required as per the requirements of the Dust Management Plan (Appendix G) – Monitoring wind and weather forecasts and delaying dust generating activities when conditions are unfavourable		
	Maintaining natural wind and dust barriers by avoiding the removal of tree/vegetation shelter belts alongside boundaries whilst major clearing works are underway at the site.		
	Managing earth moving activities by: – Not clearing areas unless they are able to be levelled and stabilised immediately – Observing weather conditions and not commencing or continuing works during unsuitable conditions		
	Managing stockpiles by locating stockpiles in sheltered areas and cover when they are to be left for longer than 24 hours		

Management Strategies	Actions	Timeframes	Responsibility
	Apply water/dust suppressant to: – Exposed areas when strong winds are expected – Areas scheduled for disturbance		
	Hydromulch or chemically stabilise any cleared areas or stockpiles which may be left for a substantial period of time	Construction period	CoA/ GSMG/ contractors
	Maintaining dust management should be undertaken by: – Nominating one person to be responsible for dust management at the site – Educating all site workers on how dust is generated and methods of reducing dust generation		
Manage noise emissions such that they result in the lowest practicable impact to sensitive receptors	Construction activities will occur during normal construction hours (7.00 am and 7.00 pm Monday to Saturday). Work outside these times would only occur if required for special tasks or to recover lost time due to project delays. Where possible, activities that could result in elevated noise levels will be scheduled during normal construction hours.	Construction period	CoA/ GSMG/ contractors
	Selection of alternate equipment or process – Where a particular item of equipment or activity is found to generate noise levels that exceed the assigned noise levels, it may be possible to select alternate equipment or approaches to reduce noise levels. For example, smaller, quieter front-end loaders will be used onsite rather than larger equipment, where operationally practicable. Wherever practicable, oscillating rollers will be used in preference to vibrating rollers as these cause significantly less vibration to surrounding sensitive receptors.		
	Acoustic barriers – Barriers or screens may be effective in reducing noise levels from work sites, when located at either the source or receptors. Barriers at the source generally only reduce noise levels from static equipment. The extent of noise reduction achieved is dependent on the degree to which the line of sight is blocked. If receptor is totally shielded, noise reduction of up 15 dBA is possible, whereas partial obstruction may only achieve noise reduction of 7 to 10 dBA.		
	Silencing – Where processes or equipment are noisy, the use of additional silencing may be possible, pending availability. This can be in the form of engine shrouding or residential grade exhaust silencers. Due to the distance to the nearest sensitive receptors, this measure is considered unlikely to be required.		
	Establishment of site practices involves formulation of work practices to reduce noise exposure to nearby sensitive receptors. The following management and mitigation measures are available to ameliorate noise impacts as far as practicable: – All plant and equipment should be selected to minimise noise emissions, maintained in good repair and operated in accordance with the manufacturer's instructions. All engine covers should be kept closed while equipment is operating. – All combustion engine plant, such as generators, compressors and welders should be checked to ensure they produce minimal noise with particular attention to residential grade exhaust silencers. – Fixed equipment (i.e. pumps, generators and air compressors) should be located as far as practicable from noise sensitive receptors and locations of equipment rotated to provide respite to receptors.		

Management Strategies	Actions	Timeframes	Responsibility
	– Where practical, machines will be operated at low speed or power and will be switched off when not being used rather than left idling for prolonged periods. – Machines found to produce excessive noise compared to industry best practice will be removed from the site or stood down until repairs or modifications can be made. – Where practical, impact wrenches will be used sparingly within close proximity to sensitive receptors, with hand tools or quiet hydraulic torque units preferred. Metal to metal contact on material should be avoided where practical. – Whenever possible, loading and unloading areas should be located as far as practicable from the noise sensitive receptors. – Materials dropped from heights into or out of trucks should be minimised. Care will be taken when loading or unloading to avoid noise resulting from material being dropped or thrown into the tray of trucks. – Vehicles will be kept properly serviced and fitted with appropriate mufflers. The use of exhaust brakes will be eliminated, where practicable. – Minimise reversing. The preference will be for broadband (croaker) reversing alarms to be installed onsite equipment, subject to meeting occupational health and safety requirements. – Where practical, vehicular movements to and from the construction site should be undertaken during normal working hours. Information to be provided to truck drivers outlining designated vehicle routes, parking locations and delivery hours. – Vehicle routes to and from site will be selected to minimise impact to neighbours, by following major roads where possible. Truck drivers will also be advised of using good techniques when driving through residential areas, in particular to limit engine braking.	Construction period	CoA/ GSMG/ contractors
Minimise detrimental impacts of surface water runoff	Areas of high-risk erosion to be identified prior to construction works and the following measures, or similar, implemented as required: – Measures such as temporary bunds, coir logs and silt fences, to be put in place to prevent erosion and sedimentation down slope of areas under construction to prevent erosion and silt runoff into the drainage system. – Temporary silt fences to be to place around the Development Exclusion Zone, at likely sedimentation points, to trap sediment prior to entering the Protected Exclusion Area. – Silt fences to be inspected and cleaned out regularly and after large rainfall events to ensure they are working adequately. – Hay/ straw bales are not recommended for use as silt traps due to risk of spreading weeds to the Protected Exclusion Area. – If soil is stockpiled ensure areas downslope are protected from potential run off and sedimentation.	Construction period	CoA/ GSMG/ contractors
	Litter and waste storage bins to prevent litter to be blown by wind or washed by rainfall.		
	Establishing a washing-down area behind the bund or silt fence.		
	Provide a stabilised entry and exit point to prevent vehicle tracking of soil from the building site onto roads.		

Management Strategies	Actions	Timeframes	Responsibility
	Position stockpiles of sand and soil stockpiles to prevent material being tracked, washed, of blown into roads, and then into existing surface drainage or constructed stormwater systems.		
Minimise risk of bushfire	Maintain 50 m wide, low fuel Development Exclusion Buffer around the Protected Exclusion Area (Figure 2, Appendix A). Undertake maintenance activities within the AMP and implement recommendations for Stage 1A and 1B: – Albany Motorsport Park, Lot 5780 Down Road, Drome, Bushfire Management Plan, Addendum Report (Bio Diverse Solutions, 2021)	Construction period	CoA/ GSMG/ contractors
Undertake strategies for construction traffic management as per the Works on Roads Traffic Management Plan (Shawmac, 2021)	Implement and adhere to the Works on Roads Traffic Management Plan (Shawmac, 2021) prepared for construction works during development of the AMP included in Appendix B.	Construction period	CoA/ GSMG/ contractors

4. Monitoring

Monitoring of the Site will be undertaken during the construction phase, by the appointed contractor, so as to meet the following performance criteria:

– All non-hazardous, recyclable, hazardous and liquid wastes removed offsite to appropriately approved disposal locations on an as required basis
– Presence of litter and windblown waste around the Site cleaned up on a weekly basis
– No impact on ecological values within the Protected Exclusion Area – implement a vegetation and flora and weed monitoring program to identify any decline or loss of native vegetation and spread of weeds and Phytophthora dieback
– No clearing to occur outside approved clearing areas
– No native fauna deaths
– No impact on surface water and groundwater levels and quality compared to baseline monitoring levels
– No erosion within the AMP area and sediment run-off to the Protected Exclusion Area
– No dewatering or disposal of dewatering effluent onsite due to drawn down of groundwater in the Protected Exclusion Area/ ASS moderate risk area
– No uncontrolled bushfires caused by the appointed contractors
– No complaints received regarding construction activities.

All environmental incidents are to be reported in the construction contractor Incident Register held at the site offices and suitable corrective actions undertaken, and recorded, as required. All incidents and corrective actions will be reported to the CoA representative.

5. Management plan aspects

The following environmental management plan aspects which apply to this Construction Management Plan have been included in the overarching Environmental Management Plan for the Site:

– Roles and responsibilities
– Environmental incidents, non-conformances and complaints
– Environmental training
– Reporting and control of environmental records.

6. Review

This Construction Management Plan will be reviewed and updated no later than annually, until construction of Stage 1A and 1B is complete. A review may occur sooner if there is a material change in risk, legal requirements or an incident relevant to construction management. Management strategies will be reviewed for effectiveness and any corrective actions will be implemented.

7. References

Bio Diverse Solutions. (2021). *Albany Motorsport Park, Lot 5780 Down Road, Drome, Bushfire Management Plan, Addendum Report.* Unpublished report prepared for GHD.

DoW. (2007). *Water Quality Protection Note 100: Motor sport facilities near sensitive water.* Perth: Department of Water.

Roberts Gardiner Architects . (2021). *Albany Motorsport Park Masterplan - Stage 1.* Unpublished masterplan for City of Albany.

Shawmac. (2021). *Albany Motorsport Park Development Works on Roads Traffic Management Plan.* Unpublished report prepared for GHD.

Appendix A

Figures

Figure 1 *Project site location*

Figure 2 *Master plan*

Pikes Rd
Redmond - Hay River Rd
Phillips Rd
REDMOND
Hazzard Rd
Down Rd
Marbelup Rd
Down West Rd
Albany Hwy
Down South Rd
DROME
Cochrane Rd
Hunwick Rd
Gunn Rd
TORBAY
Corio Rd
Boccomazzo Rd
Sandberg Rd
Ding Rd

LEGEND
- Road
- Albany Motorsport Park
- Lot 5780 Down Road South
- Cadastre

SLIP

Paper Size ISO A3

0 0.5 1 1.5

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

City of Albany
Albany Motorsport Park
Lot 5780 Down Road South, Drome

Project Site Location

Project No. 6137331
Revision No. 0
Date 22/07/2021

FIGURE 1

N:\AU\Perth\Projects\61\12546218\GIS\Maps\Working\6137331_001_Fig1_Proposal area and locality_Rev0.mxd
Print date: 22 Jul 2021 - 14:24

Data source: GHD: Proposal area; Albany Motorsports Precinct - 20190503; Landgate: Imagery (Feb 2016), Cadastre - 20180709; Main Roads WA: Roads. Created by: vdavies

LEGEND

STAGE 1A

STAGE 1B

MB - MONITORING BORE

DMB - DEEP MONITORING BORE

DOWN ROAD

RT ROAD 7m GRAVEL WITH 2m WIDE VERGES

BOUNDARY AND PRECINCT FENCING - 1.8m HIGH

PROPOSED LEFT TURN LANE OFF DOWN ROAD

ENTRY / EXIT TO PARK

SECURE GATE

SECURITY FENCE

FUTURE RACE TRACK GATEHOUSE

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

POTENTIAL LOCATION WATER SUPPLY FOR FIRE FIGHTING - 110,000L / OR SIMILAR SUITABLE SOURCE

POTENTIAL EFFLUENT SYSTEM LOCATION

TRIALS TRACK

BUNDED CONCRETE RE-FUELING & WASHDOWN AREA WITH WASTE WATER TRAP & WATER TANK

AREA FOR SELF-CONTAINED TEMPORARY FOOD VANS

TRANSPORTABLE TOILETS ZONE

PROPOSED SINGLE STOREY MULTIPURPOSE BUILDING (FIRST AID, SCRUTINEERING & STORAGE) BUILDING (~250m² - WOODLAND GREY) WITH WATER TANK & ADJACENT DISABLED BAYS AS REQUIRED

EXISTING DAM

JUNIOR MOTOCROSS AREA

GATE

COVERED CONCRETE BUNDED AREAS FOR GENERATOR (FUEL)

OPEN AIR EMERGENCY MUSTER AREA

NATIVE BUSH

EXISTING FENCE

FENCE - 1.8m HIGH

4WD DRIVER TRAINING & ATV PRECINCT

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

BOUNDARY

PEDESTRIAN ACCESS

OVERFLOW PARKING SPECTATOR ZONE

MOTOCROSS TRACK 2.1km x 8m WIDE

MOTOCROSS PRECINCT

FENCE - 1.8m HIGH

GRASSED AREA - LOW FUEL MAINTAINED

WETLAND FENCING - 1.2m HIGH

50m WIDE LOW FUEL BUFFER

PROTECTED EXCLUSION AREA

EXISTING VEGETATED CREEK ZONE NO PROPOSED WORK

FUTURE MOTOCROSS GATEHOUSE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

WETLAND FENCED IN STAGE 1A

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

RE-VEGETATED CREEK ZONE

PROTECTED EXCLUSION AREA

GRASSED AREA - LOW FUEL MAINTAINED

GRAVEL BED RUN-OFF

SECTION DETAIL REFER A-02

TREES ONLY STAGE 1A

EARTH BACKED TYRE / CONCRETE BARRIER AND TREE LINED SHELTER BELT

GRAVEL BED RUN-OFF

RACE TRACK PRECINCT

3.5km x 12m RACE TRACK

TURN 1

TURN 2

TURN 3

TURN 4

TURN 5

TURN 6

TURN 7

TURN 8

TURN 9

TURN 10

TURN 11

CONCRETE BARRIER & SAFETY FENCE

SEALED RECOVERY AREA

SPECTATOR VIEWING AREA (GRASSED & TREES - LOW FUEL)

SPECTATOR PARKING HARDSTAND (250 BAYS) AND FUTURE OVERFLOW PARKING AREA

OVERFLOW PARKING

BOUNDARY (FENCE)

DOWN ROAD SOUTH (GRAVEL)

TRANSPORTABLE SINGLE STOREY CLUBROOMS & TOILETS ~350m²

POTENTIAL EFFLUENT SYSTEM LOCATION

EMERGENCY MUSTER AREA (BITUMEN)

COVERED PIT LANE STRUCTURE & HARD STAND

DRIFT TRAINING AREA

EXISTING WESTERN POWER AERIAL POWER LINE

TRANSPORTABLE FIRST AID / AMBULANCE CONTROL ROOM ~50m²

COMPETITOR PARKING / MARSHALLING

EXISTING GRAVEL ROAD

FUTURE STORAGE SHEDS - NO FUEL OR COMBUSTIBLE MATERIALS STORAGE

WATER SUPPLY FOR FIRE FIGHTING - 110,000L

WATER BORE

4m FIRE ACCESS TRACK (GRAVEL) WITH 1m HARDENED SHOULDERS

7m WIDE GRAVEL EMERGENCY EXIT (GATED 8m)

MASTERPLAN

SCALE 1:2500 @ A1

SCALE 1:5000 @ A3

rev	date	description
A	15-04-2021	ISSUED FOR CLIENT REVIEW
B	27-04-2021	ISSUED FOR CLIENT REVIEW
C	12-05-2021	ISSUED FOR CLIENT REVIEW
D	26-05-2021	ISSUED FOR CLIENT REVIEW
E	05-07-2021	ISSUED FOR DA

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Roberts Gardiner Architects

project
Albany Motorsport Park
Lot 5780 Down Rd, Drome, WA 6330
client
City of Albany

Masterplan - Stage 1

cad file

drawn CB

project number 21-002

scale 1:2500 @A1

date JULY 2021

dwg no. A-01

rev. E

Appendix B

Works on Roads Traffic Management Plan (Shawmac, 2021)

WORKS ON ROADS
TRAFFIC MANAGEMENT PLAN

ALBANY MOTORSPORT PARK DEVELOPMENT

PREPARED FOR

GHD

I, YUYANG KE (AUS AWTM-19-6370-02), that I have designed this Traffic Management Plan following a site inspection on 18/03/2021 The Traffic Management Plan has been prepared, subject to the variations approved, in accordance with the Main Roads Traffic Management for Works on Roads Code of Practice, Austroads Guide to Temporary Traffic Management and AS 1742.3 2019.

	Name/Company	Accreditation Details	Date	Signature
TMP designed by:	ANTHONY ANASTAS Shawmac Consulting Civil and Traffic Engineers	AUS AWTM-20-4573-02	14/04/2021	
TMP Reviewed by:	YUYANG KE Shawmac Consulting Civil and Traffic Engineers	AUS AWTM-19-6370-02	14/04/2021	
RTM Reviewed and Endorsed by:				
Compliance Audit to be undertaken by:				
Road Authority Review by:				
Road Authority Authorisation:	Road authority authorisation of the implementation of traffic signs and devices is given for Traffic Management Plan No. 2103019 **Signed By:** ..... **Date:** ..... **Signature:** ..... **Position:**			

TMP No.	2103019	**Revision No.**	1	**Date**	14/04/2021

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1	14/04/21	A. Anastas	Yuyang Ke	Issued for clients review

Revision <1> Changes:		
Page Number	Header Reference	Description

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Glossary

Table 1: Glossary

Acronym	Definition
AGTTM	Austroads Guide to Temporary Traffic Management
AS	Australian Standard
AS/NZS	Australian and New Zealand Standard
AWTM	Advanced Worksite Traffic Management / Manager
CoP	Traffic Management for Works on Roads Code of Practice (MRWA)
MRWA	Main Roads Western Australia
OS&H	Occupational Safety and Health
RTM	Roadworks Traffic Manager (accredited by MRWA)
SRSA	Senior Road Safety Auditor
TGS	Traffic Guidance Schemes
TMP	Traffic Management Plan
TCP	Traffic Control Plan

1. Introduction

1.1. Purpose and Scope

This Traffic Management Plan (TMP) outlines the traffic control and traffic management procedures to be implemented by the Project Manager and Project Contractors to manage potential hazards associated with the traffic environment during the project.

The proposed project is for the development of a multipurpose motorsport park in Albany on Lot 5780 Down Road, Drome.

1.2. Objectives and Strategies

The objectives of the Traffic Management Plan is to ensure:

- The safety of the road workers.
- All road users, including vulnerable road users, are safely guided around, through or past the work site.
- The performance of the road network is not unduly impacted and the disruption and inconvenience to all road users are minimised for the duration of the works.
- Impacts on users of the road reserve and adjacent properties and facilities are minimised.

In an effort to meet these objectives the Traffic Management Plan will incorporate the following strategies:

- Providing a sufficient number of traffic lanes to accommodate vehicle volumes.
- Ensuring delays are minimised.
- Ensuring all road users are managed including motorists, pedestrians, cyclists, people with disabilities and people using public transport.
- Ensuring work activities are carried out sequentially to minimise adverse impacts.
- Provision will be made for works personnel to enter the work area in a safe manner in accordance with safety procedures.
- All entry and exit movements to and from traffic streams shall be in accordance with the requirements of safe working practices.

2. Project Overview

2.1. Project Location

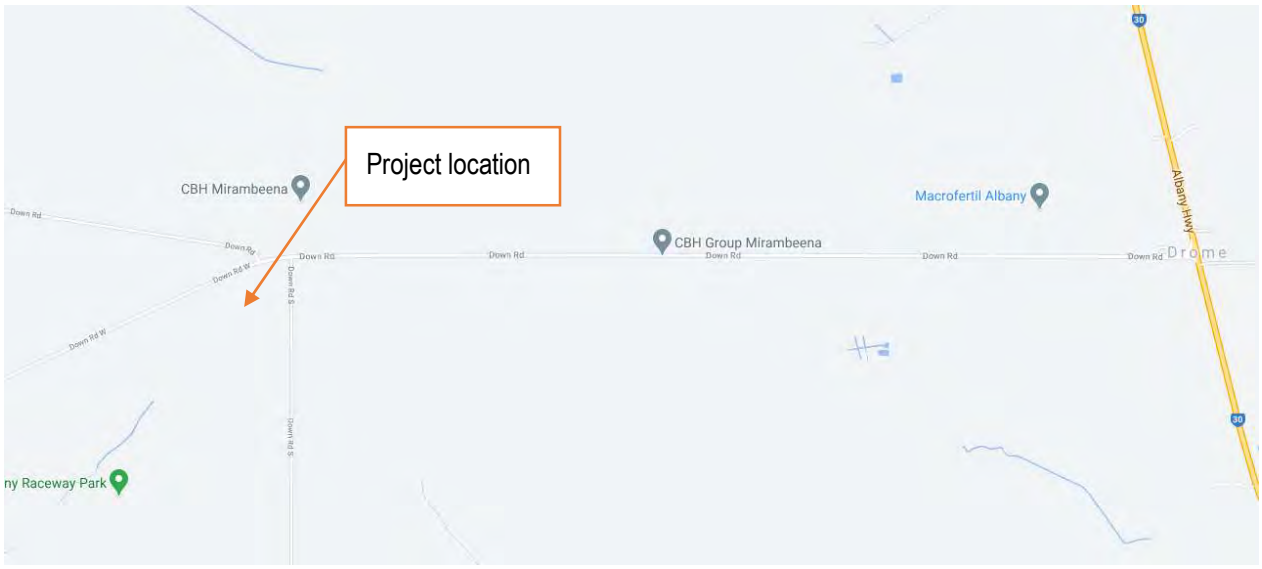


Figure 1: Location of Works

2.2. Project Details and Site Constraints/Impacts

Table 2: Project Details and Site Constraints/Impacts

Item	Description
Project Title:	Albany Motorsport Park Development
Location:	Lot 5780 Down Road, Drome, WA 6330
Road Classification & Existing Speed Limit:	Down Road – Access Road: 110km/h Down Road South - local access road (Gravel):
Road Authority:	City of Albany
Local Government:	City of Albany
Prime Contractor:	GHD
Scope of Works:	Construction of Albany Motorsport Park including earth works, car park construction, utilities installation and pavement construction.
Staging of Works:	Stage 1: western development construction Stage 2: eastern development construction
Project Date:	TBA
Hours/Days of Work:	9am to 7pm / 7 days a week
Duration of Works	8 months
Other Constraints:	Ongoing events during the construction of stage 2
Concurrent/Adjacent Works	N/A

or Projects	

2.3. Existing Traffic and Road Environment

Item	Description
Traffic Volume and Composition	Down Road: 844 vpd(2017) Down Road South: no data
Existing Road Configuration	Down Road: single carriageway with one lane in each direction approximately 9m wide. Down Road South: Gravel approximately 5m wide.
Existing Pedestrian / Cyclists Facilities	N/A

2.4. Overview of Proposed Temporary Traffic Management

Item	Description
Temporary Traffic Management Descriptions:	Verge works with various speed reductions depending on the clearance between edge of traffic and work site is required.
Speed Zone Dates and Times	40km/h to 80km/h speed reduction during work shift and 80km/h for after care Dates: TBC
Lane Closures Dates and Times	N/A
Road Closures Dates and Times	N/A
Signal Modifications Description	N/A
Proposed Lane Widths	Minimum 3.2m lane width is required.
Road Safety Barrier	N/A

2.5. Project Representatives

Table 3: Project Representatives

Position	Name	Contact Details
Road Authority Representative	City of Albany	Phone: (08) 6820 3000 Email: staff@albany.wa.gov.au Post: PO Box 484, ALBANY, WA 6331
Local Government	City of Albany	Phone: (08) 6820 3000 Email: staff@albany.wa.gov.au Post: PO Box 484, ALBANY, WA 6331
Project Manager / Prime Contractor	TBC	
Site Supervisor/Manager	TBC	

TMP Design	Yuyang Ke Shawmac Pty Ltd	Email: yyke@shawmac.com.au mob: 0421591428
TMP Implementation	TBC	

GHD have engaged Shawmac Pty Ltd to prepare this Traffic Management Plan and associated controls for the works.

The TMP will be implemented by TBC.

3. Risk Management

The following details the preliminary assessment of site hazards likely to be encountered, the level of risk associated with each and the control proposed. Note that the risk level is the level of assessed risk without the controls in place. The controls listed have been determined as being appropriate in reducing the risk to a level that is acceptable.

The hierarchy of control has been utilised to ensure that the highest practicable level of protection and safety is selected:

- Elimination
- Substitution
- Isolation
- Engineering
- Administration
- Personal Protection Equipment

In evaluating the options, a key consideration is whether the option takes traffic around, through or past the worksite.

3.1. Risk Classification Tables

3.1.1. QUALITATIVE MEASURES OF CONSEQUENCE OR IMPACT

Table 4: Risk Classification Damage/Impact

Level	Consequence	Description
1	Insignificant	• Mid-block hourly traffic flow per lane is equal to or less than the allowable lane capacity detailed in AGTTM. No impact to the performance of the network. • Affected intersection leg operates at a Level of Service (LoS) of A or B. • No property damage.
2	Minor	• Mid-block hourly traffic flow per lane is greater than the allowable road capacity and less than 110% of the allowable road capacity as detailed in AGTTM. Minor impact to the performance of the network. • Intersection performance operates at a Level of Service (LoS) of C. • Minor property damage.
3	Moderate	• Midblock hourly traffic flow per lane is equal to and greater than 110% and less than 135% of allowable road capacity as detailed in AGTTM. Moderate impact to the performance of the network. • Intersection performance operates at a Level of Service (LoS) of D. • Moderate property damage.
4	Major	• Midblock hourly traffic flow per lane is equal to and greater than 135% and less than 170% of allowable road capacity as detailed in AGTTM. Major impact to the performance of the network. • Intersection performance operates at a Level of Service (LoS) of E. • Major property damage.
5	Catastrophic	• Midblock hourly traffic flow per lane is equal to and greater than 170% of allowable road capacity as detailed in AGTTM. Unacceptable impact to the performance of the network. • Intersection performance operates at a Level of Service (LoS) of F. • Total property damage

3.1.2. OSH QUALITATIVE MEASURES OF CONSEQUENCE OR IMPACT

Table 5: Risk Classification Damage OSH

Level	Consequence	Description
1	Insignificant	No treatment required.
2	Minor	First aid treatment required.
3	Moderate	Medical treatment required or Lost Time Injury.
4	Major	Single fatality or major injuries or severe permanent disablement.
5	Catastrophic	Multiple fatalities.

3.1.3. QUALITATIVE MEASURES OF LIKELIHOOD

Table 6: Risk Classification Rarity

Level	Likelihood	Description
A	Almost certain	The event or hazard: • is expected to occur in most circumstances, • will probably occur with a frequency more than 10 times per year.
B	Likely	The event or hazard: • will probably occur in most circumstances, • will probably occur with a frequency of between 1 and 10 times per year.
C	Possible	The event or hazard: • might occur at some time, • will probably occur with a frequency of 0.1 to 1 times per year (i.e. once in 1 to 10 years).
D	Unlikely	The event or hazard: • could occur at some time, • will probably occur with a frequency of 0.02 to 0.1 times per year (i.e. once in 10 to 50 years).
E	Rare	The event or hazard: • may occur only in exceptional circumstances, • will probably occur with a frequency of less than 0.02 times per year (i.e. less than once in 50 years).

IMPORTANT NOTE: The likelihood of an event or hazard occurring shall first be assessed over the duration of the activity (i.e. "period of exposure"). For risk assessment purposes the assessed likelihood shall then be proportioned for a "period of exposure" of one year.

Example: An activity has a duration of 6 weeks (i.e. "period of exposure" = 6 weeks). The event or hazard being considered is assessed as likely to occur once every 20 times the activity occurs (i.e. likelihood or frequency = 1 event/20 times activity occurs = 0.05 times per activity). Assessed annual likelihood or frequency = 0.05 times per activity x 52 weeks/6 weeks = 0.4 times per year. Assessed likelihood = Possible.

3.1.4. QUALITATIVE RISK ANALYSIS MATRIX – RISK RATING

Table 7: Risk Classification Severity

Likelihood	Consequences				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (almost certain.)	Low 5	High 10	High 15	Very High 20	Very High 25

B (Likely)	Low 4	Medium 8	High 12	Very High 16	Very High 20
C (Possible)	Low 3	Low 6	Medium 9	High 12	High 15
D (Unlikely)	Low 2	Low 4	Low 6	Medium 8	High 10
E (Rare)	Low 1	Low 2	Low 3	Low 4	Medium 7

3.1.5. MANAGEMENT APPROACH FOR RESIDUAL RISK RATING

Table: 8: Residual Risk Rating

Residual Risk Rating	Required Treatment
Very High	Unacceptable risk. **HOLD POINT**. Work cannot proceed until risk has been reduced.
High	High priority, OSH MR and Roadworks Traffic Manager (RTM) must review the risk assessment and approve the treatment and endorse the TGS prior to its implementation.
Medium	Medium Risk, standard traffic control and work practices subject to review by accredited AWTM personnel prior to implementation.
Low	Managed in accordance with the approved management procedures and traffic control practices.

3.2. Risk Register

Table 9: Risk Register

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
3.2.1 Environmental									
3.2.1.1	Sun glare causing decreased visibility of traffic control delineation and signage for motorists resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Where sun glare is identified as adversely affecting a driver's ability to sight signage and / or traffic control devices, sign locations may need to be adjusted and additional delineation and/or traffic control devices provided to address the risk from glare. Where traffic control is adversely affected by glare at sunset and sunrise, traffic controllers may need to assist in maintaining low traffic speeds. All changes are to be noted in the daily diary.	D	4	M8
3.2.1.2	Headlight glare from night works causing decreased visibility of traffic control delineation and signage for motorists resulting in serious injury or fatality.	Serious injury or fatality.	C	3	M9	Traffic control personnel and site supervisor to conduct site drive assessments of temporarily installed signage and delineation to ensure devices are visible for all motorists. Where traffic control is adversely affected by head light glare from night works, traffic controllers may move or angle devices. All changes are to be noted in the daily diary.	D	3	L6
3.2.1.3	Reduced motorist's visibility of worksite due to night works causing an increase of interactions between workers and live traffic resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Traffic control and workers to wear High Visibility Retroreflective Vests at all time and to use night work batons. All traffic controller signs to be Class 1 Retro-reflective material. Temporary speed zones to be implemented where required for advanced warning of the worksite. Contractor to install temporary lighting towers through poorly illuminated sections of worksite if required.	D	4	M8
3.2.1.4	Inclement weather causing hazardous environments through the worksite or	Serious injury or fatality.	C	4	H12	Where adverse weather conditions are encountered during the works, the following may	D	4	M8

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
	reduced visibility of implemented traffic control resulting in serious injury or fatality.					be implemented: 1. Signage and tapers extended by 25%. 2. 'Slippery When Wet' signs may be implemented. 3. Where the road becomes impassable work may cease and traffic control implemented. Any adjustments to the plan shall be risk assessed and approved by someone holding a WTM or AWTM accreditation.			
3.2.1.5	Crests and curves causing reduced visibility of the worksite and implemented traffic control resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Sign locations can be staggered to assist driver's visibility, in accordance with Australian Standards and under the supervision of an accredited AWTM. All signs shall be regularly inspected and re-positioned as required to reduce the effects of shadows. All changes shall be recorded in the daily diary.	D	4	M8
3.2.1.6	Vegetation causing reduced visibility of the worksite and implemented traffic control resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Where vegetation impacts on the effectiveness of the traffic management, signage may be extended by 25% or reduced by 10% in order to increase visibility. Vegetation may be pruned to increase visibility as required and approved by LGA. All signage adjustments will be recorded within the daily diary.	D	4	M8
3.2.1.7	Temporary lighting installed adjacent to residential properties causing adverse environmental impacts for locals resulting in adverse public reaction.	Adverse public reaction.	C	3	M9	Lights to be positioned where illumination doesn't adversely affect residents. Temporary lights to be used only as required to light the worksite and temporary delineation.	D	3	L6
3.2.2 Temporary Speed Zones									
3.2.2.1	Traffic speed on affected routes in traffic lanes adjacent to the worksite creating hazardous worksites and unsafe worksite access.	Potential injury or fatality to road users, project personnel or sub-contractors.	C	4	H12	Introduction of temporary speed zones will be implemented where required to reduce risk to motorists, workers and plant. Temporary speed zones and adequate delineation will be implemented as per the Traffic Guidance	D	4	M8

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
						Schemes and in accordance with AS 1742.3 and MRWA CoP.			
3.2.2.2	Traffic not adhering to proposed temporary speed zones causing an increase potential for conflicts between workers and motorists resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Repeater signage and VMS boards to be implemented through the worksite as required. Speed zones should follow the minimum and maximum lengths provided in AS1742.3 and MRWA CoP.	D	4	M8
3.2.3 Excavations									
3.2.3.1	Excavations associated with the works being inadequately protected causing an increase of property damage resulting in adverse public reaction and serious injury.	Serious injury and adverse public reaction.	B	3	H12	Delineation and devices to be provided as per the Traffic Guidance Schemes and in accordance with AGTTM and MRWA CoP. Where standard delineation cannot adequately protect the work site, close delineation or safety barrier may be required. Edge clearances and protection to be installed as per Table 6.1, Page 101 of AGTTM – Part 3.	C	3	M9
3.2.4 Traffic Control/Construction Plant & Workers/Traffic Management Design									
3.2.4.1	Incorrect implementation of temporary signage and linemarkings causing an increase of interactions between traffic control and live traffic resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Before work commences, signs and devices at approaches to the work area shall be erected in accordance with the adopted TGS, in the following order: 1. Advanced warning signs. 2. All intermediate advanced warning and regulatory signs and devices required in advance of the taper or start of the work area. 3. All delineating devices required to form a taper including flashing arrow signs or temporary hazard markers where required. 4. Delineation past the work area or into a side track. 5. Other warning signs or regulatory signs. Delineation devices such as cones and bollards	D	4	M8

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
						should be placed in the same sequence, i.e. those furthest in advance of the work placed first.			
3.2.4.2	Incorrect design of temporary signage and linemarkings causing an increase of speed and errant vehicles through the worksite resulting in serious injury or fatality.	Serious injury and fatality.	C	4	H12	Traffic Management Plan and associated Traffic Guidance Schemes to be designed and endorsed by suitably accredited AWTM and RTM as required for the proposed works. Plans to be reviewed and approved by relevant LGA and road authorities prior to the implementation of the works.	D	4	M8
3.2.4.3	The interaction of work personnel with through traffic may causing an increase of conflicts resulting in serious injury or fatality.	Serious injury or fatality	C	4	H12	Traffic control and delineation to be installed as per the Traffic Guidance Schemes in accordance with AS 1742.3 and MRWA CoP. Edge clearance spacing to be provided between live traffic and workers per the posted or implemented speed zones. Temporary speed zones, lane closures, road closures or reversible flow may be provided to maintain edge clearances. A TMA may be provided for where workers are within 1.2m of live traffic to protect them from oncoming vehicles. TMA's to be installed 20m prior to the work area and 40m where site entrances are required. Workers to be within 100m of TMA for protection to be affective. Daily toolbox meetings to ensure that workers are educated on the dangers of working around live traffic.	D	4	M8
3.2.4.4	Construction traffic entering and leaving the construction site causing an increase of rear end crashes through the worksite resulting in serious injury.	Serious injury.	B	3	H12	Site entry and exit points will be provided for construction traffic at strategic locations. Vehicles shall: 1. Decelerate slowly and signal their intention by indicator to leave the traffic stream; 2. Activate the vehicle's rotating yellow lamp, where fitted, once a speed of 20 km/h. has been reached and at least 50m prior to the	C	3	M9

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
						exit location. 3. Switch on the vehicle hazard lights once the vehicle is stationary. 4. Where risks associated with unassisted exit or entry to or from the traffic stream are high, Traffic Controllers should be used to assist entry and exit movements. Spotters may be used to assist drivers enter the traffic stream. Restrictions may be put in place to restrict truck movements entering traffic flows during periods of high traffic flows from site			
3.2.4.5	Parking of construction plant causing an increase of crashes through the worksite resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Work practices will be developed to outline provisions for: 1. Short term parking of work plant. 2. Long term parking of work plant. 3. Short term parking for workers and LV's. Construction access have been shown on the Traffic Guidance Schemes.	D	4	M8
3.2.4.6	Workmen may be hit by vehicles during the setting out of traffic management control devices resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	No work shall commence until the approved traffic management has been implemented. Traffic management to be setup prior to arrival of workers to site and taken down after they leave to avoid excessive congestion.	D	4	M8
3.2.5 Lane Closures (N/A)									
3.2.6 Reversible Flow/Stop Control/Contra-flow N/A									
3.2.7 Temporary/Existing Barrier									
3.2.8 Temporary Linemarking/Ultimate Design/Existing Road Environment									
3.2.8.1	A road user may misread the proposed temporary alignment causing through	Serious injury or fatality.	C	4	H12	Traffic planning requires traffic controls to be installed to direct traffic around the work site and	D	4	M8

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
	vehicles colliding with work personnel or work vehicles resulting in serious injury or fatality.					a reduction in the speed zone of the carriageways approaching and passing the works. Temporary alignments to be installed as per the TGS and in accordance with AS 1742.3 and MRWA CoP. Temporary controls, advanced warning and directional signage to be installed as per the TGS and in accordance with the requirements of AS 1742.3 and MRWA CoP. All lane closures to use a Flashing Arrow Boards at end of taper as per TGSs. Traffic control personnel shall conduct a drive through assessment of devices to evaluate the effectiveness following initial opening, any changes to be recorded in the daily diary. Temporary alignment to be designed to meet speed requirements.			
3.2.9 Temporary/Existing Signage and Structures									
3.2.9.1	Existing signage and structures causing reduced visibility of the worksite and temporary traffic control resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	All existing signage that is contradictory to the temporary signage implemented in the TGS's are to be covered with opaque material for the duration of the works. Regular drive throughs should ensure the integrity of the worksite and all traffic management. Where signs cannot be covered and conflict with the temporary signage, it will be removed. Temporary devices may be extended 25% to accommodate for road side structures, all changes to the signage will be recorded in the daily diary.	D	4	M8
3.2.9.2	Defective temporary signage causing inadequate advanced warning of proposed works resulting in serious injury or fatality.	Serious injury or fatality.	C	4	H12	Regular site inspections of signs to be conducted by Traffic Controllers and site supervisor to ensure integrity of proposed signage. All signs to be made of retroreflective material to ensure signs can be seen during night works.	D	4	M8
3.2.10 Road Closures									

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
3.2.11 Heavy Vehicles Network									
3.2.11.1	Restrictions placed on traffic lane widths and corner geometries by temporary traffic management impacting heavy haulage traffic routes resulting in adverse public reaction and property damage.	Property damage and adverse public reaction.	C	3	M9	Details and impacts to the heavy haulage route to be communicated to MRWA HVO prior to the implementation of any works. Where corner geometry or lane widths cannot accommodate heavy vehicles, detours or provisions to escort trucks through site may be provided. Where large or oversized vehicles are moving through the worksite, traffic controllers shall be used to ensure sufficient carriageway width is provided and any workers adjacent to the traffic lanes or within a hazardous area are instructed to move clear of the traffic. Temporary alignment swept paths to be checks. Existing RAV network to be accommodated where possible.	D	3	L6
3.2.12 Public Transport Authority (N/A)									
3.2.13 Emergency Services/Emergency Arrangements and Contingencies									
3.2.13.1	Restrictions and delays associated with the traffic control causing a failure to respond for emergency services resulting in an increase severity in emergency situations.	Failure to respond to emergency situations.	C	4	H12	Pre-communication to be given to all emergency services prior to the implementation of any works in the form of the Notification of Roadworks. Details to be provided for any proposed detours, predicted increases in congestion and any works that may increase delays to the emergency network. Where safe, workers and Traffic Control to respond to emergency services to facilitate an unhindered passage through or around the worksite.	D	4	M8
3.2.13.2	Dangerous goods, damage to services or failure of services causing restricted access through the worksite resulting in adverse	Adverse public reaction.	B	3	H12	Should any incident arise involving vehicles transporting dangerous goods, damage or failure of services; all work shall cease immediately, machinery and vehicles turned off	C	3	M9

Item	Risk Event	Consequence	Pre - treatment Risk			Treatment	Residual Risk		
			L	C	RR		L	C	RR
	public reaction.					and the area cleared of personnel as soon as possible. Traffic Controllers (and other personnel if necessary) shall be deployed immediately to ensure no traffic or other road users approach the area. All site personnel shall be briefed on evacuation and control procedures.			
3.2.14 Public Interactions and Impacts									
3.2.14.1	Temporary traffic management devices restricting access to local properties and commercial premises resulting in an adverse public reaction.	Adverse public reaction	C	3	M9	Local and commercial access to be maintained where possible. Pre-communication to be provided where adverse impacts may restrict access with the associated works. Provisions including; temporary tracks, temporary closures and local access may be provided to maintain access.	D	3	L6
3.2.15 Pedestrians and Cyclists									
3.2.16 Variations to the Standards									

4. Traffic Management Planning and Assessment

4.1. Traffic Assessment and Analysis

4.1.1. Traffic and Speed data

4.1.1.1 Summarised Traffic Counts

A summary of recent traffic data is provided below:

Table 10: Summarised Traffic Volumes

Location	Average weekday (vpd)	Trucks	Average weekend (vpd)	Trucks
Down Road	844 vpd (2017)	34%	419 vpd (2017)	40%
Albany Highway	4,950 vpd (2017)	20%	3,520 vpd (2017)	16%

Volumes used in the above summary can be found in *Appendix D – Volumes.*

4.1.2. Traffic Flow Analysis

General Comments

Volumes used in this report are based on average traffic figures derived from historical counts. AGTTM - Part 2, Section 3.2.3 (refer to Table 3.1) indicates that the mid-block capacity of multi-lane roadways is 1,000 vehicles per lane per hour (vpl/ph) and 500 vehicles per hour within 200m of an intersection for each lane. These design lane capacities have been used when analysing the effects of associated with the works. Where a departure from the AGTTM regarding lane capacities is required for the works to proceed a variation form will be filled out and attached to the close of this document.

Due to expected traffic volumes (see above) it is anticipated there will only be minor delays provided the Traffic Management setup follows the instructions set out in this document.

Traffic flow should be maintained wherever possible. Traffic volumes and movements will be analysed against the requirements detailed in AGTTM - Part 2, Section 3.2.3 (refer to Table 3.1) and Section 3.3.4 (refer to table 3.4).and MRWA CoP risk tables (see section 6) to ensure levels of service are acceptable to the Road Authority. The works are expected to have very minor impacts on the impacted roads.

4.1.2.1 Traffic Impacts and Assessment:

The impact will be minor as all of the works will be completed within the verge with various speed reduction and reduced lane width on Down Road.

4.1.3. Temporary Speed Zones

A worksite speed limit of 40km/h, 60km/h and 80km/h will be implemented at Down Road due to for the property access construction.

After work hours the posted speed will be 80km/h and the road will be left clean and free of debris.

4.1.4. Existing Traffic Signals

N/A

4.1.5. Impact to Adjoining Network

There is no impact to adjoining network during the construction.

4.1.5.1 Road Closure Traffic Distribution

N/A

4.1.6. End of Queue Treatment

N/A

4.1.7. Temporary Traffic Signals

N/A

4.2. Road Users

4.2.1. Pedestrians

There are no pedestrian facilities.

4.2.2. Cyclists

There are no cyclists' facilities.

4.2.3. Public Transport

There are no public transport facilities.

4.2.4. Heavy and Oversized Vehicles

There are no impacts to the heavy and oversized vehicles.

4.2.5. Existing Parking Facilities

There are no impacts to existing parking facilities.

4.2.6. Access to Adjoining Properties/Business

There are no impacts to adjoining properties.

4.2.7. Rail Crossings

There are no impacts to railway crossings.

4.2.8. School Crossings

There are no school crossings.

4.2.9. Special Events and Other Works

There are no special event and other works.

4.2.10. Emergency Vehicle Access

Emergency vehicle access will be maintained for the duration of the works.

4.2.11. Night Work Provisions

There is no provision for night shift works.

4.2.12. Road Safety Barriers

N/A

4.3. Consultation and Communication / Notification

Contractor to liaise with stakeholders for public consultation and communication for the duration of the work shift.

4.3.1. Other Agencies

All relevant authorities to be notified prior to the commencement of any works via; email, phone or Notification of Roadworks. This includes: City of Albany, Main Roads Western Australia (MRWA), MRWA Traffic Operations Centre, MRWA Heavy Vehicle Services, Public Transport Authority.

Emergency services to be notified prior to the commencement of any works via the Notification of Roadworks.

4.3.2. Public

The public shall be notified of the works and traffic management arrangements which will affect journey times via:

- Notice to motorists in the weekend West Australian placed two weeks in advanced, one week in advance and at the commencement of works;
- Letter drop to all residents and businesses within the traffic control zone one week ahead of the scheduled works;
- VMS boards during the works; and
- Significant works may require radio advertising.

5. Site Assessment

5.1. Provision to Address Environmental Conditions

5.1.1. Adverse Weather

Weather is not expected to adversely impact on the effectiveness of the traffic control detailed on the attached TGS's. Notwithstanding this, should adverse weather conditions be encountered during the works, the following contingency plans should be activated. Note: any adjustments to the plan shall be risk assessed and approved by someone holding a WTM or AWTM accreditation. Major changes will require road authority approval.

5.1.1.1 Rain

In the event of rain, an on-site assessment shall be made and sign spacing and tapers may be extended by 25% to account for increased stopping distances. Slippery (T3-3) signs may be placed as required and all changes shall be recorded in the daily diary.

If rain occurs, Traffic Management Personnel shall inspect the site and where signage and / or devices are not clearly visible, signage may need to be adjusted to improve visibility or if necessary, provide additional signage and delineation. Where stopping distances are adversely affected by wet surfaces, spacing between signs may need to be adjusted to provide increased reaction time for drives. In cases where it is determined that the rain is so heavy that the risk is considered unacceptable, all work shall cease until rain has cleared. All changes shall be noted in the daily diary.

5.1.1.2 Floods

Should works be affected by flooding to the extent that the worksite becomes impassable or risk is considered unacceptable, all work shall cease immediately and Traffic Controllers (and other personnel if necessary) shall be deployed immediately to close the site and direct traffic around the flooded area (under the direction of the project manager or traffic manager). Emergency services and the Road Authority shall be notified immediately and Traffic Controllers shall remain onsite until emergency services and the Road Authority personnel arrive and take control of the site.

5.1.1.3 Other Adverse Weather (strong winds, thunder storms etc.)

Should strong winds or thunder storms occur, all signs are to be weighted down to prevent blowing over or debris entering the roadway causing hazards for motorists. Periodically site inspections to be conducted during storms to ensure integrity of all Traffic Management devices.

5.1.2. Sun Glare

Where sun glare is identified as adversely affecting a driver's ability to sight signage and / or traffic control devices, sign locations may need to be adjusted and additional delineation and/or traffic control devices provided to address the risk from glare. Additionally, in the event that traffic control is adversely affected by glare at sunset and sunrise,

traffic controllers may need to assist in maintaining low traffic speeds.

All changes are to be noted in the daily diary.

5.1.3. Fog/Dust/Smoke

Where fog, dust or smoke is identified as adversely affecting a driver's ability to sight signage and / or traffic control devices, sign locations may need to be adjusted and additional delineation and/or traffic control devices provided to address the risk. All changes are to be noted in the daily diary.

Should works be affected by fog, dust or smoke to the extent that risk is considered unacceptable, all work shall cease immediately and Traffic Controllers (and other personnel if necessary) shall be deployed immediately to close the site.

5.1.4. Road Geometry, Terrain, Vegetation and Structures

5.1.4.1 Road Geometry

There is a curve on the approaching to the project site on Down Road towards Down Road south and straight after Down Road south.

Sign locations can be staggered to assist driver's visibility, in accordance with Australian Standards and under the supervision of an accredited AWTM. All signs shall be regularly inspected and re-positioned as required to reduce the effects of shadows. All changes shall be recorded in the daily diary.

5.1.4.2 Terrain

The vertical geometry through the site is flat.

Sign locations can be staggered to assist driver's visibility, in accordance with Australian Standards and under the supervision of an accredited AWTM. All signs shall be regularly inspected and re-positioned as required to reduce the effects of shadows. All changes shall be recorded in the daily diary.

5.1.4.3 Vegetation

Where vegetation impacts on the effectiveness of the traffic management, signage may be extended by 25% or reduced by 10% in order to increase visibility. Where this occurs, it should be recorded within the daily diary.

5.1.4.4 Structures

Where structures impede on the temporary signage it should be moved to accommodate under the supervision of an accredited AWTM and recorded in the daily diary.

5.2. Existing Traffic and Adverting Signs

All existing signage that is contradictory to the temporary signage implemented in the TGS's are to be covered with opaque material for the duration of the works. Regular drive throughs should ensure the integrity of the worksite and all traffic management. Where signs cannot be covered and conflict with the temporary signage, it

is to be removed.

6. Safety Plan

6.1. Occupational Safety and Health

All persons and organisations undertaking these works or using the roadwork site have a duty of care under statute and common law to themselves, their employees and all site users, lawfully using the site, to take all reasonable measures to prevent accident or injury.

This TMP forms part of the overall project Safety Management Plan, and provides details on how all road users considered likely to pass through, past, or around the worksite will be safely and efficiently managed for the full duration of the site occupancy and works.

6.2. Roles and Responsibilities

6.2.1. Responsibilities

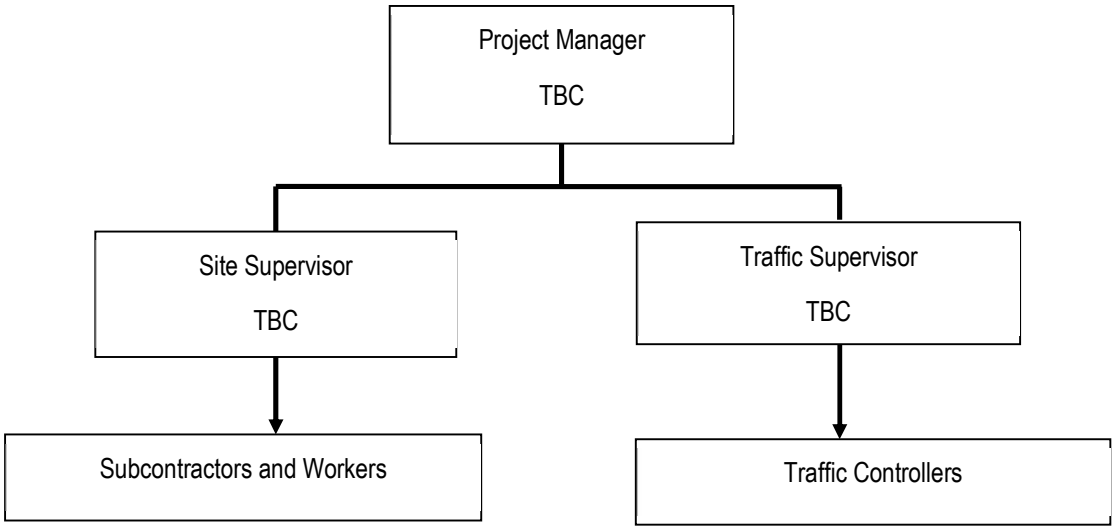
The Project Manager has the ultimate responsibility to ensure the TMP is implemented for the prevention of injury and property damage to employees, contractors, sub-contractors, road users and all members of the public. The Project Manager will ensure all site personnel are fully aware of their responsibilities, and that Traffic Controllers are appropriately trained and accredited and that sufficient controllers are available to ensure appropriate breaks are taken.

All personnel engaged in the field activities will follow the correct work practices as required by the CoP, AGTTM and AS1742.3. All personnel will not commence or continue work until all signs, devices and barricades are in place and operational in accordance with the requirements of the TMP.

All personnel responsible for temporary traffic management shall ensure that the number, type and location of signs, devices and barricades are to a standard not less than Appendix F of this plan, CoP, AGTTM and AS1742.3 (except where specifically detailed in this TMP with reasons for the variations). Should a situation arise that is not covered by this TMP, CoP, AGTTM or AS1742.3, the Road Authority Representative shall be notified.

6.2.2. Roles

The following diagram outlines the responsibility hierarchy of this contact.



6.2.2.1 Project Manager

The project manager shall:

- Ensure all traffic control measures of this TMP are placed and maintained in accordance with this plan and the relevant Acts, Codes, Standards and Guidelines
- Ensure suitable communication and consultation with the affected stakeholders is maintained at all times
- Ensure inspections of the temporary traffic management are undertaken in accordance with the TMP, and results recorded. Any variations shall be detailed together with reasons
- Review feedback from field inspections, worksite personnel and members of the public, and take action to amend the traffic control measures as appropriate following approval from the Road Authority's Representative
- Arrange and/or undertake any necessary audits and incident investigations

6.2.2.2 Site Supervisor

The site supervisor is responsible for overseeing the day-to-day activities, and is therefore responsible for the practical application of the TMP, and shall:

- Instruct workers on the relevant safety standards, including the correct wearing of high visibility safety vests
- Ensure traffic control measures are implemented and maintained in accordance with the TMP
- Undertake and submit the required inspection and evaluation reports to management
- Render assistance to road users and stakeholders when incidences arising out of the works affect the network performance or the safety of road users and workers
- Take appropriate action to correct unsafe conditions, including any necessary modifications to the TMP.

6.2.2.3 Traffic Management Personnel

- At least one person on site shall be accredited in Basic Worksite Traffic Management, and shall have the responsibility of ensuring the traffic management devices are set out in accordance with the TMP

- At least one person accredited in Advanced Worksite Traffic Management shall be available to attend the site at short notice at all times to manage variations, contingencies and emergencies, and to take overall responsibility for traffic management.

6.2.2.4 Traffic Controllers

Traffic Controllers shall be used to control road users to avoid conflict with plant, workers, traffic and pedestrians, and to stop and direct traffic in emergency situations.

Traffic Controllers shall:

- Operate in accordance with AGTTM Part 7: Traffic Controllers
- Be accredited in Basic Worksite Traffic Management
- Hold a current Traffic Controller's accreditation
- Be relieved from their duty after not more than 2 hours for a period of rest or "other duties" of at least 15 minutes as required by AGTTM and/or OS&H Regulations.
- Shall be site specific inducted (If Required)

6.2.2.5 Workers and Subcontractors

Workers and Subcontractors shall

- Correctly wear high visibility vests, in addition to other protective equipment required (e.g. footwear, eye protection, helmet sun protection etc.), at all times whilst on the worksite
- Comply with the requirements of the TMP and ensure no activity is undertaken that will endanger the safety of other workers or the general public
- Enter and leave the site by approved routes and in accordance with safe work practices

6.3. Personal Protective Equipment (PPE)

All personnel entering the work site shall correctly wear high visibility vests to AS/NZS 4602, in addition to other protective equipment required on a site-by-site basis (e.g. protective footwear, eye protection, helmet, sun protection, respiratory devices etc.) at all times whilst on the worksite.

6.4. Plant and Equipment

All plant and equipment at the workplace shall meet statutory requirements and have the required registration, licences or certification where required. All mobile equipment shall be fitted with suitable reversing alarms. All mobile plant and vehicles shall be fitted with a pair of rotating flashing yellow lamps in accordance with AS1742.3 clause 4.14. All workers will be made aware of the safe work practice at the time of the site induction.

6.5. Trip Hazards

The worksite and its immediate surroundings shall be suitably protected and free of hazards, which could result in tripping by cyclists or pedestrians. Hazards, which cannot be removed, shall be suitably protected to prevent injury to road users, including those with sight impairment. Where level differences are significant, suitable barriers, which preclude pedestrian access shall be used.

Where works extend beyond daylight hours and adjacent lighting is insufficient to illuminate hazards to cyclists or pedestrians, appropriate temporary lighting shall be installed.

The worksite shall be kept tidy to reduce the risk to workers.

7. Implementation

7.1. Traffic Guidance Schemes

The Traffic Guidance Scheme (TGS) outlined in Appendix "F" and listed below have been provided for the following stages to demonstrate the type of controls that will be implemented throughout the term of the contract. All sign and device requirements are shown on each TGS. Should the use of additional (not shown on the TGS or listing of devices) or reduced number of devices be required due to unforeseen needs, they shall be recorded within the Daily Diary as a variation to the TMP, following prior approval.

Table 11: Traffic Guidance Scheme Register

Staging	TGS Number & Revision	Details	Construction Works
Stage 1	2103019-TGS-01	Verge works at 40km/h	Main entry construction
	2103019-TGS-02	Verge works at 40km/h	Main entry construction
	2103019-TGS-03	Verge works at 60km/h	Main entry construction
	2103019-TGS-04	Verge works at 60km/h	Main entry construction
	2103019-TGS-05	Verge works after care at 60km/h	Main entry construction
	2103019-TGS-06	Verge works after care at 60km/h	Main entry construction
	2103019-TGS-07	Verge works at 80km/h	Main entry construction
	2103019-TGS-08	Verge works at 80km/h	Main entry construction
	2103019-TGS-09	Verge works after care at 80km/h	Main entry construction
	2103019-TGS-10	Verge works after care at 80km/h	Stage 1 exit construction
	2103019-TGS-11	Verge works at 40km/h	Stage 1 exit construction
	2103019-TGS-12	Verge works at 40km/h	Stage 1 exit construction
	2103019-TGS-17	Stage 1 internal works	Stage 1 internal works
Stage 2	2103019-TGS-13	Verge works	Down Road south exit construction
	2103019-TGS-14	Verge works temporary holding traffic with traffic controllers	Down Road south exit construction
	2103019-TGS-15	Verge works after care	Down Road south exit construction
	2103019-TGS-16	Stage 2 internal works	Stage 2 internal works

7.2. Sequence and Staging

The sequence of temporary traffic management installation, work activities and temporary traffic management removal are detailed below:

Table 12: Sequence and Staging

Step	Details
Pre-start	Contact 138 111 and advise of works.
Stage 1	Implement advanced warning signage.
Stage 2	Proceed construction works

Stage 3	Finish construction works and clear roadway.
Stage 4	Install after care signs
Stage 5	Pack up of TTM

7.3. Traffic Control Devices

7.3.1. Sign Requirements

All signs used shall conform to the designs and dimensions as shown in Australian Standard AS 1742.3, AGTTM and the CoP.

Prior to installation, all signs and devices shall be checked by the Site Supervisor or a suitably qualified person to ensure that they are in good condition and meet the following requirements:

- Mechanical condition - Items that are bent, broken or have surface damage shall not be used.
- Cleanliness - Items should be free from accumulated dirt, road grime or other contamination.
- Colour of fluorescent signs - Fluorescent signs whose colour has faded to a point where they have lost their daylight impact shall be replaced.
- Retroreflectivity. - Signs for night-time use whose retroreflectivity is degraded either from long use or surface damage and does not meet the requirements of AS 1906 shall be replaced.
- Battery operated devices - shall be checked for lamp operation and battery condition.

Where signs do not conform either to the requirements of AS 1742.3, AGTTM and the CoP, or would fail to pass any of the above checks, they shall be replaced on notice.

Signs and devices shall be positioned and erected in accordance with the locations and spacing's shown on the drawings. All signs shall be positioned and erected such that:

- They are properly displayed and securely mounted;
- They are within the driver's line of sight;
- They cannot be obscured from view;
- They do not obscure other devices from the driver's line of sight;
- They do not become a possible hazard to workers or vehicles; and
- They do not deflect traffic into an undesirable path.

Signs and devices that are erected before they are required shall be covered by a suitable opaque material. The cover shall be removed immediately prior to the commencement of work.

Where there is a potential for conflict of information between existing signage and temporary signage erected for the purpose of traffic control, the existing signs shall be covered. The material covering the sign shall ensure that the sign cannot be seen under all conditions i.e. day, night and wet weather. Care will be taken to ensure existing signs are not damaged by the covering material or by adhesive tape.

7.3.2. Tolerances on Positioning of Signs and Devices

Where a specific distance for the longitudinal positioning of signs or devices with respect to other items or features is stated, for the spacing of delineating devices or for the length of tapers or markings, the following tolerances

may be applied: -

(a) Positioning of signs, length of tapers or markings:

(i) Minimum, 10% less than the distances or lengths given.

(ii) Maximum, 25% more than the distances or lengths given.

(b) Spacing of delineating devices:

(i) Maximum, 10% more than the spacing shown.

(ii) No minimum.

These tolerances shall not apply where a distance, length or spacing is already stated as a maximum, a minimum or a range.

7.3.3. Flashing Arrow Signs

Where flashing arrow signs are required to better delineate lane tapers, these signs will comprise a matrix of lamps or light emitting elements in the form of an arrow that is flashed in a cyclical manner to provide advance warning. The sign shall have a minimum dimension of 2400 mm. x 1200 mm. and conform to the requirements of AS/NZS 4192. The Project Site Supervisor shall ensure that all equipment used meets the Australian Standard.

7.3.4. Delineation

7.3.4.1 General

Cones shall be used for delineation unless other treatment is specified in the Traffic Management Plan or on the Traffic Guidance Schemes. All cones shall be at least 700 millimetres in height and constructed from fluorescent orange or red material that is resilient to impact and will not damage vehicles when hit at low speed. Cones will be fitted with suitable white retro-reflective tape placed in accordance with AS 1742.3, AS 1742.3, AGTTM and the CoP.

Cones shall be designed to be stable under reasonably expected wind conditions and air turbulence from passing traffic.

The base of the cones will be secured so that they are not dislodged by traffic. Cones will be inspected at intervals necessary to ensure any mis-alignment or displacement is identified and corrected prior to this causing disruption to traffic.

Where specified, temporary frangible or otherwise non-hazardous delineator posts or bollards may be used for edge protection and taper delineation. Posts or bollards shall have a maximum dimension of 60 millimetres when measured along the longest side of a square or rectangular section or across the diameter of a circular section. Base design shall permit easy fixing to either sealed or unsealed surfaces and not intrude into traffic lanes greater than 50 millimetres from the face of the post or bollard.

All posts or bollards shall be erected in accordance with the Traffic Guidance Schemes. Posts and bollards shall

be a minimum of 1000 mm. high, capable of being fixed to the road pavement by a suitable road adhesive or by fastening bolts or spikes. Fixing shall be in accordance with manufacturer's recommendations.

Posts and bollards shall be fitted with suitable white retro-reflective tape placed in accordance with AS 1742.3, AGTTM and the CoP.

All posts or bollards will be inspected daily and where displaced or missing made good immediately. All delineator posts are to be completely removed at the completion of all stages of construction and prior to the placement of asphalt surfacing. If adhesive is used to affix the posts this shall be completely removed from the road surface so that a flush surface is obtained.

7.3.4.2 Delineation Spacing

All cones and post type delineators shall be spaced according to Table 4.7 of AS 1742.3-2019 and the Traffic Guidance Schemes.

7.4. Site Access for Work Vehicles

Construction and/or traffic management vehicles entering and exiting the traffic stream shall be mindful of the conditions that may affect the safety of these movements.

Access points shall be noted on the TGS and traffic controllers, work personnel and suppliers notified. Traffic Controllers may assist work vehicles enter and exit the work area.

All entry and exit movements will be in accordance with the Road Traffic Code and shall be undertaken in the following manner:

Vehicles shall:

- Decelerate slowly and signal their intention by indicator to leave the traffic stream;
- Activate the vehicle's rotating yellow lamp, where fitted, once a speed of 20 km/h. has been reached and at least 50m prior to the exit location.
- Switch on the vehicle hazard lights once the vehicle is stationary.
- Where risks associated with unassisted exit or entry to or from the traffic stream are high, Traffic Controllers should be used to assist entry and exit movements.

Vehicles fitted with rotating amber lamps shall have the vehicle's rotating lamp activated prior to entering the traffic stream and shall undertake the following.

- Switch off the vehicle hazard lights;
- Indicate intention to enter the traffic stream using direction indicators;
- Ensure there is a suitable gap from oncoming traffic to allow for a safe entry manoeuvre; and,
- Turn off the rotating yellow lamp(s) once a speed of 40 km/h is reached.

Entry and exit manoeuvres shall be avoided in close proximity to intersections. Work personnel shall not cross traffic streams on foot unless absolutely necessary.

Construction or traffic management vehicles shall only be parked where indicated on the Traffic Guidance

Scheme. Vehicles shall not obstruct paths and be parked an adequate distance from intersections or driveways to ensure clear sight lines remain for all road users.

7.5. Communication TMP Requirements

Contractor to liaise with stakeholders and submit notification to City of Albany for each of the work stages.

8. Emergency Arrangements and Contingencies

8.1. Traffic Incident Procedures

In the event of an incident or accident, whether or not involving traffic or road users, all work shall cease and traffic shall be stopped as necessary to avoid further deterioration of the situation. First Aid shall be administered as necessary, and medical assistance shall be called for if required.

Road plant within the work area that may impact on any services requiring access to a crash site will be cleared from the area quickly as necessary.

8.1.1. Serious Injury or Fatality

In the case of serious injury or fatality occurring within the traffic management site all work shall cease immediately, machinery and vehicles turned off and the area cleared of personnel as soon as possible. Traffic Controllers (and other personnel if necessary) shall be deployed immediately to ensure no traffic or other road users approach the area.

An Ambulance and Police shall be called on telephone number 000 where life threatening injuries are apparent.

All road workers and traffic management personnel shall preserve the scene leaving everything in situ, until direction is given by Police or WorkSafe.

A site-specific detour route and/or road closure point will be determined, signed and controlled by traffic management personnel and advised to Police, who will take charge of the site upon arrival. Detour routes will be determined so as to cater for all types of vehicles required to use them. An example of how to manage an emergency can be found in AGTTM – Part 10, Section 5.

All site personnel shall be briefed on control procedures covering incidents and crashes that result in serious injury or fatalities.

8.1.2. Minor Incident or Vehicle Break Down within Site

Broken down vehicles and vehicles involved in minor non-injury crashes shall be temporarily moved to the verge as soon as possible after details of the crash locations have been gathered and noted. Where necessary to maintain traffic flow, vehicles shall be temporarily moved into the closed section of the work area behind the cones, providing there is no risk to vehicles and their occupants or workers. Suitable recovery systems shall be used to facilitate prompt removal of broken down or crashed vehicles. Assistance shall be rendered to ensure the impact of the incident on the network is minimised.

Any traffic crash resulting in non-life threatening injury shall be reported to the WA Police Service on 131 444.

Details of all incidents and accidents shall be reported to the Site Supervisor and Project Manager using the incident report form at Appendix “C” (or similar).

8.2. Emergency Services

Emergency services shall be notified of the proposed works nature, location, date and times as well as contact details for the site supervisor.

On-site traffic controllers will be equipped with mobile communications to advise and/or liaise with emergency services to ensure a prompt response should the need arise.

8.3. Dangerous Goods

Should any incident arise involving vehicles transporting dangerous goods, all work shall cease immediately, machinery and vehicles turned off and the area cleared of personnel as soon as possible. Traffic Controllers (and other personnel if necessary) shall be deployed immediately to ensure no traffic or other road users approach the area.

Emergency services shall be notified of the proposed works nature, location, date and times as well as contact details for the site supervisor. All site personnel shall be briefed on evacuation and control procedures.

8.4. Damage to Services

In the event that gas services are damaged, all work shall cease immediately, machinery and vehicles turned off and the area cleared of personnel as soon as possible. Traffic Controllers (and other personnel if necessary) shall be deployed immediately to ensure no traffic or other road users approach the area. The Police Service and relevant supply authority shall be called immediately. Damage to any other services shall be treated in a similar manner except machinery may remain operational and access may be maintained where it is safe to do so.

All site personnel shall be briefed on evacuation and control procedures.

8.5. Failure of Services

8.5.1. Failure of Traffic Signal

In the event that traffic signal infrastructure near the worksite is damaged or fails to operate correctly, all work shall cease immediately and Main Roads WA Road Network Operation Centre (RNOC) shall be notified immediately (phone 138 111).

8.5.2. Failure of Street Lighting

In the event that street lighting is damaged and fails to operate or operates incorrectly, Traffic Controllers (and other personnel if necessary with appropriate temporary lighting) shall be deployed immediately if the lighting failure adversely affects road user safety to control traffic movements as required. Western Power shall be notified immediately.

8.5.3. Failure of Power

In the event that power infrastructure is damaged and poses a risk through live current, Traffic Controllers (and

other personnel if necessary) shall be deployed immediately to secure the site and prevent entry to the area affected by live power. Western Power shall be notified immediately (phone 13 13 51).

8.6. Emergency Contacts

In the event of an emergency the following relevant authorities must be contacted and advised of the nature of works, location, type of emergency and contact details for the site supervisor.

Emergency Service	E-mail/Website	Phone (Emergency)
WA Police Service	State.Traffic.Intelligence.Planning.&.Co-ordination.Unit@police.wa.gov.au	000
St John Ambulance	ambulanceoperations@stjohnambulance.com.au	000
DFES	dfes@dfes.wa.gov.au	000
Power	http://www.westernpower.com.au/customerservice/contactus/	13 13 51
Gas	enquiries@atcogas.com.au	13 13 52

9. Monitoring and Measurement

9.1. Daily Inspections

Prior to works commencing the Site Supervisor shall undertake to communicate the Traffic Management Plan to all key stakeholders and affected parties.

On completion of setting out the traffic control measures, the site is to be monitored for a suitable period of time. If traffic speeds on the approaches to the work site are assessed as being above the temporary posted speed zone for the work site, the Site Supervisor is to initiate action to modify the approach signage and tapers in accordance with the requirements of AS1742.3. All such actions are to be recorded in the Daily Diary. Should road users be observed to continue to travel in excess of the posted speed limit, the police may be requested to attend the site to enforce the temporary posted speed limit.

The Advanced Worksite Traffic Management accredited supervisory person at the worksite may conditionally approve changes made to a complex traffic management plan subject to review and endorsement of the change by an RTM as soon as practicably possible.

The Traffic Management Contractor shall ensure that all temporary signs, devices and controls are maintained at all times. To achieve this, procedures in line with the requirements outlined in AGTTM Part 6 will be instituted. The monitoring program shall incorporate inspections:

- Before the start of work activities on site,
- During the hours of work,
- Closing down at the end of the shift period, and
- After hours.

A daily record of the inspections shall be kept indicating

- When traffic controls where erected,
- When changes to controls occurred and why the changes were undertaken,
- Any significant incidents or observations associated with the traffic controls and their impacts on road users or adjacent properties.

The Traffic Management Contractor shall ensure that personnel are assigned to monitor the traffic control scheme. Inspections shall at least satisfy the following requirements.

9.1.1. Before Works Start

- Confirm TMP and TGS are suitable for the day's activities;
- Inspect all signs and devices to ensure they are undamaged, clean and comply with the requirements depicted on the TGS;
- All lamps should be checked and cleaned as necessary;
- After any adjustments have been made to the signs and devices, conduct a drive through inspection to confirm effectiveness.

9.1.2. During Work Hours

- Designate and ensure that appropriate work personnel drive through the site periodically to inspect all signs and devices and ensure they are undamaged and comply with the requirements depicted on the Traffic Guidance Schemes;.
- Attend to minor problems as they occur;
- Conduct on the spot maintenance/repairs as required;
- When traffic controllers are on the job, ensure they remain in place at all times. Relieve controllers as necessary to ensure attentiveness is retained;
- During breaks or changes in work activities remove or cover any signs that do not apply (e.g. PREPARE TO STOP, Workers symbolic);
- Re-position signs and devices as required by work processes throughout the day and keep records of any changes.

9.1.3. Closing Down Each Day

- Conduct a pre-close down inspection, allowing time for any appropriate maintenance works;
- Remove any unnecessary signage (e.g. Prepare to Stop, Symbolic Workers);
- Replace any unnecessary signage with appropriate delineation;
- Install barriers and lights where required;
- Drive through site and confirm all signs and devices are operating correctly with no misleading visual cues;
- Record details of inspection and any changes made to layout.

9.1.4. After Hours

- Appoint personnel to conduct after dark checks. Replace any signs / devices not working, missing or damaged and record in diary.
- Appoint personnel to conduct checks on non-work days (e.g. weekends). Replace any signs / devices not working, missing or damaged and record in diary.
- The frequency of inspections needs to align with the amount of traffic management on site, weather conditions, vehicle types and volumes, road user behaviour and site specific risks.

9.2. TMP Audits and Inspections

One compliance audit (using the 'Compliance Audit Checklist for Traffic Management for Works on Roads' – found on the MRWA website) shall be conducted following setting up of the traffic management and prior to commencement of the works.

Audit findings, recommendations and actions taken shall be documented and copies forwarded to the Project Manager and the Road Authority's Representative

9.3. Records

A daily diary recording all inspections including variations to the approved TMP shall be kept using the Daily Diary.

The Traffic Supervisor is to record all inspections made on a daily basis and at those times prescribed by the Traffic Management Implementation Standards. Upon completion of each day the Traffic Supervisor shall provide copies of the daily diary record to the Project Manager.

The Traffic Supervisor is to record all variations made to the approved Traffic Management Plan on a daily basis

and indicate clearly the nature of the variations and the reason for the variations. Upon completion of each day the Traffic Supervisor shall provide copies of the variation record to the Project Manager.

9.4. Public Feedback

Contractor shall liaise with stakeholders for any public feedback.

10. Management Review and Approvals

10.1. TMP Review and Improvement

The Project Manager will ensure that the Traffic Management Plan is implemented and evaluated for effectiveness. The Supervisor shall inspect and monitor traffic movements around the site in conjunction with the personnel who have erected the control measures.

The Project Manager will implement a procedure that ensures comments and complaints received from the public are registered. The Supervisor shall be responsible for the monitoring of the Register on a daily basis.

TCP to be reviewed and updated every 3-6 months to ensure proposed long term Traffic Management complies with changing site environment.

10.2. Variations

There are no variations.

10.3. Approvals

Before to works commencing it is necessary to seek approval from the following:

- City of Albany;
- Utility Service Providers (e.g. Western Power, Water Corp, etc.)

Appendix A - Notification of Roadworks

To be completed by contractor

NOTIFICATION OF ROADWORKS

Notifications are to be distributed at least one (1) week in advance of works
Where the traffic management is to interfere with traffic signal operation, prior approval is required 3wks in advance via enquiries@mainroads.wa.gov.au.
Where the works will place restrictions on Oversize and/or Restricted Access Vehicles Main Roads HVS requires at least 2 weeks notice.

TMP reference		Communication plan sent to Main Roads	Yes ☐	No ☐	N/A ☐
Anticipated start date:		Anticipated finish date:			
Daily work hours:		Is weekend work applicable?:	Yes ☐	No ☐	
Location of works (Road/Street, Suburb):					
Description of works:					
Description of traffic management arrangements:	To accommodate the proposed works, traffic control are to install the following stages of work;				
Posted Speed Limit:		Worksite speed limit:		After hours speed limit:	

What is the anticipated effect on traffic flows?:				Will there be restricted width for oversize escorted vehicles?:		Yes ☐	No ☐
Are lanes closed at signals?:	Yes ☐	No ☐	N/A ☐	Are signal loops or hardware affected?:	Yes ☐	No ☐	N/A ☐
Will signal phases need time changes?	Yes ☐	No ☐	N/A ☐	Will signals need to revert automatically?:	Yes ☐	No ☐	N/A ☐
Date of signal 'black out':				Times of signal 'black out':			
Will Police attendance be required?:	Yes ☐	No ☐		Dates for Police attendance :			
Are bridges located in area of works, (inc detours)?:	Yes ☐	No ☐		Will changes to traffic flows/composition occur on bridges?:		Yes ☐	No ☐
Are the works located within a School Zone?:	Yes ☐	No ☐		Will children's crossings be altered during works?:		Yes ☐	No ☐

Oversize and/or Restricted Access Vehicle Roadwork Restrictions

Location of works (include – road name, nearest intersection or marked location and SLKs)					
Road Name(s) Bridge number if applicable					
Nearest Intersection / marked location / SLKs					
Additional information					
Will there be a width restriction for oversize vehicles exceeding 2.5m in width?	Yes ☐	No ☐	Will there be a height restriction for oversize vehicles exceeding 4.3m in height?	Yes ☐	No ☐
If yes, what width limit is to be imposed on oversize vehicles travelling through the site?					

Will the width restrictions be in place outside the daily work hours?	Yes ☐	No ☐	If yes, what is the minimum height of the structure causing the restriction?		
Can the width restrictions be removed if operators provide prior notice?	Yes ☐	No ☐	If the width restrictions are fixed in place, are operators able to have a wider oversize combination if a 1.2m ground clearance can be achieved? Do not complete if width restrictions can be removed.	Yes ☐	No ☐
If yes, how much notice will be required? (i.e. 24/48 hours' notice).			If yes, how much notice will be required? (i.e. 24/48 hours' notice).		
Please provide the name and phone number of the best contact for further details in relation to these works.	Name: Contact number (mobile):				
Please provide the name and phone number of the contact for prior notification of movements.	Name: Contact number (mobile):				
Will the work result in a road closure that will impact on Restricted Access Vehicles?	Yes ☐	No ☐	If yes, have discussions been held with Main Roads Heavy Vehicle Services (HVS) in regards to a suitably approved RAV network detour. If no, please contact HVS Route Assessments on 138 486 for assistance. Note: an assessment request for a proposed detour may take up to a week to be processed.	Yes ☐	No ☐

Road Authority:					
Postal Address:					
Telephone:		Email:		Facsimile:	
Contact:					
Telephone:		Email:		Mobile:	

Construction Contractor:					
Postal Address:					
Telephone:		Email:		Facsimile:	
Contact:					
Telephone:		Email:		Mobile:	
After hours contact:		Telephone:		Mobile:	

Traffic Management Contractor:					
Postal Address:					
Telephone:		Email:		Facsimile:	
Contact:					
Telephone:		Email:		Mobile:	
After hours contact:		Telephone:		Mobile:	

Distribution List	Email/Website
WA Police State Traffic Coordination	State.Traffic.Intelligence.Planning.&.Co-ordination.Unit.SMAIL@police.wa.gov.au
Children's Crossing Unit	childrenscrossingunitsmail@police.wa.gov.au mailto:student.pedestrian.policy.unit@police.wa.gov.au
Main Roads Customer Information Centre	enquiries@mainroads.wa.gov.au
Main Roads Road Network Operations Centre	RNOC.Control.Room.Information.Desk@mainroads.wa.gov.au
Main Roads Heavy Vehicle Services	hvs@mainroads.wa.gov.au
Main Roads Engineer Bridge Loading	DLSEHeavyLoadsGroup@mainroads.wa.gov.au
St John Ambulance	BusinessSupportServices@stjohnwa.com.au
Fire & Emergency Services	Dfes@dfes.wa.gov.au

Public Transport Authority	transperth.servicedisruptions@pta.wa.gov.au
Arc Infrastructure	thirdparty.notifications@arcinfra.com
Main Roads Digital Communications	communications@mainroads.wa.gov.au
Local Government	

Note: the above distribution list is an example and should be modified as required. See section 4.4 of the Code of Practice

NOT APPLICABLE

APPLICATION FOR APPROVAL TO VARY REQUIREMENTS OF AS1742.3, AGTTM OR MRWA TRAFFIC MANAGEMENT CODES OF PRACTICE

Form Instruction

1. **Section A** – Identify the Principal Agency / person commissioning the activity. (Does not include contractors, subcontractors or **traffic** management company/traffic planners etc).
2. **Section B** – Identify activity location, start / finish date and time, type of traffic management, description location of activity.
3. **Section C** – Identify the person that has prepared the Traffic Management Plan, this person shall have AWTM accreditation.
4. **Section D** – For Works undertaken on a State road or on behalf of Main Roads Western Australia the details of the risk assessment process identified in this application form must be documented and endorsed by an accredited Roadworks Traffic Manager[1].

   All applications to be addressed to the applicable Main Roads Regional office. For contact information please refer to the online Application kits and guidelines to undertake works. (www.mainroads.wa.gov.au >Technical & Commercial > Working on roads > Third Party Works).

   For all other applications the details of the risk assessment process identified in this application form must be documented and endorsed[1] by the person responsible for approving the traffic management plan.

   Contact with the appropriate road authority should be made prior to lodgement of this application to determine its suitability and for any additional requirements.
5. **Section E** - Risk implication, identification and assessment process must be undertaken in accordance with Risk Management – Principles and Guidelines AS/NZS ISO 31000. The likelihood and consequences should be rated after the application of any additional counter measures taken utilising Tables from Annexure's 202B and 203B, Main Roads WA - Specification 202 and 203 respectively.
6. **Incomplete or applications not signed** by the RTM[1] will not be processed.

A

Applicant (Principal for the Works)					
Postal address					
Suburb		State		Postcode	
Project Manager				Telephone	
Email					

B

Anticipated start date		Anticipated finish date			
Daily work hours; From		Weekend work applicable	Yes ☐ Sat ☐ Sun	No ☐	
Location of works (Road/Street Suburb),					
Road type (eg undivided, two lane)					
Description of works					
Are alterations to permanent traffic signals required?	Yes ☐	No ☐	N/A ☐		
Posted Speed Limit		Worksite speed limit		After hours speed limit	

C

TMP Designer					
Accreditation Number					
Postal address	Level 1 / 908 Albany Highway				
Suburb	East Victoria Park	State	WA	Postcode	6101
Email		Telephone	(08) 9355 1300	Facsimile	N/A

[1]A person with AWTM accreditation is permitted to endorse a variation of less than 135 % of the allowable lane capacity as outlined in table 4.10 of AS 1742.3. See section 4.5 of the Code of Practice.

	Endorsement Signature		Date	Click here to enter a date.

APPLICATION FOR APPROVAL TO VARY REQUIREMENTS OF AS1742.3, AGTTM OR MRWA TRAFFIC MANAGEMENT CODES OF PRACTICE

D	RTM Endorsing Variation					
	Accreditation Number					
	Postal address					
	Suburb		State		Postcode	
	Email		Telephone		Facsimile	
	Endorsement signature		Date			

For Internal Use Only							
Approving Road Authority							
Approving Officer Position							
Application Approved	Yes ☐ No ☐	If Not Why Not					
Additional Conditions							
Approved By: Signature		Title		Date		File Num	

E	Description of Variation Requested	Specify Point of Departure from Standard / Code of Practice (List section and page number)	Justification (Why is this necessary)	Additional Counter Measures to be Taken (Identify additional counter measures to be used to negate the lesser treatment)	Residual Risk*		
					L	C	RR

Appendix C - Record Forms

Daily Diary

Location: _____ **Client:** _____ **Date:** _____

TMP No: _____ **TGS No:** _____ **Weather Conditions:** _____ **Diary Sheet:** _____ **of** _____

Start Time at Depot: _____ **Time Arrive Onsite:** _____ **Commencement of Site Setup:** _____ **Site Setup and Operational:** _____

Site Pulled Down at: _____ **Time Aftercare signs setup:** _____ **TGS No:** _____ **Time left site:** _____ **Finish time at Depot:** _____

☐ **Day Works** ☐ **Night Works** ☐ **Emergency Response** **Site Setup as per TGS ☐ Yes ☐ No (if not comment on next page)**

☐ **Attendance at Pre-Start Meeting** **Did an incident occur (if yes complete incident report form) ☐ Yes ☐ No**

I confirm that the above times of 'setup' and 'pulldown' of traffic management signs and devices are a true and correct

Name (Site Supervisor): _____ Signed: _____

Drive Through Checks (Checks must be conducted at least every 2 hours)

Time of check entered. Rule off and leave blank if the check does not apply to the site. Make a note of any issues on the next page.

Traffic Management Site Checks	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Time										
Are signs upright, clean, visible, level & stable										
Are taper lengths correct										
Are speed limit signs correct and doubled up										
Are sign spacings correct										
Are cone/bollard alignments straight & spaced correctly										
Are devices operating correctly										
Are pedestrians, cyclists and other vulnerable road users catered for										
Are lane widths adequate										

Are vehicle queue lengths acceptable										
Is road surface condition adequate										
Is the work area clearly defined?										
Are the travel paths for both directions of traffic clearly defined? Is the work area appropriately separated from passing traffic? Check the transition at the interface of the modified alignment.										
Are centre lines/lane lines/edge lines clear and unambiguous?										
Are sight and stopping distances adequate at works, at intersections and driveways?										
Are traffic lanes clearly delineated?										
Are lighting for night-time controls operating correcting?										
Have other risks associated with traffic management at night been catered for, e.g. placement of lighting towers										

No. of TTM Vehicles Onsite: _____ **No. of TTM Personnel Onsite:** _____

TTM Personnel Names & Accreditations:

	Accreditation Details (tick)					**Time of Break from Stop/Slow** (Traffic controllers must have a 15 minute break every two hours of constant stop/slow operation)							
Name	**TC**	**BWTM**	**WTM**	**AWTM**	**OTMA**	On	Off	On	Off	On	Off	On	Off
						:	:	:	:	:	:	:	:
						:	:	:	:	:	:	:	:
						:	:	:	:	:	:	:	:
						:	:	:	:	:	:	:	:
						:	:	:	:	:	:	:	:
						:	:	:	:	:	:	:	:

Additional Comments _____

I confirm that the details contained herein are true and correct

Name: (TTM Leader): _____ Signed: _____

Incident Report Form.

Region: Contract No.:	Incident Report No.: Contractor:

Safety Incident Report No:

Major Incident Reports must be forwarded to the Superintendent within 48 hours of the incident occurring or becoming apparent.

Contractors shall use this Form for reporting of traffic Incidents on works under Contract and this form supplements the Safety Incident Report Form.

1.0 Details of Incident	Reported to:	☐ Supervisor	☐ TMR	☐ Other
Date of incident		Time of Incident		
Work Being Undertaken				
Location (include direction and lane if applicable)				
Crash Type				

Incident type	Near Miss	Property Damage	Injury	Fatality
Atmospheric Conditions	Clear	Overcast	Raining	Fog/Smoke/Dust

Light Conditions	Day Light	Night Time	Dawn/Dusk
Road Surface	Unsealed	Sealed	

Road Condition	Wet		Dry
Street Lighting	On	Off	Not provided
Police Attended Yes/No		Officer name/number	

Other relevant details, (Last maintenance grade, watering and dust conditions):

2.0 Details of Traffic Management in place:			
TMP/TGS No:		Name of individual that prepared the TGS	
Time last inspected:		Accreditation No:	

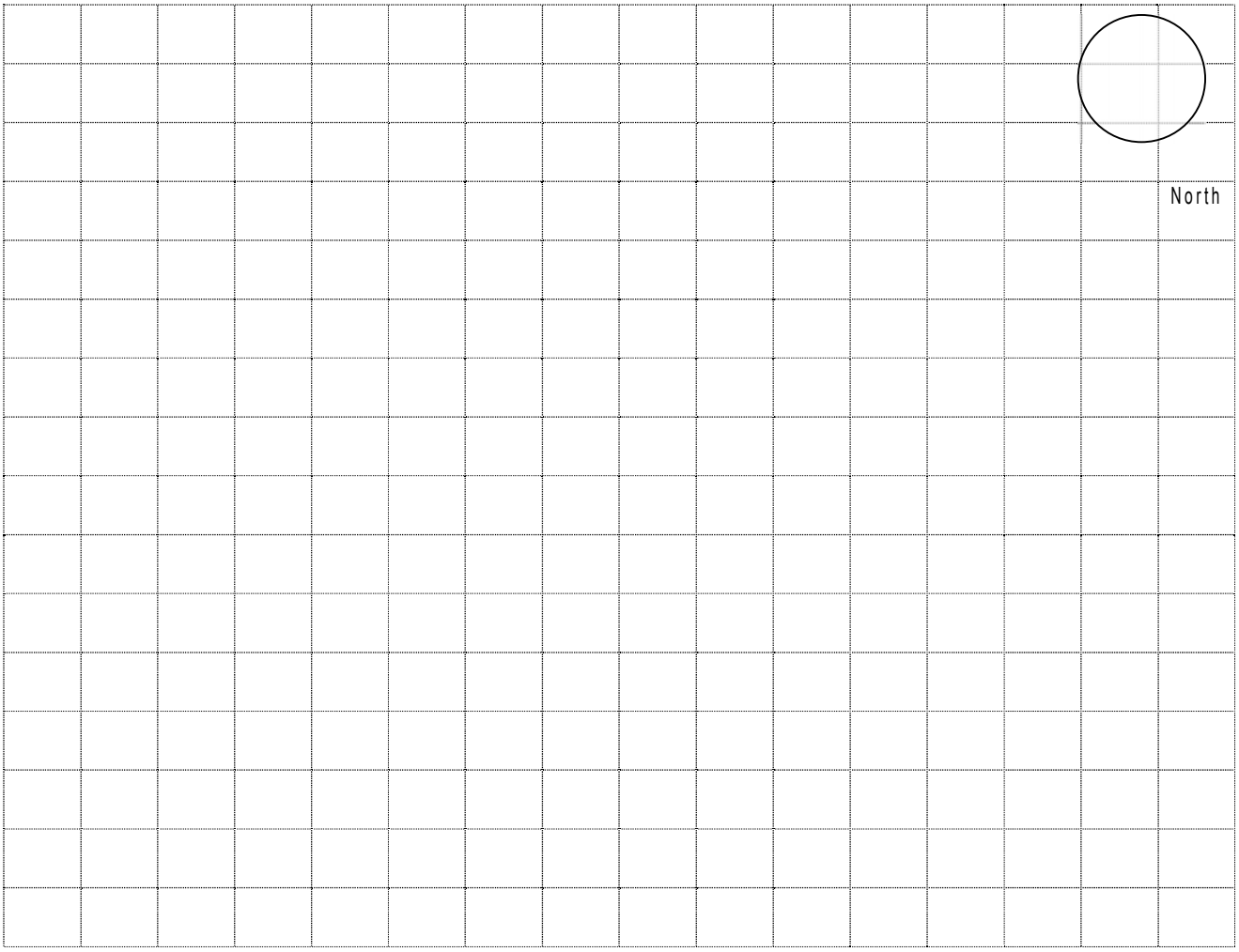
Date TGS Approved: .....

Date TMP Approved: .....

3.0	Descriptions of Vehicles:			
Detail (make, model/ped/cyclist/VRU)		Registration No	Direction of Travel	Age of Driver
3.1	Vehicle 1			
3.2	Vehicle 2			
3.3	Vehicle 3			
Comments:				

4.0	Description of Incident:

Draw the Incident including the direction of travel, traffic control signs, fixed structures and north point.



5.0	Attachments: The following copies MUST be submitted with this Incident Report.					
Approved TMP ☐		Approved TGS ☐		Approvals for temporary speed restrictions ☐	Daily Diary ☐	

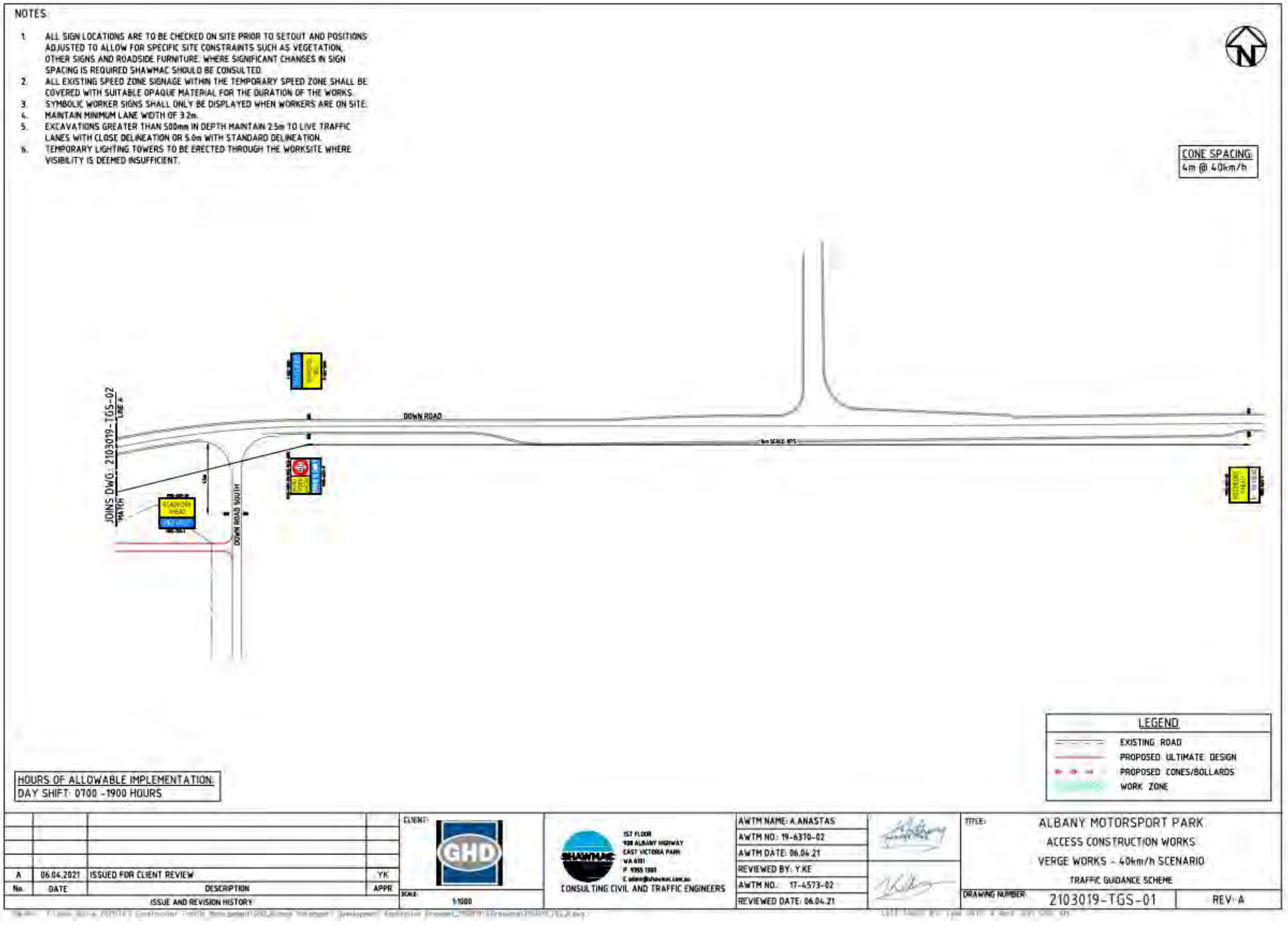
6.0	Police Report:					
Accident reported to Police:	☐ YES	☐ NO	Report made by	☐ Phone	☐ Fax	☐ Mail or E-mail
Date Report Made	Day	Month Year	Police WA Reference Number			

7.0	Details of Person Completing this Incident Form:
Name:	Contractor Name:
Position:	
Date:	Signature:

Volumes

Location	Average weekday (vpd)	Trucks	Average weekend (vpd)	Trucks
Down Road	844 vpd (2017)	34%	419 vpd (2017)	40%
Albany Highway	4,950 vpd (2017)	20%	3,520 vpd (2017)	16%

Appendix E - Roadway Access Authorisation Permit


NOTES:
1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
2. ALL EXISTING SPEED ZONE SIGNAGE WITHIN THE TEMPORARY SPEED ZONE SHALL BE COVERED WITH SUITABLE OPAQUE MATERIAL FOR THE DURATION OF THE WORKS.
3. SYMBOLIC WORKER SIGNS SHALL ONLY BE DISPLAYED WHEN WORKERS ARE ON SITE.
4. MAINTAIN MINIMUM LANE WIDTH OF 3.2m.
5. EXCAVATIONS GREATER THAN 500mm IN DEPTH MAINTAIN 2.5m TO LIVE TRAFFIC LANES WITH CLOSE DELINEATION OR 5.0m WITH STANDARD DELINEATION.
6. TEMPORARY LIGHTING TOWERS TO BE ERECTED THROUGH THE WORKSITE WHERE VISIBILITY IS DEEMED INSUFFICIENT.
N
CONE SPACING:
4m @ 40km/h
JOINS DWG.: 2103019-TGS-02
MATCH LINE A
DOWN ROAD
DOWN ROAD SOUTH
HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS
LEGEND
EXISTING ROAD
PROPOSED ULTIMATE DESIGN
PROPOSED CONES/BOLLARDS
WORK ZONE
A 06.04.2021 ISSUED FOR CLIENT REVIEW YK
No. DATE DESCRIPTION APPR
ISSUE AND REVISION HISTORY
CLIENT: GHD
SCALE: 1:1000
1ST FLOOR
938 ALBANY HIGHWAY
EAST VICTORIA PARK
WA 6101
CONSULTING CIVIL AND TRAFFIC ENGINEERS
AWTM NAME: A.ANASTAS
AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21
TITLE:
ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 40km/h SCENARIO
TRAFFIC GUIDANCE SCHEME
DRAWING NUMBER 2103019-TGS-01
REV: A

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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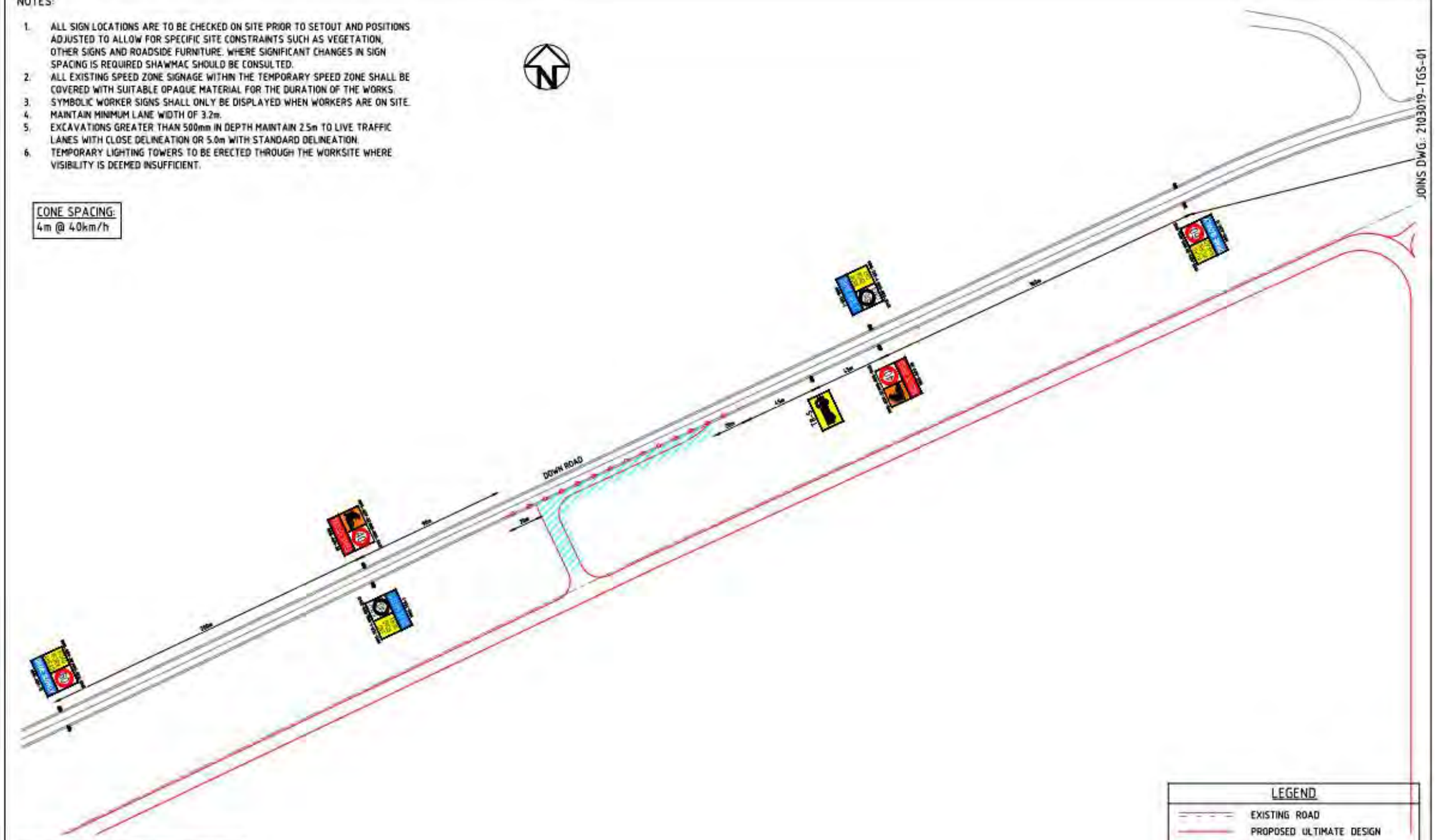
6. TEMPORARY LIGHTING TOWERS TO BE ERECTED THROUGH THE WORKSITE WHERE VISIBILITY IS DEEMED INSUFFICIENT.

CONE SPACING:
4m @ 40km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

SHAWMAC
1ST FLOOR
908 ALBANY HIGHWAY
EAST VICTORIA PARK
WA 6101
P 9355 1900
E admin@shawmac.com.au
CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS	
AWTM NO.: 19-6370-02	
AWTM DATE: 06.04.21	
REVIEWED BY: Y.KE	
AWTM NO: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 40km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-02 REV: A

NOTES:

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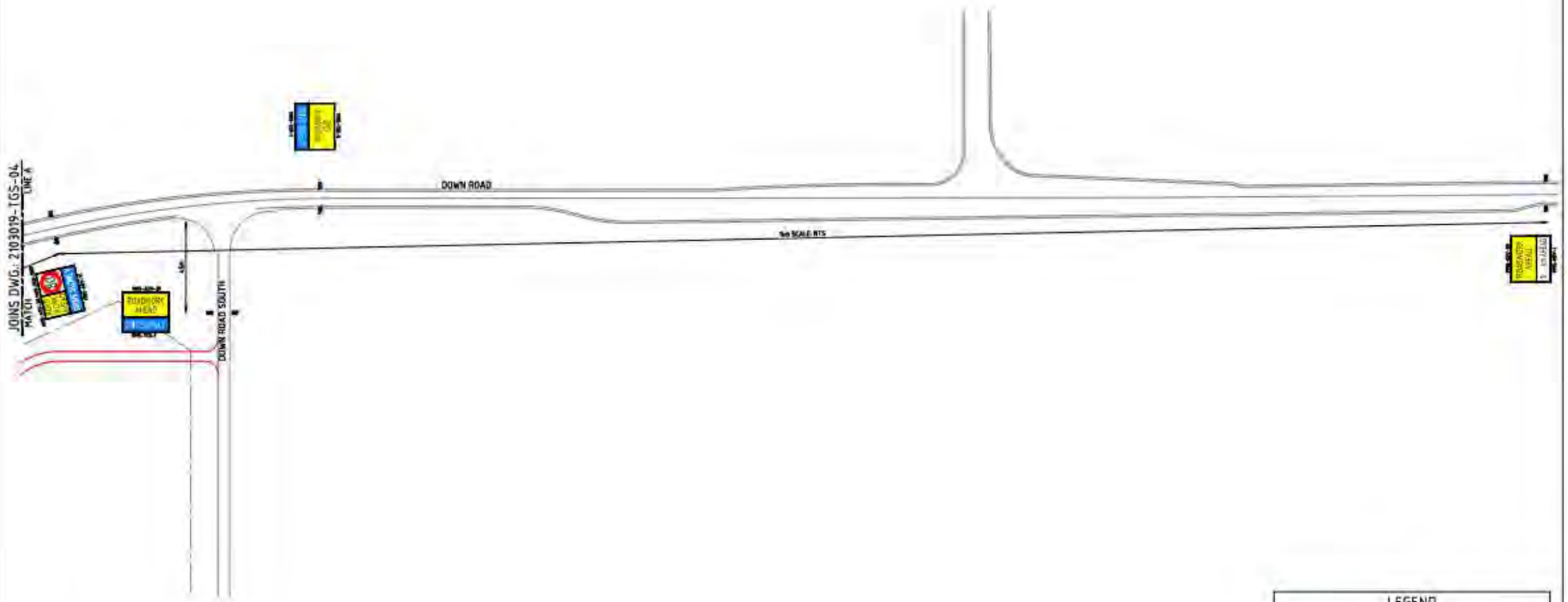
CONE SPACING:
4m @ 60km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 - 1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

SHAWMAC
1ST FLOOR
908 ALBANY HIGHWAY
EAST VICTORIA PARK
WA 6101
P: 9355 1930
CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS	
AWTM NO.: 19-6370-02	
AWTM DATE: 06.04.21	
REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 60km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-03 REV: A

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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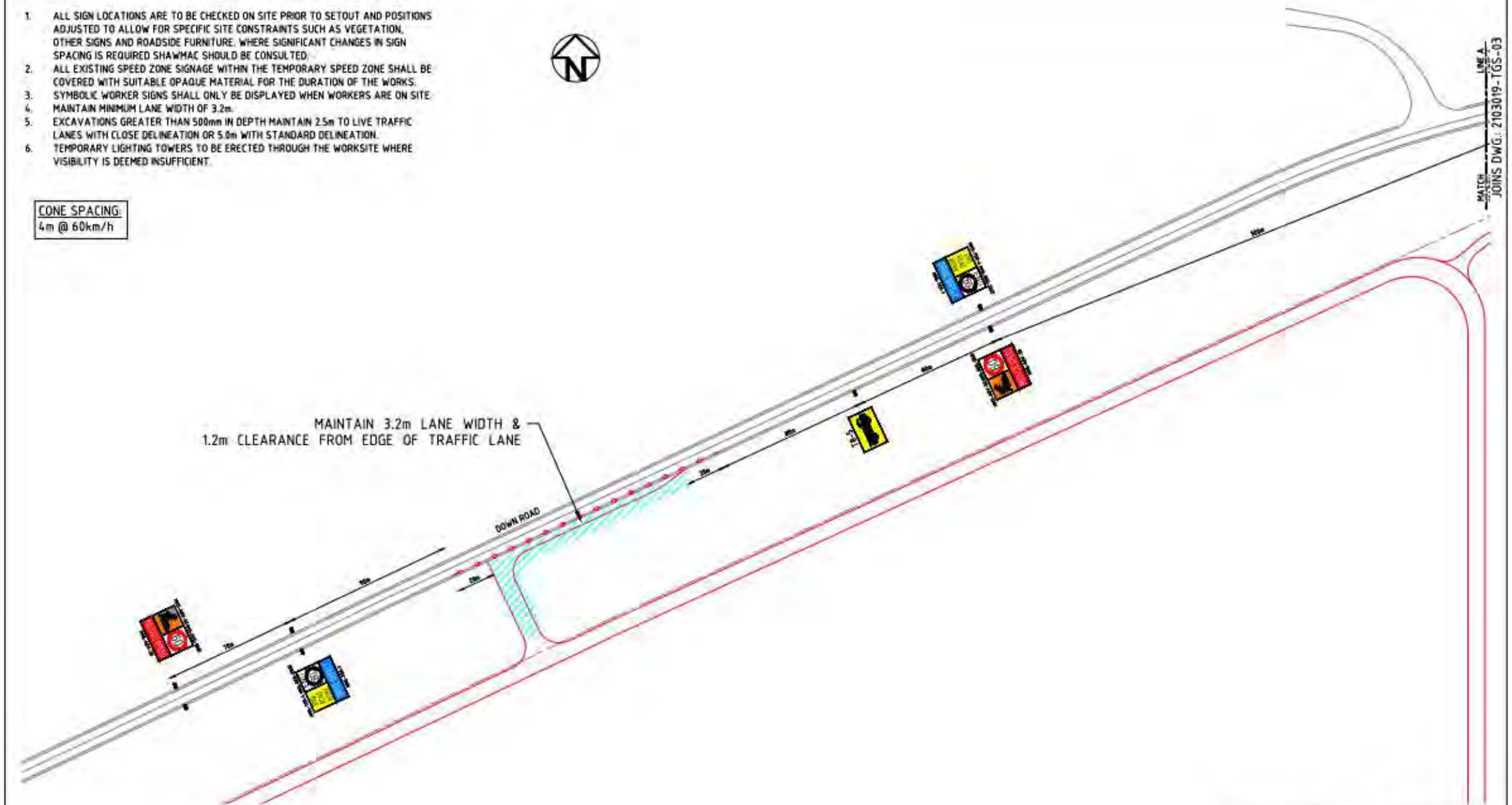
CONE SPACING:
4m @ 60km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

SHAWMAC
1ST FLOOR
908 ALBANY HIGHWAY
EAST VICTORIA PARK
WA 6101
P: 9355 1900
E admin@shawmac.com.au
CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS	
AWTM NO.: 19-6370-02	
AWTM DATE: 06.04.21	
REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 60km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-04 REV: A

File No: Y:\Jobs Active 2021\CIET Construction Traffic Management\GHD_Albany Motorsport Development Application Proposal_2103019\3.Drawings\2103019_TGS_A.dwg

LAST SAVED BY: Yves DATE: 6 April 2021 9:30 AM

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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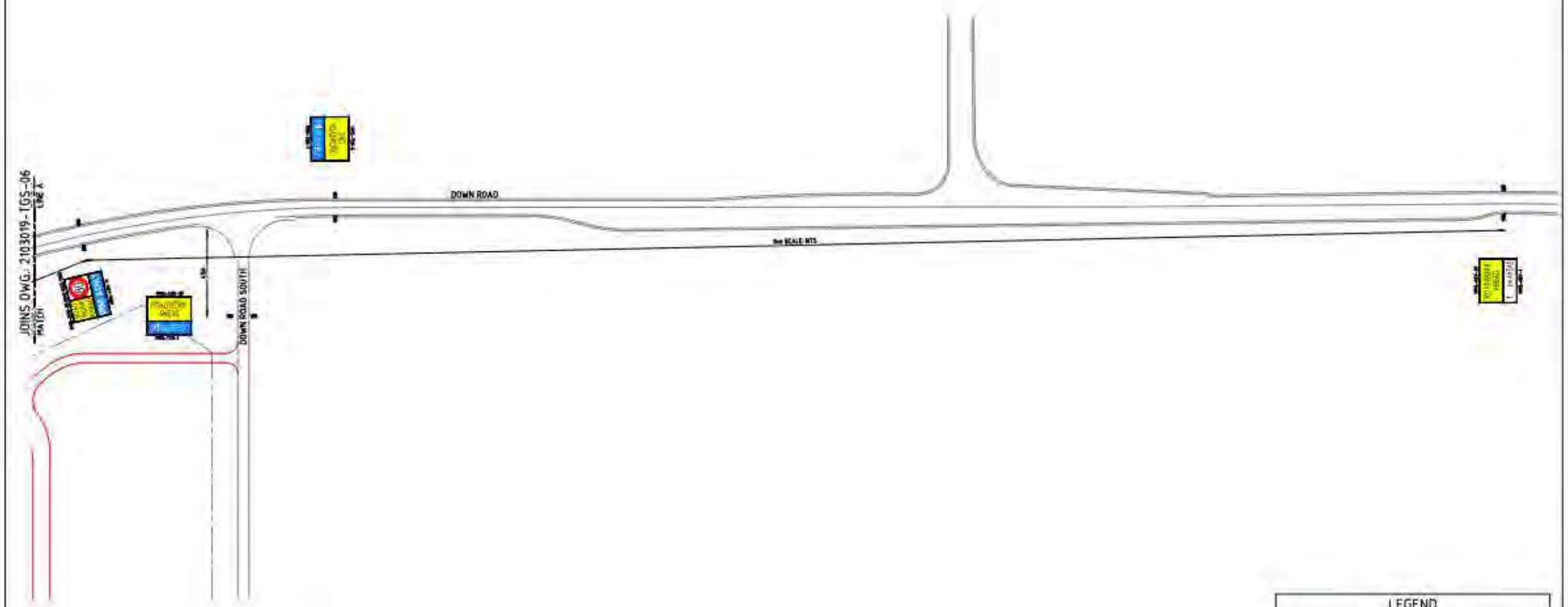
CONE SPACING:
4m @ 60km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

1ST FLOOR
938 ALBANY HIGHWAY
EAST VICTORIA PARK
WA 6101
P: 9355 1990
E: admin@shawmac.com.au
CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS
AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS AFTER CARE - 60km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-05 REV: A

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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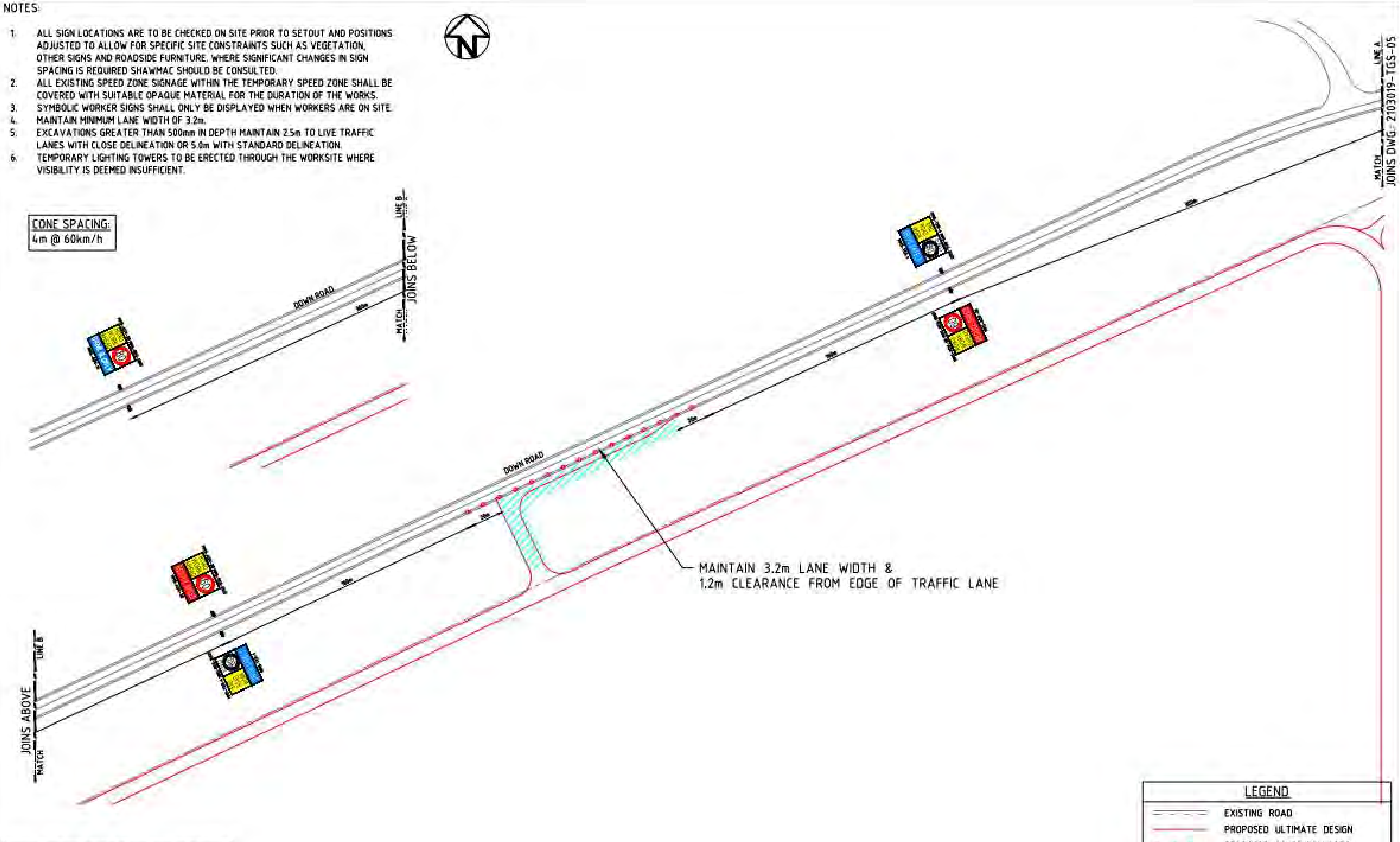
6. TEMPORARY LIGHTING TOWERS TO BE ERECTED THROUGH THE WORKSITE WHERE VISIBILITY IS DEEMED INSUFFICIENT.

CONE SPACING:
4m @ 60km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND

	EXISTING ROAD
	PROPOSED ULTIMATE DESIGN
	PROPOSED CONES/BOLLARDS
	WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS
AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS AFTER CARE - 60km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-06
REV: A

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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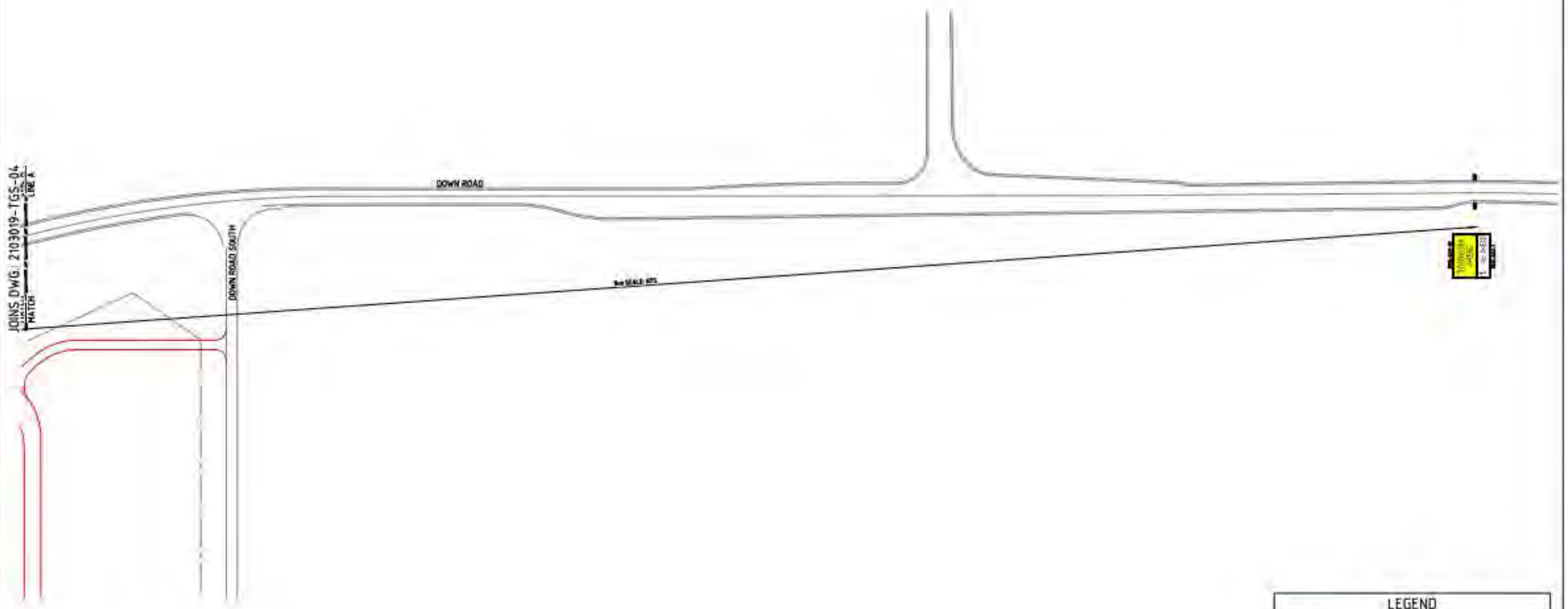
CONE SPACING:
8m @ 80km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 - 1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 80km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-07 REV: A

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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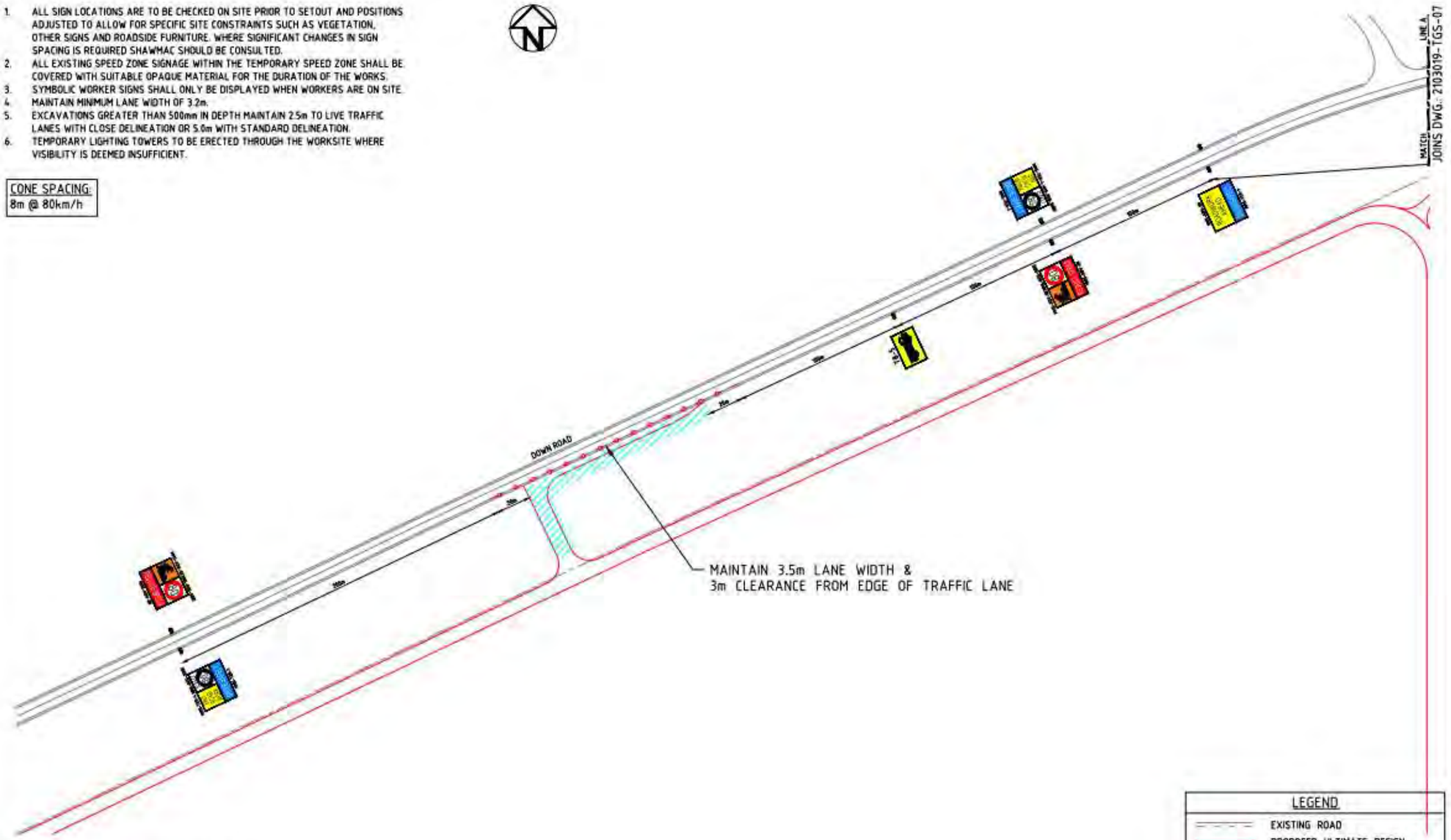
CONE SPACING:
8m @ 80km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
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ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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AWTM DATE: 06.04.21	
REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 80km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-08 | REV: A

NOTES:

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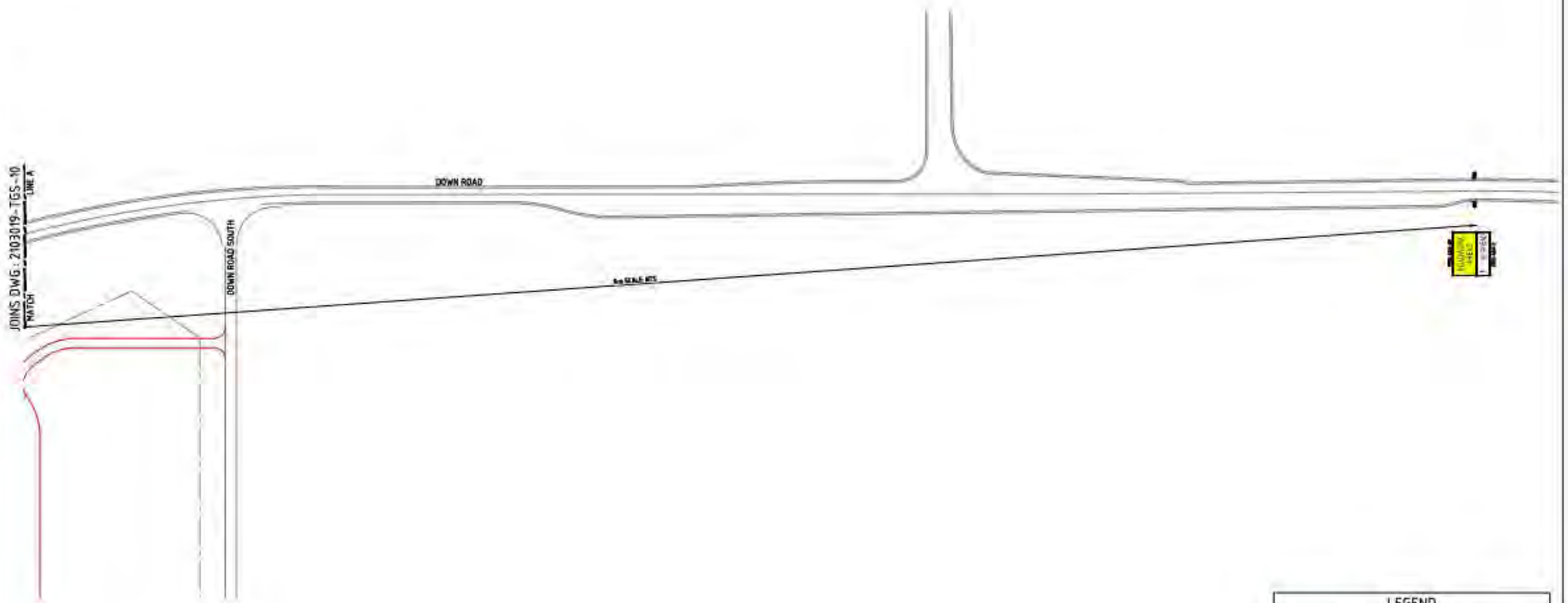
CONE SPACING:
8m @ 80km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
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ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE:
ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS AFTER CARE - 80km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-09 | REV: A

NOTES:

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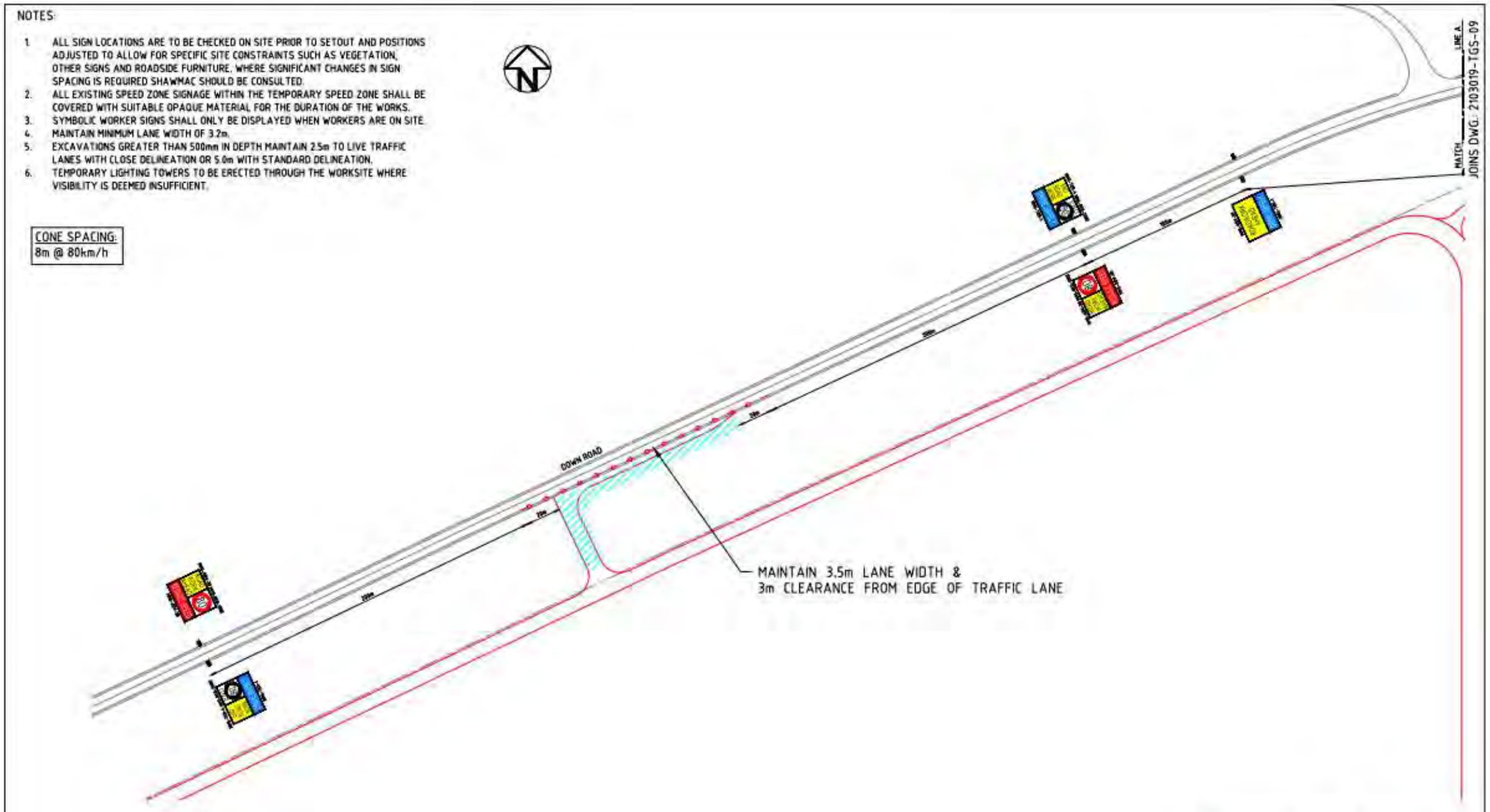
CONE SPACING:
8m @ 80km/h



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
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ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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AWTM NO.: 19-6370-02	
AWTM DATE: 06.04.21	
REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE:
ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS AFTER CARE - 80km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-10 | REV: A

NOTES:

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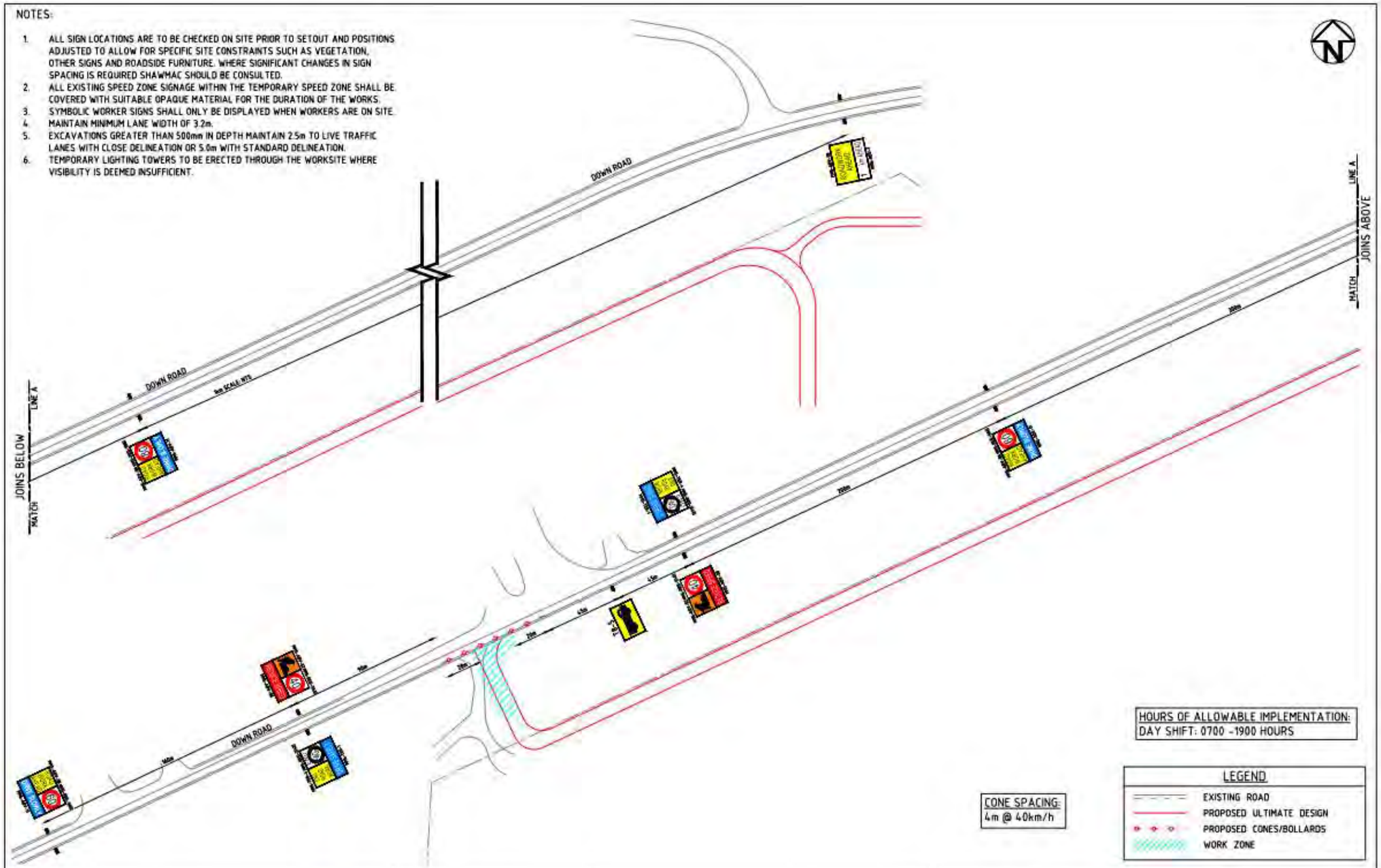

No.	DATE	DESCRIPTION	APPR.
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ISSUE AND REVISION HISTORY			

CLIENT: GHD

SCALE: 1:1000

1ST FLOOR
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CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS
AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 40km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-11

REV: A

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
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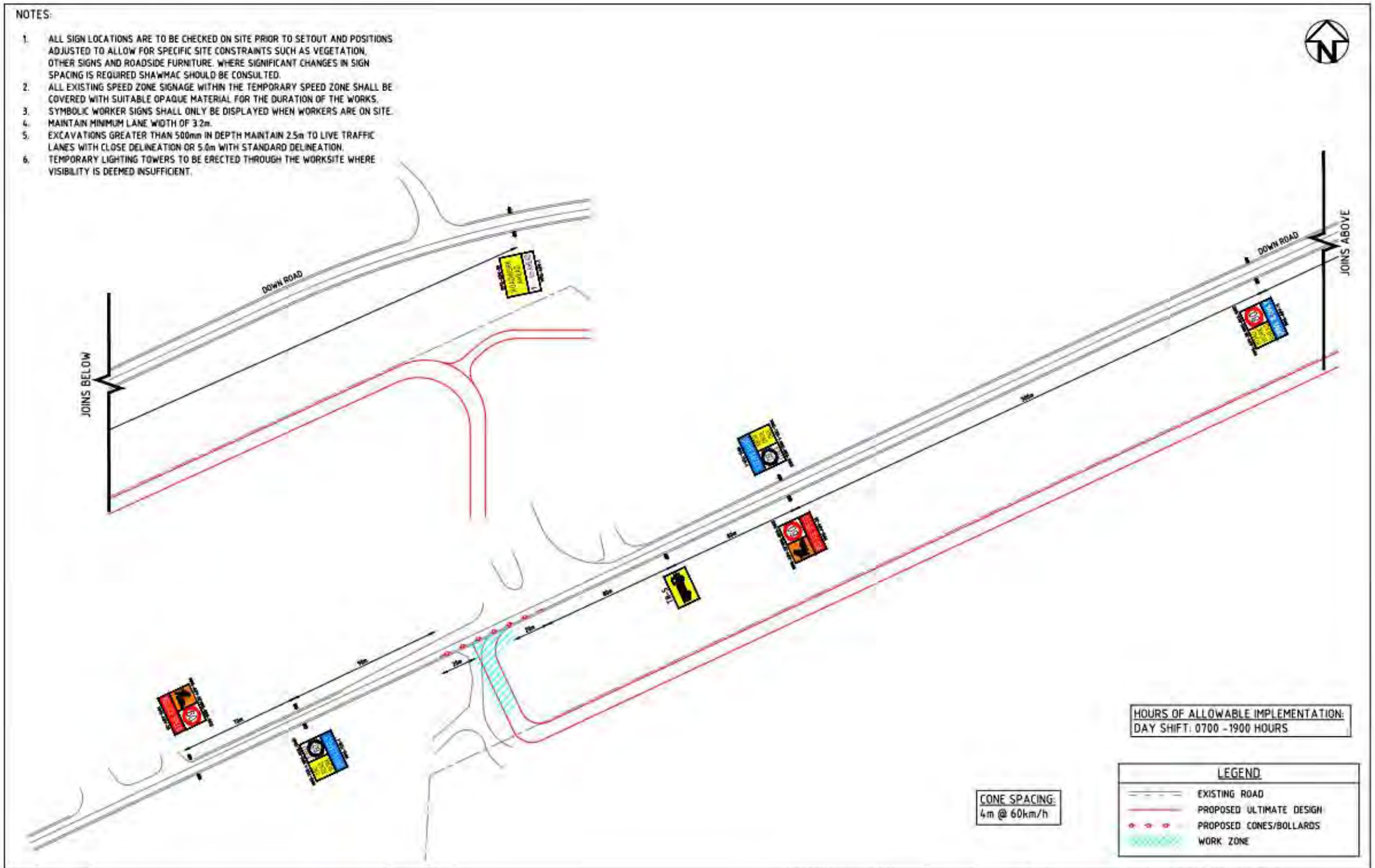

No.	DATE	DESCRIPTION	APPR.
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ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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AWTM NAME: A.ANASTAS	
AWTM NO.: 19-6370-02	
AWTM DATE: 06.04.21	
REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 60km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-12 REV: A

NOTES:

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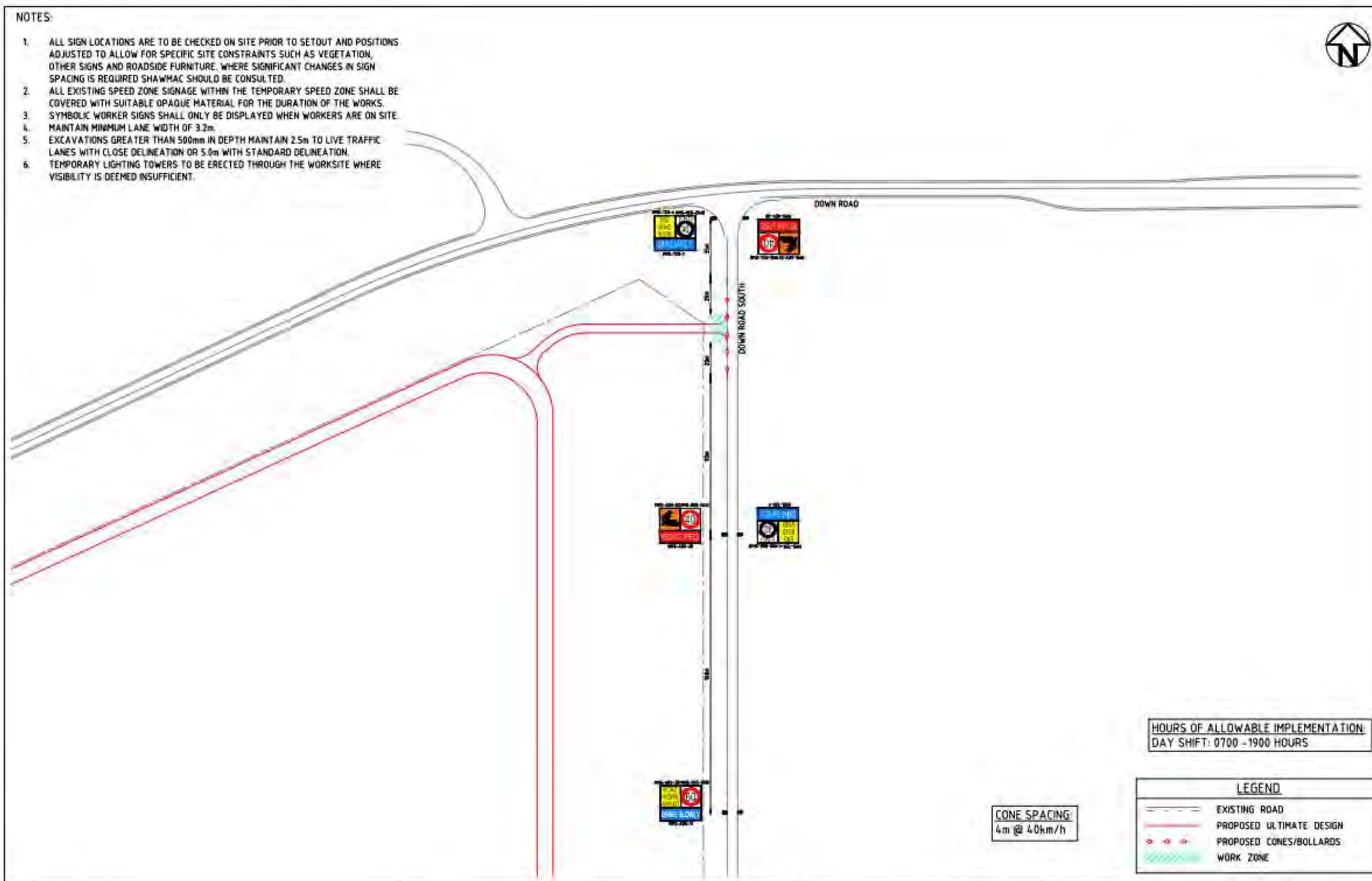

HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

CONE SPACING:
4m @ 40km/h

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
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ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

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REVIEWED BY: Y.KE	
AWTM NO.: 17-4573-02	
REVIEWED DATE: 06.04.21	

TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
VERGE WORKS - 40km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-13 REV: A

NOTES:

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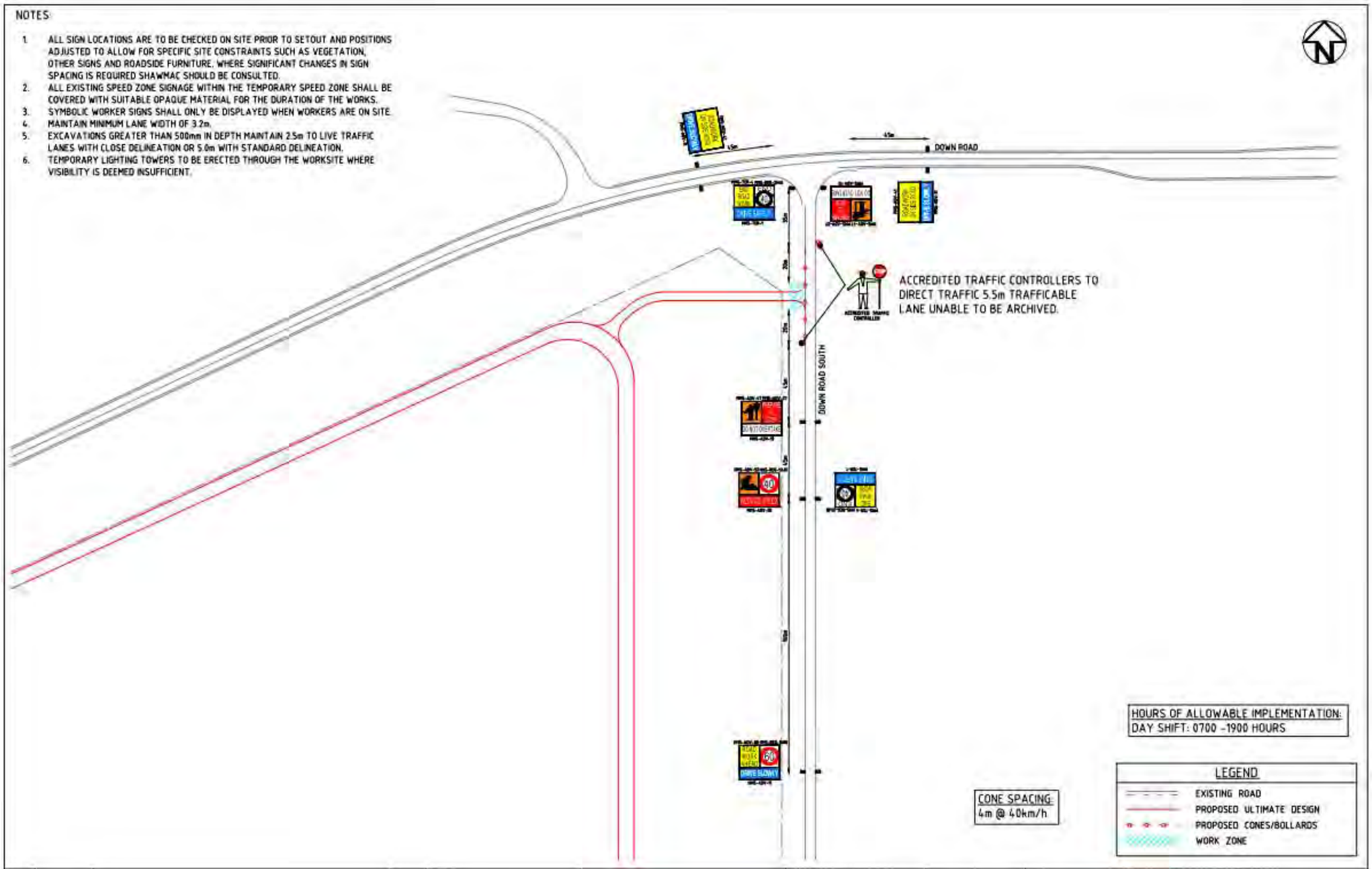

No.	DATE	DESCRIPTION	APPR.
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CLIENT: GHD

SCALE: 1:1000

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REVIEWED BY: Y.KE	
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TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
TEMPORARY HOLDING TRAFFIC - 40km/h SCENARIO
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-14 REV: A

NOTES:

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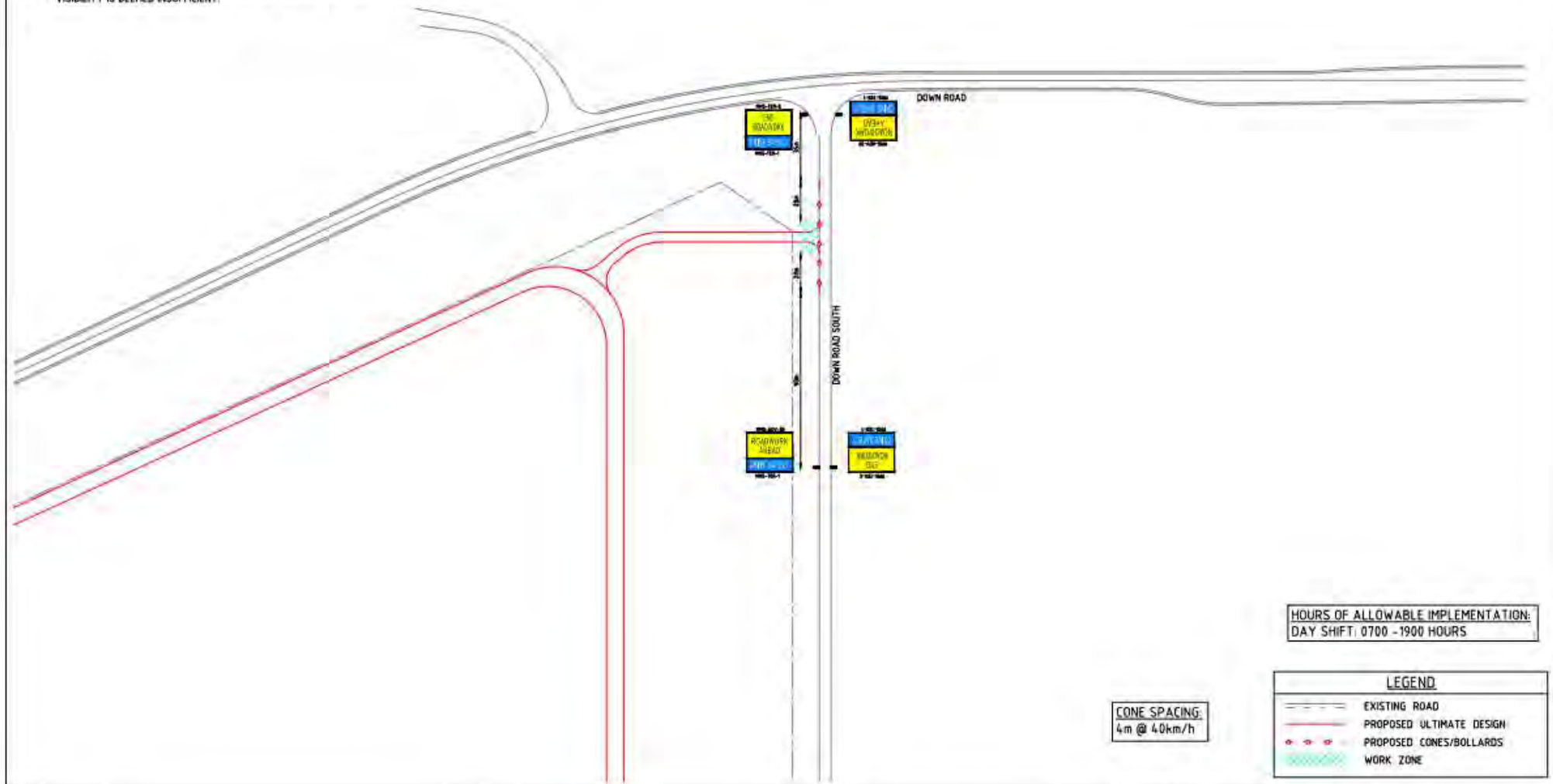

HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

CONE SPACING:
4m @ 40km/h

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
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TITLE: ALBANY MOTORSPORT PARK
ACCESS CONSTRUCTION WORKS
AFTER CARE
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-15 REV: A

NOTES:

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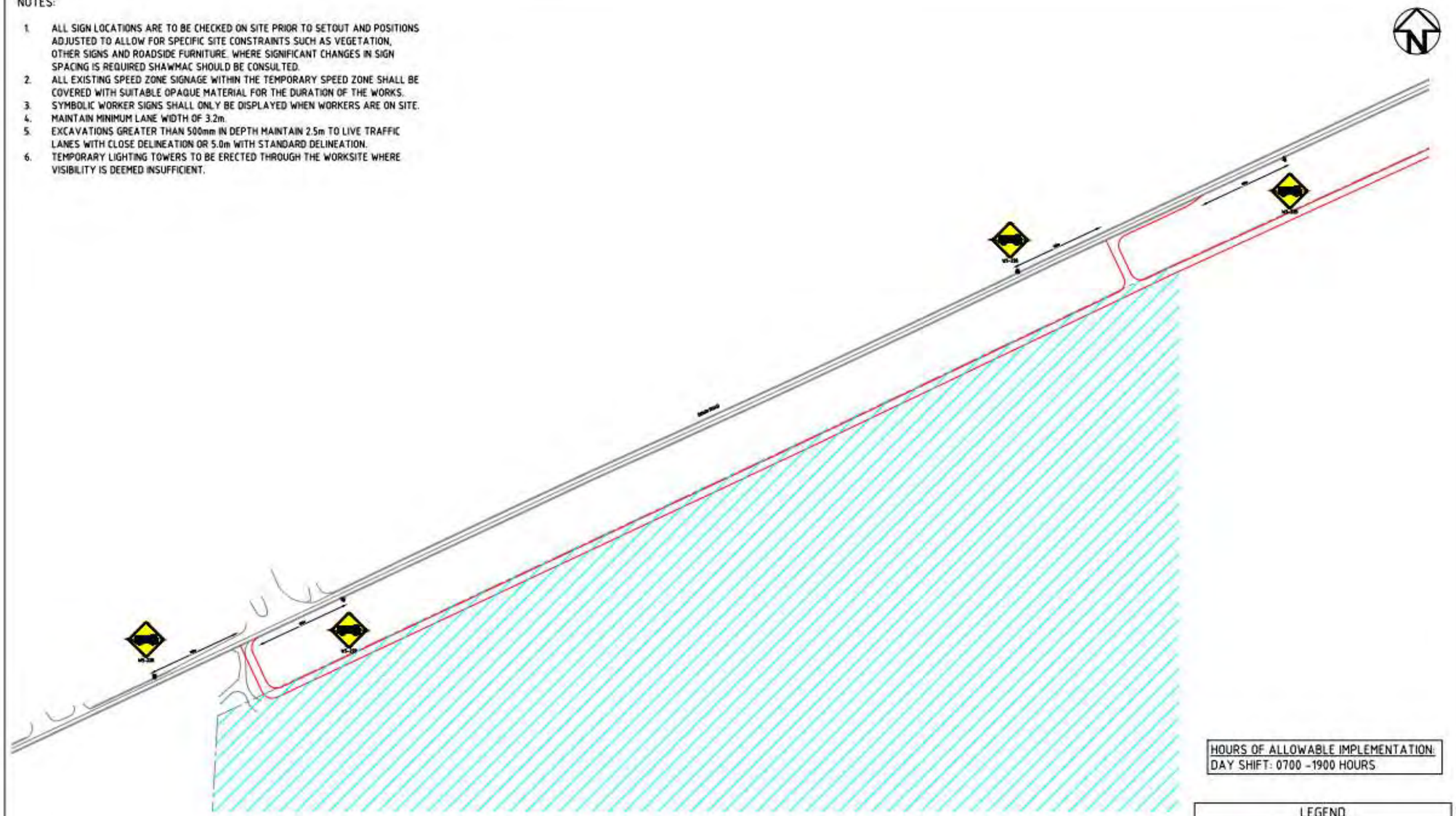
5. EXCAVATIONS GREATER THAN 500mm IN DEPTH MAINTAIN 2.5m TO LIVE TRAFFIC LANES WITH CLOSE DELINEATION OR 5.0m WITH STANDARD DELINEATION.
6. TEMPORARY LIGHTING TOWERS TO BE ERECTED THROUGH THE WORKSITE WHERE VISIBILITY IS DEEMED INSUFFICIENT.



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

1ST FLOOR
988 ALBANY HIGHWAY
EAST VICTORIA PARK
WA 6101
P 9355 1300
E admin@shawmac.com.au
CONSULTING CIVIL AND TRAFFIC ENGINEERS

AWTM NAME: A.ANASTAS
AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21

TITLE: ALBANY MOTORSPORT PARK
INTERNAL WORKS
ACCESS CONTROL LAYOUT
TRAFFIC GUIDANCE SCHEME

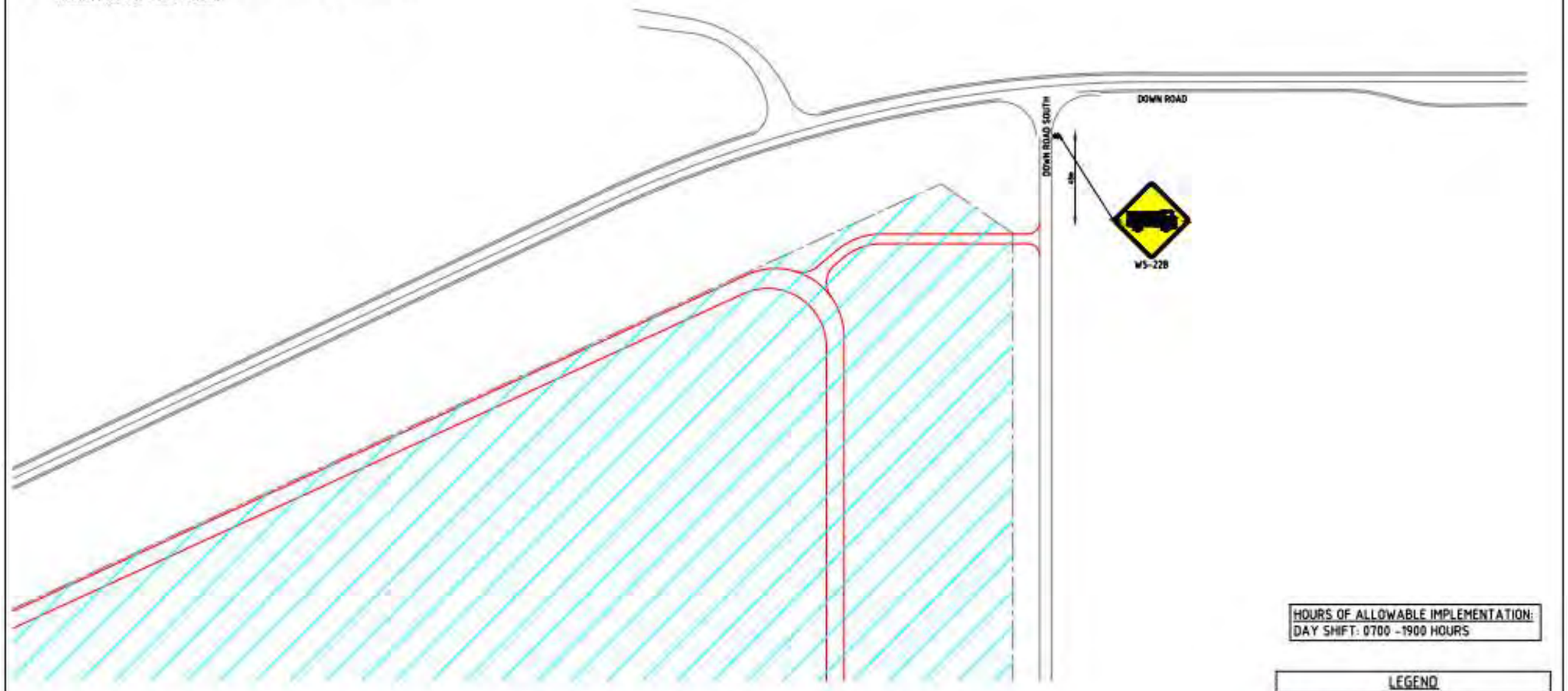
DRAWING NUMBER: 2103019-TGS-16 REV: A

File Ref: Y:\Jobs Active 2021\T&T Construction Traffic Management\GHD_Albany Motorsport Development Application Proposal_2103019\3.Drawings\2103019_TGS_A.dwg

LAST SAVED BY: Yyke DATE: 6 April 2021 12:55 AM

NOTES:

1. ALL SIGN LOCATIONS ARE TO BE CHECKED ON SITE PRIOR TO SETOUT AND POSITIONS ADJUSTED TO ALLOW FOR SPECIFIC SITE CONSTRAINTS SUCH AS VEGETATION, OTHER SIGNS AND ROADSIDE FURNITURE. WHERE SIGNIFICANT CHANGES IN SIGN SPACING IS REQUIRED SHAWMAC SHOULD BE CONSULTED.
2. ALL EXISTING SPEED ZONE SIGNAGE WITHIN THE TEMPORARY SPEED ZONE SHALL BE COVERED WITH SUITABLE OPAQUE MATERIAL FOR THE DURATION OF THE WORKS.
3. SYMBOLIC WORKER SIGNS SHALL ONLY BE DISPLAYED WHEN WORKERS ARE ON SITE.
4. MAINTAIN MINIMUM LANE WIDTH OF 3.2m.
5. EXCAVATIONS GREATER THAN 500mm IN DEPTH MAINTAIN 2.5m TO LIVE TRAFFIC LANES WITH CLOSE DELINEATION OR 5.0m WITH STANDARD DELINEATION.
6. TEMPORARY LIGHTING TOWERS TO BE ERECTED THROUGH THE WORKSITE WHERE VISIBILITY IS DEEMED INSUFFICIENT.



HOURS OF ALLOWABLE IMPLEMENTATION:
DAY SHIFT: 0700 -1900 HOURS

LEGEND
- EXISTING ROAD
- PROPOSED ULTIMATE DESIGN
- PROPOSED CONES/BOLLARDS
- WORK ZONE

No.	DATE	DESCRIPTION	APPR.
A	06.04.2021	ISSUED FOR CLIENT REVIEW	YK

ISSUE AND REVISION HISTORY

CLIENT: GHD

SCALE: 1:1000

1ST FLOOR
188 ALBANY HIGHWAY
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AWTM NAME: A.ANASTAS
AWTM NO.: 19-6370-02
AWTM DATE: 06.04.21
REVIEWED BY: Y.KE
AWTM NO.: 17-4573-02
REVIEWED DATE: 06.04.21

TITLE: ALBANY MOTORSPORT PARK
INTERNAL WORKS
ACCESS CONTROL LAYOUT
TRAFFIC GUIDANCE SCHEME

DRAWING NUMBER: 2103019-TGS-17 | REV: A

File Ref: Y:\Jobs Active 2021\T&T Construction Traffic Management\GHD_Albany Motorsport Development Application Proposal_2103019\3.Drawings\2103019_TGS_A.dwg

LAST SAVED BY: Yyke DATE: 6 April 2021 12:55 AM

N/A

Appendix H- Stakeholder Approval

ghd.com

→ The Power of Commitment

Appendix K

Albany Motorsport Park Development, Pavement Investigation (Great Southern Geotechics , 2021)

GREAT SOUTHERN GEOTECHNICS

CONSTRUCTION MATERIALS TESTING

Pavement Investigation

Report 4212/1

Friday, 9 April 2021

GHD

Albany Motorsport Park Development

GREAT SOUTHERN GEOTECHNICS

1.0 INTRODUCTION

As authorised by GHD
an ivestigation for the proposed Albany Motorsport Park Development adjacent to Down Rd, Mirambeena
was performed on the 25/03/2021

2.0 GENERAL

The intent of the investigation was to determine the following:

- Soil types and profiles.
- Characteristics of soil properties on select samples including Particle Size and Consistency Limits. (Liquid Limit, Plastic Limit, Plasticity Index & Linear Shrinkage).
- In Situ pearmeability rates. (Where applicable)
- Groundwater levels at time of investigation.

3.0 SITE INVESTIGATION

Site conditions and test pit locations were recorded and are displayed in Appendix A - Maps.
Test pits logs various materials types are noted in Appendix B - Test Pit Logs

The field investigation consisted of 8 Boreholes excavated on-site to depths of up to 2.5 meters using a Kubota KX41-3V mini excavator with a 300mm Auger.

Test pits were spread across the extent of the proposed development and locations were predetermined by GHD.
All soil layers encountered were visually assessed and classified on-site.

Samples gathered from site were the taken back to Great Southern Geotechnics Albany Laboratory For further processing and analysis.

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

4.0 LABORATORY TESTING

Results of any relevant Laboratory testing preformed are shown in Appendix C. (Test Results Report 4212/2)

Appendix A

Maps

Figure 1

Test Pits 1 to 8

Test Pit Locations

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No: 4212
Client: GHD
Project: Albany Motorsport Park Development

Appendix B

Test Pit Logs

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	1	4212G1	1		of	16

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'58.4"S 117°44'13.1"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	MD				
200 - 550	350	**SANDY gravel:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
550 - 2500	1950	**Sandy CLAY:** Low to medium plasticity, light brown/orange mottled red.	M	F				
		Fine to medium grained sand.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet
N/A - Not Applicable
N/D - Not Determined

Test Pit No.1

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 2 **of** 16

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	Job No 4212	Test Pit No. 2	Sample No. 4212G2	Sheet 3 of 16

Client:	GHD	**Date Commenced**	25/03/2021	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	**Logged By**	M.Coffey	**Equipment type:**	Kubota KX41-3V
Project No.	12546218			**Excavation Method :**	300mm Auger
Location:	34°56'03.7"S 117°44'12.6"E			**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 100	100	**(Topsoil) SAND with silt:** Dark grey, fine to medium. Roots and root fibres.	M	MD				
100 - 500	400	**SANDY gravel:** Brown, fine to coarse, sub-rounded to sub-angular.	M	MD-D				
		Fine to medium grained sand.						
500 - 2500	2000	**Sandy CLAY:** Low to medium plasticity, light brown/orange mottled red.	M	F				
		Fine to medium grained sand.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.2

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 4 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	3	4212G3	5			16

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°56'11.6"S 117°44'13.5"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 160	160	**(Topsoil) Gravelly SAND with silt:** Grey/brown, fine to medium.	DM	L-MD				
		Fine to medium, sub-rounded to sub-angular, gravel.						
160 - 2100	1940	**(FILL) Sandy GRAVEL with clay**: Low to medium plasticity, brown/red	M	MD				
		Fine to coarse, sub-rounded to sub-angular gravel. Fine to medium grained sand.						
2100 - 2500	400	**SAND with silt:** White, fine.	M	L-MD				

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.3

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	4	4212G4	7		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'55.3"S 117°44'25.3"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
0 - 50	50	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	L		No water table encountered.		
50 - 850	800	**SAND with silt:** Light grey/white, fine to medium.	D-M	L-MD				
850 - 2500	1650	**SAND with silt:** Brown, fine to medium.	M	D	WC			

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.4

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 8 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	5	4212G5	9		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'52.7"S 117°44'34.4"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 240	240	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	L-MD				
240 - 1100	860	**SAND with silt:** Light grey/white, fine to medium.	M	L-MD				
1100 - 2500	1400	**Gravelly SAND with silt:** Light brown, fine to medium.	M	MD	PC			
		Fine to medium, sub-rounded to sub-angular gravel.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.5

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 10 **of** 16

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	Job No 4212	Test Pit No. 6	Sample No. 4212G6	Sheet 11 of 16

Client:	GHD	**Date Commenced**	25/03/2021	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development			**Equipment type:**	Kubota KX41-3V
Project No.	12546218	**Logged By**	M.Coffey	**Excavation Method :**	300mm Auger
Location:	34°55'40.7"S 117°44'59.9"E			**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 180	180	**(Topsoil) SAND with silt: Grey, fine to medium. Roots and root fibres.**	M	L-MD				
180 - 1400	1220	**SAND with silt:** Light grey/white, fine to medium.	M	L-MD				
1400 - 2500	1100	**SAND with silt:** Light brown, fine to medium.	M	MD-D	MC			

***Cobbles noted on outer edge of test pit in shoulder.**

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.6

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 12 **of** 16

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

Job No	Test Pit No.	Sample No.	Sheet		of	
4212	7	4212G7	13		16	

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG	
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V	
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger	
Location:	34°55'52.2"S 117°44'50.8"E	M.Coffey	**Position:**	Refer to site plan	

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 170	170	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	MD				
170 - 450	280	**SAND with silt:** Light grey, fine to medium.	D	L-MD				
450 - 2100	1650	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	D	MD-D				
		Fine to medium grained sand.						
2100 - 2500	400	**Gravelly SAND with silt:** Light brown, fine to medium.	D	MD				
		Fine to medium, sub-rounded to sub-angualr gravel.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.7

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 14 **of** 16

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	Job No 4212	Test Pit No. 8	Sample No. 4212G8	Sheet 15 of 16

Client:	GHD	**Date Commenced**	**Operator/Contractor:**	GSG
Project:	Albany Motorsport Park Development	25/03/2021	**Equipment type:**	Kubota KX41-3V
Project No.	12546218	**Logged By**	**Excavation Method :**	300mm Auger
Location:	34°56'03.5"S 117°44'40.4"E	M.Coffey	**Position:**	Refer to site plan

Depth Below Surface (mm)	Layer Depth (mm)	Material Description SOIL TYPE, Plasticity, Colour, Particle characteristics, Secondary and other minor components	Moist. Condition	Consistency / Strength	Cementation	Water Table	Classification Symbol	Sample/Test
						No water table encountered.		
0 - 200	200	**(Topsoil) SAND with silt:** Grey, fine to medium. Roots and root fibres.	D	MD				
200 - 950	750	**SAND with silt:** Light grey, fine to medium.	D	MD				
950 - 2500	1550	**Sandy GRAVEL:** Brown, fine to coarse, sub-rounded to sub-angular.	D	MD-D				
		Fine to medium grained sand.						

Target Depth	✓	2500
Cave In		
Refusal		
Near Refusal		
Flooding		
Lack of Reach		

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

General

D - Dry M - Moist W - Wet

N/A - Not Applicable

N/D - Not Determined

Test Pit No.8

Excavation

Spoil

GREAT SOUTHERN GEOTECHNICS CONSTRUCTION MATERIALS TESTING	**Job No:** 4212 **Client:** GHD **Project:** Albany Motorsport Park Development	**Sheet** 16 **of** 16

Appendix C

Test Results

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 4

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G9

Saturated Hydraulic Conductivity (cm/min)	0.0913
Saturated Hydraulic Conductivity (m/day)	1.31
Saturated Hydraulic Conductivity (m/sec)	1.52E-05

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 5

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G10

Saturated Hydraulic Conductivity (cm/min)	0.0342
Saturated Hydraulic Conductivity (m/day)	0.49
Saturated Hydraulic Conductivity (m/sec)	5.70E-06

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 6

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G11

Saturated Hydraulic Conductivity (cm/min)	0.2282
Saturated Hydraulic Conductivity (m/day)	3.29
Saturated Hydraulic Conductivity (m/sec)	3.80E-05

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

Disclaimer: Great Southern Geotechnics does not warrant data produced by use of this spreadsheet or any interpretation based on that data.

Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 7

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G12

Saturated Hydraulic Conductivity (cm/min)	0.2282
Saturated Hydraulic Conductivity (m/day)	3.29
Saturated Hydraulic Conductivity (m/sec)	3.80E-05

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

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Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Test Pit 8

Client Number: 12546218
Date of Test: 25/03/2021

Talsma-Hallam Permeameter Test Report

Layer Type	In Situ	Material Description	Refer to Test Pit Logs (Report 4212/1)

Sample No.	4212G13

Saturated Hydraulic Conductivity (cm/min)	0.0285
Saturated Hydraulic Conductivity (m/day)	0.41
Saturated Hydraulic Conductivity (m/sec)	4.75E-06

Site Location

Comments: The Talsma-Hallam Permeameter is not a method covered by Great Southern Geotechnics Scope of Accreditation.

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Distribution: Laboratory File / Vicki Davies - GHD
Document ID: WS_1547_TalsmaHallam_Rev2_Mar2020

Name: M.Coffey
Function: Quality Manager
Date: 9/04/2021
Approved By:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

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Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Proposed Development - Materials Testing

Client Number: QU-0456
Date Sampled: 25/03/2021
Date Received: 25/03/2021

Soil Classification Test Report

Test Method - WA 115.1, WA 120.2, WA 121.1, WA 122.1, WA 123.1 & AS 1726 - Tables 9 & 10

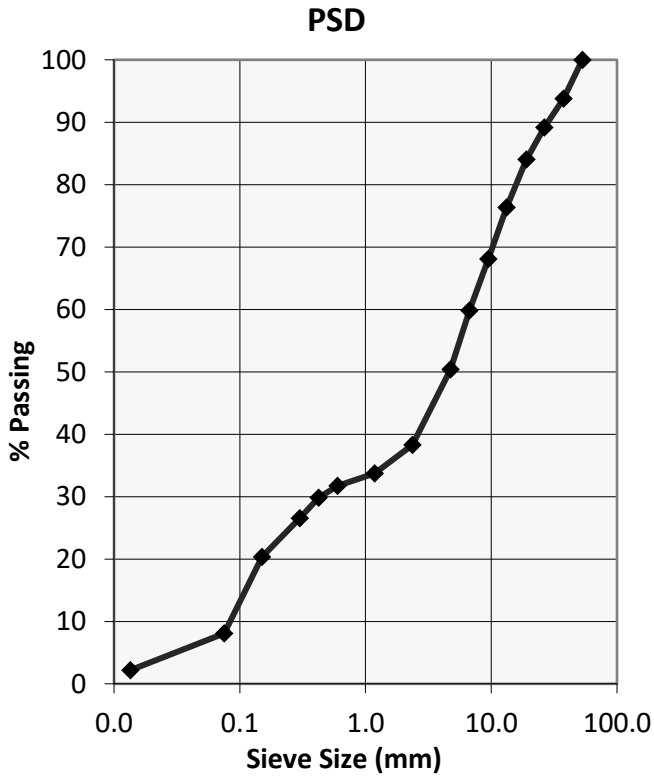
Location	Test Pit 1	Test Depth (mm)	200 - 550	Preparation Method	WA 105.1
Layer Type	In Situ	Layer Depth (mm)	200 - 550	Sampling Method	WA 100.1

Sample No.	4330G1	Material Description	Sandy GRAVEL

Sieve Size (mm)	% Passing
125.0	-
106.0	-
75.0	-
53.0	100
37.5	94
26.5	89
19.0	84
13.2	76
9.5	68
6.7	60
4.75	50
2.36	38
1.18	34
0.600	32
0.425	30
0.300	27
0.150	20
0.075	8
0.0135	2

Liquid Limit	(WA 120.2) %	30.6
Plastic Limit	(WA 121.1) %	Non Plastic
Plasticity index	(WA 122.1) %	Non Plastic
Linear Shrinkage	(WA 123.1) %	0
Linear Shrinkage Condition		Normal

PSD WA 115.1 - Percent Retained on Sieve Size 37.50 mm	6



GROUP SYMBOL	GP	AS 1726 - Tables 9 & 10 (Laboratory classification elements only)

NATA
WORLD RECOGNISED ACCREDITATION

Comments:

Distribution: Laboratory File / Vicki Davies
Document ID: WS_WA_PSD_Rev4_Mar2021
Accredited for compliance with ISO/IEC 17025 - Testing - Accreditation No. 20092

Name: M.Coffey
Function: Quality Manager
Date: 18/05/2021

Approved Signatory:

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

5a 209 Chester Pass Rd, Milpara WA 6330
Phone: 0407 903 297
Email: Info@gsgeotechnics.com
WWW.GSGEOTECHNICS.COM

Client: GHD
Project: Albany Motorsport Park Development
Section: Proposed Development - Materials Testing

Client Number: QU-0456
Date Sampled: 25/03/2021
Date Received:

Soil Classification Test Report

Test Method - WA 115.1, WA 120.2, WA 121.1, WA 122.1, WA 123.1 & AS 1726 - Tables 9 & 10

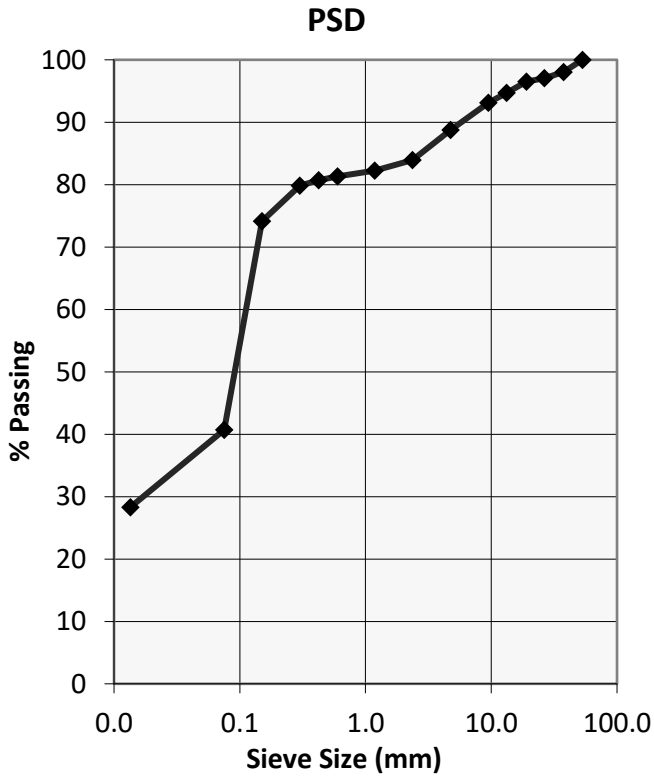
Location	Test Pit 2	Test Depth (mm)	500 - 2500	Preparation Method	WA 105.1
Layer Type	In Situ	Layer Depth (mm)	500 - 2500	Sampling Method	WA 100.1

Sample No.	4330G2	Material Description	Sandy CLAY

Sieve Size (mm)	% Passing
125.0	-
106.0	-
75.0	-
53.0	100
37.5	98
26.5	97
19.0	97
13.2	95
9.5	93
6.7	-
4.75	89
2.36	84
1.18	82
0.600	81
0.425	81
0.300	80
0.150	74
0.075	41
0.0135	28

Liquid Limit	(WA 120.2) %	37.6
Plastic Limit	(WA 121.1) %	18.3
Plasticity index	(WA 122.1) %	19.3
Linear Shrinkage	(WA 123.1) %	0.8
Linear Shrinkage Condition		Curling

PSD WA 115.1 - Percent Retained on Sieve Size 37.50 mm	2



GROUP SYMBOL	SC	AS 1726 - Tables 9 & 10 (Laboratory classification elements only)

Comments:

Distribution: Laboratory File / Vicki Davies
Document ID: WS_WA_PSD_Rev4_Mar2021

Name: M.Coffey
Function: Quality Manager
Date: 18/05/2021

Approved Signatory:

Liquid Labs WA
08 94723349
16B/81 Briggs Street
Carlisle, WA 6101

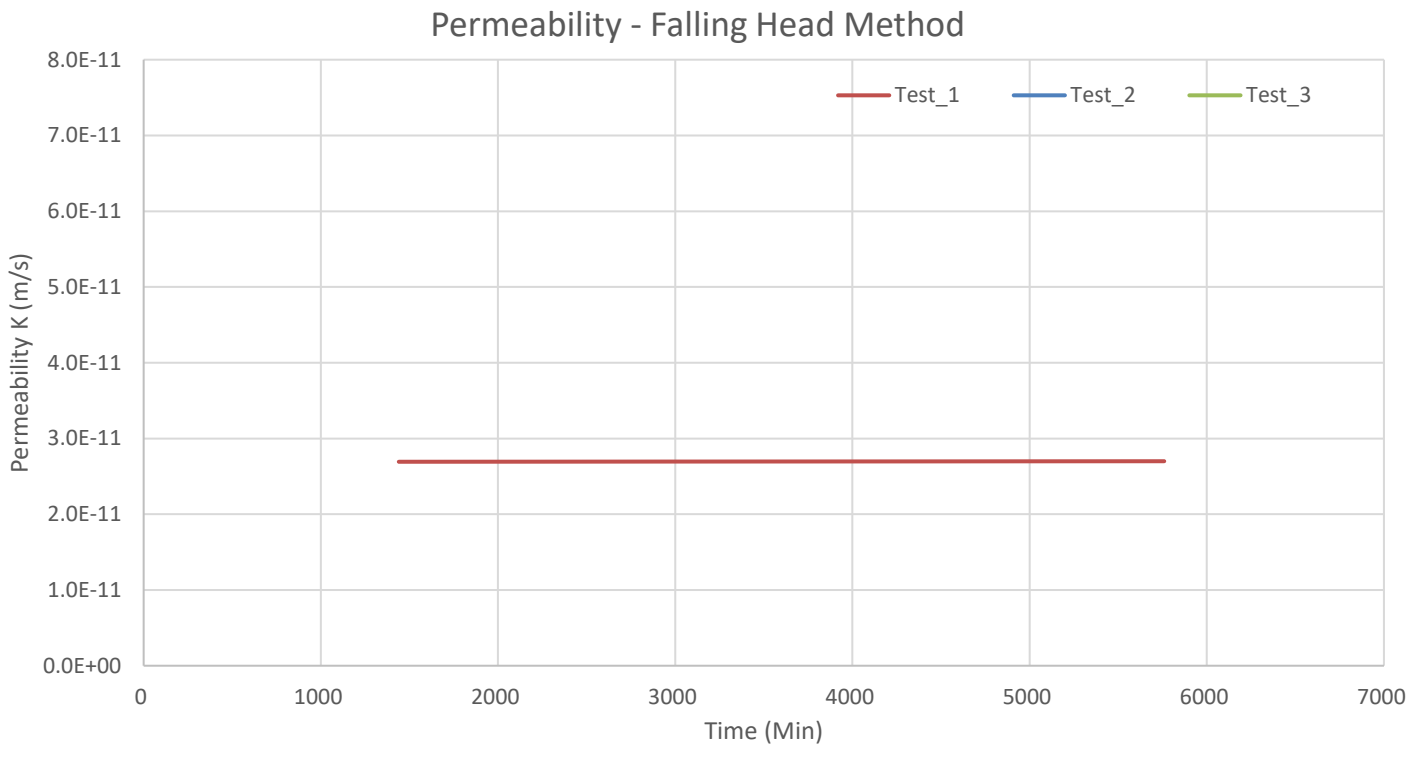
FALLING HEAD PERMEABILITY TEST REPORT

AS 1289.6.7.2, 2.1.1, 5.2.1

Client	**GHD**	Ticket No.	**S4648**
Client Address	**5a 209 Chester Pass Rd, Milpara, WA 6330**	Report No.	**LLS21/1581 _1_FHPERM**
Project	**Albany Motorsport Park Development**	Sample No.	**LLS21/1581**
Location	**Albany**	Sampled By	**Client**
Sample Identification	**Test Pit 3 - 160mm to 2100mm**		
Sampling Method:	**Sampled by Client, Tested as Received**	Date Tested	**5-9/05/2021**

Specimen conditions at test

Laboratory Density Ratio (%)	**95.0**	**Laboratory Moisture Ratio (%)**	**100.1**
Compactive Effort	**Modified**	**% Retained on 19mm Sieve**	**0.0**
Surcharge (kPa)	**3**	**Date tested**	**5-9/05/2021**



Coefficient of Permeability K_{20} (m/s) **2.70E-11**

Comments:

NATA WORLD RECOGNISED ACCREDITATION

Accredited for compliance with ISO/IEC 17025 - Testing

Accreditation No. 19872

Approved Signatory

Name Wilhem Picard

Function Senior Technician

Issue Date 17-May-2021

ǂ NATA Accreditation does not cover the performance of this service

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

COLOURS

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

MOISTURE CONDITION OF SOIL

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

PARTICLE SHAPES

ANGULAR	SUB-ANGULAR	SUB-ROUNDED	ROUNDED

PARTICLE SIZES

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

GRAIN SIZE

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

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

CLASSIFICATION CHART

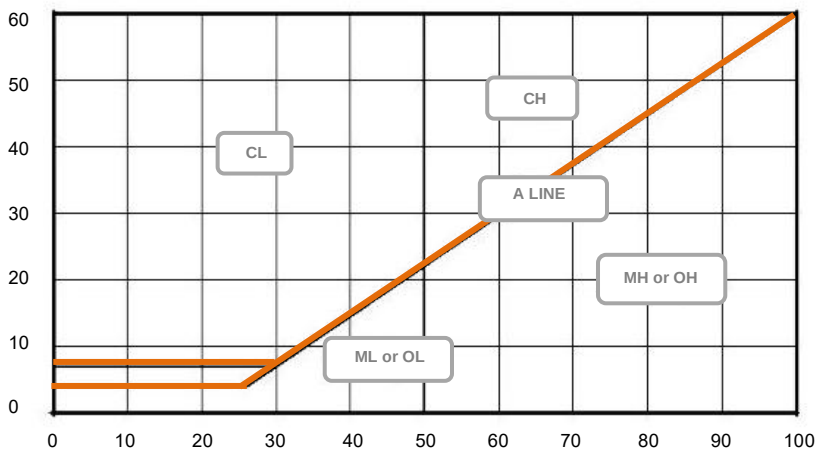
FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 60mm and basing fractions on estimated mass)				GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% of material less than 63 mm is larger than 0.075 mm	GRAVELS More than 50% of coarse fraction is larger than 2.36mm	CLEAN GRAVELS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

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

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

PLASTICITY CHART

For laboratory classification of fine grained soils



GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

PLASTICITY

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

DESCRIPTION OF ORGANIC OR ARTIFICIAL MATERIALS

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

CONSISTENCY - Cohesive soils

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

CONSISTENCY - Non-cohesive soils

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

MINOR COMPONENTS

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

GREAT SOUTHERN GEOTECHNICS
CONSTRUCTION MATERIALS TESTING

GEOLOGICAL ORIGIN

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

STRENGTH OF ROCK MATERIAL

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

ROCK MATERIAL WEATHERING CLASSIFICATION

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

Appendix L

Acid Sulfate Soil summary of results, laboratory reports and chain of custody

					ASS Field Parameters															
					pH (Field)	pH-FOX	Difference (pHF - PHFOX)	Reaction Ratings*- wrong code	pHKCl	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	Net Acidity (acidity units)	Net Acidity (sulfur units)	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC
					pH Units	pH Units		COMMENT	pH Units	mole H+/t	%S	mole H+/t	%S	mole H+/t	mole H+/t	%S	mole H+/t	% S
EQL					0.1	0.1	0.1		0.1	2	0.02	2	0.005	3	10	0.02	10	0.02
WA DER 2015 ASS Criteria					4	4	1	NV	<4	18	0.03	18	0.03	18	18	0.03	18	0.03
Location	**Depth**	**Soil Strata**	**GW Depth**	**Lab Report Number**														
TP01	0.0	(Topsoil) SAND with silt - dark grey		786961	7.1	4.9	2.2	3										
TP01	0.5	SANDY gravel - brown		786961	7	4.7	2.3	3										
TP01	1.0	Sandy CLAY - light brown/orange mottled red		786961	6.7	5.4	1.3	2										
TP01	1.5	Sandy CLAY - light brown/orange mottled red		786961	5.5	4.8	0.7	2	5.3	11	0.020	15	<0.005	<3	11	0.02	11	0.02
TP01	2.0	Sandy CLAY - light brown/orange mottled red		786961	6.1	4.9	1.2	2										
TP01	2.5	Sandy CLAY - light brown/orange mottled red		786961	5.8	4.8	1	2										
TP02	0.0	(Topsoil) SAND with silt - dark grey		786961	5.8	3.4	2.4	3	4.9	71	0.11	500	<0.005	<3	71	0.11	71	0.11
TP02	0.5	SANDY gravel - brown		786961	6.4	5.3	1.1	3										
TP02	1.0	Sandy CLAY - light brown/orange mottled red		786961	6.2	5.2	1	3										
TP02	1.5	Sandy CLAY - light brown/orange mottled red		786961	6	5.1	0.9	2										
TP02	2.0	Sandy CLAY - light brown/orange mottled red		786961	5.6	5.1	0.5	3										
TP02	2.5	Sandy CLAY - light brown/orange mottled red		786961	5.6	4.9	0.7	2										
TP03	0.0	(Topsoil) Gravelly SAND with silt - grey/brown		786961	8	6.2	1.8	2										
TP03	0.5	(FILL) Sandy GRAVEL with clay - brown/red		786961	6.9	5.8	1.1	3										
TP03	1.0	(FILL) Sandy GRAVEL with clay - brown/red		786961	7.3	6.4	0.9	3										
TP03	1.5	(FILL) Sandy GRAVEL with clay - brown/red		786961	5.6	4.9	0.7	3										
TP03	2.0	(FILL) Sandy GRAVEL with clay - brown/red		786961	5.9	5	0.9	2										
TP03	2.5	SAND with silt - white		786961	6.2	5.2	1	2	5.7	5	0.010	6	<0.005	<3	<10	<0.02	<10	<0.02

Reaction ratings

1 No reaction to slight
2 Moderate reaction
3 Strong reaction with persistent froth
4 Extreme reaction

Location	Depth	Soil Strata	GW Depth	Lab Report Number	pH (Field)	pH-FOX	Difference (pHF - PHFOX)	Reaction Ratings*- wrong code	pHKCl	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	Net Acidity (acidity units)	Net Acidity (sulfur units)	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC
					pH Units	pH Units		COMMENT	pH Units	mole H+/t	%S	mole H+/t	%S	mole H+/t	mole H+/t	%S	mole H+/t	% S
EQL					0.1	0.1	0.1		0.1	2	0.02	2	0.005	3	10	0.02	10	0.02
WA DER 2015 ASS Criteria					4	4	1	NV	<4	18	0.03	18	0.03	18	18	0.03	18	0.03
TP04	0.0	(Topsoil) SAND with silt - grey		786961	6.2	4.9	1.3	2										
TP04	0.5	SAND with silt - light grey/white		786961	5.8	4.7	1.1	2	5.4	15	0.020	36	<0.005	<3	15	0.02	15	0.02
TP04	1.0	SAND with silt - light grey/white		786961	5.8	4.8	1	1										
TP04	1.5	SAND with silt - brown		786961	6.1	4.7	1.4	1										
TP04	2.0	SAND with silt - brown		786961	6.2	4.9	1.3	1										
TP04	2.5	SAND with silt - brown		786961	6.2	5	1.2	1										
TP05	0.0	(Topsoil) SAND with silt - grey		786961	6.1	4.7	1.4	3										
TP05	0.5	SAND with silt - light grey/white		786961	6	5.1	0.9	2										
TP05	1.0	SAND with silt - light grey/white		786961	6.1	5.3	0.8	2	5.5	5	0.010	5	<0.005	<3	<10	<0.02	<10	<0.02
TP05	1.5	SAND with silt - light brown		786961	6.2	5.4	0.8	2										
TP05	2.0	SAND with silt - light brown		786961	6.3	5.3	1	2										
TP05	2.5	SAND with silt - light brown		786961	6.2	5.1	1.1	2										
TP06	0.0	(Topsoil) SAND with silt - grey		786961	6.6	4.9	1.7	3										
TP06	0.5	SAND with silt - light grey/white		786961	6.5	5.2	1.3	2										
TP06	1.0	SAND with silt - light grey/white		786961	6.3	5.2	1.1	2										
TP06	1.5	SAND with silt - light brown		786961	6	4.9	1.1	2										
TP06	2.0	SAND with silt - light brown		786961	6	5.1	0.9	2	5.3	31	0.050	80	<0.005	<3	31	0.05	31	0.05
TP06	2.5	SAND with silt - light brown		786961	6.1	5.2	0.9	2										

Reaction ratings

1 No reaction to slight
2 Moderate reaction
3 Strong reaction with persistent froth
4 Extreme reaction

						pH (Field)	pH-FOX	Difference (pHF - PHFOX)	Reaction Ratings*- wrong code	pHKCl	Titratable Actual Acidity	Titratable Actual Acidity (sulfur units)	Titratable Peroxide Acidity	Chromium Reducible Sulfur	Chromium Reducible Sulphur (acidity units)	Net Acidity (acidity units)	Net Acidity (sulfur units)	Net Acidity (Acidity Units) Minus ANC	Net Acidity (Sulfur Units) Minus ANC
						pH Units	pH Units		COMMENT	pH Units	mole H+/t	%S	mole H+/t	%S	mole H+/t	mole H+/t	%S	mole H+/t	% S
EQL						0.1	0.1	0.1		0.1	2	0.02	2	0.005	3	10	0.02	10	0.02
WA DER 2015 ASS Criteria						4	4	1	NV	<4	18	0.03	18	0.03	18	18	0.03	18	0.03
Location	**Depth**	**Soil Strata**	**GW Depth**	**Lab Report Number**															
TP07	0.0	(Topsoil) SAND with silt - grey		786961		6.2	5	1.2	3										
TP07	0.5	SAND with silt - light grey		786961		6.2	4.5	1.7	2										
TP07	1.0	Sandy GRAVEL - brown		786961		6.3	4.9	1.4	3										
TP07	1.5	Sandy GRAVEL - brown		786961		6.4	4.9	1.5	3	5.5	12	0.020	11	<0.005	<3	12	0.02	12	0.020
TP07	2.0	Sandy GRAVEL - brown		786961		7.2	5.1	2.1	3										
TP07	2.5	Gravelly SAND with silt - light brown		786961		6.6	5	1.6	3										
TP08	0.0	(Topsoil) SAND with silt - grey		786961		6.4	4.9	1.5	3										
TP08	0.5	SAND with silt - light grey		786961		6.1	4.8	1.3	2										
TP08	1.0	Gravelly SAND with silt - light brown		786961		6	4.8	1.2	2										
TP08	1.5	Gravelly SAND with silt - light brown		786961		6.1	5	1.1	3										
TP08	2.0	Gravelly SAND with silt - light brown		786961		6.3	5.4	0.9	2										
TP08	2.5	Gravelly SAND with silt - light brown		786961		6.4	5.4	1	2	5.3	24	0.040	49	<0.005	<3	24	0.04	24	0.04

Reaction ratings

1 No reaction to slight
2 Moderate reaction
3 Strong reaction with persistent froth
4 Extreme reaction

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004

Attention: **Vicki Davies**

Report **786961-S**
Project name ALBANY MOTORSPORTS PARK DA
Project ID 12546218
Received Date Apr 13, 2021

Client Sample ID			**TP01_0.0**	**TP01_0.5**	**TP01_1.0**	**TP01_1.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P21-Ap20090**	**P21-Ap20091**	**P21-Ap20092**	**P21-Ap20093**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.1	7.0	6.7	5.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	4.7	5.4	4.8
Reaction Ratings*[S05]	-	comment	3.0	3.0	2.0	2.0

Client Sample ID			**TP01_2.0**	**TP01_2.5**	**TP02_0.0**	**TP02_0.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P21-Ap20094**	**P21-Ap20095**	**P21-Ap20096**	**P21-Ap20097**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	5.8	5.8	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.9	4.8	3.4	5.3
Reaction Ratings*[S05]	-	comment	2.0	2.0	3.0	3.0

Client Sample ID			**TP02_1.0**	**TP02_1.5**	**TP02_2.0**	**TP02_2.5**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P21-Ap20098**	**P21-Ap20099**	**P21-Ap20100**	**P21-Ap20101**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.0	5.6	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	5.1	5.1	4.9
Reaction Ratings*[S05]	-	comment	3.0	2.0	3.0	2.0

Client Sample ID			TP03_0.0	TP03_0.5	TP03_1.0	TP03_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20102	P21-Ap20103	P21-Ap20104	P21-Ap20105
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	8.0	6.9	7.3	5.6
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	6.2	5.8	6.4	4.9
Reaction Ratings*[S05]	-	comment	2.0	3.0	3.0	3.0

Client Sample ID			TP03_2.0	TP03_2.5	TP04_0.0	TP04_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20106	P21-Ap20107	P21-Ap20108	P21-Ap20109
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.9	6.2	6.2	5.8
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	5.2	4.9	4.7
Reaction Ratings*[S05]	-	comment	2.0	2.0	2.0	2.0

Client Sample ID			TP04_1.0	TP04_1.5	TP04_2.0	TP04_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20110	P21-Ap20111	P21-Ap20112	P21-Ap20113
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	5.8	6.1	6.2	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	4.7	4.9	5.0
Reaction Ratings*[S05]	-	comment	1.0	1.0	1.0	1.0

Client Sample ID			TP05_0.0	TP05_0.5	TP05_1.0	TP05_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20114	P21-Ap20115	P21-Ap20116	P21-Ap20117
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.1	6.0	6.1	6.2
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.7	5.1	5.3	5.4
Reaction Ratings*[S05]	-	comment	3.0	2.0	2.0	2.0

Client Sample ID			TP05_2.0	TP05_2.5	TP06_0.0	TP06_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20118	P21-Ap20119	P21-Ap20120	P21-Ap20121
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.2	6.6	6.5
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.3	5.1	4.9	5.2
Reaction Ratings*[S05]	-	comment	2.0	2.0	3.0	2.0

Client Sample ID			TP06_1.0	TP06_1.5	TP06_2.0	TP06_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20122	P21-Ap20123	P21-Ap20124	P21-Ap20125
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.3	6.0	6.0	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.2	4.9	5.1	5.2
Reaction Ratings*[S05]	-	comment	2.0	2.0	2.0	2.0

Client Sample ID			TP07_0.0	TP07_0.5	TP07_1.0	TP07_1.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20126	P21-Ap20127	P21-Ap20128	P21-Ap20129
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.2	6.2	6.3	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.0	4.5	4.9	4.9
Reaction Ratings*[S05]	-	comment	3.0	2.0	3.0	3.0

Client Sample ID			TP07_2.0	TP07_2.5	TP08_0.0	TP08_0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20130	P21-Ap20131	P21-Ap20132	P21-Ap20133
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	7.2	6.6	6.4	6.1
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	5.1	5.0	4.9	4.8
Reaction Ratings*[S05]	-	comment	3.0	3.0	3.0	2.0

Client Sample ID			TP08_1.0	TP08_1.5	TP08_2.0	TP08_2.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap20134	P21-Ap20135	P21-Ap20136	P21-Ap20137
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
Acid Sulfate Soils Field pH Test						
pH-F (Field pH test)*	0.1	pH Units	6.0	6.1	6.3	6.4
pH-FOX (Field pH Peroxide test)*	0.1	pH Units	4.8	5.0	5.4	5.4
Reaction Ratings*[S05]	-	comment	2.0	3.0	2.0	2.0

Sample History

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported.
A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Acid Sulfate Soils Field pH Test	Perth	Apr 14, 2021	7 Days

- Method: LTM-GEN- 7060 Determination of field pH (pHF) and field pH peroxide (pHFOX) tests

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Company Name:	GHD Pty Ltd WA	**Order No.:**	
Address:	999 Hay Street Perth Perth WA 6004	**Report #:**	786961
		Phone:	08 6222 8222
		Fax:	08 9429 6555
Project Name:	ALBANY MOTORSPORTS PARK DA		
Project ID:	12546218		

Received:	Apr 13, 2021 1:13 PM
Due:	Apr 14, 2021
Priority:	1 Day
Contact Name:	Vicki Davies

Eurofins Analytical Services Manager : Rhys Thomas

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
Mayfield Laboratory						
External Laboratory						
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**	
1	TP01_0.0	Not Provided		Soil	P21-Ap20090	X
2	TP01_0.5	Not Provided		Soil	P21-Ap20091	X
3	TP01_1.0	Not Provided		Soil	P21-Ap20092	X
4	TP01_1.5	Not Provided		Soil	P21-Ap20093	X
5	TP01_2.0	Not Provided		Soil	P21-Ap20094	X
6	TP01_2.5	Not Provided		Soil	P21-Ap20095	X
7	TP02_0.0	Not Provided		Soil	P21-Ap20096	X
8	TP02_0.5	Not Provided		Soil	P21-Ap20097	X
9	TP02_1.0	Not Provided		Soil	P21-Ap20098	X

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Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
Mayfield Laboratory						
External Laboratory						
10	TP02_1.5	Not Provided		Soil	P21-Ap20099	X
11	TP02_2.0	Not Provided		Soil	P21-Ap20100	X
12	TP02_2.5	Not Provided		Soil	P21-Ap20101	X
13	TP03_0.0	Not Provided		Soil	P21-Ap20102	X
14	TP03_0.5	Not Provided		Soil	P21-Ap20103	X
15	TP03_1.0	Not Provided		Soil	P21-Ap20104	X
16	TP03_1.5	Not Provided		Soil	P21-Ap20105	X
17	TP03_2.0	Not Provided		Soil	P21-Ap20106	X
18	TP03_2.5	Not Provided		Soil	P21-Ap20107	X
19	TP04_0.0	Not Provided		Soil	P21-Ap20108	X
20	TP04_0.5	Not Provided		Soil	P21-Ap20109	X

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Contact Name: Vicki Davies

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Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
Mayfield Laboratory						
External Laboratory						
21	TP04_1.0	Not Provided		Soil	P21-Ap20110	X
22	TP04_1.5	Not Provided		Soil	P21-Ap20111	X
23	TP04_2.0	Not Provided		Soil	P21-Ap20112	X
24	TP04_2.5	Not Provided		Soil	P21-Ap20113	X
25	TP05_0.0	Not Provided		Soil	P21-Ap20114	X
26	TP05_0.5	Not Provided		Soil	P21-Ap20115	X
27	TP05_1.0	Not Provided		Soil	P21-Ap20116	X
28	TP05_1.5	Not Provided		Soil	P21-Ap20117	X
29	TP05_2.0	Not Provided		Soil	P21-Ap20118	X
30	TP05_2.5	Not Provided		Soil	P21-Ap20119	X
31	TP06_0.0	Not Provided		Soil	P21-Ap20120	X

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Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
Mayfield Laboratory						
External Laboratory						
32	TP06_0.5	Not Provided		Soil	P21-Ap20121	X
33	TP06_1.0	Not Provided		Soil	P21-Ap20122	X
34	TP06_1.5	Not Provided		Soil	P21-Ap20123	X
35	TP06_2.0	Not Provided		Soil	P21-Ap20124	X
36	TP06_2.5	Not Provided		Soil	P21-Ap20125	X
37	TP07_0.0	Not Provided		Soil	P21-Ap20126	X
38	TP07_0.5	Not Provided		Soil	P21-Ap20127	X
39	TP07_1.0	Not Provided		Soil	P21-Ap20128	X
40	TP07_1.5	Not Provided		Soil	P21-Ap20129	X
41	TP07_2.0	Not Provided		Soil	P21-Ap20130	X
42	TP07_2.5	Not Provided		Soil	P21-Ap20131	X

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Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
2/91 Leach Highway
Kewdale WA 6105
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: ALBANY MOTORSPORTS PARK DA
Project ID: 12546218

Order No.:
Report #: 786961
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Apr 13, 2021 1:13 PM
Due: Apr 14, 2021
Priority: 1 Day
Contact Name: Vicki Davies

Eurofins Analytical Services Manager : Rhys Thomas

Sample Detail						Acid Sulfate Soils Field pH Test
Melbourne Laboratory - NATA Site # 1254 & 14271						
Sydney Laboratory - NATA Site # 18217						
Brisbane Laboratory - NATA Site # 20794						
Perth Laboratory - NATA Site # 23736						X
Mayfield Laboratory						
External Laboratory						
43	TP08_0.0	Not Provided		Soil	P21-Ap20132	X
44	TP08_0.5	Not Provided		Soil	P21-Ap20133	X
45	TP08_1.0	Not Provided		Soil	P21-Ap20134	X
46	TP08_1.5	Not Provided		Soil	P21-Ap20135	X
47	TP08_2.0	Not Provided		Soil	P21-Ap20136	X
48	TP08_2.5	Not Provided		Soil	P21-Ap20137	X
Test Counts						48

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P21-Ap20090	CP	pH Units	7.1	7.2	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P21-Ap20090	CP	pH Units	4.9	4.9	pass	30%	Pass	
Reaction Ratings*	P21-Ap20090	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P21-Ap20100	CP	pH Units	5.6	5.9	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P21-Ap20100	CP	pH Units	5.1	5.1	pass	30%	Pass	
Reaction Ratings*	P21-Ap20100	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P21-Ap20110	CP	pH Units	5.8	5.7	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P21-Ap20110	CP	pH Units	4.8	4.7	pass	30%	Pass	
Reaction Ratings*	P21-Ap20110	CP	comment	1.0	1.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P21-Ap20120	CP	pH Units	6.6	6.6	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P21-Ap20120	CP	pH Units	4.9	5.0	pass	30%	Pass	
Reaction Ratings*	P21-Ap20120	CP	comment	3.0	3.0	pass	30%	Pass	
Duplicate									
Acid Sulfate Soils Field pH Test				Result 1	Result 2	RPD			
pH-F (Field pH test)*	P21-Ap20130	CP	pH Units	7.2	7.1	pass	30%	Pass	
pH-FOX (Field pH Peroxide test)*	P21-Ap20130	CP	pH Units	5.1	4.9	pass	30%	Pass	
Reaction Ratings*	P21-Ap20130	CP	comment	3.0	3.0	pass	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins | Environment Testing is not able to determine whether analysis has been performed within recommended holding times.
S05	Field Screen uses the following fizz rating to classify the rate the samples reacted to the peroxide: 1.0; No reaction to slight. 2.0; Moderate reaction. 3.0; Strong reaction with persistent froth. 4.0; Extreme reaction.

Authorised by:

Rhys Thomas	Analytical Services Manager
Rhys Thomas	Senior Analyst-SPOCAS (WA)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Caitlyn Gibson

From: Vicki Davies <Vicki.Davies@ghd.com>
Sent: Tuesday, 13 April 2021 11:21 AM
To: Caitlyn Gibson
Cc: Jon Cramer
Subject: RE: 12546218

Caitlyn Gibson
Eurofins # 786961

EXTERNAL EMAIL*

Thanks Caitlyn

Much appreciated!

Yes it looks like FD01 and FD02 were missed during the field sampling.

Kind regards

Vicki Davies
Environmental Scientist

GHD
Proudly employee owned | ghd.com
166 Stirling Terrace WA 6330 Australia
D 61 8 9840 5104 **E** Vicki.Davies@ghd.com

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Connect

From: Caitlyn Gibson <CaitlynIemma@Eurofins.com>
Sent: Tuesday, 13 April 2021 11:19 AM
To: Vicki Davies <Vicki.Davies@ghd.com>
Cc: Jon Cramer <Jon.Cramer@ghd.com>
Subject: RE: 12546218

Hi Vicki,

No problem we can do that for you. The turnaround time will be 1 Day, should get results tomorrow at latest the next day. give the lab the heads up and we'll process them as quick as we can for you.

Also we did not receive samples FD01 and FD02. I will proceed with the others accordingly.

Kind regards,
Caitlyn

Eurofins | Environment Testing AU/NZ
46-48 Banksia Road
WELSHPOOL WA 6106

Caitlyn Gibson

From: Vicki Davies <Vicki.Davies@ghd.com>
Sent: Tuesday, 13 April 2021 11:03 AM
To: Caitlyn Gibson
Cc: Jon Cramer
Subject: RE: 12546218
Attachments: SAU06PRT00221041311171.pdf

Caitlyn Gibson CG
Eurofins #786961

EXTERNAL EMAIL*

Hi Caitlyn

Could you please proceed with analysis of all samples (48) for ASS field test (fast field screen – non NATA) only at this stag

Once we get the results of the field tests we can determine which samples will be analysed for the Chromium reducible suite TPA.

Could you please let me know what the turn around will be for results of the field tests?

Kind regards

Vicki Davies
Environmental Scientist

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Proudly employee owned | ghd.com
166 Stirling Terrace WA 6330 Australia
D 61 8 9840 5104 E Vicki.Davies@ghd.com

→ **The Power of Commitment**
Connect

From: Caitlyn Gibson <CaitlynIemma@Eurofins.com>
Sent: Tuesday, 13 April 2021 10:52 AM
To: Vicki Davies <Vicki.Davies@ghd.com>
Subject: 12546218

Hi Vicki,

We received these sample on the 30/3/21 as stated on COC attached they have been put on hold. Is this still the case?

Kind regards,
Caitlyn

Eurofins | Environment Testing AU/NZ
46-48 Banksia Road

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD House 999
Hay Street PO Box Y3106 Telephone 08 6222 8222 Facsimile 08
Perth WA 6000 Perth WA 6832 6222 8555

 COC No.

Project Albany Motorsports Park DA		Laboratory: Eurofins | mgt	
Client City of Albany	**Job No.** 12546218	Address: 46-48 Banksia Road, WELSHPOOL, WA 6106	
Laboratory Quote No.	**Turnaround Time** Standard	Laboratory Contact:	
Job Manager (Invoice) Vicki.Davies@ghd.com & GHD accounts	**Email Address (Results)** Vicki.Davies@ghd.com		

GHD Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: ASS field test (fast field screen - non-NATA)	Analyses: Chromium reducible sulfur suite	Analyses: Total Peroxide Acidity (TPA)	Analyses: HOLD	Remarks
TP01_0.0m				S			1					✓	786961
TP01_0.5m				S			1					✓	
TP01_1.0m				S			1					✓	
TP01_1.5m				S			1					✓	
TP01_2.0m				S			1					✓	
TP01_2.5m				S			1					✓	
TP02_0.0m				S			1					✓	
TP02_0.5m				S			1					✓	
TP02_1.0m				S			1					✓	
TP02_1.5m				S			1					✓	
TP02_2.0m				S			1					✓	
TP02_2.5m				S			1					✓	
TP03_0.0m				S			1					✓	
TP03_0.5m				S			1					✓	
TP03_1.0m				S			1					✓	
TP03_1.5m				S			1					✓	
TP03_2.0m				S			1					✓	
TP03_2.5m				S			1					✓	

Date/Time: 30/3/21 11:15 ✓
Chilled: Yes / No
Temp: 22.9 22.6 22.4
Correction: +0.1
Final Temp: 22.6C

Sampled by: Great Southern Geotechnics	Date/Time:	Relinquished by: Great Southern Geotechnics	Date/ Time:
Received by:	Date/Time:	Relinquished by:	Date/ Time:
Received by Lab:	Date/Time:	Courier/ Transport Company:	
Sample Conditions:	Remarks:		

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST

GHD House, Hay Street, Perth WA 6000 — 999 — PO Box Y3106, Perth WA 6832 — Telephone 08 6222 8222 Facsimile 08 6222 8555

Page 2 of 3

COC No.

Project Albany Motorsports Park DA	Laboratory: Eurofins | mgt
Client City of Albany — **Job No.** 12546218	Address: 46-48 Banksia Road, WELSHPOOL, WA 6106
	Laboratory Contact:
Laboratory Quote No.	**Turnaround Time** Standard
Job Manager (Invoice) Vicki.Davies@ghd.com **& GHD accounts**	**Email Address (Results)** Vicki.Davies@ghd.com

GHD Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: ASS field test (fast field screen - non-NATA)	Analyses: Chromium reducible sulfur suite	Analyses: Total Peroxide Acidity (TPA)											HOLD	Remarks
																							78696
TP04_0.0m				S			1															✓	
TP04_0.5m				S			1															✓	
TP04_1.0m				S			1															✓	
TP04_1.5m				S			1															✓	
TP04_2.0m				S			1															✓	
TP04_2.5m				S			1															✓	
TP05_0.0m				S			1															✓	
TP05_0.5m				S			1															✓	
TP05_1.0m				S			1															✓	
TP05_1.5m				S			1															✓	
TP05_2.0m				S			1															✓	
TP05_2.5m				S			1															✓	
TP06_0.0m				S			1															✓	
TP06_0.5m				S			1															✓	
TP06_1.0m				S			1															✓	
TP06_1.5m				S			1															✓	
TP06_2.0m				S			1															✓	
TP06_2.5m				S			1															✓	

Sampled by: Great Southern Geotechnics	Date/Time:	Relinquished by: Great Southern Geotechnics	Date/ Time:
Received by:	Date/Time:	Relinquished by:	Date/ Time:
Received by Lab:	Date/Time:	Courier/ Transport Company:	
Sample Conditions:	Remarks:		

CHAIN OF CUSTORDY RECORD AND ANALYSIS REQUEST

GHD House 999
Hay Street PO Box Y3106 Telephone 08 6222 8222 Facsimile
Perth WA 6000 Perth WA 6832 08 6222 8555

COC No.

Project Albany Motorsports Park DA		Laboratory: Eurofins | mgt	
Client City of Albany	**Job No.** 12546218	Address: 46-48 Banksia Road, WELSHPOOL, WA 6106	
Laboratory Quote No.	**Turnaround Time** Standard	Laboratory Contact:	
Job Manager (Invoice) Vicki.Davies@ghd.com & GHD accounts	**Email Address (Results)** Vicki.Davies@ghd.com		

GHD Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: ASS field test (fast field screen - non-NATA)	Analyses: Chromium reducible sulfur suite	Analyses: Total Peroxide Acidity (TPA)	Analyses: HOLD	Remarks
													786961
TP07_0.0m				S			1					✓	
TP07_0.5m				S			1					✓	
TP07_1.0m				S			1					✓	
TP07_1.5m				S			1					✓	
TP07_2.0m				S			1					✓	
TP07_2.5m				S			1					✓	
TP08_0.0m				S			1					✓	
TP08_0.5m				S			1					✓	
TP08_1.0m				S			1					✓	
TP08_1.5m				S			1					✓	
TP08_2.0m				S			1					✓	
TP08_2.5m				S			1					✓	
FD01				S			1					✓	
FD02				S			1					✓	

Sampled by: Great Southern Geotechnics	Date/Time:	Relinquished by: Great Southern Geotechnics	Date/ Time:
Received by:	Date/Time:	Relinquished by:	Date/ Time:
Received by Lab:	Date/Time:	Courier/ Transport Company:	
Sample Conditions:	Remarks:		

GHD Pty Ltd WA
999 Hay Street Perth
Perth
WA 6004

Attention: **Vicki Davies**

Report **788508-S**
Project name ALBANY MOTORSPORTS PARK DA
Project ID 12546218
Received Date Apr 16, 2021

Client Sample ID			**TP01_1.5m**	**TP02_0.0m**	**TP03_2.5m**	**TP04_0.5m**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**P21-Ap31761**	**P21-Ap31762**	**P21-Ap31763**	**P21-Ap31764**
Date Sampled			**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]	**Not Provided**[I12]
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	15	500	6.0	36
Extraneous Material						
<2mm Fraction	0.005	g	32	19	35	31
>2mm Fraction	0.005	g	< 0.005	16	< 0.005	< 0.005
Analysed Material	0.1	%	100	55	100	100
Extraneous Material	0.1	%	< 0.1	45	< 0.1	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	5.3	< 1	1.1
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	11	71	< 10	15
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	0.02	0.11	< 0.02	0.02
pH-KCL	0.1	pH Units	5.3	4.9	5.7	5.4
Acid trail - Titratable Actual Acidity	2	mol H+/t	11	71	5.0	15
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.020	0.11	0.010	0.020
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	N/A	N/A	N/A	N/A
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	0.02	0.11	< 0.02	0.02
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	11	71	< 10	15
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	5.3	< 1	1.1
% Moisture	1	%	13	6.2	2.3	5.5

Client Sample ID			TP05_1.0m	TP06_2.0m	TP07_1.5m	TP08_2.5m
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			P21-Ap31765	P21-Ap31766	P21-Ap31767	P21-Ap31768
Date Sampled			Not Provided[I12]	Not Provided[I12]	Not Provided[I12]	Not Provided[I12]
Test/Reference	LOR	Unit				
SPOCAS Suite						
Acid trail - Titratable Peroxide Acidity	2	mol H+/t	5.0	80	11	49
Extraneous Material						
<2mm Fraction	0.005	g	33	35	33	39
>2mm Fraction	0.005	g	< 0.005	0.59	0.72	< 0.005
Analysed Material	0.1	%	100	98	98	100
Extraneous Material	0.1	%	< 0.1	1.7	2.1	< 0.1
Chromium Suite (Minus ANC- WA)						
CRS suite WA (-ANC) - Liming Rate	1	kg CaCO3/t	< 1	2.4	< 1	1.8
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	10	mol H+/t	< 10	31	12	24
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.05	0.02	0.04
pH-KCL	0.1	pH Units	5.5	5.3	5.5	5.3
Acid trail - Titratable Actual Acidity	2	mol H+/t	5.0	31	12	24
sulfidic - TAA equiv. S% pyrite	0.003	% pyrite S	0.010	0.050	0.020	0.040
Chromium Reducible Sulfur[S04]	0.005	% S	< 0.005	< 0.005	< 0.005	< 0.005
Chromium Reducible Sulfur -acidity units	3	mol H+/t	< 3	< 3	< 3	< 3
Sulfur - KCl Extractable	0.02	% S	N/A	N/A	N/A	N/A
HCl Extractable Sulfur Correction Factor	1	factor	2.0	2.0	2.0	2.0
HCl Extractable Sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur	0.02	% S	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - acidity units	10	mol H+/t	N/A	N/A	N/A	N/A
Net Acid soluble sulfur - equivalent S% pyrite[S02]	0.02	% S	N/A	N/A	N/A	N/A
Acid Neutralising Capacity (ANCbt)	0.01	% CaCO3	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - acidity (a-ANCbt)	2	mol H+/t	N/A	N/A	N/A	N/A
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)[S03]	0.02	% S	N/A	N/A	N/A	N/A
ANC Fineness Factor		factor	1.5	1.5	1.5	1.5
CRS Suite - Net Acidity (Sulfur Units)	0.02	% S	< 0.02	0.05	0.02	0.04
CRS Suite - Net Acidity (Acidity Units)	10	mol H+/t	< 10	31	12	24
CRS Suite - Liming Rate[S01]	1	kg CaCO3/t	< 1	2.4	< 1	1.8
% Moisture	1	%	10	15	8.2	15

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
SPOCAS Suite	Brisbane	Apr 20, 2021	6 Week
- Method: LTM-GEN-7050			
Extraneous Material	Brisbane	Apr 22, 2021	6 Week
- Method: LTM-GEN-7050/7070			
Chromium Suite (Minus ANC- WA)	Brisbane	Apr 22, 2021	6 Week
- Method: LTM-GEN-7070 Chromium Reducible Sulfur Suite			
% Moisture	Perth	Apr 20, 2021	14 Days
- Method: LTM-GEN-7080 Moisture			

eurofins | Environment Testing

ABN: 50 005 085 521 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch
43 Detroit Drive
Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

Company Name: GHD Pty Ltd WA
Address: 999 Hay Street Perth
Perth
WA 6004

Project Name: ALBANY MOTORSPORTS PARK DA
Project ID: 12546218

Order No.:
Report #: 788508
Phone: 08 6222 8222
Fax: 08 9429 6555

Received: Apr 16, 2021 9:37 AM
Due: Apr 23, 2021
Priority: 5 Day
Contact Name: Vicki Davies

Eurofins Analytical Services Manager : Rhys Thomas

Sample Detail						Acid trail - Titratable Peroxide Acidity	Moisture Set	Chromium Suite (Minus ANC- WA)
Melbourne Laboratory - NATA Site # 1254 & 14271								
Sydney Laboratory - NATA Site # 18217								
Brisbane Laboratory - NATA Site # 20794						X		X
Perth Laboratory - NATA Site # 23736							X	
Mayfield Laboratory								
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	TP01_1.5m	Not Provided		Soil	P21-Ap31761	X	X	X
2	TP02_0.0m	Not Provided		Soil	P21-Ap31762	X	X	X
3	TP03_2.5m	Not Provided		Soil	P21-Ap31763	X	X	X
4	TP04_0.5m	Not Provided		Soil	P21-Ap31764	X	X	X
5	TP05_1.0m	Not Provided		Soil	P21-Ap31765	X	X	X
6	TP06_2.0m	Not Provided		Soil	P21-Ap31766	X	X	X
7	TP07_1.5m	Not Provided		Soil	P21-Ap31767	X	X	X
8	TP08_2.5m	Not Provided		Soil	P21-Ap31768	X	X	X
Test Counts						8	8	8

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer, that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR : No Limit

Results between 10-20 times the LOR : RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
4. Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
5. Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
6. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling.Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
7. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
8. Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
9. For Matrix Spikes and LCS results a dash " -" in the report means that the specific analyte was not added to the QC sample.
10. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
LCS - % Recovery									
Chromium Suite (Minus ANC- WA)									
pH-KCL			%	100			80-120	Pass	
Acid trail - Titratable Actual Acidity			%	99			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
SPOCAS Suite				Result 1	Result 2	RPD			
Acid trail - Titratable Peroxide Acidity	P21-Ap31879	NCP	mol H+/t	< 2	< 2	<1	30%	Pass	
Duplicate									
Chromium Suite (Minus ANC- WA)				Result 1	Result 2	RPD			
CRS suite WA (-ANC) - Liming Rate	P21-Ap31879	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
CRS suite WA (-ANC) - Net Acidity (Acidity Units)	P21-Ap31879	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite WA (-ANC) - Net Acidity (Sulfur Units)	P21-Ap31879	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
pH-KCL	P21-Ap31879	NCP	pH Units	6.1	6.1	<1	30%	Pass	
Acid trail - Titratable Actual Acidity	P21-Ap31879	NCP	mol H+/t	4.0	4.0	4.0	30%	Pass	
sulfidic - TAA equiv. S% pyrite	P21-Ap31879	NCP	% pyrite S	0.010	0.010	4.0	30%	Pass	
Chromium Reducible Sulfur	P21-Ap31879	NCP	% S	< 0.005	< 0.005	<1	30%	Pass	
Chromium Reducible Sulfur -acidity units	P21-Ap31879	NCP	mol H+/t	< 3	< 3	<1	30%	Pass	
Sulfur - KCl Extractable	P21-Ap31879	NCP	% S	N/A	N/A	N/A	30%	Pass	
HCl Extractable Sulfur	P21-Ap31879	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur	P21-Ap31879	NCP	% S	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - acidity units	P21-Ap31879	NCP	mol H+/t	N/A	N/A	N/A	30%	Pass	
Net Acid soluble sulfur - equivalent S% pyrite	P21-Ap31879	NCP	% S	N/A	N/A	N/A	30%	Pass	
Acid Neutralising Capacity (ANCbt)	P21-Ap31879	NCP	% CaCO3	N/A	N/A	N/A	30%	Pass	
Acid Neutralising Capacity - equivalent S% pyrite (s-ANCbt)	P21-Ap31879	NCP	% S	N/A	N/A	N/A	30%	Pass	
ANC Fineness Factor	P21-Ap31879	NCP	factor	1.5	1.5	<1	30%	Pass	
CRS Suite - Net Acidity (Sulfur Units)	P21-Ap31879	NCP	% S	< 0.02	< 0.02	<1	30%	Pass	
CRS Suite - Net Acidity (Acidity Units)	P21-Ap31879	NCP	mol H+/t	< 10	< 10	<1	30%	Pass	
CRS Suite - Liming Rate	P21-Ap31879	NCP	kg CaCO3/t	< 1	< 1	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	P21-Ap31706	NCP	%	7.3	7.1	3.0	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	N/A
Samples received within HoldingTime	N/A
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins | Environment Testing is not able to determine whether analysis has been performed within recommended holding times.
S01	Liming rate is calculated and reported on a dry weight basis assuming use of fine agricultural lime (CaCO3) and using a safety factor of 1.5 to allow for non-homogeneous mixing and poor reactivity of lime. For conversion of Liming Rate from 'kg/t dry weight' to 'kg/m3 in-situ soil' multiply 'reported results' x 'wet bulk density of soil in t/m3'
S02	Retained Acidity is Reported when the pHKCl is less than pH 4.5
S03	Acid Neutralising Capacity is only required if the pHKCl if greater than or equal to pH 6.5
S04	Acid Sulfate Soil Samples have a 24 hour holding time unless frozen or dried within that period

Authorised by:

Rhys Thomas	Analytical Services Manager
Myles Clark	Senior Analyst-SPOCAS (QLD)

Glenn Jackson
General Manager

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates NATA accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Caitlyn Gibson

From: Vicki Davies <Vicki.Davies@ghd.com>
Sent: Tuesday, 20 April 2021 9:37 AM
To: #AU06_EnviroSampleWA
Cc: Caitlyn Gibson
Subject: FW: Eurofins Test Results, Invoice - Report 786961 : Site ALBANY MOTORSPORTS PARK D/ (12546218)
Attachments: Eurofins Quote 161026GHDW (Rev2).pdf; 12546218_COC_20210416 rebatch.pdf

EXTERNAL EMAIL*

From: Vicki Davies
Sent: Friday, 16 April 2021 12:47 PM
To: EnviroWA@eurofins.com
Subject: FW: Eurofins Test Results, Invoice - Report 786961 : Site ALBANY MOTORSPORTS PARK DA (12546218)

Hi

Could you please analyse the samples in the attached CoC for Soil Suite 2 as per the attached quote?

What will the turnaround time be for this analysis?

If you need any further information please let me know.

Kind regards

Vicki Davies
Environmental Scientist

GHD
Proudly employee owned | ghd.com
166 Stirling Terrace WA 6330 Australia
D 61 8 9840 5104 E Vicki.Davies@ghd.com

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Connect

From: RhysThomas@eurofins.com <RhysThomas@eurofins.com>
Sent: Wednesday, 14 April 2021 5:50 PM
To: Vicki Davies <Vicki.Davies@ghd.com>
Cc: GHD Lab Reports <GHDLabReports@ghd.com>; Jon Cramer <Jon.Cramer@ghd.com>
Subject: Eurofins Test Results, Invoice - Report 786961 : Site ALBANY MOTORSPORTS PARK DA (12546218)

Rob Johnston 16/4/21 Eurofins

788 SOS

Hi Vicki,

Please find attached results and invoice for your project in the subject header.

Kind regards

Rhys Thomas
Analytical Services Manager

Eurofins
Unit 2, 91 Leach Highway
Kewdale WA 6105
AUSTRALIA
Phone: +61 0 9251 9692
EnviroNote 1108 - Emissions from Stationary Sources
EnviroNote 1103 - NATA Accreditation for Dioxins

Rob Johnston
16/4/21
Eurofins

788508

CHAIN OF CUSTORDY RECORD AND ANALYSIS REQUEST

GHD House 999
Hay Street PO Box Y3106 Telephone 08 6222 8222 Facsimile 08
Perth WA 6000 Perth WA 6832 6222 8555

 COC No.

Project Albany Motorsports Park DA
Client City of Albany **Job No.** 12546218
Laboratory Quote No. **Turnaround Time** Standard
Job Manager (Invoice) Vicki.Davies@ghd.com & GHD accounts **Email Address (Results)** Vicki.Davies@ghd.com

Laboratory: Eurofins | mgt
Address: 46-48 Banksia Road, WELSHPOOL, WA 6106
Laboratory Contact:

GHD Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ Su-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: ASS field test (fast field screen - non-NATA)	Analyses: Chromium reducible sulfur suite	Analyses: Total Peroxide Acidity (TPA)	Analyses: HOLD	Remarks
TP01_0.0m				S			1					✓	788508
TP01_0.5m				S			1					✓	
TP01_1.0m				S			1					✓	
TP01_1.5m				S			1			✓	✓		
TP01_2.0m				S			1					✓	
TP01_2.5m				S			1					✓	
TP02_0.0m				S			1			✓	✓		
TP02_0.5m				S			1					✓	
TP02_1.0m				S			1					✓	
TP02_1.5m				S			1					✓	
TP02_2.0m				S			1					✓	
TP02_2.5m				S			1					✓	
TP03_0.0m				S			1					✓	
TP03_0.5m				S			1					✓	
TP03_1.0m				S			1					✓	
TP03_1.5m				S			1					✓	
TP03_2.0m				S			1					✓	
TP03_2.5m				S			1			✓	✓		

Sampled by: Great Southern Geotechnics
Received by:
Received by Lab: Rob Johnston Eurofins
Sample Conditions:

Date/Time:
Date/Time:
Date/Time: 16/4/21 1357
Remarks:

Relinquished by: Great Southern Geotechnics Date/ Time:
Relinquished by: Date/ Time:
Courier/ Transport Company:

CHAIN OF CUSTORDY RECORD AND ANALYSIS REQUEST

GHD House 999 Hay Street Perth WA 6000
PO Box Y3106 Perth WA 6832
Telephone 08 6222 8222 Facsimile 08 6222 8555

COC No.

Project Albany Motorsports Park DA		**Laboratory:** Eurofins | mgt	
Client City of Albany	**Job No.** 12546218	**Address:** 46-48 Banksia Road, WELSHPOOL, WA 6106	
Laboratory Quote No.	**Turnaround Time** Standard	**Laboratory Contact:**	
Job Manager (Invoice) Vicki.Davies@ghd.com & GHD accounts	**Email Address (Results)** Vicki.Davies@ghd.com		

GHD Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: ASS field test (fast field screen - non-NATA)	Analyses: Chromium reducible sulfur suite	Analyses: Total Peroxide Acidity (TPA)	Analyses: HOLD	Remarks 788508
TP04_0.0m				S			1					✓	
TP04_0.5m				S			1			✓	✓		
TP04_1.0m				S			1					✓	
TP04_1.5m				S			1					✓	
TP04_2.0m				S			1					✓	
TP04_2.5m				S			1					✓	
TP05_0.0m				S			1					✓	
TP05_0.5m				S			1					✓	
TP05_1.0m				S			1			✓	✓		
TP05_1.5m				S			1					✓	
TP05_2.0m				S			1					✓	
TP05_2.5m				S			1					✓	
TP06_0.0m				S			1					✓	
TP06_0.5m				S			1					✓	
TP06_1.0m				S			1					✓	
TP06_1.5m				S			1					✓	
TP06_2.0m				S			1			✓	✓		
TP06_2.5m				S			1					✓	

Sampled by: Great Southern Geotechnics	Date/Time:	Relinquished by: Great Southern Geotechnics	Date/ Time:
Received by:	Date/Time:	Relinquished by:	Date/ Time:
Received by Lab: Rob Johnston Eurofins	Date/Time: 16/4/21 9:37	Courier/ Transport Company:	
Sample Conditions:	Remarks:		

CHAIN OF CUSTORDY RECORD AND ANALYSIS REQUEST

GHD House 999 Hay Street Perth WA 6000
PO Box Y3106 Perth WA 6832
Telephone 08 6222 8222 Facsimile 08 6222 8555

COC No.

Project Albany Motorsports Park DA		**Laboratory:** Eurofins | mgt	
Client City of Albany	**Job No.** 12546218	**Address:** 46-48 Banksia Road, WELSHPOOL, WA 6106	
		Laboratory Contact:	
Laboratory Quote No.	**Turnaround Time** Standard		
Job Manager (Invoice) Vicki.Davies@ghd.com & GHD accounts	**Email Address (Results)** Vicki.Davies@ghd.com		

GHD Sample ID	Laboratory Sample ID	Date	Time	Sample Matrix S-Soil/ SL-Sludge/ W-Water/ A-Air	Container: Type B-Bottle/J-Jar/V-Vial/Bag/G-Glass/P-Plastic	Container: Preservative Unpreserved/ HCl/ H2SO4/HNO3/Other	Container: No	Container: Total Volume (mL)	Analyses: ASS field test (fast field screen - non-NATA)	Analyses: Chromium reducible sulfur sulte	Analyses: Total Peroxide Acidity (TPA)											HOLD	Remarks 788508
TP07_0.0m				S			1															✓	
TP07_0.5m				S			1															✓	
TP07_1.0m				S			1															✓	
TP07_1.5m				S			1			✓	✓												
TP07_2.0m				S			1															✓	
TP07_2.5m				S			1															✓	
TP08_0.0m				S			1															✓	
TP08_0.5m				S			1															✓	
TP08_1.0m				S			1															✓	
TP08_1.5m				S			1															✓	
TP08_2.0m				S			1															✓	
TP08_2.5m				S			1			✓	✓												
FD01				S			1															✓	
FD02				S			1															✓	

Sampled by: Great Southern Geotechnics	Date/Time:	Relinquished by: Great Southern Geotechnics	Date/ Time:
Received by:	Date/Time:	Relinquished by:	Date/ Time:
Received by Lab: Rob Johnston Eurofins	Date/Time: 16/4/21 9:37	Courier/ Transport Company:	
Sample Conditions:	Remarks:		

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