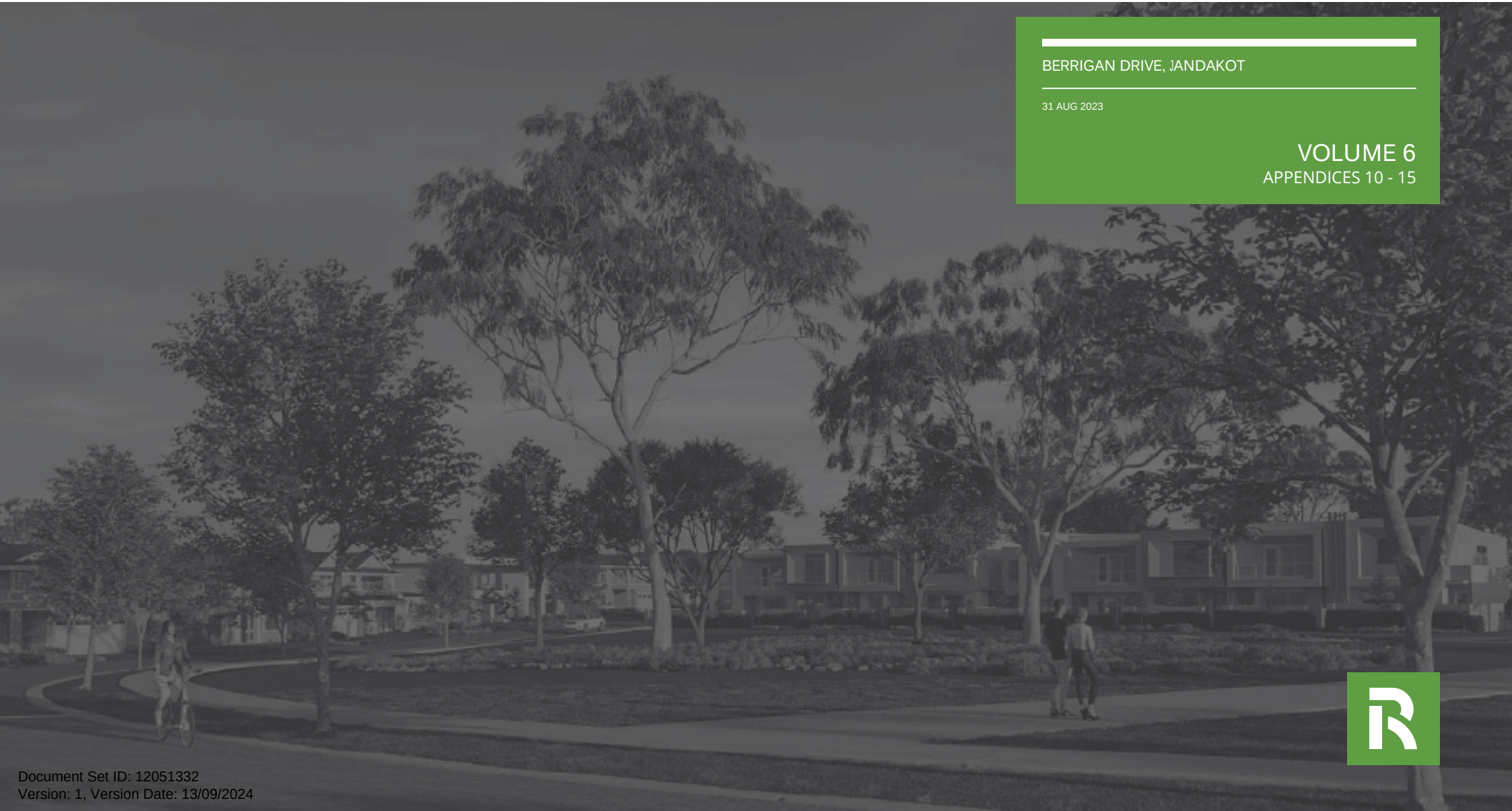
GLEN IRIS ESTATE

STRUCTURE PLAN



BERRIGAN DRIVE, JANDAKOT

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APPENDICES 10 - 15

GLEN IRIS ESTATE

APPENDIX 10
LOCAL WATER MANAGEMENT STRATEGY

Glen Iris, Jandakot

Local Water Management Strategy

August 2023

Client: ECP Acquisitions 6 Pty Ltd

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Executive Summary

Hyd2o was commissioned by ECP Acquisitions 6 Pty Ltd to prepare this Local Water Management Strategy (LWMS) to support the proposed local structure plan (LSP) for land within former Glen Iris golf course (herein referred to as the site).

The LSP area is approximately 54 ha in size and located approximately 20 km south of the Perth central business district within the City of Cockburn. The proposed urban development consists of residential lots, roads, public open space, and commercial area.

This LWMS addresses stormwater management of the site including areas outside of the LSP area which currently discharge stormwater within the site. This document provides a comprehensive overall assessment of the existing water management system of the area and how it will be modified and integrated with the new development to improve water sensitive urban design outcomes as a result of the proposed land use change.

Understanding key hydrological considerations has informed the development of the LWMS for the site. The site has been a golf course since 1995, and is generally characterised as having high permeability soils, good clearance to groundwater, and low Acid Sulphate Soil (ASS) risk across the site. It contains a number of existing stormwater storages which accept flow from external council stormwater systems whose function will need to be maintained post development.

This document has been prepared in accordance with the principles and objectives of Better Urban Water Management (Western Australian Planning Commission, 2008). Key agencies ultimately involved with its implementation including the City of Cockburn, (CoC) and Department of Water and Environmental Regulation (DWER), have been consulted during this process.

Implementation of the strategy will be undertaken in accordance with Better Urban Water Management through the development and implementation of Urban Water Management Plans for individual stages of development within the site.

The Better Urban Water Management LWMS checklist is included as Appendix A.

Local Water Management Strategy Summary

Water Use Sustainability	
Water Efficiency	• Promotion of 6 star building standards (water efficient fixtures and fittings). • Mandatory use of water-wise plantings in POS and landscape rehabilitation areas. • Landscaping and LSP design to retain significant trees • Re-use of groundwater / infiltrated stormwater for POS irrigation. • Water efficient measures to be adopted during the construction phase.
Water Supply	• Lots: Water Corporation IWSS and rainwater tanks (encouraged). • POS: Groundwater via existing DWER licence. • Construction: Groundwater via existing DWER licence.
Wastewater	• Water Corporation reticulated sewerage.
Stormwater	
Design & Management Principles	• Water quality to be managed through biofiltration treatment of runoff generated by first 15mm of rainfall prior to infiltration. • Stormwater management for larger events to be via infiltration in distributed road reserves and POS areas within the site, for both new developed areas and existing areas outside the site which currently flow into the site. • Development levels to have suitable clearance above groundwater and 1% AEP flood levels.
Lot Scale Measures	• Soakwells sized to retain and infiltrate first 15 mm rainfall on site within lots. • Rainwater tanks (optional). • Water-wise landscaping to retain stormwater and minimise runoff
Street Scale Measures	• Biofiltration areas in specified locations, with additional areas identified at UWMP scale as necessary if required • Piped drainage minimised, with maximised use of opportunities for localised swales and/or underground storage within wider road reserves. • GPT's / trash racks where appropriate.
Estate Scale Measures	• Water quality treatment areas in POS for treatment of runoff from first 15mm rainfall via biolfitration. • Flood management storage areas within POS areas to infiltrate flows in accordance with agency requirements. • Post development groundwater, surface water, and system performance monitoring and annual reporting.
Groundwater	
Fill & Subsoil	• Use of cut/ fill across the site to to minimise import fill and establish levels to meet design criteria of clearance above groundwater and the 1% AEP level in POS infiltration areas. • Subsoil drainage unlikely to be required.
Acid Sulphate Soils	• Site has moderate to low risk of ASS. Acid sulphate soils will however be investigated as a separate process if required.
Implementation	
Process	• Predevelopment groundwater and stormwater monitoring program in progress to be completed end of winter 2021. Final results to develop water quality targets. • Future stages of planning consistent with BUWM including preparation of UWMP's. • Staging of stormwater to be detailed in the relevant UWMP's and implemented to ensure key hydrological performance criteria are maintained during transition.

1. Introduction

Hyd2o was commissioned by ECP Acquisitions 6 Pty Ltd to prepare this Local Water Management Strategy (LWMS) to support the proposed local structure plan (LSP) for land within former Glen Iris golf course (herein referred to as the site).

The LSP area is approximately 54 ha in size and located approximately 20 km south of the Perth central business district within the City of Cockburn (Figure 1). The proposed urban development consists of residential lots, roads, public open space, and commercial areas.

This LWMS addresses stormwater management of the site including areas outside of the LSP area which currently discharge stormwater within the site. This document provides a comprehensive overall assessment of the existing water management system of the area and how it will be modified and integrated with the new development to improve water sensitive urban design outcomes as a result of the proposed land use change.

This LWMS provides a total water cycle management approach to development and has been prepared in accordance with the principles and objectives of Better Urban Water Management (Western Australian Planning Commission, 2008). It provides the outcomes of detailed site specific analysis relating to groundwater and stormwater and provides a clear vision in terms of adopting best management practices to achieve water sensitive design.

A copy of the Better Urban Water Management (WAPC, 2008) LWMS Checklist for Developers is included as Appendix A to assist the Department of Water and Environmental Regulation (DWER) in review of this document.

Key stakeholders involved with its implementation of this strategy including the City of Cockburn and Department of Water and Environmental Regulation (DWER), have been consulted during this process. Given the size of the site and its likely development timeframe, ongoing consultation with these stakeholders will continue as planning progresses for the site.

1.1 Planning Background

Better Urban Water Management (Western Australian Planning Commission (WAPC), 2008) provides guidance on the implementation of State Planning Policy 2.9 Water Resources (Government of WA, 2003).

The site is currently zoned Urban under the Metropolitan Region Scheme (2021). This LWMS supports the preparation of a local structure plan for the site for residential development. The urban water management planning process for the site is shown in Table 1.

Table 1: Integrated Planning and Urban Water Management Process

Planning Phase	Planning Document	Urban Water Management Documents
Local Structure Plan	Local Structure Plan	Glen Iris Local Water Management Strategy THIS DOCUMENT
Subdivision	Subdivision Application	Urban Water Management Plan FUTURE PREPARATION

1.2 Key Documents and Previous Studies

The requirements for water protection and urban water management for the site are established in a range of publications including State Planning Policy 2.3 Jandakot Groundwater Protection (WAPC, 2017) and State Planning Policy 2.9 Water Resources (WAPC, 2006). Given the site's location within the Jandakot Ground Water Protection Area, these documents are used to guide the establishment of minimum development requirements and best practice water management.

This LWMS also uses the following additional documents to define its key principles, criteria, objectives, and implementation responsibilities:

- Decision Process for Stormwater Management in WA (DWER, 2017)
- Better Urban Water Management (WAPC, 2008)
- Stormwater Management Manual for WA (Department of Water, 2007)
- Land Use Compatibility Tables for Public Drinking Water Source Areas (Department of Water (2016)

2. Proposed Development

The local structure plan for the site is shown in Figure 2, providing a unique opportunity for urban infill in close proximity to the Perth Central Business District.

The LSP area covers approximately 54 ha, with the proposed development consisting of residential lots, roads, linear connected public open space, grouped housing, and a commercial area adjoining Berrigan Drive.

The development will provide a vibrant and diverse residential community with a variety of housing choice and local amenities. The structure plan design aims to create better and safer transport routes for existing residents and introduce new landscaped areas for public recreation.

From a stormwater management perspective, the development will seek to provide significant improvements in management for existing and new systems, both from a water quality and public amenity viewpoint.

The development will also provide an opportunity to improve local environmental outcomes via a reduction in nutrient application and export and reduction in irrigation abstraction from the local superficial aquifer.

3. Existing Environment

3.1 Site Conditions

The site is located in the suburb of Jandakot in the City of Cockburn.

The site is the former Glen Iris Golf Course and is bound by existing urban development in most directions. The site straddles Berrigan Driver and has the Kwinana Freeway in close proximity to its western boundary (Figure 1).

Figure 3 shows an aerial photograph with existing land use and topography. In the area south of Berrigan Drive, with the exception of some excavated groundwater table lakes and sumps, site topography typically ranges between 27 mAHD and 31m AHD. In the area north of Berrigan Drive, topography typically ranges between 26 mAHD and 43 m AHD.

3.2 Geotechnical

According to the Perth Metropolitan Region 1:50 000 Environmental Geology Series Fremantle Pt Sheet 2033 I and 2o33 IV (Gozzard 1983), the site is characterised as Bassendean Sand (S8), described as very light grey at surface, yellow at depth, fine to medium grained, sub-rounded quartz, moderately well sorted, of eolian origin.

A geotechnical investigation for the site was undertaken by CMW Geosciences in November/December 2020.

The geotechnical report is included as Appendix B. This investigation included excavation of 55 test pits and 8 hand augered boreholes for infiltration testing. A Perth Sand Penetrometer (PSP) test was also undertaken at each test pit location. Test locations are shown on Figure 4 and Appendix B.

Based on the history of the site and surrounding land levels, some superficial depths of fill were anticipated. The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area.

The typical soil profile as described by CMW Geosciences (2020) is as follows:

- TOPSOIL: SAND / CLAYEY SAND dark grey, brown, fine to medium grained, subangular to subrounded sand with trace fines (>12% in TP48); trace organics; trace roots and rootlets; trace branches; trace vegetation, overlying;
- FILL: SAND (UNCONTROLLED) loose to very dense, fine to medium grained, subangular to subrounded; grey/pale yellow and orange-brown; trace fine grained limestone gravel (TP04, TP20); trace fines; trace organics; trace roots and rootlets; trace branches. Uncontrolled fill in the form of old reticulation pipe and bricks were found in TP04, TP18, TP28 and TP34. The reticulation pipe uncovered in TP28 and TP34 contained potential asbestos between depth of 0.5 and 1.6 mbgl, overlying;
- SAND (SP) loose to very dense, fine to medium grained, subangular to subrounded; grey/orange/yellow and white; trace fines; trace roots and rootlets, overlying;
- COFFEE ROCK very dense, fine to medium grained, subangular to subrounded, dark brown/black; weakly cemented. (Only found in TP03 TP06, TP12 and TP52). The coffee rock was typically found in or around low energy zones (lakes) located across the site where groundwater may be present.

During the investigation, which was completed in early-summer conditions, groundwater was not encountered within any of the investigation locations.

The site was classified as Class A in accordance with AS2870-2011, and considered suitable for stormwater infiltration at both lot and estate scale.

3.2.1 Permeability Testing

CMW Geosciences (2020) undertook eight in situ permeability tests within the site. Test locations are shown in Figure 4. The tests were performed using the falling head method within a hand augered borehole at a depth of approximately 1.4 m below ground surface. Results of the testing as analysed by CMW Geosciences (2020) are provided in Table 2.

Hyd2o also conducted permeability testing at the site in November/December 2020 and April 2021 to provide estimates of the field saturated hydraulic conductivity of the soils and assess their suitability for stormwater infiltration. Sixteen permeability tests were undertaken based on a constant head test at and adjacent to existing stormwater storage locations receiving flow from external catchments into the site. Test locations are shown in Figure 4 and results from the permeability tests are presented in Appendix C.

An average field saturated hydraulic conductivity rate of 40 m/day was observed by the Hyd2o testing with values ranging from approximately 4 to 139 m/day. Testing by CMW Geosciences (2020) was within a similar range.

Based on these results CMW Geosciences (2020) recommended a hydraulic conductivity of 5 m/day be used for modelling. This is considered a conservatively low value over much of the site even when applying a 50% reduction factor to account for long term clogging.

3.2.2 Acid Sulphate Soils

Acid Sulphate Soil (ASS) is the common name given to naturally occurring soil and sediment containing iron sulfides. These naturally occurring iron sulfides are generally found in a layer of waterlogged soil or sediment and are benign in their natural state.

When disturbed and exposed to air, however, they oxidise and produce sulfuric acid, iron precipitates, and concentrations of dissolved heavy metals such as aluminium, iron and arsenic. Release of acid and metals as a result of the disturbance of ASS can cause significant harm to the environment and infrastructure.

WAPC's Bulletin 64 (WAPC, 2003) ASS risk mapping for the site indicates that the whole site is classified as having a moderate to low risk of ASS across the site less than 3 m from the surface.

3.2.3 Contaminated Sites

The site is not registered as a contaminated site on DWER's online Contaminated Sites Database.

CMW Geosciences (2020), indicated some asbestos may be present within the site following previous demolition of old infrastructure along the western site boundary near Hartwell Parade. During bulk earthworks any asbestos will need to be appropriately managed by a competent environmental consultant.

Table 2: Permeability Test Results

Test Site	Tested By	Test Depth Below Surface (m)	Permeability K_s m/day
GIGC1	Hyd2o	0.7	28.4
GIGC2	Hyd2o	0.7	3.7
GIGC3	Hyd2o	0.7	23.5
GIGC4	Hyd2o	0.7	53.9
GIGC5	Hyd2o	0.7	5.9
GIGC6	Hyd2o	0.7	51.1
GIGC7	Hyd2o	0.7	10.6
GIGC8	Hyd2o	0.7	121.3
GIGC9	Hyd2o	0.7	34.2
GIGC10	Hyd2o	0.7	9.7
GIGC11	Hyd2o	0.7	42.2
GIGC12	Hyd2o	0.7	40.9
GIGC13	Hyd2o	0.7	138.6
GIGC14	Hyd2o	0.7	24.0
GIGC15	Hyd2o	0.7	36.1
GIGC16	Hyd2o	0.7	15.2
Perm1	CMW Geoscieces	1.36	5.6-27.2
Perm2	CMW Geoscieces	1.42	25.8-105.0
Perm3	CMW Geoscieces	1.35	16.0-58.2
Perm4	CMW Geoscieces	1.38	8.7-36.8
Perm5	CMW Geoscieces	1.40	17.2-71.4
Perm6	CMW Geoscieces	1.40	14.5-43.6
Perm7	CMW Geoscieces	1.41	6.8-30.6
Perm8	CMW Geoscieces	1.41	16.1-71.9

CMW Geosciences Permeabilites based on two methods : CIRIA Method (higher value)and Horslev Method (lower value)

3.3 Wetlands

There are no conservation category wetlands, resource enhancement wetlands, multiple use wetlands, or natural waterways within the site (Figure 5).

There are a number of existing open water bodies previously within the site associated with the sites previous use as a golf course. Most of these water bodies are lined and ornamental while one in the south of the site is an excavation into the regional groundwater table. Some of the water bodies in the area north of Berrigan Drive also serve an existing drainage function.

3.4 Jandakot Drinking Water Supply Area

Part of the site is currently classified as a Priority 3 Groundwater Protection Area as shown on Figure 5, however this does not preclude residential development. The Department of Water (2016) Land Use Compatibility Tables for Public Drinking Water Source Areas Water Quality Protection Note No 25, detail urban residential as an acceptable land use within a Priority 3 area.

Three Water Corporation Jandakot Mound production bores are located adjacent to the eastern boundary of the site as shown in Figure 5.

Water Corporation bores have a 300 m radius wellhead protection zone (WPZ) in Public Drinking Water Source Area (PDWSA) Priority 2 and Priority 3 areas. All three bores have WPZs which extend within the site. A fourth Water Corporation bore which is located near the clubhouse is no longer used, however a WPZ also still exists for this disused bore.

Advice from DWER indicates urban development within WPZ areas is permitted consistent with underlying Priority 3 classification, although some restrictions/exclusions may apply such as locating a sewer pump station or petrol station in these areas.

3.5 Surface Water

3.5.1 Existing Stormwater Management

There is no overarching DWER regional or district stormwater strategy which covers the site. The site does not have a connection to any arterial drainage scheme and all stormwater that is generated on site is infiltrated.

The site currently provides stormwater storage and infiltration areas for adjacent externally developed areas. According to the City of Cockburn Intramaps system, there are currently 18 bubble up pit outlets from externally developed areas which drain into the site discharging into 15 separate drainage areas. These drainage areas range from wet basins to shallow informal depressions to fenced steep sided deep sumps.

Outlet locations and storages are shown in Figure 6, with plates contained as Appendix D. These locations provide a constraint to the future development layout of the site and post development the site will be required to continue to provide stormwater storage for the external catchment. Typically this would be provided in broadly similar locations, though some movement may be possible based on engineering design considerations.

Based on topographic mapping and drainage detail via the City of Cockburn Intramaps system, the contributing external catchment has been mapped at approximately 57 ha, broadly similar to the site area itself (54 ha).

External subcatchment areas contributing flow to each outlet in the site are shown in Figure 6. As the total external contributing catchment area of 57 ha is broadly similar to the site area, the area required for stormwater management within the site as a result of the external catchment is likely to be considerably more than would be otherwise required for the site itself.

Outlet locations and associated catchments have been used to inform the LSP for the site and its POS and stormwater infiltration area locations. This is further discussed in Section 6.

A details survey of all the outlet locations and existing storage volumes was conducted by MNG. Survey details are contained as Appendix E.

3.5.2 Surface Water Quality

Hyd2o commenced an 18 month pre development surface water quality monitoring program in June 2020. Sampling was undertaken at the outlets of the existing stormwater system into the site. Locations are shown in Appendix F.

Physical parameters (temperature, electrical conductivity, and pH) were measured in situ. Samples were sent to the NATA approved MPL Laboratory for total nitrogen, ammonia, nitrate, nitrite, total phosphorus, filterable reactive phosphorus, and heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury, and zinc).

Surface water quality results are summarised in Table 3 compared to ANZECC (2000) guideline trigger values. Full monitoring results are contained in Appendix F.

Key results are summarised as follows:

- Mean pH at all sites are within the ANZECC guideline range (6.5 – 8.0).
- Mean values for Electric Conductivity (EC) for each site ranged from 82 µS/cm to 252 µS/cm. All values fell within or below the ANZECC guideline range (120-300 µS/cm).
- Mean total nitrogen (TN) for all sites ranged from 0.13 to 0.70 mg/L, within the ANZECC 95% guideline limit (1.2 mg/L). The mean TN across all sites was 0.37 mg/L.
- Mean total phosphorus (TP) ranged from 0.05 to 0.26 mg/L with values ranging from below the ANZECC 95% guideline limit (0.065 mg/L) primarily in the northern areas of the site to exceeding the limit in the south. The mean TP across all sites was 0.09 mg/L.

With respect to metals, mean results were as follows relative to ANZECC guideline values:

- Arsenic, Cadmium, Mercury, Chromium, Lead, and Nickel were all within the 95% protection limit across all sites.
- Copper was within the 95% protection limit across all sites except SW5, SW15 and SW16, which fell within the 90% protection limit, and SW2, SW4 and SW13, which fell below the 80% protection limit, with only SW1 falling below the 80% protection limit.
- Zinc was highly variable across the sites, ranging from within the ANZECC 95% protection limit at SW3, SW5, SW6, SW7 and SW8, to below the 80% protection limit at SW10, SW12, SW13, SW14, SW15 and SW16.

Table 3: Existing Surface Water Quality

Surface Water Sample	Mean for Sampled Parameters							
	EC (µS/cm)	pH	TN (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TP (mg/L)	FRP (mg/L)
ANZECC	120-300	6.5-8.0	1.2	0.32 – 2.3 (99% - 80% protection)	0.017 – 17 (99% - 80% protection)	-	0.065	0.04
SW1	209	6.85	0.26	0.01	0.04	0.01	0.05	0.02
SW2	96	7.51	0.20	0.01	0.01	0.01	0.05	0.01
SW3	82	6.90	0.30	0.02	0.02	0.01	0.05	0.03
SW4	142	6.79	0.32	0.03	0.02	0.01	0.08	0.04
SW5	140	7.11	0.25	0.01	0.02	0.01	0.09	0.01
SW6	92	7.12	0.13	0.01	0.02	0.01	0.05	0.01
SW7	89	6.67	0.20	0.03	0.05	0.01	0.08	0.01
SW8	108	6.59	0.30	0.02	0.03	0.01	0.06	0.01
SW9	123	6.73	0.58	0.01	0.01	0.01	0.09	0.02
SW10	133	6.67	0.33	0.01	0.03	0.01	0.12	0.01
SW11	252	6.91	0.70	0.04	0.03	0.01	0.26	0.01
SW12	107	6.84	0.34	0.02	0.06	0.01	0.05	0.01
SW13	147	6.56	0.50	0.02	0.01	0.01	0.10	0.01
SW14	124	6.61	0.46	0.04	0.02	0.01	0.12	0.05
SW15	150	6.51	0.44	0.07	0.02	0.01	0.14	0.04
SW16	141	6.72	0.45	0.04	0.04	0.01	0.06	0.02
All Sites	138	6.76	0.37	0.03	0.03	0.01	0.09	0.02

3.6 Groundwater

3.6.1 Groundwater Levels

The Department of Water and Environmental Regulation's (DWER) online Perth Groundwater Map, shows that groundwater levels across the site range from approximately 21 mAHD to 23 mAHD with groundwater flow to the west toward the freeway and away from Water Corporation public water supply bores (Figure 7).

These groundwater levels are contoured May 2003 readings, and represent a typical minimum groundwater level at the end of summer. The Perth Groundwater Map also provides estimated historical maximum groundwater level contours which range from 23 mAHD to 26 mAHD across the site.

In the area south of Berrigan Drive, with the exception of some excavated groundwater table lakes and sumps, site topography typically ranges between 27mAHD and 31mAHD with an existing natural surface clearance above the historical maximum contours ranging from approximately 1.5 to 6 m. In the area north of Berrigan Drive, topography typically ranges between 26 mAHD and 43 mAHD with the existing natural surface clearance above the historical maximum contours ranging from 1.5 to 19 m.

To refine groundwater mapping at the site Hyd2o installed 9 bores within the site in June 2020, which are currently being monitored monthly for water levels and quarterly for water quality. Lithological logs are including in Appendix G.

The estimated average annual maximum groundwater levels (AAMGL) for the site based on these bores and collected data are shown in Figure 7. Hyd2o have calculated the AAMGL by adjusting levels at site bores based on the recorded level in DWER bores JM12, JM2, JM45A and J310 on 23 September 2020 referenced to their long-term historical data (Table 4). Long-term hydrographs for DWER bores JM12, JM2, JM45A and J310 are provided in Appendix H. The data considered for the calculation is from the year 2000, considered representative of current climate conditions.

The AAMGL for each groundwater bore based on this analysis is shown in Table 5.

AAMGL's across the site range from 22 mAHD at the northern end to 23.6 mAHD at the southern end while MGL's across the site range from 22.7 mAHD at the northern end to 24.3 mAHD at the southern end. Depth to the AAMGL across the site typically ranges from a minimum of approximately 2 m in southern of the site to more than 18 m in the north.

It is important to note the LWMS uses the terminology AAMGL to represent a valid statistical property of groundwater in the area, and not as a concept as per previous DWER policies. This LWMS presents details of the groundwater's seasonal variation, AAMGL, and its MGL all as measures of its seasonal, annual, and interannual behaviour.

Only presenting an MGL value is not considered adequate to represent the groundwater characteristics and behaviour of the site.

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Table 4: AAMGL for DWER Bores

Bore	Period of Record Used	Groundwater Level (mAHD) 23/09/2020	AAMGL 2000-2020 (mAHD)	Correction Factor (m)	MGL (mAHD)	Correction Factor (m)
JM12	2000 – 2020	21.87	21.88	0.01	22.39	0.52
JM2	2000 – 2020	22.40	22.46	0.06	23.43	1.03
JM45A	2000 – 2020	24.39	24.36	-0.03	25.24	0.85
J310	2000 – 2020	24.05	24.13	0.08	24.64	0.59
Correction Factors for Site Bores				+0.03		+0.75

Table 5: AAMGL for Site Bores

Bore	Natural Surface (mAHD)	Groundwater Level (mAHD) 23/09/2020	AAMGL (mAHD)	MaxGL (mAHD)	Depth to AAMGL Below Natural Surface (m)
MW1	30.93	23.15	23.18	23.90	7.75
MW2	27.22	22.74	22.77	23.49	4.45
MW3	28.73	22.11	22.14	22.86	7.59
MW4	25.67	22.42	22.45	23.17	3.22
MW5	26.84	23.22	23.25	23.97	3.59
MW6	28.56	23.13	23.16	23.88	5.40
MW7	27.70	23.16	23.19	23.91	4.51
MW8	26.12	23.66	23.69	24.41	2.43
MW9	27.83	23.21	23.24	23.96	4.59

3.6.2 Groundwater Quality

Groundwater quality was monitored quarterly at the 9 onsite groundwater bores by Hyd2o from June 2020 to December 2021. Bore locations in the site are shown in Figure 7 and Appendix F.

Physical parameters (temperature, electrical conductivity, and pH) were measured in situ. Samples were sent to the NATA approved MPL Laboratory for total nitrogen, ammonia, nitrate, nitrite, total phosphorus, filterable reactive phosphorus, and heavy metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury, and zinc).

Groundwater water quality results are outlined in Table 6 compared to ANZECC (2000) guideline trigger values. Full results are contained in Appendix F.

Results are summarised as follows:

- Mean pH across the groundwater bores ranged between 4.41 and 6.26, all sites fell below the lower limit of the ANZECC guideline range (6.5 – 8.0).
- The mean EC across the groundwater bores ranged between 288 µS/cm and 844 µS/cm. All groundwater sites except MW8 exceeded the upper limit of the ANZECC guideline range (120-300 µS/cm). It is important to note that While EC values are above the ANZECC guideline range, the predevelopment EC levels recorded are a natural baseline condition of the aquifer in the area rather than a land use outcome.
- Mean TN values ranged from 0.78 mg/L to 4.72 mg/L, with the majority of bores exceeding the ANZECC guideline limit (1.2 mg/L). The bores within the limit included MW4 and MW8. The mean TN across all sites was 1.83 mg/L. TN groundwater concentrations were high than that of stormwater possibly due to fertiliser application on the golf course.
- Mean TP was within the ANZECC guideline limit of 0.065 mg/L across almost all sites. MW6 was the only exceedance with a mean value of 0.07 mg/L. The mean TP across all sites was 0.05 mg/L, lower than the TP level in stormwater.

With respect to metals, mean results were as follows relative to ANZECC guideline values:

- Arsenic, Cadmium, Nickel, Lead, and Mercury were within the 95% protection limit across all bores.
- Chromium was within the 95% protection limit across all bores except for MW6 and MW7 which fell within the 90% protection limit.
- Copper was within the 95% protection limit across all bores except for MW1, MW7, and MW9. MW7 fell within the 90% protection limit, while MW1 and MW9 fell below the 80% protection limit.
- Zinc was within the 95% protection limit across all bores except for MW1 which fell below the 80% protection limit.

Table 6: Existing Groundwater Quality

Groundwater Bore	Mean for Sampled Parameters							
	EC (µS/cm)	pH	TN (mg/L)	Ammonia (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	TP (mg/L)	FRP (mg/L)
ANZECC	120-300	6.5-8.0	1.2	0.32 – 2.3 (99% - 80% protection)	0.017 – 17 (99% - 80% protection)	-	0.065	0.04
MW1	680	6.26	1.55	0.04	1.10	0.01	0.05	0.01
MW2	844	6.00	2.10	0.02	1.80	0.01	0.05	0.01
MW3	549	5.68	2.15	0.01	1.88	0.01	0.05	0.01
MW4	649	5.85	0.78	0.20	0.02	0.01	0.05	0.01
MW5	760	4.41	1.33	0.40	0.13	0.01	0.05	0.01
MW6	556	4.75	4.72	0.21	3.26	0.08	0.07	0.01
MW7	601	5.52	1.65	0.07	0.48	0.01	0.05	0.01
MW8	288	5.74	0.97	0.14	0.02	0.01	0.05	0.01
MW9	504	5.12	1.22	0.62	0.01	0.01	0.05	0.01
All Sites	603	5.48	1.83	0.19	0.97	0.02	0.05	0.01

3.7 Nutrient Input Assessment

The Urban Nutrient Decision Outcomes (UNDO) model is a conceptual decision support tool developed by DWER that evaluates nutrient reduction decisions for urban developments on the Swan Coastal Plain in south-west Western Australia. It is designed for ease-of-use by urban development proponents and for assessment by local and state government authorities.

The tool was developed to assess the nutrient impacts of urban development on the Swan Coastal Plain in a consistent and scientifically rigorous manner, and improve scientific understanding relating to nutrient issues, and efficiencies in the investment to manage nutrients.

The tool is web-based, and provides users with the ability to implement a range of structural or non-structural design options to evaluate and reduce nutrients exported from an urban development.

Modelling of the historical land use of the site as a golf course is detailed in Appendix I.

The results indicate nutrient inputs of 8704 kg/yr for TN and 368 kg/yr TP to the environment based on typical nutrient application rate estimates. The resultant nutrient export was 715 kg/yr of TN and 2.5 kg/yr of TP. This export estimate considers soil types, groundwater gradient and depth to groundwater in its calculations.

Post development nutrient input and export rates are addressed in Section 6.2.

3.8 Constraints and Opportunities

Based on the sites existing environment, the following key constraints and opportunities are identified to guide the development of the water management strategy and proactive management practices detailed in later sections of this report:

- The site has good clearance to groundwater and highly permeable soils suitable for infiltration of stormwater. All stormwater that is currently generated on site is infiltrated.
- The site provides stormwater storage for 57 ha of external development. There are 18 outlets which currently drain into the site into 15 drainage areas. The site will be required to continue to provide storage for the external catchment post development.
- Opportunities exist to improve the existing stormwater management and water quality treatment outcomes for these areas.
- There are no conservation category wetlands, resource enhancement wetlands, multiple use wetlands, or natural waterways within the site.
- Part of the site is currently classified as a PDWSA Priority 3 area, however this does not preclude residential development. Four Water Corporation bores have wellhead protection zones (WPZ) which extend into the site, however urban development within the WPZs will be permitted consistent with their underlying Priority 3 classification.

4. Design Criteria & Objectives

Key design principles and criteria for the site are shown in Table 7 and have been established consistent with the key reference documents previously detailed in Section 1.2, and reflect the site constraints and opportunities identified in Section 3.

These principles and criteria are used to formulate the water management strategy for the site to remain within the identified constraints and opportunities of the existing environment.

Table 7: Design Principles & Criteria

Strategy Elements	Method & Approach
Water Use Sustainability	
Water Efficiency	• Water efficiency implementation to be consistent with Building Codes of Australia requirements • Aim for less than 100 kL/person/year water use • Establish "Waterwise" Public Open Space • Maximise at source infiltration of stormwater
Water Supply	• Minimise overall use of scheme water for non-drinking purposes • Water Corporation IWSS for lots plus use of rainwater tanks (non mandated) • Irrigation of POS via existing groundwater licence
Wastewater	• Water Corporation reticulated sewerage
Stormwater	
Ecological Protection	• Lot soakwells (15mm event infiltration on site) • Establishment of distributed biofiltration areas within road reserves and POS areas for treatment of first 15mm road runoff.
Serviceability	• Minimise use of piped drainage systems • Piped drainage system (where required) sized to convey 20% AEP event
Flood Protection	• Overland flow paths within road reserves for safe conveyance of flows exceeding pipe drainage system capacity • Provide storage infiltration areas within POS for management of flows from both within and external to the site for events of to 1% AEP event • Establish minimum habitable floor levels at 0.5m above the 1% AEP flood level of infiltration areas
Groundwater	
Fill Requirement & Subsoil Drainage	• Development levels to establish an acceptable clearance to groundwater using cut to fill across the site and minimising imported fill (if required).
Acid Sulphate Soils & Contamination	• Management of Acid Sulphate Soils and any contamination to be handled as a separate process if required consistent with DoE (2004) requirements.

5. Water Use Sustainability

5.1 Water Efficiency Measures

The development of the site will lead to an overall increased demand for potable water and for irrigation of gardens and POS areas. Water conservation measures will be implemented to reduce scheme water consumption within the development will be consistent with Water Corporation's "Waterwise" land development criteria including:

- Promotion of use of waterwise practices including water efficient fixtures and fittings (taps, showerheads, toilets, rainwater tanks, waterwise landscaping).
- All houses to be built to 6 star building standards (water efficient fixtures and fittings).
- Mandatory use of water wise plantings in POS areas.
- Maximising on site retention and infiltration of stormwater.
- Use of high density residential zoning to reduce garden (ex-house) use of water and minimise fertiliser nutrient inputs.

5.2 Water Supply

The Water Corporation's Integrated Water Supply System (IWSS) will supply potable water to future homes on the site.

Rainwater tanks will not be implemented/mandated at estate scale to supplement the domestic water supply scheme however will be encouraged together with house design to allow for retrofitted tanks. Residents who wish to supplement scheme water supply with rainwater tanks will be provided for by individual builders during the building application process.

The site is located within the Jandakot Groundwater Area Airport Subarea in which the superficial aquifer is fully allocated.

The site has an existing licence for 325,000 kL/yr via the superficial aquifer, with the licence valid to 2023, which was transferred on purchase of the property. A copy of the irrigation licence is include as Appendix J. This volume represents an irrigation allocation of approximately 6000 kL/yr/ha across the total site area, which is more than adequate for the irrigation of future public open space.

Landscape masterplanning for the site prepared by Emerge is contained as Appendix K.

Preparation and agency approval of final landscape plans will be undertaken at UMWP stage based on final stormwater design requirements. The UWMP will also include detailed irrigation usage tables demonstrating water use and distribution at local scale.

Note the stormwater areas shown in Appendix K should be considered indicative only, with the final form of these areas undertaken at UWMP stage based on refined stormwater modelling and landscape design.

5.3 Wastewater Management

Wastewater will be reticulated sewerage with management by the Water Corporation.

6. Stormwater Management Strategy

This LWMS proposes a pro-active treatment train approach to achieve exemplary water quality management for the site through the adoption of both non- structural and structural control measures.

Stormwater management at the site has been designed in accordance with Better Urban Water Management (WAPC, 2008), City of Cockburn principles for water quality and quantity management, DWER requirements, and Stormwater Management Manual for Western Australia (DoW, 2007).

The system will consist of a series of lot soakwells, road drainage pits, piped drainage, overland flows paths, swales, and distributed bioretention and flood storages areas within POS and road reserves for water quality treatment and major event management.

A key element of the system will be the minimisation of pipe networks and the use of many small scale local catchments to treat and infiltrate stormwater runoff at source.

In some areas, underground storages may be required due to the constraints provided via the level of existing pipe inverts entering the site from external catchments, and the desire to achieve useable POS outcomes and tree retention.

Where appropriate additional local scale management measures such as tree pits, pervious paving, and rain gardens will be considered during more detailed local planning and engineering design and appropriately documented in UWMP's.

6.1 Stormwater Event Modelling

Stormwater modelling of proposed stormwater management areas was undertaken by Hyd2o using the PONDS shallow water table infiltration model. PONDS is a program specifically designed for modelling groundwater/surface water interactions for the design of stormwater infiltration areas based on the finite difference computer program MODFLOW developed by the US Geological Survey.

The design storms modelled by PONDS were calculated with reference to the methodology in Australian Rainfall and Runoff (ARR) and the Bureau of Meteorology Computerised Design IFD Rainfall System (CDIRS). The rainfall temporal pattern was assumed to be spatially uniform across the catchment. Storm durations modelled ranged from 1 hour to 72 hours.

To support an at-source approach to stormwater management, the site was delineated into many small catchments based on existing external catchments and flow paths, proposed earthworks, and the location of the proposed POS areas. All individual catchments are shown in Figure 8.

Various runoff coefficients applied to different land uses for each of the AEP's modelled were determined using Hyd2o's CUURV runoff rate calculator as detailed in Appendix L. These rates were then used to determine the equivalent impervious areas (EIA's) for each individual catchment. These EIA's are also detailed in Appendix L.

Note that for LWMS modelling purposes group housing sites have been assumed to contribute runoff to the catchment stormwater storages in which they are located, with the exception of two early stage catchments where on site storage is proposed.

Opportunities for onsite stormwater retention of these areas will be examined at later stages of planning, particularly where this may lead to better POS outcomes and enhanced tree retention. Similarly for larger lots, opportunities for increased lot retention of runoff will be explored to achieve increased at source infiltration and reduce downstream storage requirements.

Key modelling parameters for individual catchments are provided in Appendix M and the basis for the values used summarised as follows:

- A groundwater level equivalent to the AAMGL at the location of the proposed storage was adopted a baseline condition for the start of modelling. This is considered a conservative assumption as groundwater levels will be lower than the AAMGL at most times of the year.
- A maximum inundation depth of 0.3 m for biofiltration areas and management of the 15mm event.
- Batter side slopes of 1 in 6 for both biofiltration and major event flood storage area in POS and road reserves. Vertical side slopes were adopted for underground storages.
- A maximum storage depth of 1.2 m adopted for above ground storages in POS and a maximum depth of 0.8m for swales located adjacent to road reserves.
- Variable hydraulic conductivity adopted at individual storages based on local field permeability testing with allowance for long term clogging and considering acceptable City of Cockburn upper limits for design use. Note that for biofiltration areas a rate of 5 m/d for filter media was adopted, with a 50% clogging allowance.

Individual storage details and inverts are shown in Appendix M relative to the AAMGL and MGL at each storage location. These inverts should be considered indicative only, subject to detailed future earthworks design.

It is important to note that at a few locations with lesser clearances to groundwater, this occurs due to the storage invert levels being dictated by the existing stormwater infrastructure levels from external catchments to current storages. Opportunities to raising these existing outlet levels will be further examined in consultation with the City of Cockburn in due course however this will need to ensure the stormwater function of existing piped systems outside of the site are not compromised.

The proposed stormwater management system post development is shown in Figures 9a, 9b, and 9c showing key storage locations, volumes, and areas based on modelling outcomes using PONDS for various AEP events. A full set of modelling results including details of all parameters and results for each individual catchment is provided in Appendix M, with an overlay of the stormwater management areas in relation to the landscape masterplan contained in Appendix N. Modelling results in Appendix M include levels, areas and volumes for all storage for small (15mm), minor (20% AEP) and major (1% AEP events).

Table 9 provides a summary of the overall areas for stormwater management for the site to inform planning considerations:

- With respect to the 15mm (1 EY) event the total volume required within the site to manage this event is estimated as 1,444 m^3, with an area of 6,934 m^2 (based on ~0.3 m deep storage and 1:6 side slopes). Note that this area calculation excludes likely the likely area associated with underground storage for this event as this will not affect POS usability. The area equates to approximately 1.4 % of the total site area, which is larger than would normally be expected due to runoff from external catchments into the site.
- With respect to the 20% AEP event the total volume required within the site to manage this event is estimated as 6,076 m^3, with an area of 13,672 m^2 (inclusive of the 15mm / 1 EY event storage. This area excludes any potential underground storage. The area equates to approximately 2.5 % of the total site area.
- With respect to the 1% AEP event the total volume required within the site to manage this event is estimated as 12,897 m^3, with an area of 18,849 m^2 (inclusive of the 15mm / 1 EY event storage. This area equates to approximately 3.5 % of the total site area.

Note that the extent of inundation of POS areas shown in Figure 9 for various flood management events are shown to scale. The storage shapes and locations however should be considered indicative only for determination of area space requirements and the representation of storage areas required in relation to POS areas allocated in the local structure plan.

With respect to the existing stormwater storage areas, it should be noted that the sizing of the future stormwater management areas was not done by simply accepting and replicating the volume of the existing areas but was based on updated catchment mapping, local infiltration testing, and detailed modelling of each subcatchment. This is important as Hyd2o understand the City have previously experienced some flooding issues with some the existing storage areas.

Storage volumes shown in the LWMS therefore represent updated volumes for each catchment based on achieving current design guidelines and best practice outcomes. Continued liaison with the City of Cockburn over the development timeframe will ensure additional anecdotal information regarding performance is included and informs future detailed design.

The final flood attenuation area configuration (side slopes etc), locations, and elevations will be documented in future UWMPs and will be dependent on the refined final earthworks, drainage, and road design levels for the development.

Minor refinements to catchment areas shown in this report are considered likely to occur as detailed design proceeds, and stormwater modelling will be updated accordingly during the UWMP process.

The disaggregation of the site into 38 small scale local stormwater areas represents best practice in at-source control of stormwater, particular given the size of the site. Notwithstanding it is recognised that further opportunities with the site for at source controls still exist and can be further explored as detailed planning progresses. Potential locations for further disaggregation of stormwater are identified on Figures 9 a, b, and c, and will be examined at Urban Water Management Planning (UWMP) stage. Such measures will include further implementing swales, treepits, and local raingardens where possible. A key consideration of the implementation of these measures will be the retention of trees and existing vegetation which are a key objective of the development.

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Table 8: Post Development Stormwater Management Summary

	Site	External
Residential Lots R20 (ha)	23.1	40.4
Residential Lots R30 (ha)	0.9	-
Group Housing (ha)	5.3	-
Commercial (ha)	0.7	-
POS/Conservation/Landscape Interface (ha)	11.1	1.0
Road Reserve (ha)	11.3	15.2
Total Area (ha)	52.4	56.6
Equiv Imp Area (15mm event) (ha)	7.8	10.5
Equiv Imp Area (20% AEP/1% AEP) (ha)	16.3	20.3
Storages (refer Appendix M for specific details and results for each individual storage)		
Total Number of Catchments	33	17
Total Combined Catchments/Storages	38	
Underground Storages (no.)	6	
POS Storages (no.)	17	
Swales (no.)	15	
Water Quality: 15mm Bioretention		
Total Volume (m^3)	1,444	
Top Water Level Area (m^2)	6,934	
Flood Storage: 20% AEP		
Total Volume (m^3) – inc Biofilters & Underground	6,076	
Top Water Level Area (m^2) - inc Biofilters & Underground	13,672	
Top Water Level Area (m^2) - inc Biofilters, excl Underground	11,983	
Flood Storage: 1% AEP		
Total Volume (m^3) – inc Biofilters & Underground	12,897	
Top Water Level Area (m^2) - inc Biofilters & Underground	18,849	
Top Water Level Area (m^2) - inc Biofilters, excl Underground	17,160	

6.2 Ecological Protection

Water quality management for the site will include non- structural as well as structural control measures:

- Non-Structural Controls
  Planning: POS and linear green space network, lot product, and subdivision layout.
  Maintenance: regular stormwater system maintenance including POS biofilter areas.
  Monitoring: Post development program and performance review.
- Structural Controls
  Catchment Scale Infrastructure: Bioretention areas, swales and storages (above and below ground) in POS areas and road reserves
  Local Scale Infrastructure: Soakwells
  Landscape: Maintaining existing mature trees, native plantings.

Measures adopted represent known best management practice as detailed in the Stormwater Management Manual for Western Australia (DoW, 2007). Table 9 details a summary from the Stormwater Management Manual for Western Australia (DoW, 2007) of expected pollutant removal efficiencies for various WSUD measures in relation to water quality design criteria. While DoW (2007) does not provide expected pollutant removal efficiencies for all BMP's, application of a treatment train approach using a combination of the non-structural and structural measures will achieve the design objectives for water quality treatment as detailed in Better Urban Water Management (WAPC, 2008).

Storm volumes for ecological protection based on water quality treatment of the 15mm event are provided in Table 8 and Figure 9. Appendix N provides typical storage cross sections showing biofilters in relation flood storage within POS, linear POS, and road reserve arrangements. Biofilters will be designed at UWMP stage consistent with the Adoption Guidelines for Stormwater Biofiltration Systems (CRC for Water Sensitive Cities, 2015).

Post development UNDO modelling of the site is detailed in Appendix I. The results indicate nutrient inputs of 3617 kg/yr for TN and 754 kg/yr TP post development. This indicates a 5088 kg/yr reduction in TN and 386 kg/yr increase in TP. The resultant nutrient export was 261 kg/hr/yr of TN and 6.2 kg/yr export of TP following development. This represents a 454 kg/yr reduction in TN and 3.7 kg/yr TP increase compared to existing. Note that these results exclude the additional benefit the new stormwater storages also provide in treating stormwater from the external catchment.

Table 9: BMP Water Quality Performance In Relation to Design Criteria

Parameter	Design Criteria via (WAPC, 2008) (required removal as compared to a development with no WSUD)	Structural Controls Nutrient Output Reduction (DoW,2007) [1]	
		Vegetated Swales/ Bioretention Systems	Infiltration Storages
Total Suspended Solids	80%	60-80%	65-99%
Total Phosphorus	60%	30-50%	40-80%
Total Nitrogen	45%	25-40%	50-70%
Gross Pollutants	70%	-	>90%

7. Groundwater Management Strategy

7.1 Earthworks, Fill and Subsoil Drainage

Development levels within the site are generally not dominated by fill requirements to achieve adequate separation to regional groundwater, given the proximity of groundwater levels to natural surface over much of the site.

It is envisaged that the site will broadly be a cut to fill operation with minimal imported fill required. No subsoil drainage will be needed.

Preliminary earthwork levels for the site prepared by JDSi are detailed in Appendix O. These earthwork levels have informed the establishment of catchment boundaries for the stormwater modelling detailed in Section 6.

Final design lot levels and fill specification are a detailed design issue to be addressed during the preparation of detailed engineering design drawings and preparation of the UWMP and will be ultimately submitted for council approval at that stage.

7.2 Acid Sulphate Soils

Acid sulphate soil mapping has been previously discussed in Section 3.2.1 as having moderate to low risk of ASS across the site less than 3 m from the surface.

If required, management of ASS will be addressed by a separate study by a suitably qualified environmental consultant, and any ASS management plan required will detail the actions to minimise and mitigate potential adverse environmental effects during the works.

All assessment and management of ASS will be conducted in accordance with the Acid Sulphate Soil Guideline Series Identification and Investigation of Acid Sulphate Soils (DoE, 2004). This will be conducted appropriately as a separate process to this LWMS.

8. Urban Water Management Plans

Consistent with processes defined in WAPC (2008), Urban Water Management Plans (UWMPs) will be developed and submitted to support subdivision applications for various stages of development within the site.

Preparation of the UWMP will be the responsibility of the developer. UWMPs will address:

- Demonstrated compliance with LWMS criteria and objectives to the satisfaction of the City of Cockburn and DWER.
- Agreed/approved measures to achieve water conservation and efficiencies of water use, including provision of POS irrigation water use distribution details.
- Detailed stormwater management design including the size, location and design of public open space areas, integrating major and minor flood management capability.
- Management of groundwater levels including proposed cut/fill levels.
- Specific structural and non-structural BMPs and treatment trains to be implemented including their function, location, maintenance requirements, expected performance and agreed ongoing management arrangements.
- Management of subdivisional works including development of a strategy for sediment control during construction.
- Implementation plan including roles, responsibilities, funding and maintenance arrangements.
- Specific monitoring and reporting to be undertaken for each UWMP area consistent with the monitoring program defined in the LWMS.
- Contingency plans (where necessary).

Further detail of the integration of stormwater within POS will be provided during the development of the relevant UWMP's covering those specific areas. This will include the refinement of stormwater modelling, preparation of detailed landscape plans (species selection and treatments), and detailed engineering design drawings.

Staging of stormwater changes will be detailed in the relevant UWMP's and implemented to ensure key hydrological performance criteria in relation to the receiving environment and key design objectives are maintained during the development process.

9. Monitoring

9.1 Pre Development

Baseline surface and groundwater monitoring of existing conditions was undertaken for 18 months inclusive of 2 winters periods from June 2020 to December 2021. Monthly groundwater levels and quarterly water quality were recorded in addition to sampling of existing stormwater quality discharging into the site from City of Cockburn drainage systems.

No further predevelopment monitoring is required to inform development of the site.

9.2 Post Development

Department of Water (2012) indicates a minimum of 3 years post development monitoring is required, and defines post development as "from completion of first subdivision to five years after 80 per cent of the development (by land area) has been completed".

The post development monitoring program is summarised in Table 10. Post development groundwater monitoring is proposed in 9 groundwater monitoring bores as shown in Figure 10, to provide suitable coverage of the site. Locations have been selected based on maintaining existing sampling locations where possible.

The following frequency of monitoring is proposed:

- Monthly groundwater level measurements.
- Quarterly groundwater quality measurements.

Groundwater levels will also be measured in three nearby DWER bores JM45, JM12, and JM2 consistent with pre development monitoring.

Groundwater quality will be monitored quarterly (typically January, April, July, October) for physical parameters (pH, electrical conductivity), nutrients (total nitrogen, total Kjeldahl nitrogen, ammonia, nitrate, nitrite, total phosphorus, and filterable reactive phosphorus) and heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, aluminium, manganese, arsenic and lead). All water quality samples will be analysed at a NATA approved laboratory.

Stormwater quality sampling of key stormwater infiltration and biofiltration areas within the site once constructed will also be undertaken via grab sampling on up to 4 occasions each winter. Sampling parameters will be the same as groundwater monitoring.

Visual assessment of each of these areas will also be undertaken on a quarterly basis via a standardised proforma, to assess performance in relation to design.

The monitoring schedule will be undertaken for a three year period consistent with usual DWER requirements. An annual report will be prepared summarising the results of the program, with results compared to predevelopment monitoring data.

The program may need to be modified as data is collected to increase or decrease the monitoring effort in a particular area, or to alter the scope of the program itself. This will require agreement of all parties.

If required, contingency actions will include a review of all monitoring data to determine the likely cause of any significant changes in water quality, consideration of additional monitoring required to assist a determination, and consideration of remedial actions.

A contingency plan is presented in Table 11, which will be refined during the development of individual UWMP's for the site. Post development monitoring results will be compared to both pre-development monitoring outcomes and ANZECC guideline data. This approach is required as the local baseline condition may naturally be outside the recommended ANZECC range for some parameters.

Implementation of the post development monitoring program is the responsibility of the developer. Where staging aspects require any specific additional monitoring to be conducted, this will be appropriately detailed at UWMP stage.

Table 10: Post Development Monitoring Program

Monitoring	Parameter	Location	Method	Frequency and Timing
Groundwater level	Water level (m AHD)	9 bores within site area and 3 DWER bores	Electrical depth probe or similar	Monthly (12 occasions annually)
Groundwater quality	Physical, nutrients and heavy metals	9 bores within site area	Pumped bore sample	Quarterly (4 occasions annually)
Stormwater quality	Physical, nutrients and heavy metals	Biofilters & Infiltration storages	Collected grab samples of outflow	Max four occasions during each winter monitoring period
Stormwater System performance	Profroma	Biofilters & Infiltration storages	Visual Assessment	Max four occasions during each winter monitoring period

Table 11: Contingency Planning

Type	Criteria for Assessment	Frequency	Process & Possible Actions
Water Quality	Surface and groundwater quality significantly worse than: a) predevelopment water quality; and/or b) typical urban stormwater quality on the Swan Coastal Plain (Martens et al 2005) TN : 1.1 mg/l TP : 0.21 mg/l with reference to ANZECC guidelines [1]	Ongoing assessment following monitoring with annual review	Process 1. Assess spatial extent of occurrence. 2. Determine if due to development or other 3. Perform appropriate action as required 4. Record and report any breach and action 5. If necessary inform residents of any works 6. Inform and provide data to DWER/ CoC Possible Actions 1. Resample to determine if a true reading 2. Identify & remove point sources of pollution 3. Review operation & maintenance practices 4. Consider alterations to POS areas including landscape regimes and soil amendment. 5. Consider stormwater system modifications 6. Consider community based projects.

1. ANZECC guidelines to be used as a reference point only. ANZECC guidelines state that guidelines values are not intended to be directly applied to stormwater quality, however are applicable where the stormwater system are regarded as having conservation value. ANZECC guideline values are derived for unmodified or slightly modified ecosystems. ANZECC recommends the values only be applied where site specific values do not exist, or site specific targets cannot be derived.

10. Implementation

Table 12 details the roles, responsibilities and funding to implement the LWMS.

Monitoring outcomes will be used in a continual improvement capacity to review the implemented WSUD within the site and inform the planning and design approaches and improvements for subsequent stages of development.

Details of construction and maintenance activities and responsibilities will be appropriately detailed at UWMP stage, and will include details of any specific staging considerations, and the need for ongoing management of subsoil drainage to ensure its ongoing performance in accordance with design.

Table 12: Implementation, Roles and Responsibilities

Implementation Action	Responsibility		
	Developer	DWER	City of Cockburn
Review and approval of LWMS		✓	✓
Preparation of a UWMP for individual development stages	✓		
Review and approval of UWMP		✓	✓
Construction of stormwater system and maintenance post construction until council handover	✓		
Long term stormwater system operation and maintenance			✓
Conduct post development monitoring program and annual reporting	✓		
Review of monitoring data and annual reports		✓	✓

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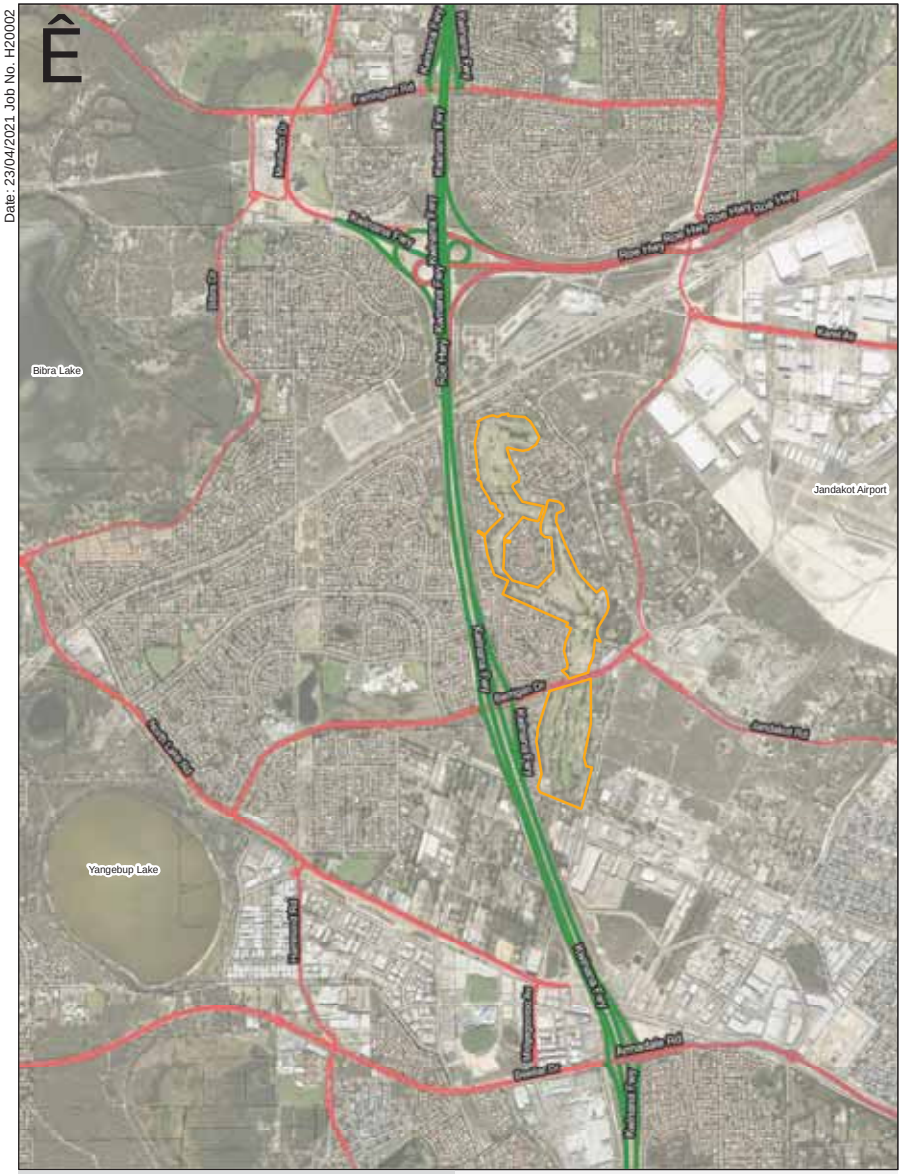
FIGURES

Date: 23/04/2021 Job No. H20002



hyd2o

Glen Iris Jandakot Local Water Management Strategy

Location Plan

Figure 1

Date: 24/08/2023 Job No H22046

Source: Rowe Group 2023

hyd2o

Glen Iris Jandakot Local Water Management Strategy

Local Structure Plan

Figure 2a

Date: 24/08/2023 Job No H22046

Source: Rowe Group 2023

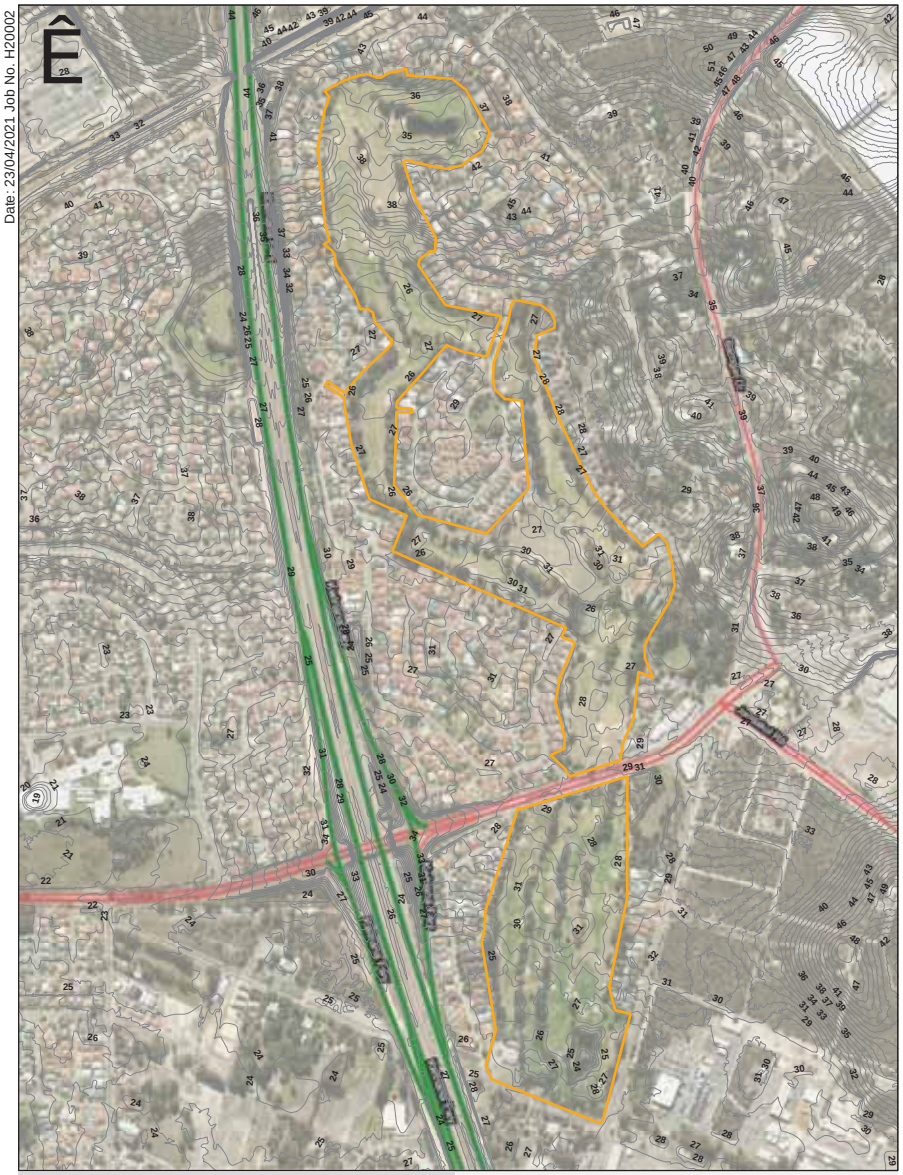
hyd2o

Glen Iris Jandakot Local Water Management Strategy

Indicative Subdivision Concept

Figure 2b

Date: 23/04/2021 Job No. H20002



hyd2o

Glen Iris Jandakot Local Water Management Strategy

Site Conditions Plan

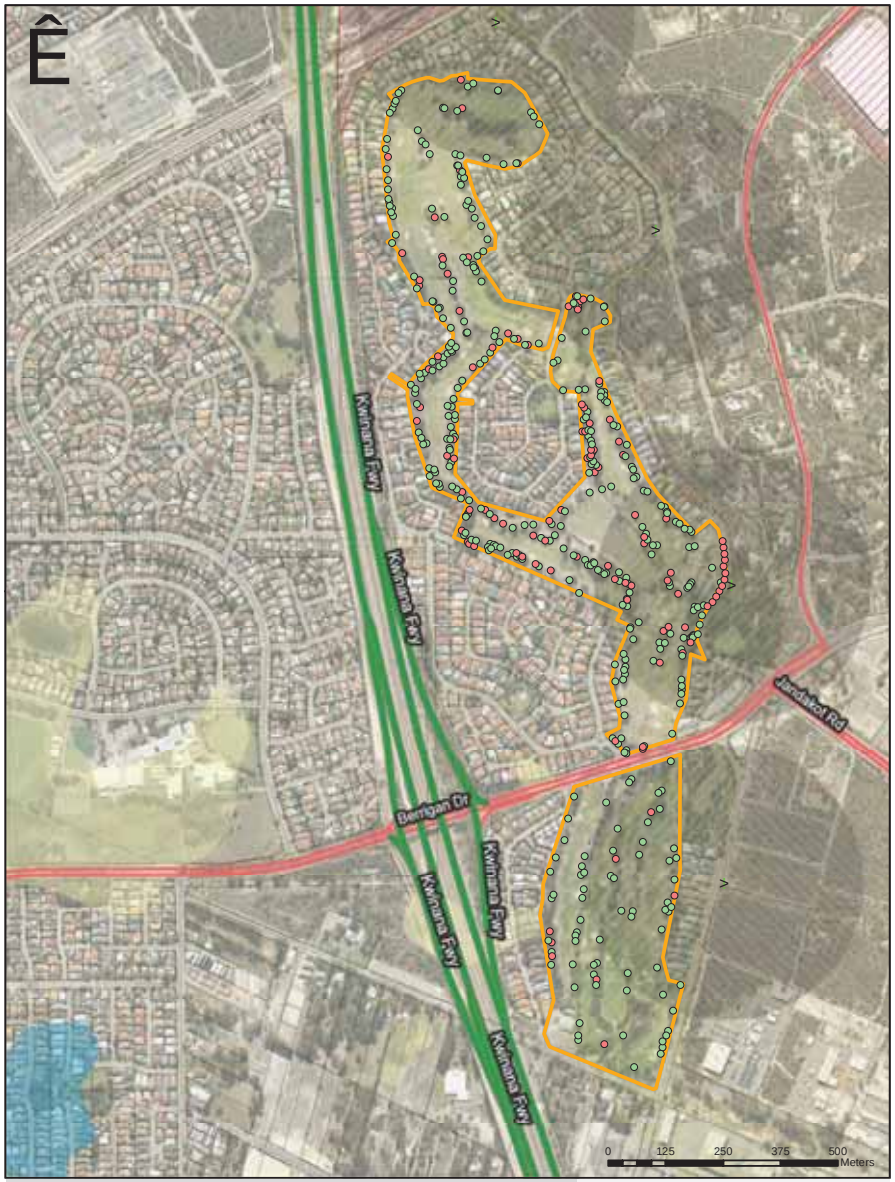
Figure 3

Date: 25/05/2021 Job No. H20002

Site Boundary
Ms5 : Sand Silt
S10 : Bassendean Sand over Guidford Formation
S8 : Bassendean Sand
ASS High to Moderate Risk
ASS Moderate to Low Risk
Hyd2o Permeability Sites (m/d)
CMW Permeability Sites (m/d)
CMW Geotech Pits

hyd2o
Glen Iris Jandakot Local Water Management Strategy
Geotechnical Plan
Figure 4

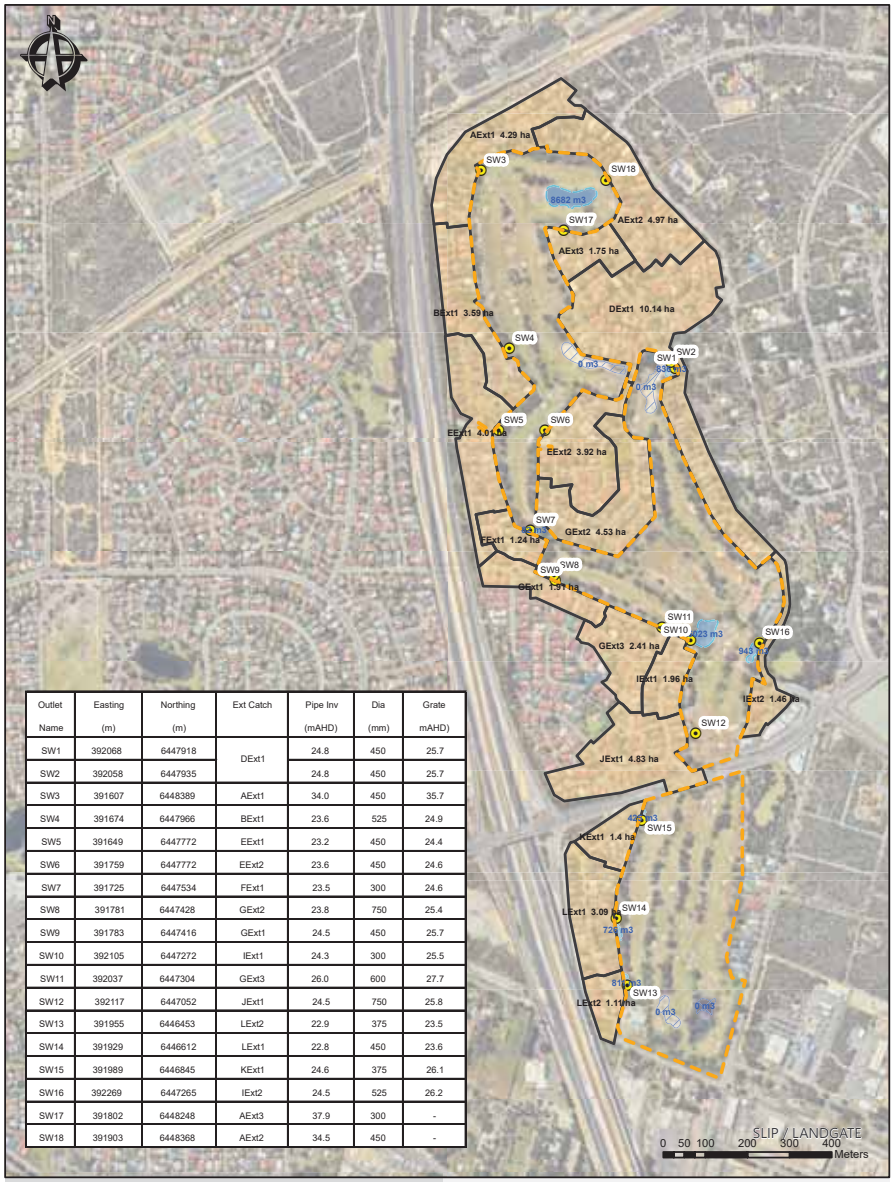
Date: 22/04/2021 Job No. P20002



Site Boundary
Conservation Wetland
Multiple Use Wetland
Resource Enhancement
Water Corp Bores
PDWSA's
P1
P2
P3
Wellhead Protection Zones
Tree Retention Priority
High
Medium

hyd2o
Glen Iris Jandakot LWMS
Environmental Plan
Figure 5

Date: 27/08/2023 Job No. H22046



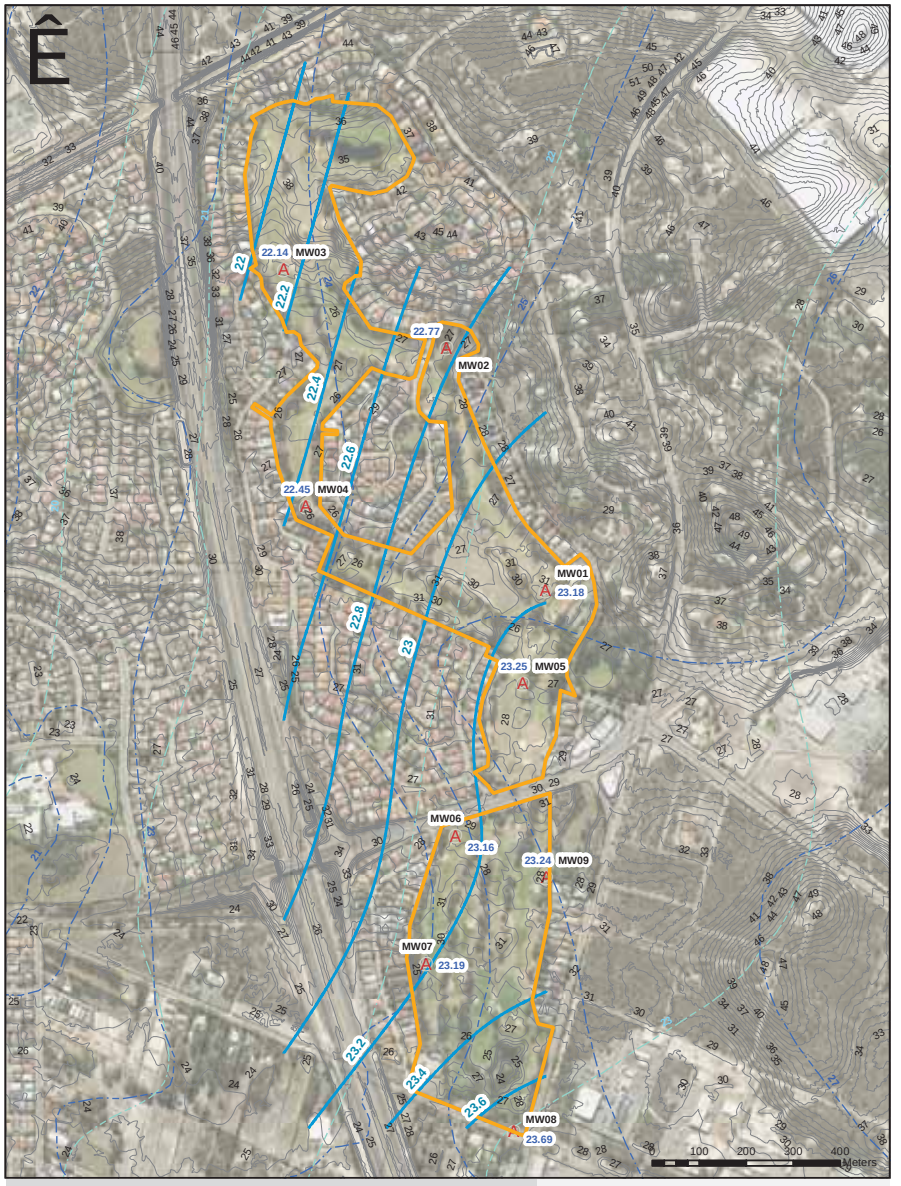
Outlet Name	Easting (m)	Northing (m)	Ext Catch	Pipe Inv (mAHD)	Dia (mm)	Grate mAHD)
SW1	392068	6447918	DExt1	24.8	450	25.7
SW2	392058	6447935		24.8	450	25.7
SW3	391607	6448389	AExt1	34.0	450	35.7
SW4	391674	6447966	BExt1	23.6	525	24.9
SW5	391649	6447772	EExt1	23.2	450	24.4
SW6	391759	6447772	EExt2	23.6	450	24.6
SW7	391725	6447534	FExt1	23.5	300	24.6
SW8	391781	6447428	GExt2	23.8	750	25.4
SW9	391783	6447416	GExt1	24.5	450	25.7
SW10	392105	6447272	IExt1	24.3	300	25.5
SW11	392037	6447304	GExt3	26.0	600	27.7
SW12	392117	6447052	JExt1	24.5	750	25.8
SW13	391955	6446453	LExt2	22.9	375	23.5
SW14	391929	6446612	LExt1	22.8	450	23.6
SW15	391989	6446845	KExt1	24.6	375	26.1
SW16	392269	6447265	IExt2	24.5	525	26.2
SW17	391802	6448248	AExt3	37.9	300	-
SW18	391903	6448368	AExt2	34.5	450	-

Site Boundary
Existing Outlets
External Subcatchments

Existing Storage Type
Other : Lined Lake
Other : Water Table Lake
Stormwater : Lined Storage
Stormwater : Shallow Depression
Stormwater : Sump

hyd2o
Glen Iris Jandakot Local Water Management Strategy
Surface Water Plan
Figure 6

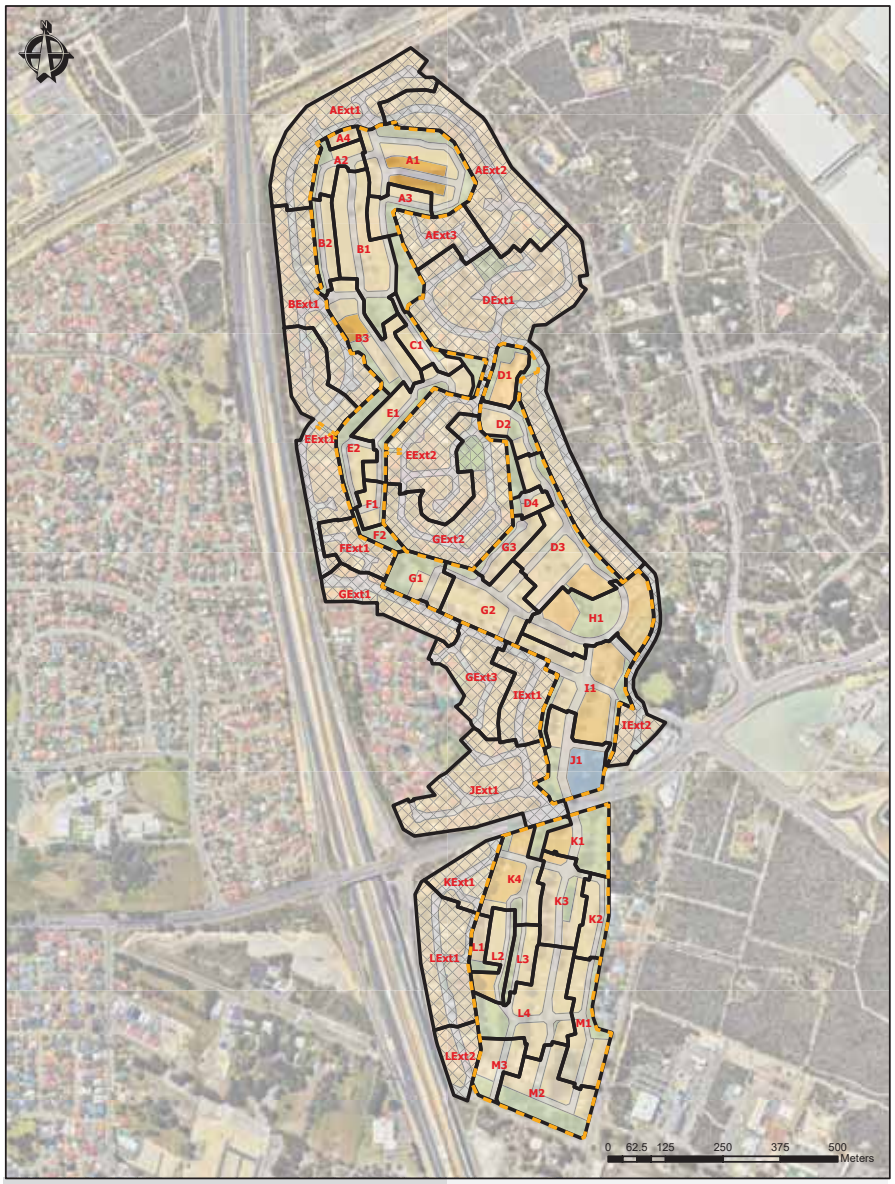
Date: 22/04/2021 Job No. P20002



Site Boundary
DWER LiDAR 1m Contours
AAMGL Contour (mAHD)
DWER Groundwater Historical Maximum (mAHD)
DWER Groundwater Historical Minimum (mAHD)
A Site Bores AAMGL (mAHD)

hyd2o
Glen Iris Jandakot LWMS
Groundwater Plan
Figure 7

Date: 24/08/2023 Job No. H22046



Site
Catchments
External Catchments
Lots R20
Lots R30
Grouped Housing
Commercial
POS/Conservation/Interface
Roads

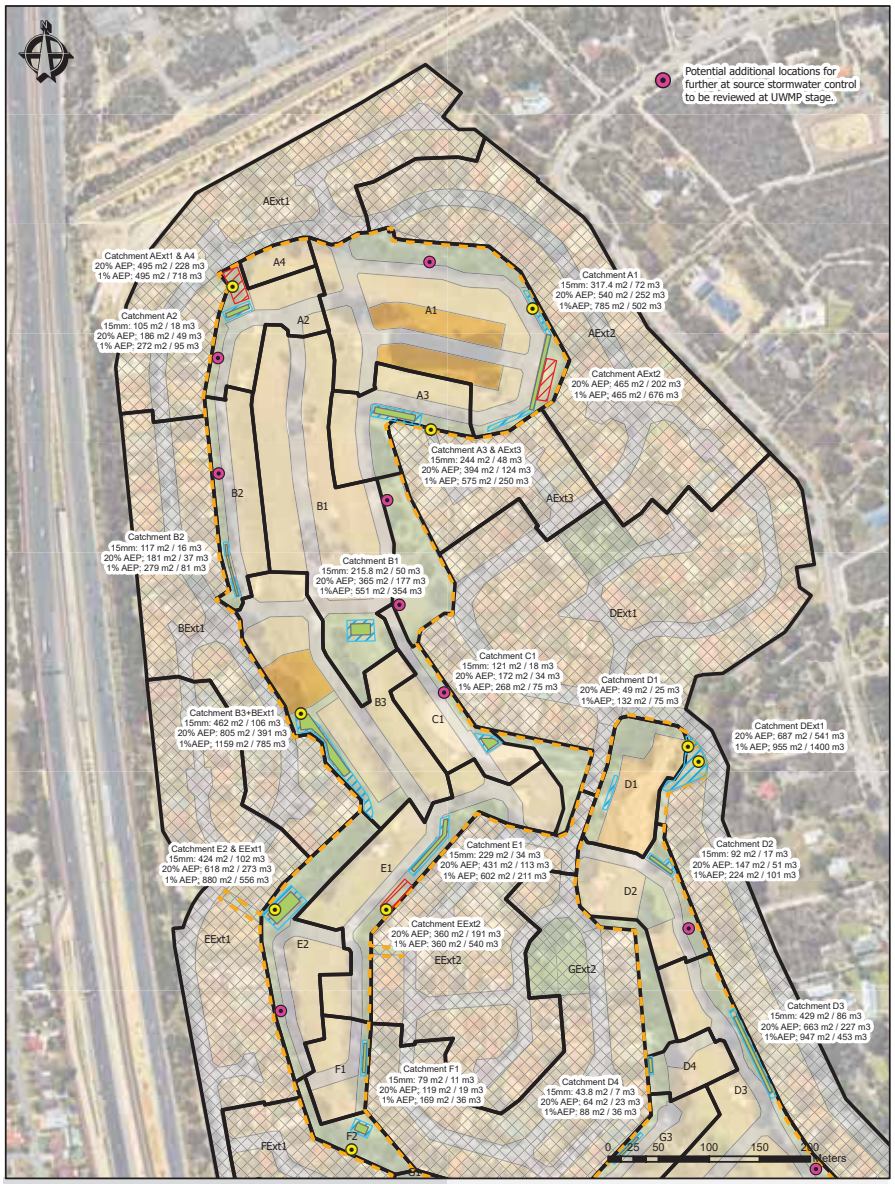
hyd2o

Glen Iris Jandakot Local Water Management Strategy

Post Development Stormwater Catchments

Figure 8

Date: 27/08/2023 Job No. H22046



Site
Catchments
External Catchments
Basin/Swale Flood Storage
Underground Storage
Biofiltration 15mm
Lots R20
Lots R30
Grouped Housing
Commercial
POS/Conservation/Interface
Roads

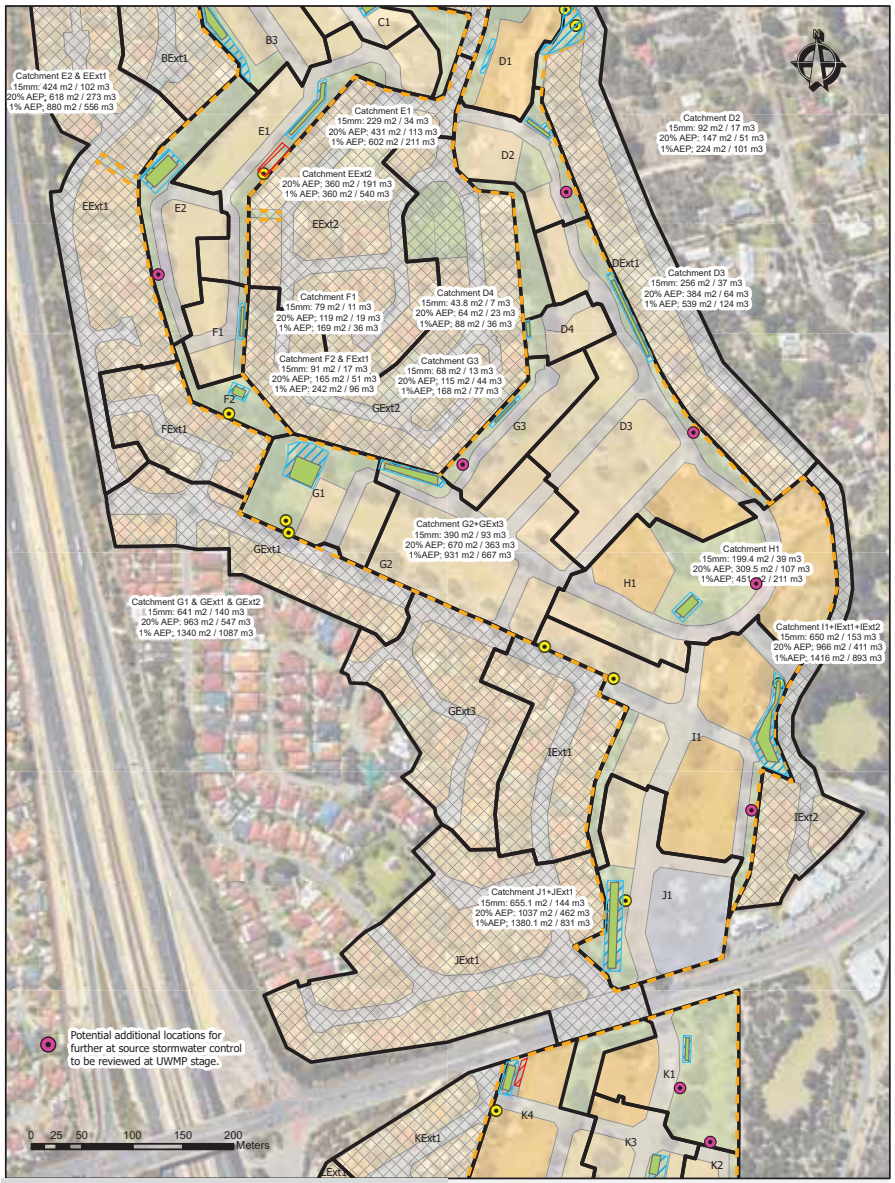
hyd2o

Glen Iris Jandakot Local Water Management Strategy

Stormwater Management Event Plan: North

Figure 9a

Date: 24/08/2023 Job No. H22046



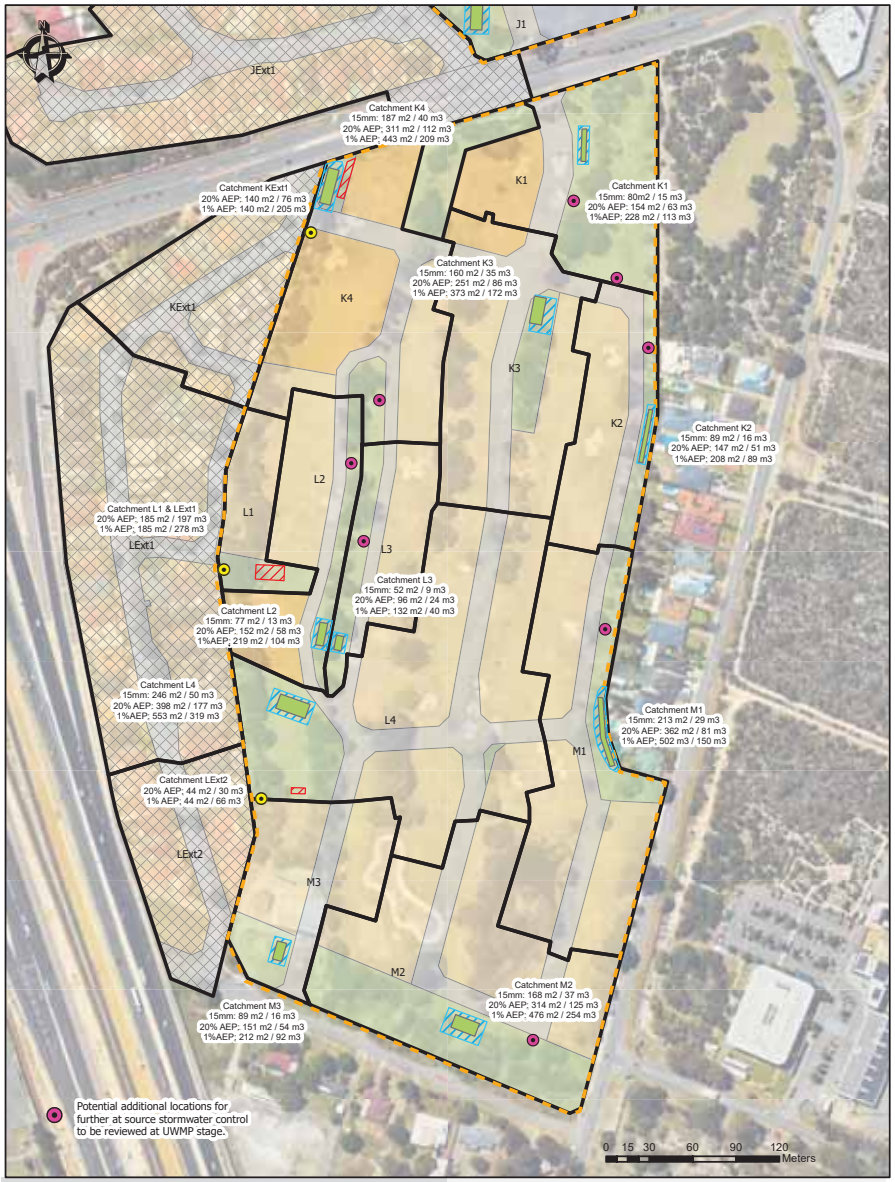
hyd2o

Glen Iris Jandakot Local Water Management Strategy

Stormwater Management Event Plan: Central

Figure 9b

Date: 28/08/2023 Job No. H22046



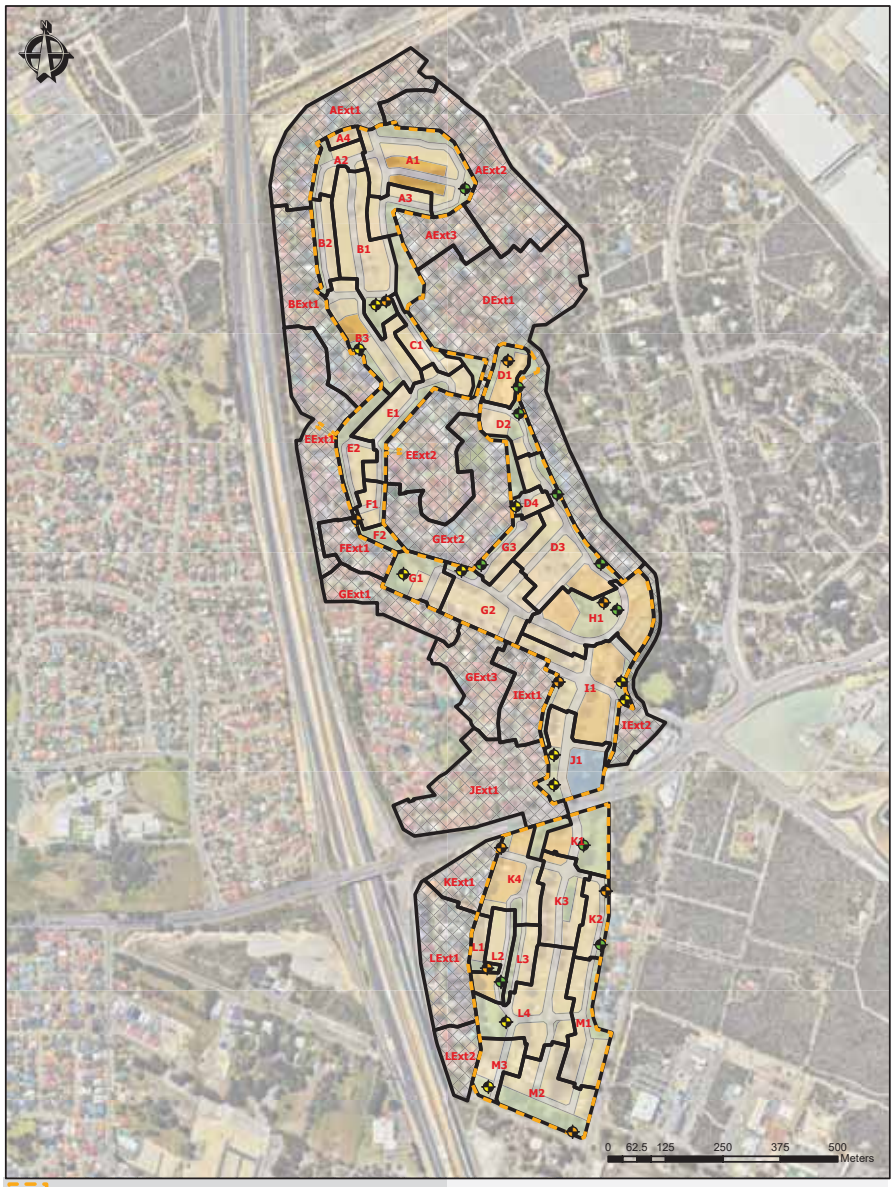
hyd2o

Glen Iris Jandakot Local Water Management Strategy

Stormwater Management Event Plan: South

Figure 9c

Date: 24/08/2023 Job No. H22046



Site
Catchments
External Catchments
Groundwater Bores
Stormwater Storages
Swales

hyd2o

Glen Iris Jandakot Local Water Management Strategy

Post Development Monitoring Sites

Figure 10

APPENDIX A
Better Urban Water Management Checklist

Better Urban Water Management LWMS Checklist

Local Water Management Strategy Item	Deliverable	✓	Comments
Executive summary			
Summary of the development design strategy, outlining how the design objectives are proposed to be met	Table 1: design elements and requirements for BMP's and critical control points	☑	Executive Summary
Introduction			
Total water cycle management - principles and objectives Planning background Previous studies		☑	Chapter 1, Figure 1
Proposed development			
Structure plan, zoning and land use Key landscape features Previous land use	Site Context Plan Structure Plan	☑	Section 1.1, Section 2, Figure 2
Landscape - proposed POS areas, POS credits, water source, bore(s), lake details (if applicable), irrigation areas	Landscape plan	☑	Section 5.2, Appendix J
Design criteria			
Agreed design objective and source of objective		☑	Section 4, Table 7
Pre-development environment			
Existing information and more detailed assessments (monitoring). How do the site characteristics affect the design?		☑	Section 3, Figures 3-7
Site conditions- existing topography/ contours, aerial photo underlay, major physical features	Site Condition plan	☑	Section 3.1, Figure 3
Geotechnical - topography, soils including acid sulfate soils and infiltration capacity, test pit locations	Geotechnical plan	☑	Section 3.2, Figure 4, Appendix B
Environmental- areas of significant flora and fauna, wetlands and buffers, waterways and buffers, contaminated sites	Environmental plan plus supporting data where appropriate	☑	Sections 3.3 & 3.4, Figures 5
Surface water- topography, 100 year floodways and flood fringe areas, water quality of flows entering and leaving (if applicable)	Surface water plan	☑	Section 3.5, Figure 6, Appendix D-F
Groundwater - topography, pre development groundwater levels and water quality, test bore locations	Groundwater plan plus details of groundwater monitoring and testing	☑	Section 3.6, Figure 7, Appendices F-H
Water use sustainability initiatives			
Water efficiency measures- private and public open spaces including method of enforcement		☑	Section 5.1
Water supply (fit- for-purpose strategy), agreed actions and implementation. If non-potable supply, support with water balance		☑	Section 5.2, Appendix I -J
Wastewater management		☑	Section 5.3
Stormwater management strategy			
Flood protection - peak flow rates, volumes and top water levels at control points, 100 year flow paths and 100 year detentions storage areas	100yr event plan Long section of critical points	☑	Section 6.1, Table 8, Figures 8 &9, Appendix K-M
Manage serviceability - storage and retention required for the critical 5 year ARI storm events Minor roads should be passable in the 5 year ARI event	5yr event plan	☑	Section 6.1, Table 8, Figures 8 & 9, Appendix K-M
Protect ecology - detention areas for the 1 yr 1 hr ARI event, areas for water quality treatment and types of (including indicative locations for) agreed structural and non-structural best management practices and treatment trains. Protection of waterways, wetlands (and their buffers), remnant vegetation and ecological linkages	1 yr event plan Typical cross sections	☑	Section 6.1, 6.2 Table 8 & 9, Figure 9, Appendix M

Local Water Management Strategy Item	Deliverable	✓	Comments
Groundwater management strategy			
Post development groundwater levels, fill requirements (including existing and likely final surface levels), outlet controls, and subsoil areas/exclusion zones	Groundwater/subsoil plan	☑	Section 7.1 Appendix N
Actions to address acid sulphate soils or contamination		☑	Section 7.2
The next stage - subdivision and urban water management plans			
Content and coverage of future urban water management plans to be completed at subdivision. Include areas where further investigations are required prior to detailed design		☑	Section 8
Monitoring			
Recommended future monitoring plan including timing, frequency, locations and parameters, together with arrangements for ongoing actions		☑	Section 9, Figure 10, Table 10 & 11
Implementation			
Developer commitments		☑	Section 10, Table 12
Roles, responsibilities, funding for implementation		☑	Section 10, Table 12
Review		☑	Section 10, Table 12

APPENDIX B
Geotechnical Report

23 December 2020

PROPOSED RESIDENTIAL SUBDIVISON GLEN IRIS GOLF COURSE, JANDAKOT, WA GEOTECHNICAL INVESTIGATION REPORT

Eastcourt Property Group

Ref. PER2020-0452AB Rev 0

PER2020-0452AB		
Date	Revision	Comments
23 December 2020	0	FINAL GEOTECHNICAL REPORT

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Figures

Appendices

GLEN IRIS ESTATE SUBDIVISON, JANDAKOT, WA – GEOTECHNICAL INVESTIGATION 23 DECEMBER 2020

1 INTRODUCTION

CMW Geosciences Pty Ltd (CMW) was authorised by Mitch Dodson of Acumends Development Solutions on behalf of Eastcourt Property Group to carry out a geotechnical investigation of a proposed residential subdivision development site located at the Glen Iris Public Golf Course on Dean Road, Jandakot WA by way of email authorisation dated 16 November 2020. The scope of work and associated terms and conditions of our engagement were detailed in our services proposal referenced *PER2020-0452AA, Rev 0*, dated 28 October 2020.

The purpose of this report is to describe the investigation completed, the ground conditions encountered and to provide recommendations with respect to geotechnical aspects of the proposed development including site preparation and earthworks, site classification, suitable foundation parameters, drainage, and the identification of geohazards and risks to the proposed development.

2 SITE DESCRIPTION

The proposed development site is approximately 53ha and will be located at the previous location of the Glen Iris Public Golf Course along Dean Road, Jandakot WA which has since been closed (refer to attached Site Investigation Plan – Figure No. 01).

For better understanding, the site has been split into three distinctive areas as seen in Figure 01. The first area, the most northern precinct is bound to the north, east and west by existing residential developments along Glen Iris Drive, and to the south by residential developments along Portsea Gardens and Twin Waterers Pass. Surface levels obtained from an imagery survey conducted by MNG (Ref. *102160-OPM-007-A*) on 09 April 2019 indicates this area is relatively steeply sloping from RL 43m AHD along the northern most boundary to RL 27m AHD along the southern boundary. The southeastern area also slopes gradually towards the centre of the northernmost lake (RL 34m AHD).

The central precinct is bound to the east by existing residential developments along Dean Road and Par Cresent which is further south, to the south by Berrigan Drive and to the west by residential developments along Hartwell Parade, Glacier Way, Eadie Cresent and Glen Iris Drive. In the centre of the precinct there are a large number of further residential developments linked by an array of roads and accessways connected to Twins Waters Pass. Near the southwestern corner of the area an existing single storey clubhouse development is located with associated carparking. Surface levels obtained from an imagery survey conducted by MNG indicates this area is relatively consistent, gently sloping from RL 27m along the northern boundary to RL 28m AHD along the southern boundary.

The southernmost precinct is bound to the north by Berrigan Drive, to the east by Prinsep Park and Prinsep Road, to the south by Imlah Cresent and to the west by residential dwellings along The Lakes Boulevard and The Fairway. In the southwestern most corner, there is two single story maintenance workshops with associated paved accessways. Surface levels obtained from an imagery survey conducted by MNG indicates this area is gently sloping from RL 26m AHD along the southern boundary to RL 29m along the northern boundary.

Surface levels are only indicative as there are numerous undulations, swales and isolated elevated areas, bunkers and fairways that mould the topographical profile of the entire site.

The site was previously used as a public golf course therefore the site contains relatively cleared areas. Vegetation cover comprises grass with some small to large sized trees lining the outsides of the fairways. There are also six manmade lakes located across the site.

It is believed the existing developments on the golf course will be demolished prior to the bulk earthworks for the proposed subdivision.

Aerial imagery from Landgate show that prior to the development of the golf course in 1965 the site was previously in use as agricultural lands. The surrounding areas have undergone significant land development and subdivision that appears to have affected the current golf course. In addition, the golf course layout has largely been man-made by earthworking. Because of this, there may be uncontrolled fill, very loose sands, buried topsoil or other unsuitable material present in areas of the site. In addition, there could be unsuitable material in the lake beds.

3 PROPOSED DEVELOPMENT

The plans supplied depict the area of approximately 53ha will be divided into approximately 600 to 800 residential lots with Public Open Space (POS), drainage basins plus associated accessways and roadways. At present, however, no specific engineering details of the proposed land development have been provided.

We anticipate that significant cut to fill earthworks will be required in order to form finished ground levels. The magnitude of the cut to fills assume the lots will be stepped from east to west. It is also understood that retaining walls will be constructed to assist with the development of the lots.

4 FIELD INVESTIGATION

The field investigation was carried out from 30 November 2020 to 02 December 2020, following a dial before you dig search. All fieldwork was carried out under the direction of CMW Geosciences Pty Ltd in general accordance with AS1726 (2017), Geotechnical Site Investigations. The scope of fieldwork completed was as follows:

- A walkover survey of the site to assess the general landform, site conditions and adjacent structures;
- 55 test pits, denoted TP01 to TP55, were excavated to depths of up to 2.2m using a JCB 8.5 tonne backhoe fitted with a 450mm wide toothed bucket to investigate the underlying soil conditions, facilitate sampling for laboratory testing and to assess excavatability and earthworks recommendations. Engineering logs of the test pits and photographs are presented in Appendix A;
- Perth Sand Penetrometer (PSP) tests were carried out adjacent to each test pit, in general accordance with AS1289.6.3.3, to depths of up to 2.1m to provide soil density/consistency profiles and to provide a subgrade CBR value for pavement design purposes. Graphical results of the PSP plots are presented on the test pit logs in Appendix A;
- 8 hand auger boreholes were drilled with a 100mm diameter auger to a depth of up to 1.42m to facilitate infiltration testing. Results of the permeability test are presented in Appendix B.

The approximate locations of the respective investigation sites referred to above are shown on the attached Site Investigation Plan (Figure No. 01). Test locations were selected by CMW with input from Steve Foley (JDSi) on specific areas to target/stay clear of during the investigation. Test locations were measured using a hand-held GPS to an accuracy of ±5m. Elevations were inferred from the imagery survey conducted by MNG (Ref. *102160-OPM-007-A*) on 09 April 2019.

5 LABORATORY TESTING

A small program of soil laboratory testing was carried out on representative soil samples generally in accordance with the requirements of the latest edition of AS1289 (where applicable).

Testing was carried out on samples selected by CMW and carried out by Western Geotechnical & Laboratory Services Pty Ltd (WGL), a NATA registered laboratory.

The following laboratory tests were carried out:

- 8 Organic Content Test (Loss on Ignition).

The laboratory test results, and associated certificates are provided in Appendix C.

6 GROUND MODEL

6.1 Geology

Published geological maps (Ref. Perth Metropolitan Region 1:50,000 Environmental Geology Series: Fremantle) and the CMW investigation database for the area depict the land as being underlain by Bassendean Sand overlying clayey and silty material of the Guildford Formation at depth.

Based on the known history of the site and surrounding land levels, some superficial depths of fill were also anticipated because of the previous agricultural use of the land.

6.2 Subsurface Conditions

The ground conditions encountered and inferred from the investigation were considered to be generally consistent with the published geology for the area and can be generalised according to the following subsurface sequence:

TOPSOIL: SAND / CLAYEY SAND	dark grey, brown, fine to medium grained, subangular to subrounded sand with trace fines (>12% in TP48); trace organics; trace roots and rootlets; trace branches; trace vegetation, overlying;
FILL: SAND (UNCONTROLLED)	loose to very dense, fine to medium grained, subangular to subrounded; grey/pale yellow and orange-brown; trace fine grained limestone gravel (TP04, TP20); trace fines; trace organics; trace roots and rootlets; trace branches. Uncontrolled fill in the form of old reticulation pipe and bricks were found in TP04, TP18, TP28 and TP34. The reticulation pipe uncovered in TP28 and TP34 contained potential asbestos between depth of 0.5 and 1.6 mbgl, overlying;
SAND (SP)	loose to very dense, fine to medium grained, subangular to subrounded; grey/orange/yellow and white; trace fines; trace roots and rootlets, overlying;
COFFEE ROCK	very dense, fine to medium grained, subangular to subrounded, dark brown/black; weakly cemented. (Only found in TP03 TP06, TP12 and TP52). The coffee rock was typically found in or around low energy zones (lakes) located across the site where groundwater may be present.

Of the six manmade lakes located across the site, only TP48 was able to excavate the base of the lake due to the lake being empty. A green plastic liner was found approximately 0.5m below the base of the lake overlying the natural sand. It is assumed this liner is present at the base of all the other lakes at a similar depth. The liner was also found to be extending to the banks of the lakes evident in test pits TP34, TP44 and TP52 where the same plastic liner was uncovered just below the surface.

The distribution of the above units is summarised in Table 1 below:

Table 1: Summary of Soil Stratigraphy			
Description	**Depth to top of layer (m)**		
	Minimum	**Maximum**	**Average**
TOPSOIL: SAND / CLAYEY SAND	0.00		
FILL: SAND (UNCONTROLLED)	0.02	0.20	0.11
SAND (SP)	0.10	1.90	1.00
COFFEE ROCK	>2.05		

6.3 Groundwater

A review of the Perth Groundwater Atlas indicates that groundwater levels are likely to be between RL 21m AHD and 26m AHD below existing ground levels. These levels equate to depths of approximately <1m below the lowest existing ground contours along the southern boundary of site.

During the investigation, which was completed in early-summer conditions (Nov/Dec 2020), groundwater was not encountered within any of the investigation locations.

6.4 Permeability

Tabulated results of the 8 in-situ falling head permeability tests carried out was used to estimate the soil coefficient of permeability in accordance with the methods described in Horslev (1951) (falling head test) and CIRIA Report No. 113 (falling head test).

Table summarises the results obtained. Complete results of the in-situ falling head tests are presented in Appendix B.

Table 2: Summary of Falling Head Permeability Tests					
Standpipe ID	**Bottom of Test Hole (mbgl)**	**Approximate Permeability**			
		CIRIA (m/sec)	**CIRIA (m/day)**	**Horslev (m/sec)**	**Horslev (m/day)**
Perm 1	1.36	$3.15x10^{-04}$	27.22	$6.50x10^{-05}$	5.61
Perm 2	1.42	$1.22x10^{-03}$	105.00	$2.99x10^{-04}$	25.84
Perm 3	1.35	$6.73x10^{-04}$	58.18	$1.85x10^{-04}$	16.00
Perm 4	1.38	$4.25x10^{-04}$	36.75	$1.01x10^{-04}$	8.69
Perm 5	1.40	$8.26x10^{-04}$	71.39	$1.99x10^{-04}$	17.16
Perm 6	1.40	$5.05x10^{-04}$	43.61	$1.69x10^{-04}$	14.46
Perm 7	1.41	$3.54x10^{-04}$	30.55	$7.82x10^{-05}$	6.75
Perm 8	1.41	$8.32x10^{-04}$	71.89	$1.87x10^{-04}$	16.13

7 LABORATORY TEST RESULTS

The soil organic content laboratory test results are summarised in Table 3 below.

Table 3: Soil Organic Content Laboratory Results			
Sample ID	**Depth To and From (mbgl)**	**Ash Content (%)**	**Organic Content (%)**
TP04	0.0 – 0.1	95.8	4.2
TP14	0.0 – 0.1	94.7	5.3
TP29	0.0 – 0.1	96.0	4.0
TP41	0.0 – 0.1	91.4	8.6
TP46	0.0 – 0.1	95.6	4.4
TP48	0.0 – 0.1	74.5	25.5
TP23	0.0 – 0.1	94.6	5.4
TP15	0.0 – 0.1	96.7	3.3
Note: TP48 was located at the base of a previous lake which may explain the abnormally high organic content.			

8 GEOTECHNICAL ASSESSMENT AND RECOMMENDATIONS

8.1 General

Following our understanding of the preliminary development plans and our interpreted ground model, we consider that the site is suitable for supporting the proposed residential development, subject to the requirements of AS 2870-2011 and our specific earthworks recommendations detailed in Section 8.2 below.

8.2 Earthworks

Natural and uncontrolled fill sand is expected to be encountered throughout the full depth range of excavations (<1m depth) We anticipate that major cut to fill bulk earthworks will be required to form finished ground levels. This activity is considered appropriate for the site subject to the earthworks construction recommendations described below.

We note earthworks must be carried out in accordance with the recommendations provided in this report and AS3798-2007 *Guidelines on Earthworks for Commercial and Residential Developments*.

8.2.1 Topsoil Strip and Subgrade Preparation

- All vegetation must be stripped and removed from site;
- A 100mm topsoil strip should be considered appropriate for most of the site, however where thick root mats or otherwise unsuitable material is present to a greater depth then this should be removed and cut to waste or reused as fill within the POS areas;
- Existing trees must be removed and their root systems must be completely grubbed out. The soil beneath the root system must be proof rolled and backfilled to the specifications described below;

- Following the topsoil strip, the top 400mm of the soil profile should be tyned to bring any waste / uncontrolled fill to the surface. In some instances, the Earthworks Contractor may be required to excavate deeper to remove all waste / uncontrolled fill. Any organic (tree roots / stumps) or manmade waste observed should be removed from site. Alternatively, the fill material should be stockpiled for reuse as sand fill material following an inspection by a suitably qualified geotechnical engineer; and
- The upper 300mm of the exposed subgrade must be moisture conditioned with a water cart and compacted with a suitable roller to achieve at least 7 blows per 300mm penetration with a Perth Sand Penetrometer (PSP) excluding the top 150mm, which is equivalent to a dry density ratio of at least 95% based on Modified Compaction (AS1289 5.1.1). Any loose, soft, organic or manmade waste materials observed during this proof roll shall be removed and replaced with compacted clean sand fill.

8.2.2 Bulk Earthworks

We recommend the following during bulk earthworks:

- Material must be moisture conditioned with a water cart and compacted in layers not exceeding 300mm with a suitable roller to achieve at least 7 blows per 300mm penetration with a PSP excluding the top 150mm, which is approximately equivalent to a dry density ratio of 95% based on Modified Compaction (AS1289 5.2.1);
- Site won material from proposed cut earthworks is considered suitable for use in bulk earthworks from a geotechnical perspective, subject to adequate placement and providing that similar and consistent fill materials are used for specific applications (i.e. entire fill pads are constructed of similar fill materials); and
- Imported sand bulk fill materials will need to be free of organic or deleterious inclusions with a fines content of less than 5% of the fill volume and a maximum particle size of 100mm. It must be moisture conditioned with a water cart and compacted in layers not exceeding 300mm to achieve at least 7 blows per 300mm penetration with a PSP, which is equivalent to a dry density ratio of 95% based on Modified Compaction (AS1289 5.2.1).

8.2.3 Retaining Wall Backfill

We recommend the following during retaining wall backfilling:

- Backfill layers should be placed in maximum 300mm thick loose layers, moisture conditioned to within ±3% of the optimum moisture content and compacted with a suitable vibrating plate compactor to achieve a dry density ratio of at least 95% based on Modified Compaction (AS1289 5.2.1).

The technical and control requirements for Engineered Fill, including site observation and compaction testing, are outlined in AS3798-2007. We recommend that this work is completed under the direction and control of a suitably experienced Geotechnical Engineer familiar with the contents of this report.

8.2.4 Excavatability

The loose to very dense natural sands and uncontrolled fill sand encountered across the site may be excavated using standard mechanical plant.

8.2.5 Earthworks Monitoring

Variations in ground conditions may occur between test locations. If conditions other than those described above are encountered, then further advice should be sought without delay. During earthworks, site visits should be made by a Geotechnical Engineer or Engineering Geologist who is familiar with the contents of this report to ensure that topsoil stripping is carried out adequately, proof

compaction and cut to fill earthworks are conducted in accordance with AS3798-2007, and to audit the compaction of earthworks. Earthworks control testing should be undertaken in accordance with the guidelines set out in AS3798-2007. CMW would be pleased to perform this function if required.

8.2.6 Lake Remediation and Backfilling

We recommend the following during lake remediation and backfilling:;

- Drain lakes to remove water. Note: Some lakes may require dewatering as the base of the lake is below groundwater;
- Remove all organics and fill material above the liner;
- Remove liner from base of lakes and along embankments; and
- Once the liner has been removed the lakes should be backfilled with clean sand fill or site won material as mentioned in 8.2.2 and compacted in layers not exceeding 300mm to achieve at least 7 blows per 300mm penetration with a PSP, which is equivalent to a dry density ratio of 95% based on Modified Compaction (AS1289 5.2.1). Each layer of fill that is placed should be keyed (fill over cut) into the lake embankments to ensure each layer extends into intact foundation materials.

8.3 Strip and Pad Foundations

The design of available foundation bearing pressures for isolated strip and pad footings with 0.5m or 1.0m embedment depth has been carried out using the Terzaghi bearing capacity equation. Subject to completing the earthworks and foundation preparation recommendations provided in section 8.2 above, shallow strip or pad footings founded within medium dense near surface soils (<1m) or compacted fill material may be designed on the basis of the maximum allowable bearing pressures provided in Table 4.

Table 4: Summary of Shallow Footing Design Bearing Pressure

Embedment Depth (m)	Footing Width (m)	Footing Length (m)	Allowable Bearing Pressure (kPa)	Estimated Settlement (mm)
0.5	0.5 Strip		170	<5
	1 Strip		220	10-15
	1	1	200	5-10
	2	2	290	10-15
1.0	0.5 Strip		280	5-10
	1 Strip		330	15-20
	1	1	310	5-10
	2	2	400	20-25

These values are based on a geotechnical strength reduction factor of 0.5 and an average load factor of 1.5 (Factor of Safety = 3.0). It should be noted that these bearing pressures assume isolated vertical, non-eccentric loads. The assessment has been undertaken based on a static load and does not consider any dynamic or cyclic loading effects. It also does not consider any interaction of closely spaced foundations.

Subject to the earthworks and foundation preparation works being undertaken as described herein, it has been calculated that the total settlements of the footing configurations and design pressures outlined in Table 4 above is unlikely to exceed approximately 20mm to 25mm. Differential settlements are unlikely to exceed approximately one half of these values.

8.4 Retaining Wall Design

Localised cut and fill earthworks will be required along proposed property boundaries for subdivision layout and drainage purposes. All retaining wall footings will be founded on either reworked *in situ* or engineered sand fill material to depths of at least 0.5m. Based on this, recommended retaining wall design parameters are summarised in Table 5 below:

Table 5: Retaining Wall Design Parameters

Soil Unit	Y (kN/m^3)	Ø' (deg)	K_0	E' (MPa)	No wall friction		Wall friction = 2/3Ø	
					K_a	K_p	K_a	K_p
ENGINEERED FILL: SAND (medium dense)	18	34	0.441	60	0.283	3.537	0.254	8.952
SAND (medium dense)	18	34	0.441	60	0.283	3.537	0.254	8.952

Notes:
1. Refer to Table 1 for definition of soil unit levels.
2. Y – soil unit weight; Ø' - angle of internal soil friction; K_0 - coefficient of earth pressure at rest, K_a - coefficient of active earth pressure, K_p - coefficient of passive earth pressure; E' – long term Young's modulus.
3. Values of K_0 are based on initial conditions following construction of the walls.
4. The retaining wall designer must adopt the above set of K_a and K_p parameters relevant to the actual construction method adopted.
5. The above parameters are based on the condition of a horizontal ground surface behind the retaining structure. Applicable surcharge loads behind the wall must also be considered in the design.

Retaining structures should be designed in accordance with AS 4678-2002 "*Earth Retaining Structures*" or an alternate approved factor of safety approach. Should any fill be placed against the permanent retaining walls after construction, it is expected that the compaction induced pressures will be much greater than the above active earth pressures. The compaction equipment used to compact backfill behind the wall must be carefully selected and preferably light-weight compaction equipment should be used. The load on the retaining wall due to compaction equipment may be estimated from Figure J5 in AS4678-2002 *"Earth Retaining Structures"*.

It is noted that some ground movement will occur behind temporary or permanent retaining walls. By definition, movement of the wall must occur to fully mobilise the active and passive earth pressure coefficients provided in Table 5 above. The extent of this movement is dependent on the height of retaining wall, type of wall selected and construction methodology. This must be considered during the design and construction of the retaining walls to ensure adjacent facilities are not adversely affected.

Any ground anchors associated with retaining wall construction should be designed on the basis of the above effective stress soil parameters and using appropriate design standards such as BS8081.

8.5 Site Classification

A site classification of CLASS A in accordance with AS2870-2011 is recommended subject to the foundation preparation recommendations provided in Section 8.2 above.

8.6 Environmental

The National Acid Sulfate Soils Map shows that the site is located in a "low to moderate risk area for ASS occurring within 3m of natural surface".

After discussions with Steve Foley (JDSi) during our site walkover, it was mentioned some asbestos may be present across the site following the demolition of old infrastructure. The area in question was along the western boundary of the central precinct by Hartwell Parade. Potential asbestos in the form of an old, fractured pipe was found in the upper 0.5m of this area in TP28 (pictured in the test pit photographs). The same pipe was also found in the upper 1.6m of TP34, on the edge of lake in the southeastern portion of the northern precinct.

During bulk earthworks asbestos will need to be appropriately managed by a competent environmental consultant.

8.7 Pavement CBR

Based on the field density testing undertaken using the PSP and our experience with similar materials, it is recommended that pavements be designed on the basis of a subgrade CBR value of 12% due to the sandy nature of the soils.

This design CBR value is subject to the exposed subgrade being moisture conditioned and compacted in accordance with the recommendations provided in Section 8.2 above. It is recommended that appropriate QA / QC testing be undertaken on subgrade and pavement materials during construction.

8.8 Drainage

It is recommended that soakwells and drainage basins be designed on the basis of a saturated soil coefficient of permeability of 5 m/day subject to them being located a distance of at least 3m away from any structure foundations. This does not allow for any clogging, silting or other design aspects of the soakwells.

9 CLOSURE

The findings contained within this report are the result of limited discrete investigations conducted in accordance with normal practices and standards. To the best of our knowledge, they represent a reasonable interpretation of the general condition of the site. Under no circumstances, can it be considered that these findings represent the actual state of the ground conditions away from our investigation locations.

If the ground conditions encountered during construction are significantly different from those described in this report and on which the conclusions and recommendations were based, then we must be notified immediately.

This report has been prepared for use by Eastcourt Property Group in relation to the proposed Glen Iris Estate residential subdivision project in accordance with generally accepted consulting practice. No other warranty, expressed or implied, is made as to the professional advice included in this report. Use of this report by parties other than Eastcourt Property Group and their respective consultants and contractors is at their risk as it may not contain sufficient information for any other purposes.

For and on behalf of
CMW Geosciences Pty Ltd

Reviewed by:

Mitchell Owen
Engineering Geologist

Alex Petty
Principal Geotechnical Engineer

Distribution: 1 copy to Eastcourt Property Group (electronic)
Original held by CMW Geosciences Pty Ltd

GLEN IRIS ESTATE SUBDIVISON, JANDAKOT, WA – GEOTECHNICAL INVESTIGATION 23 DECEMBER 2020

10 REFERENCES

- Appendix 4, Control of Groundwater for Temporary Works (CIRIA Report No. 113)
- AS 1170, *Structural design actions,* Standards Australia, Sydney, 2007
- AS 1289, *Methods of testing soils for engineering purposes,* Standards Australia, Sydney
- AS 1726, *Geotechnical Site Investigations,* Standards Australia, Sydney, 2017
- AS 2870, *Residential slabs and footings,* Standards Australia, Sydney, 2011
- AS 3798 (inc. amendment 1), *Guidelines on earthworks for commercial and residential developments,* Standards Australia, Sydney, 2007
- AS 4678 (inc amendments 1 & 2), *Earth retaining structures,* Standards Australia, Sydney, 2002
- BS 1377-9:1990 Methods for test for soils for civil engineering purposes. In-situ tests.
- Department of Environment and Conservation (DEC), 2011, Treatment and management of soils and water in acid sulfate soil landscapes, Acid Sulfate Soils Guideline Series.
- *Guide to Residential Slabs and Footings in Saline Environments (CCAA T56),* Cement Concrete & Aggregates Australia, 2005
- Hvorslev J M, *Time lag and soil permeability in ground-water observations,* Bull. 36, 50 pp., U.S. Corps of Eng., Waterways Exp. Sta., Vicksburg, Miss., 1951
- *Perth Groundwater Atlas,* Second Edition, Perth: Department of Environment, 2004
- *Fremantle, Sheet 2033 I & 2033 IV,* Perth Metropolitan Region Environmental Geology Series, Geological Survey of Western Australia, 1986
- Schmertmann, 1970 and Schmertmann et al, 1978.
- Terzaghi, K. (1943). Theoretical soil mechanics. 1st ed. New York: J. Wiley and Sons, Inc.
- WA Online Atlas, Shared Land Information Platform – ASS Risk Map, https://www2.landgate.wa.gov.au/bmvf/app/waatlas/.

CMW Geosciences Pty Ltd
Ref. PER2020-0452AB Rev 0

Figure

LEGEND:

TP01 TEST PIT LOCATION

PSP01 PERMEABILITY TEST LOCATION

NOTES:

1. AERIAL FROM NEARMAP 20.11.20

CMW Geosciences

CLIENT: JDSi CONSULTING ENGINEERS		DRAWN: DE	PROJECT: PER2020-0452
PROJECT: GLEN IRIS ESTATE JANDAKOT, WA		CHECKED: MO	DRAWING: 01
		REVISION: A	SCALE: 1:7500
TITLE: SITE INVESTIGATION PLAN		DATE: 22.12.20	SHEET: A3 P

Appendix A

Test Pit Logs, PSP Plots and Photos

TEST PIT LOG - TP01

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392145m N.6446295m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						SP: SAND: fine to medium grained, subangular to subrounded; dark grey; trace fines; trace rootlets.		MD to D	6, 6, 6, 5, 6, 6	
				1		... from 1.40m to 1.70m, trace branches	D to M			1.05m: PSP conducted within base of test pit
								L to MD	1, 1, 3, 2, 3, 3	
			26.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP02

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392135m N.6446325m
Elevation: 28 m

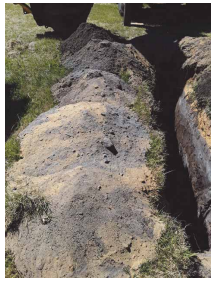
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located behind retaining wall of lake
						FILL: SAND: fine to medium grained, subangular to subrounded; dark grey; trace fines; trace rootlets.			3, 4, 4	
						... at 0.20m, becoming pale yellow				
			27.6			SP: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.		L to MD	3, 2, 3	
				1		... at 0.60m, becoming grey brown with orange	D to M			1.05m: PSP conducted within base of test pit
									2, 1, 3	
								MD to D	5, 6, 4	
			26.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP03

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392058m N.6446394m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located behind retaining wall of lake
			27.8			FILL: SAND: fine to medium grained, subangular to subrounded; grey brown; trace fines; trace rootlets; trace organics.				
						FILL: SAND: fine to medium grained, subangular to subrounded; black with dark grey; trace fines; trace root and rootlets; trace coffee rock.		MD to D	5, 7, 5, 6, 7	
						... at 0.90m, no longer rootlets				
			27.0	1		SP: SAND: fine to medium grained, subangular to subrounded; grey; trace fines.	D to M	VD	11	
			26.0	2		COFFEE ROCK: fine to medium grained, subangular to subrounded; dark brown; weakly cemented; trace fines.				
			26.0			Test pit terminated at 2.05 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP04

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391978m N.6446343m
Elevation: 26 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	0.0 - 0.1	D	25.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.		MD	4	
			25.7			FILL: SAND: fine to medium grained, subangular to subrounded; orange grey; trace fines; trace rootlets; trace organics.			11	
						FILL: SAND: fine to medium grained, subangular to subrounded; trace gravel; pale yellow; trace fines; trace rootlets; trace cobbles; gravel and cobbles are limestone; trace uncontrolled fill (bricks, rubbish).			10	
								D to VD	8	
			25.2			SP: SAND: fine to medium grained, subangular to subrounded; black with dark grey; trace fines; trace rootlets.			7	
				1		... at 1.10m, no longer rootlets	D to M		10	1.05m: PSP conducted within base of test pit
									4	
									5	
								MD to D	5	
									4	
									4	
			24.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP05

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392208m N.6446432m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						SP: SAND: fine to medium grained, subangular to subrounded; dark grey; trace fines; trace rootlets.	D to M	D to VD	5, 7, 7, 9, 9, 10	
				1		... at 1.30m, trace branches		D	5, 5, 6, 5, 5	1.05m: PSP conducted within base of test pit
			26.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP06

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392152m N.6446434m
Elevation: 26 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			25.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located next to lake
						SP: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.	D to M	L	2, 3, 3	
						... at 0.30m, becoming pale grey		D to VD	5, 8, 8	
				1					3, 5, 6	1.05m: PSP conducted within base of test pit
			24.1					VD	10, 20	
			24.0	2		COFFEE ROCK: fine to medium grained, subangular to subrounded; black; weakly cemented; trace fines.				
						Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP07

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392068m N.6446510m
Elevation: 27 m

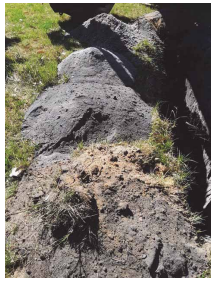
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			26.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.			6	
			26.7			FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets; trace organics.			4	
						... at 0.20m, becoming pale grey with orange				
						SP: SAND: fine to medium grained, subangular to subrounded; black with dark grey; trace fines; trace root and rootlets; trace branches.		MD to D	5	
						... at 0.50m, becoming grey			4	
				1			D to M		5	
									6	1.05m: PSP conducted within base of test pit
									3	
									3	
								L to MD	3	
									3	
									4	
			25.0	2		Test pit terminated at 2.00 m			4	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP08

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392172m N.6446593m
Elevation: 29 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			28.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.			5	
						SP: SAND: fine to medium grained, subangular to subrounded; dark orange with brown; trace fines; trace rootlets.			5	
						... at 0.50m, becoming orange		D	6	
									5	
									6	
				1			D to M		5	
										1.05m: PSP conducted within base of test pit
									2	
									3	
								L to MD	3	
									3	
									4	
			27.0	2		Test pit terminated at 2.00 m			3	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP09

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391961m N.6446622m
Elevation: 28 m

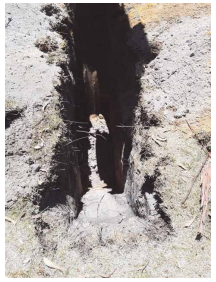
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.			5	
						SP: SAND: fine to medium grained, subangular to subrounded; grey with black orange; trace fines; trace root and rootlets; trace branches.			6	
									6	
									5	
						... at 0.80m, no longer branches	D to M	D to VD		1.05m: PSP conducted within base of test pit
				1					4	
						... at 1.40m, becoming orange			7	
									8	
									8	
									8	
			26.0	2		Test pit terminated at 2.00 m			9	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP10

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392112m N.6446693m
Elevation: 31 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			30.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.			4	
						SP: SAND: fine to medium grained, subangular to subrounded; grey with black orange; trace fines; trace rootlets.			4	
						... at 0.20m, becoming pale grey		D to VD	7	
									10	
						... at 0.80m, becoming orange	D to M		9	
				1					8	1.05m: PSP conducted within base of test pit
									2	
									3	
								L to MD	4	
									4	
									5	
			29.0	2		Test pit terminated at 2.00 m			4	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP11

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392038m N.6446762m
Elevation: 31 m
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting
Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			30.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a mound
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace root and rootlets; trace branches. *... at 0.30m, becoming orange with grey*		MD to D	3, 4, 5, 5	
			30.2			SP: SAND: fine to medium grained, subangular to subrounded; grey and orange; trace fines; trace root and rootlets. *... at 0.90m, no longer roots and rootlets*	D to M		4, 4	1.05m: PSP conducted within base of test pit
				1				VD	5, 8, 14	
			29.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached
Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP12

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392037m N.6446878m
Elevation: 29 m
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting
Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			29.0			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a green
						FILL: SAND: fine to medium grained, subangular to subrounded; grey with orange; trace fines; trace rootlets. *... at 0.20m, becoming dark grey with black ... from 0.21m to 0.35m, coffee rock, only found in discrete area*		D to VD	5, 6, 11, 20	
			28.6			SP: SAND: fine to medium grained, subangular to subrounded; orange with grey; trace fines.	D to M			1.05m: PSP conducted within base of test pit
				1						
			27.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached
Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP13

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392127m N.6446838m
Elevation: 28 m

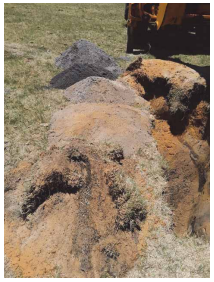
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						SP: SAND: fine to medium grained, subangular to subrounded; orange with pale grey; trace fines; trace root and rootlets.			6 7 6 8 10 8	
						... at 0.40m, becoming grey with orange and black	D to M	D to VD		
				1		... at 1.20m, becoming black with grey and orange			4 7 11 9 8	1.05m: PSP conducted within base of test pit
			26.0	2		Test pit terminated at 2.00 m			8	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP14

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 02/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392214m N.6446932m
Elevation: 31 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	0.0 - 0.1	D	30.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a tee box
						FILL: SAND: fine to medium grained, subangular to subrounded; dark grey with black; trace fines; trace root and rootlets.			3 4 4 5 4 4	
			30.0	1		SP: SAND: fine to medium grained, subangular to subrounded; pale grey with orange; trace fines; trace root and rootlets; trace branches.	D to M	MD to D	3 4 6 5 6	1.05m: PSP conducted within base of test pit
						... at 1.60m, no longer branches				
			29.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP15

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392112m N.6446995m
Elevation: 29 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	0.0 - 0.1	D	28.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.			6	0.00m: test pit located on tee box
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.			11	
			28.5			SP: SAND: fine to medium grained, subangular to subrounded; yellow; trace fines.			12	
						... from 0.60m to 0.80m, becoming black			12	
						... at 0.80m, becoming yellow, no longer rootlets			10	
				1			D to M	D to VD	10	1.05m: PSP conducted within base of test pit
									4	
									5	
									10	
									22	
			27.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached
Remarks: Backfilled.

TEST PIT LOG - TP16

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392205m N.6447054m
Elevation: 30 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			29.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.			6	0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.			7	
						... at 0.30m, becoming pale yellow		D to VD	7	
			29.3			SP: SAND: fine to medium grained, subangular to subrounded; yellow; trace fines.			7	
									8	
				1			D to M		7	1.05m: PSP conducted within base of test pit
								L	1	
									1	
									2	
									2	
									4	
			28.0	2		Test pit terminated at 2.00 m		D to VD	8	
				3						

Termination Reason: Target depth reached
Remarks: Backfilled.

TEST PIT LOG - TP17

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392177m N.6447122m
Elevation: 30 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	0.0 - 0.1	D	29.8			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey black; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.			3 3 3	
						... at 0.50m, becoming white. Not a homogenous layer			5 6 6	
			29.3	1		SP: SAND: fine to medium grained, subangular to subrounded; yellow; trace fines.	D to M	MD to D	3 3 4 5 6	1.05m: PSP conducted within base of test pit
			28.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP18

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392132m N.6447199m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets; trace branches; with some uncontrolled fill (old reticulation pipe, tree roots, bricks).		D to VD	5 5 6 5 5	
			27.1	1		SP: SAND: fine to medium grained, subangular to subrounded; yellow; trace fines; trace root.	D to M		7	1.05m: PSP conducted within base of test pit
						... at 1.10m, becoming grey			9 20	
			26.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP19

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392209m N.6447301m
Elevation: 29 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			28.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace rootlets.			5, 10, 17	0.00m: test pit located on green
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow with grey; trace fines.				
			28.0	1		SP: SAND: fine to medium grained, subangular to subrounded; yellow; trace fines.	D to M	D to VD	6, 8, 10, 12, 16	1.05m: PSP conducted within base of test pit
			27.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP20

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392305m N.6447413m
Elevation: 30 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			29.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.			6, 4, 4, 6, 11, 15	
						FILL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey yellow; trace fines; trace rootlets; gravel is limestone.				
			29.2	1		SP: SAND: fine to medium grained, subangular to subrounded; yellow; trace fines.	D to M	D to VD		1.05m: PSP conducted within base of test pit
			28.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP21

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO | Position: E.392233m N.6447425m | Plant: JCB 8 tonne backhoe
Checked by:AP | Elevation: 31 m | Contractor: ANH Contracting | Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			30.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow with black; trace fines; trace rootlets.		MD to D	4 5 5	
						... at 0.50m, no longer branches				
				1			D to M		2 2 2	1.05m: PSP conducted within base of test pit
								L	1 2 1 1 1 2 1	
			29.1			SP: SAND: fine to medium grained, subangular to subrounded; orange with grey.				
			29.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP22

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO | Position: E.392210m N.6447383m | Plant: JCB 8 tonne backhoe
Checked by:AP | Elevation: 31 m | Contractor: ANH Contracting | Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			30.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow with grey; trace fines; trace rootlets.			4 4	
								MD to D	5	
						... at 0.70m, no longer rootlets			4 4	
				1			D to M		3	1.05m: PSP conducted within base of test pit
								L	1 1 1 1 1 1	
			29.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP23

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392132m N.6447358m
Elevation: 29 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			28.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on driving range
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.		MD to D	4, 3, 7	
			28.4			SP: SAND: fine to medium grained, subangular to subrounded; pale grey white; trace fines.		VD	10, 12, 10	
				1			D to M			1.05m: PSP conducted within base of test pit
								MD to D	3, 4, 5, 5, 6	
			27.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP24

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392095m N.6447310m
Elevation: 30 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			29.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace branches; trace vegetation.				0.00m: test pit located on tee box
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow with grey; trace fines; trace rootlets.		MD to D	4, 6, 6	
				1			D to M		5, 6, 4	1.05m: PSP conducted within base of test pit
						... at 1.30m, becoming dark grey				
								D to VD	6, 9, 10, 7, 6	
			28.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP25

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392026m N.6447373m
Elevation: 32 m
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting
Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			31.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; trace gravel; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace branches; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow with grey; trace fines; trace root and rootlets; trace branches.		D	5, 6, 6, 7, 7, 7	
						... at 0.45m, no longer branches				
				1			D to M			1.05m: PSP conducted within base of test pit
			30.1			SP: SAND: fine to medium grained, subangular to subrounded; yellow.		MD to D	2, 4, 5, 4, 5, 5	
			30.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached
Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP26

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392008m N.6447494m
Elevation: 28 m
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting
Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on driving range
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.		MD to D	3, 4, 5, 6, 6, 6	
			27.3			SP: SAND: fine to medium grained, subangular to subrounded; pale grey with black; trace fines; trace rootlets.				
						... at 0.90m, no longer rootlets				
				1			D to M			1.05m: PSP conducted within base of test pit
								L	1, 1	
								MD	3, 3, 3, 4	
				2		... at 2.10m, becoming pale brown				
			25.8			Test pit terminated at 2.20 m				
				3						

Termination Reason: Target depth reached
Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP27

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391844m N.6447426m
Elevation: 27 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			26.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace root and rootlets; trace branches.			5, 4	
			26.5			SP: SAND: fine to medium grained, subangular to subrounded; pale grey; trace fines.		D to VD	7, 9, 10, 10	
				1			D to M			1.05m: PSP conducted within base of test pit
								MD to D	3, 5, 5, 5, 6	
			25.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP28

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391771m N.6447468m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on green
						FILL: SAND: fine to medium grained, subangular to subrounded; grey with pale yellow; trace fines; trace root and rootlets; trace branches; with some uncontrolled fill (tree roots, potential asbestos at 0.5m).			4, 6, 6	
								D to VD	4, 4, 4	
				1			D to M			1.05m: PSP conducted within base of test pit
								L	1, 1, 1	
								MD to D	3, 7, 7	
			26.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP29

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391692m N.6447613m
Elevation: 27 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	0.0 - 0.1	D	26.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on tee box
						SP: SAND: fine to medium grained, subangular to subrounded; grey with orange; trace fines; trace rootlets.		MD to D	3, 4, 4, 7	
						... at 0.45m, becoming pale grey				
						... at 0.60m, no longer rootlets		VD	10, 9	
				1			D to M			1.05m: PSP conducted within base of test pit
						... at 1.80m, becoming brown orange		L to MD	2, 2, 3, 4, 4, 4	
			25.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP30

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391668m N.6447725m
Elevation: 26 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			25.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a mound
						SP: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace root and rootlets.		D to VD	7, 8, 7, 6, 6, 7	
				1		... from 1.00m to 1.60m, high root content	D to M			1.05m: PSP conducted within base of test pit
									3, 8, 14	
			24.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP31

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391798m N.6447972m
Elevation: 26 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			25.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.		D	5	
						SP: SAND: fine to medium grained, subangular to subrounded; dark grey with black; trace fines; trace root and rootlets; trace branches.			5	
						... at 0.40m, becoming pale grey			7	
									5	
									6	
				1		... at 0.90m, no longer roots, rootlets or branches	D to M		5	1.05m: PSP conducted within base of test pit
								L	2	
									2	
									3	
								MD to D	4	
						Test pit terminated at 1.80 m			4	
			24.0	2					5	
				3						

Termination Reason: Test pit walls collapsing

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP32

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391789m N.6447873m
Elevation: 27 m

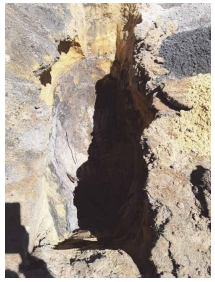
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 1.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.0	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; with organics; trace rootlets; trace vegetation.			5	0.00m: test pit located on green
			26.9			FILL: SAND: fine to medium grained, subangular to subrounded; brown orange; trace fines; trace rootlets; trace organics.		D to VD	9	
						SP: SAND: fine to medium grained, subangular to subrounded; orange.			9	
						... at 0.60m, becoming black with grey			9	
									9	
				1		... at 1.00m, becoming grey with black	D to M		8	1.05m: PSP conducted within base of test pit
								L	2	
									4	
									6	
								MD to D	5	
									5	
			25.0	2		Test pit terminated at 2.00 m			6	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP33

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391914m N.6447886m
Elevation: 29 m
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting
Dimensions : 1.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			29.0			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; with organics; trace rootlets; trace vegetation.		MD to D	5, 7, 7, 4, 4, 5	0.00m: test pit located on green
			28.9			FILL: SAND: fine to medium grained, subangular to subrounded; brown orange; trace fines; trace root and rootlets; trace organics.				
				1		SP: SAND: fine to medium grained, subangular to subrounded; grey with orange.	D to M			1.05m: PSP conducted within base of test pit
								VD	5, 9, 10, 12, 11, 12	
			27.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP34

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

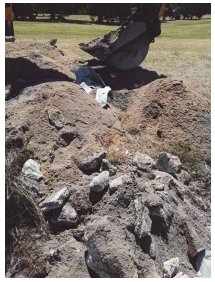
Logged by: MO
Checked by:AP

Position: E.391798m N.6447972m
Elevation: 27 m
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting
Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			26.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; with gravel, coarse grained, subangular to subrounded; with cobbles and boulders, subangular to subrounded (surface); dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.		MD to D	4, 5, 6, 6	0.00m: test pit located next to lake
						FILL: SAND: fine to medium grained, subangular to subrounded; orange brown with black; trace fines; trace rootlets.				0.20m: plastic liner
				1			D to M	VD	8, 10	1.05m: PSP conducted within base of test pit
						... at 1.40m, increasing black colouration		VL to L	1, 1, 3	
						... at 1.60m, potential asbestos pipe				
			25.2			Test pit terminated at 1.80 m		D to VD	5, 6, 8	
				2						
				3						

Termination Reason: Test pit walls collapsing

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP35

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391695m N.6447961m
Elevation: 26 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			25.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						SP: SAND: fine to medium grained, subangular to subrounded; dark grey; trace fines; trace root and rootlets.		D to VD	6, 8, 12, 17	
						... at 0.50m, becoming pale grey	D to M			
				1						
				2						
			23.8			Test pit terminated at 2.20 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP36

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391780m N.6448083m
Elevation: 33 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			33.0	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; with organics; trace fines; trace rootlets; trace vegetation.				0.00m: test pit located on green
			32.8			FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace root and rootlets; trace organics.		D to VD	4, 7, 10, 10, 12, 14	
						SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines.	D to M			
						... at 0.70m, becoming pale yellow with orange				1.05m: PSP conducted within base of test pit
				1						
			31.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP37

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391641m N.6448108m
Elevation: 31 m

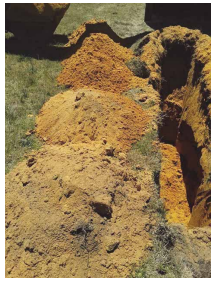
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

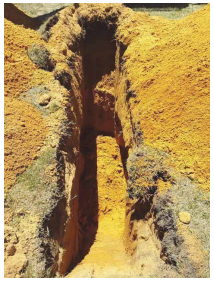
Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			30.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.				
						FILL: SAND: fine to medium grained, subangular to subrounded; pale grey orange; trace fines; trace rootlets.		VD	8, 9, 10, 11, 14	
			30.5			SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines; trace rootlets.	D to M			1.05m: PSP conducted within base of test pit
			29.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.





This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP38

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391687m N.6448201m
Elevation: 40 m

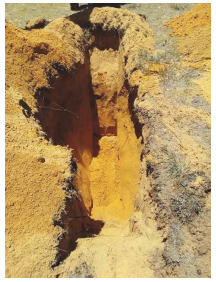
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			39.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow; trace fines; trace root and rootlets.		L	3, 2, 3, 3	
			39.2			SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines; trace rootlets.	D to M	MD to D	4, 4	
				1						
									6	
								VD	13	
			38.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP39

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391604m N.6448263m
Elevation: 39 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			38.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.				0.00m: test pit located on a mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow; trace fines; trace rootlets.		D to VD	6, 7, 10	
			38.4			SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines.			12, 16	
				1			D to M			
			37.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP40

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391717m N.6448301m
Elevation: 37 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			36.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
			36.7			FILL: SAND: fine to medium grained, subangular to subrounded; orange brown; trace fines; trace rootlets.			5	
						SP: SAND: fine to medium grained, subangular to subrounded; orange with black; trace fines; trace rootlets.			6, 6, 6, 6, 7	
				1			D to M	D to VD		1.05m: DCP conducted within base of test pit
									5, 8, 9, 9, 8, 8	
			35.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP41

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391656m N.6448386m
Elevation: 40 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
	0.0 - 0.1	D	39.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow with black; trace fines; trace rootlets.	D to M	D	5, 6, 6, 6, 7, 7	
				1						1.05m: DCP conducted within base of test pit
			38.6			SP: SAND: fine to medium grained, subangular to subrounded; orange with black; trace fines; trace rootlets.		L	2, 3	
								D to VD	6, 9, 15	
			38.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP42

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391769m N.6448368m
Elevation: 36 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			35.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.				
			35.7			FILL: SAND: fine to medium grained, subangular to subrounded; orange brown; trace fines; trace rootlets.	D to M	D to VD	5, 7, 14	
				1		SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines; trace root and rootlets.			5, 6, 6, 6, 5, 6	1.05m: DCP conducted within base of test pit
			34.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP43

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391858m N.6448357m
Elevation: 35 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			34.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.		MD	4	
						FILL: SAND: fine to medium grained, subangular to subrounded; grey orange; trace fines; trace rootlets.			4	
			34.4						7	
						SP: SAND: fine to medium grained, subangular to subrounded; orange with black white; trace fines; trace rootlets.			7	
									8	
				1			D to M	D to VD	12	1.05m: DCP conducted within base of test pit
									7	
									15	
			33.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP44

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391800m N.6448352m
Elevation: 35 m

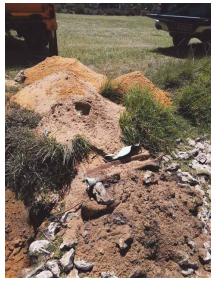
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			34.9	0		TOPSOIL; SAND: fine to medium grained, subangular to subrounded; with gravel, coarse grained, subangular to subrounded; with cobbles and boulders, subangular to subrounded (surface); dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.		MD	3	0.00m: test pit located next to lake
			34.8			FILL: SAND: fine to medium grained, subangular to subrounded; brown orange; trace fines; trace root and rootlets.			5	0.20m: plastic liner
						SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines; trace rootlets.			6	
								D to VD	9	
				1			D to M		9	
									9	
			33.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP45

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391830m N.6448277m
Elevation: 37 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			36.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a tee box
						FILL: SAND: fine to medium grained, subangular to subrounded; grey with black; trace fines; trace rootlets.		D	5, 6, 6	
			36.4			SP: SAND: fine to medium grained, subangular to subrounded; orange with black white; trace fines; trace rootlets.	D to M	D to VD	7, 11, 17	1.05m: DCP conducted within base of test pit
			35.0	2		Test pit terminated at 2.00 m			7, 13	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP46

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.391760m N.6448174m
Elevation: 42 m

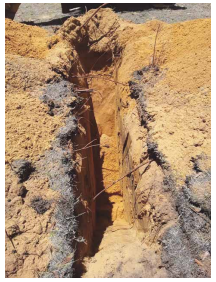
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
	0.0 - 0.1	D	41.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.				0.00m: test pit located on a mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow; trace fines; trace root and rootlets; trace branches.		MD to D	8, 5, 4	
			41.4			SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines; trace rootlets.	D to M	D to VD	8, 10, 9	1.05m: PSP conducted within base of test pit
			40.0	2		Test pit terminated at 2.00 m			7, 13	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP47

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392020m N.6447932m
Elevation: 27 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			26.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.				
			26.7			FILL: SAND: fine to medium grained, subangular to subrounded; brown orange; trace fines; trace root and rootlets.				
						SP: SAND: fine to medium grained, subangular to subrounded; white; trace fines; trace root and rootlets.		D to VD	7, 8, 9, 11	
				1		... at 0.90m, becoming orange	D to M			1.05m: DCP conducted within base of test pit
								MD to D	3, 4, 5, 6, 6	
			25.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP48

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392002m N.6447829m
Elevation: 26 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
	0.0 - 0.1	D	25.9			TOPSOIL: CLAYEY SAND: fine to medium grained, subangular to subrounded; clay, low plasticity; dark grey brown; with organics; trace roots and rootlets; very light, crusted material found at base of lake.	M			0.00m: test pit located on a previous lake
						FILL: SAND: fine to medium grained, subangular to subrounded; orange brown; trace fines.	W	VL to L	2, 3	
			25.5			SP: SAND: fine to medium grained, subangular to subrounded; white; trace fines.			6, 6, 7	0.50m: plastic liner
				1			M			1.05m: DCP conducted within base of test pit
								MD to D	3, 5, 6, 7, 7	
				2		Test pit terminated at 2.00 m			7	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP49

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392001m N.6447777m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			27.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on a mound
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow; trace fines; trace rootlets.		VD	8, 8, 8, 9, 10, 9	
						... at 0.70m, becoming pale yellow with black	D to M			
				1						1.05m: DCP conducted within base of test pit
								MD to D	3, 5, 5, 4, 3	
			26.0	2		Test pit terminated at 2.00 m			4	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP50

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392027m N.6447786m
Elevation: 27 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			26.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
			26.8			FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace root and rootlets.			5	
						SP: SAND: fine to medium grained, subangular to subrounded; pale grey; trace fines; trace root and rootlets; trace branches.			4, 5, 4, 4, 4	
						... at 0.70m, becoming orange	D to M	MD to D		
				1						1.05m: PSP conducted within base of test pit
									3, 4, 5, 5, 6	
			25.0	2		Test pit terminated at 2.00 m			6	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

TEST PIT LOG - TP51

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 7

Logged by: MO
Checked by:AP

Position: E.392051m N.6447678m
Elevation: 27 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			26.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace root and rootlets.		D	6, 6, 7	
			26.4			SP: SAND: fine to medium grained, subangular to subrounded; pale grey; trace fines; trace rootlets.	D to M		7, 7, 7	
				1						1.05m: PSP conducted within base of test pit
								L	2, 3	
								MD	4, 4	
									11, 11	
			25.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP52

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 01/12/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392157m N.6447272m
Elevation: 26 m

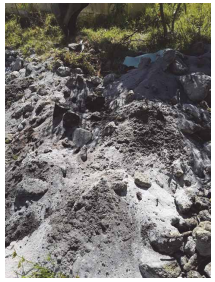
Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			25.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; with gravel, coarse grained, subangular to subrounded; with cobbles and boulders, subangular to subrounded (surface); dark grey; trace fines; trace organics; trace roots and rootlets; trace vegetation and branches.		MD	3	0.00m: test pit located on edge of lake
			25.7			SAND: FILL: fine to medium grained, subangular to subrounded; brown orange, trace roots and rootlets.			6	0.10m: plastic liner on lake embankment
						SP: SAND: fine to medium grained, subangular to subrounded; pale grey; trace fines; trace root and rootlets.			8	
									8	
							D to M	D to VD	9	
						... at 0.90m, becoming orange			8	
			25.0	1		COFFEE ROCK: fine to medium grained, subangular to subrounded; dark brown; weakly cemented; trace fines.				1.05m: DCP conducted within base of test pit
									4	
								VD	20	
			24.3			Test pit terminated at 1.70 m				
				2						
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.



TEST PIT LOG - TP53

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392109m N.6447575m
Elevation: 28 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			27.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained, subangular to subrounded; grey; trace fines; trace rootlets.				
			27.6			SP: SAND: fine to medium grained, subangular to subrounded; pale grey; trace fines; trace root and rootlets.		D to VD	5, 7, 7, 6, 7, 9	
				1			D to M			1.05m: PSP conducted within base of test pit
								MD to D	4, 5, 6, 6, 6, 6	
			26.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP54

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392112m N.6447508m
Elevation: 30 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description: Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm) 5 10 15	Structure & other observations
			29.9	0		TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				0.00m: test pit located on mound
						FILL: SAND: fine to medium grained; dark grey with black; trace fines; trace rootlets.		L	2, 1, 1, 1, 1, 1	
				1			D to M			1.05m: PSP conducted within base of test pit
								MD	1, 2, 4, 6	
			28.1			SP: SAND: fine to medium grained, subangular to subrounded; pale grey.		VD	8, 8	
			28.0	2		Test pit terminated at 2.00 m				
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

TEST PIT LOG - TP55

Client: JDSi Consulting Engineers
Project: Glen Iris Estate
Location: Jandakot, WA
Project: PER2020-0452
Date: 30/11/2020

CMW Geosciences

1:23 Sheet 1 of 1

Logged by: MO
Checked by:AP

Position: E.392174m N.6447445m
Elevation: 29 m

Plant: JCB 8 tonne backhoe
Contractor: ANH Contracting

Dimensions : 0.50m x 3.50m

Groundwater	Samples & Insitu Tests: Depth	Samples & Insitu Tests: Type & Results	RL (m)	Depth (m)	Graphic Log	Material Description (Soil Type, Plasticity or Particle Characteristics, Colour, Secondary and Minor Components)	Moisture Condition	Consistency/ Relative Density	Perth Sand Penetrometer (Blows/150mm)	Structure & other observations
			28.9			TOPSOIL: SAND: fine to medium grained, subangular to subrounded; dark grey brown; trace fines; trace organics; trace roots and rootlets; trace vegetation.				
						FILL: SAND: fine to medium grained, subangular to subrounded; pale yellow; trace fines; trace rootlets.	D to M	D	6, 7, 7, 7, 7, 6	
				1						1.05m: PSP conducted within base of test pit
			27.8			SP: SAND: fine to medium grained, subangular to subrounded; orange; trace fines.		MD to D	3, 3, 4, 5, 6	
			27.0	2		Test pit terminated at 2.00 m			5	
				3						

Termination Reason: Target depth reached

Remarks: Backfilled.

This report must be read in conjunction with accompanying notes and abbreviations.

Appendix B

Permeability Test Results

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 1	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.41	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.05	m

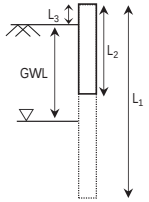
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.36 m BGL



Hydraulic Conductivity (k)

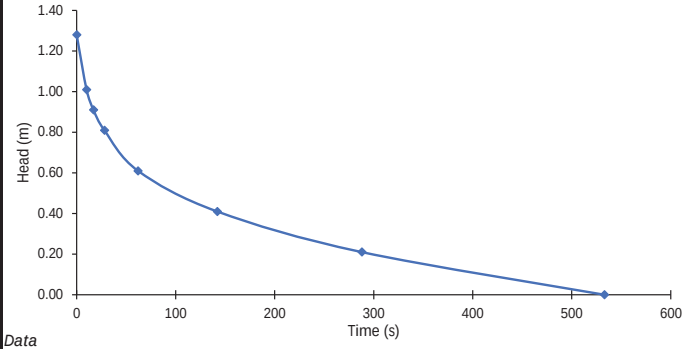
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 3.15E-04 ms^{-1} : 27.22 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 6.50E-05 ms^{-1} : 5.61 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.36m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.130	1.280					
10	0.400	1.010	1.145		5.55E-05	4.01E-04	
17	0.500	0.910	0.960		3.95E-05	2.49E-04	
28	0.600	0.810	0.860		3.02E-05	1.76E-04	
62	0.800	0.610	0.710		2.71E-05	1.39E-04	12.00
142	1.000	0.410	0.510		1.99E-05	8.19E-05	
288	1.200	0.210	0.310		2.44E-05	7.49E-05	
533	1.410	0.000	0.105		2.58E-04	1.08E-03	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 2	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.43	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.01	m

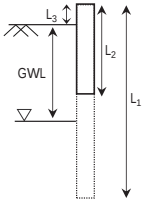
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.42 m BGL



Hydraulic Conductivity (k)

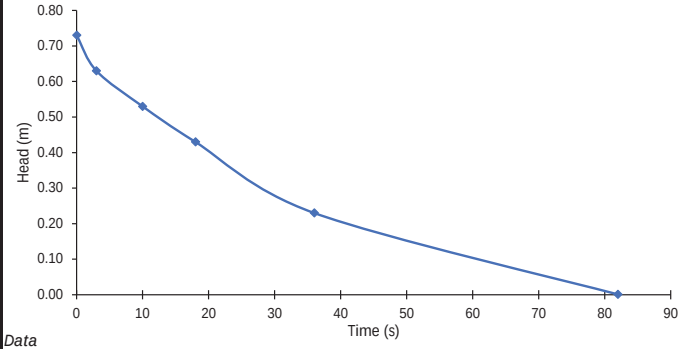
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 1.22E-03 ms^{-1} : 105.00 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 2.99E-04 ms^{-1} : 25.84 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.42m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.700	0.730					
3	0.800	0.630	0.680		1.64E-04	8.08E-04	
10	0.900	0.530	0.580		9.12E-05	4.03E-04	
18	1.000	0.430	0.480		1.09E-04	4.22E-04	
36	1.200	0.230	0.330		1.79E-04	5.68E-04	49.11
82	1.429	0.001	0.116		9.52E-04	3.87E-03	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 3	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.39	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.04	m

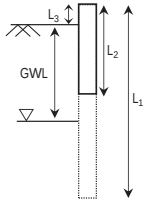
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.35 m BGL



Hydraulic Conductivity (k)

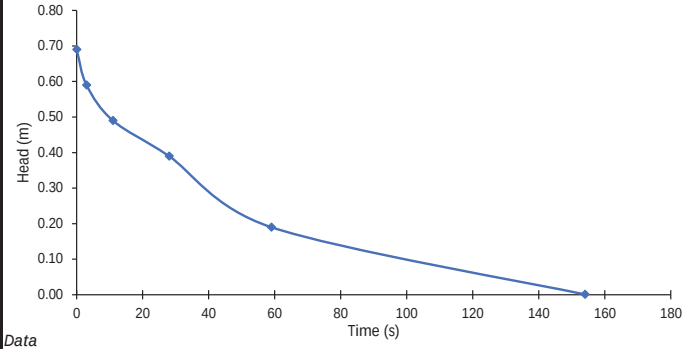
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 6.73E-04 ms^{-1} : 58.18 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 1.85E-04 ms^{-1} : 16.00 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.35m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.700	0.690					
3	0.800	0.590	0.640		1.81E-04	8.56E-04	
11	0.900	0.490	0.540		8.97E-05	3.77E-04	
28	1.000	0.390	0.440		5.87E-05	2.15E-04	
59	1.200	0.190	0.290		1.28E-04	3.80E-04	32.79
154	1.389	0.001	0.095		4.68E-04	1.54E-03	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 4	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.42	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.04	m

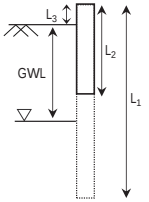
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.38 m BGL



Hydraulic Conductivity (k)

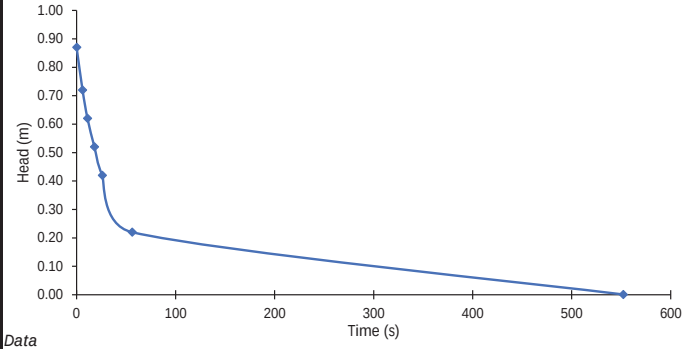
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 4.25E-04 ms^{-1} : 36.75 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 1.01E-04 ms^{-1} : 8.69 m/day



STRATIGRAPHIC LOG

Fill

EOH @ 1.38m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.550	0.870					
6	0.700	0.720	0.795		9.50E-05	5.25E-04	
11	0.800	0.620	0.670		1.01E-04	4.92E-04	
18	0.900	0.520	0.570		9.39E-05	4.10E-04	
26	1.000	0.420	0.470		1.12E-04	4.30E-04	37.18
56	1.200	0.220	0.320		1.13E-04	3.52E-04	
552	1.419	0.001	0.111		8.87E-05	3.43E-04	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate, Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 5	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.42	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.02	m

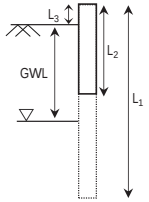
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h / k_v}$

Bottom of Test Hole: 1.40 m BGL



Hydraulic Conductivity (k)

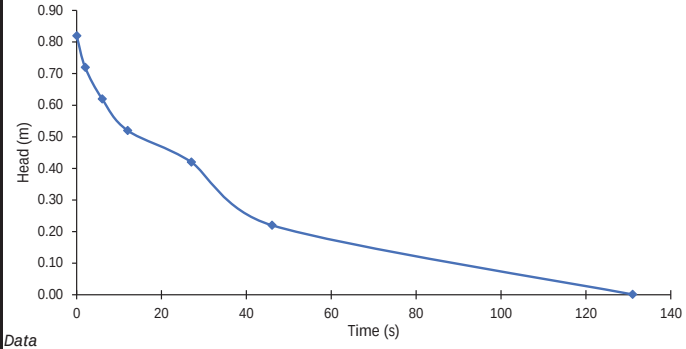
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 8.26E-04 ms^{-1} : 71.39 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 \ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 1.99E-04 ms^{-1} : 17.16 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.4m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.600	0.820					
2	0.700	0.720	0.770		2.00E-04	1.08E-03	
6	0.800	0.620	0.670		1.26E-04	6.15E-04	
12	0.900	0.520	0.570		1.10E-04	4.78E-04	
27	1.000	0.420	0.470		5.99E-05	2.29E-04	19.83
46	1.200	0.220	0.320		1.78E-04	5.56E-04	
131	1.419	0.001	0.111		5.18E-04	2.00E-03	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate, Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 6	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.44	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.04	m

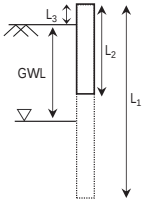
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h / k_v}$

Bottom of Test Hole: 1.40 m BGL



Hydraulic Conductivity (k)

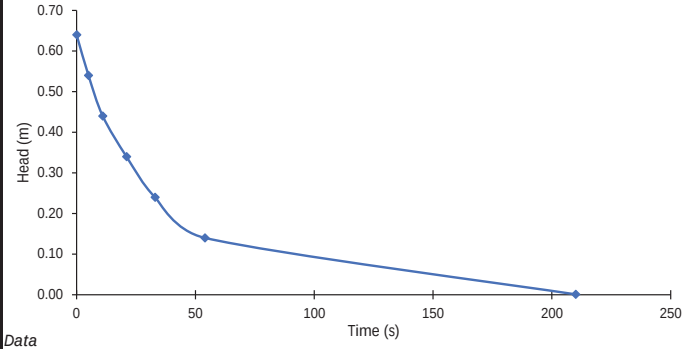
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 5.05E-04 ms^{-1} : 43.61 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 \ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 1.67E-04 ms^{-1} : 14.46 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.4m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.800	0.640					
5	0.900	0.540	0.590		1.24E-04	5.55E-04	
11	1.000	0.440	0.490		1.40E-04	5.52E-04	
21	1.100	0.340	0.390		1.21E-04	4.10E-04	
33	1.200	0.240	0.290		1.60E-04	4.51E-04	38.92
54	1.300	0.140	0.190		1.73E-04	3.82E-04	
210	1.439	0.001	0.070		2.86E-04	6.80E-04	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate, Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 7	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.44	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.03	m

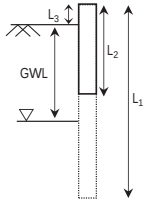
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.41 m BGL



Hydraulic Conductivity (k)

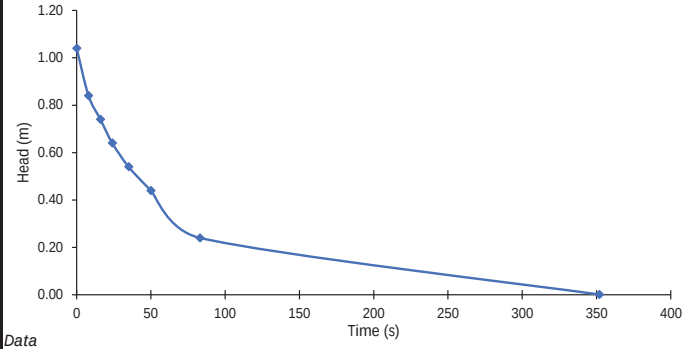
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 3.54E-04 ms^{-1} : 30.55 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 \ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 7.82E-05 ms^{-1} : 6.75 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.41m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.400	1.040					
8	0.600	0.840	0.940		7.18E-05	4.48E-04	
16	0.700	0.740	0.790		4.79E-05	2.63E-04	
24	0.800	0.640	0.690		6.00E-05	2.99E-04	
35	0.900	0.540	0.590		5.65E-05	2.52E-04	21.81
50	1.000	0.440	0.490		5.60E-05	2.21E-04	
83	1.200	0.240	0.340		9.31E-05	3.00E-04	
352	1.439	0.001	0.121		1.62E-04	6.92E-04	

CMW Geosciences	CLIENT: JDSi Consulting Engineers	DESIGNER:	MO
	PROJECT: Glen Iris Estate, Jandakot, WA	CHECKED:	AP
		REVISION:	1
	TITLE: Falling Head Permeability Test 8	DATE:	3/12/2020
		PROJECT:	PER2020-0452

Specifications - Open-Ended Tube

Length L_1:	1.44	m
Diameter:	80	mm
Non-Perm L_2:		m
Above Gnd L_3:	0.03	m

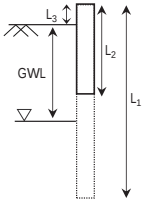
Ground Conditions

GWL: 3 m BGL (Blank = Bottom of hole)

Permeability Anisotropy

m: 1 $m = \sqrt{k_h/k_v}$

Bottom of Test Hole: 1.41 m BGL



Hydraulic Conductivity (k)

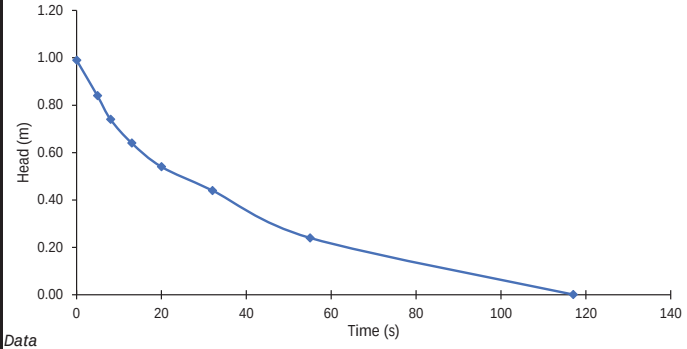
Note: CMW considers the CIRIA 113 value the most appropriate method for most purposes, but also provides the analysis method as outlined by Hvorslev if desired.

CIRIA 113: Somerville (1986), *Control of groundwater for temporary works,* CIRIA Report 113, Appendix 4

$$k = \left(log\frac{h_1}{h_2} - log\frac{2h_1 + d}{2h_2 + d}\right) \cdot \frac{(h_1 + h_2)}{2(t_2 - t_1)} =$$ 8.32E-04 ms^{-1} : 71.89 m/day

Hvorslev: Hvorslev (1951) *Time Lag and Soil Permeability in Ground-Water Observations* , Fig 18, p49

$$k = \frac{d^2 \ln\left(\frac{mL}{d} + \sqrt{\left(\frac{mL}{d}\right)^2 + 1}\right)}{8L(t_2 - t_1)} ln\frac{H_1}{H_2} =$$ 1.87E-04 ms^{-1} : 16.13 m/day



STRATIGRAPHIC LOG

Sand

EOH @ 1.41m

Data

Time (s)	Tape Avg (m)	Head (m)	Perm. Length (m)		Hvorslev 'k' Case G (ms^{-1})	CIRIA 113 'k' (ms^{-1})	
0	0.450	0.990					
4.9	0.600	0.840	0.915		9.18E-05	5.60E-04	
8	0.700	0.740	0.790		1.24E-04	6.78E-04	
13	0.800	0.640	0.690		9.60E-05	4.78E-04	
20	0.900	0.540	0.590		8.87E-05	3.97E-04	34.27
32	1.000	0.440	0.490		7.00E-05	2.76E-04	
55	1.200	0.240	0.340		1.34E-04	4.31E-04	
117	1.439	0.001	0.121		7.03E-04	3.00E-03	

Appendix C

Laboratory Test Results

WESTERN GEOTECHNICAL & Laboratory Services

SOIL | AGGREGATE | CONCRETE | CRUSHING

TEST REPORT - ASTM D2974-14 (Test Method C)

Client:	CMW Geosciences	*Ticket No.*	S2166
Client Address:	Suite 1, Level 3/29 Flynn Street, Wembley WA	*Report No.*	WG20/11347-11354_1_OF
Project:	Geotechnical Investigation	*Sample No.*	WG20/11347-11354
Location:	Glen Iris Golf Course	*Date Sampled:*	Not Specified
Sample Identification:	Various - See Below	*Date Tested:*	4-12-2020

TEST RESULTS - Organic Content

Sampling Method:	Sampled by Client, Tested as Received
Testing Completed By:	WGLS - KT
Furnace Temperature (°C):	440

Sample Number	Sample Identification	Ash Content (%)	Organic Content (%)
WG20/11347	TP04 0.01m	95.8	4.2
WG20/11348	TP14 0.01m	94.7	5.3
WG20/11349	TP29 0.01m	96.0	4.0
WG20/11350	TP41 0.01m	91.4	8.6
WG20/11351	TP46 0.01m	95.6	4.4
WG20/11352	TP48 0.01m	74.5	25.5
WG20/11353	TP23 0.01m	94.6	5.4
WG20/11354	TP15 0.01m	96.7	3.3

Comments:

Approved Signatory:

Name: Brooke Elliott

Date: 05-December-2020

Accreditation No. 20599
Accredited for compliance with ISO/IEC 17025 - Testing

APPENDIX C
Hyd2o Permeability Testing

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 1
Soil Descrip	Yellow grey fine to medium sand
Location	392063 mE
	6447929 mN

TEST 1

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	4.5	
5	25.0	20.5
10	37.5	12.5
15	51.0	13.5
20	73.0	22.0
		17.1
q (cm^3/s)		30.1

TEST 2

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	8.5	
5	33.0	24.5
10	44.0	11.0
15	64.0	20.0
Avg Diff (cm)		18.5
q (cm^3/s)		32.6

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
Avg Diff (cm)		
q (cm^3/s)		

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0316	Ks (cm/s)	0.0341	Ks (cm/s)	
Ks (m/day)	27.26	Ks (m/day)	29.45	Ks (m/day)	
Average (m/day)	28.4				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	1808.4		1953.6 cm3/min		cm3/min
r (cm)	6		6.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.38		0.38		
-sqrt((r/H)^2+0.25)	-0.78		-0.78		
r/H	0.60		0.60		
Sum	0.20		0.20		
Sum*4.4*q	1577.21		1703.85		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	2.5		2.7		
Ksat (m/day)	36.15		39.05		
Average (m/day)	37.6				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 2
Soil Descrip	Dark grey fine to medium sand
Location	391613 mE
	6448399 mN

TEST 1

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	3.0	
5	7.5	4.5
10	12.0	4.5
15	16.0	4.0
20	19.5	3.5
25	23.2	3.7
30	23.2	0.0
35	26.5	3.3
40	26.5	0.0
45	29.5	3.0
50	32.0	2.5
55	36.3	4.3
60	36.3	0.0
65	39.5	3.2
70	40.0	0.5
75	40.0	0.0
80	40.0	0.0
85	40.0	0.0
90	45.0	5.0
95	45.0	0.0
100	49.0	4.0
105	56.5	7.5
110	56.5	0.0
115	60.5	4.0
120	64.0	3.5
125	64.0	0.0
130	67.0	3.0
135	67.0	0.0
140	71.0	4.0
145	74.0	3.0
150	74.0	0.0
		2.4
q (cm^3/s)		4.2

TEST 2

r	6.0	cm
H	10.0	cm
time step	10	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	6.3	
10	16.8	10.5
20	21.2	4.4
30	26.0	4.8
40	31.0	5.0
50	35.0	4.0
60	39.7	4.7
70	39.7	0.0
80	44.2	4.5
90	48.6	4.4
100	48.6	0.0
110	57.0	8.4
120	61.0	4.0
130	65.1	4.1
140	69.3	4.2
150	73.5	4.2
Avg Diff (cm)		4.5
q (cm^3/s)		3.9

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
Avg Diff (cm)		
q (cm^3/s)		

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0044	Ks (cm/s)	0.0041	Ks (cm/s)	
Ks (m/day)	3.77	Ks (m/day)	3.57	Ks (m/day)	
Average (m/day)	3.7				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	249.9		236.5 cm3/min		cm3/min
r (cm)	6		6.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.38		0.38		
-sqrt((r/H)^2+0.25)	-0.78		-0.78		
r/H	0.60		0.60		
Sum	0.20		0.20		
Sum*4.4*q	217.97		206.30		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	0.3		0.3		
Ksat (m/day)	5.00		4.73		
Average (m/day)	4.9				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 3
Soil Descrip	Grey to dark grey fine to medium sand
Location	391674 mE
	6447970 mN

TEST 1

r	5.0	cm
H	10.0	cm
time step	10	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	4.5	
10	28.0	23.5
20	50.2	22.2
30	71.5	21.3
		22.3
q (cm^3/s)		19.7

TEST 2

r	5.0	cm
H	8.0	cm
time step	5	secs
H/r	1.60	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	5.5	
5	24.0	18.5
10	34.0	10.0
15	41.0	7.0
20	51.2	10.2
25	58.5	7.3
30	66.0	7.5
Avg Diff (cm)		10.1
q (cm^3/s)		17.7

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
Avg Diff (cm)		
q (cm^3/s)		

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0256	Ks (cm/s)	0.0287	Ks (cm/s)	
Ks (m/day)	22.14	Ks (m/day)	24.83	Ks (m/day)	
Average (m/day)	23.5				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	1179.2		1064.8 cm3/min		cm3/min
r (cm)	5		5.0 cm		cm
H (cm)	10.0		8.0 cm		cm
0.5sinh^{-1}(H/2r)	0.44		0.37		
-sqrt((r/H)^2+0.25)	-0.71		-0.80		
r/H	0.50		0.63		
Sum	0.23		0.19		
Sum*4.4*q	1211.93		894.59		
2*pi*H^2	628.32		402.12		
Ksat (cm/min)	1.9		2.2		
Ksat (m/day)	27.78		32.04		
Average (m/day)	29.9				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 4
Soil Descrip	Grey to dark grey fine to medium sand
Location	391658 mE
	6447775 mN

TEST 1

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	2.5	
5	44.0	41.5
10	61.0	17.0
		29.3
q (cm^3/s)		51.5

TEST 2

r	5.0	cm
H	9.0	cm
time step	5	secs
H/r	1.80	
C	0.83	

Time (sec)	Level (cm)	Diff (cm)
0	5.0	
5	43.0	38.0
10	61.0	18.0
15	73.0	12.0
Avg Diff (cm)		22.7
q (cm^3/s)		39.9

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)		Diff (cm)
Avg Diff (cm)		
q (cm^3/s)		

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0671	Ks (cm/s)	0.0578	Ks (cm/s)	
Ks (m/day)	57.98	Ks (m/day)	49.91	Ks (m/day)	
Average (m/day)	53.9				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	3088.8		2393.6 cm3/min		cm3/min
r (cm)	5		5.0 cm		cm
H (cm)	10.0		9.0 cm		cm
0.5sinh^{-1}(H/2r)	0.44		0.40		
-sqrt((r/H)^2+0.25)	-0.71		-0.75		
r/H	0.50		0.56		
Sum	0.23		0.21		
Sum*4.4*q	3174.52		2238.71		
2*pi*H^2	628.32		508.94		
Ksat (cm/min)	5.1		4.4		
Ksat (m/day)	72.75		63.34		
Average (m/day)	68.0				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 5
Soil Descrip	Grey fine to medium sand
Location	391757 mE
	6447775 mN

TEST 1

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	4.0	
5	8.1	4.1
10	12.1	4.0
15	16.0	3.9
20	20.2	4.2
25	23.5	3.3
30	27.0	3.5
35	31.1	4.1
40	34.8	3.7
45	39.0	4.2
50	43.0	4.0
55	43.0	0.0
60	46.9	3.9
65	52.2	5.3
70	52.2	0.0
75	56.2	4.0
80	60.2	4.0
85	65.0	4.8
90	69.0	4.0
95	69.0	0.0
100	73.5	4.5
		3.5
	q (cm^3/s)	6.1

TEST 2

r	6.0	cm
H	8.0	cm
time step	5	secs
H/r	1.33	
C	0.66	

Time (sec)	Level (cm)	Diff (cm)
0	4.7	
5	9.5	4.8
10	13.7	4.2
15	17.6	3.9
20	21.5	3.9
25	25.0	3.5
30	29.2	4.2
35	29.2	0.0
40	33.5	4.3
45	37.4	3.9
50	43.1	5.7
55	43.1	0.0
60	47.0	3.9
65	52.3	5.3
70	52.3	0.0
75	56.4	4.1
80	62.0	5.6
85	62.0	0.0
90	65.9	3.9
95	71.0	5.1
	Avg Diff (cm)	3.5
	q (cm^3/s)	6.1

TEST 3

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	4.5	
5	9.1	4.6
10	13.0	3.9
15	13.0	0.0
20	17.1	4.1
25	21.2	4.1
30	25.2	4.0
35	29.6	4.4
40	29.6	0.0
45	33.5	3.9
50	38.2	4.7
55	42.7	4.5
60	42.7	0.0
65	47.1	4.4
70	51.6	4.5
75	51.6	0.0
80	54.6	3.0
85	60.0	5.4
90	60.0	0.0
95	65.0	5.0
100	69.2	4.2
105	73.4	4.2
110	73.4	0.0
	Avg Diff (cm)	3.1
	q (cm^3/s)	5.5

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0064	Ks (cm/s)	0.0085	Ks (cm/s)	0.0058
Ks (m/day)	5.53	Ks (m/day)	7.30	Ks (m/day)	4.99
Average (m/day)	5.9				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	367.0		368.5	cm3/min	330.7	cm3/min
r (cm)	6		6.0	cm	6.0	cm
H (cm)	10.0		8.0	cm	10.0	cm
0.5sinh^{-1}(H/2r)	0.38		0.31		0.38	
-sqrt((r/H)^2+0.25)	-0.78		-0.90		-0.78	
r/H	0.60		0.75		0.60	
Sum	0.20		0.16		0.20	
Sum*4.4*q	320.05		261.34		288.44	
2*pi*H^2	628.32		402.12		628.32	
Ksat (cm/min)	0.5		0.6		0.5	
Ksat (m/day)	7.33		9.36		6.61	
Average (m/day)	8.3					

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 6
Soil Descrip	Grey to dark grey fine to medium sand
Location	391723 mE
	6447547 mN

TEST 1

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	5.0	
5	28.0	23.0
10	60.0	32.0
		27.5
	q (cm^3/s)	48.4

TEST 2

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	5.8	
5	46.0	40.2
10	54.0	8.0
	Avg Diff (cm)	24.1
	q (cm^3/s)	42.4

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm^3/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0631	Ks (cm/s)	0.0553	Ks (cm/s)	
Ks (m/day)	54.51	Ks (m/day)	47.77	Ks (m/day)	
Average (m/day)	51.1				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	2904.0		2545.0	cm3/min		cm3/min
r (cm)	5		5.0	cm		cm
H (cm)	10.0		10.0	cm		cm
0.5sinh^{-1}(H/2r)	0.44		0.44			
-sqrt((r/H)^2+0.25)	-0.71		-0.71			
r/H	0.50		0.50			
Sum	0.23		0.23			
Sum*4.4*q	2984.59		2615.59			
2*pi*H^2	628.32		628.32			
Ksat (cm/min)	4.8		4.2			
Ksat (m/day)	68.40		59.94			
Average (m/day)	64.2					

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 7
Soil Descrip	Grey to dark grey fine to medium sand
Location	391790 mE
	6447430 mN

TEST 1

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	8.2	
5	15.6	7.4
10	21.0	5.4
15	29.4	8.4
20	29.4	0.0
25	36.1	6.7
30	39.4	3.3
35	46.0	6.6
40	50.0	4.0
45	53.5	3.5
50	60.5	7.0
55	67.0	6.5
60	71.0	4.0
65	75.0	4.0
		5.1
	q (cm^3/s)	9.0

TEST 2

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	5.0	
5	13.2	8.2
10	18.0	4.8
15	28.5	10.5
20	34.5	6.0
25	36.4	1.9
30	36.4	0.0
35	40.4	4.0
40	49.0	8.6
45	52.0	3.0
50	57.0	5.0
55	65.0	8.0
60	72.1	7.1
	Avg Diff (cm)	5.6
	q (cm^3/s)	9.8

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm^3/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0118	Ks (cm/s)	0.0128	Ks (cm/s)	
Ks (m/day)	10.19	Ks (m/day)	11.08	Ks (m/day)	
Average (m/day)	10.6				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	542.6		590.5 cm3/min		cm3/min
r (cm)	5		5.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.44		0.44		
-sqrt((r/H)^2+0.25)	-0.71		-0.71		
r/H	0.50		0.50		
Sum	0.23		0.23		
Sum*4.4*q	557.68		606.87		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	0.9		1.0		
Ksat (m/day)	12.78		13.91		
Average (m/day)	13.3				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 8
Soil Descrip	Grey to dark grey fine to medium sand
Location	392037 mE
	6447313 mN

TEST 1

r	5.5	cm
H	10.0	cm
time step	5	secs
H/r	1.82	
C	0.83	

Time (sec)	Level (cm)	Diff (cm)
0	7.5	
5	76.0	68.5
		68.5
	q (cm^3/s)	120.6

TEST 2

r	5.5	cm
H	10.0	cm
time step	5	secs
H/r	1.82	
C	0.83	

Time (sec)	Level (cm)	Diff (cm)
0	9.0	
5	76.0	67.0
	Avg Diff (cm)	67.0
	q (cm^3/s)	117.9

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm^3/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.1417	Ks (cm/s)	0.1386	Ks (cm/s)	
Ks (m/day)	122.45	Ks (m/day)	119.77	Ks (m/day)	
Average (m/day)	121.1				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	7233.6		7075.2 cm3/min		cm3/min
r (cm)	5.5		5.5 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.41		0.41		
-sqrt((r/H)^2+0.25)	-0.74		-0.74		
r/H	0.55		0.55		
Sum	0.21		0.21		
Sum*4.4*q	6827.10		6677.61		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	10.9		10.6		
Ksat (m/day)	156.47		153.04		
Average (m/day)	154.8				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 9
Soil Descrip	Grey to dark grey fine to medium sand
Location	392107 mE
	6447280 mN

hyd2o HYDROLOGY

TEST 1

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	5.5	
5	28.0	5.5
10	49.0	28.0
15	74.0	49.0

27.5

q (cm³/s) 48.4

TEST 2

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	9.0	
5	29.5	20.5
10	41.5	12.0
15	57.0	15.5
20	71.0	14.0

Avg Diff (cm) 15.5

q (cm³/s) 27.3

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)

Avg Diff (cm)

q (cm³/s)

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0507	Ks (cm/s)	0.0286	Ks (cm/s)	
Ks (m/day)	43.78	Ks (m/day)	24.68	Ks (m/day)	

Average (m/day) 34.2

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	2904.0		1636.8 cm3/min		cm3/min
r (cm)	6		6.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.38		0.38		
-sqrt((r/H)^2+0.25)	-0.78		-0.78		
r/H	0.60		0.60		
Sum	0.20		0.20		
Sum*4.4*q	2532.75		1427.55		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	4.0		2.3		
Ksat (m/day)	58.05		32.72		

Average (m/day) 45.4

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 10
Soil Descrip	Grey to dark grey fine to medium sand
Location	392118 mE
	6447046 mN

hyd2o HYDROLOGY

TEST 1

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	6.3	
5	15.2	8.9
10	20.2	5.0
15	20.2	0.0
20	24.4	4.2
25	31.0	6.6
30	43.0	12.0
35	37.6	-5.4
40	40.9	3.3
45	45.2	4.3
50	49.5	4.3
55	54.1	4.6
60	60.0	5.9
65	65.6	5.6
70	71.0	5.4
75	71.0	0.0
80	76.0	5.0

4.4

q (cm³/s) 7.7

TEST 2

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	4.7	
5	12.0	7.3
10	18.0	6.0
15	26.0	8.0
20	31.2	5.2
25	39.5	8.3
30	42.9	3.4
35	51.1	8.2
40	55.0	3.9
45	59.1	4.1
50	68.0	8.9
55	75.0	7.0

Avg Diff (cm) 6.4

q (cm³/s) 11.2

TEST 3

r	6.0	cm
H	10.0	cm
time step	5	secs
H/r	1.67	
C	0.75	

Time (sec)	Level (cm)	Diff (cm)
0	4.8	
5	15.2	10.4
10	19.8	4.6
15	29.5	9.7
20	32.6	3.1
25	41.2	8.6
30	50.0	8.8
35	57.0	7.0
40	66.0	9.0
45	72.5	6.5

Avg Diff (cm) 7.5

q (cm³/s) 13.2

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0080	Ks (cm/s)	0.0118	Ks (cm/s)	0.0139
Ks (m/day)	6.94	Ks (m/day)	10.17	Ks (m/day)	11.98

Average (m/day) 9.7

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	460.0		674.9 cm3/min		794.3 cm3/min
r (cm)	6		6.0 cm		6.0 cm
H (cm)	10.0		10.0 cm		10.0 cm
0.5sinh^{-1}(H/2r)	0.38		0.38		0.38
-sqrt((r/H)^2+0.25)	-0.78		-0.78		-0.78
r/H	0.60		0.60		0.60
Sum	0.20		0.20		0.20
Sum*4.4*q	401.21		588.60		692.80
2*pi*H^2	628.32		628.32		628.32
Ksat (cm/min)	0.6		0.9		1.1
Ksat (m/day)	9.20		13.49		15.88

Average (m/day) 11.3

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 11
Soil Descrip	Fine to medium grey sand
Location	391956 mE
	6446486 mN

TEST 1

r	4.5	cm
H	10.0	cm
time step	5	secs
H/r	2.22	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	4.5	
5	26.0	21.5
10	50.4	24.4
15	64.0	13.6
		19.8
q (cm^3/s)		34.9

TEST 2

r	4.5	cm
H	10.0	cm
time step	5	secs
H/r	2.22	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	13.0	
5	41.1	28.1
10	52.3	11.2
	Avg Diff (cm)	19.7
	q (cm^3/s)	34.6

TEST 3

r	4.5	cm
H	10.0	cm
time step	5	secs
H/r	2.22	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	5.5	
5	28.0	22.5
10	52.2	24.2
15	74.8	22.6
	Avg Diff (cm)	23.1
	q (cm^3/s)	40.7

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0464	Ks (cm/s)	0.0460	Ks (cm/s)	0.0540
Ks (m/day)	40.09	Ks (m/day)	39.72	Ks (m/day)	46.70

Average (m/day) 42.2

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	2094.4		2075.0	cm3/min	2439.4	cm3/min
r (cm)	4.5		4.5	cm	4.5	cm
H (cm)	10.0		10.0	cm	10.0	cm
0.5sinh^{-1}(H/2r)	0.48		0.48		0.48	
-sqrt((r/H)^2+0.25)	-0.67		-0.67		-0.67	
r/H	0.45		0.45		0.45	
Sum	0.26		0.26		0.26	
Sum*4.4*q	2361.15		2339.32		2750.05	
2*pi*H^2	628.32		628.32		628.32	
Ksat (cm/min)	3.8		3.7		4.4	
Ksat (m/day)	54.11		53.61		63.03	

Average (m/day) 53.9

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 12
Soil Descrip	Fine to medium brown grey sand
Location	391933 mE
	6446563 mN

TEST 1

r	5.5	cm
H	10.0	cm
time step	5	secs
H/r	1.82	
C	0.83	

Time (sec)	Level (cm)	Diff (cm)
0	4.5	
5	28.5	24.0
10	47.3	18.8
15	68.4	21.1
		21.3
q (cm^3/s)		37.5

TEST 2

r	5.5	cm
H	10.0	cm
time step	5	secs
H/r	1.82	
C	0.83	

Time (sec)	Level (cm)	Diff (cm)
0	3.6	
5	27.7	24.1
10	46.8	19.1
15	75.0	28.2
	Avg Diff (cm)	23.8
	q (cm^3/s)	41.9

TEST 3

r	5.5	cm
H	10.0	cm
time step	5	secs
H/r	1.82	
C	0.83	

Time (sec)	Level (cm)	Diff (cm)
0	4.2	
5	37.5	33.3
10	52.8	15.3
15	75.0	22.2
	Avg Diff (cm)	23.6
	q (cm^3/s)	41.5

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0441	Ks (cm/s)	0.0492	Ks (cm/s)	0.0488
Ks (m/day)	38.08	Ks (m/day)	42.55	Ks (m/day)	42.19

Average (m/day) 40.9

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	2249.3		2513.3	cm3/min	2492.2	cm3/min
r (cm)	5.5		5.5	cm	5.5	cm
H (cm)	10.0		10.0	cm	10.0	cm
0.5sinh^{-1}(H/2r)	0.41		0.41		0.41	
-sqrt((r/H)^2+0.25)	-0.74		-0.74		-0.74	
r/H	0.55		0.55		0.55	
Sum	0.21		0.21		0.21	
Sum*4.4*q	2122.88		2372.04		2352.11	
2*pi*H^2	628.32		628.32		628.32	
Ksat (cm/min)	3.4		3.8		3.7	
Ksat (m/day)	48.65		54.36		53.91	

Average (m/day) 51.5

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 13
Soil Descrip	Fine to medium sand. Grey to white.
Location	391992 mE
	6446852 mN

TEST 1

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	9.0	
5	76.0	67.0
		67.0
	q (cm³/s)	117.9

TEST 2

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	3.2	
5	76.0	72.8
	Avg Diff (cm)	72.8
	q (cm³/s)	128.1

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm³/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.1537	Ks (cm/s)	0.1670	Ks (cm/s)	
Ks (m/day)	132.81	Ks (m/day)	144.31	Ks (m/day)	
Average (m/day)	138.6				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	7075.2		7687.7 cm3/min		cm3/min
r (cm)	5		5.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.44		0.44		
-sqrt((r/H)^2+0.25)	-0.71		-0.71		
r/H	0.50		0.50		
Sum	0.23		0.23		
Sum*4.4*q	7271.55		7901.03		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	11.6		12.6		
Ksat (m/day)	166.65		181.08		
Average (m/day)	173.9				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 14
Soil Descrip	Grey to yellow, fine to medium grain sand
Location	391620 mE
	6448394 mN

TEST 1

r	4.0	cm
H	10.0	cm
time step	5	secs
H/r	2.50	
C	1.06	

Time (sec)	Level (cm)	Diff (cm)
0	4.5	
5	17.0	12.5
10	25.8	8.8
15	37.0	11.2
20	50.5	13.5
25	57.0	6.5
30	73.4	16.4
35	76.0	2.6
		10.2
	q (cm³/s)	18.0

TEST 2

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	4.1	
5	18.6	14.5
10	31.3	12.7
15	41.5	10.2
20	54.0	12.5
25	72.5	18.5
30	76.0	3.5
	Avg Diff (cm)	12.0
	q (cm³/s)	21.1

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm³/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0280	Ks (cm/s)	0.0275	Ks (cm/s)	
Ks (m/day)	24.22	Ks (m/day)	23.75	Ks (m/day)	
Average (m/day)	24.0				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	1078.6		1265.4 cm3/min		cm3/min
r (cm)	4		5.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.52		0.44		
-sqrt((r/H)^2+0.25)	-0.64		-0.71		
r/H	0.40		0.50		
Sum	0.28		0.23		
Sum*4.4*q	1345.41		1300.56		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	2.1		2.1		
Ksat (m/day)	30.83		29.81		
Average (m/day)	30.3				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 15
Soil Descrip	Fine to medium sand. Grey to dark grey.
Location	391795 mE
	6447827 mN

TEST 1

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	3.0	
5	41.0	38.0
10	47.0	6.0
15	65.0	18.0
20	76.0	11.0
		18.3
	q (cm^3/s)	32.1

TEST 2

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	3.2	
5	34.0	30.8
10	53.0	19.0
15	70.0	17.0
20	76.0	6.0
	Avg Diff (cm)	18.2
	q (cm^3/s)	32.0

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm^3/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0419	Ks (cm/s)	0.0418	Ks (cm/s)	
Ks (m/day)	36.18	Ks (m/day)	36.08	Ks (m/day)	
Average (m/day)	36.1				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	1927.2		1921.9 cm3/min		cm3/min
r (cm)	5		5.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.44		0.44		
-sqrt((r/H)^2+0.25)	-0.71		-0.71		
r/H	0.50		0.50		
Sum	0.23		0.23		
Sum*4.4*q	1980.68		1975.26		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	3.2		3.1		
Ksat (m/day)	45.39		45.27		
Average (m/day)	45.3				

Borehole Permeameter : Field Result Analysis

Project/Site	Glen Iris Test Site 16
Soil Descrip	Fine to medium sand. Grey to dark grey.
Location	392078 mE
	6446319 mN

TEST 1

r	4.0	cm
H	10.0	cm
time step	5	secs
H/r	2.50	
C	1.06	

Time (sec)	Level (cm)	Diff (cm)
0	9.2	
5	20.1	10.9
10	28.4	8.3
15	36.5	8.1
20	45.4	8.9
25	45.4	0.0
30	53.0	7.6
35	60.0	7.0
40	64.0	4.0
45	67.0	3.0
		6.4
	q (cm^3/s)	11.3

TEST 2

r	5.0	cm
H	10.0	cm
time step	5	secs
H/r	2.00	
C	0.91	

Time (sec)	Level (cm)	Diff (cm)
0	7.0	
5	18.0	11.0
10	27.2	9.2
15	34.4	7.2
20	40.0	5.6
25	48.0	8.0
30	58.4	10.4
35	66.5	8.1
40	75.0	8.5
45	76.0	1.0
	Avg Diff (cm)	7.7
	q (cm^3/s)	13.5

TEST 3

r		cm
H		cm
time step		secs
H/r		
C		

Time (sec)	Level (cm)	Diff (cm)
	Avg Diff (cm)	
	q (cm^3/s)	

METHOD 1 : Elrick and Reynolds (1992)

Ks (cm/s)	0.0176	Ks (cm/s)	0.0176	Ks (cm/s)	
Ks (m/day)	15.23	Ks (m/day)	15.20	Ks (m/day)	
Average (m/day)	15.2				

METHOD 2 : Talsma and Hallam Method (for low Ks only <2.9)

q (cm3/min)	678.2		809.6 cm3/min		cm3/min
r (cm)	4		5.0 cm		cm
H (cm)	10.0		10.0 cm		cm
0.5sinh^{-1}(H/2r)	0.52		0.44		
-sqrt((r/H)^2+0.25)	-0.64		-0.71		
r/H	0.40		0.50		
Sum	0.28		0.23		
Sum*4.4*q	845.92		832.07		
2*pi*H^2	628.32		628.32		
Ksat (cm/min)	1.3		1.3		
Ksat (m/day)	19.39		19.07		
Average (m/day)	19.2				

APPENDIX D
Existing Stormwater System Plates

PLATES

PLATE 1:

PLATE 2:

PLATE 3:

PLATE 4:

PLATE 5:

PLATE 6:

SW1

SW2

SW3

SW8

PLATE 7-10: Various Existing Stormwater Outlets

SW10

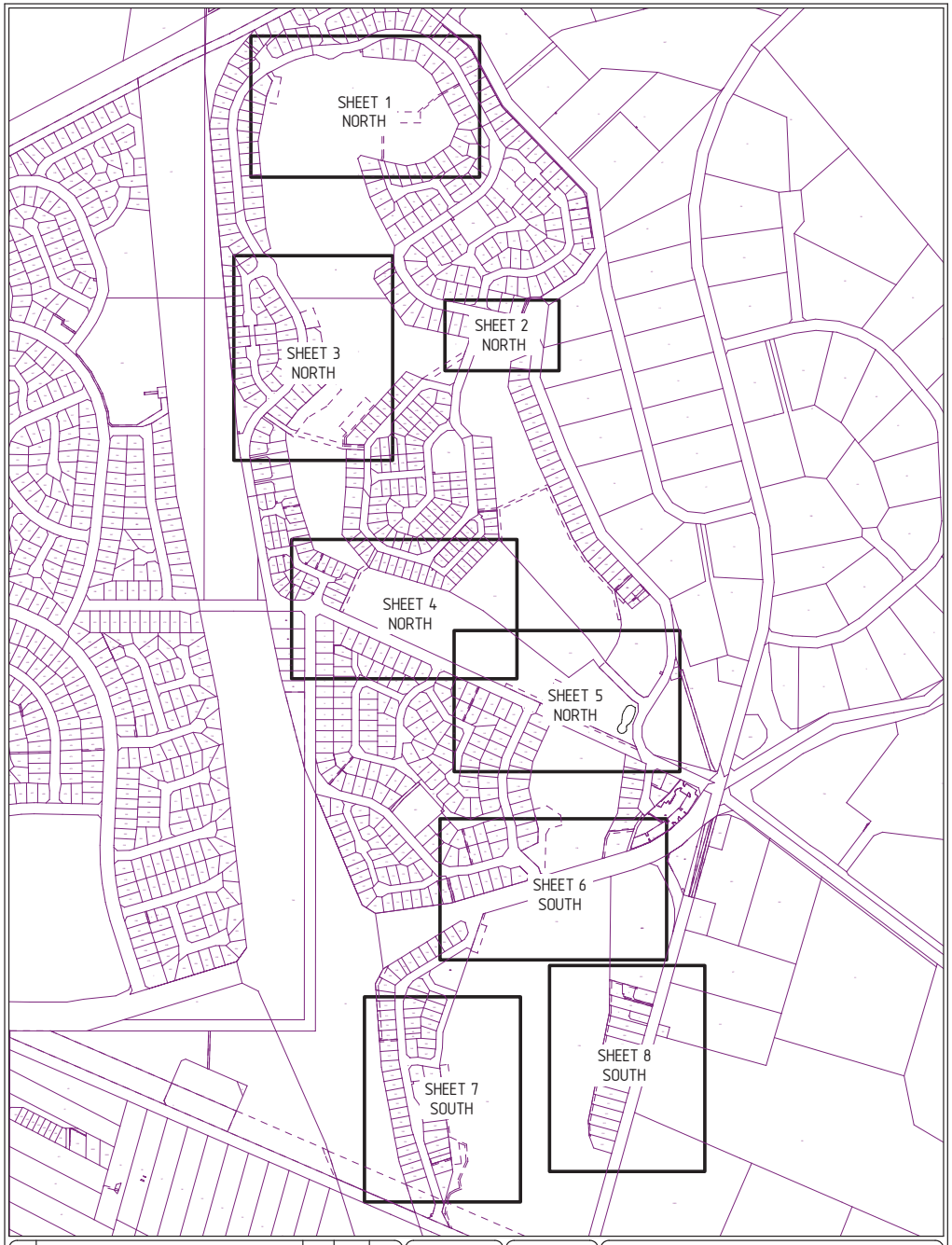
SW11

SW13

SW15

PLATE 11-14: Various Existing Stormwater Outlets

APPENDIX E
Survey of Existing Stormwater Storages & Outlets



Rev.	Description	Drawn	Date	Checked
A	Initial Issue	TM	16/2/2021	KEN

Surveyor: TM
Survey Date: 15/1/2021
Precal/Cad: LANDGATE SCDB

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DRAINAGE INVESTIGATION
GLEN IRIS GOLF COURSE
INDEX SHEET

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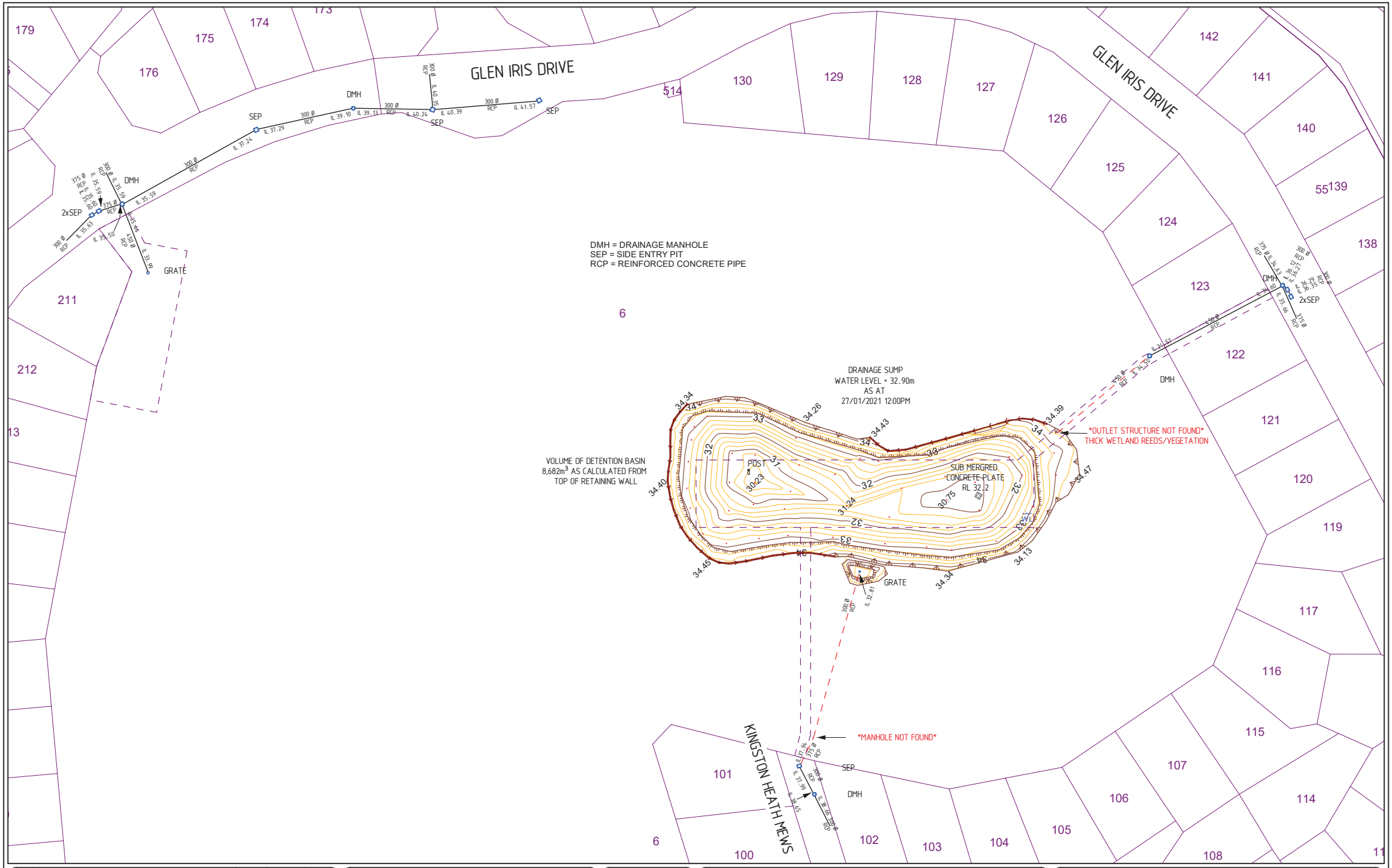
Project Mngr	KEN SELLERS	Datum	PCGDA / AHD

102160 - AS - 015 - A
Job Number | Type | Plan Number | Revision



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DRAINAGE INVESTIGATION
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NORTH - SHEET 1

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Project Mngr:	KEN SELLERS	Datum	PCG94 / AHD

102160 - AS - 015 - A
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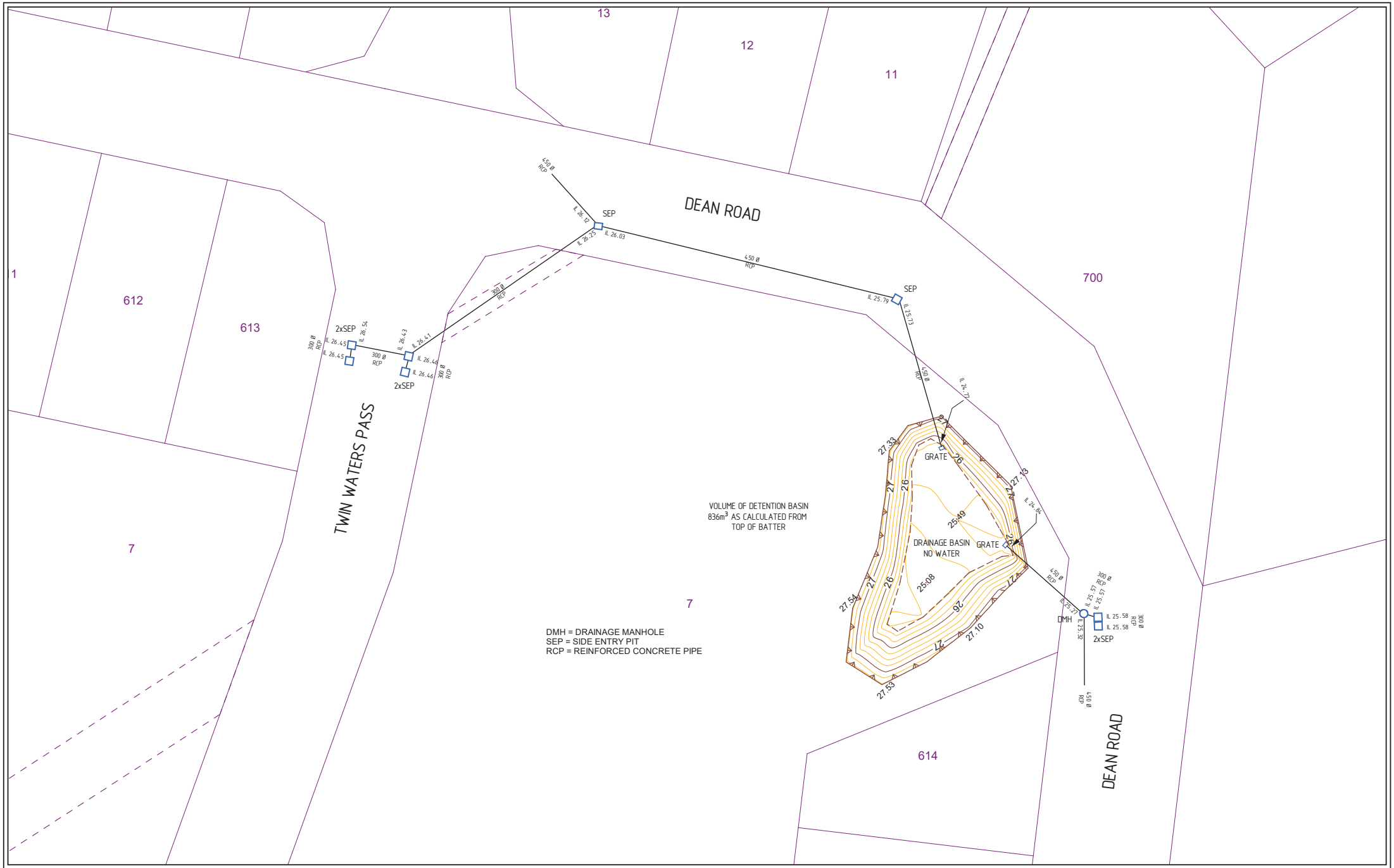

A	Initial Issue	TM	15/2/2021	KEN
Rev	Description	Drawn	Date	Checked

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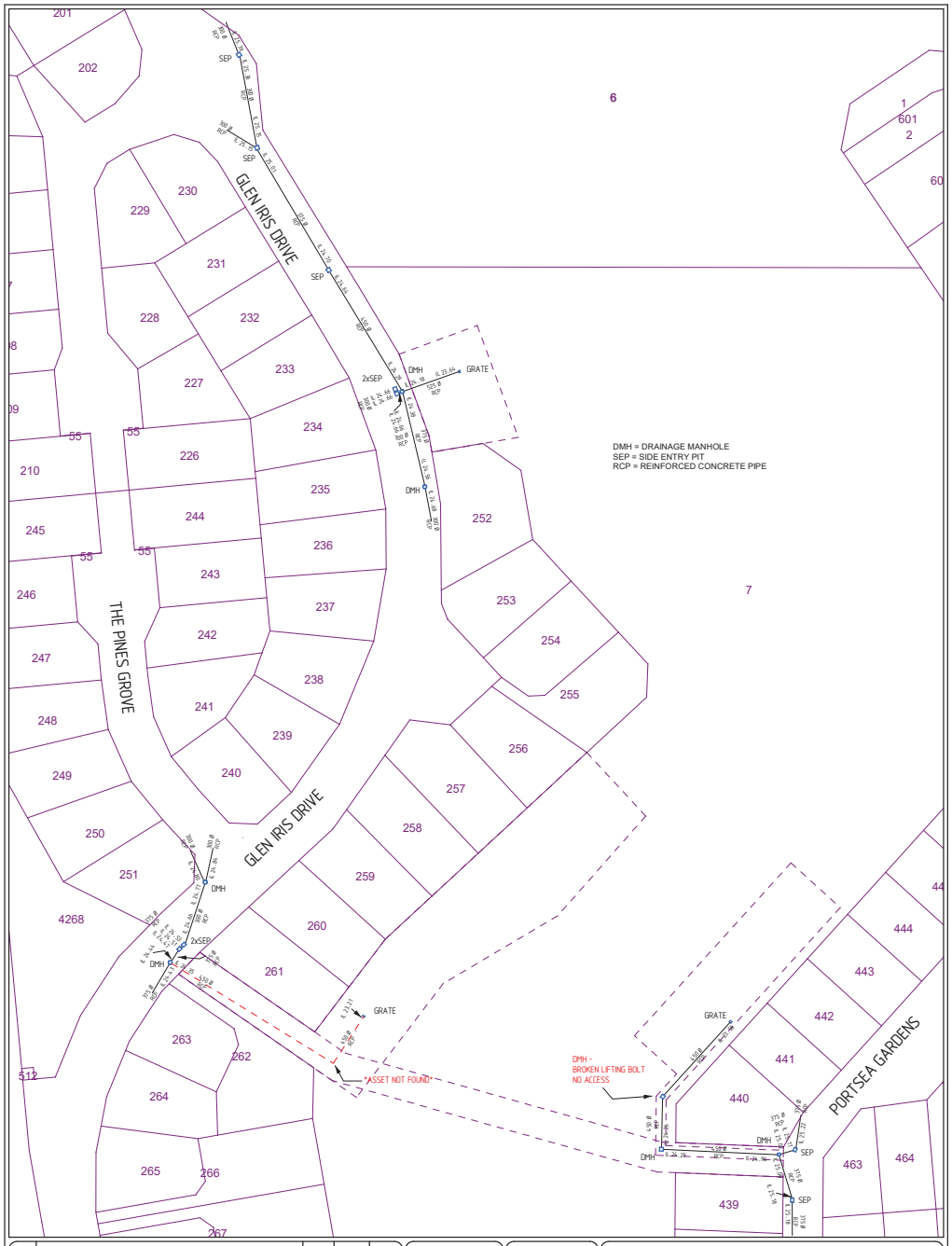

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GLEN IRIS GOLF COURSE
NORTH - SHEET 3

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Rev.	Description	Drawn	Date	Checked
A	Initial Issue	TM	16/2/2021	KEN

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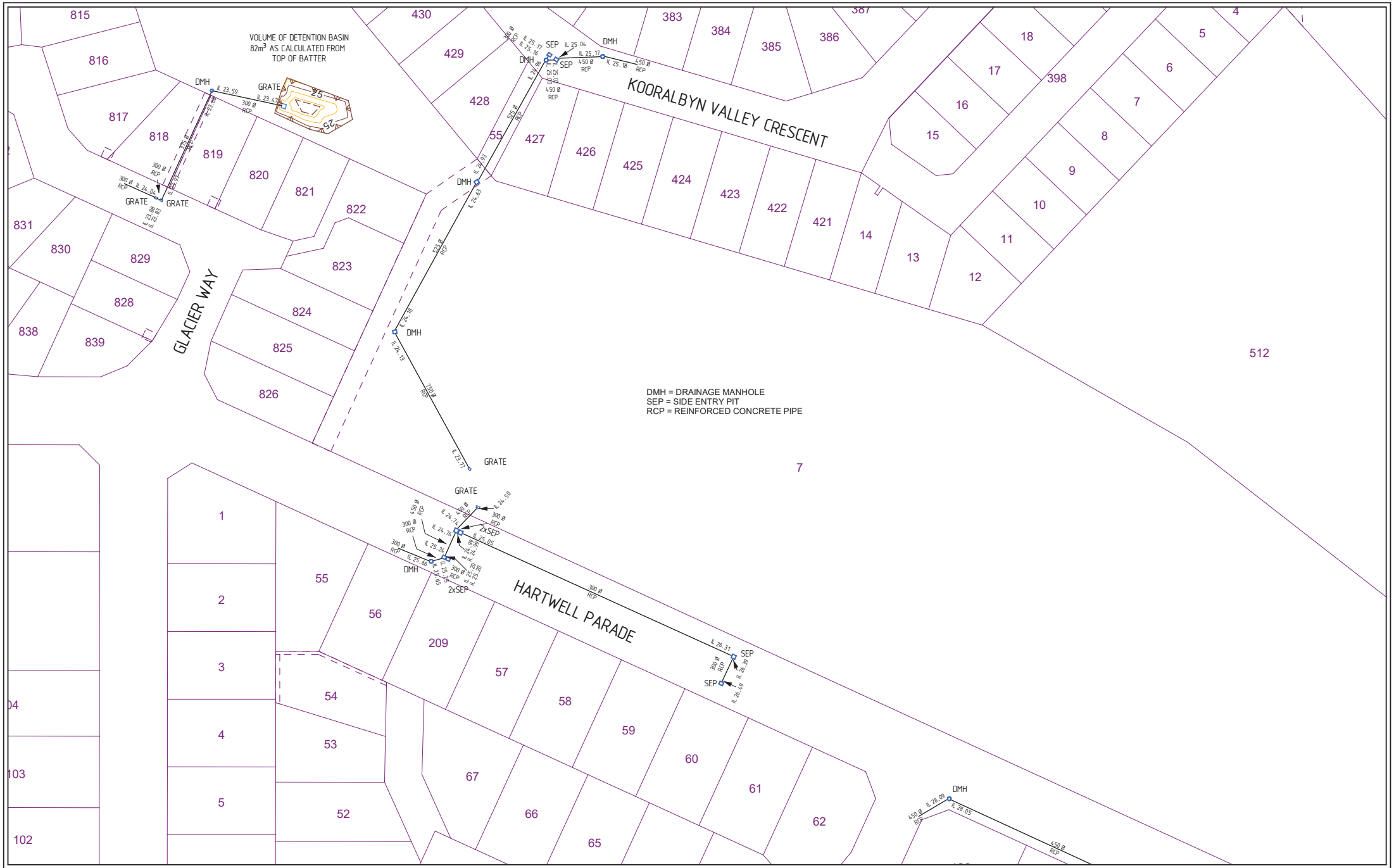
Job Number	Type	Plan Number	Revision
102160	AS - 015	A	



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GLEN IRIS GOLF COURSE
NORTH - SHEET 4

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Survey Date:- 11/1/2021
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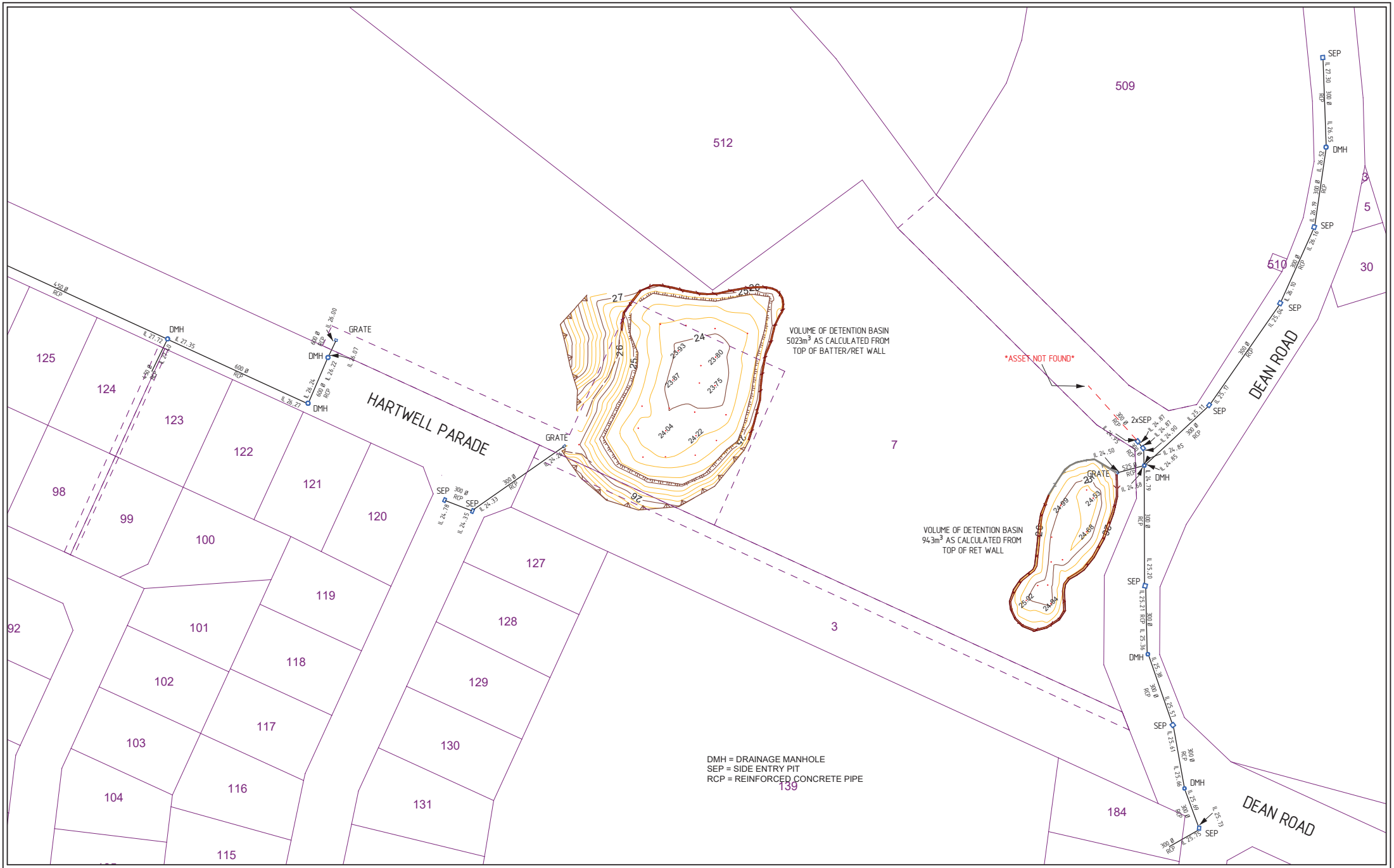
102160	- AS -	015	- A
Job Number	Type	Plan Number	Revision



A	Initial Issue	TM	15/2/2021	KEN
		Drawn	Date	Checked

SCALE 1:1000 @ A3

0 10 20 30 40 50

ALL DISTANCES ARE IN METRES

For a true to scale reproduction of this plan, plot it to A3 with the Paging Scaling set to None.

The contents of this plan are current and correct as of the date stated within the revision panel. All consultants and persons wishing to utilise this data should satisfy themselves of this plans currency by contacting the McMullen Nolan Group.

Surveyor:- TM
Survey Date:- 11/1/2021
Precal/Cad:- LANDGATE SCDB

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The boundaries shown on this plan were not re-established as part of this survey, therefore this plan does not guarantee their accuracy. Existing easements, encumbrance or interest are not depicted and a title search is recommended to obtain this information. Re-establishment of the cadastral boundaries is recommended for any proposed works on or near existing boundaries.

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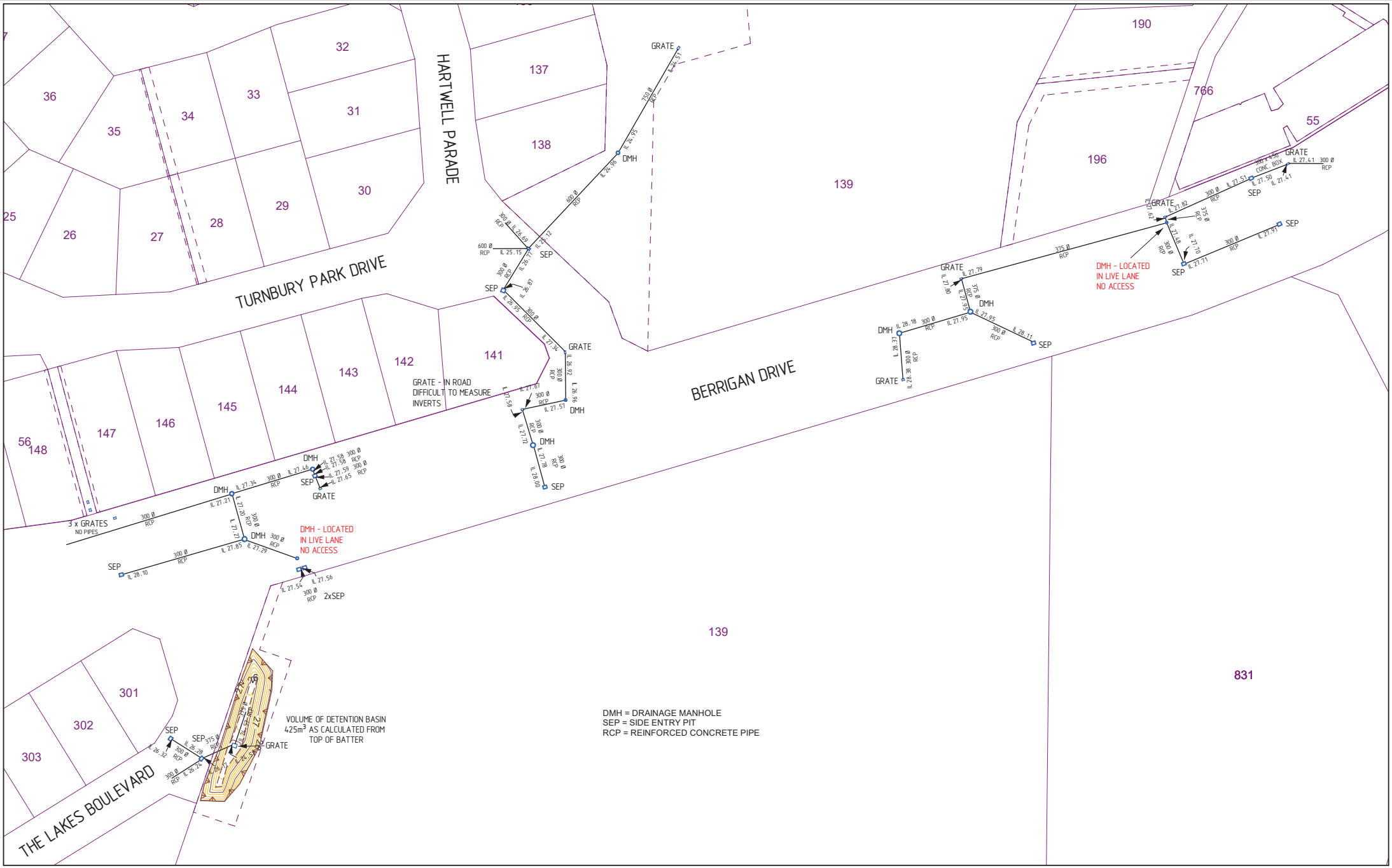
DRAINAGE INVESTIGATION
GLEN IRIS GOLF COURSE
NORTH - SHEET 5

CLIENT:
ACUMEN DEVELOPMENT SOLUTIONS

Project Mngr	KEN SELLERS	Datum	PCG94 / AHD

Job Number	Type	Plan Number	Revision
102160	AS	015	A



A	Initial Issue	TM	15/2/2021	KEN
		Drawn	Date	Checked

SCALE 1:1000 @ A3

0 10 20 30 40 50

ALL DISTANCES ARE IN METRES

For a true to scale reproduction of this plan, plot it to A3 with the Paging Scaling set to None.

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Surveyor:- TM
Survey Date:- 11/1/2021
Precal/Cad:- LANDGATE SCDB

N

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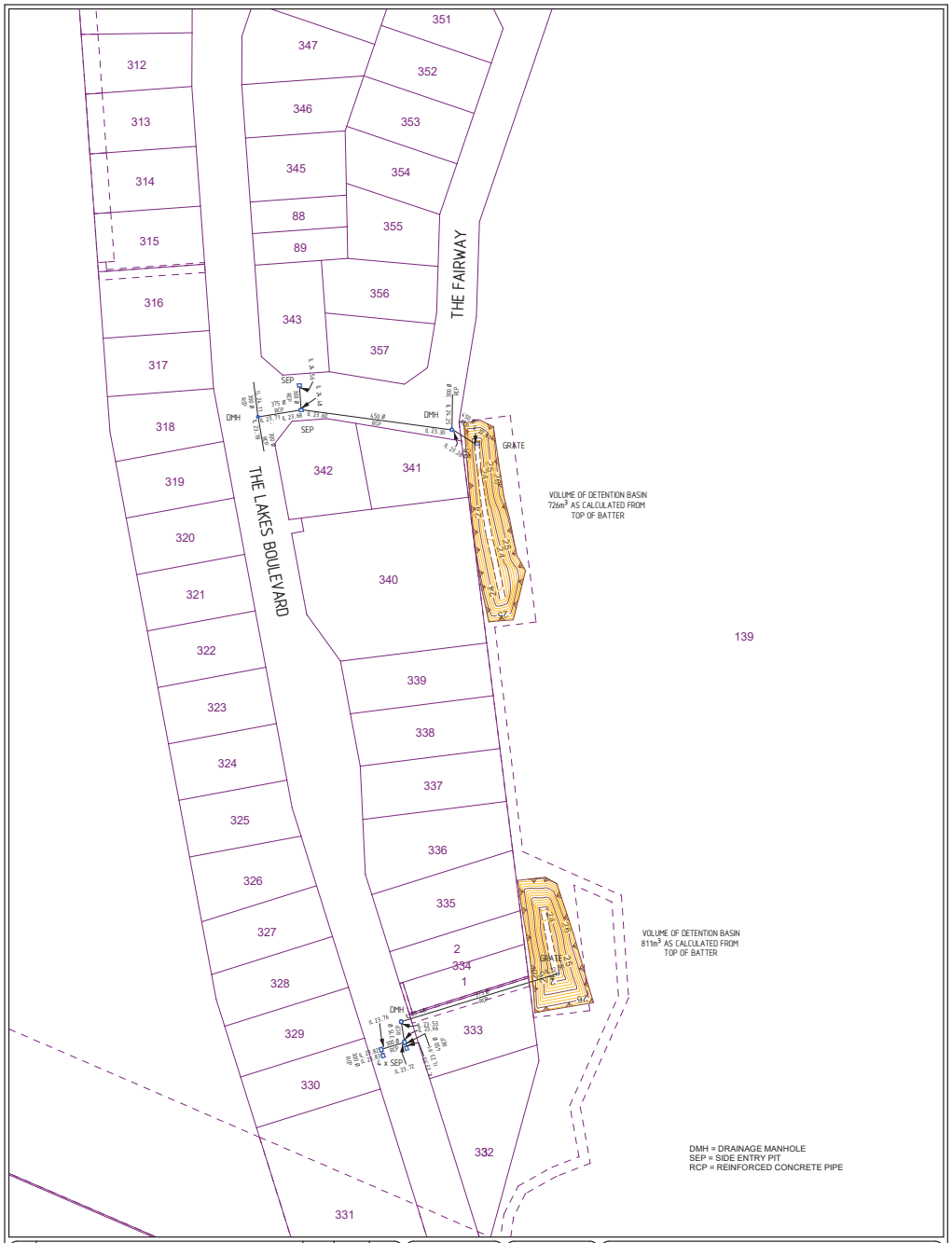
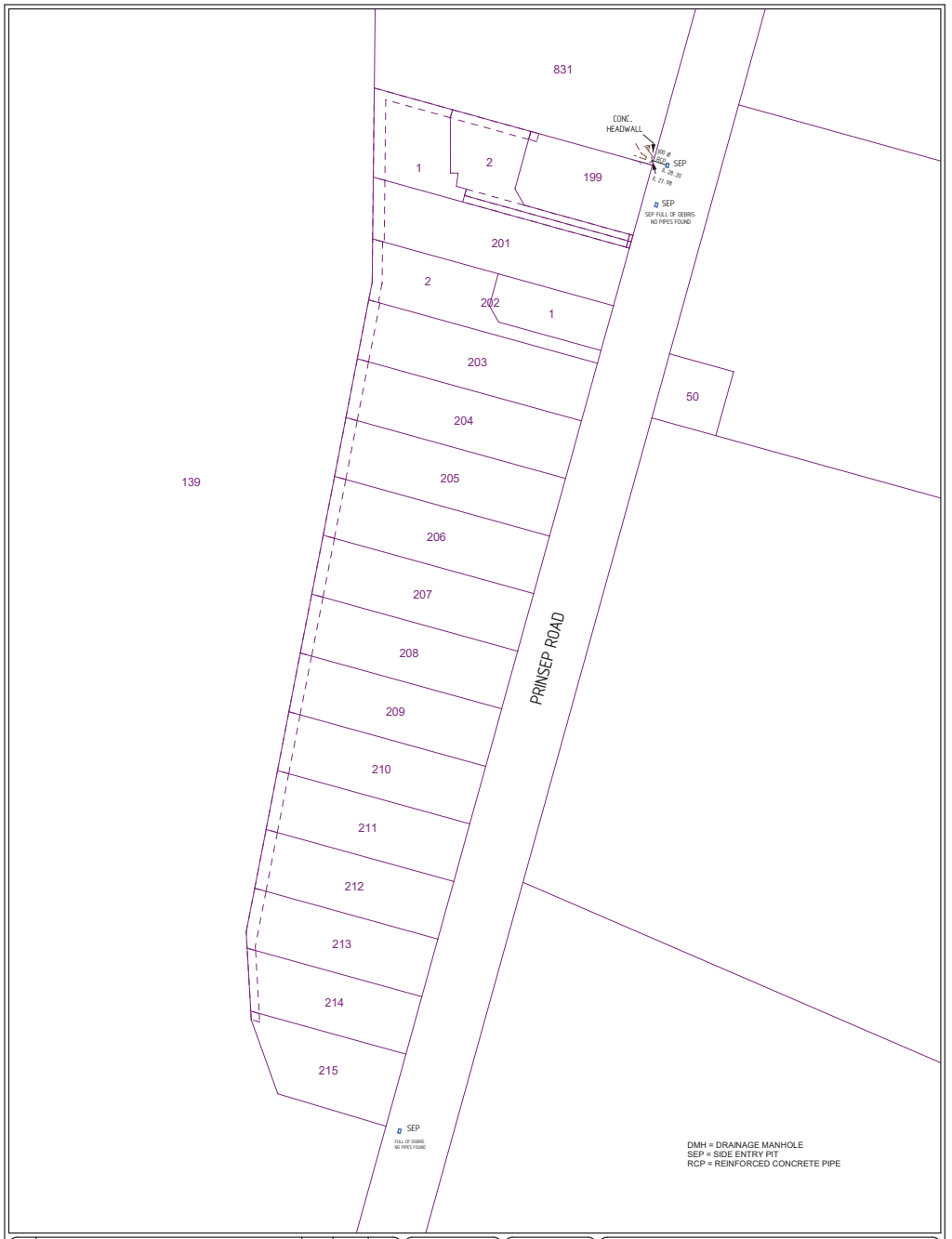
DRAINAGE INVESTIGATION
GLEN IRIS GOLF COURSE
SOUTH - SHEET 6

CLIENT:
ACUMEN DEVELOPMENT SOLUTIONS

Project Mngr	KEN SELLERS	Datum	PCG94 / AHD

Job Number	Type	Plan Number	Revision
102160	AS	015	A





DRAINAGE INVESTIGATION
GLEN IRIS GOLF COURSE
SOUTH - SHEET 7

CLIENT: ACUMEN DEVELOPMENT SOLUTIONS

SCALE 1:1000 @ A3
ALL DISTANCES ARE IN METRES

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DRAINAGE INVESTIGATION
GLEN IRIS GOLF COURSE
SOUTH - SHEET 8

CLIENT: ACUMEN DEVELOPMENT SOLUTIONS

SCALE 1:1000 @ A3
ALL DISTANCES ARE IN METRES

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APPENDIX F
Predevelopment Site Monitoring Data

Date: 16/09/2021 Job No. H20002

A Stormwater Monitoring Sites
A Site Groundwater Bores
Site Boundary

0 100 200 300 400 Meters

hyd2o
Glen Iris Jandakot Local Water Management Strategy
Site Monitoring Locations
Appendix F1

Date: 16/09/2021 Job No. H20002

Site Boundary
A Stormwater Monitoring Sites
A Site Groundwater Bores
A DWER Groundwater Bores

0 150 300 450 600 Meters

hyd2o
Glen Iris Jandakot Local Water Management Strategy
DWER Groundwater Monitoring Bore Locations
Appendix F2

H20002 Glen Iris GC

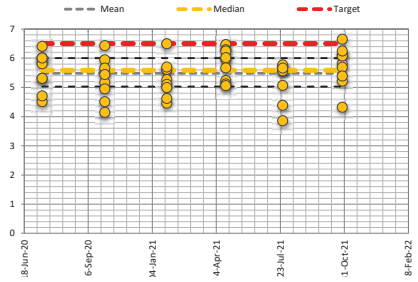
Aggregated Data for All Sites
Groundwater

Data Analysis Period Start Date: 1/06/2020
Data Analysis Period End Date: 31/12/2021

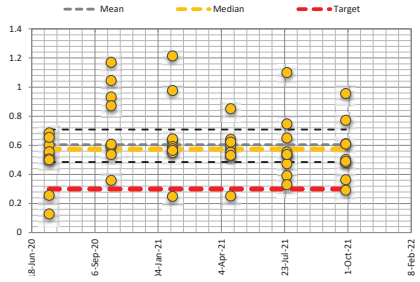
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	227	2.44	3.74	5.89	**5.36**	8.16	13.39		0
GWL mAHD	Groundwater Level mAHD	mAHD	227	21.29	22.26	22.90	**22.82**	23.64	24.93		0
T	Temperature	°C	54	17.00	18.90	20.63	**20.45**	22.40	26.00		0
EC	Electrical Conductivity	mS/cm	54	0.13	0.48	0.603	**0.57**	0.71	1.21	0.30	49
pH	pH	pH	54	3.85	5.03	5.48	**5.58**	6.00	6.64	6.50	1
DO%	Dissolved Oxygen	%	53	10.50	22.93	31.56	**31.00**	35.78	72.80		0
TN	Total Nitrogen	mg/L	54	0.30	0.80	1.83	**1.35**	2.20	13.00	1.20	32
TKN	Total Kej Nitrogen	mg/L	54	0.10	0.40	0.84	**0.80**	1.30	1.70		0
NH3-N	Ammonia as N	mg/L	54	0.01	0.01	0.19	**0.12**	0.33	0.69	1.90	0
NO_3-N	Nitrate as N	mg/L	54	0.01	0.01	0.97	**0.13**	1.84	11.00	0.70	19
NO2-N	Nitrite as N	mg/L	54	0.01	0.01	0.02	**0.01**	0.01	0.43		0
TP	Total Phosphorous	mg/L	54	0.05	0.05	0.05	**0.05**	0.05	0.15	0.07	1
PO4-	Phosphate as P	mg/L	54	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	54	0.00100	0.00100	0.00180	**0.00100**	0.00100	0.01000	0.02400	0
Cd	Cadmium	mg/L	54	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	54	0.00100	0.00100	0.00109	**0.00100**	0.00100	0.00200	0.00100	5
Cu	Copper	mg/L	54	0.00100	0.00100	0.00613	**0.00100**	0.00100	0.10000	0.00140	9
Pb	Lead	mg/L	54	0.00100	0.00100	0.00124	**0.00100**	0.00100	0.00400	0.00340	1
Hg	Mercury	mg/L	54	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	54	0.00100	0.00100	0.00170	**0.00100**	0.00100	0.01100	0.01100	0
Zn	Zinc	mg/L	54	0.00100	0.00100	0.00983	**0.00150**	0.00880	0.08900	0.00800	11
Nox	Nox	mg/L	54	0.01	0.01	0.98	**0.13**	1.84	11.00	0.15000	27

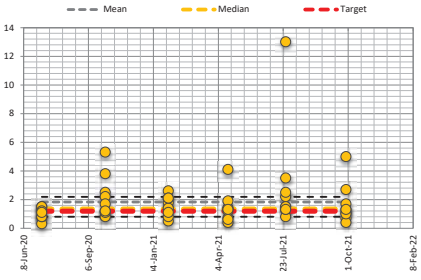
pH



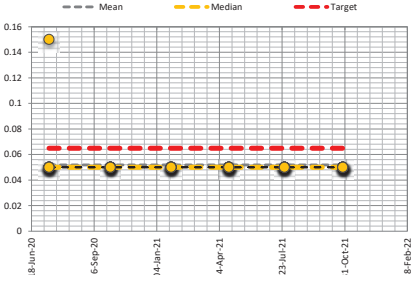
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

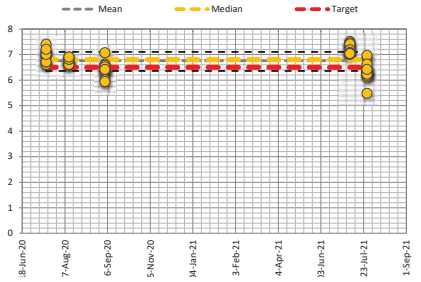
Aggregated Data for All Sites
Surface Water

Data Analysis Period Start Date: 1/06/2020
Data Analysis Period End Date: 31/12/2021

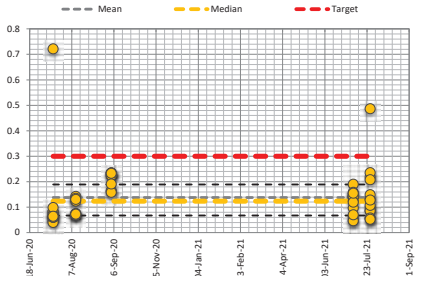
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	60	11.40	14.48	15.66	**15.40**	16.82	23.50		0
EC	Electrical Conductivity	mS/cm	60	0.04	0.07	0.138	**0.12**	0.19	0.72	0.30	2
pH	pH	pH	60	5.47	6.36	6.76	**6.80**	7.10	7.51	6.50	43
DO%	Dissolved Oxygen	%	60	6.20	35.54	55.91	**64.55**	72.44	82.60		0
TN	Total Nitrogen	mg/L	60	0.10	0.20	0.37	**0.30**	0.50	1.90	1.20	3
TKN	Total Kej Nitrogen	mg/L	60	0.01	0.20	0.35	**0.20**	0.40	1.90		0
NH3-N	Ammonia as N	mg/L	60	0.01	0.01	0.03	**0.01**	0.03	0.26	1.90	0
NO_3-N	Nitrate as N	mg/L	60	0.01	0.01	0.03	**0.02**	0.05	0.12	0.70	0
NO2-N	Nitrite as N	mg/L	60	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	60	0.05	0.05	0.09	**0.05**	0.09	0.50	0.07	15
PO4-	Phosphate as P	mg/L	60	0.00	0.01	0.02	**0.01**	0.02	0.19	0.04	6
As	Arsenic	mg/L	60	0.00100	0.00100	0.00102	**0.00100**	0.00100	0.00200	0.02400	0
Cd	Cadmium	mg/L	60	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	60	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	60	0.00100	0.00100	0.00307	**0.00100**	0.00200	0.10000	0.00140	17
Pb	Lead	mg/L	60	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	60	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	60	0.00100	0.00100	0.00108	**0.00100**	0.00100	0.00600	0.01100	0
Zn	Zinc	mg/L	60	0.00200	0.00700	0.03260	**0.01300**	0.04440	0.30000	0.00800	41
Nox	Nox	mg/L	60	0.01	0.01	0.03	**0.02**	0.05	0.12	0.15000	0

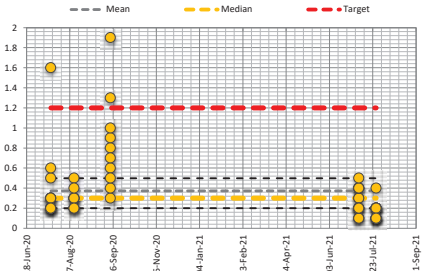
pH



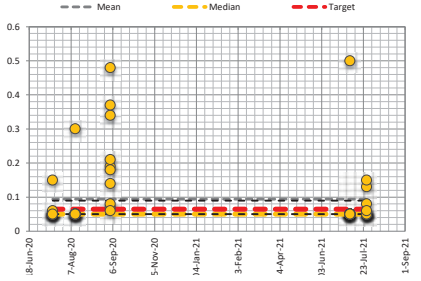
Electrical Conductivity



Total Nitrogen



Total Phosphorous



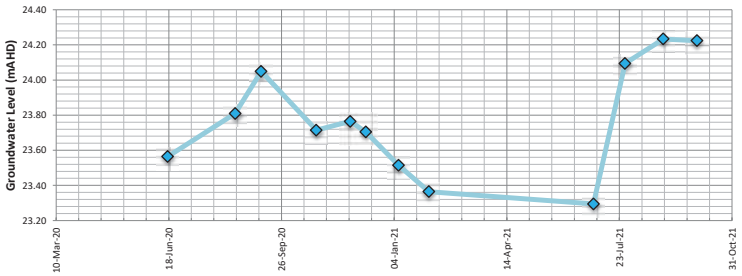
FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

J310 DWER Bore 1

Data Analysis Period Start Date	1/06/2020	Easting	396862	Natural Surface (mAHD)	
Data Analysis Period End Date	31/12/2021	Northing	6442071	Top of Casing (m AHD)	26.69
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	3.13	23.56	
16/08/2020	2.89	23.81	
8/09/2020	2.65	24.05	
27/10/2020	2.98	23.71	
26/11/2020	2.93	23.76	
10/12/2020	2.99	23.70	
8/01/2021	3.18	23.51	
4/02/2021	3.33	23.36	
30/06/2021	3.40	23.29	
28/07/2021	2.60	24.09	
31/08/2021	2.46	24.23	
30/09/2021	2.47	24.22	

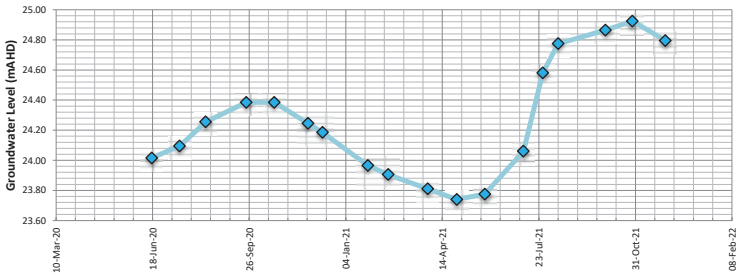
Minimum Recorded Level (mAHD)	23.29
Maximum Recorded Level (mAHD)	24.23

H20002 Glen Iris GC

JM45A DWER Bore 2

Data Analysis Period Start Date	1/06/2020	Easting	393033	Natural Surface (mAHD)	27.50
Data Analysis Period End Date	31/12/2021	Northing	6447505	Top of Casing (m AHD)	27.93
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	3.91	24.02	3.48
16/07/2020	3.83	24.10	3.40
12/08/2020	3.67	24.26	3.24
23/09/2020	3.54	24.39	3.11
22/10/2020	3.54	24.39	3.11
26/11/2020	3.68	24.25	3.25
11/12/2020	3.74	24.19	3.31
27/01/2021	3.96	23.97	3.53
17/02/2021	4.02	23.91	3.59
30/03/2021	4.12	23.81	3.69
29/04/2021	4.19	23.74	3.76
28/05/2021	4.15	23.78	3.72
7/07/2021	3.87	24.06	3.44
27/07/2021	3.35	24.58	2.92
12/08/2021	3.15	24.78	2.72
30/09/2021	3.06	24.87	2.63
28/10/2021	3.00	24.93	2.57
1/12/2021	3.13	24.80	2.70

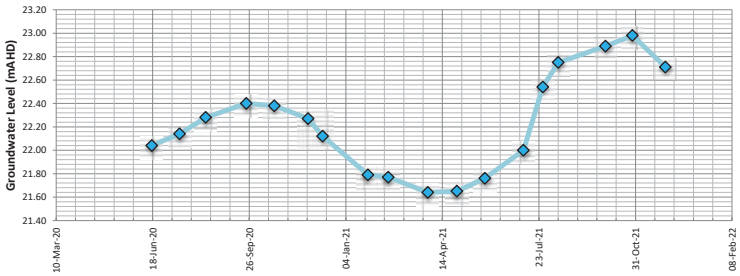
Minimum Recorded Level (mAHD)	23.74
Maximum Recorded Level (mAHD)	24.93

H20002 Glen Iris GC

JM2 DWER Bore 3

Data Analysis Period Start Date	1/06/2020	Easting	393255	Natural Surface (mAHD)	27.79
Data Analysis Period End Date	31/12/2021	Northing	6449864	Top of Casing (m AHD)	28.23
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	6.19	22.04	5.75
16/07/2020	6.09	22.14	5.65
12/08/2020	5.95	22.28	5.51
23/09/2020	5.83	22.40	5.39
22/10/2020	5.85	22.38	5.41
26/11/2020	5.96	22.27	5.52
11/12/2020	6.11	22.12	5.67
27/01/2021	6.44	21.79	6.00
17/02/2021	6.46	21.77	6.02
30/03/2021	6.59	21.64	6.15
29/04/2021	6.58	21.65	6.14
28/05/2021	6.47	21.76	6.03
7/07/2021	6.23	22.00	5.79
27/07/2021	5.69	22.54	5.25
12/08/2021	5.48	22.75	5.04
30/09/2021	5.34	22.89	4.90
28/10/2021	5.25	22.98	4.81
1/12/2021	5.52	22.71	5.08

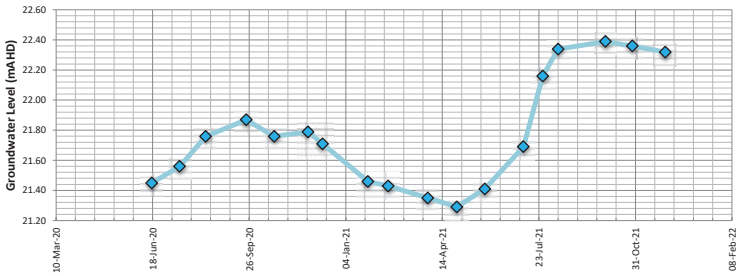
Minimum Recorded Level (mAHD)	21.64
Maximum Recorded Level (mAHD)	22.98

H20002 Glen Iris GC

JM12 DWER Bore 4

Data Analysis Period Start Date	1/06/2020	Easting	391437	Natural Surface (mAHD)	34.51
Data Analysis Period End Date	31/12/2021	Northing	6447453	Top of Casing (m AHD)	34.68
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	13.23	21.45	13.06
16/07/2020	13.12	21.56	12.95
12/08/2020	12.92	21.76	12.75
23/09/2020	12.81	21.87	12.64
22/10/2020	12.92	21.76	12.75
26/11/2020	12.89	21.79	12.72
11/12/2020	12.97	21.71	12.80
27/01/2021	13.22	21.46	13.05
17/02/2021	13.25	21.43	13.08
30/03/2021	13.33	21.35	13.16
29/04/2021	13.39	21.29	13.22
28/05/2021	13.27	21.41	13.10
7/07/2021	12.99	21.69	12.82
27/07/2021	12.52	22.16	12.35
12/08/2021	12.34	22.34	12.17
30/09/2021	12.29	22.39	12.12
28/10/2021	12.32	22.36	12.15
1/12/2021	12.36	22.32	12.19

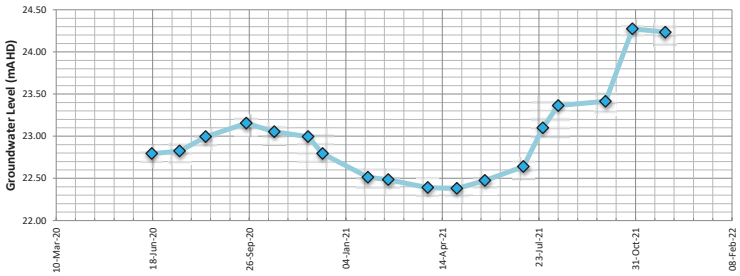
Minimum Recorded Level (mAHD)	21.29
Maximum Recorded Level (mAHD)	22.39

H20002 Glen Iris GC

MW1 Site Monitoring Bore 1

Data Analysis Period Start Date	1/06/2020	Easting	392219	Natural Surface (mAHD)	30.93
Data Analysis Period End Date	31/12/2021	Northing	6447400	Top of Casing (m AHD)	31.53
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	8.74	22.79	8.14
16/07/2020	8.71	22.82	8.11
12/08/2020	8.54	22.99	7.94
23/09/2020	8.38	23.15	7.78
22/10/2020	8.48	23.05	7.88
26/11/2020	8.54	22.99	7.94
11/12/2020	8.74	22.79	8.14
27/01/2021	9.02	22.51	8.42
17/02/2021	9.05	22.48	8.45
30/03/2021	9.14	22.39	8.54
29/04/2021	9.15	22.38	8.55
28/05/2021	9.06	22.47	8.46
7/07/2021	8.89	22.64	8.29
27/07/2021	8.43	23.10	7.83
12/08/2021	8.17	23.36	7.57
30/09/2021	8.12	23.41	7.52
28/10/2021	7.26	24.27	6.66
1/12/2021	7.30	24.23	6.70

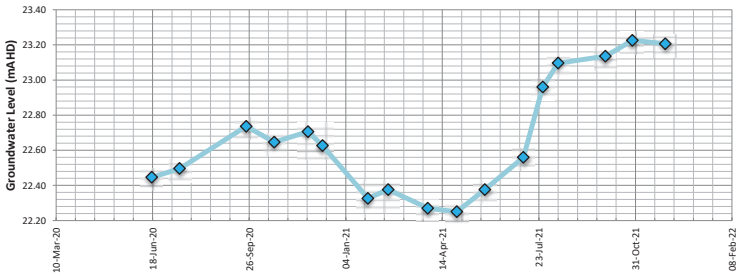
Minimum Recorded Level (mAHD)	22.38
Maximum Recorded Level (mAHD)	24.27

H20002 Glen Iris GC

MW2 Site Monitoring Bore 2

Data Analysis Period Start Date	1/06/2020	Easting	392008	Natural Surface (mAHD)	27.22
Data Analysis Period End Date	31/12/2021	Northing	6447916	Top of Casing (m AHD)	27.82
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	5.37	22.45	4.77
16/07/2020	5.32	22.50	4.72
23/09/2020	5.08	22.74	4.48
22/10/2020	5.17	22.65	4.57
26/11/2020	5.11	22.71	4.51
11/12/2020	5.19	22.63	4.59
27/01/2021	5.49	22.33	4.89
17/02/2021	5.44	22.38	4.84
30/03/2021	5.55	22.27	4.95
29/04/2021	5.57	22.25	4.97
28/05/2021	5.44	22.38	4.84
7/07/2021	5.26	22.56	4.66
27/07/2021	4.86	22.96	4.26
12/08/2021	4.72	23.10	4.12
30/09/2021	4.68	23.14	4.08
28/10/2021	4.59	23.23	3.99
1/12/2021	4.61	23.21	4.01

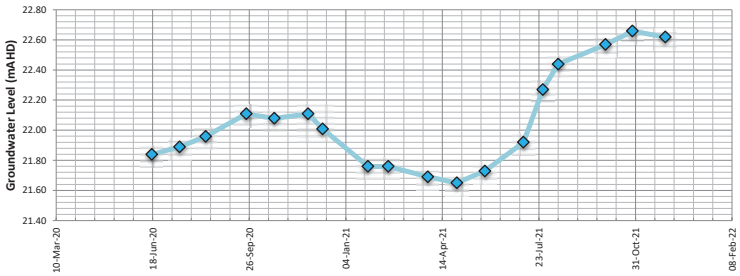
Minimum Recorded Level (mAHD)	22.25
Maximum Recorded Level (mAHD)	23.23

H20002 Glen Iris GC

MW3 Site Monitoring Bore 3

Data Analysis Period Start Date	1/06/2020	Easting	391661	Natural Surface (mAHD)	29.73
Data Analysis Period End Date	31/12/2021	Northing	6448084	Top of Casing (m AHD)	30.33
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	8.49	21.84	7.89
16/07/2020	8.44	21.89	7.84
12/08/2020	8.37	21.96	7.77
23/09/2020	8.22	22.11	7.62
22/10/2020	8.25	22.08	7.65
26/11/2020	8.22	22.11	7.62
11/12/2020	8.32	22.01	7.72
27/01/2021	8.57	21.76	7.97
17/02/2021	8.57	21.76	7.97
30/03/2021	8.64	21.69	8.04
29/04/2021	8.68	21.65	8.08
28/05/2021	8.60	21.73	8.00
7/07/2021	8.41	21.92	7.81
27/07/2021	8.06	22.27	7.46
12/08/2021	7.89	22.44	7.29
30/09/2021	7.76	22.57	7.16
28/10/2021	7.67	22.66	7.07
1/12/2021	7.71	22.62	7.11

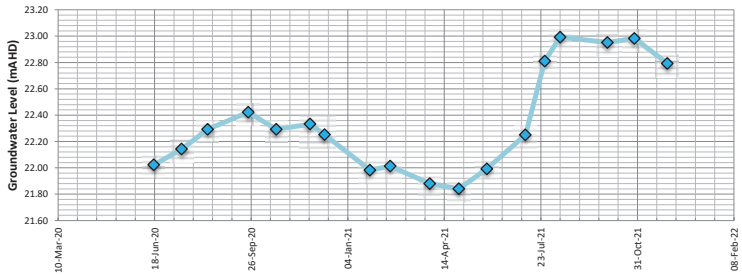
Minimum Recorded Level (mAHD)	21.65
Maximum Recorded Level (mAHD)	22.66

H20002 Glen Iris GC

MW4 Site Monitoring Bore 4

Data Analysis Period Start Date	1/06/2020	Easting	391708	Natural Surface (mAHD)	25.67
Data Analysis Period End Date	31/12/2021	Northing	6447579	Top of Casing (m AHD)	26.27
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	4.25	22.02	3.65
16/07/2020	4.13	22.14	3.53
12/08/2020	3.98	22.29	3.38
23/09/2020	3.85	22.42	3.25
22/10/2020	3.98	22.29	3.38
26/11/2020	3.94	22.33	3.34
11/12/2020	4.02	22.25	3.42
27/01/2021	4.29	21.98	3.69
17/02/2021	4.26	22.01	3.66
30/03/2021	4.39	21.88	3.79
29/04/2021	4.43	21.84	3.83
28/05/2021	4.28	21.99	3.68
7/07/2021	4.02	22.25	3.42
27/07/2021	3.46	22.81	2.86
12/08/2021	3.28	22.99	2.68
30/09/2021	3.32	22.95	2.72
28/10/2021	3.29	22.98	2.69
1/12/2021	3.48	22.79	2.88

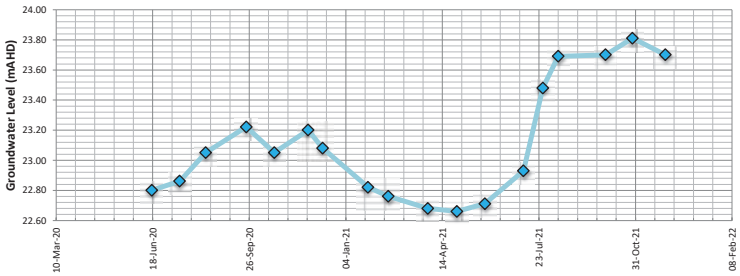
Minimum Recorded Level (mAHD)	21.84
Maximum Recorded Level (mAHD)	22.99

H20002 Glen Iris GC

MW5 Site Monitoring Bore 5

Data Analysis Period Start Date	1/06/2020	Easting	392170	Natural Surface (mAHD)	26.84
Data Analysis Period End Date	31/12/2021	Northing	6447202	Top of Casing (m AHD)	27.44
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	4.64	22.80	4.04
16/07/2020	4.58	22.86	3.98
12/08/2020	4.39	23.05	3.79
23/09/2020	4.22	23.22	3.62
22/10/2020	4.39	23.05	3.79
26/11/2020	4.24	23.20	3.64
11/12/2020	4.36	23.08	3.76
27/01/2021	4.62	22.82	4.02
17/02/2021	4.68	22.76	4.08
30/03/2021	4.76	22.68	4.16
29/04/2021	4.78	22.66	4.18
28/05/2021	4.73	22.71	4.13
7/07/2021	4.51	22.93	3.91
27/07/2021	3.96	23.48	3.36
12/08/2021	3.75	23.69	3.15
30/09/2021	3.74	23.70	3.14
28/10/2021	3.63	23.81	3.03
1/12/2021	3.74	23.70	3.14

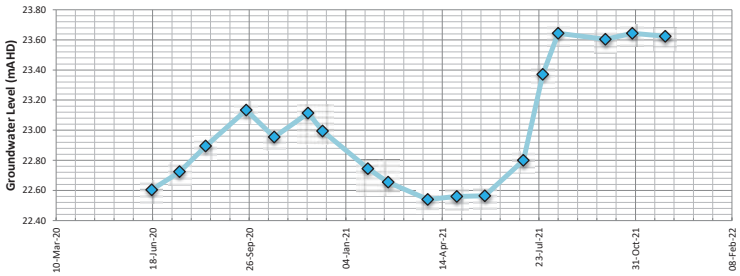
Minimum Recorded Level (mAHD)	22.66
Maximum Recorded Level (mAHD)	23.81

H20002 Glen Iris GC

MW6 Site Monitoring Bore 6

Data Analysis Period Start Date	1/06/2020	Easting	392027	Natural Surface (mAHD)	28.56
Data Analysis Period End Date	31/12/2021	Northing	6446878	Top of Casing (m AHD)	29.16
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	6.56	22.60	5.96
16/07/2020	6.44	22.72	5.84
12/08/2020	6.27	22.89	5.67
23/09/2020	6.03	23.13	5.43
22/10/2020	6.21	22.95	5.61
26/11/2020	6.05	23.11	5.45
11/12/2020	6.17	22.99	5.57
27/01/2021	6.42	22.74	5.82
17/02/2021	6.51	22.65	5.91
30/03/2021	6.62	22.54	6.02
29/04/2021	6.60	22.56	6.00
28/05/2021	6.60	22.56	6.00
7/07/2021	6.36	22.80	5.76
27/07/2021	5.79	23.37	5.19
12/08/2021	5.52	23.64	4.92
30/09/2021	5.56	23.60	4.96
28/10/2021	5.52	23.64	4.92
1/12/2021	5.54	23.62	4.94

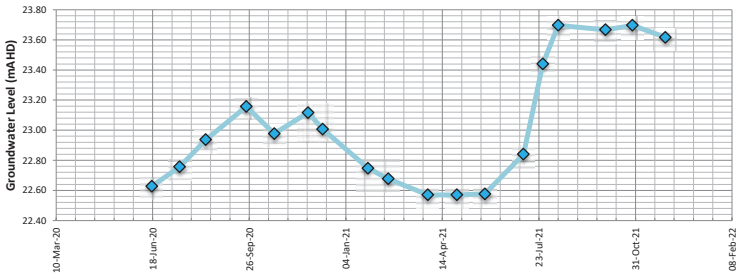
Minimum Recorded Level (mAHD)	22.54
Maximum Recorded Level (mAHD)	23.64

H20002 Glen Iris GC

MW7 Site Monitoring Bore 7

Data Analysis Period Start Date	1/06/2020	Easting	391965	Natural Surface (mAHD)	27.70
Data Analysis Period End Date	31/12/2021	Northing	6446606	Top of Casing (m AHD)	28.30
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	5.67	22.63	5.07
16/07/2020	5.54	22.76	4.94
12/08/2020	5.36	22.94	4.76
23/09/2020	5.14	23.16	4.54
22/10/2020	5.32	22.98	4.72
26/11/2020	5.18	23.12	4.58
11/12/2020	5.29	23.01	4.69
27/01/2021	5.55	22.75	4.95
17/02/2021	5.62	22.68	5.02
30/03/2021	5.73	22.57	5.13
29/04/2021	5.73	22.57	5.13
28/05/2021	5.72	22.58	5.12
7/07/2021	5.46	22.84	4.86
27/07/2021	4.86	23.44	4.26
12/08/2021	4.60	23.70	4.00
30/09/2021	4.63	23.67	4.03
28/10/2021	4.60	23.70	4.00
1/12/2021	4.68	23.62	4.08

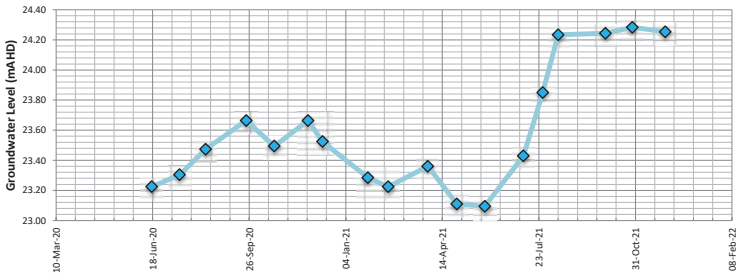
Minimum Recorded Level (mAHD)	22.57
Maximum Recorded Level (mAHD)	23.70

H20002 Glen Iris GC

MW8 Site Monitoring Bore 8

Data Analysis Period Start Date	1/06/2020	Easting	392151	Natural Surface (mAHD)	26.12
Data Analysis Period End Date	31/12/2021	Northing	6446249	Top of Casing (m AHD)	26.72
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	3.50	23.22	2.90
16/07/2020	3.42	23.30	2.82
12/08/2020	3.25	23.47	2.65
23/09/2020	3.06	23.66	2.46
22/10/2020	3.23	23.49	2.63
26/11/2020	3.06	23.66	2.46
11/12/2020	3.20	23.52	2.60
27/01/2021	3.44	23.28	2.84
17/02/2021	3.50	23.22	2.90
30/03/2021	3.36	23.36	2.76
29/04/2021	3.61	23.11	3.01
28/05/2021	3.63	23.09	3.03
7/07/2021	3.29	23.43	2.69
27/07/2021	2.87	23.85	2.27
12/08/2021	2.49	24.23	1.89
30/09/2021	2.48	24.24	1.88
28/10/2021	2.44	24.28	1.84
1/12/2021	2.47	24.25	1.87

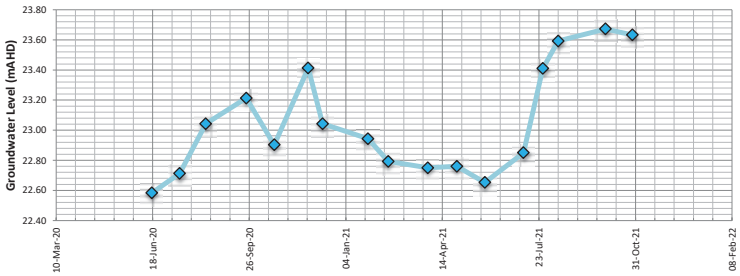
Minimum Recorded Level (mAHD)	23.09
Maximum Recorded Level (mAHD)	24.28

H20002 Glen Iris GC

MW9 Site Monitoring Bore 9

Data Analysis Period Start Date	1/06/2020	Easting	392221	Natural Surface (mAHD)	27.83
Data Analysis Period End Date	31/12/2021	Northing	6446790	Top of Casing (m AHD)	28.43
				End of Hole (mAHD)	

Report Date : 28/08/2023



Date	Groundwater bTOC	Groundwater mAHD	Depth Below NS m
17/06/2020	5.85	22.58	5.25
16/07/2020	5.72	22.71	5.12
12/08/2020	5.39	23.04	4.79
23/09/2020	5.22	23.21	4.62
22/10/2020	5.53	22.90	4.93
26/11/2020	5.02	23.41	4.42
11/12/2020	5.39	23.04	4.79
27/01/2021	5.49	22.94	4.89
17/02/2021	5.64	22.79	5.04
30/03/2021	5.68	22.75	5.08
29/04/2021	5.67	22.76	5.07
28/05/2021	5.78	22.65	5.18
7/07/2021	5.58	22.85	4.98
27/07/2021	5.02	23.41	4.42
12/08/2021	4.84	23.59	4.24
30/09/2021	4.76	23.67	4.16
28/10/2021	4.80	23.63	4.20

Minimum Recorded Level (mAHD)	22.58
Maximum Recorded Level (mAHD)	23.67

H20002 Glen Iris GC

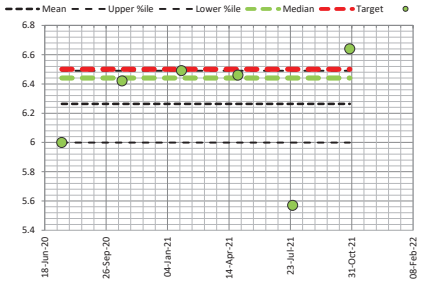
MW1 Site Monitoring Bore 1

Easting	392219	Data Analysis Period Start Date	1/06/2020
Northing	6447400	Data Analysis Period End Date	31/12/2021

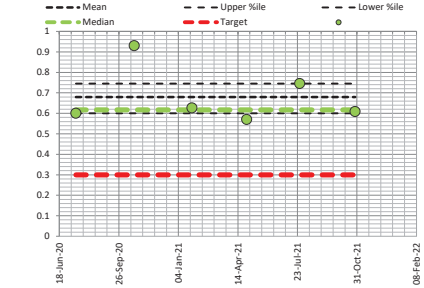
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	7.26	8.25	8.54	**8.63**	9.04	9.15		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	22.38	22.50	22.99	**22.91**	23.28	24.27		0
T	Temperature	°C	6	19.10	19.40	21.05	**20.75**	21.40	24.90		0
EC	Electrical Conductivity	mS/cm	6	0.57	0.60	0.680	**0.62**	0.75	0.93	0.30	6
pH	pH	pH	6	5.57	6.00	6.26	**6.44**	6.49	6.64	6.50	1
DO%	Dissolved Oxygen	%	6	18.20	29.40	31.00	**32.95**	35.00	37.50		0
TN	Total Nitrogen	mg/L	6	0.40	0.70	1.55	**1.10**	2.20	3.80	1.20	3
TKN	Total Kej Nitrogen	mg/L	6	0.40	0.40	0.47	**0.40**	0.50	0.70		0
NH3-N	Ammonia as N	mg/L	6	0.01	0.01	0.04	**0.02**	0.05	0.11	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.25	1.10	**0.71**	1.80	3.10	0.70	3
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.04350	**0.04150**	0.07600	0.10000	0.00140	4
Pb	Lead	mg/L	6	0.00100	0.00100	0.00217	**0.00200**	0.00300	0.00400	0.00340	1
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00567	**0.00700**	0.00700	0.01100	0.01100	0
Zn	Zinc	mg/L	6	0.00800	0.02700	0.05650	**0.06400**	0.08700	0.08900	0.00800	5
Nox	Nox	mg/L	6	0.01	0.25	1.10	**0.71**	1.80	3.10	0.15	5

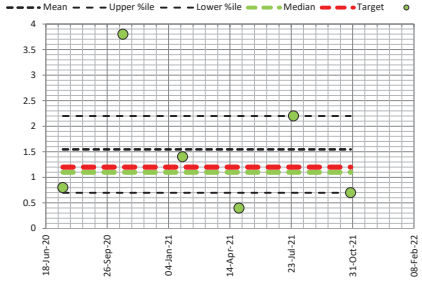
pH



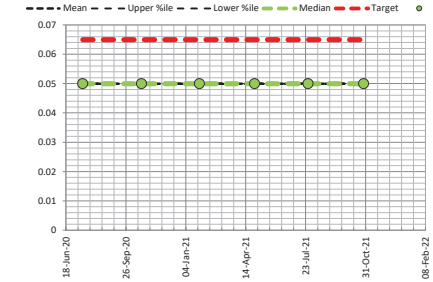
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

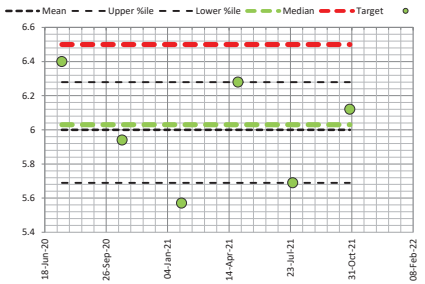
MW2 Site Monitoring Bore 2

Easting 392008 | Northing 6447916 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

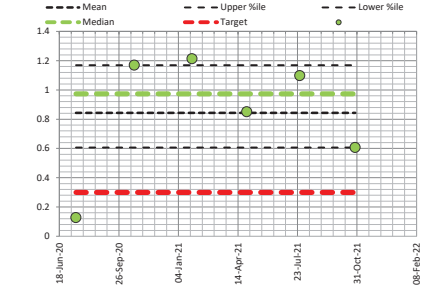
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	17	4.59	4.75	5.14	**5.19**	5.44	5.57		0
GWL mAHD	Groundwater Level mAHD	mAHD	17	22.25	22.38	22.67	**22.63**	23.07	23.23		0
T	Temperature	°C	6	18.00	18.90	19.88	**19.80**	21.00	21.80		0
EC	Electrical Conductivity	mS/cm	6	0.13	0.61	0.844	**0.97**	1.17	1.21	0.30	5
pH	pH	pH	6	5.57	5.69	6.00	**6.03**	6.28	6.40	6.50	0
DO%	Dissolved Oxygen	%	6	13.10	18.20	25.29	**26.67**	32.40	34.70		0
TN	Total Nitrogen	mg/L	6	0.30	0.40	2.10	**2.15**	3.50	4.10	1.20	4
TKN	Total Kej Nitrogen	mg/L	6	0.10	0.20	0.28	**0.30**	0.40	0.40		0
NH3-N	Ammonia as N	mg/L	6	0.01	0.01	0.02	**0.01**	0.03	0.05	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.03	0.19	1.80	**1.75**	3.10	4.00	0.70	4
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	6	0.00100	0.00100	0.00133	**0.00100**	0.00200	0.00200	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00117	**0.00100**	0.00100	0.00200	0.00800	0
Nox	Nox	mg/L	6	0.04	0.19	1.80	**1.75**	3.10	4.00	0.15	5

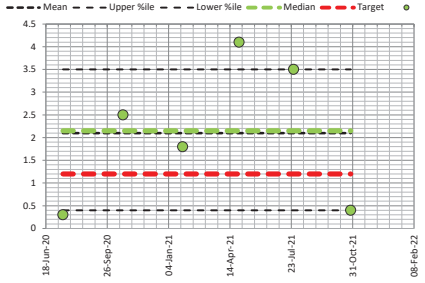
pH



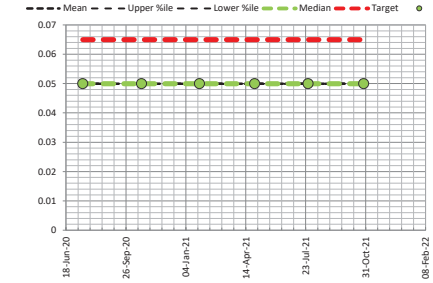
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

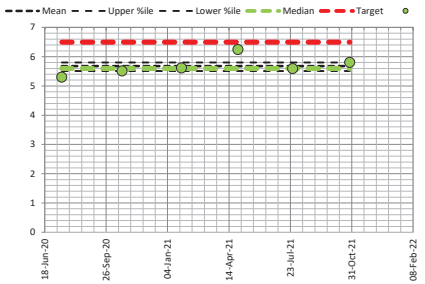
MW3 Site Monitoring Bore 3

Easting 391661 | Northing 6448084 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

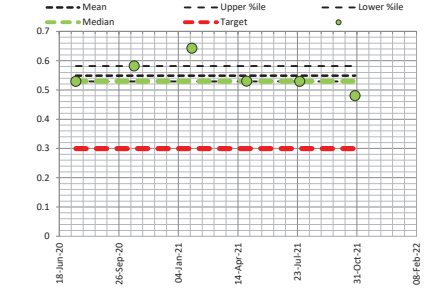
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	7.67	7.96	8.27	**8.35**	8.57	8.68		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	21.65	21.76	22.06	**21.98**	22.37	22.66		0
T	Temperature	°C	6	19.10	19.10	20.58	**20.15**	22.40	22.60		0
EC	Electrical Conductivity	mS/cm	6	0.48	0.53	0.549	**0.53**	0.58	0.64	0.30	6
pH	pH	pH	6	5.30	5.51	5.68	**5.60**	5.80	6.24	6.50	0
DO%	Dissolved Oxygen	%	6	41.60	53.80	59.69	**62.22**	65.50	72.80		0
TN	Total Nitrogen	mg/L	6	1.40	1.50	2.15	**2.35**	2.60	2.70	1.20	6
TKN	Total Kej Nitrogen	mg/L	6	0.20	0.20	0.25	**0.20**	0.30	0.40		0
NH3-N	Ammonia as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	1.90	0
NO_3-N	Nitrate as N	mg/L	6	1.20	1.30	1.88	**2.05**	2.30	2.40	0.70	6
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00267	**0.00150**	0.00300	0.00800	0.00800	0
Nox	Nox	mg/L	6	1.20	1.31	1.88	**2.05**	2.30	2.40	0.15	6

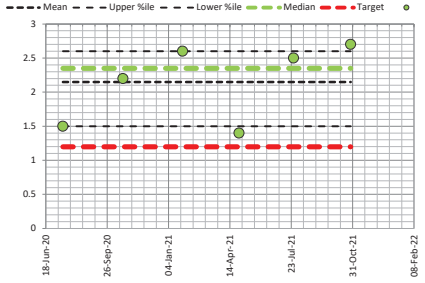
pH



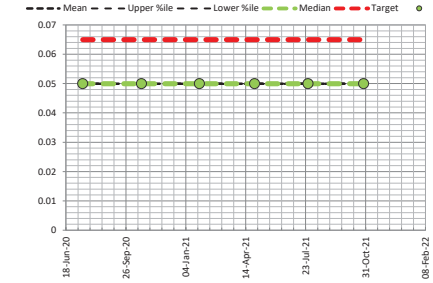
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

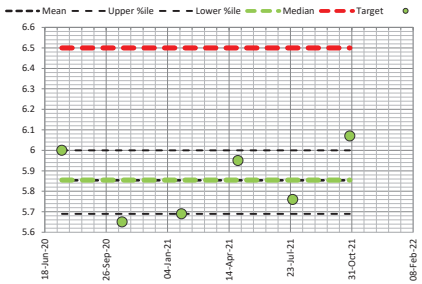
MW4 Site Monitoring Bore 4

Easting 391708 | Northing 6447579 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

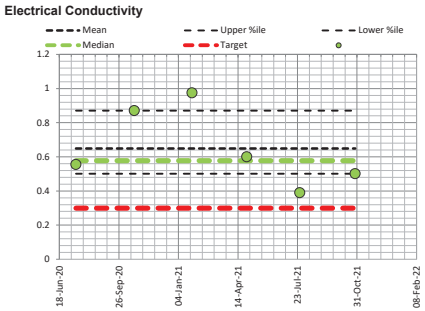
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	3.28	3.47	3.93	**4.00**	4.27	4.43		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	21.84	22.00	22.35	**22.27**	22.80	22.99		0
T	Temperature	°C	6	19.10	19.30	21.15	**21.10**	23.10	23.20		0
EC	Electrical Conductivity	mS/cm	6	0.39	0.50	0.649	**0.58**	0.87	0.98	0.30	6
pH	pH	pH	6	5.65	5.69	5.85	**5.86**	6.00	6.07	6.50	0
DO%	Dissolved Oxygen	%	6	14.20	24.30	26.68	**29.35**	31.40	31.50		0
TN	Total Nitrogen	mg/L	6	0.50	0.70	0.78	**0.80**	0.80	1.10	1.20	0
TKN	Total Kej Nitrogen	mg/L	6	0.70	0.80	0.90	**0.80**	1.10	1.20		0
NH3-N	Ammonia as N	mg/L	6	0.10	0.14	0.20	**0.21**	0.26	0.28	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.01	0.02	**0.01**	0.05	0.05	0.70	0
NO2-N	Nitrite as N	mg/L	5	#REF!	0.00	0.00	**0.00**	0.00	#REF!		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00300	0.00400	0.00650	**0.00650**	0.00900	0.01000	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	6	0.00100	0.00100	0.00167	**0.00150**	0.00200	0.00300	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00117	**0.00100**	0.00100	0.00200	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00200	**0.00150**	0.00200	0.00500	0.00800	0
Nox	Nox	mg/L	6	0.01	0.01	0.02	**0.01**	0.05	0.05	0.15	0

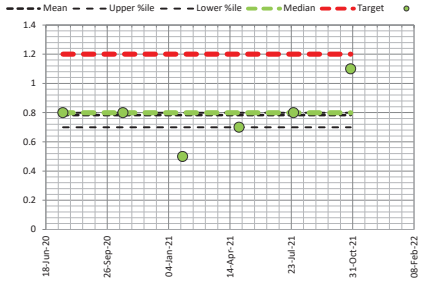
pH



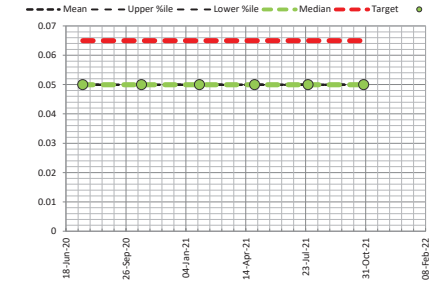
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

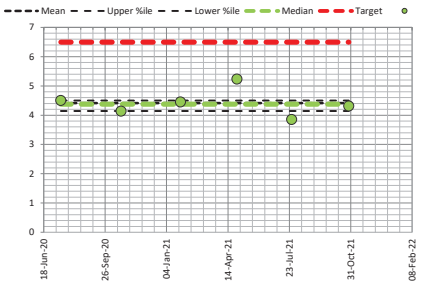
MW5 Site Monitoring Bore 5

Easting 392170 | Northing 6447202 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

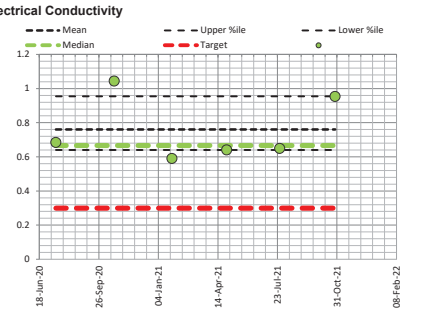
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	3.63	3.83	4.32	**4.39**	4.66	4.78		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	22.66	22.78	23.12	**23.05**	23.61	23.81		0
T	Temperature	°C	6	17.90	18.90	20.25	**20.25**	21.80	22.40		0
EC	Electrical Conductivity	mS/cm	6	0.59	0.64	0.760	**0.67**	0.95	1.04	0.30	6
pH	pH	pH	6	3.85	4.14	4.41	**4.38**	4.50	5.23	6.50	0
DO%	Dissolved Oxygen	%	6	13.30	21.20	27.82	**32.07**	33.60	34.70		0
TN	Total Nitrogen	mg/L	6	1.20	1.20	1.33	**1.35**	1.40	1.50	1.20	4
TKN	Total Kej Nitrogen	mg/L	6	0.90	1.00	1.20	**1.25**	1.40	1.40		0
NH3-N	Ammonia as N	mg/L	6	0.27	0.35	0.40	**0.42**	0.45	0.49	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.01	0.13	**0.01**	0.19	0.59	0.70	0
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00117	**0.00100**	0.00100	0.00200	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00217	**0.00150**	0.00400	0.00400	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00767	**0.00100**	0.00600	0.03600	0.00800	1
Nox	Nox	mg/L	6	0.01	0.01	0.14	**0.01**	0.20	0.60	0.15	2

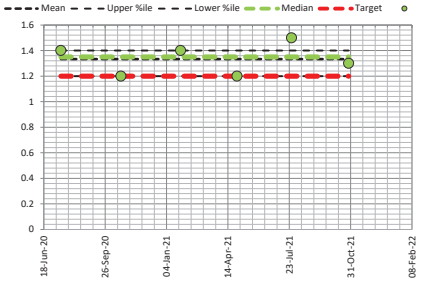
pH



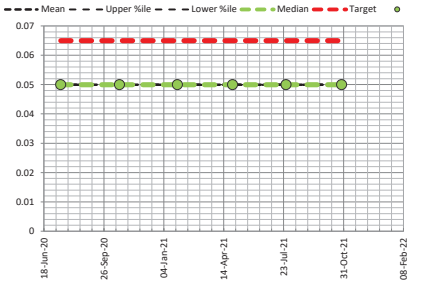
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

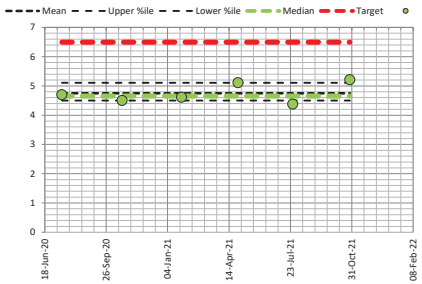
MW6 Site Monitoring Bore 6

Easting 392027 | Northing 6446878 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

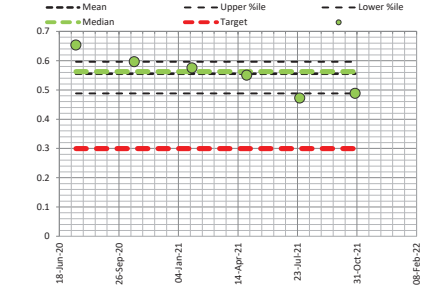
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	5.52	5.65	6.15	**6.24**	6.54	6.62		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	22.54	22.62	23.01	**22.92**	23.51	23.64		0
T	Temperature	°C	6	18.20	18.90	20.28	**20.05**	21.50	23.00		0
EC	Electrical Conductivity	mS/cm	6	0.47	0.49	0.556	**0.56**	0.60	0.65	0.30	6
pH	pH	pH	6	4.38	4.50	4.75	**4.66**	5.11	5.21	6.50	0
DO%	Dissolved Oxygen	%	6	13.10	26.20	29.22	**29.36**	31.40	45.90		0
TN	Total Nitrogen	mg/L	6	1.40	1.50	4.72	**3.55**	5.30	13.00	1.20	6
TKN	Total Kej Nitrogen	mg/L	6	0.90	1.20	1.27	**1.30**	1.40	1.50		0
NH3-N	Ammonia as N	mg/L	6	0.01	0.16	0.21	**0.25**	0.30	0.31	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.27	3.26	**2.26**	3.80	11.00	0.70	4
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.08	**0.01**	0.01	0.43		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.07	**0.05**	0.05	0.15	0.07	1
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00250	**0.00200**	0.00400	0.00500	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00150	**0.00150**	0.00200	0.00200	0.00100	3
Cu	Copper	mg/L	6	0.00100	0.00100	0.00133	**0.00100**	0.00200	0.00200	0.00140	2
Pb	Lead	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00133	**0.00100**	0.00200	0.00200	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00500	**0.00150**	0.00500	0.02000	0.00800	1
Nox	Nox	mg/L	6	0.01	0.28	3.33	**2.31**	4.10	11.00	0.15	5

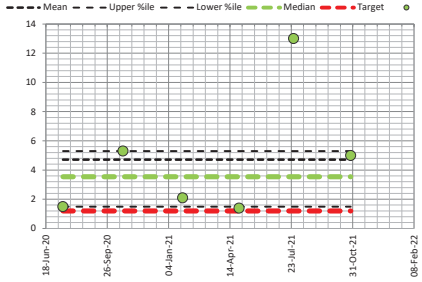
pH



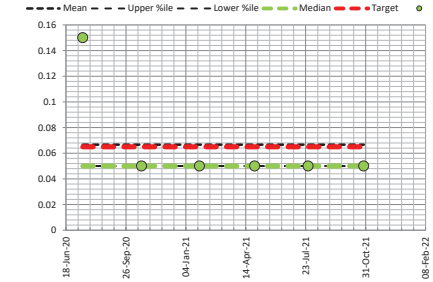
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

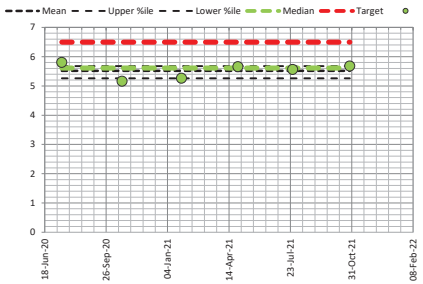
MW7 Site Monitoring Bore 7

Easting 391965 | Northing 6446606 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

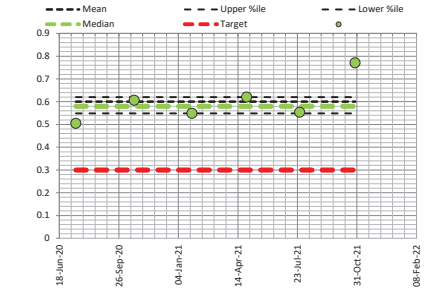
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	4.60	4.75	5.26	**5.34**	5.65	5.73		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	22.57	22.65	23.04	**22.96**	23.55	23.70		0
T	Temperature	°C	6	17.00	18.60	20.08	**20.15**	22.10	22.50		0
EC	Electrical Conductivity	mS/cm	6	0.51	0.55	0.601	**0.58**	0.62	0.77	0.30	6
pH	pH	pH	6	5.16	5.26	5.52	**5.61**	5.68	5.80	6.50	0
DO%	Dissolved Oxygen	%	6	10.50	22.98	28.43	**30.00**	34.70	42.40		0
TN	Total Nitrogen	mg/L	6	1.20	1.30	1.65	**1.70**	1.90	2.10	1.20	5
TKN	Total Kej Nitrogen	mg/L	6	0.70	0.70	1.20	**1.30**	1.50	1.70		0
NH3-N	Ammonia as N	mg/L	6	0.01	0.04	0.07	**0.06**	0.11	0.15	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.02	0.48	**0.50**	0.91	0.93	0.70	2
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.02	0.02		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00133	**0.00100**	0.00200	0.00200	0.00100	2
Cu	Copper	mg/L	6	0.00100	0.00100	0.00167	**0.00100**	0.00200	0.00400	0.00140	2
Pb	Lead	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00517	**0.00200**	0.01000	0.01500	0.00800	2
Nox	Nox	mg/L	6	0.01	0.01	0.40	**0.27**	0.93	0.94	0.15	3

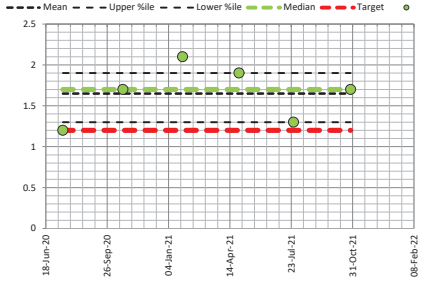
pH



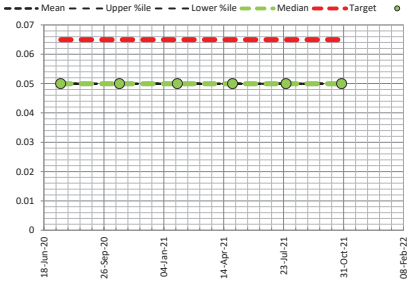
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

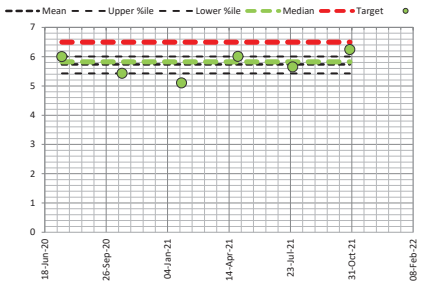
MW8 Site Monitoring Bore 8

Easting 392151 | Northing 6446249 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

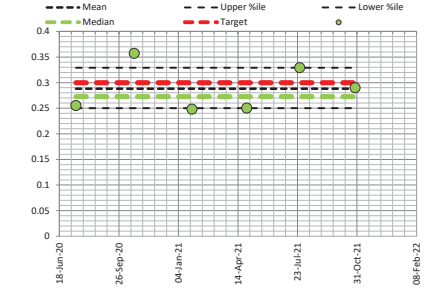
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	18	2.44	2.64	3.13	**3.24**	3.48	3.63		0
GWL mAHD	Groundwater Level mAHD	mAHD	18	23.09	23.25	23.60	**23.48**	24.08	24.28		0
T	Temperature	°C	6	17.70	19.70	21.25	**20.70**	22.70	26.00		0
EC	Electrical Conductivity	mS/cm	6	0.25	0.25	0.288	**0.27**	0.33	0.36	0.30	2
pH	pH	pH	6	5.10	5.43	5.74	**5.83**	6.01	6.24	6.50	0
DO%	Dissolved Oxygen	%	6	12.50	19.34	24.71	**25.65**	28.80	36.30		0
TN	Total Nitrogen	mg/L	6	0.60	0.80	0.97	**0.90**	1.10	1.50	1.20	1
TKN	Total Kej Nitrogen	mg/L	6	0.60	0.80	0.93	**0.90**	1.10	1.30		0
NH3-N	Ammonia as N	mg/L	6	0.06	0.07	0.14	**0.14**	0.22	0.25	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.01	0.02	**0.01**	0.01	0.07	0.70	0
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00450	**0.00300**	0.00600	0.01300	0.00800	1
Nox	Nox	mg/L	6	0.01	0.01	0.10	**0.01**	0.07	0.50	0.15	1

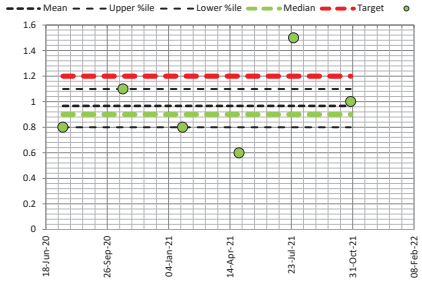
pH



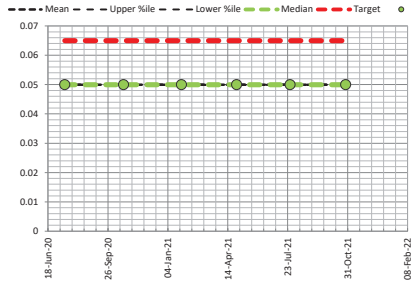
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

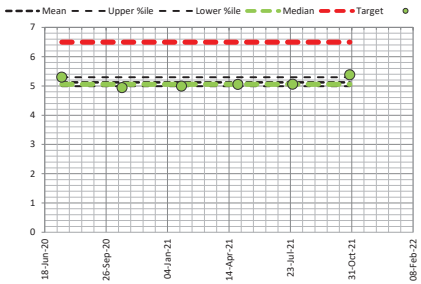
MW9 Site Monitoring Bore 9

Easting 392221 | Northing 6446790 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

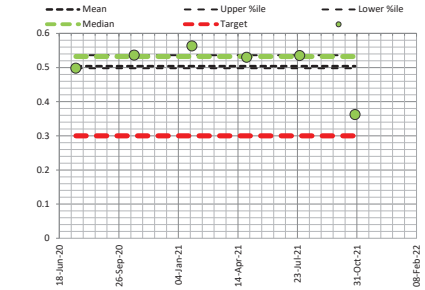
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	17	4.76	5.02	5.38	**5.49**	5.68	5.85		0
GWL mAHD	Groundwater Level mAHD	mAHD	17	22.58	22.75	23.06	**22.94**	23.41	23.67		0
T	Temperature	°C	6	18.70	19.80	21.10	**20.55**	23.10	23.90		0
EC	Electrical Conductivity	mS/cm	6	0.36	0.50	0.504	**0.53**	0.54	0.56	0.30	6
pH	pH	pH	6	4.94	4.99	5.12	**5.06**	5.30	5.38	6.50	0
DO%	Dissolved Oxygen	%	5	22.90	28.34	31.14	**30.88**	34.96	38.00		0
TN	Total Nitrogen	mg/L	6	1.10	1.10	1.22	**1.25**	1.30	1.30	1.20	3
TKN	Total Kej Nitrogen	mg/L	6	0.20	1.10	1.03	**1.15**	1.30	1.30		0
NH3-N	Ammonia as N	mg/L	6	0.54	0.56	0.62	**0.63**	0.67	0.69	1.90	0
NO_3-N	Nitrate as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.70	0
NO2-N	Nitrite as N	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	6	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	6	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	6	0.00100	0.00100	0.00367	**0.00100**	0.00100	0.01700	0.00140	1
Pb	Lead	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	6	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	6	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	6	0.00100	0.00100	0.00383	**0.00250**	0.00600	0.01000	0.00800	1
Nox	Nox	mg/L	6	0.01	0.01	0.01	**0.01**	0.01	0.01	0.15	0

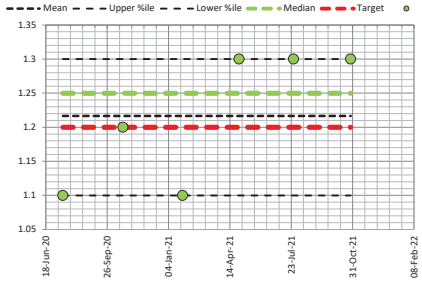
pH



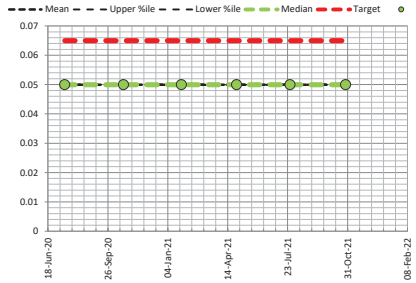
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

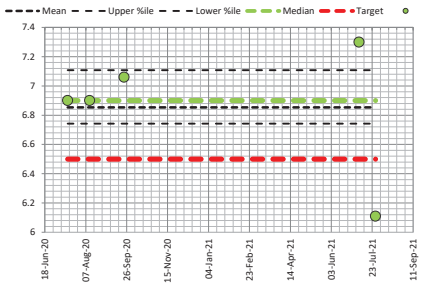
SW1 Surface Water Monitoring Site 1

Easting 392068 | Northing 6447918 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

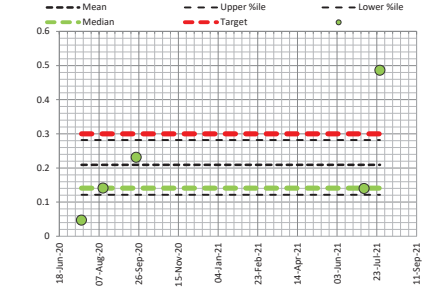
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	11.40	13.88	15.16	**15.80**	16.60	17.80		0
EC	Electrical Conductivity	mS/cm	5	0.05	0.12	0.209	**0.14**	0.28	0.49	0.30	1
pH	pH	pH	5	6.11	6.74	6.85	**6.90**	7.11	7.30	6.50	4
DO%	Dissolved Oxygen	%	5	52.50	56.90	65.62	**67.10**	71.08	82.20		0
TN	Total Nitrogen	mg/L	5	0.20	0.20	0.26	**0.30**	0.30	0.30	1.20	0
TKN	Total Kej Nitrogen	mg/L	5	0.20	0.20	0.22	**0.20**	0.22	0.30		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.01	0.01	0.04	**0.03**	0.06	0.10	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.05	**0.05**	0.05	0.07	0.07	1
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.02	**0.01**	0.02	0.04	0.04	1
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.02180	**0.00300**	0.02320	0.10000	0.00140	3
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00200	**0.00100**	0.00200	0.00600	0.01100	0
Zn	Zinc	mg/L	5	0.00200	0.01000	0.02160	**0.01600**	0.02700	0.05900	0.00800	4
Nox	Nox	mg/L	5	0.01	0.01	0.05	**0.04**	0.07	0.11	0.15	0

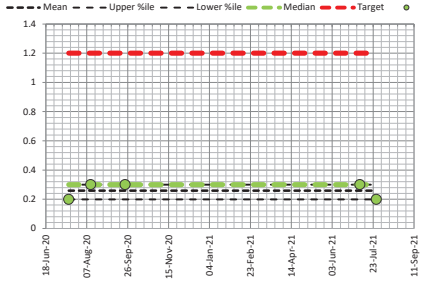
pH



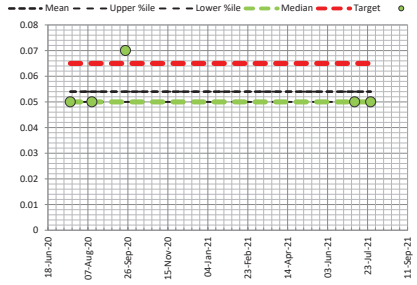
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

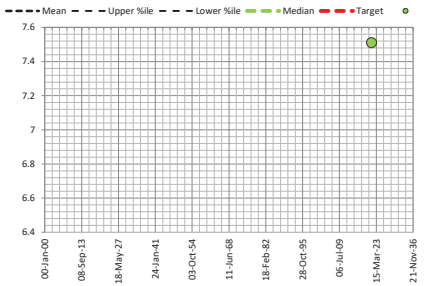
SW2 Surface Water Monitoring Site 2

Easting 392058 | Northing 6447935 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

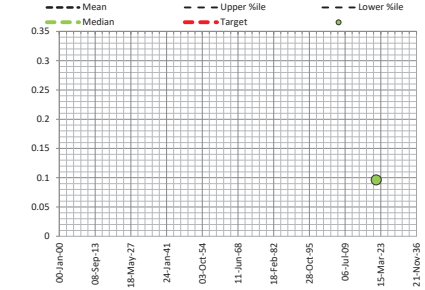
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	1	15.10	15.10	15.10	**15.10**	15.10	15.10		0
EC	Electrical Conductivity	mS/cm	1	0.10	0.10	0.096	**0.10**	0.10	0.10	0.30	0
pH	pH	pH	1	7.51	7.51	7.51	**7.51**	7.51	7.51	6.50	1
DO%	Dissolved Oxygen	%	1	80.50	80.50	80.50	**80.50**	80.50	80.50		0
TN	Total Nitrogen	mg/L	1	0.20	0.20	0.20	**0.20**	0.20	0.20	1.20	0
TKN	Total Kej Nitrogen	mg/L	1	0.20	0.20	0.20	**0.20**	0.20	0.20		0
NH3-N	Ammonia as N	mg/L	1	0.01	0.01	0.01	**0.01**	0.01	0.01	1.90	0
NO_3-N	Nitrate as N	mg/L	1	0.01	0.01	0.01	**0.01**	0.01	0.01	0.70	0
NO2-N	Nitrite as N	mg/L	1	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	1	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	1	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	1	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	1	0.00200	0.00200	0.00200	**0.00200**	0.00200	0.00200	0.00140	1
Pb	Lead	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	1	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	1	0.01200	0.01200	0.01200	**0.01200**	0.01200	0.01200	0.00800	1
Nox	Nox	mg/L	1	0.01	0.01	0.01	**0.01**	0.01	0.01	0.15	0

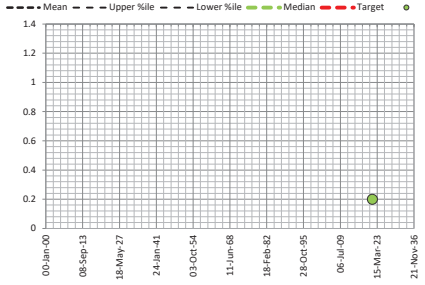
pH



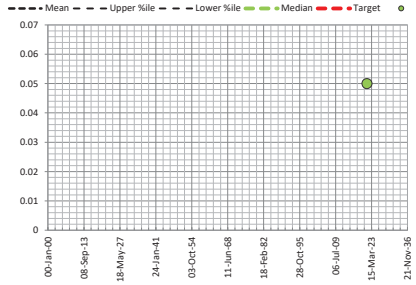
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

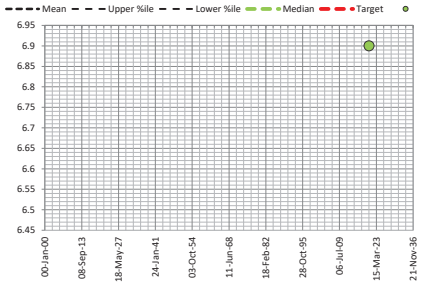
SW3 Surface Water Monitoring Site 3

Easting 391607 | Northing 6448389 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

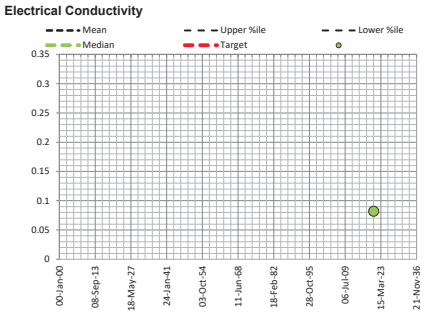
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	1	17.00	17.00	17.00	**17.00**	17.00	17.00		0
EC	Electrical Conductivity	mS/cm	1	0.08	0.08	0.082	**0.08**	0.08	0.08	0.30	0
pH	pH	pH	1	6.90	6.90	6.90	**6.90**	6.90	6.90	6.50	1
DO%	Dissolved Oxygen	%	1	74.00	74.00	74.00	**74.00**	74.00	74.00		0
TN	Total Nitrogen	mg/L	1	0.30	0.30	0.30	**0.30**	0.30	0.30	1.20	0
TKN	Total Kej Nitrogen	mg/L	1	0.30	0.30	0.30	**0.30**	0.30	0.30		0
NH3-N	Ammonia as N	mg/L	1	0.02	0.02	0.02	**0.02**	0.02	0.02	1.90	0
NO_3-N	Nitrate as N	mg/L	1	0.02	0.02	0.02	**0.02**	0.02	0.02	0.70	0
NO2-N	Nitrite as N	mg/L	1	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	1	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	1	0.03	0.03	0.03	**0.03**	0.03	0.03	0.04	0
As	Arsenic	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	1	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	1	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	1	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	1	0.00500	0.00500	0.00500	**0.00500**	0.00500	0.00500	0.00800	0
Nox	Nox	mg/L	1	0.03	0.03	0.03	**0.03**	0.03	0.03	0.15	0

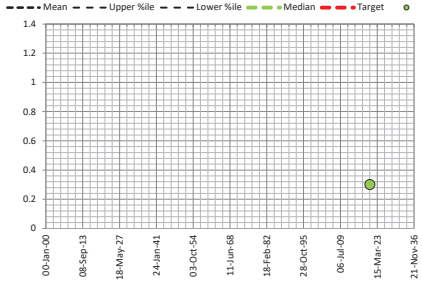
pH



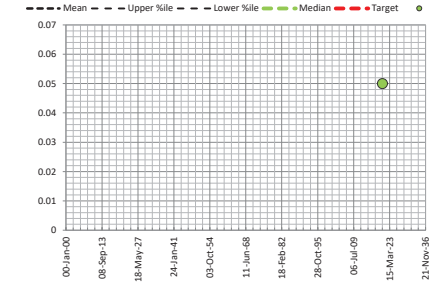
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

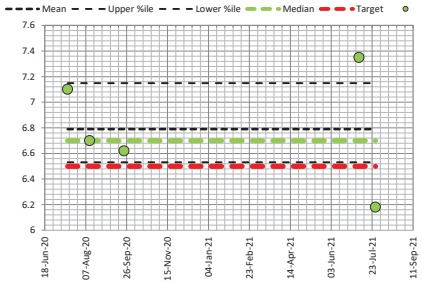
SW4 Surface Water Monitoring Site 4

Easting 391674 | Northing 6447966 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

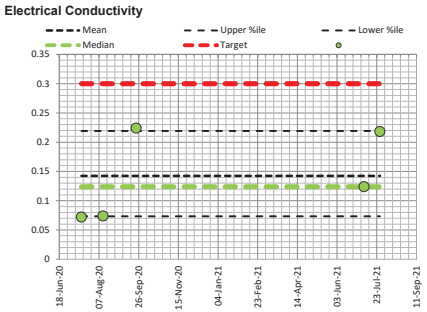
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	14.30	14.62	15.76	**15.50**	16.46	18.30		0
EC	Electrical Conductivity	mS/cm	5	0.07	0.07	0.142	**0.12**	0.22	0.22	0.30	0
pH	pH	pH	5	6.18	6.53	6.79	**6.70**	7.15	7.35	6.50	4
DO%	Dissolved Oxygen	%	5	13.60	22.16	50.18	**68.40**	71.82	73.10		0
TN	Total Nitrogen	mg/L	5	0.20	0.20	0.32	**0.30**	0.36	0.60	1.20	0
TKN	Total Kej Nitrogen	mg/L	5	0.20	0.20	0.32	**0.30**	0.36	0.60		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.03	**0.01**	0.04	0.11	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.01	0.01	0.02	**0.02**	0.03	0.04	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.08	**0.05**	0.08	0.19	0.07	1
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.04	**0.04**	0.06	0.11	0.04	2
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00200	**0.00200**	0.00240	0.00400	0.00140	3
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.00400	0.00640	0.00980	**0.00900**	0.01360	0.01600	0.00800	3
Nox	Nox	mg/L	5	0.01	0.01	0.02	**0.02**	0.03	0.04	0.15	0

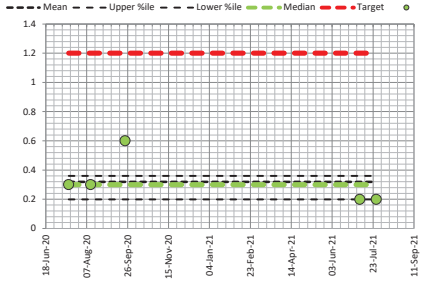
pH



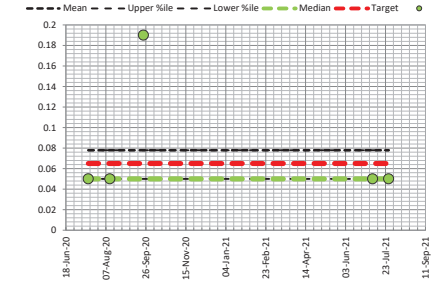
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

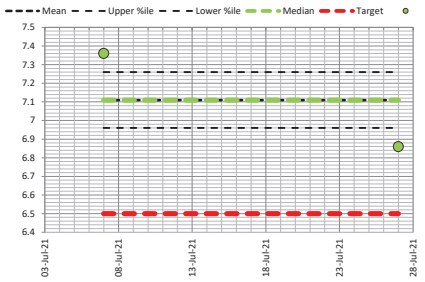
SW5 Surface Water Monitoring Site 5

Easting 391649 | Northing 6447772 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

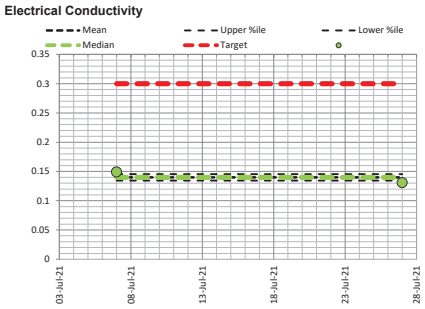
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	2	15.80	15.84	15.90	**15.90**	15.96	16.00		0
EC	Electrical Conductivity	mS/cm	2	0.13	0.13	0.140	**0.14**	0.15	0.15	0.30	0
pH	pH	pH	2	6.86	6.96	7.11	**7.11**	7.26	7.36	6.50	2
DO%	Dissolved Oxygen	%	2	59.50	60.54	62.10	**62.10**	63.66	64.70		0
TN	Total Nitrogen	mg/L	2	0.20	0.22	0.25	**0.25**	0.28	0.30	1.20	0
TKN	Total Kej Nitrogen	mg/L	2	0.20	0.22	0.25	**0.25**	0.28	0.30		0
NH3-N	Ammonia as N	mg/L	2	0.01	0.01	0.01	**0.01**	0.01	0.01	1.90	0
NO_3-N	Nitrate as N	mg/L	2	0.02	0.02	0.02	**0.02**	0.02	0.03	0.70	0
NO2-N	Nitrite as N	mg/L	2	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	2	0.05	0.07	0.09	**0.09**	0.11	0.13	0.07	1
PO4-	Phosphate as P	mg/L	2	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	2	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	2	0.00100	0.00120	0.00150	**0.00150**	0.00180	0.00200	0.00140	1
Pb	Lead	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	2	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	2	0.00600	0.00660	0.00750	**0.00750**	0.00840	0.00900	0.00800	1
Nox	Nox	mg/L	2	0.02	0.02	0.02	**0.02**	0.03	0.03	0.15	0

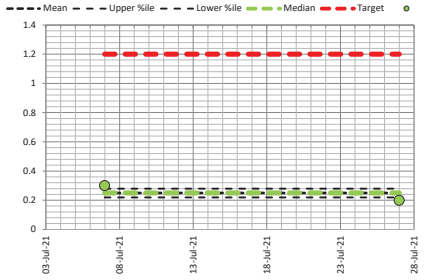
pH



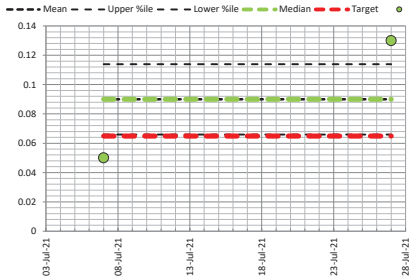
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

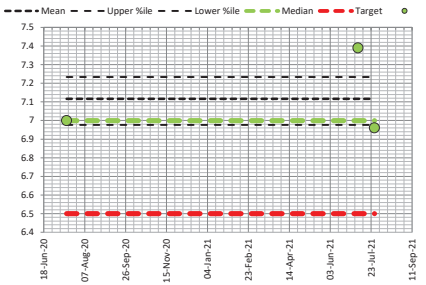
SW6 Surface Water Monitoring Site 6

Easting 391759 | Northing 6447772 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

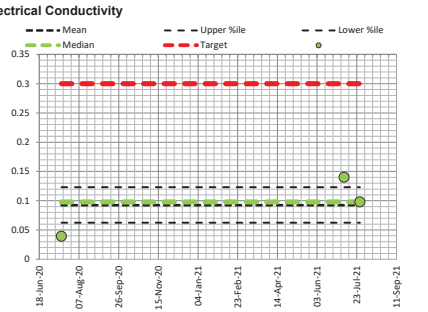
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	3	11.60	13.00	14.30	**15.10**	15.76	16.20		0
EC	Electrical Conductivity	mS/cm	3	0.04	0.06	0.092	**0.10**	0.12	0.14	0.30	0
pH	pH	pH	3	6.96	6.98	7.12	**7.00**	7.23	7.39	6.50	3
DO%	Dissolved Oxygen	%	3	71.40	71.80	74.70	**72.40**	77.14	80.30		0
TN	Total Nitrogen	mg/L	3	0.10	0.10	0.13	**0.10**	0.16	0.20	1.20	0
TKN	Total Kej Nitrogen	mg/L	3	0.10	0.10	0.10	**0.10**	0.10	0.10		0
NH3-N	Ammonia as N	mg/L	3	0.01	0.01	0.01	**0.01**	0.01	0.02	1.90	0
NO_3-N	Nitrate as N	mg/L	3	0.01	0.01	0.02	**0.01**	0.03	0.04	0.70	0
NO2-N	Nitrite as N	mg/L	3	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	3	0.05	0.05	0.05	**0.05**	0.05	0.05	0.07	0
PO4-	Phosphate as P	mg/L	3	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	3	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	3	0.00100	0.00100	0.00133	**0.00100**	0.00160	0.00200	0.00140	1
Pb	Lead	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	3	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	3	0.00300	0.00300	0.00533	**0.00300**	0.00720	0.01000	0.00800	1
Nox	Nox	mg/L	3	0.01	0.01	0.02	**0.01**	0.03	0.05	0.15	0

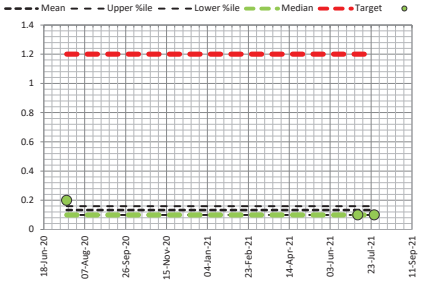
pH



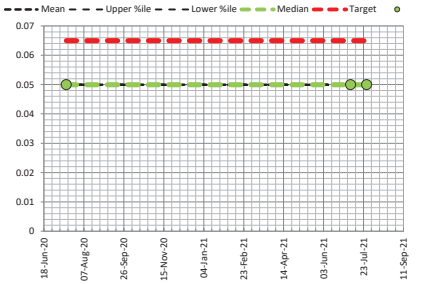
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

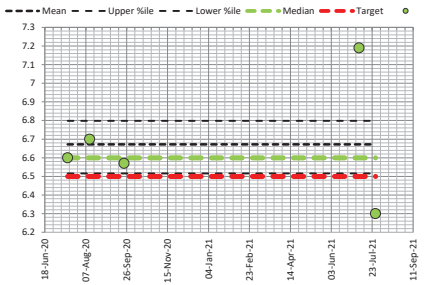
SW7 Surface Water Monitoring Site 7

Easting 391725 | Northing 6447534 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

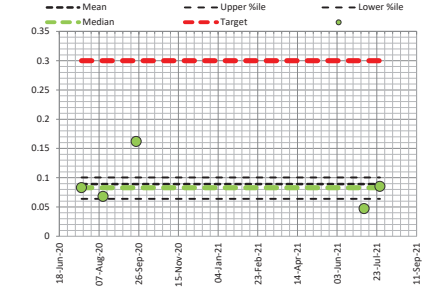
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	14.50	14.90	15.70	**15.40**	16.74	16.90		0
EC	Electrical Conductivity	mS/cm	5	0.05	0.06	0.089	**0.08**	0.10	0.16	0.30	0
pH	pH	pH	5	6.30	6.52	6.67	**6.60**	6.80	7.19	6.50	4
DO%	Dissolved Oxygen	%	5	11.40	30.92	46.70	**41.50**	67.60	80.40		0
TN	Total Nitrogen	mg/L	5	0.10	0.10	0.20	**0.20**	0.24	0.40	1.20	0
TKN	Total Kej Nitrogen	mg/L	5	0.01	0.08	0.18	**0.20**	0.24	0.40		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.03	**0.01**	0.04	0.10	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.02	0.03	0.05	**0.05**	0.06	0.07	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.08	**0.05**	0.08	0.18	0.07	1
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.01	**0.01**	0.02	0.04	0.04	1
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00120	**0.00100**	0.00120	0.00200	0.00140	1
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.00500	0.00660	0.00940	**0.00700**	0.00980	0.02100	0.00800	1
Nox	Nox	mg/L	5	0.03	0.03	0.05	**0.05**	0.07	0.08	0.15	0

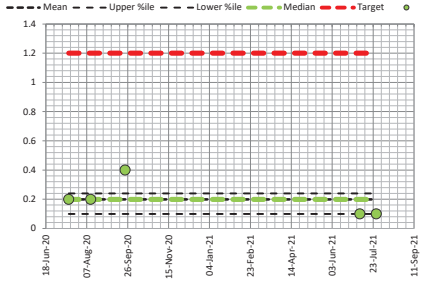
pH



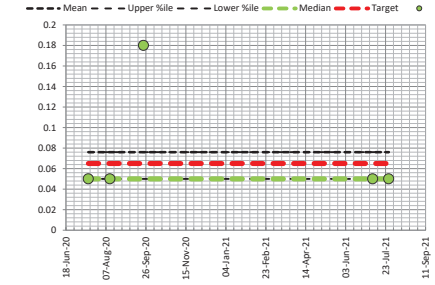
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

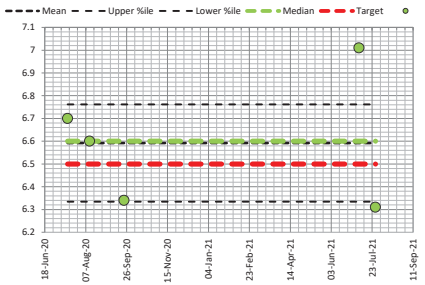
SW8 Surface Water Monitoring Site 8

Easting 391781 | Northing 6447428 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

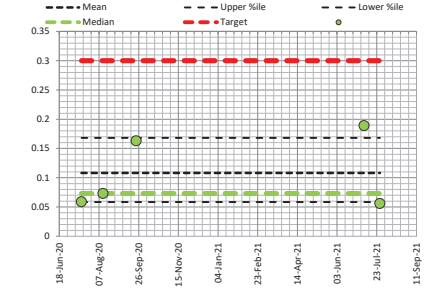
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	13.00	14.92	15.62	**15.50**	16.74	17.70		0
EC	Electrical Conductivity	mS/cm	5	0.06	0.06	0.108	**0.07**	0.17	0.19	0.30	0
pH	pH	pH	5	6.31	6.33	6.59	**6.60**	6.76	7.01	6.50	3
DO%	Dissolved Oxygen	%	5	11.40	28.84	49.54	**59.90**	65.00	82.60		0
TN	Total Nitrogen	mg/L	5	0.10	0.18	0.30	**0.20**	0.50	0.50	1.20	0
TKN	Total Kej Nitrogen	mg/L	5	0.10	0.10	0.28	**0.20**	0.50	0.50		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.02	**0.01**	0.03	0.09	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.01	0.01	0.03	**0.04**	0.04	0.04	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.06	**0.05**	0.06	0.08	0.07	1
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.02	0.04	0
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.00500	0.00580	0.00800	**0.00600**	0.01060	0.01300	0.00800	2
Nox	Nox	mg/L	5	0.01	0.01	0.03	**0.04**	0.04	0.05	0.15	0

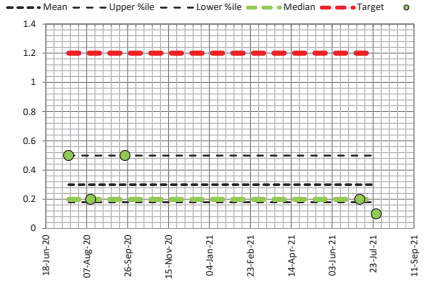
pH



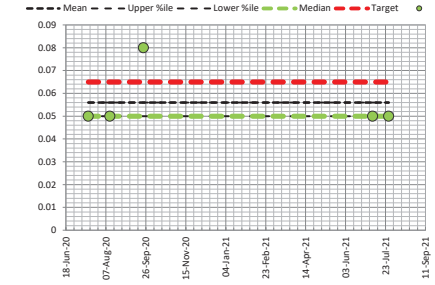
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

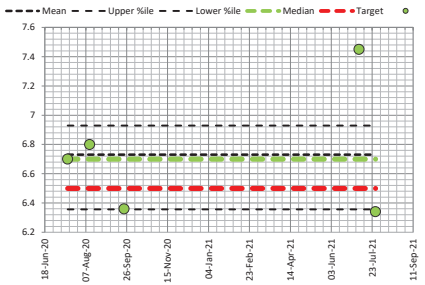
SW9 Surface Water Monitoring Site 9

Easting 391783 | Northing 6447416 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

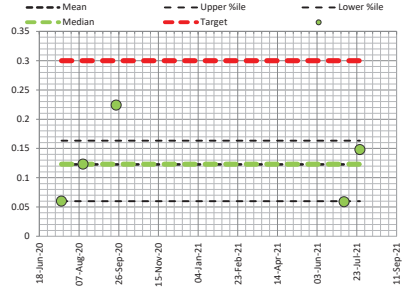
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	14.10	14.18	15.12	**14.80**	15.98	16.70		0
EC	Electrical Conductivity	mS/cm	5	0.06	0.06	0.123	**0.12**	0.16	0.22	0.30	0
pH	pH	pH	5	6.34	6.36	6.73	**6.70**	6.93	7.45	6.50	3
DO%	Dissolved Oxygen	%	5	6.20	16.20	47.86	**64.00**	71.24	81.80		0
TN	Total Nitrogen	mg/L	5	0.10	0.10	0.58	**0.30**	0.96	1.60	1.20	1
TKN	Total Kej Nitrogen	mg/L	5	0.01	0.08	0.56	**0.30**	0.96	1.60		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.02	0.03	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.09	**0.05**	0.14	0.15	0.07	2
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.02	**0.02**	0.03	0.03	0.04	0
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.00500	0.00660	0.01000	**0.01200**	0.01300	0.01300	0.00800	3
Nox	Nox	mg/L	5	0.01	0.01	0.01	**0.01**	0.02	0.03	0.15	0

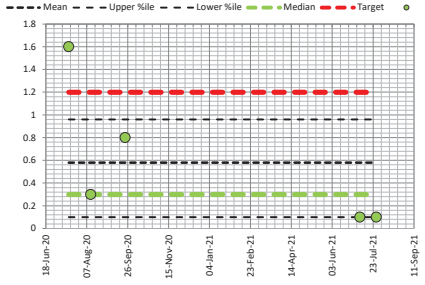
pH



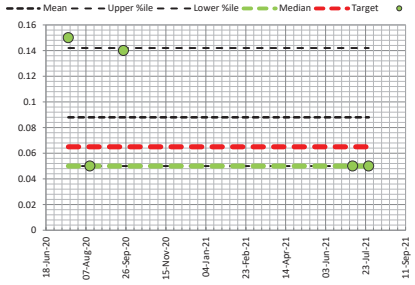
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

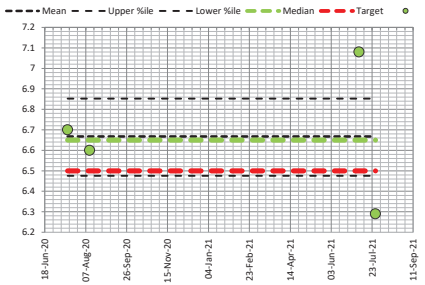
SW10 Surface Water Monitoring Site 10

Easting 392105 | Northing 6447272 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

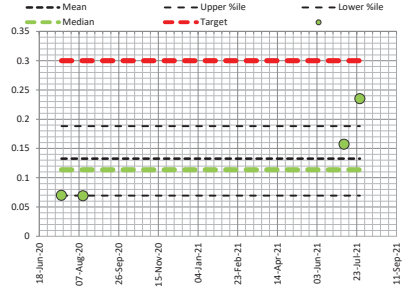
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	4	11.40	13.62	14.63	**15.15**	15.84	16.80		0
EC	Electrical Conductivity	mS/cm	4	0.07	0.07	0.133	**0.11**	0.19	0.24	0.30	0
pH	pH	pH	4	6.29	6.48	6.67	**6.65**	6.85	7.08	6.50	3
DO%	Dissolved Oxygen	%	4	36.70	41.44	54.23	**55.15**	67.38	69.90		0
TN	Total Nitrogen	mg/L	4	0.20	0.20	0.33	**0.25**	0.42	0.60	1.20	0
TKN	Total Kej Nitrogen	mg/L	4	0.20	0.20	0.30	**0.20**	0.36	0.60		0
NH3-N	Ammonia as N	mg/L	4	0.01	0.01	0.01	**0.01**	0.01	0.01	1.90	0
NO_3-N	Nitrate as N	mg/L	4	0.01	0.01	0.03	**0.01**	0.04	0.08	0.70	0
NO2-N	Nitrite as N	mg/L	4	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	4	0.05	0.05	0.12	**0.07**	0.17	0.30	0.07	2
PO4-	Phosphate as P	mg/L	4	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	4	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	4	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	4	0.00700	0.02860	0.03850	**0.04750**	0.05200	0.05200	0.00800	3
Nox	Nox	mg/L	4	0.01	0.01	0.03	**0.01**	0.04	0.08	0.15	0

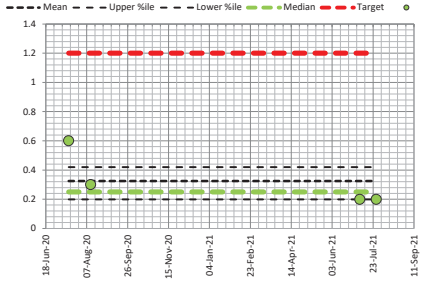
pH



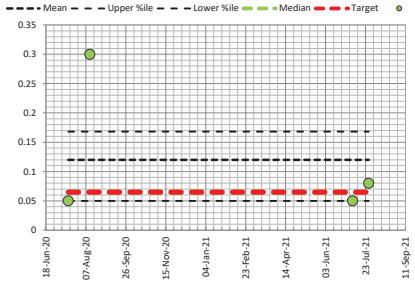
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

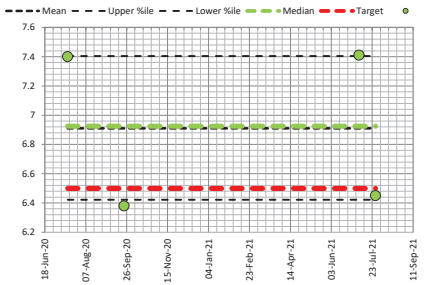
SW11 Surface Water Monitoring Site 11

Easting 392037 | Northing 6447304 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

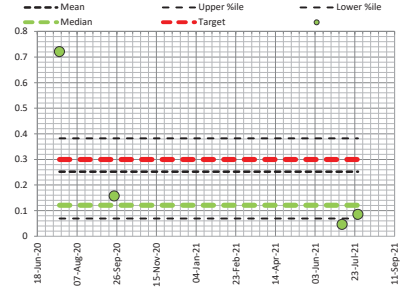
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	4	14.80	14.98	16.45	**16.30**	17.86	18.40		0
EC	Electrical Conductivity	mS/cm	4	0.05	0.07	0.252	**0.12**	0.38	0.72	0.30	1
pH	pH	pH	4	6.38	6.42	6.91	**6.93**	7.40	7.41	6.50	2
DO%	Dissolved Oxygen	%	4	10.00	43.12	55.23	**68.35**	72.58	74.20		0
TN	Total Nitrogen	mg/L	4	0.20	0.26	0.70	**0.35**	1.00	1.90	1.20	1
TKN	Total Kej Nitrogen	mg/L	4	0.20	0.20	0.65	**0.25**	0.94	1.90		0
NH3-N	Ammonia as N	mg/L	4	0.01	0.01	0.04	**0.01**	0.06	0.13	1.90	0
NO_3-N	Nitrate as N	mg/L	4	0.02	0.02	0.03	**0.03**	0.04	0.06	0.70	0
NO2-N	Nitrite as N	mg/L	4	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	4	0.05	0.11	0.26	**0.25**	0.40	0.50	0.07	3
PO4-	Phosphate as P	mg/L	4	0.01	0.01	0.01	**0.01**	0.01	0.01	0.04	0
As	Arsenic	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	4	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00140	0
Pb	Lead	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	4	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	4	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	4	0.01200	0.01320	0.02500	**0.01950**	0.03460	0.04900	0.00800	4
Nox	Nox	mg/L	4	0.02	0.02	0.03	**0.03**	0.05	0.06	0.15	0

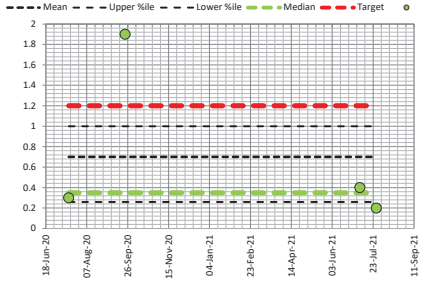
pH



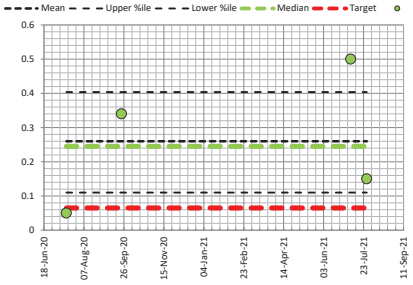
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

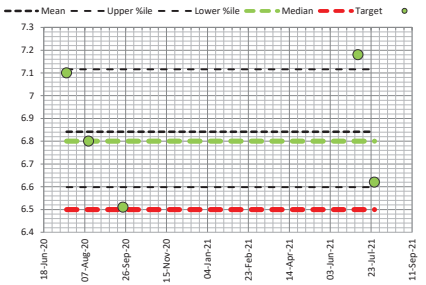
SW12 Surface Water Monitoring Site 12

Easting 392117 | Northing 6447052 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

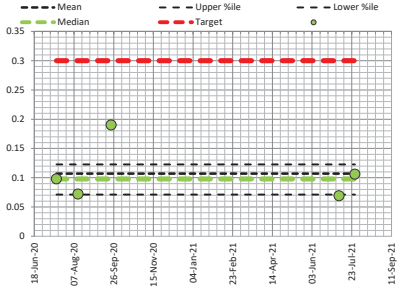
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	14.60	14.92	17.04	**15.50**	17.98	23.50		0
EC	Electrical Conductivity	mS/cm	5	0.07	0.07	0.107	**0.10**	0.12	0.19	0.30	0
pH	pH	pH	5	6.51	6.60	6.84	**6.80**	7.12	7.18	6.50	5
DO%	Dissolved Oxygen	%	5	34.50	44.90	59.22	**70.10**	71.64	72.60		0
TN	Total Nitrogen	mg/L	5	0.10	0.18	0.34	**0.30**	0.46	0.70	1.20	0
TKN	Total Kej Nitrogen	mg/L	5	0.10	0.18	0.26	**0.20**	0.34	0.50		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.02	**0.02**	0.03	0.06	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.03	0.04	0.06	**0.05**	0.07	0.12	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.05	**0.05**	0.05	0.06	0.07	0
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.02	0.04	0
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00140	**0.00100**	0.00140	0.00300	0.00140	1
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.01200	0.01840	0.07640	**0.02600**	0.09120	0.28000	0.00800	5
Nox	Nox	mg/L	5	0.03	0.04	0.06	**0.05**	0.08	0.12	0.15	0

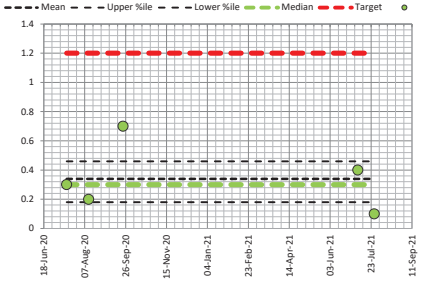
pH



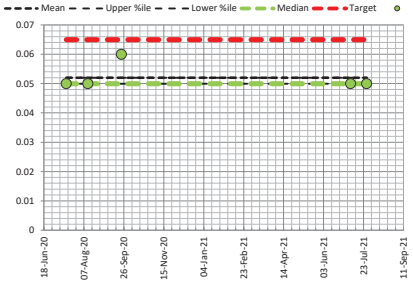
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

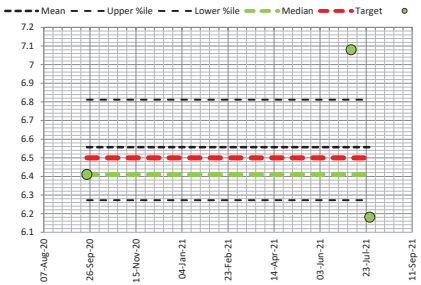
SW13 Surface Water Monitoring Site 13

Easting 391955 | Northing 6446453 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

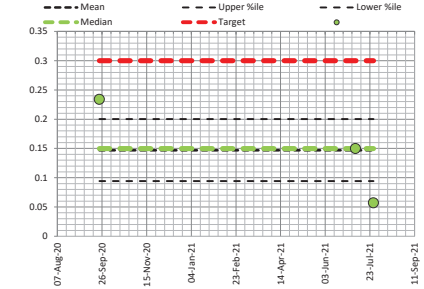
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	3	14.30	14.46	16.87	**14.70**	18.84	21.60		0
EC	Electrical Conductivity	mS/cm	3	0.06	0.09	0.147	**0.15**	0.20	0.23	0.30	0
pH	pH	pH	3	6.18	6.27	6.56	**6.41**	6.81	7.08	6.50	1
DO%	Dissolved Oxygen	%	3	16.80	38.52	53.07	**71.10**	71.22	71.30		0
TN	Total Nitrogen	mg/L	3	0.20	0.28	0.50	**0.40**	0.70	0.90	1.20	0
TKN	Total Kej Nitrogen	mg/L	3	0.20	0.28	0.47	**0.40**	0.64	0.80		0
NH3-N	Ammonia as N	mg/L	3	0.01	0.01	0.02	**0.01**	0.03	0.05	1.90	0
NO_3-N	Nitrate as N	mg/L	3	0.01	0.01	0.01	**0.01**	0.01	0.01	0.70	0
NO2-N	Nitrite as N	mg/L	3	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	3	0.05	0.05	0.10	**0.05**	0.15	0.21	0.07	1
PO4-	Phosphate as P	mg/L	3	0.00	0.01	0.01	**0.01**	0.02	0.02	0.04	0
As	Arsenic	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	3	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	3	0.00100	0.00100	0.00200	**0.00100**	0.00280	0.00400	0.00140	1
Pb	Lead	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	3	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	3	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	3	0.01000	0.02280	0.11733	**0.04200**	0.19680	0.30000	0.00800	3
Nox	Nox	mg/L	3	0.01	0.01	0.01	**0.01**	0.01	0.01	0.15	0

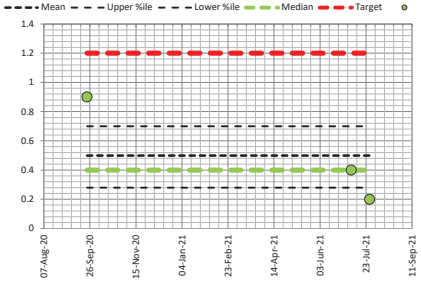
pH



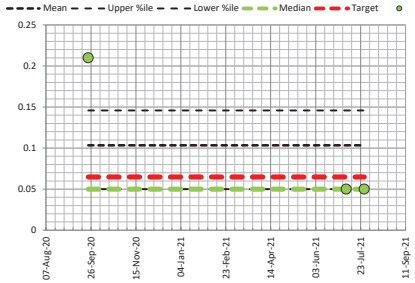
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

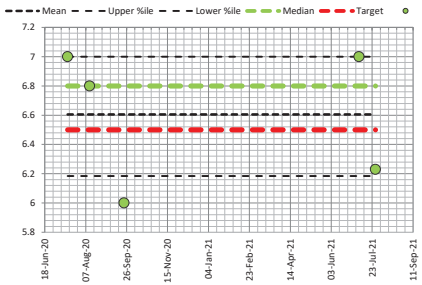
SW14 Surface Water Monitoring Site 14

Easting 391929 | Northing 6446612 | Data Analysis Period Start Date 1/06/2020 | Data Analysis Period End Date 31/12/2021

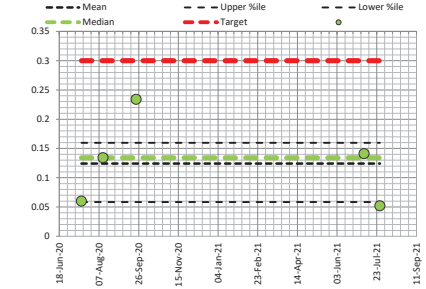
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	14.10	14.34	15.76	**15.70**	17.18	17.50		0
EC	Electrical Conductivity	mS/cm	5	0.05	0.06	0.124	**0.13**	0.16	0.23	0.30	0
pH	pH	pH	5	6.00	6.18	6.61	**6.80**	7.00	7.00	6.50	3
DO%	Dissolved Oxygen	%	5	19.60	40.64	51.38	**53.20**	61.90	81.10		0
TN	Total Nitrogen	mg/L	5	0.20	0.20	0.46	**0.40**	0.60	1.00	1.20	0
TKN	Total Kej Nitrogen	mg/L	5	0.20	0.20	0.44	**0.40**	0.52	1.00		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.02	0.04	**0.03**	0.06	0.08	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.01	0.01	0.02	**0.02**	0.03	0.06	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.12	**0.05**	0.12	0.37	0.07	1
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.05	**0.01**	0.06	0.18	0.04	1
As	Arsenic	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00140	**0.00100**	0.00200	0.00200	0.00140	2
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.00800	0.01200	0.05260	**0.03600**	0.06880	0.16000	0.00800	4
Nox	Nox	mg/L	5	0.01	0.01	0.02	**0.02**	0.03	0.07	0.15	0

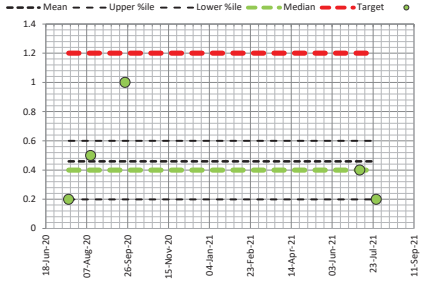
pH



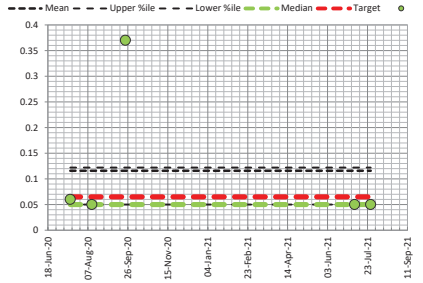
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

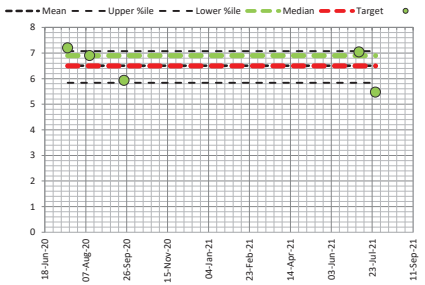
SW15 Surface Water Monitoring Site 15

Easting 391989
Northing 6446845
Data Analysis Period Start Date 1/06/2020
Data Analysis Period End Date 31/12/2021

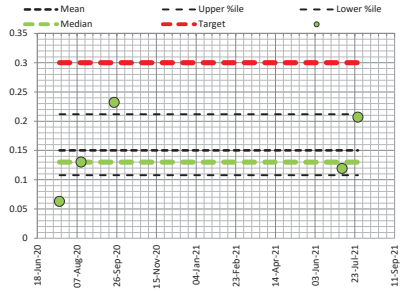
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	5	14.40	14.96	15.80	**15.30**	16.38	18.30		0
EC	Electrical Conductivity	mS/cm	5	0.06	0.11	0.150	**0.13**	0.21	0.23	0.30	0
pH	pH	pH	5	5.47	5.84	6.51	**6.90**	7.07	7.20	6.50	3
DO%	Dissolved Oxygen	%	5	13.10	43.50	55.96	**64.10**	72.60	81.00		0
TN	Total Nitrogen	mg/L	5	0.10	0.18	0.44	**0.20**	0.58	1.30	1.20	1
TKN	Total Kej Nitrogen	mg/L	5	0.10	0.18	0.42	**0.20**	0.50	1.30		0
NH3-N	Ammonia as N	mg/L	5	0.01	0.01	0.07	**0.03**	0.10	0.26	1.90	0
NO_3-N	Nitrate as N	mg/L	5	0.01	0.01	0.02	**0.01**	0.03	0.07	0.70	0
NO2-N	Nitrite as N	mg/L	5	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	5	0.05	0.05	0.14	**0.05**	0.14	0.48	0.07	1
PO4-	Phosphate as P	mg/L	5	0.01	0.01	0.04	**0.01**	0.04	0.19	0.04	1
As	Arsenic	mg/L	5	0.00100	0.00100	0.00120	**0.00100**	0.00120	0.00200	0.02400	0
Cd	Cadmium	mg/L	5	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	5	0.00100	0.00100	0.00160	**0.00100**	0.00220	0.00300	0.00140	2
Pb	Lead	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	5	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	5	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	5	0.00700	0.04220	0.05740	**0.05300**	0.08560	0.09200	0.00800	4
Nox	Nox	mg/L	5	0.01	0.01	0.03	**0.01**	0.03	0.09	0.15	0

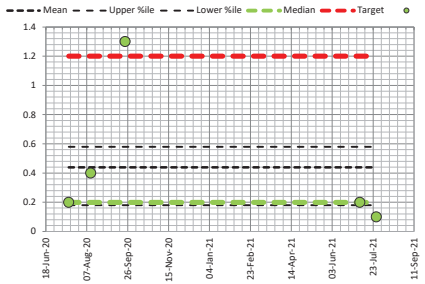
pH



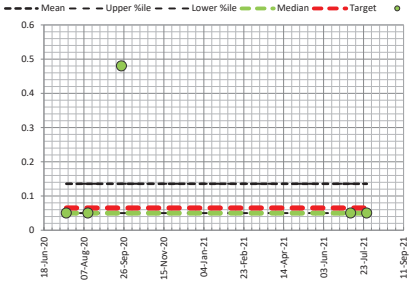
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
Field Data Analysis & Evaluation System

H20002 Glen Iris GC

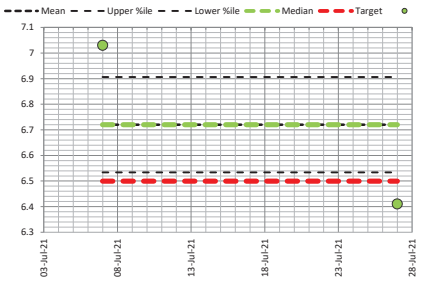
SW16 Surface Water Monitoring Site 16

Easting
Northing
Data Analysis Period Start Date 1/06/2020
Data Analysis Period End Date 31/12/2021

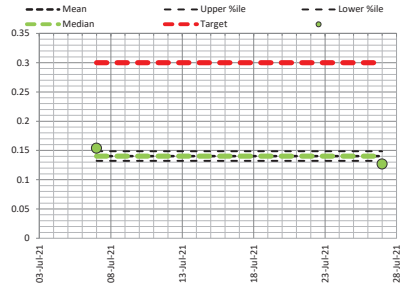
Report Date : 28/08/2023

Parameter	Description	Units	Samples	Minimum	Low %ile 20	Mean	Median	High %ile 80	Maximum	Target ANZECC 95%	Times Exceeded
GWL bTOC	GW Level below Top of Casing	mBTOC	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
GWL mAHD	Groundwater Level mAHD	mAHD	0	0.00	0.00	0.00	**0.00**	0.00	0.00		0
T	Temperature	°C	2	13.60	13.82	14.15	**14.15**	14.48	14.70		0
EC	Electrical Conductivity	mS/cm	2	0.13	0.13	0.141	**0.14**	0.15	0.15	0.30	0
pH	pH	pH	2	6.41	6.53	6.72	**6.72**	6.91	7.03	6.50	1
DO%	Dissolved Oxygen	%	2	50.60	54.88	61.30	**61.30**	67.72	72.00		0
TN	Total Nitrogen	mg/L	2	0.40	0.42	0.45	**0.45**	0.48	0.50	1.20	0
TKN	Total Kej Nitrogen	mg/L	2	0.40	0.40	0.40	**0.40**	0.40	0.40		0
NH3-N	Ammonia as N	mg/L	2	0.03	0.03	0.04	**0.04**	0.04	0.04	1.90	0
NO_3-N	Nitrate as N	mg/L	2	0.02	0.03	0.04	**0.04**	0.06	0.07	0.70	0
NO2-N	Nitrite as N	mg/L	2	0.01	0.01	0.01	**0.01**	0.01	0.01		0
TP	Total Phosphorous	mg/L	2	0.05	0.05	0.06	**0.06**	0.06	0.06	0.07	0
PO4-	Phosphate as P	mg/L	2	0.01	0.01	0.02	**0.02**	0.02	0.02	0.04	0
As	Arsenic	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.02400	0
Cd	Cadmium	mg/L	2	0.00010	0.00010	0.00010	**0.00010**	0.00010	0.00010	0.00020	0
Cr	Chromium	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00100	0
Cu	Copper	mg/L	2	0.00100	0.00120	0.00150	**0.00150**	0.00180	0.00200	0.00140	1
Pb	Lead	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.00340	0
Hg	Mercury	mg/L	2	0.00005	0.00005	0.00005	**0.00005**	0.00005	0.00005	0.00060	0
Ni	Nickel	mg/L	2	0.00100	0.00100	0.00100	**0.00100**	0.00100	0.00100	0.01100	0
Zn	Zinc	mg/L	2	0.03200	0.03440	0.03800	**0.03800**	0.04160	0.04400	0.00800	2
Nox	Nox	mg/L	2	0.03	0.03	0.05	**0.05**	0.06	0.07	0.15	0

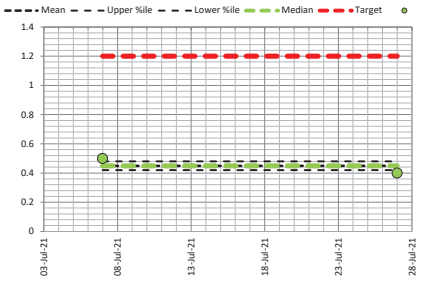
pH



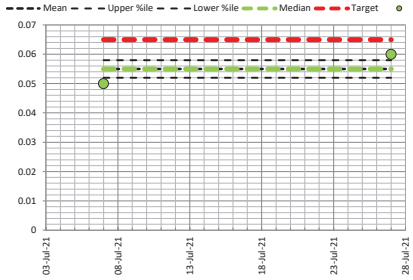
Electrical Conductivity



Total Nitrogen



Total Phosphorous



FieldDAE
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Field Data Analysis & Evaluation System

Water Quality Monitoring Data

	Site Name/Type	Date	Site	Monitored By	Monitoring Comment	GWL bTOC mBTOC	GWL mAHD mAHD	T °C	EC mS/cm	pH pH	DO% %	TN mg/L	TKN mg/L	NH3-N mg/L	NO_3-N mg/L	NO2-N mg/L	TP mg/L	PO4- mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Ni mg/L	Zn mg/L	Nox mg/L
1	Site Monitoring Bore 1	17/06/2020	MW1	SO		8.74	22.79																				
2	Site Monitoring Bore 2	17/06/2020	MW2	SO		5.37	22.45																				
3	Site Monitoring Bore 3	17/06/2020	MW3	SO		8.49	21.84																				
4	Site Monitoring Bore 4	17/06/2020	MW4	SO		4.25	22.02																				
5	Site Monitoring Bore 5	17/06/2020	MW5	SO		4.64	22.80																				
6	Site Monitoring Bore 6	17/06/2020	MW6	SO		6.56	22.60																				
7	Site Monitoring Bore 7	17/06/2020	MW7	SO		5.67	22.63																				
8	Site Monitoring Bore 8	17/06/2020	MW8	SO		3.50	23.22																				
9	Site Monitoring Bore 9	17/06/2020	MW9	SO		5.85	22.58																				
10	DWER Bore 1	17/06/2020	J310	SO		3.13	23.56																				
11	DWER Bore 2	17/06/2020	JM45A	SO		3.91	24.02																				
12	DWER Bore 3	17/06/2020	JM2	SO		6.19	22.04																				
13	DWER Bore 4	17/06/2020	JM12	SO		13.23	21.45																				
14	Site Monitoring Bore 1	16/07/2020	MW1	SO and SS		8.71	22.82	19.10	0.600	6.00	18.2	0.800	0.400	0.012	0.420	0.007	0.050	0.005	0.001	0.0001	0.001	0.011	0.002	0.00005	0.007	0.063	0.427
15	Site Monitoring Bore 2	16/07/2020	MW2	SO and SS		5.32	22.50	19.00	0.127	6.40	18.2	0.300	0.300	0.005	0.031	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.002	0.00005	0.001	0.002	0.036
16	Site Monitoring Bore 3	16/07/2020	MW3	SO and SS		8.44	21.89	19.10	0.529	5.30	72.8	1.500	0.200	0.005	1.300	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	1.305
17	Site Monitoring Bore 4	16/07/2020	MW4	SO and SS		4.13	22.14	19.30	0.555	6.00	24.3	0.800	0.800	0.210	0.005	0.005	0.050	0.005	0.010	0.0001	0.001	0.001	0.001	0.00005	0.001	0.002	0.010
18	Site Monitoring Bore 5	16/07/2020	MW5	SO and SS		4.58	22.86	18.90	0.684	4.50	33.6	1.400	1.400	0.490	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.036	0.010
19	Site Monitoring Bore 6	16/07/2020	MW6	SO and SS		6.44	22.72	18.90	0.653	4.70	28.5	1.500	1.200	0.300	0.270	0.005	0.150	0.005	0.004	0.0001	0.001	0.002	0.001	0.00005	0.001	0.020	0.275
20	Site Monitoring Bore 7	16/07/2020	MW7	SO and SS		5.54	22.76	18.90	0.505	5.80	34.7	1.200	0.700	0.110	0.510	0.008	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.015	0.518
21	Site Monitoring Bore 8	16/07/2020	MW8	SO and SS		3.42	23.30	20.30	0.255	6.00	28.8	0.800	0.800	0.150	0.011	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.005	0.016
22	Site Monitoring Bore 9	16/07/2020	MW9	SO and SS		5.72	22.71	19.80	0.498	5.30	29.7	1.100	1.100	0.620	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.010	0.010
23	DWER Bore 2	16/07/2020	JM45A	SO and SS		3.83	24.10																				
24	DWER Bore 3	16/07/2020	JM2	SO and SS		6.09	22.14																				
25	DWER Bore 4	16/07/2020	JM12	SO and SS		13.12	21.56																				
26	Surface Water Monitoring Site 1	16/07/2020	SW1	SO and SS	Flowing			15.80	0.047	6.90	82.2	0.200	0.200	0.014	0.028	0.007	0.050	0.011	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.002	0.035
27	Surface Water Monitoring Site 3	16/07/2020	SW3	SO and SS	Flowing			17.00	0.082	6.90	74.0	0.300	0.300	0.016	0.020	0.005	0.050	0.026	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.005	0.025
28	Surface Water Monitoring Site 4	16/07/2020	SW4	SO and SS	Bubble up pond			16.00	0.072	7.10	73.1	0.300	0.300	0.022	0.037	0.006	0.050	0.044	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.004	0.043
29	Surface Water Monitoring Site 6	16/07/2020	SW6	SO and SS	Bubble up pond			16.20	0.039	7.00	72.4	0.200	0.100	0.005	0.042	0.005	0.050	0.008	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.003	0.047
30	Surface Water Monitoring Site 7	16/07/2020	SW7	SO and SS	Bubble up pond			16.90	0.083	6.60	41.5	0.200	0.200	0.020	0.049	0.005	0.050	0.012	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.005	0.054
31	Surface Water Monitoring Site 8	16/07/2020	SW8	SO and SS	Bubble up pond			16.50	0.059	6.70	60.6	0.500	0.500	0.005	0.037	0.005	0.050	0.009	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.006	0.042
32	Surface Water Monitoring Site 9	16/07/2020	SW9	SO and SS	Flowing			15.80	0.060	6.70	81.8	1.600	1.600	0.005	0.013	0.005	0.150	0.023	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.013	0.018
33	Surface Water Monitoring Site 10	16/07/2020	SW10	SO and SS	Bubble up pond			16.80	0.070	6.70	69.9	0.600	0.600	0.005	0.014	0.006	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.007	0.020
34	Surface Water Monitoring Site 11	16/07/2020	SW11	SO and SS	Bubble up pond			17.50	0.721	7.40	65.2	0.300	0.200	0.006	0.033	0.005	0.050	0.007	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.012	0.038
35	Surface Water Monitoring Site 12	16/07/2020	SW12	SO and SS	Flowing			16.60	0.098	7.10	72.6	0.300	0.200	0.024	0.062	0.007	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.012	0.069
36	Surface Water Monitoring Site 14	16/07/2020	SW14	SO and SS	Bubble up pond			17.50	0.060	7.00	81.1	0.200	0.200	0.019	0.015	0.005	0.060	0.034	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.013	0.020
37	Surface Water Monitoring Site 15	16/07/2020	SW15	SO and SS	Bubble up pond			18.30	0.063	7.20	81.0	0.200	0.200	0.029	0.015	0.006	0.050	0.008	0.002	0.0001	0.001	0.001	0.001	0.00005	0.001	0.007	0.021
38	Site Monitoring Bore 1	12/08/2020	MW1	SO		8.54	22.99																				
39	Site Monitoring Bore 3	12/08/2020	MW3	SO		8.37	21.96																				
40	Site Monitoring Bore 4	12/08/2020	MW4	SO		3.98	22.29																				
41	Site Monitoring Bore 5	12/08/2020	MW5	SO		4.39	23.05																				
42	Site Monitoring Bore 6	12/08/2020	MW6	SO		6.27	22.89																				
43	Site Monitoring Bore 7	12/08/2020	MW7	SO		5.36	22.94																				
44	Site Monitoring Bore 8	12/08/2020	MW8	SO		3.25	23.47																				
45	Site Monitoring Bore 9	12/08/2020	MW9	SO		5.39	23.04																				
46	DWER Bore 1	16/08/2020	J310	SO		2.89	23.81																				
47	DWER Bore 2	12/08/2020	JM45A	SO		3.67	24.26																				
48	DWER Bore 3	12/08/2020	JM2	SO		5.95	22.28																				
49	DWER Bore 4	12/08/2020	JM12	SO		12.92	21.76																				
50	Surface Water Monitoring Site 1	12/08/2020	SW1	SO				16.30	0.141	6.90	52.5	0.300	0.200	0.014	0.056	0.005	0.050	0.009	0.001	0.0001	0.001	0.003	0.001	0.00005	0.001	0.012	0.061
51	Surface Water Monitoring Site 4	12/08/2020	SW4	SO				14.70	0.074	6.70	24.3	0.300	0.300	0.005	0.013	0.005	0.050	0.039	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.009	0.018
52	Surface Water Monitoring Site 7	12/08/2020	SW7	SO				15.00	0.068	6.70	35.8	0.200	0.200	0.014	0.056	0.005	0.050	0.009	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.007	0.061
53	Surface Water Monitoring Site 8	12/08/2020	SW8	SO				15.40	0.073	6.60	33.2	0.200	0.100	0.011	0.044	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.006	0.049
54	Surface Water Monitoring Site 9	12/08/2020	SW9	SO				14.20	0.123	6.80	18.7	0.300	0.300	0.005	0.005	0.005	0.050	0.016	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.007	0.010
55	Surface Water Monitoring Site 10	12/08/2020	SW10	SO				15.20	0.069	6.60	36.7	0.300	0.200	0.007	0.076	0.005	0.300	0.012	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.043	0.081
56	Surface Water Monitoring Site 12	12/08/2020	SW12	SO				15.50	0.072	6.80	47.5	0.200	0.200	0.011	0.049	0.005	0.050	0.012	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.044	0.054
57	Surface Water Monitoring Site 14	12/08/2020	SW14	SO				15.70	0.134	6.80	45.9	0.500	0.400	0.052	0.060	0.008	0.050	0.013	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.046	0.068
58	Surface Water Monitoring Site 15	12/08/2020	SW15	SO				15.30	0.130	6.90	51.1	0.400	0.300	0.056	0.074	0.011	0.050	0.006	0.001	0.0001	0.001	0.003	0.001	0.00005	0.001	0.051	0.085

FieldDAE
Field Data Analysis & Evaluation System

Water Quality Monitoring Data

	Site Name/Type	Date	Site	Monitored By	Monitoring Comment	GWL bTOC mBTOC	GWL mAHD mAHD	T °C	EC mS/cm	pH pH	DO% %	TN mg/L	TKN mg/L	NH3-N mg/L	NO_3-N mg/L	NO2-N mg/L	TP mg/L	PO4- mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Ni mg/L	Zn mg/L	Nox mg/L
59	Site Monitoring Bore 1	23/09/2020	MW1	SO and ASM		8.38	23.15																				
60	Site Monitoring Bore 2	23/09/2020	MW2	SO and ASM		5.08	22.74																				
61	Site Monitoring Bore 3	23/09/2020	MW3	SO and ASM		8.22	22.11																				
62	Site Monitoring Bore 4	23/09/2020	MW4	SO and ASM		3.85	22.42																				
63	Site Monitoring Bore 5	23/09/2020	MW5	SO and ASM		4.22	23.22																				
64	Site Monitoring Bore 6	23/09/2020	MW6	SO and ASM		6.03	23.13																				
65	Site Monitoring Bore 7	23/09/2020	MW7	SO and ASM		5.14	23.16																				
66	Site Monitoring Bore 8	23/09/2020	MW8	SO and ASM		3.06	23.66																				
67	Site Monitoring Bore 9	23/09/2020	MW9	SO and ASM		5.22	23.21																				
68	DWER Bore 1	8/09/2020	J310	SO and ASM		2.65	24.05																				
69	DWER Bore 2	23/09/2020	JM45A	SO and ASM		3.54	24.39																				
70	DWER Bore 3	23/09/2020	JM2	SO and ASM		5.83	22.40																				
71	DWER Bore 4	23/09/2020	JM12	SO and ASM		12.81	21.87																				
72	Surface Water Monitoring Site 1	23/09/2020	SW1	SO and ASM				17.80	0.231	7.06	58.0	0.300	0.200	0.011	0.100	0.005	0.070	0.042	0.001	0.0001	0.001	0.100	0.001	0.00005	0.006	0.059	0.110
73	Surface Water Monitoring Site 4	23/09/2020	SW4	SO and ASM				18.30	0.224	6.62	13.6	0.600	0.600	0.110	0.005	0.005	0.190	0.110	0.001	0.0001	0.001	0.004	0.001	0.00005	0.001	0.016	0.005
74	Surface Water Monitoring Site 7	23/09/2020	SW7	SO and ASM				16.70	0.162	6.57	11.4	0.400	0.400	0.100	0.068	0.013	0.180	0.043	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.007	0.081
75	Surface Water Monitoring Site 8	23/09/2020	SW8	SO and ASM				17.70	0.163	6.34	11.4	0.500	0.500	0.094	0.005	0.005	0.080	0.017	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.010	0.005
76	Surface Water Monitoring Site 9	23/09/2020	SW9	SO and ASM				16.70	0.224	6.36	6.2	0.800	0.800	0.013	0.005	0.005	0.140	0.033	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.012	0.005
77	Surface Water Monitoring Site 11	23/09/2020	SW11	SO and ASM				18.40	0.157	6.38	10.0	1.900	1.900	0.130	0.019	0.005	0.340	0.010	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.049	0.024
78	Surface Water Monitoring Site 12	23/09/2020	SW12	SO and ASM				23.50	0.190	6.51	34.5	0.700	0.500	0.061	0.120	0.005	0.060	0.023	0.001	0.0001	0.001	0.003	0.001	0.00005	0.001	0.280	0.120
79	Surface Water Monitoring Site 13	23/09/2020	SW13	SO and ASM				21.60	0.234	6.41	16.8	0.900	0.800	0.050	0.014	0.005	0.210	0.022	0.001	0.0001	0.001	0.004	0.001	0.00005	0.001	0.300	0.014
80	Surface Water Monitoring Site 14	23/09/2020	SW14	SO and ASM				17.10	0.234	6.00	19.6	1.000	1.000	0.078	0.005	0.005	0.370	0.180	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.160	0.005
81	Surface Water Monitoring Site 15	23/09/2020	SW15	SO and ASM				15.90	0.232	5.93	13.1	1.300	1.300	0.260	0.005	0.005	0.480	0.190	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.053	0.005
82	Site Monitoring Bore 1	22/10/2020	MW1	SG and SO		8.48	23.05	24.90	0.930	6.42	32.3	3.800	0.700	0.018	3.100	0.005	0.050	0.005	0.001	0.0001	0.001	0.072	0.004	0.00005	0.007	0.089	3.100
83	Site Monitoring Bore 2	22/10/2020	MW2	SG and SO		5.17	22.65	21.80	1.169	5.94	34.7	2.500	0.300	0.005	2.200	0.006	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	2.200
84	Site Monitoring Bore 3	22/10/2020	MW3	SG and SO		8.25	22.08	22.60	0.582	5.51	53.8	2.200	0.200	0.005	1.900	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.002	1.900
85	Site Monitoring Bore 4	22/10/2020	MW4	SG and SO		3.98	22.29	23.10	0.871	5.65	31.4	0.800	0.800	0.280	0.005	0.005	0.050	0.005	0.009	0.0001	0.001	0.001	0.001	0.00005	0.001	0.002	0.005
86	Site Monitoring Bore 5	22/10/2020	MW5	SG and SO		4.39	23.05	21.80	1.044	4.14	32.6	1.200	1.000	0.270	0.190	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.004	0.006	0.200
87	Site Monitoring Bore 6	22/10/2020	MW6	SG and SO		6.21	22.95	21.20	0.596	4.50	45.9	5.300	1.500	0.240	3.800	0.005	0.050	0.005	0.003	0.0001	0.002	0.001	0.001	0.00005	0.001	0.005	3.800
88	Site Monitoring Bore 7	22/10/2020	MW7	SG and SO		5.32	22.98	22.10	0.606	5.16	42.4	1.700	0.700	0.070	0.930	0.013	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.003	0.940
89	Site Monitoring Bore 8	22/10/2020	MW8	SG and SO		3.23	23.49	21.10	0.357	5.43	24.4	1.100	1.100	0.120	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.013	0.005
90	Site Monitoring Bore 9	22/10/2020	MW9	SG and SO		5.53	22.90	23.10	0.536	4.94	34.2	1.200	1.200	0.690	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.017	0.001	0.00005	0.001	0.004	0.005
91	DWER Bore 2	22/10/2020	JM45A	SG and SO		3.54	24.39																				
92	DWER Bore 3	22/10/2020	JM2	SG and SO		5.85	22.38																				
93	DWER Bore 4	22/10/2020	JM12	SG and SO		12.92	21.76																				
94	Site Monitoring Bore 1	26/11/2020	MW1	SO		8.54	22.99																				
95	Site Monitoring Bore 2	26/11/2020	MW2	SO		5.11	22.71																				
96	Site Monitoring Bore 3	26/11/2020	MW3	SO		8.22	22.11																				
97	Site Monitoring Bore 4	26/11/2020	MW4	SO		3.94	22.33																				
98	Site Monitoring Bore 5	26/11/2020	MW5	SO		4.24	23.20																				
99	Site Monitoring Bore 6	26/11/2020	MW6	SO		6.05	23.11																				
100	Site Monitoring Bore 7	26/11/2020	MW7	SO		5.18	23.12																				
101	Site Monitoring Bore 8	26/11/2020	MW8	SO		3.06	23.66																				
102	Site Monitoring Bore 9	26/11/2020	MW9	SO		5.02	23.41																				
103	DWER Bore 2	26/11/2020	JM45A	SO		3.68	24.25																				
104	DWER Bore 3	26/11/2020	JM2	SO		5.96	22.27																				
105	DWER Bore 4	26/11/2020	JM12	SO		12.89	21.79																				
106	Site Monitoring Bore 1	11/12/2020	MW1	SO and ASM		8.74	22.79																				
107	Site Monitoring Bore 2	11/12/2020	MW2	SO and ASM		5.19	22.63																				
108	Site Monitoring Bore 3	11/12/2020	MW3	SO and ASM		8.32	22.01																				
109	Site Monitoring Bore 4	11/12/2020	MW4	SO and ASM		4.02	22.25																				
110	Site Monitoring Bore 5	11/12/2020	MW5	SO and ASM		4.36	23.08																				
111	Site Monitoring Bore 6	11/12/2020	MW6	SO and ASM		6.17	22.99																				
112	Site Monitoring Bore 7	11/12/2020	MW7	SO and ASM		5.29	23.01																				
113	Site Monitoring Bore 8	11/12/2020	MW8	SO and ASM		3.20	23.52																				
114	Site Monitoring Bore 9	11/12/2020	MW9	SO and ASM		5.39	23.04																				
115	DWER Bore 2	11/12/2020	JM45A	SO and ASM		3.74	24.19																				
116	DWER Bore 3	11/12/2020	JM2	SO and ASM		6.11	22.12																				
117	DWER Bore 4	11/12/2020	JM12	SO and ASM		12.97	21.71																				
118	Site Monitoring Bore 1	27/01/2021	MW1	SO		9.02	22.51	21.40	0.626	6.49	29.4	1.400	0.400	0.011	1.000	0.005	0.050	0.005	0.001	0.0001	0.001	0.076	0.002	0.00005	0.007	0.065	1.000

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Water Quality Monitoring Data

	Site Name/Type	Date	Site	Monitored By	Monitoring Comment	GWL bTOC mBTOC	GWL mAHD mAHD	T °C	EC mS/cm	pH pH	DO% %	TN mg/L	TKN mg/L	NH3-N mg/L	NO_3-N mg/L	NO2-N mg/L	TP mg/L	PO4- mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Ni mg/L	Zn mg/L	Nox mg/L
119	Site Monitoring Bore 2	27/01/2021	MW2	SO		5.49	22.33	21.00	1.213	5.57	13.1	1.800	0.400	0.048	1.300	0.007	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	1.300
120	Site Monitoring Bore 3	27/01/2021	MW3	SO		8.57	21.76	22.40	0.642	5.61	41.6	2.600	0.400	0.005	2.200	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	2.200
121	Site Monitoring Bore 4	27/01/2021	MW4	SO		4.29	21.98	23.20	0.975	5.69	14.2	0.500	1.200	0.260	0.005	0.005	0.050	0.005	0.009	0.0001	0.001	0.001	0.003	0.00005	0.001	0.001	0.005
122	Site Monitoring Bore 5	27/01/2021	MW5	SO		4.62	22.82	22.40	0.590	4.45	13.3	1.400	1.400	0.450	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
123	Site Monitoring Bore 6	27/01/2021	MW6	SO		6.42	22.74	23.00	0.575	4.61	13.1	2.100	1.300	0.260	0.810	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.810
124	Site Monitoring Bore 7	27/01/2021	MW7	SO		5.55	22.75	22.50	0.549	5.26	10.5	2.100	1.200	0.040	0.910	0.024	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.930
125	Site Monitoring Bore 8	27/01/2021	MW8	SO		3.44	23.28	26.00	0.248	5.10	12.5	0.800	0.800	0.250	0.005	0.005	0.050	0.007	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
126	Site Monitoring Bore 9	27/01/2021	MW9	SO		5.49	22.94	23.90	0.563	4.99		1.100	1.100	0.540	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
127	DWER Bore 2	27/01/2021	JM45A	SO		3.96	23.97																				
128	DWER Bore 3	27/01/2021	JM2	SO		6.44	21.79																				
129	DWER Bore 4	27/01/2021	JM12	SO		13.22	21.46																				
130	Site Monitoring Bore 1	17/02/2021	MW1	SO		9.05	22.48																				
131	Site Monitoring Bore 2	17/02/2021	MW2	SO		5.44	22.38																				
132	Site Monitoring Bore 3	17/02/2021	MW3	SO		8.57	21.76																				
133	Site Monitoring Bore 4	17/02/2021	MW4	SO		4.26	22.01																				
134	Site Monitoring Bore 5	17/02/2021	MW5	SO		4.68	22.76																				
135	Site Monitoring Bore 6	17/02/2021	MW6	SO		6.51	22.65																				
136	Site Monitoring Bore 7	17/02/2021	MW7	SO		5.62	22.68																				
137	Site Monitoring Bore 8	17/02/2021	MW8	SO		3.50	23.22																				
138	Site Monitoring Bore 9	17/02/2021	MW9	SO		5.64	22.79																				
139	DWER Bore 2	17/02/2021	JM45A	SO		4.02	23.91																				
140	DWER Bore 3	17/02/2021	JM2	SO		6.46	21.77																				
141	DWER Bore 4	17/02/2021	JM12	SO		13.25	21.43																				
142	Site Monitoring Bore 1	30/03/2021	MW1	SO		9.14	22.39																				
143	Site Monitoring Bore 2	30/03/2021	MW2	SO		5.55	22.27																				
144	Site Monitoring Bore 3	30/03/2021	MW3	SO		8.64	21.69																				
145	Site Monitoring Bore 4	30/03/2021	MW4	SO		4.39	21.88																				
146	Site Monitoring Bore 5	30/03/2021	MW5	SO		4.76	22.68																				
147	Site Monitoring Bore 6	30/03/2021	MW6	SO		6.62	22.54																				
148	Site Monitoring Bore 7	30/03/2021	MW7	SO		5.73	22.57																				
149	Site Monitoring Bore 8	30/03/2021	MW8	SO		3.36	23.36																				
150	Site Monitoring Bore 9	30/03/2021	MW9	SO		5.68	22.75																				
151	DWER Bore 2	30/03/2021	JM45A	SO		4.12	23.81																				
152	DWER Bore 3	30/03/2021	JM2	SO	Corrected Reading	6.59	21.64																				
153	DWER Bore 4	30/03/2021	JM12	SO		13.33	21.35																				
154	Site Monitoring Bore 1	29/04/2021	MW1	SO & GR		9.15	22.38	21.40	0.570	6.460	35.000	0.400	0.400	0.053	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.100	0.003	0.00005	0.011	0.087	0.005
155	Site Monitoring Bore 2	29/04/2021	MW2	SO & GR		5.57	22.25	20.60	0.850	6.280	24.400	4.100	0.100	0.005	4.000	0.009	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	4.000
156	Site Monitoring Bore 3	29/04/2021	MW3	SO & GR		8.68	21.65	21.10	0.530	6.240	61.600	1.400	0.200	0.005	1.200	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.008	1.200
157	Site Monitoring Bore 4	29/04/2021	MW4	SO & GR		4.43	21.84	22.20	0.600	5.950	27.700	0.700	0.700	0.100	0.050	0.050	0.050	0.005	0.004	0.0001	0.001	0.001	0.002	0.00005	0.001	0.001	0.050
158	Site Monitoring Bore 5	29/04/2021	MW5	SO & GR		4.78	22.66	21.40	0.640	5.230	21.200	1.200	1.200	0.430	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
159	Site Monitoring Bore 6	29/04/2021	MW6	SO & GR		6.60	22.56	21.50	0.550	5.110	26.200	1.400	1.400	0.310	0.005	0.005	0.050	0.005	0.005	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
160	Site Monitoring Bore 7	29/04/2021	MW7	SO & GR		5.73	22.57	21.40	0.620	5.660	26.100	1.900	1.400	0.005	0.490	0.017	0.050	0.005	0.001	0.0001	0.002	0.004	0.001	0.00005	0.001	0.001	0.005
161	Site Monitoring Bore 8	29/04/2021	MW8	SO & GR		3.61	23.11	22.70	0.250	6.010	26.900	0.600	0.600	0.220	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.500
162	Site Monitoring Bore 9	29/04/2021	MW9	SO & GR		5.67	22.76	21.30	0.530	5.050	22.900	1.300	1.300	0.670	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
163	DWER Bore 2	29/04/2021	JM45A	SO & GR		4.19	23.74																				
164	DWER Bore 3	29/04/2021	JM2	SO & GR		6.58	21.65																				
165	DWER Bore 4	29/04/2021	JM12	SO & GR		13.39	21.29																				
166	Site Monitoring Bore 1	28/05/2021	MW1	SO & GR		9.06	22.47																				
167	Site Monitoring Bore 2	28/05/2021	MW2	SO & GR		5.44	22.38																				
168	Site Monitoring Bore 3	28/05/2021	MW3	SO & GR		8.60	21.73																				
169	Site Monitoring Bore 4	28/05/2021	MW4	SO & GR		4.28	21.99																				
170	Site Monitoring Bore 5	28/05/2021	MW5	SO & GR		4.73	22.71																				
171	Site Monitoring Bore 6	28/05/2021	MW6	SO & GR		6.60	22.56																				
172	Site Monitoring Bore 7	28/05/2021	MW7	SO & GR		5.72	22.58																				

FieldDAE
Field Data Analysis & Evaluation System

Water Quality Monitoring Data

	Site Name/Type	Date	Site	Monitored By	Monitoring Comment	GWL bTOC mBTOC	GWL mAHD mAHD	T °C	EC mS/cm	pH pH	DO% %	TN mg/L	TKN mg/L	NH3-N mg/L	NO_3-N mg/L	NO2-N mg/L	TP mg/L	PO4- mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Ni mg/L	Zn mg/L	Nox mg/L
173	Site Monitoring Bore 8	28/05/2021	MW8	SO & GR		3.63	23.09																				
174	Site Monitoring Bore 9	28/05/2021	MW9	SO & GR		5.78	22.65																				
175	DWER Bore 2	28/05/2021	JM45A	SO & GR		4.15	23.78																				
176	DWER Bore 3	28/05/2021	JM2	SO & GR		6.47	21.76																				
177	DWER Bore 4	28/05/2021	JM12	SO & GR		13.27	21.41																				
178	Surface Water Monitoring Site 1	7/07/2021	SW1	SO & GR				11.40	0.140	7.30	67.100	0.300	0.30	0.005	0.005	0.005	0.050	0.011	0.001	0.0001	0.001	0.004	0.001	0.00005	0.001	0.019	0.006
179	Surface Water Monitoring Site 2	7/07/2021	SW2	SO & GR				15.10	0.096	7.51	80.500	0.200	0.20	0.005	0.006	0.005	0.050	0.006	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.012	0.008
180	Surface Water Monitoring Site 4	7/07/2021	SW4	SO & GR				14.30	0.124	7.35	71.500	0.200	0.20	0.007	0.015	0.005	0.050	0.015	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.007	0.017
181	Surface Water Monitoring Site 5	7/07/2021	SW5	SO & GR				16.00	0.149	7.36	64.700	0.300	0.30	0.005	0.018	0.005	0.050	0.009	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.009	0.020
182	Surface Water Monitoring Site 6	7/07/2021	SW6	SO & GR				11.60	0.140	7.39	80.300	0.100	0.10	0.005	0.009	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.010	0.010
183	Surface Water Monitoring Site 7	7/07/2021	SW7	SO & GR				14.50	0.047	7.19	80.400	0.100	0.010	0.005	0.024	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.021	0.025
184	Surface Water Monitoring Site 8	7/07/2021	SW8	SO & GR				13.00	0.189	7.01	82.600	0.200	0.20	0.005	0.008	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.013	0.009
185	Surface Water Monitoring Site 9	7/07/2021	SW9	SO & GR				14.80	0.059	7.45	68.600	0.100	0.010	0.005	0.028	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.005	0.029
186	Surface Water Monitoring Site 10	7/07/2021	SW10	SO & GR				11.40	0.157	7.08	65.700	0.200	0.20	0.005	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.052	0.005
187	Surface Water Monitoring Site 11	7/07/2021	SW11	SO & GR				14.80	0.046	7.41	74.200	0.400	0.30	0.013	0.061	0.005	0.50	0.007	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.025	0.061
188	Surface Water Monitoring Site 12	7/07/2021	SW12	SO & GR				14.60	0.069	7.18	71.400	0.400	0.30	0.015	0.039	0.005	0.050	0.006	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.026	0.04
189	Surface Water Monitoring Site 13	7/07/2021	SW13	SO & GR				14.70	0.150	7.08	71.100	0.400	0.40	0.008	0.012	0.005	0.050	0.010	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.042	0.013
190	Surface Water Monitoring Site 14	7/07/2021	SW14	SO & GR				14.40	0.141	7.00	53.200	0.400	0.40	0.028	0.019	0.005	0.050	0.009	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.036	0.02
191	Surface Water Monitoring Site 15	7/07/2021	SW15	SO & GR				15.10	0.119	7.04	70.500	0.200	0.20	0.005	0.010	0.005	0.050	0.005	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.092	0.014
192	Surface Water Monitoring Site 16	7/07/2021	SW16	SO & GR				14.70	0.154	7.03	72.000	0.500	0.40	0.044	0.065	0.005	0.050	0.008	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.044	0.067
193	Site Monitoring Bore 1	7/07/2021	MW1	SO & GR		8.89	22.64																				
194	Site Monitoring Bore 2	7/07/2021	MW2	SO & GR		5.26	22.56																				
195	Site Monitoring Bore 3	7/07/2021	MW3	SO & GR		8.41	21.92																				
196	Site Monitoring Bore 4	7/07/2021	MW4	SO & GR		4.02	22.25																				
197	Site Monitoring Bore 5	7/07/2021	MW5	SO & GR		4.51	22.93																				
198	Site Monitoring Bore 6	7/07/2021	MW6	SO & GR		6.36	22.80																				
199	Site Monitoring Bore 7	7/07/2021	MW7	SO & GR		5.46	22.84																				
200	Site Monitoring Bore 8	7/07/2021	MW8	SO & GR		3.29	23.43																				
201	Site Monitoring Bore 9	7/07/2021	MW9	SO & GR		5.58	22.85																				
202	DWER Bore 2	7/07/2021	JM45A	SO & GR		3.87	24.06																				
203	DWER Bore 3	7/07/2021	JM2	SO & GR		6.23	22.00																				
204	DWER Bore 4	7/07/2021	JM12	SO & GR		12.99	21.69																				
205	Site Monitoring Bore 1	27/07/2021	MW1	SO & GR		8.43	23.10	19.40	0.745	5.57	37.500	2.2	0.4	0.008	1.800	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.008	1.800
206	Site Monitoring Bore 2	27/07/2021	MW2	SO & GR		4.86	22.96	18.00	1.098	5.69	32.400	3.5	0.4	0.029	3.100	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.002	0.00005	0.001	0.001	3.100
207	Site Monitoring Bore 3	27/07/2021	MW3	SO & GR		8.06	22.27	19.20	0.529	5.59	65.500	2.5	0.3	0.005	2.300	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.003	2.300
208	Site Monitoring Bore 4	27/07/2021	MW4	SO & GR		3.46	22.81	19.10	0.390	5.76	31.500	0.8	0.8	0.140	0.005	0.005	0.05	0.005	0.004	0.0001	0.001	0.001	0.002	0.00005	0.001	0.005	0.005
209	Site Monitoring Bore 5	27/07/2021	MW5	SO & GR		3.96	23.48	17.90	0.649	3.85	34.700	1.5	0.9	0.350	0.590	0.011	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.002	0.001	0.600
210	Site Monitoring Bore 6	27/07/2021	MW6	SO & GR		5.79	23.37	18.20	0.472	4.38	31.400	13.0	1.3	0.010	11.000	0.005	0.05	0.005	0.001	0.0001	0.002	0.002	0.001	0.00005	0.002	0.002	11.000
211	Site Monitoring Bore 7	27/07/2021	MW7	SO & GR		4.86	23.44	17.00	0.553	5.56	33.900	1.3	1.5	0.045	0.015	0.005	0.05	0.005	0.001	0.0001	0.002	0.002	0.001	0.00005	0.001	0.010	0.015
212	Site Monitoring Bore 8	27/07/2021	MW8	SO & GR		2.87	23.85	17.70	0.329	5.65	36.300	1.5	1.3	0.058	0.067	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.006	0.067
213	Site Monitoring Bore 9	27/07/2021	MW9	SO & GR		5.02	23.41	18.70	0.535	5.06	38.000	1.3	0.2	0.560	0.005	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.006	0.005
214	DWER Bore 2	27/07/2021	JM45A	SO & GR		3.35	24.58																				
215	DWER Bore 3	27/07/2021	JM2	SO & GR		5.69	22.54																				
216	DWER Bore 4	27/07/2021	JM12	SO & GR		12.52	22.16																				
217	Surface Water Monitoring Site 1	27/07/2021	SW1	SO & GR				14.50	0.486	6.11	68.300	0.2	0.2	0.005	0.012	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.016	0.013
218	Surface Water Monitoring Site 4	27/07/2021	SW4	SO & GR				15.50	0.218	6.18	68.400	0.2	0.2	0.008	0.030	0.005	0.05	0.009	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.013	0.031
219	Surface Water Monitoring Site 5	27/07/2021	SW5	SO & GR				15.80	0.131	6.86	59.500	0.2	0.2	0.014	0.026	0.005	0.13	0.007	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.006	0.028
220	Surface Water Monitoring Site 6	27/07/2021	SW6	SO & GR				15.10	0.098	6.96	71.400	0.1	0.1	0.016	0.009	0.005	0.05	0.005	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.003	0.010
221	Surface Water Monitoring Site 7	27/07/2021	SW7	SO & GR				15.40	0.085	6.30	64.400	0.1	0.1	0.005	0.029	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.007	0.030
222	Surface Water Monitoring Site 8	27/07/2021	SW8	SO & GR				15.50	0.056	6.31	59.900	0.1	0.1	0.005	0.041	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.005	0.042
223	Surface Water Monitoring Site 9	27/07/2021	SW9	SO & GR				14.10	0.148	6.34	64.000	0.1	0.1	0.005	0.005	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.013	0.005
224	Surface Water Monitoring Site 10	27/07/2021	SW10	SO & GR				15.10	0.235	6.29	44.600	0.2	0.2	0.005	0.005	0.005	0.08	0.008	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.052	0.005
225	Surface Water Monitoring Site 11	27/07/2021	SW11	SO & GR				15.10	0.085	6.45	71.500	0.2	0.2	0.005	0.015	0.005	0.15	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.014	0.016
226	Surface Water Monitoring Site 12	27/07/2021	SW12	SO & GR				15.00	0.106	6.62	70.100	0.1	0.1	0.005	0.026	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.020	0.027

FieldDAE
Field Data Analysis & Evaluation System

Water Quality Monitoring Data

	Site Name/Type	Date	Site	Monitored By	Monitoring Comment	GWL bTOC mBTOC	GWL mAHD mAHD	T °C	EC mS/cm	pH pH	DO% %	TN mg/L	TKN mg/L	NH3-N mg/L	NO_3-N mg/L	NO2-N mg/L	TP mg/L	PO4- mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Ni mg/L	Zn mg/L	Nox mg/L
227	Surface Water Monitoring Site 13	27/07/2021	SW13	SO & GR				14.30	0.057	6.18	71.300	0.2	0.2	0.009	0.005	0.005	0.05	0.003	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.010	0.005
228	Surface Water Monitoring Site 14	27/07/2021	SW14	SO & GR				14.10	0.052	6.23	57.100	0.2	0.2	0.005	0.005	0.005	0.05	0.014	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.008	0.005
229	Surface Water Monitoring Site 15	27/07/2021	SW15	SO & GR				14.40	0.207	5.47	64.100	0.1	0.1	0.005	0.005	0.005	0.05	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.084	0.005
230	Surface Water Monitoring Site 16	27/07/2021	SW16	SO & GR				13.60	0.127	6.41	50.600	0.4	0.4	0.030	0.023	0.005	0.06	0.023	0.001	0.0001	0.001	0.002	0.001	0.00005	0.001	0.032	0.025
231	Site Monitoring Bore 1	12/08/2021	MW1	SO & GR		8.17	23.36																				
232	Site Monitoring Bore 2	12/08/2021	MW2	SO & GR		4.72	23.10																				
233	Site Monitoring Bore 3	12/08/2021	MW3	SO & GR		7.89	22.44																				
234	Site Monitoring Bore 4	12/08/2021	MW4	SO & GR		3.28	22.99																				
235	Site Monitoring Bore 5	12/08/2021	MW5	SO & GR		3.75	23.69																				
236	Site Monitoring Bore 6	12/08/2021	MW6	SO & GR		5.52	23.64																				
237	Site Monitoring Bore 7	12/08/2021	MW7	SO & GR		4.60	23.70																				
238	Site Monitoring Bore 8	12/08/2021	MW8	SO & GR		2.49	24.23																				
239	Site Monitoring Bore 9	12/08/2021	MW9	SO & GR		4.84	23.59																				
240	DWER Bore 2	12/08/2021	JM45A	SO & GR		3.15	24.78																				
241	DWER Bore 3	12/08/2021	JM2	SO & GR		5.48	22.75																				
242	DWER Bore 4	12/08/2021	JM12	SO & GR		12.34	22.34																				
243	DWER Bore 1	27/10/2020	J310	WC		2.98	23.71																				
244	DWER Bore 1	26/11/2020	J310	WC		2.93	23.76																				
245	DWER Bore 1	10/12/2020	J310	WC		2.99	23.70																				
246	DWER Bore 1	8/01/2021	J310	WC		3.18	23.51																				
247	DWER Bore 1	4/02/2021	J310	WC		3.33	23.36																				
248	DWER Bore 1	30/06/2021	J310	WC		3.40	23.29																				
249	DWER Bore 1	28/07/2021	J310	WC		2.60	24.09																				
250	DWER Bore 1	31/08/2021	J310	WC		2.46	24.23																				
251	Site Monitoring Bore 1	30/09/2021	MW1	GR		8.12	23.41																				
252	Site Monitoring Bore 2	30/09/2021	MW2	GR		4.68	23.14																				
253	Site Monitoring Bore 3	30/09/2021	MW3	GR		7.76	22.57																				
254	Site Monitoring Bore 4	30/09/2021	MW4	GR		3.32	22.95																				
255	Site Monitoring Bore 5	30/09/2021	MW5	GR		3.74	23.70																				
256	Site Monitoring Bore 6	30/09/2021	MW6	GR		5.56	23.60																				
257	Site Monitoring Bore 7	30/09/2021	MW7	GR		4.63	23.67																				
258	Site Monitoring Bore 8	30/09/2021	MW8	GR		2.48	24.24																				
259	Site Monitoring Bore 9	30/09/2021	MW9	GR		4.76	23.67																				
260	DWER Bore 1	30/09/2021	J310	GR		2.47	24.22																				
261	DWER Bore 2	30/09/2021	JM45A	GR		3.06	24.87																				
262	DWER Bore 3	30/09/2021	JM2	GR		5.34	22.89																				
263	DWER Bore 4	30/09/2021	JM12	GR		12.29	22.39																				
264	Site Monitoring Bore 1	28/10/2021	MW1	GR & SO		7.26	24.27	20.10	0.609	6.64	33.600	0.70	0.5	0.11	0.250	0.005	0.050	0.012	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.027	0.250
265	Site Monitoring Bore 2	28/10/2021	MW2	GR & SO		4.59	23.23	18.90	0.607	6.12	28.930	0.40	0.2	0.005	0.190	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.190
266	Site Monitoring Bore 3	28/10/2021	MW3	GR & SO		7.67	22.66	19.10	0.480	5.80	62.840	2.70	0.2	0.005	2.400	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	2.400
267	Site Monitoring Bore 4	28/10/2021	MW4	GR & SO		3.29	22.98	20.00	0.501	6.07	31.000	1.10	1.1	0.21	0.050	0.050	0.050	0.005	0.003	0.0001	0.001	0.001	0.001	0.00005	0.002	0.001	0.050
268	Site Monitoring Bore 5	28/10/2021	MW5	GR & SO		3.63	23.81	19.10	0.954	4.31	31.530	1.30	1.3	0.41	0.006	0.005	0.050	0.005	0.002	0.0001	0.001	0.001	0.001	0.00005	0.004	0.001	0.011
269	Site Monitoring Bore 6	28/10/2021	MW6	GR & SO		5.52	23.64	18.90	0.488	5.21	30.220	5.00	0.9	0.16	3.700	0.430	0.050	0.005	0.001	0.0001	0.002	0.001	0.001	0.00005	0.002	0.001	4.100
270	Site Monitoring Bore 7	28/10/2021	MW7	GR & SO		4.60	23.70	18.60	0.770	5.68	22.980	1.70	1.7	0.15	0.005	0.005	0.050	0.006	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
271	Site Monitoring Bore 8	28/10/2021	MW8	GR & SO		2.44	24.28	19.70	0.290	6.24	19.340	1.00	1.0	0.07	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
272	Site Monitoring Bore 9	28/10/2021	MW9	GR & SO		4.80	23.63	19.80	0.362	5.38	30.880	1.30	1.3	0.64	0.005	0.005	0.050	0.005	0.001	0.0001	0.001	0.001	0.001	0.00005	0.001	0.001	0.005
273	DWER Bore 2	28/10/2021	JM45A	GR & SO		3.00	24.93																				
274	DWER Bore 3	28/10/2021	JM2	GR & SO		5.25	22.98																				
275	DWER Bore 4	28/10/2021	JM12	GR & SO		12.32	22.36																				
276	Site Monitoring Bore 1	1/12/2021	MW1	GR & SO		7.30	24.23																				
277	Site Monitoring Bore 2	1/12/2021	MW2	GR & SO		4.61	23.21																				
278	Site Monitoring Bore 3	1/12/2021	MW3	GR & SO		7.71	22.62																				
279	Site Monitoring Bore 4	1/12/2021	MW4	GR & SO		3.48	22.79																				
280	Site Monitoring Bore 5	1/12/2021	MW5	GR & SO		3.74	23.70																				

FieldDAE
Field Data Analysis & Evaluation System

Water Quality Monitoring Data

	Site Name/Type	Date	Site	Monitored By	Monitoring Comment	GWL bTOC mBTOC	GWL mAHD mAHD	T °C	EC mS/cm	pH pH	DO% %	TN mg/L	TKN mg/L	NH3-N mg/L	NO_3-N mg/L	NO2-N mg/L	TP mg/L	PO4- mg/L	As mg/L	Cd mg/L	Cr mg/L	Cu mg/L	Pb mg/L	Hg mg/L	Ni mg/L	Zn mg/L	Nox mg/L
281	Site Monitoring Bore 6	1/12/2021	MW6	GR & SO		5.54	23.62																				
282	Site Monitoring Bore 7	1/12/2021	MW7	GR & SO		4.68	23.62																				
283	Site Monitoring Bore 8	1/12/2021	MW8	GR & SO		2.47	24.25																				
284	DWER Bore 2	1/12/2021	JM45A	GR & SO		3.13	24.80																				
285	DWER Bore 3	1/12/2021	JM2	GR & SO		5.52	22.71																				
286	DWER Bore 4	1/12/2021	JM12	GR & SO		12.36	22.32																				

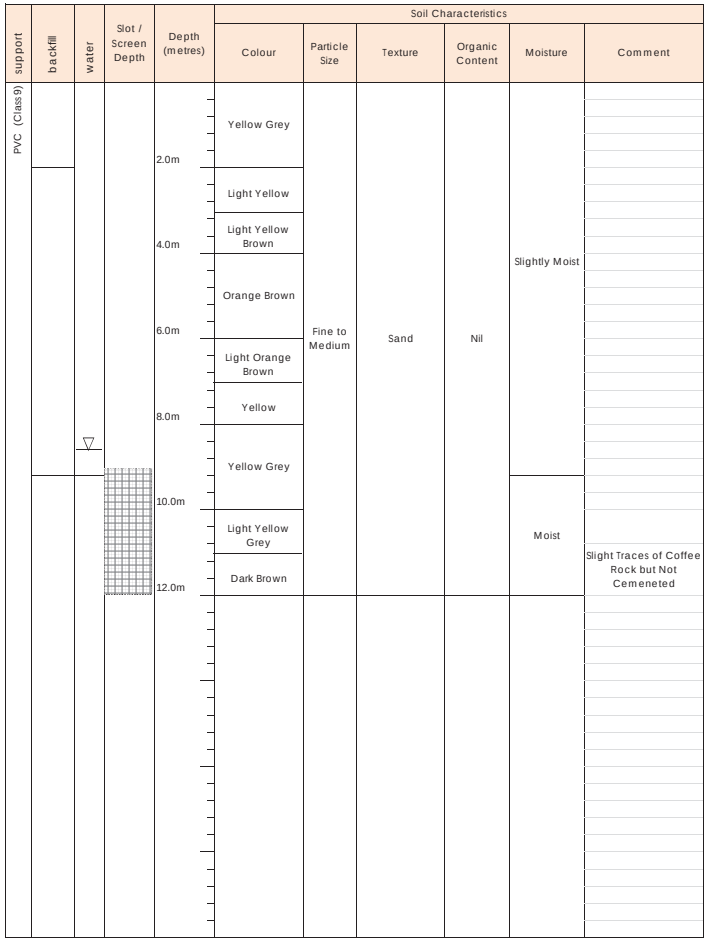
APPENDIX G
Lithological Logs

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	3/06/2020				Bore Name
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002		
Project:	Glen Iris LWMS	Start Hole :	9.30 am		
Easting	392219	End Hole :	10 am		MW1
Northing	6447400	Logged by :	SO		
Datum:	AHD	Total Depth :	12 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	31.53 mAHD		
Hole diameter:	2.5 Inch	RL Nat Surface :	30.93 mAHD		



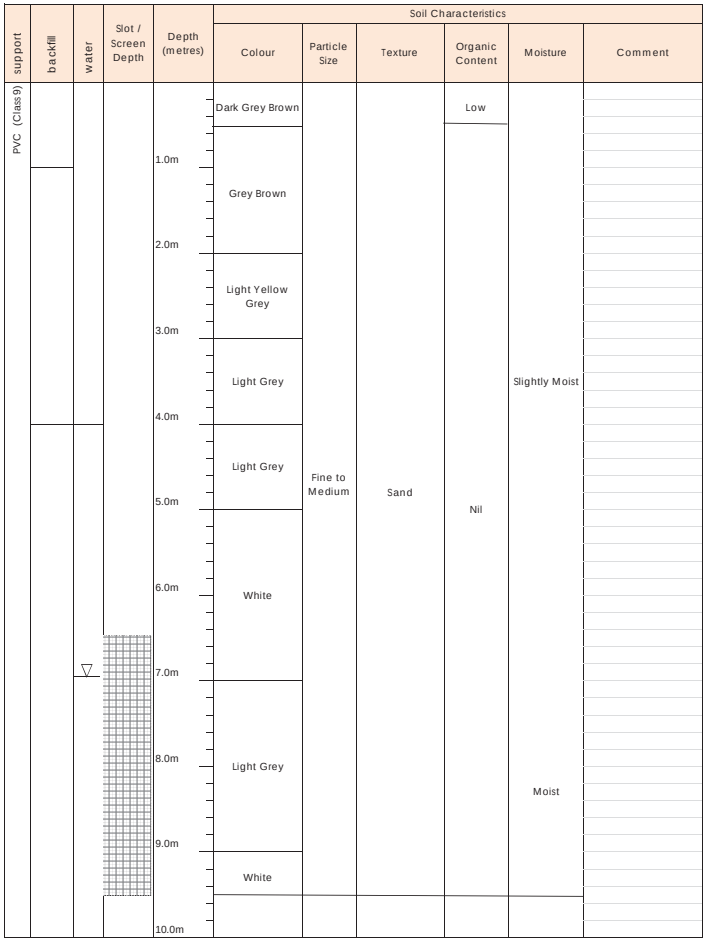
COLOUR :	Black, White, Biege Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	3/06/2020				Bore Name
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002		
Project:	Glen Iris LWMS	Start Hole :	10.15 am		
Easting	392008	End Hole :	10.45 am		MW2
Northing	6447916	Logged by :	SO		
Datum:	AHD	Total Depth :	9.5 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	27.82 mAHD		
Hole diameter:	2.5 Inch	RL Nat Surface :	27.22 mAHD		



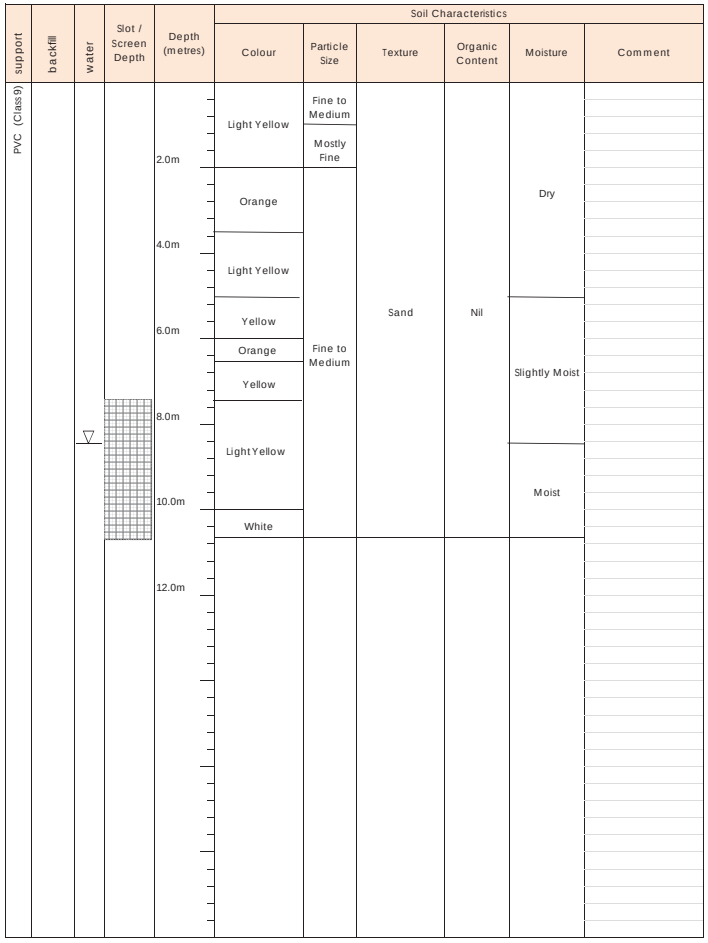
COLOUR :	Black, White, Biege Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	3/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	11.00 am		
Easting	391661	End Hole :	11.30 am	MW3	
Northing	6446084	Logged by :	SO		
Datum:	AHD	Total Depth :	11 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	30.33		
Hole diameter:	2.5 Inch	RL Nat Surface :	29.73		



COLOUR : Black, White, Biege
Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue
Composition : Solid , Blemish, Mottle

PARTICLE SIZE : Fine, Medium, Course

TEXTURE : Sand, Loamy Sand, Clayey Sand
Silt, Loam, Sandy Loam, Clayey Loam
Clay, Sandy Clay

ORGANICS : High, Medium, Low

MOISTURE : Dry, Slightly Moist, Moist, Saturated

Static Water Level

Date

Stickup above NS (m)

Water Level bTOC (m)

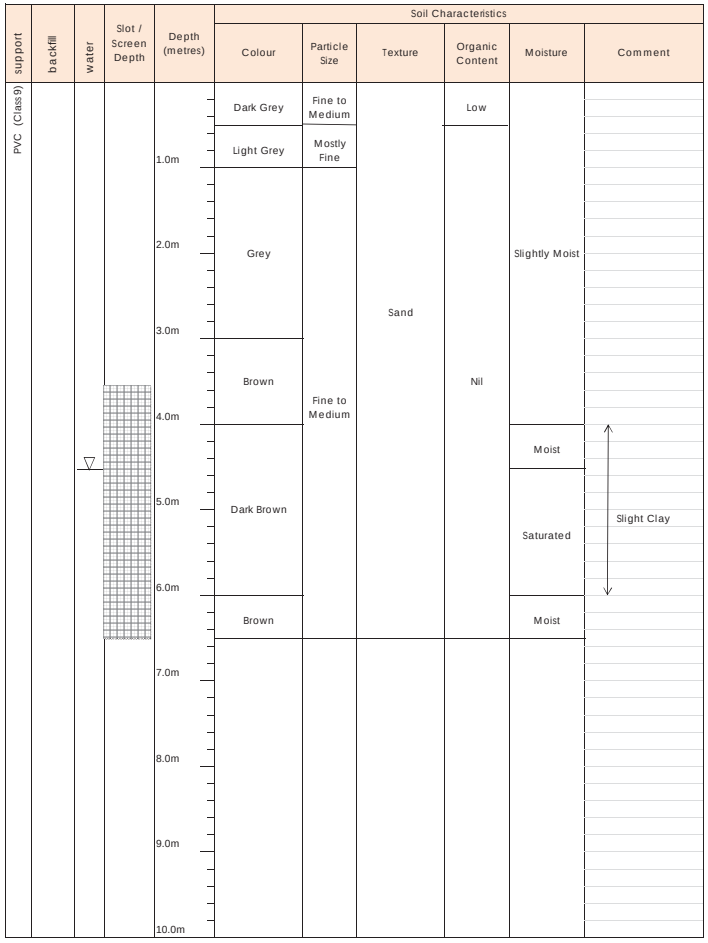
Water Level bNS (m)

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	3/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	11.45 am		
Easting	391708	End Hole :	12.15 pm	MW4	
Northing	6447579	Logged by :	SO		
Datum:	AHD	Total Depth :	6.5 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	26.27		
Hole diameter:	2.5 Inch	RL Nat Surface :	25.67		



COLOUR : Black, White, Biege
Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue
Composition : Solid , Blemish, Mottle

PARTICLE SIZE : Fine, Medium, Course

TEXTURE : Sand, Loamy Sand, Clayey Sand
Silt, Loam, Sandy Loam, Clayey Loam
Clay, Sandy Clay

ORGANICS : High, Medium, Low

MOISTURE : Dry, Slightly Moist, Moist, Saturated

Static Water Level

Date

Stickup above NS (m)

Water Level bTOC (m)

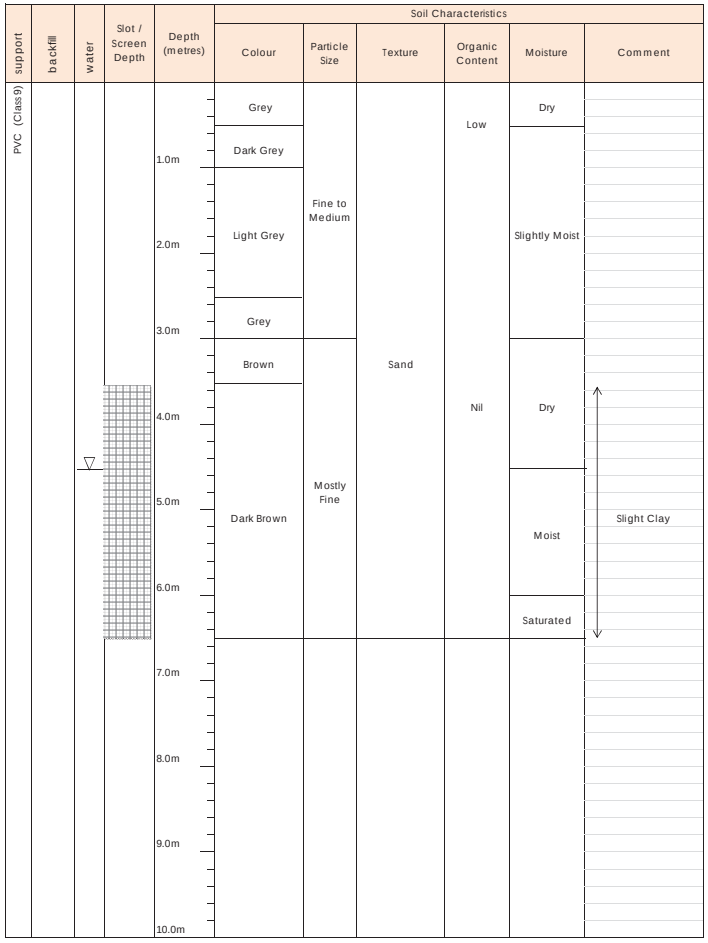
Water Level bNS (m)

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	3/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	12.30 pm		
Easting	392170	End Hole :	1.00 pm	MW5	
Northing	6447202	Logged by :	SO		
Datum:	AHD	Total Depth :	6.5 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	27.44		
Hole diameter:	2.5 Inch	RL Nat Surface :	26.84		



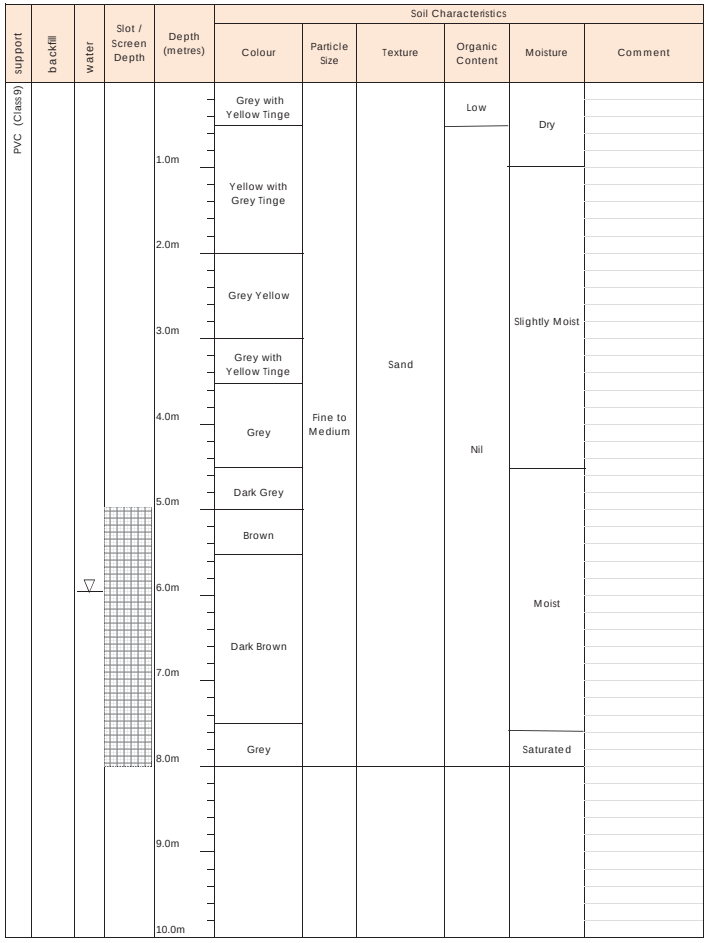
COLOUR :	Black, White, Beige Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date	
		Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	4/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	8.30 am		
Easting	392027	End Hole :	9.00 am	MW6	
Northing	6446878	Logged by :	SO		
Datum:	AHD	Total Depth :	8 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	29.16		
Hole diameter:	2.5 Inch	RL Nat Surface :	28.56		



COLOUR :	Black, White, Beige Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date	
		Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	4/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	7.45 am		
Easting	391965	End Hole :	8.15 am		
Northing	6446606	Logged by :	SO	MW7	
Datum:	AHD	Total Depth :	8 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	391965		
Hole diameter:	2.5 Inch	RL Nat Surface :	6446606		

support	backfill	water	Slot / Screen Depth	Depth (metres)	Soil Characteristics: Colour	Particle Size	Texture	Organic Content	Moisture	Comment
PVC (Class 9)		▽		1.0m	Brown Grey	Fine to Medium	Sand	Low	Slightly Moist	
				2.0m	Black			Nil		
				3.0m	Grey	Mostly Fine				Slightly Cemented but No Perched Layer
				4.0m	Dark Grey					
				5.0m	Brown	Fine to Medium			Moist	
				6.0m						
				7.0m	Light Brown					
				8.0m	White				Sat	
				9.0m						
				10.0m						

COLOUR :	Black, White, Biege Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date	
		Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

Date :	4/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	1.15 pm		
Easting	392151	End Hole :	1.45 pm		
Northing	6446249	Logged by :	SO	MW8	
Datum:	AHD	Total Depth :	5 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	26.72		
Hole diameter:	2.5 Inch	RL Nat Surface :	26.12		

support	backfill	water	Slot / Screen Depth	Depth (metres)	Soil Characteristics: Colour	Particle Size	Texture	Organic Content	Moisture	Comment
PVC (Class 9)		▽		1.0m	Dark Grey	Fine to Medium	Sand	High	Dry	
				2.0m	Light Grey					
				3.0m	Grey			Low		
				4.0m	Dark Grey				Slightly Moist	
				5.0m	Brown			Nil	Moist	
				6.0m					Saturated	
				7.0m						
				8.0m						
				9.0m						
				10.0m						

COLOUR :	Black, White, Biege Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date	
		Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

Lithological Log

Hyd2o
Suite 6B 103 Rokeby Rd
Subiaco, WA 6008

PO Box 1055
Subiaco WA 6904

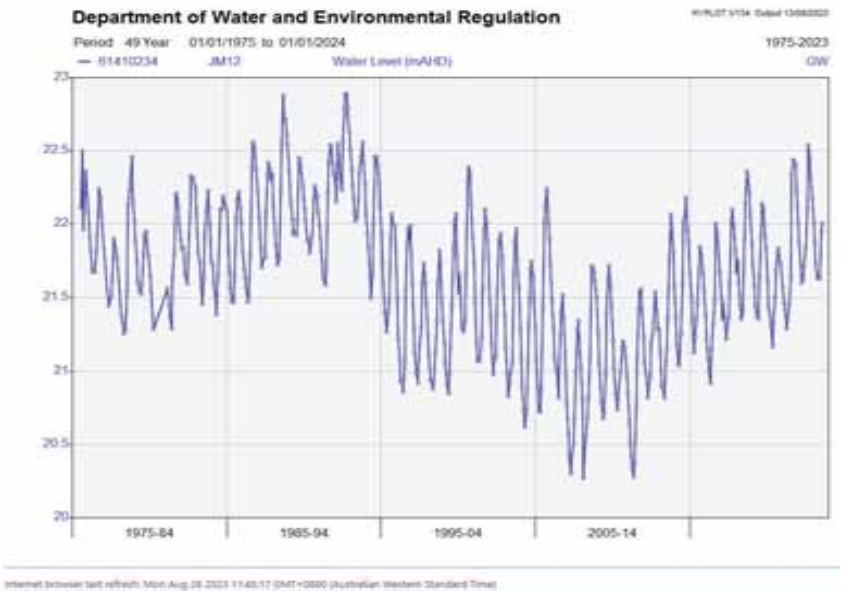
Date :	3/06/2020				
Client :	ECP Acquisitions 6 Pty Ltd	Job Number :	H20002	Bore Name	
Project:	Glen Iris LWMS	Start Hole :	9.15 am		
Easting	392221	End Hole :	9.45 am		
Northing	6446790	Logged by :	SO	MW9	
Datum:	AHD	Total Depth :	8 m		
Drill type:	Drill Rig Hollow Auger	RL Top of Casing	28.43		
Hole diameter:	2.5 Inch	RL Nat Surface :	27.73		

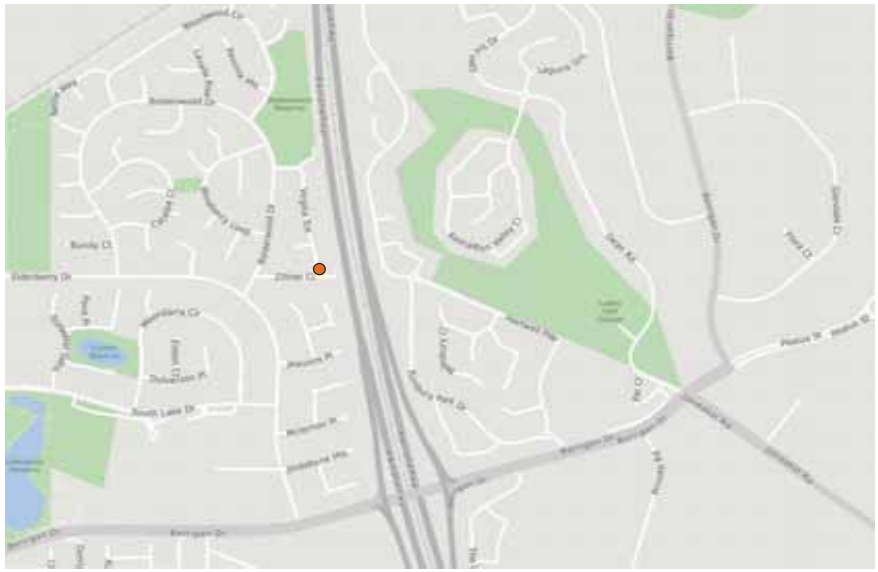
support	backfill	water	Slot / Screen Depth	Depth (metres)	Soil Characteristics					
					Colour	Particle Size	Texture	Organic Content	Moisture	Comment
PVC (Class 9)				1.0m	Yellow with Grey Tinge	Fine to Medium	Sand	Low	Slightly Moist	
				2.0m	Black				Dry	
				3.0m	Dark Grey					
				4.0m	Grey			Nil		
		▽		5.0m					Slightly Moist	
				6.0m					Moist	
				7.0m	Dark Brown				Saturated	
				8.0m						
				9.0m						
				10.0m						

COLOUR :	Black, White, Biege Dark/Medium/Light : Brown, Red, Orange, Yellow, Grey, Blue Composition : Solid , Blemish, Mottle		Static Water Level
PARTICLE SIZE :	Fine, Medium, Course		
TEXTURE :	Sand, Loamy Sand, Clayey Sand Silt, Loam, Sandy Loam, Clayey Loam Clay, Sandy Clay	Date	
		Stickup above NS (m)	
ORGANICS :	High, Medium, Low	Water Level bTOC (m)	
MOISTURE :	Dry, Slightly Moist, Moist, Saturated	Water Level bNS (m)	

APPENDIX H
DWER Groundwater Monitoring Data

Date: 26/08/2023 Job No. H22046





Source: Department of Water and Environmental Regulation (2023)

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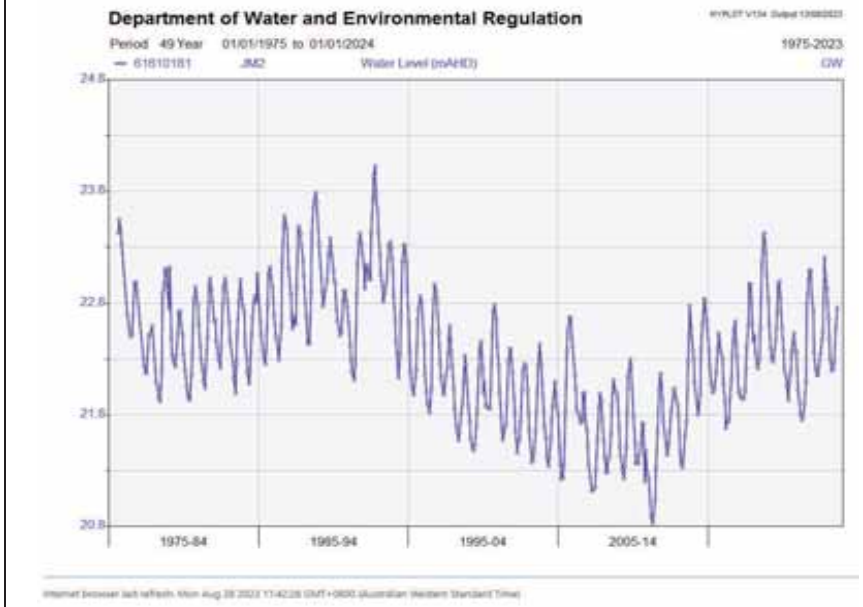
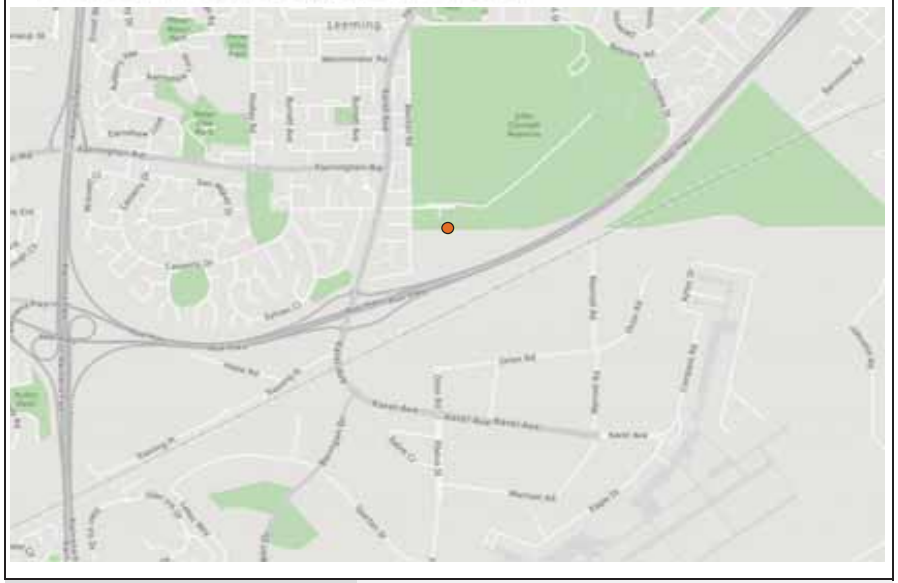
Glen Iris Jandakot Local Water Management Strategy

DWER Bore Hydrographs : JM12

Appendix H1

Date: 26/08/2023 Job No. H22046





Source: Department of Water and Environmental Regulation (2023)

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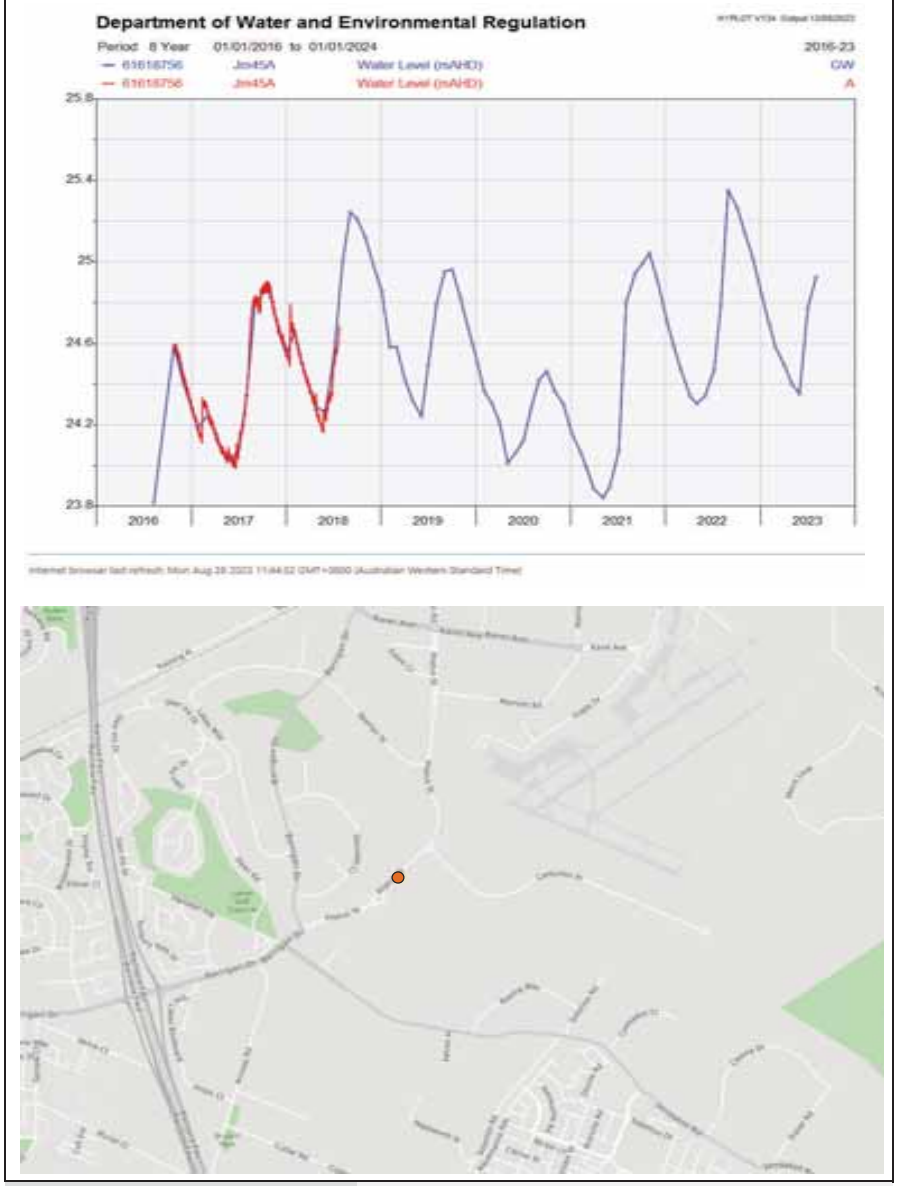
Glen Iris Jandakot Local Water Management Strategy

DWER Bore Hydrographs : JM2

Appendix H2

Date: 26/08/2023 Job No. H22046



Source: Department of Water and Environmental Regulation (2023)

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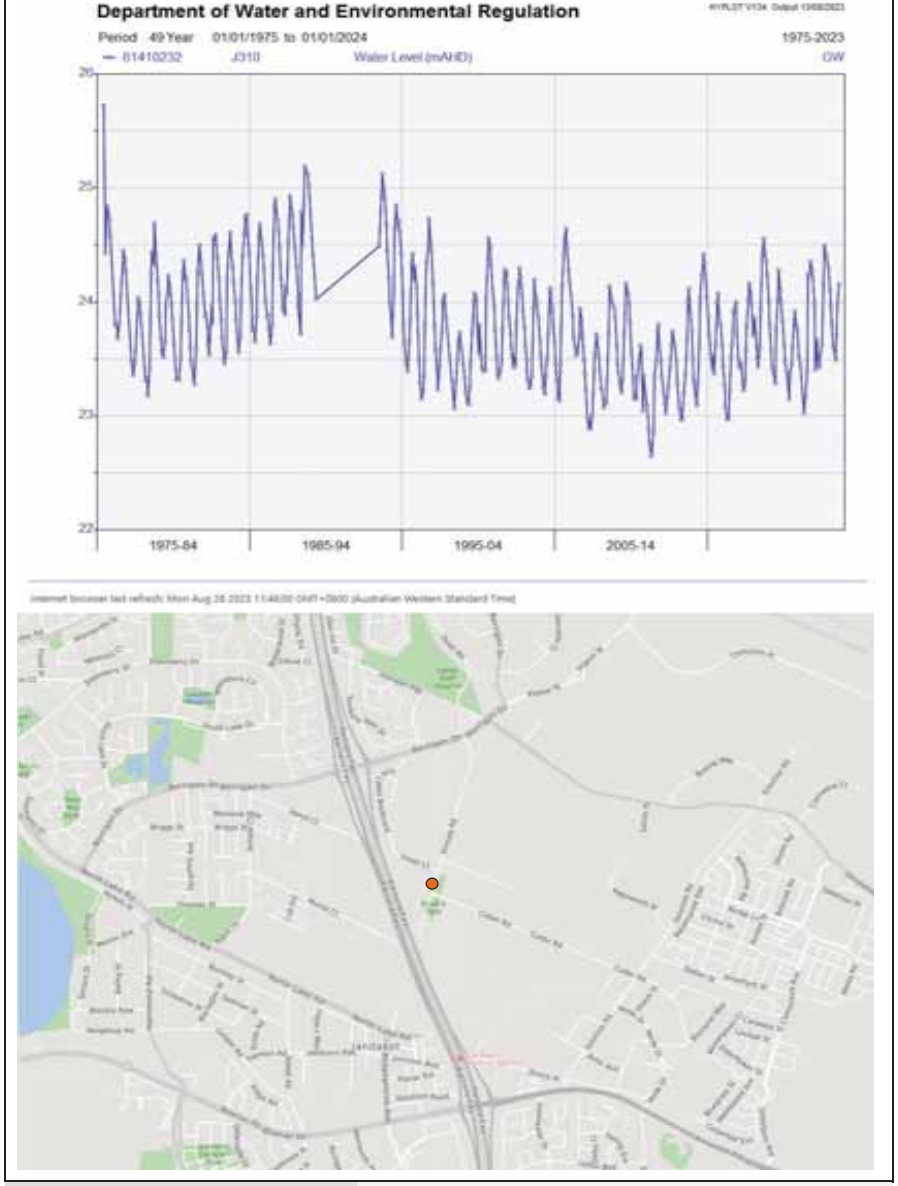
Glen Iris Jandakot Local Water Management Strategy

DWER Bore Hydrographs : JM45A

Appendix H3

Date: 26/08/2023 Job No. H22046



Source: Department of Water and Environmental Regulation (2023)

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Glen Iris Jandakot Local Water Management Strategy

DWER Bore Hydrographs : J310

Appendix H4

APPENDIX I
UNDO Nutrient Modelling

Government of Western Australia
Department of Water and Environmental Regulation

Project: Glen Iris Pre Development
Date: 26/04/2021
Version: Version 1.2.0.19289

Subregion name: Existing Golf Course

Landuse	Percent (%)	Area (ha)	Input load Nitrogen (kg)	Input load Phosphorus (kg)
Residential	0	0.00	0.00	0.00
Industrial, commercial & schools	0	0.00	0.00	0.00
Rural living	0	0.00	0.00	0.00
Public open space	100	53.00	8427.00	360.40
Road reserve	0	0.00	0.00	0.00

Total area (ha)	Total percent (%)
53.00	100

Nitrogen input (kg/yr)	Phosphorus input (kg/yr)
8704.19	368.35

Nitrogen export (kg/yr)	Phosphorus (kg/yr)
656.38	2.46

Public Open Space (POS)

Landuse	Percent (%)	Area (ha)
Native gardens	0	0.00
Non-native gardens	0	0.00
Not fertilised	0	0.00
Nature	0	0.00
Sport	0	0.00
Recreation	0	0.00
Golf course	100	53.00
Bowling green	0	0.00
Impervious	0	0.00
Water body	0	0.00

Total area (ha)	Total percent (%)
53.00	100

Nitrogen input (kg)	Phosphorus input (kg)
8427.00	360.40

Soil and drainage information

Type of drainage	Infiltration	Does it contain imported fill?	No
Soil type	Bassendean	Does subregion contain onsite sewage diposal system?	No
Depth to groundwater (m)	10		
Groundwater slope (%)	0.15		
Soil PRI	5.0		

Note: Please attach the results of soil tests to this report when submitting.

Summary: Nutrient stripping devices

Treatment	Name	Size (m²)	Treated area (ha)	Treating	N removed (kg/yr)	P removed (kg/yr)
Load removed					0.00	0.00
Net export					715.09	2.46

Summary: Nutrient load exports

Region	Area (ha)	P export (kg/yr)	N export (kg/yr)
Existing Golf Course	53.00	2.46	656.38

PRE-TREATMENT LOAD (kg/yr)		LOAD REMOVED (kg/yr)		NET LOAD EXPORT (kg/yr)	
NITROGEN	PHOSPHORUS	NITROGEN	PHOSPHORUS	NITROGEN	PHOSPHORUS
656.38	2.46	0.00	0.00	715.09	2.46

Government of **Western Australia**
Department of **Water and Environmental Regulation**

Project: Glen Iris Post Development
Date: 26-Apr-21
Version: Version 1.2.0.19289

Subregion name: Lots & POS

Landuse	Percent (%)	Area (ha)	Input load Nitrogen (kg)	Input load Phosphorus (kg)
Residential	68	27.03	2342.78	629.10
Industrial, commercial & schools	2	0.80	20.99	5.09
Rural living	0	0.00	0.00	0.00
Public open space	30	11.93	660.65	71.85
Road reserve	0	0.00	0.00	0.00

Total area (ha)	Total percent (%)
39.75	75

Nitrogen input (kg/yr)	Phosphorus input (kg/yr)
3232.31	712.00

Nitrogen export (kg/yr)	Phosphorus (kg/yr)
243.75	4.76

Residential

Size (m²)	Percent (%)	Area (ha)	Input load Nitrogen (kg)	Input load Phosphorus (kg)
<400	16	4.32	101.60	29.77
400-500 m²	0	0.00	0.00	0.00
501-600 m²	84	22.71	2241.18	599.34
601-730 m²	0	0.00	0.00	0.00
>730 m²	0	0.00	0.00	0.00
Multiple dwellings	0	0.00	0.00	0.00

Total area (ha)	Total percent (%)
27.03	68

Nitrogen input (kg)	Phosphorus input (kg)
2342.78	629.10

Commercial, Industry and Schools

Landuse	Percent (%)	Area (ha)
Light industrial	0	0.00
Heavy industrial	0	0.00
Commercial / Offices	100	0.80
Schools	0	0.00
Public buildings	0	0.00

Total area (ha)	Total percent (%)
0.80	2

Nitrogen input (kg)	Phosphorus input (kg)
20.99	5.09

Public Open Space (POS)

Landuse	Percent (%)	Area (ha)
Native gardens	25	2.98
Non-native gardens	20	2.39
Not fertilised	0	0.00
Nature	0	0.00
Sport	0	0.00
Recreation	50	5.96
Golf course	0	0.00
Bowling green	0	0.00
Impervious	5	0.60
Water body	0	0.00

Total area (ha)	Total percent (%)
11.93	30

Nitrogen input (kg)	Phosphorus input (kg)
660.65	71.85

Soil and drainage information

Type of drainage	**Infiltration**	**Does it contain imported fill?**	**No**
Soil type	**Bassendean**	**Does subregion contain onsite sewage diposal system?**	**No**
Depth to groundwater (m)	**10**		
Groundwater slope (%)	**0.15**		
Soil PRI	**5.0**		

Note: Please attach the results of soil tests to this report when submitting.

Subregion name: Roads

Landuse	Percent (%)	Area (ha)	Input load Nitrogen (kg)	Input load Phosphorus (kg)
Residential	0	0.00	0.00	0.00
Industrial, commercial & schools	0	0.00	0.00	0.00
Rural living	0	0.00	0.00	0.00
Public open space	0	0.00	0.00	0.00
Road reserve	100	13.25	315.35	40.35

Total area (ha)	Total percent (%)
13.25	25

Nitrogen input (kg/yr)	Phosphorus input (kg/yr)
384.65	42.33

Nitrogen export (kg/yr)	Phosphorus (kg/yr)
23.34	1.98

Road reserve

Landuse	Percent (%)	Area (ha)
Roads	40	5.30
Road reserve - impervious	30	3.98
Road reserve - native garden	5	0.66
Road reserve - non-native garden	0	0.00
Road reserve - turf	20	2.65
Road reserve - not fertilised	5	0.66

Total area (ha)	Total percent (%)
13.25	100

Nitrogen input (kg)	Phosphorus input (kg)
315.35	315.35

Soil and drainage information

Type of drainage	**Piped drainage**	**Does it contain imported fill?**	**No**
Soil type	**Bassendean**	**Does subregion contain onsite sewage diposal system?**	**No**
Depth to groundwater (m)	**10**		
Groundwater slope (%)	**0.15**		
Soil PRI	**5.0**		

Note: Please attach the results of soil tests to this report when submitting.

Summary: Nutrient stripping devices

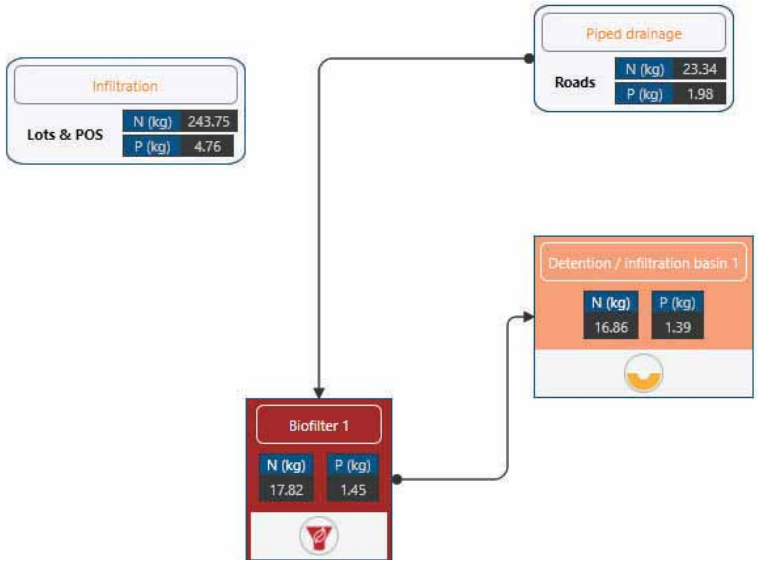
Treatment	Name	Size (m²)	Treated area (ha)	Treating	N removed (kg/yr)	P removed (kg/yr)
Biofilter	Biofilter 1	5300.00	13.25	Sandy soils – Runoff only (infiltration on lots)	5.52	0.53
Detention / infiltration basin	Detention / infiltration basin 1	15900.00	13.25	Sandy soils – Runoff only (infiltration on lots)	0.96	0.06
Load removed					**6.48**	**0.59**
Net export					**260.61**	**6.15**

Summary: Nutrient load exports

Region	Area (ha)	P export (kg/yr)	N export (kg/yr)
Lots & POS	39.75	4.76	243.75
Roads	13.25	1.98	23.34

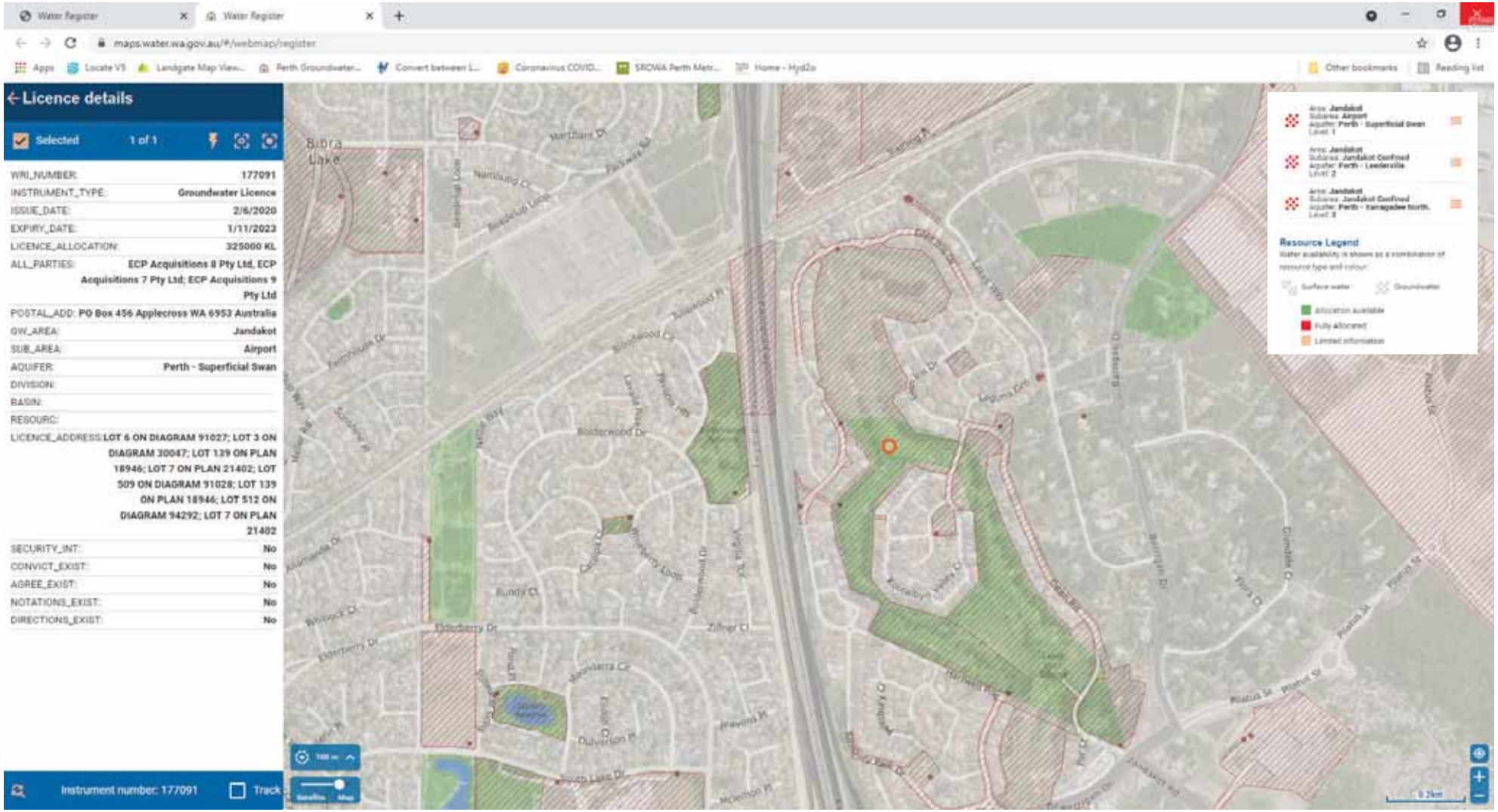
PRE-TREATMENT LOAD (kg/yr)		LOAD REMOVED (kg/yr)		NET LOAD EXPORT (kg/yr)	
NITROGEN	PHOSPHORUS	NITROGEN	PHOSPHORUS	NITROGEN	PHOSPHORUS
267.09	6.74	6.48	0.59	260.61	6.15

Treatment diagram



APPENDIX J
Groundwater Licence & Water Register Extracts

DWER WATER REGISTER EXTRACT



LICENCE TO TAKE WATER

Granted by the Minister under section 5C of the Rights in Water and Irrigation Act 1914

Licensee(s)	ECP Acquisitions 8 Pty Ltd ECP Acquisitions 7 Pty Ltd ECP Acquisitions 9 Pty Ltd		
Description of Water Resource	Jandakot Perth - Superficial Swan	**Annual Water Entitlement**	325,000kL
Location of Water Source	Lot 139 On Plan 18946 Volume/Folio 1947/547 Lot 139 Imlah Ct Jandakot Back Nine Lot 7 On Plan 21402 Volume/Folio 2195/189 Lot 7 Jandakot Hartwell Paw		

Authorised Activities	**Taking of water for**	**Location of Activity**
	Irrigation of up to 29 ha of golf course	LOT 139 ON PLAN 18946 - Volume/Folio 1947/547 - Lot 139 Lot 139 On Plan 18946 Volume/Folio 1947/547 Lot 139 Imlah Ct Jandakot Back Nine LOT 3 ON DIAGRAM 30047 - Volume/Folio 2190/500 - Lot 3 DEAN RD JANDAKOT LOT 509 ON DIAGRAM 91028 - Volume/Folio 2183/871 - Lot 509 DEAN RD JANDAKOT LOT 512 ON DIAGRAM 94292 - Volume/Folio 2183/872 - Lot 512 LOT 6 ON DIAGRAM 91027 - Volume/Folio 2765/992 - Lot 6 LOT 7 ON PLAN 21402 - Volume/Folio 2195/189 - Lot 7 Lot 7 On Plan 21402 Volume/Folio 2195/189 Lot 7 Jandakot Hartwell Paw
Duration of Licence	From 2 June 2020 to 1 November 2023	

This Licence is subject to the following terms, conditions and restrictions:

1. The annual water year for water taken under this licence is defined as 1 July to 30 June.

2. The licensee shall not use water for irrigation between 9 am and 6 pm except for the establishment of newly planted areas. For newly planted areas water may be used within these hours for a period of up to 28 consecutive days, commencing from the date of planting.

3. Between 1 June and 31 August in any year, the licence-holder must not water a lawn, garden, or grass-covered area ("turf") by reticulation, provided always that this restriction shall not apply; watering with a hand held hose; or watering, by way of reticulation: golf course tees and greens, turf wickets, bowling greens and active sporting areas; newly planted areas for a period of up to 28 days from the date of planting; for renovating turf; or for maintenance of reticulation systems

End of terms, conditions and restrictions

This Licence is granted subject to the Rights in Water and Irrigation Regulations 2000.

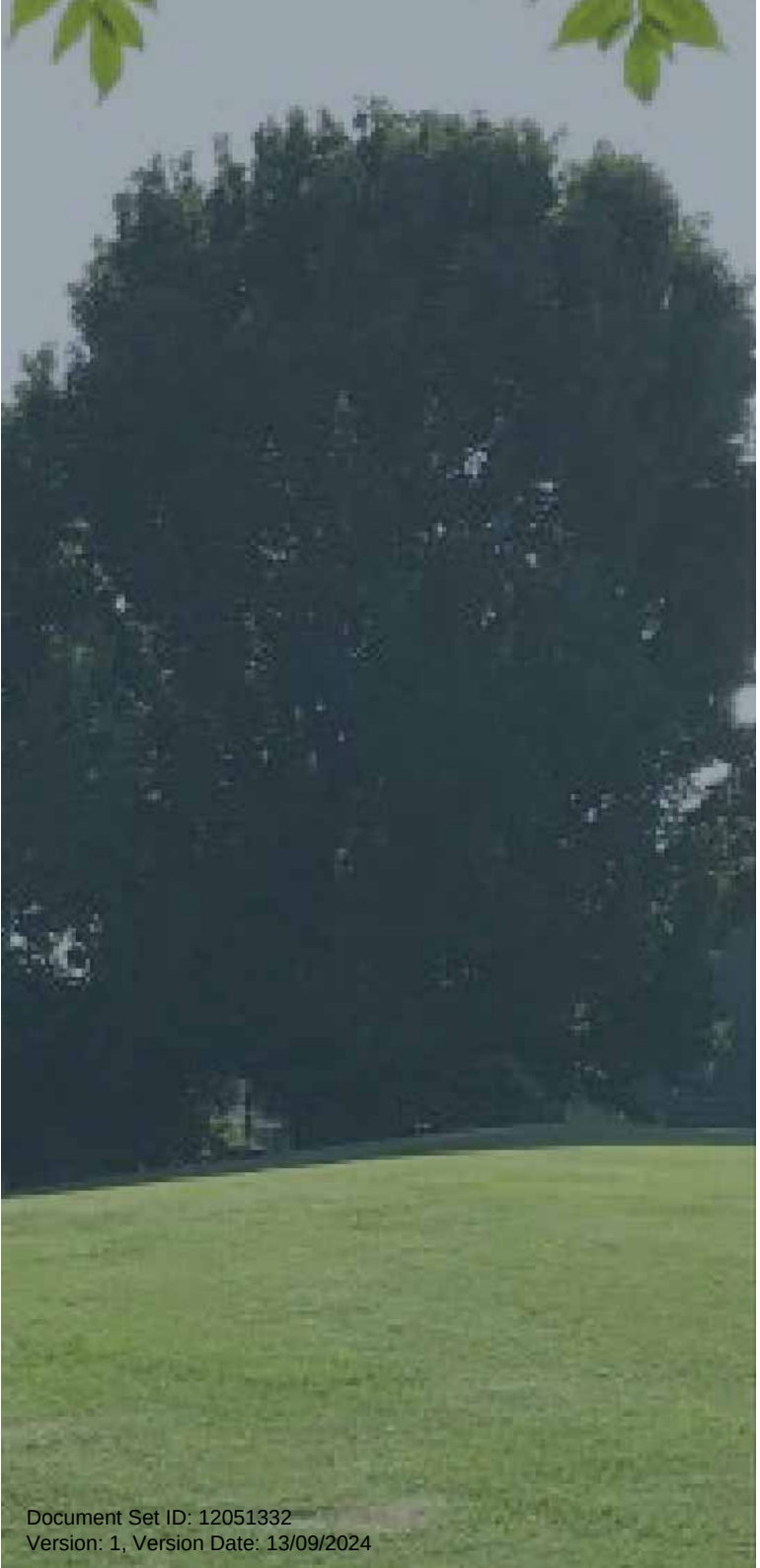
APPENDIX K
Landscape Masterplan

Glen Iris Estate

Landscape Strategy for Local Structure Plan
Eastcourt

July 2023

emerge ASSOCIATES



Contents

REVISION	DATE	ISSUE OR AMENDMENT	BY	REVIEWED
A	June 2021	Issued for approval	CN	CN
B	Sept 2021	Issued for approval	CN	CN
C	March 2022	Issued for Text Update to page19	CN	CN
D	April 2022	Issued for Text Update to page 5	CN	CN
E	July 2023	Structure Plan Modifications	XZ	SM

1.1 General

The proposed redevelopment of the former Glen Iris golf course has created the need for a planning design to create residential housing including the provision of considerable areas of landscaped open space in a generally somewhat constrained space. The redevelopment includes planning for between 550 and 600 residential dwellings of varying densities in areas between the existing residential uses adjoining and surrounding the site. The use of landscaped open space is critical in providing for the needs of new and providing additional amenity to all existing residents. The project broadly consists of north, central and southern residential precincts.

It was noted during the extensive community consultation phase of the design process that the opportunity exists for a more diversified and broader accessible open space network than the previous fenced and single use golf course. The planning layout and landscape design have worked together to maximise the access and usability of the open space areas as a broader green link network with the aim of connecting precincts both within the new development and with the existing development surrounding the site.

1.2 Landscape Approach

The nature of the project as an infill redevelopment offers the opportunity to both create new existing open space precincts in its own contemporary style and also to be complimentary and mindful of the retention and expression of the sites existing older character. The overall intent of the landscaped open space design is encompassed below:

- To reflect and respond to the key existing landscape elements and character of the site in order to maintain visual continuity between existing and new precincts wherever reasonably possible. This includes built form and landscape treatments within streetscapes and open space.
- To provide safe external environment for the quiet enjoyment of the residents, guests and the general public.
- To best cater for the lifestyle needs and aesthetic desires of the existing residential community within the bounds of the capacity of the development to do so.
- To best cater for the lifestyle needs and expected desires of the new future residential community in reference to their anticipated demographics.
- To provide integrated public access that links with the existing residential, street and path network with a strong sense of movement opportunity, options and legibility as part of a broader open space green link strategy.
- To retain mature trees where ever reasonable and practical to do so within the bounds of the projects delivery and approval requirements.
- To provide a more environmentally sustainable outcome than the prior land use as a golf course, inclusive of the use of sustainable design practices as applied to new works.
- To consider habitat retention and creation in various methods including vegetation retention and replanting.

- To clearly define various landscape design typologies as applicable to all areas of open space to assist in the provision of facilities and legibility.
- To manage fire risk in a creative and aesthetic manner while meeting required standards and obligations.
- To respond to the local colour palette with either matching or complimentary colours and textures with the aim of visually minimizing visual impacts and blending where possible.

1.3 Private Realm Strategy

The project's private realm consists of landscaped open space within private residential lots in both front and rear yards. In the case of higher density strata development areas, the open space consists of common areas for access and the use of those strata residents as well as private open space to balconies and courtyards in accordance with R-Code requirements.

It is envisaged that landscape guidelines will be provided to residents as part of their purchase process to assist them in making informed landscape choices around design, aesthetics, sustainability and maintenance. In all cases the private realm will be under the care and control of the individual resident or the strata body.

1.4 Public Realm Strategy

Generally the public realm includes primarily the landscaped open space and path network within the proposed development and its linkages to the existing adjacent and surrounding open spaces networks and streetscapes. The landscape design aims to:

- Provide clear, direct, safe and compliant access around and through the proposed development
- Positioned to ensure the retention of a significant number of existing mature trees in new parks and linear interface buffers adjoining existing residences.
- Be designed and installed to integrate and manage fire risk to the required areas of the landscape treatment
- Provide open usable informal grass recreation space for new and existing residents visitors and the general public.
- Provide shaded seating as a point of refuge on the pedestrian and cycle networks
- Provide suitably sized central play facility befitting the character and history of the site.
- Provide small informal play area for general public use.
- Provide shady endemic native and exotic trees for respite.
- Provide signage elements for clarity of pedestrian and cycle movement.
- To cater for a range of demographics, user groups and skill levels.

Braithwaite Park, Emerge Associates

Newhaven, Emerge Associates

Secret Harbour, Emerge Associates

1.5 Changing Demographics

The demographics of the existing Glen Iris locality is generally characterized as a mature suburb with a large proportion of long standing residents. There is a lower than average number of children or adolescents and young people living in the locality. It is understood that grandchildren are somewhat present when visiting the existing residents. The anticipated demographics of new residents is younger than the existing Glen Iris age cohort. New residents will bring a range of children ranging in ages from school age children to older teens as part of a general second and third home buyer profile. It is not currently expected that first home buyers will be significantly present within the new development based on proximity, lot size and anticipated pricing structures.

1.6 Open Space Distribution

The proposed open space typologies are arranged to provide a range of experiences and also a range of facilities within both vehicular and walking proximity to all new and existing residents of Glen Iris and Jandakot generally. The landscape plans attached identify the open space distribution and strategy.

1.7 Open Space Typologies

Broadly the open space areas within the project consist of set landscape and use typologies. These typologies are determined by a number of factors including size of the open space, grade / levels and grade within the open space, the amount and location of gravity surface runoff, tree retention ability, habitat retention and creation, usable and safe walkable linkages.

The four open space typologies include:

1. Focal open space

The proposed design consists of four distributed larger open space areas suitable for community gathering and active informal recreation. These four parks are distributed reasonably evenly throughout the proposed redevelopment. These parks cater for a range of informal active recreation uses and a mix of passive recreation uses. These larger areas of open space have the ability to cater for tree retention and larger areas of surface runoff drainage storage and management.

2. Access open space

The proposed design consists of a series of access open space areas. These open space areas are characterized by providing a strong open space link between other open space typologies. In so doing, these open spaces provide a critical role in creation of a continuous green link option for pedestrian and cycle movement around the redevelopment. The linear nature of these open space links allows for the retention of vegetation, while the width of these open spaces enables the inclusion of series of public facilities accessible for existing and new residents.

3. Pocket park open space

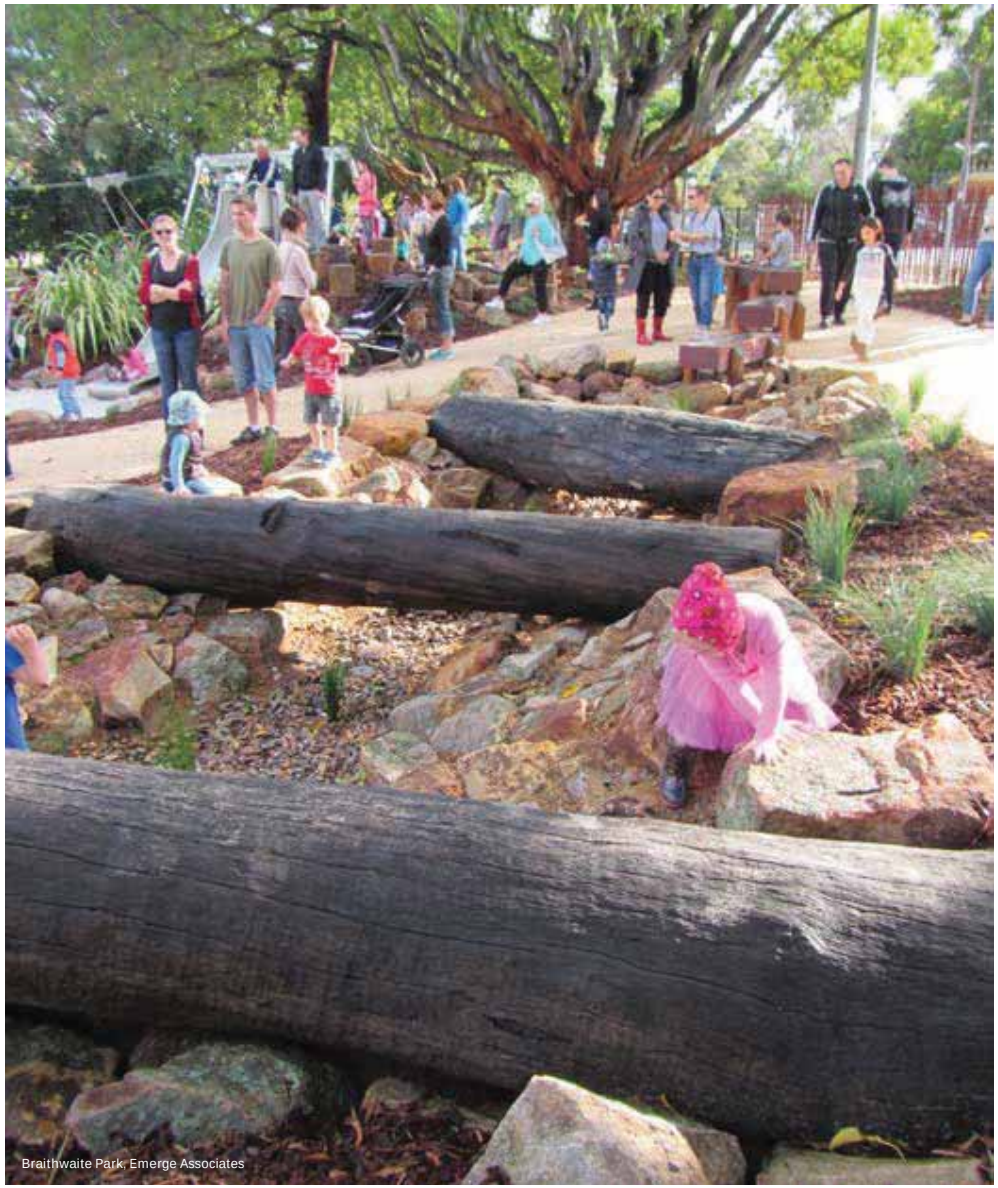
The proposed design locates a number of smaller open space areas set within the residential zone. These smaller open space areas are located to provide a range of localized incidental benefits including visual softening among the residential zone, walkability rest and respite via shade and seating, and in some cases specific associated needs such as low point drainage management and existing landmark specimen tree retention.

4. Buffer and linking open space

The proposal consists of a series of linear open space links. The nature of these open space areas ranges from road reserves with a widened verge to one side, to narrow buffers suitable to cater for a linking path and low planting between existing and new residences. The internal function of these spaces is to act as an access link.

Bibra Lake Regional Playground, Emerge Associates

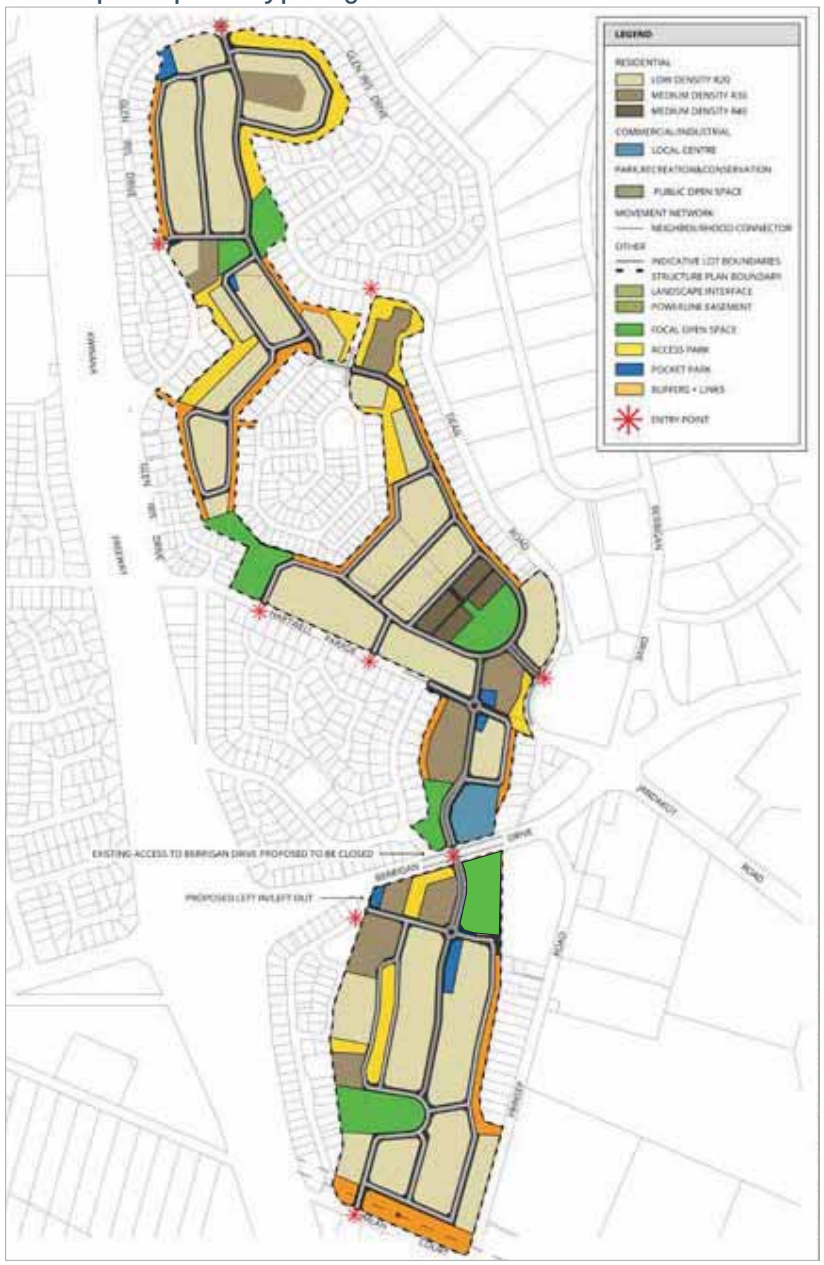
Bibra Lake Regional Playground, Emerge Associates



Braithwaite Park, Emerge Associates

Evermore Heights, Emerge Associates

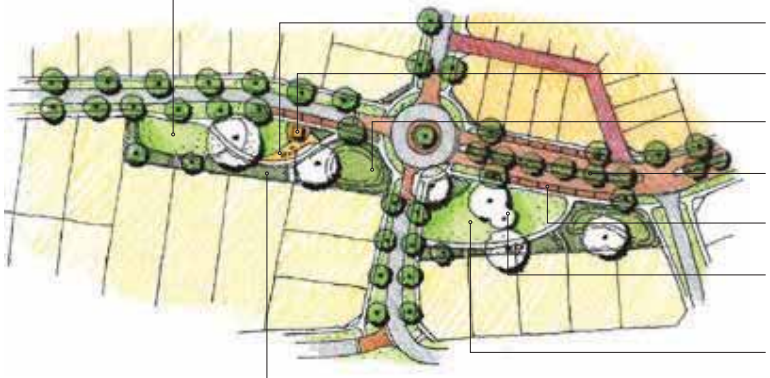
1.8 Open Space Typologies Visual



FOCAL OPEN SPACE CONCEPT DESIGN EXAMPLE

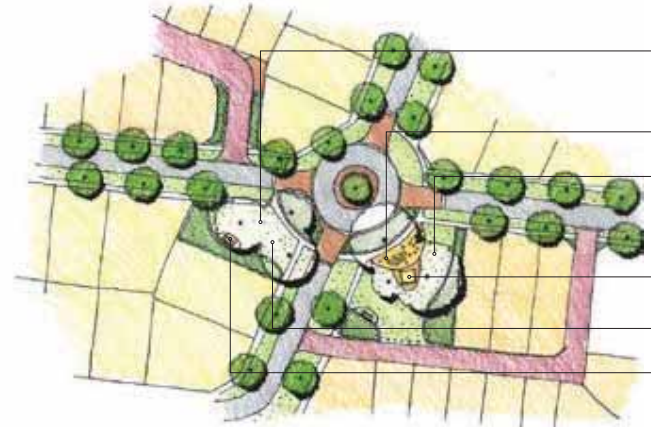
- HABITAT PLANTING TO QUIETER ZONE
- MIXTURE OF PLAY ELEMENTS & NATURE PLAY ELEMENTS SET AMONGST EXISTING TREES. PLAY AREA SET ON AXIS VIEW
- PLANTED DRAINAGE BASIN
- FEATURE SHELTER SET ON AXIS VIEW
- 50m X 30m OPEN LEVEL GRASS KICKABOUT AREA
- CAPARKING ADJACENT PARK
- RETAIN & PROTECT SIGNIFICANT EXISTING TREES
- 50m X 40m OPEN LEVEL GRASS KICKABOUT AREA

ACCESS PARK CONCEPT DESIGN EXAMPLE



- 30m X 10m INFORMAL GRASS AREA
- NATURE PLAY TRAIL
- FEATURE SHELTER
- PLANTED DRAINAGE BASIN
- PLANTED BOULEVARD
- CAPARKING
- RETAIN & PROTECT SIGNIFICANT EXISTING TREES
- 50m X 15m GRASS KICKABOUT AREA
- HABITAT PLANTING TO QUIETER ZONE

POCKET PARK CONCEPT DESIGN EXAMPLE



RETAIN & PROTECT SIGNIFICANT EXISTING TREES

NATURE PLAY TRAIL

INFORMAL GRASS AREA

FEATURE SHELTER

SHADY GRASS AREA

BENCH SEAT

LANDSCAPE BUFFER WITH ROAD FRONTAGE CONCEPT DESIGN EXAMPLE

PLANTED DRAINAGE BASIN

NEW RESIDENCES

OPEN GRASS AREA

RETAIN & PROTECT SIGNIFICANT EXISTING TREES

PEDESTRIAN FOOTPATH

RIGHT OF WAY PEDESTRIAN CONNECTION

LANDSCAPE BUFFER WITHOUT ROAD FRONTAGE CONCEPT DESIGN EXAMPLE

NEW RESIDENCES

ACTIVE OPEN SPACE

PEDESTRIAN FOOTPATH SET AMONGST LOW SHRUB PLANTNG & GRASS

LIGHTING SET AT LOW PHYSICAL LEVEL

SHADY TREES AT REGULAR INTERVALS

EXISTING RESIDENCES

Glen Iris Estate

1.9 Landscape Masterplan

Glen Iris Estate

1.10 Functional Layout Masterplan

1.11 Public Facilities

The development proposes to build upon existing public facilities whilst catering for new residents via a range of new publicly accessible facilities. The extensive community consultation process and discussions with the City of Cockburn technical staff have identified a number of desirable public facilities including:

1. Informal larger play areas disbursed through the focal parks to cater for informal recreation activities eg: informal touch football, ball games, unstructured training, frisbee, kite flying, dog exercise and the like.
2. Defined personal training areas. It is envisaged that areas set aside for small gatherings of residents and visitors to allow for use/hiring for personal training and bootcamp type events. This is intended to cater for a variety of local age groups and skill levels. The landscape design can provide definition to these areas via small level changes and path and wall layouts.
3. 3. Playground facilities – it is noted that the need for a major regional facility is already catered for externally to the development area. It is proposed that a mid order play facility is located within the development to cater for the expected increase in local use and change in demographics. The aim is to design play elements that complement the existing retained play elements within Glen Iris rather than copy them, this will better provide a range of user experiences.
4. 4. Smaller play elements generally associated with nature play items located in discrete locations along the green links as part of a broader play trail running through the proposed development. This caters for smaller residential local precincts and also acts as a combined whole with each nature play area having a different type of play offering to those retained play elements currently in the Glen Iris.
5. Shelter structures with picnic settings to select locations where residents are encouraged to stop and stay for a while. These are generally associated with play elements and view axis lines from adjacent roads.
6. Electric BBQs are proposed to a couple of select locations as part of a social gathering and mixing initiative catering for smaller family groups and family scaled events.
7. Fitness elements are proposed as part of the broader green link design approach. This is in response to community feedback gained from the community consultation process.
8. Walking trails are proposed to occur through the green link network and are to be denoted via signage and colour coded elements to identify trails of various lengths and difficulty to suit a variety of users (eg: 1km, 3km, 5km, 7km). It is envisaged these trails will form a key tool in encouraging greater social interaction between existing and new residents.
9. Cycle trails are proposed to meander through the proposed development primarily on a path system with suitable signage and in some locations this may also occur partly onto the road system where low vehicle flow is to occur.
10. Dog walking trails and facilities are proposed to be included generally in alignment with the walking trails. These may include rest points in shade, taps and fixed dog bowls and discrete areas containing dog agility elements as part of a broader walking network.
11. A hard surface ball court is proposed to provide an active focus for teens. The final location of these facilities will be subject to detail design to mitigate noise impacts to adjacent residents but also to maintain clear and open view lines for passive surveillance.
12. Embayment carparking is proposed adjacent to the larger areas of open space and along certain streets. The car bays will cater for local visitors and a variety of social events and informal activities.
13. Street furniture is proposed to occur to defined set locations for the comfort of open space users. This will be inclusive of seating, table settings, drink fountains, select bollards and the like.
14. Public art is proposed to occur either as a larger landmark element on key view lines or as smaller discrete art elements to be discovered as part of the green link approach perhaps set into paving or on to low walls and the like.
15. A 3 phase power outlet is proposed for the larger open community gathering grass space to cater for possible periodic larger scaled community events.

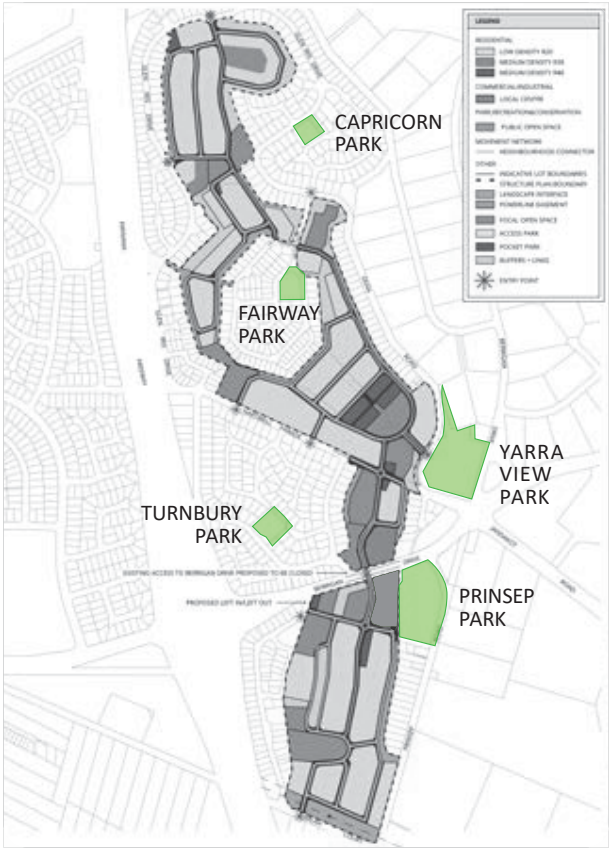
Dalyellup Beach, Emerge Associates

Evermore Heights, Emerge Associates

Osprey Waters, Emerge Associates

1.12 Existing Open Space Facilities

Glen Iris has 5 existing parks that form part of the current local urban layout that are well used and loved by the local community. Each has differing sizes and facilities catering for the local population and visiting public as summarised below. It is not proposed that any reduction in the existing public open space areas is to occur. The new open space network aims to be complimentary to the existing parks and their facilities.



A. Prinsep Park

This is a large neighbourhood scale park with minimal facilities. There is a large open grass kickabout area centrally located to the park bounded by clumps of taller native trees and stands of native bushland shrub vegetation forming bushland. The park appears to be well maintained but somewhat underutilised for its scale with limited public facilities. A simple path system and a shelter and table setting front onto the central grass area. Access into the park is currently difficult as it occurs mainly off major roads and intersections bounding the park.

It is noted that officers from the City of Cockburn have indicated there is the current need for a formal oval playing surface somewhere in the Glen Iris area as part of a broader growing need within Jandakot and Treeby. One possible option suggested by the City is its inclusion by reimagining the existing Prinsep Park on the corner of Berrigan Drive and Prinsep Road given the parks size can cater for an oval. Should the City wish to pursue this option it will be subject to a separate application process led by the City and is not part of the proponents proposal.

B. Yarra View Park

This is a large neighbourhood scale park with numerous facilities including a dedicated carpark for approx 20 cars. Existing native mature trees are located internally within the park with mature exotic street trees located to street edges. There is a large grass kick about area that doubles as a drainage overflow basin. There are 2 off lead fenced dog agility areas that exist with gate access and a variety of dog agility elements that cater for local and visiting dog walkers.

An existing off the shelf plastic playground is set in a sand base which caters for a variety of play and user ages from 4 to 10. Individual standalone small play elements exist in grass outside of the main play area for 2 – 4 year old users. Bench seating is set into the park near existing path system and there is a picnic shelter and table setting overlooking the usable grass area. There is a partly fenced basketball court in a raised area within the park that caters for teens.

C. Turnbury Park

This is a local scale park that is well maintained with central open grass kickabout area and numerous exotic shade trees set in grass. A central off the shelf plastic playground currently caters for 2-10 years of age and includes an off the shelf climbing wall and swings. A small basketball half court caters for teens as active semi formal play. There is a BBQ located in the park but no table setting. There is bench seating located under trees overlooking the grass area.

A large feature brick arbor at the main entry point adds formality and shade but has no particular usability or shaded seating. Hedge planting along the road edge limits some views from Turnbury Park Drive. The park has its own bore. Residents directly side onto the park and view over park inclusive of areas of detailed exotic shrub planting in a domestic character and scale.





D. Fairway Park

Generally the park consists of a central open grass kickabout area bounded by a variety of shrubs and hedges interspersed with a variety of mature native and exotic nature trees. A children's play area caters for toddlers and young children in a fairy garden character inclusive of off the shelf play items and with a small amount of specialised themed equipment for imagination play with a seesaw all set in a white picket fence. The park contains a bore and is well maintained and is overlooked by adjacent residences and bounded in part by a residential scaled road system.



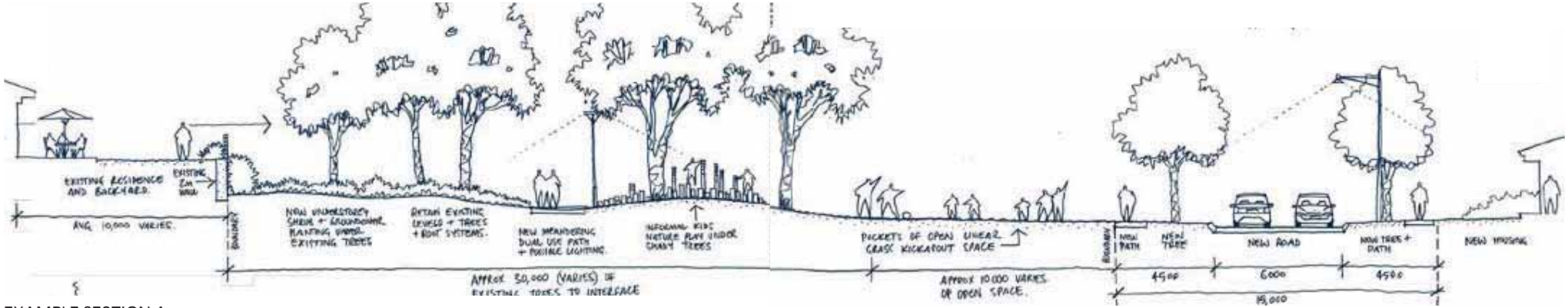
E. Capricorn Park

The park is located on a hilltop location with views to the surrounding area. Pockets of retained mature native vegetation inclusive of mature native trees exist with mature exotic trees located along adjacent street edges. A meandering concrete path is set into pockets of sloped grass set among native planting beds. An off the shelf playground set in a sand surface is nestled into bushland adjacent to residents side boundary fence with a single solar light located nearby. The playground appears well maintained and caters for children 2 - 10yrs and generally the park is in good condition. The park has low passive surveillance and is not particularly safe with limited street visibility. No seating is evident within the park.




Sunrise, Emerge Associates

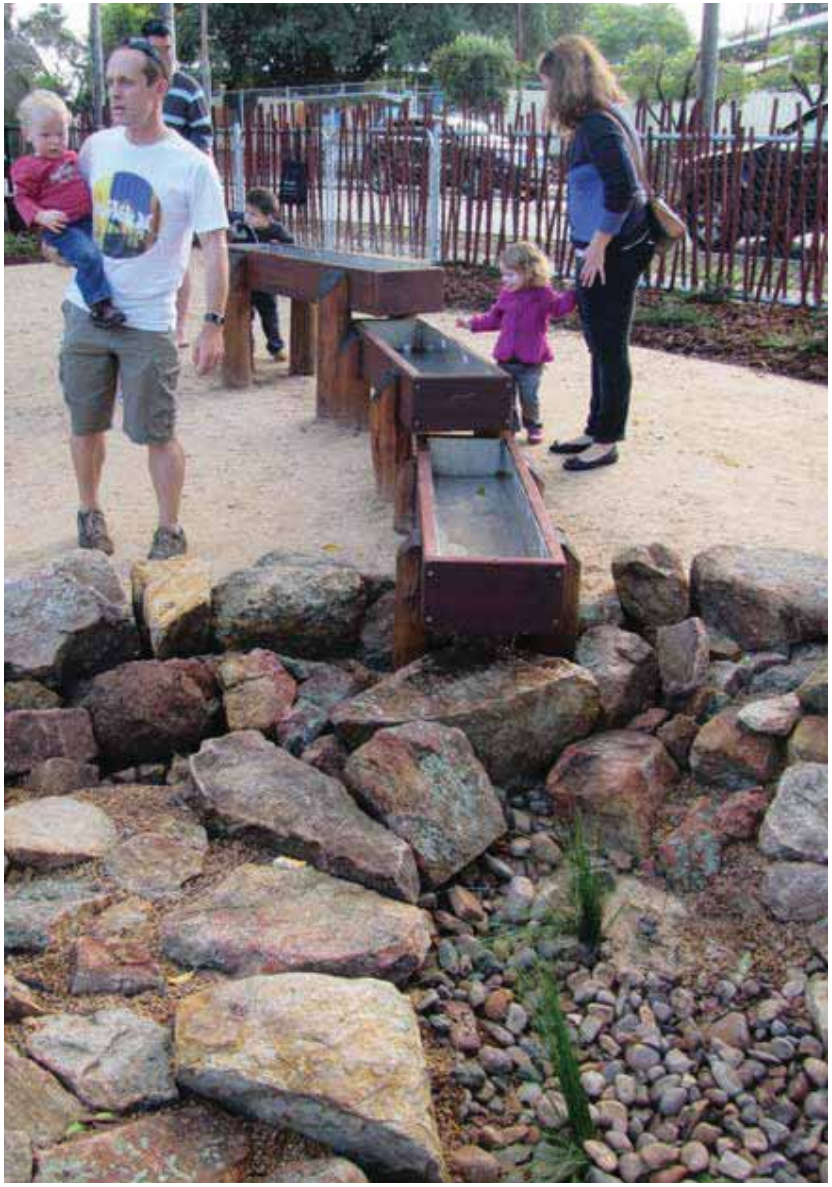

Brighton, Emerge Associates



EXAMPLE SECTION A

Braithwaite Park, Emerge Associates

Spire, Emerge Associates



Braithwaite Park, Emerge Associates

Allara, Emerge Associates

1.13 Interface to Existing Residences

The former golf course was directly backed onto by existing one and two storey residential housing. Some of the adjoining existing residential land is elevated above the subject site. In all instances, private rear fences along the boundary interface generated the safety and security necessary for the respective residence. Under the proposed development approvch the edge treatment between the existing residences and the new development will be managed in a variety of ways including:

- Upgrading to the existing rear wall and fencing where suitable and necessary subject to need, levels and impact with the work to be managed by the developer at 50/50 shared expense in consultation with individual affected adjoining landowners.
- The creation of new walling and/or fencing where suitable and necessary subject to levels and the impact of any alterations proposed by the development.

The design of the interface may be managed in a variety of ways including but not limited to:

- The backing of new housing directly onto the rear of the existing residence creating a typical residential rear boundary interface.
- The creation of a road and streetscape to the rear boundary of the existing residence.
- The creation of open space to the rear boundary of the existing residence.
- The creation of an access and buffer strip to the rear boundary of the existing residence.

1.14 CPTED & Passive Surveillance Approach

The landscape design of open space and streetscapes will take into consideration various crime prevention through environmental design (CPTED) principles. Noting the extent of open space and the connected nature of the path system, passive surveillance over the open space areas is a key part of the developments safety and security approach. The design of the open space landscape treatments combined with orientation of the open space to roads, paths and new and existing residences enables passive surveillance over parks.

The height of rear boundary fencing and possible semi permeable detailing enables interaction. In addition the use of level changes where required allows for some overlooking of open space areas. The location of trees, furnishings, and play elements will be arranged to not impede views to smaller open space areas.

Shrub planting will typically be lower shrubs and groundcovers to minimize the ability for hiding. The location of key facilities will be set ion key view lines from adjacent streets inclusive of car headlights illuminating various elements. The use of lighting has been described elsewhere within this document.

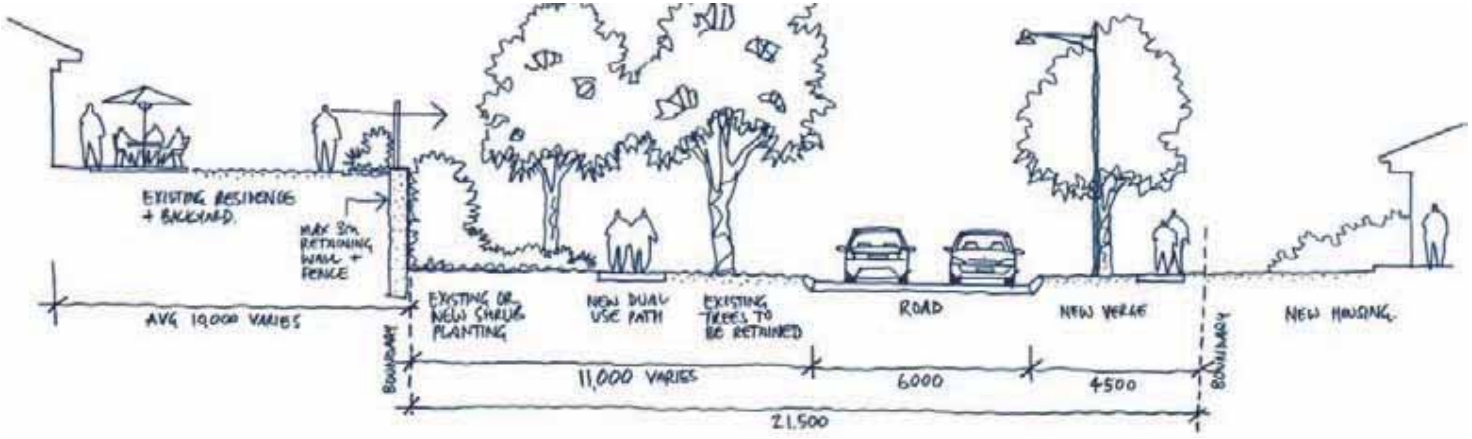
1.15 Existing Adjacent Public Open Space Upgrades

The Glen Iris precinct has a number of existing parks throughout the existing residential areas that are well used and loved by the local community. It is not proposed that any reduction in the existing public open space areas is to occur.

Osprey Waters, Emerge Associates


The Sanctuary, Emerge Associates


The Sanctuary, Emerge Associates



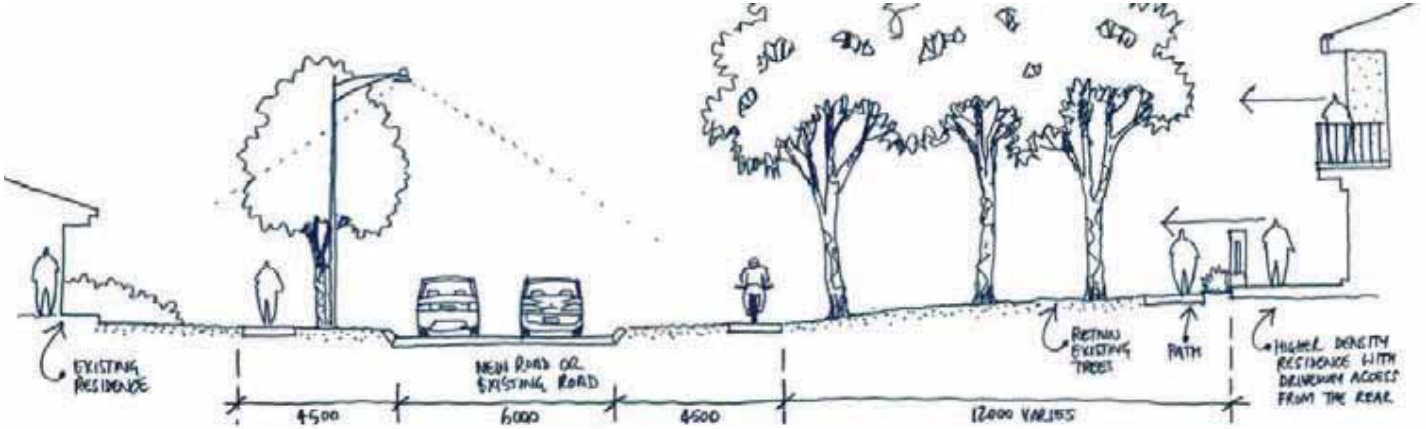
EXAMPLE SECTION B

Glen Iris Estate


The Sanctuary, Emerge Associates

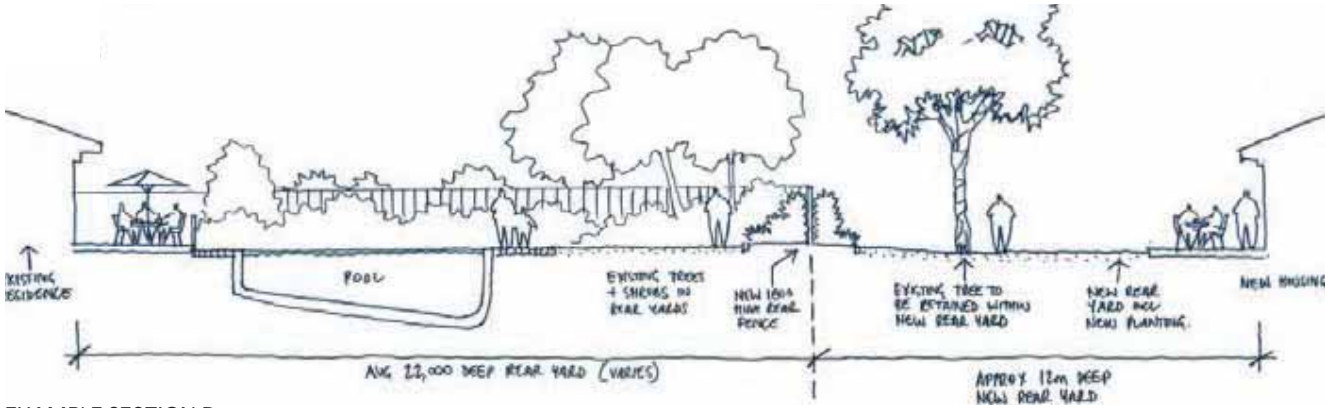

Heritage Park, Emerge Associates


Shoreline, Emerge Associates



EXAMPLE SECTION C

Lakeway, Claremont



EXAMPLE SECTION D

Lakeway, Claremont

1.16 Streetscapes

Road Hierarchy

The proposed road network will consist of a variety of typologies to better define planning legibility to the user, including:

- A series of entry points into the proposed development that will aim to define the edge of the new works without being completely divorced from the character, colour and finish of the existing Glen Iris residential area.
- Collector roads. These will distribute traffic into and out of the proposed development, these will have defined larger future tree stock to recreate the meandering shady drive as the most travelled roads. The opportunity for drainage management exists based on the generally wider road verges.
- Residential streets landscape type 1: These streets are generally longer and more direct in their layout and will have a series of tree species befitting this street type.
- Residential streets landscape type 2: These are smaller shorter residential streets which act as much more localized road element in some cases as cul-de-sacs.

In all cases the provision of shade and canopy cover is paramount and in keeping with urban green canopy coverage aims and the reduction of the urban heat island effect wherever possible.

Existing Streets

The existing streetscapes in Glen Iris are one of its key defining character and landscape features. The intention is to retain the existing streetscapes as is, and to aim to replicate elements of this avenue approach in the proposed streets where possible. It is proposed that in the order of 500 existing mature trees will be retained within the proposed open space areas, and more than 1,000 new trees will be planted across the new development in open space and streetscape areas. This is in addition to the trees to be retained within existing streetscapes in and around the surrounds of the site.

Widened Road Reserves

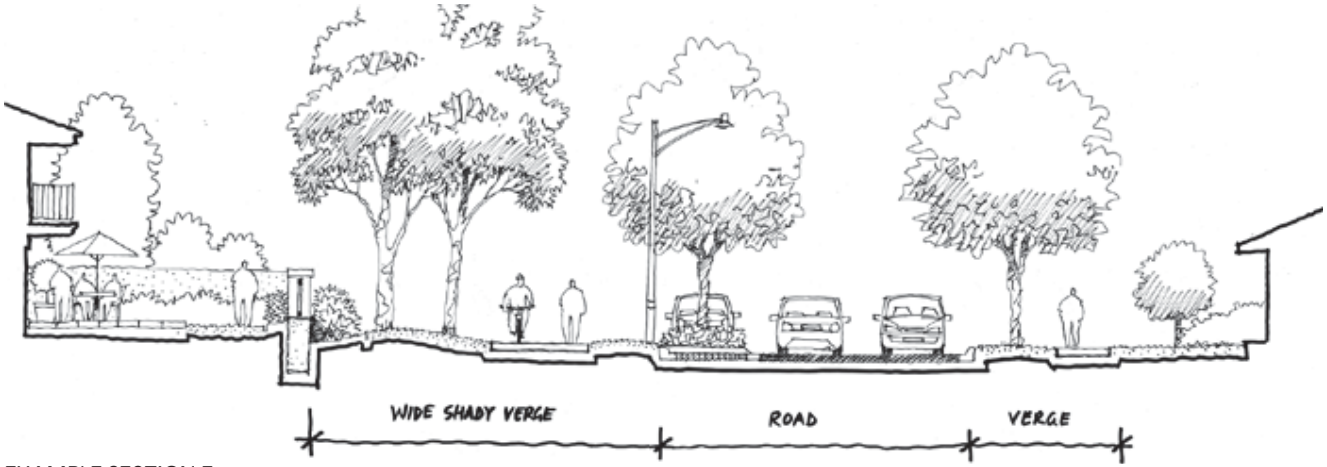
Select streets are proposed to have an offset road carriageway and a widened verge to cater for a widened 2.5m dual use footpath and a shady double tree avenue either side of the path, which will act as a key part of the broader safe and secure green link movement network through the proposed development. This enables access to occur off street and can cater for visitors carparking in select locations in addition to flush kerbing and drainage swales in select locations - subject to future detail design.

New Roads

New road design will cater for street tree planting and the broader safe and secure green link network. Street tree planting will be selective and will be variable to bring a variable character to different streets.

Traffic Calming

In locations of longer lengths of straight residential roads the inclusion of traffic calming may be employed to assist in slowing traffic speeds and allowing crossing points are suitable locations and allow for additional landscape softening. Locations of traffic calming will need to pay due regard to driveways and lot access and footpath road crossings.



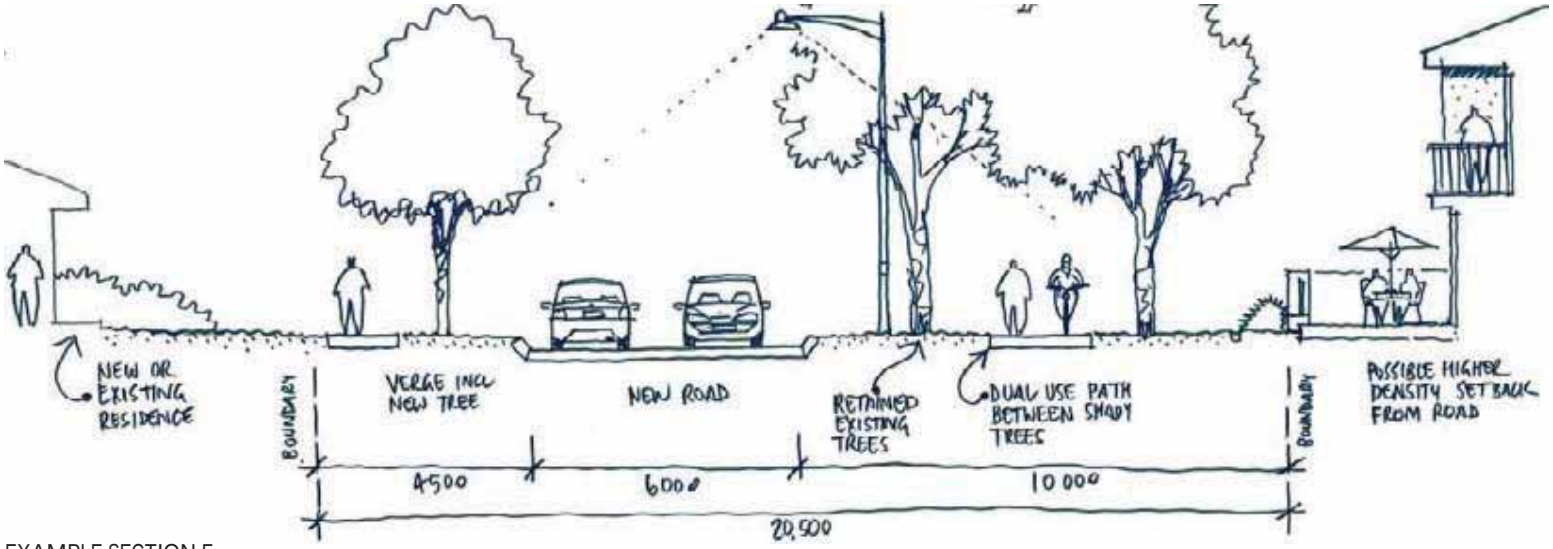
EXAMPLE SECTION E

Jacob's Ridge, Queensland

Lakeway, Claremont

Newhaven, Emerge Associates


Baldivis Town Centre, Emerge Associates

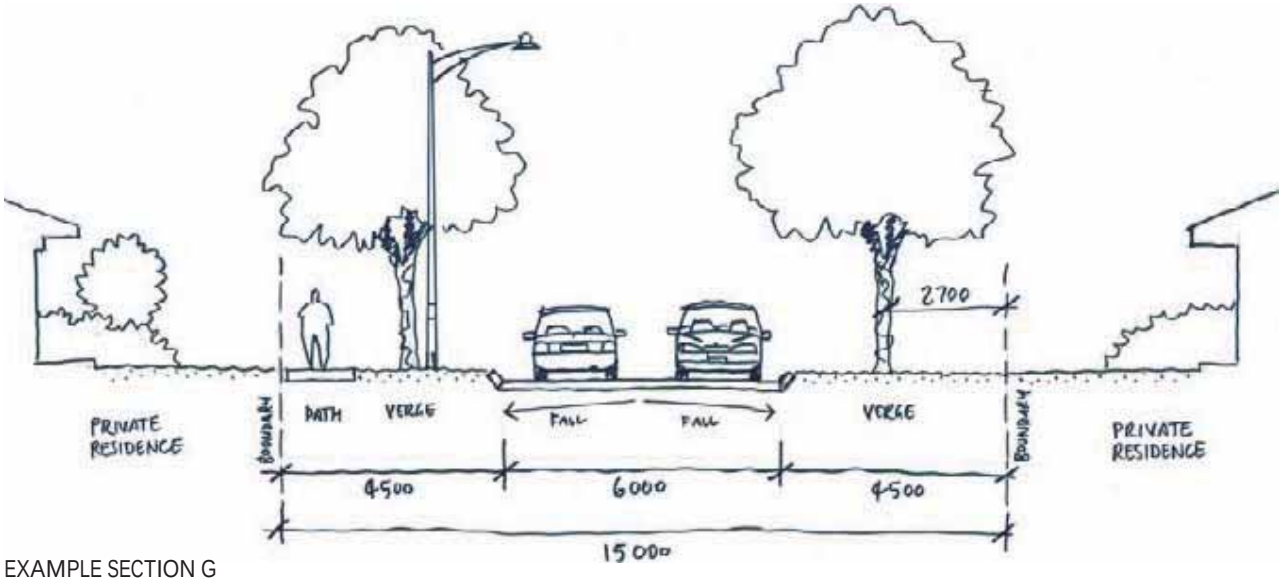


EXAMPLE SECTION F


Baldivis Town Centre, Emerge Associates


Vale, Emerge Associates

Bushmead



EXAMPLE SECTION G

Honeywood, Emerge Associates

Lakeway, Claremont

1.17 Tree and Plant Species

An indicative plant list and select imagery has been included within the attached drawings in support of the proposal. While the list is subject to refinement in consultation with the City of Cockburn, it clearly defines the plant species approach and intent. Planting will consist of a mix of mature stock for specific uses and high profile location purposes, and smaller nursery hardened off stock for mass planting purposes.

The planting strategy consists of the following three principal approaches:

a. Retained trees. The retention of existing trees from the golf course rough areas in between the various former fairways is proposed. This creates instant visual effect, retains shade and habitat and maintains an element of the site's former use.

b. Transplanted trees. The preparation and transplanting of existing trees is possible based on the diversity of species currently located on the site. Existing transplantable trees include but are not limited to: Norfolk Island Pines, Plane trees, Palms of various species, Cape lilacs (subject to approval), WA Peppermints, Liquidambers, casuarinas, ficus species, melaleuca species and grass trees.

c. New tree planting. The proposed development intends on undertaking a new tree planting regime for streetscapes and parkland areas. The final extent and species mix will be subject to approvals and availability. In addition to planting in public areas, the planting of trees is also encouraged in the private realm noting the generally larger sized residential lots proposed for this development.

The new planting selections are aimed at achieving the below criteria:

- Being of local character.
- Preferably being endemic and native to the site area.
- Not being invasive by habit and not containing any declared weed species.
- Being hardy to local soils, wind and salt tolerant and with lower water needs.
- Where required and suitable, being of low fire fuel creation and load as a key part of fire management to the margins of the development.
- Promoting the local ecosystem as habitat for a range of endemic fauna.
- Being of a series of attractive and contrasting foliage, colour and form to enable design based planting and displaying the diversity of the local environment.
- Having a selection of species that ideally enable some to be seasonally flowering at all times of the year.
- Being of suitable form and habit to promote shade where suitable and to either open or screen select views.
- Being of species that are readily commercially accessible and available for future replenishment.









Verge Planting


Scaevola ‘Purple Fanfare’


Melaleuca incana ‘Nana’


Adenanthos cuneatus ‘Coral Carpet’


Hemiandra pungens


Grevillea obtusifolia prostrate


Westringia mundi


Eremophila glabra


Myoporum parvifolium purpurea


Lomandra tanika

Feature Planting


Grevillea obtusifolia prostrate


Beaufortia squarrosa orange


Westringia fruticosa ‘Smokey’


Scaevola ‘Purple Fanfare’


Hemiandra pungens purpurea


Lomandra tanika

Broad Planting



Adenanthos sericea



Pimelia ferruginea



Eremophila nivea ‘Spring Mist’



Grevillea olivacea



Grevilea olivacea



Dampiera linearis



Acacia lasiocarpa



Acacia saligna ‘Green Mulch’



Acacia pulchella



Hemiandra pungens purpurea



Chamelaucium unicnatum



Calothamnus quadrifidus



Hypocalymma angustifolium



Thryptomene baeckeacea



Grevillea thelemanniana



Beaufortia squarrosa orange



Westringia fruticosa ‘Jervis Gem’



Adenanthos cuneatus



Ricinocarpus ‘Bridal Star’



Callistemon phoeniceus

1.18 Habitat Approach

The former fenced golf course created the opportunity for native fauna to use the area as part of a broader habitat area with access to shelter, shade, food and water and some degree of protection. The conclusion of the golf course use may alter aspects of this until such time as the new open space can be created and established. The City has indicated its support for the creation of a series of smaller habitat zones within the proposals open space areas that encourage the survival and retention of native fauna in the area. The final locations will be determined based on existing vegetation, suitable seclusion from humans.

Avian fauna will be able to access the site and use its existing retained trees as it always has done, albeit noting that works may see some degree of disturbance. Ultimately new tree planting will rise to provide generational change to the existing tree stock currently providing habitat. The retention of trees individually, in clumps and in avenues, encourages the retention of existing fauna.

Ground dwelling native fauna will have access to the site noting that construction will occur in stages allowing fauna to adjust to newly created open space areas as the environment transitions over time. As the landscaped areas are installed and mature over time, it is envisaged that native fauna will return to the site from adjacent bushland areas. The proposed retention of two smaller areas of existing banksia bushland provides some continuity for habitat and cover for native fauna.

The landscape design aims to provide areas suitable for fauna to reside and move through the development over time. This will be accomplished by planting types and densities, continuous cover, pockets of refuge for example logs and rocks to lesser used areas of open space, planted drainage basins with infrequent domestic animal and human use. Education of the local existing and new community around risks to native fauna and what individuals can do to promote preservation. An item possibly worthy of examination as part of future detail design is the creation of defined native fauna refuge zones with controlled suitably sized access that limits domestic animal access.

1.19 Sustainability Approach

The landscape approach will have embedded within it a series of sustainable initiatives to be further refined at the detail design stage. These include, but are not limited to:

- Tree retention above and beyond that typical for greenfield development within parks and streetscapes.
- Transplanting of existing mature tree stock saving from destruction and retaining habitat and creating instant shade.
- Larger percentage of open space (22.9% total proposed green space) beyond that typical for greenfield development.
- A variety of storm water management initiative, techniques and inclusions to provide at source recharge including possible subsurface storage tanks.
- Planted detention basins inclusive of nutrient stripping capability in place of sumps.
- A major reduction in the existing long term groundwater draw and licensing needs for public open space maintenance, and significant reduction in the use of fertilizers and herbicides and pesticides.
- Removal of existing lined lakes and their groundwater top up resulting from evaporation and use by the former golf course for irrigation purposes.
- Relocation of native fauna (as may either be temporary or permanent)
- A variety of water wise initiatives applied to the public and private realm inclusive of a new, more efficient irrigation system.
- Retention of two small pockets of existing Banksia woodland.
- Reuse of timber removed from the site as both nature play elements and in mulch and possible select public art elements.
- Preference for use of low embodied energy materials where possible and suitable.
- Use of select LED /and solar lighting where possible and suitable.
- Creation of possible fauna habitat opportunities within open space and retention of trees suitable for avian fauna.
- A maintenance minimisation in design approach to limit cost and time impacts.
- A series of maintenance initiatives to reduce pesticides, herbicides and chemical use generally.
- The aim of creating a continuous tree canopy coverage to limit urban heat island effect and maximise green canopy coverage.
- Use of predominantly native shrub and groundcover vegetation endemic to the Swan coastal plain.

1.20 Wayfinding & Signage Approach

Wayfinding

The design of the development is proposed to be undertaken to encourage intuitive orientation and movement through the development. This is to be undertaken through the use of materials and colours to define particular movement routes, visibility to key features and elements, open viewsheds to desirable destinations and screened viewsheds to assist in directing users and promote privacy where necessary. The design of the path system is aimed at promoting connectivity through the development in an expanded, safe and efficient manner.

Signage

Signage to the development will be unified in its materials and form. Signage is proposed to be located at key decision points including points of arrival, intersections of roads and paths and at reinforcement locations along longer paths.

Signage is proposed to consist of:

- Directional signage to facilitate efficient movement within the precinct.
- Educational signage relating to the local area its habitat, features and history.
- Orientation signage pertaining to direction and distances to local places of interest inclusive of information pertaining to users' fitness and outdoor activities.

1.21 Landscape Materials & Furnishings

Landscape materials will be common to the proposed development area to bring design and character unity to the precinct while also marking quality of the new development area. External landscape materials will be generally selected to be complimentary to the local character in texture, colour and style. The attraction of the local area is intended to be reflected in the materials used. In all instances materials will be robust and fit for purpose with consideration on durability, longevity and maintenance minimization over the longer term inclusive of minimized replacement, local availability and all relevant warranties and guarantees.

Furnishings will all be off the shelf proprietary elements available locally inclusive of parts, replacements, and all suitable guarantees and warranties.

The proposed range of landscape includes:

- Stone paving finish to select higher use and feature areas and to select dry stacked look limestone feature walls befitting of a more handcrafted finish.
- A mix of exposed aggregate and plain concrete finishes to select areas.
- A mix of fencing materials fit for purpose.
- Off form concrete to select feature walls and stairs.
- Metal frames decking and structures with a variety of materials panels and finishes.
- Stabilised gravel paving to select lower use paths.
- Galvanised metal finish to select landscape elements.
- Natural loose gravel paths to select private access points.
- Natural treated timber materials for nature play elements.
- Red asphalt for select paths and higher use road areas.
- A combination of large stone, concrete and steel and/or plastic garden edging.
- Minimal timber to reduce maintenance and extend longevity.
- Low fuel mulches including sand, gravels, select organic mulches to defined areas.

1.22 Landscape Lighting Strategy

Lighting to the landscaped areas will be kept to the minimum necessary to enable safe access to select key routes and areas. The intention is that lighting is subtle but effective, directed rather than broad. There is proposed to be minimal light overspill and light pollution generated by the development.

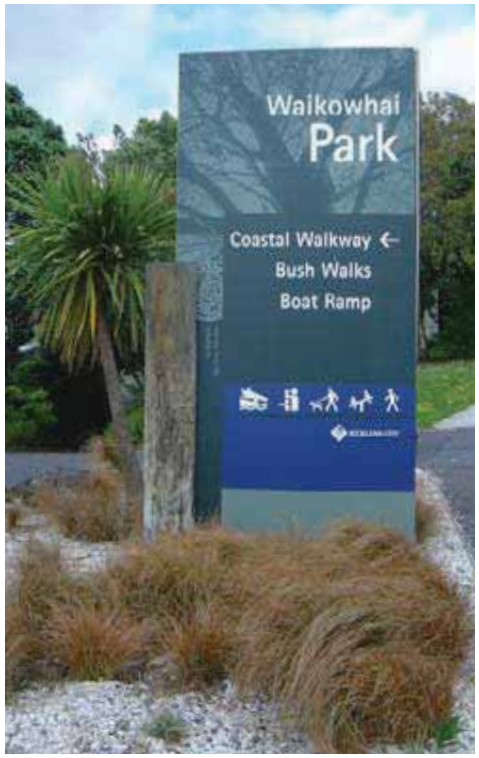
In the main, landscape lighting will be solar and/or LED or similar low electricity use equivalent and will typically be lower directed lighting to signage, doorways, roads and key paths and access routes as opposed to lighting to all access routes. Street lighting will be managed by the civil design package.

1.23 Bushfire Risk Management Landscape Response

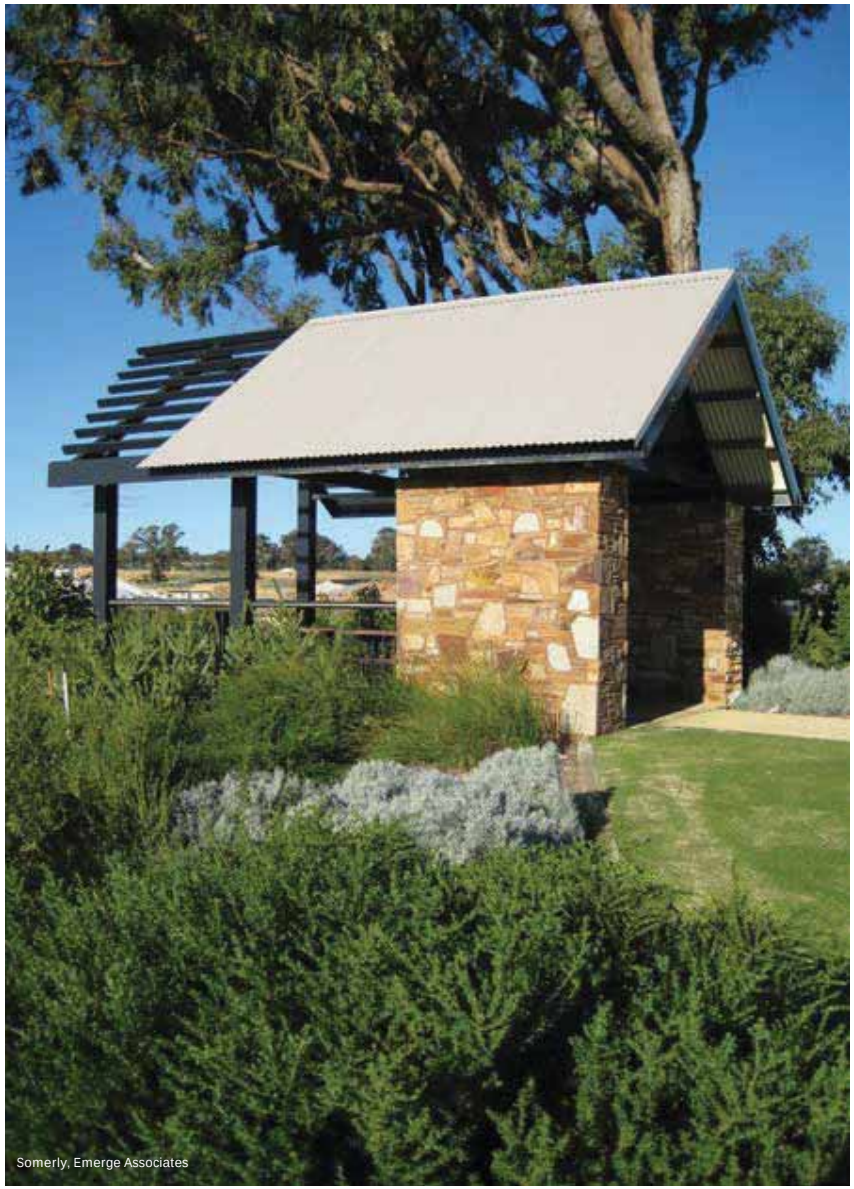
The fire setback zone occurs around most of the margins of the development where they abut a bushland fire threat. Two small areas of existing banksia bushland are proposed to be retained within the design. The resulting landscape design will respond to the projects BAL line in these two smaller defined locations and will employ the use of compliant fire management techniques to meet fire management obligations.

The landscape response will include, but not be limited to, the below in all selected effected fire management zone areas:

- Use of endemic plants and native species identified by the Department of Fire and Emergency Services (DFES) as being low fire fuel species.
- Selection, arrangement and spacing of shrub planting to meet low fire risk principles and requirements.
- Selection, arrangement and spacing of trees to meet low fire risk principles and requirements.
- Use of noncombustible and low combustible landscape materials within the fire setback zone including hard paving, gravels as paths and mulches in select areas, limited organic material, rocks and boulders.
- Provision of access for fire and emergency vehicles.
- Incorporation of a fire setback zone management and maintenance approach inclusive of removal of necessary vegetative fuel and debris at standard required intervals.




The Sanctuary, Emerge Associates


Somerly, Emerge Associates

- Proposed inclusion of irrigation to fire zones for use in advance of fire emergency. Should fire management may require fire mitigation measures in addition to setbacks, the installation of irrigation sprays to defined locations can assist in the suppression of fire prone material and flames within the fire buffer zone.

1.24 Irrigation Strategy

The former golf course has a large irrigation allocation suitable for the preparation and maintenance of healthy greens and fairways over a larger area than that proposed for the new development. This irrigation allocation remains in place.

With the removal of the golf course it is anticipated that the use of ground water will significantly decline. Initial expectations are in the vicinity of up to a 70% reduction in water usage which may be on-sold, traded and / or returned to the groundwater aquifer.

The exiting irrigation system will be removed and replaced with a new integrated irrigation system designed and installed to meet the standards of the City of Cockburn. This may include a system of sprays, drippers and bubblers to suit various circumstances and planting regimes. The existing bores are expected to be reviewed and reworked to maximise water extraction efficiency and to meet new standards. Additional bores may also be considered/ required to better distribute extraction and more efficiently cater for water distribution. Ultimately the groundwater licence and infrastructure required for the new parks will be transferred to the City.

The irrigation water source is proposed to be from the existing (or new) bore system and will be separately metered. The irrigation system will have a range of inbuilt sustainable measures including, but not limited to, rain gauges, water use monitoring, partial drip systems and hydro zoning as part of the design process, inclusive of manual override to respond to periods of excessive rain or lengthy dry periods. Conscious of continuing staged house and road construction, there is also the opportunity to consider a mainline loop system with reverse flow or to be linked to a variety of bores in order to maintain water flow irrespective of any possible future break.

Individual residences may apply for a domestic bore or uitilise mains scheme water as suitable and will be separately metered accordingly. The individual on lot and verge irrigation system will be under the care and control of the resident. In the main, the planting species palette will be local endemic species / native species requiring less water than existing system.

1.25 Landscape Surface Drainage Strategy

Generally the site has a good drainage infiltration rates and good soil permeability reducing the need for extensive drainage and water storage infrastructure. Where possible, the development will opt for at source drainage solutions to distribute drainage throughout. Landscape zones will include planted basins at key low point locations within the development and also will utilize the existing drainage basins where possible. Overflow onto adjacent grass areas may occur to cater for defined irregular larger storm events.

The residential lots and the medium density sites will seek to manage their drainage and infiltration within their lot or strata area. Where open space areas are somewhat limited in space to cater for surface drainage management, underground storage solutions are proposed in accordance with relevant standards and subject to detail design, to ensure maximum open space areas are available for the community.

Roads and paths will be generally graded to sheet drain inclusive of a mix of infiltration basins, raingardens in select locations and swales where suitable. Final drainage design will be subject to detail engineering design. The streetscapes will seek to have flush kerbing in select locations adjacent to grass swales or planted swales inclusive of defined rain gardens to select locations.


Harvest Lakes, Emerge Associates


Vivente, Emerge Associates

1.26 Maintenance Strategy

In all cases, a maintenance regime will be in place inclusive of general maintenance minimization through design practices and will aim to use sustainable maintenance practices. This includes, but is not limited to, defined edges and borders, minimal and preferably alternate approaches to pesticides, controlled and minimized fertilizer use.

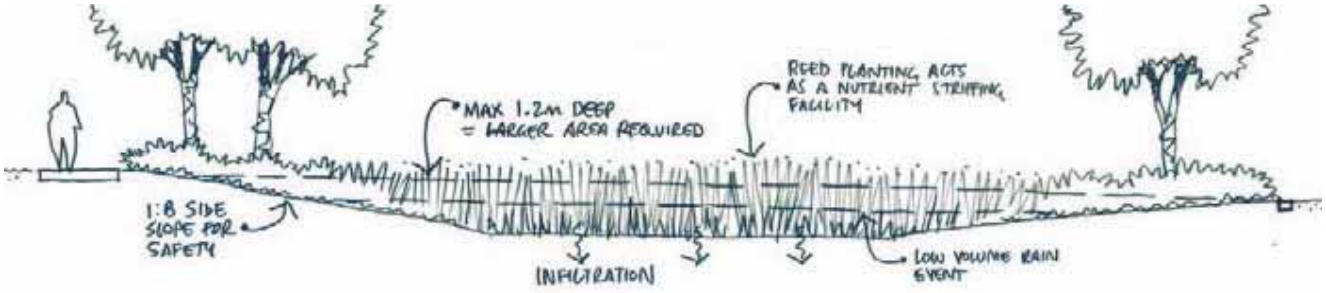
Planted revegetation areas and managed vegetation zones will include a maintenance regime as part of its bushfire management obligations. This will include but is not limited to required periodic removal of natural fuel, review of planting densities to ensure continued compliance with fire regulations and checking and testing of irrigation sprays.

Maintenance will be undertaken via general access to all public accessible areas. Light maintenance vehicles can access all public areas and can adjoin all private areas within the development. This will occur initially via the road system and then by careful access over landscaped grass areas and select areas of the pedestrian path system. Use of removable bollards will limit and control unauthorize access to link areas between roads.

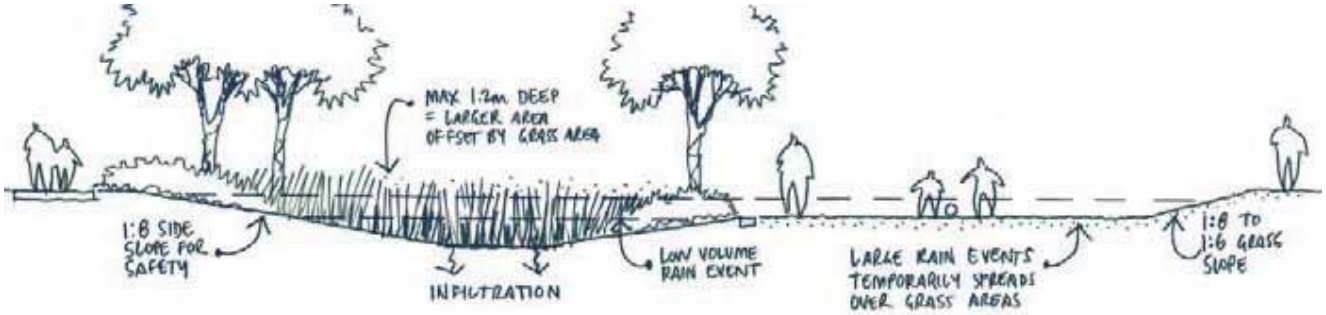
Maintenance will be managed by the development for the first 2 years minimum. The 2 year maintenance timeframe may be extended in certain locations at the developers discretion in liaison with the City.

The increased volume of open space will see additional expenditure occur as necessary in order to maintain the increase in area of open space. This additional cost is somewhat offset by the content of the additional open space (which will mainly be linear widened streetscape areas)

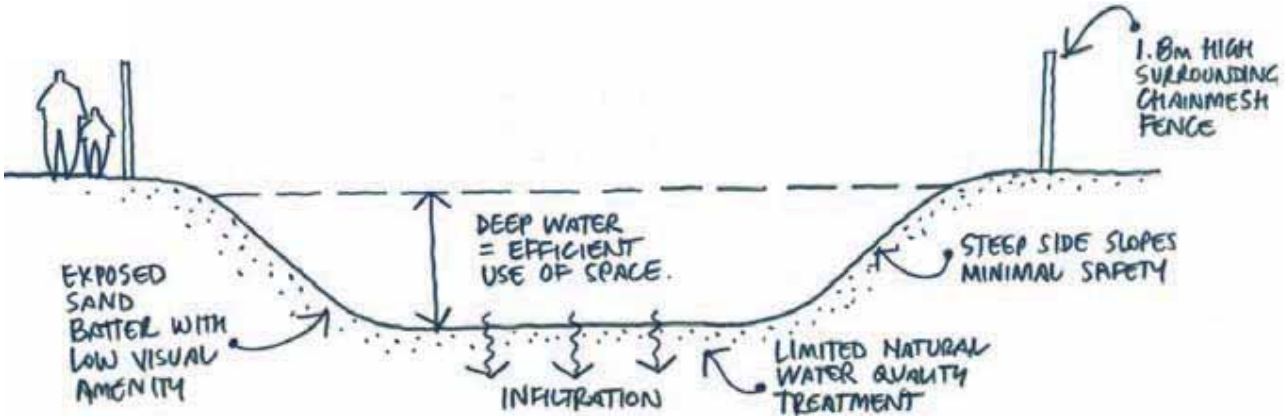

The Sanctuary, Emerge Associates



EXAMPLE SECTION H



EXAMPLE SECTION I



EXAMPLE SECTION J

which will not generally be complex in layout, detail design or material selection thus minimising maintenance costs.

The proponent has been advised by the City that the City's current typical maintenance rate is approximately $2.00/m2. Preliminary calculations indicates that the likely maintenance cost for the proposed design is approximately $2.50/m2 average.

The additional maintenance required to deliver the proposed design may be met by either:

a. The City agreeing to undertake additional maintenance based on the larger volume of open space in response to the existing residents requests and concerns as identified through the community consultation process and the resulting proposed masterplan.

b. The City agreeing to a special area rate to be applied to the new residential lots in addition to their usual rates in order to meet the additional costs over and above Council typical expenditure. This arrangement would be disclosed to the purchasers of new lots at the time of sale and written into the sale contract annexures. This arrangement requires confirmation that the City's expenditure of these funds occurs within the Glen Iris precinct.

Providence, Emerge Associates

APPENDIX L

Post Development Catchments & Runoff Rate Estimation

Land Use Breakdown and EIA's for Individual Subcatchments - Modelling Purposes

Hyd2o 25/08/2023

Internal Catchments

		Area (ha)								
		Low Density (R20)	Medium Density (R30)	Group Housing (R30/R40)	Commercial	POS/Conservation/ Lansdcape Interface	Road Res	Total	15mm EIA	1% AEP EIA
1	A1	0.98	0.64	0.00	0.00	0.70	0.97	3.29	0.67	1.32
2	A2	0.42	0.00	0.00	0.00	0.17	0.26	0.85	0.18	0.31
3	A3	0.55	0.00	0.00	0.00	0.27	0.25	1.07	0.17	0.34
4	A4	0.22	0.00	0.00	0.00	0.00	0.00	0.22	0.00	0.04
5	B1	1.87	0.00	0.00	0.00	0.40	0.66	2.93	0.46	0.94
6	B2	0.52	0.00	0.00	0.00	0.11	0.25	0.88	0.17	0.32
7	B3	1.16	0.27	0.00	0.00	0.32	0.48	2.23	0.33	0.75
8	C1	0.44	0.00	0.00	0.00	0.13	0.25	0.82	0.17	0.31
9	D1	0.00	0.00	0.55	0.00	0.32	0.00	0.87	0.00	0.24
10	D2	0.45	0.00	0.00	0.00	0.30	0.23	0.98	0.16	0.31
11	D3	1.61	0.00	0.44	0.00	0.47	0.84	3.36	0.58	1.22
12	D4	0.21	0.00	0.00	0.00	0.08	0.10	0.39	0.07	0.13
13	E1	1.61	0.00	0.00	0.00	0.34	0.50	2.45	0.34	0.75
14	E2	0.41	0.00	0.00	0.00	0.52	0.29	1.22	0.20	0.38
15	F1	0.33	0.00	0.00	0.00	0.08	0.16	0.57	0.11	0.20
16	F2	0.01	0.00	0.00	0.00	0.33	0.00	0.34	0.00	0.04
17	G1	0.45	0.00	0.00	0.00	0.68	0.13	1.26	0.09	0.27
18	G2	1.72	0.00	0.00	0.00	0.13	0.54	2.39	0.37	0.78
19	G3	0.56	0.00	0.00	0.00	0.17	0.18	0.91	0.12	0.27
20	H1*	0.42	0.00	1.37	0.00	0.86	0.53	3.18	0.37	0.62
21	I1*	0.73	0.00	1.35	0.00	0.53	0.79	3.40	0.55	0.86
22	J1	0.31	0.00	0.00	0.73	0.38	0.52	1.94	0.36	0.54
23	K1	0.00	0.00	0.32	0.00	0.92	0.20	1.44	0.14	0.39
24	K2	0.59	0.00	0.00	0.00	0.19	0.22	1.00	0.15	0.31
25	K3	1.03	0.00	0.10	0.00	0.19	0.46	1.78	0.32	0.64
26	K4	0.49	0.00	0.88	0.00	0.10	0.37	1.84	0.26	0.75
27	L1	0.36	0.00	0.00	0.00	0.14	0.00	0.50	0.00	0.08
28	L2	0.42	0.00	0.28	0.00	0.21	0.18	1.09	0.12	0.36
29	L3	0.43	0.00	0.00	0.00	0.21	0.12	0.77	0.09	0.21
30	L4	1.85	0.00	0.00	0.00	0.56	0.68	3.09	0.47	0.97
31	M1	1.16	0.00	0.00	0.00	0.25	0.44	1.85	0.30	0.61
32	M2	1.16	0.00	0.00	0.00	0.82	0.49	2.48	0.34	0.72
33	M3	0.68	0.00	0.00	0.00	0.16	0.21	1.05	0.14	0.32
	Total	23.14	0.91	5.29	0.73	11.06	11.30	52.43	7.80	16.31

External Catchments

		Area (ha)					
		Lots (R20)	POS	Road Res	Total	15mm EIA	1% AEP EIA
1	AExt1	3.30	0.00	0.99	4.29	0.68	1.44
2	AExt2	3.85	0.00	1.12	4.97	0.77	1.64
3	AExt3	1.33	0.01	0.41	1.75	0.28	0.59
4	BExt1	2.65	0.00	0.94	3.59	0.65	1.27
7	DExt1	7.04	0.34	2.76	10.14	1.91	3.65
5	EExt1	2.92	0.01	1.08	4.01	0.75	1.44
6	EExt2	2.71	0.18	1.02	3.92	0.70	1.38
8	FExt1	0.98	0.01	0.25	1.24	0.17	0.39
9	GExt1	1.13	0.00	0.78	1.91	0.54	0.87
10	GExt2	3.10	0.40	1.03	4.53	0.71	1.48
11	GExt3	1.70	0.00	0.71	2.41	0.49	0.91
12	IExt1	1.45	0.00	0.51	1.96	0.35	0.69
13	IExt2	0.72	0.00	0.74	1.46	0.51	0.76
14	JExt1	3.39	0.00	1.44	4.83	0.99	1.83
15	KExt1	0.91	0.07	0.42	1.40	0.29	0.53
16	LExt1	2.39	0.00	0.70	3.09	0.48	1.02
17	LExt2	0.80	0.00	0.31	1.11	0.21	0.41
	Total	40.37	1.03	15.19	56.60	10.48	20.29

CURRV

Calculator for Urban Runoff Rates & Volumes
27/08/2023

Project: Glen Iris Jandakot LWMS

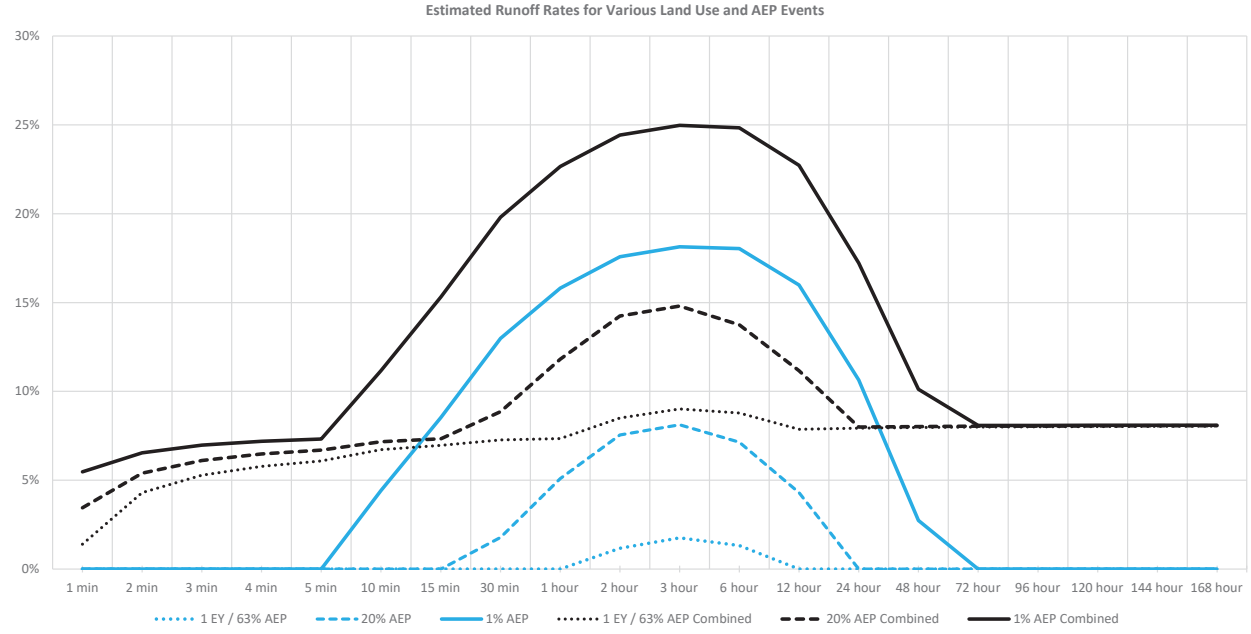
	Land Use Description	Area (ha)	Use in Calc	Imperv Initial Loss mm	Perv Initial Loss mm	Perv Continue Loss mm/hr	On Site Soak (mm)	AR&R Empty (days)	EIA/TIA System Connect Ratio	Roof %	Ext Imp %	Ext Perv %	Comment
1	Residential Lots : R20	23.1	Yes	1.5	20.0	4.0	15.0	0.25	60%	23.5	6.5	20	Soakwells, Assume only Front of Lot Runoff Contribution
2	Group Housing	5.3	Yes	1.5	20.0	4.0	15.0	0.25	60%	65	20	15	Soakwells with Overflow Connection Assumed (R30 Equiv)
3	Medium Density	0.9	Yes	1.5	20.0	4.0	15.0	0.25	60%	70	20	10	Lot Connections Assumed - Conservative
4	Commercial	0.7	Yes	1.5	20.0	4.0	0.0	0.25	0%	60	35	5	Assumed Water Managed On Site - No Contribution to Estate Storages
5	POS/Conservation/Landscape Interface	11.1	Yes	1.5	20.0	4.0	0.0	0.25	20%	0	5	95	Impervious Allowance for Paths/Hardstand Areas
6	Road Reserve	11.3	Yes	1.5	20.0	4.0	0.0	0.25	100%	0	70	30	
7	External Catchment : Lots	40.4	Yes	1.5	20.0	4.0	15.0	0.25	60%	23.5	6.5	20	Existing Developed Area
8	External Catchment : Road Reserve	1.0	Yes	1.5	20.0	4.0	0.0	0.25	100%	0	70	30	Existing Developed Area
9	External Catchment : POS	15.2	Yes	1.5	20.0	4.0	0.0	0.25	20%	0	5	95	Existing Developed Area
10								1.00					
	Total Area :	109.0											

EIA : Effective Impervious Area, TIA : Total Impervious Area

Land Use Graph Selector: 1

(11 - combined total)

Residential Lots : R20



Rainfall IFD Data (via Bureau of Meterology)
Annual Exceedence Probability / ARI

	Duration	63.2% 1.00	50% 1.44	20% 4.48	10% 10	5% 20	2% 50	1% 100
1	1 min	1.8	2.0	2.6	3.0	3.5	4.1	4.6
2	2 min	3.2	3.5	4.4	5.1	5.8	6.8	7.6
3	3 min	4.3	4.7	6.0	6.9	7.9	9.3	10.4
4	4 min	5.1	5.6	7.3	8.5	9.7	11.3	12.7
5	5 min	5.9	6.5	8.4	9.8	11.2	13.1	14.7
6	10 min	8.5	9.4	12.3	14.4	16.5	19.4	21.6
7	15 min	10.3	11.4	14.9	17.4	19.9	23.3	26.1
8	30 min	13.7	15.1	19.7	22.9	26.2	30.7	34.3
9	1 hour	15.0	19.6	25.3	29.4	33.6	39.6	44.4
10	2 hour	23.0	25.1	32.2	37.6	43.2	51.4	58.2
11	3 hour	26.6	29.0	37.3	43.6	50.4	60.3	68.8
12	6 hour	34.0	37.0	47.9	56.4	65.6	79.5	91.5
13	12 hour	42.9	47.0	61.1	72.2	84.2	102.0	118.0
14	24 hour	53.5	58.6	76.4	89.8	104.0	125.0	143.0
15	48 hour	65.9	72.3	93.2	108.0	123.0	144.0	161.0
16	72 hour	74.7	82.0	105.0	120.0	134.0	155.0	171.0
17	96 hour	82.5	90.3	114.0	130.0	145.0	165.0	181.0
18	120 hour	89.7	98.1	123.0	140.0	155.0	177.0	193.0
19	144 hour	96.9	106.0	133.0	150.0	167.0	190.0	207.0
20	168 hour	104.0	114.0	143.0	161.0	179.0	205.0	224.0

Estimated Runoff Rates
Annual Exceedence Probability / ARI

	63.2% 1.00	50% 1.44	20% 4.48	10% 10	5% 20	2% 50	1% 100
Maximum of All Events	1.00	1.44	4.48	10	20	50	100
Residential Lots : R20	2%	3%	8%	11%	14%	16%	18%
Group Housing	5%	9%	19%	25%	30%	35%	38%
Medium Density	5%	9%	20%	26%	30%	35%	39%
Commercial	0%	0%	0%	0%	0%	0%	0%
POS/Conservation/Landscape Interface	1%	1%	4%	6%	8%	10%	11%
Road Reserve	69%	69%	71%	76%	79%	82%	85%
External Catchment : Lots	2%	3%	8%	11%	14%	16%	18%
External Catchment : Road Reserve	69%	69%	71%	76%	79%	82%	85%
External Catchment : POS	1%	1%	4%	6%	8%	10%	11%
0	0%	0%	0%	0%	0%	0%	0%
combined total	**9%**	**10%**	**15%**	**18%**	**21%**	**23%**	**25%**

Event Selector	9	1 hour					
Residential Lots : R20	0%	1%	5%	9%	11%	14%	16%
Group Housing	0%	2%	13%	20%	25%	30%	33%
Medium Density	0%	2%	14%	20%	25%	30%	34%
Commercial	0%	0%	0%	0%	0%	0%	0%
POS/Conservation/Landscape Interface	1%	1%	2%	4%	6%	8%	10%
Road Reserve	63%	65%	67%	72%	75%	79%	81%
External Catchment : Lots	0%	1%	5%	9%	11%	14%	16%
External Catchment : Road Reserve	63%	65%	67%	72%	75%	79%	81%
External Catchment : POS	1%	1%	2%	4%	6%	8%	10%
0	0%	0%	0%	0%	0%	0%	0%
combined total	**7%**	**8%**	**12%**	**15%**	**18%**	**21%**	**23%**

APPENDIX M
Post Development Stormwater Modelling

Post Development Stormwater Modelling Detailed Results : Individual Catchments

							15mm Event : Water Quality Treatment						20% AEP Event							1% AEP Event					
	Contributing Catchments	Storage Type	Storage Invert (mAHD)	AAMGL (mAHD)	MGL (mAHD)	Inv above AAMGL (m)	EIA (ha)	K (m/d)	Flood Rise (m)	Top Water Level (mAHD)	TWL Area (m2)	Reqd Volume (m3)	20%/1% AEP EIA (ha)	Modelled Effective K (m/d)	Flood Rise (m)	Top Water Level (mAHD)	TWL Area (m2)	Reqd Volume (m3)	Critical Duration (hr)	Modelled Effective K (m/d)	Flood Rise (m)	Top Water Level (mAHD)	TWL Area (m2)	Reqd Volume (m3)	Critical Duration (hr)
S1	A1	Swale	35.8	22.2	22.9	13.6	0.67	2.5	0.29	36.09	317	72	1.32	5.2	0.68	36.48	540	252	6	6.9	1.04	36.84	785	502	12
S2	A2	Swale	36.7	19.9	20.6	16.8	0.18	2.5	0.29	36.99	105	18	0.31	4.9	0.51	37.21	186	49	1	5.5	0.71	37.41	272	95	12
S3	AExt1 & A4	Underground	34.0	19.9	20.6	14.1	0.69	-	-	-	-	-	1.48	6.9	0.46	34.46	495	228	1	6.9	1.45	35.45	495	718	12
S4	AExt2	Underground	33.5	22.4	23.1	11.1	0.77	-	-	-	-	-	1.64	10.0	0.44	33.94	465	202	12	10.0	1.45	34.95	465	676	12
S5	AExt3 & A3	Basin	36.7	22.2	22.9	14.5	0.45	2.5	0.30	37.00	244	48	0.93	9.0	0.54	37.24	394	124	1	11.0	0.80	37.50	575	250	12
S6	B1	Basin	35.8	22.3	23.0	13.5	0.46	2.5	0.30	36.10	216	50	0.94	5.2	0.66	36.46	365	177	6	7.0	1.02	36.82	551	354	12
S7	B2	Swale	26.8	22.1	22.8	4.7	0.17	2.5	0.29	27.09	117	16	0.32	8.0	0.43	27.23	181	37	1	9.4	0.62	27.42	279	81	12
S8	B3 & BExt1	Basin	26.8	22.3	23.0	4.5	0.98	2.5	0.29	27.09	462	106	2.03	5.3	0.71	27.51	805	391	6	6.9	1.09	27.89	1159	785	12
S9	C1	Basin	25.9	22.4	23.1	3.5	0.17	2.5	0.30	26.20	121	18	0.31	8.9	0.41	26.31	172	34	1	10.5	0.60	26.50	268	75	12
S10	D1	Swale	27.0	22.7	23.4	4.3	0.00	-	-	-	-	-	0.24	6.2	0.49	27.49	49	25	12	8.7	0.86	27.86	132	75	12
S11	D2	Basin	27.0	22.9	23.6	4.1	0.16	2.5	0.29	27.29	92	17	0.31	4.7	0.47	27.47	147	51	1	6.5	0.68	27.68	224	101	12
S12	D3	Swale	26.5	23.1	23.8	3.4	0.58	2.5	0.30	26.80	429	86	1.22	4.8	0.53	27.03	663	227	12	6.5	0.79	27.29	947	453	12
S13	D4	Basin	26.5	23.0	23.7	3.5	0.07	2.5	0.27	26.77	44	7	0.13	3.3	0.38	26.88	64	23	12	5.3	0.49	26.99	88	36	1
S14	DExt1	Basin	25.5	22.8	23.5	2.7	1.91	-	-	-	-	-	3.65	14.0	0.93	26.43	687	541	12	14.0	1.98	27.48	955	1400	12
S15	E1	Swale	24.7	22.5	23.2	2.2	0.34	2.5	0.30	25.00	229	34	0.75	6.1	0.54	25.24	431	113	1	8.1	0.73	25.43	602	211	12
S16	E2 & EExt1	Basin	24.5	22.3	23.0	2.2	0.95	2.5	0.29	24.79	424	102	1.82	8.8	0.62	25.12	618	273	1	11.4	1.00	25.50	880	556	12
S17	EExt2	Underground	23.0	22.5	23.2	0.5	0.70	-	-	-	-	-	1.38	11.0	0.53	23.53	360	191	1	11.0	1.50	24.50	360	540	12
S18	F1	Swale	26.0	22.5	23.2	3.5	0.11	2.5	0.28	26.28	79	11	0.20	9.6	0.34	26.34	119	19	1	12.0	0.46	26.46	169	36	12
S19	F2 & FExt1	Basin	25.7	22.5	23.2	3.2	0.17	2.5	0.28	25.98	91	17	0.42	10.7	0.55	26.25	165	51	1	13.4	0.77	26.47	242	96	12
S20	G1 & GExt1 & GExt2	Basin	25.0	22.8	23.5	2.2	1.34	2.5	0.25	25.25	641	140	2.61	4.8	0.72	25.72	963	547	6	6.6	1.18	26.18	1340	1087	12
S21	G2 & GExt3	Swale	25.0	22.9	23.6	2.1	0.86	2.5	0.30	25.30	390	93	1.69	4.5	0.76	25.76	670	363	6	6.9	1.12	26.12	931	667	12
S22	G3	Swale	26.0	23.0	23.7	3.0	0.12	2.5	0.29	26.29	68	13	0.27	5.0	0.48	26.48	115	44	1	6.6	0.66	26.66	168	77	1
S23	H1	Basin	26.2	23.2	23.9	3.0	0.37	2.5	0.30	26.50	199	39	0.62	4.5	0.51	26.71	310	107	6	6.5	0.75	26.95	451	211	12
S24	I1 & IExt1 & IExt2	Swale	26.2	23.3	24.0	2.9	1.41	2.5	0.30	26.50	650	153	2.31	5.5	0.60	26.80	966	411	12	6.4	0.99	27.19	1416	893	12
S25	J1 & JExt1	Basin	26.0	23.3	24.0	2.7	1.35	2.5	0.28	26.28	655	144	2.37	4.8	0.63	26.63	1037	462	6	6.2	0.92	26.92	1380	831	6
S26	K1	Swale	27.5	23.3	24.0	4.2	0.14	2.5	0.30	27.80	80	15	0.39	5.9	0.56	28.06	154	63	1	7.3	0.77	28.27	228	113	1
S27	K2	Basin	27.4	23.3	24.0	4.1	0.15	2.5	0.28	27.68	89	16	0.31	4.8	0.47	27.87	147	51	1	6.3	0.64	28.04	208	89	1
S28	K3	Basin	26.6	23.3	24.0	3.3	0.32	2.5	0.30	26.90	160	35	0.64	9.7	0.55	27.15	251	86	1	12.2	0.83	27.43	373	172	12
S29	K4	Basin	26.6	23.1	23.8	3.5	0.26	2.5	0.30	26.90	187	40	0.75	9.6	0.59	27.19	311	112	1	13.1	0.85	27.45	443	209	12
S30	KExt1	Underground	24.5	23.1	23.8	1.4	0.29	-	-	-	-	-	0.53	10.0	0.54	25.04	140	76	1	10.0	1.47	25.97	140	205	12
S31	L1 & LExt1	Undergound	23.6	23.2	23.9	0.4	0.48	-	-	-	-	-	1.10	10.0	1.06	24.66	185	197	1	10.0	1.50	25.10	185	278	12
S32	L2	Swale	27.4	23.2	23.9	4.2	0.12	2.5	0.27	27.67	77	13	0.36	5.5	0.53	27.93	152	58	12	7.0	0.72	28.12	219	104	1
S33	L3	Swale	25.8	23.2	23.9	2.6	0.09	2.5	0.29	26.09	52	9	0.21	10.2	0.50	26.30	96	24	1	13.7	0.64	26.44	132	40	12
S34	L4	Basin	25.0	23.3	24.0	1.7	0.47	2.5	0.30	25.30	246	50	0.97	5.1	0.61	25.61	398	177	6	6.5	0.88	25.88	553	319	6
S35	LExt2	Undergound	23.5	23.3	24.0	0.2	0.21	-	-	-	-	-	0.41	10.0	0.68	24.18	44	30	1	10.0	1.49	24.99	44	66	12
S36	M1	Swale	24.8	23.4	24.1	1.4	0.30	2.5	0.28	25.08	213	29	0.61	7.3	0.46	25.26	362	81	1	9.4	0.62	25.42	502	150	12
S37	M2	Basin	24.5	23.6	24.3	0.9	0.34	2.5	0.30	24.80	168	37	0.72	5.2	0.67	25.17	314	125	6	6.0	1.00	25.50	476	254	12
S38	M3	Basin	25.2	23.4	24.1	1.8	0.14	2.5	0.28	25.48	89	16	0.32	5.0	0.48	25.68	151	54	1	6.4	0.65	25.85	212	92	1
										Total	**6934**	**1444**				Total	**13672**	**6076**					Total	**18849**	**12897**	
																Total (ex UG)	**11983**	**5152**					Total (ex UG)	**17160**	**10414**	

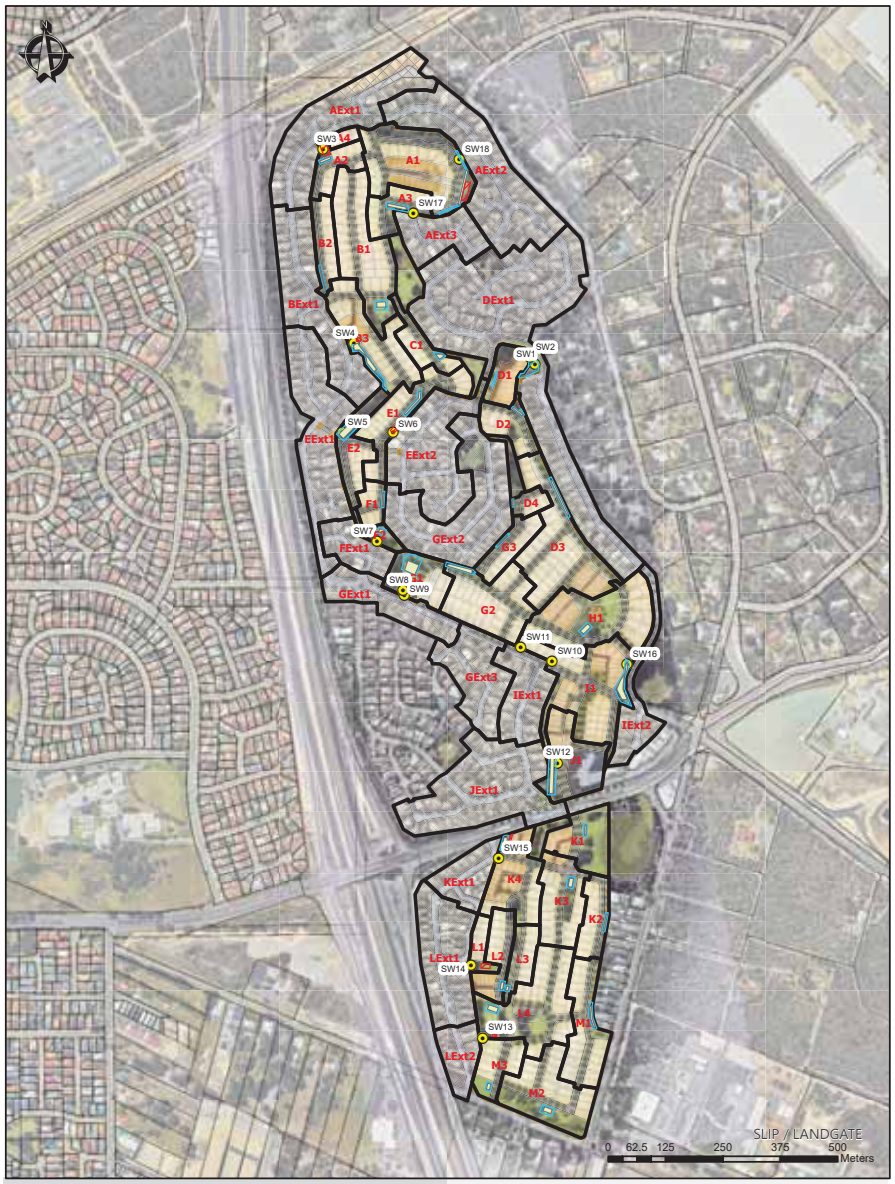
Underground storage inverts dictated by surveyed inverts of existing pipework

Effective K shown in table above represents a combination of K for the biofilter area and adopted K for the larger flood area , considering the relative areas of inundation and permeability testing

APPENDIX N

Indicative Storage Cross Sections **& Landscape Overlay**

Date: 27/08/2023 Job No. H22046



Site
Catchments
External Catchments
Biofiltration Area
Basin/Swale Flood Storage
Underground Flood Storage
Existing Pipework/ Outlet

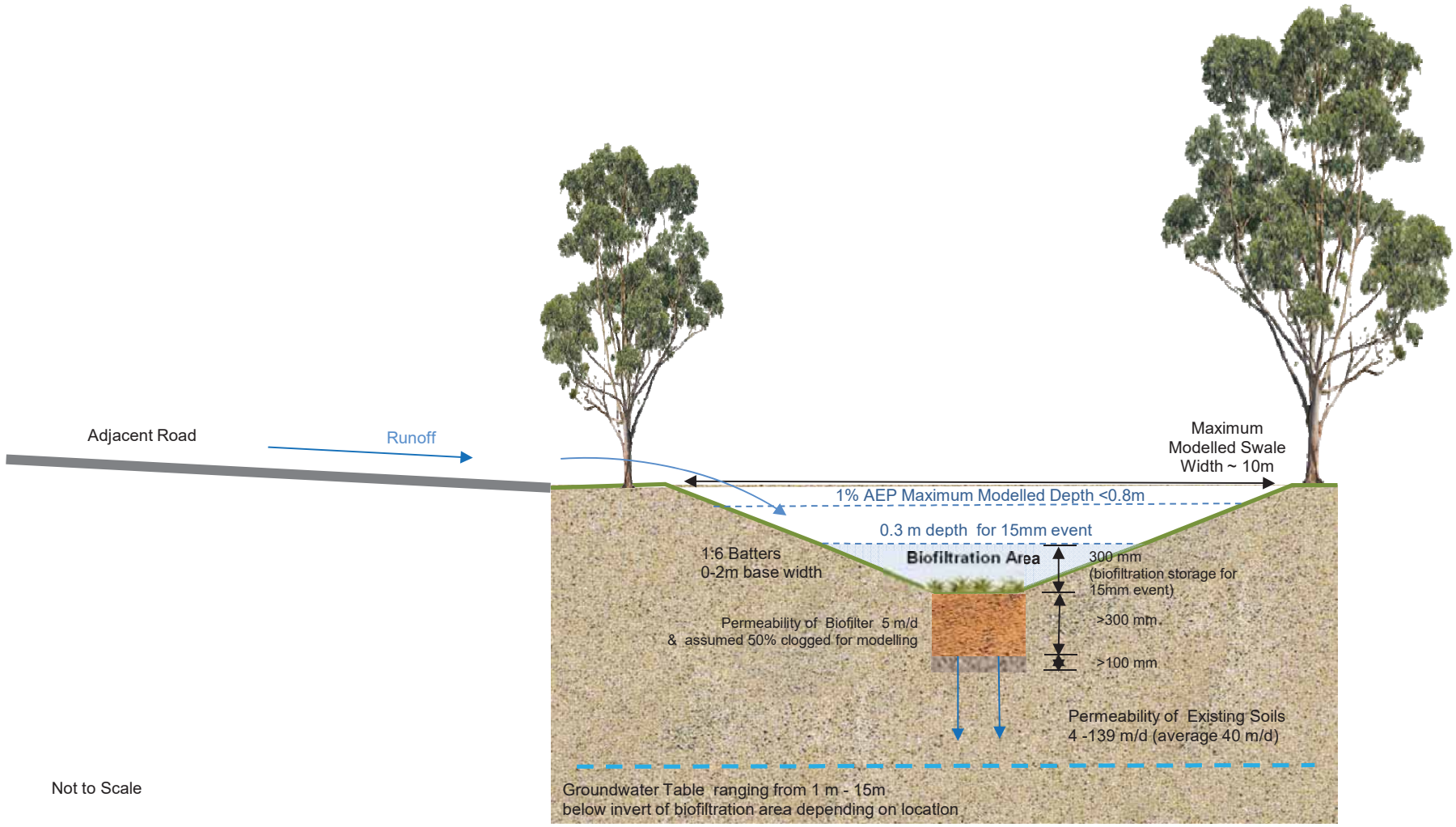
hyd2o

Glen Iris Jandakot Local Water Management Strategy

Stormwater Management Landscape Overlay

Appendix N

Date: 25/5/2021 Job No H20002



Swale cross section shown indicative for modelling purposes
Actual depth and width to vary based on individual detailed design requirements at each location at UWMP stage

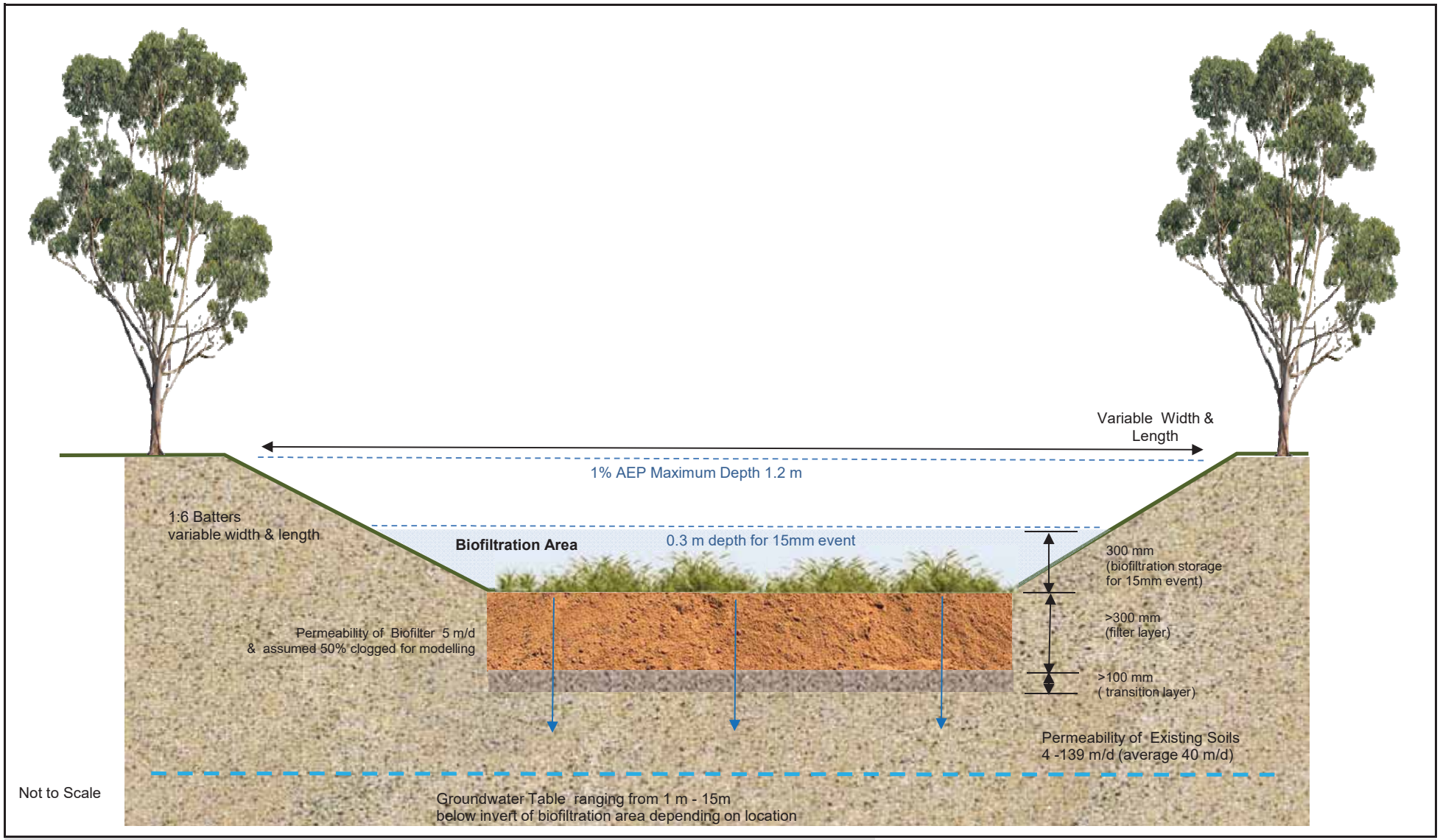
hyd$_2$o

Glen Iris Jandakot Local Water Management Strategy

Typical Modelled Swale Cross Section

Appendix N1

Date: 25/5/2021 Job No H20002



Basin cross section shown indicative for modelling purposes
Actual depth and width to vary based on individual detailed design requirements at each location at UWMP stage

hyd$_2$o

Glen Iris Jandakot Local Water Management Strategy

Typical Modelled Basin Cross Section

Appendix N2

APPENDIX O
Engineering Drawings

PLAN
SCALE 1:1000

0 10 20 40 60m
SCALE 1:1000 @ ORIGINAL SHEET SIZE A1

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATION
2. ALL DIMENSIONS SHOWN ARE IN METRES UNLESS OTHERWISE SHOWN.
3. SURVEY DATA PROVIDED BY MNG.
4. ALL LEVELS SHALL BE DETERMINED FROM BENCH MARKS ESTABLISHED BY THE PROJECT SURVEYOR.
5. ALL SETBACKS TO BE 6m FROM FRONT BOUNDARY UNLESS NOTED OTHERWISE.
6. GEOTECHNICAL INSPECTIONS AND ASSESSMENTS TO BE CARRIED OUT AS PER SPECIFICATION AND AT RECOMMENDATION FROM THE PRINCIPAL NOMINATED GEOTECHNICAL CONSULTANT.
7. EXISTING SERVICES ARE SHOWN FOR INFORMATION ONLY. ALL SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF WORKS. THE CONTRACTOR SHALL REPORT ANY DISCREPANCY OR CLASH WITH SERVICES TO THE SUPERINTENDENT.
8. ALL INFRASTRUCTURE IDENTIFIED TO BE REMOVED IS TO BE DISPOSED OF OFF SITE UNLESS NOTED OTHERWISE.
9. CONTRACTOR SHALL REMOVE ALL RUBBISH, MISCELLANEOUS REMNANTS AND THE LIKE FROM WITHIN THE SITE.
10. SITE TO REMAIN SECURE AT ALL TIMES. CONTRACTOR TO ALLOW FOR TEMPORARY FENCE TO BE INSTALLED/RELOCATED SO THE WORKS CAN BE CONSTRUCTED IN ITS ENTIRETY.
11. UPON DISCOVERY OF ANY "UNEXPECTED FIND" THE CONTRACTOR SHALL CEASE WORK IN THE VICINITY OF THIS DISCOVERY, MAKE THE AREA SAFE AND NOTIFY THE SUPERINTENDENT OF THE OCCURRENCE.
12. ALL WORKS IN THE VICINITY OF "TREES TO BE PROTECTED" SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE PROJECT ARBORIST. CONTRACTOR TO INSTALL AND MAINTAIN TPZ FENCING THROUGHOUT WORKS.
13. INTERNAL BATTER SLOPES TO BE NO STEEPER THAN 1:3 (V:H). UNLESS NOTED OTHERWISE. ADJACENT POS AREAS, BATTERS ARE TO BE WHOLLY WITHIN THE LOT TO MINIMISE CLEARING.

LEGEND

- LIMIT OF WORKS
- 2 — LOT NUMBER
- 43.15 — PROPOSED BULK EARTHWORKS PAD LEVEL
- 43.15 — FUTURE BULK EARTHWORKS PAD LEVEL
- PROPOSED BULK EARTHWORKS CONTOURS (0.25m INTERVAL)
- EXISTING SURFACE CONTOURS (0.5m INTERVAL)
- GROUNDWATER LEVEL CONTOURS (0.50m INTERVAL)
- FUTURE RETAINING WALL
- EXISTING ROAD/KERB
- PROPOSED ROAD/KERB
- PROPOSED BATTER
- EXISTING EMBANKMENT
- FUTURE BATTER
- EXISTING SEWER
- EXISTING WATER
- EXISTING DRAINAGE
- EXISTING NBN
- EXISTING TELSTRA
- EXISTING GAS
- EXISTING UNDERGROUND POWER
- EXISTING OVERHEAD POWER
- EXISTING IRRIGATION
- EXISTING TREE TO REMAIN AND BE PROTECTED
- EXISTING TREE TO BE REMOVED
- BLACK COCKATOO HABITAT TREE (SURVEYED)
- BLACK COCKATOO HABITAT TREE (UN-SURVEYED)

WARNING
BEWARE OF UNDERGROUND SERVICES
The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.
DIAL1100 BEFORE YOU DIG

C	25.07.23	JJ	BG	BT	ISSUED FOR COUNCIL APPROVAL
B	07.07.23	JJ			REVISED PRECALCULATION PLAN
A	01.06.23	JJ			ISSUED FOR TENDER

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JDSi CONSULTING ENGINEERS

CLIENT:
ECP ACQUISITIONS 6 PTY LTD
ACUMEN DEVELOPMENT SOLUTIONS

PROJECT:
GLEN IRIS ESTATE JANDAKOT
CENTRAL BULK EARTHWORKS

DRAWING TITLE:
BULK EARTHWORKS PLAN
SHEET 1

DRAWN: H.VU	WAPC No.: 163728
DESIGNED: J.JONES	SCALE @ A1: 1:1000
PROJECT MANAGER: B.TREW	DATUM: AHD; CO-ORDS: PCG94
JDSI PROJECT No.: JDS201817.BE01	DRAWING No.: C100; REVISION: C

PLAN
SCALE 1:1000

0 10 20 40 60m
SCALE 1:1000 @ ORIGINAL SHEET SIZE A1

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.
2. FOR STANDARD NOTES AND LEGEND REFER TO C100 OF THIS SET

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DIAL1100 BEFORE YOU DIG

C	25.07.23	JJ	BG	BT	ISSUED FOR COUNCIL APPROVAL
B	07.07.23	JJ			REVISED PRECALCULATION PLAN
A	01.06.22	JJ			ISSUED FOR TENDER

NOTE
This drawing shall be preliminary only until it is issued for Construction.
Certified Quality System to ISO 9001

JDSi CONSULTING ENGINEERS

CLIENT:
ECP ACQUISITIONS 6 PTY LTD
ACUMEN DEVELOPMENT SOLUTIONS

PROJECT:
GLEN IRIS ESTATE JANDAKOT
CENTRAL BULK EARTHWORKS

DRAWING TITLE:
BULK EARTHWORKS PLAN
SHEET 2

DRAWN: H.VU	WAPC No.: 163728
DESIGNED: J.JONES	SCALE @ A1: 1:1000
PROJECT MANAGER: B.TREW	DATUM: AHD; CO-ORDS: PCG94
JDSI PROJECT No.: JDS201817.BE01	DRAWING No.: C101; REVISION: C

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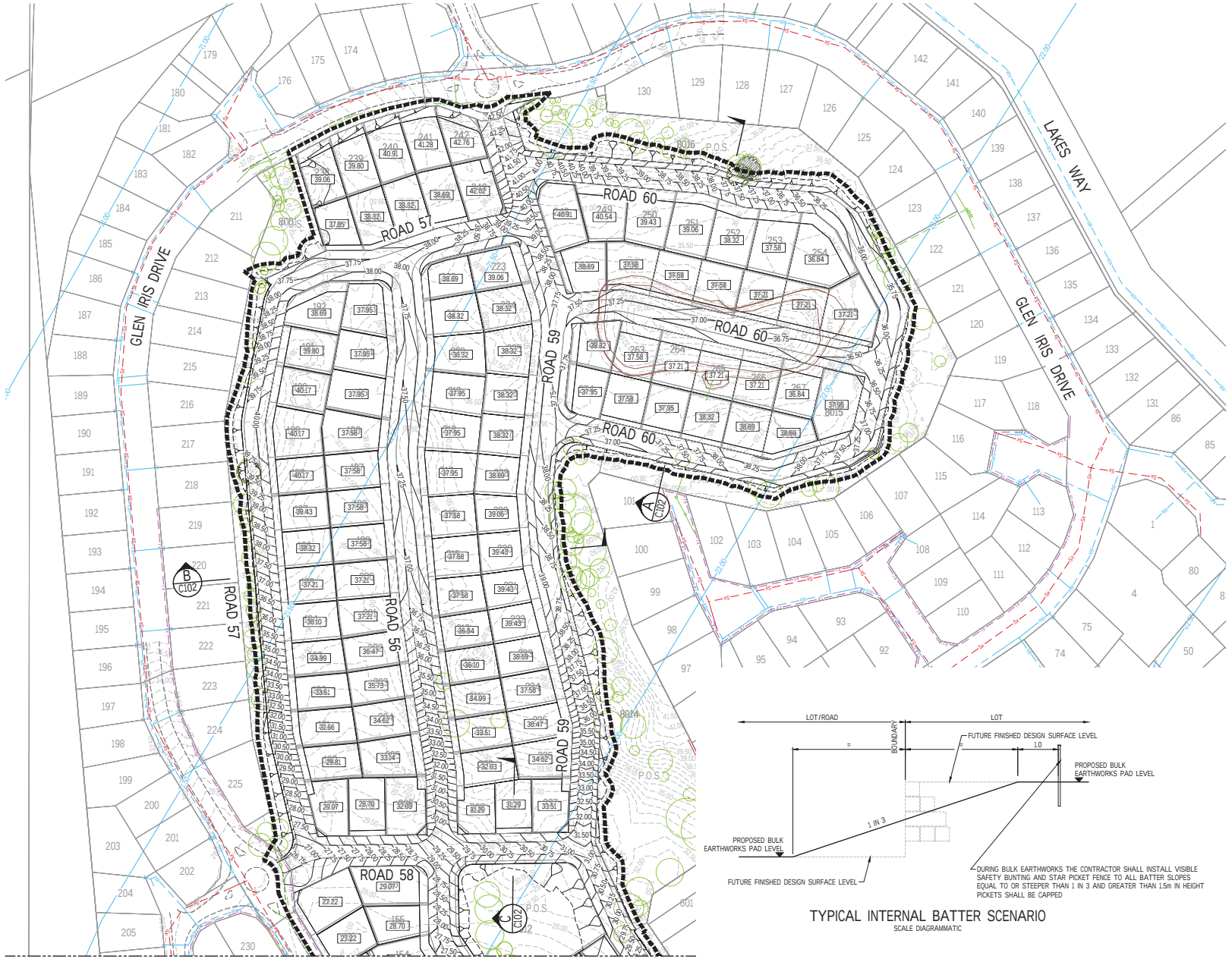

PLAN
SCALE 1:1000

0 10 20 40 60m
SCALE 1:1000 @ ORIGINAL SHEET SIZE A1

TYPICAL INTERNAL BATTER SCENARIO
SCALE DIAGRAMMATIC

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATION
2. ALL DIMENSIONS SHOWN ARE IN METRES UNLESS OTHERWISE SHOWN.
3. SURVEY DATA PROVIDED BY LAND SURVEYS, SAVAGE SURVEYING AND MNG.
4. ALL LEVELS SHALL BE DETERMINED FROM BENCH MARKS ESTABLISHED BY THE PROJECT SURVEYOR.
5. ALL SETBACKS TO BE 4m FROM FRONT BOUNDARY UNLESS NOTED OTHERWISE.
6. GEOTECHNICAL INSPECTIONS AND ASSESSMENTS TO BE CARRIED OUT AS PER SPECIFICATION AND AT RECOMMENDATION FROM THE PRINCIPAL NOMINATED GEOTECHNICAL CONSULTANT.
7. EXISTING SERVICES ARE SHOWN FOR INFORMATION ONLY. ALL SERVICES ARE TO BE LOCATED PRIOR TO THE COMMENCEMENT OF WORKS. THE CONTRACTOR SHALL REPORT ANY DISCREPANCY OR CLASH WITH SERVICES TO THE SUPERINTENDENT.
8. NO WORKS ARE TO BE UNDERTAKEN WITHIN THE TREE PROTECTION ZONE WITHOUT PRIOR APPROVAL FROM THE PROJECT ARBORIST.
9. FOR TREE PROTECTION ZONE FENCING REQUIREMENTS REFER TO EMERGE ASSOCIATES TREE PROTECTION PLAN FB-SK-01.
10. ALL INFRASTRUCTURE IDENTIFIED TO BE REMOVED IS TO BE DISPOSED OF OFF SITE UNLESS NOTED OTHERWISE.
11. CONTRACTOR SHALL REMOVE ALL RUBBISH, MISCELLANEOUS REMNANTS AND THE LIKE FROM WITHIN THE SITE.
12. SITE TO REMAIN SECURE AT ALL TIMES. CONTRACTOR TO ALLOW FOR TEMPORARY FENCE TO BE INSTALLED/RELOCATED SO THE WORKS CAN BE CONSTRUCTED IN ITS ENTIRETY.
13. UPON DISCOVERY OF ANY "UNEXPECTED FIND" THE CONTRACTOR SHALL CEASE WORK IN THE VICINITY OF THIS DISCOVERY, MAKE THE AREA SAFE AND NOTIFY THE SUPERINTENDENT OF THE OCCURRENCE.
14. CONTRACTOR TO MAKE ALLOWANCE FOR ALL ITEMS OF DEMOLITION WORKS CONTAINED OR IMPLIED WITHIN THE DRAWING SET AS NECESSARY FOR THE SATISFACTORY COMPLETION AND PERFORMANCE OF THE WORKS.
15. ALL WORKS IN THE VICINITY OF "TREES TO BE PROTECTED" SHALL BE UNDERTAKEN IN ACCORDANCE WITH THE RECOMMENDATIONS OF THE PROJECT ARBORIST.
16. INTERNAL BATTER SLOPES TO BE NO STEEPER THAN 1:3 (V:H). UNLESS NOTED OTHERWISE.

LEGEND

- LIMIT OF WORKS
- 2 — LOT NUMBER
- 43.15 — PROPOSED BULK EARTHWORKS PAD LEVEL
- 43.15 — EXISTING LOT LEVEL
- 43.15 — FUTURE BULK EARTHWORKS PAD LEVEL
- 15.00 — PROPOSED BULK EARTHWORKS CONTOURS (025m INTERVAL)
- 15.00 — EXISTING SURFACE CONTOURS (0.50m INTERVAL)
- 15.00 — GROUNDWATER LEVEL CONTOURS (0.50m INTERVAL)
- FUTURE RETAINING WALL
- EXISTING RETAINING WALL
- EXISTING ROAD/KERB
- PROPOSED ROAD/KERB
- PROPOSED BATTER
- EXISTING EMBANKMENT
- FUTURE BATTER
- Sx — EXISTING SEWER
- Wx — EXISTING WATER
- Dx — EXISTING DRAINAGE
- NBNx — EXISTING NBN
- Tx — EXISTING TELSTRA
- Gx — EXISTING GAS
- Ex — EXISTING UNDERGROUND POWER
- OHx — EXISTING OVERHEAD POWER
- Ix — EXISTING IRRIGATION
- EXISTING TREE TO REMAIN AND BE PROTECTED
- EXISTING TREE POSSIBLE RETENTION
- BLACK COCKATOO HABITAT TREE (SURVEYED)
- BLACK COCKATOO HABITAT TREE (UN-SURVEYED)

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PRELIMINARY

JDSi CONSULTING ENGINEERS

CLIENT: EASTCOURT

PROJECT: GLEN IRIS ESTATE JANDAKOT NORTHERN BULK EARTHWORKS

DRAWING TITLE: BULK EARTHWORKS PLAN SHEET 1 OF 2

DRAWN: N.TRAN		WAPC No.	
DESIGNED: J.JONES		SCALE @ A1: 1:1000	
PROJECT MANAGER: S.FOLEY		DATUM: AHD	CO-ORDS: PCG94
JDSI PROJECT No.: JDS201817.BE02	DRAWING No.: C100	REVISION: A	

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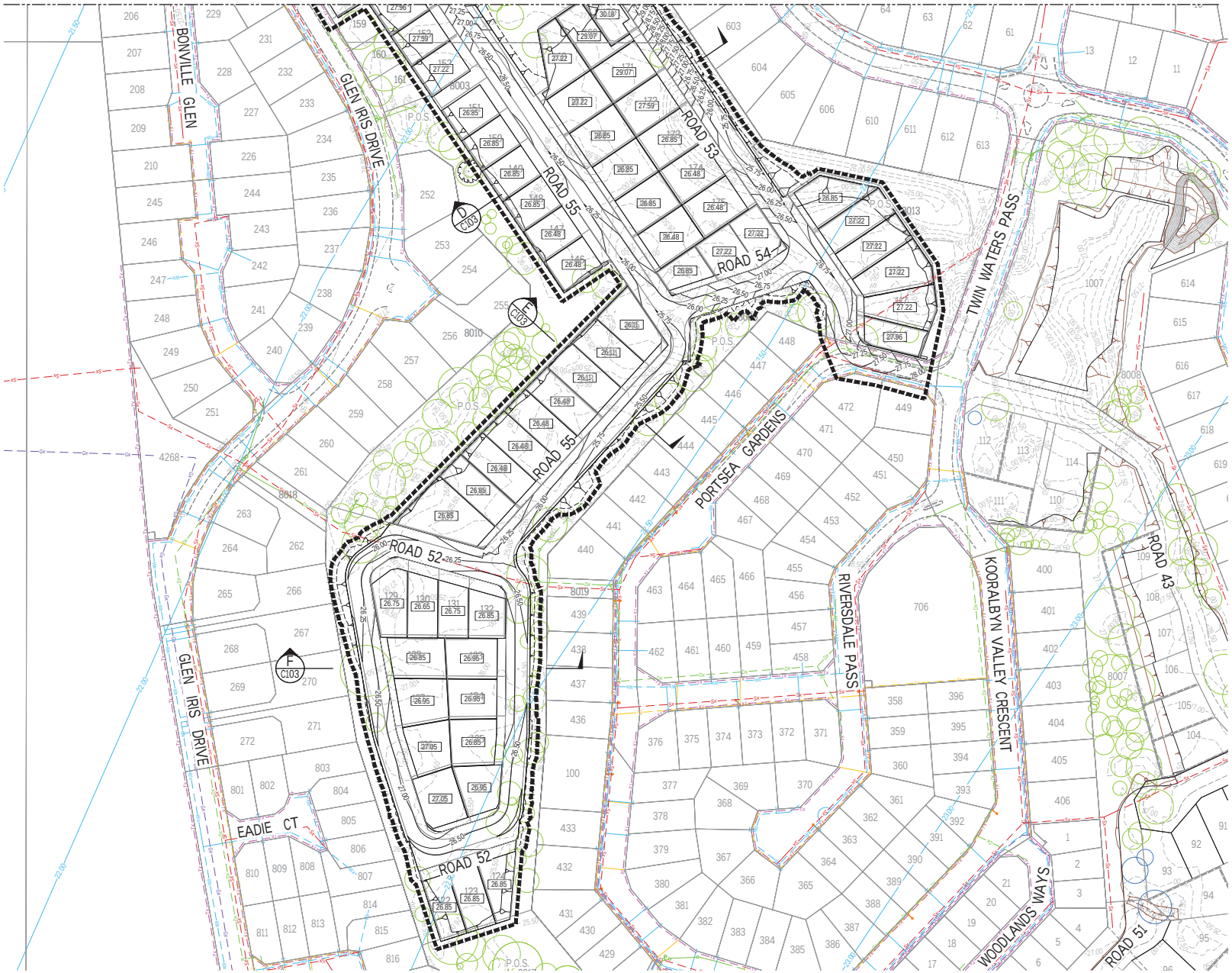

PLAN
SCALE 1:1000

0 10 20 40 60m
SCALE 1:1000 @ ORIGINAL SHEET SIZE A1

NOTES

1. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH THE CONTRACT DRAWINGS AND SPECIFICATIONS.
2. FOR STANDARD NOTES AND LEGEND REFER TO C100 OF THIS SET

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DIAL1100 BEFORE YOU DIG

PRELIMINARY

JDSi CONSULTING ENGINEERS

CLIENT: EASTCOURT

PROJECT: GLEN IRIS ESTATE JANDAKOT NORTHERN BULK EARTHWORKS

DRAWING TITLE: BULK EARTHWORKS PLAN SHEET 2 OF 2

DRAWN N.TRAN		WAPC No.	
DESIGNED J.JONES		SCALE @ A1 1:1000	
PROJECT MANAGER S.FOLEY		DATUM AHD	CO-ORDS PCG94
JDSI PROJECT No. JDS201817.BE02	DRAWING No. C101		REVISION A

Plotted By: Bsamuel Plot Date: 24/08/23 - 16:03 Cad File: C:\12d\5\data\JDSI-12DSYN\JDS201817.BE02_171\CIVIL\Drawings\JDS201817.BE02_C100-C101.dwg