JANDAKOT AIRPORT

LOCAL WATER MANAGEMENT STRATEGY

Jandakot Airport Holdings Pty Ltd
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Jandakot WA 6164

Prepared for Jandakot Airport Holdings, By Urbaqua

January 2024

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Signed 

Full name (please print) John Fraser

Organisation Jandakot Airport Holdings

Date 11/7/2024

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1 INTRODUCTION

Jandakot Airport is leased from the Commonwealth Government by Jandakot Airport Holdings (JAH) and is an important piece of infrastructure, being Western Australia's major general aviation airport.

1.1 Legislative background

Jandakot Airport is Commonwealth Land and is therefore subjected to Commonwealth legislation (Primarily the *Airports Act 1966*, *Airports (Environment Protection) Regulations 1997* and the *Environmental Protection and Biodiversity Conservation Act 1999*). State legislation may apply where Commonwealth Legislation is silent or does not conflict.

1.1.1 Commonwealth Legislation

Airports Act 1996

The *Airports Act 1996* requires the operator of an airport to prepare a Master Plan for review and approval by the Federal Minister for Infrastructure and Regional Development. This Local Water Management Strategy (LWMS) complements the Jandakot Airport Environment Strategy 2020 which has been updated within the Jandakot Airport Master Plan 2020 (JAMP 2020) and will act as a guide for environmental management of the airport for the next eight years.

The Environment Strategy builds upon the Environment Management Framework (EMF) which incorporates measures to meet Jandakot Airport's obligations under Commonwealth and relevant State legislation. This Environment Strategy has been developed with consideration of current airport operations as well as proposed future development.

Airports (Environment Protection) Regulations 1997

The Airport (Environment Protection) Regulations 1997 requires the development and adoption of a comprehensive environmental management system (EMS). Environmental management at the Airport is the responsibility of JAH. The Jandakot Airport EMS comprises policies and procedures that ensure the protection of the environment within the airport, including preparation of management plans, incident reporting systems, awareness training, auditing, monitoring and reporting within a context of continuous improvement.

Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides for the protection of the environment, especially matters of national environmental significance (NES). Under the EPBC Act, a person must not take action that has, will have, or is likely to have a significant impact on any matters of NES without approval from the Australian Government Environment Minister.

The initial *Jandakot Airport Local Water Management Strategy* (LWMS) and *Groundwater Management Plan* (GMP) were developed to support the expansion of development of Jandakot Airport into Precinct 5, which is located within the Priority 1 Source Protection Area of the Jandakot Underground Water Pollution Control Area (JUWPCA). The requirement for the LWMS and GMP was (and remains) directly associated with EPBC 2009/4796 conditions of approval, specifically Condition 7 which states:

"The person taking the action must develop and submit a Jandakot Groundwater Mound Management Plan which must include but not be limited to:

a. Groundwater monitoring and reporting;
b. Provision of groundwater monitoring reports to the Western Australian Department of Water[1] and the Water Corporation;
c. Address all relevant measures included in the **Local Water Management Strategy**;
d. Schedules for the independent audit of groundwater monitoring results and reports;
e. Spill avoidance, management and rehabilitation measures and procedures; and
f. The introduction of a sewerage system.

The Jandakot Groundwater Mound Management Plan must be submitted within four (4) months of the date of this approval.

***Construction** must not commence within precinct 5 until the Jandakot Groundwater Mound Management Plan has been approved by the **Minister**. The approved Jandakot Groundwater Mound Management Plan must be implemented."*

In 2014, the Department of Climate Change, Energy, the Environment and Water (DCCEEW), formerly known as the Department of Environment approved EPBC 2013/7032, which allows for the clearing and development of Precinct 6, which is also partially within the Priority 1 Source Protection Area of the JUWPCA. Condition 2 of EPBC 2013/7032 states:

2. *To mitigate impacts to the environment from an action on Commonwealth land, in particular the Jandakot Groundwater Mound, the person taking the action must prepare and submit a revised Groundwater Management Plan to the Minister for approval. The revised plan must be submitted at least 3 months prior to commencement of the action.*

   The revised plan must include, but not be limited to:

a. The introduction of a sewerage system;
b. Provision of groundwater monitoring reports to the Western Australian Department of Water[1] and the Water Corporation;
c. A water management strategy, specifically designed for Precincts 6 and 6A;
d. Schedule for the independent audit of groundwater monitoring results and reports
e. Spill avoidance, management and rehabilitation measures and procedures
f. Groundwater monitoring; and
g. Acceptable development types.

   If the minister approves the revised plan the approved revised plan must be implemented.

This LWMS has been prepared as an update to the previous LWMS (Essential Environmental, 2015) which was developed to provide water management strategies relevant to the Jandakot Airport estate with particular focus on the ongoing development of precincts 5, 6 and 6A.

[1] Note: Now the Department of Water and Environmental Regulation

1.1.2 State Legislation

Some State legislation can apply to Jandakot Airport under the provisions of the *Commonwealth Places (Application of Laws) Act 1970*. Regulation of environmental issues can therefore occur through state agencies in selected circumstances, typically in instances where Commonwealth legislation does not exist (i.e., waste management). Where State and Commonwealth legislation conflicts; Commonwealth legislation takes precedence. The key water related State Government legislation that is relevant to the development of this LWMS is State Planning Policy 2.9: Planning for Water (draft).

State Planning Policy 2.9: Draft Planning for Water and Planning for Water Guidelines (SPP2.9)

The intent of the draft State Planning Policy 2.9 Planning for Water and the draft Planning for Water Guidelines (SPP 2.9) is to deliver greater clarity around how water related provisions are implemented.

The draft SPP 2.9 and Guidelines incorporate improvements that will lead to better planning decision-making through consideration of appropriate management measures to achieve optimal water resource and development outcomes.

The draft SPP 2.9, when gazetted, will replace the current SPP 2.9: Water Resources and SPP 2.3: Jandakot Groundwater Protection, as well as other water related policies.

1.2 Key documents

The following documents inform this plan's strategies and management principles:

- Jandakot Airport Master Plan 2020 (JAH, 2020a)
- Jandakot Airport Holdings Environment Strategy (JAH, 2020b)
- Jandakot Airport Holdings Annual Environment Report 2021-2022 (JAH, 2021)
- Jandakot Airport Groundwater Management Plan (JAH, 2019)
- Draft State Planning Policy 2.9 Planning for Water (WAPC, 2021)
- Stormwater Management Manual for Western Australia (DWER, 2004-07).

Table 1 below displays key documents that are discussed throughout the LWMS.

This LWMS has been prepared in accordance with the requirements of *draft SPP2.9: Planning for Water* and *Planning for Water Guidelines* (WAPC 2021), and the Department of Water and Environmental Regulation's *Interim: Developing a local water management strategy* (2008).

Table 1: Key Document Summary

Document	Objective	Regulating Entity	Date	Link
Jandakot Airport Master Plan 2020	A 20-year strategic vision for the airport that details how Jandakot Airport will be developed and operated.	DITRDCA	2021	https://www.jandakotairport.com.au/corporate/master-plan.html

Document	Objective	Regulating Entity	Date	Link
Jandakot Airport Holdings Annual Environment Reports	Reports Jandakot Airport Holdings (JAH) environmental management of Jandakot Airport on an annual basis. This satisfies the statutory annual reporting requirements of the Airports (Environment Protection) Regulations 1997 (A(EP)R) as well as reporting requirements within management plans linked to *Environmental Protection and Biodiversity Conservation (EPBC) Act 1999* EPBC 2009/4796 conditions of approval	DCCEEW	Annual	Submitted to DCCEEW annually by 28th of October each year. This is not a publicly available document.
Jandakot Airport Annual EPBC Compliance Reports	Annual summary of compliance to EPBC 2009/4796 conditions of approval	DCCEEW	Annual	https://www.jandakotairport.com.au/environment/environment-plans.html
Jandakot Airport Groundwater Management Plan	Detail the groundwater management and monitoring measures required at Jandakot Airport to protect the Jandakot Groundwater Mound (specifically the Priority 1 Source Protection Area).	DCCEEW	2023	https://www.jandakotairport.com.au/environment/environment-plans.html

1.3 Scope of the Strategy

Consistent with the requirements of Condition 2 of EPBC 2013/7032 (refer to Appendix 1) and SPP 2.9, this LWMS has been prepared to provide updated information and strategies relevant to the Jandakot Airport estate with particular focus on the ongoing development of Precincts 5, 6 and 6A and to inform the preparation of a GMP in accordance with Condition 7 of EPBC 2013/7032.

The GMP also requires regular review and amendment to meet practical requirements on site as changing circumstances demand, including a review following the approval of the Jandakot Airport Master Plan. In accordance with the *Airports Act 1996*, Jandakot Airport Holdings is required to have a Master Plan (which includes the Environment Strategy) reviewed and approved at least every eight years. The Jandakot Airport Master Plan 2020 was approved by the Minister on 22 August 2021.

Precincts 5, 6, and 6A have been cleared and developed in accordance with Jandakot Airport Master Plan 2014 and Jandakot Airport LWMS. Since approval of the Jandakot Airport

Master Plan in 2020, no clearing has taken place; however, development continues to be undertaken in accordance with the current 2020 Master Plan and the Jandakot Airport and city leasing and development guidelines. Therefore, this revised LWMS includes revisions to update background information and reflect the land use and development changes that have occurred since 2015 when the previous LWMS was prepared.

Two wetlands are present at Jandakot Airport, as defined by the Geomorphic Wetland Swan Coastal Plain (GWSCP) dataset (DBCA-019) (DBCA, 2023). These are located within Precincts 1A and 2A of Master Plan 2020 (hereafter referred to as 'wetland 1A' and 'wetland 2A'), both of which are designated conservation areas.

Due to recent DBCA wetland reclassification, Wetland 1A is now categorised as Conservation Management (per comm, DBCA 2023), and wetland 2A is categorised as Resource Enhancement Management, as defined by the GWSCP dataset (DBCA-019) (DBCA, 2023). The wetland reclassification is detailed further in Section 2.3.

This LWMS and the associated GMP have been updated to reflect the wetland management category change. Water management strategies providing protection to the wetlands at the Airport have been in place at the Airport since 2009, including management measures to prevent pollution of groundwater within the JUWPCA which, consistent with Western Australian policy, requires more stringent water quality controls than would typically be required for protection of wetlands in the reclassified CCW management category. Management measures in place to prevent pollution of groundwater are further discussed in Section 2.8.5.

The LWMS aims to demonstrate to the satisfaction of relevant agencies:

- How the key principles and strategies of this plan have been addressed.
- How the urban structure will address water use and management.
- Existing and required water management infrastructure.
- Detailed land requirements for water management.

1.4 Implementation of the strategy

The principles and strategies contained within this *LWMS* should be implemented as part of land use planning and development and are consistent with the framework and requirements in the draft *Planning for Water Guidelines* (WAPC 2021).

Table 7 summarises the roles and responsibilities relating to implementation of this *LWMS*.

1.5 The Strategy Area

Jandakot Airport is located approximately 18 km south of the Perth CBD, within the City of Cockburn. The airport covers an area of approximately 622 hectares (ha) of land, which is owned by the Commonwealth Government. Of this 622 ha, approximately 119 ha is bushland. The land within Jandakot Airport that is the subject of this LWMS is delineated in Figure 1.

The subject land is currently zoned 'Public Purpose – Commonwealth Government' under the Metropolitan Region Scheme and has been identified as a 'Specialised Centre' in State Planning Policy 4.2 – Activity Centres for Perth and Peel. The land is similarly zoned 'Public Purpose – Commonwealth Government' under the City of Cockburn's Town Planning Scheme No 3 which also identifies the land within the 'Jandakot Airport Special Control Area'.

Part of the subject land lies within the Metropolitan Region Scheme Reserve for 'Water Catchments'. The Jandakot Airport estate lies wholly within the boundary of the City of Cockburn. Part of the northern boundary of the estate (Leeming Road and Ken Hurst Park) abuts the southern boundary of the City of Melville, and the western boundary of the City of Canning abuts the northeast airport boundary.

1.5.1 Acceptable Development under EPBC2013/7032

To meet condition 2 G) of EPBC 2013/7032, this section outlines acceptable development specific to Precincts 6 and 6A.

Precinct 6 provides a mixed business use in a park-like setting which allows for uses appropriate to the JUWPCA (Figure 12) and is responsive to its interface with rural-residential neighbours bordering the southern boundary of the Airport. It will support warehouse, manufacturing and storage type development and land uses that will be generally consistent with the City of Cockburn's 'Mixed Business' zone from the City of Cockburn's Town Planning Scheme No. 3 (TPS 3, see Section 2.8.2). Uses will be responsive to the JUWPCA and potential pollutants will be minimised and managed by ensuring:

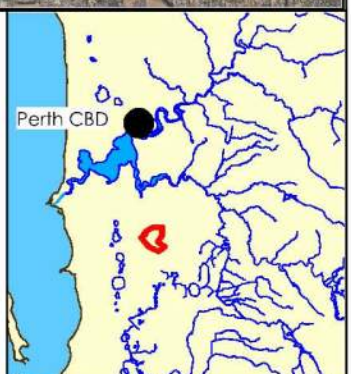
- Bulk storage (manifest quantities as defined under the *Dangerous Goods Safety Act 2004* and associated regulations), of potentially polluting dangerous goods, chemicals etc. within the Priority 1 Source Protection Area of the Jandakot Underground Water Pollution Control Area is not permitted.
- Minor chemical storage, consistent with the approved uses at the site, will be permitted only if managed under an approved Operational Environmental Management Plan that requires all chemicals to be managed in accordance with relevant Australian Standards.
- Precinct 6A will be developed for uses that seek to capitalise on access to the new taxiway system within Precinct 3 and will include aviation activity and aviation support facilities.

Any proposed development on land cleared under EPBC 2013/7032 is approved by DITRDCA under the *Airports Act 1996* and associated regulations, in accordance with Jandakot Airport Master Plan 2020.

Jandakot Airport - Local Water Management Strategy
Figure 1 - Location Plan

LEGEND:

- Airport boundary
- Local government boundary
- Roads



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2 CONTEXT

2.1 Climate

The site is located in the south-west of Western Australia and experiences a Mediterranean climate associated with warm, dry summers and cool, wet winters.

A Bureau of Meteorology (BOM) weather station (number 9217) is located at Jandakot Airport and has been operating continuously since 1972. Rainfall has been recorded at the site since its establishment and temperature has been recorded since 1989.

The long term annual average rainfall recorded at Jandakot Airport is 817 mm. Most of the year's rainfall is typically received during May to September, as shown in Chart 1 below.

Temperatures recorded at Jandakot Airport range between 15 and 32 degrees in summer and between 7 and 19 degrees in winter.

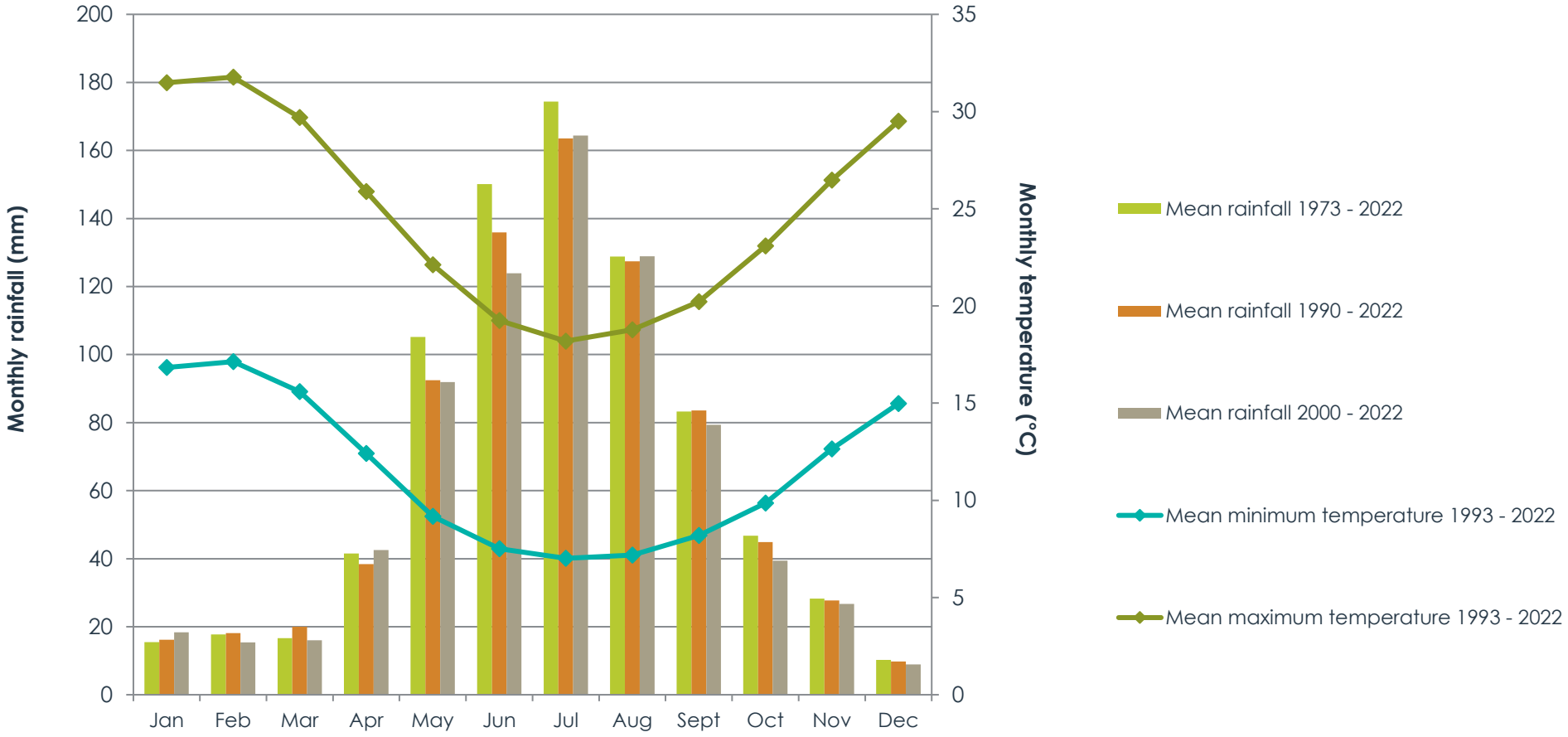


Chart 1: Climate summary data - Jandakot Airport (BOM, 2023)

2.2 Geotechnical Conditions

2.2.1 *Topography and geology*

Jandakot Airport is partially located on the northern margin of the Jandakot Ground Water Mound with the crest of the mound located south of the airport.

The topography of the airport and surrounding areas is generally flat, with local variations in height of 20 m or less. Most of the site has an elevation of approximately 28-30 m AHD. High points of 40-45 m AHD occur in the south-eastern corner and within Precinct 1A (Figure 2).

Jandakot Airport lies approximately 3 km east of the Spearwood dune system boundary and within the Bassendean north-south striking dune system.

The Armadale and Fremantle 1:50 000 Environmental Geology Series indicates Jandakot Airport consists of Quaternary superficial alluvial sediments, varying in thickness from around 30m to 60m. The sands unconformably overlay the older Osborne and Leederville formations, comprising of shale and siltstones. The surface geology presented in Figure 2 comprises of fine to medium grained sand (S8) as a thin veneer over silts and clays in some parts (S10).

2.2.2 *Acid sulfate soils*

According to Department of Water and Environmental Regulation (DWER) mapping, the majority of the site is located in an area of moderate to low risk of ASS occurring within 3 metres of the natural soil surface (i.e., Class 2). A small area of land in the south of the airport is categorised as 'high to moderate risk of ASS occurring within 3 metres of the natural soil surface' (i.e., Class 1) (DWER 2017). Refer to Figure 3.

Consistent with DWER guidelines, sites should be investigated for acid sulfate soils if any of the following are proposed:

- Soil or sediment disturbance of 100m3 or in areas depicted in an ASS risk map as Class 1 (High to moderate risk);
- Soil or sediment disturbance of 100m3 or more with excavation from below the natural water table in an area depicted on an ASS risk map as Class 2 (moderate to low risk); and
- Lowering of the water table (i.e., dewatering), whether temporary or permanent, in areas depicted in an ASS risk map as Class 1 or Class 2.

Groundwater is identified as being located approximately 4-5 m below the natural surface. Any construction activity expected to require temporary or permanent dewatering should trigger consideration and investigation of acid sulfate soils.

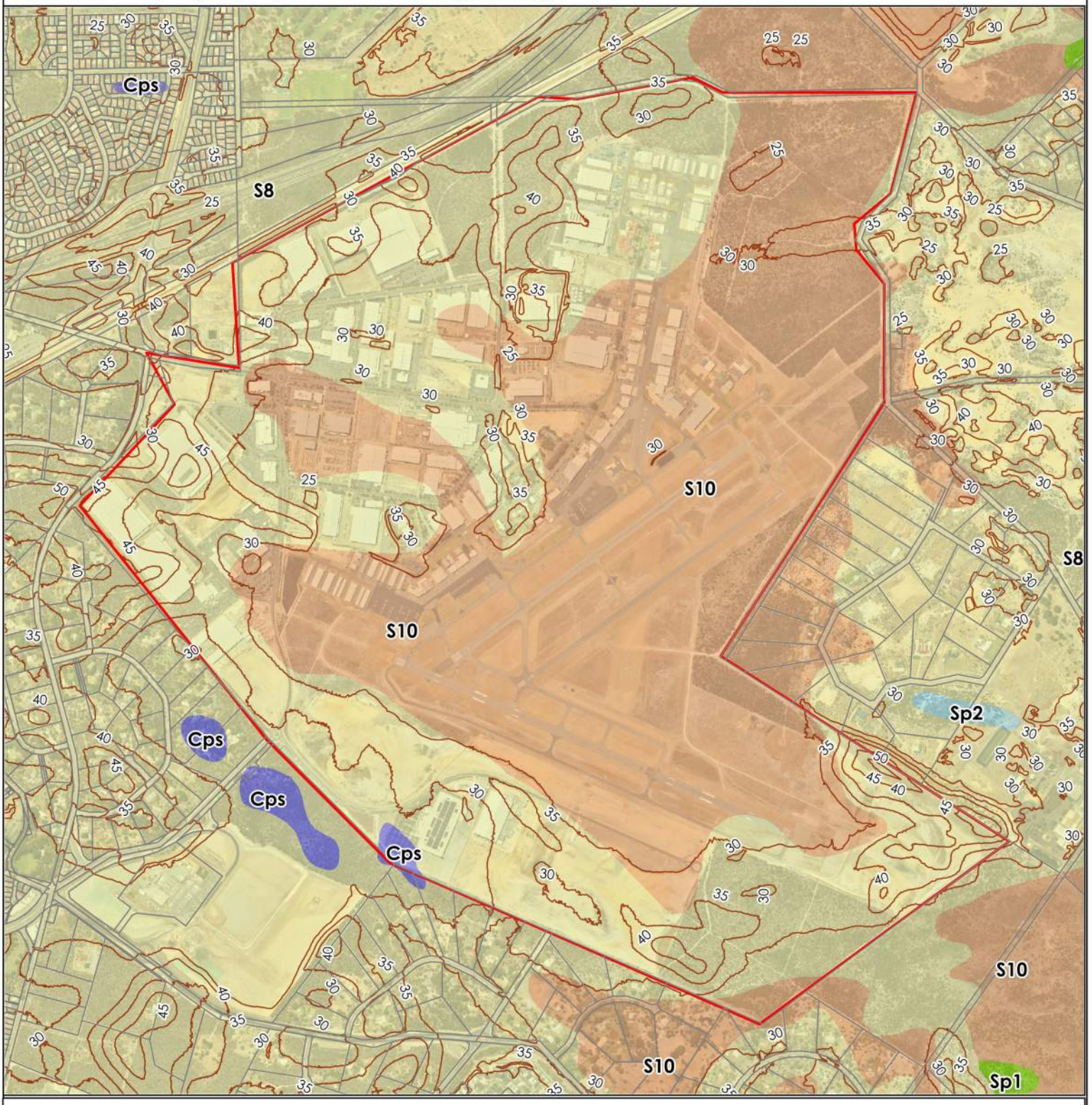
2.2.3 *Contaminated sites*

A search of the DWER contaminated sites database identified no known or suspected contaminated sites within the study area (Figure 4). A group of three lots classified '*Remediated – restricted use*' are located on the eastern boundary of the site. These lots were formerly used for sand extraction and have been subdivided to form 30 lots, some of which contain residential dwellings. The registered sites are located to the southeast (hydrologically up gradient) of the subject land.

It is acknowledged, considering the past and current activities associated with an operational airport, that a number of potential sources of contamination may be present within the airport boundaries. Contamination and contaminated sites are managed in accordance with the *Airports (Environment Protection) Regulations 1997*. JAH is required to maintain an Environmental Site Register that includes records of known and suspected contaminated sites. Sites are ranked according to the nature of contamination and risks posed. Where investigation identifies sites as requiring remediation or ongoing monitoring, appropriate plans are developed and implemented.

None of the contaminated sites on the Environmental Site Register are located within the JUWPCA.

Jandakot Airport - Local Water Management Strategy
Figure 2 - Topography and surface geology



LEGEND:

- Airport boundary
- Cadastre
- Topographic contours (mAHD)

Surface geology

- Cps - Peaty clay
- Ms5 - Sandy silt
- S10 - as S8 sand over sandy clay to clayey sand
- S8 - Sand
- Sp1 - Peaty sand
- Sp2 - Peat rich sand

Data source: Landgate, DMIRS Created by: RM Projection: MGA: zone 50.

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Jandakot Airport - Local Water Management Strategy
Figure 3 - Acid sulfate soils

LEGEND:

- Airport boundary
- Cadastre

Acid sulfate soil risk category

- High to moderate risk
- Moderate to low risk

Data source: Landgate, MRWA, DWER. Created by: RM Projection: MGA: zone 50.

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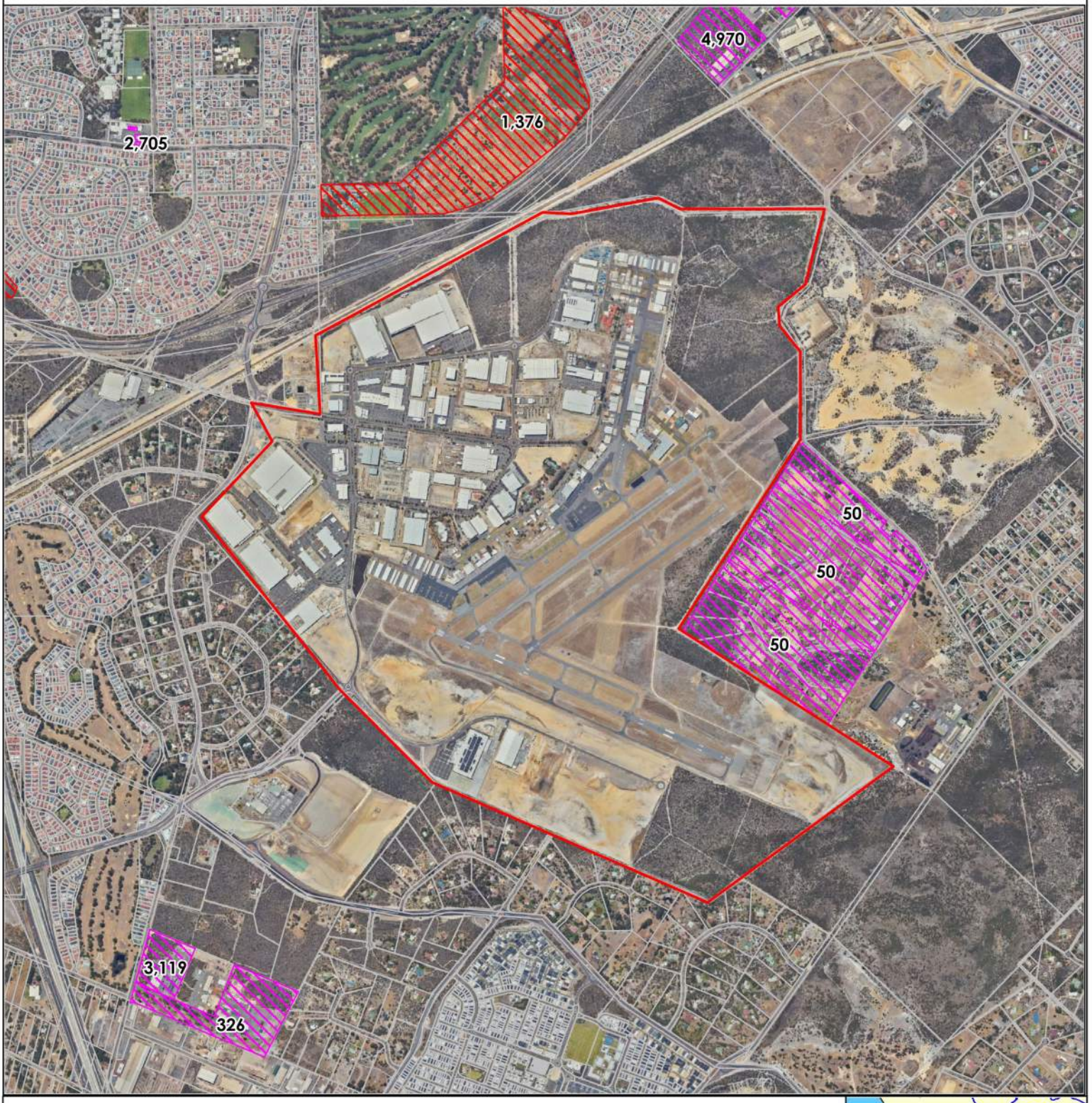
Jandakot Airport - Local Water Management Strategy
Figure 4 - Contaminated sites

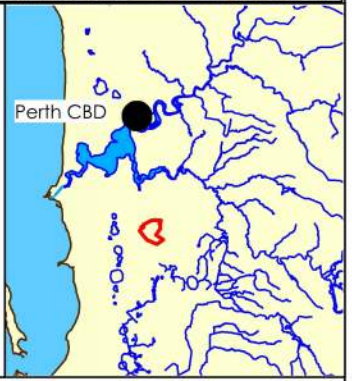


LEGEND:

- Airport boundary
- Cadastre

Contaminated site classification:

- Contaminated - remediation required
- Contaminated - restricted use
- Remediated for restricted use



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2.3 Wetlands

Two wetlands occur within the bounds of the airport as defined by the GWSCP dataset (DBCA-019) (DBCA, 2023). These are located in Precincts 1A and 2A of Master Plan 2020 (hereafter referred to as 'wetland 1A' and 'wetland 2A'), both of which are designated conservation areas in the Master Plan (Figure 5).

During the public comment period for Master Plan 2020, JAH received a recommendation from DBCA to review and assess the wetland management categories for the wetlands located in the conservation areas at Jandakot Airport, both of which were classified by DBCA as Resource Enhancement category wetlands (damplands) (DBCA, 2023).

A review of the wetland management categories, including an on-ground wetland assessment survey were undertaken in 2022/2023 by suitably qualified environmental consultants (Ecoscape, Umwelt, and Lateral).

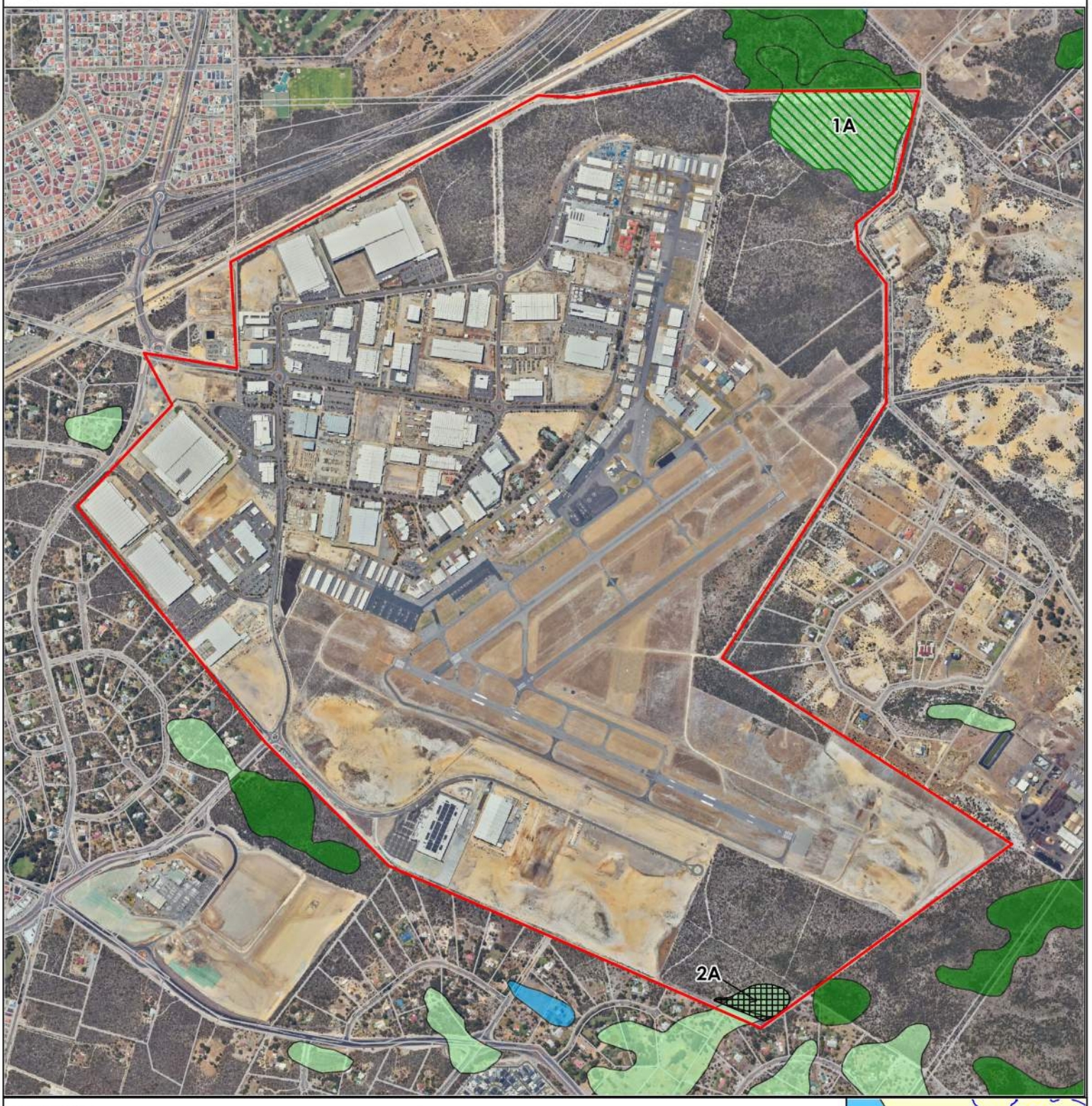
Prior to the review, both wetlands were resource enhancement management category wetlands. The results indicated both wetlands 1A and 2A had values commensurate with conservation category wetlands. The findings of these reviews were submitted to DBCA for assessment.

As of 25 July 2023, wetland 1A has been reclassified as Conservation Management (per comm, DBCA 2023), and wetland 2A is still categorised as Resource Enhancement Management, as defined by the GWSCP dataset (DBCA-019) (DBCA, 2023).

DBCA is actively reviewing the categorisation of wetland 2A, but the above listed statement provides the categorisation at a point in time and any future revisions may require this statement to be amended.

Conservation category wetlands are identified as highest priority wetlands which support a high level of attributes and functions (DBCA 2018).

Jandakot Airport - Local Water Management Strategy
Figure 5 - Wetlands



LEGEND:

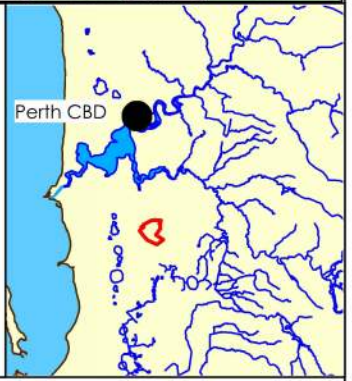
- Airport boundary
- Cadastre

Wetland changes:

- 1A: Proposed Conservation category
- 2A: Currently Resource Enhancement category, still under review.

Geomorphic wetland categories (Swan Coastal Plain):

- Conservation
- Multiple Use
- Resource Enhancement



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2.4 Hydrology

2.4.1 Surface water

Within the study area there are no natural drainage channels or defined areas of surface water. Naturally there would be little runoff generated in the study area with most rainfall directly recharging the Jandakot mound groundwater aquifers by infiltration through the predominantly sandy soils. In larger storm events runoff would flow to one of the several low points present at the northern and western boundaries of the site where seasonal damplands have been identified.

Drainage swales and basins have been created in strategic areas of the airport to collect run-off from roads and other sealed surfaces. Due to the high permeability of the Bassendean soils, run-off is localised and short term as it generally infiltrates very quickly.

Groundwater downgradient from drainage basins adjacent to the Jandakot Underground Water Pollution Control Area, is monitored to ensure that water quality is not adversely impacted by stormwater management practices at the airport.

2.4.2 Groundwater

Jandakot Airport is underlain by the Jandakot groundwater system. The Jandakot groundwater system provides water for public open space, horticulture, industry and gardens, and contributes to Perth's public water supply.

Jandakot Airport is partially located on the northern margin of the Jandakot Groundwater Mound, with the crest of the mound located just south of the airport (Davidson, 1995).

The system comprises three main aquifers:

- Jandakot Mound (shallow, unconfined superficial);
- Leederville aquifer (deeper, mostly confined); and
- Yarragadee aquifer (deeper, mostly confined).

Groundwater levels across the Jandakot Mound have declined over the last 30 years, but at a slower rate than seen in the Gnangara Mound (DWER, 2014). This is due to a combination of factors including:

- The Jandakot Mound receives more rainfall than the Gnangara Mound;
- Abstraction pressure on the Jandakot Mound is less than on the Gnangara Mound; and
- Large parts of the Jandakot Mound are now urbanised, which has increased recharge.

Inferred groundwater contour mapping indicates that groundwater flows in a northerly direction over much of the airport, with a north westerly flow in some areas; notably Precinct 5 and more western areas of the airport.

Ministerial criteria sites (Jandakot Mound)

The Jandakot Mound is gazetted under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* as both an Underground Water Pollution Control Area (UWPCA) and a Public Drinking Water Supply Area (PDWSA). DWER is bound to manage abstraction of groundwater for public and private water supply from the Jandakot Mound with provision for environmental water

requirements, as documented in Ministerial statement 688. The statement sets environmental water provisions in the form of water level criteria at 23 sites across the Jandakot Mound. These sites include 10 wetland sites, nine terrestrial phreatophytic vegetation monitoring sites (phreatophytic vegetation is vegetation that utilises groundwater to meet at least part of its water needs) and four rare flora sites. Some sites have more than one water level criterion. Water level criteria include:

- Absolute minimum water levels; and
- Rate of decline and timing of drying (referred to as other water level criteria).

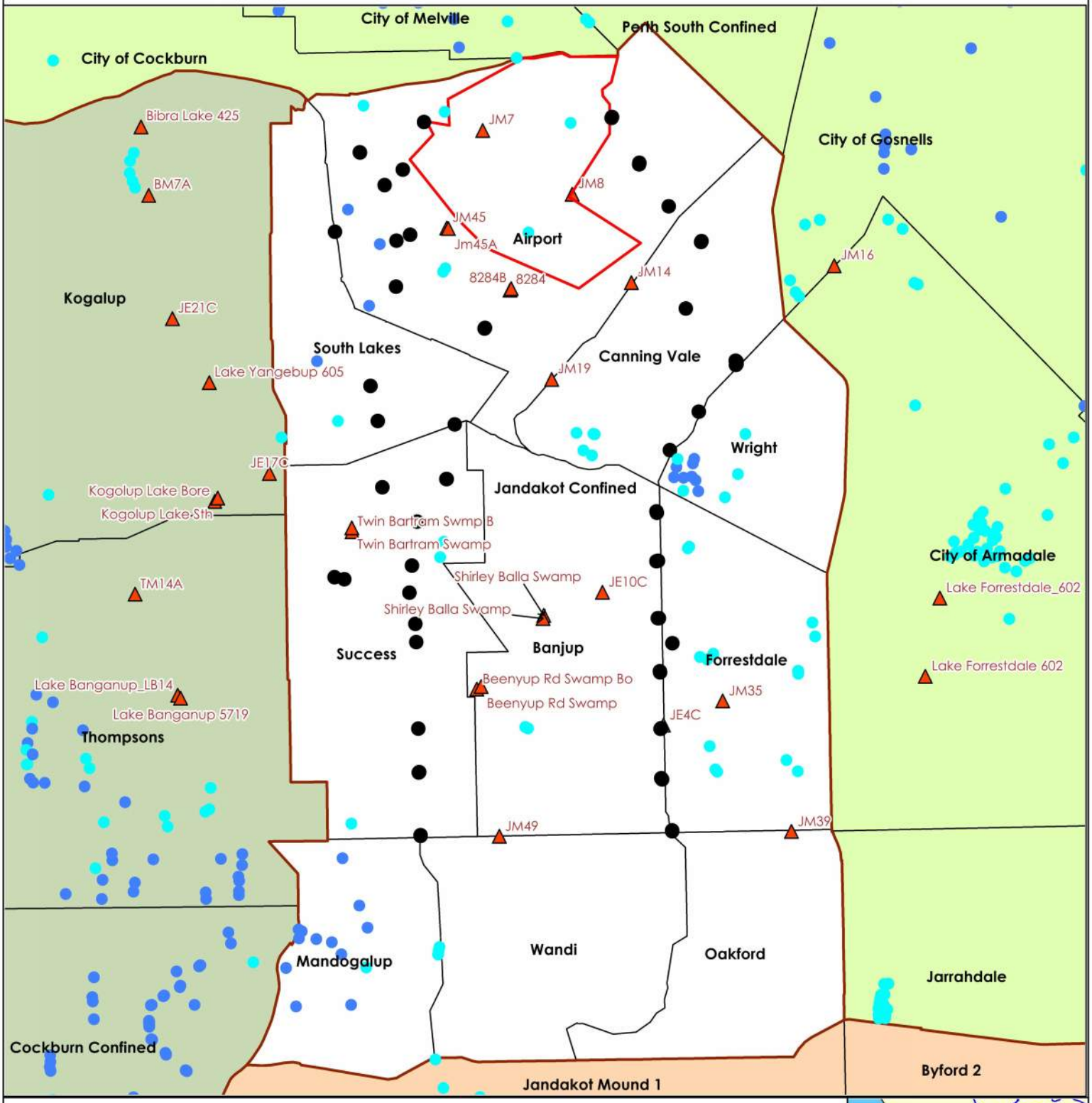
DWER is bound through the statement to manage abstraction and/or development to meet these water level criteria to achieve set objectives including:

- Manage abstraction of groundwater for public and private water supply from the Jandakot Mound sustainably;
- Protect significant environmental values of groundwater dependent ecosystems; and
- Minimise environmental impacts associated with abstraction.

Any proposed developments or groundwater license applications under the *Rights and Water Irrigation Act 1914* located in close proximity to Ministerial Criteria Sites (Figure 6) will be required to demonstrate negligible impact on these receptors.

There are a number of ministerial criteria sites (rare flora) located within (JM7) and adjacent to Jandakot Airport. According to the most recent DWER compliance report (DWER, 2020) these sites are currently compliant with relevant groundwater level criteria. Previous non-compliance has occurred at these bores; with water levels declining by greater than 0.1 m/year during 2006/07 and 2010/11. These sites have been compliant in all other years since 2000.

Jandakot Airport - Local Water Management Strategy
Figure 6 - Jandakot groundwater system - location of Ministerial sites



LEGEND:

- Airport boundary
- Ministerial criteria site
- Water Corporation bore

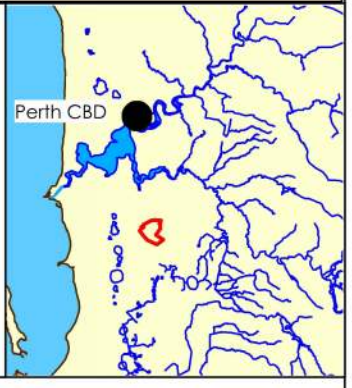
Private drawpoints (minus LG and WC):

- > 250,000 kL
- > 50,000 kL

Groundwater Area:

- Serpentine
- Jandakot
- Cockburn
- Perth

Groundwater subareas



Data source: Landgate, MRWA Created by: RM Projection: MGA: zone 50.

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Groundwater levels

The Perth Groundwater Map (DWER, 2023) indicates that regional groundwater flows in a north westerly direction, towards the coast and Swan River (Figure 7). The historical maximum groundwater level lies at approximately 26 to 28 m AHD. Given that elevation at the site varies between approximately 30 and 50 m AHD, this suggests that the minimum depth to groundwater at the site is approximately 4 m below ground level (BGL).

Since March 2012, groundwater levels have been monitored at nine locations across the Jandakot Airport estate (Chart 2), with an additional two locations added to the monitoring program in December 2013, totalling 11 sites currently.

The maximum measured groundwater level during the monitoring period has varied between 2 and 12 m below ground level. Although it is not possible to determine if annual minima and maxima have been recorded each year, the timing of monitoring events has been designed to capture the groundwater level close to its annual maximum and minimum. Groundwater monitoring locations and levels recorded in March 2023 are presented in Figure 7.

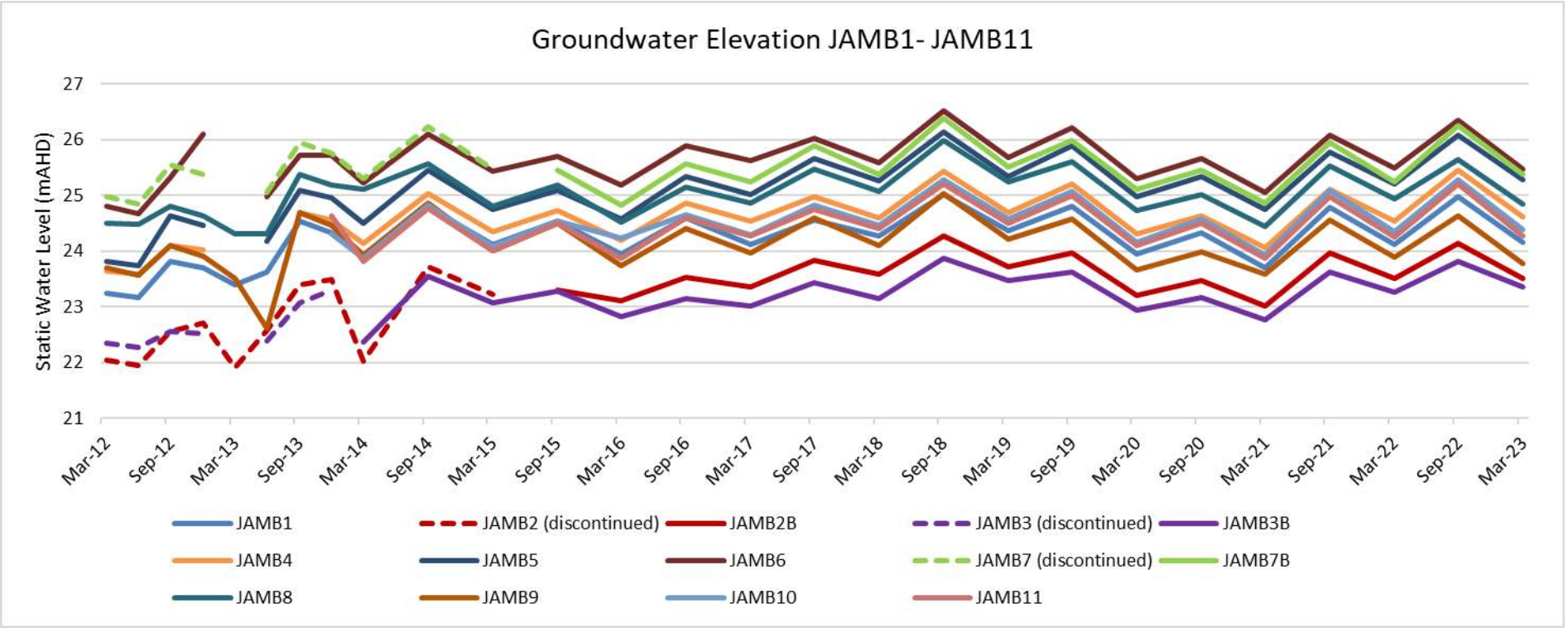


Chart 2: Available groundwater level data

Groundwater quality

Groundwater quality has been monitored since March 2012 at nine locations across the Jandakot Airport estate, with an additional two locations added to the program in December 2013, totalling 11 sites currently.

Groundwater monitoring locations and water quality data for total nitrogen and total phosphorus from the 2021/22 monitoring are presented in Figure 8 and Figure 9. Tables extracted from the 2021/22 Annual Groundwater Monitoring Report (Urbaqua, 2022) are provided in Appendix 2.

The following are summary observations based on the 2021/22 monitoring data:

- In situ measurement of pH values of groundwater range from 3.58 to 6.61, with an average pH of 5.08 indicating acidic conditions.
- Total nitrogen and total phosphorus were above guidelines as follows;
    - Total nitrogen concentration was in exceedance of Airports (Environment Protection) Regulations 1997 Schedule 2 assessment level (0.1 mg/L) across all bores. JAMB4 was also in exceedance of the Jandakot Airport GMP v5.6 assessment level (6.39 mg/L).
    - Total phosphorus concentration was in exceedance of Airports (Environment Protection) Regulations 1997 Schedule 2 assessment level (0.01 mg/L) across all bores. JAMB1, JAMB2B, JAMB3B, JAMB5 and JAMB9 were also in exceedance of the Jandakot Airport GMP v5.6 assessment level (0.12 mg/L).
- Aluminium, copper, lead and zinc concentrations were above guidelines as follows;
    - Dissolved aluminium concentration was in exceedance of the A(EP)R (1997) Schedule 2 assessment level (0.1 mg/L) at JAMB1, JAMB2B, JAMB4, JAMB5, JAMB7B, JAMB8, JAMB9, JAMB10 and JAMB11;
    - Dissolved copper concentration was in exceedance of the Jandakot Airport GMP v5.6 assessment level (0.003 mg/L) at all bores except JAMB2B, which was in exceedance of the A(EP)R (1997) Schedule 2 (0.002 mg/L);
    - Dissolved lead concentration was in exceedance of the Jandakot Airport GMP v5.6 assessment level (0.003 mg/L) at JAMB4, JAMB8 and JAMB9;
    - Dissolved zinc concentration was in exceedance of the A(EP)R (1997) Schedule 2 assessment level (0.005 mg/L) at JAMB1, JAMB2B, JAMB4, JAMB5, JAMB7B, JAMB8 and JAMB9;
- Petroleum hydrocarbons are stored on-site, however available groundwater data does not identify any adverse impacts from airport activities.

Low pH values are sometimes due to organic acids resulting from decomposition of vegetation in swampy environments (Davidson 1995). This is natural acidification through CO^2 production and root respiration in the soil in such environments. Appelo and Postma (2005) identified the lowest pH from CO^2 production in soil is around 4.6, so that groundwater which has a lower pH value must involve other processes of acidification.

A second possible source of acidification is the excessive use of ammonia and manure fertilisers. Another major acidification process is the oxidation of pyrite (FeS2). Pyrite is found, at least in small quantities, in most reduced sediments in the Bassendean Sand and swamp and lacustrine deposits at shallow depth. The lowering of the watertable by climate variability or from public and/or private abstraction may cause the oxidation of pyrite.

Groundwater monitoring at up-hydraulic locations (JAMB5, 6, 7, 8 and 9) identifies groundwater quality of a similar acidity which suggests the low pH levels are a regional issue and that conditions local to the Jandakot Airport do not contribute significantly to the acidity of the regional aquifer (Coffey, 2014).

Onsite nutrient sources, nitrogen and phosphorous, include sewage/wastewater and chemical applications to the soil. Historically leasehold sites at Jandakot Airport disposed of domestic wastewater via septic tanks and aerobic treatment units (ATU's). Minor fertilising of the airfield grassed areas and phosphite treatment of dieback has occurred onsite. No onsite point of source of nutrient contamination or on-site diffuse source has been identified. It is inferred it likely to be a regional issue with up-hydraulic groundwater monitoring showing similar results.

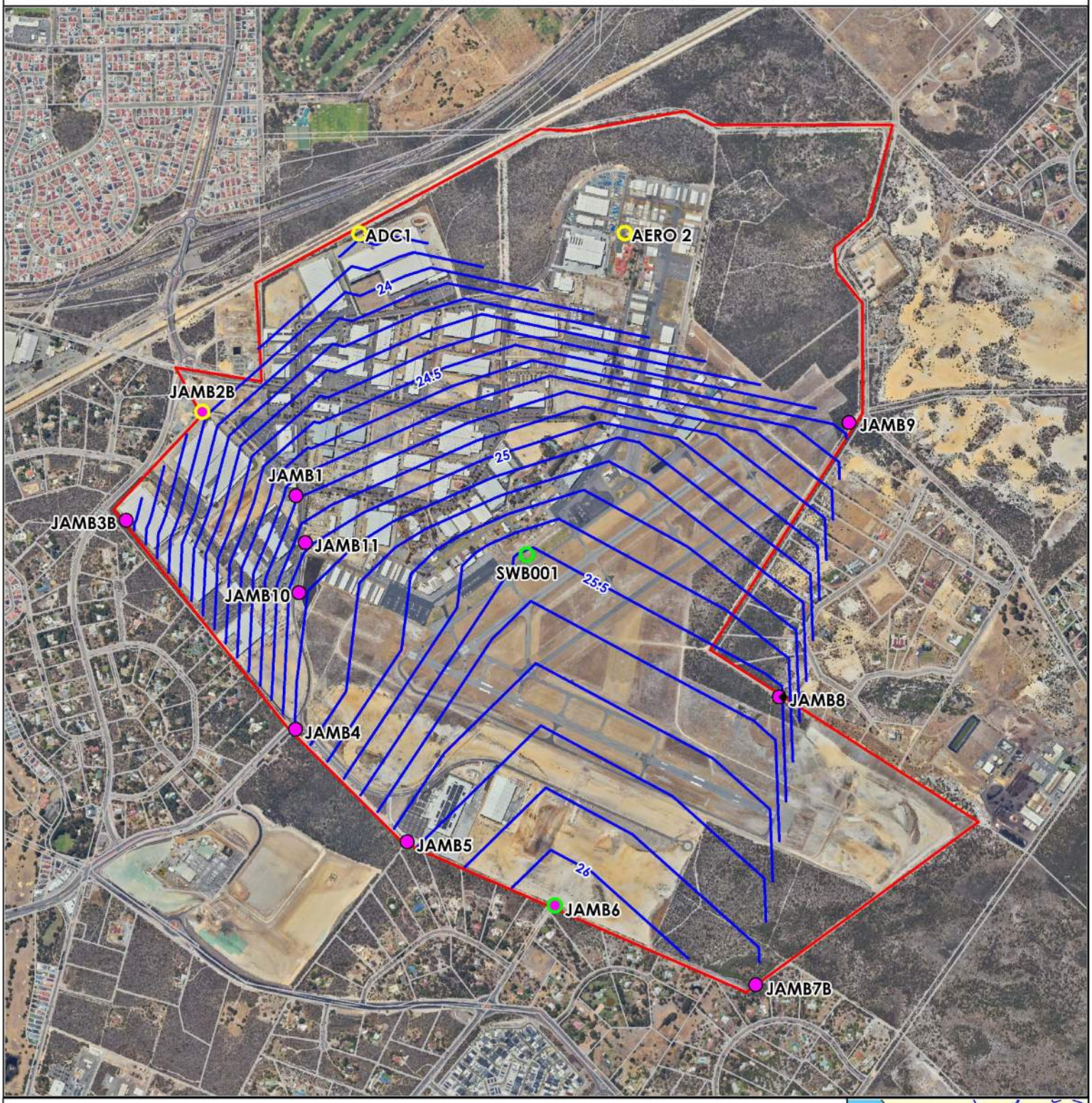
All new developments within the airport shall be connected to reticulated wastewater system, furthermore existing septic and ATU's are to be progressively made redundant, consistent with commitments within Master Plan 2020. However, due to the ongoing issues regarding budgets and time constraints following on from COVID-19, these timeframes will likely be extended until 2028.

Elevated levels of aluminium, copper, lead and zinc have been detected in the 2021/22 results, consistent with previous years. The presence of the metals is considered due to the acidification of the regional aquifer, possible due to acid sulphate soils. Concentrations do not show clear trends correlating with on-site activities or potential sources.

Monocyclic aromatic hydrocarbons and total recoverable hydrocarbons were reported below the assessment levels for all bores in 2021/22.

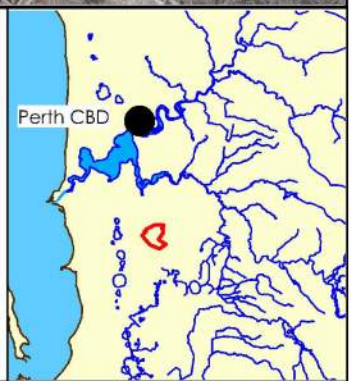
Monitoring bores situated within the site located on the southern boundary, up-gradient of any site operations, are considered to represent background conditions of groundwater entering the site. Generally, trends show there is no evidence of groundwater degradation associated with site operations, therefore risk to receptors such as Jandakot Mound, onsite users and workers is considered low.

Jandakot Airport - Local Water Management Strategy
Figure 7 - Groundwater monitoring network and mapped groundwater levels



LEGEND:

- Airport boundary
- Cadastre
- Monitoring well - full groundwater quality suite (not including caffeine unless circled)
- Caffeine monitoring - down-gradient of septic & ATUs
- Caffeine monitoring - up-gradient of septic & ATUs
- Groundwater contour (mAHD)



Data source: Landgate, MRWA Created by: RM Projection: MGA: zone 50.

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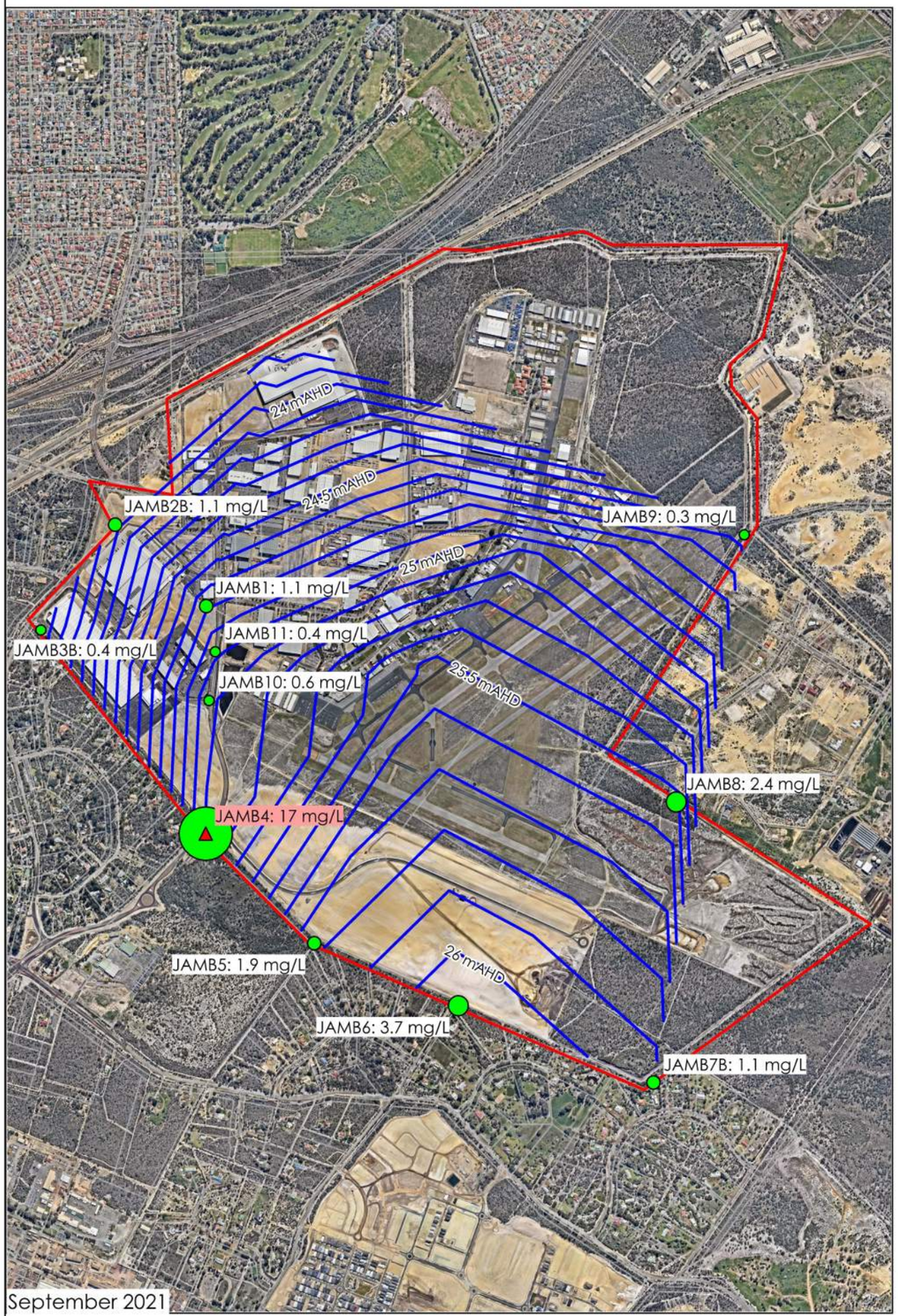
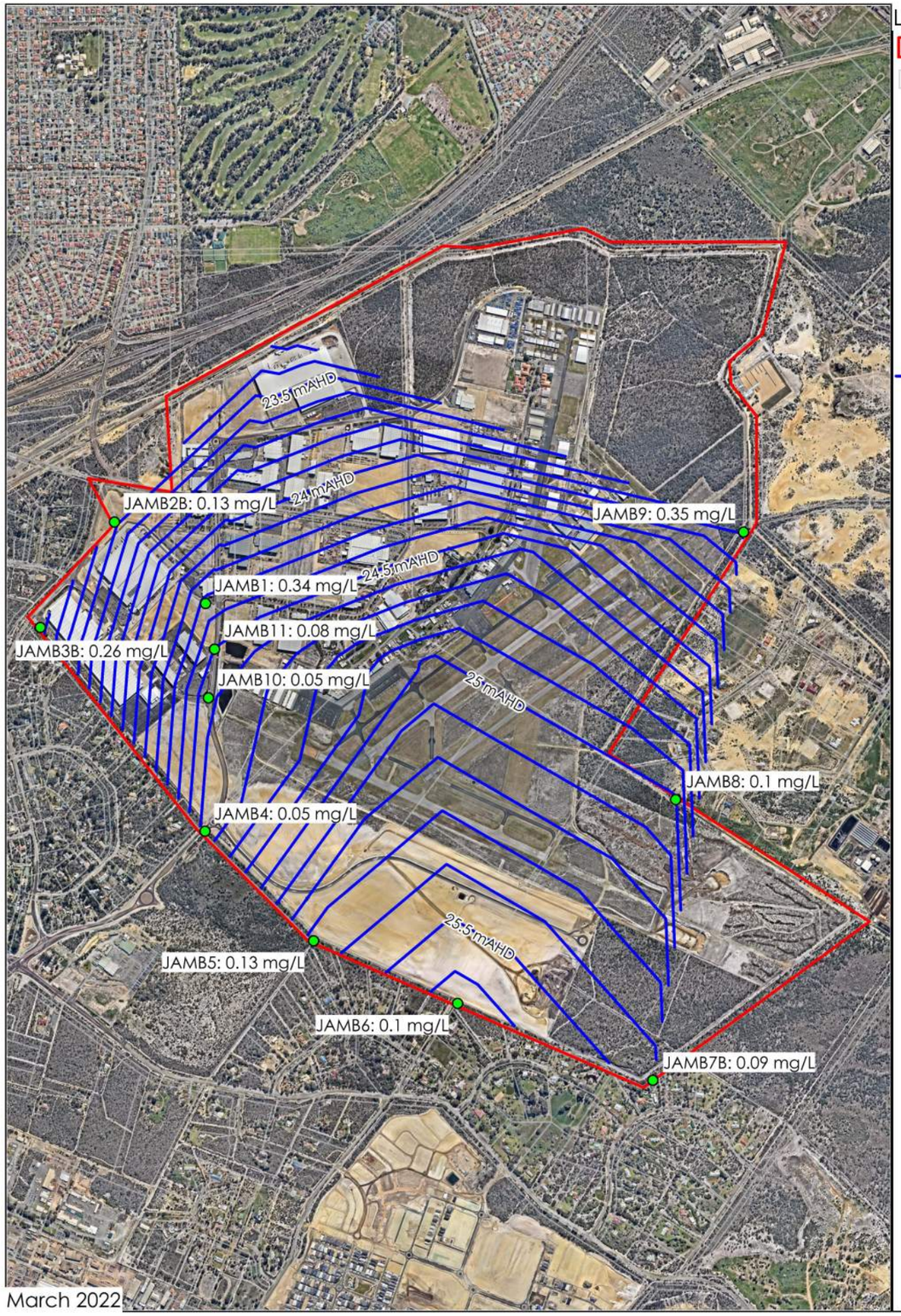
Jandakot Airport - Local Water Management Strategy
Figure 8 - Total nitrogen concentrations 2021-2022



September 2021



March 2022

LEGEND:

- Airport boundary
- Cadastre

Total nitrogen concentration (mg/L)

- 8 to 18
- 4 to 8
- 2 to 4
- 1 to 2
- 0 to 1
- Exceeds Jandakot Airport GMP v5.6 assessment level (6.39 mg/L)
- Groundwater contours (mAHD)

Data source: Landgate, JAH, MRWA, DPLH, DWER, Created by: AT Projection: MGA2020: zone 50.

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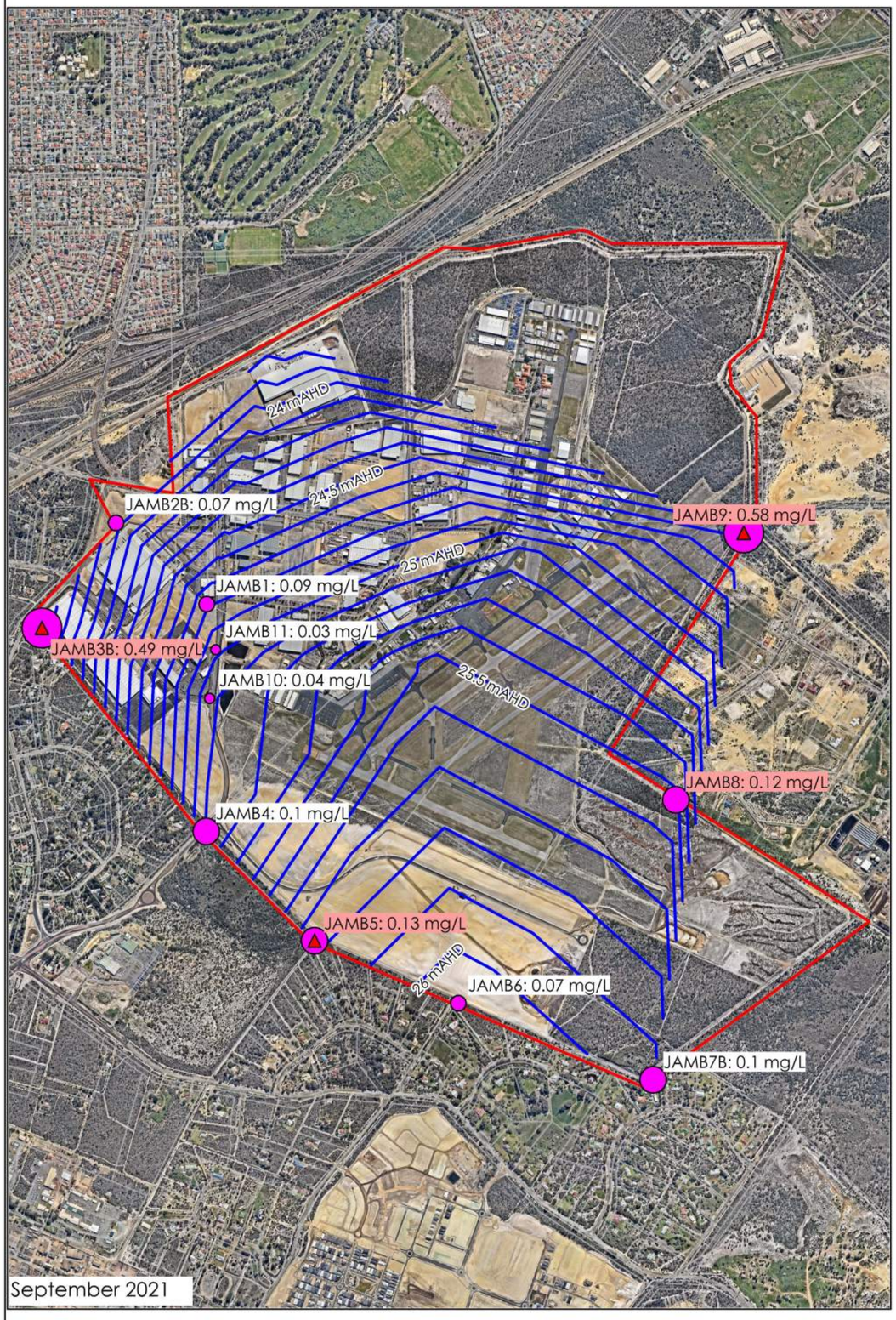
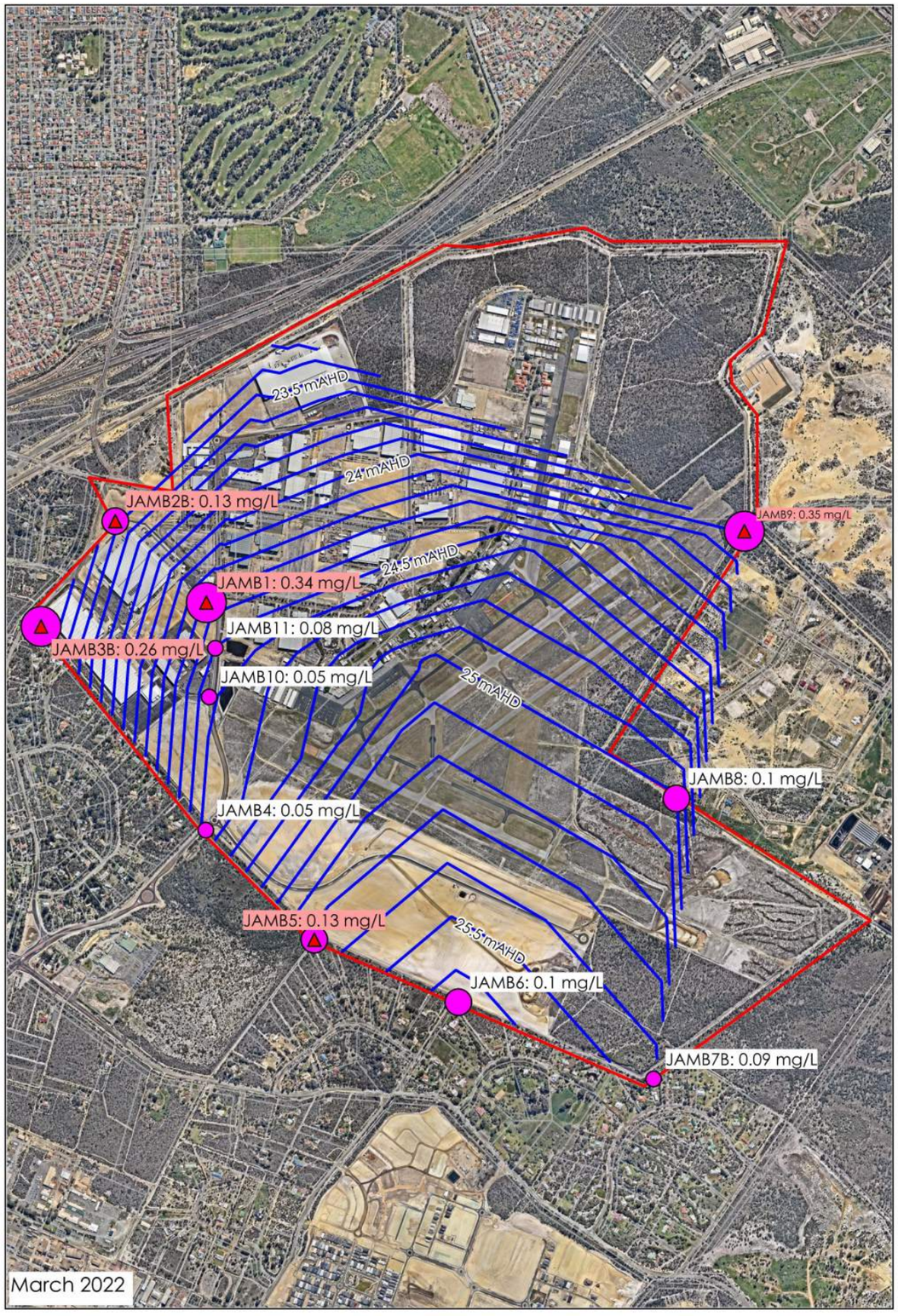
Jandakot Airport - Local Water Management Strategy
Figure 9 - Total phosphorus concentrations





LEGEND:

- Airport boundary
- Line
- Cadastre

Total phosphorus concentration (mg/L)

- 0.2 to 0.6
- 0.1 to 0.2
- 0.05 to 0.1
- 0 to 0.05
- Exceeds Jandakot Airport GMP v5.6 assessment level (0.12 mg/L)
- Groundwater contours (mAHD)

Data source: Landgate, JAH, MRWA, DPLH, DWER, Created by: AT Projection: MGA2020: zone 50.

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Groundwater flow and contaminant modelling

The majority of Precinct 5 and approximately half of Precinct 6/6A are within in the Jandakot Groundwater Mound Area. A hydrological assessment of the impacts of the development at Jandakot Airport on the downstream public water supply has been conducted (Cymod, 2009) as the proposed development area is presently a Priority 1 groundwater protection zone.

The investigation simulated both long term contamination and a single accident contamination. It was found that exceedance of drinking water criterion at downstream locations would occur after more than 10 years, minimum for both cases, with an average of 20 years.

The investigation found that in a single accident contamination, the area can be effectively remediated using aquifer restoration via conventional recovery bores. Long term contamination, however, is less likely to be successful using recovery bores, and management plans should be developed to minimise long term contamination risks. It has been ascertained by the inclusion of non-structural and structural storm water controls and risk assessments that Precincts 5 and 6/6A can be developed without posing additional risks to water resources (CyMod 2009).

Groundwater availability

The site lies within the Airport and Jandakot Confined subareas of the Jandakot groundwater area. Groundwater is not available for allocation licensing to private users within the Leederville or Yarragadee Aquifers because the water is reserved for public water supply and groundwater available for private licensing within the Superficial Aquifer is fully allocated (shown in Table 2). Jandakot Airport Holdings currently hold a license for 225,000 kL from the Superficial Aquifer.

Table 2: Groundwater allocations

Subarea	Aquifer	Allocation limit – private users (kL/year)	Availability June 2023
Airport	Perth – Superficial Swan	1,048,456	No
Jandakot Confined	Perth - Leederville	0	No
	Perth – Yarragadee North	0	No

Groundwater use

Groundwater is used within the Jandakot Airport estate for irrigation of areas of landscaping abstracted under Jandakot Airport Holdings (JAH) current groundwater licence (GWL95741(5)). The license is held for 225,000 kL of groundwater from the superficial aquifer based on a rate of 7,500 kL/ha of irrigated lawn/garden area.

The 2021/22 reporting year is the eighth year that all abstraction was 100% recorded by water meters. Prior to 2014/15, water use for some bores was estimated as the meter installation program was rolled out.

Current uses for groundwater are summarised as follows and areas are estimated in Table 3.

Airside: Irrigation of approximately 8.47 ha of lawn/grass. This is a reduction from 9.40 ha in 2020/21, associated sealing several grassed aircraft parking areas. The watering of lawn/grass areas in the airside area is undertaken for two reasons: (1) To provide stable grassed areas for aircraft parking; and (2) for aircraft safety purposes, such as dust management and soil stabilisation in the vicinity of aircraft movement areas. Irrigated areas are anticipated to increase in coming years, associated with additional planned airside developments in Precinct 6.

However, this may possibly be offset in some areas where existing grassed aircraft parking areas are scheduled to be replaced with hardstand.

Landside: Irrigation of approximately 2.66 ha of lawns and gardens, including verges, median strips and amenity garden beds. This area remains unchanged from 2020/21, noting it had previously been reduced (from 3.34 ha in 2016/2017) due to development and the implementation of water saving initiatives. This area is likely to increase in future years as development in the landside aviation precincts expands.

New Commercial: Irrigation of 4.65 ha of lawns and gardens, including verges, median strips and amenity garden beds (reduced from 4.75 ha in 2020/21). The area under irrigation is likely to increase as development of commercial areas increases significantly in the next few years, particularly within Precinct 6.

Table 3: Irrigation Area estimates

	Area Irrigated by Groundwater (ha)							
Areas	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022 (Current)**	***Future 2023+**
Airside	10.47	10.47	10.14	9.38	9.40	9.40	8.47	14
Landside	3.34	3.34	2.63	2.63	2.63	2.66	2.66	4
New Commercial	2.75	2.75	4.63	4.87	4.75	4.75	4.65	12

*Unconfirmed estimates only, calculated for the purpose of this report.

Construction: Groundwater is used from designated bores (currently 13 and 15) for construction activities – notably dust suppression, road construction, site levelling, compaction etc. From late 2014, bore 13 was used for both construction and verge irrigation within the newly developed Precinct 5; however, it was not utilised for construction irrigation in 2021/22. A new bore, bore 15 was commissioned in January 2016. Major construction involving bulk earthworks/activities are anticipated to continue for a number of years. Bulk earthworks (e.g., levelling and compaction) require approximately 450kL per day of operation, and cutting to level and other activities generally utilises 100kL/day per day of operation.

Groundwater abstraction

In 2021/22, 13 groundwater abstraction bores existed at Jandakot Airport (Figure 10).

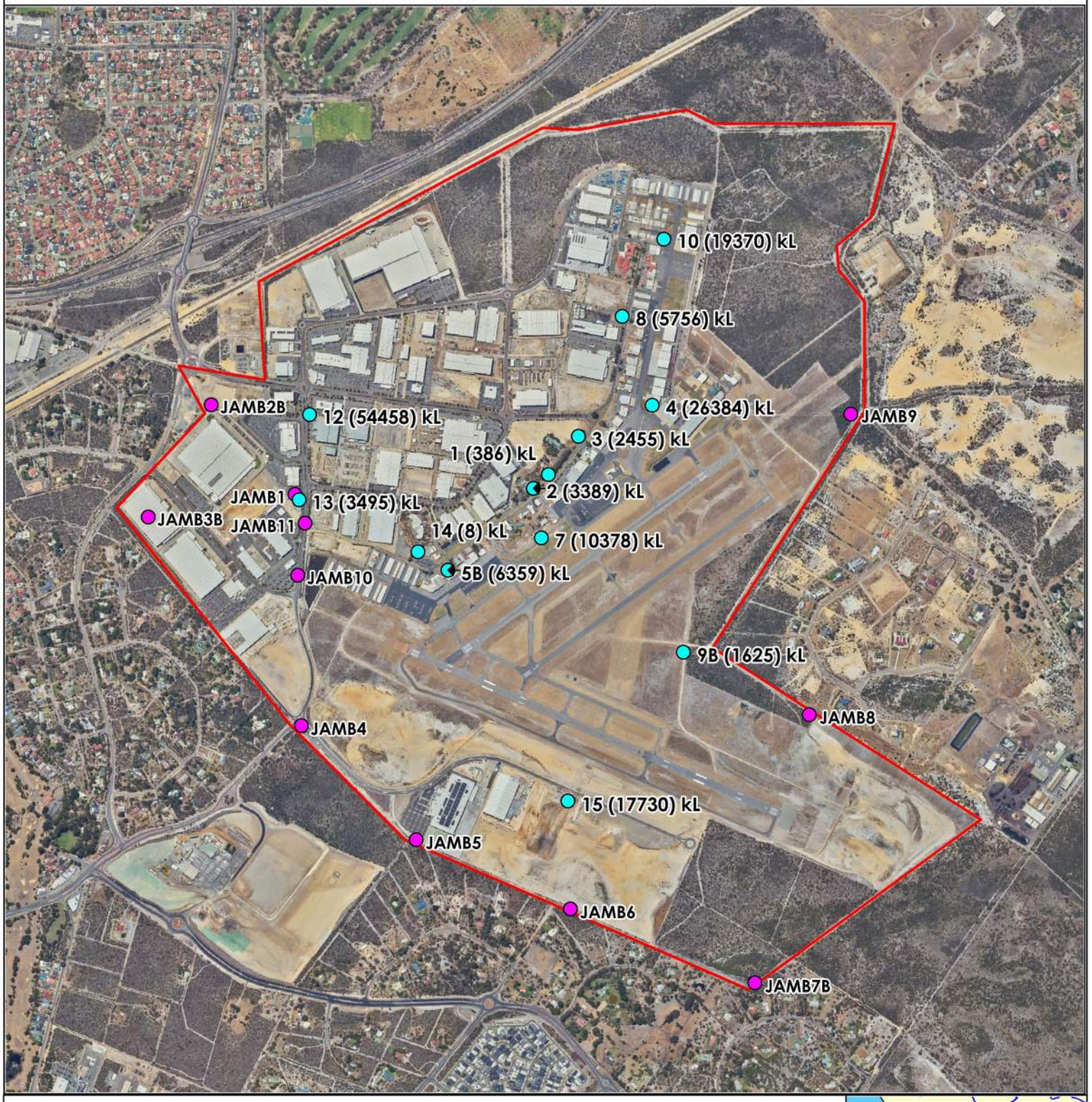
Groundwater abstraction for the financial year 2021/2022 is provided in Table 4 and compared to longer term abstraction rates in Chart 3 and Chart 4. Abstraction was within the allocation specified within the licence (GWL95741(5)). In 2021/22 JAH used 151,793 kL. This is a 6.56% decrease from 2020/21 (162,453 kL).

In 2021/22 20,274 kL (13.36%) was utilised for construction activities and 131,519 kL (86.64%) was utilised for irrigation.

Use of groundwater for construction increased by 31% compared to 2020/21 (15,470 kL). This corresponds with the commencement of large construction projects in 2021/22.

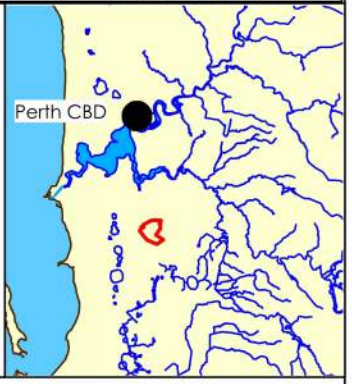
There has been a decrease in the volume of water abstracted for irrigation purposes (10.5%), and a decrease in the total area under irrigation (down 6.2% from 16.8 ha to 15.78 ha). In 2021/22, 131,519 kL was utilised compared to 146,983 kL in 2020/21 and 148,824 kL in 2019/20.

Jandakot Airport - Local Water Management Strategy
Figure 10 - Location of Groundwater Abstraction Bores and Monitoring Bores



LEGEND:

- Airport boundary
- Abstraction bore (2021-22 abstraction volume, kL)
- Monitoring bores



Data source: Landgate, MRWA Created by: RM Projection: MGA: zone 50.

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Table 4: Annual water use from July 2021 to June 2022

Bore ID	Status	Primary use	Annual use (kL)
1	Operational	Landside irrigation	386
2	Operational	Landside irrigation	3,389
3	Operational	Landside irrigation	2,455
4	Operational	Airside irrigation	26,384
5B	Operational	Landside irrigation	6,359
7	Operational	Airside irrigation	10,378
8*	Operational	Landside irrigation 50% and construction 50%	5,756
9B	Operational	Airside irrigation	1,625
10	Operational	Airside irrigation	19,370
12	Operational	Commercial irrigation	54,458
13	Operational	Commercial irrigation and construction	3,495
14	Operational	Tenant – Irrigation (CSWAFC)	8
15	Operational	Construction 80% and commercial irrigation 20%	17,730
Annual Water Use (kL) - Irrigation			**131,519**
Annual Water Use (kL) - Construction			**20,274**
Annual Water Use (kL) - Total			**151,793**

*Recently decommissioned and is no longer operational

Airside and Landside irrigation currently meets the proposed efficient use target of 7,500 Kl/ha (Section 3.5.2), utilising 6823 Kl/ha and 5264 Kl/ha respectively. Compared to 2020/21, Airside irrigation increased by 7.67% and Landside irrigation decreased by 21.31%. Commercial irrigation decreased by 18.57% and used 12,856 Kl/ha, exceeding the target.

When all irrigated areas are combined, JAH utilised 8,336 Kl/ha, which is above the target of 7,500 Kl/ha; however, it is an improvement on 2020/21 (8,672 Kl/ha).

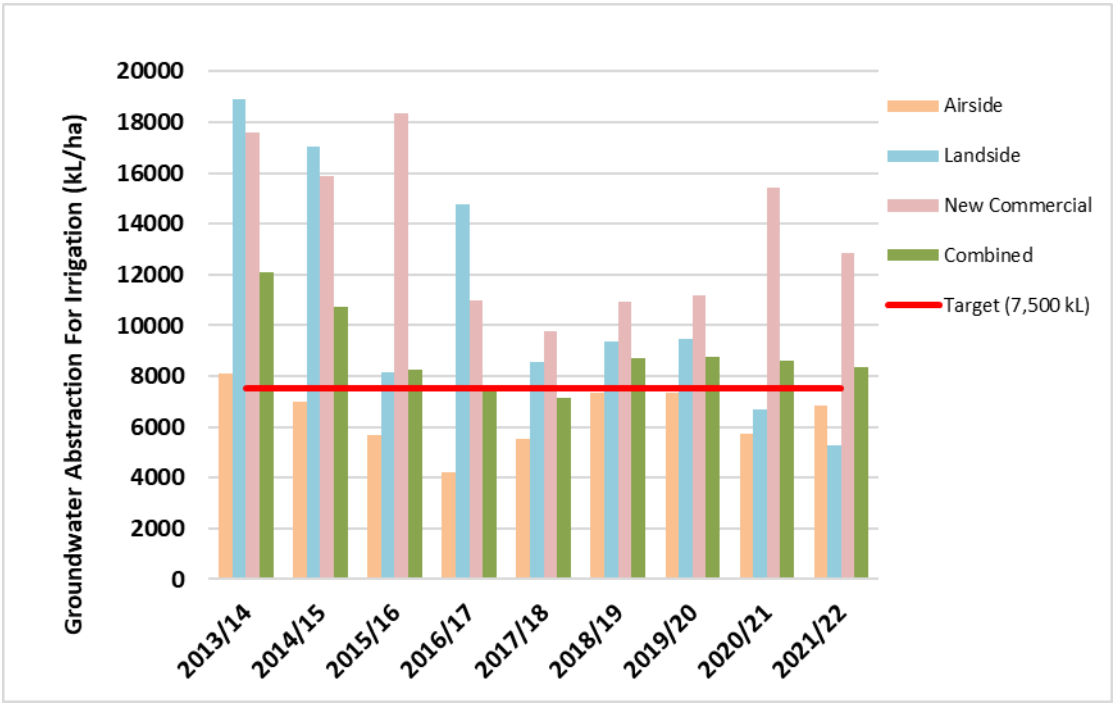


Chart 3: Jandakot Airport Irrigation Rates 2013/14 - 2021/22

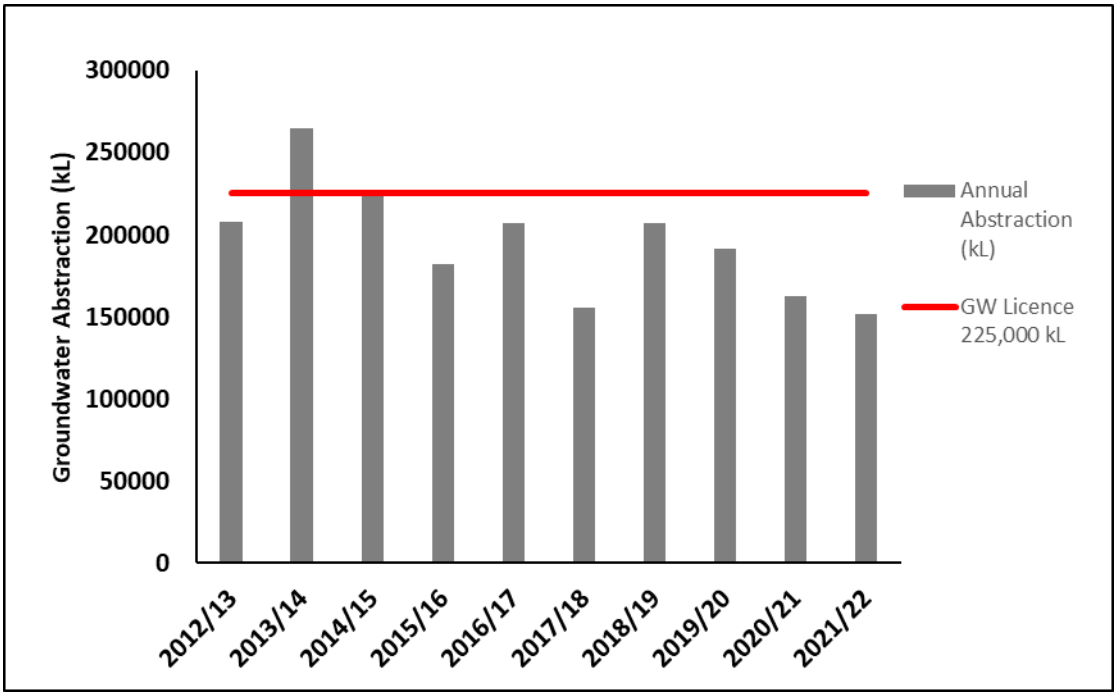


Chart 4: Jandakot Airport Annual Groundwater Abstraction 2012/13 - 2021/22

2.5 Flora

The following information is from the Jandakot Airport Master Plan 2020:

"Jandakot Airport is located in the Swan Coastal Plain Unit of the Drummond Botanical Subdistrict, part of the greater South-West Botanical District (Beard 1990). Under the Interim Biogeographic Regionalisation for Australia (IBRA), the airport is within the Swan Coastal Plain subregion (DoEE2017). Within the Bassendean Coastal Plain, the airport is situated on one major geomorphological system, the Bassendean Dunes (Mattiske 2017). The Bassendean Dune System comprises vegetation on dis-continuous older leached sands. This system is characterised by Banksia low woodland (B. attenuata, B. menziesii, and B. ilicifolia), Eucalyptus todtiana (to the north), E. marginata (to the south) and Nuytsia floribunda over a dense understorey of sclerophyll shrubs. Low lying areas of the Bassendean system are dominated by mixtures of Melaleuca preissiana, M. rhaphiophylla, B. littoralis, Casurarina obesa, E. rudis and/or sedges (Beard 1990)."

2.5.1 Environmentally Significant Areas

Conservation Precincts as designated in Master Plan 2020 are considered environmentally significant primarily due to the presence of banksia woodland, which provides foraging habitat for Carnaby's Cockatoos (*Calyptorhynchus latirostris*). In addition, the presence of the Grand Spider Orchid (*Caladenia huegelii*) in Precinct 1A and to a lesser extent Precinct 1B, adds to the significance of these specific conservation areas. Vegetation within the Conservation Precincts mainly comprises low banksia woodland with dense understory.

Reflecting the evolution of development, aviation requirements and management of Jandakot Airport, the Master Plan identifies Precincts 6 and 6A as Mixed Business and Aviation Operation respectively. As required under Commonwealth legislation, the proposed development of Precincts 6 and 6A was subject to assessment, and EPBC Approval 2013/7032 resulted in the provision of offsets by JAH and measures to protect the Jandakot Groundwater Mound. The 2014 Master Plan also split the former Precinct 2 in Precincts 2A and 2B, whilst retaining the proposed use as Conservation.

JAH recognises that the airport estate contains environmental values that are listed under Commonwealth and State legislation. Impacts proposed to listed values require consideration under applicable legislation, most notably, the EPBC Act. Defining areas as environmentally significant under the *Airports Act 1996* does not therefore afford listed natural values an increased level of protection.

2.5.2 Threatened Ecological Communities (TEC)

Banksia Woodlands of the Swan Coastal Plain ecological community has been listed as a TEC under section 184 of the EPBC Act in the 'Endangered' category.

2.5.3 Protected flora

Two endangered flora species protected under the EPBC Act have been previously identified as occurring within the bushland of Jandakot Airport:

- Grand Spider Orchid (Caladenia huegelii); and
- Glossy-leaved Hammer Orchid (Drakaea elastica).
- However, surveys by Mattiske (2010, 2013 and 2017) to identify new and previously recorded Glossy-leaved Hammer Orchids did not locate any plants and it is now suspected that it was initially misidentified and that no specimens are present on site.

- Surveys of the airport have confirmed populations of the Grand Spider Orchid at Jandakot Airport in Precinct 1A, 1B and a single individual being located in 2A.

2.6 Fauna

2.6.1 Key species

Environmental assessments have identified two EPBC listed threatened fauna species that are known to occur or potentially occur at Jandakot Airport (Western Wildlife 2017; JAH 2022a) including:

- Carnaby's Black-cockatoo (*Calyptorhynchus latirostris*); and
- Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*).

Other conservation significant fauna potentially occurring (visiting) Jandakot Airport include:

- Forktailed Swift (*Apus pacificus*);
- Rainbow Bee-eater *(Merops ornatus)*; and
- Peregrine Falcon (*Falco peregrinus*).

Eight Priority Species listed under the Wildlife Conservation Regulations 2018 that occur, or potentially occur, at Jandakot Airport are:

- Perth Lined Lerista (*Lerista lineata*) –Priority 3;
- Jewelled Ctenotus (*Ctenotus gemmula*) – Priority 3;
- Black-striped Snake (*Neelaps calonotos*) – Priority 3;
- Western False Pipistrelle (*Falsistrellus mackenziei*) – Priority 4;
- Western Brush Wallaby (*Notamacropus irma*) – Priority 4;
- Quenda (*Isoodon fusciventer*) – Priority 4;
- Graceful Sun-moth (*Synemon gratiosa*) – Priority 4; and
- Katydid or Bush Cricket (*Throscodectes xiphos*) – Priority 1.

2.7 Heritage and Culture

The Jandakot Airport Heritage Management Plan (Appendix I to the Conservation Management Plan) was developed to ensure that JAH conducts its developments in a manner that complies with the *Airports Act 1996* and other statutory requirements in relation to areas of cultural significance.

2.7.1 Indigenous Heritage

Prior to the approval of the Jandakot Airport Master Plan 2009 and Environment Strategy 2009, JAH engaged Australian Interaction Consultants (AIC 2008) to undertake an Ethnographic and Archaeological Site Identification Survey of the areas to be impacted under the Jandakot Airport Master Plan 2009. The surveys, involving archaeologists and indigenous custodians, encompassed the entire airport including all areas of development to which this LWMS applies.

Archival research revealed two sites (artefact scatters) which were believed to be within the airport boundary; Site 4309 Princep Road and Site 3513 Lukin Swamp. The 2008 investigation concluded:

- No new ethnographic or archaeological sites were identified.

- Site 3513 Lukin Swamp could not be located within Jandakot Airport.
- Previously identified Site 4309 Princep Road is no longer a site within the meaning of Section 5 of the *Aboriginal Heritage Act 1972*.
- A Section 18 application is not required for the Jandakot Airport Master Plan to proceed.

The potential for ground disturbing activities to encounter previously unknown archaeological deposits (which may contain cultural materials) was noted and JAH addresses this within the Cultural Heritage Management Plan and relevant Construction Environment Management Plans.

JAH are currently in the process of updating and amending the Jandakot Airport Cultural Heritage Management Plan and will consider recent changes to the Western Australian heritage laws, subsidiary legislation and associated guidelines, if applicable.

2.7.2 European Heritage

No European heritage sites have been registered within the City of Cockburn Local Government Inventory and Heritage List, the State Heritage Register or the Commonwealth Heritage List. There are also no visible signs of European heritage on site.

Jandakot was utilised for grazing activities from 1867. Experienced vegetable and orchard gardeners were attracted to the Cockburn region when Fremantle and Perth grew rapidly due to Western Australia's gold rush. Rural housing developments commenced in the post war years and Jandakot Airport opened in 1963 following closure of the Maylands airfield (JAH 2020).

2.8 Current and proposed land use and infrastructure

2.8.1 *Jandakot Airport Master Plan 2020*

The *Jandakot Airport Master Plan* 2020 (the Masterplan) defines land use precincts within the estate (Figure 11) as:

- Precinct 1A (48 ha) – Conservation;
- Precinct 1B (31 ha) – Conservation;
- Precinct 2A (29ha) – Conservation;
- Precinct 2B (11 ha) – Conservation;
- Precinct 3 (247 ha) – Aviation Operations;
- Precinct 4 (120 ha) – Mixed Business;
- Precinct 5 (41 ha) – Mixed Business;
- Precinct 6 (40 ha) – Mixed Business; and
- Precinct 6A (10 ha) – Aviation Operations.

The remainder of the 622-ha site is allocated to roads and services (approximately 45 ha). This results in the following overall land use areas:

- Conservation – 119 hectares (19%);
- Aviation Operations (includes runways and taxiways) – 257 hectares (42%);
- Non-Aviation Development – 201 hectares (32%); and
- Existing and Proposed Internal Roads and Services Area – 45 hectares (7%).

Future aviation development

The proposed aviation related development at Jandakot Airport will facilitate a significant increase in the economic activity at the site. At full development, estimated within the 20-year period of the Masterplan, it is anticipated that the estate will accommodate approximately 155,000 square metres of aviation related and aircraft hangar floor space. This increase will predominantly come from the development of Precinct 6A which will accommodate approximately 40,000 square metres of aviation-related and aircraft hangar floor space.

Future non-aviation development

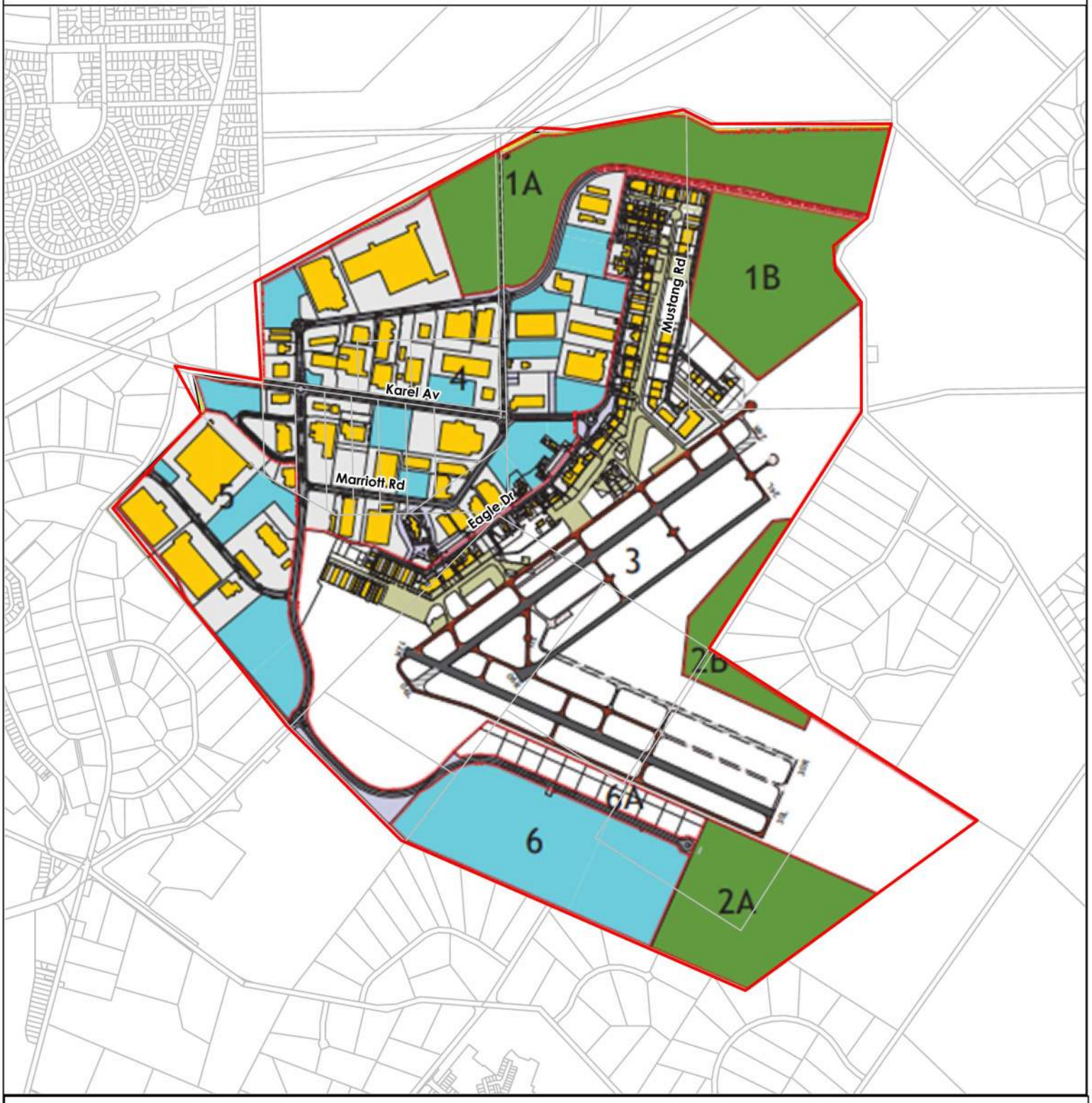
At full development, it is anticipated that the estate will accommodate approximately 725,000 square metres of non-aviation floor space, comprising 525,000 square metres of warehouse, 128,000 square metres of manufacturing, 67,000 square metres of office and 5,000 square metres of retail (already constructed) floor space.

2.8.2 *City of Cockburn Town Planning Scheme No. 3*

The Jandakot Airport estate is currently zoned 'Public Purpose – Commonwealth Government' under the City of Cockburn's Town Planning Scheme No 3 and is covered by the 'Jandakot Airport Special Control Area'.

The ongoing aviation use and development of Jandakot Airport is supported through the Town Planning Scheme, such that land surrounding the airport has been zoned 'Resource' so as to prevent more intensive residential development which may be sensitive to aircraft noise.

Jandakot Airport - Local Water Management Strategy
Figure 11 - Precinct plan



LEGEND:

- Airport boundary
- Cadastre
- Roads

Precinct plan areas:

- 3 - Aviation operations
- 1A, 1B, 2A, 2B - Conservation
- 4, 5, 6 - Mixed business
- Existing developed sites
- 6A - Aviation operations
- Roads, services and batter areas
- Existing runways
- Existing taxiways
- Apron
- Proposed runways
- Proposed taxiways

Data source: Landgate, MRWA, JAH Created by: RM Projection: MGA: zone 50.

0 400
metres
Scale 1:20,000 @ A4

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2.8.3 *Metropolitan Region Scheme*

Jandakot Airport estate is reserved for 'Public Purposes: Commonwealth Government' under the Metropolitan Region Scheme (Figure 12). Additionally, the entire estate is identified as 'Bush Forever Area' whilst only western and southern portions of the site are contained within the 'water catchments' reserve which coincides with the boundary of the JUWPCA (Figure 13).

The MRS does not place any limitations on permissible uses in the designated reservations. That is, under the provisions of the MRS, any use can be approved on any reserved land. The 'Public Purposes: Commonwealth Government' and 'Water Catchments' reservations, and 'Bush Forever Area' identification do not prevent the approval of any use or development on the airport site.

Current land use zoning and reservations in the area surrounding Jandakot Airport, as depicted in the Metropolitan Region Scheme, include:

- Public Purposes – Special Uses;
- Urban;
- Rural;
- Parks & Recreation;
- Industrial; and
- Rural – Water Protection.

2.8.4 *Infrastructure*

The Jandakot Airport estate contains substantial existing and proposed aviation infrastructure (Figure 14) as well as associated roads and services infrastructure necessary to support aviation and mixed business land uses.

Wastewater

A reticulated sewerage network is present within the Jandakot Airport estate, connected to the local municipal sewerage system. This system currently services all new developments within Precincts 4 and 5, as well as some of the established areas of the airport. The sewer is a reticulated gravity system to the main internal pump station located on Marriott Road which is connected via a pressure main to the Bibra Lake main sewer. All proposed future developments within Precinct 6/6A will be connected to reticulated sewer.

Older, established areas of the airport will be progressively linked to sewer in coming years. A small number of pre-existing tenants continue to operate septic tanks. Larger pre-existing tenants have aerobic treatment units (ATUs). Existing ATU's and septic tanks will be decommissioned and removed in accordance with the existing procedure which requires approval by the Department of Infrastructure, Transport, Regional Development, Communications, and the Arts (DITRDCA); Airport Building Controller.

As outlined within the Masterplan 2020, JAH intends to connect all facilities to the sewer system by 2024 where feasible. However, due to the ongoing issues regarding budgets and time constraints following on from the COVID-19 pandemic, this will likely be extended until 2028. Caffeine testing at groundwater monitoring bores up-gradient and down-gradient of existing septics and ATU systems will provide assurance that the current arrangements continue to protect groundwater. The monitoring regime is outlined in Section 4.1, with these bores shown on Figure 7.

Figure 12: Metropolitan Region Scheme Zones and Reserves

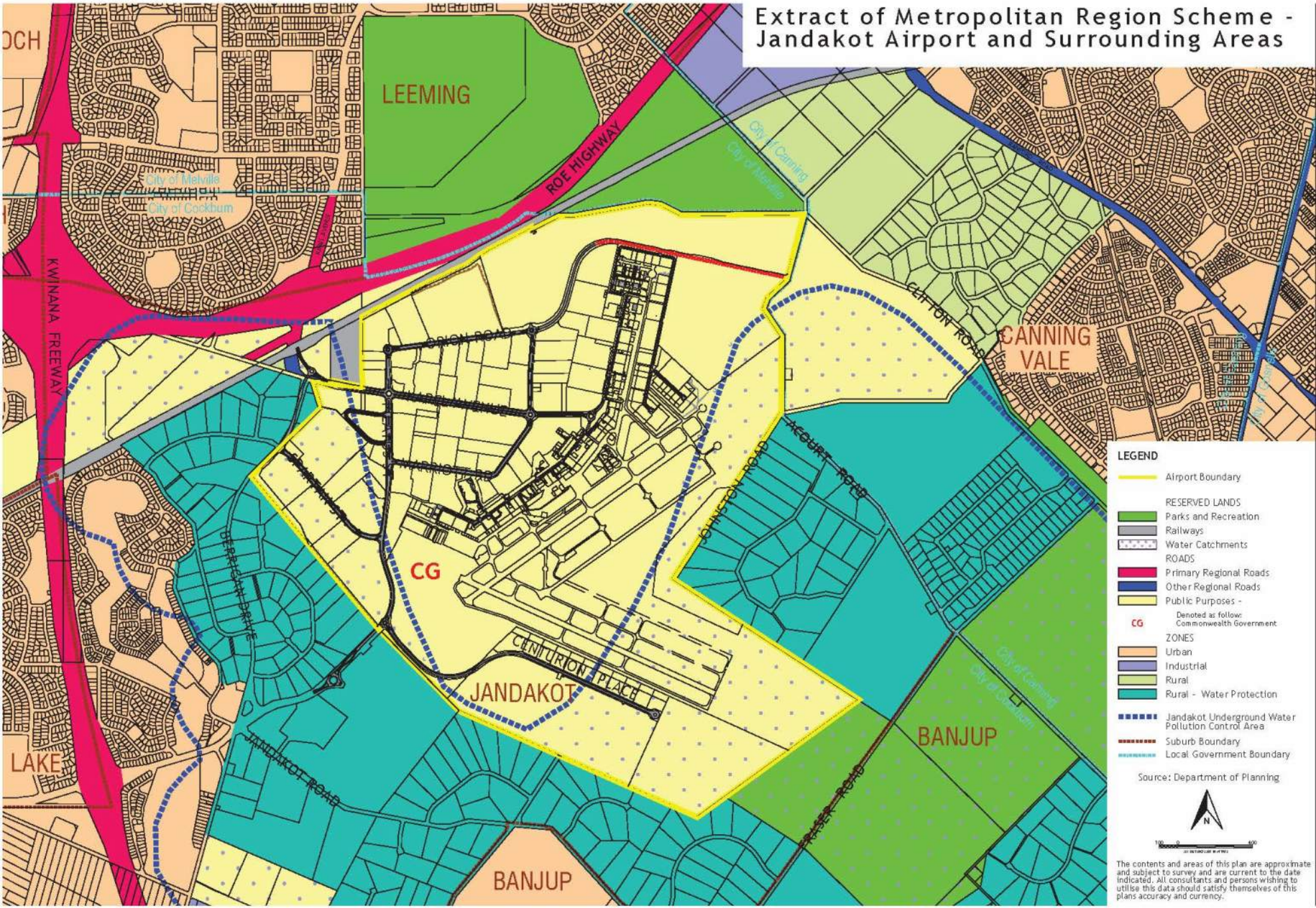
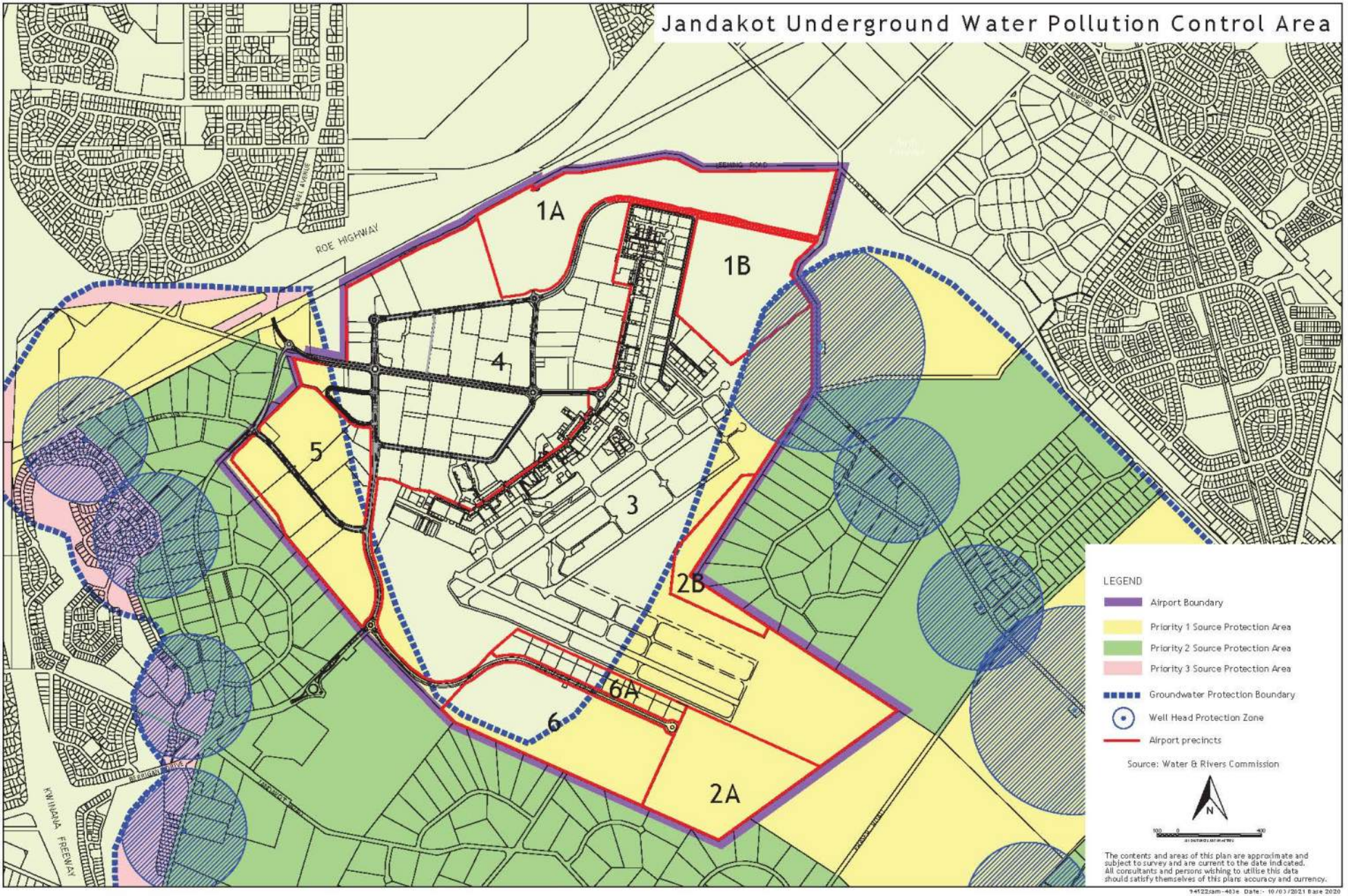
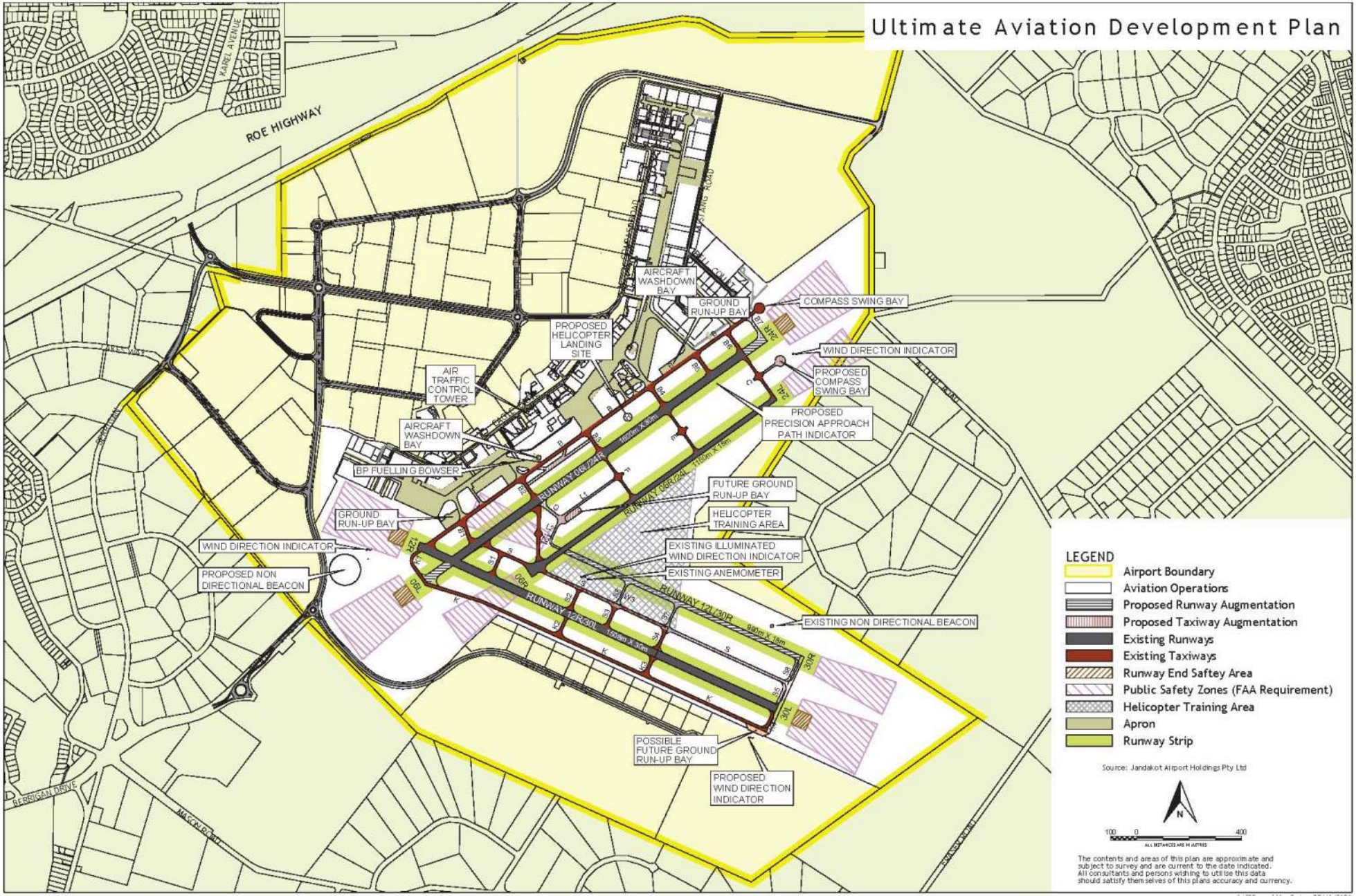


Figure 13: Jandakot Underground Water Pollution Control Area



Jandakot Airport - Local Water Management Strategy
Figure 14: Aviation Development Plan



Potable water

Jandakot Airport estate is connected to the Water Corporation's Integrated Water Supply System (IWSS) via two metered connections at the northern and southern boundaries of the airport. Both metered connections are fed directly into storage tanks fitted with booster pumps which are subsequently connected to the internal main line. The booster pumps have been installed to maintain and regulate the internal mains reticulation pressure during peak demand periods and fluctuating Water Corporation service pressures/flows.

Well Head Protection Zones

The Jandakot Airport estate contains part of a Well Head Protection Zone (WHPZ) associated with Water Corporation drinking water production bores J150 and J160. The WHPZ extends into precincts 1 and 3, is largely vegetated and contains no significant infrastructure.

Drainage

The prevailing soil conditions of highly permeable sands lend themselves to on-site stormwater disposal. Additionally, it is desirable to maximise recharge of the Jandakot groundwater system through promotion of infiltration at source wherever possible.

All existing lots within the Jandakot Airport estate manage stormwater on-site through provision of onsite retention of 5% annual exceedance probability event (AEP) storm events without ponding through use of soakwells or small infiltration areas within their respective lots. Developments are also required to attenuate the 1% exceedance probability event (AEP) storm event although some short duration ponding is accepted in these events. Larger storm events discharge into road reserves and are directed to open drains/swales and/or drainage basins.

Roads and aviation areas of the Jandakot Airport estate are served by a combination of open and piped drains connected to a small number of stormwater infiltration basins. Ponding within these basins rarely occurs even during large storm events with all existing stormwater basins observed to hold water for short periods after sustained rainfall of high intensity, avoiding the creation of habitats that might otherwise attract water birds (JAH 2014).

Treatment of stormwater run-off from paved areas, including runways and taxiways is provided through adjacent grassed areas or 'buffer strips' prior to discharge into the piped drainage system. The existing underground pipe network discharges to an open drain between the central and southern aprons, which directs flows to the basin at the northeastern end of the airport.

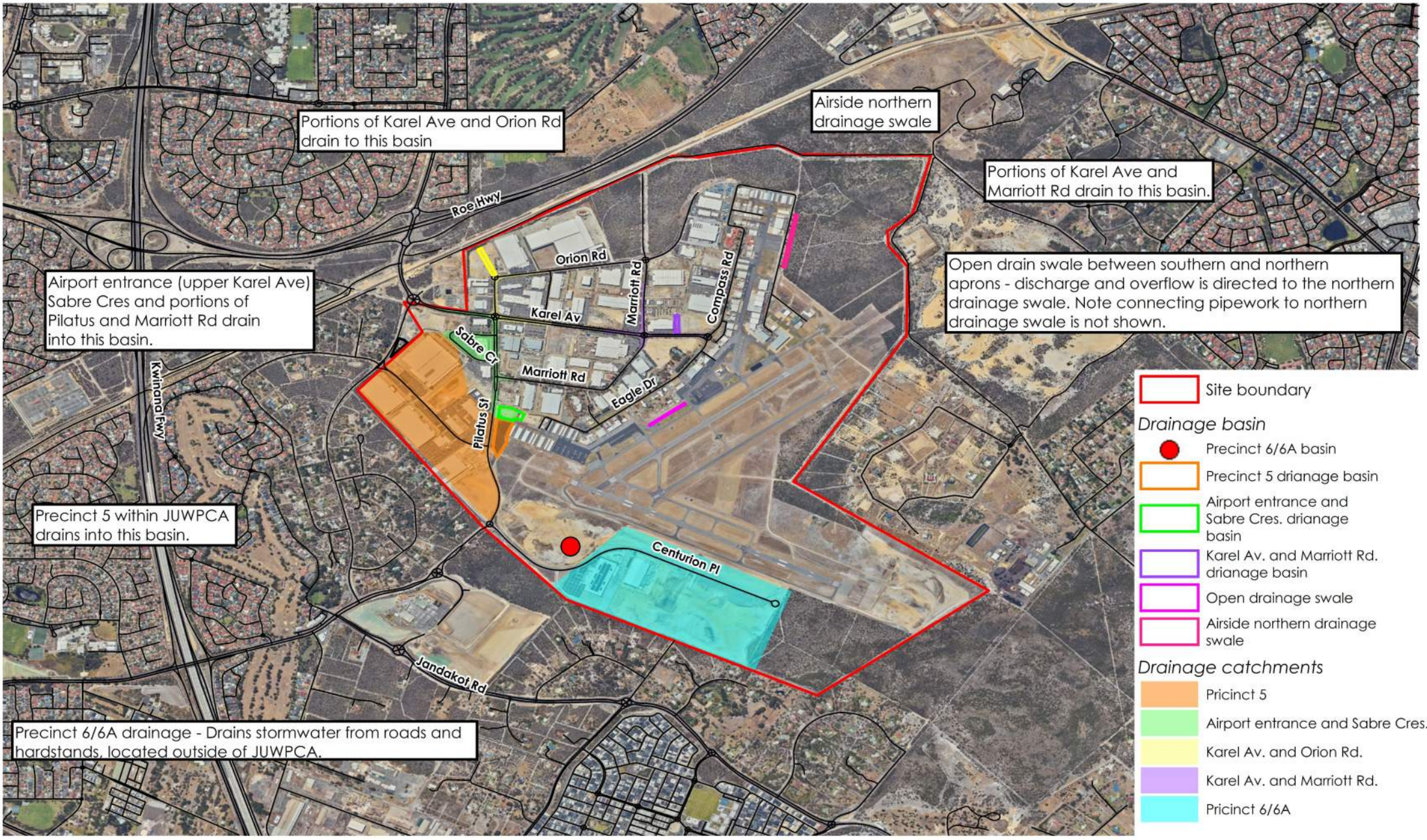
Drainage from aircraft wash bays is managed consistent with the Jandakot Airport Equipment and Washdown Policy, which requires appropriate treatment and disposal of water including the use of approved interceptors and/or separators. Similarly, stormwater drainage from fixed refuelling areas is captured and discharged via purpose-built plate separators or interceptor pits.

Within the JUWPCA stormwater management aims to promote infiltration at source for all stormwater collected from clean roof surfaces within all lots except where rainwater tanks are used. Stormwater from all roads, carparks and external hardstands within the JUWPCA is discharged via piped drainage networks into drainage basins located outside of the JUWPCA boundary and sized to cater for the 1:100 year/24hr ARI storm event.

Existing stormwater infiltration basins and their catchment areas are presented in Figure 15.

Jandakot Airport - Local water management strategy

Figure 15: Drainage catchment areas



Data source: Landgate, Jandakot Airport. Created by: RM Projection: MGA: zone 50.

0 1,000

metres

Scale 1:25,000

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2.8.5 Spill Avoidance and Contamination Management

Spill management is a critical tool in the prevention of soil and groundwater contamination and is addressed within the GMP as well as a suite of tenant resources, including JAH Policies, available on the JAH website.

Spill management encompasses awareness and training of stakeholders as to spill prevention and control, and the provision of materials and practical skills to attend to spills as and when they occur. Regular communication with tenants and contractors regarding spills, including advice on spill clean-up and training suppliers is undertaken through audits, environmental bulletins, and on-site tenant/contractor meetings.

Clearing under EPBC Act approvals (2009/4796 and 2013/7032) and civil construction activities are managed via the current approved version of the Construction Environment Management Plan (JAH 2015) and includes a Hazardous Materials Management Plan and Environmental Emergency Response Procedures. Examples of specific spill avoidance measures undertaken include, but are not limited to:

- Providing a contractor spill control plan to JAH EM.
- Ensuring fully stocked spill kit is available on refuelling truck(s) and (if applicable) in the vicinity of hazardous material storage area(s).
- Providing a designated bunded storage area.
- Labelling and storing containers holding hazardous substances in an upright position with lids closed in designated bunded storage areas when not in use.

Airport tenants who store chemicals or undertake activities that have the potential to result in environmental harm (including soil or groundwater contamination) are required to develop site-specific CEMPS and OEMPs that include emergency response procedures. Examples of applicable spill avoidance mitigation measures undertaken include, but are not limited to:

- Liquid chemicals, including hydrocarbons, of a volume 205L (44 gallons) or greater, must be stored within impervious bunding designed to contain 110% of the volume of the largest storage vessel (e.g., self-bunded spill pallet).
- If the storage area is not located in a covered area, bunding must have the capacity to allow for heavy rainfall events, preferably with overhead protection to restrict the entry of water.
- Suitably designed drip trays or other containment must be used for volumes less than 205L.
- Appropriate licensing must be obtained where required under legislation (e.g., Dangerous Goods Licence).
- A spill kit that is appropriate for the volume and type of substances stored must be kept on site.

Incidents, Emergencies and Audits

JAH staff, tenants and contractors are required to report all environmental incidents to JAH for investigation. This includes all spills that have the potential to cause environmental harm (i.e., soil and/or groundwater contamination), regardless of volume.

Sites are inspected by JAH staff (or their consultants) for evidence of unreported spills during tenant audits, formal and informal site inspections and Environmental Site Assessments. Suspected spills are then reported and subsequently investigated as environmental incidents.

The Aerodrome Emergency Plan (AEP) has been developed to ensure effective and efficient arrangements for the response to, and recovery from, an emergency at Jandakot Airport. This

includes emergency response plans for potentially polluting events such as 'fuel and oil spills' and 'hazardous materials'.

JAH reviews tenant auditing/inspection findings on a regular basis to determine if a tenant's environmental risk profile has changed. In accordance with the Jandakot Airport Tenant Environmental Risk Allocation and Auditing Frequency Criteria, potential changes to a tenant's environmental risk profile may result in a change to their audit frequency.

Outcomes and details of incidents, tenant audits and inspections are presented in the JAH Annual Environmental Reports and EPBC Compliance Reports each year. The compliance reports are available on the Jandakot website.

3 WATER MANAGEMENT STRATEGY

Limited future land use change is expected within the Jandakot Airport estate. Existing developed areas of the Jandakot Airport estate will retain their current Airport and mixed business land uses.

The Jandakot Airport Master Plan 2020 identifies Precinct 6 for additional mixed business use development (approximately 43 ha) and Precinct 6A for aviation related development (approximately 10 ha).

This water management strategy has been developed to provide a consolidated approach to water management that is applicable to the ongoing development within Precincts 5, 6 and 6A that continues to be undertaken in accordance with the current 2020 Master Plan and the Jandakot Airport and city leasing and development guidelines.

Water management strategies providing protection to wetland habitats at the Airport have been in place at the Airport since 2015. The change in classification from Resource Enhancement to Conservation Category at wetland 1A (and potentially 2A following more detailed review) (DBCA, 2023) indicates that wetland health has improved since they were last evaluated supporting the conclusion that these strategies have been successful. Therefore, no substantial changes to management strategies are proposed in response to this change.

3.1 Objectives for water management

Water management objectives for the site have been developed with consideration of site-specific issues identified in Section 2. The objectives identified are also informed by statutory requirements, relevant policies, by-laws and guidelines including overarching objectives from the draft *Planning for Water Guidelines* (WAPC, 2021).

The site-specific water management objectives are focussed on protection of public drinking water resources within the JUWPCA and maintaining the economic sustainability of Jandakot Airport into the future. Water management objectives are identified as follows:

- Prevent pollution of groundwater within the JUWPCA;
- Contribute to improving the health and sustainability of the Jandakot groundwater system and the wetland habitats it supports;
- Provide a local drainage system with an appropriate level of amenity and safety during storm events; and
- Ensure the efficient use and re-use of water resources.

3.2 Prevent pollution of groundwater within the JUWPCA

Key strategies are identified that are appropriate to achieve this objective are as follows:

- Implementation of the Local Water Management Strategy and Groundwater Management Plan.
- No bulk storage of potentially polluting chemicals within the JUWPCA.
- Development of Construction Environmental Management Plans (CEMPs), Demolition Environmental Management Plans and Operational Environmental Management Plans (OEMPs) to reduce the risk of pollution on tenant sites.
- Undertaking tenant audits and inspections.
- Training and awareness programs (e.g., Site inductions, Tenant Environmental Handbook, spill response training, etc.).

- Mandatory reporting of all spills greater than 2L and all spills that have the potential to result in environmental harm (regardless of volume).
- Prior to the expiry, transfer or termination of a tenant lease or licence, an environmental site assessment is undertaken if the activities of the tenant are determined to have resulted in possible soil or groundwater contamination.
- All new developments are to be connected to reticulated sewerage. Caffeine testing will detect sewerage contamination to groundwater, as detailed in Section 4.1.
- All existing buildings to be connected to reticulated sewerage by end of 2028 (excluding facilities where connection to reticulated sewerage is not feasible).

All lots within precincts 6 and 6A will be connected to reticulated sewerage via a local precinct gravity sewer network discharging to a new sewer pump station, to be located on the eastern boundary of Precinct 6. This Precinct 6 pump station will discharge the sewer via a pressure main into the existing gravity sewer within Orion Road. Once within the existing Orion Road gravity sewer network, it will discharge into the existing Wastewater Pump Station.

3.3 Contribute to improving the health and sustainability of the Jandakot groundwater system and the wetland habitats it supports

Key strategies are identified that are appropriate to achieve this objective are as follows:

- Any construction activity expected to require temporary or permanent dewatering requires consideration and investigation of acid sulfate soils.
- Maximise local recharge to the superficial groundwater aquifer through the use of distributed stormwater infiltration systems.
- Adopt a risk management approach to stormwater management for each land use:
- Infiltrate uncontaminated stormwater runoff from roofs, paths and landscaped areas at source using soakwells, permeable paving or through direction of runoff to adjacent pervious areas.
- Provide treatment of stormwater runoff from low-risk areas of roads and hardstand areas in vegetated swales and buffer strips.
- Manage stormwater quality from higher risk areas through appropriate treatment devices such as interceptors and/or separators.
- Street sweeping is to be implemented when warranted to reduce entrainment of contaminants via stormwater and to improve the efficiencies of the retention systems.
- Reduce groundwater demand through waterwise (preferably locally native) species selection, improved irrigation efficiency and hydro-zoning, and use of alternative water sources wherever possible.
- Minimise the use of fertilisers and pesticides in public and private open spaces.

3.4 Provide a local drainage system with an appropriate level of amenity and safety during storm events

The design of on-site drainage systems will be undertaken applying the following strategies:

- Provide a minimum of 300 mm clearance for habitable floors from flooding in the 1:100-year Average Recurrence Interval (ARI) event in roads and the drainage system.
- All lots to provide of onsite retention of 1:20 year ARI storm events without ponding through use of soakwells or infiltration areas within their respective lots.
- All lots to provide onsite attenuation of the 1:100 year/24 hr ARI storm event with overflows directed to road reserves and open drains/swales and/or drainage basins.
- Design developments such that roads are trafficable during the 1:20 year ARI flood event.

- Minimise ponding in all areas to avoid the creation of habitats that might attract water birds.
- Wherever applicable incorporate adjacent grass areas or buffer strips for stormwater discharge into the design of paved areas.
- Manage drainage from wash bays consistent with the Jandakot Airport Equipment and Washdown Policy, which requires appropriate treatment and disposal of water including the use of approved interceptors and/or separators.
- Design stormwater drainage from fixed refuelling areas to capture and discharge via purpose-built plate separators or interceptor pits.

Additionally (or alternatively if applicable), within the JUWPCA:

- Promote infiltration at source for all stormwater collected from clean roof surfaces within all lots except where rainwater tanks are used.
- Collect and convey stormwater from all roads, carparks and external hardstands within the JUWPCA via piped drainage networks into drainage basins located outside of the JUWPCA boundary.
- Stormwater from taxiways and runways will be discharged in adjacent swales and grassed verges.

All lots within Precincts 5, 6 and 6A are required to promote at source infiltration consistent with these stormwater management strategies. A new drainage basin was constructed in 2017 (Figure 15) and sized to cater for the 1:100 year/24hr ARI storm event in Precinct 6 and 6A.

Engineering designs for Precinct 5, 6 and 6A are provided in Appendix 3.

3.4.1 Mosquito control

Consistent with the need to avoid creation of areas of standing water within the Airport vicinity that might attract birds and thereby increase bird-strike risks, the study area does not contain mosquito breeding sites. However, mosquito breeding sites can occur in relatively small areas of standing water that may not be large or long-lived enough to attract birds. In the context of the development mosquito breeding can be controlled in the future urban environment by ensuring:

- Shallow areas of standing water drain within three days of filling;
- Areas of standing water are free from depressions, potholes and related irregularities;
- Bank gradients are steep enough not to trap pockets of stagnant water;
- Weeds are controlled in open drains and areas of standing water; and
- Drainage infrastructure and public open space areas will be designed to avoid the creation of new mosquito breeding sites.

The key strategy for the development is the prevention of standing water in drainage swales and treatment areas.

Where possible the inverts of open drains and culverts will be designed to be free draining with a minimum longitudinal grade of 1:1000. Where it is necessary to provide water storage below the invert of downstream stormwater infrastructure for water quality management or hydraulic controls then subsoil drainage will be provided no more than 500mm below the invert of the storage area to ensure drainage of the area will occur within a reasonable timeframe.

Regular inspections and maintenance (culvert and swale clearing) to avoid blockages and ponding should ensure adequate drainage and prevent occurrences of standing water.

3.5 Efficient use and re-use of water resources

The following targets and strategies are proposed:

- Groundwater use for irrigation should not exceed 7,500 kl/ha of irrigated open space.
- Promotion of water efficiency actions and appliances to existing and future tenants including the use of rainwater tanks for non-potable water demands where feasible.
- Water efficient appliances, fixtures and fittings to be promoted for use in all buildings.
- Waterwise landscaping and irrigation to be promoted in landscaped areas, consistent with the Jandakot Airport Landscape Design Guidelines.

3.5.1 Potable water

All lots within precincts 6 and 6A will be connected to the Water Corporation's Integrated Water Supply System via DN200 water mains which are to be connected into the existing Pilatus Street water reticulation network. It is not considered useful to undertake a potable water demand assessment for existing or proposed parts of the Jandakot Airport estate since the demand is highly variable and dependent on individual lot tenants and their businesses.

3.5.2 Non-Potable water

Non-potable water demand within the Jandakot Airport estate is restricted to areas of landscaping which are irrigated using groundwater abstracted under JAH current groundwater licence (GWL95741(5)). The license is held for 225,000 Kl of groundwater from the superficial aquifer based on a rate of 7,500 Kl/ha of irrigated lawn/garden area.

Groundwater abstraction was 151,793 Kl in 2021/22 which is within the licensed allocation limit. and is a 6.56% decrease from 2020/21 (162,453 Kl). Both airside and landside irrigation met the 7,500 kL/ha target rate in 2021/22 but commercial irrigation exceeded the target significantly and so the total groundwater use for irrigation was above the target 8,336 Kl/ha. Therefore, in future it will be necessary to focus on improving irrigation efficiency in commercial areas.

To address the objectives outlined in Section 3.1 and site-specific constraints Jandakot Airport Holdings will implement the following strategies and commitments specifically in relation to groundwater demand management:

- Engagement of turf/landscaping professionals for soil testing and advice on matters such as wetting agents, irrigation design and watering rates, and fertilisers.
- Ongoing review and improvement in order to
- abstract within the licenced limit; and
- work towards achieving an irrigation rate of 7,500Kl/ha.
- Recording of monthly meter readings from all metered bores.
- Compliance with the winter sprinkler ban (1 June to 31 August each year) except for the use of water required for construction purposes, bore testing and the establishment of new lawns and gardens.
- Implement a water quality sampling program to ensure abstracted water is suitable for irrigation purposes.

4 IMPLEMENTATION

The success of the water management strategies outlined in this document depends on their implementation.

4.1 Monitoring

4.1.1 Surface water

As there are no natural drainage channels or defined areas of surface water, surface water monitoring is unachievable.

Monitoring to capture potential water quality impacts from stormwater infiltration systems is undertaken by positioning groundwater monitoring bores at locations down gradient from the points of discharge/infiltration.

4.1.2 Groundwater

The purpose of the groundwater monitoring program is to:

- Establish baseline groundwater conditions against which future changes/trends can be measured.
- Ensure that development and activities on the airport estate, particularly within the JUWPCA, are not impacting the quality of groundwater.

Groundwater monitoring is undertaken by suitably qualified professional consultants.

Monitoring Bore Locations

Nine groundwater monitoring bores were installed at Jandakot Airport in February 2012. Following consultation with DWER, a further two bores (JAMB10 and JAMB11) were installed in December 2013 to monitor groundwater quality immediately downgradient to stormwater infiltration basins located to the east of the JUWPCA boundary in the eastern portion of Precinct 5 with JAMB2 and JAMB3 providing additional coverage. Following construction of the Precinct 6/6A stormwater infiltration basin and based on its currently proposed location, it is considered that JAMB4 will provide suitable downgradient monitoring coverage. These groundwater monitoring bores (11 in total) are shown in Figure 7.

Caffeine monitoring has been added to five key locations across the site for future events as an additional assurance to detect any seepage from septic tanks or ATU systems. Caffeine samples will be taken at five bores located up-gradient and down-gradient of existing septics and ATU systems. Up-gradient bores (JAMB6 and SWB001) and downgradient bores (JAMB2B, ADC1, and Aero 2) are shown on Figure 7.

Additional bores may be installed if warranted in future, depending on the infrastructure developed and the activities undertaken. Similarly, where existing bores are determined by the groundwater monitoring consultant to be immaterial or irrelevant in their contribution towards the purpose of the groundwater monitoring program, those bores may be omitted from the groundwater monitoring program or sampled at an amended frequency.

Sampling Frequency

To establish baseline groundwater conditions JAMB1-JAMB9 were sampled quarterly for two years (i.e., a minimum of 8 sampling events during 2012 and 2013). Urbaqua (previously Essential

Environmental) reviewed these monitoring results and determined there were no issues that warranted ongoing quarterly investigation, changing to biannually from 2014 onwards.

Ongoing monitoring occurs biannually in March and September to coincide with the anticipated highest and lowest seasonal groundwater levels.

The addition of bores JAMB10 and JAMB11 were sampled concurrently with the established sampling regime, and any additional monitoring bores installed from here on will also be sampled biannually, unless results (any significant exceedances of the appropriate guidelines) warrant further investigation as deemed critical by the environmental consultant and JAH.

Suite of Analytes and Assessment Levels

The suite of analytes and relevant assessment levels that will be applied to the groundwater sampling program are detailed in Table 6.

Under the *Airports (Environmental Protection) Regulations 1997*, the accepted statutory limits of water pollution are defined in Schedule 2. Whilst Schedule 2 remains the statutory document, assessment levels (or 'trigger values') have been developed for the monitoring program to consider local and site-specific baseline conditions when interpreting and reporting groundwater monitoring results.

When developing trigger values for water quality, *Australian and New Zealand guidelines for fresh and marine water quality* (ANZG, 2018) recommend the use of the 90th percentile of an observed control site where the aim is to maintain water quality.

The data collected facilitated a review of assessment levels to adopt more appropriate, revised assessment levels for a number of analytes based on observed control upgradient sites. This is particularly relevant for nutrients and electrical conductivity since none of the previously applied targets have considered the typical range of concentrations found in Swan Coastal Plain shallow aquifer groundwater systems.

Revised assessment levels have been adopted for Total Nitrogen, Total Phosphorous, pH, Electrical Conductivity, Aluminium, Cadmium, Zinc, Lead and Iron based on the 90th percentile of collected groundwater data from ten monitoring events (March 2012 to September 2014) at bores JAMB5, 6, 7, 8 & 9 which are all located upgradient of infrastructure and operations on the Jandakot Airport estate and may therefore be considered 'observed control sites' consistent with the recommendations of ANZG 2018.

Under Part 5 Division 1 of the Regulations, the airport-lessee company (i.e., JAH) may propose a substitute standard that is applicable to the site if the existing standard defined in a Schedule to the Regulations is inappropriate, thereby establishing a 'local standard'. Whilst JAH does not intend to formally establish a local standard in the immediate future (noting it is lengthy process and rarely undertaken), it will consider the possibility at a future time and determine, following liaison with DITRDCA, if warranted.

QA/QC

All monitoring is to be undertaken using the appropriate applicable field and laboratory QA/QC procedures (e.g., AS 5667). Analysis of samples should be completed by laboratories which hold National Association of Testing Authorities (NATA) accreditation for the particular parameters and methodologies needed.

Reporting

Monitoring results (field or laboratory) that indicate the potential presence of contamination (as determined by the professional consultants engaged to undertake the monitoring program) must be reported to JAH immediately (i.e., within 72 hours of results becoming available) so as necessary action can be agreed upon and implemented.

Where an exceedance of assessment level is reported, JAH will advise the DITRDCA Airport Environment Officer (AEO) within 14 days. The AEO (in consultation as necessary with JAH and the consultant undertaking groundwater monitoring) will determine if the nature of contamination is of a level that requires further action or for other agencies to be notified prior to the distribution of the Annual Report.

Groundwater monitoring results will be maintained on an electronic database that will be updated by the professional consultants engaged to undertake the monitoring program. The updated electronic database will be provided to the JAH Environment Manager along with an interim GME report (summarising any exceedances or issues from the previous monitoring event) within 8 weeks of the sampling event. Note that an interim GME report is not warranted if the draft Annual Report, as detailed below, is provided to the JAH Environment Manager within 8 weeks of the final GME of the Financial Year.

Consultants undertaking the Annual Groundwater Monitoring Program will prepare an Annual Report, which details the results of monitoring undertaken as described within this plan.

The Annual Monitoring Report will be submitted by 28 October each year to DCCEEW, DITRDCA, DWER and the Water Corporation and contain the following:

- An Executive Summary.
- An Introduction.
- Methodology.
- Results, including interpretation, tabular and graphical reporting of results, analysis of long-term trends and comparison with any other relevant regional data that is available from DWER and/or Water Corporation.
- Conclusions and Recommendations, including recommended changes to the sampling plan and/or assessment levels.
- QA/QC, including a validation of the analytical data by a critical review of all QA/QC processes.

Amendment of Groundwater Sampling Program

The bores sampled, sampling frequency and/or suite of analytes may be reviewed and amended from time to time when warranted.

Changes that increase the sampling frequency or suite of analytes may occur at any time based on the recommendation of the groundwater consultant engaged to undertake the groundwater monitoring program.

Any proposed changes in sampling frequency, suite of analytes or assessment levels will be proposed and justified within either a GME interim report or the Annual Groundwater Monitoring Report. Key stakeholders will be asked to comment on proposed changes prior to the changes being implemented.

Auditing of Groundwater Monitoring

The Annual Groundwater Monitoring Reports are provided to key stakeholders and regulators annually for review and comment. This process allows for expert peer review, which may result in changes and/or improvements to the monitoring program.

Independent auditing of the groundwater monitoring program (including results and reports) will be undertaken every five years. Previous audits were conducted by GreenCap in November 2017 and June 2023, respectively. Upcoming five yearly independent audits are planned for 2027 and 2032.

The audit report will be provided to key stakeholders for review and comment. Table 5 below provides information on previous audits undertaken by an independent auditor and a proposed schedule for future independent audits of the groundwater monitoring program.

Table 5: Audit Schedule

Audit	Auditor/Timing
Past audit of: • Annual Groundwater Monitoring Report, August 2013 (Pendragon Environmental Solutions) • 2013-2014 Annual Groundwater Monitoring Report, Jandakot Airport, WA, 20 October 2014 (Coffey Environments Australia Pty Ltd) • 2014-2015 Annual Groundwater Monitoring Report, Jandakot Airport, WA, 30 September 2015 (Coffey Environments Australia Pty Ltd) • 2015-16 Annual Groundwater Monitoring Report, September 2016 (Essential Environmental [now Urbaqua]) • 2016-17 Annual Groundwater Monitoring Report, September 2017 (Essential Environmental [now Urbaqua])	GreenCap, November 2017
Past audit of Urbaqua monitoring reports: • 2017-2018 Annual Monitoring Report • 2018-2019 Annual Monitoring Report • 2019-2020 Annual Monitoring Report • 2020-2021 Annual Monitoring Report • 2021-2022 Annual Monitoring Report	GreenCap, June 2023
Audit of future groundwater monitoring reports	Every 5 years, next due 2027 following the 2026-27 annual groundwater monitoring report

Table 6: Ground Water Assessment Levels

Parameter	Unit	A(EP)R 1997 Schedule 2	Adopted assessment Level
On Site Field Measurements			
Rainfall	mm	n/a	n/a
Depth to Groundwater Level	mtoc	n/a	n/a
Groundwater Level	mAHD	n/a	n/a
pH	Units	6.5-9.0	3.5-9.0
Temperature	˚C	>2 above seasonal mean	>2 above seasonal mean
Electrical Conductivity (EC)	µS/cm	1,000	120-440
Dissolved Oxygen (DO)	%	>80	>80
	mg/L	>6	>6

Parameter	Unit	A(EP)R 1997 Schedule 2	Adopted assessment Level
Laboratory Analysis			
Electrical Conductivity (EC)	µS/cm	n/a	120-480
Total Dissolved Solids	mg/L	<1000 or 5% increase	<1000 or 5% increase
Total Acidity (as CaCo3)	mg/L	n/a	60
Net Acidity (Tacid-Talk as CaCo3)	mg/L	n/a	60
Chloride (Cl)	mg/L	n/a	250
Sulphate (SO4)	mg/L	n/a	500
Hardness (as CaCo3)	mg/L	n/a	n/a
Caffeine	mg/L	n/a	An increase at down-gradient bores JAMB2B, ADC1 or Aero 2 compared to up-gradient bores
Nutrients			
Phosphorus (P)	mg/L	0.01	0.12
Nitrogen (N)	mg/L	0.1	6.39
Heavy Metals			
Aluminium	mg/L	0.1	3.34
Arsenic	mg/L	0.05	0.05
Cadmium	mg/L	0.0002	0.0002
Chromium	mg/L	0.01	0.01
Copper	mg/L	0.002	0.003
Iron	mg/L	1	1.45
Lead	mg/L	0.001	0.003
Nickel	mg/L	0.015	0.015
Zinc	mg/L	0.005	0.019
Total Petroleum Hydrocarbons			
Fuel (C6-C9 fractions)	mg/L	0.15	0.15
Mineral Oil (>C9 fractions)	mg/L	0.6	0.6
Monocyclic Aromatic Compounds			
Benzene	mg/L	0.3	<0.001
Toluene	mg/L	0.3	0.025
Ethylbenzene	mg/L	0.14	0.003
Xylene	mg/L	n/a	0.02

- *Values in RED are assessment levels adopted based on the 90th percentile of collected groundwater data (March 2012 – September 2014) at observed control sites consistent with the recommendations of ANZG 2018*
- *Values in BLUE adopted from ADWG as requested by the WA Department of Health*
- *On site measurements are to be undertaken with appropriately calibrated equipment (certificates to be provided within AGMR)*

4.2 Delivery

Key tasks, roles and responsibilities relating to delivery of urban water management objectives are outlined in Table 7.

Table 7: Summary of roles and responsibilities

Task		Responsibility	Timing
01	Implementation of the LWMS and GMP.	JAH	Ongoing
02	Development and implementation of Construction Environmental Management Plans (CEMPs), Demolition Environmental Management Plans and Operational Environmental Management Plans (OEMPs) to reduce the risk of pollution on tenant sites.	All relevant tenants and contractors, facilitated by JAH	Ongoing
03	Undertaking tenant audits and inspections.	JAH	Ongoing
04	Training and awareness programs (e.g., Site inductions, Tenant Environmental Handbook, spill response training, etc.).	JAH	Ongoing
05	Reporting of all spills greater than 2L and all spills that have the potential to result in environmental harm (regardless of volume).	All relevant tenants and contractors, facilitated by JAH	Ongoing
06	Environmental site assessment where the activities of the tenant are determined to have resulted in possible soil or groundwater contamination.	All relevant tenants and contractors, facilitated by JAH	Prior to expiry, transfer or termination of a tenant lease or licence,
07	Connection of new developments to reticulated sewerage.	JAH	Ongoing
08	Connection of existing buildings to reticulated sewerage by end of 2028 (excluding facilities where connection to reticulated sewerage is not feasible).	All relevant tenants, facilitated by JAH	Ongoing
09	Investigate Acid Sulfate Soils in line with DWER guidelines and triggers.	Proponent, facilitated by JAH	Prior to any action that triggers a requirement for investigation.
10	Design and construction of lot scale drainage systems consistent with the LWMS.	Proponent, facilitated by JAH	Ongoing
11	Design and construction of lot scale landscaping and irrigation systems consistent with the LWMS.	Proponent, facilitated by JAH	Ongoing
12	Design and construction of precinct drainage systems consistent with the LWMS.	JAH	Ongoing
13	Provide an annual groundwater abstraction report, containing abstraction volumes obtained from monthly meter readings, to DWER.	JAH	Annually, ongoing
14	Provide an annual groundwater monitoring report, containing abstraction volumes obtained from monthly meter readings, to DCCEEW, DITRDCA, DWER and the Water Corporation.	JAH	Annually, ongoing

4.3 Review

This Local Water Management Strategy has been prepared in support of Jandakot Airport developments within the JUWPCA.

The document should be revised and updated in the future should development vary significantly from that proposed within Master Plan 2020 or the development of additional precincts be proposed.

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6 ACRONYMS AND ABBREVIATIONS

A(EP)R	Airports (Environment Protection) Regulations 1997
AHD	Australian Height Datum
AEO	Airport Environment Officer: a statutory office holder appointed by the Secretary of DITRDCA and is responsible for the day-to-day administration of the Airports (Environment Protection) Regulations 1997.
AER	Annual Environment Report: annual report outlining the performance of Jandakot Airport Holdings in the environmental management of the estate.
AL	Assessment Levels (relating to criteria defined in the Jandakot Airport Groundwater Management Plan)
ANZG 2018	Updated version of Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Formerly ANZECC & ARMCANZ (2000))
ASS	Acid Sulfate Soils
BTEX	An acronym that stands for benzene, toluene, ethylbenzene, and xylenes. These compounds are some of the volatile organic compounds (VOCs) found in petroleum derivatives.
CEMP	Construction Environmental Management Plan: a document to be submitted by a proponent to an operator of undertaking prior to the construction of major and minor projects on the estate.
CMP	Conservation Management Plan
DBCA	WA Department of Biodiversity, Conservation and Attractions (Previously DPAW, DEC and CALM).
DITRDCA	Department of Infrastructure, Transport, Regional Development, Communications and the Arts (Formerly DIRDC, DIRD and DIT), the Commonwealth department that administers domestic and international aviation legislation and policies and is responsible for developing and implementing the regulatory regime for federally leased airports. The DITRDCA is responsible for appointing and overseeing the role of the AEO.
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Formerly DoE, DoEE, DAWE and DEWHA)
DWER	WA Department of Water and Environmental Regulation (Formerly DER and DoW).
EMP	Environmental Management Plan: a procedure that identifies potential impacts and methodologies necessary to prevent or mitigate environmental impacts.
EMS	Environmental Management System: a system of implementation to support the Environmental Management Framework.
EPBC	*Environment Protection and Biodiversity Conservation Act, (1999):* Commonwealth Act that provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places.
ESR	Environmental Site Register: In accordance with Section 6.02 of the Airports (Environment Protection) Regulations 1997, JAH maintains a written record

	of the environmental condition of the estate and its general environmental management.
GME	Groundwater Monitoring Event
GMP	Groundwater Management Plan
JUWPCA	Jandakot Underground Water Pollution Control Area
LOR	Limit of Reporting
LWMS	Local Water Management Strategy
OEMP	Operational Environment Management Plan: a document that identifies the environmental risks (and legal obligations) associated with day-to-day operations of a business and specifies the actions to mitigate environmental risks.
TPH	Total Petroleum Hydrocarbons: measure of the concentration or mass of petroleum hydrocarbon constituents present, in a given amount of soil or water.

Appendix 1 Conditions of Approval Reference Table

The table below summarises compliance with EPBC 2009/4796 and EPBC 2013/7032 conditions of approval during the 2021/22 reporting period.

EPBC 2013/7032 Cond.	**EPBC 2009/4796 Cond.**	**Plan reference**	**Demonstration of how the plan addresses condition requirements and commitments made in the plan to address condition requirements**
2. To mitigate the impacts to the environment from an action on Commonwealth land, in particular the Jandakot Groundwater Mound, the person taking the action must prepare and submit a revised Groundwater Management Plan to the Minister for approval. The revised plan must be submitted at least 3 months prior to commencement of the action. The revised plan must include, but not limited to:	7. The person taking the action must develop and submit a Jandakot Groundwater Mound Management Plan which must include but not be limited to:	All sections	Compliant The Jandakot Airport Groundwater Management Plan had already been submitted and approved by the Minister. Minor amendments (v4 3/7/12) were approved by the Minister in 2012. The GMP was further reviewed and amended in early 2014 and submitted to DOEE for approval in July 2014. Following approval of EPBC 2013/7032, JAH made further amendments to the GMP (including reviewing and amending the local water management strategy) to address the requirements of both EPBC 2009/4796 and EPBC 2013/7032 within a single document. This GMP (v5.4) was submitted 4/3/15 and approved 24/7/15, with the DOEE confirming that it satisfied the requirements of condition 7. A minor amendment (raised with DOEE 21/10/15) to the GMP (v5.5) was submitted 1/2/16 and approved 14/3/16, with the DOEE confirming that it satisfied the requirements of condition 7. The GMP was reviewed and amended in 2018 and submitted to DOEE 21/12/18. The amended GMP (v5.6) was approved by DOEE 19/7/19.
a) the introduction of a sewerage system;	f) The introduction of a sewerage system	Sections 2.8.4 and 3.2	
b) provision of groundwater monitoring reports to the Western Australian Department of Water[2] and Water Corporation;	b) provision of groundwater monitoring reports to the Western Australian	Section 4.1	

[2] Note, now Department of Water and Environmental Regulation

	Department of Water and Water Corporation;		The approved GMP (v5.6) that addresses condition 7 of EPBC 2009/4796 and Condition 2 of EPBC 2013/7032 is published on the JAH website: http://www.jandakotairport.com.au/environment/environment-plans.html
c) a water management strategy, specifically designed for precincts 6 and 6A;		Entire LWMS (or specifically Section 2.8.5)	
	c) Address all relevant measures included in the Local Water Management Strategy;	All sections	
d) schedules for the independent audit of groundwater monitoring results and reports;	d) schedules for the independent audit of groundwater monitoring results and reports;	Section 4.1.2, subheading 'Auditing'	
e) spill avoidance, management and rehabilitation measures and procedures;	e) spill avoidance, management and rehabilitation measures and procedures;	Section 3.2	
f) groundwater monitoring; and	a) groundwater monitoring and reporting;	Sections 2.4 and 4.1	
g) acceptable development types.		Section 1.5.1	

Appendix 2 2021-2022 Annual Groundwater Monitoring Report Results

September 2021

	Parameter	Unit	LoR	Trigger*	Assessment levels**	JAMB1	JAMB2B	JAMB3B	JAMB4	JAMB5	JAMB6	JAMB7B	JAMB8	JAMB9	JAMB10	JAMB11
	sample date					22/09/2021	20/09/2021	20/09/2021	20/09/2021	20/09/2021	20/09/2021	20/09/2021	21/09/2021	21/09/2021	21/09/2021	22/09/2021
In-situ field measurements	depth to water	m toc	-	-	-	3.97	10.74	8.87	4.63	2.655	6.44	2.8	3.745	3.505	3.63	4.135
	TOC	mAHD	-	-	-	28.756	34.709	32.500	29.739	28.433	32.530	28.754	29.282	28.064	28.713	29.114
	Water level	mAHD				24.786	23.969	23.630	25.109	25.778	26.090	25.954	25.537	24.559	25.083	24.979
	pH		-	6.5-9.0	3.5-9.0	4.77	4.4	5.28	5.4	4.23	6.61	3.84	3.58	4.32	5.51	5.68
	temp	°C	-	-	-	21.8	20.4	19.9	20.7	19.3	19.9	19.9	20	18.6	16.2	26.3
	EC	µS/cm	-	1000	120-440	219.3	285.5	98.2	555	227.6	387.8	611	311.7	464	122.7	121.3
	DO	mg/L	-	>6	>6	0.24	0.56	8.09	2.7	0.32	6.11	0.47	1.93	0.39	4.28	5.42
	TDS	mg/L	-	-	-	142.35	185.9	63.7	357.5	148.2	252.2	396.5	202.8	301.6	79.95	78.65
	Redox potential	mV	-	-	-	127	99.2	139.7	129.1	91.3	140	161	143.8	100.6	121.1	160.2
Laboratory analysis	EC	µS/cm	10	-	120-480	**230**	**300**	**100**	**570**	**240**	**390**	**630**	**320**	**480**	**130**	**130**
	TDS	mg/L	5	<1000 or 5% increase	<1000 or 5% increase	**140**	**180**	**60**	**320**	**140**	**230**	**280**	**190**	**290**	**78**	**78**
	total acidity	mgCaCO3/L	5	-	60	**100**	**140**	**10**	**88**	**120**	**19**	**85**	**110**	**60**	**27**	**22**
	Alkalinity	mgCaCO3/L	5	-	-	**20**	**11**	**6**	**64**	**6**	**120**	<5	<5	<5	<5	**25**
	net acidity	mgCaCO3/L	5	-	60	**80**	**130**	<5	**24**	**110**	<5	**85**	**110**	**60**	**26**	<5
	chloride	mg/L	5	-	250	**37**	**42**	**20**	**48**	**34**	**25**	**160**	**86**	**96**	**18**	**19**
	sulfate	mg/L	1	-	500	**18**	**41**	**4**	**78**	**37**	**25**	**47**	**10**	**96**	**5**	**3**
	hardness	mg/L	5	-	-	**32**	**74**	**25**	**170**	**32**	**150**	**65**	**35**	**100**	**20**	**32**
Nutrients	TN	mg/L	0.2	0.10	6.39	**1.1**	**1.1**	**0.4**	**17.0**	**1.9**	**3.7**	**1.1**	**2.4**	**0.3**	**0.6**	**0.4**
	TP	mg/L	0.01	0.01	0.12	**0.09**	**0.07**	**0.49**	**0.10**	**0.13**	**0.07**	**0.1**	**0.12**	**0.58**	**0.04**	**0.03**
Dissolved Metals	aluminium	mg/L	0.01	0.1	3.34	**0.43**	**0.18**	<0.01	**0.28**	**1.4**	<0.01	**1.2**	**0.5**	**0.32**	<0.01	**0.12**
	arsenic	mg/L	0.001	0.05	0.05	**0.001**	<0.001	<0.001	<0.001	<0.001	<0.001	**0.002**	<0.001	<0.001	<0.001	<0.001
	cadmium	mg/L	0.0001	0.0002	0.0002	<0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	chromium	mg/L	0.001	0.01	0.01	**0.001**	<0.001	<0.001	**0.003**	**0.001**	<0.001	<0.001	**0.001**	<0.001	<0.001	**0.001**
	copper	mg/L	0.001	0.002	0.003	<0.001	<0.001	<0.001	**0.001**	<0.001	<0.001	**0.002**	**0.001**	<0.001	<0.001	<0.001
	iron	mg/L	0.01	1.00	1.45	**0.18**	**0.78**	<0.01	**0.07**	**0.31**	<0.01	**0.56**	**0.16**	**0.07**	<0.01	<0.01
	lead	mg/L	0.001	0.001	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	**0.001**	**0.001**	<0.001	<0.001	<0.001
	nickel	mg/L	0.001	0.015	0.015	<0.001	**0.001**	<0.001	**0.002**	**0.001**	<0.001	**0.006**	**0.001**	<0.001	<0.001	<0.001
	zinc	mg/L	0.005	0.005	0.019	<0.005	<0.005	<0.005	**0.007**	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TPH Fractions	TPH C6-C9	mg/L	0.02	0.15	0.15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	TPH C10-C14	mg/L	0.02	0.6	0.6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	TPH C15-C28	mg/L	0.04	0.6	0.6	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	TPH C29-C36	mg/L	0.04	0.6	0.6	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	TPH >36	mg/L	0.04	0.6	0.6	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
BTEX	Benzene	mg/L	0.001	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Toluene	mg/L	0.001	0.3	0.025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Ethyl benzene	mg/L	0.001	0.14	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Xylene	mg/L	0.003	-	0.02	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

***A(EP)R (1997) Schedule 2 Water pollution - accepted limits**

**** Site specific adopted assessment levels of the Jandakot Groundwater Management Plan v5.6**

1	Values highlighted indicate values reported above Laboratory LOR
1	Values highlighted indicate exceedances of A(EP)R (1997) Schedule 2
2	Values highlighted indicate exceedances of Interim Assessment Levels (JA GMP v5.6, 2019)

March 2022

	Parameter	Unit	LoR	Trigger*	Assessment levels**	JAMB1	JAMB2B	JAMB3B	JAMB4	JAMB5	JAMB6	JAMB7B	JAMB8	JAMB9	JAMB10	JAMB11
	sample date					16/03/2022	16/03/2022	16/03/2022	18/03/2022	17/03/2022	17/03/2022	17/03/2022	18/03/2022	18/03/2022	16/03/2022	16/03/2022
In-situ field measurements	depth to water	m toc	-	-	-	4.63	11.2	9.23	5.205	3.22	7.04	3.52	4.335	4.18	4.37	4.86
	TOC	mAHD	-	-	-	28.756	34.709	32.500	29.739	28.433	32.530	28.754	29.282	28.064	28.713	29.114
	Water level	mAHD				24.126	23.509	23.270	24.534	25.213	25.490	25.234	24.947	23.884	24.343	24.254
	pH		-	6.5-9.0	3.5-9.0	5.33	4.86	5.52	5.87	4.8	6.16	4.44	4.05	4.85	6.04	6.27
	temp	°C	-	-	-	24.6	23	22.7	23.4	21.9	24.5	24	22.7	20.2	22.5	21.9
	EC	µS/cm	-	1000	120-440	303.3	295.2	269.7	565	211.3	446	516	302.2	226.2	128.6	171.4
	DO	mg/L	-	>6	>6	4.56	1.12	5.29	2.71	4.18	3.4	3.48	2.95	4.43	1.36	3.78
	TDS	mg/L	-	-	-	196.9	191.75	175.6	370.5	137.15	289.9	338	196.3	146.9	83.85	111.15
	Redox potential	mV	-	-	-	32.9	-13.3	57.7	-61.7	-17.3	31.9	17.3	-1.8	-9.3	42	44.9
Laboratory analysis	EC	µS/cm	10	-	120-480	**300**	**290**	**260**	**570**	**210**	**440**	**510**	**300**	**220**	**130**	**170**
	TDS	mg/L	5	<1000 or 5% increase	<1000 or 5% increase	**180**	**170**	**160**	**340**	**130**	**260**	**310**	**180**	**130**	**78**	**100**
	total acidity	mgCaCO3/L	5	-	60	**73**	**130**	**33**	**130**	**110**	**33**	**66**	**76**	**41**	**27**	**23**
	Alkalinity	mgCaCO3/L	5	-	-	**23**	**14**	**19**	**130**	**10**	**52**	<5	<5	**24**	**38**	**52**
	net acidity	mgCaCO3/L	5	-	60	**50**	**116**	**14**	<5	**100**	<5	**66**	**76**	**17**	<5	<5
	chloride	mg/L	5	-	250	**72**	**49**	**53**	**72**	**39**	**88**	**130**	**63**	**30**	**18**	**18**
	sulfate	mg/L	1	-	500	**22**	**54**	**25**	**22**	**29**	**16**	**39**	**19**	**46**	<1	**7.4**
	hardness	mg/L	5	-	-	**39**	**70**	**37**	**140**	**32**	**76**	**39**	**36**	**55**	**32**	**48**
Nutrients	TN	mg/L	0.2	0.10	6.39	**3**	**1.1**	**1.8**	**10.0**	**1.9**	**2.5**	**1.3**	**2.4**	**0.3**	**3.4**	**1.2**
	TP	mg/L	0.01	0.01	0.12	**0.34**	**0.13**	**0.26**	**0.05**	**0.13**	**0.1**	**0.09**	**0.1**	**0.35**	**0.05**	**0.08**
Dissolved Metals	aluminium	mg/L	0.01	0.1	3.34	**0.76**	**0.28**	**0.05**	**0.43**	**1.4**	**0.06**	**0.84**	**0.4**	**0.05**	**0.11**	**0.09**
	arsenic	mg/L	0.001	0.05	0.05	**0.001**	<0.001	<0.001	**0.001**	<0.001	<0.001	**0.003**	<0.001	<0.001	<0.001	<0.001
	cadmium	mg/L	0.0001	0.0002	0.0002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	chromium	mg/L	0.001	0.01	0.01	**0.002**	<0.001	<0.001	**0.003**	**0.002**	**0.001**	**0.001**	**0.002**	**0.001**	<0.001	<0.001
	copper	mg/L	0.001	0.002	0.003	**0.018**	**0.003**	**0.015**	**0.006**	**0.005**	**0.012**	**0.008**	**0.008**	**0.008**	**0.016**	**0.014**
	iron	mg/L	0.01	1.00	1.45	**0.21**	**0.86**	<0.01	**0.21**	**0.34**	**0.02**	**0.36**	**0.14**	**0.05**	**0.02**	**0.04**
	lead	mg/L	0.001	0.001	0.003	**0.001**	<0.001	<0.001	**0.003**	<0.001	<0.001	**0.001**	**0.003**	**0.003**	<0.001	<0.001
	nickel	mg/L	0.001	0.015	0.015	**0.003**	**0.004**	**0.003**	**0.005**	**0.004**	**0.002**	**0.005**	**0.003**	**0.003**	**0.003**	**0.003**
	zinc	mg/L	0.005	0.005	0.019	**0.007**	**0.007**	<0.005	<0.005	**0.008**	<0.005	**0.006**	**0.01**	**0.008**	<0.005	<0.005
TRH Fractions	TPH C6-C9	mg/L	0.02	0.15	0.15	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	TPH C10-C14	mg/L	0.05	0.6	0.6	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
	TPH C15-C28	mg/L	0.1	0.6	0.6	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	TPH C29-C36	mg/L	0.1	0.6	0.6	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
	TPH >36	mg/L	0.04	0.6	0.6	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
BTEX	Benzene	mg/L	0.001	0.3	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Toluene	mg/L	0.001	0.3	0.025	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Ethyl benzene	mg/L	0.001	0.14	0.003	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
	Xylene	mg/L	0.003	-	0.02	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003

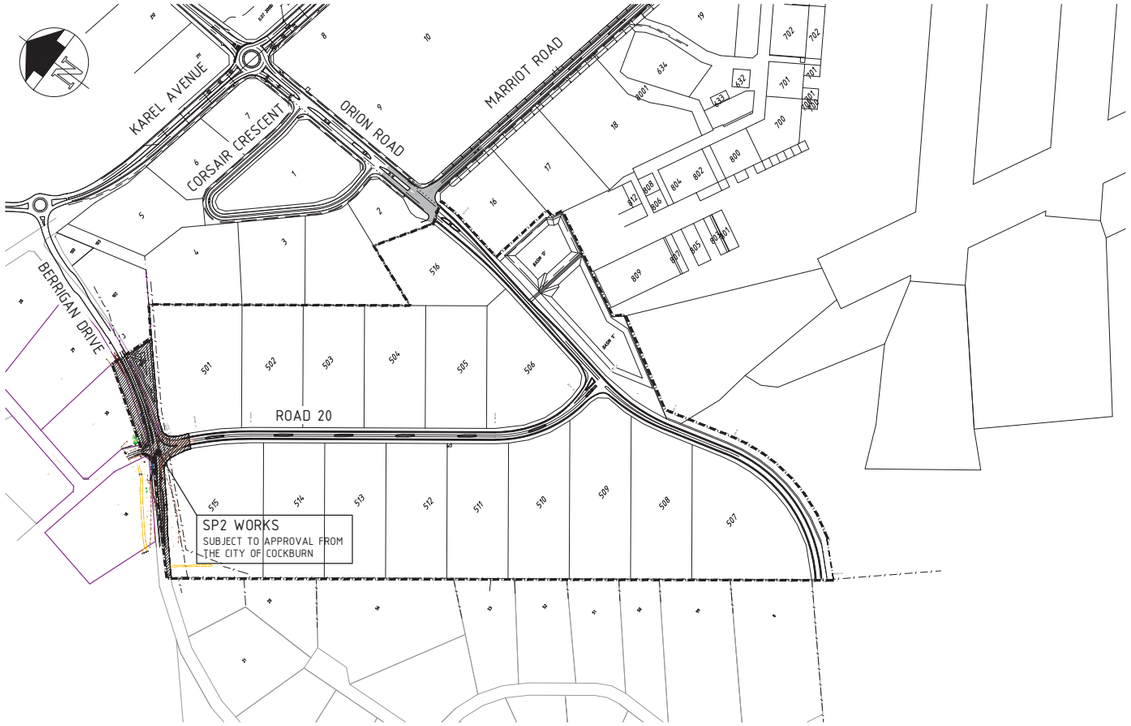
***A(EP)R (1997) Schedule 2 Water pollution - accepted limits**

**** Site specific adopted assessment levels of the Jandakot Groundwater Management Plan v5.6**

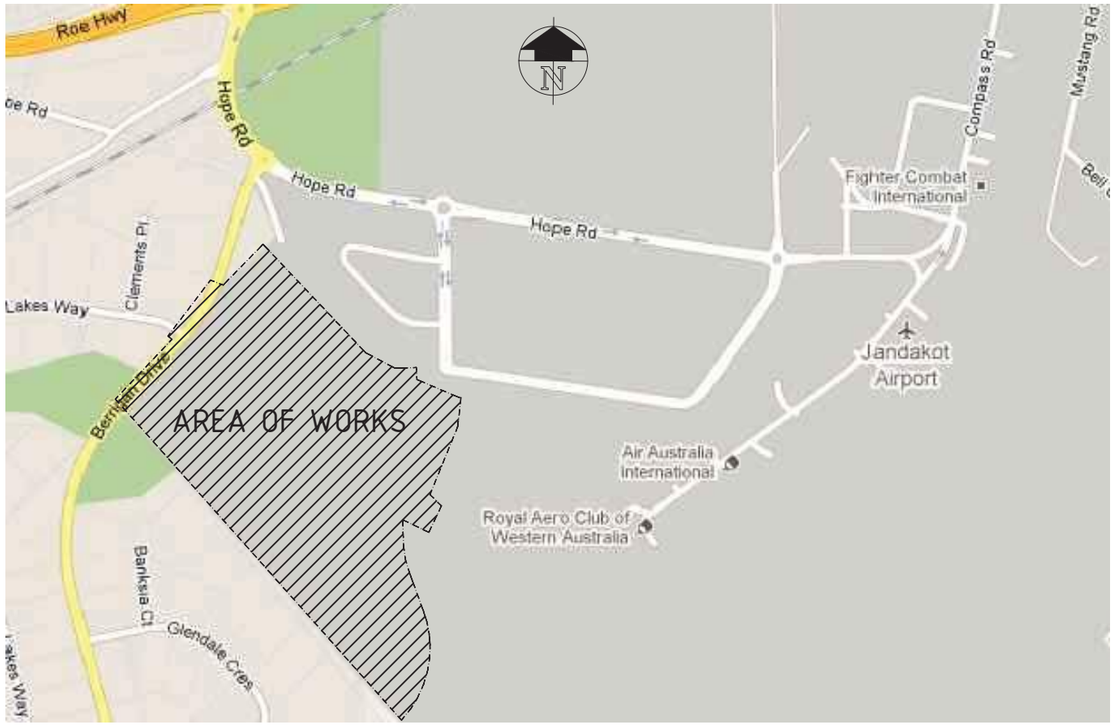
1	Values highlighted indicate values reported above Laboratory LOR
1	Values highlighted indicate exceedances of A(EP)R (1997) Schedule 2
2	Values highlighted indicate exceedances of Interim Assessment Levels (JA GMP v5.6, 2019)

Appendix 3 Engineering designs

JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 5
DRAWING INDEX, SITE PLAN & LOCALITY PLAN



SITE PLAN
1:5000



LOCALITY PLAN
N.T.S.

DRAWING LIST

DRAWING No.	TITLE
05-C-001	SITE PLAN, LOCALITY PLAN & DRAWING INDEX
05-C-010	GENERAL ARRANGEMENT
05-C-100	PLAN & PROFILE ORION ROAD CH. 0 TO CH. 500
05-C-101	PLAN & PROFILE ORION ROAD CH. 500 TO END
05-C-102	PLAN & PROFILE ROAD 20 CH. 0 TO CH. 400
05-C-103	PLAN & PROFILE ROAD 20 CH. 400 TO END
05-C-200	ROAD LAYOUT PLAN, ORION ROAD - SHEET 1
05-C-201	ROAD LAYOUT PLAN, ORION ROAD - SHEET 2
05-C-202	ROAD LAYOUT PLAN, ORION ROAD - SHEET 3
05-C-203	ROAD LAYOUT PLAN, ORION ROAD - SHEET 4
05-C-204	ROAD LAYOUT PLAN, ROAD 20 - SHEET 1
05-C-205	ROAD LAYOUT PLAN, ROAD 20 - SHEET 2
05-C-206	ROAD LAYOUT PLAN, ROAD 20/BERRIGAN DRIVE - SHEET 1
05-C-300	TYPICAL CROSS SECTIONS
05-C-310	TYPICAL SECTIONS KERB PROFILES
05-C-320	FENCING LAYOUT
05-C-321	TYPICAL FENCING DETAIL - SHEET 1 OF 2
05-C-322	TYPICAL FENCING DETAIL - SHEET 2 OF 2
05-C-400	LINEMARKING AND SIGNAGE - SHEET 1 OF 4
05-C-401	LINEMARKING AND SIGNAGE - SHEET 2 OF 4
05-C-402	LINEMARKING AND SIGNAGE - SHEET 3 OF 4
05-C-403	LINEMARKING AND SIGNAGE - SHEET 4 OF 4
05-C-410	LINEMARKING AND SIGNAGE

DRAWING No.	TITLE
05-C-500	DRAINAGE PLAN - SHEET 1 OF 4
05-C-501	DRAINAGE PLAN - SHEET 2 OF 4
05-C-502	DRAINAGE PLAN - SHEET 3 OF 4
05-C-503	DRAINAGE PLAN - SHEET 4 OF 4
05-C-504	DRAINAGE BASIN PLAN, ORION ROAD
05-C-505	DRAINAGE BASIN SECTIONS AND DETAILS - SHEET 1 OF 2
05-C-506	DRAINAGE BASIN PLAN, BERRIGAN DRIVE
05-C-507	DRAINAGE CATCHMENT PLAN
05-C-508	DRAINAGE BASIN SECTIONS AND DETAILS - SHEET 2 OF 2
05-C-510	DRAINAGE SCHEDULE
05-C-600	SEWER RETICULATION SITE PLAN
05-C-601	SEWER RETICULATION DESIGN DATA PLAN
05-C-602	SEWER RETICULATION - SHEET 1 OF 2
05-C-603	SEWER RETICULATION - SHEET 2 OF 2
05-C-610	WATER RETICULATION - SHEET 1 OF 2
05-C-611	WATER RETICULATION - SHEET 2 OF 2
05-C-620	W-POWER FIBRE OPTIC PROPOSED RELOCATION
05-C-622	SPARE COMMS RETICULATION
05-C-623	TELSTRA RETICULATION
05-C-630	GAS RETICULATION PLAN. PLAN LAYOUT DETAILS
05-C-631	TELSTRA PIT RELOCATION PLAN LAYOUT

DRAWING No.	TITLE
05-C-701	PAVEMENT PLAN - SHEET 1
05-C-702	PAVEMENT PLAN - SHEET 2
05-C-703	PAVEMENT PLAN - SHEET 3
05-C-800	EARTHWORKS PLAN - SHEET 1 OF 4
05-C-801	EARTHWORKS PLAN - SHEET 2 OF 4
05-C-802	EARTHWORKS PLAN - SHEET 3 OF 4
05-C-803	EARTHWORKS PLAN - SHEET 4 OF 4
05-C-810	CONTRACTORS SITE AREA SITE PLAN
05-C-900	ORION ROAD CROSS SECTIONS - SHEET 1 OF 7
05-C-901	ORION ROAD CROSS SECTIONS - SHEET 2 OF 7
05-C-902	ORION ROAD CROSS SECTIONS - SHEET 3 OF 7
05-C-903	ORION ROAD CROSS SECTIONS - SHEET 4 OF 7
05-C-904	ORION ROAD CROSS SECTIONS - SHEET 5 OF 7
05-C-905	ORION ROAD CROSS SECTIONS - SHEET 6 OF 7
05-C-906	ORION ROAD CROSS SECTIONS - SHEET 7 OF 7
05-C-907	ROAD 20 CROSS SECTIONS - SHEET 1 OF 8
05-C-908	ROAD 20 CROSS SECTIONS - SHEET 2 OF 8
05-C-909	ROAD 20 CROSS SECTIONS - SHEET 3 OF 8
05-C-910	ROAD 20 CROSS SECTIONS - SHEET 4 OF 8
05-C-911	ROAD 20 CROSS SECTIONS - SHEET 5 OF 8
05-C-912	ROAD 20 CROSS SECTIONS - SHEET 6 OF 8
05-C-913	ROAD 20 CROSS SECTIONS - SHEET 7 OF 8
05-C-914	ROAD 20 CROSS SECTIONS - SHEET 8 OF 8
05-C-915	BERRIGAN DRIVE CROSS SECTIONS - SHEET 1 OF 2
05-C-916	BERRIGAN DRIVE CROSS SECTIONS - SHEET 2 OF 2

DRAWING No.	TITLE
E-01	SITE PLAN AND DETAILS
E-02	STREET LIGHTING
E-03	INFRASTRUCTURE LAYOUT
E-04	HV SINGLE LINE DIAGRAM

AS CONSTRUCTED DRAWING LIST
(FROM PREVIOUS STAGE OF WORK)

94522AS-070A	WATER RETICULATION PLAN
94522AS-126A	FIRE RING RETICULATION PLAN
JCE06061-E01	HV/LV CONDUIT LAYOUT
JCE06061-E03	STREET LIGHTING LAYOUT
JCE06061-E08	BLOWN FIBER CONDUITING LAYOUT
2880-8/31	SEWER RETICULATION PLAN - SHEET 2
2880-8/32	SEWER RETICULATION PLAN - SHEET 3
CW4-95376111-212387-00002_3	SERVICE EASEMENT PLAN

REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	25.02.2013	ISSUED FOR CONSTRUCTION; SHEET 05-C-508 ADDED	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV | DATE | DESCRIPTION | RVD

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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web: www.bgeeng.com
PERTH ~ MELBOURNE ~ SYDNEY ~ DUBAI ~ ABU DHABI

PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	A.P

DATUM	GRID	SCALE	
AHD	PCG	AS SHOWN	AT A1 SIZE

TITLE: DRAWING INDEX, SITE PLAN & LOCALITY PLAN

PROJECT No. P10268.01 | DRAWING No. 05-C-001 | REV. 2

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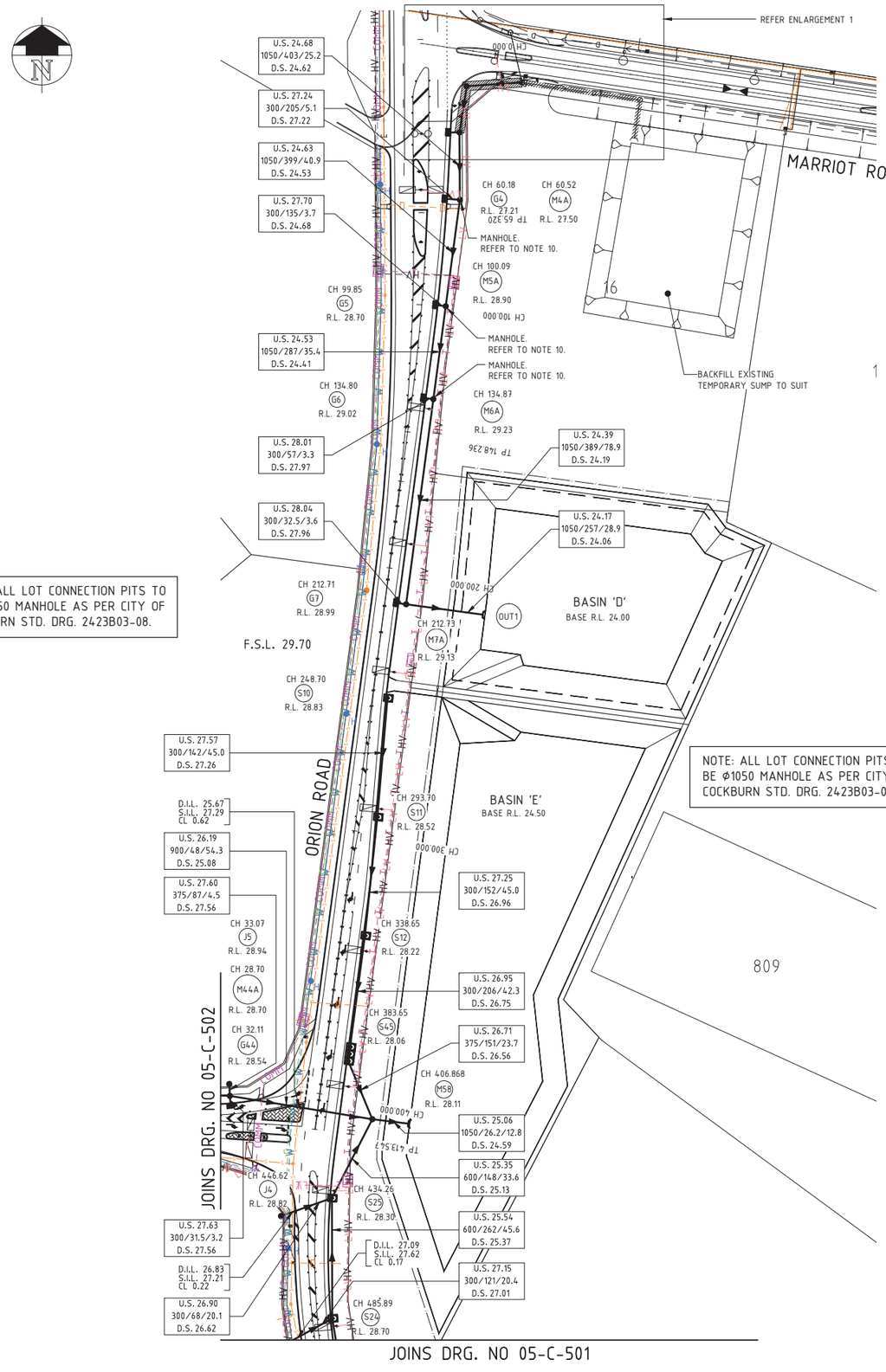


NOTE: ALL LOT CONNECTION PITS TO BE Ø1050 MANHOLE AS PER CITY OF COCKBURN STD. DRG. 2423B03-08.

NOTE: ALL LOT CONNECTION PITS TO BE Ø1050 MANHOLE AS PER CITY OF COCKBURN STD. DRG. 2423B03-08.

NOTES

1. SERVICE LOCATION DIAGRAMMATIC ONLY - CONTACT SERVICE AUTHORITIES FOR EXACT IN GROUND LOCATIONS PRIOR TO COMMENCEMENT OF WORK.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PIPES SHALL BE SPIGOT AND SOCKET TYPE WITH RUBBER RING JOINTS, RCP CLASS 2 UNLESS OTHERWISE NOTED.
4. CONSTRUCTION PLANT SHALL NOT BE PERMITTED TO TRAVEL OVER COMPACTED PIPELINE UNTIL A MINIMUM THICKNESS OF COMPACTED BACKFILL HAS BEEN PLACED TO PROVIDE ADEQUATE PROTECTION.
5. MATERIALS FOR BEDDING, HAUNCH AND SIDE ZONES SHALL COMPLY WITH WITH THE RELEVANT REQUIREMENTS OF TABLE 3 & 4 OF AS3725 FOR HS3 SUPPORT CONDITIONS.
6. BEDDING AND BACKFILL MATERIAL TO BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION.
7. UNSUITABLE IN SITU BEDDING MATERIAL SHALL BE TREATED IN ACCORDANCE WITH THE SPECIFICATION.
8. CONTRACTOR TO EXERCISE EXTREME CARE IN THE VICINITY OF THE U/GROUND POWER, TELSTRA CONDUITS AND FIBRE OPTIC CABLES.
9. ALL ROAD GULLIES SHALL BE CLASS D BICYCLE FRIENDLY TYPE.
10. ALL MANHOLE DRAINAGE PITS AS PER MAIN ROADS STANDARDS. REFER TO DRAWING 200231-084 FOR SELECTION GUIDE.

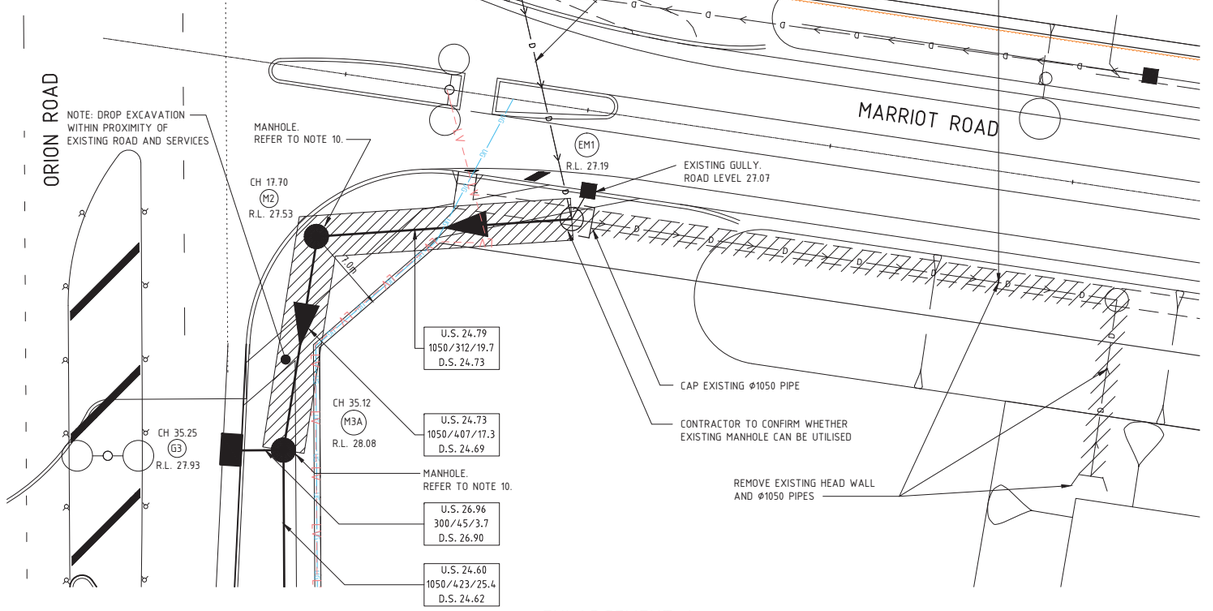
TABLE - PIT LINER SIZES

PIPE SIZE MAX	NOM. DIA CLASS '2' R.C. LINER
375	1050
600	1200
750	1500*
900	1800*
1050	2250*

* CONVERSION SLABS REQUIRED WITH Ø1050 SHAFT LINER

LEGEND

- PROPOSED DRAINAGE LINE & FLOW DIRECTION
- EXISTING DRAINAGE LINE & FLOW DIRECTION
- EXISTING DRAINAGE LINE TO BE REMOVED
- PROPOSED MANHOLE
- PROPOSED SIDE ENTRY PIT
- PROPOSED DOUBLE SIDE ENTRY PIT
- (12) DRAINAGE STRUCTURE NUMBER - J = LOT CONNECTION PIT, M = MANHOLE, S = SIDE ENTRY PIT, G = GULLY PIT.
- U.S. 24.90 / 750/833/50.0 / D.S. 24.84 — UPSTREAM INVERT LEVEL, DIA/GRADE/LENGTH OF PIPE, DOWNSTREAM INVERT LEVEL
- SEWER MAIN
- D.I.L. 26.05 / S.I.L. 27.18 / CL 0.23 — DRAINAGE INVERT LEVEL, SEWER INVERT LEVEL, CLEARANCE
- GULLY GRATE
- F.S.L. FINISH LOT DESIGN SURFACE (APPROXIMATE ONLY)



ENLARGEMENT 1
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REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	19.04.2012	ADJUSTED DESIGN TO SUIT NEW LOT LEVELS	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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web: www.bgeerg.com
PERTH - MELBOURNE - SYDNEY - DUBAI - ABU DHABI

PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: DRAINAGE PLAN SHEET 1 OF 4

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-500	2

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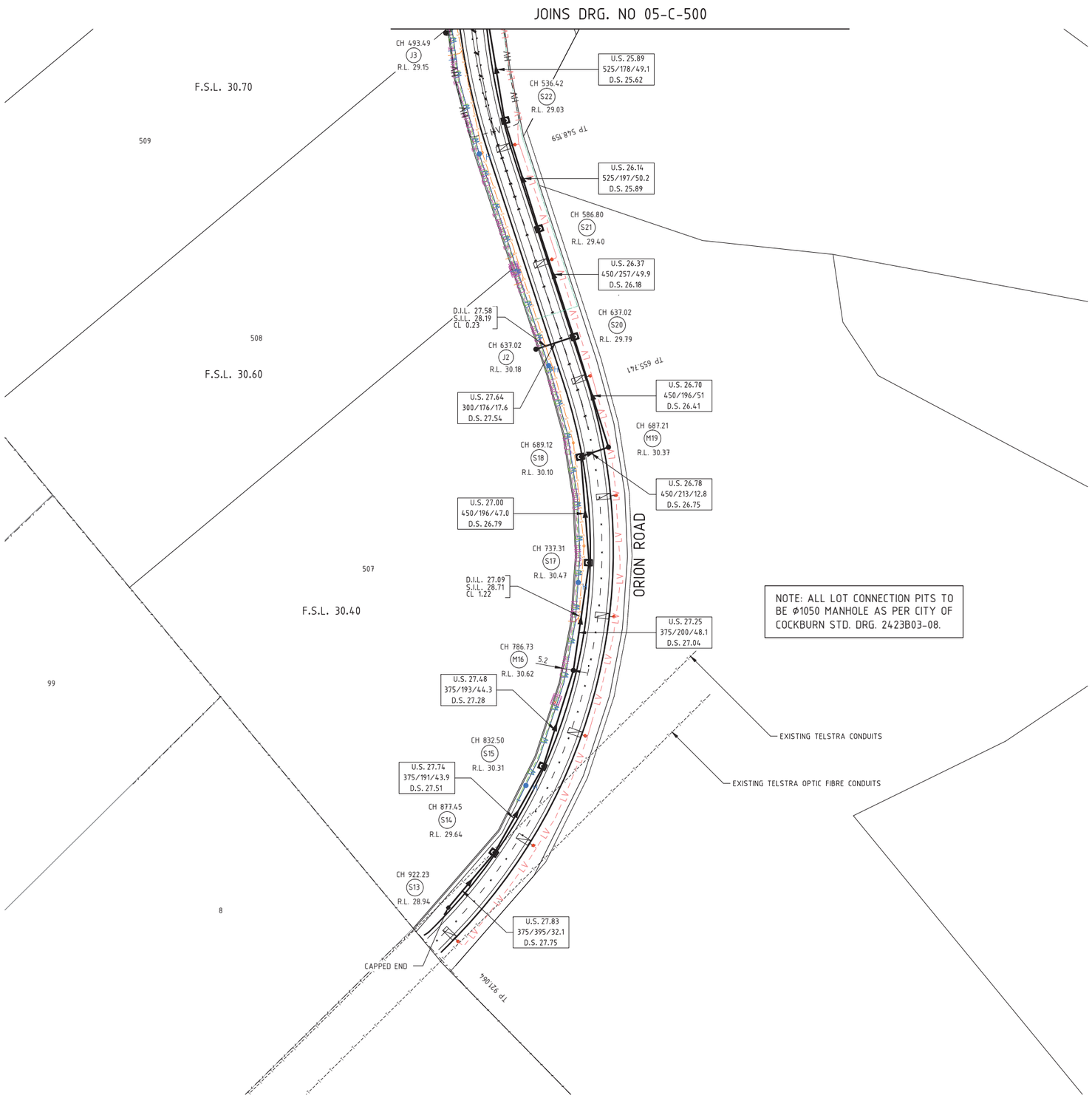

NOTE: ALL LOT CONNECTION PITS TO BE ⌀1050 MANHOLE AS PER CITY OF COCKBURN STD. DRG. 2423B03-08.

LEGEND

- PROPOSED DRAINAGE LINE & FLOW DIRECTION
- EXISTING DRAINAGE LINE & FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED SIDE ENTRY PIT
- PROPOSED DOUBLE SIDE ENTRY PIT
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- SEWER MAIN
- D.I.L. 26.05 / S.I.L. 27.18 / CL 0.23 — DRAINAGE INVERT LEVEL, SEWER INVERT LEVEL, CLEARANCE
- F.S.L. — FINISH LOT DESIGN SURFACE (APPROXIMATE ONLY)

NOTES

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REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	19.04.2012	ADJUSTED DESIGN TO SUIT NEW LOT LEVELS	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: DRAINAGE PLAN SHEET 2 OF 4

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-501	2

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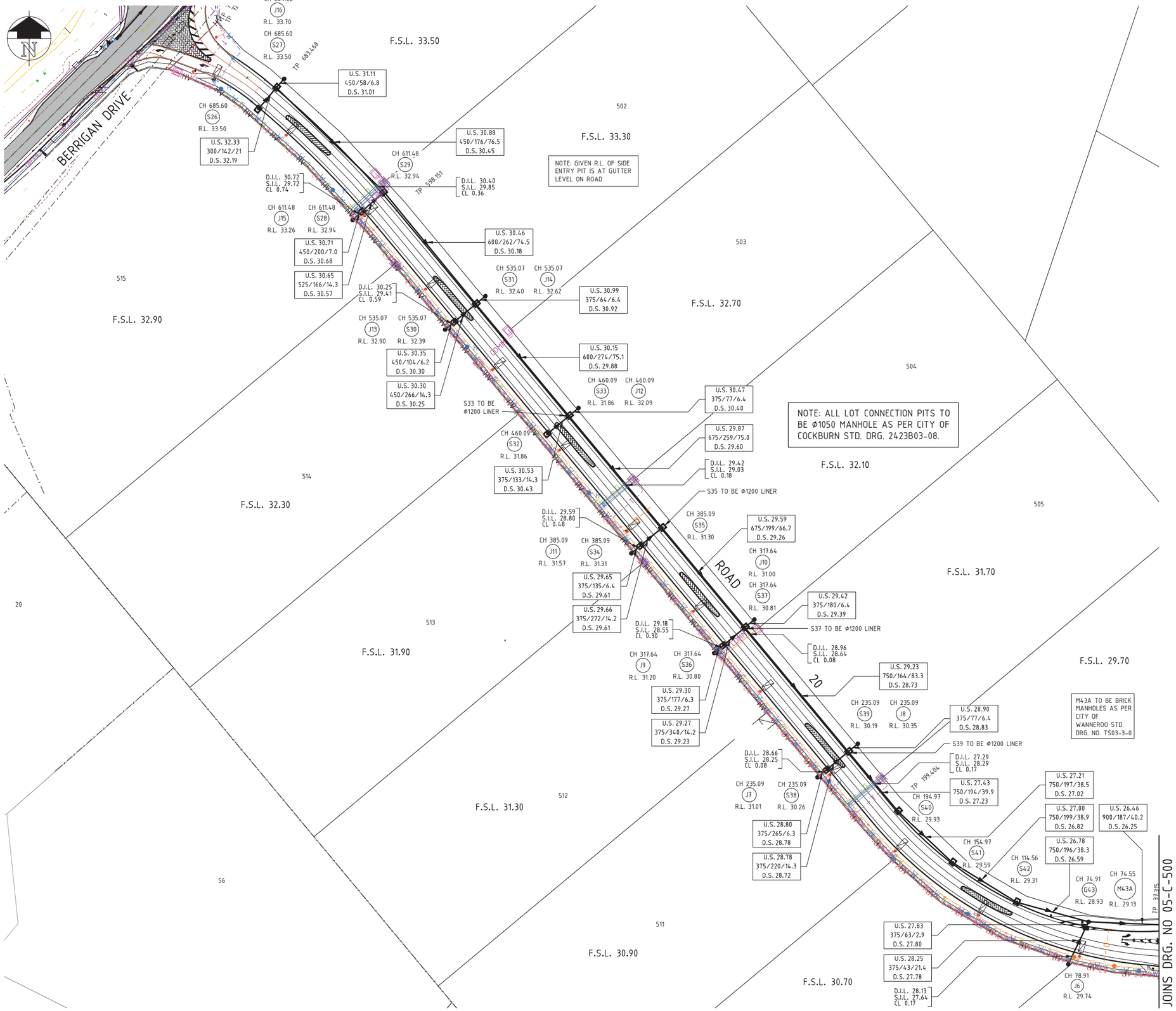

LEGEND

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- PROPOSED MANHOLE
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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: DRAINAGE PLAN SHEET 3 OF 4

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-502	2

P:\P10268-01 JANDAKOT AIRPORT PRECINCT 5\100 DRAWINGS\102 CIVIL\AUTOCAD\P10268_01_05-C-502 DRAINAGE.DWG
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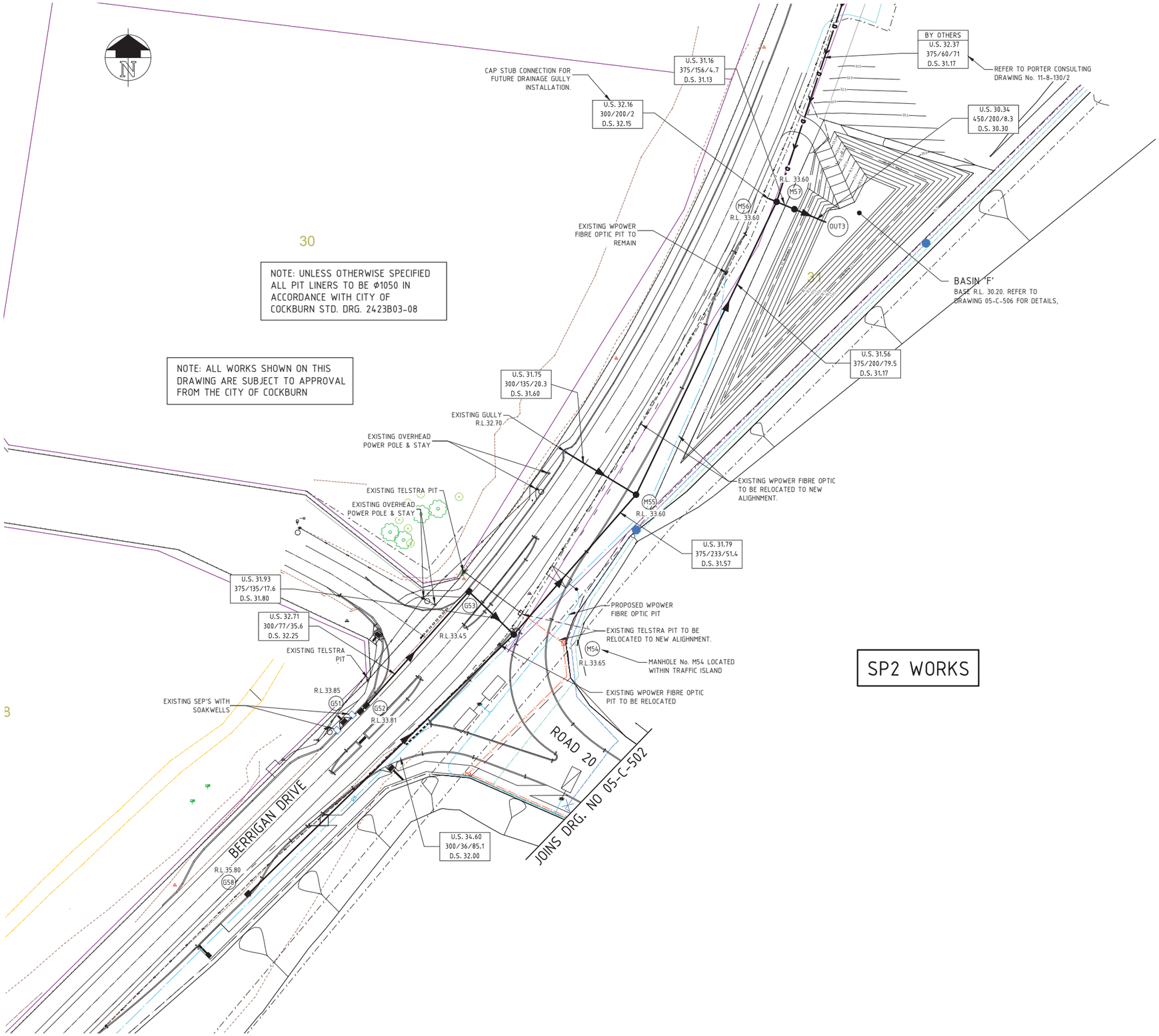

LEGEND

- PROPOSED DRAINAGE LINE & FLOW DIRECTION
- EXISTING DRAINAGE LINE & FLOW DIRECTION
- PROPOSED MANHOLE
- PROPOSED SIDE ENTRY PIT
- PROPOSED DOUBLE SIDE ENTRY PIT
- (12) DRAINAGE STRUCTURE NUMBER - M = MANHOLE, S = SIDE ENTRY PIT, G = GULLY PIT.
- U.S. 24.90 / 750/833/50.0 / D.S. 24.84 — UPSTREAM INVERT LEVEL, DIA/GRADE/LENGTH OF PIPE, DOWNSTREAM INVERT LEVEL
- EXISTING WESTERN POWER FIBRE OPTIC
- EXISTING TELSTRA
- EXISTING OVERHEAD POWER

NOTES

1. SERVICE LOCATION DIAGRAMMATIC ONLY - CONTACT SERVICE AUTHORITIES FOR EXACT IN GROUND LOCATIONS PRIOR TO COMMENCEMENT OF WORK.
2. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE NOTED.
3. ALL PIPES SHALL BE SPIGOT AND SOCKET TYPE WITH RUBBER RING JOINTS, RCP CLASS 2 UNLESS OTHERWISE NOTED.
4. CONSTRUCTION PLANT SHALL NOT BE PERMITTED TO TRAVEL OVER COMPACTED PIPELINE UNTIL A MINIMUM THICKNESS OF COMPACTED BACKFILL HAS BEEN PLACED TO PROVIDE ADEQUATE PROTECTION.
5. MATERIALS FOR BEDDING, HAUNCH AND SIDE ZONES SHALL COMPLY WITH WITH THE RELEVANT REQUIREMENTS OF TABLE 3 & 4 OF AS3725 FOR HS3 SUPPORT CONDITIONS.
6. BEDDING AND BACKFILL MATERIAL TO BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION.
7. UNSUITABLE IN SITU BEDDING MATERIAL SHALL BE TREATED IN ACCORDANCE WITH THE SPECIFICATION.
8. CONTRACTOR TO EXERCISE EXTREME CARE IN THE VICINITY OF THE U/GROUND POWER, TELSTRA CONDUITS AND FIBRE OPTIC CABLES.

TABLE - PIT LINER SIZES

PIPE SIZE MAX	NOM. DIA CLASS '2' R.C. LINER
375	1050
600	1200
750	1500*
900	1800*
1050	2250*

* CONVERSION SLABS REQUIRED WITH ⌀1050 SHAFT LINER

SP2 WORKS

REV	DATE	DESCRIPTION	RVD
1	03.08.2012	AMENDED AS PER RSA	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
E	22.02.2012	MINOR DRAINAGE AMENDMENTS	AC
D	20.12.2011	ADDITIONAL DRAINAGE AS SHOWN	JB
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD
3	12.09.2013	AS CONSTRUCTED	DP
2	29.08.2012	BASIN 'F' UPDATED	GC

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN SHEET 4 OF 4

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-503	3

P:\P10268-01 JANDAKOT AIRPORT PRECINCT 5\100 DRAWINGS\102 CIVIL\AUTOCAD\P10268_01_05-C-503 DRAINAGE.DWG
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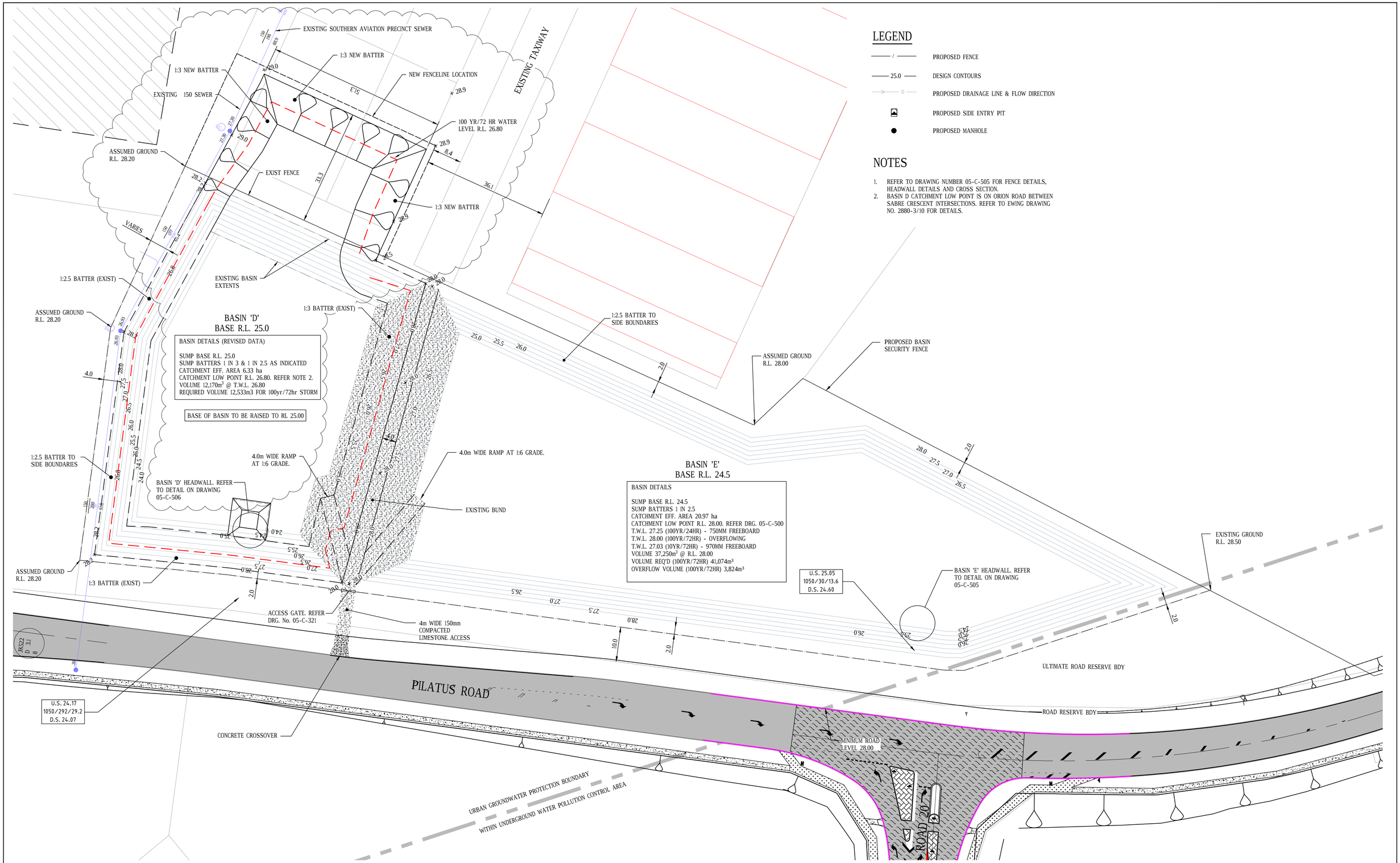

REV	DATE	DESCRIPTION	RVD
3	25.02.2013	BASIN D BATTER MODIFIED	AP
2	18.06.2012	BASINS MODIFIED, OVERFLOW SWALE ADDED	AP
1	12.06.2012	BASINS ALTERED DUE TO CADASTRAL CHANGES	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD
6	26/04/2018	REVISED ISSUED FOR CONSTRUCTION	AP
5	17.06.2016	ISSUED FOR CONSTRUCTION	AP
4	12.09.2013	AS CONSTRUCTED	DP

REVISIONS

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PROJECT
JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS
AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:500 AT A1 SIZE

TITLE
DRAINAGE BASINS PILATUS STREET PLAN

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-504	6

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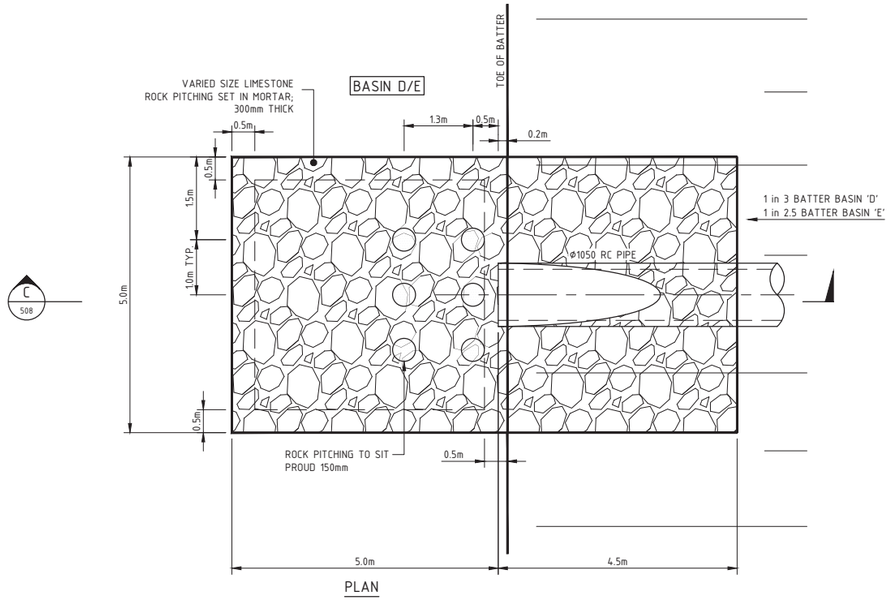
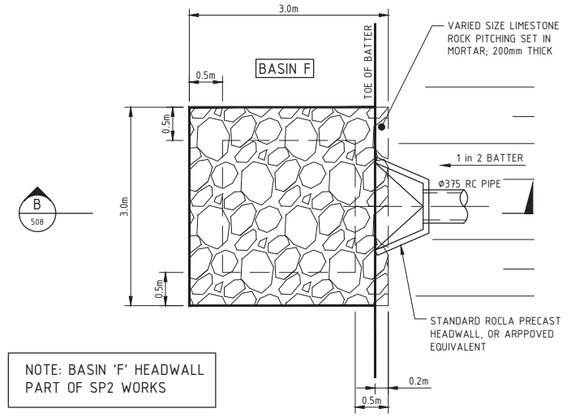


PLAN

BASINS 'D' AND 'E' DISCHARGE HEADWALL DETAIL

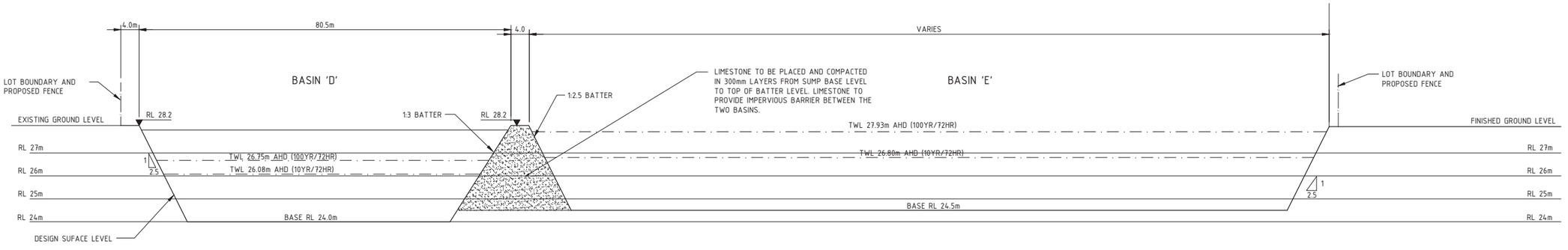
N.T.S.



PLAN

BASIN 'F' DISCHARGE HEADWALL DETAIL

N.T.S.



SECTION A
504

SCALE HOR. 1:500
VER. 1:100

REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	25.02.2013	REISSUED FOR CONSTRUCTION	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:1000 AT A1 SIZE

TITLE: DRAINAGE BASIN SECTIONS AND DETAILS SHEET 1 OF 2

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-505	2

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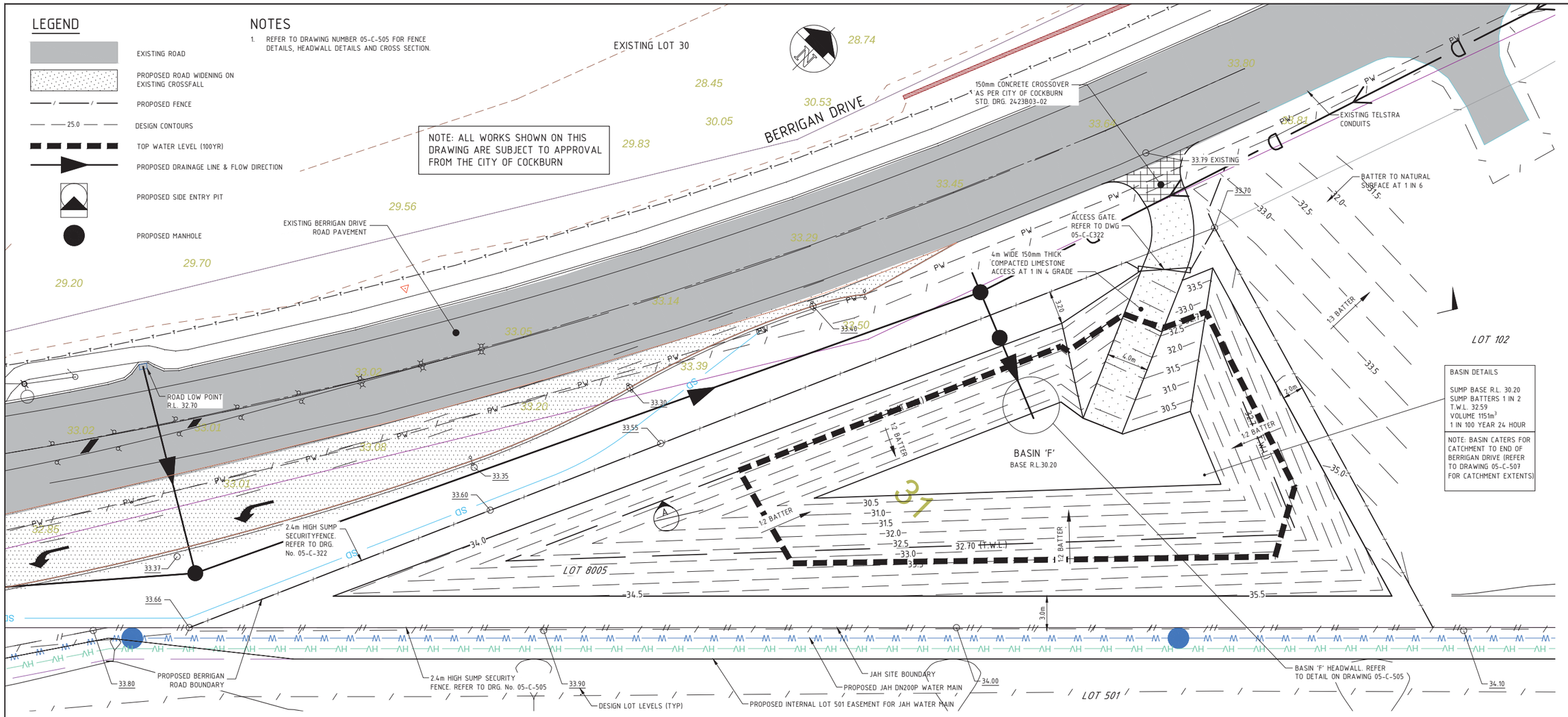
LEGEND

- EXISTING ROAD
- PROPOSED ROAD WIDENING ON EXISTING CROSSFALL
- PROPOSED FENCE
- 25.0 DESIGN CONTOURS
- TOP WATER LEVEL (100YR)
- PROPOSED DRAINAGE LINE & FLOW DIRECTION
- PROPOSED SIDE ENTRY PIT
- PROPOSED MANHOLE

NOTES

1. REFER TO DRAWING NUMBER 05-C-505 FOR FENCE DETAILS, HEADWALL DETAILS AND CROSS SECTION.

NOTE: ALL WORKS SHOWN ON THIS DRAWING ARE SUBJECT TO APPROVAL FROM THE CITY OF COCKBURN

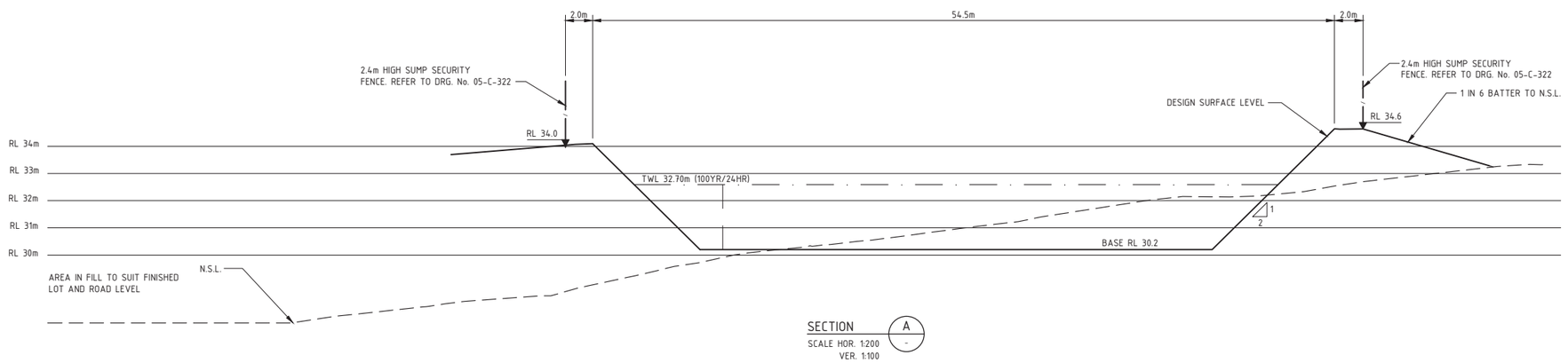


BASIN DETAILS

SUMP BASE R.L. 30.20
SUMP BATTERS 1 IN 2
T.W.L. 32.59
VOLUME 1151m³
1 IN 100 YEAR 24 HOUR

NOTE: BASIN CATERS FOR CATCHMENT TO END OF BERRIGAN DRIVE (REFER TO DRAWING 05-C-507 FOR CATCHMENT EXTENTS)

SP2 WORKS



SECTION A
SCALE HOR. 1:200
VER. 1:100

REV	DATE	DESCRIPTION	RVD
2	29.08.2012	BASIN 'F' UPDATED	GC
1	03.08.2012	AMENDED AS PER RSA	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
D	30.11.2011	BASIN TWL AND VOLUMES CHANGED	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD
3	12.09.2013	AS CONSTRUCTED	DP

REVISIONS

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:200 AT A1 SIZE

TITLE: DRAINAGE BASIN 'F' BERRIGAN DRIVE PLAN AND SECTION

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-506	3

P:\P10268-01 JANDAKOT AIRPORT PRECINCT 5\100 DRAWINGS\102 CIVIL\AUTOCAD\P10268_01_05-C-506 DRAINAGE.DWG
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LEGEND

- BASIN 'D' LOTS CATCHMENT AREA (ASSUMED 50% IMPERVIOUS AREA) = 79,886m²
- BASIN 'E' LOTS CATCHMENT AREA (ASSUMED 50% IMPERVIOUS AREA) = 362,276m²
- BASIN 'D' ROAD CATCHMENT AREA (ASSUMED 80% IMPERVIOUS AREA) = 31,739m²
- BASIN 'E' ROAD CATCHMENT AREA (ASSUMED 80% IMPERVIOUS AREA) = 35,651m²
- BASIN 'F' ROAD CATCHMENT AREA (ASSUMED 80% IMPERVIOUS AREA) = 17,461m²

REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	29.08.2012	REVISED LOT BOUNDARIES	GC
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
D	30.11.2011	CATCHMENTS CHANGED	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV | DATE | DESCRIPTION | RVD

REVISIONS

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: DRAINAGE CATCHMENT PLAN

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-507	2

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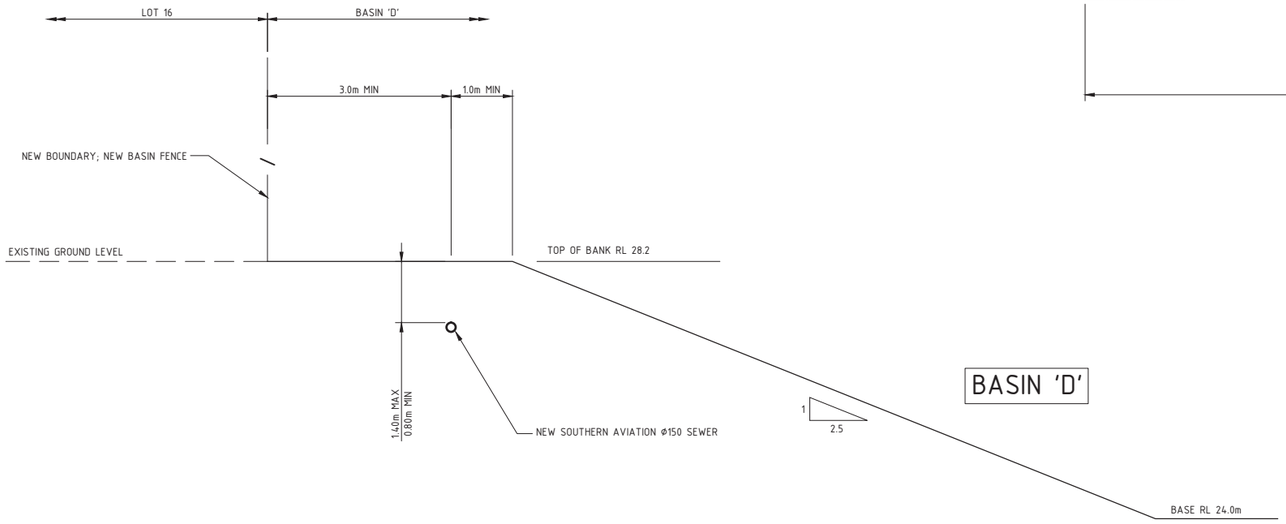
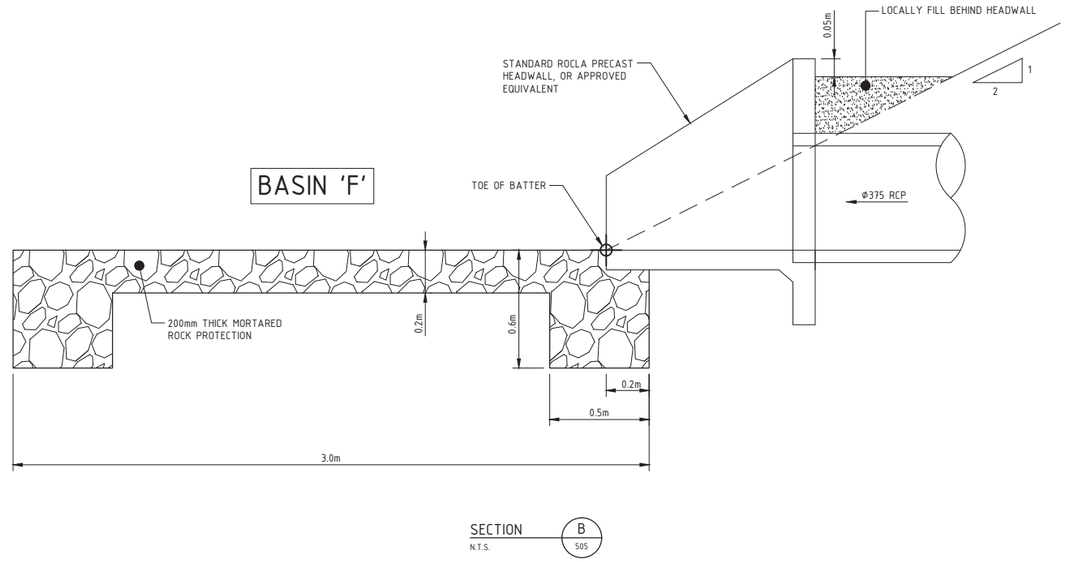


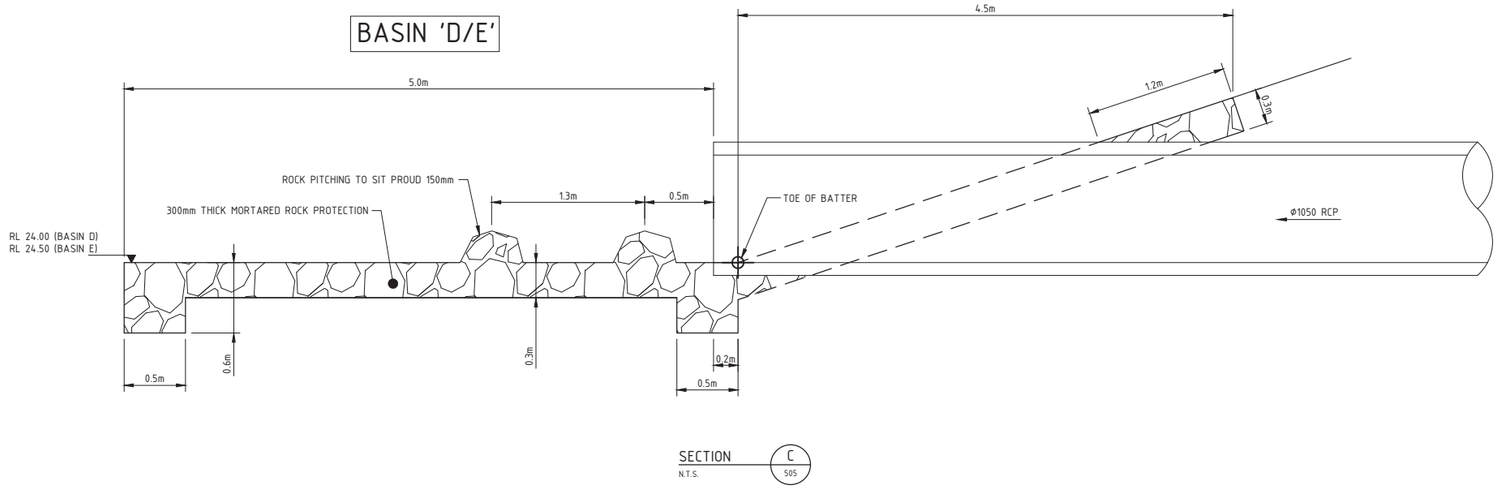
BASIN 'D'

BASIN 'D' BATTER DETAIL - LOT 16 SIDE BOUNDARY

SCALE 1:50



SECTION B
N.T.S. 505



SECTION C
N.T.S. 505

REV	DATE	DESCRIPTION	RVD
1	12.09.2013	AS CONSTRUCTED	DP
0	25.02.2013	ISSUED FOR CONSTRUCTION	AP

REVISIONS

REV	DATE	DESCRIPTION	RVD

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: DRAINAGE BASIN SECTIONS AND DETAILS SHEET 2 OF 2

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-508	1

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DRAINAGE STRUCTURES ON DRAWING 05-C-500					
STRUC No.	STRUC TYPE	CO-ORDINATES		REF PT. ELEV.	COMMENTS
		EASTING	NORTHING		
EM1	-	54923.223	247675.896	27.19	EXISTING MANHOLE
M2	-	54902.366	247674.485	27.60	MANHOLE
M3A	SRN	54899.678	247657.049	28.14	MANHOLE
G3	TGT	54896.237	247657.029	27.93	GULLY
M4A	DRN	54899.829	247631.629	28.47	MANHOLE
G4	TGT	54894.935	247631.959	28.23	GULLY
M5A	DRN	54894.496	247591.488	28.91	MANHOLE
G5	TGT	54891.392	247591.901	28.70	GULLY
M6A	DRN	54889.841	247556.457	29.23	MANHOLE
G6	TGT	54886.873	247556.851	29.03	GULLY
M7A	DRN	54879.560	247479.091	29.17	MANHOLE
G7	TGT	54876.584	247479.495	28.97	GULLY
S10	TEN	54871.938	247443.811	28.75	SIDE ENTRY PIT
S11	TEN	54868.151	247398.928	28.43	SIDE ENTRY PIT
S12	TEN	54863.452	247354.212	28.12	SIDE ENTRY PIT
S45	TEN	54857.518	247309.604	28.00	3 x SIDE ENTRY PITS
S24	SEN	54851.127	247209.661	28.58	SIDE ENTRY PIT
S25	SEN	54850.858	247255.211	28.18	SIDE ENTRY PIT
G44	TGT	54813.371	247290.811	28.54	GULLY
M44A	SRN-B	54813.136	247293.684	28.81	MANHOLE
J4	SRN	54832.392	247248.349	28.80	MANHOLE
J5	SWN	54812.894	247298.177	28.81	MANHOLE
M58	-	54866.839	247284.878	28.21	MANHOLE

DRAINAGE STRUCTURES ON DRAWING 05-C-501					
STRUC No.	STRUC TYPE	CO-ORDINATES		REF PT. ELEV.	COMMENTS
		EASTING	NORTHING		
J1	SWN	54821.870	246808.569	29.24	MANHOLE
S13	TEN	54827.561	246803.640	28.94	SIDE ENTRY PIT
S14	SEN	54855.803	246837.121	29.58	SIDE ENTRY PIT
S15	SEN	54877.403	246875.404	30.20	SIDE ENTRY PIT
M16	BRT	54890.218	246918.157	30.74	MANHOLE
S17	SEN	54897.767	246965.765	30.37	SIDE ENTRY PIT
S18	SEN	54894.123	247012.812	30.02	SIDE ENTRY PIT
M19	DRN	54905.700	247016.770	30.50	MANHOLE
J2	SRN	54873.656	247060.061	30.17	MANHOLE
S20	SEN	54889.812	247065.352	29.71	SIDE ENTRY PIT
S21	SEN	54874.206	247113.004	29.34	SIDE ENTRY PIT
S22	SEN	54859.262	247160.877	28.97	SIDE ENTRY PIT
J3	SRN	54833.779	247199.835	29.15	MANHOLE

DRAINAGE STRUCTURES ON DRAWING 05-C-502					
STRUC No.	STRUC TYPE	CO-ORDINATES		REF PT. ELEV.	COMMENTS
		EASTING	NORTHING		
S26	TEN	54346.119	247714.593	33.45	SIDE ENTRY PIT
S27	SEN	54354.499	247724.505	33.45	SIDE ENTRY PIT
J16	SWN	54358.962	247729.541	33.71	MANHOLE
J15	SWN	54394.194	247656.850	33.20	MANHOLE
S28	SEN	54399.657	247661.838	32.91	SIDE ENTRY PIT
S29	SEN	54409.423	247670.419	32.91	SIDE ENTRY PIT
J13	SWN	54441.844	247600.387	32.63	MANHOLE
S30	SEN	54447.223	247604.866	32.35	SIDE ENTRY PIT
J14	SWN	54462.603	247617.650	32.63	MANHOLE
S31	SEN	54457.221	247613.174	32.35	SIDE ENTRY PIT
S32	SEN	54495.198	247547.204	31.79	SIDE ENTRY PIT
S33	SEN	54505.192	247555.519	31.79	SIDE ENTRY PIT
J12	SWN	54510.562	247560.009	32.08	MANHOLE
J11	SWN	54537.740	247485.129	31.52	MANHOLE
S34	SEN	54543.116	247489.612	31.24	SIDE ENTRY PIT
S35	SEN	54553.110	247497.926	31.24	SIDE ENTRY PIT
J9	SWN	54580.459	247433.785	31.02	MANHOLE
S36	SEN	54585.825	247438.280	30.75	SIDE ENTRY PIT
S37	SEN	54595.798	247446.619	30.75	SIDE ENTRY PIT
J10	SWN	54601.200	247451.072	31.02	MANHOLE
J7	SWN	54633.688	247369.810	30.42	MANHOLE
S38	SEN	54639.089	247374.261	30.14	SIDE ENTRY PIT
S39	SEN	54649.053	247382.612	30.14	SIDE ENTRY PIT
J8	SWN	54654.447	247387.074	30.42	MANHOLE
S40	SEN	54674.689	247351.875	29.85	SIDE ENTRY PIT
S41	SEN	54702.859	247325.390	29.55	SIDE ENTRY PIT
S42	SEN	54736.046	247304.901	29.26	SIDE ENTRY PIT
J6	SWN	54762.843	247273.504	29.65	MANHOLE
G43	TGT	54772.194	247292.997	28.92	GULLY
M43A	SRN-B	54773.286	247295.353	29.11	MANHOLE

DRAINAGE STRUCTURES ON DRAWING 05-C-503					
STRUC No.	STRUC TYPE	CO-ORDINATES		REF PT. ELEV.	COMMENTS
		EASTING	NORTHING		
ESS0	-	-	-	-	EXISTING SOAKWELL
ESS1	-	-	-	-	EXISTING SOAKWELL
G58	TGT	54245.727	247705.583	35.80	GULLY
G51	TGT	54272.697	247750.775	33.85	GULLY
G52	TGT	54274.092	247752.209	33.81	GULLY
G53	TGT	54299.231	247780.156	33.45	GULLY
M54	SRN	54310.549	247769.327	33.65	MANHOLE
M55	SRN	54340.495	247803.582	33.60	MANHOLE
M56	SRN	54374.928	247875.324	33.60	MANHOLE
M57	SRN	54379.291	247873.522	33.60	MANHOLE

REV	DATE	DESCRIPTION	RVD
1	12.09.2013	AS CONSTRUCTED	DP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
D	22.02.2012	PIT No. M59 REMOVED, PIT No. M54 RELOCATED	AC
C	12.12.2011	PITS ADDED	JB
B	22.11.2011	ISSUED FOR TENDER	AP
A	11.11.2011	ISSUED FOR TENDER REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: DRAINAGE
DRAINAGE SCHEDULE

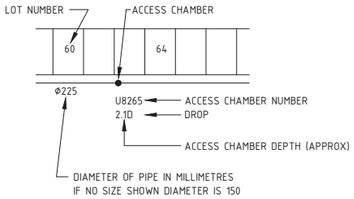
PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-510	1

P:\P10268-01 JANDAKOT AIRPORT PRECINCT 5\100 DRAWINGS\102 CIVIL\AUTOCAD\P10268_01_05-C-510 DRAINAGE.DWG
12/09/2013 3:11:55 PM

LEGEND

- EXISTING SEWER PIPE AND ACCESS CHAMBER.
- EXISTING SEWER PRESSURE MAIN
- PROPOSED SEWER PIPE AND ACCESS CHAMBER.
- FUTURE SEWER PIPE
- RETICULATION AREA BOUNDARY.
- CATCHMENT AREA BOUNDARY.
- ø225 — DIAMETER OF PIPE IN MILLIMETRES IF NO SIZE SHOWN DIAMETER IS 150
- AREA OF LOT NOT SEWERED

NOTATION



QUANTITIES

LOCAL AUTHORITY: CITY OF COCKBURN

LENGTH OF SEWERS	ø225	1488m
TOTAL No. OF MAINTENANCE SHAFTS:		15
TOTAL No. OF ACCESS CHAMBERS:		5
NUMBER OF LOTS SERVED		16

REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	29.08.2012	REVISED LOT BOUNDARIES	GC
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV | DATE | DESCRIPTION | RVD

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:2000	AT A1 SIZE

TITLE: SEWER RETICULATION SITE PLAN

PROJECT No. P10268.01 | DRAWING No. 05-C-600 | REV. 2

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REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	29.08.2012	REVISED LOT BOUNDARIES	GC
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	-	ISSUED FOR REVIEW	AP

REVISIONS

REV | DATE | DESCRIPTION | RVD

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:2000	AT A1 SIZE

TITLE: SEWER RETICULATION DESIGN DATA PLAN

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-601	2

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SEWER STRUCTURES			
STRUC No.	CO-ORDINATES		REF PT. ELEV.
	EASTING	NORTHING	
JK500	54404.906	247651.818	33.00
JK501	54468.313	247575.608	32.25
JK502	54532.272	247498.736	31.54
JK503	54596.231	247421.865	30.80
JK517	54852.359	247392.168	28.81
JK518	54864.614	247484.305	29.39
JK519	54869.979	247539.061	29.55
JK520	54871.652	247595.657	29.22
JK521	54871.124	247666.626	29.89

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH NOTE SHEET FOR RETICULATION PLANS. STANDARD WATER CORPORATION DRAWING AA01-3-1.
2. MAXIMUM GROUND WATER LEVEL R.L. 24.5m.
3. CONTRACTOR IS RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING SERVICES AND IMPROVEMENTS ON SITE AND TO MEET THE COST OF PROTECTION, REPAIRS AND REINSTATEMENT WHERE DAMAGE IS CAUSED BY THE CONTRACTOR.
4. ALL ACCESS CHAMBERS TO BE ON THE FOLLOWING ALIGNMENTS UNLESS SHOWN OTHERWISE:
   a) WITHIN LOTS - 1.0m
   b) WITHIN ROAD RESERVE - 3.5m
5. BACKFILL TO BE COMPACTED TO 95% M.M.D.D.

LEGEND

- PROPOSED SEWERS (PIPE SIZE, GRADE, I.L., LENGTH)
- EXISTING SEWERS
- EXISTING PRESSURE MAIN
- FUTURE SEWERS
- US 37.50 / 150 - 14.6 / D = 12.5m / DS 37.40 — UPSTREAM SEWER INVERT LEVEL; PIPE SIZE - GRADE; DISTANCE; DOWNSTREAM SEWER INVERT LEVEL
- X0000 D 1.2 1 D — PROPOSED ACCESS CHAMBER (ACCESS CHAMBER NUMBER; LID CLASS, ACCESS CHAMBER DEPTH TYPE, D IF DROP)
- X0000 D 1.2 1 D — EXISTING ACCESS CHAMBER (ACCESS CHAMBER NUMBER; LID CLASS, ACCESS CHAMBER DEPTH TYPE, D IF DROP)
- RETICULATION AREA BOUNDARY
- 30 — FINISHED CONTOUR LEVEL
- FSL — FINISHED DESIGN SURFACE LEVEL LOT LEVEL
- FFL — FINISHED FLOOR LEVEL (DESIGN)
- * — LOTS TO BE SERVED BUT NOT RELEASED
- AREA OF LOT NOT GRAVITY SEWERED
- IS 23.0 U2.1 — LOT CONNECTION

JOINS DRG. NO 05-C-603

REVISIONS			
REV	DATE	DESCRIPTION	RVD
2	12.09.2013	AS CONSTRUCTED	DP
1	19.04.2012	ADJUSTED DESIGN TO SUIT NEW LOT LEVELS	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AC
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS (REV | DATE | DESCRIPTION | RVD)

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PERTH • MELBOURNE • SYDNEY • DUBAI • ABU DHABI

PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:1000 AT A1 SIZE

TITLE: SEWER RETICULATION SHEET 1 OF 2

PROJECT No. P10268.01 | DRAWING No. 05-C-602 | REV. 2

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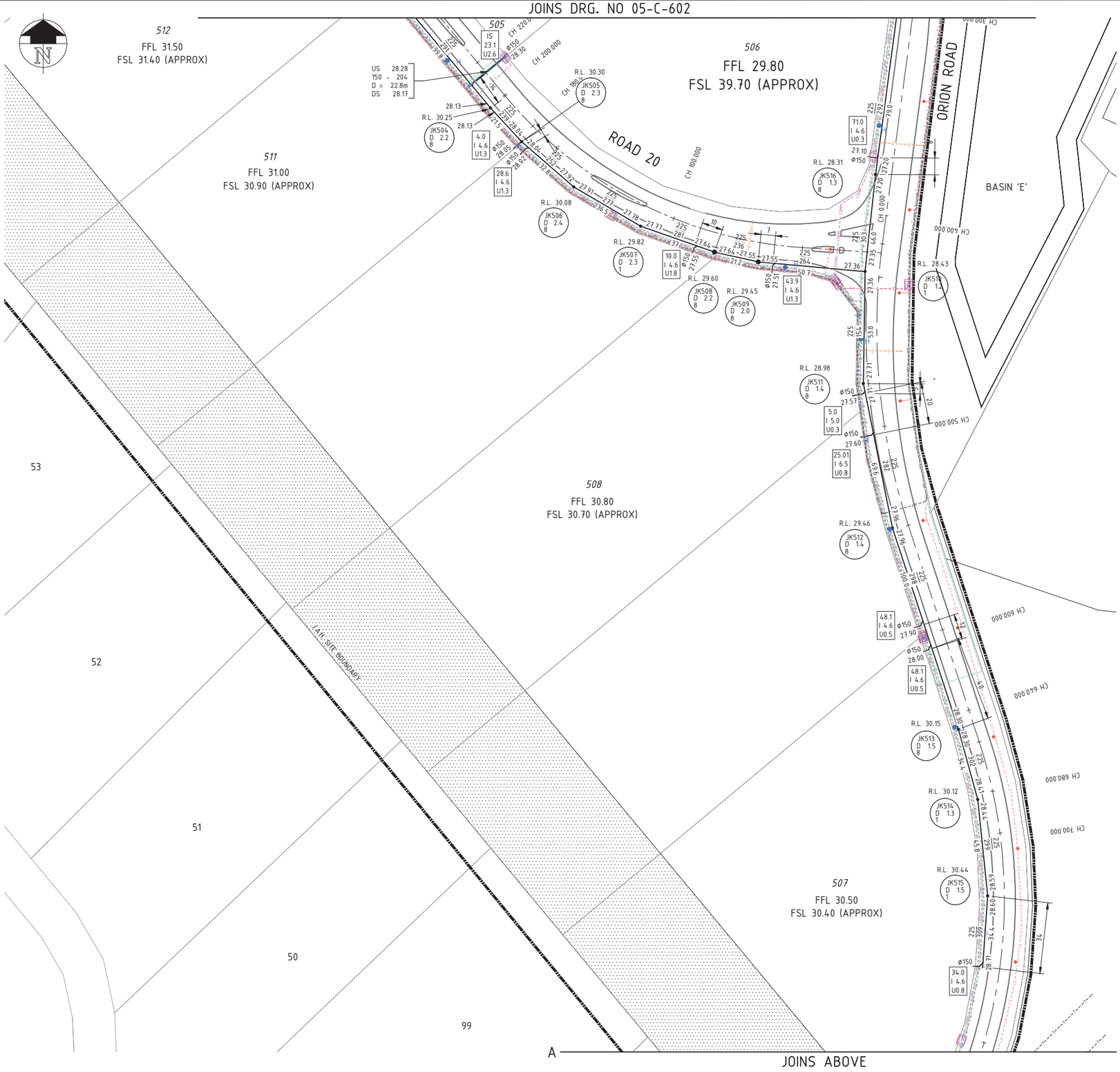
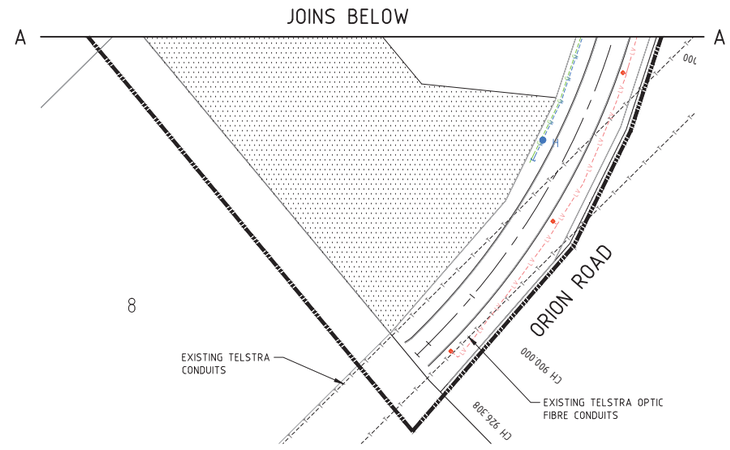
JOINS DRG. NO 05-C-602





SEWER STRUCTURES			
STRUC No.	CO-ORDINATES		REF PT. ELEV.
	EASTING	NORTHING	
JK504	54659.935	247345.299	30.25
JK505	54674.632	247329.384	30.30
JK506	54699.265	247308.022	30.34
JK507	54730.889	247289.443	30.10
JK508	54765.803	247277.236	29.84
JK509	54786.501	247272.604	29.41
JK510	54836.974	247268.104	28.45
JK511	54836.170	247215.133	28.96
JK512	54849.952	247146.903	29.46
JK513	54881.084	247051.825	30.09
JK514	54890.228	247018.687	30.20
JK515	54894.919	246973.132	30.50
JK516	54841.946	247313.882	28.31

NOTES

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH NOTE SHEET FOR RETICULATION PLANS STANDARD WATER CORPORATION DRAWING AA01-3-1.
   MAXIMUM GROUND WATER LEVEL R.L. 24.5m.
2. CONTRACTOR IS RESPONSIBLE TO LOCATE AND PROTECT ALL EXISTING SERVICES AND IMPROVEMENTS ON SITE AND
3. TO MEET THE COST OF PROTECTION, REPAIRS AND REINSTATEMENT WHERE DAMAGE IS CAUSED BY THE CONTRACTOR.
   ALL ACCESS CHAMBERS TO BE ON THE FOLLOWING ALIGNMENTS UNLESS SHOWN OTHERWISE:
   a) WITHIN LOTS - 1.0m
4. b) WITHIN ROAD RESERVE - 3.5m
   BACKFILL TO BE COMPACTED TO 95% M.M.D.D.
5.

LEGEND

- PIPE SIZE / I.L. GRADE I.L. / LENGTH — PROPOSED SEWERS
- EXISTING SEWERS
- EXISTING PRESSURE MAIN
- FUTURE SEWERS
- US 37.50 / 150 - 14.6 / D = 12.5m / DS 37.40 — UPSTREAM SEWER INVERT LEVEL; PIPE SIZE - GRADE; DISTANCE; DOWNSTREAM SEWER INVERT LEVEL
- X0000 / D 1.2 / 1 D — PROPOSED ACCESS CHAMBER; ACCESS CHAMBER NUMBER; LID CLASS, ACCESS CHAMBER DEPTH; TYPE, D IF DROP
- RETICULATION AREA BOUNDARY
- 30 — FINISHED CONTOUR LEVEL
- FSL — FINISHED DESIGN SURFACE LEVEL LOT LEVEL
- FFL — FINISHED FLOOR LEVEL (DESIGN)
- * — LOTS TO BE SERVED BUT NOT RELEASED
- AREA OF LOT NOT GRAVITY SEWERED
- IS 23.0 U2.1 — LOT CONNECTION

REV	DATE	DESCRIPTION	RVD
3	12.09.2013	AS CONSTRUCTED	DP
2	29.08.2012	REVISED LOT BOUNDARIES	GC
1	19.04.2012	ADJUSTED DESIGN TO SUIT NEW LOT LEVELS	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AC
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE	
AHD	PCG	1:1000	AT A1 SIZE

TITLE: SEWER RETICULATION SHEET 2 OF 2

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-603	3

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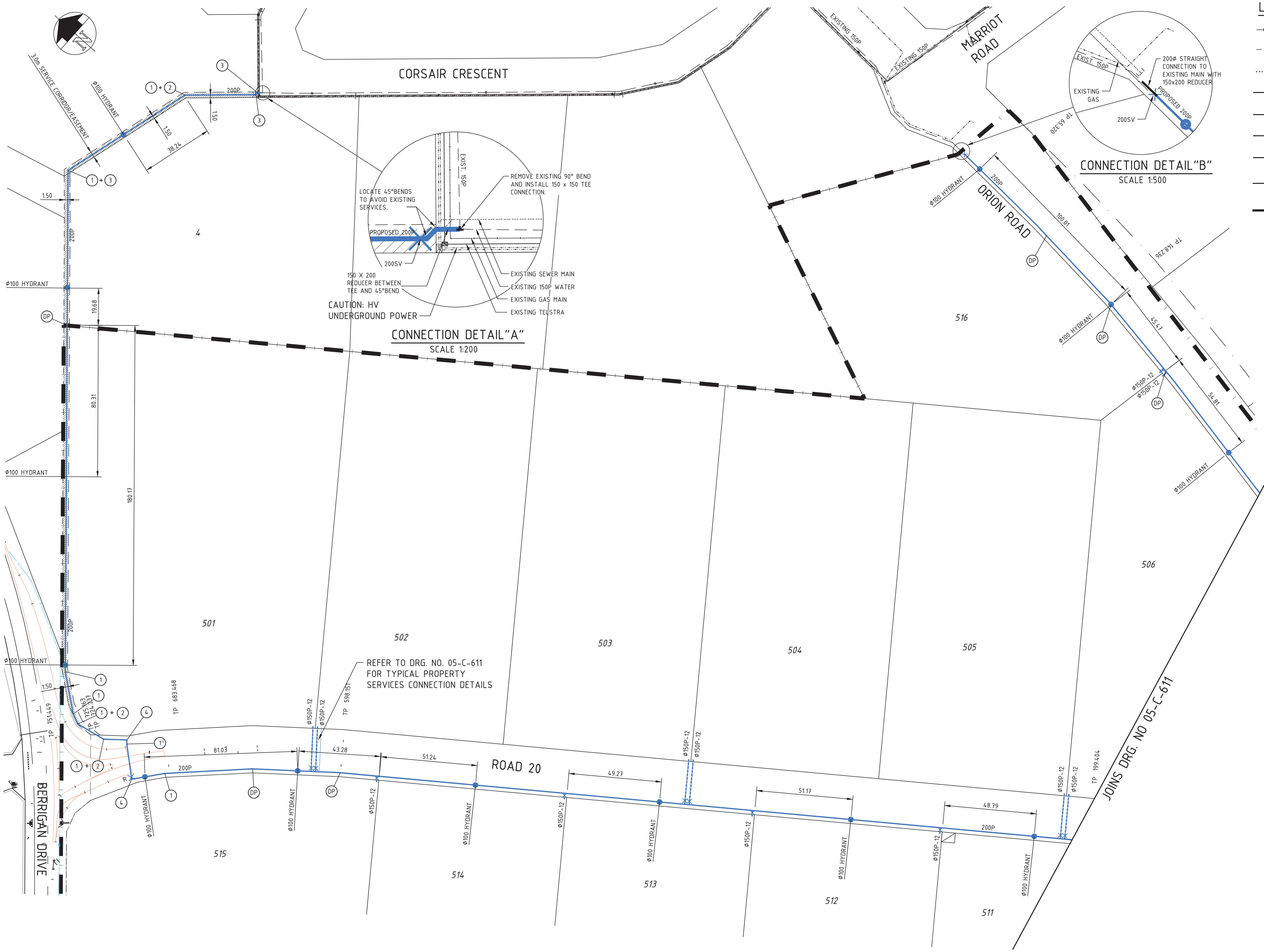

LEGEND

- EXISTING PIPEWORK/HYDRANT/VALVE
- FUTURE PIPEWORK
- PRELAID LONG SERVICE
- PROPOSED PIPEWORK
- HYDRANT
- CAPPED END
- VALVE (RESILIENT SEAT TYPE)
- CHANGE IN PIPE SIZE OR MATERIAL.
- AREA TO BE SERVED
- LOTS TO BE SERVED BUT NOT RELEASED
- DP DENOTES DEFLECT PIPES
- 1 DENOTES 11¼° BEND
- 2 DENOTES 22½° BEND
- 3 DENOTES 45° BEND
- 4 DENOTES 90° BEND
- LOTS WHERE SERVICES LAID IN PREVIOUS STAGE

GENERAL NOTES

1. PROPOSED PIPEWORK TO BE : UPVC CLASS 12 BLUE
2. CONSTRUCTION PROCEDURES TO BE IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS FOR THE RELEVANT PIPE.
3. HYDRANTS NOMINALLY LOCATED ONLY. FINAL LOCATION TO BE DETERMINED IN CONJUNCTION WITH LOCAL FIRE BRIGADE AND WATER CORPORATION PROCEDURES.
5. THRUST BLOCKS SHALL BE POSITIONED AND FORMED IN ACCORDANCE WITH PIPE FITTING MANUFACTURER'S INSTRUCTIONS AND TECHNICAL SPECIFICATIONS.
6. ALIGNMENT OF PIPES SHALL BE NOMINALLY 2.1m AT CENTRELINE IN ACCORDANCE WITH SPECIFICATION.
7. ALL FITTINGS FOR PIPES TO CONFORM TO AS 2544
8. CONNECTION TO EXISTING MAINS TO BE CARRIED OUT LAST AND SHOULD BE SCHEDULED TO MINIMISE ANY DISRUPTION TO PROPERTIES.
9. FR & FL INDICATES THE SIDE OF THE LOT WHEN VIEWED FROM THE ROAD FRONTAGE ON WHICH THE PRELAID SERVICES ARE TO BE LAID.
10. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CO-ORDINATE THE INSTALLATION OF ALL SERVICES WITHIN THE SUBDIVISION. THE CONTRACTOR SHOULD CHECK TO ENSURE THAT THERE IS NO CONFLICT BETWEEN THE POSITION OF FULLY PRELAID WATER SERVICES AND ANY OTHER SERVICES OR SITE FACILITIES. THESE MAY INCLUDE WESTERN POWER UNDERGROUND POWER CONNECTION PILLARS, RETAINING WALLS, DRAINAGE MANHOLES AND SEWER ACCESS CHAMBERS.
11. THE CONTRACTOR SHALL ALLOW FOR THE SUPPLY AND INSTALLATION OF ANY ADDITIONAL FLUSHING POINTS NECESSARY FOR PRESSURE TESTING AT HIS OWN EXPENSE.

REV	DATE	DESCRIPTION	RVD
1	12.09.2013	AS CONSTRUCTED	DP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD

REVISIONS

CLIENT
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PROJECT
JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS
AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:1000 AT A1 SIZE

TITLE
WATER RETICULATION SHEET 1 OF 2

PROJECT No.	DRAWING No.	REV.
P10268.01	05-C-610	1

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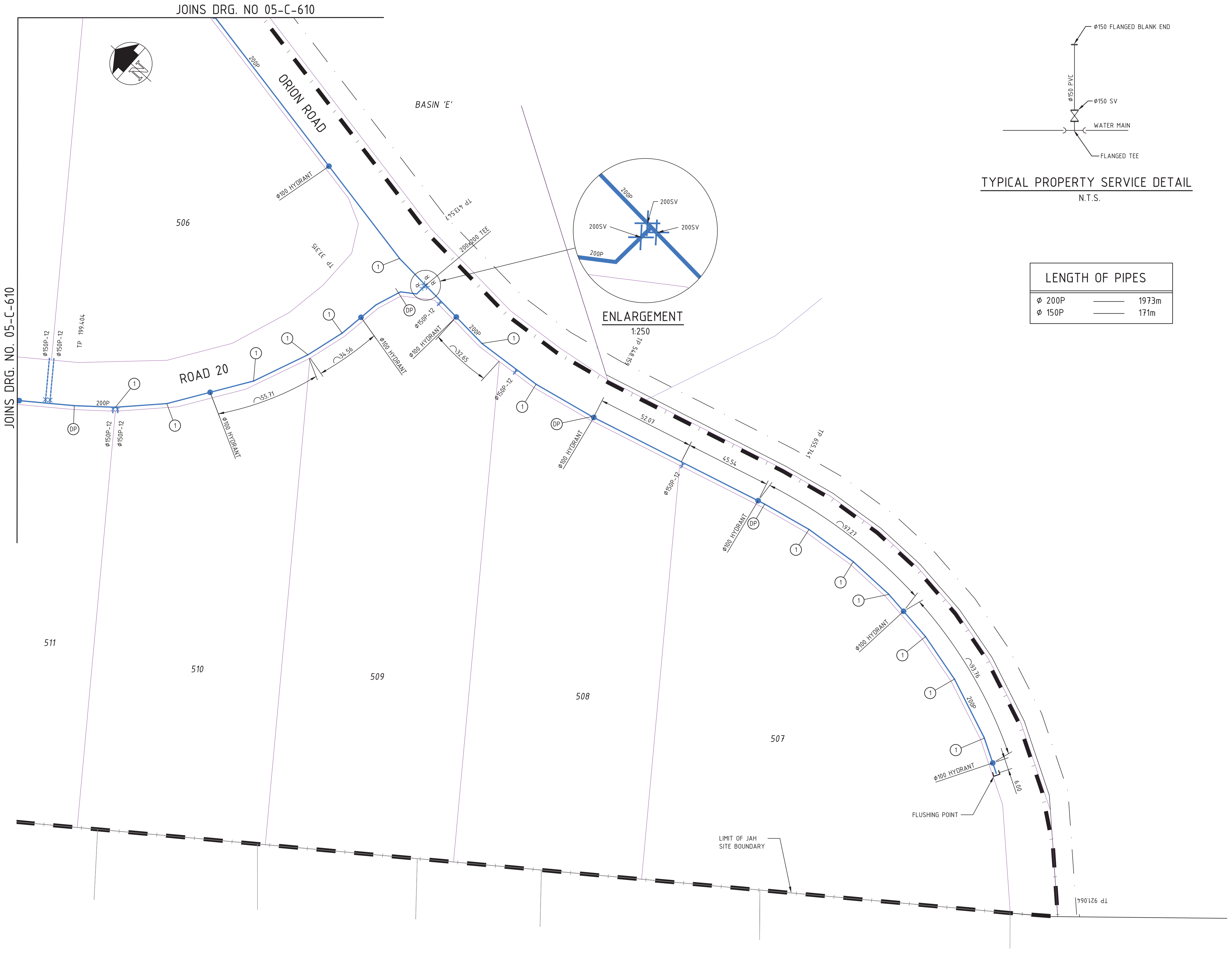

TYPICAL PROPERTY SERVICE DETAIL
N.T.S.

LENGTH OF PIPES	
ø 200P	1973m
ø 150P	171m

GENERAL NOTES

1. PROPOSED PIPEWORK TO BE : UPVC CLASS 12 BLUE
2. CONSTRUCTION PROCEDURES TO BE IN ACCORDANCE WITH TECHNICAL SPECIFICATIONS FOR THE RELEVANT PIPE.
3. HYDRANTS NOMINALLY LOCATED ONLY. FINAL LOCATION TO BE DETERMINED IN CONJUNCTION WITH LOCAL FIRE BRIGADE AND WATER CORPORATION PROCEDURES.
5. THRUST BLOCKS SHALL BE POSITIONED AND FORMED IN ACCORDANCE WITH PIPE FITTING MANUFACTURER'S INSTRUCTIONS AND TECHNICAL SPECIFICATIONS.
6. ALIGNMENT OF PIPES SHALL BE NOMINALLY 2.1m AT CENTRELINE IN ACCORDANCE WITH SPECIFICATION.
7. ALL FITTINGS FOR PIPES TO CONFORM TO AS 2544
8. CONNECTION TO EXISTING MAINS TO BE CARRIED OUT LAST AND SHOULD BE SCHEDULED TO MINIMISE ANY DISRUPTION TO PROPERTIES.
9. FR & FL INDICATES THE SIDE OF THE LOT WHEN VIEWED FROM THE ROAD FRONTAGE ON WHICH THE PRELAID SERVICES ARE TO BE LAID.
10. IT IS THE CONTRACTOR'S RESPONSIBILITY TO CO-ORDINATE THE INSTALLATION OF ALL SERVICES WITHIN THE SUBDIVISION. THE CONTRACTOR SHOULD CHECK TO ENSURE THAT THERE IS NO CONFLICT BETWEEN THE POSITION OF FULLY PRELAID WATER SERVICES AND ANY OTHER SERVICES OR SITE FACILITIES. THESE MAY INCLUDE WESTERN POWER UNDERGROUND POWER CONNECTION PILLARS, RETAINING WALLS, DRAINAGE MANHOLES AND SEWER ACCESS CHAMBERS.
11. THE CONTRACTOR SHALL ALLOW FOR THE SUPPLY AND INSTALLATION OF ANY ADDITIONAL FLUSHING POINTS NECESSARY FOR PRESSURE TESTING AT HIS OWN EXPENSE.

LEGEND

- EXISTING PIPEWORK/HYDRANT/VALVE
- FUTURE PIPEWORK
- PRELAID LONG SERVICE
- PROPOSED PIPEWORK
- PROPOSED 350 HDPE MAIN. REFER DRG. NO. P10268-610
- HYDRANT
- CAPPED END
- VALVE (RESILIENT SEAT TYPE)
- CHANGE IN PIPE SIZE OR MATERIAL.
- AREA TO BE SERVED
- LOTS TO BE SERVED BUT NOT RELEASED
- DENOTES DEFLECT PIPES
- DENOTES 11¼° BEND
- DENOTES 22½° BEND
- DENOTES 45° BEND
- DENOTES 90° BEND
- LOTS WHERE SERVICES LAID IN PREVIOUS STAGE

REV	DATE	DESCRIPTION	RVD
1	12.09.2013	AS CONSTRUCTED	DP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD

REVISIONS

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:1000

AT A1 SIZE

TITLE: WATER RETICULATION SHEET 2 OF 2

PROJECT No. P10268.01 — DRAWING No. 05-C-611 — REV. 1

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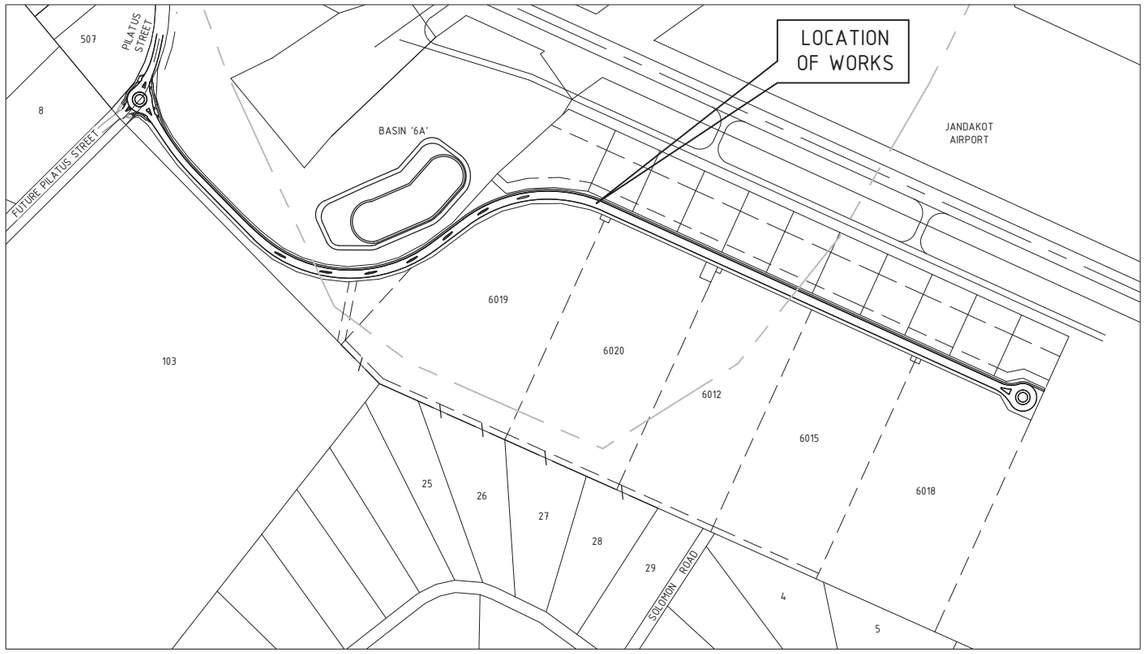
JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6



KEY PLAN

SCALE NTS

LOCALITY PLAN

SCALE N.T.S.

DRAWING INDEX

CIVIL DRAWINGS

C-0001	LOCALITY PLAN AND DRAWING INDEX
C-0010	GENERAL ARRANGEMENT PLAN
C-0100	PLAN AND PROFILE - CHA 0 TO CHA 600
C-0101	PLAN AND PROFILE - CHA 600 TO CHA 1200
C-0102	PLAN AND PROFILE - CHA 1200 TO CHA 1713
C-0200	ROAD LAYOUT PLAN - CHA 0 TO CHA 150
C-0201	ROAD LAYOUT PLAN - PILATUS STREET
C-0202	ROAD LAYOUT PLAN - CHA 150 TO CHA 300
C-0203	ROAD LAYOUT PLAN - CHA 300 TO CHA 475
C-0204	ROAD LAYOUT PLAN - CHA 475 TO CHA 600
C-0205	ROAD LAYOUT PLAN - CHA 600 TO CHA 750
C-0206	ROAD LAYOUT PLAN - CHA 750 TO CHA 960
C-0207	ROAD LAYOUT PLAN - CHA 960 TO CHA 1260
C-0208	ROAD LAYOUT PLAN - CHA 1260 TO CHA 1580
C-0209	ROAD LAYOUT PLAN - CHA 1580 TO CHA 1713
C-0220	INTERSECTION PLAN - PILATUS STREET / ROAD 6-1
C-0230	TURN ANALYSIS - ORION ROAD / ROAD 6-1
C-0231	TURN ANALYSIS - TURN AROUND ROUNDABOUT
C-0300	TYPICAL ROAD CROSS SECTIONS
C-0320	FENCING PLAN - SHEET 1
C-0321	FENCING PLAN - SHEET 2
C-0400	PAVEMENT MARKING AND MINOR SIGNAGE PLAN - CHA 0 TO CHA 290
C-0401	PAVEMENT MARKING AND MINOR SIGNAGE PLAN - CHA 290 TO CHA 560
C-0402	PAVEMENT MARKING AND MINOR SIGNAGE PLAN - CHA 560 TO CHA 1090
C-0403	PAVEMENT MARKING AND MINOR SIGNAGE PLAN - CHA 1090 TO CHA 1713
C-0500	DRAINAGE PLAN - CHA 0 TO CHA 290 - SHEET 1
C-0501	DRAINAGE PLAN - CHA 290 TO CHA 560 - SHEET 2
C-0502	DRAINAGE PLAN - CHA 560 TO CHA 1090 - SHEET 3
C-0503	DRAINAGE PLAN - CHA 1090 TO CHA 1713 -SHEET 4
C-0504	DRAINAGE PLAN - SHEET 5
C-0505	DRAINAGE PLAN - SHEET 6
C-0515	DRAINAGE CATCHMENT PLAN - SHEET 1
C-0516	DRAINAGE CATCHMENT PLAN - SHEET 2

DRAWING INDEX

CIVIL DRAWINGS

C-0600	SEWER RETICULATION - SITE AND DESIGN DATA PLAN
C-0601	SEWER RETICULATION - SHEET 1
C-0602	SEWER RETICULATION - SHEET 2
C-0610	SEWER RISING MAIN - SITE PLAN
C-0611	SEWER RISING MAIN - PLAN AND PROFILE - CHA 0 TO CHA 650
C-0612	SEWER RISING MAIN - PLAN AND PROFILE - CHA 650 TO CHA 1253
C-0630	PUMP STATION - PLAN
C-0631	PRESSURE MAIN CHARACTERISTIC CURVE
C-0670	WATER RETICULATION PLAN - OFFSITE - SHEET 1
C-0671	WATER RETICULATION PLAN - ONSITE - SHEET 1
C-0672	WATER RETICULATION PLAN - ONSITE - SHEET 2
C-0680	SERVICES PLAN - SPARE COMMS
C-0681	SERVICES PLAN - TELSTRA
C-0800	BULK EARTHWORKS PLAN - SHEET 1
C-0801	BULK EARTHWORKS PLAN - SHEET 1
C-0805	BULK EARTHWORKS SECTIONS - SHEET 1

REV	DATE	DESCRIPTION	RVD
A	31.03.2015	ISSUED FOR 50% REVIEW	AP

REVISIONS

CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

Perth *Office*—
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E / info@bgeeng.com
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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 6

STATUS: ISSUED FOR INFORMATION — NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	NTS	AT A1 SIZE

TITLE: LOCALITY PLAN AND DRAWING INDEX

PROJECT No.	DRAWING No.	REV.
P14327	C-0001	A

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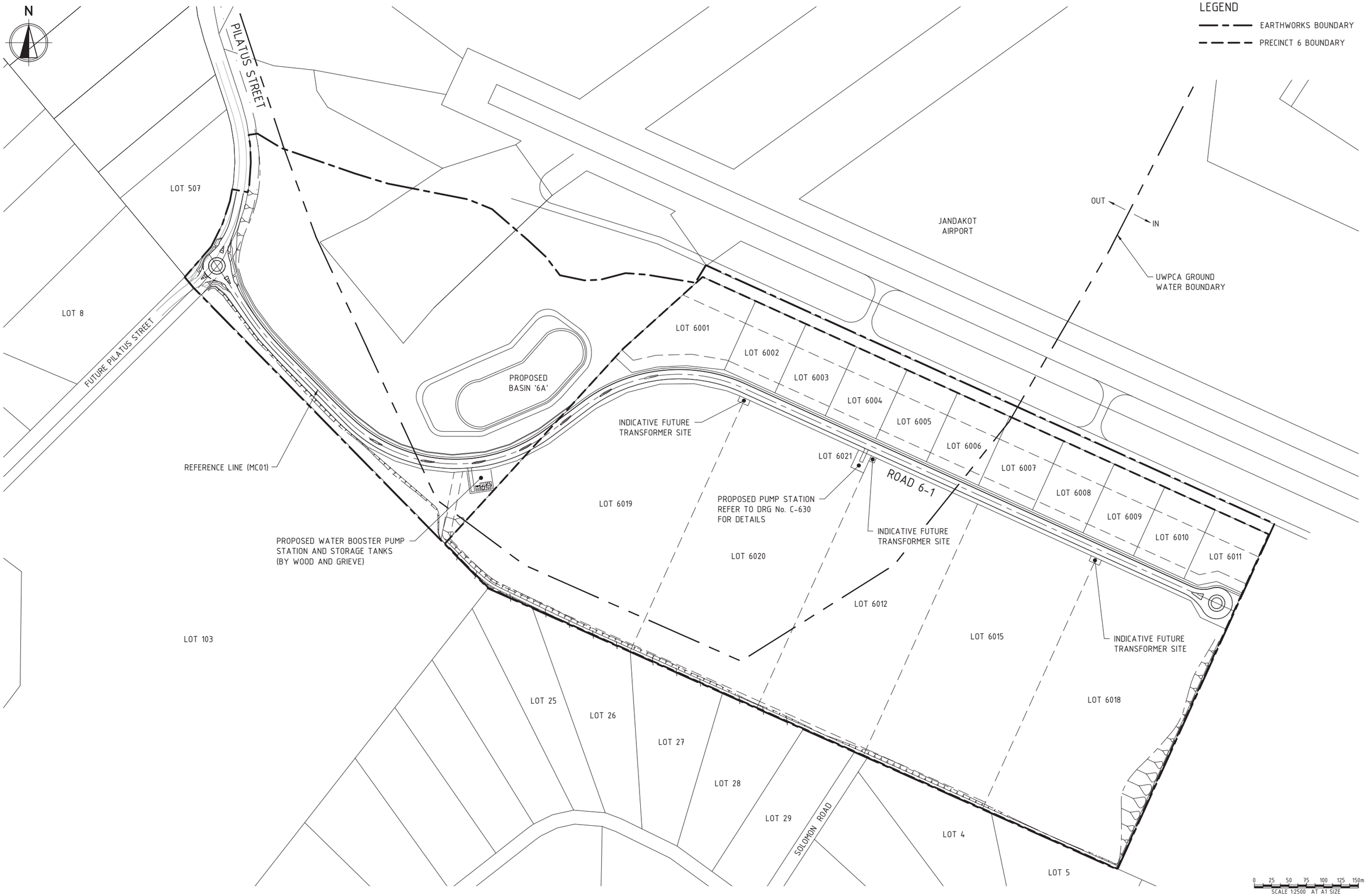

REV	DATE	DESCRIPTION	RVD
A	31.03.2015	ISSUED FOR 50% REVIEW	AP

REVISIONS

REVISIONS

CLIENT
JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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E / info@bgeeng.com
bgeeng.com—

PROJECT
JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:2500	AT A1 SIZE

TITLE
GENERAL ARRANGEMENT PLAN

PROJECT No.	DRAWING No.	REV.
P14327	C-0010	A

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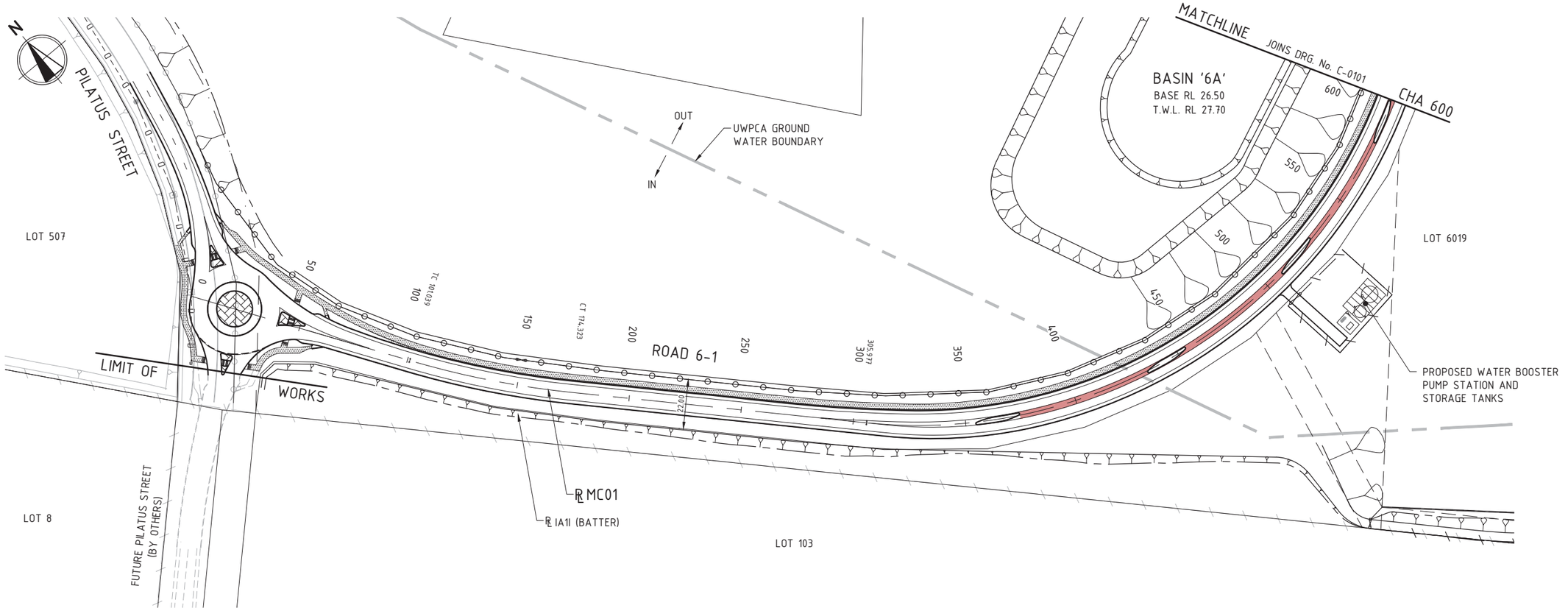
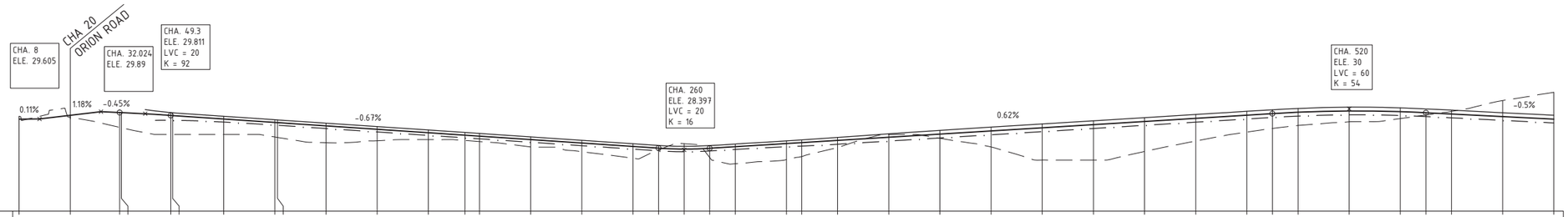


PLAN

SCALE 1:1000



DATUM=26

+CUT/-FILL	0.115	-0.074	-0.579	-0.591	-0.744	-0.739	-0.605	-0.57	-0.58	-0.66	-0.452	-0.271
DESIGN MC01	29.597	29.748	29.857	29.854	29.744	29.739	29.605	29.471	29.464	29.337	29.202	29.068
EXISTING GROUND	29.711	29.674	29.278	29.262	29	29	29	28.901	28.884	28.677	28.75	28.798
CHAINAGE	0	20	39.3	40	59.3	60	80	100	101.04	120	140	160

+CUT/-FILL	-0.209	-0.214	-0.289	-0.34	-0.463	-0.068	0.207	-0.361	-0.666	-0.628	-0.547	-0.278
DESIGN MC01	28.972	28.934	28.800	28.665	28.531	28.464	28.429	28.459	28.520	28.644	28.680	28.767
EXISTING GROUND	28.763	28.72	28.51	28.325	28.068	28.397	28.636	28.098	27.854	28.015	28.134	28.489
CHAINAGE	174.32	180	200	220	240	250	260	270	280	300	305.98	320

+CUT/-FILL	0.11	-0.163	-0.625	-1.26	-1.383	-1.172	-0.888	-0.662	-0.58	-0.516	-0.422	-0.27	-0.089	0.099	0.627	1.046
DESIGN MC01	28.890	29.014	29.137	29.260	29.383	29.507	29.630	29.753	29.815	29.867	29.916	29.891	29.850	29.800	29.700	29.600
EXISTING GROUND	29	28.85	28.511	28	28	28.334	28.742	29.092	29.236	29.351	29.494	29.621	29.761	29.899	30.327	30.646
CHAINAGE	340	360	380	400	420	440	460	480	490	500	520	540	550	560	580	600

HORIZ. ALIGN MC01	D=20	D=81.04	R=-400 L=73.28	D=131.65	R=-225 L=323.49

VERT. ALIGN MC01	G=0.11% L=8	G=1.18% L=24.02	G=-0.45% L=7.28	K=92.47 L=20	G=-0.67% L=190.7	K=15.53 L=20	G=0.62% L=220	K=53.74 L=60	G=-0.5% L=110

SUPERELEVATION	RHS 3% LHS -3%

PROFILE

SCALE 1:1000H, 1:100V

NOTES

1. REFER TO DRG No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.

LEGEND

─	CADASTRAL
━	PROPOSED KERBING
─	PROPOSED LINEMARKING
▨	PROPOSED BRICKPAVING
▒	PROPOSED 2.5m WIDE RED ASPHALT SHARED PATH
🟥	PROPOSED RED ASPHALT
─○─○─	PROPOSED AIRSIDE FENCE
─\─	PROPOSED 1.8m HIGH SECURITY FENCE
⊶	PROPOSED GATE

0 1 2 3 4 5 6m
SCALE 1:100 AT A1 SIZE

0 10 20 30 40 50 60m
SCALE 1:1000 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A	31.03.2015	ISSUED FOR 50% REVIEW	AP

REVISIONS

REV	DATE	DESCRIPTION	RVD

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PROJECT
JANDAKOT AIRPORT
REDEVELOPMENT
PRECINCT 6

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:1000H, 1:100V	AT A1 SIZE

TITLE
PLAN AND PROFILE
CHA 0 TO CHA 600

PROJECT No.	DRAWING No.	REV.
P14327	C-0100	A

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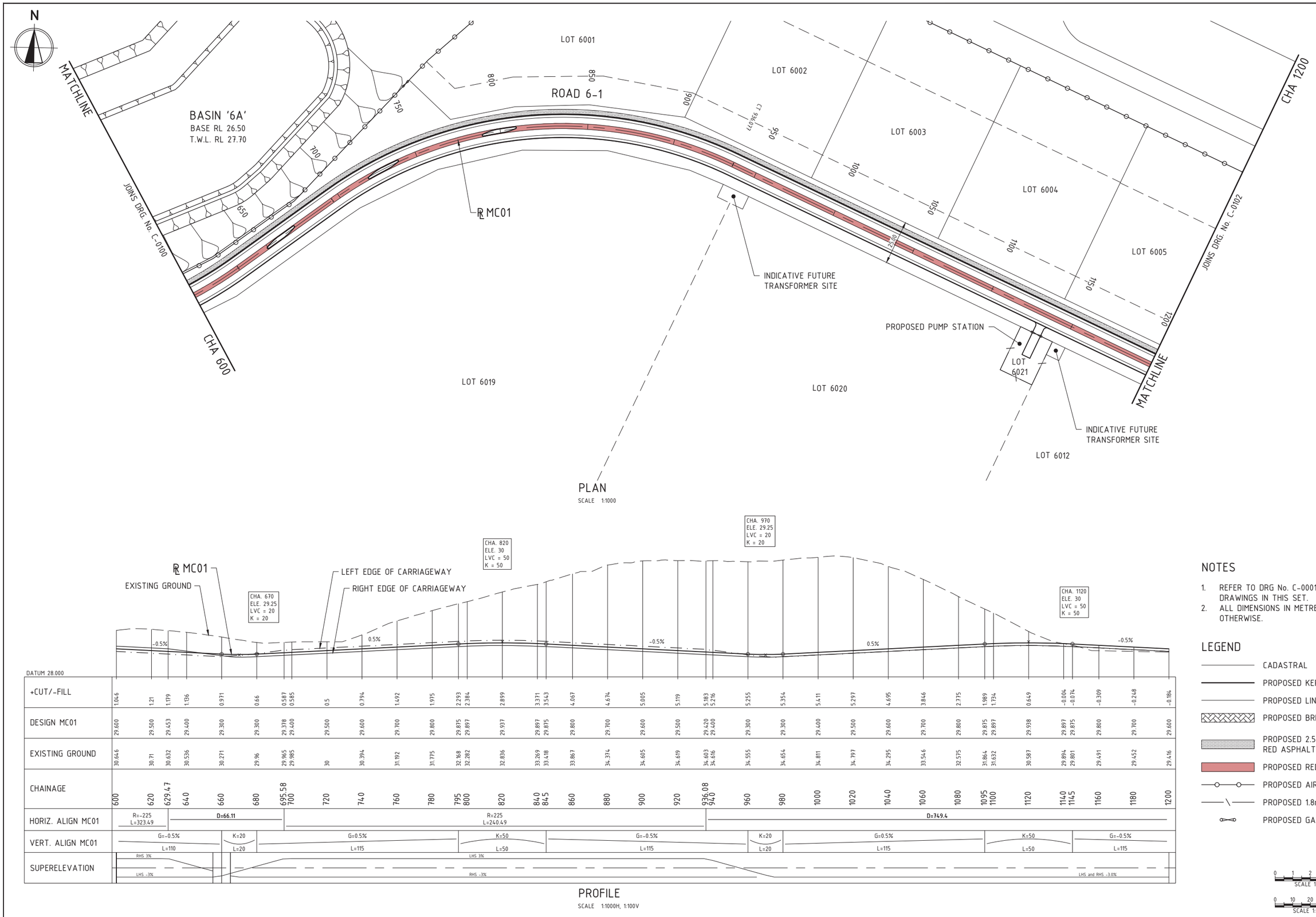

PLAN
SCALE 1:1000

DATUM 28.000

CHAINAGE	+CUT/-FILL	DESIGN MC01	EXISTING GROUND
600	1.046	29.600	30.646
620	1.21	29.500	30.71
629.47	1.179	29.453	30.632
640	1.136	29.400	30.536
660	0.971	29.300	30.271
680	0.66	29.300	29.96
695.58	0.587	29.378	29.965
700	0.585	29.400	29.985
720	0.5	29.500	30
740	0.794	29.600	30.394
760	1.492	29.700	31.192
780	1.975	29.800	31.775
795	2.293	29.875	32.168
800	2.384	29.897	32.282
820	2.899	29.937	32.836
840	3.371	29.897	33.269
845	3.543	29.875	33.418
860	4.067	29.800	33.867
880	4.674	29.700	34.374
900	5.005	29.600	34.605
920	5.119	29.500	34.619
936.08	5.183	29.420	34.603
940	5.216	29.400	34.616
960	5.255	29.300	34.555
980	5.354	29.300	34.654
1000	5.411	29.400	34.811
1020	5.297	29.500	34.797
1040	4.695	29.600	34.295
1060	3.846	29.700	33.546
1080	2.775	29.800	32.575
1095	1.989	29.875	31.864
1100	1.734	29.897	31.632
1120	0.649	29.938	30.587
1140	-0.004	29.897	29.894
1145	-0.074	29.875	29.801
1160	-0.309	29.800	29.491
1180	-0.248	29.700	29.452
1200	-0.184	29.600	29.416

HORIZ. ALIGN MC01	R=-225 L=323.49; D=66.11; R=225 L=240.49; D=749.4
VERT. ALIGN MC01	G=-0.5% L=110; K=20 L=20; G=0.5% L=115; K=50 L=50; G=-0.5% L=115; K=20 L=20; G=0.5% L=115; K=50 L=50; G=-0.5% L=115
SUPERELEVATION	RHS 3%; LHS -3%; LHS 3%; RHS -3%; LHS and RHS -3.0%

PROFILE
SCALE 1:1000H, 1:100V

NOTES
1. REFER TO DRG No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.

LEGEND
- CADASTRAL
- PROPOSED KERBING
- PROPOSED LINEMARKING
- PROPOSED BRICKPAVING
- PROPOSED 2.5m WIDE RED ASPHALT SHARED PATH
- PROPOSED RED ASPHALT
- PROPOSED AIRSIDE FENCE
- PROPOSED 1.8m HIGH SECURITY FENCE
- PROPOSED GATE

0 1 2 3 4 5 6m
SCALE 1:100 AT A1 SIZE

0 10 20 30 40 50 60m
SCALE 1:1000 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A			

REVISIONS

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

STATUS: ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:1000H, 1:100V	AT A1 SIZE

TITLE: PLAN AND PROFILE CHA 600 TO CHA 1200

PROJECT No.	DRAWING No.	REV
P14327	C-0101	A

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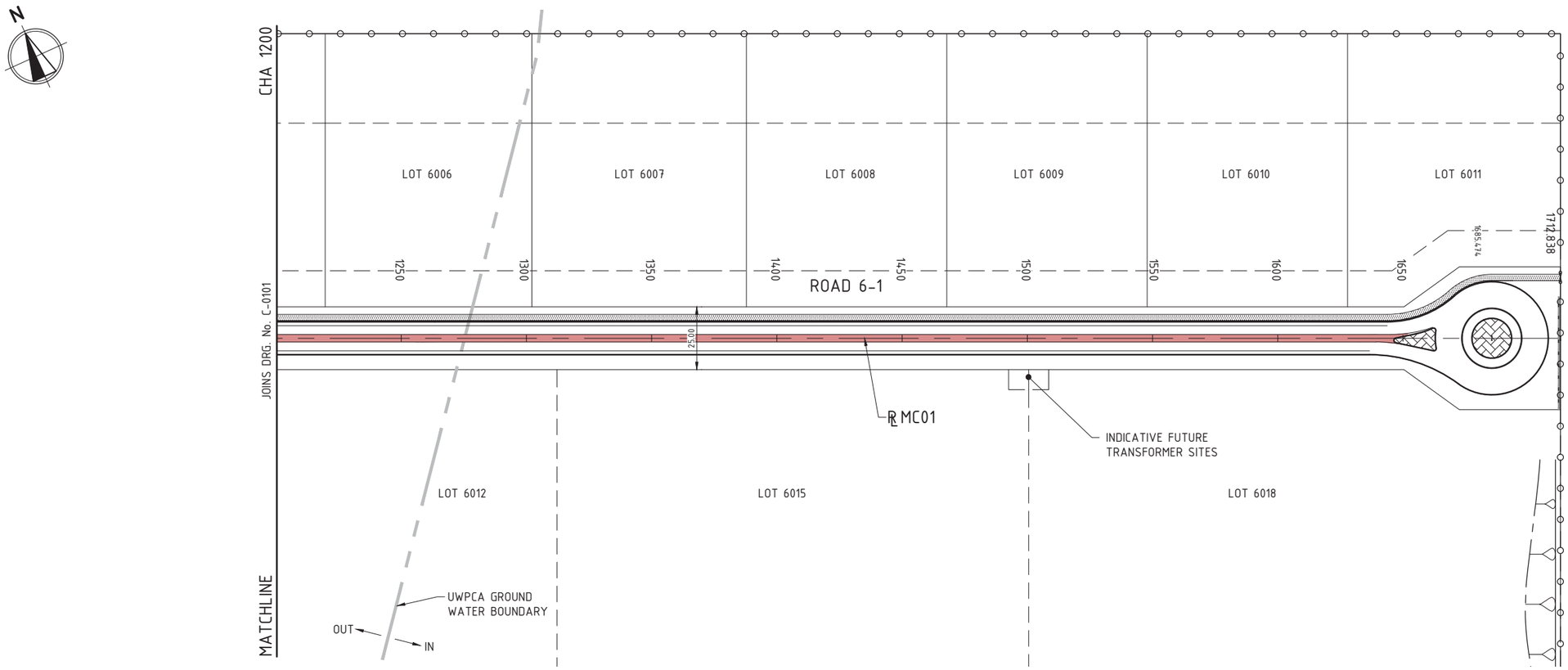
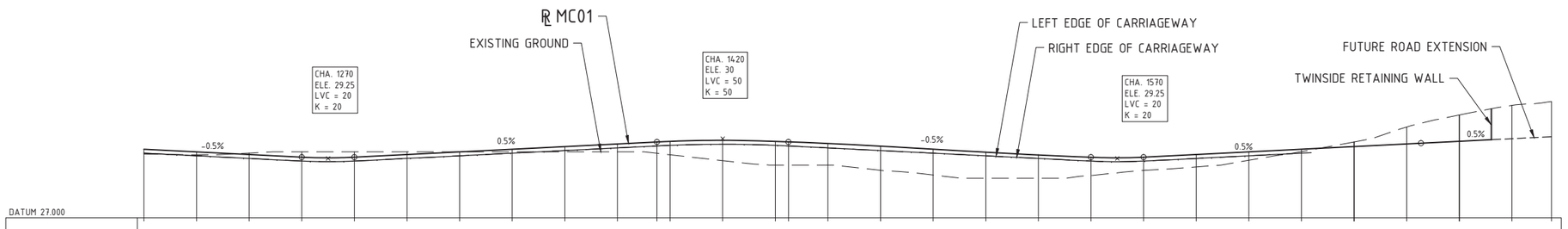


PLAN

SCALE 1:1000



DATUM 27.000

CHAINAGE	1200	1220	1240	1260	1280	1300	1320	1340	1360	1380	1395	1400	1420	1440	1445
+CUT/-FILL	-0.184	-0.112	0.053	0.2	0.2	0.1	0	-0.1	-0.2	-0.3	-0.43	-0.508	-0.771	-0.897	-0.875
DESIGN MC01	29.600	29.500	29.400	29.300	29.300	29.400	29.500	29.600	29.700	29.800	29.875	29.897	29.937	29.897	29.875
EXISTING GROUND	29.416	29.388	29.453	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.445	29.39	29.167	29	29
HORIZ. ALIGN MC01	D=749.4														
VERT. ALIGN MC01	G=-0.5% L=115			K=20 L=20	G=0.5% L=115						K=50 L=50				G=-0.5% L=115
SUPERELEVATION	LHS and RHS -3%														

CHAINAGE	1460	1480	1500	1520	1540	1560	1580	1600	1620	1640	1660	1680	1700	1720	1735.01
+CUT/-FILL	-0.8	-0.901	-0.978	-1	-0.9	-0.7	-0.502	-0.472	-0.319	-0.093	0.175	0.643	0.999	1.261	
DESIGN MC01	29.800	29.700	29.600	29.500	29.400	29.300	29.300	29.400	29.500	29.600	29.700	29.800	29.900	30.000	
EXISTING GROUND	29	28.799	28.622	28.5	28.5	28.6	28.798	28.928	29.181	29.507	29.875	30.442	30.899	31.261	31.404
HORIZ. ALIGN MC01													D=49.53		
VERT. ALIGN MC01						K=20.01 L=20	G=0.5% L=105.47						G=0.5% L=49.53		
SUPERELEVATION															

PROFILE

SCALE 1:1000H, 1:100V

NOTES

1. REFER TO DRG No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.

LEGEND

———	CADASTRAL
━━━	PROPOSED KERBING
———	PROPOSED LINEMARKING
▨	PROPOSED BRICKPAVING
▤	PROPOSED 2.5m WIDE RED ASPHALT SHARED PATH
🟥	PROPOSED RED ASPHALT
—○—○—	PROPOSED AIRSIDE FENCE
—\—	PROPOSED 1.8m HIGH SECURITY FENCE
⊶	PROPOSED GATE

0 1 2 3 4 5 6m
SCALE 1:100 AT A1 SIZE

0 10 20 30 40 50 60m
SCALE 1:1000 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD	REV	DATE	DESCRIPTION	RVD
A							

REVISIONS REVISIONS

CLIENT
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PTY. LTD.

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bgeeng.com—

PROJECT
JANDAKOT AIRPORT
REDEVELOPMENT
PRECINCT 6

STATUS
ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE
AHD	PCG94	1:1000H, 1:100V AT A1 SIZE

TITLE
PLAN AND PROFILE
CHA 1200 TO CHA 1713

PROJECT No.	DRAWING No.	REV.
P14327	C-0102	A

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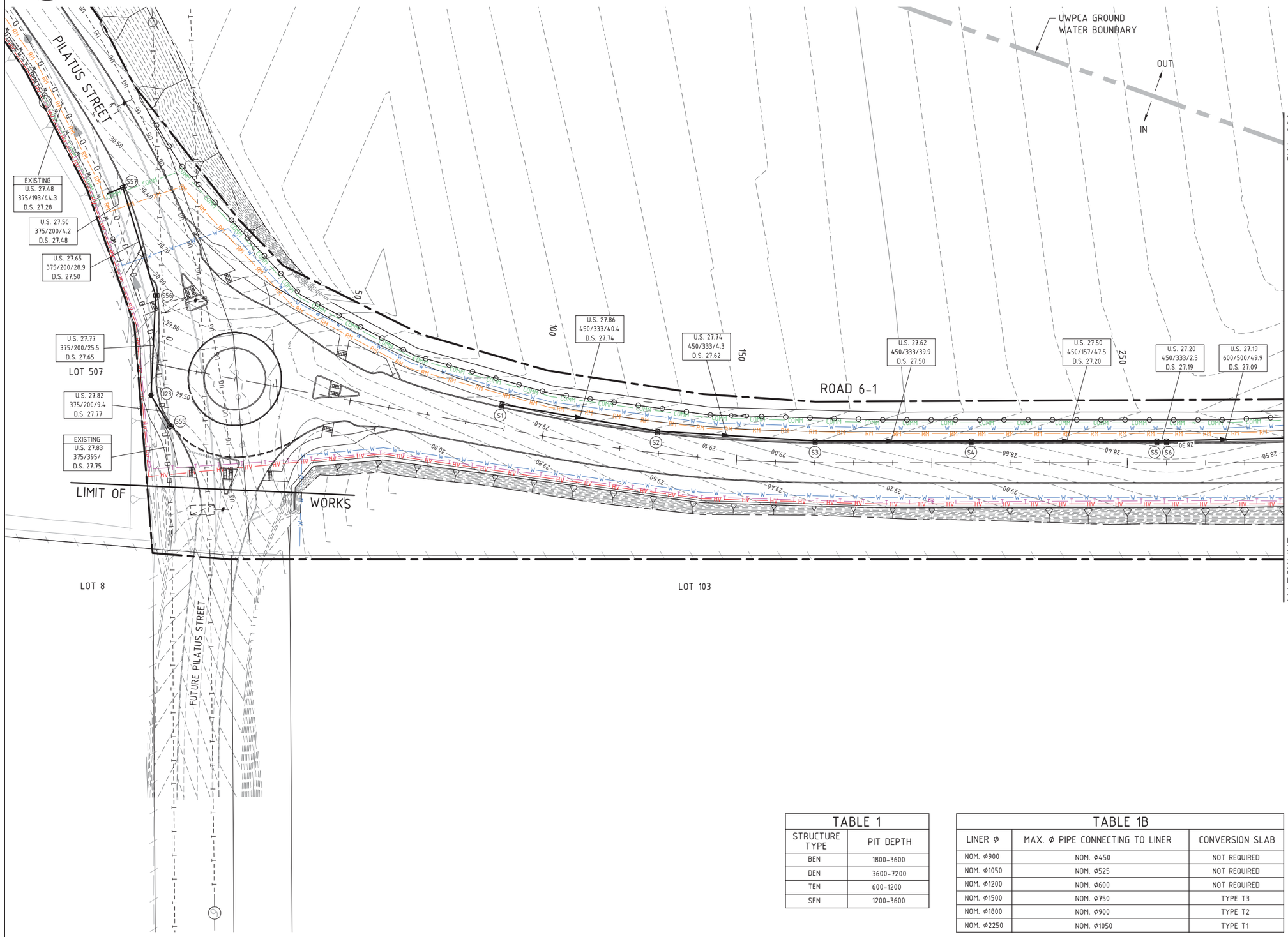

NOTES

1. REFER TO DRG. No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. REFER TO MAIN ROAD STANDARD DRAWINGS 200231-091 AND 200231-093 FOR SIDE ENTRY PITS.
3. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.
4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO ACCURATELY LOCATE ALL SERVICES AND CARRY OUT ANY SERVICE PROTECTION WORKS DEEMED NECESSARY PRIOR TO WORK COMMENCING ON SITE.
5. ALL PIPES SHALL BE SPIGOT AND SOCKET TYPE WITH RUBBER RING JOINTS, RCP CLASS 2 UNLESS OTHERWISE NOTE.
6. CONSTRUCTION PLANT SHALL NOT BE PERMITTED TO TRAVEL OVER COMPACTED PIPELINE UNTIL A MINIMUM THICKNESS OF COMPACTED BACKFILL HAS BEEN PLACED TO PROVIDE ADEQUATE PROTECTION.
7. MATERIALS FOR BEDDING, HAUNCH AND SIDE ZONES SHALL COMPLY WITH WITH THE RELEVANT REQUIREMENTS OF TABLE 3 & 4 OF AS3725 FOR HS3 SUPPORT CONDITIONS.
8. BEDDING AND BACKFILL MATERIAL TO BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATION.
9. UNSUITABLE IN SITU BEDDING MATERIAL SHALL BE TREATED IN ACCORDANCE WITH THE SPECIFICATION.
10. CONTRACTOR TO EXERCISE EXTREME CARE IN THE VICINITY OF THE U/GROUND POWER, TELSTRA CONDUITS AND FIBRE OPTIC CABLES.
11. PITS ARE NOT DRAWN TO SCALE.

LEGEND

- PROJECT BOUNDARY
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE PIT
- EXISTING PIPE TO BE REMOVED
- PROPOSED DRAINAGE PIPE
- PROPOSED DRAINAGE MANHOLE
- PROPOSED SIDE ENTRY PIT
- PROPOSED HEADWALL
- PROPOSED MAJOR CONTOUR (1.0m INTERVALS)
- PROPOSED MINOR CONTOUR (0.1m INTERVALS)
- (S1) DRAINAGE STRUCTURE NUMBER J = LOT CONNECTION PIT, M = MANHOLE, S = SIDE ENTRY PIT, G = GULLY PIT
- U.S. 12.42 / 300/100/12.00 / D.S. 12.30 — UPSTREAM PIPE INVERT LEVEL / PIPE DIA(mm)/GRADE/LENGTH(m) / DOWNSTREAM PIPE INVERT LEVEL

SERVICES LEGEND

EXISTING	PROPOSED	
--W---W--	W W	WATER MAIN
	F F	FEEDER PIPE
	W W	WATER (MAINS EXTENSION)
--S---S--	S S	SEWER
RM	RM	SEWER RISING MAIN
--G---G--	G G	HIGH PRESSURE GAS PIPE
UG		POWER (UNDERGROUND)
HV	HV	POWER (HV UNDERGROUND)
--T---T--	T T	TELSTRA CABLES
COMM	COMM	COMMUNICATIONS CONDUIT
		ELECTRICAL PIT (ACO P66 OR SIM.)
		COMMS PIT (ACO P66 OR SIM.)

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0 5 10 15 20 25 30m
SCALE 1:500 AT A1 SIZE

TABLE 1

STRUCTURE TYPE	PIT DEPTH
BEN	1800-3600
DEN	3600-7200
TEN	600-1200
SEN	1200-3600

TABLE 1B

LINER Ø	MAX. Ø PIPE CONNECTING TO LINER	CONVERSION SLAB
NOM. Ø900	NOM. Ø450	NOT REQUIRED
NOM. Ø1050	NOM. Ø525	NOT REQUIRED
NOM. Ø1200	NOM. Ø600	NOT REQUIRED
NOM. Ø1500	NOM. Ø750	TYPE T3
NOM. Ø1800	NOM. Ø900	TYPE T2
NOM. Ø2250	NOM. Ø1050	TYPE T1

REV	DATE	DESCRIPTION	RVD
A	20.03.2015	ISSUED FOR 50% REVIEW	AP

REVISIONS

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CLIENT: JANDAKOT AIRPORT HOLDINGS PTY. LTD.

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

STATUS: ISSUED FOR INFORMATION
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DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN CHA 0 TO CHA 290 SHEET 1

PROJECT No.	DRAWING No.	REV
P14327	C-0500	A

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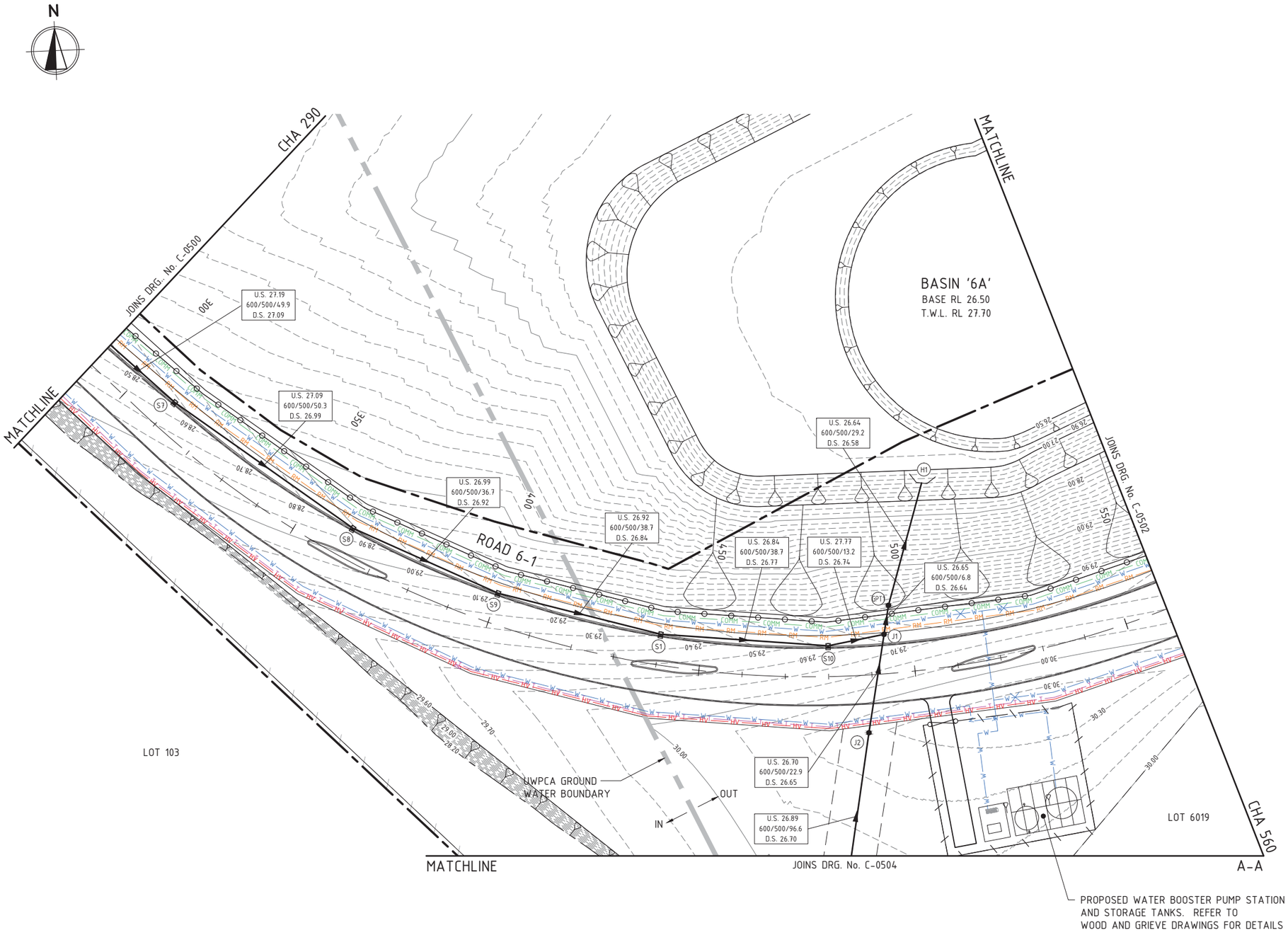

NOTES

1. REFER TO DRG. No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. REFER TO MAIN ROAD STANDARD DRAWINGS 200231-091 AND 200231-093 FOR SIDE ENTRY PITS.
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11. PITS ARE NOT DRAWN TO SCALE.

LEGEND

- PROJECT BOUNDARY
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE PIT
- EXISTING PIPE TO BE REMOVED
- PROPOSED DRAINAGE PIPE
- PROPOSED DRAINAGE MANHOLE
- PROPOSED SIDE ENTRY PIT
- PROPOSED HEADWALL
- 14.50 PROPOSED MAJOR CONTOUR (1.0m INTERVALS)
- PROPOSED MINOR CONTOUR (0.1m INTERVALS)
- (S1) DRAINAGE STRUCTURE NUMBER J = LOT CONNECTION PIT, M = MANHOLE, S = SIDE ENTRY PIT, G = GULLY PIT
- U.S. 12.42 / 300/100/12.00 / D.S. 12.30 — UPSTREAM PIPE INVERT LEVEL; PIPE DIA(mm)/GRADE/LENGTH(m); DOWNSTREAM PIPE INVERT LEVEL

SERVICES LEGEND

EXISTING	PROPOSED	
--W---W--	W W	WATER MAIN
	F F	FEEDER PIPE
	W W	WATER (MAINS EXTENSION)
--S---S--	S S	SEWER
-- RM --	RM	SEWER RISING MAIN
--G---G--	G G	HIGH PRESSURE GAS PIPE
-- UG --		POWER (UNDERGROUND)
-- HV --	HV	POWER (HV UNDERGROUND)
--T---T--	T T	TELSTRA CABLES
-- COMM --	COMM	COMMUNICATIONS CONDUIT
		ELECTRICAL PIT (ACO P66 OR SIM.)
	PIT	COMMS PIT (ACO P66 OR SIM.)

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0 5 10 15 20 25 30m
SCALE 1:500 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A	31.03.2015	ISSUED FOR 50% REVIEW	AP

REVISIONS

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

STATUS: ISSUED FOR INFORMATION
NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN CHA 0 TO CHA 290 SHEET 1

PROJECT No. P14327 | DRAWING No. C-0500 | REV. A

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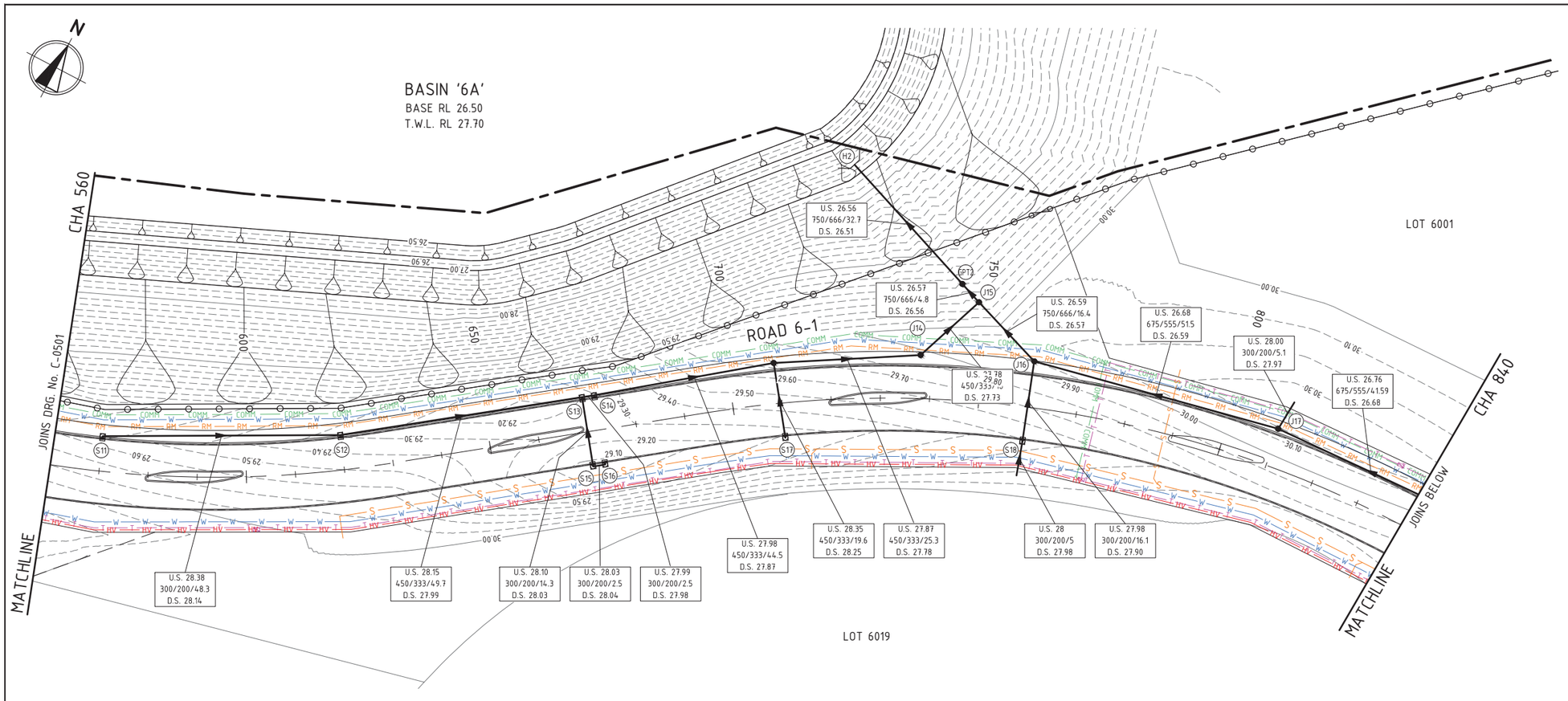

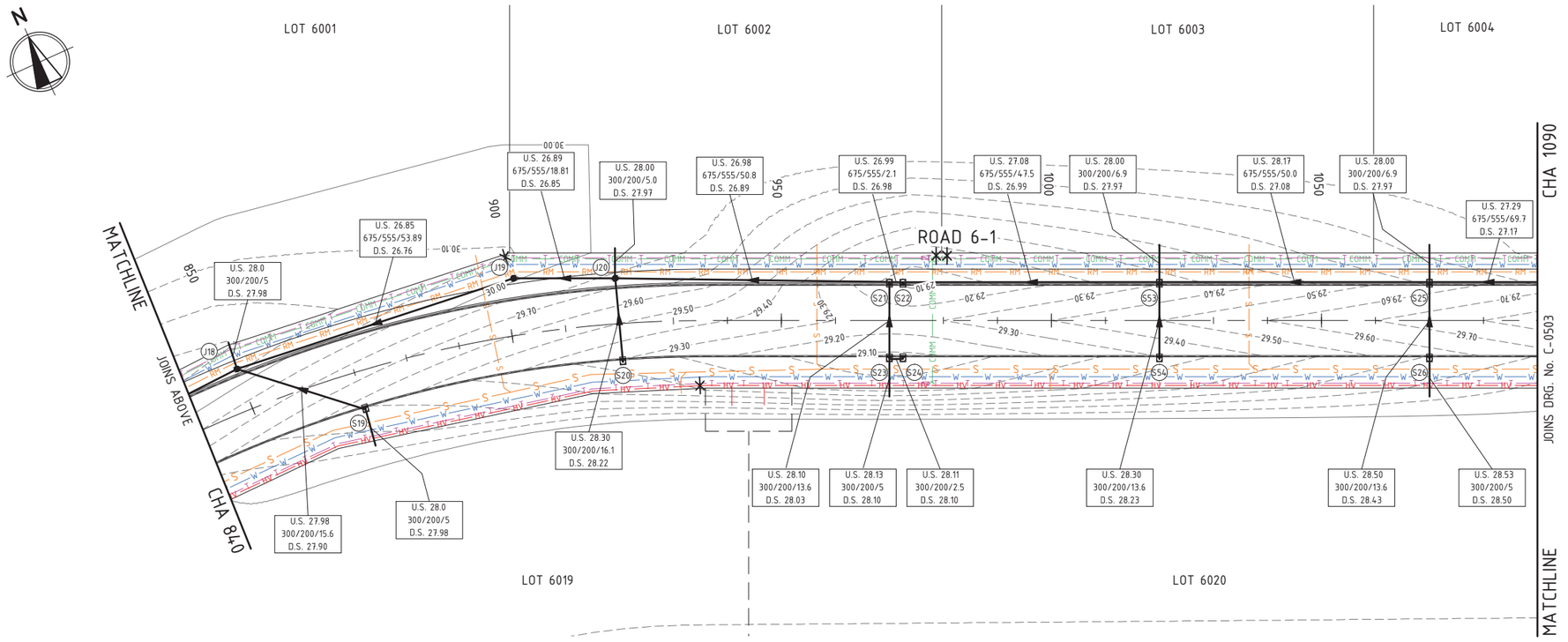

NOTES

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2. REFER TO MAIN ROAD STANDARD DRAWINGS 200231-091 AND 200231-093 FOR SIDE ENTRY PITS.
3. ALL DIMENSIONS IN METRES UNLESS NOTED OTHERWISE.
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10. CONTRACTOR TO EXERCISE EXTREME CARE IN THE VICINITY OF THE U/GROUND POWER, TELSTRA CONDUITS AND FIBRE OPTIC CABLES.
11. PITS ARE NOT DRAWN TO SCALE.

LEGEND

- PROJECT BOUNDARY
- EXISTING DRAINAGE PIPE
- EXISTING DRAINAGE PIT
- EXISTING PIPE TO BE REMOVED
- PROPOSED DRAINAGE PIPE
- PROPOSED DRAINAGE MANHOLE
- PROPOSED SIDE ENTRY PIT
- PROPOSED HEADWALL
- 14.50 PROPOSED MAJOR CONTOUR (1.0m INTERVALS)
- PROPOSED MINOR CONTOUR (0.1m INTERVALS)
- (S1) DRAINAGE STRUCTURE NUMBER J = LOT CONNECTION PIT, M = MANHOLE, S = SIDE ENTRY PIT, G = GULLY PIT
- U.S. 12.42 / 300/100/12.00 / D.S. 12.30 — UPSTREAM PIPE INVERT LEVEL / PIPE DIA(mm)/GRADE/LENGTH(m) / DOWNSTREAM PIPE INVERT LEVEL

SERVICES LEGEND

EXISTING	PROPOSED	
--W---W--	W W	WATER MAIN
	F F	FEEDER PIPE
	W W	WATER (MAINS EXTENSION)
--S---S--	S S	SEWER
RM	RM	SEWER RISING MAIN
--G---G--	G G	HIGH PRESSURE GAS PIPE
UG		POWER (UNDERGROUND)
HV	HV	POWER (HV UNDERGROUND)
--T---T--	T T	TELSTRA CABLES
COMM	COMM	COMMUNICATIONS CONDUIT
		ELECTRICAL PIT (ACO P66 OR SIM.)
		COMMS PIT (ACO P66 OR SIM.)

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SCALE 1:500 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A	20.03.2015	ISSUED FOR 50% REVIEW	AP

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REV	DATE	DESCRIPTION	RVD

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

STATUS: ISSUED FOR INFORMATION
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DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN CHA 560 TO CHA 1090 SHEET 3

PROJECT No.	DRAWING No.	REV.
P14327	C-0502	A

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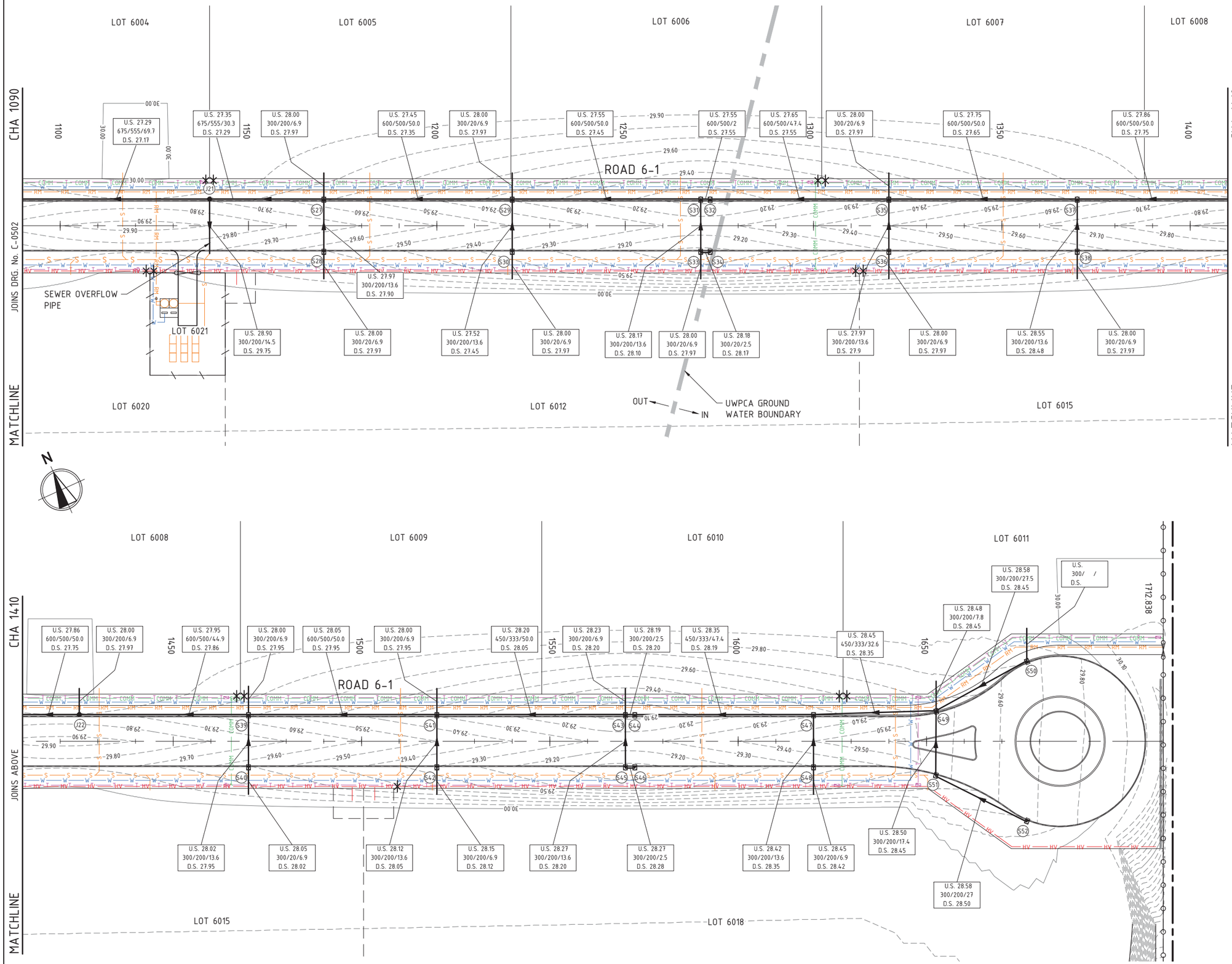

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LEGEND

- PROJECT BOUNDARY
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- EXISTING DRAINAGE PIT
- EXISTING PIPE TO BE REMOVED
- PROPOSED DRAINAGE PIPE
- PROPOSED DRAINAGE MANHOLE
- PROPOSED SIDE ENTRY PIT
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- U.S. 12.42 / 300/100/12.00 / D.S. 12.30 — UPSTREAM PIPE INVERT LEVEL; PIPE DIA(mm)/GRADE/LENGTH(m); DOWNSTREAM PIPE INVERT LEVEL

SERVICES LEGEND

EXISTING	PROPOSED	
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	F F	FEEDER PIPE
	W W	WATER (MAINS EXTENSION)
--S---S--	S S	SEWER
RM	RM	SEWER RISING MAIN
--G---G--	G G	HIGH PRESSURE GAS PIPE
UG		POWER (UNDERGROUND)
HV	HV	POWER (HV UNDERGROUND)
--T---T--	T T	TELSTRA CABLES
COMM	COMM	COMMUNICATIONS CONDUIT
	E	ELECTRICAL PIT (ACO P66 OR SIM.)
	C	COMMS PIT (ACO P66 OR SIM.)

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REV	DATE	DESCRIPTION	RVD
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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

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DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN CHA 1090 TO CHA 1713 SHEET 4

PROJECT No.	DRAWING No.	REV.
P14327	C-0503	A

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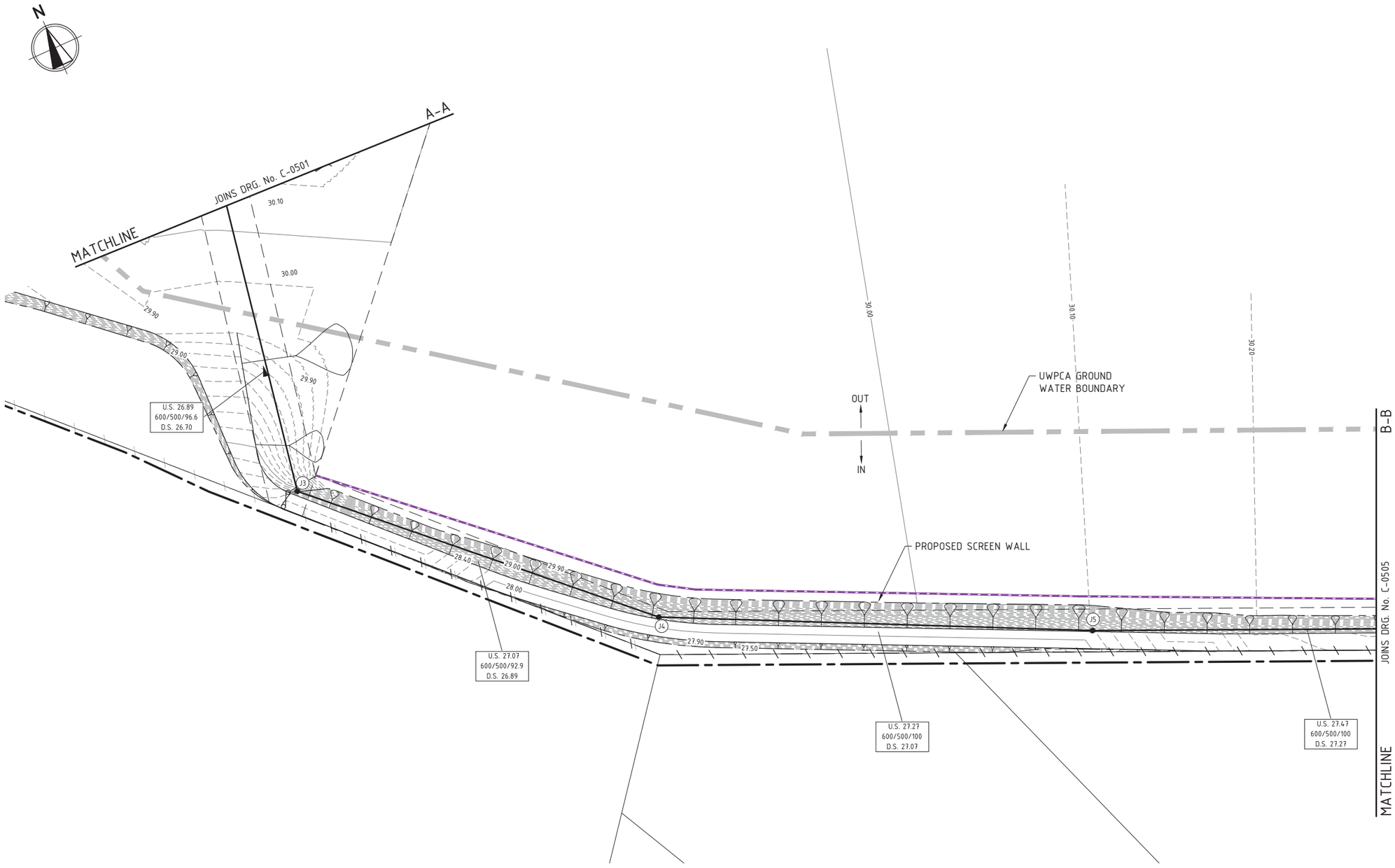

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- PROPOSED DRAINAGE PIPE
- PROPOSED DRAINAGE MANHOLE
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	W W	WATER (MAINS EXTENSION)
--S---S--	S S	SEWER
-- RM --	RM	SEWER RISING MAIN
--G---G--	G G	HIGH PRESSURE GAS PIPE
-- UG --		POWER (UNDERGROUND)
-- HV --	HV	POWER (HV UNDERGROUND)
--T---T--	T T	TELSTRA CABLES
-- COMM --	COMM	COMMUNICATIONS CONDUIT
		ELECTRICAL PIT (ACO P66 OR SIM.)
	PG	COMMS PIT (ACO P66 OR SIM.)

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SCALE 1:500 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A	20.03.2015	ISSUED FOR 50% REVIEW	AP

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

STATUS: ISSUED FOR INFORMATION
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DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN SHEET 5

PROJECT No.	DRAWING No.	REV.
P14327	C-0504	A

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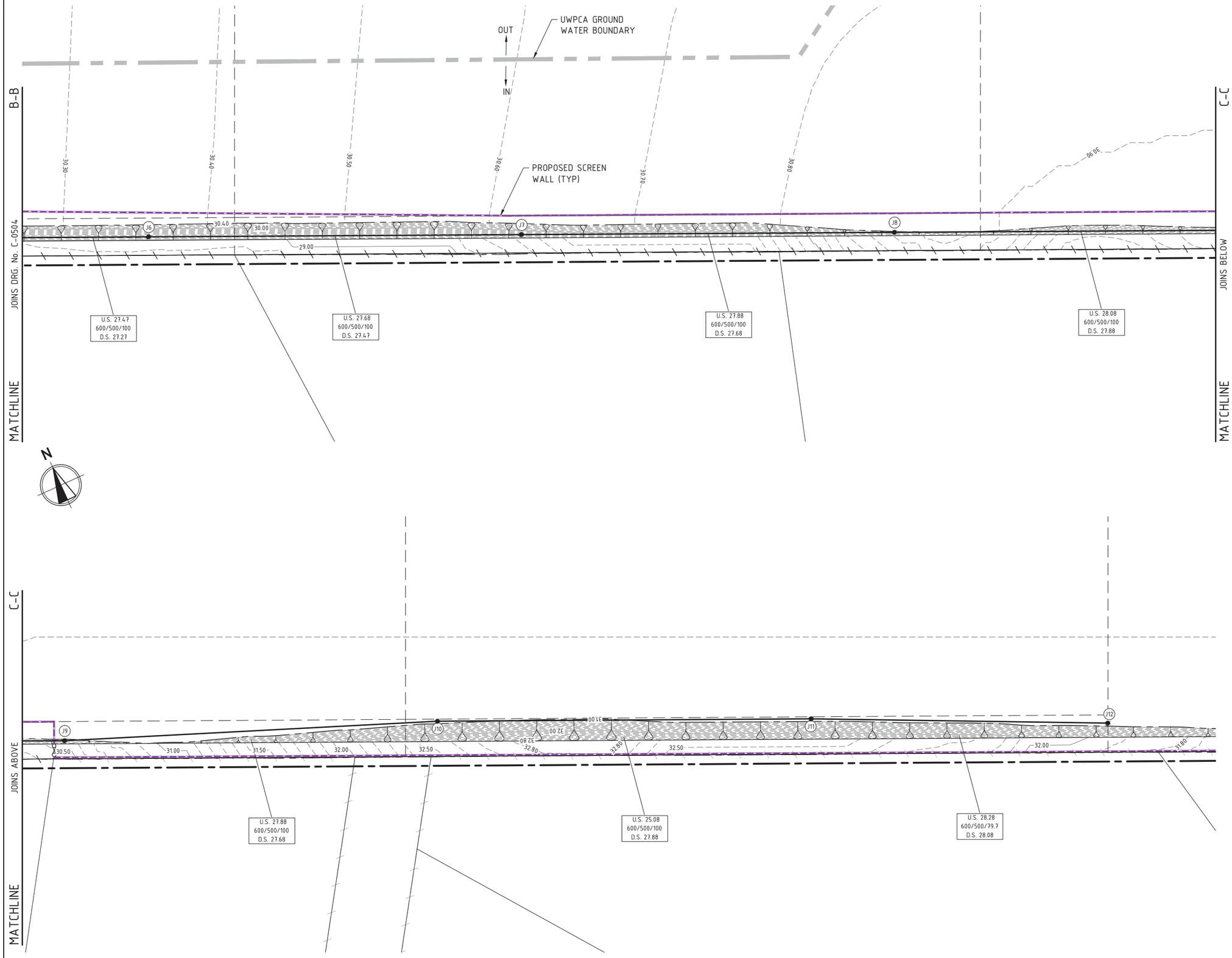

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EXISTING	PROPOSED	
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	—F—F—	FEEDER PIPE
	—W—W—	WATER (MAINS EXTENSION)
--S---S--	—S—S—	SEWER
—RM—	—RM—	SEWER RISING MAIN
--G---G--	—G—G—	HIGH PRESSURE GAS PIPE
—UG—		POWER (UNDERGROUND)
—HV—	—HV—	POWER (HV UNDERGROUND)
--T---T--	—T—T—	TELSTRA CABLES
—COMM—	—COMM—	COMMUNICATIONS CONDUIT
		ELECTRICAL PIT (ACO P66 OR SIM.)
		COMMS PIT (ACO P66 OR SIM.)

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0 5 10 15 20 25 30m
SCALE 1:500 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A	20.03.2015	ISSUED FOR 50% REVIEW	AP

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 6

STATUS: ISSUED FOR INFORMATION — NOT TO BE USED FOR CONSTRUCTION

DRAWN	DESIGNED	CHECKED	APPROVED
SP	LF		

DATUM	GRID	SCALE	
AHD	PCG94	1:500	AT A1 SIZE

TITLE: DRAINAGE PLAN SHEET 6

PROJECT No.	DRAWING No.	REV.
P14327	C-0505	A

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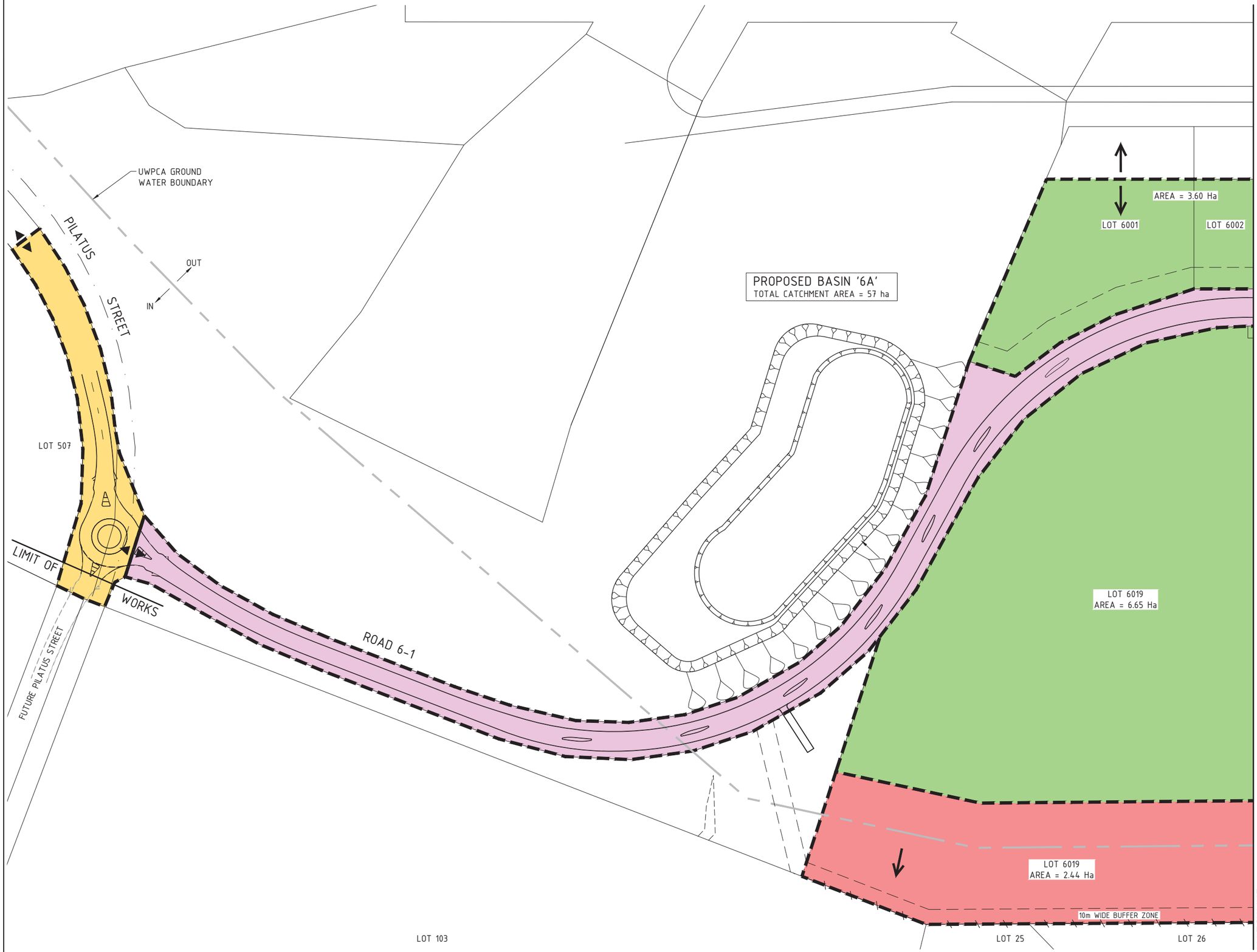

NOTES

1. REFER TO DRG No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. ALL LOTS TO STORE 150m^3 / Ha.

LEGEND

- PRECINCT 5 CATCHMENT AREA = 0.68 Ha
- LOT CATCHMENTS OUTSIDE UWPCA GROUND WATER BOUNDARY AREA = 16.29 Ha
- LOT CATCHMENTS INSIDE UWPCA GROUND WATER BOUNDARY AREA = 32.38 Ha
- ROAD RESERVE CATCHMENT AREA = 4.45 Ha

TOTAL CONTRIBUTING AREA : 38.6 Ha

EQUIVALENT IMPERVIAS AREA : 20.2 Ha

LOTS OUTSIDE UPWCA TO RETAIN ALL STORMWATER ONSITE. NO CONNECTION TO STORMWATER DRAINAGE PIT AND PIT SYSTEM

0 12.5 25 37.5 50 62.5 75m
SCALE 1:1250 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
A	31.03.2015	ISSUED FOR 50% REVIEW	AP

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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT
PRECINCT 6

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DRAWN	DESIGNED	CHECKED	APPROVED
SP	AH		

DATUM	GRID	SCALE
AHD	PCG94	1:1250 AT A1 SIZE

TITLE: DRAINAGE CATCHMENT PLAN BASIN '6A' - SHEET 1

PROJECT No.	DRAWING No.	REV
P14327	C-0515	A

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A-A

UWPCA GROUND WATER BOUNDARY

OUT

IN

AREA = 3.60 Ha

AREA = 3.53 Ha

LOT 6002 | LOT 6003 | LOT 6004 | LOT 6005 | LOT 6006 | LOT 6007 | LOT 6008 | LOT 6009 | LOT 6010 | LOT 6011

ROAD 6-1

LOT 6021

LOT 6020
AREA = 6.04 Ha

LOT 6012
AREA = 4.48 Ha

LOT 6015
AREA = 4.99 Ha

LOT 6018
AREA = 5.51 Ha

LOT 6020
AREA = 1.95 Ha

LOT 6012
AREA = 2.23 Ha

LOT 6015
AREA = 2.49 Ha

LOT 6018
AREA = 2.8 Ha

10m WIDE BUFFER ZONE

JOINS DRG No. C-0515

MATCHLINE

LOT 27 | LOT 28 | LOT 29 | SOLOMON ROAD | LOT 4 | LOT 5

FUTURE PUMPED FLOW FROM AREA TO THE EAST. DEVELOPMENT TO EAST TO ALLOW MIN. 2 HOUR STORAGE PRIOR TO PUMPING INTO PRECINCT 6 CATCHMENT

NOTES

1. REFER TO DRG No. C-0001 FOR OTHER DRAWINGS IN THIS SET.
2. ALL LOTS TO STORE 150m^3 / Ha.

LEGEND

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0 12.5 25 37.5 50 62.5 75m
SCALE 1:1250 AT A1 SIZE

REV	DATE	DESCRIPTION	RVD
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DRAWN	DESIGNED	CHECKED	APPROVED
SP	AH		

DATUM	GRID	SCALE	
AHD	PCG94	1:1250	AT A1 SIZE

TITLE: DRAINAGE CATCHMENT PLAN BASIN '6A' - SHEET 2

PROJECT No.	DRAWING No.	REV.
P14327	C-0516	A

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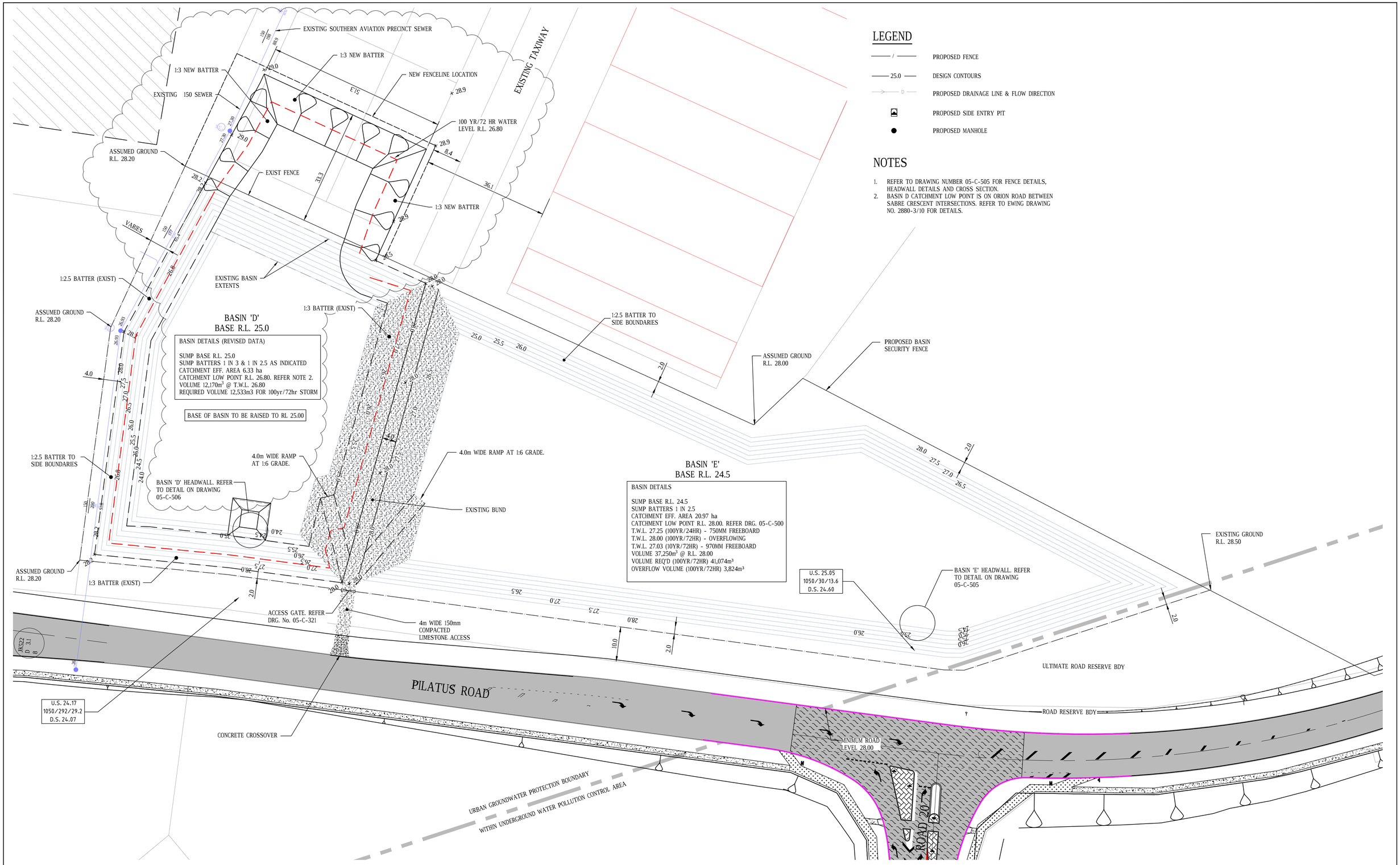

LEGEND

- PROPOSED FENCE
- 25.0 — DESIGN CONTOURS
- PROPOSED DRAINAGE LINE & FLOW DIRECTION
- PROPOSED SIDE ENTRY PIT
- PROPOSED MANHOLE

NOTES

1. REFER TO DRAWING NUMBER 05-C-505 FOR FENCE DETAILS, HEADWALL DETAILS AND CROSS SECTION.
2. BASIN D CATCHMENT LOW POINT IS ON ORION ROAD BETWEEN SABRE CRESCENT INTERSECTIONS. REFER TO EWING DRAWING NO. 2880-3/10 FOR DETAILS.

REV	DATE	DESCRIPTION	RVD
3	25.02.2013	BASIN D BATTER MODIFIED	AP
2	18.06.2012	BASINS MODIFIED, OVERFLOW SWALE ADDED	AP
1	12.06.2012	BASINS ALTERED DUE TO CADASTRAL CHANGES	AP
0	26.03.2012	ISSUED FOR CONSTRUCTION	AP
C	22.11.2011	ISSUED FOR TENDER	AP
B	11.11.2011	ISSUED FOR TENDER REVIEW	JB
A	21.10.2011	ISSUED FOR REVIEW	JB

REVISIONS

REV	DATE	DESCRIPTION	RVD
6	26/04/2018	REVISED ISSUED FOR CONSTRUCTION	AP
5	17.06.2016	ISSUED FOR CONSTRUCTION	AP
4	12.09.2013	AS CONSTRUCTED	DP

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web: www.bgeeng.com
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PROJECT: JANDAKOT AIRPORT REDEVELOPMENT PRECINCT 5

STATUS: AS CONSTRUCTED

DRAWN	DESIGNED	CHECKED	APPROVED
JSB	JSB	AP	AP

DATUM	GRID	SCALE
AHD	PCG	1:500 AT A1 SIZE

TITLE: DRAINAGE BASINS PILATUS STREET PLAN

PROJECT No. P10268.01 | DRAWING No. 05-C-504 | REV. 6

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26/04/2018 6:50:11 PM

Appendix 4 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 & requirements for BMPs and critical control points	☑	
Introduction			
Total water cycle management – principles & objectives Planning background Previous studies		☑	
Proposed development			
Structure plan, zoning and land use. Key landscape features Previous land use	Site context plan Structure plan	☑ n/a	
Landscape - proposed POS areas, POS credits, water source, bore(s), lake details (if applicable)	Landscape Plan	n/a	
Design criteria			
Agreed design objectives		☑	
Pre-development environment			
Existing information and more detailed assessments (monitoring). How do the site characteristics affect the design?		☑	
Site Conditions - existing topography/ contours, aerial photo underlay, major physical features	Site condition plan	☑	
Geotechnical - topography, soils including acid sulphate soils and infiltration capacity, test pit locations	Geotechnical plan	☑	
Environmental - areas of significant vegetation, wetlands and buffers, waterways and buffers, contaminated sites	Environmental Plan plus supporting data where appropriate	☑	
Surface Water – topography, 100-year floodways and flood fringe areas, water quality of flows entering and leaving (if applicable)	Surface Water Plan	☑	
Groundwater – topography, predevelopment groundwater levels and water quality, test bore locations	Groundwater Plan plus details of groundwater monitoring and testing	☑	
Water sustainability initiatives			
Water supply & efficiency measures – private and public open spaces		☑	
Fit-for-purpose strategy and agreed actions. If non-potable supply, support with water balance		☑	
Wastewater management		☑	
Stormwater management strategy			
Flood protection - peak flow rates, volumes and top water levels at control points,100-year flow paths and100 year detentions storage areas	100yr event Plan Long section of critical points	n/a	
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	n/a	

Local water management strategy Item	Deliverable	☑	Comments
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	1yr event Plan Typical cross sections	n/a	
Groundwater management strategy			
Post development groundwater levels and fill requirements (including existing and likely final surface levels), outlet controls, and any subsoils	Groundwater/subsoil Plan	n/a	
Actions to address acid sulfate soils or contamination		☑	
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.		n/a	
Monitoring			
Recommended future monitoring plan including timing, frequency, locations and parameters, together with arrangements for ongoing actions		☑	
Implementation			
Developer commitments		☑	
Roles, responsibilities, funding for implementation		☑	
Review		☑	

Report	Version	Prepared by	Reviewed by	Submitted to Client	
				Copies	Date
Draft V1	V1	RF	HB	Electronic	26 July 2023
Draft V2	V2	RF	HB	Electronic	01 August 2023
Draft V3	V3	RF	HB	Electronic	30 August 2023
Draft V4	V4	RF	HB	Electronic	6 September 2023
Draft V5	V5	RM/RF	HB	Electronic	12 January 2024
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