230 Martin Road, Badgerys Creek, NSW

Civil Infrastructure Report

25 November 2025

230 Martin Road, Badgerys Creek, NSW

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Our Ref:

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1 Introduction

Arcadis has been engaged by EMKC Cubed Pty Ltd to prepare this report for the State Significant Development Application (SSDA) for the development of Lot A DP 406215 - 230 Martin Road, Badgerys Creek (reference SSD-65529236). The SSDA seeks approval for two contemporary warehouse or distribution centre buildings. The development will involve:

- Site clearing works, including the removal of existing structures and trees
- Bulk earthworks and the installation and augmentation of utilities infrastructure and other services
- Construction and operational use of two warehouse or distribution centres containing ancillary offices, amenities and manufacturing (in lot 1) with associated, parking, landscaping and access
- Other ancillary works

This report supports the SSDA and is to be read together with the EIS, development plans, and supporting documentation submitted with the SSDA. The location of the site is shown in Figure 1.

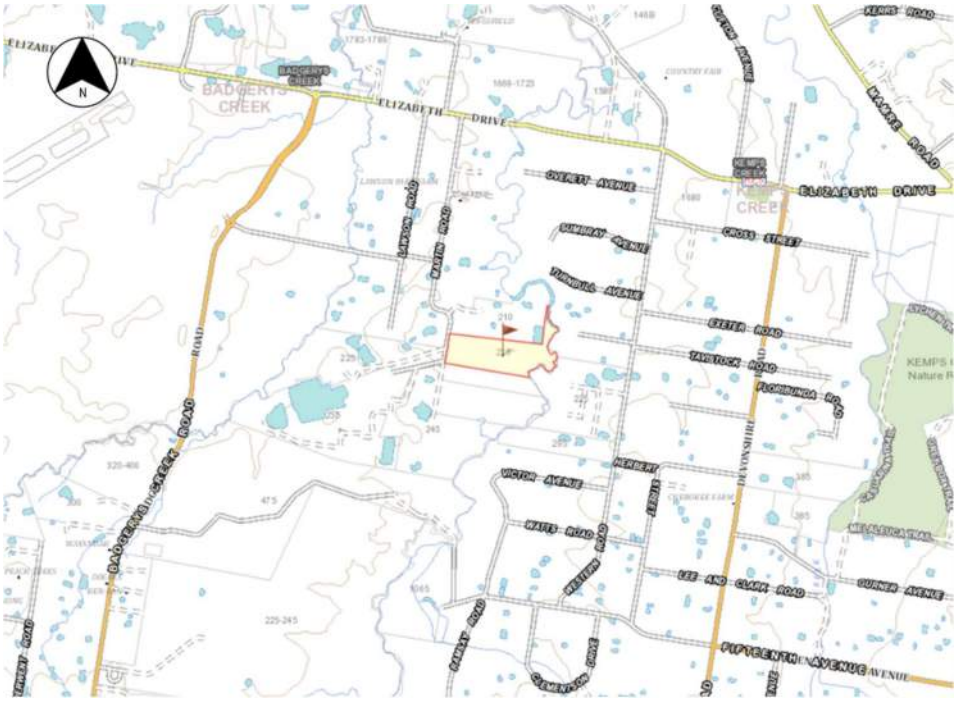


Figure 1: Site location

1.1 Site Description

The proposed development site is located within the Liverpool City Council Local Government Area at 230 Martin Road, Badgerys Creek, on Lot A DP 406215. The site is located on the eastern side of Martin Road, approximately 2km east of Badgerys Creek Road and 1.8km south of the intersection of Martin Road and Elizabeth Drive. The site has approximately 250m of direct frontage to Martin Road to the west, an Australian Native Landscapes facility to the north, undeveloped land to the south, and South Creek to the east. Located within the Western Sydney Aerotropolis (WSA), the site has recently been rezoned by the NSW Department of Planning, Housing and Infrastructure (DPHI) to a mix of Enterprise (ENT) and Environment and Recreation (ENZ). The proposed development will be contained within the ENT area of the site. Refer to Figure 2 for an aerial image of the site and zoning extents.

Figure 2: Site extent and zoning

The site is predominantly rural pasture with some scattered trees and an existing pond in the ENZ area. Within the northwestern corner of the site there is a concrete pad, a metal shed, and a few other minor structures. The total site area is approximately 24.06 hectares (ha) (subject to final survey), with the ENT area being 8.07ha. Flood mapping of the site for the 1% Annual Exceedance Probability (AEP) storm event indicates that the 1% AEP South Creek flood extent encroaches into the east of the ENT area – refer to Advisian's Flood Impact and Risk Assessment (2024) for flood mapping.

1.2 Proposed Development

The proposed development will subdivide the ENT area of the site for industrial purposes. The ultimate development will include two warehouses, the first with an area of 16,462m^2, and the second with an area of 18,567m^2. The development will also include office buildings, loading hardstands, carparks, landscaping areas, and stormwater infrastructure. The design considers the 1% AEP flood level, with the two warehouses being located outside of the South Creek 1% AEP flood zone.

The proposed layout of the development is shown in Figure 3.

Figure 3: Proposed development layout

1.3 Scope of this Report

This report outlines the design criteria adopted for the engineering and design of all civil infrastructure components of the development and demonstrates compliance with the applicable requirements from the NSW DPHI WSA Development Control Plan (DCP) Phase 2. Civil infrastructure works will include bulk earthworks, stormwater infrastructure including On Site Detention (OSD) and Water Sensitive Urban Design (WSUD), and provision of utilities.

This report should be read in conjunction with the Arcadis Civil Engineering drawings included in Appendix A.

2 Compliance with SEARs

This report responds to the NSW Planning Secretary's Environment Assessment Requirements (SEARs) issued by the NSW DPHI. Table 1 summarises all key civil infrastructure issues raised in the SEARs and how this report addresses them.

Table 1: SEARs addressed in this report

Key issue listed in the SEARs	Response
Water Management	
Details site water balance *A detailed site water balance including a description of potable and non-potable water demands and breakdown of water supplies, and any water licensing requirements.*	A Water Balance section has been included in this report – refer to **Section 8**.
Proposed stormwater drainage design *Details of the proposed stormwater/wastewater drainage design including the capacity of onsite detention system(s), onsite sewage management and measures to treat, reuse or dispose of water, consistent with the requirements of the Phase 2 Aerotropolis Development Control Plan and the Blue Green Infrastructure framework of the Western Sydney Aerotropolis Precinct Plan*	Refer to **Section 6** and **Section 7** for details of the proposed stormwater drainage management strategy.
Connection to Sydney Water's stormwater system *Details of how the proposed stormwater drainage system will connect to Sydney Water's regional stormwater system, including details of any interim solution, consistent with the Department's 'Technical guidance for achieving Wianamatta–South Creek stormwater management targets' (2022) for both construction and operational phases*	Refer to **Section 7.5** for details of future interface with Sydney Water's regional stormwater system.
Water use minimisation *Description of the measures to minimise water use*	Refer to **Section 8.4** for water use minimisation principles.
Water quality *Characterisation of water quality at the point of discharge to surface and/or groundwater against relevant water quality criteria*	Refer to **Section 7** for details on water quality and integrated Water Sensitive Urban Design principles.
Handover of drainage infrastructure *Where water and drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards, the local council or other drainage or water authority.*	Proposed stormwater drainage will be privately owned, no drainage infrastructure will be handed over to an authority – refer to **Section 6** and **Section 7**.
Surface or groundwater monitoring activities	Not applicable – refer to **Section 4.6**.

Details of any surface or groundwater monitoring activities and methodologies.	
Infrastructure Requirements	
An assessment of impacts of the development on existing utility infrastructure and service provider assets surrounding the site.	Refer to **Section 9**.
A detailed written and/or graphical description of infrastructure required on the site, including any electrical substation/s and on-site switch yard/s.	Refer to **Section 9**.
Details of the existing capacity of the site to service the proposed development and any extension or augmentation, property tenure or staging requirements for the provision of utilities, and demonstration that satisfactory arrangements for electrical network requirements, drinking water, wastewater, recycled water and stormwater have been made.	Refer to **Section 9**.
A description of how any upgrades will be co-ordinated, funded and delivered on time and be maintained to facilitate the development.	Refer to **Section 9**.
Identification of any existing infrastructure or easements on or off the site which may be impacted by construction or operation of the development and details of measures to be implemented to address any impacts.	There is no existing infrastructure or easements on or adjacent to the site that will be impacted by the development.
Evidence of endorsement and/or approval from Sydney Water to ensure that the proposed development does not adversely impact on any existing water, wastewater or stormwater main, or other Sydney Water asset, including any easement or property.	Refer to **Section 9**.
Consultation	
Consultation with stakeholders *During the preparation of the EIS, you must consult with the relevant local, State or Commonwealth Government authorities, service providers, community groups and affected landowners.*	Refer to **Section 3** for details of consultations.

Table 2 summarises all additional agency requirements related to civil infrastructure and how this report addresses them.

Table 2: Additional agency requirements addressed in this report

Key issue listed in the additional agency requirements	
Department of Planning, Housing and Infrastructure (Biodiversity and Conservation)	
Water and soils ***The EIS must describe background conditions for any water resource likely to be affected by the development, including:*** *a. Existing surface and groundwater*	Refer to **Section 4.6** and **Section 6.2** for details on existing groundwater and surface water.

b. *Hydrology, including volume, frequency and quality of discharges at proposed intake* c. *And discharge locations*	
Waterway health *EHG recommends the applicant address the provisions of section 2.3 Stormwater, Water Sensitive Urban Design and Integrated Water Management and section 2.5.5 Erosion and Sediment Control within the Phase 2 Aerotropolis Development Control Plan and Section 4.5 Blue-Green Infrastructure framework of the Western Sydney Aerotropolis Precinct Plan. In addressing the above, the applicant will need to access the technical guidance for achieving Wianamatta South Creek stormwater management targets (DPHI, 2022) and associated MUSIC modelling toolkit.*	Refer to **Section 5** for details of erosion and sediment control measures. Refer to **Section 6** and **Section 7** for details on the proposed stormwater drainage management strategy and integrated Water Sensitive Urban Design principles.
Sydney Water	
Water related infrastructure requirements *The proponent must ensure consideration of and compliance with Sydney Water's regional approach to stormwater and recycled water including determination of and design for any infrastructure requirements on the land for regional stormwater and recycled water servicing.*	Refer to **Section 7.5** for details of future interface with Sydney Water's regional stormwater system.
Integrated water cycle management *The proponent should outline the development's projected potable and non-potable water demands and any sustainability initiatives that will minimise/reduce the demand for drinking water. This will allow Sydney Water to determine the impact of the proposed development on our existing services and required system capacity to service the development.* ***To demonstrate compliance with the regional stormwater servicing approach, the development must:*** • *demonstrate the integration of any planned regional stormwater infrastructure on the development site,* • *provide gross pollutant traps to service the development site,* • *demonstrate a commitment to connect to the regional stormwater scheme,* • *demonstrate compliance with the Technical guidance for achieving Wianamatta – South Creek stormwater management targets (DPHI, 2022) for both construction and operational phases (including for interim periods before the Regional Stormwater Scheme is available).*	Refer to **Section 6**, **Section 7**, and **Section 8** for details of compliance.

Liverpool City Council	
Sustainability *The proposed development should integrate Water Sensitive Urban Design principles into the design of the landscape and built form in accordance with the Western Sydney Aerotropolis Precinct Plan.*	Refer to **Section 6** and **Section 7** for details on integrated Water Sensitive Urban Design principles.
Land engineering *Onsite Detention may be required for the development. Water Sensitive Urban Design measures will be required.* *Detailed stormwater drainage plans, DRAINS and MUSIC models will be required.* ***Full width road construction is likely to be required as part of this development for at least the full frontage of the site to Martin Road. Concept Civil road and drainage designs will be required.***	Refer to **Section 6** and **Section 7** for details of On Site Detention and integrated Water Sensitive Urban Design principles. It is proposed to construct a half road width as part of this development refer to drawings in **Appendix A**. The design and documentation for a full road width construction would be subject to coordination with the development proponent for the sites west of Martin Road.

3 Authority Consultation

EMKC Cubed has consulted with relevant agencies regarding the proposed development. Correspondence from Liverpool City Council and Sydney Water has been reviewed and incorporated as necessary into this report. The development is taking a proactive approach to engaging in consultation with the relevant agencies, including utility authorities. Further consultation will be undertaken during subsequent design phases.

The project team have also consulted with the State Design Review Panel (SDRP) on the 1st March 2024 and again on the 2nd May 2024. As a result of the feedback from these meetings, the design has been updated to minimize earthworks and reduce retaining wall heights to better integrate with the natural topography while maintaining the intended functionality of the site. The project team made the design decision to limit the retaining walls that face a public domain to 2 tiers (4m high), instead of the maximum 3 tires (6m high) to exceed the benchmark solution specified in Section 2.18 of the DCP.

4 Site Works

4.1 Soil and Geological Conditions

Fortify Geotech has prepared a geotechnical investigation report for the site (dated October – November 2023). The study identified that Local Geology Maps indicate the site to be underlain by Quaternary age Alluvial floodplain deposits which consists of silt, very fine- to medium-grained lithic to quartz-rich sand, clay, underlain by Middle Triassic age Bringelly Shale, which consists of shale, carbonaceous claystone, laminate, lithic sandstone, and rare coal.

Fortify Geotech conducted a site investigation on the 23rd of October 2023 which comprised of 20 test pits, with target depths between 1.9m and 2.4m. Table 3 summarises the subsurface profile based on these test pits.

Table 3: Subsurface profile based on test pits

Geological Profile	Typical Depth Interval	Description
Topsoil fill/ topsoil	0m/0.25m to 0.1m/0.5m	silty sand, silty gravelly sand, sandy silt, silty clayey sand, sandy silty clay, clayey sandy silt, silty sandy clay silty sand, clayey silty sand; fine grained sand, fine to medium grained sand, fine to coarse grained sand, low to medium plasticity clay, brown, trace grey, grass roots at surface, some roots, trace anthropogenic material (plastic), some fine to medium sized gravels, dry, w~PL, loose to medium dense, medium dense, medium dense to dense, firm
Fill	0m/0.45m to 0.45m/1.6m	gravelly sand, sandy gravel, gravelly sandy clay, clayey silty sand, silty sandy clay; fine to coarse grained sand, fine to medium grained sand, medium to coarse sized gravels, low to medium plasticity clay, medium plasticity clay, dark brown, brown, dark brown to grey, trace orange, red, black, trace fine to coarse sized gravels, trace anthropogenic material (gravels, brick, plastic), dry, w<PL, w~PL firm, medium

		dense, medium dense to dense. This material was only encountered in test pits TP13, TP14 & TP15.
Alluvial/ residual soils	0.1m/1.6m to 1.7m/>2.0m	sandy clay, clay with sand, silty sandy clay, clay trace sand, silty clayey gravel, gravelly silty clay, gravelly sandy clay, silty clay, silty clay trace sand; low to medium plasticity clay, medium plasticity clay, medium to high plasticity clay, fine grained sand, fine to medium grained sand, fine to coarse grained sand, fine to coarse sized gravels, red to brown, orange to brown, red mottled grey, pale grey mottled red to brown, trace brown, grey mottled red to brown, orange to brown mottled brown and red, grey to brown mottled brown and red to brown, trace red and orange, trace fine to medium sized gravels, trace fine to coarse sized ironstone gravels, w<PL, w~PL, firm to stiff, stiff, stiff to very stiff, very stiff, dense
Weathered bedrock	Below 1.7m/1.8m	sandstone, shale; extremely weathered (XW), excavates as silty clayey gravel, gravelly sand trace clay & clayey sandy gravel. Bedrock was only encountered in test pits TP04, TP08 & TP16.

Source: Fortify Geotech, Geotechnical Investigation Report dated October – November 2023

4.2 Bulk Earthworks

The site in its existing condition generally falls west to east with grades ranging between 1% to 5%. Bulk earthworks will be undertaken across the development footprint to achieve two suitably flat pads for the proposed warehouses, allow for compliant vehicular access from Martin Road and provide the required flood immunity in accordance with the WSA DCP Phase 2.

The proposed surface grading of the site follows the existing site topography, falling from the southwest corner to the northeast corner. Retaining walls will be required along the southern, eastern, and northern boundaries of the site since existing ground levels vary at the interface with adjoining properties. The warehouse levels have been set with consideration to the visual impact from Martin Road and its physical connection. Import of clean fill material to the site will be required. All filling will be undertaken in a controlled manner to Level 1 standard with required geotechnical engineering supervision.

A concept earthworks design has been completed for the site and is documented on drawings MAR-AAP-DA-01-DRG-CV-0101 and MAR-AAP-DA-01-DRG-CV-0102 within Appendix A.

4.3 Retaining Walls

The objective of the civil engineering design is to minimise retaining walls and use landscape batters to accommodate any level changes. Where this is not possible, retaining walls have been designed in accordance with Section 2.18 of the DCP. The location and details of these walls has been documented on drawings MAR-AAP-DA-01-DRG-CV-0101 and MAR-AAP-DA-01-DRG-CV-0102 within Appendix A.

4.4 Embankment Stability

Permanent batters on the site will be vegetated and their slopes have been designed in accordance with Liverpool City Council requirements which state:

- Desirable batter slopes shall be 3:1. Absolute minimum batter slopes shall be.
  - Cut 2:1, fill 3:1.
  - Rock batters ¼: 1.
- Landscape storage: Maximum batter slopes shall be 1:4.

Fortify Geotech Geotechnical Investigation Report have specified that temporary site excavations to 1.5m depth can be formed near vertical, although any loose topsoil and fill should be cut back at 1(H):1(V). If required and space allows, deeper temporary cuts can be formed at 1(H):1(V) or benched at 1.5m intervals in natural soils. A geotechnical engineer should inspect all cut batters during construction to confirm stability. Exposed temporary batters should be protected from the weather by black plastic pinned to the face with link-wire mesh, or similar.

4.5 Supervision of Earthworks

All geotechnical testing and inspections undertaken during filling operations will be undertaken to Level 1 geotechnical control, in accordance with AS3798-2007.

4.6 Groundwater

Fortify Geotech Geotechnical Investigation Report stated that no groundwater was encountered within the investigation depth. It should be noted however that the permanent groundwater level is expected to be below the investigation depth. EP Risk prepared a Groundwater Impact Assessment for the site which identifies groundwater from depths of 2.4m.

4.7 Acid Sulphate Soils and Salinity

As part of the geotechnical investigations undertaken by Fortify Geotech, four representative soil samples were tested in a NATA laboratory for aggressivity (Cl, SO4, pH & EC). Based on the testing results, the following exposure classification applies:

- Concrete piles – ‘mild’.
- Steel piles - ‘moderate’.
- Steel piles - saline soils of ‘A1’ and in sulfate soils of ‘A2’.

5 Construction Soil and Water Management

The WSA DCP Phase 2 states that a Soil and Water Management Plan (SWMP) must be developed for sites greater than 2,500m^2 to manage erosion and sediment. Section 2.5.5 of the DCP outlines the following objectives of erosion and sediment control:

- *O1: Protect the health of Wianamatta-South Creek and its tributaries from construction and building runoff and meet the performance criteria for ambient water quality objectives.*
- *O2. Encourage vegetation retention, protect vegetation during construction and operation, and facilitate prompt rehabilitation through revegetation strategies.*
- *O3. Minimise site disturbance during construction, reduce the amount of erosion, and stabilise construction works as quickly as possible following completion.*

5.1 Design of Erosion and Sediment Control Measures

A SWMP will be developed for the proposed development. The SWMP will need to include Erosion and Sediment Control (ESC) measures that have been designed and documented in accordance with the requirements of:

- NSW DPHI WSA DCP Phase 2
- Liverpool City Council's guidelines and specifications
- Managing Urban Stormwater: Soils and Construction, Landcom, (4th Edition) (The "Blue Book") Volume 1 and Volume 2

In addition to these measures contractors will develop plans such as site establishment details, maintenance schedules and checklists. The contractor will ensure that all soil and water management measures are implemented and maintained to suit the construction staging and the expected weather conditions. It is the contractor's responsibility to ensure all erosion and sediment control devices are maintained in good working order and operate effectively.

5.2 Erosion and Sediment Control Measures

ESC measures to be incorporated into the SWMP may include clean water channels, dirty water channels, a sediment basin, sediment fences, and stabilised site access. The sediment basin will need to be sized using 5 day 85th percentile rainfall and be located to collect all runoff conveyed via the dirty water channels. The contractor will be required to manage the basin to ensure no coarse sediment leaves the site, and that 80% of all flows leaving the site achieve a total suspended solids concentration of 50mg/L or less and a pH of 6.5-8.5.

In addition to the ESC measures incorporated into the SWMP, the contractor is expected to minimise the extent of disturbed area on site at any one time and undertake stabilisation of disturbed areas or previously completed earthworks as necessary.

6 Stormwater Drainage

6.1 Stormwater Drainage Design Criteria

The design criteria and requirements for stormwater conveyance and discharge are outlined in Appendix B and are derived from the following applicable standards:

- Australian Standard AS3500 Part 3: Stormwater Drainage
- Liverpool Council Stormwater Drainage Design Specification (D5) 2003
- Liverpool Council Handbook for Drainage Design 2003
- Australian Rainfall and Runoff (AR&R) 2019
- Austroads Road Design Guide
- NSW DPHI Western Sydney Aerotropolis Precinct Plan 2022
- DPHI Technical guidance for achieving Wianamatta-South Creek stormwater management targets 2022
- Sydney Water – Stormwater Scheme Infrastructure Design Guideline DRAFT – Version 2024-1.0

6.1.1 Hydrological and Hydraulic Modelling

DRAINS (Version 2023.11) software has been used for the hydrological and hydraulic modelling of the pre- and post-development conditions. Parameters used in the analysis are summarised in Table 4. Note that RAFTS hydrology has only been used for analysis of the pre-development rural catchment and the upstream external catchment.

Table 4: DRAINS key model parameters

Parameter	Value
AR&R Revision	2019
Rainfall IFD	Site specific IFD and pre-burst rainfall depths have been extracted from the Bureau of Meteorology ARR Data Hub (Latitude: - 33.8875, Longitude: 150.7625)
RAFTS	Impervious Area Initial Loss (mm) = 1 Impervious Area Continuing Loss (mm/h) = 0 Pervious Area Initial Loss (mm) = 35.9 (Sydney Water) Pervious Area Continue Loss (mm/h) = 0.94 (Sydney Water) BX = 1 Manning's n = 0.08
IL-CL	Impervious Area Initial Loss (mm) = 1 Impervious Area Continuing Loss (mm/h) = 0 Pervious Area Initial Loss (mm) = 35.9 (Sydney Water) Pervious Area Continue Loss (mm/h) = 0.94 (Sydney Water) Catchment impervious area = 100%

The hydrological and hydraulic modelling was undertaken using DRAINS in accordance with the stormwater design criteria – refer to Appendix B.

6.2 Existing Site Stormwater Drainage

The site is classified as a “greenfield” site, with existing runoff draining across the site via vegetated natural channels. The western catchment of the site generally falls towards the existing pond in the ENZ area. This pond discharges via a spillway to South Creek. The eastern catchment of the site, which generally falls towards the east, also discharges to South Creek. A detailed survey prepared by ENG Land Services has been included in Appendix C.

The site is impacted by overland flow from an external upstream catchment of approximately 25.8ha. Runoff from this catchment is intercepted in the north-west corner of the site via an open channel that carries flows along the northern boundary to South Creek.

6.3 Proposed Site Stormwater Drainage

One of the main objectives of the proposed stormwater drainage network is to manage post-developed flows leaving the site so that they do not exceed the pre-developed flows. The stormwater drainage design incorporates On Site Detention (OSD) to limit post-developed peak flows to pre-developed peak flow rates, ensuring no adverse flooding impacts downstream of the development.

The proposed stormwater pit and pipe network has been designed to convey flows safely in the minor (5% AEP) and major (1% AEP) events. Runoff collected from the development via the proposed network will be directed to OSD tanks under the handstand area to the north and south of the northern warehouse. In the interim scenario, discharge from the OSD tank will be directed to a Filterra basin that will outlet to the existing pond in the ENZ area. No changes are proposed to the spillway of the existing pond that directs flows to South Creek. In the ultimate scenario, when downstream Sydney Water regional stormwater infrastructure is operational, it will receive the flows from the development’s Filterra basin - subject to approval upon finalisation of Sydney Water’s regional stormwater infrastructure.

In the interim scenario, twin 1200mm diameter stormwater pipes have been designed to convey the external 25.8ha catchment through the proposed development to the ENZ area. Overland flow from the upstream catchment will be intercepted in the north-west corner of the development. This external catchment has not been included in the assessment of the development’s water quality and water quantity management measures. Flows from the external catchment will bypass the proposed OSD tank and Filterra basin and will not be retained or treated. In the ultimate scenario, these external flows will be intercepted and conveyed by the proposed riparian street that will run within the neighbouring lot parallel to the site’s northern boundary.

Refer to civil drawings MAR-AAP-DA-01-DRG-CV-0201 to MAR-AAP-DA-01-DRG-CV-0202 in Appendix A for the layout of the proposed stormwater network.

7 Water Management Strategy

The following section provides a summary of the proposed water management strategy for the development and details the stormwater management measures to address the water quality and water quantity targets from the WSA DCP Phase 2 which apply to the development.

7.1 Water Management Strategy Objectives and Controls

Requirements and targets applicable to the stormwater management and WSUD within the proposed development are set out in Section 2.3 of the WSA DCP Phase 2. Requirements relating to maintaining peak flows are set out in Section 2.5 of the DCP. The NSW DPHI's *Technical guidance for achieving Wianamatta-South Creek stormwater management targets* (herein referred to as 'the technical guidance document'), which is referenced by the DCP, provides additional detail and guidance on the design of WSUD strategies to achieve the prescribed targets outlined in the DCP.

7.2 Water Quality and Water Quantity Objectives

WSUD principles have been incorporated into the stormwater design of the proposed development to minimise stormwater pollution leaving the site and reaching South Creek.

7.2.1 Design Criteria

The WSA DCP Phase 2 sets out specific requirements that must be achieved with regards to water quality and water quantity. The design has adopted the operational phase Annual Load Reduction water quality targets from the DCP, which are summarised below:

- Gross Pollutants: 90% reduction in the average annual load
- Total Suspended Solids (TSS): 90% reduction in the average annual load
- Total Phosphorus (TP): 80% reduction in the average annual load
- Total Nitrogen (TN): 65% reduction in the average annual load

Regarding water quantity, the design has adopted the operational phase Mean Annual Runoff targets from the DCP. These targets are summarised below:

- Mean Annual Runoff Volume (MARV): ≤2 ML/ha/y at the point of discharge to the local waterway
- 90th percentile flow: 1,000–5,000 L/ha/day at the point of discharge to the local waterway
- 50th percentile flow: 5–100 L/ha/day at the point of discharge to the local waterway
- 10th percentile flow: 0 L/ha/day at the point of discharge to the local waterway

7.2.2 Stormwater Quality and Quantity Management Measures

Measures to address the operational stormwater quality and quantity targets outlined in the WSA DCP Phase 2 are summarised in Table 5.

Table 5: Adopted stormwater management measures

Measure	Purpose
Rainwater tanks (for non-potable reuse)	Tanks to collect roof water to meet at least 80% of the development's demand for non-potable water (toilet flushing and landscape irrigation).
Gully Pit Baskets	To remove gross pollutants prior to tertiary treatment downstream.
StormFilters	Proprietary Ocean Protect filtration cartridges within the proposed OSD tank to contribute to the removal of suspended solids, phosphorus, and nitrogen.
Filterra basin	To contribute to the removal of suspended solids, phosphorus, and nitrogen.

The OSD tanks under the handstand area to the east of the northern warehouse is proposed to limit post-developed peak flows to pre-developed peak flow rates.

7.3 Proposed Water Management Measures

The proposed development utilises a treatment train approach whereby rainwater tanks, gully pit baskets, proprietary Ocean Protect StormFilters, and a Filterra basin are proposed to treat stormwater conveyed by the upstream piped network prior to discharging to the existing pond within the ENZ area. Rainwater tanks have also been incorporated to reduce the total volume of runoff discharging from the development. The treatment measures have been sized to treat the catchment area of the development and achieve the required water quality targets. In addition to the treatment train, the proposed OSD tank will attenuate peak flows.

7.3.1 Rainwater Tanks

Rainwater tanks have been incorporated to reduce the total volume of runoff discharging from the development. Refer to civil drawings MAR-AAP-DA-01-DRG-CV-0201 to MAR-AAP-DA-01-DRG-CV-0202 in Appendix A for indicative locations of the proposed rainwater tanks. Water collected from roof areas will be collected by rainwater tanks for reuse on site for non-potable purposes. The technical guidance document states that rainwater tanks within an industrial development must be sized to supply 80% of the development's non-potable water demand. The non-potable water demand for the development was calculated in line with Table 51 and Table 52 from the technical guidance document – see below.

Table 6: Non-potable water demand calculations

Water use	Demand
Toilet flushing	15L/persons/ha/day Assuming 21 persons/ha Demand = 15L x 21persons/ha x 7.20ha = 2268L/day = 2.3kL/day (1 d.p.)
Irrigation	Area = 50% of landscape areas Irrigation rate = 600mm/y Demand = 0.5 x 4166m^2 x 600mm/y = 1250m^3/y = 1250kL/y This annual demand was distributed using the monthly pattern provided in the technical guidance document.

Based on the calculated demand in Table 6 and the proposed combined roof catchment area of 3.59ha, rainwater tanks have been sized using MUSIC to balance supply and demand. To supply 80% of the non-potable water demand, five 27kL rainwater tanks will be required. MUSIC estimates that these five tanks will supply 89% of the non-potable water demand. The configuration and sizing of the rainwater tanks is to be confirmed during subsequent design phases.

7.3.2 Gully Pit Baskets

Gully pit baskets serve as a means of primary stormwater treatment and capture litter, debris, and coarse sediment. OceanGuard gully pit baskets are proposed in every inlet pit within the development. Having the OceanGuards treat flows upstream of the OSD tank will protect the proprietary Ocean Protect StormFilters, which will be contained within the OSD tank, from gross pollutants.

The OceanGuard has been included in the proposed MUSIC model using the parameters and modelling methodology set out in its verification certificate issued under the Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP) – refer to Appendix D.

7.3.3 Ocean Protect StormFilter Cartridges

44 proprietary Ocean Protect StormFilter cartridges are proposed within the OSD tank. The cartridges provide tertiary stormwater treatment and will contribute to the removal of suspended solids, phosphorus, and nitrogen. The StormFilter cartridges have been included in the proposed MUSIC model using the parameters and modelling methodology set out in their verification certificate issued under the SQIDEP – refer to Appendix D.

7.3.4 On Site Detention (OSD)

As discussed in Section 6.3, OSD is required to manage post-development flow rates. The OSD tanks will attenuate peak flows and the larger tank (A) on the southern side of the northern warehouse will house the Ocean Protect StormFilter cartridges. Table 7 summarises the parameters of the proposed OSD tanks.

Table 7: Detention system design parameters

Parameter	OSD Tank A	OSD Tank B
Area (m^2)	1,250	130
Required Internal Tank Depth (m)	2.58	2.66
Min. Detention Volume (m^3)	3,225	346

7.3.5 Filterra Basin

The Filterra basin has been included in the proposed MUSIC model using the parameters and modelling methodology set out in its verification certificate issued under the SQIDEP – refer to Appendix D. The basin has a filter media area of 306m^2, a filter depth of 530mm, and an extended detention depth of 150mm. The basin will be vegetated with plants for effective nutrient removal, have an underdrain present, and will not have a submerged zone. The Filterra basin will contribute to the removal of suspended solids, phosphorus, and nitrogen.

7.4 Water Quality and Water Quantity Modelling

Compliance with the water quality and water quantity targets outlined in the WSA DCP Phase 2 has been assessed using MUSIC (Version 6.3). The MUSIC model was created using prescribed parameters in accordance with the technical guidance document and the *MUSIC Modelling Toolkit – Wianamatta* (NSW DPHI, 2021).

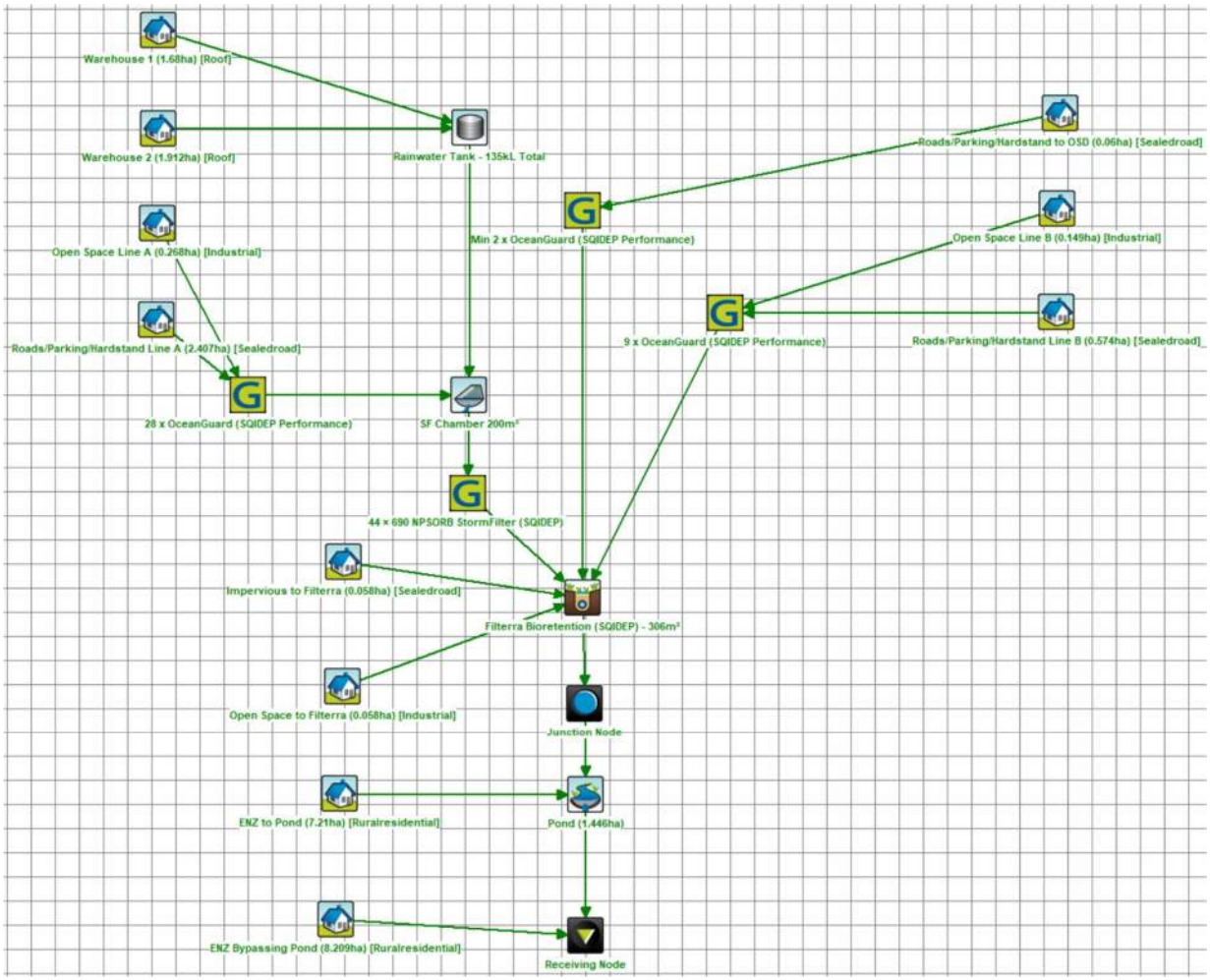


Figure 4: MUSIC model layout

The catchments in the MUSIC model upstream of the Filterra basin were determined using the architectural design layout of the development. Catchments downstream of the Filterra basin, within the ENZ area, were determined using site survey.

7.4.1 Water Quality Assessment

Pollutant load estimates were derived using MUSIC. Only the developed area has been assessed for compliance with the required water quality targets. Table 8 presents the estimated average annual pollutant loads from the proposed development and the performance of the adopted treatment train. These results are from the Junction node shown in Figure 4 and do not consider the ENZ area downstream of the development.

The results indicate that the proposed treatment measures are sufficient and that the Annual Load Reduction percentages will be achieved.

Table 8: MUSIC modelling water quality results

	Pollutant			
	GP	**TSS**	**TP**	**TN**
Source Loads Without Treatment (kg/yr)	1190	7400	14.8	95.6
Target Reduction Required (%)	90	90	80	65
Residual Load Modelled with Proposed Treatment Train (kg/yr)	0	318	3	33.7
Total Reduction Modelled (%)	100	96	80	65

7.4.2 Water Quantity Assessment

MUSIC was used to assess compliance with the MARV water quantity targets outlined in the DCP. The MUSIC modelling toolkit for Wianamatta includes a post-processing spreadsheet to assist in the assessment of proposed development against the required MARV targets. Note that the entire area, the development, and the ENZ area downstream of the development, were included in the MARV assessment. Regarding the existing pond in the ENZ area, assumptions were made about its initial pool volume (7500m^3), its permanent pool volume (11359m^3), and its extended detention depth (100mm) – these assumptions should be validated with survey during subsequent design phases. Table 9 presents the results from the toolkit's post-processing spreadsheet, which is included in full in Appendix E. Note that these results are dependent on the assumptions made regarding the existing pond in the ENZ area. The results are derived from daily flows exported out of MUSIC from the Receiving node shown in Figure 4. The results indicate that the development will achieve the required MARV targets.

Table 9: MUSIC modelling water quantity results

Indices	Target Required	Modelled Result
MARV (ML/ha/yr)	≤ 2	1.28
90th Percentile (L/ha/day)	1000 – 5000	1529
50th Percentile (L/ha/day)	5 to 100	14
10th Percentile (L/ha/day)	0	0

DRAINS was used to assess the pre-development and post-development peak flow rates for the developed catchment that will drain to the proposed OSD tanks. The peak flow rates are summarised in Table 10. The post-development peak flow rate is below the pre-development peak flow rate for each design storm event considered.

Table 10: Pre-development and post-development peak flow rates for catchment draining to OSD tanks

AEP	OSD Tank A		OSD Tank B	
	Pre-Development Peak Flow Rate (m^3/s)	Post-Development Peak Flow Rate (m^3/s)	Pre-Development Peak Flow Rate (m^3/s)	Post-Development Peak Flow Rate (m^3/s)
63.21%	0.109	0.105	0.017	0.016
50%	0.138	0.113	0.021	0.018
20%	0.305	0.293	0.050	0.049
10%	0.430	0.384	0.076	0.064
5%	0.549	0.484	0.098	0.096
2%	0.719	0.711	0.129	0.124
1%	0.872	0.823	0.160	0.144

7.5 Sydney Water Regional Scheme

In the interim scenario, the proposed stormwater management measures achieve the required water quality and water quantity targets without relying on future Sydney Water regional stormwater infrastructure. The NSW DPHI WSA Precinct Plan includes a regional plan covering total water cycle management within the WSA. This plan indicates that regional stormwater infrastructure is to be located downstream of the proposed development within the ENZ area – see Figure 5. In the interim scenario, prior to the regional infrastructure being operational, flows from the Filterra basin will discharge to the existing pond in the ENZ area. In the ultimate scenario, when the downstream regional stormwater infrastructure is operational, it will receive flows from the development's Filterra basin - subject to approval upon finalisation of Sydney Water's regional stormwater infrastructure. When details of the downstream infrastructure are available, water quantity results will need to be confirmed for the ultimate scenario, as the results may be impacted.

Figure 5: Extract from WSA Precinct Plan (Figure 6: Total Water Cycle Management)

Consultation with Sydney Water regarding their regional scheme is ongoing. As the scheme progresses and more detail regarding the regional stormwater infrastructure in the ENZ becomes available, delivery methods for the regional infrastructure will be explored as the project continues to collaborate with Sydney Water.

7.6 Management and Maintenance

The stormwater management measures proposed as part of the development will be managed and maintained by the proponent. During subsequent design phases, when the scope and layout of all required water management measures are confirmed, an Inspection and Maintenance Plan will be developed which will be submitted with the construction certificate application. The Inspection and Maintenance Plan will be prepared in accordance with the requirements outlined in applicable standards and outline the function of each measure, qualifications required to manage and maintain each measure, inspection activities and schedule, and requirements in relation to record keeping.

8 Water Cycle Management

8.1 Water Balance Overview

The potable water supply in the greater Sydney region is under increasing pressure due to population growth, potential impacts from climate change, and periods of drought. Development within the WSA is going to add to increasing demands on the available potable water supply. In consultation with Sydney Water, government entities are encouraging proposed development in the WSA to adopt a sustainable approach to integrated water cycle management (potable water, sewerage, stormwater, and rainwater) to minimise potable water demand and maximise water reuse on site for non-potable purposes where feasible.

Sydney Water is to manage the regional stormwater network within the WSA. The regional stormwater management strategy includes a reticulated recycled water network.

8.2 Water Demand

Water will be required by the proposed development for office amenities (kitchen and bathroom) and irrigation of landscaped areas. The water demand of the development will be confirmed during subsequent design phases.

8.3 Water Supply

The primary source of water to the development will be Sydney Water's potable water network. Refer to Section 9.2 for details of Sydney Water's existing potable water network in the area, and the proposed augmentations that will be required to service the development.

A reticulated recycled water network is proposed to supply non-potable water throughout the WSA. This network will provide a secondary source of water to the development, to be used for non-potable purposes. The primary source of non-potable water for the development will be the proposed rainwater tanks.

8.4 Water Use Minimisation

Sydney Water provides advice and guidance on minimising water use and improving water efficiency. Although warehouses use relatively little water compared to other industrial developments, the water use minimisation principles below will apply to the development:

- Where possible, avoid using water by opting for alternatives like sweeping hard surfaces instead of hosing them down.
- Reduce water use by installing water efficient appliances and equipment (eg. dishwashers, toilets).
- Reuse water for non-potable purposes (eg. collect rainwater for landscape irrigation and toilet flushing).

9 Utility Services

9.1 Existing utilities in the vicinity of the site

A desktop study has been undertaken using information received in response to an inquiry lodged with Before You Dig Australia (BYDA) and Google Street View. The following utility services are located within the vicinity of the site:

- Potable Water (Sydney Water)
- Electrical (Endeavour Energy)
- Telecommunications (Telstra)
- Gas (Jemena)

There is no wastewater within the immediate vicinity of the site.

9.2 Potable Water

9.2.1 Existing

Sydney Water is the utility authority for potable water in the Greater Sydney area, including the WSA. The BYDA plans received from Sydney Water indicate an existing100mm diameter uPVC watermain on the western side of Martin Road.

9.2.2 Demand Assessment

An assessment of the estimated potable water demand generated by the development has been undertaken. Demand estimates for potable water have been based on Sydney Water's Average Daily Water Use By Property Development Type schedule for warehousing (2.82L/m2) and offices (2.27L/m2) respectively. The daily demand for the development is 78kL/day (see Appendix G).

It is noted that should industrial uses other than warehousing be considered for the development in future, the demand rates given may increase.

9.2.3 Proposed

Following the lodgement of a feasibility application with Sydney Water, initial advice was received in December 2023 (see Appendix F) that states that *"the area is currently supplied with rural drinking water infrastructure and does not have capacity to service developments within this area prior to delivery of major system amplifications... Sydney Water is delivering trunk infrastructures in stages to service Western Sydney Aerotropolis Growth Area."* Precinct trunk and reticulation amplifications will be required to service the development, with Sydney Water's delivery timeframes to align with road infrastructure. Figure 6, from Sydney Water's *WSA (Initial Precincts) Stormwater and Water Cycle Management Study (2021),* shows the proposed drinking water infrastructure for the region.

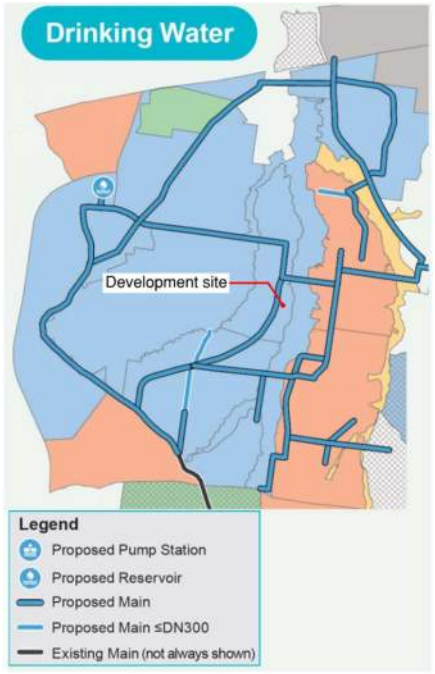


Figure 6: Sydney Water's proposed drinking water infrastructure

9.3 Wastewater

9.3.1 Existing

Sydney Water is the utility authority for wastewater in the Greater Sydney area, including the WSA. The BYDA plans received from Sydney Water indicate that there is no existing sewer infrastructure within the vicinity of the site.

9.3.2 Demand Assessment

An assessment of the estimated sewer loading generated by the development has been undertaken. Sewer loading has been calculated as 80% of potable water demand. The daily demand for the development is 62.4kL/day

It is noted that should industrial uses other than warehousing be considered for the development in future, the demand rates given may increase.

9.3.3 Proposed

The development site is within Sydney Water's Badgerys Creek Growth Area and is in the proposed South Creek wastewater catchment. Feasibility advice from Sydney Water (see Appendix F) notes that Stage 1 of the South Creek wastewater network will include a gravity trunk wastewater carrier along the western side of South Creek, which will transfer flows to the proposed Upper South Creek Advanced Wastewater Recycling Centre via a pumping station. The proposed development will connect to the trunk main via a proposed maintenance hole within the site.

In March 2024, EMKC Cubed and Arcadis met with Sydney Water to discuss the proposed development and servicing requirements. Sydney Water advised that the trunk main, currently in the concept design phase, is

expected to be delivered between 2026-2028. Figure 7 shows the concept alignment of the trunk main through the site. The alignment of the trunk main is subject to change and consultations with Sydney Water are ongoing.

If construction of the Sydney Water trunk main has not been completed by the time the development is to be operational, septic tanks will be utilised that will require periodic pump out. Refer to civil drawings MAR-AAP-DA-01-DRG-CV-0201 to MAR-AAP-DA-01-DRG-CV-0202 in Appendix A for indicative locations of the proposed septic tanks.

Figure 7: Alignment of Sydney Water's proposed gravity sewer trunk main

9.4 Recycled Water

9.4.1 Existing

There is no existing recycled water infrastructure located within the vicinity of the site.

9.4.2 Proposed

Feasibility advice received from Sydney Water in December 2023 (see Appendix F) advised that a reticulated recycled water network is proposed for the South Creek wastewater catchment. The recycled water network is to be supplied by the South Creek Advanced Water Recycling Centre, which is expected to operate from 2026/2027 (subject to funding approval). The recycling scheme is currently in the planning phase.

The primary source of non-potable water for the development will be the proposed rainwater tanks that have been sized to supply 80% of the non-potable water demand (refer to Section 7.3.1). Sydney Water's recycled water network will be a secondary source of non-potable water to the development and a connection to the network is not required for the development to be operational.

Figure 8 in Sydney Water's *WSA (Initial Precincts) Stormwater and Water Cycle Management Study (2021),* shows the proposed recycled water infrastructure for the South Creek Advanced Water Recycling Centre.

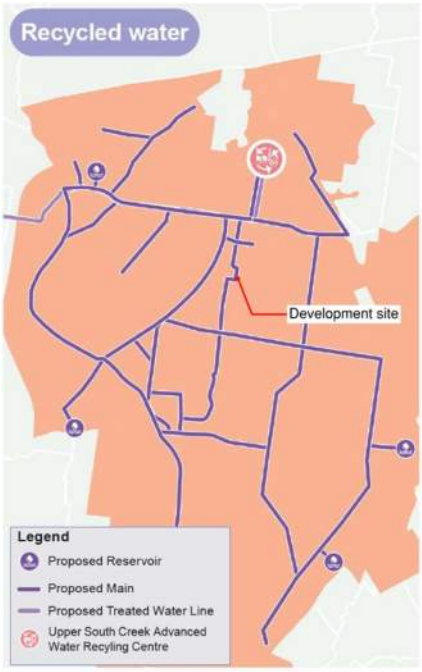


Figure 8: Sydney Water's proposed recycled water infrastructure

9.5 Electricity

9.5.1 Existing

BYDA plans received from Endeavour Energy indicate existing underground electrical infrastructure adjacent to the site along Martin Road. Google Street View also shows aerial electrical infrastructure adjacent to the site. Using Endeavour Energy's ASP Map portal, it was determined that the site currently has a low voltage supply pole in the north west corner adjacent to Martin Road. This supply comes via a feeder from the Kemps Creek zone substation. It is also noted that there is an existing high voltage customer further south on Martin Road.

9.5.2 Demand Assessment

An assessment of the estimated increase in electrical demand, generated by the development has been undertaken. Electrical demands are based on the methods described in Australian Standard's Demand Method for Non-Domestic Installations (AS3000 Table C3) and common industry practice. The estimated maximum electrical demand for the development is 791kVA (see Appendix G).

9.5.3 Proposed

It is anticipated that future electrical services for the proposed development will be serviced from infrastructure in Martin Road. It is anticipated that two new substations will be required to service the development, one for each proposed warehouse. A technical review enquiry is being lodged with Endeavour Energy to understand if there is sufficient capacity in the existing network to supply the proposed development.

9.6 Telecommunications

9.6.1 Existing

Telstra is one of the telecommunications utility authorities in the WSA. The BYDA plans received from Telstra indicate a mix of aerial and in ground telecommunications infrastructure adjacent to the site along Martin Road.

9.6.2 Proposed

It is anticipated that future telecommunication services for the proposed development will be serviced from infrastructure in Martin Road. A feasibility application will need to be lodged with NBN Co to determine if there are plans to extend the NBN network to the site. Alternatively, a feasibility application could be lodged with Telstra to determine if the existing infrastructure on Martin Road could service the proposed development.

9.7 Gas

9.7.1 Existing

Jemena is the largest gas distributor in New South Wales. The BYDA plans received from Jemena indicate an existing 200mm diameter steel 1050kPa high pressure gas main along Martin Road.

9.7.2 Proposed

Consultations with Jemena have commenced and they have confirmed the presence of a secondary high pressure gas main along Martin Road. Jemena has noted that construction of driveways over the existing gas main is acceptable subject to a design review. It is anticipated that the proposed development could be supplied from this existing gas main, this is to be confirmed.

9.8 Lead in Utility Funding

Table 11 summarises the infrastructure delivery responsibilities and funding of lead in services to the site.

Table 11: Lead in utility funding and delivery summary

Name of Lead In Infrastructure	Funding Source	Delivery by the Proponent	Delivery Year
Potable Water	Sydney Water with developers paying DSP charges	No	To be confirmed - in line with adjacent road upgrades
Wastewater	Sydney Water with developers paying DSP charges	No	2026-2028
Recycled Water	Sydney Water with developers paying DSP charges	No	2026/2027
Electrical	To be confirmed	To be confirmed	2026
Telecommunications	To be confirmed	To be confirmed	To be confirmed
Gas	To be confirmed	To be confirmed	To be confirmed

Appendix A

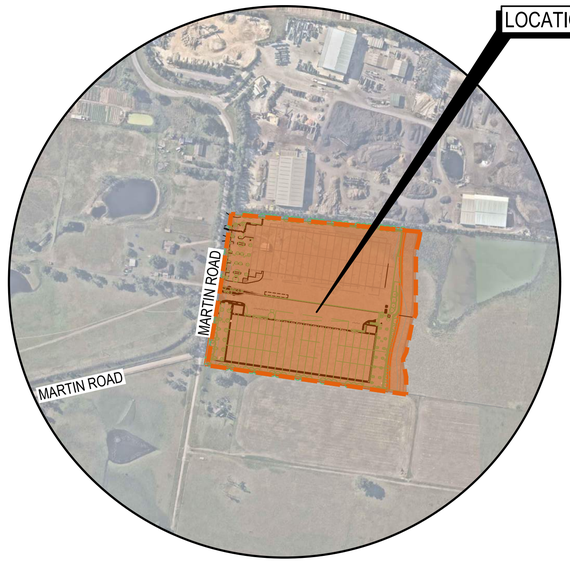
Arcadis Civil Engineering Drawings

230 MARTIN ROAD BADGERYS CREEK

STATE SIGNIFICANT DEVELOPMENT APPLICATION (SSD-65529236)

DRAWING SCHEDULE

DRAWING NUMBER	DESCRIPTION
GENERAL	
MAR-AAP-DA-01-DRG-CV-0001	COVER SHEET, LOCALITY PLAN AND DRAWING SCHEDULE
MAR-AAP-DA-01-DRG-CV-0021	GENERAL NOTES
MAR-AAP-DA-01-DRG-CV-0061	GENERAL ARRANGEMENT PLAN
EARTHWORKS	
MAR-AAP-DA-01-DRG-CV-0101	BULK EARTHWORKS PLAN SHEET 1
MAR-AAP-DA-01-DRG-CV-0102	BULK EARTHWORKS PLAN SHEET 2
MAR-AAP-DA-01-DRG-CV-0121	BULK EARTHWORKS SITE SECTIONS SHEET 1
MAR-AAP-DA-01-DRG-CV-0122	BULK EARTHWORKS SITE SECTIONS SHEET 2
MAR-AAP-DA-01-DRG-CV-0141	RETAINING WALL PLAN SHEET 1
MAR-AAP-DA-01-DRG-CV-0142	RETAINING WALL PLAN SHEET 2
MAR-AAP-DA-01-DRG-CV-0143	RETAINING WALL PLAN SHEET 3
MAR-AAP-DA-01-DRG-CV-0144	RETAINING WALL PLAN SHEET 4
MAR-AAP-DA-01-DRG-CV-0145	RETAINING WALL PLAN SHEET 5
MAR-AAP-DA-01-DRG-CV-0146	RETAINING WALL PLAN SHEET 6
MAR-AAP-DA-01-DRG-CV-0147	RETAINING WALL PLAN SHEET 7
ROADWORKS	
MAR-AAP-DA-01-DRG-CV-0201	CIVIL WORKS PLAN SHEET 1
MAR-AAP-DA-01-DRG-CV-0202	CIVIL WORKS PLAN SHEET 2
MAR-AAP-DA-01-DRG-CV-0241	TYPICAL SITE SECTIONS
STORMWATER	
MAR-AAP-DA-01-DRG-CV-0481	TYPICAL STORMWATER DRAINAGE DETAILS
MAR-AAP-DA-01-DRG-CV-0491	BASIN DETAIL PLAN



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Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

N

0 50 100 200 300 400 500m

1 : 5000

Surveyor

ENG LAND SERVICES

Client & Architect

EMKC³ development | cubed

Status

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project

230 MARTIN ROAD,
BADGERYS CREEK

Title

COVER SHEET, LOCALITY PLAN AND DRAWING SCHEDULE

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0001

Issue: 04

Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0001-CoverSheetAndDrawingList.dwg

GENERAL

1. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH THE LIVERPOOL CITY COUNCIL ENGINEERING GUIDELINES FOR DEVELOPMENT AND SUBDIVISION WORKS RELEVANT AUSTRALIAN STANDARDS, OTHER CONSULTANTS DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED.
2. ANY DISCREPANCIES OR OMISSIONS SHALL BE REFERRED TO THE SUPERINTENDENT FOR A DECISION BEFORE PROCEEDING WITH THE WORK.
3. ALL WORKMANSHIP AND MATERIALS SHALL COMPLY WITH THE BUILDING CODE OF AUSTRALIA AS AMENDED AND THE APPROPRIATE AND CURRENT AUSTRALIAN STANDARDS.
4. ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE.
5. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS.
6. ALL DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE VERIFIED ON SITE BY THE BUILDER PRIOR TO CONSTRUCTION OR FABRICATION.
7. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL ENGINEERING DESIGN FOR DEVELOPMENT GUIDELINES. ENGINEERING CONSTRUCTION CODE AND STANDARD DRAWINGS. WHERE DISCREPANCIES OCCUR THE MORE STRINGENT SPECIFICATION WILL TAKE PRECEDENCE.
8. THE CONTRACTOR SHALL LOCATE AND LEVEL ALL EXISTING SERVICES PRIOR TO COMMENCING CONSTRUCTION AND SHALL MAKE ALL NECESSARY ARRANGEMENTS WITH THE RELEVANT AUTHORITY TO RELOCATE OR ADJUST AS REQUIRED. ALL COSTS TO BE BORNE BY THE APPLICANT.
9. THE CONTRACTOR SHALL NOT ENTER UPON OR DO ANY WORK WITHIN ADJACENT LAND WITHOUT PRIOR WRITTEN PERMISSION OF THE LAND OWNER.
10. THE CONTRACTOR SHALL PROVIDE MINIMUM 48 HOURS NOTICE TO THE PRINCIPAL FOR ALL INSPECTIONS.

FINISHED SURFACE LEVELS

1. ALL FINISHED SURFACE LEVELS ARE +/- 1m U.N.O.

SITEWORKS NOTES

1. ORIGIN OF LEVELS:- REFER SURVEY NOTES.
2. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO THE SUPERINTENDENT.
3. MAKE SMOOTH CONNECTION WITH EXISTING WORKS.
4. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
5. ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED IN ACCORDANCE WITH LIVERPOOL CITY ENGINEERING DESIGN FOR DEVELOPMENT GUIDELINES AND HS3 BEDDING OR RELEVANT AUTHORITY STANDARD.
6. ALL BASE COURSE MATERIAL SHALL BE COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
7. ALL SUB-BASE COURSE MATERIAL SHALL BE COMPACTED TO MINIMUM 95% MODIFIED DENSITY IN ACCORDANCE WITH A S 1289 5.2.1. BEFORE PLACING FILL, PROOF ROLL EXPOSED SUBGRADE WITH AN 8 TONNE (MIN) DEADWEIGHT SMOOTH DRUM NON-VIBRATORY ROLLER TO DETECT THEN REMOVE SOFT SPOTS (AREAS WITH MORE THAN 2mm MOVEMENT UNDER ROLLER). SOFT SPOTS ARE TO BE REPLACED WITH SUITABLE SELECT FILL FOR A DEPTH OF AT LEAST 0.5m OR AS ADVISED BY THE GEOTECHNICAL ENGINEER.
8. SELECT MATERIAL FOR BACKFILLING SHALL BE GRANULAR MATERIAL WHICH IS NATURALLY OCCURRING, HAVING A PARTICLE SIZE DISTRIBUTION, DETERMINED IN ACCORDANCE WITH AS 1289. 3.6.1. SELECT MATERIAL CAN BE CRUSHED ROCK, NATURAL SOIL, GRAVEL AND SAND, OR OTHER APPROVED GRANULAR MATERIAL CONSISTING OF CLEAN, SOUND, DURABLE FRAGMENTS, FREE FROM ORGANIC MATTER FROM AN APPROVED SOURCE. GRADING LIMITS FOR SELECT FILL SHALL BE IN ACCORDANCE WITH AS 3725 AND LIVERPOOL CITY COUNCIL ENGINEERING DESIGN FOR DEVELOPMENT GUIDELINES.
9. ALL FREQUENCY OF COMPACTION TESTING SHALL BE IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL ENGINEERING OR RELEVANT AUSTRALIAN STANDARDS.
10. FILL MATERIAL SHALL BE SPREAD IN LAYERS MAXIMUM 300mm THICK AND COMPACTED TO SPECIFICATION.
11. WHERE NOTED ON THE DRAWINGS THAT WORKS ARE TO BE CARRIED BY OTHERS, (eg. ADJUSTMENT OF SERVICES), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THESE WORKS.

KERB AND GUTTER NOTES

1. ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 32MPa U.N.O IN REINFORCED CONCRETE NOTES.
2. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON MIN. 175mm DGB20 COMPACTED TO MINIMUM 98% MODIFIED DRY DENSITY (AS 1289 5.2.1).
3. EXPANSION JOINTS (E.J) TO BE FORMED FROM 12mm COMPRESSIBLE JOINT FILLER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX 9m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
4. WEAKENED PLANE JOINTS TO BE 3mm TO 5mm WIDE AND LOCATED AT 900mm CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
5. LIGHT BROOM FINISH TO ALL FOOTPATHS, PRAM RAMPS AND DRIVEWAYS.
6. IN THE REPLACEMENT OF KERB AND GUTTER :-
   EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm U.N.O FROM THE LIP OF GUTTER. UPON COMPLETION OF THE NEW KERB AND GUTTER NEW BASECOURSE AND SURFACE TO BE LAID 900mm WIDE U.N.O.
7. EXISTING KERB AND GUTTER IS TO BE COMPLETELY REMOVED WHERE NEW KERB AND GUTTER IS SHOWN.

STREET FURNITURE

1. ALL SIGNAGE TO BE IN ACCORDANCE WITH THE CURRENT VERSION OF THE R.M.S REGULATORY SIGNS MANUAL.
2. ALL LAMP COLUMNS TO BE IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL AND / OR ENDEAVOUR ENERGY ENERGY SPECIFICATIONS.

SURVEY NOTES

1 DETAILED GROUND SURVEY WITHIN THE SITE AND BOUNDARIES WERE SUPPLIED BY ENG LAND SERVICES, DRAWING REFERENCE: 230508D1GN
SURVEY IS IN MGA2020 COORDINATE SYSTEM AND TO AUSTRALIAN HEIGHT DATUM.

2. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. ARCADIS DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.
3. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT ARCADIS.

MARK ADOPTED: SSM 33801

RL: 62.465

TRAFFIC CONTROL NOTES

1. A TRAFFIC CONTROL PLAN IF REQUIRED IS TO BE PREPARED AND LODGED WITH COUNCIL BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION.

GEOTECHNICAL NOTES

1. THE CONTRACTOR SHALL REVIEW FORTIFY GEOTECH GEOTECHNICAL INVESTIGATION REPORT DATED OCTOBER - NOVEMBER 2023 REFERENCE NUMBER.JS/S2024 TO SATISFY THEMSELVES OF THE ANTICIPATED GROUND CONDITIONS DURING EARTHWORKS. THE CONTRACTOR MUST ALLOW FOR ADDITIONAL GEOTECHNICAL INVESTIGATIONS & TESTING DURING CONSTRUCTION TO VERIFY SUBGRADE CONDITIONS AND APPROPRIATE TREATMENTS ON SITE THAT ARE CONSISTENT WITH THE PARAMETERS USED IN THE PAVEMENT DESIGN.

CONCRETE NOTES

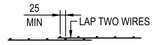
1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS AND LIVERPOOL CITY COUNCIL GUIDELINES FOR DEVELOPMENT AND SUBDIVISION WORKS - CONCRETE PAVEMENT NOTES.
2. CONCRETE QUALITY
   ALL REQUIREMENTS OF THE CURRENT AUSTRALIAN STANDARD SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	AS3600 F'c MPA AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
VEHICULAR BASE	32	60	20
KERBS, PATHS AND PITS	32	80	20
DRAINAGE PITS	32	80	20
RETAINING WALL FOOTING	32	80	20
IN CONTACT WITH SALTWATER	40	80	20
IN CONTACT WITH ACID SULFATE SOIL	50	80	20

- CEMENT TYPE SHALL BE (AS 3600) TYPE SL
- CEMENT TYPE SHALL BE TYPE SR FOR ALL ELEMENTS IN CONTACT WITH ACID SULFATE SOIL
- PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379.

3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY ARCADIS.
4. CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 50mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.
6. THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH RMS SPECIFICATION R83.
7. REINFORCEMENT SYMBOLS:
   N - DENOTES GRADE 450 N BARS TO AS 4671 GRADE N
   R - DENOTES 230 R HOT ROLLED PLAIN BARS TO AS 4671
   SL - DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS 4671
   NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE
   17 N 20 250
   NOMINAL BAR SIZE IN mm — SPACING IN mm

   THE FIGURE FOLLOWING THE FABRIC SYMBOL SL IS THE REFERANCE NUMBER FOR FABRIC TO AS 4671.
8. REINFORCEMENT SHOULD HAVE THE FOLLOWING MINIMUM COVER:
   - 40mm MINIMUM (AS PER LIVERPOOL CITY COUNCIL SPECIFICATIONS)
   - 50mm FOR CONCRETE CAST IN CONTACT WITH EARTH OR FRESH WATER
   - 55mm FOR CONCRETE CAST IN CONTACT WITH SALTWATER
   - 65mm FOR CONCRETE CAST IN CONTACT WITH ACID SULFATE SOIL
   - AS NOTED ON DESIGN DRAWINGS AND DETAILS
9. FABRIC SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING DETAIL:



JOINTING NOTES

PEDESTRIAN PAVEMENT JOINTS

1. ALL PEDESTRIAN PAVEMENTS ARE TO BE JOINTED IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL STANDARD DRAWINGS R23 AND R24.
2. WHERE POSSIBLE JOINTS SHOULD BE LOCATED TO MATCH KERBING AND OR ADJACENT PAVEMENT JOINTS.
3. PEDESTRIAN PAVEMENT JOINT LOCATIONS TO BE CONFIRMED BY PAVEMENT DESIGN FOLLOWING IN-SITU MATERIAL TESTING AND LIVERPOOL CITY COUNCIL ENGINEERING DESIGN CODE.
4. REFER TO LANDSCAPE ARCHITECTS PLANS FOR ALL OTHER PEDESTRIAN PAVEMENT JOINT SPECIFICATIONS.

PAVEMENT NOTES:

1. PAVEMENT IS TO BE INSTALLED IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL ENGINEERING DESIGN FOR DEVELOPMENT GUIDELINES SECTION 3.6 PAVEMENT DESIGN.
2. SUBSOIL DRAINAGE TO BE PROVIDED IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL ENGINEERING DESIGN FOR DEVELOPMENT GUIDELINES SECTION 3.6 (IX) SUBSOIL DRAINAGE.

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

1. THE SITE SUPERINTENDENT/ENGINEER WILL ENSURE THAT ALL SOIL AND WATER MANAGEMENT WORKS ARE IMPLEMENTED AND MAINTAINED TO SUIT THE CONSTRUCTION STAGING AND METHODOLOGY AND THE SITE AND WEATHER CONDITIONS AT THE TIME.
2. ALL WORK SHALL BE GENERALLY CARRIED OUT IN ACCORDANCE
   2.1. WITH LOCAL AUTHORITY REQUIREMENTS
   2.2. EPA REQUIREMENTS
   2.3. LANDCOM MANUAL "MANAGING URBAN STORMWATER, SOILS AND CONSTRUCTION", 4th EDITION, MARCH 2004.
3. MAINTAIN THE EROSION CONTROL DEVICES TO THE SATISFACTION OF THE SUPERINTENDENT AND THE LOCAL AUTHORITY.
4. WHEN STORMWATER PITS ARE CONSTRUCTED, PREVENT SITE RUNOFF ENTERING UNLESS SEDIMENT FENCES ARE ERECTED AROUND PITS OR THE STORMWATER OUTLET PITS AND PIPES HAVE BEEN CONSTRUCTED.
5. CONTRACTOR IS TO ENSURE ALL EROSION & SEDIMENT CONTROL DEVICES ARE MAINTAINED IN GOOD WORKING ORDER AND OPERATE EFFECTIVELY. REPAIRS AND OR MAINTENANCE SHALL BE UNDERTAKEN AS REQUIRED, PARTICULARLY FOLLOWING STORM EVENTS.

LAND DISTURBANCE

6. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE.

EROSION CONTROL

7. DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS WILL BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER TO KEEP DUST UNDER CONTROL.
8. SITE STABILISATION BY APPLICATION OF SEEDED HYDROMULCH WILL BE UNDERTAKEN AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.

SEDIMENT CONTROL

9. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.
10. CONTRACTOR TO DESIGN AND MANAGE ALL OF THE STOCKPILE REQUIREMENTS.
11. CONTRACTOR TO CONSIDER CONSTRUCTION ENVIRONMENTAL MANAGEMENT REPORT. ANY PROTECTED TREES TO BE REMOVED SHALL BE CONSULTED WITH THE ARBORIST.
12. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
13. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

OTHER MATTERS

14. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.
15. ALL TREES WITHIN THE EXTENT OF PROPOSED WORKS ARE TO BE REMOVED AND DISPOSED OF BY THE CONTRACTOR.

TELSTRA - DUTY OF CARE NOTE

1. TELSTRA'S PLANS SHOW ONLY THE PRESENCE OF CABLES AND PLANT. THEY ONLY SHOW THEIR POSITION RELATIVE TO ROAD BOUNDARIES, PROPERTY FENCES ETC. AT THE TIME OF INSTALLATION AND TELSTRA DOES NOT WARRANT OR HOLD OUT THAT SUCH PLANS ARE ACCURATE THEREAFTER DUE TO CHANGES THAT MAY OCCUR OVER TIME. DO NOT ASSUME DEPTH OR ALIGNMENT OF CABLES OR PLANT AS THESE VARY SIGNIFICANTLY.
2. THE CONTRACTOR HAS A DUTY OF CARE WHEN EXCAVATING NEAR TELSTRA CABLES AND PLANT. BEFORE USING MACHINE EXCAVATORS TELSTRA PLANT MUST FIRST BE PHYSICALLY EXPOSED BY SOFT DIG POTHOLING TO IDENTIFY ITS LOCATION TELSTRA WILL SEEK COMPENSATION FOR DAMAGES CAUSED TO ITS PROPERTY AND LOSSES CAUSED TO TELSTRA AND ITS CUSTOMERS.

EXISTING UNDERGROUND SERVICES NOTES

1. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN IN THIS SET OF DRAWINGS HAVE BEEN PLOTTED FROM SURVEY INFORMATION AND SERVICE AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.
   ARCADIS CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN FROM ANY CAUSE WHATSOEVER.
2. CONTRACTORS SHALL TAKE DUE CARE WHEN EXCAVATING ONSITE INCLUDING HAND EXCAVATION WHERE NECESSARY.
3. CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION WORKS.
4. CONTRACTORS ARE TO UNDERTAKE A SERVICES SEARCH, PRIOR TO COMMENCEMENT OF WORKS ON SITE. SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.

STORMWATER DRAINAGE NOTES

1. STORMWATER DESIGN CRITERIA:
   SITE DRAINAGE
   5% AEP MINOR STORM EVENT
   1% AEP MAJOR STORM EVENT
2. ALL STORMWATER DRAINAGE INFRASTRUCTURE TO BE CONSTRUCTED IN ACCORDANCE WITH RELEVANT LIVERPOOL CITY COUNCIL STANDARDS.
3. REINFORCED CONCRETE CLASS '3' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS.
4. REINFORCED BOX CULVERTS TO BE EXPOSURE CLASS C2.
5. PIPES UP TO 300mm DIA SHALL BE BACKFILLED WITH COMPACTED GRANULAR MATERIAL AND INSTALLED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION.
6. ALL STORMWATER TRENCHES AND BEDDING SHALL BE BACKFILLED IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL ENGINEERING DESIGN DEVELOPMENT.
7. ALL INTERNAL STORMWATER DRAINAGE WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS 3500 3.1 AND AS/NZS 3500 3.2.
8. ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA.
9. WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED uPVC SEWER GRADE PIPE IS TO BE USED.
10. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL.
11. GRATES AND COVERS SHALL CONFORM TO AS 3996.
12. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.
13. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS.
14. STEP IRONS ARE TO BE PROVIDED IN ALL PITS DEEPER THAN 1.0m IN ACCORDANCE WITH LIVERPOOL CITY COUNCIL ENGINEERING SPECIFICATIONS.
15. CCTV ALL PIPES AFTER CONSTRUCTION AND PRIOR TO PRACTICAL COMPLETION. THIS INCLUDES ALL EXISTING PIPES THAT ARE TO BE RETAINED.
16. PIPES ARE DESIGNED FOR OPERATIONAL LOADS ONLY. APPROPRIATE MEASURES SHOULD BE TAKEN TO PROTECT PIPES DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR REPLACING ANY DAMAGED PIPE.
17. PREFABRICATED PITS TO COME FROM A QUALITY ASSURED SUPPLIER. CONTRACTOR TO INSPECT PITS WHEN DELIVERED TO SITE PRIOR TO INSTALLATION. ONLY THE DESIGNED KNOCKOUT AREAS TO BE USED FOR PIPE ENTRIES. ANY CRACKS IN PITS OR EVIDENCE THAT CONTRACTOR HAS EXTENDED THE KNOCKOUT AREA SHALL RENDER THE PIT UNACCEPTABLE. IT IS RECOMMENDED TO SAW CUT THE KNOCK OUT AREA WHEN CREATING THE OPENING IN THE PIT FOR THE PIPE TO MINIMISE POTENTIAL DAMAGE TO PIT.
18. CONTRACTOR TO CCTV STORMWATER DRAINAGE NO SOONER THAN AFTER BASE COURSE LAYER IS PLACED. ANY DAMAGE TO PIPES / CULVERTS MUST BE REPORTED TO THE PCA PRIOR TO UNDERTAKING ANY REPAIRS. IT IS TO BE NOTED THAT ANY DAMAGE TO PIPES / CULVERTS IDENTIFIED IN THE CCTV REPORT THAT ARE LOCATED UNDER ROADS SHALL AS A MINIMUM REQUIRE A FULL SLEEVE REPAIR FROM PIT TO PIT. CIRCUMFERENTIAL CRACKS IN OTHER LOCATIONS SHALL AS A MINIMUM REQUIRE A SLEEVE REPAIR. THE REPAIR SHALL BE DONE BY AN APPROVED CONTRACTOR. A CCTV REPORT ON ALL REPAIRS WILL BE REQUIRED BY COUNCIL.
19. PVC PIPES SHOULD BE INSTALLED IN ACCORDANCE WITH AS 2032:2006 INSTALLATION OF PVC PIPE SYSTEMS.

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

Scales

100mm on Original

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: GENERAL NOTES

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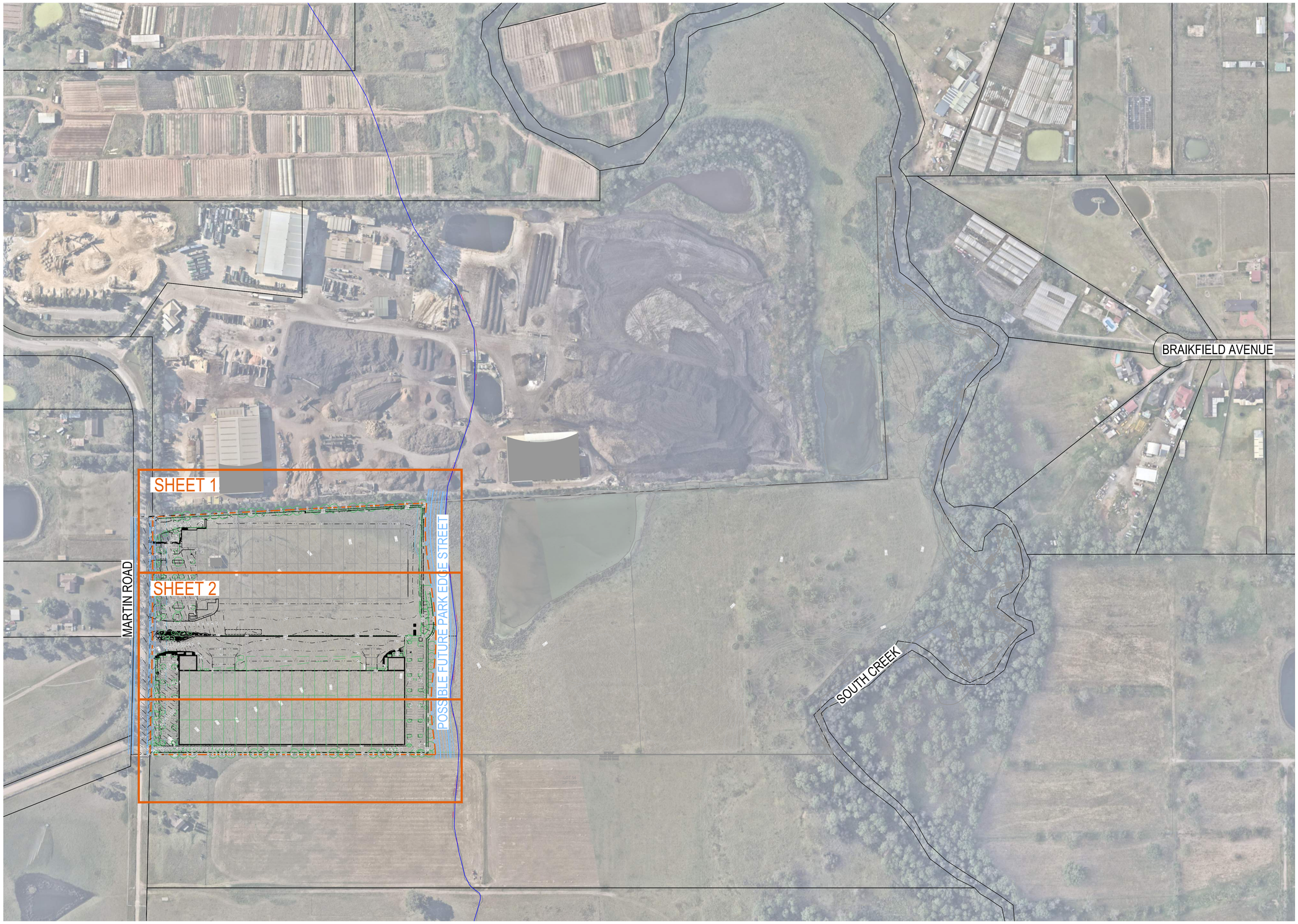
Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0021

Issue: 04

Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0021-GeneralNotes.dwg



LEGEND

- 5.0 DESIGN SURFACE CONTOUR
- 5.0 EXISTING SURFACE CONTOUR
- EXTENT OF WORK BOUNDARY
- SHEET LAYOUT
- PROPOSED ARCHITECTURAL
- BY OTHERS

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KR	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
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01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

0 50 100 150 200m

1 : 2000

Surveyor

ENG LAND SERVICES

Client & Architect

EMKC³ development | cubed

Status

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Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project

230 MARTIN ROAD,
BADGERYS CREEK

Title

GENERAL ARRANGEMENT PLAN

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Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0061

Issue: 04

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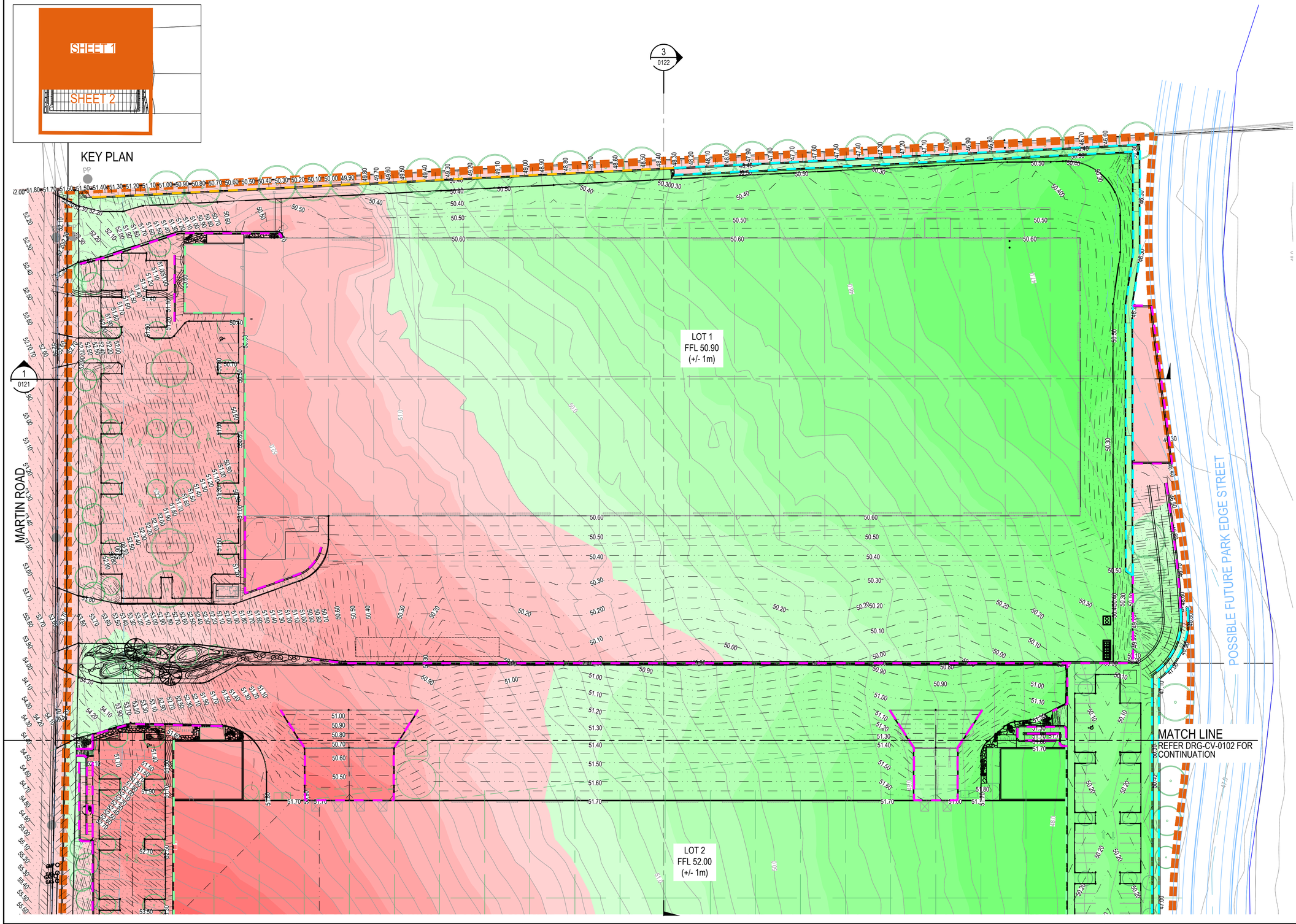

LEGEND

- BULK EARTHWORKS CONTOUR
- EXISTING SURFACE CONTOUR
- SITE BOUNDARY
- BLOCK WORK RETAINING WALL MAX HEIGHT 4.5m
- 2-TIERED LANDSCAPED RETAINING WALL MAX HEIGHT 4m
- 1-TIERED LANDSCAPED RETAINING WALL MAX HEIGHT 2m
- BUILDING RETAINING WALL (REFER TO ARCHITECTS DRAWINGS FOR DETAILS)
- FBEL — FINISHED BULK EARTHWORKS LEVEL
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS

NOTES

1. THE EXISTING SURFACE IS TAKEN FROM SURVEY BY ENG LAND SERVICES 230508D1GN DATED 08.05.23
2. TOPSOIL STRIP DEPTH OF 300mm HAS BEEN APPLIED BASED ON THE GEOTECHNICAL INVESTIGATION REPORT DATED OCTOBER - NOVEMBER 2023 REFERENCE NUMBER:JS/S2024.
3. EARTHWORKS VOLUMES HAVE BEEN CALCULATED BETWEEN THE STRIPPED EXISTING SURFACE AND STRIPPED DESIGN EARTHWORKS SURFACE AND SHOULD BE CONSIDERED APPROXIMATE ONLY. DESIGN SURFACE HAS BEEN STRIPPED 300mm.
4. NO ALLOWANCE HAS BEEN MADE FOR
   - SELECT BACKFILL FOR RETAINING WALLS
   - UTILITIES TRENCHING
   - BUILDING SLABS
   - PAVEMENT BOXOUT DEPTHS
   - SEDIMENT CONTROL BASIN
   - RECESSED DOCKS
5. NO COMPACTION OR BULKING FACTORS HAVE BEEN APPLIED
6. LEVELS MAY VARY +/- 1m.

CUT / FILL VOLUMES

CUT	-44,225m³
FILL	80,492m³
BALANCE (IMPORT)	36,267m³
TOPSOIL STRIP VOLUME	-22,819m³

NOTE: NO COMPACTION OR BULKING FACTORS HAVE BEEN APPLIED.

CUT FILL DEPTH RANGE

LOWER_VALUE		UPPER_VALUE		COLOUR
-5	TO	-4.5	m	
-4.5	TO	-4	m	
-4	TO	-3.5	m	
-3.5	TO	-3	m	
-3	TO	-2.5	m	
-2.5	TO	-2	m	
-2	TO	-1.5	m	
-1.5	TO	-1	m	
-1	TO	-.5	m	
-.5	TO	0.00	m	
0.00	TO	.5	m	
.5	TO	1	m	
1	TO	1.5	m	
1.5	TO	2	m	
2	TO	2.5	m	
2.5	TO	3	m	
3	TO	3.5	m	
3.5	TO	4	m	
4	TO	4.5	m	
4.5	TO	5	m	
5	TO	5.5	m	

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Scales

N

0 5 10 20 30 40 50m

1 : 500

100mm on Original

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
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Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: BULK EARTHWORKS PLAN SHEET 1

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Drawing No.: MAR-AAP-DA-01-DRG-CV-0101

Issue: 04

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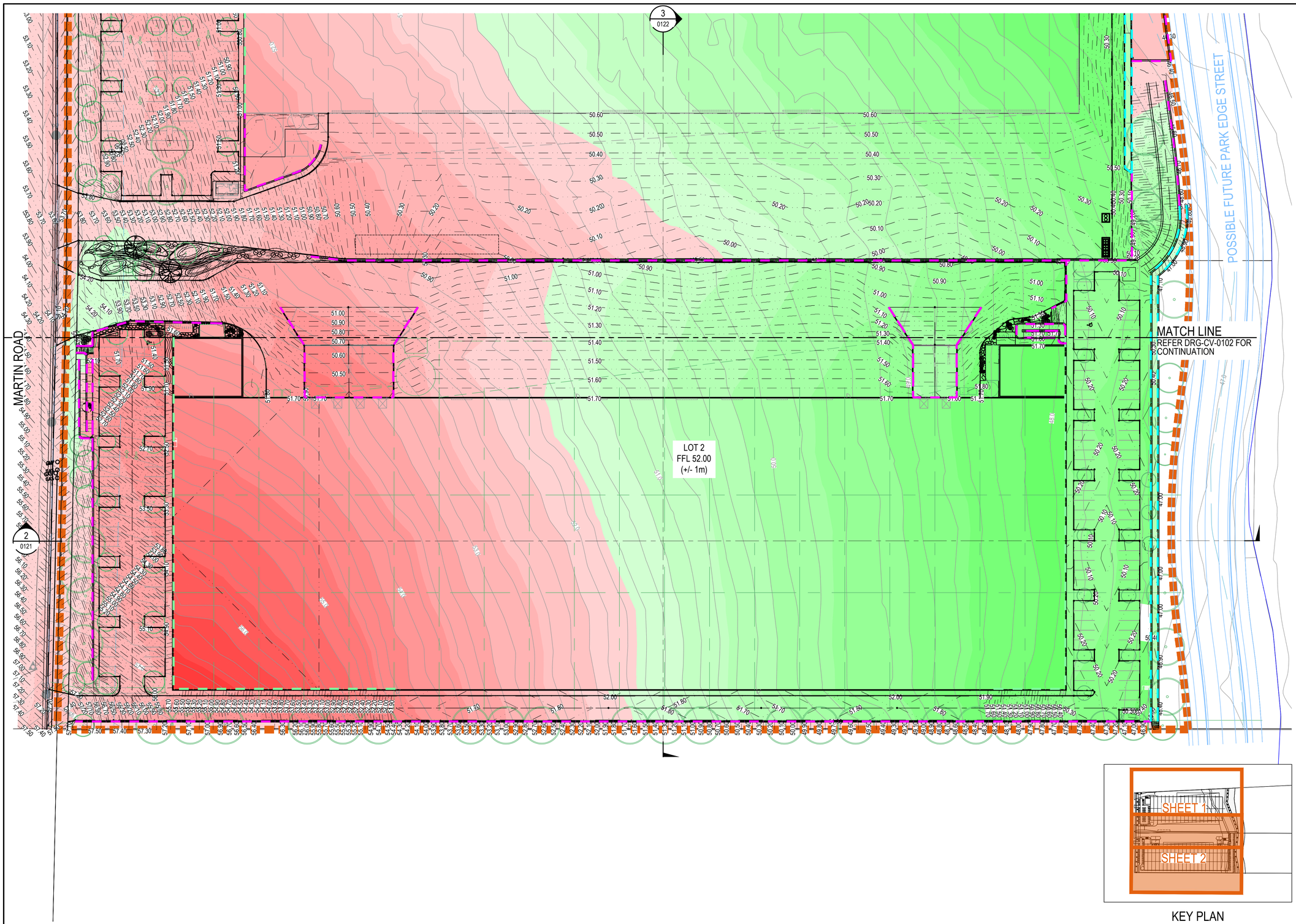

LEGEND

- BULK EARTHWORKS CONTOUR
- EXISTING SURFACE CONTOUR
- SITE BOUNDARY
- BLOCK WORK RETAINING WALL MAX HEIGHT 4.5m
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   - BUILDING SLABS
   - PAVEMENT BOXOUT DEPTHS
   - SEDIMENT CONTROL BASIN
   - RECESSED DOCKS
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6. LEVELS MAY VARY +/- 1m.

CUT / FILL VOLUMES

CUT	-44,225m³
FILL	80,492m³
BALANCE (IMPORT)	36,267m³
TOPSOIL STRIP VOLUME	-22,819m³

NOTE: NO COMPACTION OR BULKING FACTORS HAVE BEEN APPLIED.

CUT FILL DEPTH RANGE

LOWER_VALUE		UPPER_VALUE		COLOUR
-5	TO	-4.5	m	
-4.5	TO	-4	m	
-4	TO	-3.5	m	
-3.5	TO	-3	m	
-3	TO	-2.5	m	
-2.5	TO	-2	m	
-2	TO	-1.5	m	
-1.5	TO	-1	m	
-1	TO	-.5	m	
-.5	TO	0.00	m	
0.00	TO	.5	m	
.5	TO	1	m	
1	TO	1.5	m	
1.5	TO	2	m	
2	TO	2.5	m	
2.5	TO	3	m	
3	TO	3.5	m	
3.5	TO	4	m	
4	TO	4.5	m	
4.5	TO	5	m	
5	TO	5.5	m	

KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

Scales

0 5 10 20 30 40 50m

1 : 500

100mm on Original

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: BULK EARTHWORKS PLAN SHEET 2

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

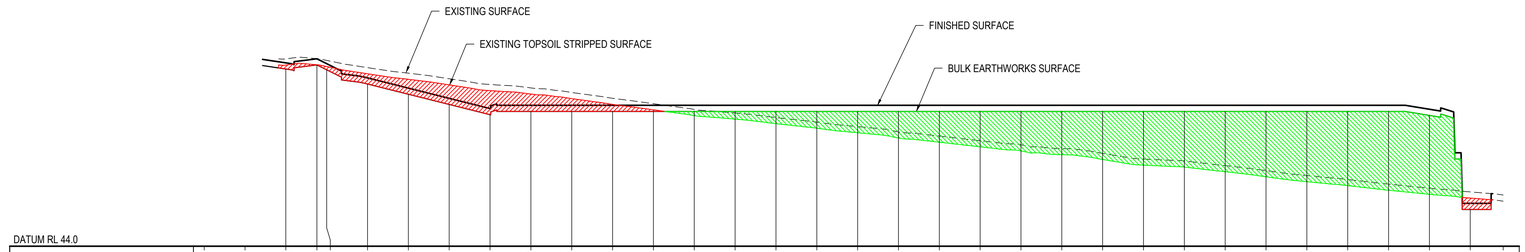
Drawing No.: MAR-AAP-DA-01-DRG-CV-0102

Issue: 04

Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0101-BulkEarthworksPlan.dwg

LEGEND

- FILL AREA
- CUT AREA
- BOX SECTION



DATUM RL 44.0

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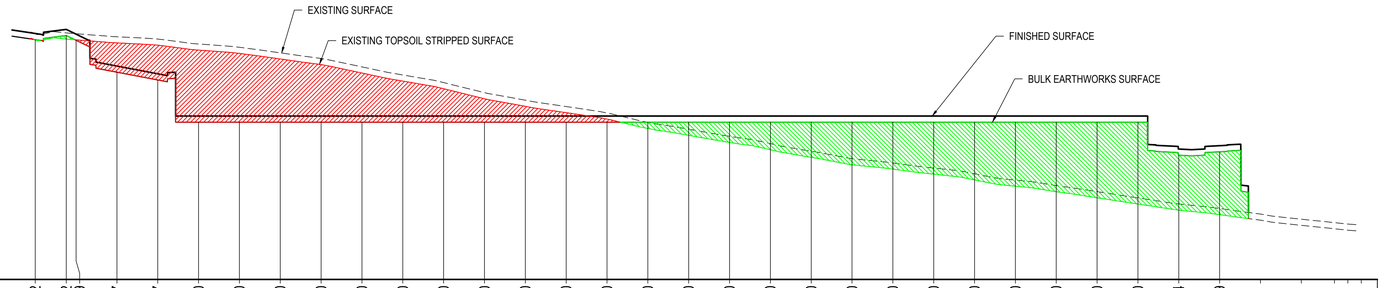
EXISTING STRIPPED LEVEL			52.872	52.884	52.799	52.444	52.174	51.901	51.619	51.452	51.227	50.943	50.679	50.397	50.223	50.001	49.777	49.556	49.297	49.093	48.866	48.668	48.482	48.246	47.970	47.875	47.648	47.401	47.160	46.967	46.741	46.541	46.359	46.206
BULK EARTHWORKS LEVEL			52.676	52.876	52.638	51.943	51.442	50.941	50.441	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	50.600	45.800	

SECTION 01 LONGITUDINAL SECTION

SCALE 1:750 HORI.
1:150 VERT.



DATUM RL 44.0

CHAINAGE	0.000	10.000	20.000	27.600	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	290.000	300.000	310.000	320.000	330.000	338.119	340.000	343.402
EXISTING STRIPPED LEVEL			55.726	55.770	55.731	55.580	55.469	55.228	55.066	54.794	54.520	54.106	53.712	53.338	52.846	52.476	52.166	51.850	51.392	51.056	50.709	50.352	49.978	49.613	49.402	49.154	48.873	48.564	48.295	47.998	47.691	47.395	47.173	46.902	46.650	46.481	46.442	46.382
BULK EARTHWORKS LEVEL			55.742	55.942	55.709	54.147	53.767	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	51.700	50.084	50.249					

SECTION 02 LONGITUDINAL SECTION

SCALE 1:750 HORI.
1:150 VERT.

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

HORZ 0 15 30 45 60 75m
1 : 750
VERT 0 3 6 9 12 15m
1 : 150

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: BULK EARTHWORKS SITE SECTIONS SHEET 1

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

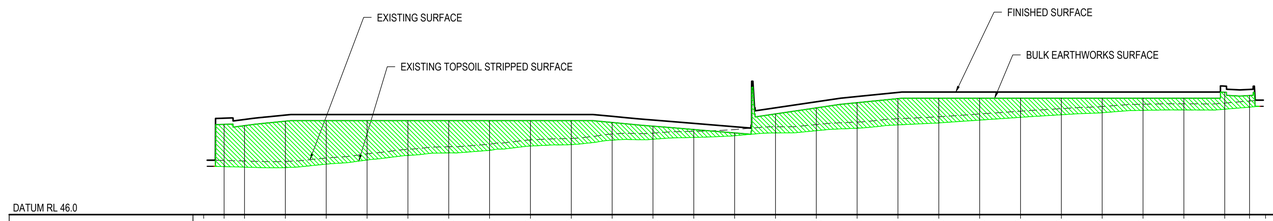
Drawing No.: MAR-AAP-DA-01-DRG-CV-0121

Issue: 04

Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0121-BulkEarthworksSiteSections.dwg

LEGEND

- FILL AREA
- CUT AREA
- BOX SECTION



DATUM RL 46.0

CHAINAGE	BULK EARTHWORKS LEVEL	EXISTING STRIPPED LEVEL
0.000	50.419	48.350
5.000	50.357	48.323
10.000	50.574	48.303
20.000	50.600	48.470
30.000	50.600	48.673
40.000	50.600	48.896
50.000	50.600	49.022
60.000	50.600	49.145
70.000	50.600	49.357
80.000	50.600	49.429
90.000	50.600	49.644
100.000	50.511	49.689
110.000	50.330	49.779
120.000	50.166	49.863
130.000	50.001	49.997
140.000	50.928	50.108
150.000	51.224	50.229
160.000	51.481	50.393
170.000	51.681	50.490
180.000	51.700	50.627
190.000	51.700	50.764
200.000	51.700	50.888
210.000	51.700	50.990
220.000	51.700	51.104
230.000	51.700	51.123
240.000	51.700	51.160
250.000	51.990	51.261
256.080	51.828	
260.000		
261.453		

SECTION 03 LONGITUDINAL SECTION

SCALE 1:750 HORI.
1:150 VERT.

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

HORZ 0 15 30 45 60 75m — 1 : 750

VERT 0 3 6 9 12 15m — 1 : 150

Surveyor: LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: BULK EARTHWORKS SITE SECTIONS SHEET 2

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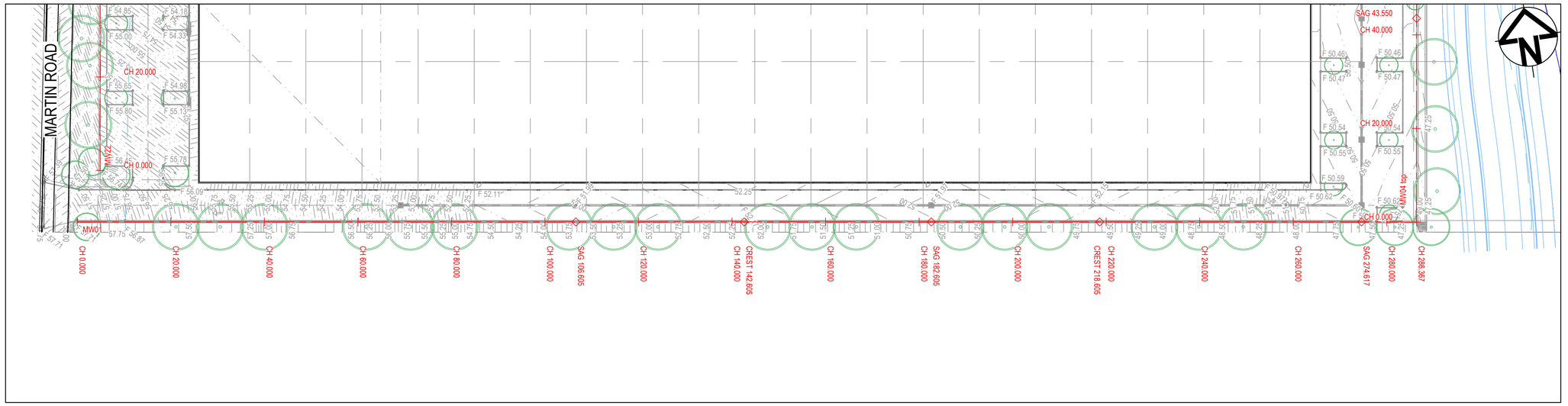
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0122

Issue: 04

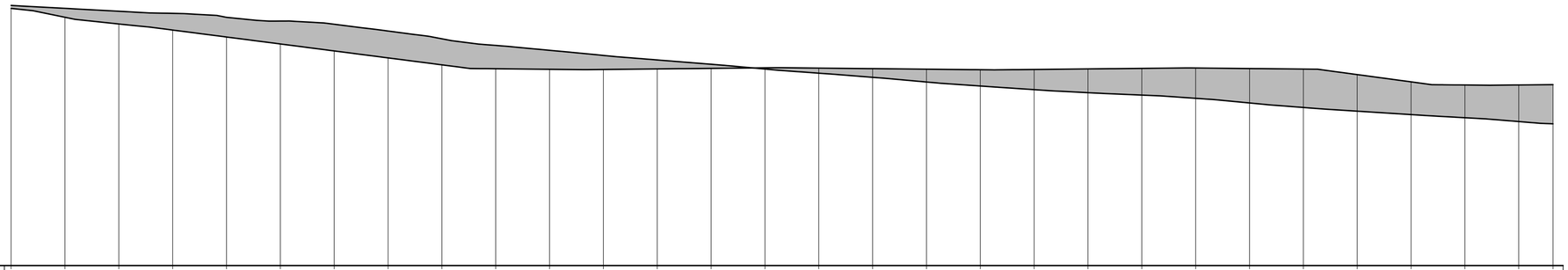
Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0121-BulkEarthworksSiteSections.dwg



RETAINING WALL PLAN
1 : 500

LEGEND

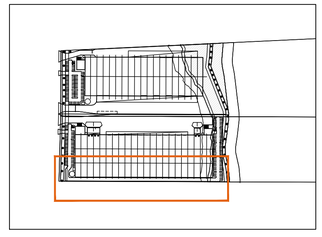
- PROPOSED SURFACE LEVEL AT TOP OF WALL
- 5.0 DESIGN SURFACE CONTOURS
- 5.0 EXISTING SURFACE CONTOURS
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- CH 0.000 CHAINAGE AND CONTROL LINE
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS



DATUM RL 34.0

BOTTOM OF RETAINING WALL	57.858	57.037	56.415	55.852	55.207	54.561	53.915	53.270	52.624	52.261	52.211	52.195	52.245	52.295	52.345	52.321	52.271	52.221	52.171	52.195	52.245	52.295	52.331	52.281	52.231	51.720	51.045	50.753	50.757	50.789
TOP OF RETAINING WALL	58.134	57.864	57.595	57.399	57.031	56.686	56.387	55.761	55.041	54.424	53.973	53.498	53.077	52.678	52.234	51.851	51.466	51.032	50.66	50.323	50.042	49.819	49.518	49.086	48.668	48.326	48.009	47.718	47.362	47.152
HEIGHT OF RETAINING WALL	0.275	0.827	1.180	1.546	1.825	2.125	2.472	2.491	2.417	2.163	1.762	1.303	0.832	0.384	-0.110	-0.470	-0.805	-1.189	-1.511	-1.872	-2.203	-2.476	-2.813	-3.195	-3.563	-3.394	-3.035	-3.035	-3.395	-3.636
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	270.000	280.000	286.367

MW01 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

Scales

HORZ 0 5 10 20 30 40 50m — 1 : 500

VERT 0 5 10 15 20 25m — 1 : 250

100mm on Original

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: RETAINING WALL PLAN SHEET 1

ARCADIS
Arcadis Australia Pacific Pty Limited
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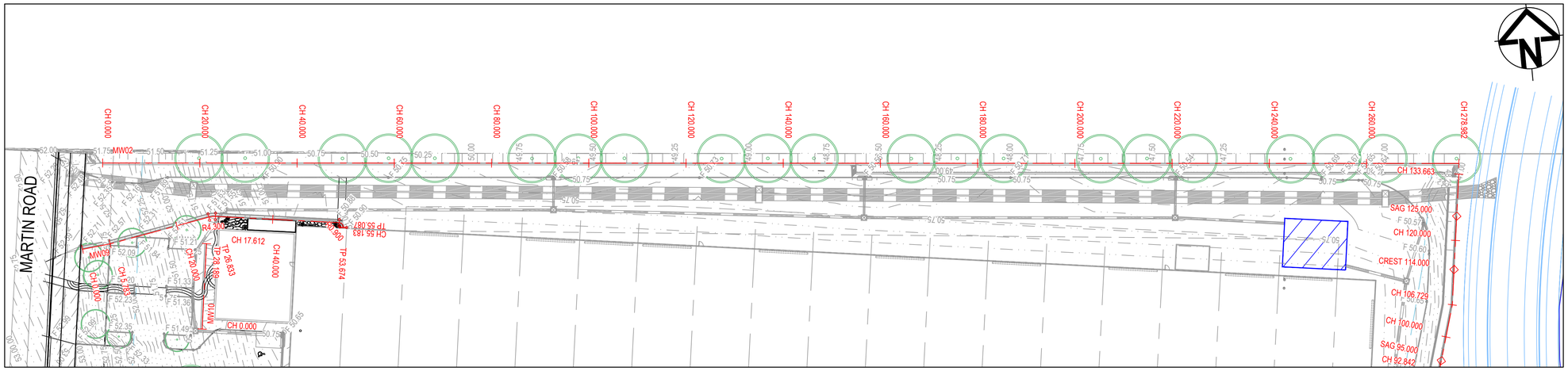
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0141

Issue: 04

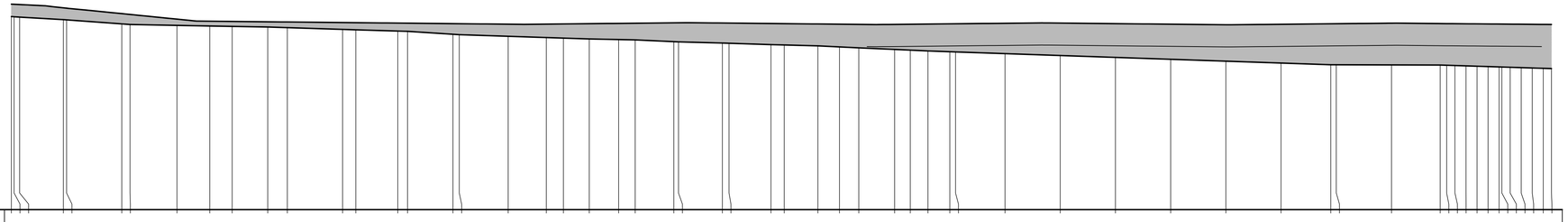
Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CIStage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0141-RetainingWallPlan.dwg



RETAINING WALL PLAN
1 : 500

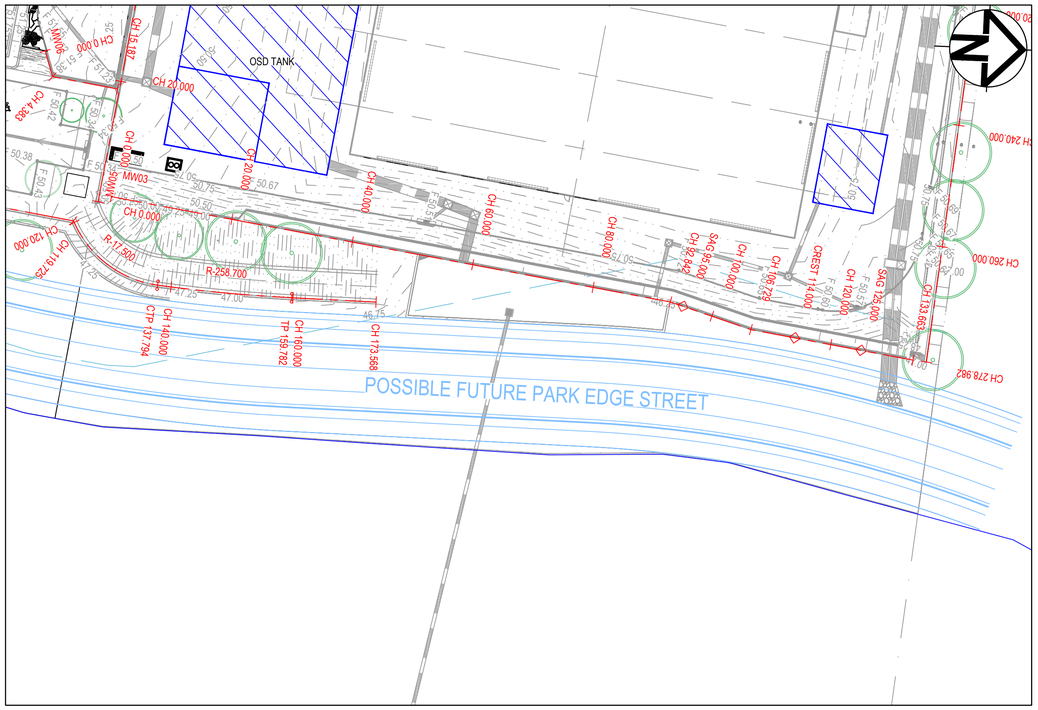
LEGEND

- PROPOSED SURFACE LEVEL AT TOP OF WALL
- 5.0 DESIGN SURFACE CONTOURS
- 5.0 EXISTING SURFACE CONTOURS
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- 000.000 CH CHAINAGE AND CONTROL LINE
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS



DATUM RL 34.0

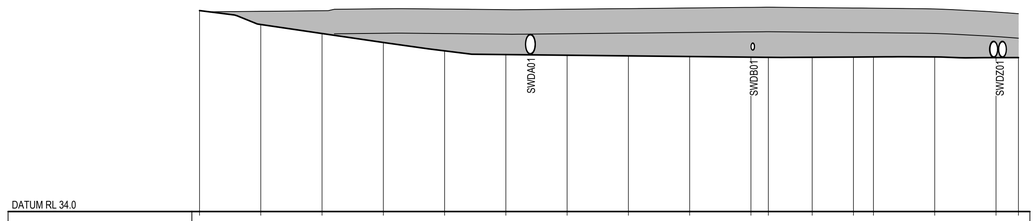
| | | |



RETAINING WALL PLAN
1 : 500

LEGEND

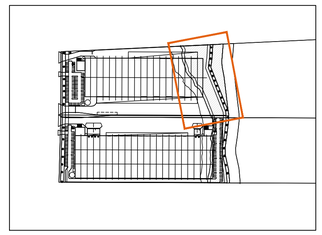
- PROPOSED SURFACE LEVEL AT TOP OF WALL
- 5.0 DESIGN SURFACE CONTOURS
- 5.0 EXISTING SURFACE CONTOURS
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- CH 0.000 CHAINAGE AND CONTROL LINE
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS



DATUM RL 34.0

BOTTOM OF RETAINING WALL	50.399	49.260	48.523	47.793	47.110	46.807	46.754	46.701	46.648	46.595	46.582	46.585	46.602	46.614	46.615	46.558	46.562		
TIER 2 OF RETAINING WALL		50.337	50.387	50.545	50.521	50.471	50.509	50.559	50.609	50.659	50.673	50.638	50.606	50.591	50.528	50.278			
TOP OF RETAINING WALL				48.545	48.521	48.471	48.509	48.559	48.609	48.659	48.673	48.638	48.604	48.591	48.528	48.278			
HEIGHT OF RETAINING WALL				0.752	1.411	1.665	1.755	1.858	1.961	2.064	2.091	2.052	2.003	1.977	1.913	1.72			
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	92.842	100.000	106.729	110.000	120.000	130.000	133.663		

MW03 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

Scales

HORZ 0 5 10 20 30 40 50m — 1 : 500

VERT 0 5 10 15 20 25m — 1 : 250

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: RETAINING WALL PLAN SHEET 3

ARCADIS
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SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

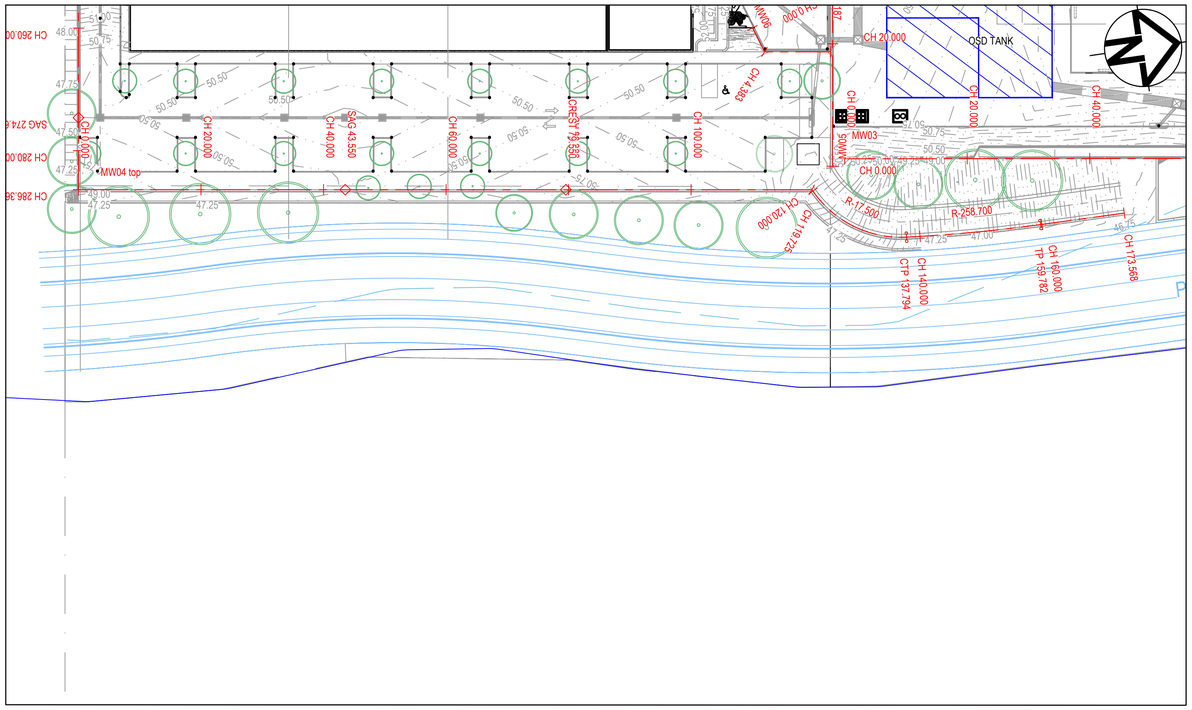
Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0143

Issue: 04

100mm on Original

Date Plotted: 21 Apr 2026 - 01:49PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0141-RetainingWallPlan.dwg

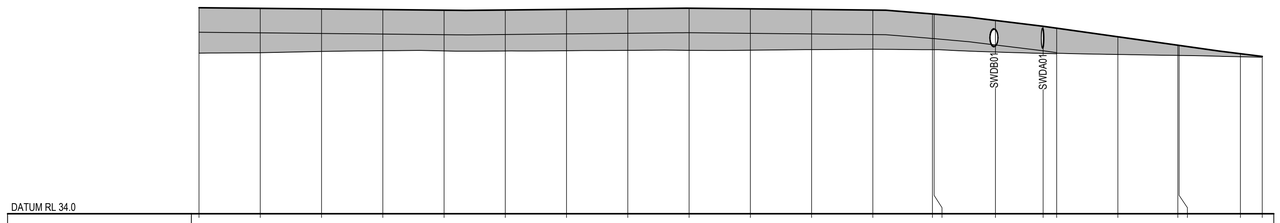


RETAINING WALL PLAN

1 : 500

LEGEND

- PROPOSED SURFACE LEVEL AT TOP OF WALL
- DESIGN SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- CHAINAGE AND CONTROL LINE (CH 0.000)
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS

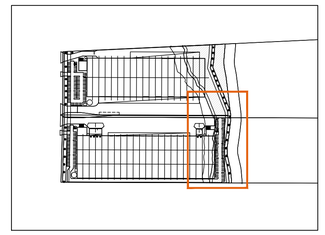


DATUM RL 34.0

BOTTOM OF RETAINING WALL	47.111	47.142	47.244	47.304	47.29	47.284	47.306	47.335	47.336	47.345	47.394	47.425	47.348 47.355	47.197	47.085								
TIER 2 OF RETAINING WALL	48.813	48.763	48.713	48.663	48.613	48.628	48.678	48.728	48.773	48.723	48.673	48.623	48.283 48.294	47.775	47.301 47.097	46.999		46.922 46.92		46.811			
TOP OF RETAINING WALL	50.813	50.763	50.713	50.663	50.613	50.628	50.678	50.728	50.773	50.723	50.673	50.623	50.396 50.394	49.775	49.301 49.146	48.443		47.756 47.740		47.060		46.837	
HEIGHT OF RETAINING WALL	-3.702	-3.621	-3.469	-3.36	-3.323	-3.344	-3.372	-3.393	-3.437	-3.379	-3.279	-3.198	-2.958 -2.888	-2.578	-2.216								
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	119.725 120.000	130.000	137.794 140.000	150.000		159.782 160.000		170.000		173.568	

MW04 top LONGITUDINAL SECTION

SCALE 1:500 HORI.
1:250 VERT.



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

HORZ 0 5 10 20 30 40 50m — 1 : 500

VERT 0 5 10 15 20 25m — 1 : 250

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: RETAINING WALL PLAN SHEET 4

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

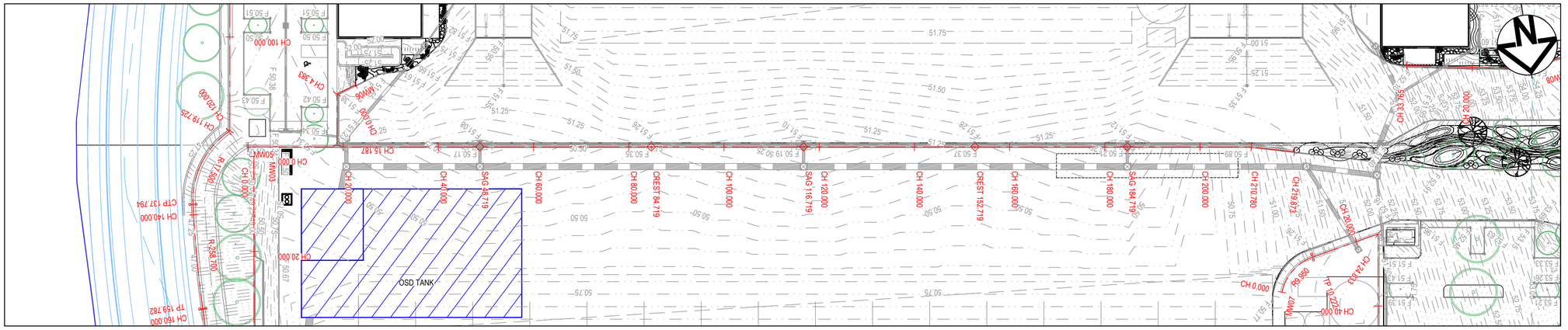
Drawing No.: MAR-AAP-DA-01-DRG-CV-0144

Issue: 04

Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0141-RetainingWallPlan.dwg

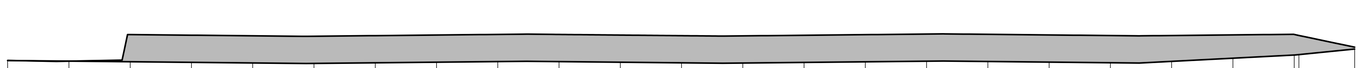
LEGEND

- PROPOSED SURFACE LEVEL AT TOP OF WALL
- DESIGN SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- CHAINAGE AND CONTROL LINE (CH 0.000)
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS



RETAINING WALL PLAN

1 : 500

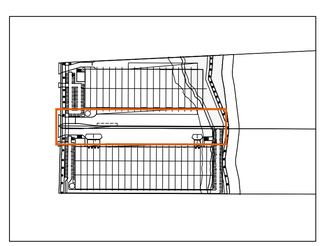


DATUM RL 37.0

CHAINAGE	BOTTOM OF RETAINING WALL	TOP OF RETAINING WALL	HEIGHT OF RETAINING WALL
0.000	50.561	50.569	0.007
10.000	50.511	50.510	-0.001
20.000	50.461	52.678	2.217
30.000	50.411	52.628	2.217
40.000	50.361	52.578	2.217
50.000	50.324	52.541	2.217
60.000	50.374	52.591	2.217
70.000	50.424	52.641	2.217
80.000	50.474	52.691	2.217
90.000	50.471	52.688	2.217
100.000	50.421	52.638	2.217
110.000	50.371	52.588	2.217
120.000	50.354	52.571	2.217
130.000	50.404	52.621	2.217
140.000	50.454	52.671	2.217
150.000	50.504	52.721	2.217
160.000	50.481	52.698	2.217
170.000	50.431	52.648	2.217
180.000	50.381	52.598	2.217
190.000	50.493	52.601	2.108
200.000	50.750	52.651	1.901
210.000	51.007	52.691	1.684
210.780	51.043	52.606	1.562
219.873	51.498	51.651	0.153

MW05 LONGITUDINAL SECTION

SCALE 1:500 HORI.
1:250 VERT.



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

HORZ 0 5 10 20 30 40 50m — 1 : 500

VERT 0 5 10 15 20 25m — 1 : 250

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: RETAINING WALL PLAN SHEET 5

ARCADIS
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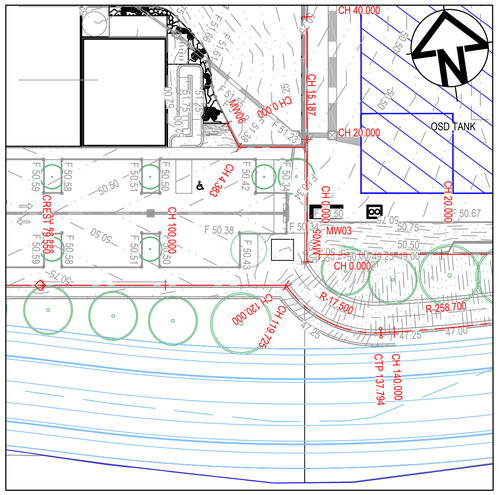
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

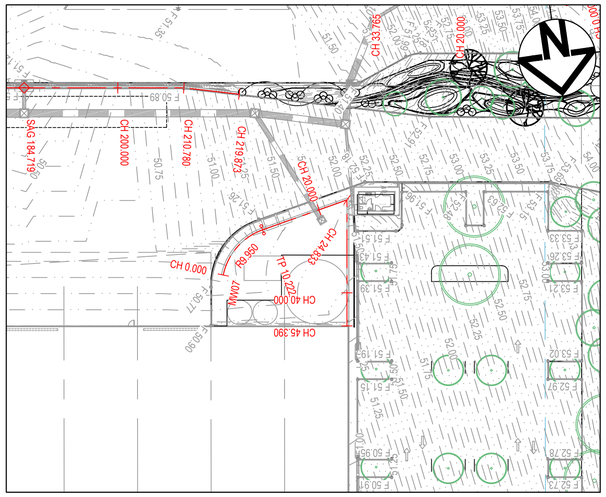
Drawing No.: MAR-AAP-DA-01-DRG-CV-0145

Issue: 04

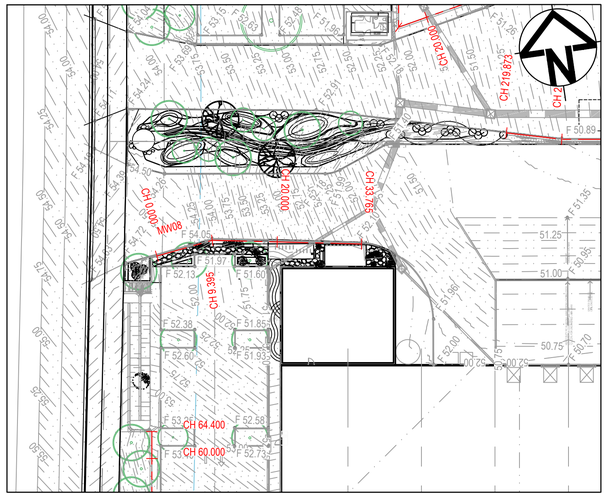
Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0141-RetainingWallPlan.dwg



RETAINING WALL PLAN
1 : 500



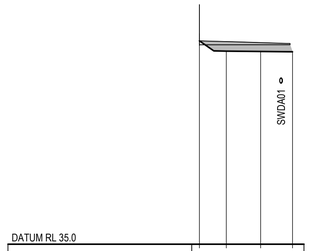
RETAINING WALL PLAN
1 : 500



RETAINING WALL PLAN
1 : 500

LEGEND

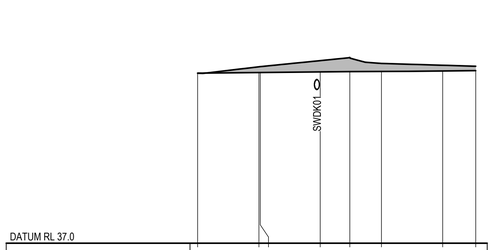
- PROPOSED SURFACE LEVEL AT TOP OF WALL
- 5.0 DESIGN SURFACE CONTOURS
- 5.0 EXISTING SURFACE CONTOURS
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- CH 0.000 CHAINAGE AND CONTROL LINE
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS



DATUM RL 35.0

BOTTOM OF RETAINING WALL	51.597	50.753	50.725	50.699
TOP OF RETAINING WALL	51.597	51.535	51.45	
HEIGHT OF RETAINING WALL	0	0.781	0.725	
CHAINAGE	0.000	4.383	10.000	15.187

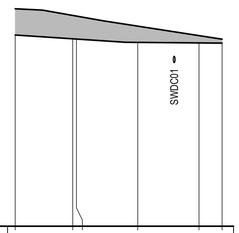
MW06 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



DATUM RL 37.0

BOTTOM OF RETAINING WALL	50.877	50.927 50.928	50.977	51.001	51.014	51.053	51.080
TOP OF RETAINING WALL	50.877	51.396 51.409	51.898	52.104	51.669	51.521	51.441
HEIGHT OF RETAINING WALL	0	0.469 0.481	0.921	1.104	0.655	0.468	0.361
CHAINAGE	0.000	10.000 10.222	20.000	24.833	30.000	40.000	45.390

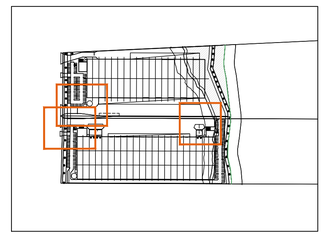
MW07 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



DATUM RL 37.0

BOTTOM OF RETAINING WALL	52.601	52.291 52.271	51.998	51.954	51.938
TOP OF RETAINING WALL	54.745	54.198 54.145	53.325	52.554	52.264
HEIGHT OF RETAINING WALL	2.144	1.907 1.874	1.327	0.6	0.326
CHAINAGE	0.000	9.395 10.000	20.000	30.000	33.765

MW08 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

Scales

HORZ 0 5 10 20 30 40 50m
1 : 500
VERT 0 5 10 15 20 25m
1 : 250

Surveyor: LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: RETAINING WALL PLAN SHEET 6

ARCADIS
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SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

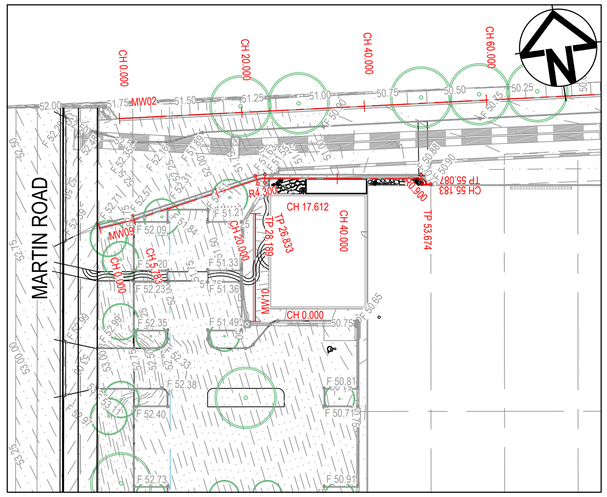
Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0146

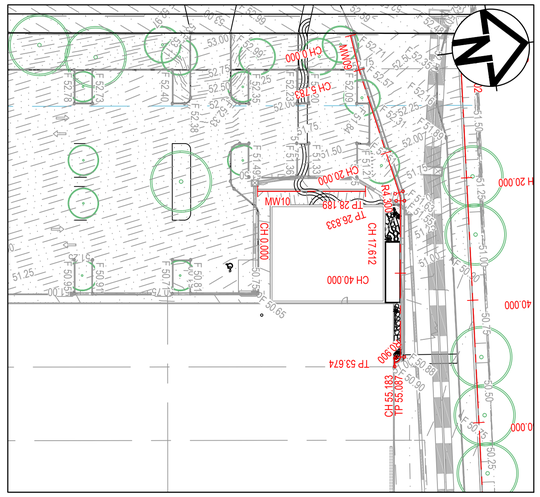
Issue: 04

100mm on Original

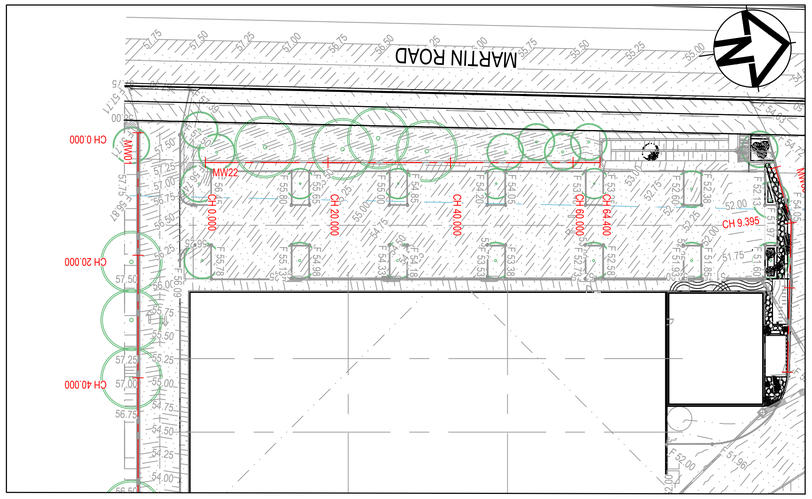
Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0141-RetainingWallPlan.dwg



RETAINING WALL PLAN
1 : 500



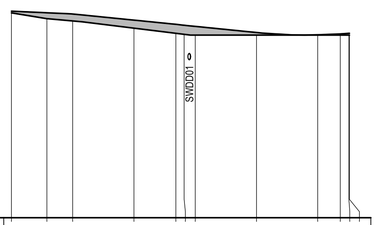
RETAINING WALL PLAN
1 : 500



RETAINING WALL PLAN
1 : 500

LEGEND

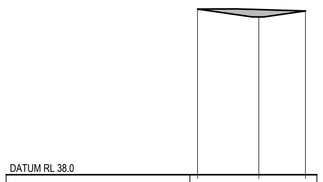
- PROPOSED SURFACE LEVEL AT TOP OF WALL
- 5.0 DESIGN SURFACE CONTOURS
- 5.0 EXISTING SURFACE CONTOURS
- PROPOSED SURFACE LEVEL AT BOTTOM PF WALL
- CH 0.000 CHAINAGE AND CONTROL LINE
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS



DATUM RL 36.0

BOTTOM OF RETAINING WALL	52.719	52.242	52.055	51.467	51.047	50.963	50.900	50.900	50.900	50.900	50.900	50.900	50.900	50.900
TOP OF RETAINING WALL	52.854	52.724	52.625	52.125	51.784	51.705	51.614	51.114	50.93	50.998	51.048	51.145		
HEIGHT OF RETAINING WALL	0.136	0.482	0.570	0.659	0.737	0.742	0.714	0.214	0.030	0.098	0.148	0.245		
CHAINAGE	0.000	5.783	10.000	20.000	26.833	28.189	30.000	40.000	50.000	53.674	55.189	55.783		

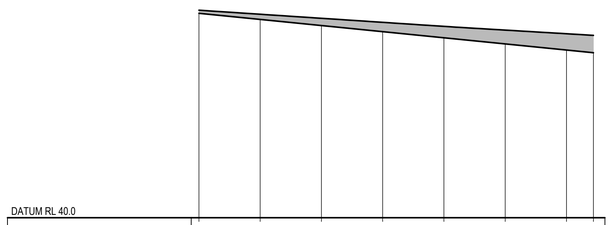
MW09 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



DATUM RL 38.0

BOTTOM OF RETAINING WALL	51.518	50.878	51.364
TOP OF RETAINING WALL	51.518	51.478	51.364
HEIGHT OF RETAINING WALL	0.000	0.600	0.000
CHAINAGE	0.000	10.000	17.612

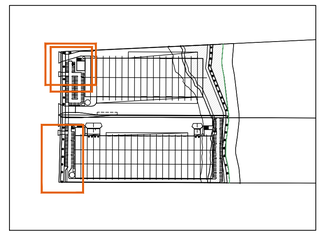
MW10 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



DATUM RL 40.0

BOTTOM OF RETAINING WALL	56.681	56.181	55.681	55.181	54.681	54.181	53.681	53.461
TOP OF RETAINING WALL	56.934	56.604	56.274	55.944	55.615	55.311	55.013	54.882
HEIGHT OF RETAINING WALL	0.252	0.422	0.593	0.763	0.934	1.130	1.332	1.421
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	64.400

MW22 LONGITUDINAL SECTION
SCALE 1:500 HORI.
1:250 VERT.



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales
HORZ 0 5 10 20 30 40 50m
1 : 500
VERT 0 5 10 15 20 25m
1 : 250

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: RETAINING WALL PLAN SHEET 7

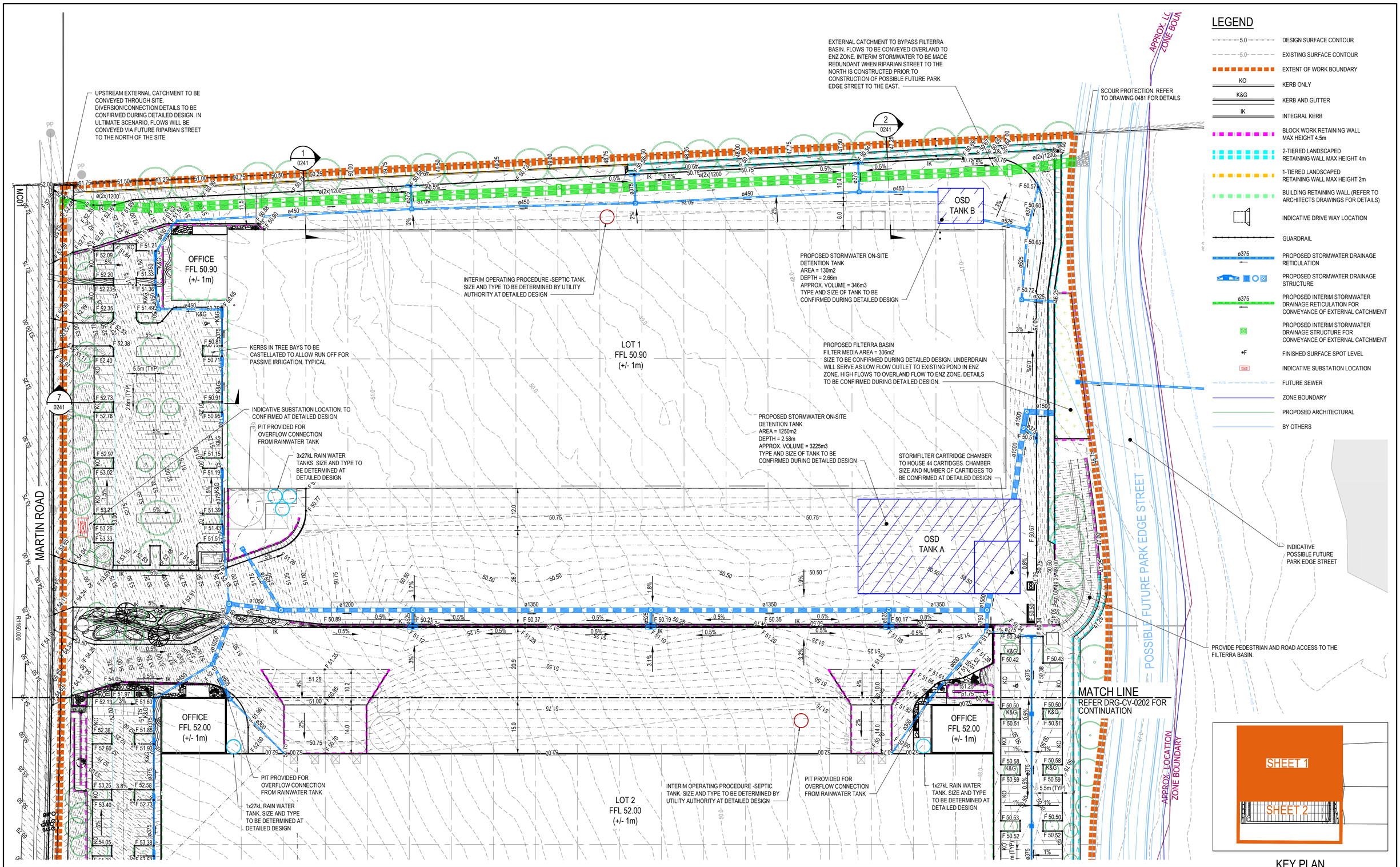
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0147

Issue: 04

Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0141-RetainingWallPlan.dwg



Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

ENG LAND SERVICES

Client & Architect

EMKC³ development | cubed

Status

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project

230 MARTIN ROAD, BADGERYS CREEK

Title

CIVIL WORKS PLAN SHEET 1

ARCADIS
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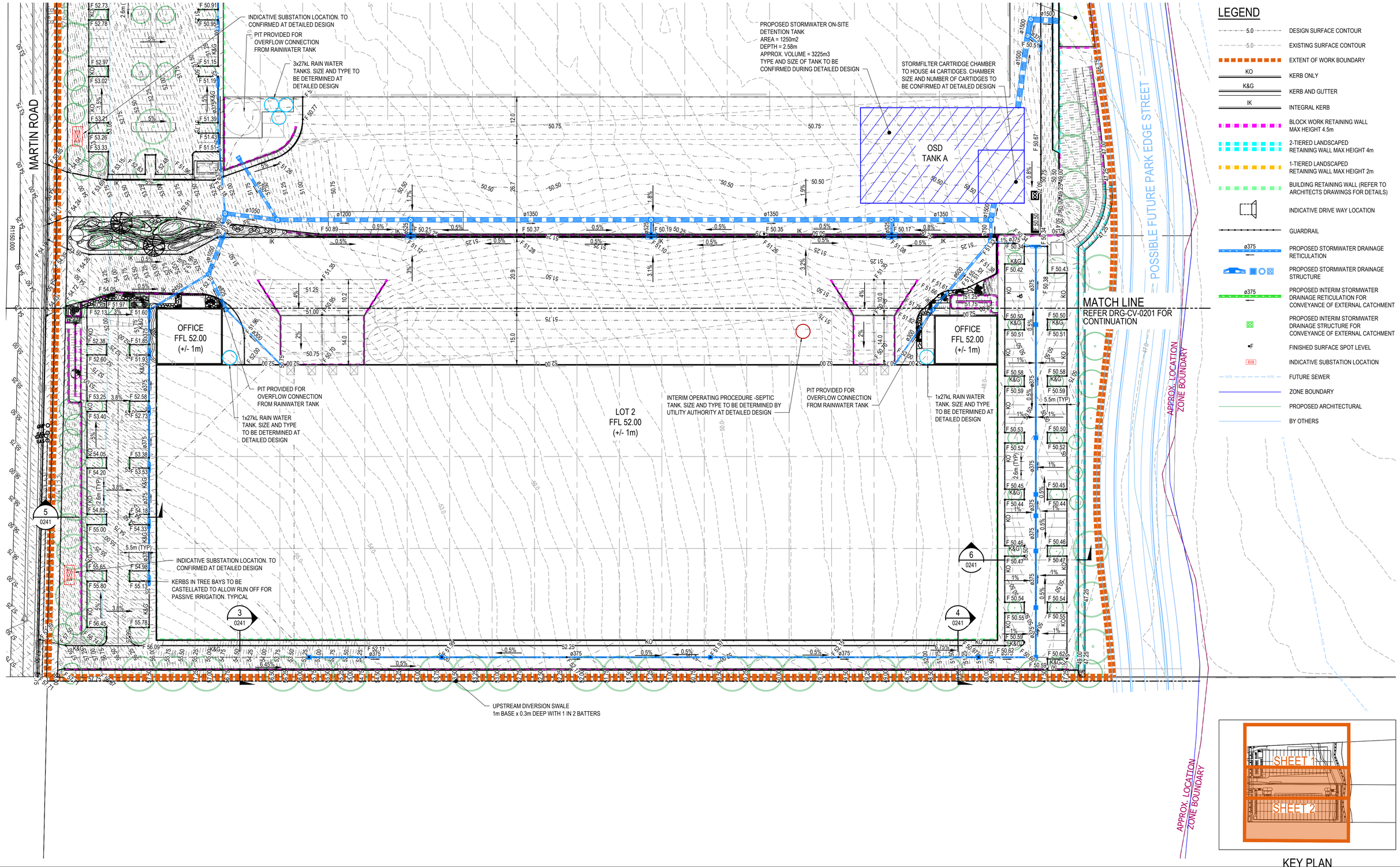
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0201

Issue: 04

Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CIStage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0201-CivilWorksPlan.dwg



KEY PLAN

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KM	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

LAND SERVICES

Client & Architect

EMKC³ development | cubed

Status

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project

230 MARTIN ROAD,
BADGERYS CREEK

Title

CIVIL WORKS
PLAN SHEET 2

ARCADIS
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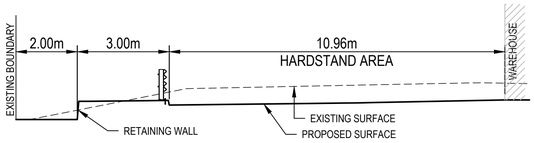
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0202

Issue: 04

Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CfStage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0201-CivilWorksPlan.dwg



SECTION 1
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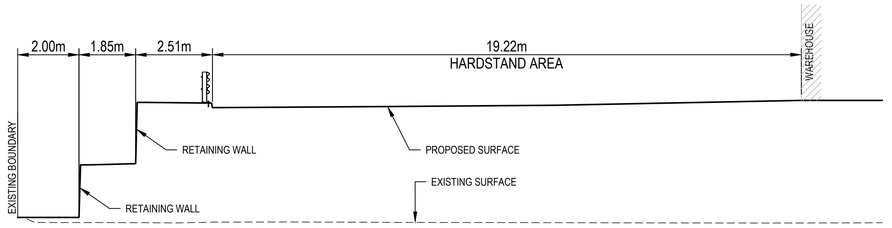

SECTION 2
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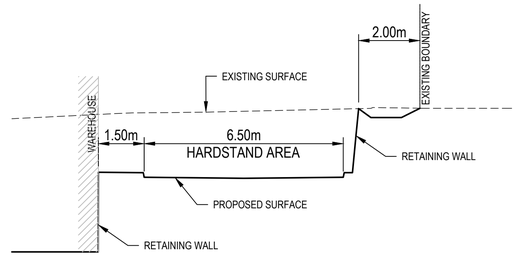

SECTION 3
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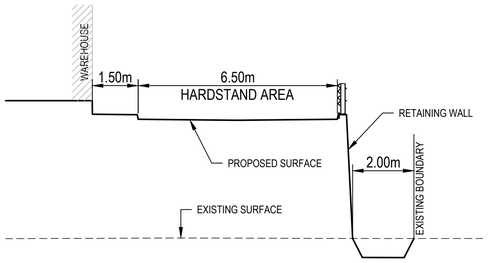

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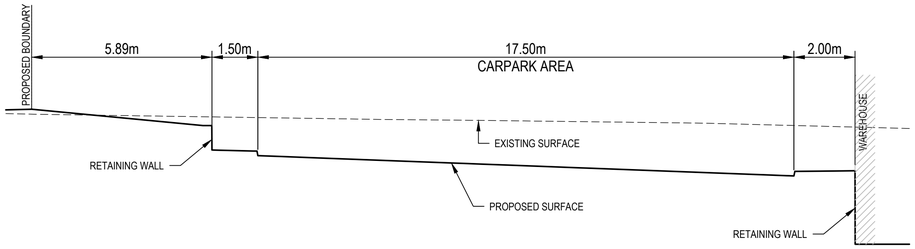

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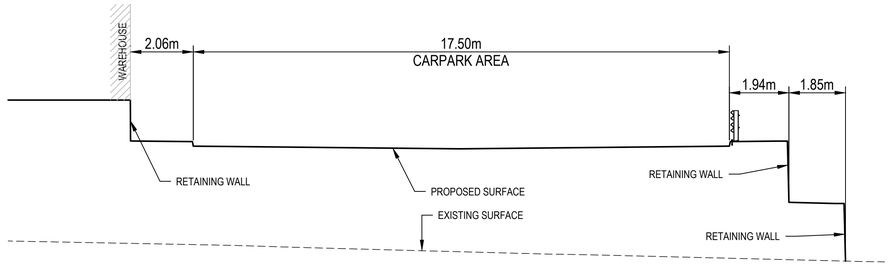

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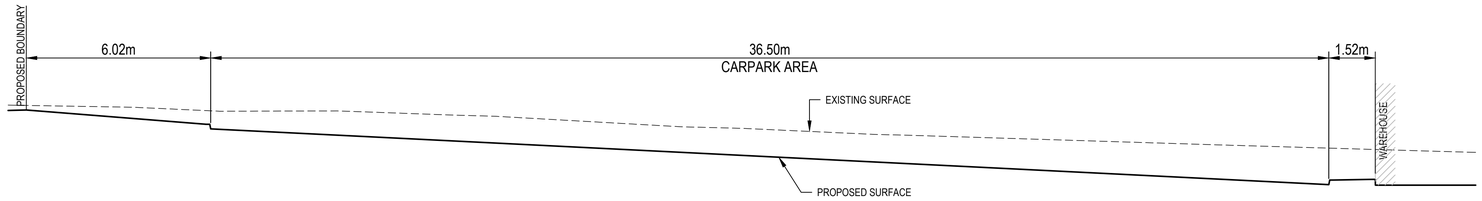

SECTION 7
1 : 100 0201

Issue	Description	DR	CH	VE	Date
04	FOR APPROVAL	JD	KR	KM	25.11.25
03	FOR COORDINATION	JD	KR	KM	21.10.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

0 1 2 4 6 8 10m

1 : 100

Surveyor

ENG LAND SERVICES

Client & Architect

EMKC³ development | cubed

Status

FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures

Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project

230 MARTIN ROAD,
BADGERYS CREEK

Title

TYPICAL SITE SECTIONS

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number 30183733

Drawing No. MAR-AAP-DA-01-DRG-CV-0241

Issue 04

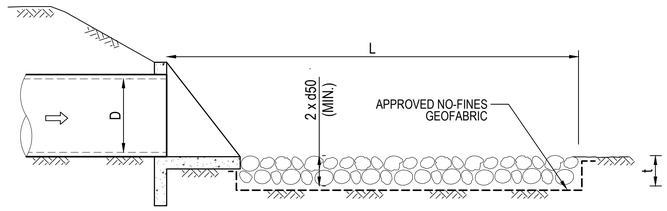
Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CIStage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0241-TypicalSiteSections.dwg

ROCK PROTECTION NOTES

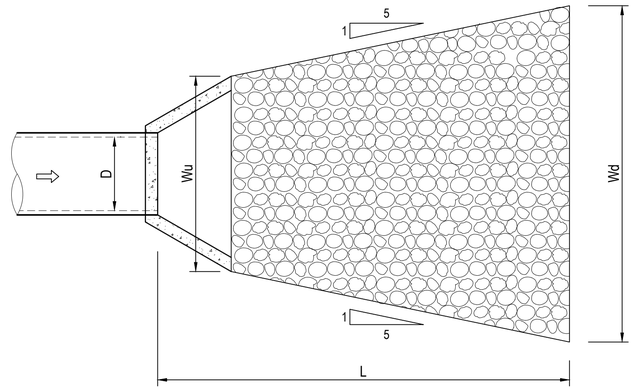
1. NOMINAL ROCK SIZE TO BE AS PER OUTLET PROTECTION TABLE. ROCK GRADATION TO BE AS PER TABLE.
2. SELECTED ROCKS TO BE DURABLE AND RESISTANT TO WEATHERING, AND SHOULD BE PROPORTIONED SO THAT NEITHER THE BREADTH NOR THE THICKNESS OF A SINGLE ROCK IS LESS THAN ONE-THIRD ITS LENGTH.
3. ROCKS SHOULD BE PLACED IN STABLE POSITIONS WITH SEVERAL POINT CONTACTS, GENERALLY BALANCED REARWARD.
4. ROCKS SHOULD FORM AN INTERLOCKING MASS WHEN COMPLETED WITH NO INDIVIDUAL ROCKS FREE TO MOVE.

ROCK GRADATION TABLE

SMALLEST DIMENSIONS IN (mm)						% OF ROCK SMALLER THAN SIZE SHOWN
$150d_{50}$	$200d_{50}$	$300d_{50}$	$400d_{50}$	$500d_{50}$	$600d_{50}$	
300	380	525	630	750	850	100
200	300	450	550	650	750	50-70
150	200	300	400	500	600	35-50
50	75	100	130	150	175	2-10



TYPICAL STORMWATER OUTLET SECTION
N.T.S



TYPICAL STORMWATER OUTLET PLAN
N.T.S

SCOUR PROTECTION TABLE

STRUCTURE	INLET/OUTLET	PIPE/CULVERT DIMENSION (mm)	ROCK SIZE, D50, X (mm)	LENGTH, L (m)	START WIDTH, WU (m)	END WIDTH, WD (m)
2x1200 dia	OUTLET	2x1200	400	3.60	7.89	7.89

Issue	Description	DR	CH	VE	Date
02	FOR APPROVAL	JD	KM	KM	25.11.25
01	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	JH	24.04.25

Scales
0 100 200 400 600 800 1000mm
1 : 10
0 0.5 1 1.5 2m
1 : 20
0 0.5 1 2 3 4 5m
1 : 50

100mm on Original

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: TYPICAL STORMWATER DRAINAGE DETAILS

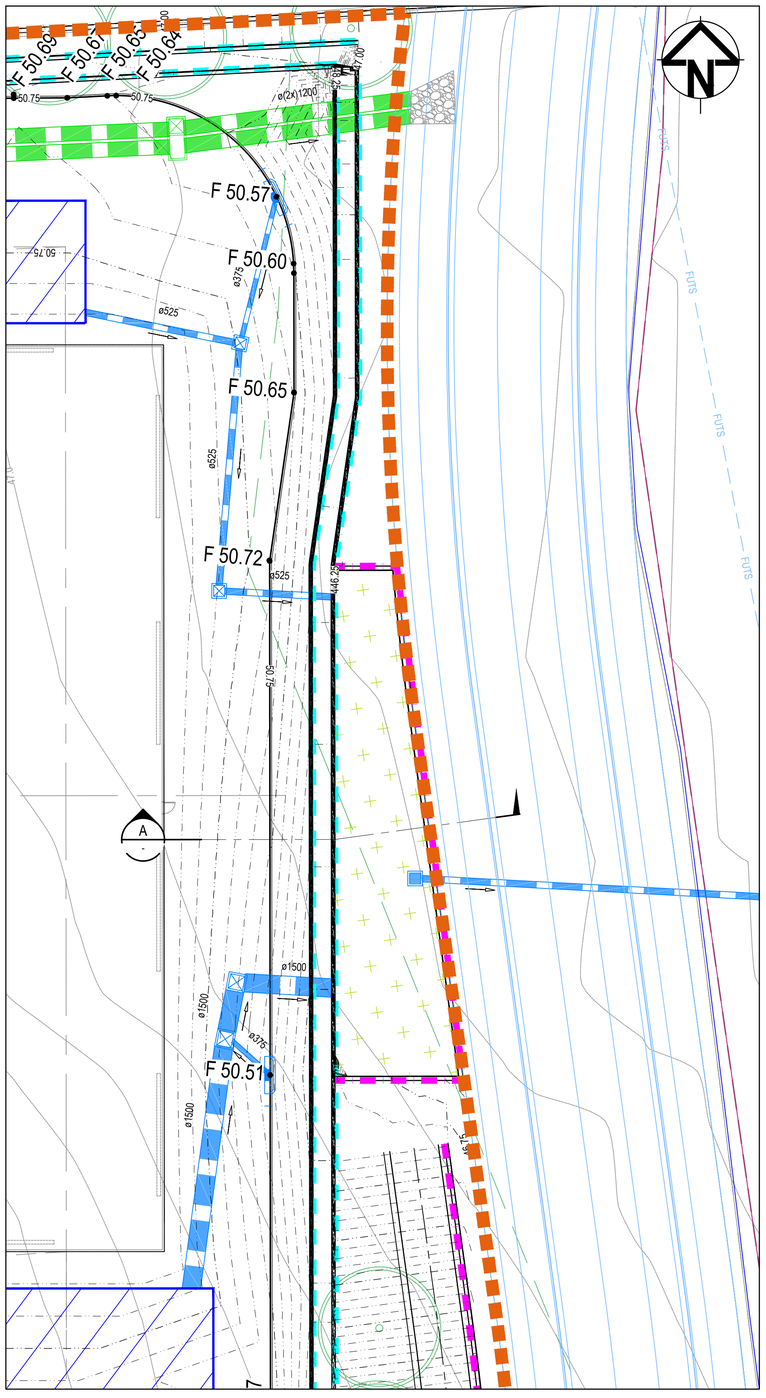
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

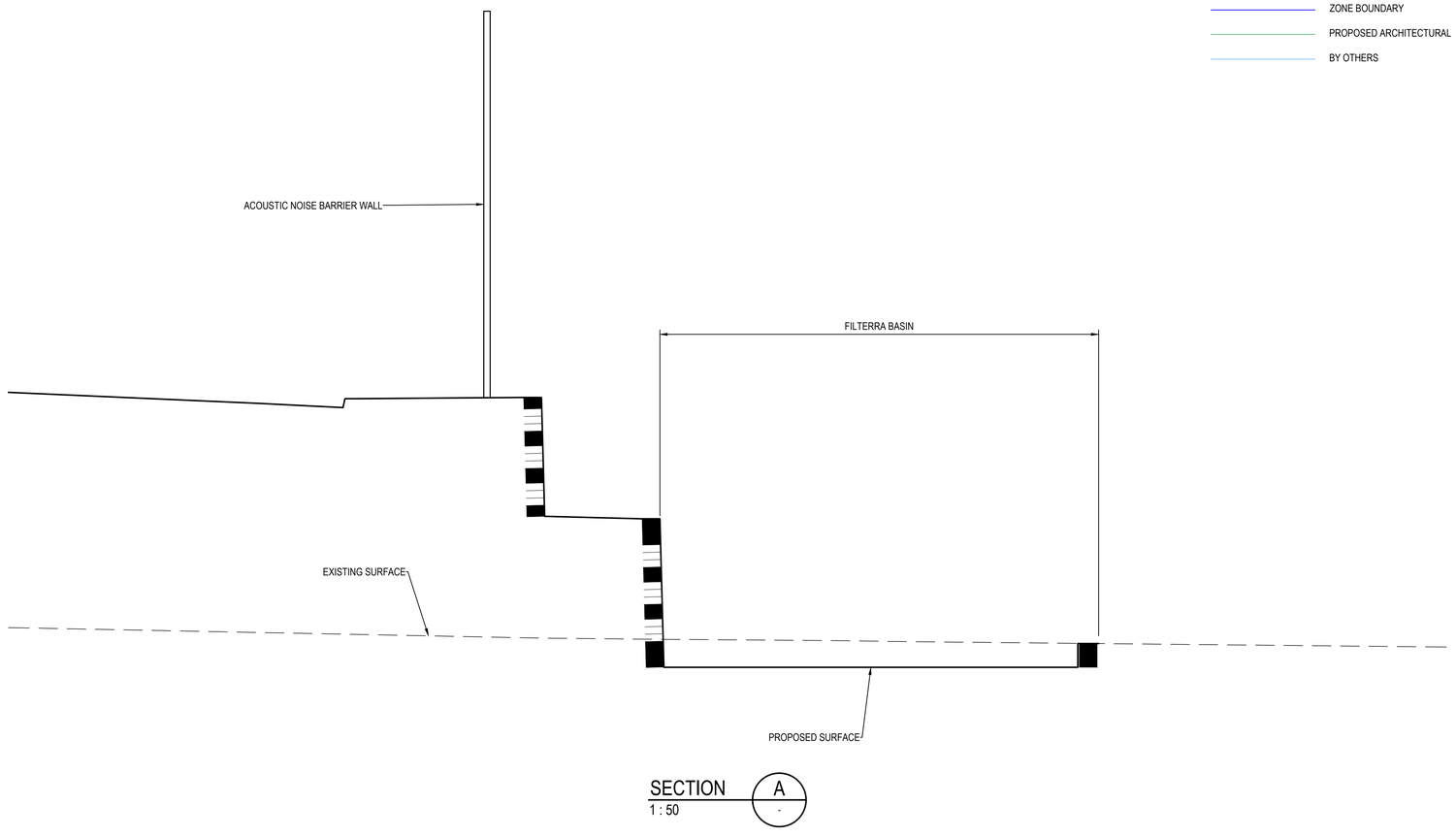
Drawing No.: MAR-AAP-DA-01-DRG-CV-0481

Issue: 02

Date Plotted: 21 Apr 2026 - 01:40PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0481-TypicalStormwaterDetails.dwg



BASIN LAYOUT PLAN
1 : 250



SECTION A
1 : 50

LEGEND

- DESIGN SURFACE CONTOUR
- EXISTING SURFACE CONTOUR
- EXTENT OF WORK BOUNDARY
- EXISTING STAGE BOUNDARY
- BLOCK WORK RETAINING WALL MAX HEIGHT 4.5m
- 2-TIERED LANDSCAPED RETAINING WALL MAX HEIGHT 4m
- 1-TIERED LANDSCAPED RETAINING WALL MAX HEIGHT 2m
- BUILDING RETAINING WALL (REFER TO ARCHITECTS DRAWINGS FOR DETAILS)
- FILTERRA BASIN
- ZONE BOUNDARY
- PROPOSED ARCHITECTURAL
- BY OTHERS

Issue	Description	DR	CH	VE	Date
03	FOR APPROVAL	JD	KM	KM	25.11.25
02	FOR APPROVAL - RESPONSE TO TOA COMMENTS	JL	KR	KM	24.04.25
01	FOR APPROVAL	JL	KR	JH	13.09.24

100mm on Original

Scales

0 5 10 15 20 25m
1 : 250

0 0.5 1 2 3 4 5m
1 : 50

Surveyor: ENG LAND SERVICES

Client & Architect: EMKC³ development | cubed

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

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Original Issue Signatures			
Drawn	J. LOPEZ	Original Size	A1
Designed	K. ROBINSON	Height Datum	AHD
Design Manager	K. MCAREAVEY	Grid	MGA/20-56
Verified	J. HEYDON		

Project: 230 MARTIN ROAD, BADGERYS CREEK

Title: BIORETENTION BASIN DETAIL PLAN

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30183733

Drawing No.: MAR-AAP-DA-01-DRG-CV-0491

Issue: 03

Date Plotted: 21 Apr 2026 - 01:41PM File Name: C:\Users\lopezj1319\DC\ACCDocs\Arcadis ACC US\AAU-30183733-230 Martin Road\Project Files\10_WIP\10e_Civil_CI\Stage_01\Drawings\MAR-AAP-DA-01-DRG-CV-0491-WetlandBasinDetailPlan.dwg

Appendix B

Stormwater Design Criteria

Design Criteria - Stormwater

PROJECT DETAILS

Project Name:	230 Martin Road	**Date:**	16/10/2023
Project Number:	30183733	**Designer:**	MC
Location:	230 Martin Road	**Checker:**	MF
Project Description:	Industrial development including two warehouses, WSUD, and OSD		

STANDARDS / REFERENCES

Reference	Short Ref.
Australian Standard AS3500 Part 3: Stormwater Drainage	AS3500.3
Liverpool Council Stormwater Drainage Design Specification (D5) 2003	LC D5
Liverpool Council Handbook for Drainage Design 2003	LC H
Australian Rainfall and Runoff 2019	ARR
Austroads Road Design Guide	AGRD
DPE Technical guidance for achieving Wianamatta-South Creek stormwater management targets 2022	TG
DPE Western Sydney Aerotropolis Precinct Plan 2022	PP

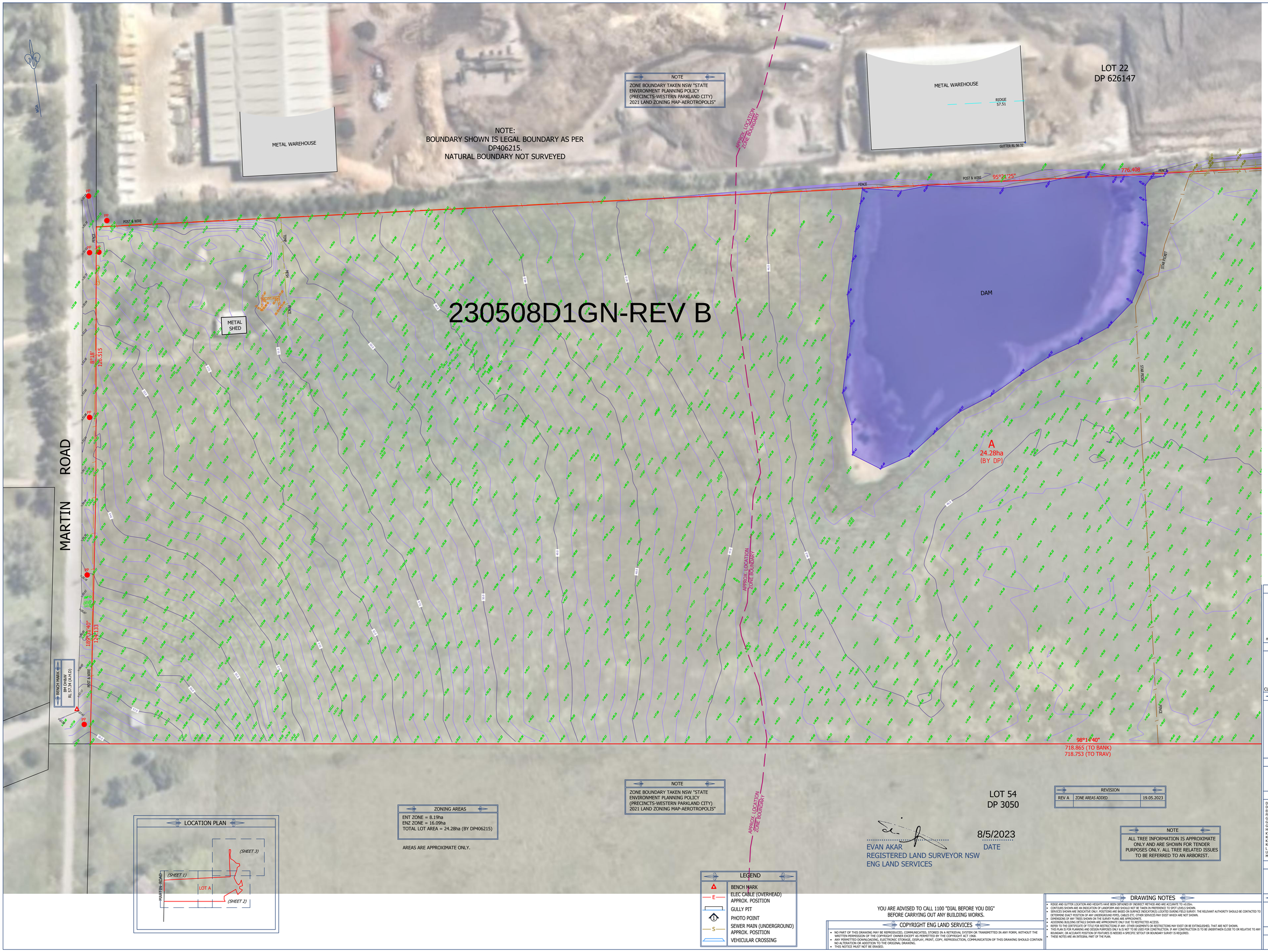
ISSUES	DESIGN CRITERIA	REFERENCE
Design Events		
Minor Storm	5% AEP	AS3500.3 Table 5.4.3
Major Storm	1% AEP	LC D5.12.2
Rainfall Runoff		
AR&R Revision	2019	LC D5.01.2(a)
Rainfall IFD Parrameters	Calculated from BOM and ARR data hub	AGRD 5 6.5.4
Catchments		
Times of Concentration	Minimum of 5 minutes	AGRD 5 Table 6.25
Pipe Design		
Minimum Grade (%)	**MINIMUM GRADIENT OF SITE STORMWATER DRAINS** Nominal size / Minimum gradient / Nominal size / Minimum gradient 90 / 1:100 / 225 / 1:200 100 / 1:100 / 300 / 1:250 150 / 1:100 / 375 / 1:300	AS3500.3 Table 6.3.4
Maximum Grade (%)	10%	LC D5.09.4
Minimum Velocity	0.6m/s	LC D5.09.3
Maximum Velocity	6m/s	LC D5.09.3
Minimum Size	150mm	AS3500.3 Section 6.3.3

ISSUES	DESIGN CRITERIA	REFERENCE
Minimum Cover	**Table 6.2.5 — Minimum pipe cover — Finished surface to top of pipe** Location / Ductile iron, galvanized steel / Plastics (Minimum cover, mm) 1 Not subject to vehicular loading: (a) Without pavement in Australia — (i) for single dwellings; or — 100 / 100 (ii) for other than single dwellings. — 100 / 300 (b) Without pavement in New Zealand. — 100 / 300 (c) With pavement of brick or unreinforced concrete. — 100[a] / 100 2 Subject to vehicular loading: (a) Other than roads: (i) Without pavement. — 300 / 450 (ii) With pavement of — (A) reinforced concrete for heavy vehicular loading; or — Nil[a] / 100[a] (B) brick or unreinforced concrete for light vehicular loading. — Nil[a] / 75[a] (b) Roads — (i) sealed; or — 600 / 600 (ii) unsealed. — 600 / 750 3 Subject to construction equipment loading or in embankment conditions. — 600 / 750 4 Land zone for agricultural use. — 600 / 600 [a] Below the underside of the pavement.	AS3500.3 Table 6.2.5
Pipe Roughness	**COLEBROOK–WHITE ROUGHNESS COEFFICIENT (*k*)** Pipe material / Typical values for *k*, mm Copper, copper alloys, stainless steel — 0.015 All plastic pipelines having a smooth (non-profiled) internal bore — 0.015 Fibre-reinforced concrete (FRC) — 0.15 Cast iron, ductile iron, galvanized steel and malleable cast iron — 0.6 Vitrified clay, precast concrete — 0.6 Corrugated aluminium and steel — 3.0	AS3500.3 Table 5.4.11.2
Pipe Angle	Greater than 90 degrees	LD D5.09.7
Pipe Class	In accordance with AS 4058 (concrete)	AS3500.3 Section 2.4
Pipe Bedding	In accordance with AS 3725 (concrete)	AS3500.3 Section 6.3.5
Clearances to Services	In accordance with requirements of relevant utility authority In accordance with AS3500.3 Section 6.2.6 *Proximity to other services*	LC D5.09.5 AS3500.3 Section 6.2.6
Pit Design		
Pit Losses	Missouri charts	LC H App D
Pit Spacing	Pipes < 1200 - 100m Pipes >= 1200 - 150m	LC D5 Table D5.1
Pit Drop	20mm	AS3500.3 Section 7.5.3
Pit Blockage (on grade)	Blockage factos are variable but a value of 0.8 (reducing capacties to 80% of values given by design aids) shall be used for on-grade pits.	AS3500.3 Section 5.4.10.2
Pit Blockage (sag)	50%	AS3500.3 Section 5.4.10.1
Freeboard (Minor)	150mm	LC D5.08.4
Freeboard (Major)	500mm from 100 year flood level and floor levels of structures	LC D5.12.3
Minimum pit size	**Table 7.5.2.1 — Minimum internal dimensions for stormwater and inlet pits** Depth to invert of outlet / Minimum internal dimensions, mm: Rectangular (Width, Length) / Circular (Diameter) ≤ 450 — 350 — 350 — — ≤ 600 — 450 — 450 — 600 > 600 ≤ 900 — 600 — 600 — 900 > 900 ≤ 1 200 — 600 — 900 — 1 000 > 1 200 — 900 — 900 — 1 000	AS3500.3 Table 7.5.2.1

<table>
<tr><th>ISSUES</th><th>DESIGN CRITERIA</th><th>REFERENCE</th></tr>
<tr><td colspan="3">Overland Flow Paths</td></tr>
<tr><td>Maximum vxd (Major and Minor)</td><td>0.4m2/s</td><td>LC D5.12.2</td></tr>
<tr><td>Maximum Ponding Depth (Minor)</td><td>150mm</td><td>Assumed</td></tr>
<tr><td>Maximum Ponding Depth (Major)</td><td>200mm</td><td>LC D5.12.2</td></tr>
<tr><td>Maximum Gutter Bypass Flow</td><td>10L/s</td><td>LC D5.09.9</td></tr>
<tr><td>Maximum Overland Flow Width (Minor)</td><td>2.5m for 5 yr ARI</td><td>LC D5.09.1</td></tr>
<tr><td>Building Floor Level</td><td>500mm from 100 year flood level and floor levels of structures</td><td>LC D5.12.3</td></tr>
<tr><td colspan="3">Open Channel</td></tr>
<tr><td>Channel Roughness</td><td>MANNING ROUGHNESS COEFFICIENT (n)<table><tr><th>Surface type</th><th>Typical values for n</th></tr><tr><td>Polyethylene (PE)</td><td>0.009 to 0.010</td></tr><tr><td>Polyvinylchloride (PVC)</td><td>0.009 to 0.010</td></tr><tr><td>Smooth concrete</td><td>0.011 to 0.012</td></tr><tr><td>Trowelled concrete</td><td>0.012 to 0.015</td></tr><tr><td>Asphalt paving</td><td>0.013 to 0.015</td></tr><tr><td>Brickwork</td><td>0.014 to 0.016</td></tr><tr><td>Roughly jointed bricks or pitchers</td><td>0.016 to 0.020</td></tr><tr><td>Sprayed concrete (gunite)</td><td>0.016 to 0.020</td></tr><tr><td>Earth-lined channels</td><td>0.018 to 0.025</td></tr><tr><td>Corrugated metal</td><td>0.012 to 0.015</td></tr><tr><td>Rock lining or rip-rap</td><td>0.025 to 0.030</td></tr><tr><td>Rock cut</td><td>0.035 to 0.040</td></tr><tr><td>Grassed or vegetated channels</td><td>0.025 to 0.075*</td></tr></table>* Depending on vegetation growth</td><td>AS3500.3 Table 5.4.9</td></tr>
<tr><td>Side Slopes</td><td>Max 1:6 for grass lined - 1:4 may be accepted in exceptional circumstances with approval from Council.</td><td>LC D5.13.4</td></tr>
<tr><td>Base Cross Slope</td><td>Min 1:20</td><td>LC D5.13.5</td></tr>
<tr><td>Longitudinal Grade</td><td>Min 0.5%</td><td>AGRD 5B 2.7.1</td></tr>
<tr><td>Freeboard</td><td>500mm from 100 year flood level and floor levels of structures</td><td>LC D5.12.3</td></tr>
</table>

Appendix C

Site Survey



EVAN AKAR
REGISTERED LAND SURVEYOR NSW
ENG LAND SERVICES

8/5/2023
DATE

YOU ARE ADVISED TO CALL 1100 "DIAL BEFORE YOU DIG" BEFORE CARRYING OUT ANY BUILDING WORKS.

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DRAWING NOTES

- RIDGE AND GUTTER LOCATION AND HEIGHTS HAVE BEEN OBTAINED BY INDIRECT METHOD AND ARE ACCURATE TO ±0.05m.
- CONTOURS SHOWN ARE AN INDICATION OF LANDFORM AND SHOULD NOT BE TAKEN IN PREFERENCE TO SPOT LEVELS SHOWN.
- SERVICES SHOWN ARE INDICATIVE ONLY. POSITIONS ARE BASED ON SURFACE INDICATOR(S) LOCATED DURING FIELD SURVEY. THE RELEVANT AUTHORITY SHOULD BE CONTACTED TO DETERMINE EXACT POSITION OF ANY UNDERGROUND PIPES, CABLES ETC. OTHER SERVICES MAY EXIST WHICH ARE NOT SHOWN.
- DIMENSIONS OF ANY TREES SHOWN ON THE SURVEY PLANS ARE APPROXIMATE.
- ADDZONING BUILDING DETAILS SHOWN ARE APPROXIMATE ONLY DUE TO RESTRICTED ACCESS.
- REFER TO THE CERTIFICATE OF TITLE FOR RESTRICTIONS IF ANY. OTHER EASEMENTS OR RESTRICTIONS MAY EXIST OR BE EXTINGUISHED, THAT ARE NOT SHOWN.
- THIS PLAN IS FOR PLANNING AND DESIGN PURPOSES ONLY & IS NOT TO BE USED FOR CONSTRUCTION. IF ANY CONSTRUCTION IS TO BE UNDERTAKEN CLOSE TO OR RELATIVE TO ANY BOUNDARY, OR ACCURATE POSITION OF FEATURES IS NEEDED A SPECIFIC SETOUT OR BOUNDARY SURVEY IS REQUIRED.
- THESE NOTES ARE AN INTEGRAL PART OF THE PLAN.

REVISION

REV A	ZONE AREAS ADDED	19.05.2023

NOTE

ALL TREE INFORMATION IS APPROXIMATE ONLY AND ARE SHOWN FOR TENDER PURPOSES ONLY. ALL TREE RELATED ISSUES TO BE REFERRED TO AN ARBORIST.

ABBREVIATIONS

D - DOOR	PP - POWER POLE
DR - DRAIN	RL - REDUCED LEVEL
EB - ELEC BOX	SIO-SEWER INSPECTION
FL - FLOOR LEVEL	SMH - SEWER MAN HOLE
GDN - GARDEN	SVP - SEWER VENT PIPE
GM - GAS METER	SWP - STORM WATER PIT
GMP - GAS MARKER POST	T - TREE
H - HYDRANT	TF - TOP OF FENCE
KT - KERB TOP	TP - TELECOMMS PIT
KL - KERB LIP	TW - TOP OF WALL
KI - KERB INVERT	VER - VERANDAH
KO - KERB OUTLET	W - WINDOW
L - LANDING	WM - WATER METER
LP - LIGHT POLE	W/C - WATER CLOSET
MH - MAN HOLE	

PLAN BY

ENG LAND SERVICES

m: 0434 824 595 e: office@englandservices.com.au

CLIENT

EMKC CUBED

CLIENT REFERENCE:

PROJECT LOCATION

LOT A
DP 406215
230 MARTIN ROAD
BADGERYS CREEK

PLAN TYPE

CONTOUR PLAN

JOB REFERENCE

230508D1GN-REV A

SOURCE OF LEVELS

SSM 33801 RL 62.465 (AHD)
(SCIMS, DATED 07.05.2023)

SURVEY DATE	SCALE / SHEET
08.05.2023	1:800@A1 SHEET 1 of 3

NOTE:
BOUNDARY SHOWN IS LEGAL BOUNDARY AS PER DP406215.
NATURAL BOUNDARY NOT SURVEYED

LOT 22
DP 626147

METAL WAREHOUSE
RIDGE 57.51
GUTTER RL 56.32

DAM

DAM

POST & WIRE
FENCE
95°24'25"
776.408
STAR PICKET
TREE LINE
5°06'10"
150.635
28°23'
87.508
347°56'40"
69.691
372°18'40"
31.583
208°12'30"
35.899
228°00'20"
29.855
355°04'40"
67.834
80°53'
35.995
6°53'40"
22.752
303°09'40"
35.567
45°39'
15.671
77°06'40"
31.304
16°41'40"
24.393
54°57'30"
61.419
67°13'30"
158.802
20°09'10"
67.774
335°34'20"
26.051
98°14'40"
718.865 (TO BANK)
718.753 (TO TRAV)
T38 (DEAD)
T15 (DEAD)
A
24.28ha
(BY DP)
LOT 54
DP 3050
NOTE:
BOUNDARY SHOWN IS LEGAL BOUNDARY AS PER DP406215.
NATURAL BOUNDARY NOT SURVEYED

SCHEDULE OF TREES

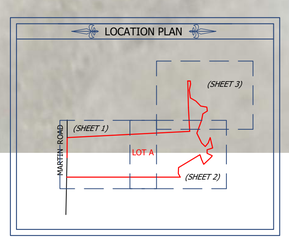
	DIAMETER	HEIGHT	SPREAD
T01	0.3	6	4
T02	0.3	6	4
T03	0.3	6	4
T04	0.5	8	5
T05	0.5	8	5
T06	0.6	10	6
T07	0.6	10	6
T08	0.6	10	6
T09	0.6	10	6
T10	0.6	10	6
T11	0.9	12	10
T12	0.9	12	10
T13	0.7	10	8
T14	0.3	6	4
T15	0.6	8	1
T16	0.4	8	4
T17	0.5	8	5
T18	0.6	12	8
T19	0.3	6	4
T20	0.4	8	5
T21	0.3	6	4
T22	0.3	6	4
T23	0.5	10	8
T24	0.5	10	8
T25	0.8	12	8
T26	0.8	12	8
T27	0.5	10	6
T28	0.6	10	6
T29	0.6	10	6
T30	0.9	10	8
T31	0.5	6	6
T32	0.3	6	6
T33	0.3	6	6
T34	0.3	6	4
T35	0.3	6	4
T36	0.3	6	4
T37	0.3	6	4
T38	0.6	10	4
T39	0.3	6	4
T40	0.3	6	4
T41	0.3	6	4

ZONING AREAS

ENT ZONE = 8.19ha
ENZ ZONE = 16.09ha
TOTAL LOT AREA = 24.28ha (BY DP406215)

AREAS ARE APPROXIMATE ONLY.

LOCATION PLAN



LEGEND

- BENCH MARK
- E — ELEC CABLE (OVERHEAD) APPROX. POSITION
- GULLY PIT
- PHOTO POINT
- S — SEWER MAIN (UNDERGROUND) APPROX. POSITION
- VEHICULAR CROSSING

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- THESE NOTES ARE AN INTEGRAL PART OF THE PLAN.

REVISION

REV A	ZONE AREAS ADDED	19.05.2023

8/5/2023
EVAN AKAR
REGISTERED LAND SURVEYOR NSW
ENG LAND SERVICES
DATE

NOTE

ALL TREE INFORMATION IS APPROXIMATE ONLY AND ARE SHOWN FOR TENDER PURPOSES ONLY. ALL TREE RELATED ISSUES TO BE REFERRED TO AN ARBORIST.

PLAN BY

ENG LAND SERVICES
m: 0434 824 595 e: office@englandservices.com.au

CLIENT

EMKC CUBED

CLIENT REFERENCE:

PROJECT LOCATION

LOT A
DP 406215
230 MARTIN ROAD
BADGERYS CREEK

PLAN TYPE

CONTOUR PLAN

ABBREVIATIONS

D - DOOR
DR - DRAIN
EB - ELEC BOX
FL - FLOOR LEVEL
GDN - GARDEN
GM - GAS METER
GMP - GAS MARKER POST
H - HYDRANT
KT - KERB TOP
KL - KERB LIP
KI - KERB INVERT
KO - KERB OUTLET
L - LANDING
LP - LIGHT POLE
MH - MAN HOLE
PP - POWER POLE
RL - REDUCED LEVEL
SIO-SEWER INSPECTION
SMH - SEWER MAN HOLE
SVP - SEWER VENT PIPE
SWP - STORM WATER PIT
T - TREE
TF - TOP OF FENCE
TP - TELECOMMS PIT
TW - TOP OF WALL
VER - VERANDAH
W - WINDOW
WM - WATER METER
W/C - WATER CLOSET

JOB REFERENCE

230508D1GN-REV A

SOURCE OF LEVELS

SSM 33801 RL 62.465 (AHD)

SURVEY DATE	SCALE / SHEET
08.05.2023	1:800@A1 SHEET 2 of 3

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DRAWING NOTES

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- ADJOINING BUILDING DETAILS SHOWN ARE APPROXIMATE ONLY DUE TO RESTRICTED ACCESS.
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THESE NOTES ARE AN INTEGRAL PART OF THE PLAN.

PLAN BY

ENG LAND SERVICES
m: 0434 824 595 e: office@englandservices.com.au

CLIENT

EMKC CUBED

CLIENT REFERENCE:

PROJECT LOCATION

LOT A
DP 406215
230 MARTIN ROAD
BADGERYS CREEK

PLAN TYPE

CONTOUR PLAN

ABBREVIATIONS

D - DOOR	PP - POWER POLE
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H - HYDRANT	TF - TOP OF FENCE
KT - KERB TOP	TP - TELECOMMS PIT
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KI - KERB INVERT	VER - VERANDAH
KO - KERB OUTLET	W - WINDOW
L - LANDING	WM - WATER METER
LP - LIGHT POLE	W/C - WATER CLOSET
MH - MAN HOLE	

JOB REFERENCE

230508D1GN-REV A

SOURCE OF LEVELS

SSM 33801 RL 62.465 (AHD)

SURVEY DATE	SCALE / SHEET
08.05.2023	1:800@A1 SHEET 3 of 3

Appendix D

Stormwater Quality Improvement Device Evaluation Protocol Certificates

STORMWATER AUSTRALIA

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Applicant Name	**Ocean Protect Pty Ltd**
Applicant Address	PO Box 75, Casula Mall NSW 2170
Website	www.oceanprotect.com.au
Contact Email	michaelw@oceanprotect.com.au

Verified Technology

Product Title	**OceanGuard**
SQIDEP Pathway	**Body of Evidence Pathway**
Reviewed Documents	The following documents form the basis of this independent evaluation: ● Dalrymple B, Wicks M. (2021). A review of the application of OceanGuard® in Australia. Prepared on behalf of Ocean Protect. ● Letter from Ocean Protect (3 March 2019) describing the equivalence of OceanGuard® technology to EnviroPod® technology. ● Peer review report by Damian McCann of OceanGuard® (16 June 2021) ● Goonetilleke A (2011), Kuranda Stormwater Treatment System Field Evaluation. ● Butler K, Ockleston G, Foster M (2002), Auckland City's field and laboratory testing of stormwater catchpit filters. ● Renew Solutions, 2023, Hydraulic testing of OceanGuard Technology. ● Dalrymple B, Wicks M, Jones W, Allingham B (2021), "Gully pit inserts" shown to reduce pollutants in stormwater, Australian Water Association Water e-Journal, Vol 6, No.1. ● White M, Pezzaniti D (2002), Evaluation of Gully Pit Inlet Litter Control Systems – Final Report. Prepared for Brisbane City Council. ● Wicks M, Vigar N, Hannah M (2011), Nutrients and solids removal by an engineered treatment train – Field evaluation of a gully pit insert and cartridge media filter. Published in Water Journal of the Australian Water Association, September 2011. ● Vigar N, Wicks M (2010), Kuranda Stormwater Treatment System Field Evaluation – StormFilter Enviropod® (SFEP) Treatment Train with ZPGTM Media. ● Michael Wicks, Brad Dalrymple, OceanGuard SQIDEP Compliance (undated) (spreadsheet data with more details regarding monitoring of OceanGuard at Western Sydney, NSW – includes spreadsheets of water quality results, event flows and sample aliquots). ● Various supporting files from monitoring of OceanGuard at Western Sydney University including individual storm reports, chain of custody documentation, maintenance reports, statutory declarations, and photos.

Technology Information

Applicant's Verified Performance Claims (ER)	**Total Suspended Solids (TSS)** **51.6 %** **Total Phosphorus (TP)** **64.7 %** **Total Nitrogen (TN)** **24.9 %** **Gross Pollutants** **100 %**
Test Stormwater Runoff	The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (urban roads, residential, industrial, commercial). The TN component of one event was removed from the performance claim as it was considered an outlier, and not representative of TN loading and treatment. The gross pollutant performance claim is based on independent laboratory testing.
Test Catchment	Commercial

Maintenance Performed during monitoring	● The OceanGuard at the site was maintained in accordance with typical/ standard maintenance procedures for these assets during the study period. In summary, the system was maintained approximately every four (4) months, with maintenance undertaken on 14 February 2020, 4 June 2020, 27 November 2020 and 25 March 2021 – noting the monitoring of the OceanGuard at the site was undertaken between March 2020 and June 2021.

Verified method to model in MUSIC

Modelling a OceanGuard in MUSIC is as follows:

Use a Generic node with the following properties:

High flow bypass/ treatment flow rate (TFR)	Pollutant removal up to TFR
20 L/ s per OceanGuard	51.6% for TSS 64.7% for TP 24.9% for TN 100% for gross pollutants

Input properties should reflect those given below:

Pollutant	Influent	Effluent	Reduction
Total suspended solids (TSS)	1000	484	51.6%
Total Phosphorus (TP)	10	3.53	64.7%
Total Nitrogen	100	75.1	24.9%
Gross Pollutants	1000	0	100%

Conditions/Notes

The limitations of the acceptance of these claims include:

- The results lie within acceptable inflow limits for this type of catchment and based on the analysis are found to be representative. The device has been tested within the pollutant loading ranges specified by SQIDEP v1.3. As with the majority of treatment devices, where the influent water is more polluted there would likely be a greater percentage of pollutants removed and a higher residual load in effluent water – and, where the influent water is cleaner (i.e. below limits of detection), there would likely be a lower percentage of pollutants removed and a lower residual pollutant load in effluent water.
- The OP OceanGuard filter bag is the only treatment mechanism applied by the device. The field results evaluated for the OP OceanGuard were for a device with a 200-micron filter bag. The OP OceanGuard filter bag can be supplied with multiple pore sizes from 200 micron or larger. This verification certificate is specific to filter bag with pore size of 200 microns.
- Design and installation should be performed in accordance with the manufacturer's guidelines. Results are reliant on the maintenance of the device being consistent with the manufacturer's guidelines.
- Regular inspection and maintenance should be performed in accordance with the manufacturer's operation and maintenance manuals.

Independent Reviewers

Evaluator Signature	
Dr Baden Myers Director Baden Myers Consulting	

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	13 November 2023
Acceptance by Stormwater Australia Board of Directors	1 December 2023
Verification Issued	1 December 2023
Stormwater Australia Verification Certificate Number Reference	SA-2023/08-VC

Verified under SQIDEP Version

1.3 Body of Evidence Pathway

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Applicant Name	**Ocean Protect Pty Ltd**
Applicant Address	60 Lyn Parade, Prestons, NSW 2170
Website	www.oceanprotect.com.au
Contact Email	bradd@oceanprotect.com.au

Verified Technology

Product Title	**StormFilter NPSorb**
SQIDEP Pathway	**Body of Evidence Pathway**
Reviewed Documents	The following documents form the basis of this independent evaluation: • Dalrymple B, Wicks M. (2024). *Performance report for SQIDEP review – StormFilter NPSorb*. Prepared on behalf of Ocean Protect. • Supporting information for the StormFilter NPSorb technology monitoring at the study site at Western Sydney, including plan and section drawings, site photos, sample receipt notifications, chain of custody documentation, certificate of analyses, individual storm reports, and monitoring equipment calibration and maintenance logs. • Statutory declarations from Ocean Protect personnel. • Photos of other StormFilter technology installations. • Dalrymple B, Wicks M. (2021). *A review of the application of StormFilter® in Australia*. Prepared on behalf of Ocean Protect. • Ocean Protect (2019). *StormFilter® Operations & Maintenance Manual*. • Ocean Protect (2020). *StormFilter® Technical Design Guide*.

Technology Information

Applicant's Verified Performance Claims (ER)	**Total Suspended Solids (TSS) 87 %** **Total Phosphorus (TP) 72 %** **Total Nitrogen (TN) 65 %** **Gross Pollutants 100 %**
Test Stormwater Runoff	The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (e.g. urban roads, residential, industrial, commercial).
Test Catchment	Commercial

Maintenance Performed during monitoring	• Zero servicing or maintenance of the StormFilter NPSorb system at the study site was undertaken following the installation of the StormFilter NPSorb cartridges in April 2021 until after the last sampling event (in March 2023). Only visual inspections of the system were undertaken. • The StormFilter NPSorb system at the study site has been maintained in accordance with typical/ standard maintenance procedures for these assets, as described in the Manufacturer's guidelines.

Verified method to model in MUSIC

Modelling a StormFilter NPSorb technology in MUSIC is as follows:

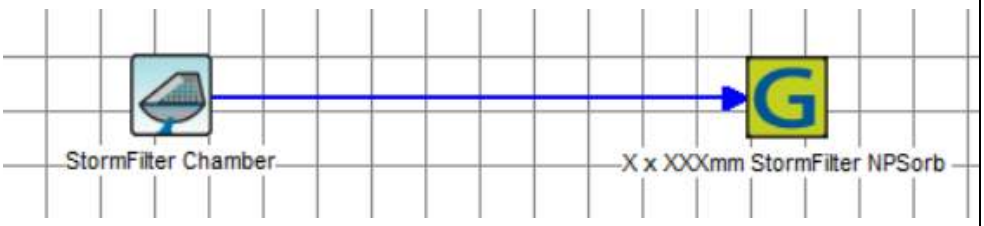


Table 1 – Summary of StormFilter NPSorb cartridge dimensions

Parameter	Cartridge name/ siphon height		
	690	460	310
Physical height (mm)	840	600	600
Typical weir height from outlet (mm)	920	690	540
Treatment flow rate (L/s)*	1.60	1.10	0.70

*: Treatment flow rate based on StormFilter NPsorb technology applied at study site.

Use the detention basin node to hydraulically represent the detention tank (or 'vault'/ storage) 'housing' the StormFilter cartridge system(s), with the properties given in Table 2.

Table 2 – Recommended values for MUSIC Detention Node (StormFilter Chamber) component for StormFilter NPSorb technology modelling

Parameter	Value for given cartridge name/ siphon height			
	690	460	310	Comments
Inlet properties				
Low flow by-pass (m^3/s)	0			No bypass of flows below treatment flow rate occurs.
High flow by-pass (m^3/s)	100			Default (very high value), noting bypass occurs in the Generic (NP Sorb) node and any overflow occurs via the overflow weir in the detention (Stormfilter chamber) node.
Storage properties				
Surface area (m^2)	Varies. Adjust to be equal to value of surface area of chamber housing StormFilter cartridges minus area of cartridges.			
Extended detention depth (m)	0.77	0.54	0.39	Standard 80mm head above top of cartridge media.
Permanent pool volume (m^3)	0			No permanent ponding of water occurs in appropriately functioning StormFilter technologies.
Initial volume (m^3)	0			
Evaporative Loss as % of PET	0			StormFilter cartridges are almost exclusively underground. Any evaporative loss is likely to be minimal.
Outlet properties				
Equivalent pipe diameter (mm)	Varies.			Depends on cartridge height, number, and chamber dimensions. Best to liaise with Ocean Protect.
Overflow weir width (m)	Varies. Adjust to be equal to width of weir structure within system.			
Notional detention time (hrs)	Varies.			
Advanced properties				
k (m/year)	Set to 1 or zero.			Ensures no additional treatment is modelled where none exists.

Use the generic node with the properties given below in Tables 3 and 4.

Table 3 – Recommended treatment flow rate & pollutant removal for StormFilter NPSorb technology (Generic Node)

High flow bypass/ treatment flow rate (TFR)	Pollutant removal up to TFR
Treatment flow rate multiplied by type and number of cartridges*	87% for TSS 72% for TP 65% for TN 100% for gross pollutants

*: Treatment flow rates for available configurations given in Table 1.

Table 4 – Recommended generic node transfer function properties for StormFilter NPSorb technology

Pollutant	Influent	Effluent	Reduction
Total suspended solids (TSS)	1000	130	87%
Total Phosphorus (TP)	10	2.8	72%
Total Nitrogen	100	35	65%
Gross Pollutants	1000	0	100%

Conditions/Notes

The limitations of the acceptance of these claims include:

- The results lie within acceptable inflow limits for this type of catchment and based on the analysis are found to be representative. The device has been tested within the pollutant loading ranges specified by SQIDEP v1.3. As with the majority of treatment devices, where the influent water is more polluted there would likely be a greater percentage of pollutants removed and a higher residual load in effluent water – and, where the influent water is cleaner (i.e. below limits of detection), there would likely be a lower percentage of pollutants removed and a lower residual pollutant load in effluent water.
- Design and installation should be performed in accordance with the Manufacturer's guidelines. Results are reliant on the design of the device being consistent with the Manufacturer's guidelines.
- Regular inspection and maintenance should be performed in accordance with the Manufacturer's Operation and Maintenance Manuals. Results are reliant on the maintenance of the device being consistent with the Manufacturer's guidelines.

Independent Reviewers

Evaluator Signature	
Damian McCann Director AWC	
Chris Beardshaw Principal Engineer Afflux Consulting	

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	16 September 2024
Acceptance by Stormwater Australia Board of Directors	16 September 2024
Verification Issued	9 September 2024
Stormwater Australia Verification Certificate Number Reference	SA-2024/10-VC

Verified under SQIDEP Version 1.3

Body of Evidence Pathway

STORMWATER AUSTRALIA

Stormwater Quality Improvement Device Evaluation Protocol (SQIDEP)

VERIFICATION CERTIFICATE

Applicant Information

Applicant Name	**Ocean Protect Pty Ltd**
Applicant Address	60 Lyn Parade, Prestons, NSW 2170
Website	www.oceanprotect.com.au
Contact Email	michaelw@oceanprotect.com.au

Verified Technology

Product Title	**Filterra**
SQIDEP Pathway	**Body of Evidence Pathway**
Reviewed Documents	The following documents form the basis of this independent evaluation: • Dalrymple B, Wicks M. (August 2024). *Detailed performance report for SQIDEP review – Filterra biofiltration*. Prepared on behalf of Ocean Protect. • Supporting information for the Filterra biofiltration technology monitoring at the study site at Western Sydney, including plan and section drawings, site photos, sample receipt notifications, chain of custody documentation, certificate of analyses, individual storm reports, and monitoring equipment calibration and maintenance logs. • Statutory declarations from Ocean Protect personnel. • Ocean Protect (2019). *Filterra® Operations & Maintenance Manual*. • Ocean Protect (2020). *Filterra® Technical Design Guide*. • Anderson A, Smolek A (2015). Filterra® Bioretention System Water Quality and Hydrologic Field-Scale Performance Evaluation. Prepared for Contech Engineering Solutions. • Pattle Delamore Partners Ltd, (2023), Letter re *Coatesville Filterra Infiltration Trial*, prepared for Stormwater360. • Smolek A P, Anderson A R, Hunt W F (2018). Hydrologic and Water-Quality Evaluation of a Rapid-Flow Biofiltration Device. Journal of Environmental Engineering 144(2), February 2018.

Technology Information

<table>
<tr><td>Applicant's Verified Performance Claims</td><td>The verified performance claim is shown below in Table 1. It is based on the Efficiency Ratio included in the DPR.

Table 1 – Verified Performance Claim
<table><tr><th>Pollutant</th><th>Verified Performance Claim (% reduction)</th></tr><tr><td>TSS</td><td>90</td></tr><tr><td>TP</td><td>85</td></tr><tr><td>TN</td><td>47</td></tr><tr><td>Gross Pollutant</td><td>100</td></tr></table>
The verified method for modelling Filterra in MUSIC is described in section "Verified method to model in MUSIC".</td></tr>
<tr><td>Test Stormwater Runoff</td><td>The presented runoff pollutant test results complied with the SQIDEP typical stormwater pollutant concentrations for urban environments. The device has therefore been tested within the pollutant loading ranges specified by SQIDEP v1.3 for typical urban environments (e.g. urban roads, residential, industrial, commercial).</td></tr>
<tr><td>Test Catchment</td><td>University car park</td></tr>
</table>

Maintenance Performed during monitoring	• The system was maintained approximately every twelve (12) months. • Specific maintenance activities that have been undertaken are: inspection of Filterra® biofiltration system and surrounding area; temporary removal of tree grate to access filter media surface; removal of debris, litter and mulch; mulch replacement; and plant health evaluation and pruning, as necessary.

STORMWATER AUSTRALIA

Verified method to model in MUSIC

Modelling a Filterra in MUSIC is as follows:

Table 2 – Recommended values for MUSIC Bioretention node for Filterra modelling

Parameter	Recommended value	Comments
Inlet properties		
Low-flow bypass (m^3/s)	User defined	
High-flow bypass (m^3/s)	User defined	
Storage properties		
Extended detention depth (m)	≤ 0.3	150mm is a typical value, equal to the depth of air space above the mulch layer. The mulch layer is 75mm thick and shall not be included within the EDD calculation.
Surface area	User defined	
Filter and media properties		
Filter area (m^2)	User defined and to be at least 0.3% of the catchment area.	
Unlined filter media perimeter (m)	User defined	
Saturated hydraulic conductivity (mm/hour)	3550	
Filter depth (m)	0.53	
Total Nitrogen (TN) content (mg/kg)	1000	
Orthophosphate content	40	
Infiltration properties		
Exfiltration rate (mm/hr)	User defined	
Lining properties		
Is the base lined ?	User defined	
Vegetation properties		
Plant selection	User defined	'Vegetated with nutrient effective plants' recommended for optimal performance.
Outlet properties		
Overflow weir width (m)	User defined	
Underdrain present	Yes	
Submerged zone with carbon present	No	
Depth (of submerged zone)	-	

Conditions/Notes	The limitations of the acceptance of these claims include: • The results lie within acceptable inflow limits for this type of catchment and based on the analysis are found to be representative. The device has been tested within the pollutant loading ranges specified by SQIDEP v1.3. As with the majority of treatment devices, where the influent water is more polluted there would likely be a greater percentage of pollutants removed and a higher residual load in effluent water – and, where the influent water is cleaner (i.e. below limits of detection), there would likely be a lower percentage of pollutants removed and a lower residual pollutant load in effluent water. • Design and installation should be performed in accordance with the Manufacturer's guidelines. Results are reliant on the design of the device being consistent with the Manufacturer's guidelines and this verification certificate. • Regular inspection and maintenance should be performed in accordance with Ocean Protect's Operation and Maintenance Manuals. Results are reliant on the maintenance of the device being consistent with the Manufacturer's guidelines. • If the filter media used within Filterra is altered, then this verification becomes invalid.

STORMWATER AUSTRALIA

Independent Reviewers

Evaluator Signature	
Mark Liebman Director, Principal Engineer Sustainability Workshop	
Ricky Kwan Technical Director AECOM	

Issue of Verification Certificate

Acceptance by SQIDEP Governance Panel	24 October 2024
Acceptance by Stormwater Australia Board of Directors	24 October 2024
Verification Issued	24 October 2024
Stormwater Australia Verification Certificate Number Reference	SA-2024/13-VC

Verified under SQIDEP Version 1.3

Body of Evidence Pathway

Appendix E

Mean Annual Rainfall Volume Spreadsheet

ENTER DEVELOPMENT AREA (in cell F2)			
Development Area	**24.062**	ha	(i.e. the total catchment areas used in MUSIC)

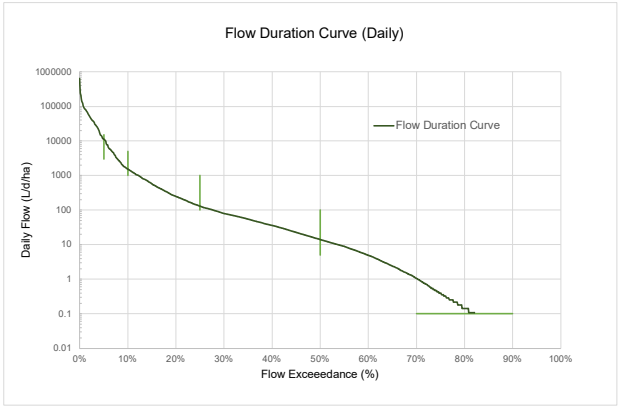
Stormwater Quantity (flow) Targets Option 2- flow percentiles			
Indices	**Result**	**Comply**	**Target**
95%ile	11,188	Yes	3000 to 15000 L/ha/day
90%ile	1,529	Yes	1000 to 5000 L/ha/day
75%ile	130	Yes	100 to 1000 L/ha/day
50%ile	14	Yes	5 to 100 L/ha/day
Cease to Flow	18%	Yes	10-30%

Stormwater Quantity (flow) Targets Option 1 - MARV			
Indices	**Result**	**Comply**	**Target**
MARV (ML/ha/yr)	1.28	Yes	≤ 2
90%ile	1,529	Yes	1000 to 5000 L/ha/day
50%ile	14	Yes	5 to 100 L/ha/day
10%ile	0	Yes	0 L/ha/day

Paste daily flow time series from MUSIC

Date	m3/s	L/ha/day
1/01/1999	0.00080727	2898.68373
2/01/1999	0.00000071	2.54941401
3/01/1999	0.0000007	2.51350677
4/01/1999	0.00000069	2.47759953
5/01/1999	0.00000068	2.44169229
6/01/1999	0.00000067	2.40578506
7/01/1999	0.00000066	2.36987782
8/01/1999	0.00000065	2.33397058
9/01/1999	0.00000064	2.29806334
10/01/1999	0.00000063	2.2621561
11/01/1999	0.00000062	2.22624886
12/01/1999	0.00000062	2.22624886
13/01/1999	0.00000061	2.19034162
14/01/1999	0.0000006	2.15443438
15/01/1999	0.00000059	2.11852714
16/01/1999	0.00000058	2.0826199
17/01/1999	0.00000057	2.04671266
18/01/1999	0.00000057	2.04671266
19/01/1999	0.00013823	496.345773
20/01/1999	0.00056112	2014.82703
21/01/1999	0.00405317	14553.8146
22/01/1999	0.06055033	217419.521
23/01/1999	0.0004088	1467.88796
24/01/1999	0.00000052	1.86717646
25/01/1999	0.00806561	28961.3791
26/01/1999	0.0000005	1.79536198
27/01/1999	0.0000005	1.79536198
28/01/1999	0.00000049	1.75945474
29/01/1999	0.00000048	1.7235475
30/01/1999	0.00011449	411.101987
31/01/1999	0.00000047	1.68764026
1/02/1999	0.00000046	1.65173302
2/02/1999	0.0003443	1236.28626
3/02/1999	0.00000045	1.61582578
4/02/1999	0.00000044	1.57991854
5/02/1999	0.00000044	1.57991854
6/02/1999	0.00000043	1.5440113
7/02/1999	0.00000043	1.5440113
8/02/1999	0.00000042	1.50810406
9/02/1999	0.00313369	11252.2158
10/02/1999	0.00807811	29006.2632
11/02/1999	0.00007421	266.467625
12/02/1999	0.0000004	1.43628959
13/02/1999	0.00000039	1.40038235
14/02/1999	0.00000039	1.40038235
15/02/1999	0.00000038	1.36447511
16/02/1999	0.00000038	1.36447511
17/02/1999	0.00000037	1.32856787
18/02/1999	0.00000037	1.32856787
19/02/1999	0.00000036	1.29266063
20/02/1999	0.00000035	1.25675339
21/02/1999	0.00000035	1.25675339
22/02/1999	0.00000035	1.25675339
23/02/1999	0.00000034	1.22084615
24/02/1999	0.00000034	1.22084615
25/02/1999	0.00000033	1.18493891
26/02/1999	0.00000033	1.18493891
27/02/1999	0.00000032	1.14903167
28/02/1999	0.00000032	1.14903167
1/03/1999	0.0016253	5836.00366
2/03/1999	0.00000031	1.11312443
3/03/1999	0.0000003	1.07721719
4/03/1999	0.0000003	1.07721719
5/03/1999	0.0000003	1.07721719
6/03/1999	0.00000029	1.04130995
7/03/1999	0.00000029	1.04130995
8/03/1999	0.00000028	1.00540271
9/03/1999	0.00000028	1.00540271
10/03/1999	0.00000028	1.00540271
11/03/1999	0.00000027	0.96949547
12/03/1999	0.00000027	0.96949547
13/03/1999	0.00000026	0.93358823
14/03/1999	0.00000026	0.93358823
15/03/1999	0.00000026	0.93358823
16/03/1999	0.00000025	0.89768099
17/03/1999	0.00000025	0.89768099
18/03/1999	0.00000025	0.89768099
19/03/1999	0.00000024	0.86177375
20/03/1999	0.00000024	0.86177375
21/03/1999	0.00000024	0.86177375
22/03/1999	0.00000023	0.82586651
23/03/1999	0.00000023	0.82586651
24/03/1999	0.00000023	0.82586651
25/03/1999	0.00000022	0.78995927
26/03/1999	0.00000022	0.78995927
27/03/1999	0.00000022	0.78995927
28/03/1999	0.00000021	0.75405203
29/03/1999	0.00000021	0.75405203
30/03/1999	0.00000021	0.75405203
31/03/1999	0.0000002	0.71814479
1/04/1999	0.0000002	0.71814479
2/04/1999	0.0000002	0.71814479
3/04/1999	0.0000002	0.71814479
4/04/1999	0.00000019	0.68223755
5/04/1999	0.00065777	2361.8705
6/04/1999	0.00000019	0.68223755
7/04/1999	0.00000019	0.68223755
8/04/1999	0.00000018	0.64633031
9/04/1999	0.00000018	0.64633031
10/04/1999	0.00000018	0.64633031
11/04/1999	0.00000018	0.64633031
12/04/1999	0.00000017	0.61042307
13/04/1999	0.00000017	0.61042307
14/04/1999	0.00000017	0.61042307

Percentile	Flow (L/ha/day)
0.0%	644,479
0.1%	262,395
0.2%	212,329
0.3%	173,785
0.4%	139,742
0.5%	133,106
0.6%	119,637
0.7%	104,635
0.8%	94,149
0.9%	90,825
1.0%	84,290
1.1%	82,272
1.2%	80,268
1.3%	77,538
1.4%	71,797
1.5%	70,239
1.6%	65,372
1.7%	62,096
1.8%	58,142
1.9%	55,243
2.0%	52,516
2.1%	49,331
2.2%	46,997
2.3%	44,585
2.4%	42,284
2.5%	41,144
2.6%	38,997
2.7%	38,421
2.8%	37,363
2.9%	36,266
3.0%	34,107
3.1%	31,329
3.2%	29,489
3.3%	28,963
3.4%	27,552
3.5%	26,454
3.6%	25,347
3.7%	24,238
3.8%	22,538
3.9%	21,241
4.0%	19,689
4.1%	17,849
4.2%	15,870
4.3%	14,819
4.4%	14,577
4.5%	14,079
4.6%	13,216
4.7%	12,178
4.8%	11,906
4.9%	11,257
5.0%	11,188
5.1%	11,110
5.2%	10,613
5.3%	10,301
5.4%	9,762
5.5%	8,444
5.6%	7,806
5.7%	7,650
5.8%	7,567
5.9%	6,768
6.0%	6,289
6.1%	6,035
6.2%	5,900
6.3%	5,737
6.4%	5,626
6.5%	5,441
6.6%	5,171
6.7%	4,980
6.8%	4,828
6.9%	4,712
7.0%	4,539
7.1%	4,322
7.2%	3,964
7.3%	3,919
7.4%	3,685
7.5%	3,426
7.6%	3,252
7.7%	3,174
7.8%	3,031
7.9%	2,948
8.0%	2,818
8.1%	2,713
8.2%	2,685
8.3%	2,557
8.4%	2,449
8.5%	2,373
8.6%	2,284
8.7%	2,132
8.8%	2,048
8.9%	2,030
9.0%	1,908
9.1%	1,842
9.2%	1,816
9.3%	1,789
9.4%	1,760
9.5%	1,729
9.6%	1,678
9.7%	1,620
9.8%	1,583
9.9%	1,562
10.0%	1,529
10.1%	1,497
10.2%	1,471
10.3%	1,439



15/04/1999	0.00000017	0.61042307		10.4%	1,413
16/04/1999	0.00000016	0.57451583		10.5%	1,387
17/04/1999	0.00000016	0.57451583		10.6%	1,348
18/04/1999	0.00000016	0.57451583		10.7%	1,319
19/04/1999	0.00000016	0.57451583		10.8%	1,294
20/04/1999	0.00000015	0.53860859		10.9%	1,279
21/04/1999	0.00000015	0.53860859		11.0%	1,234
22/04/1999	0.00000015	0.53860859		11.1%	1,216
23/04/1999	0.00000015	0.53860859		11.2%	1,204
24/04/1999	0.00000015	0.53860859		11.3%	1,176
25/04/1999	0.00000014	0.50270135		11.4%	1,153
26/04/1999	0.00000014	0.50270135		11.5%	1,126
27/04/1999	0.00000014	0.50270135		11.6%	1,099
28/04/1999	0.00000014	0.50270135		11.7%	1,062
29/04/1999	0.00000014	0.50270135		11.8%	1,052
30/04/1999	0.00000013	0.46679412		11.9%	1,043
1/05/1999	0.00000013	0.46679412		12.0%	1,030
2/05/1999	0.00000013	0.46679412		12.1%	1,020
3/05/1999	0.00000013	0.46679412		12.2%	1,006
4/05/1999	0.00000013	0.46679412		12.3%	979
5/05/1999	0.00000013	0.46679412		12.4%	965
6/05/1999	0.00000012	0.43088688		12.5%	942
7/05/1999	0.00000012	0.43088688		12.6%	924
8/05/1999	0.00000012	0.43088688		12.7%	901
9/05/1999	0.00006663	239.249938		12.8%	880
10/05/1999	0.00000012	0.43088688		12.9%	861
11/05/1999	0.00000011	0.39497964		13.0%	829
12/05/1999	0.00000011	0.39497964		13.1%	813
13/05/1999	0.00000011	0.39497964		13.2%	802
14/05/1999	0.00000011	0.39497964		13.3%	792
15/05/1999	0.00000011	0.39497964		13.4%	783
16/05/1999	0.00000011	0.39497964		13.5%	776
17/05/1999	0.00000011	0.39497964		13.6%	764
18/05/1999	0.0000001	0.3590724		13.7%	750
19/05/1999	0.0000001	0.3590724		13.8%	738
20/05/1999	0.0000001	0.3590724		13.9%	725
21/05/1999	0.0000001	0.3590724		14.0%	713
22/05/1999	0.0000001	0.3590724		14.1%	697
23/05/1999	0.0000001	0.3590724		14.2%	688
24/05/1999	0.0000001	0.3590724		14.3%	662
25/05/1999	0.00000009	0.32316516		14.4%	647
26/05/1999	0.00000009	0.32316516		14.5%	639
27/05/1999	0.00000009	0.32316516		14.6%	628
28/05/1999	0.00000009	0.32316516		14.7%	617
29/05/1999	0.00000009	0.32316516		14.8%	601
30/05/1999	0.00000009	0.32316516		14.9%	588
31/05/1999	0.00000009	0.32316516		15.0%	573
1/06/1999	0.00000009	0.32316516		15.1%	563
2/06/1999	0.00000008	0.28725792		15.2%	548
3/06/1999	0.00000008	0.28725792		15.3%	537
4/06/1999	0.00000008	0.28725792		15.4%	529
5/06/1999	0.00000008	0.28725792		15.5%	520
6/06/1999	0.00000008	0.28725792		15.6%	515
7/06/1999	0.00001889	67.8287757		15.7%	507
8/06/1999	0.00000008	0.28725792		15.8%	497
9/06/1999	0.00124815	4481.76211		15.9%	485
10/06/1999	0.00000008	0.28725792		16.0%	474
11/06/1999	0.00000007	0.25135068		16.1%	463
12/06/1999	0.00000007	0.25135068		16.2%	455
13/06/1999	0.00000007	0.25135068		16.3%	450
14/06/1999	0.00000007	0.25135068		16.4%	442
15/06/1999	0.00000007	0.25135068		16.5%	436
16/06/1999	0.00000007	0.25135068		16.6%	429
17/06/1999	0.00000007	0.25135068		16.7%	422
18/06/1999	0.00000007	0.25135068		16.8%	414
19/06/1999	0.00000007	0.25135068		16.9%	409
20/06/1999	0.00000007	0.25135068		17.0%	402
21/06/1999	0.00000006	0.21544344		17.1%	398
22/06/1999	0.00000006	0.21544344		17.2%	390
23/06/1999	0.00000006	0.21544344		17.3%	382
24/06/1999	0.00000006	0.21544344		17.4%	375
25/06/1999	0.00000006	0.21544344		17.5%	369
26/06/1999	0.00000006	0.21544344		17.6%	361
27/06/1999	0.00000006	0.21544344		17.7%	354
28/06/1999	0.00000006	0.21544344		17.8%	348
29/06/1999	0.00000006	0.21544344		17.9%	344
30/06/1999	0.00000006	0.21544344		18.0%	339
1/07/1999	0.00109297	3924.55357		18.1%	335
2/07/1999	0.00000006	0.21544344		18.2%	330
3/07/1999	0.00000005	0.1795362		18.3%	322
4/07/1999	0.00000005	0.1795362		18.4%	316
5/07/1999	0.00000005	0.1795362		18.5%	312
6/07/1999	0.00000005	0.1795362		18.6%	307
7/07/1999	0.00000005	0.1795362		18.7%	298
8/07/1999	0.00000005	0.1795362		18.8%	292
9/07/1999	0.00000005	0.1795362		18.9%	286
10/07/1999	0.00000005	0.1795362		19.0%	282
11/07/1999	0.00000005	0.1795362		19.1%	277
12/07/1999	0.00136973	4918.32233		19.2%	274
13/07/1999	0.00164498	5906.6691		19.3%	271
14/07/1999	0.02378691	85412.2277		19.4%	268
15/07/1999	0.00090198	3238.7612		19.5%	264
16/07/1999	0.00009445	339.143878		19.6%	261
17/07/1999	0.00000004	0.14362896		19.7%	259
18/07/1999	0.00000004	0.14362896		19.8%	256
19/07/1999	0.00000004	0.14362896		19.9%	252
20/07/1999	0.00000004	0.14362896		20.0%	248
21/07/1999	0.00000004	0.14362896		20.1%	244
22/07/1999	0.00000004	0.14362896		20.2%	242
23/07/1999	0.00000004	0.14362896		20.3%	239
24/07/1999	0.00000004	0.14362896		20.4%	236
25/07/1999	0.00000004	0.14362896		20.5%	233
26/07/1999	0.00000004	0.14362896		20.6%	229
27/07/1999	0.00000004	0.14362896		20.7%	226
28/07/1999	0.00000004	0.14362896		20.8%	225
29/07/1999	0.00000004	0.14362896		20.9%	221
30/07/1999	0.00000004	0.14362896		21.0%	218
31/07/1999	0.00000004	0.14362896		21.1%	215
1/08/1999	0.00000004	0.14362896		21.2%	213
2/08/1999	0.00000004	0.14362896		21.3%	210
3/08/1999	0.00000004	0.14362896		21.4%	207
4/08/1999	0.00000003	0.10772172		21.5%	203
5/08/1999	0.00000003	0.10772172		21.6%	201
6/08/1999	0.00000003	0.10772172		21.7%	198
7/08/1999	0.00000003	0.10772172		21.8%	196
8/08/1999	0.00000003	0.10772172		21.9%	193
9/08/1999	0.00000003	0.10772172		22.0%	191
10/08/1999	0.00000003	0.10772172		22.1%	188
11/08/1999	0.00000003	0.10772172		22.2%	186
12/08/1999	0.00000003	0.10772172		22.3%	183
13/08/1999	0.00000003	0.10772172		22.4%	181
14/08/1999	0.00000003	0.10772172		22.5%	177
15/08/1999	0.00000003	0.10772172		22.6%	173

16/08/1999	0.00000003	0.10772172		22.7%	171
17/08/1999	0.00000003	0.10772172		22.8%	169
18/08/1999	0.00000003	0.10772172		22.9%	167
19/08/1999	0.00000003	0.10772172		23.0%	166
20/08/1999	0	0		23.1%	164
21/08/1999	0	0		23.2%	162
22/08/1999	0	0		23.3%	160
23/08/1999	0	0		23.4%	156
24/08/1999	0	0		23.5%	155
25/08/1999	0	0		23.6%	153
26/08/1999	0	0		23.7%	150
27/08/1999	0.00042918	1541.06691		23.8%	148
28/08/1999	0	0		23.9%	146
29/08/1999	0.00046651	1675.10864		24.0%	146
30/08/1999	0	0		24.1%	144
31/08/1999	0	0		24.2%	143
1/09/1999	0	0		24.3%	142
2/09/1999	0	0		24.4%	140
3/09/1999	0	0		24.5%	138
4/09/1999	0	0		24.6%	136
5/09/1999	0	0		24.7%	134
6/09/1999	0	0		24.8%	133
7/09/1999	0	0		24.9%	131
8/09/1999	0	0		25.0%	130
9/09/1999	0	0		25.1%	129
10/09/1999	0	0		25.2%	127
11/09/1999	0	0		25.3%	125
12/09/1999	0	0		25.4%	124
13/09/1999	0	0		25.5%	122
14/09/1999	0	0		25.6%	121
15/09/1999	0	0		25.7%	120
16/09/1999	0	0		25.8%	118
17/09/1999	0.00003896	139.894606		25.9%	117
18/09/1999	0	0		26.0%	116
19/09/1999	0	0		26.1%	115
20/09/1999	0	0		26.2%	114
21/09/1999	0.00035154	1262.2831		26.3%	113
22/09/1999	0	0		26.4%	113
23/09/1999	0	0		26.5%	112
24/09/1999	0	0		26.6%	111
25/09/1999	0	0		26.7%	110
26/09/1999	0	0		26.8%	109
27/09/1999	0.00013007	467.045466		26.9%	108
28/09/1999	0	0		27.0%	107
29/09/1999	0	0		27.1%	106
30/09/1999	0	0		27.2%	105
1/10/1999	0.00004741	170.236223		27.3%	104
2/10/1999	0	0		27.4%	104
3/10/1999	0.00048456	1739.9212		27.5%	103
4/10/1999	0.00049074	1762.11188		27.6%	101
5/10/1999	0.00059012	2118.95803		27.7%	100
6/10/1999	0	0		27.8%	99
7/10/1999	0	0		27.9%	99
8/10/1999	0	0		28.0%	97
9/10/1999	0	0		28.1%	97
10/10/1999	0	0		28.2%	96
11/10/1999	0	0		28.3%	95
12/10/1999	0	0		28.4%	94
13/10/1999	0	0		28.5%	93
14/10/1999	0	0		28.6%	92
15/10/1999	0	0		28.7%	91
16/10/1999	0	0		28.8%	91
17/10/1999	0	0		28.9%	89
18/10/1999	0.00001995	71.6349431		29.0%	88
19/10/1999	0.00088713	3185.43895		29.1%	87
20/10/1999	0	0		29.2%	86
21/10/1999	0	0		29.3%	86
22/10/1999	0	0		29.4%	85
23/10/1999	0.00716109	25713.4975		29.5%	84
24/10/1999	0.01964375	70535.2839		29.6%	83
25/10/1999	0	0		29.7%	82
26/10/1999	0	0		29.8%	81
27/10/1999	0	0		29.9%	80
28/10/1999	0	0		30.0%	80
29/10/1999	0	0		30.1%	79
30/10/1999	0.00806639	28964.1799		30.2%	79
31/10/1999	0.01088294	39077.6334		30.3%	78
1/11/1999	0	0		30.4%	78
2/11/1999	0	0		30.5%	77
3/11/1999	0	0		30.6%	76
4/11/1999	0	0		30.7%	76
5/11/1999	0	0		30.8%	75
6/11/1999	0	0		30.9%	75
7/11/1999	0	0		31.0%	74
8/11/1999	0	0		31.1%	74
9/11/1999	0	0		31.2%	73
10/11/1999	0	0		31.3%	73
11/11/1999	0	0		31.4%	72
12/11/1999	0	0		31.5%	72
13/11/1999	0	0		31.6%	71
14/11/1999	0	0		31.7%	71
15/11/1999	0	0		31.8%	70
16/11/1999	0	0		31.9%	70
17/11/1999	0	0		32.0%	69
18/11/1999	0	0		32.1%	69
19/11/1999	0	0		32.2%	68
20/11/1999	0	0		32.3%	68
21/11/1999	0	0		32.4%	67
22/11/1999	0	0		32.5%	67
23/11/1999	0	0		32.6%	66
24/11/1999	0	0		32.7%	66
25/11/1999	0	0		32.8%	65
26/11/1999	0	0		32.9%	65
27/11/1999	0	0		33.0%	64
28/11/1999	0	0		33.1%	64
29/11/1999	0	0		33.2%	63
30/11/1999	0	0		33.3%	63
1/12/1999	0	0		33.4%	62
2/12/1999	0	0		33.5%	62
3/12/1999	0	0		33.6%	61
4/12/1999	0	0		33.7%	61
5/12/1999	0	0		33.8%	60
6/12/1999	0	0		33.9%	60
7/12/1999	0	0		34.0%	59
8/12/1999	0	0		34.1%	59
9/12/1999	0	0		34.2%	58
10/12/1999	0	0		34.3%	58
11/12/1999	0	0		34.4%	58
12/12/1999	0	0		34.5%	57
13/12/1999	0	0		34.6%	57
14/12/1999	0	0		34.7%	56
15/12/1999	0	0		34.8%	55
16/12/1999	0	0		34.9%	55

17/12/1999	0	0		35.0%	55
18/12/1999	0	0		35.1%	54
19/12/1999	0	0		35.2%	54
20/12/1999	0	0		35.3%	53
21/12/1999	0	0		35.4%	53
22/12/1999	0	0		35.5%	52
23/12/1999	0	0		35.6%	52
24/12/1999	0.00282061	10128.0319		35.7%	51
25/12/1999	0.00093073	3341.99451		35.8%	51
26/12/1999	0	0		35.9%	50
27/12/1999	0.00060741	2181.04164		36.0%	50
28/12/1999	0.00012665	454.76519		36.1%	49
29/12/1999	0.0002572	923.534203		36.2%	49
30/12/1999	0	0		36.3%	49
31/12/1999	0	0		36.4%	48
1/01/2000	0	0		36.5%	48
2/01/2000	0	0		36.6%	47
3/01/2000	0	0		36.7%	47
4/01/2000	0	0		36.8%	47
5/01/2000	0	0		36.9%	46
6/01/2000	0	0		37.0%	46
7/01/2000	0	0		37.1%	46
8/01/2000	0	0		37.2%	45
9/01/2000	0	0		37.3%	45
10/01/2000	0	0		37.4%	45
11/01/2000	0	0		37.5%	44
12/01/2000	0.00044275	1589.79303		37.6%	44
13/01/2000	0	0		37.7%	44
14/01/2000	0	0		37.8%	43
15/01/2000	0	0		37.9%	43
16/01/2000	0	0		38.0%	42
17/01/2000	0	0		38.1%	42
18/01/2000	0	0		38.2%	41
19/01/2000	0	0		38.3%	41
20/01/2000	0	0		38.4%	40
21/01/2000	0	0		38.5%	40
22/01/2000	0	0		38.6%	40
23/01/2000	0	0		38.7%	40
24/01/2000	0	0		38.8%	39
25/01/2000	0	0		38.9%	39
26/01/2000	0	0		39.0%	39
27/01/2000	0.00042261	1517.47585		39.1%	38
28/01/2000	0.00013986	502.198653		39.2%	38
29/01/2000	0	0		39.3%	38
30/01/2000	0	0		39.4%	38
31/01/2000	0	0		39.5%	37
1/02/2000	0	0		39.6%	37
2/02/2000	0	0		39.7%	37
3/02/2000	0	0		39.8%	36
4/02/2000	0	0		39.9%	36
5/02/2000	0	0		40.0%	36
6/02/2000	0	0		40.1%	36
7/02/2000	0	0		40.2%	35
8/02/2000	0	0		40.3%	35
9/02/2000	0	0		40.4%	35
10/02/2000	0	0		40.5%	35
11/02/2000	0	0		40.6%	34
12/02/2000	0.00098755	3546.01945		40.7%	34
13/02/2000	0	0		40.8%	34
14/02/2000	0	0		40.9%	33
15/02/2000	0	0		41.0%	33
16/02/2000	0	0		41.1%	33
17/02/2000	0	0		41.2%	32
18/02/2000	0	0		41.3%	32
19/02/2000	0	0		41.4%	32
20/02/2000	0	0		41.5%	31
21/02/2000	0	0		41.6%	31
22/02/2000	0	0		41.7%	31
23/02/2000	0	0		41.8%	31
24/02/2000	0	0		41.9%	30
25/02/2000	0	0		42.0%	30
26/02/2000	0	0		42.1%	30
27/02/2000	0	0		42.2%	30
28/02/2000	0	0		42.3%	30
29/02/2000	0	0		42.4%	29
1/03/2000	0	0		42.5%	29
2/03/2000	0	0		42.6%	29
3/03/2000	0	0		42.7%	28
4/03/2000	0	0		42.8%	28
5/03/2000	0.00031249	1122.06533		42.9%	28
6/03/2000	0.00332531	11940.2703		43.0%	27
7/03/2000	0	0		43.1%	27
8/03/2000	0.02162768	77659.0288		43.2%	27
9/03/2000	0.00216231	7764.25833		43.3%	27
10/03/2000	0	0		43.4%	26
11/03/2000	0.02078087	74618.3679		43.5%	26
12/03/2000	0	0		43.6%	26
13/03/2000	0	0		43.7%	26
14/03/2000	0	0		43.8%	25
15/03/2000	0	0		43.9%	25
16/03/2000	0	0		44.0%	25
17/03/2000	0	0		44.1%	25
18/03/2000	0	0		44.2%	24
19/03/2000	0	0		44.3%	24
20/03/2000	0.02159425	77538.9909		44.4%	24
21/03/2000	0.02669574	95857.0333		44.5%	24
22/03/2000	0.0138146	49604.4153		44.6%	24
23/03/2000	0.00109035	3915.14587		44.7%	23
24/03/2000	0.00003233	116.088106		44.8%	23
25/03/2000	0.00003188	114.47228		44.9%	23
26/03/2000	0.00003143	112.856454		45.0%	23
27/03/2000	0.00003099	111.276536		45.1%	22
28/03/2000	0.00003056	109.732524		45.2%	22
29/03/2000	0.00003013	108.188513		45.3%	22
30/03/2000	0.00002971	106.680409		45.4%	22
31/03/2000	0.00002929	105.172305		45.5%	22
1/04/2000	0.00002888	103.700108		45.6%	21
2/04/2000	0.0004813	1728.21544		45.7%	21
3/04/2000	0.00002808	100.827529		45.8%	21
4/04/2000	0.00267804	9616.1024		45.9%	21
5/04/2000	0.00160194	5752.12435		46.0%	21
6/04/2000	0.00002692	96.6622891		46.1%	20
7/04/2000	0.00002654	95.297814		46.2%	20
8/04/2000	0.00002617	93.9692461		46.3%	20
9/04/2000	0.0000258	92.6406782		46.4%	20
10/04/2000	0.00002544	91.3480176		46.5%	20
11/04/2000	0.00002509	90.0912642		46.6%	19
12/04/2000	0.00002473	88.7986036		46.7%	19
13/04/2000	0.00002439	87.5777575		46.8%	19
14/04/2000	0.00002405	86.3569113		46.9%	19
15/04/2000	0.00002371	85.1360652		47.0%	19
16/04/2000	0.00157963	5672.01529		47.1%	19
17/04/2000	0.00085996	3087.87898		47.2%	18

18/04/2000	0.00002273	81.6171557		47.3%	18
19/04/2000	0.00002241	80.468124		47.4%	18
20/04/2000	0.0000221	79.3549996		47.5%	18
21/04/2000	0.00002179	78.2418752		47.6%	18
22/04/2000	0.00002148	77.1287507		47.7%	17
23/04/2000	0.00002118	76.0515335		47.8%	17
24/04/2000	0.00002088	74.9743163		47.9%	17
25/04/2000	0.00002059	73.9330064		48.0%	17
26/04/2000	0.0000203	72.8916965		48.1%	17
27/04/2000	0.00002002	71.8862937		48.2%	17
28/04/2000	0.00001974	70.880891		48.3%	17
29/04/2000	0.00001946	69.8754883		48.4%	16
30/04/2000	0.00001919	68.9059929		48.5%	16
1/05/2000	0.00001892	67.9364974		48.6%	16
2/05/2000	0.00049628	1782.00449		48.7%	16
3/05/2000	0.0000184	66.0693209		48.8%	16
4/05/2000	0.00001814	65.1357327		48.9%	16
5/05/2000	0.00001788	64.2021445		49.0%	15
6/05/2000	0.00001763	63.3044635		49.1%	15
7/05/2000	0.00001739	62.4426897		49.2%	15
8/05/2000	0.00001714	61.5450087		49.3%	15
9/05/2000	0.0000169	60.683235		49.4%	15
10/05/2000	0.00001667	59.8573685		49.5%	15
11/05/2000	0.00001643	58.9955947		49.6%	15
12/05/2000	0.0000162	58.1697282		49.7%	15
13/05/2000	0.00001598	57.3797689		49.8%	14
14/05/2000	0.00001575	56.5539024		49.9%	14
15/05/2000	0.00001553	55.7639431		50.0%	14
16/05/2000	0.00001532	55.0098911		50.1%	14
17/05/2000	0.0000151	54.2199318		50.2%	14
18/05/2000	0.00001489	53.4658798		50.3%	14
19/05/2000	0.00001468	52.7118278		50.4%	13
20/05/2000	0.00001448	51.993683		50.5%	13
21/05/2000	0.00001427	51.239631		50.6%	13
22/05/2000	0.00001407	50.5214862		50.7%	13
23/05/2000	0.00001388	49.8392486		50.8%	13
24/05/2000	0.00001368	49.1211038		50.9%	13
25/05/2000	0.00001349	48.4388663		51.0%	13
26/05/2000	0.0000133	47.7566287		51.1%	13
27/05/2000	0.00001311	47.0743912		51.2%	13
28/05/2000	0.00001293	46.4280608		51.3%	12
29/05/2000	0.00001275	45.7817305		51.4%	12
30/05/2000	0.00001257	45.1354002		51.5%	12
31/05/2000	0.0000124	44.5249771		51.6%	12
1/06/2000	0.00001222	43.8786468		51.7%	12
2/06/2000	0.00001205	43.2682238		51.8%	12
3/06/2000	0.00001188	42.6578007		51.9%	12
4/06/2000	0.00001172	42.0832848		52.0%	12
5/06/2000	0.00001155	41.4728618		52.1%	12
6/06/2000	0.00001139	40.8983459		52.2%	11
7/06/2000	0.00001123	40.3238301		52.3%	11
8/06/2000	0.00001107	39.7493143		52.4%	11
9/06/2000	0.00001092	39.2107057		52.5%	11
10/06/2000	0.00001077	38.6720971		52.6%	11
11/06/2000	0.00001062	38.1334885		52.7%	11
12/06/2000	0.00001047	37.5948799		52.8%	11
13/06/2000	0.00001032	37.0562713		52.9%	11
14/06/2000	0.00001018	36.5535699		53.0%	11
15/06/2000	0.00001003	36.0149613		53.1%	11
16/06/2000	0.00000989	35.51226		53.2%	10
17/06/2000	0.00000975	35.0095586		53.3%	10
18/06/2000	0.00000962	34.5427645		53.4%	10
19/06/2000	0.00000948	34.0400632		53.5%	10
20/06/2000	0.00000935	33.5732691		53.6%	10
21/06/2000	0.00000922	33.1064749		53.7%	10
22/06/2000	0.00000909	32.6396808		53.8%	10
23/06/2000	0.00000896	32.1728867		53.9%	10
24/06/2000	0.00000884	31.7419998		54.0%	10
25/06/2000	0.00000871	31.2752057		54.1%	10
26/06/2000	0.00000859	30.8443188		54.2%	10
27/06/2000	0.00000847	30.413432		54.3%	9
28/06/2000	0.00000835	29.9825451		54.4%	9
29/06/2000	0.00000824	29.5875655		54.5%	9
30/06/2000	0.00000812	29.1566786		54.6%	9
1/07/2000	0.00000801	28.7616989		54.7%	9
2/07/2000	0.00000789	28.3308121		54.8%	9
3/07/2000	0.00000778	27.9358324		54.9%	9
4/07/2000	0.00000768	27.57676		55.0%	9
5/07/2000	0.00000757	27.1817804		55.1%	9
6/07/2000	0.00000746	26.7868008		55.2%	9
7/07/2000	0.00000736	26.4277284		55.3%	9
8/07/2000	0.00000725	26.0327487		55.4%	9
9/07/2000	0.00000715	25.6736763		55.5%	8
10/07/2000	0.00000705	25.3146039		55.6%	8
11/07/2000	0.00000695	24.9555315		55.7%	8
12/07/2000	0.00000686	24.6323664		55.8%	8
13/07/2000	0.00000676	24.273294		55.9%	8
14/07/2000	0.00000667	23.9501288		56.0%	8
15/07/2000	0.00000657	23.5910564		56.1%	8
16/07/2000	0.00000648	23.2678913		56.2%	8
17/07/2000	0.00000639	22.9447261		56.3%	8
18/07/2000	0.0000063	22.621561		56.4%	8
19/07/2000	0.00000621	22.2983958		56.5%	7
20/07/2000	0.00000613	22.0111379		56.6%	7
21/07/2000	0.00000604	21.6879727		56.7%	7
22/07/2000	0.00000595	21.3648076		56.8%	7
23/07/2000	0.00000587	21.0775497		56.9%	7
24/07/2000	0.00000579	20.7902917		57.0%	7
25/07/2000	0.00000571	20.5030338		57.1%	7
26/07/2000	0.00000563	20.2157759		57.2%	7
27/07/2000	0.00000555	19.928518		57.3%	7
28/07/2000	0.00000547	19.6412601		57.4%	7
29/07/2000	0.0000054	19.3899094		57.5%	7
30/07/2000	0.00000532	19.1026515		57.6%	7
31/07/2000	0.00000525	18.8513008		57.7%	6
1/08/2000	0.00000517	18.5640429		57.8%	6
2/08/2000	0.0000051	18.3126922		57.9%	6
3/08/2000	0.00000503	18.0613415		58.0%	6
4/08/2000	0.00000496	17.8099909		58.1%	6
5/08/2000	0.00000489	17.5586402		58.2%	6
6/08/2000	0.00000482	17.3072895		58.3%	6
7/08/2000	0.00000475	17.0559388		58.4%	6
8/08/2000	0.00000469	16.8404954		58.5%	6
9/08/2000	0.00000462	16.5891447		58.6%	6
10/08/2000	0.00000456	16.3737013		58.7%	6
11/08/2000	0.00000449	16.1223506		58.8%	6
12/08/2000	0.00000443	15.9069072		58.9%	6
13/08/2000	0.00000437	15.6914637		59.0%	6
14/08/2000	0.00000431	15.4760203		59.1%	6
15/08/2000	0.00000425	15.2605768		59.2%	5
16/08/2000	0.00000419	15.0451334		59.3%	5
17/08/2000	0.00000413	14.82969		59.4%	5
18/08/2000	0.00000407	14.6142465		59.5%	5

19/08/2000	0.00000401	14.3988031		59.6%	5
20/08/2000	0.00000396	14.2192669		59.7%	5
21/08/2000	0.0000039	14.0038235		59.8%	5
22/08/2000	0.00000385	13.8242873		59.9%	5
23/08/2000	0.00000379	13.6088438		60.0%	5
24/08/2000	0.00000374	13.4293076		60.1%	5
25/08/2000	0.00000369	13.2497714		60.2%	5
26/08/2000	0.00000364	13.0702352		60.3%	5
27/08/2000	0.00000358	12.8547918		60.4%	5
28/08/2000	0.00000353	12.6752556		60.5%	5
29/08/2000	0.00000348	12.4957194		60.6%	5
30/08/2000	0.00000344	12.3520904		60.7%	5
31/08/2000	0.00000339	12.1725542		60.8%	4
1/09/2000	0.00000334	11.993018		60.9%	4
2/09/2000	0.00027199	976.641011		61.0%	4
3/09/2000	0.00000325	11.6698529		61.1%	4
4/09/2000	0.0000032	11.4903167		61.2%	4
5/09/2000	0.00000316	11.3466877		61.3%	4
6/09/2000	0.00000311	11.1671515		61.4%	4
7/09/2000	0.00000307	11.0235226		61.5%	4
8/09/2000	0.00000303	10.8798936		61.6%	4
9/09/2000	0.00000298	10.7003574		61.7%	4
10/09/2000	0.00000294	10.5567285		61.8%	4
11/09/2000	0.0000029	10.4130995		61.9%	4
12/09/2000	0.00000286	10.2694705		62.0%	4
13/09/2000	0.00000282	10.1258416		62.1%	4
14/09/2000	0.00000278	9.98221262		62.2%	4
15/09/2000	0.00000274	9.83858366		62.3%	4
16/09/2000	0.0000027	9.6949547		62.4%	4
17/09/2000	0.00000267	9.58723298		62.5%	3
18/09/2000	0.00000263	9.44360402		62.6%	3
19/09/2000	0.00000259	9.29997506		62.7%	3
20/09/2000	0.00000256	9.19225335		62.8%	3
21/09/2000	0.00000252	9.04862439		62.9%	3
22/09/2000	0.00000248	8.90499543		63.0%	3
23/09/2000	0.00000245	8.79727371		63.1%	3
24/09/2000	0.00000242	8.68955199		63.2%	3
25/09/2000	0.00000238	8.54592303		63.3%	3
26/09/2000	0.000367	1317.79569		63.4%	3
27/09/2000	0.00023006	826.081955		63.5%	3
28/09/2000	0.00000228	8.18685064		63.6%	3
29/09/2000	0.00000225	8.07912892		63.7%	3
30/09/2000	0.00000222	7.9714072		63.8%	3
1/10/2000	0.00000219	7.86368548		63.9%	3
2/10/2000	0.00000216	7.75596376		64.0%	3
3/10/2000	0.00000213	7.64824204		64.1%	3
4/10/2000	0.0000021	7.54052032		64.2%	3
5/10/2000	0.00000207	7.4327986		64.3%	3
6/10/2000	0.00000204	7.32507688		64.4%	3
7/10/2000	0.00000201	7.21735517		64.5%	3
8/10/2000	0.00000198	7.10963345		64.6%	3
9/10/2000	0.00192356	6906.97299		64.7%	3
10/10/2000	0.00000193	6.93009725		64.8%	2
11/10/2000	0.0000019	6.82237553		64.9%	2
12/10/2000	0.00000187	6.71465381		65.0%	2
13/10/2000	0.00050902	1827.75031		65.1%	2
14/10/2000	0.0005222	1875.07605		65.2%	2
15/10/2000	0.0000018	6.46330313		65.3%	2
16/10/2000	0.00000177	6.35558141		65.4%	2
17/10/2000	0.00001315	47.2180201		65.5%	2
18/10/2000	0.00017996	646.186684		65.6%	2
19/10/2000	0.00028749	1032.29723		65.7%	2
20/10/2000	0.00000167	5.99650902		65.8%	2
21/10/2000	0.00000165	5.92469454		65.9%	2
22/10/2000	0.00000163	5.85288006		66.0%	2
23/10/2000	0.0000016	5.74515834		66.1%	2
24/10/2000	0.0006031	2165.56562		66.2%	2
25/10/2000	0.00000156	5.60152938		66.3%	2
26/10/2000	0.00000154	5.5297149		66.4%	2
27/10/2000	0.00000152	5.45790042		66.5%	2
28/10/2000	0.0000015	5.38608594		66.6%	2
29/10/2000	0.00000147	5.27836423		66.7%	2
30/10/2000	0.00000145	5.20654975		66.8%	2
31/10/2000	0.00000143	5.13473527		66.9%	2
1/11/2000	0.00000141	5.06292079		67.0%	2
2/11/2000	0.00000139	4.99110631		67.1%	2
3/11/2000	0.00000137	4.91929183		67.2%	2
4/11/2000	0.00000136	4.88338459		67.3%	2
5/11/2000	0.00000134	4.81157011		67.4%	2
6/11/2000	0.00003343	120.037902		67.5%	2
7/11/2000	0.0000013	4.66794115		67.6%	2
8/11/2000	0.00000128	4.59612667		67.7%	2
9/11/2000	0.00000126	4.52431219		67.8%	2
10/11/2000	0.00000125	4.48840495		67.9%	2
11/11/2000	0.00000123	4.41659047		68.0%	1
12/11/2000	0.00153802	5522.60527		68.1%	1
13/11/2000	0.00008091	290.525476		68.2%	1
14/11/2000	0.00311528	11186.1105		68.3%	1
15/11/2000	0.04836424	173662.636		68.4%	1
16/11/2000	0.02159394	77537.8778		68.5%	1
17/11/2000	0.00021283	764.213781		68.6%	1
18/11/2000	0.01000031	35908.3528		68.7%	1
19/11/2000	0.0000677	243.092012		68.8%	1
20/11/2000	0.0000218	78.2777824		68.9%	1
21/11/2000	0.00312859	11233.9031		69.0%	1
22/11/2000	0.00002119	76.0874408		69.1%	1
23/11/2000	0.0000209	75.0461308		69.2%	1
24/11/2000	0.0000206	73.9689136		69.3%	1
25/11/2000	0.00002032	72.9635109		69.4%	1
26/11/2000	0.00002003	71.922201		69.5%	1
27/11/2000	0.00001975	70.9167983		69.6%	1
28/11/2000	0.00001947	69.9113956		69.7%	1
29/11/2000	0.0000192	68.9419001		69.8%	1
30/11/2000	0.00193969	6964.89136		69.9%	1
1/12/2000	0.02590958	93034.1498		70.0%	1
2/12/2000	0.00309904	11127.7972		70.1%	1
3/12/2000	0.00001815	65.1716399		70.2%	1
4/12/2000	0.00001789	64.2380517		70.3%	1
5/12/2000	0.00001764	63.3403707		70.4%	1
6/12/2000	0.00018861	677.246447		70.5%	1
7/12/2000	0.00001715	61.580916		70.6%	1
8/12/2000	0.00001691	60.7191422		70.7%	1
9/12/2000	0.00001668	59.8932757		70.8%	1
10/12/2000	0.00001644	59.031502		70.9%	1
11/12/2000	0.00001621	58.2056354		71.0%	1
12/12/2000	0.00001599	57.4156762		71.1%	1
13/12/2000	0.01585146	56918.2173		71.2%	1
14/12/2000	0.00025569	918.11221		71.3%	1
15/12/2000	0.00001532	55.0098911		71.4%	1
16/12/2000	0.00001511	54.2558391		71.5%	1
17/12/2000	0.0000149	53.5017871		71.6%	1
18/12/2000	0.0074655	26806.5497		71.7%	1
19/12/2000	0.00004818	173.001081		71.8%	1

20/12/2000	0.00001428	51.2755382		71.9%	1
21/12/2000	0.00001408	50.5573934		72.0%	1
22/12/2000	0.00001388	49.8392486		72.1%	1
23/12/2000	0.00001369	49.1570111		72.2%	1
24/12/2000	0.0000135	48.4747735		72.3%	1
25/12/2000	0.00001331	47.7925359		72.4%	1
26/12/2000	0.00001312	47.1102984		72.5%	1
27/12/2000	0.00001294	46.4639681		72.6%	1
28/12/2000	0.00001276	45.8176378		72.7%	1
29/12/2000	0.00001258	45.1713075		72.8%	1
30/12/2000	0.0000124	44.5249771		72.9%	1
31/12/2000	0.00001223	43.9145541		73.0%	1
1/01/2001	0.00001206	43.304131		73.1%	1
2/01/2001	0.00001189	42.6937079		73.2%	1
3/01/2001	0.00001172	42.0832848		73.3%	1
4/01/2001	0.00001156	41.508769		73.4%	1
5/01/2001	0.0000114	40.9342532		73.5%	1
6/01/2001	0.00001124	40.3597373		73.6%	1
7/01/2001	0.00001108	39.7852215		73.7%	1
8/01/2001	0.00001092	39.2107057		73.8%	0
9/01/2001	0.00001077	38.6720971		73.9%	0
10/01/2001	0.00001062	38.1334885		74.0%	0
11/01/2001	0.00001047	37.5948799		74.1%	0
12/01/2001	0.00001033	37.0921785		74.2%	0
13/01/2001	0.00001018	36.5535699		74.3%	0
14/01/2001	0.00001004	36.0508686		74.4%	0
15/01/2001	0.0000099	35.5481672		74.5%	0
16/01/2001	0.00000976	35.0454659		74.6%	0
17/01/2001	0.00000962	34.5427645		74.7%	0
18/01/2001	0.00312102	11206.7213		74.8%	0
19/01/2001	0.00000936	33.6091763		74.9%	0
20/01/2001	0.00000922	33.1064749		75.0%	0
21/01/2001	0.0000091	32.6755881		75.1%	0
22/01/2001	0.00000897	32.2087939		75.2%	0
23/01/2001	0.00000884	31.7419998		75.3%	0
24/01/2001	0.00000872	31.311113		75.4%	0
25/01/2001	0.0000086	30.8802261		75.5%	0
26/01/2001	0.00000848	30.4493392		75.6%	0
27/01/2001	0.0181366	65123.5242		75.7%	0
28/01/2001	0.00134637	4834.44302		75.8%	0
29/01/2001	0.00000813	29.1925858		75.9%	0
30/01/2001	0.00848909	30481.9789		76.0%	0
31/01/2001	0.17948436	644478.792		76.1%	0
1/02/2001	0.07290761	261791.102		76.2%	0
2/02/2001	0.00294788	10585.0234		76.3%	0
3/02/2001	0.00004632	166.322334		76.4%	0
4/02/2001	0.00004567	163.988363		76.5%	0
5/02/2001	0.00818668	29396.1081		76.6%	0
6/02/2001	0.07339126	263527.756		76.7%	0
7/02/2001	0.00412768	14821.3595		76.8%	0
8/02/2001	0.00012233	439.253262		76.9%	0
9/02/2001	0.00012062	433.113124		77.0%	0
10/02/2001	0.00057191	2053.57094		77.1%	0
11/02/2001	0.00014929	536.05918		77.2%	0
12/02/2001	0.00011563	415.195412		77.3%	0
13/02/2001	0.00011401	409.378439		77.4%	0
14/02/2001	0.00011241	403.633281		77.5%	0
15/02/2001	0.00011084	397.995844		77.6%	0
16/02/2001	0.00010929	392.430222		77.7%	0
17/02/2001	0.00010776	386.936414		77.8%	0
18/02/2001	0.00010625	381.514421		77.9%	0
19/02/2001	0.00010476	376.164242		78.0%	0
20/02/2001	0.00010329	370.885878		78.1%	0
21/02/2001	0.00043581	1564.87341		78.2%	0
22/02/2001	0.00010042	360.5805		78.3%	0
23/02/2001	0.00009902	355.553487		78.4%	0
24/02/2001	0.00009763	350.562381		78.5%	0
25/02/2001	0.00009626	345.643089		78.6%	0
26/02/2001	0.00009491	340.795611		78.7%	0
27/02/2001	0.00009359	336.055856		78.8%	0
28/02/2001	0.00136524	4902.19998		78.9%	0
1/03/2001	0.00386485	13877.6095		79.0%	0
2/03/2001	0.00008971	322.123847		79.1%	0
3/03/2001	0.00078086	2803.85271		79.2%	0
4/03/2001	0.00008722	313.182944		79.3%	0
5/03/2001	0.00008599	308.766354		79.4%	0
6/03/2001	0.00127596	4581.62015		79.5%	0
7/03/2001	0.0154204	55370.3998		79.6%	0
8/03/2001	0.00165421	5939.81149		79.7%	0
9/03/2001	0.00348005	12495.8989		79.8%	0
10/03/2001	0.00977297	35092.0376		79.9%	0
11/03/2001	0.01187361	42634.856		80.0%	0
12/03/2001	0.01081282	38825.8519		80.1%	0
13/03/2001	0.00007682	275.839415		80.2%	0
14/03/2001	0.00007575	271.99734		80.3%	0
15/03/2001	0.00007469	268.191173		80.4%	0
16/03/2001	0.00007364	264.420913		80.5%	0
17/03/2001	0.00007261	260.722467		80.6%	0
18/03/2001	0.00007159	257.059929		80.7%	0
19/03/2001	0.00007059	253.469205		80.8%	0
20/03/2001	0.0000696	249.914388		80.9%	0
21/03/2001	0.00006863	246.431386		81.0%	0
22/03/2001	0.00006767	242.984291		81.1%	0
23/03/2001	0.00006672	239.573103		81.2%	0
24/03/2001	0.00006579	236.23373		81.3%	0
25/03/2001	0.00006486	232.894356		81.4%	0
26/03/2001	0.00006396	229.662705		81.5%	0
27/03/2001	0.00006306	226.431053		81.6%	0
28/03/2001	0.00006218	223.271216		81.7%	0
29/03/2001	0.00006131	220.147286		81.8%	0
30/03/2001	0.00006045	217.059264		81.9%	0
31/03/2001	0.0000596	214.007148		82.0%	0
1/04/2001	0.00005877	211.026847		82.1%	0
2/04/2001	0.00085395	3066.29873		82.2%	0
3/04/2001	0.00005713	205.13806		82.3%	0
4/04/2001	0.00005634	202.301388		82.4%	0
5/04/2001	0.00005555	199.464716		82.5%	0
6/04/2001	0.00005477	196.663951		82.6%	0
7/04/2001	0.000054	193.899094		82.7%	0
8/04/2001	0.00005325	191.206051		82.8%	0
9/04/2001	0.0000525	188.513008		82.9%	0
10/04/2001	0.00005177	185.89178		83.0%	0
11/04/2001	0.00005104	183.270551		83.1%	0
12/04/2001	0.00005033	180.721137		83.2%	0
13/04/2001	0.00004962	178.171723		83.3%	0
14/04/2001	0.00004893	175.694124		83.4%	0
15/04/2001	0.00004824	173.216524		83.5%	0
16/04/2001	0.00004757	170.810739		83.6%	0
17/04/2001	0.0000469	168.404954		83.7%	0
18/04/2001	0.00004624	166.035076		83.8%	0
19/04/2001	0.0000456	163.737013		83.9%	0
20/04/2001	0.00172552	6195.86601		84.0%	0
21/04/2001	0.02345421	84217.5939		84.1%	0

22/04/2001	0.02283874	82007.611		84.2%	0
23/04/2001	0.0000431	154.760203		84.3%	0
24/04/2001	0.00004249	152.569861		84.4%	0
25/04/2001	0.0000419	150.451334		84.5%	0
26/04/2001	0.00004131	148.332807		84.6%	0
27/04/2001	0.00004073	146.250187		84.7%	0
28/04/2001	0.00004016	144.203474		84.8%	0
29/04/2001	0.0000396	142.192669		84.9%	0
30/04/2001	0.00003905	140.217771		85.0%	0
1/05/2001	0.0000385	138.242873		85.1%	0
2/05/2001	0.00003796	136.303882		85.2%	0
3/05/2001	0.00003743	134.400798		85.3%	0
4/05/2001	0.00003691	132.533621		85.4%	0
5/05/2001	0.00279253	10027.2044		85.5%	0
6/05/2001	0.00213136	7653.12543		85.6%	0
7/05/2001	0.00142633	5121.55731		85.7%	0
8/05/2001	0.00212507	7630.53977		85.8%	0
9/05/2001	0.00016547	594.157094		85.9%	0
10/05/2001	0.00003391	121.76145		86.0%	0
11/05/2001	0.00003344	120.073809		86.1%	0
12/05/2001	0.00003297	118.386169		86.2%	0
13/05/2001	0.00003251	116.734436		86.3%	0
14/05/2001	0.00003205	115.082703		86.4%	0
15/05/2001	0.0000316	113.466877		86.5%	0
16/05/2001	0.00003116	111.886959		86.6%	0
17/05/2001	0.00003072	110.30704		86.7%	0
18/05/2001	0.00003029	108.763029		86.8%	0
19/05/2001	0.00002987	107.254925		86.9%	0
20/05/2001	0.00002945	105.746821		87.0%	0
21/05/2001	0.00002904	104.274624		87.1%	0
22/05/2001	0.00002863	102.802427		87.2%	0
23/05/2001	0.00002823	101.366137		87.3%	0
24/05/2001	0.00002784	99.9657551		87.4%	0
25/05/2001	0.00002745	98.5653728		87.5%	0
26/05/2001	0.00002706	97.1649904		87.6%	0
27/05/2001	0.00002668	95.8005153		87.7%	0
28/05/2001	0.00029006	1041.52539		87.8%	0
29/05/2001	0.00029378	1054.88289		87.9%	0
30/05/2001	0.00002558	91.850719		88.0%	0
31/05/2001	0.00002522	90.5580583		88.1%	0
1/06/2001	0.00002487	89.301305		88.2%	0
2/06/2001	0.00002452	88.0445516		88.3%	0
3/06/2001	0.00002418	86.8237054		88.4%	0
4/06/2001	0.00002384	85.6028593		88.5%	0
5/06/2001	0.0000235	84.3820131		88.6%	0
6/06/2001	0.00002318	83.2329815		88.7%	0
7/06/2001	0.00002285	82.0480426		88.8%	0
8/06/2001	0.00002253	80.8990109		88.9%	0
9/06/2001	0.00002222	79.7858865		89.0%	0
10/06/2001	0.0000219	78.6368548		89.1%	0
11/06/2001	0.0000216	77.5596376		89.2%	0
12/06/2001	0.0000213	76.4824204		89.3%	0
13/06/2001	0.000021	75.4052032		89.4%	0
14/06/2001	0.0000207	74.327986		89.5%	0
15/06/2001	0.00002041	73.2866761		89.6%	0
16/06/2001	0.00002013	72.2812734		89.7%	0
17/06/2001	0.00001985	71.2758707		89.8%	0
18/06/2001	0.00001957	70.270468		89.9%	0
19/06/2001	0.00001929	69.2650652		90.0%	0
20/06/2001	0.00001902	68.2955698		90.1%	0
21/06/2001	0.00001876	67.3619815		90.2%	0
22/06/2001	0.0000185	66.4283933		90.3%	0
23/06/2001	0.00001824	65.4948051		90.4%	0
24/06/2001	0.00001798	64.5612169		90.5%	0
25/06/2001	0.00001773	63.6635359		90.6%	0
26/06/2001	0.00001748	62.7658549		90.7%	0
27/06/2001	0.00001724	61.9040811		90.8%	0
28/06/2001	0.00001699	61.0064001		90.9%	0
29/06/2001	0.00001676	60.1805336		91.0%	0
30/06/2001	0.00001652	59.3187599		91.1%	0
1/07/2001	0.00001629	58.4928934		91.2%	0
2/07/2001	0.01066739	38303.6529		91.3%	0
3/07/2001	0.00756543	27165.3708		91.4%	0
4/07/2001	0.00001562	56.0871083		91.5%	0
5/07/2001	0.0000154	55.297149		91.6%	0
6/07/2001	0.00097591	3504.22342		91.7%	0
7/07/2001	0.00001497	53.7531377		91.8%	0
8/07/2001	0.00001476	52.9990857		91.9%	0
9/07/2001	0.00001455	52.2450337		92.0%	0
10/07/2001	0.00001435	51.5268889		92.1%	0
11/07/2001	0.00001415	50.8087441		92.2%	0
12/07/2001	0.00001395	50.0905993		92.3%	0
13/07/2001	0.00001376	49.4083617		92.4%	0
14/07/2001	0.00001356	48.6902169		92.5%	0
15/07/2001	0.00001337	48.0079794		92.6%	0
16/07/2001	0.00001319	47.3616491		92.7%	0
17/07/2001	0.000013	46.6794115		92.8%	0
18/07/2001	0.00001282	46.0330812		92.9%	0
19/07/2001	0.00001264	45.3867509		93.0%	0
20/07/2001	0.00001246	44.7404206		93.1%	0
21/07/2001	0.00001229	44.1299975		93.2%	0
22/07/2001	0.00001212	43.5195744		93.3%	0
23/07/2001	0.00001195	42.9091514		93.4%	0
24/07/2001	0.00001178	42.2987283		93.5%	0
25/07/2001	0.0001281	459.97174		93.6%	0
26/07/2001	0.01465919	52637.1048		93.7%	0
27/07/2001	0.00437582	15712.3617		93.8%	0
28/07/2001	0.00001113	39.9647577		93.9%	0
29/07/2001	0.00001098	39.4261491		94.0%	0
30/07/2001	0.00001082	38.8516333		94.1%	0
31/07/2001	0.00001067	38.3130247		94.2%	0
1/08/2001	0.00001052	37.7744161		94.3%	0
2/08/2001	0.00001038	37.2717147		94.4%	0
3/08/2001	0.00001023	36.7331061		94.5%	0
4/08/2001	0.00001009	36.2304048		94.6%	0
5/08/2001	0.00000995	35.7277034		94.7%	0
6/08/2001	0.00000981	35.2250021		94.8%	0
7/08/2001	0.00000967	34.7223007		94.9%	0
8/08/2001	0.00000953	34.2195994		95.0%	0
9/08/2001	0.0000094	33.7528053		95.1%	0
10/08/2001	0.00000927	33.2860111		95.2%	0
11/08/2001	0.00000914	32.819217		95.3%	0
12/08/2001	0.00000901	32.3524229		95.4%	0
13/08/2001	0.00000888	31.8856288		95.5%	0
14/08/2001	0.00000876	31.4547419		95.6%	0
15/08/2001	0.00000864	31.023855		95.7%	0
16/08/2001	0.00000852	30.5929682		95.8%	0
17/08/2001	0.0000084	30.1620813		95.9%	0
18/08/2001	0.00000828	29.7311944		96.0%	0
19/08/2001	0.00000816	29.3003075		96.1%	0
20/08/2001	0.00000805	28.9053279		96.2%	0
21/08/2001	0.00000794	28.5103483		96.3%	0
22/08/2001	0.00000783	28.1153686		96.4%	0

23/08/2001	0.00000772	27.720389
24/08/2001	0.00000761	27.3254094
25/08/2001	0.0000075	26.9304297
26/08/2001	0.00035666	1280.66761
27/08/2001	0.00075513	2711.46339
28/08/2001	0.00000719	25.8173053
29/08/2001	0.00000709	25.4582329
30/08/2001	0.00000699	25.0991605
31/08/2001	0.00000689	24.7400881
1/09/2001	0.0000068	24.4169229
2/09/2001	0.0000067	24.0578506
3/09/2001	0.00000661	23.7346854
4/09/2001	0.00000652	23.4115202
5/09/2001	0.00000642	23.0524478
6/09/2001	0.00000633	22.7292827
7/09/2001	0.00000625	22.4420248
8/09/2001	0.00000616	22.1188596
9/09/2001	0.00000607	21.7956945
10/09/2001	0.00000599	21.5084365
11/09/2001	0.0000059	21.1852714
12/09/2001	0.0033284	11951.3656
13/09/2001	0.00000574	20.6107555
14/09/2001	0.00000566	20.3234976
15/09/2001	0.00000558	20.0362397
16/09/2001	0.0000055	19.7489818
17/09/2001	0.00000542	19.4617239
18/09/2001	0.00000535	19.2103732
19/09/2001	0.00000527	18.9231153
20/09/2001	0.00131223	4711.85571
21/09/2001	0.00000513	18.4204139
22/09/2001	0.00000506	18.1690633
23/09/2001	0.00000498	17.8818053
24/09/2001	0.00000491	17.6304547
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Appendix F

Sydney Water Feasibility Advice

Case Number: 209639

December 19, 2023

EMKC Cubed DevCo 2 Pty Ltd
c/- ARCADIS AUSTRALIA PACIFIC PTY LTD.

Feasibility Letter

Developer:	**EMKC Cubed DevCo 2 Pty Ltd**
Your reference:	**230 Martin Road**
Development:	**Lot A DP 406215 MARTIN RD, Badgerys Creek**
Development Description:	**Proposed Industrial Development with 2 Warehouses**
Your application date:	**September 8, 2023**

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what our requirements could be if you applied to us for a Section 73 Certificate (Certificate) for your proposed development. **The information is accurate at today's date only.**

We have not allocated any system capacity to your proposal from the investigation into this Feasibility advice. This advice is only an indication of our systems and possible requirements as of today. Where there is system capacity, it may have been fully utilised by the time you obtain a Consent. The requirements applied to any approved Development proposal may differ significantly in the future since the original advice was issued.

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator (WSC).

We'll then send you either a:

- Notice of Requirements (Notice) and Developer Works Deed (Deed)
  or
- Certificate.

These documents will be the definitive statement of our requirements.

There may be changes in our requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

- if you change your proposed development eg the development description or the plan/site layout, after today, the requirements in this Letter could change when you submit your new application

- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

Infrastructure contributions for drinking water and wastewater will be payable on all developments that require a Section 73 Compliance Certificate to be issued from 1 July 2024 onwards. Infrastructure contributions help recover the cost of providing infrastructure to new developments. Please refer to the Costs section of this letter for more information.

You have made an application for specific information. Our possible requirements are:

Water

The area is currently supplied with rural drinking water infrastructure and does not have capacity to service developments within this area prior to delivery of major system amplifications.

The existing DN100 main in Martin Rd does not have capacity and amplification of this main from Elizabeth Dr may be required to service this development. Further details of amplification requirements will be provided during Section 73 application.

Sydney Water is delivering trunk infrastructures in stages to service Western Sydney Aerotropolis Growth Area.

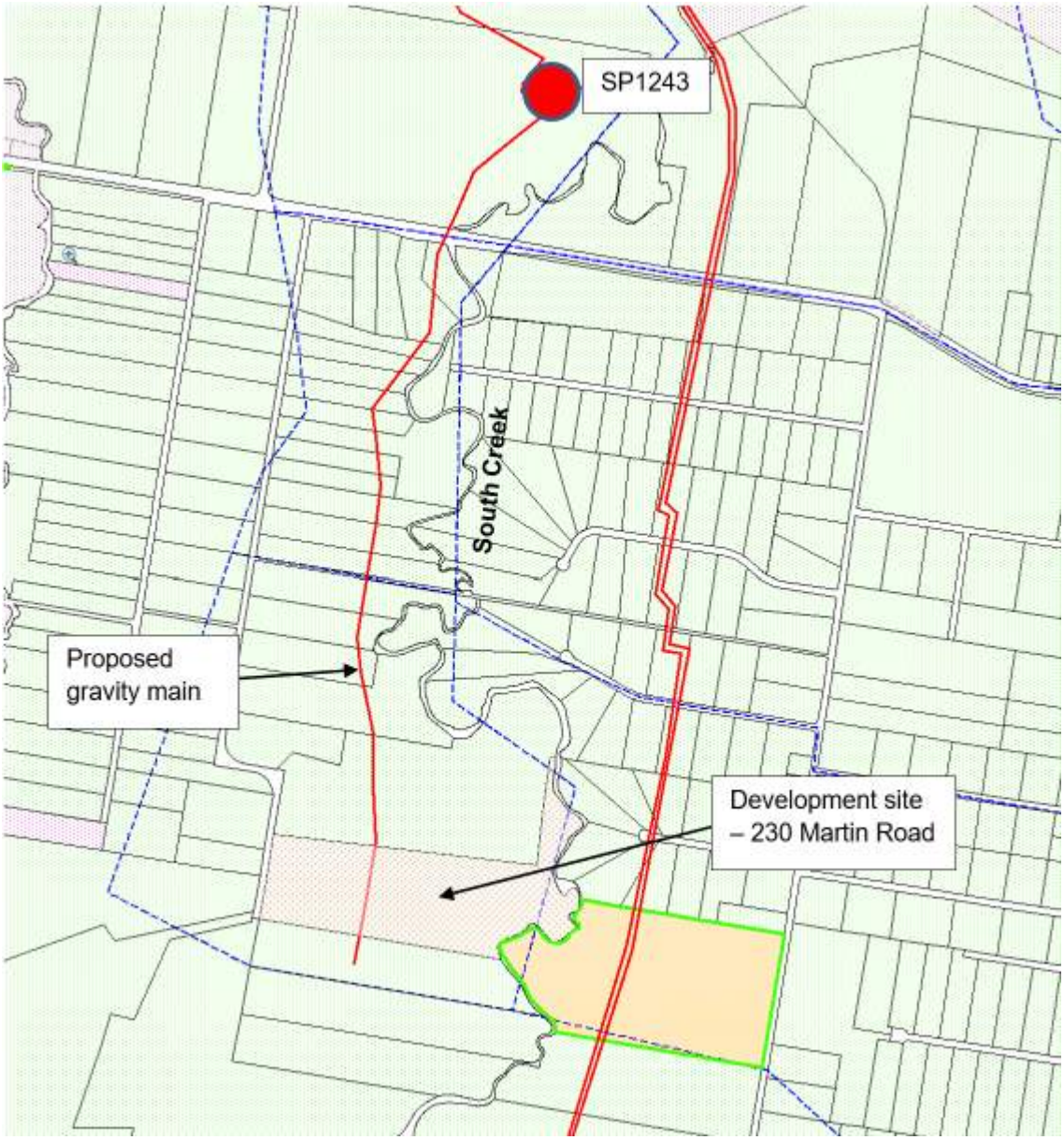
Sewer

The proposed development is part of the Badgerys Creek growth area within WSAGA.

Proposed wastewater servicing of this area is part of the South Creek catchment wastewater network.

Stage 1 of the proposed South Creek Wastewater Network includes –

- a gravity trunk wastewater carrier along the western side of South Creek, following the 1% AEP flood boundary and flood zone. The carrier will transfer flows to the proposed Upper South Creek (USC) Advance Wastewater Recycling Centre (AWRC) via proposed pumping station SP1243. The majority of the carrier runs through private property. Refer to catchment plan extract below.



- Note, the indicative road layouts shown on the catchment plan are subject to finalisation of Precinct Plans.

- The anticipated timing for delivery of the trunk wastewater infrastructure is 2026-28.
  - Currently this project is in concept design stage.
- The design and sizing will be further reviewed during detailed design/design review.
- All pipe and valve design must comply with WSA code.

No property connections are allowed to connect directly to the trunk gravity carriers. All properties are to be provided with a connection to the developer designed reticulation network which will connect to the trunk gravity carriers at MHs. The inlets to the MHs will be included in the South Creek Wastewater Network and capped off to allow for future connection.
For the developable non-residential area in the catchment, an assumption of 30 EP/ha and 150 L/EP/d for average dry weather flow (ADWF) has been made. For the 7.89ha of developable area at 230 Martin Road, this would assume around 237 EP with an associated wastewater generation of 0.41 L/s (35.4 kL/d).
It is noted that the planning proposal estimates ADWF based on 80% of the estimated water usage. If the proposed job numbers for the development are known, EP should be calculated based on employee count. For planning purposes, the conversion rate to EP is 0.225 EP/job.

Recycled Water

Sydney Water is in the planning phase of providing recycled water service from the future Upper South Creek Advanced Water Recycling Centre, which is expected to operate from 2026/27 subject to funding approval. The recycling scheme boundary and timing of future assets is subject to the outcome of the planning phase and future approvals. Any further information on timing and potential non-drinking demand for the proposed development would help us in our investigation.
Sydney Water supports the use of recycled water and/or harvested stormwater to meet non-drinking demands for the proposed development as these measures would contribute to meeting livability, productivity and sustainability vision for Western Sydney. To future-proof the proposed development, design for the water supply could include provision for dual plumbing/recycled water connection.

Stormwater

General Advice

Sydney Water is the Regional Stormwater Authority for declared catchment areas which include the Aerotropolis Initial Precincts. Sydney Water is delivering these services via the Regional Stormwater Scheme (Regional Scheme) which are designed to meet NSW Government waterway health targets and parkland city objectives by treating and harvesting stormwater for non-potable reuse across the precincts.

The Regional Scheme will be constructed on land mapped as Regional Stormwater Infrastructure in the State Environmental Planning Policy (Precincts - Western Parkland City) 2021 (**SEPP**) and

the Western Sydney Aerotropolis Precinct Plan, and as further detailed in the Aerotropolis Initial Precincts Stormwater Scheme Plans (draft due for public release by mid-2024).

The Regional Scheme comprises natural creek lines, naturalised (constructed) trunk drainage channels, consolidated treatment including bioretention cells, wetlands, and stormwater harvesting ponds that pump water to the recycled water infrastructure network.

Connection required to the Regional Scheme

All development within the declared catchment areas (see **Error! Reference source not found.**), including your development is required to connect to the Regional Scheme. Connection to the Regional Scheme will enable development to meet the NSW Government waterway health objectives once the Scheme is operational.

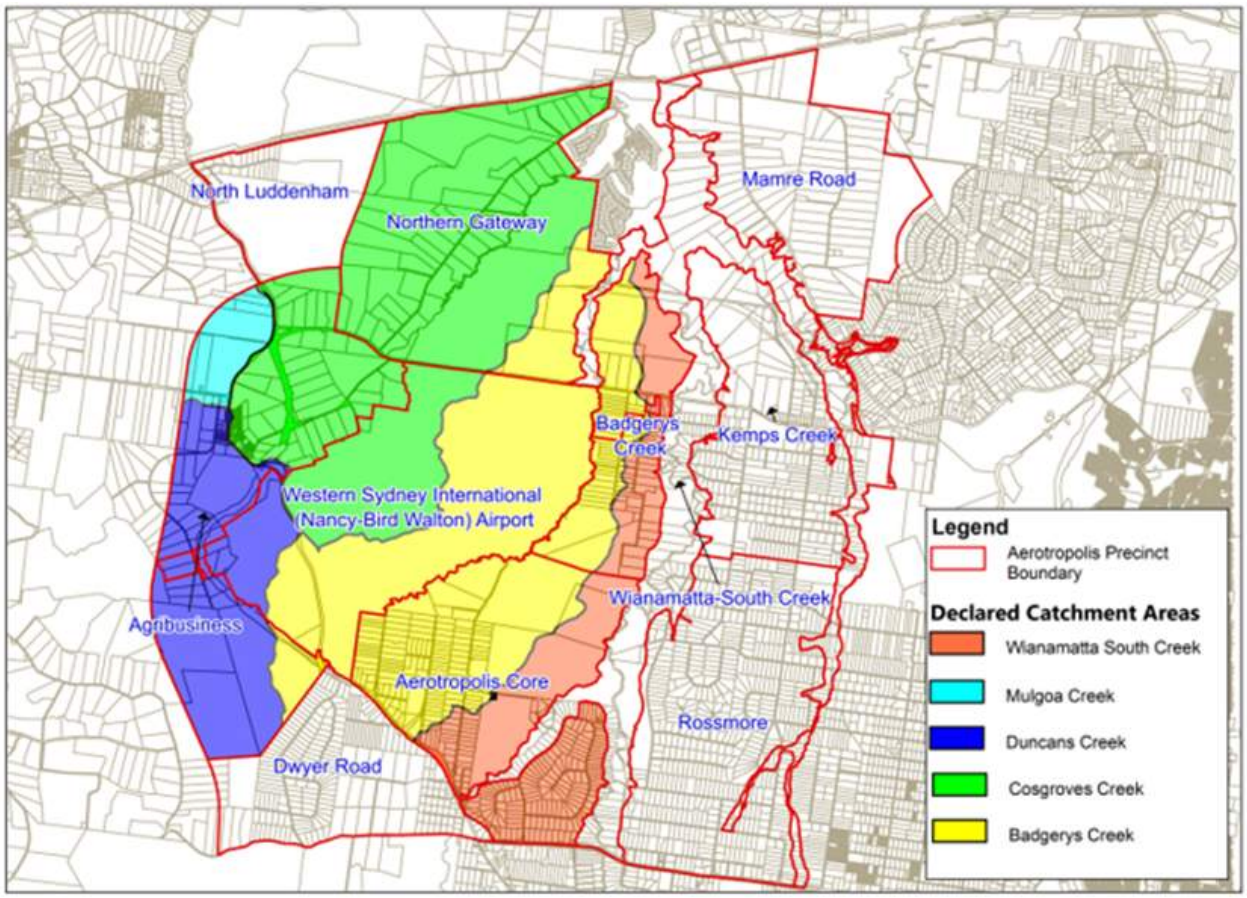
Once the Regional Scheme Plans for the Aerotropolis Initial Precincts are finalised, Sydney Water will be able to confirm any infrastructure to be delivered within your development site, or for your development to connect to on adjacent land.

General requirements for connection will include:

- Land within the development site that is identified for regional stormwater infrastructure as mapped in the Western Parkland City – Precincts SEPP and Western Sydney Aerotropolis Precinct Plan 2022, must be preserved for the delivery for this infrastructure.
- If stormwater infrastructure is mapped on your land, you may be required to deliver some of the regional stormwater infrastructure as developer delivered works under a stormwater developer works agreement.
- Your proposed development must satisfy all stormwater and trunk drainage requirements set out in the Western Sydney Aerotropolis Development Control plan – Phase 2 2022 (**DCP**).
- All public roads within the development site must be clearly identified in the plans and include integration of passively irrigated street trees per Council's adopted design(s).
- Your development must meet the appropriate pervious area requirement for its development type as per the DCP, and this must be clearly documented.
- The site must include private Gross Pollutant Traps per the Technical guidance for achieving Wianamatta - South Creek stormwater management targets (DPE, 2022).
- Your proposed development must satisfy all stormwater and trunk drainage requirements included in Sydney Water's Draft Stormwater Scheme Infrastructure Design Guidelines

(Please note that updates to this document are anticipated to be released publicly early 2024).

- Your development must not preclude the efficient delivery of Regional Scheme.
- As part of your development application, you must prepare a Water and Stormwater Management Plan report for your development application consistent with the requirements specified in the Technical guidance for achieving Wianamatta - South Creek stormwater management targets (DPE, 2022). This report and the civil plans for your development must document how the development will connect to the Regional Scheme in the ultimate state.
- We will require registration of easements under section 88A and/or restriction or public positive covenant under section 88E of the Conveyancing Act 1919 on title of the land in favour of Sydney Water for the purpose of the Regional Scheme, using Sydney Water's standard memoranda. This will be at no cost to Sydney Water. These easements and/or public positive covenants will use Sydney Water's standard memoranda and are to provide for drainage of stormwater and appropriate access for Sydney Water to maintain any Regional Scheme trunk drainage channel (constructed or natural) within the development site.



No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from us and to the extent that it is able, we limit its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

OTHER THINGS YOU MAY NEED TO DO

Shown below are other things you need to do that are NOT a requirement for the Certificate. They may well be a requirement from us in the future because of the impact of your development on our assets. You must read them before you go any further.

Soffit Requirements

Please be aware that floor levels must be able to meet our soffit requirements for property connection and drainage.

Requirements for Business Customers for Commercial and Industrial Property Developments

If this property is to be developed for Industrial or Commercial operations, it may need to meet the following requirements:

Trade Wastewater Requirements

If this development is going to generate trade wastewater, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. You must wait for approval of this permit before any business activities can commence.

The permit application should be emailed to Sydney Water's Business Customer Services at businesscustomers@sydneywater.com.au

It is illegal to discharge Trade Wastewater into the Sydney Water sewerage system without permission.

A **Boundary Trap** is required for all developments that discharge trade wastewater where arrestors and special units are installed for trade wastewater pre-treatment.

If the property development is for Industrial operations, the wastewater may discharge into a sewerage area that is subject to wastewater reuse. Find out from Business Customer Services if this is applicable to your development.

Backflow Prevention Requirements

Backflow is when there is unintentional flow of water in the wrong direction from a potentially polluted source into the drinking water supply.

All properties connected to Sydney Water's supply must install a testable **Backflow Prevention Containment Device** appropriate to the property's hazard rating. Property with a high or medium hazard rating must have the backflow prevention containment device tested annually. Properties identified as having a low hazard rating must install a non-testable device, as a minimum.

Separate hydrant and sprinkler fire services on non-residential properties, require the installation of a testable double check detector assembly. The device is to be located at the boundary of the property.

Before you install a backflow prevention device:

1. Get your hydraulic consultant or plumber to check the available water pressure versus the property's required pressure and flow requirements.
2. Conduct a site assessment to confirm the hazard rating of the property and its services. Contact PIAS at NSW Fair Trading on **1300 889 099**.

For installation you will need to engage a licensed plumber with backflow accreditation. Visit www.sydneywater.com.au > Plumbing, building & developing > Plumbing > Backflow prevention to find a plumber.

Water Efficiency Recommendations

Water is our most precious resource and every customer can play a role in its conservation. By working together with Sydney Water, business customers are able to reduce their water consumption. This will help your business save money, improve productivity and protect the environment.

Some water efficiency measures that can be easily implemented in your business are:

- Install water efficiency fixtures to help increase your water efficiency. Visit www.waterrating.gov.au/ to take you to the WELS (Water Efficiency Labelling and Standards (WELS) Scheme
- Consider installing rainwater tanks to capture rainwater runoff, and reusing it, where cost effective. Visit www.sydneywater.com.au > Plumbing, building & developing > Plumbing > Rainwater *tanks*
- Install water-monitoring devices on your meter to identify water usage patterns and leaks.
- Develop a water efficiency plan for your business.

It is cheaper to install water efficiency appliances while you are developing than retrofitting them later.

Fire Fighting

Definition of fire fighting systems is the responsibility of the developer and is not part of the Section 73 process. It is recommended that a consultant should advise the developer regarding the fire fighting flow of the development and the ability of our system to provide that flow in an emergency. Sydney Water's Operating Licence directs that our mains are only required to provide domestic supply at a minimum pressure of 15 m head.

A report supplying modelled pressures called the Statement of Available pressure can be purchased through Sydney Water Tap in ™ and may be of some assistance when defining the fire fighting system. The Statement of Available pressure may advise flow limits that relate to system capacity or diameter of the main and pressure limits according to pressure management initiatives. If mains are required for fire fighting purposes, the mains shall be arranged through the water main extension process and not the Section 73 process.

Large Water Service Connection

A water main are available to provide your development with a domestic supply. The size of your development means that you will need a connection larger than the standard domestic 20 mm size.

To get approval for your connection, you will need to lodge an application with Sydney Water Tap in ™. You, or your hydraulic consultant, may need to supply the following:

- a plan of the hydraulic layout
- a list of all the fixtures/fittings within the property
- a copy of the fireflow pressure inquiry issued by us
- a pump application form (if a pump is required)
- all pump details (if a pump is required).

You'll have to pay an application fee.

We don't consider whether a water main is adequate for fire fighting purposes for your development. We can't guarantee that this water supply will meet your Council's fire fighting requirements. The Council and your hydraulic consultant can help.

Disused Water Service Sealing

You must pay to disconnect all disused private water services and seal them at the point of connection to our water main. This work must meet our standards in the Plumbing Code of Australia (the Code) and be done by a licensed plumber. The licensed plumber must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Other fees and requirements

The requirements in this Notice relate to your Certificate application only. We may be involved with other aspects of your development and there may be other fees or requirements. These include:

- plumbing and drainage inspection costs
- the installation of backflow prevention devices;
- trade waste requirements
- large water connections and

- council fire fighting requirements. (It will help you to know what the fire fighting requirements are for your development as soon as possible. Your hydraulic consultant can help you here.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from us and to the extent that it is able, we limit its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

END

Appendix G

Potable Water and Electrical Demand Calculations

POTABLE WATER DAILY DEMAND ESTIMATES

Masterplan Typology Breakdown	Potable	Unit
	kL/Day	
Warehouse	0.0028	per m2
Office	0.0023	per m2

Variables	Offset	Unit
Diversity factor applied to stage total (related to occupancy/population)	20	%

DEMAND ESTIMATES

Masterplan Typology Breakdown	Warehouse (sqm)		Office (sqm)		Warehouse	Office	Warehouse & Office Total	Warehouse (Diversity Factor Applied)	Total (Including Diversity Factor)	Converstion to ML/day
	GFA	NLA	GFA	NLA	kL/day	kL/day	kL/day	kL/day	kL/day	ML/day
Warehouse 1	16,462	14,816	600	510	**42**	**1**	**43**	**-9**	**34**	**0.03**
Warehouse 2	18,567	16,710	1,100	935	**47**	**2**	**49**	**-10**	**39**	**0.04**
	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0.00**
Sub-totals	**GFA**	**NLA**	**GFA**	**NLA**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
					89	**3**	**92**	**-18**	**74**	**0.07**

Assumptions and conversion factors

1. Rates taken from Sydney Water Document - Average Daily Water Use By Property Development Type.
2. Potable water conservative diversity = 20% diversity.
3. The building efficiency is used to convert the Gross Floor Area (GFA) to Net Lettable Area (NLA).

ELECTRICAL DEMAND ESTIMATES

Masterplan Typology Breakdown	Electrical VA/m2		
Warehouse	20		
Office	85		

Variables	Offset	Unit
Diversity factor applied to stage total (related to occupancy/population)		%

DEMAND ESTIMATES

Masterplan Typology Breakdown	Warehouse (sqm)		Office (sqm)		Warehouse	Office	Warehouse & Office Total	Warehouse & Office (Diversity Factor)	Total Demand (Including Diversity Factor)	Converstion to kVA
	GFA	NLA	GFA	NLA	VA/m2	VA/m2	VA/m2	VA/m2	VA/m2	kVA
Warehouse 1	16,462	14,816	600	510	**296,316**	**43,350**	**339,666**	**0**	**339,666**	**339.67**
Warehouse 2	18,567	16,710	1,100	935	**334,206**	**79,475**	**413,681**	**0**	**413,681**	**414**
	0	0	0	0	**0**	**0**	**0**	**0**	**0**	**0.00**
Sub-totals	**GFA**	**NLA**	**GFA**	**NLA**	**Total**	**Total**	**Total**	**Total**	**Total**	**Total**
					630,522	**122,825**	**753,347**	**0**	**753,347**	**753.35**

Assumptions and conversion factors

1. AS3000:2018 Table C3 Max. Demand - Energy Demand Method with range of VA/m² utilised for estimation e.g. Education, Retail, Commercial, Hotel and Cultural with average of 100VA/m² for light and power requirement.

2.The Maximum Demand Calculation is based-off the Yield Data and Infrastructure Plan shall be only used as a high level energy consumption result for information only.

3. No power proviion has been made for EV charging stations.

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