XAVIER KNIGHT

INTEGRATED WATER MANAGEMENT PLAN

241206 - Macarthur Gardens North R3

Contents

Document Summary

Project Number:	241206
Project Name:	Macarthur Gardens North, Campbelltown
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XK Project Director:	Duncan Marshall

Status	Issue	Date	Prepared By	Approved By
Draft	A	11.07.2025	Evan Legg	Duncan Marshall
Final	B	24.07.2025	Evan Legg	Duncan Marshall

1 Introduction

1.1 EXECUTIVE SUMMARY

This Civil Engineering SSDA report has been prepared by Xavier Knight to accompany a State Significant Development Application (SSDA) for an affordable housing development within the Macarthur Gardens North precinct (MGN) in the Campbelltown Local Government Area (LGA). The MGN precinct is identified as Lot 1097 in DP1182558.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-80482713) on 16th July 2025.

This report concludes that the proposed development is suitable and warrants approval subject to the implementation of the following mitigation measures.

- 5kL Rainwater tank for irrigation reuse onsite as per BASIX report prepared by BSE.
- Developed site not to exceed fraction impervious value as per the overall precinct plan
- Erosion control to be implemented as per plan and details
- Site grading and minor stormwater network to manage overland flows through the site

Following the implementation of the above mitigation measures, the remaining impacts are considered appropriate.

1.2 INTRODUCTION

The SSDA seeks development consent for a 100% affordable housing development on site R3 of the MGN Precinct.
Specifically, the SSDA seeks development consent for:

- construction of two 3 to 9 storey residential flat buildings
- 130 dwellings, all of which are affordable housing
- one basement level for car parking
- landscaping
- communal open space area

The purpose of the project is to facilitate the delivery of high-quality affordable housing, on a strategically located site consistent with the vision for MGN.

1.3 PURPOSE OF THIS REPORT

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 16th July 2025 and issued for the SSDA (SSD-80482713). Specifically, this report has been prepared to respond to the SEARs requirement issued below.

SEARs Requirement	Report Section
14. Water Management • Provide an Integrated Water Management Plan for the development that: ✓ is prepared in consultation with the local council and any other relevant drainage or water authority. ✓ outlines the water-related servicing infrastructure required by the development (informed by the anticipated annual and ultimate increase in servicing demand) and evaluates opportunities to reduce water demand (such as recycled water provision). ✓ details the proposed drainage design (stormwater and wastewater) for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and nominated discharge points. ✓ demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse downstream impacts. • 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.	Refer to Section 3 of this report Potable water, wastewater and sewer requirements to be addressed by Section 73 Consultant

2 Site Information

2.1 SITE LOCATION

The proposed development of Lot R3 at the Macarthur Gardens North site is within the Macarthur Region in South West Sydney. Located within the Campbelltown Local Government Area (LGA), the site is to be developed as part of the larger Precent situated between Goldsmith Ave, the main southern railway corridor and Gilcrist Drive.

On 14 December 2022, the Sydney Western City Planning Panel approved 3944/2021/DA-SW which comprised:

- a concept masterplan for mixed use development within MGN (see figure 1 below)
- Stage 1 works (parks, civil works, landscaping and subdivision of the site into superlots)

The masterplan sets the planning context for MGN. Importantly, the use and building envelopes for the site subject to this SSDA outlined in red below.

The proposed site, hereinafter referred to as R3, is a 4,895m^2 parcel of land currently known as Lot R3 and part of Lot 1097 in DP1182558, provided in the Figure 1 below.

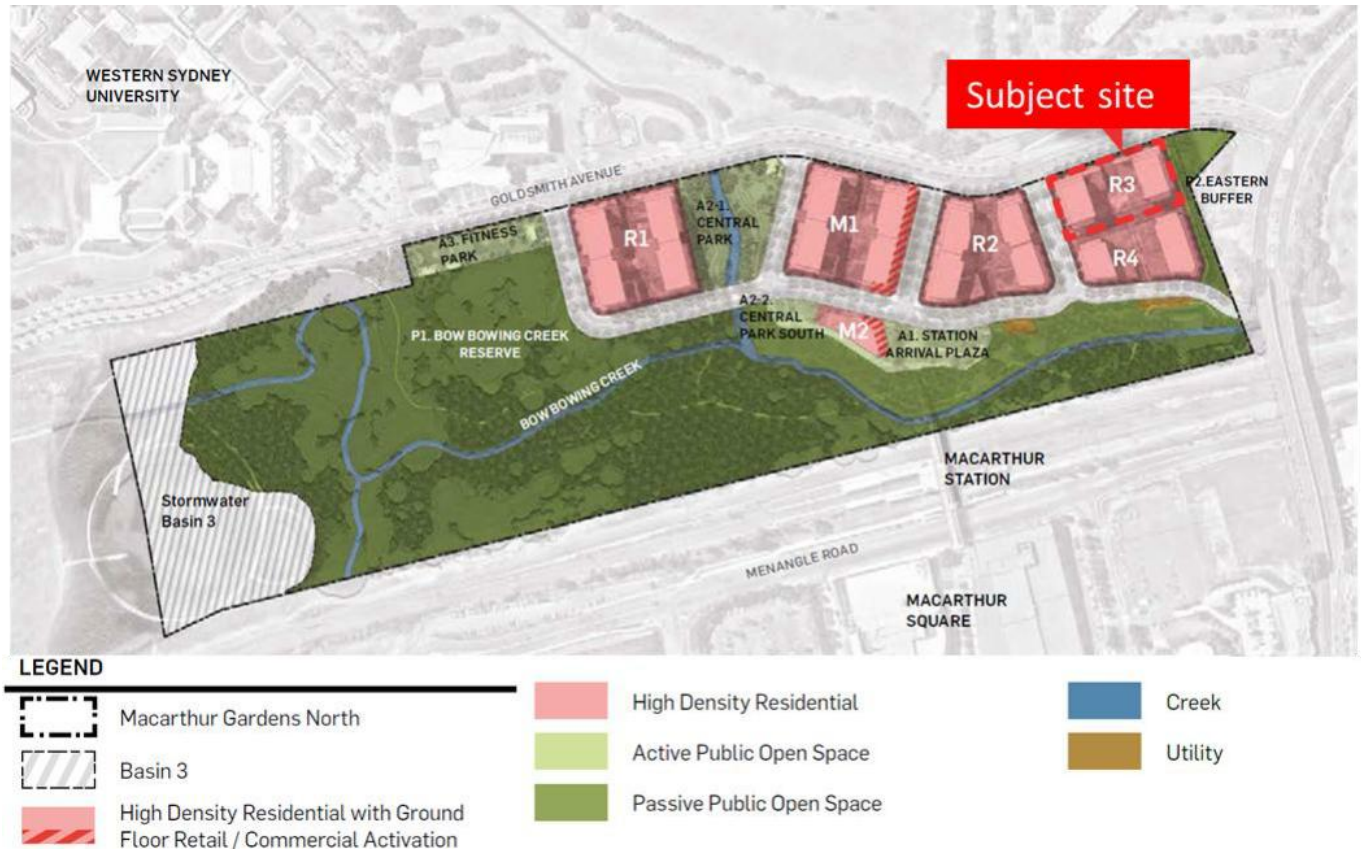


Figure 1 – Precinct Plan

2.2 SUBJECT SITE

The site is located in the MGN precinct within the Campbelltown LGA. The MGN Precinct is legally described as Lot 1097 in DP1182558.

As shown within Figure 2 below, R3 located within the northeastern corner of MGN and is rectangular in shape. The site has an area of 4,895m2 and is currently bound by Goldsmith Avenue to the north, vacant land (known as site R4 within the 3944/2021/DA-SW concept masterplan) to the south and a pedestrian link and road, which are under construction, to the east and west respectively.
The site is zoned R4 High Density Residential pursuant to the *Campbelltown Local Environmental Plan 2015* and is currently vacant land which has been excavated in accordance with Stage 1 of the 3944/2021/DA-SW approval.

Figure 2 – Surrounding Site

The site is also strategically located within the Glenfield to Macarthur Urban Renewal Corridor which is identified by the Department of Planning Housing and Infrastructure as a corridor to accelerate housing and jobs.

2.3 SURROUNDING CONTEXT

The vision on MGN is a mixed-use development precinct. Once developed, the site will be immediately bound by high density residential, roads and landscape buffers.

Outside of the MGN precinct, the broader site context is characterised by educational establishments to the north and northwest (Western Sydney University and TAFE), vacant undeveloped land to the west, Macarthur Train Station, railway lines, commercial premises (including Macarthur Square Shopping Centre) and low density residential to the south and a recreation area known as Gilchrist Oval to the east.
The site is located approximately 43 kilometres south west of the Sydney CBD, and 20km south west of Liverpool.

2.4 STANDARDS AND GUIDELINES

The following design standards and guidelines have been used for the preparation of this civil engineering report.

- BCA National Construction Code 2022
- AS/NZS 2890.1:2004 Parking facilities, Part 1: Off-street car parking
- AS/NZS 2890.2:2018 Parking facilities, Part 2: Off-street commercial vehicle facilities
- AS/NZS 3500.3: 2025 Plumbing and drainage, Part 3: Stormwater drainage
- Australian Rainfall & Runoff: Volumes 1 & 2, 2019
- Managing Urban Stormwater - Soils and Construction Vol. 1 (4th edition 2004, Landcom)
- Macarthur Gardens North Development Control Plan – Volume 2
- Campbelltown (Sustainable City) Council DCP 2015
- Campbelltown (Sustainable City) Council DCP 2009 – Engineering Design for Development

2.5 REFERENCE INFORMATION

This report is to be read in conjunction with the following documentation by others.

- Architectural layout prepared by DKO
- Preliminary Geotechnical Assessment prepared by Douglas Partners
- Detail Survey plans prepared by IDC, rev A, dated 06.05.2024
- Draft Subdivision plan prepared by JMD development Consultants

3 Stormwater Management

3.1 EXISTING STORMWATER DRAINAGE

The documentation prepared by IDC of the Macarthur Gardens North (MGN) precinct provides the design of the internal road network and stormwater system that will service the future development at lot R3. Provision has been made for a stormwater pit in the southeastern corner of the R3 site. This pit drains via 375mm diameter pipe placed in a dedicated drainage easement along the eastern boundary of the R4 lot and towards Road 4. From Road 4, the piped stormwater flows through a Gross Pollutant Trap (GPT) to remove suspended solids and debris before discharging into bioretention basin along Road 4 for treatment for further organic pollutant removal. This design has been developed alongside the larger Macarthur Precinct masterplan, where treated water from the bioretention basins flows through the Bow Bowing Creek will be retained by the Gilchrist Oval Basin to the west. Refer to **Error! Reference source not found.**Figure 3 showing the proposed civil works plan of the site and the existing treatment system located to the south.

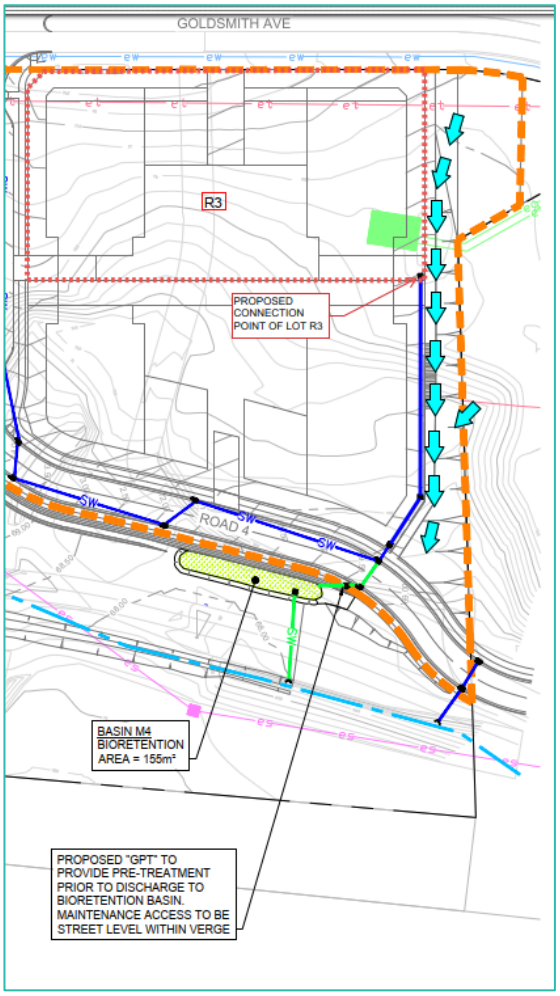


Figure 3 - Constructed Precinct Stormwater Plan (IDC, 2021)

3.2 STORMWATER QUANTITY

As Lot R3 is part of the larger Macarthur Precinct, J. Wyndham Prince (JWP) prepared a stormwater and flooding strategy that discusses the detention requirements for the precinct. The Masterplan stormwater and flooding strategy - *WSU Campbelltown & Macarthur Gardens North Residential Development* has planned a series of detention basins along Bow Bowing creek with minor works to the creek to meet the detention requirements as stated by Campbelltown Council. The precinct will drain to the Gilchrist Oval to the west of MGN, see Figure 4.

Figure 4 - Regional Stormwater Management (JWP, Nov 2017)

For the MGN development, new pits and pipes have been designed and constructed to ensure runoff from the lots are captured and directed to these detention basins. To obtain the volumes requirements for these basins, the JPW report assumes the fraction impervious foreach of the land use were:

- High rise residential = 90%
- Road reserve = 90%
- Open space = 20%

From this, a DRAINS model was developed by IDC defining each lot and area by these criteria and determined the pipe sizing throughout the network, see Figure 5.

Figure 5 - DRAINS model (IDC, Dec 2021)

The DRAINS model by IDC uses a major/minor system in accordance with Campbelltown City Council Standards. The stormwater design of piped drainage systems is sized to sufficiently capture and convey runoff up to a 20% AEP storm event with overland flow paths catering for larger storm events up to the 1% AEP storm event. For Lot R3, runoff captured onsite will be discharged to the existing inlet pit at the south east corner of the site. Refer to Figure 6 below showing proposed ground floor stormwater drainage for the developed site.

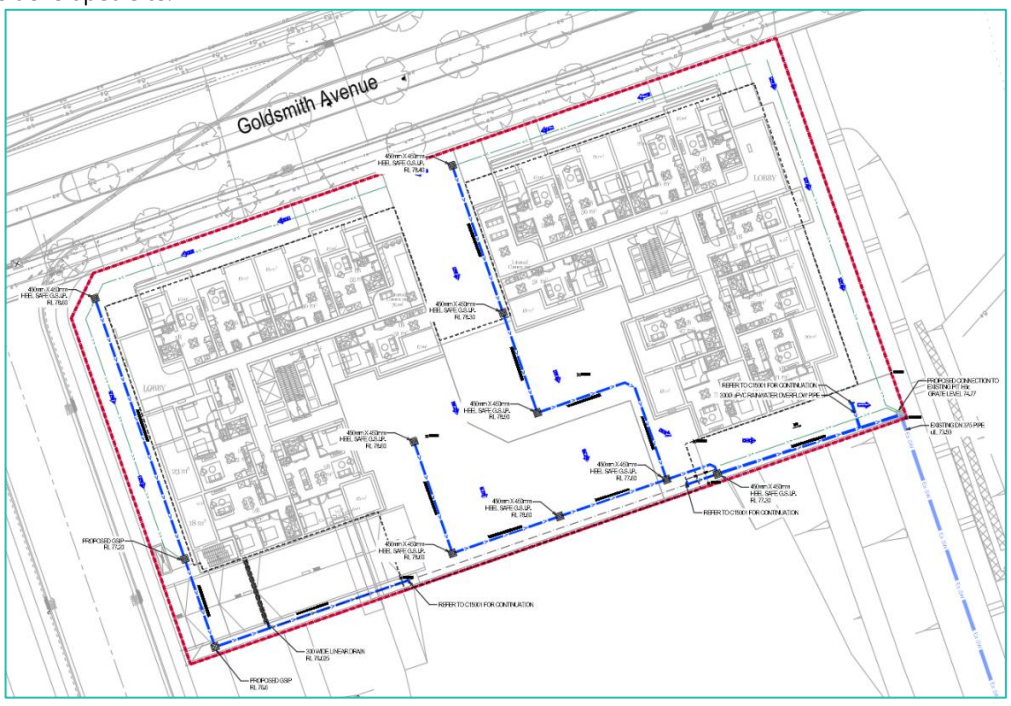


Figure 6 - Stormwater Management Plan Ground Floor

When R3 is developed, the site has been designed to have 55% impervious area and 45% pervious, which is less than the assumed value as prepared by the JWP report. The areas for pervious and impervious area are shown in Figure 7. Based on the above and information provided by JWP, no on-site detention tank will be included in the development at R3 to meet water quantity requirements as this will be managed by the overall precinct stormwater strategy.

Figure 7 - Pervious / Impervious Catchment Plan

3.3 STORMWATER QUALITY

Stormwater quality management from the development has been addressed in the larger precinct development design by IDC. As the site is located within the Bow Bowing Creek Catchment, development in the area requires Water Sensitive Urban Design methods to be incorporated into the design. The precinct had been model in MUSIC software to assess the minimal WSUD requirements that would meet the treatment targets as put forth by council, these targets include:

- 90% reduction of Gross pollutants (GP)
- 85% reduction of Total Suspended Solids (TSS)
- 60% reduction of Total Phosphorus (TP); and
- 45% reduction of Total Nitrogen (TN)

The Campbelltown Council DCP provides the required IFD coefficients for the site to be inputted into MUSIC for the analysis. The storm events and respective rainfall has been complied into Table 1 - Rainfall Intensities table (IDC, Dec 2021)Table 1 below:

Duration	5 Year	20 Year	100 Year
5 min	134	173	223
10 min	103	132	171
15 min	86.3	111	143.1
20 min	75.4	96.9	125
25 min	67.4	86.7	111.8
30 min	61.3	78.9	102
45 min	49.0	63.1	81.4
1 hour	41.4	53.3	68.9
1.5 hours	32.25	41.43	53.66
2 hours	26.8	34.7	45.0
3 hours	20.6	26.7	34.7

Table 1 - Rainfall Intensities table (IDC, Dec 2021)

To assess the site, the catchments were broken down in various types based on the proposed future use. These include 'roads', 'Lot' and 'open spaces'. A full break down of the MUSIC model inputs can be found in the report by IDC in Appendix H.

Based on the above inputs, the site conditions and layout, multiple gross pollutant traps and bioretention basins have been sized to treat the runoff generated by the new roads and proposed lot developments, see Figure 8

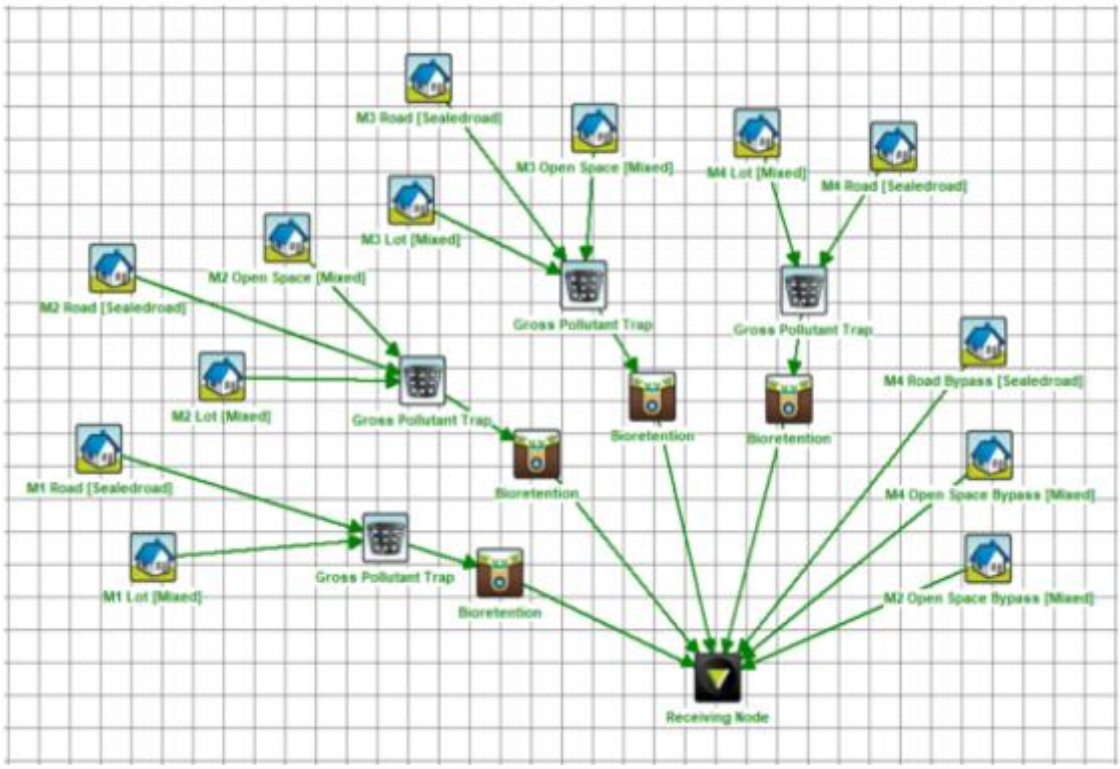


Figure 8- MUSIC model (IDC, Dec 2021)

A summary of IDCs MUSIC results can be seen in Table 2

Pollutant	Generation (kg/yr)	Output (kg/yr)	Removal Rate	Target Removal Rate
Total Suspended Solids	15,500	2,330	85%	85%
Total Phosphorus	24.8	6.85	72.3%	65%
Total Nitrogen	154	84	45.5%	45%
Gross Pollutants	1,600	55.8	96.5%	90%

Table 2 - Rainfall Intensities table (IDC, Dec 2021)

Based on the above and information provided by IDC, there would be no requirement for additional on-site treatment measures for the development at Lot R3 to meet water quality requirements as this will be managed by the overall precinct stormwater strategy. However, the developer may choose to include pit filter baskets throughout the development to limit the accumulation of debris traveling through the system and limit the need for on-going pipe maintenance.

4 Erosion & Sediment Control

All erosion and sediment control measures are to be in accordance with 'Managing Urban Stormwater: Soils and construction – Volume 1' (Landcom 4th edition, 1 March 2004) commonly known as the 'Blue Book'.

Erosion and sediment control devices and procedures will be put in place during construction to ensure that stormwater runoff will be collected and diverted around the disturbed site with sediments removed prior to discharge to the existing stormwater system. The proposed controls may include:

- Silt fences at the downstream boundary of the construction zone;
- Wash down and diversions at temporary vehicle entrances/exists to the construction zone;
- Sedimentation basin with outlet control and overflow;
- Diversions to prevent upstream runoff entering the construction zone; and
- Sandbag sediment traps and geotextile filters to protect existing stormwater pits and inlets.

The erosion controls and sediment collection devices will need to be modified and adjusted by the contractor to suit building work stages and programme as it progresses. All erosion and sediment control measures will be constructed in accordance with "Managing Urban Stormwater – Soils & Construction Volume 1 2004 (Landcom)" and "Approved Methods for the Modelling and Assessment of air pollutants in NSW (EPA).

5 Earthworks

The development site has an area of a 4,895m^2 where significant earthworks have been undertaken as part of the larger precinct. These works included the construction of a new road on the western and southern boundary of the site and benching through the site to stabilise the slope. As additional localised earthworks will be required for the site, sediment and erosion controls are to be established as outlined in the Sediment Erosion Control Plan and Section 4 of this report.
The top 150mm of existing topsoil from the site area will be stripped to remove any degraded fill or organic material that has accumulated on site prior to construction. The stripped topsoil will have an approximate volume of 735m^3 and will be disposed of offsite as General Soil Waste (GSW). Due to the benching that has occurred onsite, the current design levels have a maximum fill of 3.6m and cut depth of 4.8m resulting in large volumes of cut material.

To minimise the export of the excavated material from the site, the basement carpark level has been separated into three areas of varying heights. The entrance will remain as per the concept design, whilst the northwest and northeast section will be lifted 1500mm 800mm respectfully. This stepped basement approach resulted in a reduction of excavated material needing to be exported from site - approximately 2520m^3 of cut will need to be removed and disposed of in accordance with the geotechnical engineer's recommendations. As many of the nearby sites are to be developed, there is an opportunity that the excess material could be utilised elsewhere in the precinct under the guidance of the geotechnical engineers. Refer to drawing C01101of the civil package for the earthworks cut and fill plan.

6 Conclusions

Stormwater drainage system has been designed in accordance with relevant standards and Campbelltown City Council requirements. The design aims to convey all stormwater generated from the site to the existing grated surface inlet pit and onto the stormwater to the existing detention basin system designed by IDC. This stormwater discharge will be treated through existing WSUD assets as per IDC design of the subdivision. Therefore, the SEARs requirement *14. Water Management* has been addressed except the wastewater requirements. This and the Section 73 requirements are to be addressed by others and read in conjunction with this report.

This report has been prepared based on information available at the time of writing. Should new information become available, elements of the civil and stormwater strategy will need to be updated as part of the design development.

Kind Regards,

Duncan Marshall
CIVIL GROUP LEADER & ASSOCIATE
BE (Civil) (Hons)

APPENDIX A

IDC Report

infrastructure & development consulting

Macarthur Gardens North

Civil Engineering, Services & Infrastructure

Master Planning Report

December 2021

Table of Contents

Project Number	19-036	Date	9/12/21
Project Name	Macarthur Gardens North	Status	Final – Revised Layout
Client	Landcom	Revision	D
Author	R. Higgisson	Reviewed	C. Avis

1 Introduction

Infrastructure & Development Consulting (IDC) have been commissioned by Landcom to prepare a Civil Engineering, Services and Infrastructure Master Planning Report to guide the proposed urban renewal at Macarthur Gardens North for apartment and mixed-use development.

This report is to be lodged with Campbelltown City Council in support of the proposed planning application and aims to review the infrastructure requirements for the overall site and to identify and address the following servicing issues and proposed solutions with respect to:

- Stormwater Management
- Water Sensitive Urban Design;
- Municipal Overland Flow and Flooding;
- Lot grading and local road layout;
- Sydney Water Servicing including potable water and wastewater;
- Electrical reticulation in accordance with Endeavour Energy requirements;
- Telecommunications; and
- Gas.

The following analyses have been undertaken to provide an overall strategy for servicing the site and to guide future detailed design through the implementation of appropriate authority controls and best management practices.

We note that the proposed servicing measures are strategic in nature and further refinement may be required during the subsequent design phases of the proposal, however, the underlying principles and objectives of this Report are to be maintained.

2 Site Description & Proposed Works

The Macarthur Gardens North site is located approximately 45km south-west of the Sydney CBD at Lot 1097 DP1182558 and is situated within the Campbelltown City Council local government area. The Macarthur Gardens North (MGN) site, which is located to the north of the Macarthur Train Station, covers an area of approximately 18Ha and forms part of the larger Macarthur Precinct.

The existing MGN site, which currently consists of undeveloped land, falls generally from north to south and is bound by:

- Goldsmith Avenue to the north
- The Airport & South rail line to the south
- Gilchrist Drive / Oval to the east; and
- The existing Macarthur Heights development to the west

The proposed development includes the subdivision of the site to provide up to 1,250 apartment dwellings split over 4 lots as well as a new local access road network to link the development to the surrounding street system.

This report considers the civil engineering, infrastructure and servicing requirements associated with the master planning for the site.

Figure 1 - Site Boundary

3 Data

The following data has been resourced to assist with the preparation of this report:

- Dial Before You Dig (DBYD) services search
- Site survey prepared by JMD Surveyors
- Sydney Water hydra search
- Endeavour Energy Distribution Annual Planning Report online tool
- Feedback from service providers
- Campbelltown City Council Development Control Plans

4 Stormwater

The aim of this section of the report is to:

- Understand the existing stormwater flow conditions for the site and determine requirements for post-development flows from regulatory authorities;
- Prepare a concept masterplan stormwater pipe network to convey flows throughout the site to appropriate discharge points including connecting to the existing network where applicable; and
- Identify appropriate measures to satisfy Council's water quality and detention requirements and determine the location and land area required to implement the measures.

The following analyses have taken into consideration the economical, engineering, environmental and social aspects of the works through the implementation of appropriate stormwater controls in accordance with Campbelltown City Council's statutory requirements.

4.1 Design Guidelines

The stormwater network for the site has been designed to comply with the following guidelines:

- Campbelltown City Council Development Control Plans
    - Campbelltown (Sustainable City) Development Control Plan 2015
    - Campbelltown (Sustainable City) Development Control Plan 2009 – Engineering Design for Development
- Australian Rainfall and Runoff
- Managing Urban Stormwater: Soils and Construction

4.2 Stormwater Management Strategy

The following section provides a breakdown of the key technical aspects split into the various stages of the water cycle which have been used to inform the concept masterplan strategy for the proposed development.

4.2.1 Water Quantity

Major/Minor System Drainage

The major/minor approach to stormwater drainage is the recognized drainage concept for urban catchments within the Campbelltown City Council local government area.

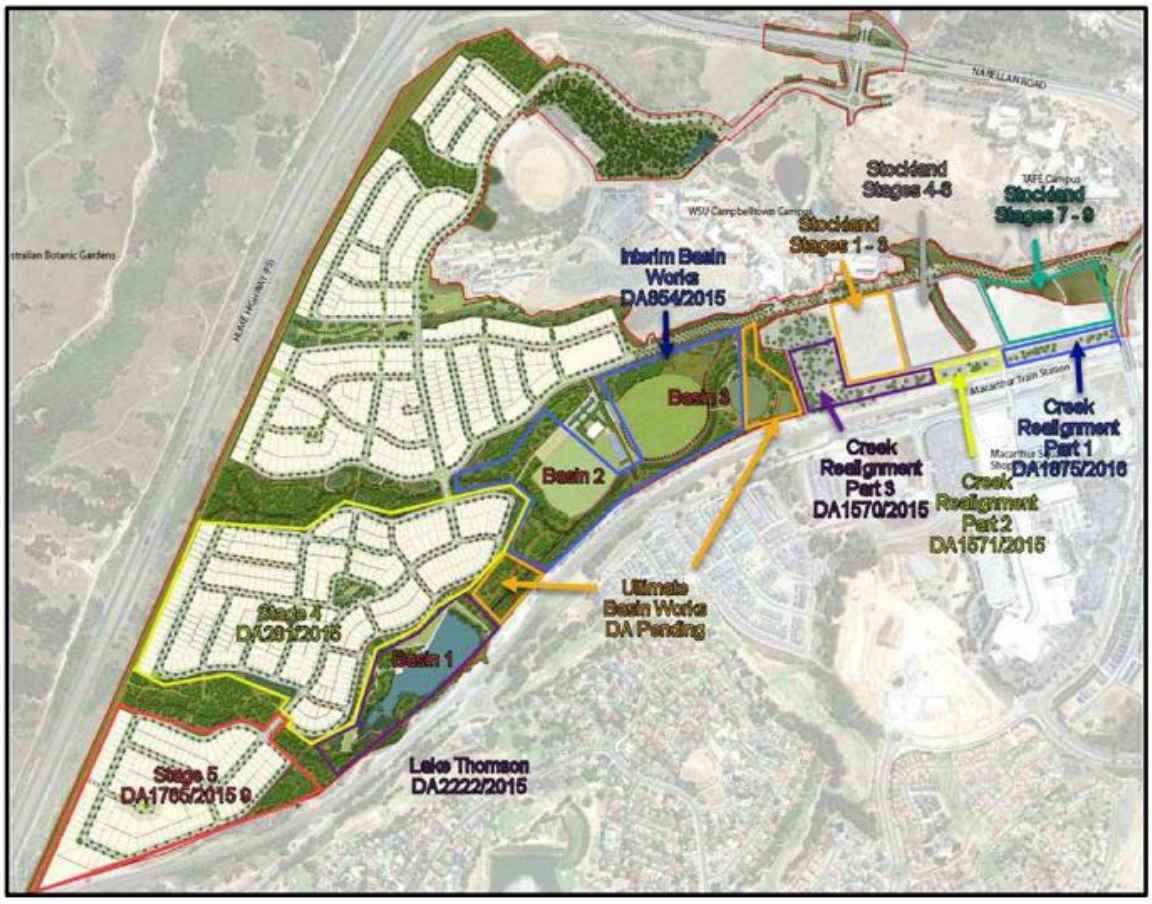
The minor drainage system is comprised of the below ground pit and pipe network within the new local roads and is designed to control nuisance flooding and enable effective stormwater management for the site. Council's Development Controls requires that the minor system be designed for a minimum 5-year ARI for residential areas.

The major drainage system incorporates overland flow routes through proposed road, hardstand and landscaped areas and is assessed against the 100-year ARI design storm event. The major system also exists to cater for minor system failures. In accordance with council's requirements, the major drainage system is to be designed in a manner that ensures that personal safety is not compromised. As such, all overland flow routes for the site are to be designed so that the maximum velocity-depth product shall not exceed 0.4m^2/s in accordance with standard engineering practice.

Detention Strategy

In 2017, J. Wyndham Prince (JWP) prepared a stormwater and flooding strategy to support the various Development Applications prepared for the MGN/WSU Precinct across 2015 and 2016. As outlined in the *Masterplan Stormwater and Flooding Strategy - WSU Campbelltown & Macarthur Gardens North Residential Development*, we note that On-Site Stormwater Detention requirements for the subject site have been accommodated in a series of regional detention basins and creek works as part of the adjoining Macarthur Heights / Wester Sydney University Development (see Figure 2 below taken from the JWP Report for details), as well as downstream via the Gilchrist Oval Basin.

Figure 2 – OSD Basin Strategy



Source: *Western Sydney University Campbelltown Works Sequencing and Basin Strategy* – J. Wyndham Prince (Nov 2017)

As discussed in the JWP Report, "*by implementing the proposed basin works, flood levels at Gilchrist Basin and downstream of Basin 3 are generally lower than under existing conditions (improvement)*". As such, it is understood that provision for additional on-site stormwater detention facilities is not required as part of this proposal.

4.2.2 Water Quality

The proposed development is situated with the Bow Bowing Creek Catchment and, similar with many other urbanised areas in Sydney, the study area at times can result in poor water quality from roads and open spaces, particularly after heavy rain. This untreated runoff in the localised catchment also contributes to the overall water quality in Bow Bowing Creek. As part of the infrastructure masterplan, Water Sensitive Urban Design (WSUD) procedures have been incorporated to improve water quality in local waterways.

Due to the emphasis on active open space, it is proposed that end-of-line treatments be incorporated as part of the proposed landscape design to ensure that downstream water quality targets are achieved for the site.

Due to the site's close proximity to Bow-Bowing Creek, we note that the following targets have conservatively been set in relation to stormwater quality in accordance with general engineering practice:

- 90% reduction in the post development mean annual load for Gross Pollutants (GP) greater than 5mm;
- 85% reduction in the post development mean annual load of Total Suspended Solids (TSS);
- 60% reduction in the post development mean annual load of Total Phosphorus (TP); and
- 45% reduction in the post development mean annual load of Total Nitrogen (TN)

The removal and treatment of the above pollutants is to be achieved through the implementation of appropriate water sensitive urban design principles on site in accordance with Council requirements. As such, for the purposes of this Report, a concept treatment train for the building works has been modelled in MUSIC to provide an indication of the minimum works required to meet the water quality targets for the development (refer to Section 4.4 of this Report for details).

4.2.3 Flooding

As outlined in the previous Masterplan Flooding and Stormwater Strategy prepared by J. Wyndham Prince (JWP) for the development area, we note that the subject site is affected by mainstream flooding from Bow-Bowing Creek in large storm events.

As such, a separate site-specific flood assessment has been undertaken for the development by JWP to support the DA and determine an appropriate flood management strategy for the site in line with Council's statutory requirements.

As outlined in the JWP study, it is understood that that the proposed filling associated with the development area will not adversely impact on flood conveyance in Bow-Bowing Creek and that the proposed building pads for the residential lots are located a minimum of 500mm above the peak 1% AEP flood levels to ensure that sufficient freeboard is maintained to the future dwellings in accordance with Council requirements.

4.3 Water Quality Modelling – DRAINS

A hydrological model of the catchment was formulated using the DRAINS software package and was analysed to assess the performance of the site stormwater network. The DRAINS program typically performs design and analysis calculations for urban stormwater systems and models the runoff behaviour on both rural and urban catchments.

The user data inputs required by DRAINS include catchment areas, flow path lengths, time of concentration, pervious and impervious areas, IFD rainfall intensities and flow path roughness. Modelling is performed through the development of a network of pipes, pits and nodes to represent both the proposed and existing scenarios on site.

4.3.1 DRAINS Model Parameters

Intensity-Frequency-Duration

IFD data obtained from the *Campbelltown (Sustainable City) Development Control Plan 2009 – Engineering Design for Development* was utilised for the subject site, with the IFD data for durations longer than the 60 minute interval interpolated based on the IFD polynomial coefficients supplied by Council. This data is provided in Table 1 below.

Table 1 - Rainfall Intensities for Campbelltown

Duration	5 Year	20 Year	100 Year
5 min	134	173	223
10 min	103	132	171
15 min	86.3	111	143.1
20 min	75.4	96.9	125
25 min	67.4	86.7	111.8
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2 hours	26.8	34.7	45.0
3 hours	20.6	26.7	34.7

Source: Campbelltown (Sustainable City) Development Control Plan 2009 – Engineering Design for Development

Hydrological Model

- Paved (impervious) area depression storage = 1 mm
- Supplementary area depression storage = 1 mm
- Grassed (pervious) area depression storage = 5 mm
- Soil Type = 3

The DRAINS user guide describes Soil Type 3 as follows:

Type 3 (or C) slow infiltration rates (may have layers that impede downward movement of water).

4.3.2 Existing System

Upstream Flows

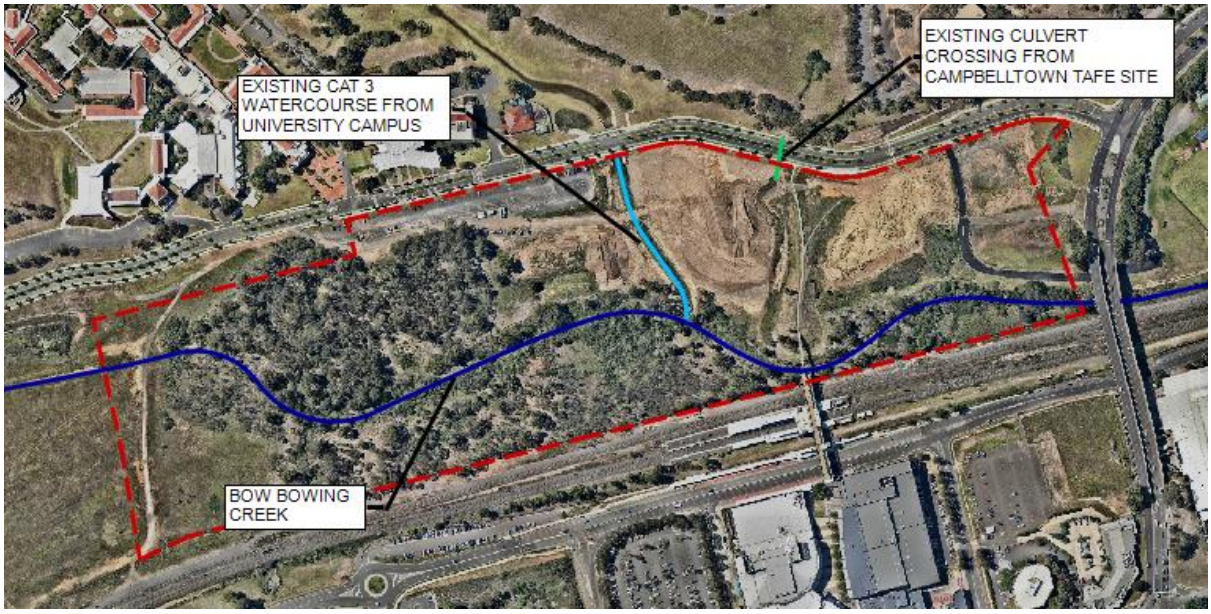
The subject site is currently bisected by three (3) primary overland flow paths:

- Bow Bowing Creek which flows west-east along the southern boundary of the site;
- A Third-Order watercourse which enters the site via an existing box culvert crossing in Goldsmith Ave situated just to the east of the Western Sydney University Campus. From here, flows drain overland north-south through the site before joining Bow-Bowing Creek further downstream; and
- An existing pipe outlet situated on the north-eastern portion of the development area which conveys upstream flows from the Campbelltown TAFE site. Flows associated with this outlet drain informally across the lot before eventually discharging downstream to Bow Bowing Creek.

Local Site Flows

Based on a review of detailed site survey and visual site inspections we note that local stormwater runoff generated within the subject site boundary is currently conveyed overland via informal flow paths to Bow Bowing Creek. From here, flows drain west-east through the site before continuing to Gilchrist Oval further downstream.

Figure 3 - Existing Drainage Layout



4.3.3 Proposed System

The proposed stormwater management strategy for the site is to consist of the following:

- Bow Bowing Creek is to generally be maintained in its current alignment along the southern boundary of the lot, with minor localised re-grading proposed just to the south of the new local link road to Gilchrist Oval;
- The existing Third-Order watercourse which enters the site to the north from Goldsmith Ave is to be realigned as part of the proposal. Here, upstream flows will be captured and conveyed through the site via a new watercourse which is to drain from Goldsmith Ave to Bow Bowing Creek as per the existing flow regime. We note that this watercourse is to be integrated as part of the proposed landscape design for the masterplan with appropriate dedicated riparian offsets to suit;
- A below ground trunk pit and pipe system is to be created within the new local road network to capture and convey runoff from the proposed road, lot, and building areas before discharging to Bow Bowing Creek as per the existing scenario; and
- Flows relating to the upstream pipe crossing from the Campbelltown TAFE site are to be intercepted within an easement and diverted to the new trunk street drainage network.

We note that flows associated with both Bow Bowing Creek and the re-aligned Third-Order watercourse have been assessed as part of the separate flooding and overland flow study undertaken by J. Wyndham Prince (JWP) for the proposal (refer to the JWP Report for details).

As such, the DRAINS model of the proposed site was created to assess the performance of the new street pit and pipe network to adequately convey stormwater flows to the downstream watercourses and was developed based on the following methodology:

- Stormwater flows from the site are to discharge via a new below ground pipe network to Bow-Bowing Creek / realigned watercourse as per the existing flow regime;

- An indicative pit and pipe network was developed for the proposed siteworks (refer to IDC Drawing *19-036-DA-C2100* for details);
- Tailwater conditions at each of the outlets to the watercourses have been set as the peak downstream flood level. These levels are considered appropriate as they assume the worst-case scenario for the site and have been specified to simulate a charged system downstream to verify the capacity of the proposed piped network for stormwater flows generated during the design storm events;
- Contributing flows from the upstream Campbelltown TAFE site have also been considered in the modelling process. Here, the existing culvert crossing beneath Goldsmith Avenue is to be intercepted and diverted within the new trunk street drainage network before eventually discharging downstream to Bow Bowing Creek as per the existing scenario;
- Assumed impervious fractions for the different land uses were adopted as follows:
    - High Rise Residential = 90%;
    - Road Reserve = 90%; and
    - Open Space = 20%

  It should be noted that, as the final built forms are unknown at this stage, assumptions have been made regarding impervious fractions for each land use and the rates adopted above are considered appropriate for standard developments of this type;
- 5 year and 100-year ARI events were considered for the standard durations listed in Section 4.3.1 of this report; and

Figure 4 - Proposed DRAINS Model

Note: Pit and catchment details have not been shown for clarity

4.3.4 DRAINS Results

Iterations were performed in the DRAINS model to determine the size of the proposed piped network in order to satisfy major / minor system requirements in accordance with Campbelltown City Council standards.

The proposed piped drainage system has been designed to cater for the 1 in 5-year ARI event leading to the outlet to the downstream watercourse. A provision for overland flows for events greater than the 1 in 5-year ARI event has also been considered.

Results indicate that the major / minor system requirements are satisfied at all proposed pits in the development area and that the piped system sufficiently conveys minor storm flows with safe provision for major system flows.

4.4 Water Quality Modelling – MUSIC

Modelling of the proposed development was undertaken using Model for Urban Stormwater Improvement Conceptualisation (MUSIC) software. The software was utilised to simulate urban stormwater systems operating at a range of temporal and spatial scales. MUSIC models the total amounts of gross pollutants and nutrients produced within various types of catchments. It allows the user to simulate the removal rates expected when implementing removal filters to reduce the increased gross pollutant and nutrient levels created by the proposed development.

The following methodology and parameters were incorporated into the MUSIC modelling for the proposed site:

- The post-developed site was consolidated into four (4) main sub-catchment areas based on the proposed drainage and lot layout as shown in Table 2.

Table 2 - MUSIC Sub-Catchment Summary

MUSIC Sub-Catchment	Area (Ha)
M1	0.980
M2	2.446
M3	1.179
M4	1.472
Total	**6.077**

- Catchments were than separated into "Road", "Lot" and "Open Space" areas as per the latest masterplan for the site. The breakdown for each catchment is shown in Table 3.

Table 3 - MUSIC Catchment Breakdown

MUSIC Sub-Catchment	Road (Ha)	Lot (Ha)	Open Space (Ha)	Open Space Bypassing Treatments (Ha)	Road Bypassing Treatments (Ha)	Total Area (Ha)
M1	0.192	0.788	-	-	-	**0.980**
M2	0.745	0.809	0.175	0.717	-	**2.446**
M3	0.248	0.733	0.198	-	-	**1.179**
M4	0.269	0.986	-	0.179	0.038	**1.472**
Total	**1.454**	**3.316**	**0.373**	**0.896**	**0.038**	**6.077**

- The pollutant concentration parameters used within the model were based on the recommended model defaults for different land use categories as specified in the *DRAFT NSW MUSIC Modelling Guidelines* (2010). These are summarised in Table 4.

Table 4 - MUSIC Node Classification

MUSIC Node	Classification
Roof	"Roof Areas"
Road	"Road Areas"
Lot	"Residential"

- From the NSW Government datasets, we note that the subject site is situated within the "Blacktown" soil classification group. As such, the soil properties for the pervious areas of the catchment were defined based on the recommended default parameters for "Clay Type" soils as summarised in Table 5.

Table 5 - MUSIC Soil Parameters

Soil Properties	Lot	Roof	Road
Impervious Threshold (mm)	1	0.3	1.5
Soil Storage Capacity (mm)	187	187	187
Initial Storage (% of capacity)	30	30	30
Field Capacity (mm)	127	127	127
Infiltration coefficient 'a'	135	135	135
Infiltration coefficient 'b'	4	4	4
Initial groundwater depth (mm)	10	10	10
Daily recharge rate (%)	10	10	10
Daily base flow rate (%)	10	10	10
Daily deep seepage rate (%)	0	0	0

4.4.1 Water Quality Treatment Train

The following treatment train has been proposed for the site:

- Rainwater Tanks are to be provided within each new lot to collect roof water for re-use on-site within the new dwellings and for irrigation of garden areas. From here, overflows from the rainwater tanks are to be directed to the new street drainage system. It should be noted that for the purposes of this study that Rainwater Tank treatments have been excluded from the proposed MUSIC model. This is considered appropriate as it assumes the worst-case scenario for the site. Moving forward, the exact type, size and location of the proposed tanks are to be confirmed via detailed modelling during the subsequent Development Application proposals for each building. Similarly, this will allow for different options to be explored to achieve higher standards (including BASIX requirements) where feasible;
- Runoff from the new road reserve areas are to be collected within the below-ground pit and pipe network before being conveyed to a series of bioretention basins which are to be incorporated as part of the proposed landscape masterplan for the site;
- Gross Pollutant Traps (GPT) are proposed immediately upstream of each bioretention system to provide pre-treatment of larger pollutants and sediments prior to discharge to the basin; and
- Bioretention "Raingardens" are proposed as an end-of-line treatment prior to discharge to Bow-Bowing Creek.

Bioretention

In developing the MUSIC mode for the post-developed site, the following assumptions have been made regarding the bioretention system:

- Treatable Flow Rate = 3-month ARI

Table 6 - Bioretention Parameters

Parameter	Basin M1	Basin M2	Basin M3	Basin M4
Filter Area (m^2)	105	215	105	155
Extended Detention Depth (m)	0.3	0.3	0.3	0.3
Filter Depth (m)	0.5	0.5	0.5	0.5
Saturated Hydraulic Conductivity (mm/hr)*	125	125	125	125

Note: Modelled number is 50% of assumed hydraulic conductivity for the filter media of 250mm/hr (Benedicts M165 or similar) in accordance with general engineering practice. This is to allow for compaction and accumulation of fine sediment particles within the bioretention system over time and is considered appropriate as it assumes the worst-case scenario for the catchment.

We note that the remaining bioretention parameters as per the recommended model defaults.

Gross Pollutant Trap

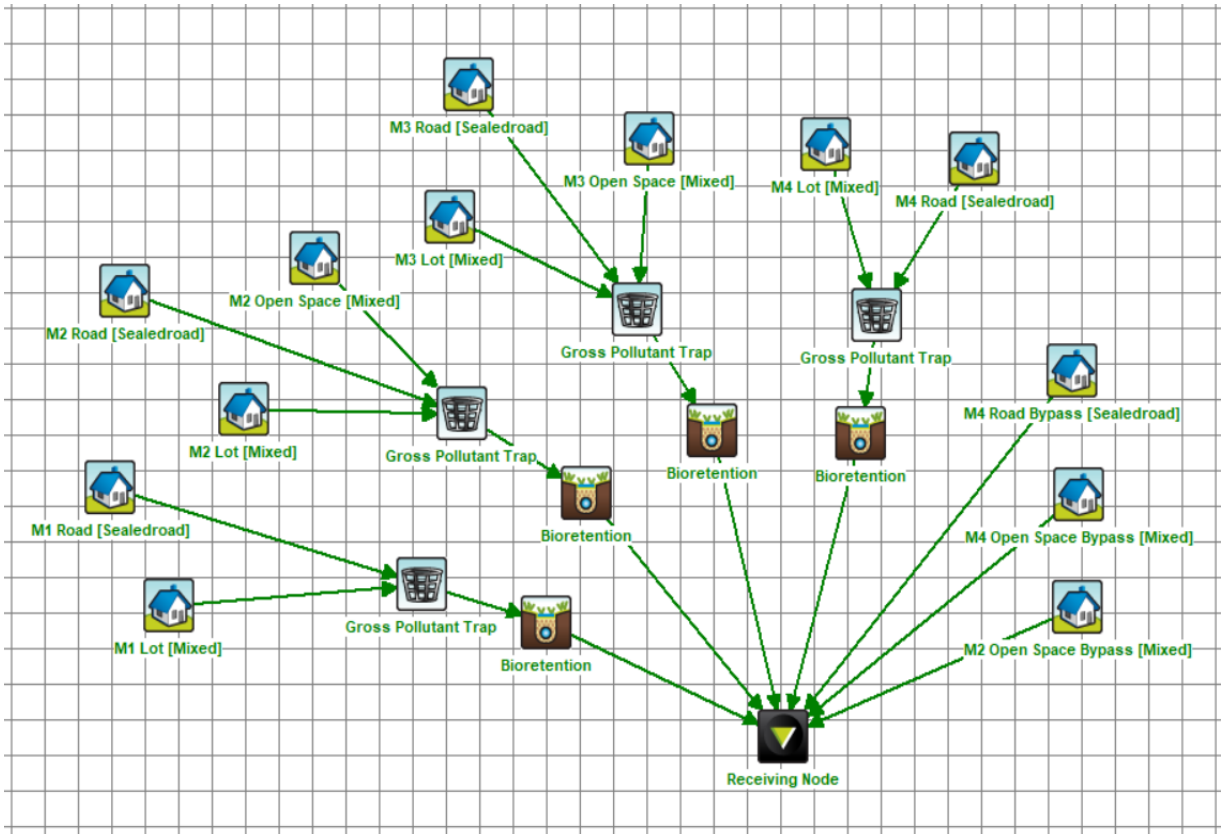
Pollutant removal rates utilised in the MUSIC model for the GPTs have been based on a generic CDS style system and have been summarised in the table below:

- Treatable Flow Rate = 3-month ARI

Table 7 - GPT Parameters

Pollutant	Input	Output	Reduction
Total Suspended Solids	100	30	70%
Total Phosphorus	100	70	30%
Total Nitrogen	50	50	0%
Gross Pollutants	100	2	98%

Figure 5 - Proposed MUSIC Model



4.4.2 MUSIC Results

The results of the MUSIC analysis are summarised in Table 8.

Table 8 - MUSIC Results

Pollutant	Generation (kg/yr)	Output (kg/yr)	Removal Rate	Target Removal Rate
Total Suspended Solids	15,500	2,330	85%	85%
Total Phosphorus	24.8	6.85	72.3%	65%
Total Nitrogen	154	84	45.5%	45%
Gross Pollutants	1,600	55.8	96.5%	90%

Based on the results of the assessment detailed above, we note that the proposed treatment train will provide adequate improvements to satisfy the water quality improvement objectives set out in Council's DCP. As such, the water quality objectives have been achieved for the proposed development.

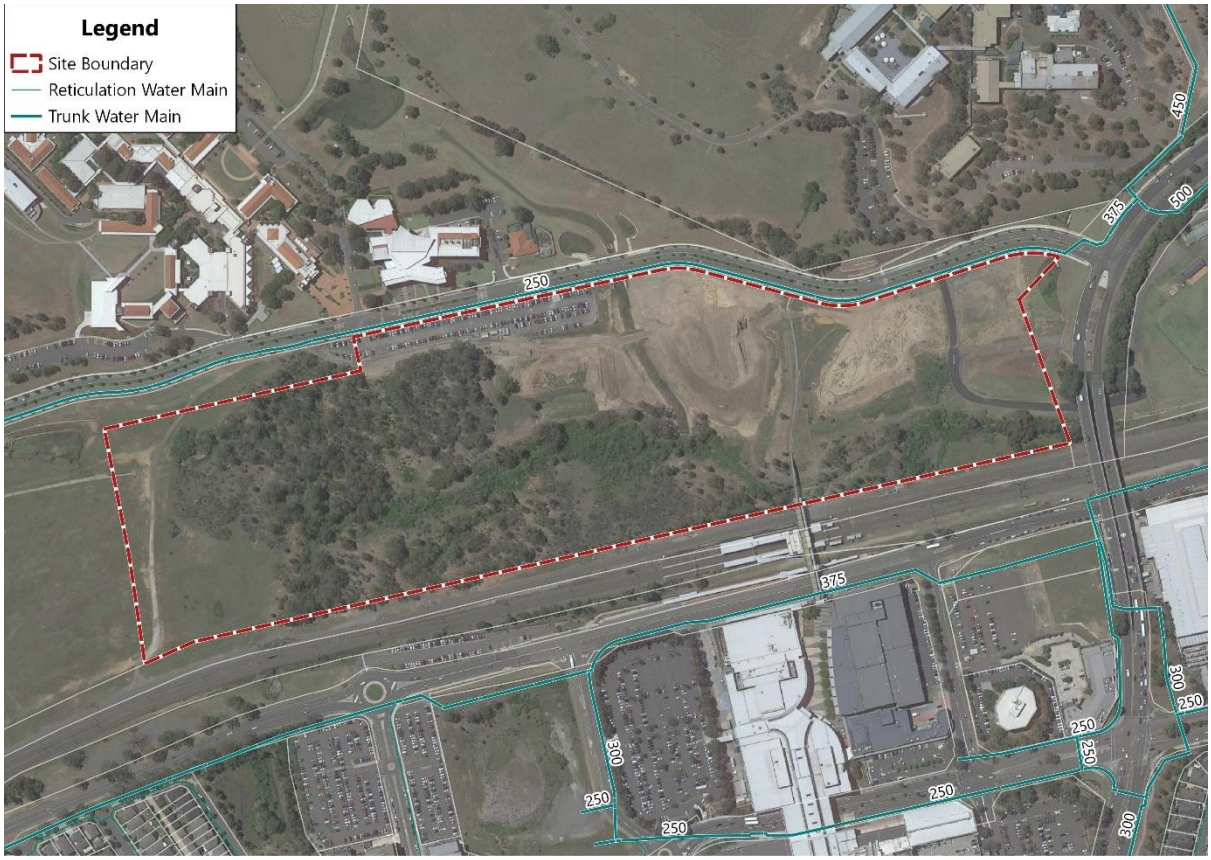
5 Potable Water

5.1 Existing Network

The existing site is serviced by a 250mm diameter trunk main located along Goldsmith Avenue, adjacent the northern site boundary. This main will be used to supply future development on the site. As this main also supplies water to adjacent sites, service disruptions should be avoided during any future construction works and connection of proposed services.

Watermains are also located to the south of the site in Menangle Road on the southern side of the rail corridor. The existing water mains within the vicinity of the site are shown in Figure 6 below.

Figure 6 - Existing Potable Water Network



5.2 Sydney Water Growth Servicing Plan

In March 2021 Sydney Water released a Growth Servicing Plan (GSP) which outlines the servicing strategy to support planned growth in Greater Sydney up to 2025. The GSP indicates that trunk infrastructure to support the Greater Macarthur Region is in the strategic planning phase, with no planned date provided for infrastructure delivery.

5.3 Proposed Network

A high-level assessment was undertaken using the Water Supply Code of Australia (WSA) to determine the infrastructure requirements to support the proposed development. This involved calculating the peak hourly demand to estimate the likely trunk main size required.

The maximum water demand rates were extracted from the WSA. These rates were used to determine the peak hour demand for each land use type. The results of the assessment are provided in Table 9.

Table 9 - Proposed Water Demand Calculations

Land Use	Dwellings	Max Day Demand Rate (kL/Dwelling/day)	Max Day Demand (kL/day)	Peak Hour Demand (kL/hour)	Peak Demand (L/s)
Apartment Precinct	1,250	0.8	1,000.0	83.3	23.15
Total	**1,250**		**1,000.0**	**83.3**	**23.15**

Based on the above assessment and assuming a target velocity of 1.0-1.5m/s, a minimum 150mm diameter watermain would be required to support the proposed development. This could be provided as a single 150mm main or through a series of smaller mains.

As discussed in Section 5.1, the site will likely be supplied via the 250mm trunk main located in Goldsmith Avenue. New water mains will be constructed within the standard trench allocation in the road reserve of all new roads within the site boundary. Each lot in the subdivision will have frontage to a drinking water main, with new mains to be constructed across the full road frontage of each lot as part of the proposed development.

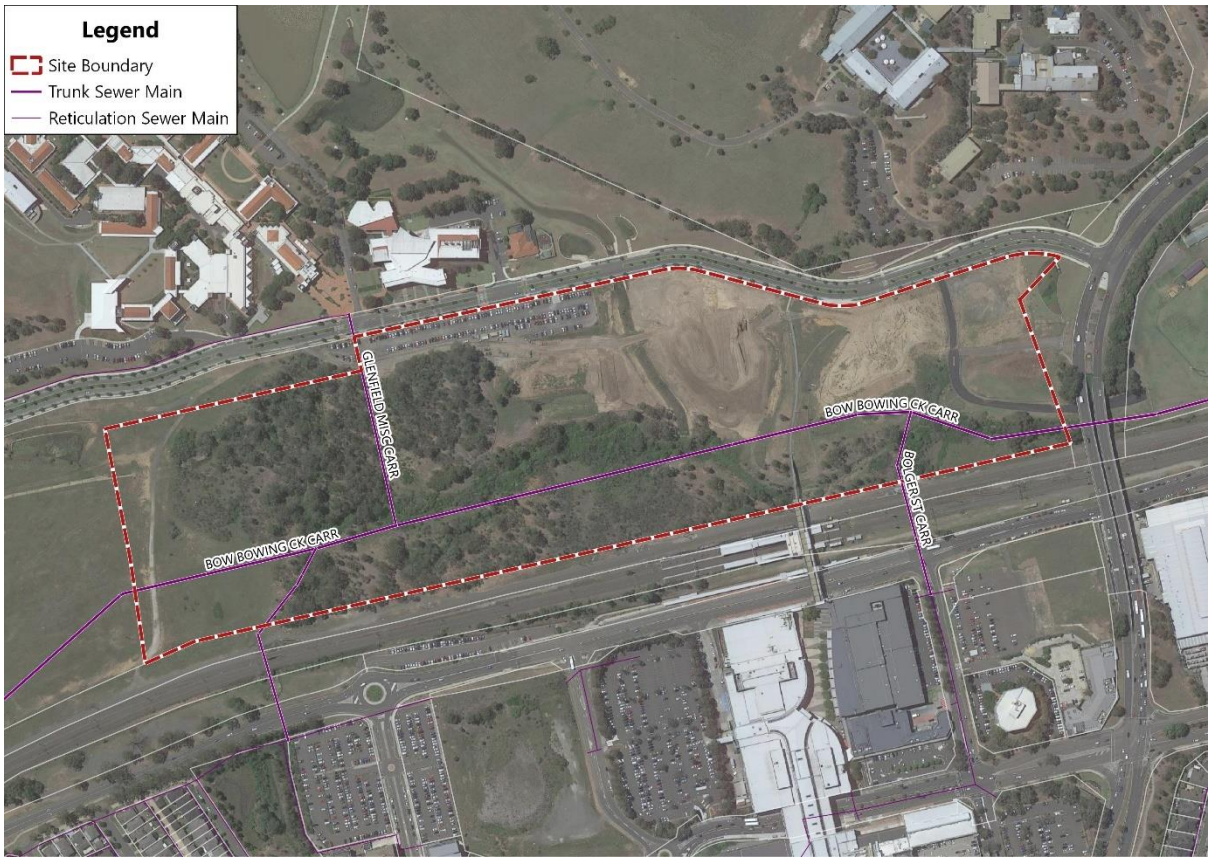
Once the Development Application (DA) has been lodged and a DA number provided, a Section 73 Compliance Certificate will be lodged with Sydney Water to obtain a formal Anticipated Notice of Requirements for the development.

6 Sewer

6.1 Existing Network

The site is currently serviced by the Sydney Water sewer network. The Bow Bowing Creek carrier is a 750mm diameter trunk sewer main which bisects the site in an east-west direction. The Bow Bowing Creek carrier drains to the Glenfield Campbelltown Submain, located at the intersection of the rail corridor and Narellan Road. It is anticipated all future development of the site will utilise the Bow Bowing Creek carrier main for sewer servicing. The existing sewer mains within the vicinity of the site are shown in Figure 7.

Figure 7 - Existing Sewer Network



6.2 Sydney Water Growth Servicing Plan

In March 2021 Sydney Water released a Growth Servicing Plan (GSP) which outlines the servicing strategy to support planned growth in Greater Sydney up to 2025. The GSP indicates that trunk infrastructure to support the Greater Macarthur Region is in the strategic planning phase, with no planned date provided for infrastructure delivery.

6.3 Proposed Network

As discussed in Section 6.1, the Bow Bowing Carrier is located within the site boundary, adjacent the creek corridor. Future development will drain directly to this main.

The trunk main has an associated zone of influence of approximately 12m. The proposed development layout has been located to minimise the impact on the existing main where feasible. The alignment of this infrastructure will be retained to ensure upstream properties do not experience disruptions to servicing.

A high-level assessment of the required infrastructure was undertaken using the Sewage Supply Code of Australia (SSA) to determine if the development can be serviced by the Bow Bowing Carrier. The load on the sewer network is expressed in Equivalent Population (EP). The EP for the proposed land uses were extracted from the SSA. For residential uses, EP is expressed as a rate per dwelling. The approximate total EP for the site was calculated using the EP rates tabulated below.

Table 10 - Calculated Equivalent Population

Land Use	EP Rate	Dwellings	Total EP
High Density Residential	2.5/Dwelling	1,250	3,125
Total		**1,250**	**3,125**

Based on the above, a total equivalent population of 3,125 is expected within the site. The site would require the equivalent of a 225mm diameter main to service the development in its entirety. As discussed above, the Bow Bowing Carrier is 750mm in diameter. It is likely that the development can be serviced by this main.

Within the site boundary, each lot within the development will have frontage to a sewer main that can be used for connection. Once the development application has been lodged and a DA number provided, a Section 73 compliance certificate will be lodged with Sydney Water to obtain a formal Anticipated Notice of Requirements for the development.

7 Electricity

7.1 Existing Network

The site is located within the Endeavour Energy electrical supply zone. The closest zone substation (ZS) to the site is the Campbelltown ZS, located on Narellan Road, approximately 450m north east of the site. A number of high voltage 11kV feeders are located within the vicinity of the site. Two feeders bisect the site in a north-south direction. Another feeder is located on the northern side of Goldsmith Avenue, adjacent the northern site boundary. The existing electrical infrastructure within the vicinity of the site is shown in Figure 8.

Figure 8 - Existing Electricity Network

7.2 Endeavour Energy Growth Servicing Plan

Endeavour Energy released a Growth Servicing Plan in 2018 which outlines the servicing strategy to support planned growth across Greater Sydney. Over the four years to 2022, Endeavour Energy will invest $33 million on growth projects in the Greater Macarthur Priority Growth Area to ensure connection capacity is available for new developments.

7.3 Proposed Network

A high-level assessment was undertaken to determine the electrical servicing requirements for the site. The electrical demand was calculated using electrical demand rates provided by Endeavour Energy. The results are tabulated below.

Land Use	Dwellings	After Diversity Maximum Demand (kVA/unit)	Diversified Load (MVA)
Apartments	1,250	3.5	4.38
Total			**4.38**

Based on the assumption that a single 11kV feeder can supply approximately 4-5MVA, the proposed Macarthur Gardens North site would require one 11kV feeder to support the proposed development.

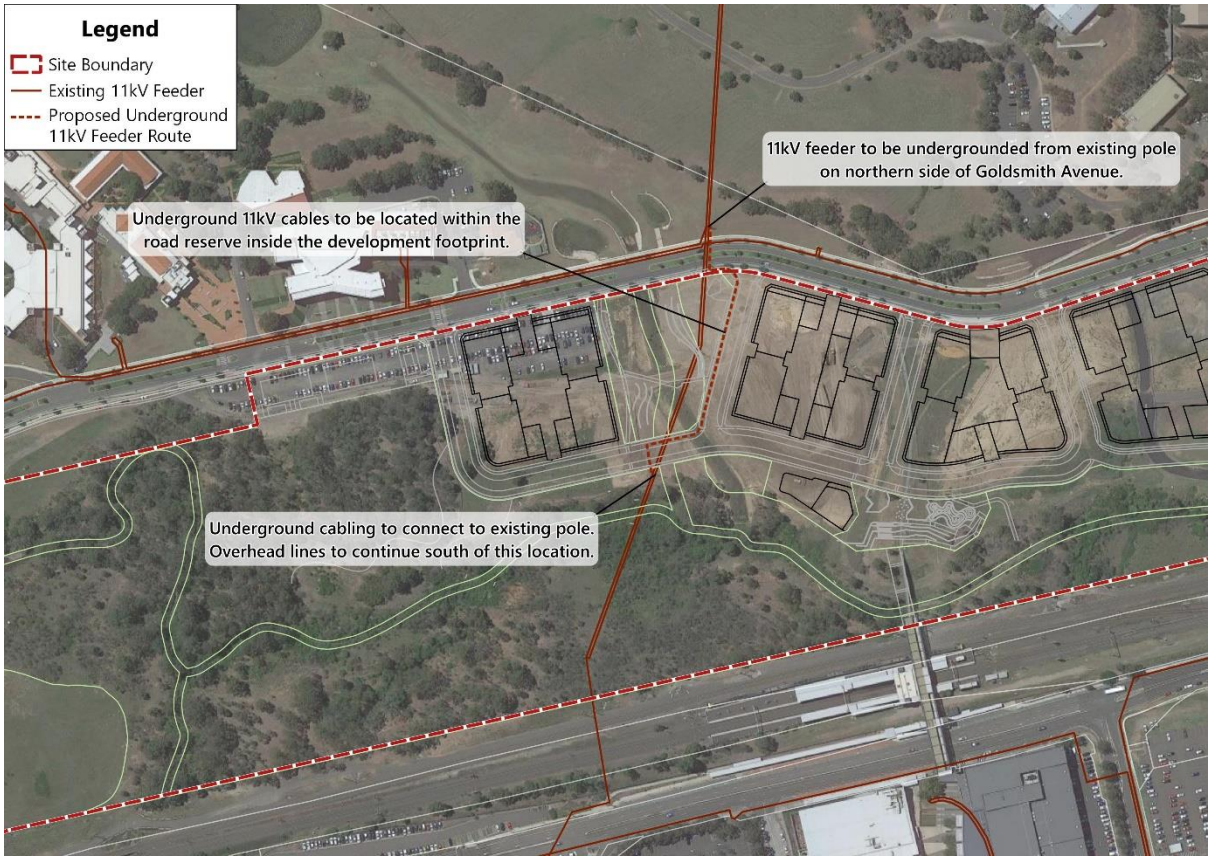
The Campbelltown ZS is forecast to have residual capacity of 18.9 MVA in 2025. Based on this assumption, there is sufficient residual capacity to support the proposed development.

It should be noted that spare capacity cannot be reserved for developments and connection applications are assessed as they are received. However, given the significant investment in infrastructure across the Greater Macarthur Growth Area, it is likely that capacity will be available to support the development.

Based on the previous assessment for the site undertaken by Arcadis in 2018, it is understood that the existing 11kV feeders within the vicinity of the site have limited capacity. A new feeder will therefore be required to support the development and will be constructed from the Campbelltown ZS to the site.

The feeders which bisect the site will be relocated underground within the development footprint to suit the proposed road layout. These services will need to be maintained as they supply the adjacent site. The proposed area of relocation works is indicatively shown in Figure 9.

Figure 9 – Proposed Electrical Relocation Works



Existing redundant assets fronting the site are to be removed in accordance with Endeavour Energy requirements. Once the Development Application has been lodged an Application for Connection of Load will be submitted and a Level 3 ASP will be engaged to provide an electrical design to Endeavour Energy in the form of a Proposed Method of Supply.

8 Telecommunications

8.1 NBN

The site is currently serviced by NBN Co. fixed line technology. Existing NBN Co. infrastructure is located on the northern side of Goldsmith Avenue.

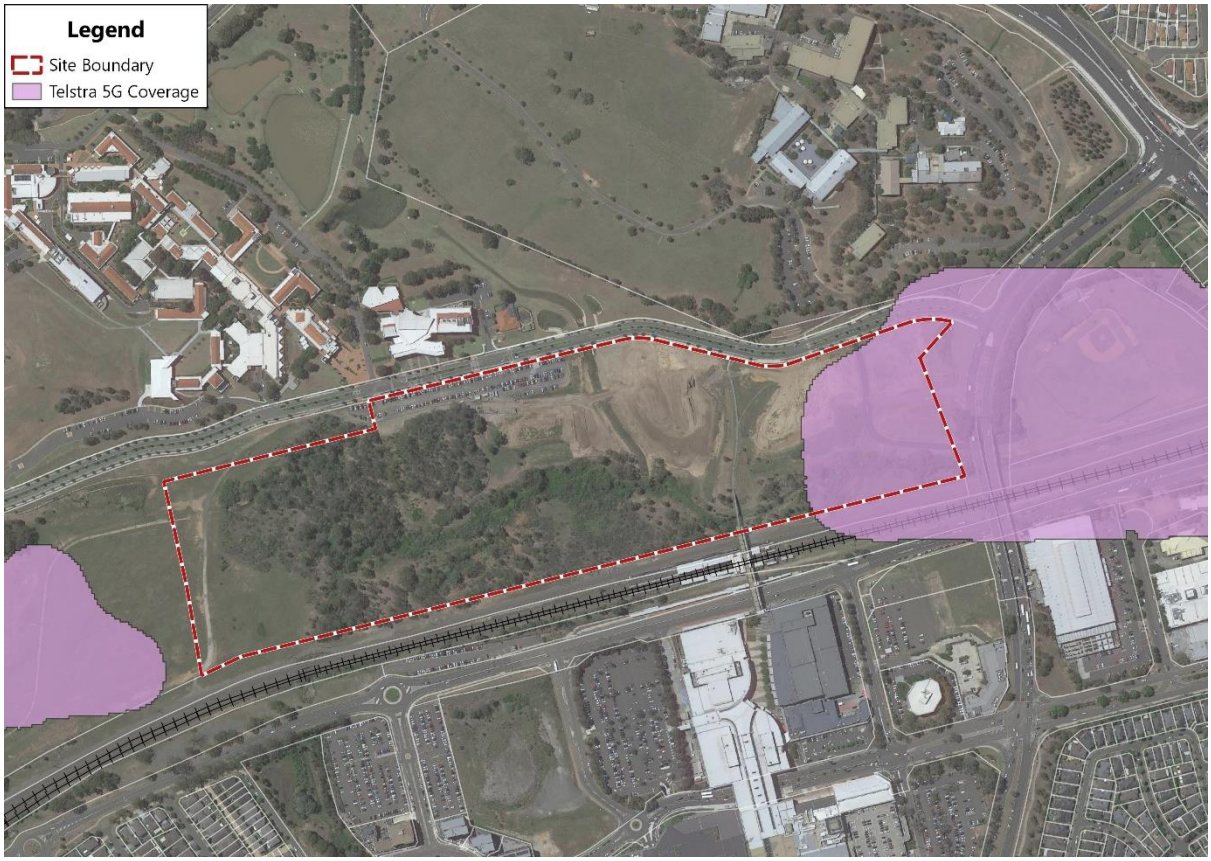
NBN Co. policy requires developers to provide pit and pipe infrastructure within the road reserve for all subdivisions. NBN assess each application request separately to negotiate commercial terms, however connection fees of up to $400 may apply to multi dwelling units. Please note this charge is subject to change.

8.2 Telstra 5G Network

Telstra have blanket handheld 4G coverage across the site. Rollout of Telstra's 5G network has commenced across the Greater Macarthur Growth Area. Parts of the site can already access 5G coverage, near the eastern boundary. It is expected that 5G network coverage will extend across the whole site over the coming years. The existing 5G network coverage is shown in

The provision of telecommunications infrastructure is not expected to pose a constraint to development.

Figure 10 - Telstra 5G Coverage



9 Gas

Gas is supplied to the area by Jemena. A high pressure secondary gas main (1050kPa) traverses the western side of Gilchrist Drive and terminates at a Distribution Regulator Set located inside the eastern site boundary. From the Distributor Regulator Set, a medium pressure network main (210kPa) extends along the northern side of Goldsmith Avenue.

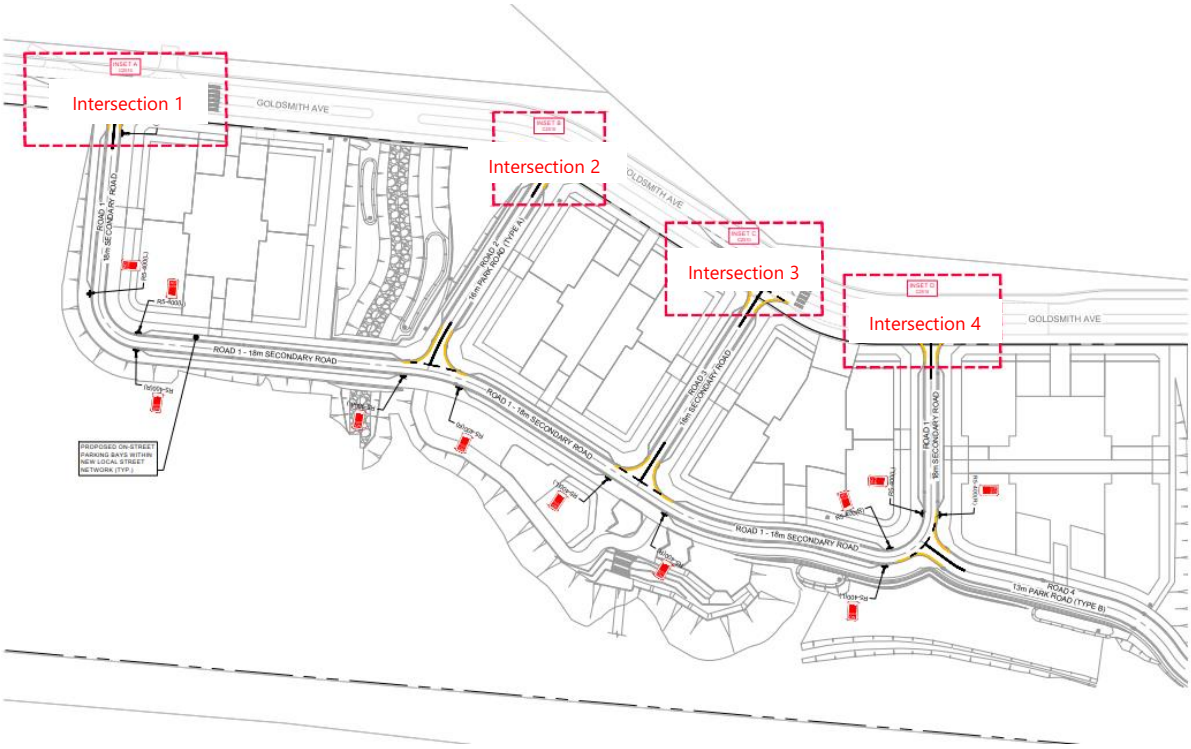
The existing network is likely to have sufficient capacity to supply the proposed development. The provision of gas supply is not expected to pose a constraint to development.

10 Road Network

As part of the proposal, a new local road network is to be constructed to link the site to Goldsmith Avenue and provide vehicle access to each of the individual residential lots within the precinct. Access is to be provided via four (4) new priority intersection to treatments with Goldsmith Avenue as shown in Figure 11.

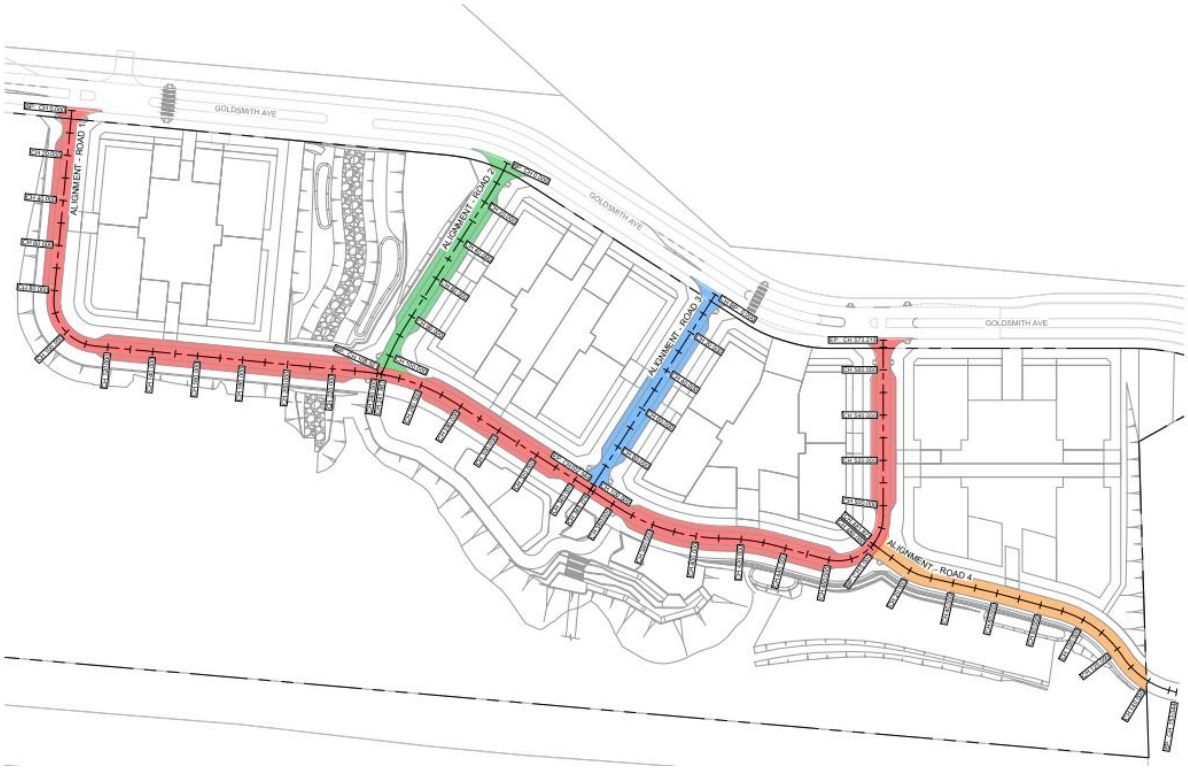
- Intersection 1 – All vehicle movements
- Intersection 2 – Left in/left out only
- Intersection 3 – All vehicle movements
- Intersection 4 – Signalised intersection

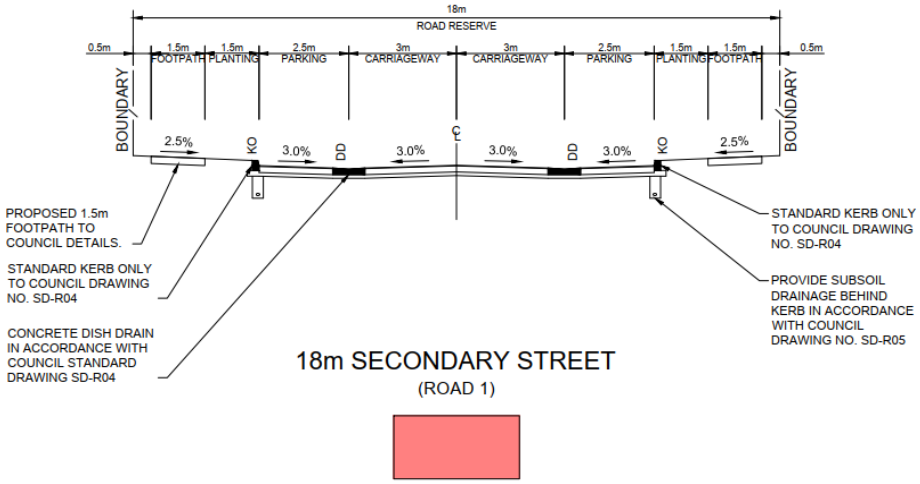
Figure 11 - Proposed Intersection Layout

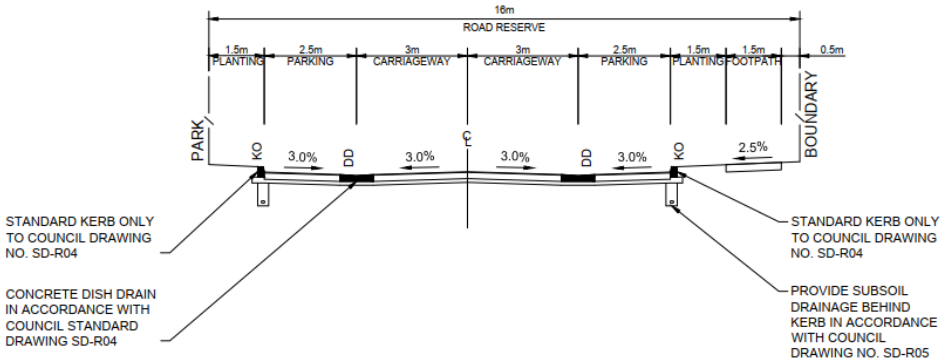


The proposed internal road network layout consists of four north-south local streets off Goldsmith Avenue as well as an east-west road along the southern boundary with Bow-Bowing Creek. The hierarchy of these roads can be split into either an 18m Secondary Street, 18m Main Street, or a 16m Green Street (see Figure 12 below for reference), with the proposed cross-sections for each road based generally on Council Guidelines. There is also to be a new 13m local perimeter road that will provide a vehicle link through to Gilchrist Oval to the east of the proposed site. Similarly, we note that provision for on-street parking is to be provided on all internal roads within the MGN site in accordance with Council requirements.

Figure 12 - Proposed Road Hierarchy

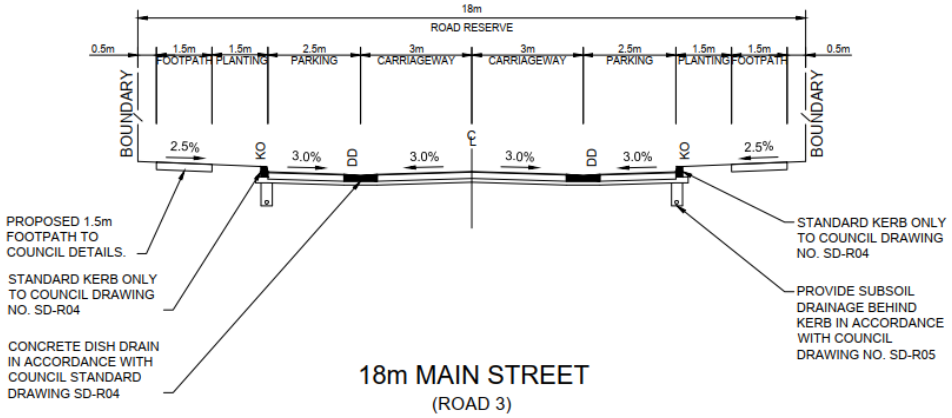






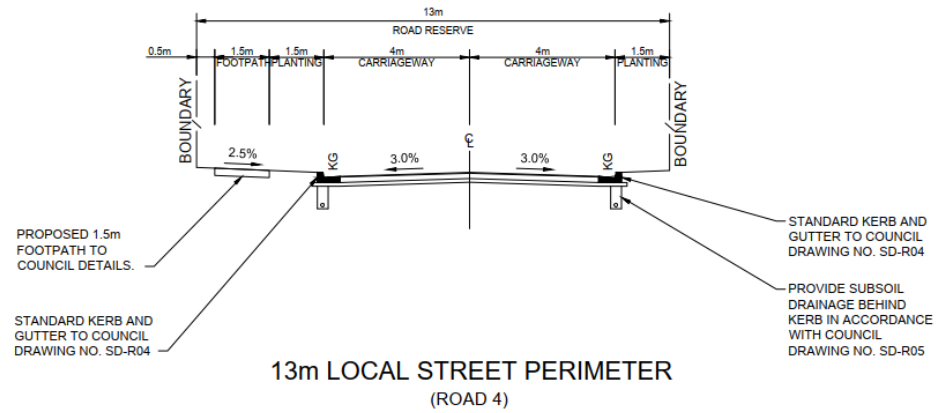
16m SECONDARY GREEN STREET

(ROAD 2)



18m MAIN STREET

(ROAD 3)



13m LOCAL STREET PERIMETER

(ROAD 4)

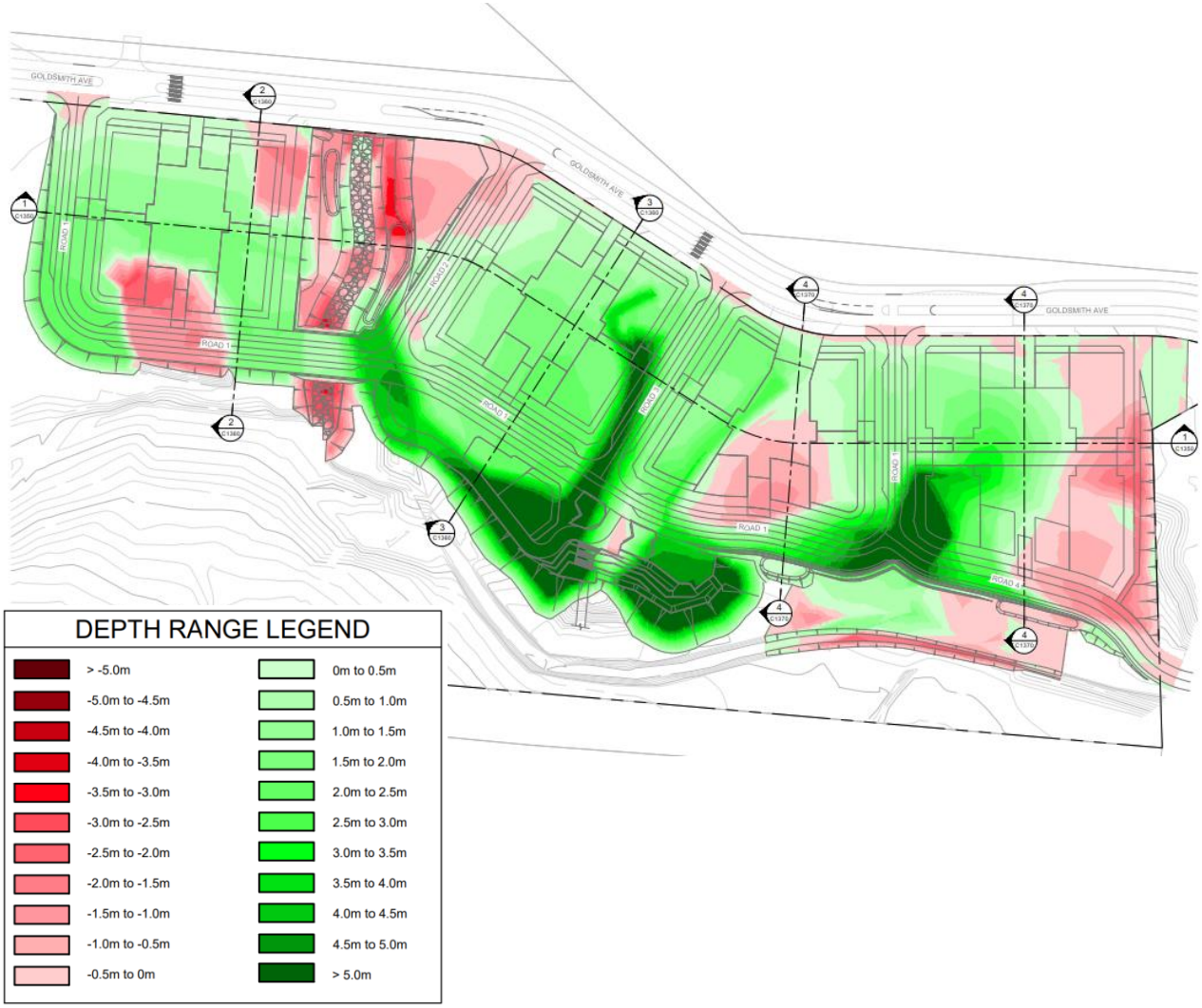
11 Earthworks

Preliminary assessment of the site indicates that import of fill will be required to both:

a) ensure that the proposed lot areas are situated above the 100yr ARI flood extents in accordance with Council requirements; and
b) allow for level pedestrian access and egress to Macarthur Train Station which is situated immediately to the south of the MGN site. We note that the site is to be linked to the train station via a new pedestrian walkway which is to be constructed over Bow Bowing Creek and connect to the Station concourse.

Initial review based on the current Masterplan Lot Layout indicates that approximately 83,700m^3 of fill will need to be imported to the site to suit (refer to IDC Drawing 19-036-DA-C1300 for details).

Figure 13 - Concept Earthworks Extents



12 Conclusion

Following initial review of the existing utilities and local infrastructure, it is evident that opportunities exist to adequately service the proposed development.

Detailed requirements from the relevant service providers will be obtained as the project progresses and incorporated into the relevant design documentation for service authority approval prior to Subdivision Certificate.

APPENDIX B

Civil Engineering Drawings

MACARTHUR GARDEN NORTH
R3 AFFORDABLE HOUSING
SSD-80482713

LOCALITY PLAN
SOURCE: NEARMAPS - 07.17.2024
NOT TO SCALE

Sheet List Table	
Sheet Number	Sheet Title
C00000	COVER SHEET
C00001	GENERAL NOTES
C01101	EARTHWORKS PLAN
C01201	EARTHWORKS SECTIONS - SHEET 1
C01202	EARTHWORKS SECTIONS - SHEET 2
C12001	SEDIMENT & EROSION CONTROL PLAN
C12101	SEDIMENT & EROSION CONTROL DETAILS
C15001	STORMWATER MANAGEMENT PLAN - BASEMENT
C15002	STORMWATER MANAGEMENT PLAN - GROUND FLOOR
C12001	CATCHMENT PLAN
C19001	TYPICAL DETAILS

PRINTING NOTE:
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FOR APPROVAL

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Rev	Description	Eng	Draft	Date
1	FOR APPROVAL	EL	EL	24.07.2025

Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT

T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

Project
MACARTHUR GARDENS AFFORDABLE HOUSING PROJECT
SITE R3, MACARTHUR GARDENS, NORTH CAMPBELLTOWN NSW 2560

Sheet Subject
COVER SHEET

Scale at A1	Drawn	Approved
NTS	EL	FC
Job No	**Drawing No**	**Revision**
241206	C00000	1

GENERAL

1. ALL DIMENSIONS SHOWN ON THE DRAWINGS ARE IN MILLIMETERS AND ALL LEVELS ARE IN METRES (U.N.O.).
2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ALL DISCREPANCIES SHALL BE REFERRED TO THE ARCHITECT AND ENGINEER BEFORE PROCEEDING WITH THE WORK.
3. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING OF THESE DRAWINGS. USE FIGURED DIMENSIONS ONLY.
4. SETTING OUT DIMENSIONS AND LEVELS SHOWN ON THE DRAWINGS SHALL BE VERIFIED BY THE CONTRACTOR.
5. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE CURRENT EDITIONS, INCLUDING AMENDMENTS OF THE RELEVANT STANDARDS AND CODES OF PRACTICE EXCEPT AS VARIED BY THE CONTRACT DOCUMENTS AND THE LAWS AND REQUIREMENTS OF THE STATUTORY AUTHORITIES.
6. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH ALL THE WORKCOVER REQUIREMENTS AND OCCUPATIONAL HEATH AND SAFETY ACT REGULATIONS
7. WHERE THE ENGINEERS ARE ENGAGED FOR INSPECTIONS AND/OR SUPERVISION A MINIMUM OF 24 HOURS NOTICE SHALL BE GIVEN.
8. DURING CONSTRUCTION, THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVER-STRESSED. TEMPORARY STRUCTURES, FORMWORK, FALSEWORK, TEMPORARY BRACING, SHORING AND THE LIKE SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
9. CONSTRUCTION USING THESE DRAWINGS SHALL NOT COMMENCE UNTIL A CONSTRUCTION CERTIFICATE IS ISSUED BY THE PRINCIPAL CERTIFYING AUTHORITY

GEOTECHNICAL REFERENCES:

1. *FOR GEOTECHNICAL REFERENCES REFER TO THE FOLLOWING DOCUMENTS:*
   a) *"REPORT ON PRELIMINARY GEOTECHNICAL ASSESSMENT", PROJECT NO.34255.39 BY DOUGLAS PARTNERS DATED 06 JUNE 2035*

GROUND PREPARATION:

1. EXCAVATION AND GROUND PREPARATION SHALL BE CARRIED OUT IN ACCORDANCE WITH THE SPECIFICATION FOLLOWING THE RECOMMENDATIONS OF THE GEOTECHNICAL REFERENCES AND ANY ADDITIONAL INSTRUCTIONS THAT MAY BE PROVIDED BY A GEOTECHNICAL ENGINEER DURING THE COURSE OF THE PROJECT.

STORMWATER DRAINAGE

1. SELECTION AND INSTALLATION OF PITS, PIPES, TANKS AND TRENCHES SHALL BE IN ACCORDANCE WITH THE CURRENT EDITION OF AS/NZS3500, LOCAL AND STATUTORY REQUIREMENTS (U.N.O.)
2. THE CONTRACTOR SHALL IDENTIFY AND LOCATE ALL SERVICES PRIOR TO COMMENCEMENT OF CONSTRUCTION.
3. SEDIMENT AND EROSION CONTROLS TO BE PROVIDED IN ACCORDANCE WITH ALL LOCAL AND STATUTORY REGULATIONS.
4. WHERE REQUIRED, STORMWATER EASEMENTS SHALL BE OBTAINED BY THE OWNER. ALL NEGOTIATIONS/COMPENSATION PAYMENTS AND THE INTEGRATION OF ANY EASEMENTS INTO THE TITLE DOCUMENTS SHALL BE BY THE OWNER UNLESS AGREED OTHERWISE.
5. REFER TO ARCHITECT FOR BUILDING AND DRIVEWAY SETOUT.
6. PIPE POSITIONS ARE INDICATIVE ONLY. FINAL POSITIONS TO BE DETERMINED ON-SITE AND SHALL CONFORM WITH THE INTENT OF THE DESIGN.
7. THE ENGINEER SHALL BE ADVISED IF ANY EXISTING STRUCTURES ARE WITHIN THE ZONE OF INFLUENCE OF AN EXCAVATION. ANY REQUIRED UNDER-PINNING OR PIERING SHALL BE PROVIDED.
8. WHERE EXCAVATING ADJACENT TO BOUNDARIES, ADEQUATE SHORING SHALL BE PROVIDED.
9. THE CONTRACTOR SHALL ENSURE THAT ALL NEW STRUCTURES ARE FOUNDED BELOW THE ZONE OF INFLUENCE OF ANY EXCAVATIONS WHETHER THEY BE FOR PIPELINES, TANKS OR OTHER DRAINAGE FACILITIES.
10. UNLESS NOTED OTHERWISE, THE MAXIMUM DEVIATION FROM NOMINATED LEVELS SHALL BE ±10mm, EXCEPT IN INSTANCES WHERE SUCH A DEVIATION COULD HAVE ADVERSE EFFECTS, IN WHICH CASE THE ENGINEER SHALL BE CONSULTED.
11. LOAD CLASS FOR COVERS/GRATES SHALL BE IN ACCORDANCE WITH AS3996 - 2019. COMMON CASES ARE SUMMARISED IN THE FOLLOWING TABLE:-

CLASS	LOADING	DESCRIPTION
A	10kn	INACCESSIBLE TO VEHICLES, PEDESTRIAN TRAFFIC ONLY
B	80kn	FOR USE ON FOOTWAYS WHERE IT IS POSSIBLE FOR LIGHT VEHICLES OR LIVESTOCK TO USE THE PEDESTRIAN FACILITY
C	150kn	FOR USE IN PEDESTRIAN ACCESS INCLUDING OCCASIONAL MOTOR VEHICLES WITH WHEEL LOADS NOT EXCEEDING 3.7 TONNES OR FOR USE IN MINOR RESIDENTIAL ROADS & CUL-DE-SACS CARRYING SLOW MOVING COMMERCIAL VEHICLES (GENERATING NO IMPACT LOADING) WHERE WHEEL LOADS WILL NOT EXCEED 7.5 TONNES
D	210kn	FOR USE IN CARRIAGEWAYS OF ROADS WHICH CARRY FAST MOVING HEAVY VEHICLES WITH WHEEL LOADS NOT EXCEEDING 5.2 TONNES OR FOR USE IN AREAS TRAFFICKED BY SLOW MOVING HEAVY VEHICLES WITH WHEEL LOADS NOT EXCEEDING 10.5 TONNES

13. UNTIL COMPLETION OF ALL WORKS, THE CONTRACTOR SHALL FIRSTLY FILTER ALL STORMWATER IN ACCORDANCE WITH APPROVED DETAILS TO ENSURE THE REMOVAL OF ALL CONCRETE AND PLASTERING FINES, AND OTHER BUILDING SITE POLLUTANTS.
14. THE CONTRACTOR SHALL SEEK DIRECTION BEFORE COMMENCING ANY EXCAVATION THAT MAY RESULT IN DAMAGE TO ANY EXISTING TREES.
15. RETAINING STRUCTURES SHALL BE PROVIDED AS REQUIRED IN ORDER TO ACHIEVE THE LEVELS NOMINATED ON THE DRAWINGS. THESE STRUCTURES SHALL COMPLY WITH ALL LOCAL AND STATUTORY REGULATIONS, AND MAY REQUIRE DESIGN BY AN ENGINEER.
16. UNLESS NOTED OTHERWISE, WHERE A PIT INVERT IS BELOW THE INVERT OF THE LOWEST OUTLET PIPE, THE CONTRACTOR SHALL EITHER PROVIDE DRAINAGE HOLES IN THE BASE OF THE PIT OR ELSE FILL THE BASE OF THE PIT WITH MASS CONCRETE TO THE INVERT OF THE LOWEST OUTLET PIPE.
17. WHERE REQUIRED BY REGULATIONS, STEP IRONS IN ACCORDANCE WITH AS1657 SHALL BE INSTALLED IN DEEP PITS/TANKS TO ALLOW ACCESS FOR MAINTENANCE. PIT COVERS OVER DEEP PITS SHALL BE 'CHILD-PROOFED' BY BOLTING THEM DOWN, EXCEPT WHERE THE COVER WEIGHS OVER 30kg.
18. ALL IMPERVIOUS SURFACES SHALL BE GRADED SUCH THAT THEY ARE FREE DRAINING.
19. YARD PITS SHALL BE PROVIDED AS REQUIRED. YARDS SHALL BE GRADED TO FALL TO PITS UNLESS INDICATED OTHERWISE (eg. BY DESIGN CONTOURS, SPOT LEVELS OR A NOTE).

PRINTING NOTE:
THIS DRAWING TO BE PRINTED IN COLOUR.

STORMWATER DRAINAGE CONTINUED

20. WHERE REQUIRED BY THE PRINCIPAL CERTIFIER, WORK-AS-EXECUTED DETAILS SHALL BE PREPARED BY A REGISTERED SURVEYOR/CHARTERED PROFESSIONAL ENGINEER VERIFYING THAT THE DRAINAGE SYSTEM HAS BEEN CONSTRUCTED IN ACCORDANCE WITH THE DRAWINGS. ANY DEVIATIONS FROM THE APPROVED PLANS SHALL BE NOTED AND BROUGHT TO THE ATTENTION OF THE ENGINEER. ADEQUATE INSPECTIONS SHOULD BE CARRIED OUT DURING THE COURSE OF CONSTRUCTION.
21. WHERE AN ENGINEER'S CERTIFICATE WILL BE REQUIRED, THE ENGINEER SHALL BE CALLED ON TO INSPECT THE WORKS PRIOR TO ANY CONCRETE POURS, PRIOR TO BACKFILLING AROUND ANY TANKS, AND AT THE COMPLETION OF WORKS. THE ENGINEER SHALL BE GIVEN A MINIMUM OF 24 HOURS NOTICE BEFORE AN INSPECTION IS REQUIRED.
22. ANY PROPOSED ALTERATIONS TO THE DETAILS SHOWN ON THE DRAWINGS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
23. LEAF SCREENS, SILT CONTROLS AND ANY OTHER POLLUTANT CONTROL DEVICES SHALL BE REGULARLY SERVICED TO ENSURE THAT THE DRAINAGE SYSTEM REMAINS UNBLOCKED AND OPERATES AS ORIGINALLY INTENDED.
24. OVERLAND FLOW PATHS SHALL BE REGULARLY MAINTAINED AND KEPT FREE OF OBSTRUCTIONS TO THE FLOW OF WATER.
25. SUBSOIL DRAINAGE LINES SHALL BE PROVIDED BEHIND RETAINING WALLS AND OTHER AREAS AS REQUIRED TO RELIEVE HYDROSTATIC PRESSURE AND DRAIN GROUND WATERS. CONNECT INTO THE DRAINAGE SYSTEM IN SUCH A WAY AS TO AVOID BACKFLOW OF STORMWATER INTO THE SUBSOIL DRAINAGE LINE. IF IN DOUBT REFER TO ENGINEER.
26. NEW FENCES, RETAINING WALLS AND OTHER LANDSCAPING ITEMS SHALL BE DETAILED IN SUCH A WAY SO AS TO AVOID IMPOUNDING OR DIVERTING SURFACE WATERS ON TO ADJOINING PROPERTIES.
27. UPON COMPLETION, PIPE/PIT EXCAVATIONS SHALL BE BACKFILLED WITH SUITABLE COMPACTED MATERIAL IN ACCORDANCE WITH NOTES BELOW.
28. ALL PVC PIPES ARE TO BE:-
a. SEWER GRADE (U.N.O.)
b. INSTALLED AND BACKFILLED IN ACCORDANCE WITH AS2566.1
29. ALL CONCRETE PIPES ARE TO BE:-
a. STRENGTH LOAD CLASS 4 (U.N.O.)
b. INSTALLED AND BACKFILLED IN ACCORDANCE WITH AS3725 WITH CLASS H2 BEDDING SUPPORT.
30. ALL PIPES ARE TO BE INSTALLED WITH 450mm MINIMUM COVER (U.N.O.). WHERE ADEQUATE COVER CANNOT BE PROVIDED PIPES SHALL BE ENCASED IN CONCRETE, REFER TO ENGINEER FOR DETAILS.
31. THE CONTRACTOR SHALL ADEQUATELY SHIELD PIPES AGAINST CONSTRUCTION AND PERMANENT LOADS.
32. PIPES HAVE BEEN DESIGNED TO WITHSTAND SM1600 TRAFFIC LOADING IN ACCORDANCE WITH AS5100

EXISTING SERVICES

1. UTILITY INFORMATION SHOWN ON THE PLANS IS NOT INTENDED TO DEPICT MORE THAN THE PRESENCE OF ANY SERVICES. ACTUAL LOCATIONS SHOULD BE VERIFIED BY HAND EXCAVATION PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF ALL EXISTING SERVICES IN AREAS AFFECTED BY THE WORKS.
3. THE CONTRACTOR SHALL ENSURE THAT SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED AT ALL TIMES. THE CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN EXISTING SUPPLY TO BUILDINGS REMAINING WHERE REQUIRED. ONCE THE WORKS ARE COMPLETE AND COMMISSIONED THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD ALL DISTURBED AREAS.

EROSION CONTROL

1. TEMPORARY PROTECTION FROM WIND AND WATER EROSION WILL BE UNDERTAKEN ON LANDS WHERE WORKS ARE UNLIKELY TO PROCEED FOR PERIODS OF AT LEAST TWO MONTHS AND FINAL SHAPING HAS NOT BEEN COMPLETED (eg. TOPSOIL STOCKPILES), THIS MAY BE ACHIEVED WITH A VEGETATIVE COVER. A RECOMMENDED LISTING OF PLANT SPECIES FOR TEMPORARY COVER IS AS FOLLOWS:-
   SEPTEMBER - MARCH SOWING - JAPANESE MILLET @ 50 KG/HA
   APRIL - AUGUST SOWING - OATS/RYECORN @ 50 KG/HA
   - TETILA RYE @ 5 KG/HA
   FOOT AND VEHICULAR TRAFFIC SHOULD BE KEPT AWAY FROM ANY REHABILITATED AREAS WHERE PRACTICAL.
2. DURING WINDY WEATHER, LARGE, UNPROTECTED AREAS ARE TO BE KEPT MOIST (NOT WET) BY SPRINKLING WITH WATER FOR DUST CONTROL.
3. FINAL SITE LANDSCAPING WILL BE UNDERTAKEN ON EACH PRECINCT/AREA AS SOON AS POSSIBLE AND WITHIN 20 WORKING DAYS FROM COMPLETION OF CONSTRUCTION ACTIVITIES.

LAND DISTURBANCE

1. THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE AND PRACTICAL. TO THIS END, WORKS IS TO BE UNDERTAKEN IN THE FOLLOWING GENERAL SEQUENCE:-
   a) CONSTRUCTION OF SEDIMENT AND EROSION CONTROLS PRIOR TO ANY WORK COMMENCING.
   b) REHABILITATION OF ANY DISTURBED LANDS WITHIN 20 WORKING DAYS.
   c) UNDERTAKE SITE DEVELOPMENT WORKS IN ACCORDANCE WITH THE ENGINEERING PLANS. WHERE POSSIBLE, PHASE DEVELOPMENT SO THAT LAND DISTURBANCE IS CONFINED TO AREAS OF WORKABLE SIZE.
2. THE SITE MANAGER (PRINCIPAL CONTRACTOR) IS TO INFORM ALL CONTRACTORS AND SUBCONTRACTORS OF THEIR OBLIGATIONS UNDER THE EROSION AND SEDIMENT CONTROL PLAN.
3. TOPSOIL FROM ALL AREAS THAT WILL BE DISTURBED IS TO BE STRIPPED AND STOCKPILED AT THE NOMINATED LOCATION.
4. CUT AND FILL BATTER GRADIENTS TO BE 1 VERTICAL (MAX) : 2 HORIZONTAL (MIN).

INSPECTION AND MAINTENANCE:

1. THE SITE MANAGER (PRINCIPAL CONTRACTOR) WILL ENSURE THAT ALL SEDIMENT AND EROSION CONTROL WORKS ARE LOCATED AS INSTRUCTED IN THIS SPECIFICATION OR IN ANY SUBSEQUENT SITE INSTRUCTION
2. ALL BUILDERS AND SUB-CONTRACTORS SHALL BE INFORMED OF THEIR RESPONSIBILITIES BY THE SITE MANAGER (PRINCIPAL CONTRACTOR) IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS.
3. RECEPTORS FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER ARE TO BE EMPTIED AS NECESSARY. DISPOSAL OF WASTE SHALL BE IN A MANNER APPROVED BY THE SITE SUPERINTENDENT AND GENERALLY OFF SITE.
4. AT LEAST WEEKLY, THE CONTRACTOR SHALL INSPECT THE SITE AND ENSURE THAT:-
   a) DRAINS OPERATE EFFECTIVELY AND INITIATE REPAIR OR MAINTENANCE AS REQUIRED.
   b) SPILLED SOIL (OR OTHER MATERIAL) IS REMOVED FROM HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS, GUTTERS, PAVED AREAS AND DRIVEWAYS.
   c) SEDIMENT IS REMOVED FROM BASINS AND/OR TRAPS WHEN LESS THAN 20m OF TRAPPING CAPACITY REMAIN PER 1000m OF DISTURBED LANDS, AND/OR LESS THAN 500mm DEPTH REMAINS IN THE SETTLING ZONE. ANY COLLECTED SEDIMENT WILL BE DISPOSED IN AREAS WHERE FURTHER POLLUTION TO DOWNSLOPE LANDS AND WATERWAYS IS UNLIKELY.
   d) REHABILITATED LANDS HAVE EFFECTIVELY REDUCED THE EROSION HAZARD AND INITIATE UPGRADING OR REPAIRS AS APPROPRIATE.
5. THE CONTRACTOR SHALL PROVIDE A DETAILED 'LOG BOOK' RECORDING INFORMATION & DATA WITH RESPECT TO THE SEDIMENT & EROSION CONTROL PLAN AND TO ENSURE SEDIMENT CONTROL DEVICES ARE FUNCTIONING PROPERLY. THIS IS TO BE KEPT ON SITE AT ALL TIMES AND UPDATED DAILY. INFORMATION RECORDED MUST INCLUDE:-
   a) RAINFALL EVENTS
   b) RAINFALL IN MILLIMETRES
   c) RESULTS OF ANY INSPECTIONS

SEDIMENT CONTROL

1. THE ARRANGEMENT OF SEDIMENT CONTROL MEASURES SHOWN ON THE PLAN ARE INDICATIVE ONLY AND RELATE TO A PARTICULAR STAGE OF THE CONSTRUCTION WORKS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO DESIGN, CONSTRUCT AND MAINTAIN ANY ADDITIONAL MEASURES THAT MAY BE REQUIRED FOR THE CONTRACTOR'S CONSTRUCTION METHODOLOGIES, IN ORDER TO MEET ALL CONDITIONS AND REQUIREMENTS IMPOSED BY ANY STATUTORY AUTHORITY.
2. ALL SEDIMENT CONTROL MEASURES ARE TO BE INSTALLED PRIOR TO ANY SITE DISTURBANCE.
3. STOCKPILES ARE NOT TO BE LOCATED WITHIN 2m OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS, PAVED AREAS AND DRIVEWAYS. WHERE THEY ARE BETWEEN 2m AND 5m FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION OF DOWNSLOPE WATERWAYS (eg. THROUGH INSTALLATION OF SEDIMENT FENCING).
4. WATER IS TO BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
5. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE.
6. A STRIP OF TURF 600mm WIDE IS TO BE PLACED IMMEDIATELY BEHIND THE KERB ON ALL NEW ROADS TO ACT AS A FILTER TRAP.
7. ALL EXPOSED FILL AREAS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS OPERATION.
8. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND MULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
9. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) IS TO BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS AFTER PLACEMENT.
10. TEMPORARY SEDIMENT AND EROSION CONTROL STRUCTURES ARE TO BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED AND WHEN REMOVAL IS APPROVED BY THE SITE SUPERINTENDENT.

UTILITIES

1. LOCATE ALL PIPES, DUCTS, CABLES, RETAINING WALLS AND EXCAVATIONS OUTSIDE A 1:2 (VERTICAL:HORIZONTAL) ZONE OF INFLUENCE FROM THE BOTTOM EDGE OF THE FOOTING.
2. THE CONTRACTOR MUST TAKE EVERY PRECAUTION TO PROTECT EXISTING GAS, WATER, STORMWATER, SEWERAGE, ELECTRICITY, TELEPHONE CONDUITS AND OTHER EXISTING WORKS AND SERVICES.
3. CIVIL WORKS REQUIRED TO PROTECT EXISTING SERVICES IS TO BE AT THE FULL COST OF THE CONTRACTOR.

PAVEMENTS

1. WHERE NEW WORKS ARE TO MATCH EXISTING, THE LEVELS GIVEN ARE APPROXIMATE ONLY. ALL NEW WORKS MUST NEATLY JOIN IN WITH EXISTING LEVELS.
2. PRIOR TO THE CONSTRUCTION OF NEW ROAD PAVEMENTS, THE SUBGRADE CBR SHALL BE CONFIRMED.
3. ADJUST SERVICE COVERS AS NECESSARY TO SUIT PROPOSED LEVELS PROVIDED ON ENGINEERING DRAWINGS.
4. ALL JUNCTIONS BETWEEN NEW AND EXISTING PAVEMENT/KERB AND GUTTER WORKS SHALL BE NEATLY SAW CUT.

EARTHWORKS

1. ALL TREES AND SHRUBS (UNLESS NOTED TO BE PROTECTED ON THE LANDSCAPE PLANS), RUBBLE, EXISTING PAVEMENT AND EXISTING STRUCTURES WITHIN THE SITE SHALL BE REMOVED AND REUSED OR RECYCLED WHERE POSSIBLE. WHERE NOT POSSIBLE, THIS MATERIAL SHALL BE REMOVED FROM SITE AND DISPOSED OF AS PART OF THE CONTRACT.
2. ANY TREES WITHIN THE WORKS AREA WHICH, IN THE OPINION OF THE CONTRACT ADMINISTRATOR, ARE UNSOUND OR WOULD CONSTITUTE A DANGER, SHALL BE CUT DOWN AND REMOVED (EXCEPT THOSE IDENTIFIED AS BEING PROTECTED). ALL STUMPS OF TREES CUT DOWN WITHIN THE BOUNDS OF THE CONSTRUCTION AREA WHICH ARE LARGER THAN 250mm IN GIRTH, SHALL BE COMPLETELY REMOVED.
3. ALL ROOTS SHALL BE REMOVED FOR A DEPTH OF 1m. CAVITIES FORMED BY THE REMOVAL OF ROOTS SHALL BE BACKFILLED AND COMPACTED.
4. AFTER CLEARING AND GRUBBING ARE COMPLETE, THE CONTRACTOR SHALL STRIP AND STOCKPILE TOPSOIL FROM THE CLEARED AREA (INCLUDING AREAS THAT HAVE BEEN CLEARED AND GRUBBED). REMOVAL OF TOPSOIL FROM ANY SECTION OF THE WORKS SHALL ONLY COMMENCE AFTER SEDIMENT AND EROSION CONTROLS HAVE BEEN IMPLEMENTED.
5. TOPSOIL SHALL BE STRIPPED FROM WITHIN THE FORMATION AREAS OF ROADS, PATHWAYS, BUILDING PADS AND MISCELLANEOUS PAVEMENTS, INCLUSIVE OF BATTERS, AND IS TO BE CONSERVED FOR THE TOP-DRESSING OF FORMED FOOTWAYS, BERMS AND BATTERS TO THE SPECIFIED DEPTH, OR WHERE NO DEPTH IS SPECIFIED TO A MINIMUM DEPTH OF 150mm, OR AS DETERMINED ON-SITE.
6. EXCAVATED FILL MATERIAL NOT SUITABLE FOR REUSE ON-SITE MUST BE REMOVED OFF-SITE OR OTHERWISE USED IN LANDSCAPING AREAS WHERE AGREED IN ADVANCE WITH ENGINEER.
7. EROSION AND SEDIMENT CONTROL MUST BE PROVIDED IN ACCORDANCE WITH THE REQUIREMENTS OF THE LOCAL CITY COUNCIL DCP, DA AND CC CONDITIONS, AND BE INSTALLED TO THE SATISFACTION OF THE ENGINEER.
8. THE CONTRACTOR SHALL TAKE ALL NECESSARY STEPS TO LIMIT THE CREATION OF DUST NUISANCE, WHICH MIGHT ARISE DURING THE EXECUTION OF THE WORKS.
9. FILL MATERIAL MUST BE PLACED IN MAXIMUM LAYERS OF 200mm (LOOSE) AND COMPACTED TO THE LEVELS AS SPECIFIED ON THE DRAWINGS.
10. COMPACTED FILL MUST BE TESTED IN ACCORDANCE WITH THE REQUIREMENTS OF AS3798 AND AS GIVEN IN THE CIVIL SPECIFICATION.
11. THE DESIGN CONTOURS AND LEVELS SHOWN ON THE EARTHWORKS DRAWINGS ARE THE FINISHED SURFACE LEVELS UNLESS NOTED OTHERWISE.
12. THE CONTRACTOR SHALL PROOF ROLL THE PREPARED SUBGRADE AND EXCAVATED SURFACES IN THE PRESENCE OF THE CONTRACT ADMINISTRATOR. PROOF ROLLING SHALL COMPRISE 6 PASSES OF A MINIMUM 12 TONNE DEADWEIGHT ROLLER. THE FINAL PASS IS TO BE WITNESSED BY A SUITABLY QUALIFIED GEOTECHNICAL ENGINEER. THERE SHALL BE NO VISIBLE DEFLECTION OF THE SURFACE BEING PROOF ROLLED.

KERBING

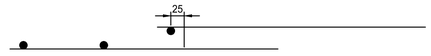
1. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON MINIMUM 75mm GRANULAR BASECOURSE COMPACTED TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS1289 5.2.1.
2. EXPANSION JOINTS (EJ) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILLER BOARD FOR FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
3. WEAKENED PLANE JOINTS TO BE MINIMUM 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
4. PROVIDE BROOM FINISH TO ALL RAMPS AND VEHICULAR CROSSINGS. ALL OTHER KERBS OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
5. WHERE REPLACEMENT OF EXISTING KERBING IS REQUIRED, ROAD PAVEMENT IS TO BE SAWCUT 900mm FROM LIP OF GUTTER. UPON COMPLETION OF NEW KERBS, NEW BASECOURSE AND SURFACE IS TO BE LAID 900mm WIDE. MAKE GOOD ANY DAMAGE TO SURROUNDING KERBING OR PAVEMENT. EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN.

REINFORCEMENT:

1. FIX REINFORCEMENT AS SHOWN ON THE DRAWINGS. THE TYPE AND GRADE IS INDICATED BY THE SYMBOL AS SHOWN BELOW ON THE DRAWINGS. THIS IS FOLLOWED BY A NUMERAL WHICH INDICATES A SIZE IN MILLIMETRES OF THE REINFORCEMENT.
   N - HOT-ROLLED DEFORMED BAR (GRADE D500N)
   R - PLAIN ROUND BAR (GRADE R250N)
   SL - SQUARE MESH (GRADE 500L)
   RL - RECTANGULAR MESH (GRADE 500L)
2. PROVIDE BAR SUPPORTS OR SPACERS TO GIVE CONCRETE COVER TO ALL REINFORCEMENT.
3. WELDING OF REINFORCEMENT WILL NOT BE PERMITTED UNLESS SHOWN ON THE STRUCTURAL DRAWINGS.
4. SPLICES IN REINFORCEMENT SHALL BE MADE ONLY IN THE POSITIONS SHOWN. THE WRITTEN APPROVAL OF THE ENGINEER SHALL BE OBTAINED FOR ANY OTHER SPLICES WHERE THE LAP LENGTH IS NOT SHOWN.
5. CLEAR CONCRETE COVER TO REINFORCEMENT IS AS FOLLOWS UNLESS SHOWN OTHERWISE ON THE DRAWINGS:

ELEMENT	BOTTOM (mm)	SIDES (mm)	TOP (mm)
ALL (U.N.O.)	40	40	40

6. COVER TO REINFORCEMENT ENDS TO BE 50mm (U.N.O.).
7. PROVIDE N12-450 SUPPORT BARS TO TOP REINFORCEMENT AS REQUIRED, LAP 450 (U.N.O.)
8. HOOKS, BENDS, SPLICES AND LAPS TO BE IN ACCORDANCE WITH AS3600.
9. AT SPLICES FABRIC SHALL BE LAPPED AS FOLLOWS:



10. LAPS IN REINFORCEMENT SHALL BE MADE ONLY WHERE SHOWN ON THE DRAWINGS UNLESS OTHERWISE APPROVED. LAP LENGTHS AS PER THE TABLE BELOW.

TENSION LAPS			COMPRESSION LAPS
BAR SIZE	TOP BARS IN BANDS & BEAMS	ALL OTHER BARS	
N12	570	480	450
N16	800	700	640
N20	1150	950	800
N24	1500	1250	960
N28	1850	1500	1120
N32	2250	1800	1280
N36	2700	2100	1440

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NOT TO BE USED FOR CONSTRUCTION

FOR APPROVAL

A1 0 2 4 6 8 10 12 14 16 18 20 1:200

Rev	Description	Eng	Draft	Date
1	FOR APPROVAL	EL	EL	24.07.2025

Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

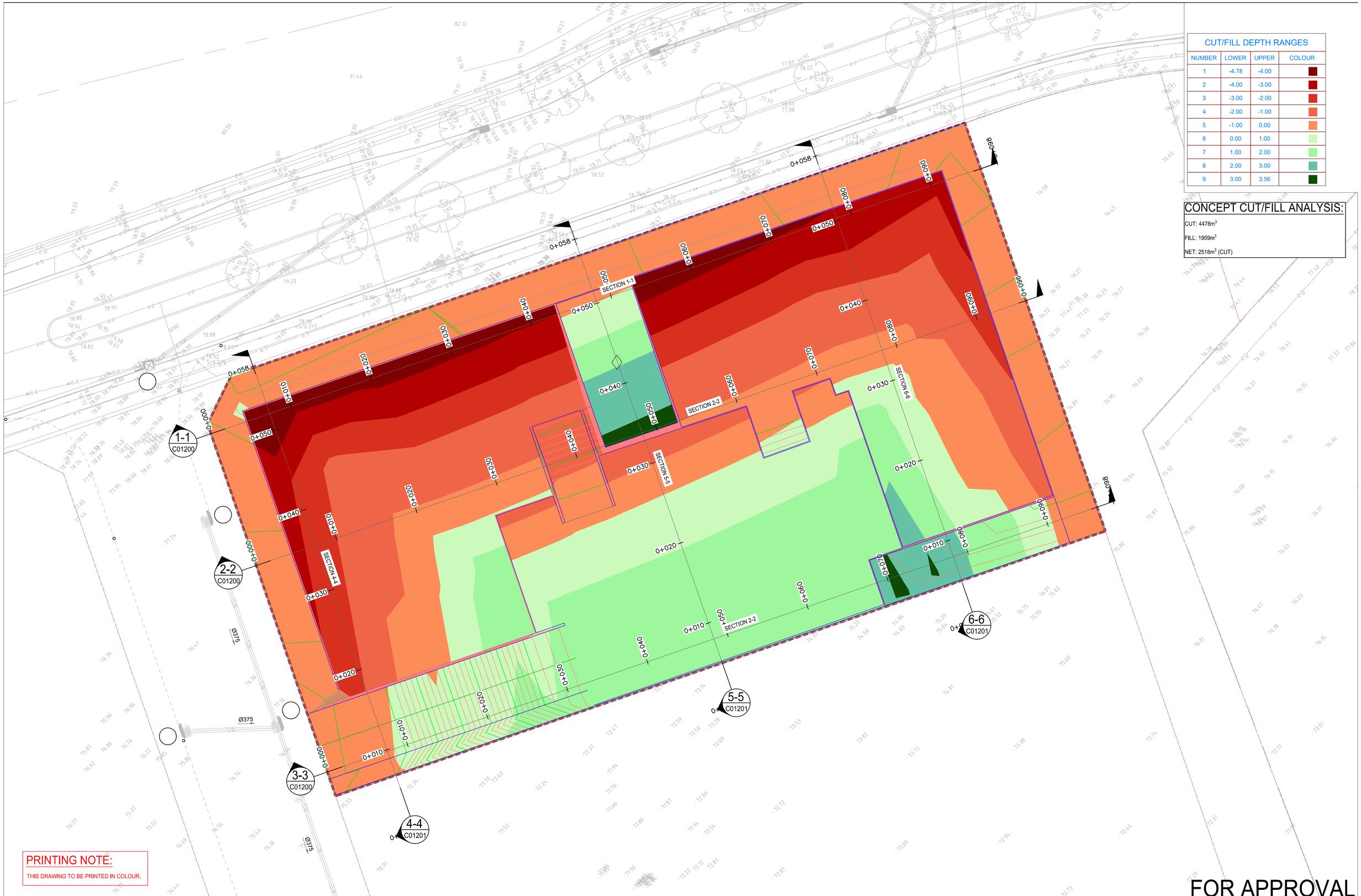
XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

Project
MACARTHUR GARDENS AFFORDABLE HOUSING PROJECT
SITE R3, MACARTHUR GARDENS, NORTH CAMPBELLTOWN NSW 2560

Sheet Subject
GENERAL NOTES

Scale at A1	Drawn	Approved
NTS	EL	FC
Job No	Drawing No	Revision
241206	C00001	1



CUT/FILL DEPTH RANGES			
NUMBER	LOWER	UPPER	COLOUR
1	-4.78	-4.00	
2	-4.00	-3.00	
3	-3.00	-2.00	
4	-2.00	-1.00	
5	-1.00	0.00	
6	0.00	1.00	
7	1.00	2.00	
8	2.00	3.00	
9	3.00	3.56	

CONCEPT CUT/FILL ANALYSIS:

CUT: 4478m^3

FILL: 1959m^3

NET: 2518m^3 (CUT)

PRINTING NOTE:

THIS DRAWING TO BE PRINTED IN COLOUR.

FOR APPROVAL

Rev	Description	Eng	Draft	Date
3	FOR APPROVAL	EL	EL	24.07.2025
2	FOR COORDINATION	EL	EL	20.06.2025
1	FOR COORDINATION	TR	TR	20.05.2025

Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

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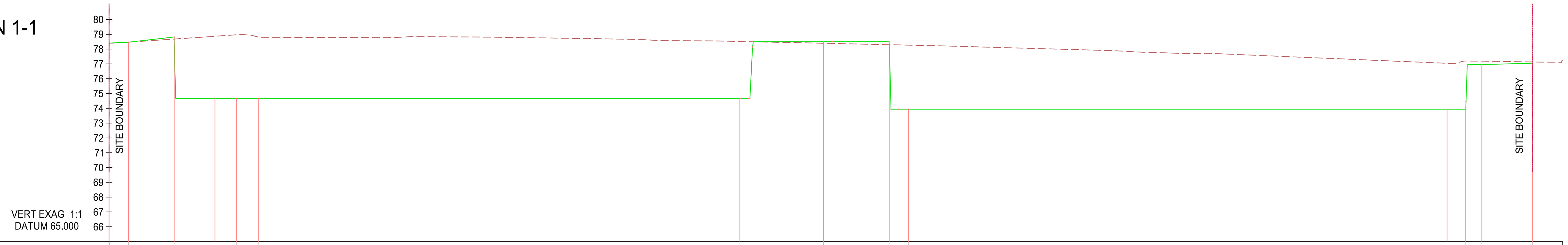
SITE R3, MACARTHUR GARDENS, NORTH CAMPBELLTOWN NSW 2560

Sheet Subject
EARTHWORKS PLAN

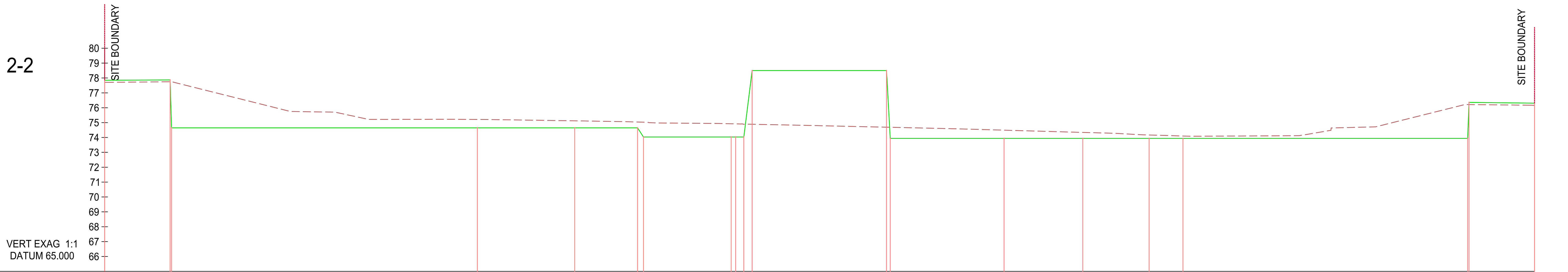
Scale at A1	Drawn	Approved
1:100	EL	FC
Job No	**Drawing No**	**Revision**
241206	C01101	3

SECTION 1-1



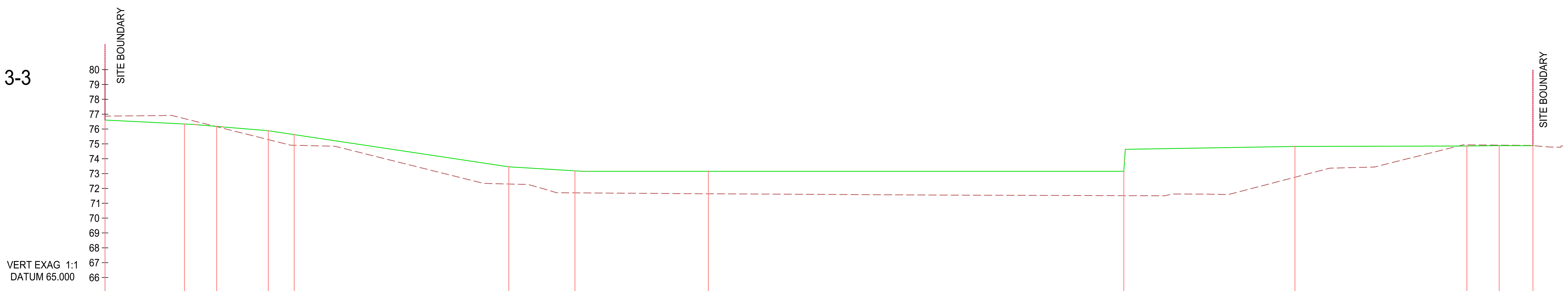
DESIGN LEVELS (mAHD)	78.464	78.817	74.650	74.650	74.650	74.650	78.500	78.500	73.940	73.940	73.940	76.953	77.043
EXISTING LEVELS (mAHD) (150mm STRIPPED)	78.465	78.676	78.865	78.964	78.807	78.515	78.394	78.294	78.265	77.039	77.195	77.184	77.129
DEPTH (m)	-0.002	0.141	-4.215	-4.314	-4.157	-3.865	0.106	0.206	-4.325	-3.099	-3.255	-0.231	-0.086
CHAINAGE (m)	0+001.32	0+004.40	0+007.16	0+008.60	0+010.12	0+042.64	0+048.30	0+052.73	0+054.03	0+090.44	0+091.70	0+092.79	0+096.20

SECTION 2-2



DESIGN LEVELS (mAHD)	77.871	74.650	74.650	74.650	74.035	78.500	78.500	73.940	73.940	73.940	73.940	73.940	76.310
EXISTING LEVELS (mAHD) (150mm STRIPPED)	77.749	75.212	75.121	75.040	74.923	74.889	74.693	74.492	74.342	74.168	74.100	76.213	76.155
DEPTH (m)	0.122	-0.562	-0.471	-0.390	-0.888	3.611	3.807	-0.552	-0.402	-0.228	-0.160	-2.273	0.154
CHAINAGE (m)	0+004.40	0+025.07	0+031.63	0+035.85	0+042.15	0+043.56	0+052.60	0+060.51	0+065.81	0+070.27	0+072.54	0+091.70	0+096.20

SECTION 3-3



DESIGN LEVELS (mAHD)	76.339	76.178	75.883	75.622	73.453	73.183	73.150	73.150	74.827	74.858	74.883	74.877
EXISTING LEVELS (mAHD) (150mm STRIPPED)	76.700	76.158	75.288	74.907	72.296	71.701	71.639	71.513	72.754	74.936	74.914	74.879
DEPTH (m)	-0.361	0.020	0.595	0.714	1.157	1.482	1.511	1.637	2.074	-0.078	-0.031	-0.002
CHAINAGE (m)	0+005.36	0+007.52	0+011.00	0+012.74	0+027.20	0+031.66	0+040.65	0+068.64	0+080.17	0+091.75	0+093.93	0+096.20

FOR APPROVAL

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2	FOR APPROVAL	EL	EL	24.07.2025
1	FOR COORDINATION	EL	EL	20.0.6.2025

Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT

T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

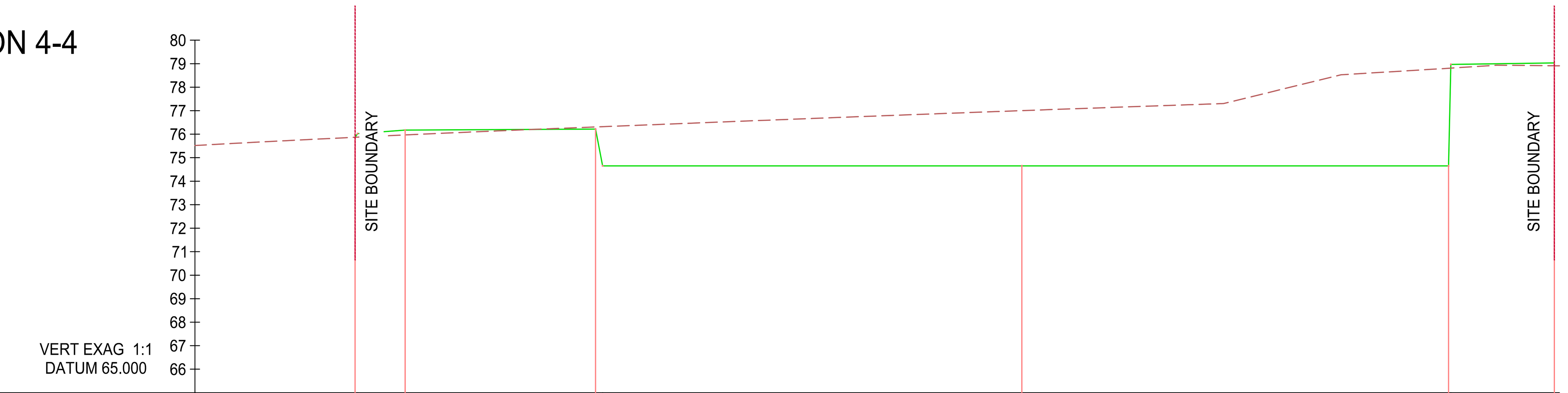
North

Project
MACARTHUR GARDENS AFFORDABLE HOUSING PROJECT
SITE R3, MACARTHUR GARDENS, NORTH CAMPBELLTOWN NSW 2560

Sheet Subject
EARTHWORKS SECTIONS - SHEET 1

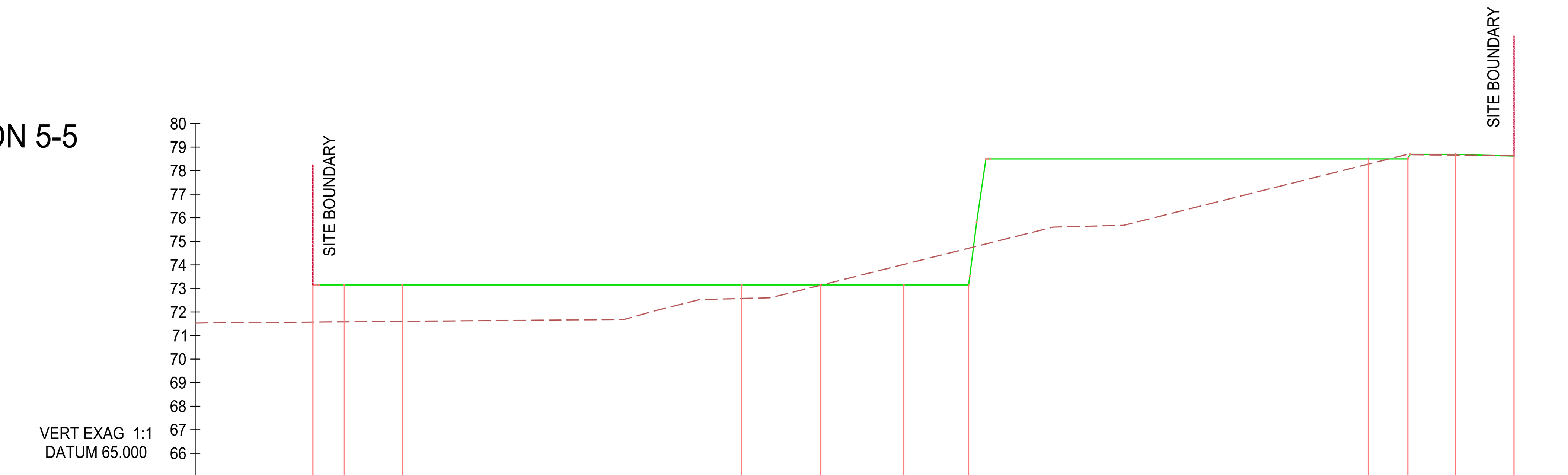
Scale at A1	Drawn	Approved
1:200	EL	FC
Job No	**Drawing No**	**Revision**
241206	C01201	2

SECTION 4-4



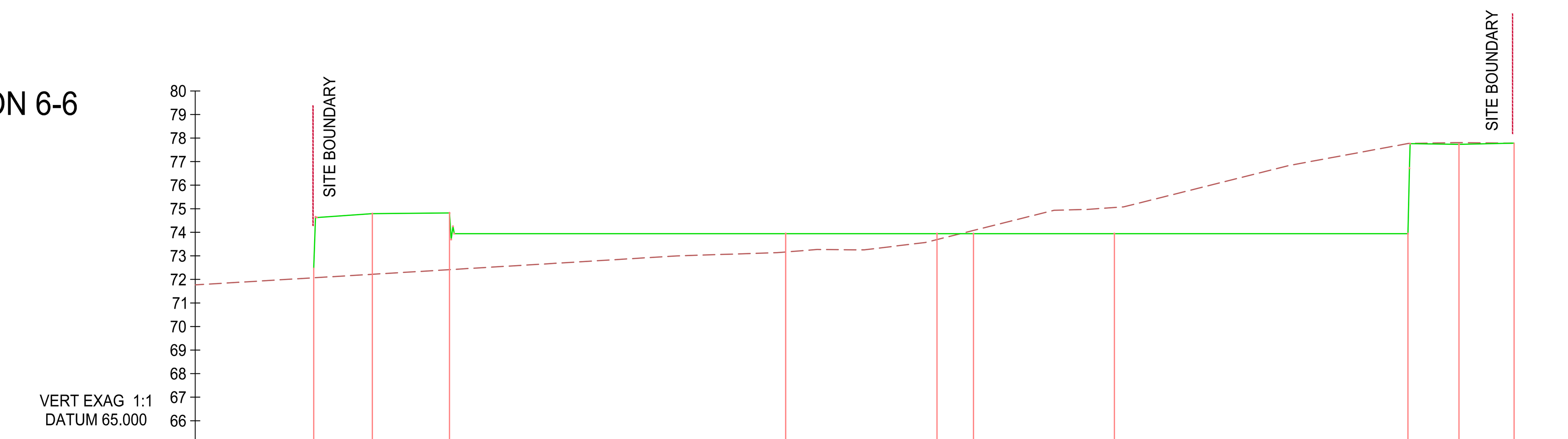
DESIGN LEVELS (mAHD)	75.868	76.023	76.173	76.218	74.650	74.650	74.650	78.968	79.033
EXISTING LEVELS (mAHD) (150mm STRIPPED)	75.868	75.873	75.968	76.308	76.320	77.002	78.805	78.811	78.911
DEPTH (m)	0.000	0.150	0.205	-0.090	-1.670	-2.352	-4.155	0.157	0.122
CHAINAGE (m)	0+006.81	0+006.92	0+008.94	0+017.04	0+017.34	0+035.17	0+053.32	0+053.42	0+057.82

SECTION 5-5



DESIGN LEVELS (mAHD)	73.150	73.150	73.150	73.150	73.150	73.150	73.150	78.500	78.500	78.692	78.619
EXISTING LEVELS (mAHD) (150mm STRIPPED)	71.571	71.582	71.603	72.572	73.137	74.019	74.707	78.278	78.679	78.659	
DEPTH (m)	1.579	1.568	1.547	0.578	0.013	-0.869	-1.557	0.222	-0.179	0.032	
CHAINAGE (m)	0+005.00	0+006.32	0+008.79	0+023.20	0+026.57	0+030.09	0+032.85	0+049.83	0+051.50	0+053.53	0+056.01

SECTION 6-6



DESIGN LEVELS (mAHD)	72.482	74.789	74.822	73.940	73.940	73.940	73.940	73.940	77.735	77.785
EXISTING LEVELS (mAHD) (150mm STRIPPED)	72.068	72.218	72.414	73.164	73.690	74.078	75.051	77.768	77.805	
DEPTH (m)	0.413	2.572	2.408	0.776	0.250	-0.138	-1.111	-3.828	-0.070	
CHAINAGE (m)	0+005.03	0+007.52	0+010.80	0+025.08	0+031.50	0+033.05	0+039.04	0+051.51	0+053.67	0+056.02

FOR APPROVAL

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Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT

T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

Project
MACARTHUR GARDENS AFFORDABLE HOUSING PROJECT
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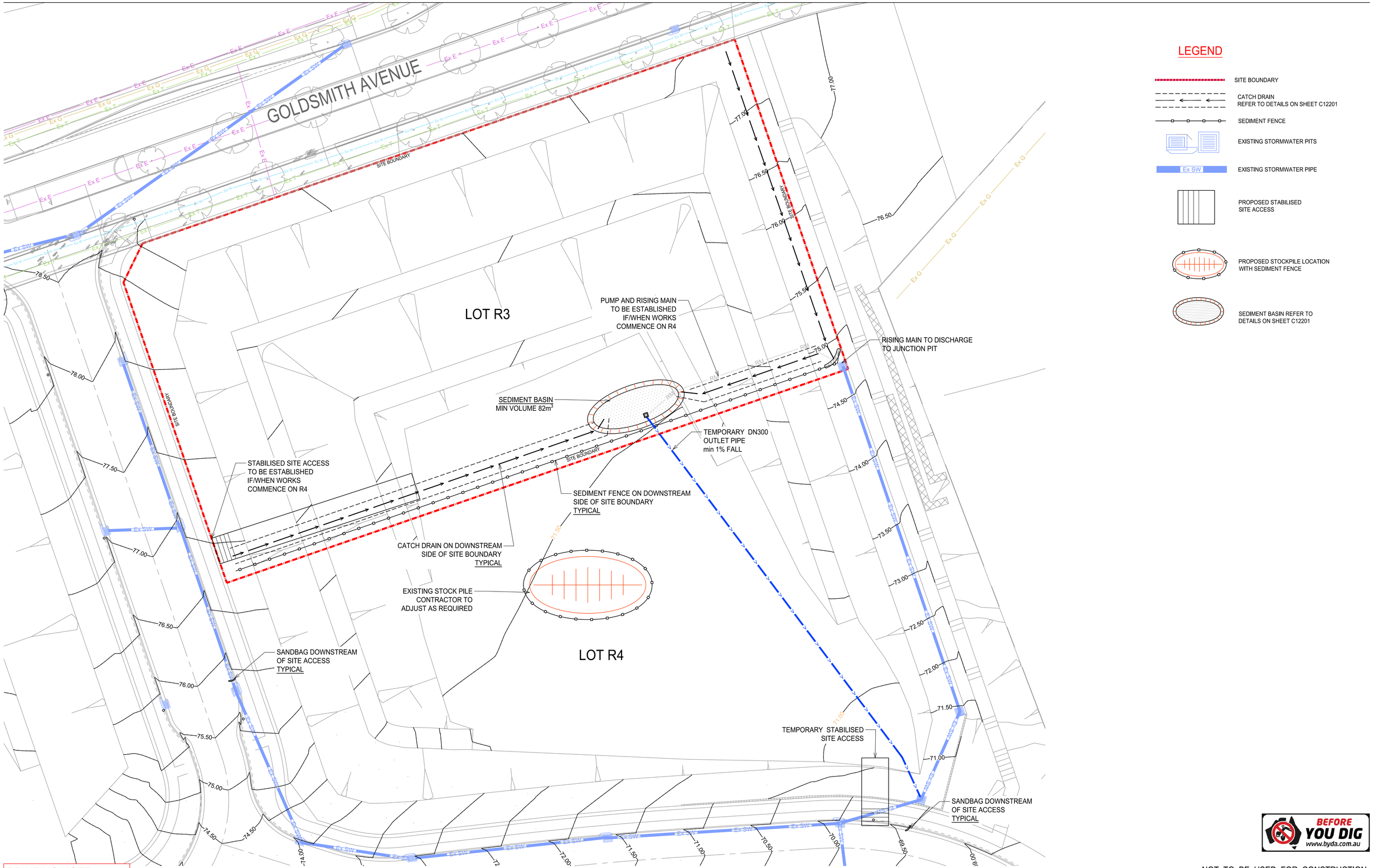
Sheet Subject
EARTHWORKS SECTIONS - SHEET 2

Scale at A1	Drawn	Approved
1:200	EL	FC
Job No	**Drawing No**	**Revision**
241206	C01202	2



LEGEND

- SITE BOUNDARY
- CATCH DRAIN REFER TO DETAILS ON SHEET C12201
- SEDIMENT FENCE
- EXISTING STORMWATER PITS
- Ex SW — EXISTING STORMWATER PIPE
- PROPOSED STABILISED SITE ACCESS
- PROPOSED STOCKPILE LOCATION WITH SEDIMENT FENCE
- SEDIMENT BASIN REFER TO DETAILS ON SHEET C12201

PRINTING NOTE:

THIS DRAWING TO BE PRINTED IN COLOUR.

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A1 0 2 4 6 8 10 12 14 16 18 20 1:200

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Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

Project
MACARTHUR GARDENS AFFORDABLE HOUSING PROJECT
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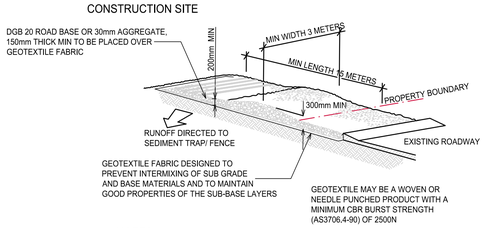
Sheet Subject
SEDIMENT & EROSION CONTROL PLAN

Scale at A1	Drawn	Approved
1:250	EL	FC
Job No	**Drawing No**	**Revision**
241206	C12001	2

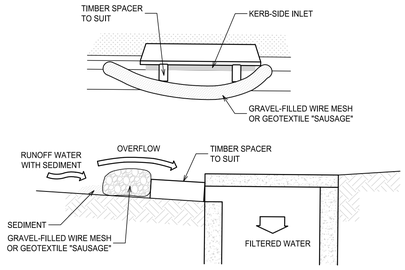


NOTES:

1. THIS DEVICE IS TO BE LOCATED AT ALL EXITS FROM CONSTRUCTION SITE.
2. THIS DEVICE IS TO BE REGULARLY CLEANED OF DEPOSITED MATERIAL SO AS TO MAINTAIN A 50mm DEEP SPACE BETWEEN PLANKS.
3. ANY UNSEALED ROAD BETWEEN THIS DEVICE AND NEAREST ROADWAY IS TO BE TOPPED WITH 100mm THICK 40-70mm SIZE AGGREGATE.
4. ALTERNATIVELY, THREE(3) PRECAST CONCRETE CATTLE GRIDS (AS MANUFACTURED BY "HUMES CONCRETE MAY BE USED, 1, 2 & 3 ABOVE ALSO APPLY.

STABILISED SITE ACCESS WITH SHAKER RAMP

SCALE N.T.S.

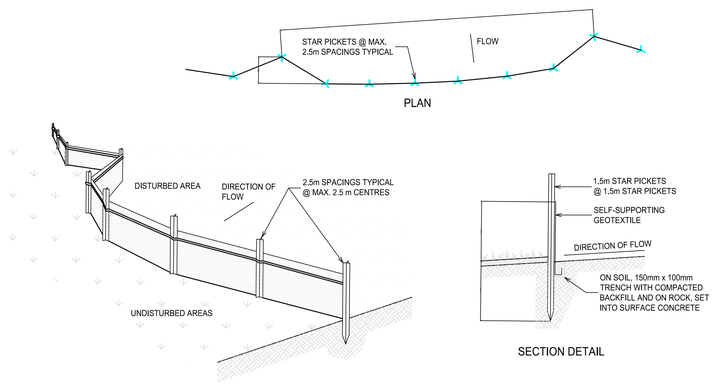


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
3. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET, MAINTAIN THE OPENING WITH SPACER BLOCKS.
4. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
5. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY CAN FIRMLY ABUT EACH OTHER AND SEDIMENT / LADEN WATERS CANNOT PASS BETWEEN.

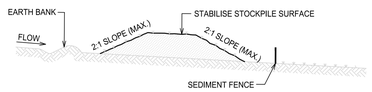
MESH & GRAVEL INLET FILTER

SCALE N.T.S.



SEDIMENT FENCE

SCALE N.T.S.

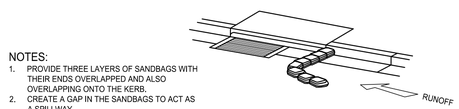


STOCKPILE CONSTRUCTION NOTES:

1. PLACE STOCKPILES MORE THAN 2 (PREFERABLY 5) METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
4. WHERE THEY ARE TO BE PLACED FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED E,S,C,P, OR S,W,M,P, TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES 1 TO 2 METRES DOWNSLOPE.

STOCKPILES

SCALE N.T.S.

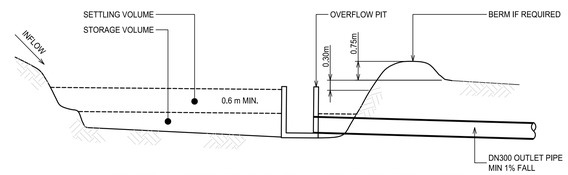


NOTES:

1. PROVIDE THREE LAYERS OF SANDBAGS WITH THEIR ENDS OVERLAPPED AND ALSO OVERLAPPING ONTO THE KERB.
2. CREATE A GAP IN THE SANDBAGS TO ACT AS A SPILLWAY.
3. SANDBAG BARRIER TO BE MIN. 2m FROM THE INLET AND EXTEND MIN. 0.9m OUT FROM THE KERB.

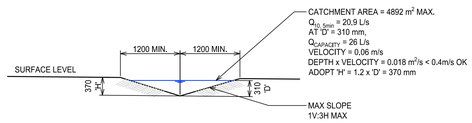
GULLY INLET SANDBAG PROTECTION DETAIL

SCALE N.T.S.



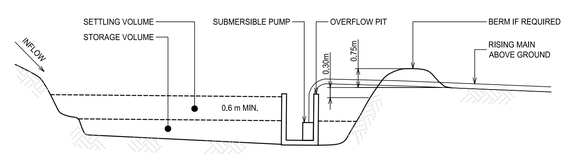
TYPICAL SEDIMENT BASIN - GRAVITY DRAINED

SCALE N.T.S.



CATCH DRAIN TYPICAL SECTION

SCALE N.T.S



TYPICAL SEDIMENT BASIN - PUMPED DRAINED

SCALE N.T.S.

SEDIMENT FENCE CONSTRUCTION NOTES:

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150 mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 1.5 m LONG STAR PICKETS INTO GROUND @ 2.5 m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150 mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

GENERAL INSTRUCTIONS:

1. THIS SEDIMENT AND EROSION CONTROL WORKS FOR THE SITE SHALL BE CARRIED OUT IN ACCORDANCE WITH THE REQUIREMENTS OF "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION, 4TH EDITION (2004)" BY LANDCOM.
2. AS REQUIRED BY COUNCIL, SEDIMENT CONTROL MEASURES WILL BE REQUIRED DURING THE CONSTRUCTION OF ALL DEVELOPMENTS/BUILDING WORKS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY THAT THE WORKS ARE CARRIED OUT IN ACCORDANCE WITH THE SEDIMENT AND EROSION CONTROL PLAN AND COUNCIL'S REQUIREMENTS.
3. THE CONTRACTOR SHALL ENSURE THAT ALL SUBCONTRACTORS ARE INFORMED OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWNSLOPE AREAS.
4. THE NON-DISTURBED PORTION OF THE CATCHMENT OUTSIDE OF OPERATING AREA IS TO BYPASS THE BASINS BY MEANS OF LINED CATCH DRAINS.
5. WHERE PRACTICABLE, THE SOIL EROSION HAZARD SHALL BE KEPT AS LOW AS POSSIBLE. LIMITATIONS TO ACCESS ARE TO BE VIA STANLEY LANE UNLESS OTHERWISE APPROVED BY COUNCIL.
6. ENSURE THAT ALL DRAINS ARE OPERATING EFFECTIVELY AND SHALL MAKE ANY NECESSARY REPAIRS. REMOVE TRAPPED SEDIMENT WHERE THE CAPACITY OF THE TRAPPING DEVICE FALLS BELOW 60%.
7. CONSTRUCT ADDITIONAL EROSION OR SEDIMENT CONTROL WORKS AS MAY BE APPROPRIATE TO ENSURE THE PROTECTION OF DOWNSLOPE LANDS AND WATERWAYS.
8. MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES IN A FULLY FUNCTIONING CONDITION AT ALL TIMES UNTIL THE SITE IS REHABILITATED.
9. REMOVE TEMPORARY SOIL CONSERVATION STRUCTURES AS THE LAST ACTIVITY IN THE REHABILITATION PROGRAM.

CONSTRUCTION SEQUENCE:

WORKS SHALL BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:

1. INSTALL SEDIMENT FENCING AND CUT DRAINS TO MEET THE REQUIREMENTS OF THE SEDIMENT AND EROSION CONTROL PLAN. WASTE COLLECTION BINS SHALL BE INSTALLED ADJACENT TO SITE OFFICE.
2. CONSTRUCT STABILISED SITE ACCESS IN ACCORDANCE WITH COUNCIL'S REQUIREMENTS.
3. REDIRECT CLEAN WATER AROUND THE CONSTRUCTION SITE.
4. INSTALL SEDIMENT CONTROL PROTECTION MEASURES AT ALL NATURAL AND MAN-MADE DRAINAGE STRUCTURES. MAINTAIN UNTIL ALL THE DISTURBED AREAS ARE STABILISED.
5. CLEAR AND STRIP THE WORK AREAS. MINIMISE THE DAMAGE TO THE GRASS AND LOW GROUND COVER OF NON-DISTURBED AREAS.
6. ANY DISTURBED AREAS, OTHER THAN BUILDING PAD AREAS, SHALL IMMEDIATELY BE COVERED WITH SITE TOPSOIL WITHIN 7 DAYS OF CLEARING. BUILDING PAD AREAS SHALL BE COVERED WITH BITUMEN EMULSION AS SPECIFIED.
7. APPLY PERMANENT STABILISATION TO SITE (LANDSCAPING).

PRINTING NOTE:

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A1 0 2 4 6 8 10 12 14 16 18 20 1:200

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1	FOR COORDINATION	EL	EL	16.07.2025

Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

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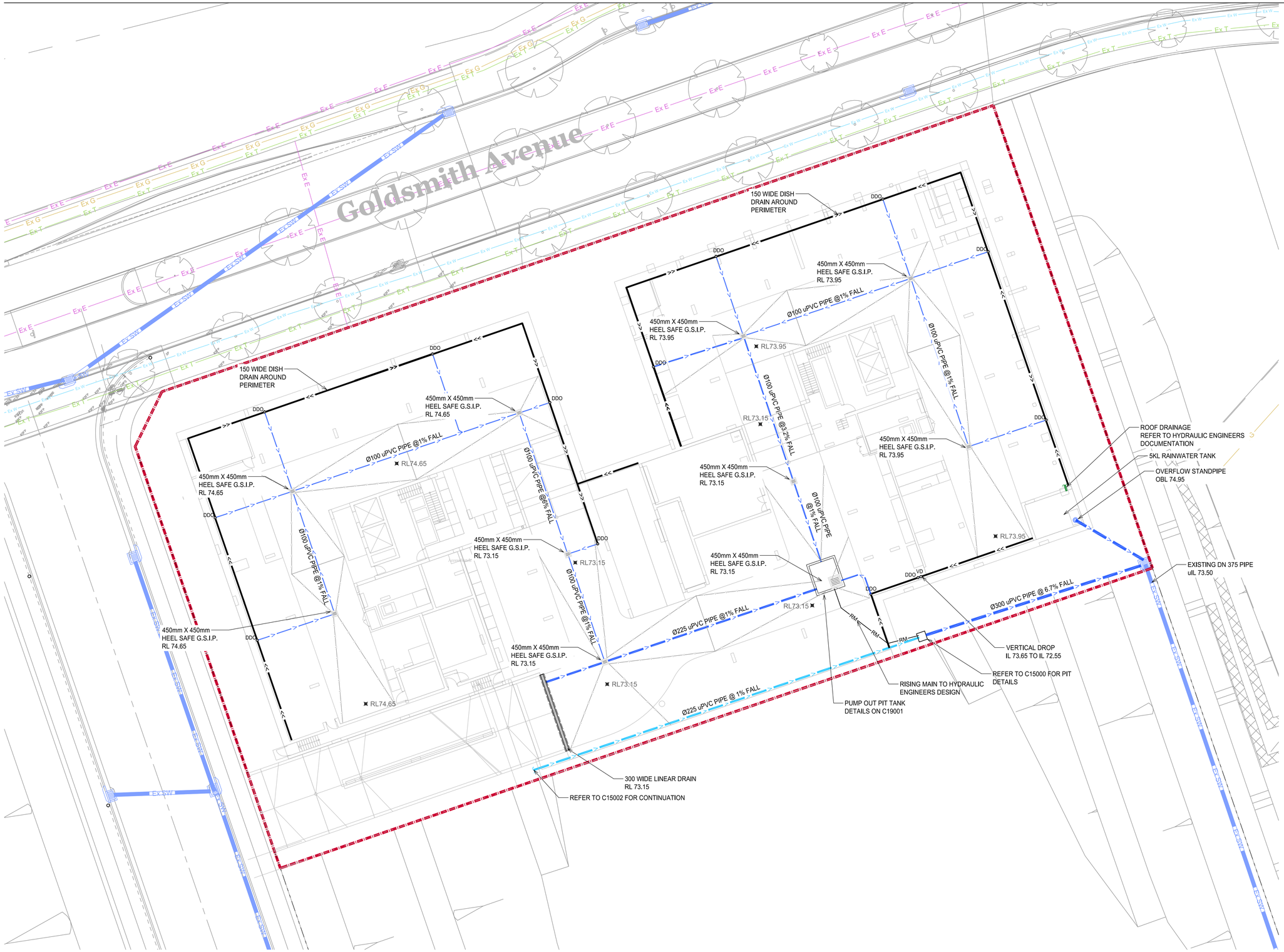
Sheet Subject
SEDIMENT & EROSION CONTROL DETAILS

Scale at A1	Drawn	Approved
1:100	EL	FC
Job No	**Drawing No**	**Revision**
241206	C12101	2



LEGEND

- SITE BOUNDARY
- EXISTING STORMWATER PIPE
- PROPOSED DRAINAGE PIPE
- PROPOSED SUSPENDED DRAINAGE PIPE
- PROPOSED RISING MAIN
- 150 WIDE SPOON DRAIN
- PROPOSED GRATED DRAIN
- PROPOSED ACCESS PIT WITH HEEL-SAFE GRATED COVER
- PROPOSED JUNCTION PIT
- DISH DRAIN OUTLET
- VERTICAL DROPPER
- PROPOSED ROOF DRAINAGE (BY OTHERS)
- VALLEY LINE
- SWALE DRAIN
- FLOW DIRECTION
- OUTLINE BASEMENT BELOW
- EXISTING GAS MAIN
- EXISTING WATER MAIN
- EXISTING POWER LINE
- EXISTING COMMUNICATION LINE
- EXISTING SEWER LINE

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Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

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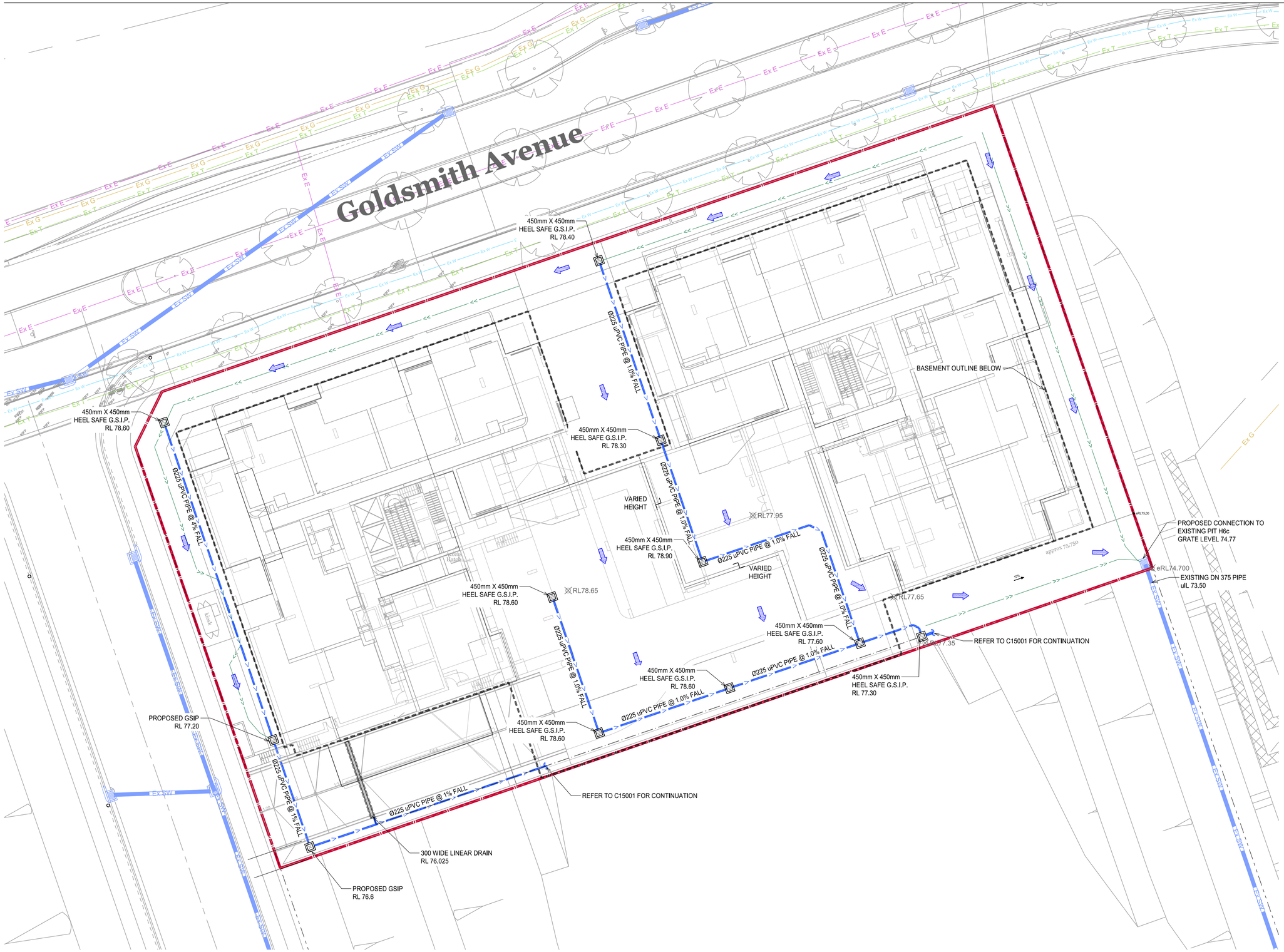
Sheet Subject
STORMWATER MANAGEMENT PLAN - BASEMENT

Scale at A1	Drawn	Approved
1:200	EL	FC
Job No	**Drawing No**	**Revision**
241206	C15001	2



LEGEND

- SITE BOUNDARY
- EXISTING STORMWATER PIPE
- PROPOSED DRAINAGE PIPE
- PROPOSED SUSPENDED DRAINAGE PIPE
- PROPOSED RISING MAIN
- 150 WIDE SPOON DRAIN
- PROPOSED GRATED DRAIN
- PROPOSED ACCESS PIT WITH HEEL-SAFE GRATED COVER
- PROPOSED JUNCTION PIT
- DISH DRAIN OUTLET
- VERTICAL DROPPER
- PROPOSED ROOF DRAINAGE (BY OTHERS)
- VALLEY LINE
- SWALE DRAIN
- FLOW DIRECTION
- OUTLINE BASEMENT BELOW
- EXISTING GAS MAIN
- EXISTING WATER MAIN
- EXISTING POWER LINE
- EXISTING COMMUNICATION LINE
- EXISTING SEWER LINE

PRINTING NOTE:

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A1 0 1 2 4 6 8 10 12 14 16 18 20 1:200

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DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

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Sheet Subject
STORMWATER MANAGEMENT PLAN - GROUND FLOOR

Scale at A1	Drawn	Approved
1:200	EL	FC
Job No	**Drawing No**	**Revision**
241206	C15002	2

LEGEND

- SITE BOUNDARY
- BASEMENT OUTLINE
- ROOF AREA DRAINING VIA HYDRAULIC =2436 m²
- PERVIOUS AREA TO BYPASS PUMP OUT TANK = 2,272 m²
- DRIVEWAY DRAINING TO BYPASS PUMP OUT TANK= 97 m²
- DRIVEWAY DRAINING TO PUMP OUT TANK = 91m²

PRINTING NOTE:

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A1 0 2 4 6 8 10 12 14 16 18 20 1:200

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FOR APPROVAL

Rev	Description	Eng	Draft	Date
1	FOR APPROVAL	EL	EL	24.07.2025

Architect
DKO
42 DAVIES STREET, SURRY HILLS NSW 2010

Client
LANDCOM
14-60 STATION STREET EAST, PARRAMATTA NSW 2150

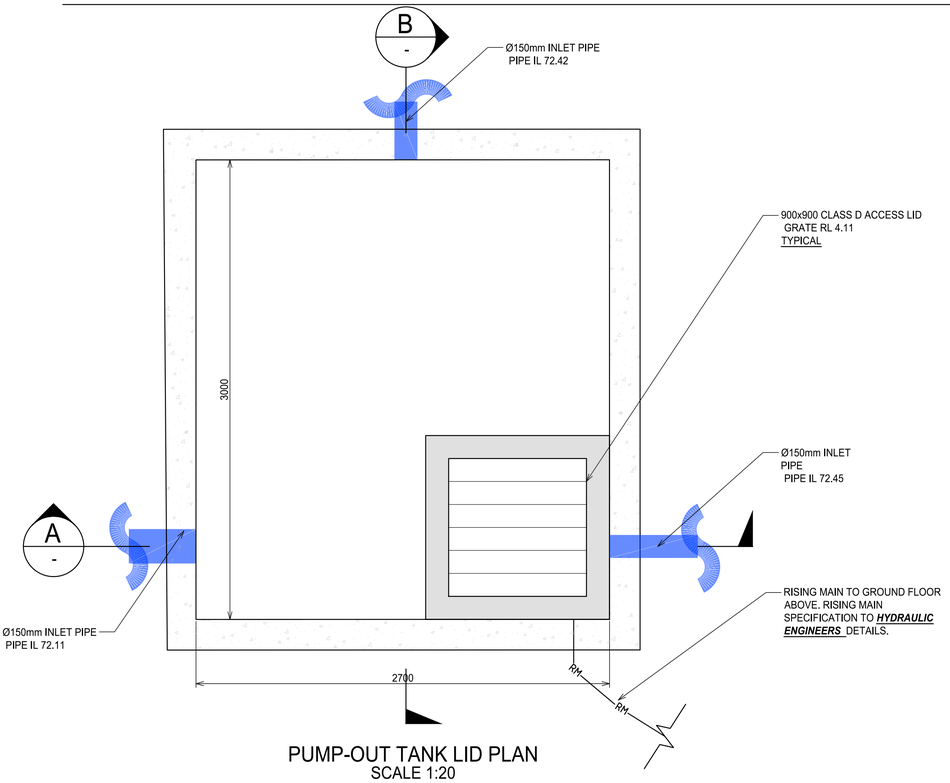
XAVIER KNIGHT
T : 02 8810 5800 E : info@xavierknight.com.au
A : Level 7, 210 Clarence Street, Sydney NSW 2000
xavierknight.com.au

North

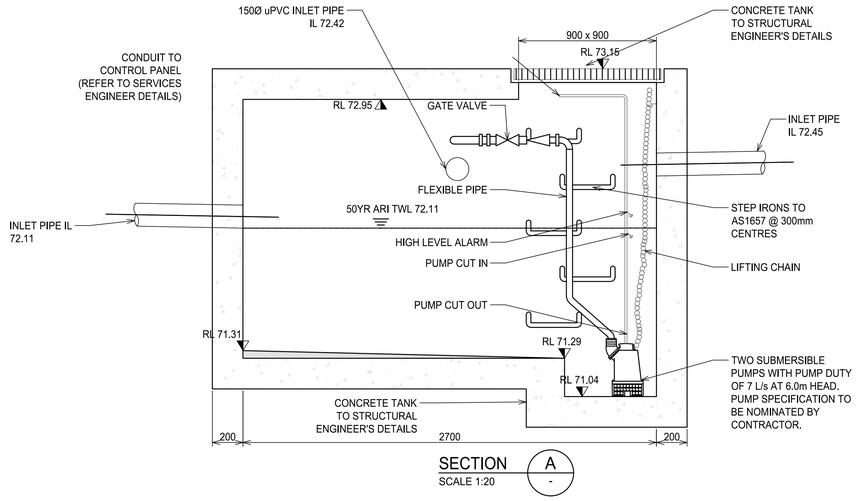
Project
MACARTHUR GARDENS AFFORDABLE HOUSING PROJECT
SITE R3, MACARTHUR GARDENS, NORTH CAMPBELLTOWN NSW 2560

Sheet Subject
CATCHMENT PLAN

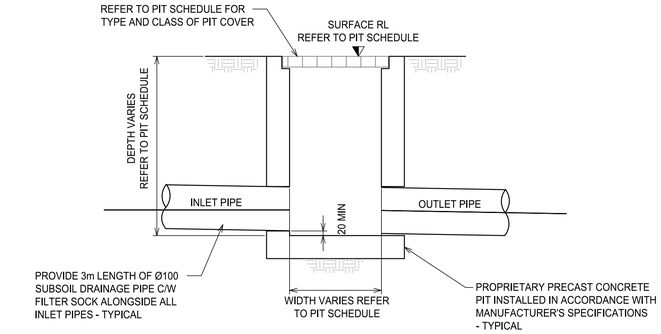
Scale at A1	Drawn	Approved
1:200	EL	FC
Job No	**Drawing No**	**Revision**
241206	C12001	1



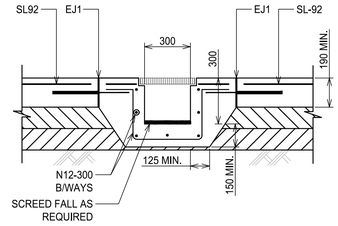
PUMP-OUT TANK LID PLAN
SCALE 1:20



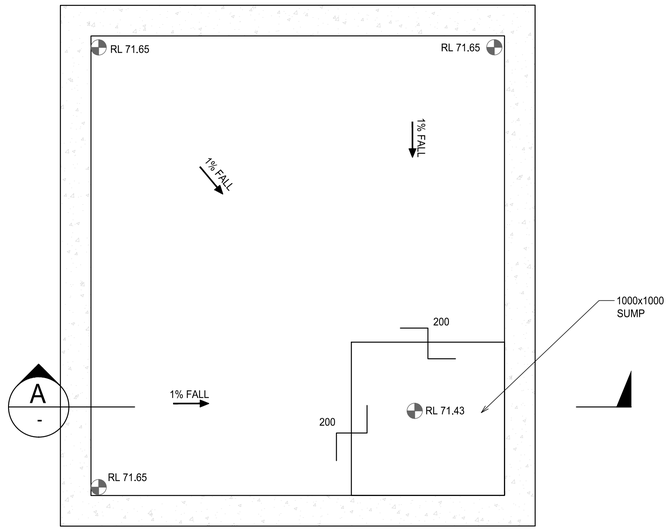
SECTION A
SCALE 1:20



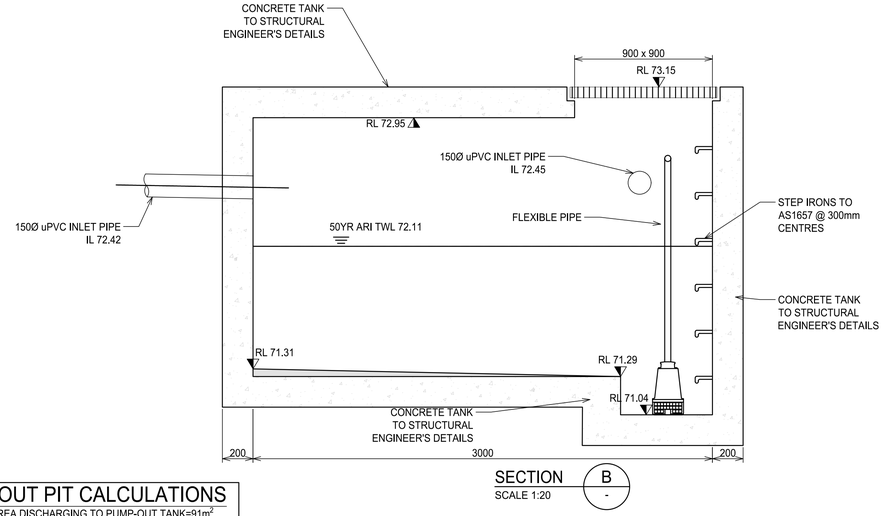
STORMWATER DRAINAGE PIT - PRECAST PIT
SCALE 1:20



GRATED TRENCH DRAIN DETAIL
SCALE 1:20



PUMP-OUT TANK BASE PLAN
SCALE 1:20



SECTION B
SCALE 1:20

PUMP-OUT PIT CALCULATIONS

DRIVEWAY AREA DISCHARGING TO PUMP-OUT TANK=91m^2

PUMP-OUT TANK VOLUME CALCULATIONS
50yr ARI 2hr STORM = 34.9 mm/hr
100yr ARI 6min STORM = 215 mm/hr

ARI x 2 = 34.9 x 2 = 69.8 mm

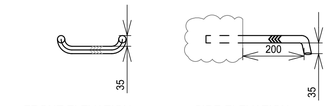
PUMP TANK VOLUME CALCULATED FOR 50yr ARI 2hr DURATION

V = 91x 69.8/ 1000 = 6.4m^3

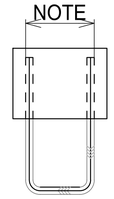
PUMP-OUT RATE CALCULATIONS
PUMP-OUT RATE CALCULATED FOR 100yr ARI 6min .

RUNOFF RATE = 91 x 215/ 3600 = 5.4L/s

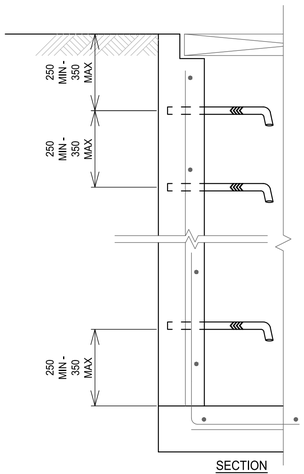
THEREFORE, 6.4 m^3 VOLUME AND 2 MECHANICAL PUMPS WITH CAPACITY OF 5.4 L/s EACH, HEAD = 6 m ARE REQUIRED FOR PUMP-OUT TANK.



REFER TO NOTE



FRONT ELEVATION



SECTION

NOTE
1. WHEN POSITIONED IN STRAIGHT ALIGNMENT, STEP TO BE 400mm WIDE
2. STAGGERED STEPS TO BE 200mm WIDE, STEPS TO BE STAGGERED 200mm CENTER TO CENTER FOR ALTERATIVE STEPS
3. SPACING OF STEPS TO BE UNIFORM TO WITHIN ± 8mm IN EACH PIT

PIT ACCESS STEP DETAIL
SCALE 1:10

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Sheet Subject
TYPICAL DETAILS

Scale at A1	Drawn	Approved
1:100	EL	FC
Job No	**Drawing No**	**Revision**
241206	C19001	1