

3-5 Help Street Chatswood

Integrated Water Management Strategy

Prepared for: Loffex Chatswood Pty Ltd

Date: 18th February 2025

Prepared by: Philip De Pasquale

Ref: 301351072

Stantec Australia Pty Ltd

Level 9, The Forum, 203 Pacific Highway, St Leonards NSW 2065

Tel: +61 2 8484 7000 Web: www.stantec.com

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Revision

Site Address: 3-5 Help Street, Chatswood, NSW, 2067

Real Property Description: SP52320
SP134

Proposed Development: Commercial and Residential Mixed Use
Tower

Client: Loftex Chatswood Pty Ltd

Local Authority: Willoughby City Council

Authority Reference #: N/A

Stantec Reference: 301351072-IWMP-001



Jackson Bramley BE (Civil) MIEAust NER

Principal, Civil Team Lead

For and on behalf of
Stantec Australia Pty Ltd

Revision	Date	Comment	Prepared By	Approved By
001	20.12.2024	SDDA Issue	PDP	JMB
002	18.02.2025	SDDA Issue	PDP	JMB

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1. Introduction

Stantec have been commissioned by Loftex Chatswood Pty Ltd to prepare this Integrated Water Management Plan in support of the State Significant Development Application for the proposed commercial development at 3-5 Help Street, Chatswood, NSW 2067.

The Integrated Water Management Plan (IWMP) elements illustrated in this report for the proposed development complies with conditions set out by Willoughby City Council, Australian Rainfall and Runoff 2019 (ARR), Australian Standards and best engineering practices.

The proposed development of the site, a new commercial and residential mixed use tower, includes five (5) levels of basement carparking, ground and level one retail and commercial and 33 levels of residential apartments.

The overall site is bound by:

- McIntosh Street to the North
- Neighbouring mixed-use developments to the East
- Help Street to the South
- Cambridge Lane to the West

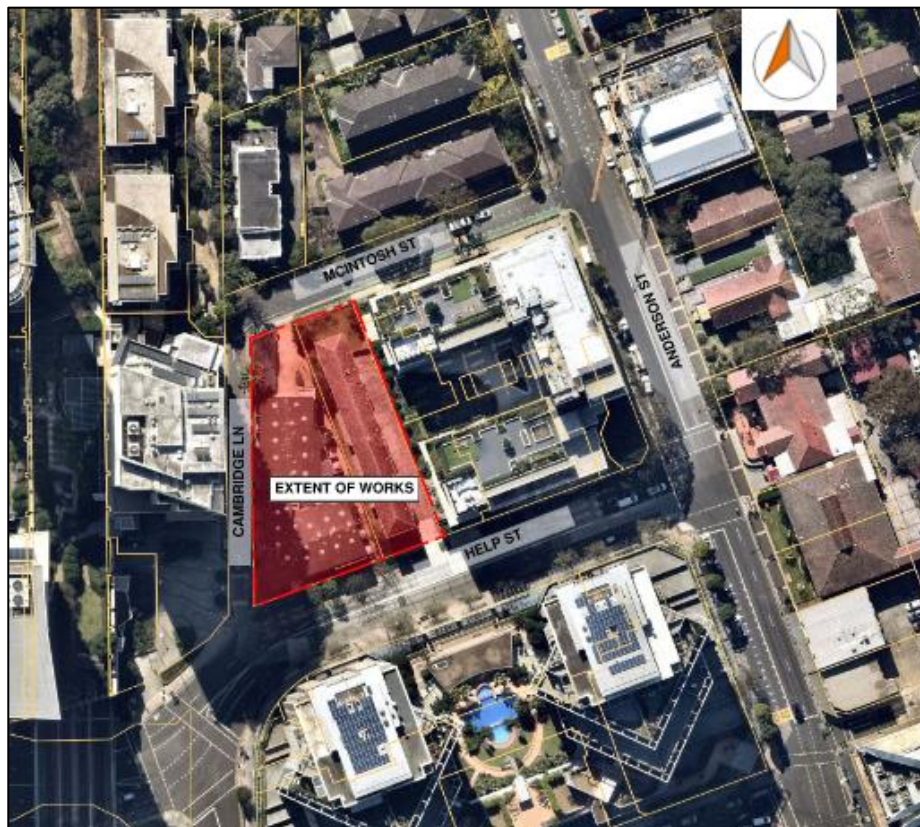


Figure 1: Site Location Plan (Source: Nearmaps 2023)



2. SEARS Provisions

The following table provides a review of the specific matters raised by the DPHI in the issued Planning Secretary's Environmental Assessment Requirements (SEARS) report dated 8th October 2024 (Application Number: SSD-76555711). Refer to this table to assist with confirmation that raised elements are addressed.

Element	Current site provision	Reference to section in report to satisfy provision
Water Management	Provide consultation with the local council and any other relevant drainage or water authority.	Appendix C
	Outline 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).	Chapter 9 of the Integrated Water Management Plan (IWMP)
	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.	Chapter 6 and Chapter 8 of the IWMP Appendix A Civil Documentation
	Demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse downstream impacts.	Chapter 6 and Chapter 8 of the IWMP. Design departure from Willoughby Council's Technical Standards No.1 (2019) Section 6.2 requiring OSD outlet IL to be above 1% HGL level. However, DRAINS modelling demonstrates system functionality and alignment with Council stormwater objectives, noting existing site and infrastructure conditions. Design departure from PSD requirement, however a significant reduction in PSD compared to pre-development levels is achieved. Council's PSD requirement deemed unfeasible due to the size of the OSD tank that would be required and the constraints posed by the site and downstream topography.
Flooding	Identifies the flood planning level and any flood risk on site having regard to adopted flood studies, the potential effects of climate change and any relevant provisions of the NSW Flood risk management manual (2023)	Chapter 7 of the IWMP and the Upstream Catchment Analysis Report
	Where the development is occurring on flood prone land a flood impact and risk assessment (FIRA) must be prepared having regard to the Flood Impact and Risk Assessment Guideline -	Refer Upstream Catchment Analysis Report



	LU01 (FIRA guide). When determining the scope and category of the FIRA the requirements outlined in the FIRA guide must be considered.	
	Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines. Detail any flood risk management measures that are to be incorporated as part of the development having regard to relevant guidelines (including any design solutions, flood modification measures, property modification measures, operational procedures or Flood Emergency Response Plan).	Chapter 7 of the IWMP and the Upstream Catchment Analysis Report

3. Abbreviations Definitions

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
BoM	Bureau of Meteorology
DA	Development Application
DCP	Development Control Plan
DN	Diameter Nominal (mm)
EY	Exceedances per Year
FFL	Finished Floor Level
FPL	Flood Planning Level
GPT	Gross Pollutant Trap
IFD	Intensity-Frequency-Duration
IL	Invert Level
L/s	Litres per second
m/s	Metres per second
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
OSD	On-Site Stormwater Detention
PSD	Permissible Site Discharge
RCP	Reinforced Concrete Pipe
RL	Relative Level
RWT	Rainwater Tank
SEARS	Secretary's Environmental Assessment Requirements
SEI	Stream Erosion Index
SID	Safety In Design
SSR	Site Storage Requirement
VPA	Voluntary Planning Agreement
WSUD	Water Sensitive Urban Design



4. Existing Site Characteristics

4.1 Property Detail

The proposed development forms part of the site with the following property details:

Site Address: 3-5 Help Street, Chatswood, NSW, 2067

Real Property Description: SP52320 and SP134

Development Area: 2,290m² (0.229Ha)

The proposed development can be seen on the Civil Design Documentation shown in Appendix A of this report.

The proposed development of the site, a new commercial and residential mixed use tower, includes five (5) levels of basement carparking, ground and level one retail and commercial and 33 levels of residential apartments.

4.2 Topography

The local topography around the site shows that the site primarily falls North to South. The high point of the site is located along the North-East boundary at a level of RL 95.6m AHD and the low point located along the Southern boundary at a level of RL 92m AHD this is an average slope of approximately 5.56%.



Figure 2: Site Topography (Source: Mecone Mosaic, 2023)

4.3 External Stormwater Catchments

The surrounding area has been investigated to determine the likely impact of existing external stormwater catchments on the proposed site.

A separate report has been prepared by Stantec (Detailed Catchment Analysis, Ref: 301351072-CV-RP-002, Dated: 20/12/24) that reviews and assesses the existing catchment upstream of site.



4.4 Existing Stormwater Infrastructure

Through review of survey information, it has been determined that existing stormwater pit and pipe infrastructure within Help Street is suitable for connection of new site stormwater. This stormwater network contains several grated inlet pits along the kerb line abutting the site of the proposed development.

Refer to Figure 3 for further information.



Figure 3: Site Image of Stormwater Infrastructure at Help Street

4.5 Existing Stormwater Discharge

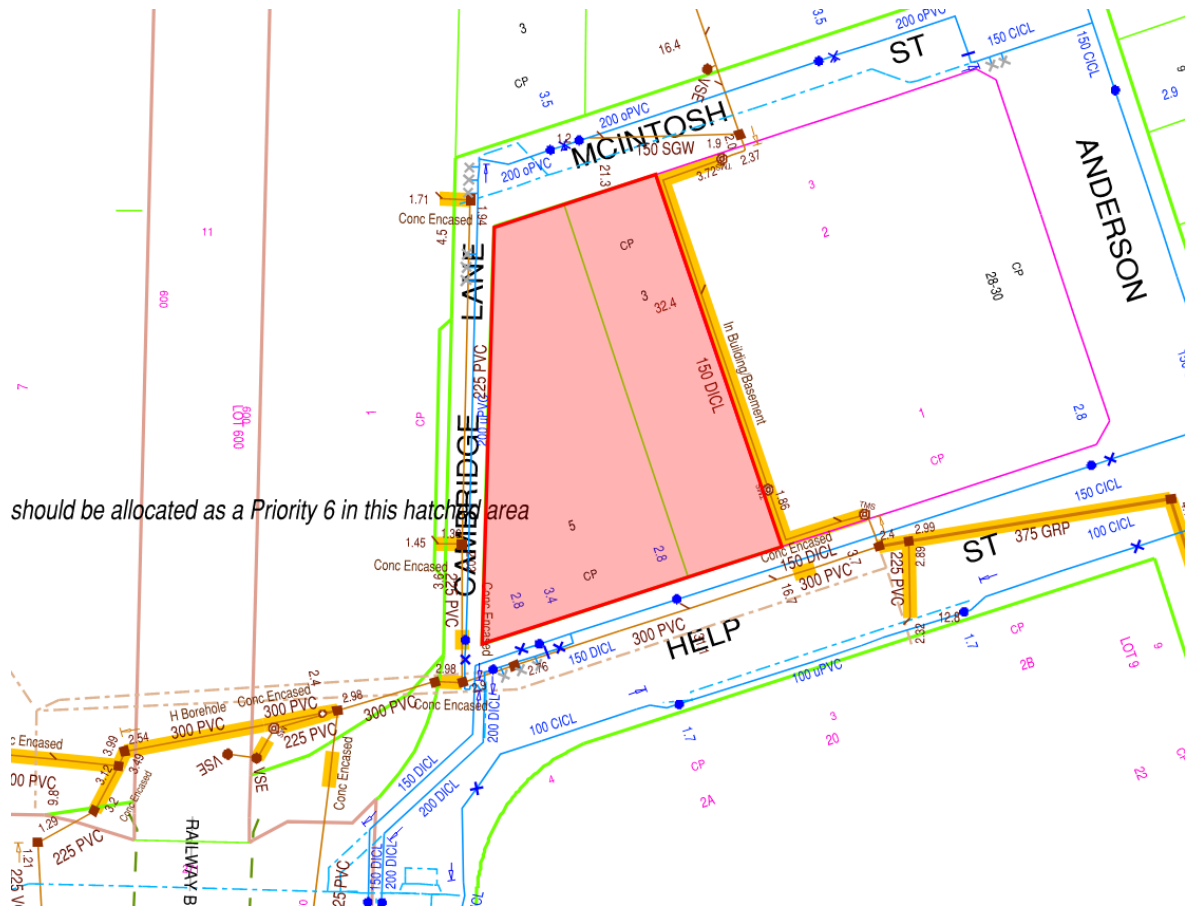
Stormwater for the existing buildings within this site appear to discharge directly to the external hardstand, and an additional inground network. This inground network appears to connect to the Cambridge Lane Council network, or discharge via overland flow to the kerb and gutter network.

4.6 Existing Water Infrastructure

Through analysis of Dial Before You Dig Sydney Water information, there are existing potable water hydrants on Help Street, Cambridge Lane and McIntosh Street, with the closest connections to the development area being at the corner of Help Street and Cambridge Lane (refer to blue linework and symbols on Figure 4 below). Significant water infrastructure also exists along Orchard Road. The inground water services appear to connect to the water infrastructure on Cambridge Lane or Help Street.

4.7 Existing Sewer Infrastructure

Through analysis of Dial Before You Dig Sydney Water information, there are existing sewer mains and pressure sewer mains on Help Street, Cambridge Lane and McIntosh Street (refer to yellow/brown linework and symbols on Figure 4 below). The inground sewer services appear to connect to the sewer infrastructure on Cambridge Lane.



Symbol	Meaning	Symbol	Meaning	Symbol	Meaning	Symbol	Meaning
	Sewer main with flow arrow and size type text.		Sewer vertical		Stormwater gully		Potable water stop valves with Tapers
	Disuses sewer main This means the sewer has been disused but remains in the ground.		Sewer pumping station		Stormwater maintenance hole		Potable water closed stop valve
	Sewer maintenance hole with upstream depth invert.		Pressure sewer main These are also found in Vacuum sewer areas.		Disconnected watermain - potable drinking water This means the watermain has been disused but remains in the ground.		Potable water air valve
	Sewer Sub-surface chamber		Pressure sewer Pump unit Alarm, electrical cable and pump unit.		Recycled watermain		Potable water valve
	Sewer Maintenance hole with overflow chamber		Pressure sewer property valve boundary assembly		Special supply conditions - potable drinking water		Potable water scour
	Sewer Ventshaft EDUCT		Pressure sewer stop valve		Special supply conditions - recycled water		Potable water reducer / taper
	Sewer Ventshaft IDUCT		Pressure sewer reducer / taper		Restrained joints - Potable drinking water		Potable water vertical bends
	Sewer property connection point With chainage to downstream maintenance hole.		Pressure sewer flushing point		Sewer concrete encased section		Potable water reservoir
	Sewer concrete encased section		Vacuum sewer division valve		Restrained joints - Potable drinking water		Recycled water is shown as per potable above. Colour as indicated
	Sewer Rehabilitation		Vacuum sewer vacuum chamber		Potable water hydrant		Private potable water main
	Sewer terminal maintenance shaft		Vacuum sewer clean out pot		Potable water maintenance hole		Private recycled water main
	Sewer maintenance shaft		Stormwater pipe		Potable water stop valve		Private sewer main
	Sewer rodding point		Stormwater channel		Potable water stop valve with By-pass		
	Sewer lamphole						

Figure 4: Sydney Water DBYD Map



5. Stormwater Services

5.1 Purpose of this Document

The purpose of this document is to describe the integrated water (stormwater, water and sewer) services in relation to the development at 3-5 Help Street, Chatswood.

5.2 Reference Documents

This report is based on the following reference documents: -

- Survey Plan by SDG, dated 01/07/2021 (Ref No.: 8917);
- Architectural Site Plan – Proposed by EM BE CE Architecture, dated 05/12/2024 (Drawing No. 1011, Job No. 22023);
- Dial Before You Dig.
- Willoughby City Council DCP, 2023
- Technical Standard No.1 – STORMWATER MANAGEMENT, February 2019
- Commercial and Industrial Development Checklist for DA
- Scotts Creek Flood Study, (2008)
- Guidelines for development adjoining land and water managed by DECCW (OEH, 2013)

5.3 Civil Scope of Work

The Civil Services scope of work consists of the following services: -

- Stormwater Drainage works.
- Existing and proposed connections to the drainage system
- Flooding and advice on FFLs
- WSUD requirements
- Sediment and erosion control.

The civil scope for proposed stormwater drainage shall comprise of the in-ground pit and pipe network external to the building and external overland flow paths.

5.4 Limitations

This report is based primarily on the information provided by the architect, design team, survey drawings, and information communicated during the design development process. Any assumptions made through the design process have been communicated in this report.



5.5 Design Criteria

Table 1: Civil Design Criteria

Item	Design Criteria
Stormwater Drainage	Australian Rainfall and Runoff (ARR) 2019 AS/NZS 3500.3-2021 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Willoughby City Council DCP (2023) Technical Standard No.1 – STORMWATER MANAGEMENT (2019)
Flooding and FFLs	Willoughby City Council DCP (2023) Scotts Creek Flood Study (2008)
Sediment and Erosion Control	Landcom 'Blue Book' – Managing Urban Stormwater Soils and Construction Guideline Edition



6. Stormwater Drainage

Design requirements for stormwater management on the site have been set out in the Willoughby City Council DCP (2023). These requirements are summarised in the sections below.

6.1 Stormwater Drainage Design Requirements

The Willoughby City Council DCP 2023 Section 7 refers to Standards No.1 (2019) which clearly states that the following design storm Average Recurrence Intervals (ARI)'s should be allowed for when designing the Stormwater runoff conveyance systems for the development. The site has been considered as a Major Development under Section 5.3 (Willoughby City Council DCP, 2023).

6.1.1 Stormwater Conveyance

- The minor (pipied) drainage system must be designed to convey stormwater runoff for storm events up to, and including, the 1 in 20-year Average Recurrence Interval (ARI) storm event.
- The major (overland) drainage system must be designed to convey stormwater runoff for storm events up to, and including, the 1 in 100-year Average Recurrence Interval (ARI) storm event.

6.1.2 On-Site Detention Requirements

The Technical Standards No.1 (2019), Section 6.2 Design Requirements, states that OSD systems shall be designed in accordance with Council's policy as follows:

In accordance with the Technical Standards No.1 (2019), Section 6, all developments that are not regarded as 'minor' are deemed to be 'major' development. All major developments are required to provide OSD devices and/or other additional water management strategies, such as water sensitive urban design (WSUD) measures.

The volume of storage or the site storage requirement (SSR) for a site must be in accordance with Table 2.

Table 2: Site storage required per area

Zone	Volume of Storage Required m ³ /Ha	Volume of Storage Required m ³ /100m ²
1	327	3.27
2	360	3.6
3	380	3.8
4	315	3.15

According to Appendix 1 of the Technical Standards No.1 (2019), the site is located within Zone 2, therefore the **SSR is equivalent to 82m³**. This SSR needs to be reviewed when taking into consideration the performance of the Council drainage network and overland flow volumes. DRAINS modelling will be used to verify OSD sizing to best manage overland flow levels. This may mean that the OSD tank sizing will need to increase.

Additionally, the Permissible site discharge (PSD) for a site must be in accordance with Table 2 of WDCP Technical Standards No.1 (2019).

Table 3: Site storage required per area

Zone	Permissible Site Discharge L/s/Ha	Permissible Site Discharge L/s/100m ²
1	225	2.25
2	170	1.7
3	180	1.8
4	136	1.36

According to table 3 above, the site is located within Zone 2, therefore the **PSD is equivalent to 39L/s**.



6.2 Stormwater Conveyance

This section of the report discusses the systems proposed to allow for stormwater to be conveyed across the site to the legal point of discharge. As discussed in Section 6.1 of this report council have set serviceability requirements for the stormwater conveyance network such that minor flows are conveyed through piped drainage, and major flows are discharged via controlled overland flow.

6.2.1 Roof Drainage

All roof areas will be drained through a siphonic system. The drainage system will be designed in accordance with AS3500.3-2003 to convey the minor design storm runoff from the roof to the in-ground drainage system. Flows in excess of the design flows will surcharge the roof drainage system and discharge onto the surrounding ground where it will then be conveyed to the surrounding ground drainage within the site.

6.2.2 Surface Drainage

The surface areas will be drained through a variety of methods, discussed below, in accordance with AS3500.3:2003 and Council's stormwater drainage guidelines.

The in-ground drainage has been designed to meet the following criteria:

- In the minor design storm event (1 in 20-year ARI) there will be no surcharging of the in-ground drainage system;
- The new stormwater infrastructure will be designed to suit a minor design storm event (1 in 20-year ARI), where there will be no surcharging of the in-ground drainage system. All stormwater will be controlled within the kerb and gutter network for up to the 1 in 100 year ARI storm.
- In the major design storm event (1 in 100-year ARI) there will be no uncontrolled discharge from the site onto neighbouring properties or the surrounding street

Surface runoff from the developments roof will be directed to stormwater inlet structures using the design topography of these elements. The inlet structures have been designed to adequately convey the surface runoff into the in-ground drainage network.

The runoff will then be conveyed underground across the site to the on-site detention basin and then the legal point of discharge using gravity and the geometric falls of the pipe system.

A portion of the outlet pipe from Pit 01\01 runs through the basement and is proposed to be strapped to the shoring wall.

6.3 Legal Point of Discharge

During construction, any runoff that is generated will be collected in a sediment basin located within the lowest point of site. The runoff generated during rainfall events is then discharged via 225mm pipe along the kerb inlet on Cambridge Lane.

An existing kerb inlet pit within Help Street will be utilised for the connection of site stormwater. Stantec propose a new kerb inlet pit adjacent to the proposed site for the stormwater to discharge into, which shall connect into the existing kerb inlet pit further east in Help Street. Refer to the stormwater drainage plan shown in Appendix A, for further clarification on the proposal.

Any infrastructure upgrades and work within the public domain and roadways, will need to be constructed in accordance with Council's "Infrastructure Specification for Roadworks, Drainage and Miscellaneous Works".

6.4 Proposed Site Stormwater Design

The existing site is approximately 90% impervious and is assumed to not have any OSD catering for the development. Using DRAINS to model this pre-development scenario, it was determined that the existing pre-development site discharge rate is 171L/s.



As part of the 3-5 Help St development, an OSD with orifice, designed in accordance with WCC's stormwater management policy and Technical Standard No. 1, shall capture the total site area and discharge to the existing stormwater pit further east in Help Street. The OSD tank flows have been entered into the model as piped flow. The post developed site is approximately 91% impervious.

The post development hydraulic model has been developed based on Willoughby Council's Technical Standards No.1 (2019), Section 6.2 Design Requirements site storage requirements which require the tank to be approximately 82m³. The proposed OSD provides 83.23m³ of storage volume. This SSR has been reviewed when considering the performance of the council drainage network and overland flow volumes. DRAINS Modelling has also been used to verify OSD sizing to best manage overland flow levels.

Table 4: On-Site Detention Tank Specifications (Modelled for 1% AEP Storm Event)

Area Reticulating to OSD (Ha)	Required SSR (m ³)	Required PSD (L/s)
0.195	82	39
	Provided SSR (m ³)	Provided PSD (L/s)
	83.23	65

As described in Section 6.1.2, the total permissible site discharge in accordance with WDCP Technical Standards No.1 (2019) is 39L/s. This includes flows from the OSD as well as flows bypassing the OSD system. Through DRAINS modelling, it has been determined that the flows from the OSD in the 1% AEP storm event as 39L/s, and flows bypassing the system are 26L/s. Overall, this gives a discharge flow rate of 65L/s from the site which is greater than the required PSD of 39L/s. Conducting a pre- vs post-development comparison of flows (table 5 below) however, it is clear that through the introduction of OSD and a flow-limiting orifice, the post-development are significantly reduced compared to the existing condition. Specifically, in the 1% AEP storm event, there is a 62% reduction in site discharge between the existing and proposed scenarios.

Table 5: Pre and Post-Development PSD Rates

Storm Event	Pre-Development PSD (L/s)	Provided Post-Development PSD (L/s)
1% AEP	171	65
5% AEP	128	52
10% AEP	111	45
20% AEP	93	39
50% AEP	67	30

Willoughby City Council's Technical Standard Clause 6.2 requires that the outlet of the OSD system is to be above the downstream 1% AEP water level. For an inground OSD tank in the proposed location of this development, this is nearly impossible to achieve, due to the high 1% AEP water level within the existing adjacent stormwater network. Based on the Detailed Catchment Analysis and subsequent flood impact analysis, the downstream 1% AEP water level is at a level that does not align with any drainage strategy for either the existing or proposed development. As such, assessment of the proposed stormwater network was completed to ensure that any proposed system reduced site discharge and in turn



minimised downstream flooding extents. The proposed design was to aim at aligning with Willoughby City Council's Stormwater policy objectives.

Setting the downstream outlet water level at the connection into Council's network at 91.33m – representative of the top of kerb level – DRAINS analysis demonstrates that our proposed design does not align with DA Consent Condition 16 which states that the OSD outlet must be above the downstream water level. As shown in figure 5 below, the invert level of the OSD outlet is not above the downstream water level. Despite this, in all storm events up to and including the 1% AEP event, the proposed network has adequate capacity to overflow safely into the road reserve, as confirmed by a HGL analysis in DRAINS.

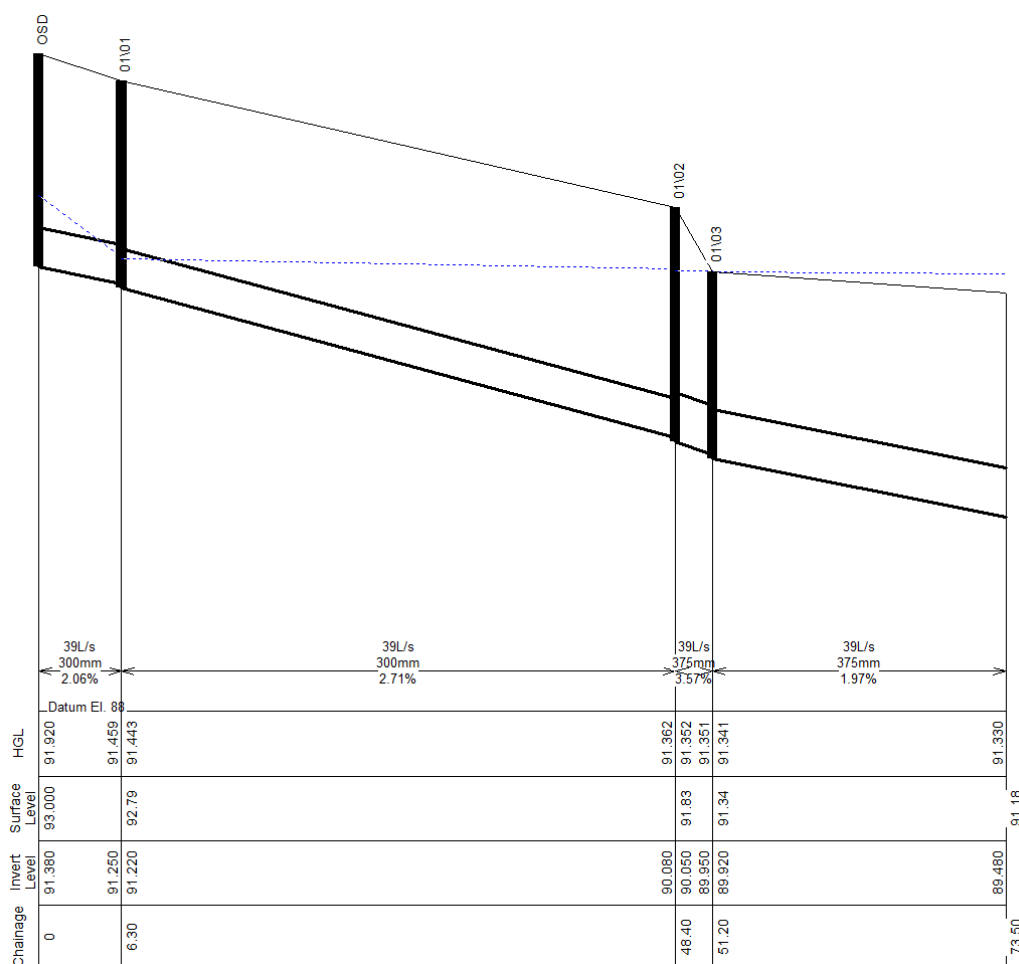


Figure 5: HGL Analysis Long Section (Source: DRAINS Modelling)

DA Consent Condition 16 cites the prevention of property damage as justification of the nominated stormwater requirements. As shown throughout this section of the report, the introduction of OSD to the site will result in a reduction of discharge flows by 62% which is significantly minimising the subsequent downstream flows along Help Street in the 1% AEP storm event. The system will also remain fully operational during all storm events, and therefore by reducing flows along the downstream road reserve, our proposed network represents a prevention of property damages.

Given the nominated building levels, site grading and associated levels of the downstream connection point, meeting requirements for the total site PSD and the OSD outlet IL being above the downstream water level in the 1% AEP would require a significantly larger OSD tank which is not feasible for the site constraints and purpose of the development. As such, we consider that our proposed site stormwater design is adequate for this development considering general best practices, feasibility and the overall objective to prevent property damages.

In the following Section 6.5, our proposed design will be compared to the objectives of Willoughby City Council's Technical Standard to demonstrate how it satisfies Council's intentions despite not meeting all design requirements.



6.5 Alignment of Proposed Stormwater Design to Willoughby City Council Technical Standard Objectives

The following objectives are taken from the Willoughby City Council Technical Standard Section 2.

Table 6: Alignment of Proposed Stormwater Design to Willoughby Council Objectives

Willoughby Council Technical Standard Objective	Proposed Stormwater Design Alignment to Objective
Regulate development to ensure that it does not contribute to increased flood risk	Refer Section 6; As shown in Table 5, the total volume of runoff being discharged in the post-development scenario is reduced in all storm events up to and including the 1% AEP event compared to the pre-development scenario, thus minimising downstream flooding extents. The reduction of stormwater runoff from the site in the 1% AEP storm is by 263%. The OSD is fully operational in all storm events up to and including the 1% AEP event, and the network has adequate capacity to overflow safely into the road reserve, as determined by HGL analysis in DRAINS. This contributes to a reduction in flood risk
Manage the change in discharges from development sites by source control	Refer Section 6; The OSD discharge flow rate is managed via an orifice plate which restricts the volume of flow from the OSD. Refer to <i>Stormwater Drainage Details Sheet 2</i> in Appendix A for orifice plate details
Minimise adverse environmental impacts caused by increased stormwater runoff by reducing the total volume of runoff being discharged from individual properties	Refer Section 6; As shown in Table 5, the total volume of runoff being discharged in the post-development scenario is reduced in all storm events up to and including the 1% AEP event compared to the pre-development scenario. The reduction of stormwater runoff from the site in the 1% AEP storm is by 263%.
Minimise the use of mains supplied water by encouraging water conservation through the reuse of rainwater	Refer Section 8; A 5kL rainwater reuse tank has been proposed for the development. Water collected will be reused for 250 square metres of common landscaped areas on the site.
Provide an effective framework for the installation and ongoing maintenance of OSD systems and rainwater reuse tanks	Refer Section 10; Stormwater Network Maintenance Schedule provided which details modes of inspection and maintenance, and frequency of maintenance on all stormwater items including OSD and rainwater tanks, and Storm Filter Cartridges. Maintenance Schedule formed in accordance



	with manufacturer recommendations/requirements and general best practice
Ensure compliance with all codes, guidelines and legislation relating to OSD and rainwater reuse tanks	Refer Section 10; Stormwater Network Maintenance Schedule provided which details modes of inspection and maintenance, and frequency of maintenance on all stormwater items including OSD and rainwater tanks, and Storm Filter Cartridges. Maintenance Schedule formed in accordance with manufacturer recommendations/requirements and general best practice
Minimises water pollution from new developments	Refer Section 8; Water sensitive urban design pollutant reduction requirements satisfied through the introduction of a rainwater reuse tank, OSD tank and Ocean Protect Storm Filter Cartridges
Protects the water quality of natural watercourses and receiving waters by preventing further deterioration of the water quality, riparian zones and aquatic ecosystems due to development	Refer Section 8; Water sensitive urban design pollutant reduction requirements satisfied through the introduction of a rainwater reuse tank, OSD tank and Ocean Protect Storm Filter Cartridges
Maintain public health and safety	Refer Section 6 and 7; The introduction of OSD will significantly reduce the volume flow rate discharging into the Council network in all storm events up to and including the 1% AEP event. Adequate overflow route provided to guide and limit stormwater runoff into the road reserve extent. In addition where overland flow is expected from site, it has been assessed to have a VxD under 0.2 in all storm events, but primarily the 1% AEP where most site runoff is generated., This is considered safe for pedestrian movement.

7. Flooding

When considering a new development, it is important to assess the impact of existing flooding on the proposed development and the impact of the proposed development on existing or potential flooding both upstream and downstream of the development.

7.1 Existing Flooding

7.1.1 Regional Flooding

The site has been identified in the Scotts Creek Flood Study (2008) as not flood prone land and hence isn't subject to any flood planning controls. However, during a Pre-DA meeting, Council has identified that the property is subject to flooding as a result of overland flow.



7.1.2 Local Flooding

The proposed development site is located within the upstream reaches of the Scotts Creek catchment. A flood study was commissioned by Willoughby City Council and the Department of Environment and Climate Change, and undertaken by Lyall and Associates, for the Scotts Creek catchment in 2008. This flood study defined indicative flooding extents for flood events ranging from the 20% AEP to the PMF flood event. Flood hazard and hydraulic categorisation were defined for the 5% and 1% AEP flood events.

Flood behaviour was defined using a hydrological DRAINS rainfall-runoff routing model, to determine flood flows in the catchment, and a hydraulic model of overland flow path based on a HEC-RAS 1D model, to model flood levels in Scotts Creek. The flood mapping for this project extends from Chatswood Chase near Havilah Street to the east to discharge to Castle Cove near Eastern Valley Way. The proposed development site and its surrounds are therefore not included in the mainstream floodplain of Scotts Creek.

A separate report has been prepared by Stantec (Detailed Catchment Analysis, Ref: 301351072-CV-RP-002, Dated: 20/12/24) that reviews and assesses the existing catchment upstream of site. This report reviews pre-development overland flow levels to provide design advice for the proposed development.

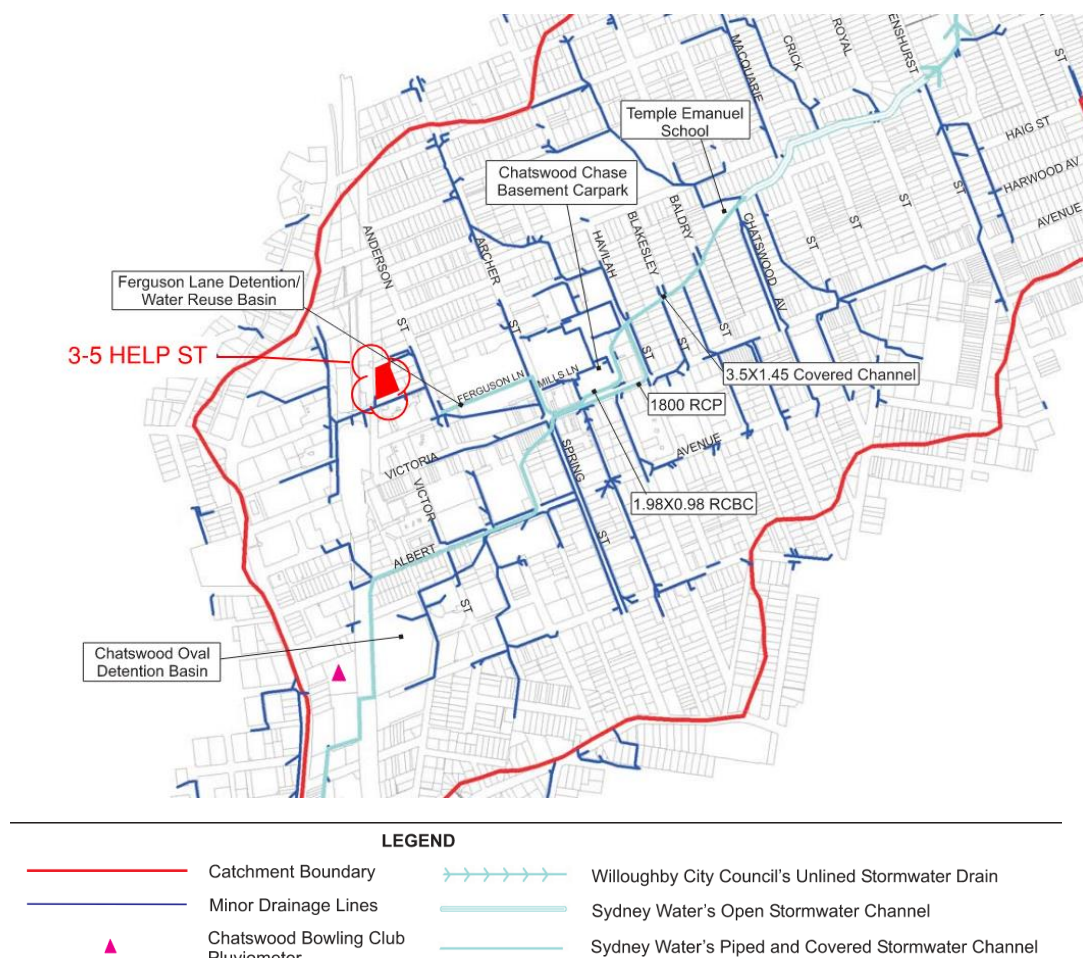


Figure 6: Scotts Creek Flood Study (2008)

7.1.3 Flood Impacts

Refer to the Detailed Catchment Analysis report prepared by Stantec (Ref: 301351072-CV-RP-002, Dated: 20/12/24) that reviews and assesses the existing catchment upstream of site.

The site is not currently impacted by flooding and the proposed stormwater network will ensure the development will not increase outflows from the site as such, the site will not have an impact on flooding.

8. Water Sensitive Urban Design

8.1 Proposed Stormwater Treatment Plan

The development on this site will involve disturbance of the soil surface, thus erosion, sediment and pollution controls need to be implemented. This development must achieve a minimum percentage reduction of the post development average annual load of pollutants in line with Table 7 below.

Table 7: Willoughby City Council Required Pollutant Reduction Targets

Pollutant	Post development average annual load Reduction Target	Post development average annual load Reduction
Gross Pollutants	90%	98.6%
Total Suspended Solids	85%	86.4%
Total Phosphorous	60%	80.3%
Total Nitrogen	45%	53.9%

To achieve the above reduction targets, treatment devices are to be used in the stormwater network; ultimately forming a stormwater train. Stormwater primary treatment is used initially to remove gross pollutants and coarse sediments, followed by a secondary treatment used to remove oils and fine particles, finally a tertiary treatment is used to remove heavy metals and nutrients.

Table 8: Catchment Type

Type of Catchment	Catchment Area (ha)
Roof Area	0.071
Trafficable Roof	0.065
Missed Ground	0.059
Bypass	0.004



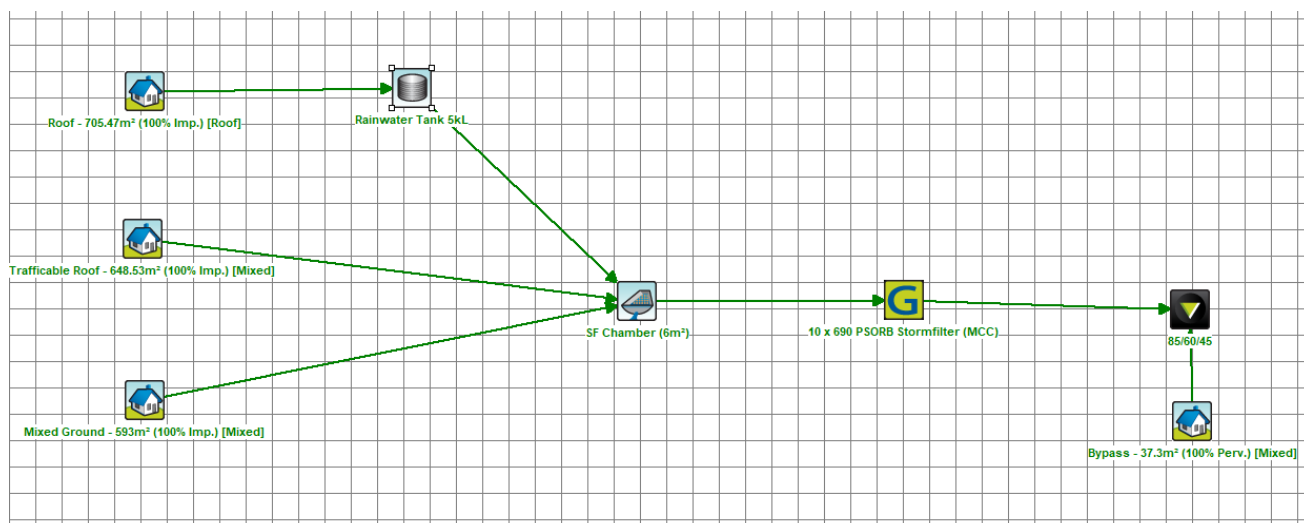


Figure 7: MUSIC Model Treatment Train

	Sources	Residual Load	% Reduction
Flow (ML/yr)	2.2	2.12	3.7
Total Suspended Solids (kg/yr)	270	36.8	86.4
Total Phosphorus (kg/yr)	0.528	0.104	80.3
Total Nitrogen (kg/yr)	4.81	2.22	53.9
Gross Pollutants (kg/yr)	53.2	0.745	98.6

Figure 8: MUSIC Modelling Results

The Water Technical Manual (2014) refers to the 'Managing Urban Stormwater: Treatment Techniques' which refers to 'Managing Urban Stormwater: Treatment Techniques (1997). We have modelled the catchment in MUSIC in accordance with the following guidelines & parameters;

- Music version 6.2.1
- "Draft NSW MUSIC Modelling Guidelines", Sydney Catchment Management Authority (August 2010)
- SF Chamber node modelled with 'k' values set to 1
- Rainfall Station 66062 Sydney Observatory Hill, 6 Minute Time Step 1962 To 1966
- Sydney Catchment Management Authority (CMA) Source Node(s) utilizing modified % impervious area, rainfall threshold, soil properties & pollutant concentrations
- No drainage routing between nodes

In order to demonstrate that the proposed treatment train meets the required reduction targets, a pollutant reduction model has been generated using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Software program Version 6.3 by eWater CRC. Pollutant export rates are currently only available for Total Suspended Solids (TSS), Total Nitrogen (TN), Total Phosphorus (TP) and Gross Pollutants (GP). Therefore, only quantitative modelling for TSS, TN, TP & GN has been undertaken using MUSIC.

Modelling has only been undertaken on the post-development proposal with SQID's installed so as to demonstrate the percentage reduction for each pollutant type.

The proposed treatment train includes the following:

- 10x 690mm Psorb Cartridge Filters from Ocean Protect proposed within the On-Site Detention Tanks



Ocean Protect Filter Cartridges

The Ocean Protect Cartridge Filters clean stormwater through a patented passive filtration system, effectively removing pollutants to meet regulatory requirements. This treatment system uses rechargeable, self-cleaning, media-filled cartridges to absorb and retain pollutants from stormwater runoff including total suspended solids, hydrocarbons, nutrients, soluble heavy metals and other common pollutants.

- OSD Tank will consist of 10 x 690 Psorb StormFilter Cartridges

Rainwater Re-Use Tanks

A Rainwater Tank is a water storage system designed to be installed on an industrial/ business development to catch rainfall on roof surfaces. These tanks can provide water for non-potable uses such as, toilet flushing, hot water, laundry washing, vehicle washing, irrigation, and industrial wash down. The proposed Rainwater tank shall be incorporated into the stormwater drainage system and will collect run-off from non-trafficable roof area in the development. A 5kL RWT has been proposed for the site.

Table 9: Recycle Water Demand Rates

Rainwater Tank Volume (kL)	Roof area (m ²) total	Water Demand (kL/year)
5	705.47m ²	100

The proposed Rainwater tank is approximately 5kL, with a surface area of 5m², and tank depth of 1m. Applying reuse to 250 square metres for irrigation, the tank allows for 81.59% of rainwater reuse. Of note, the model does not include daily demand use from non-potable uses including toilet flushing, hot water and laundry washing.

Node Water Balance - Rainwater Tank 5kL					
	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	0.83	21.76	0.13	1.82	19.85
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	0.75	18.51	0.11	1.63	0.00
Weir Out	0.00	0.00	0.00	0.00	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.08	1.30	0.01	0.17	0.00
Reuse Requested	0.10	0.00	0.00	0.00	0.00
% Reuse Demand Met	81.59	0.00	0.00	0.00	0.00
% Load Reduction	9.80	14.94	11.19	10.59	100.00

Figure 9: Rainwater Tank Reuse Demand Target

The arrangement and location of the rainwater tank can be reviewed on the stormwater management documents included in Appendix A of this report.



9. Erosion & Sedimentation Control

Landcom have published a design guide entitled “Managing Urban Stormwater - Soils and Construction” which is regarded as the standard to which erosion and sedimentation control should be designed to within NSW.

The control of erosion and sedimentation describes the measures incorporated during and following construction of a new development to prevent the pollution and degradation of the downstream watercourse.

According to Section 3.2 of the Technical Standard No.3 (2019) a Soil and Water Management Plan is required as outlined under the conditions outlined below.

Development Applications must include a soil and water management plan if:

- The proposed area of soil surface exposure is 2000m² or more
- The development contains 10 or more parking spaces
- New commercial, industrial or institutional development

The soil and water management plan must specify proposed measures to control erosion and pollution sources of water both during and after the construction phases.

The Willoughby Council DCP (2023), Technical Standard No.3 (2019) Section 3.1 Site Management Plan and WSUD indicates that a Sediment & Erosion plan (Site Management Plan) is not required as the site area exposed is > 2,000m². We note that at all times a minimum of 300m² of the site will not be exposed or under construction. Upon instatement of basement slab structure, the soil is not considered exposed.

Council may require a Site Management Plan to be lodged for consideration prior to issue of a Construction Certificate for a proposed development. However, all Development Applications shall require the inclusion of a Site Management Plan where the proposed development will expose a soil surface area:

- greater than 250 square metres up to 2,000 square metres, or
- less than 250 square metres if the site:
 - o immediately adjoins public open space or a watercourse, or
 - o is on a slope exceeding 18 degrees, or
 - o involves cut or filling of the land which will alter the rate, volume or direction of overland flow, or
 - o where a new residential, commercial or industrial building is proposed to be demolished and/or constructed.

Figure 10: Technical Standard No.3 (2019) - Section 3.1.

Disturbed Area (m ²)	Typical Activities	Submission Requirements
<250	Alterations and additions such as house extensions, small driveways, carports and garages which are <u>not</u> : • adjacent to public open space or a watercourse, • located on a slope exceeding 18 degrees, or • involving any cut or filling of the land which may alter the rate, volume or direction of overland flow.	A brief written statement on the proposed water management measures and expected performance levels is to be included in the SEE submitted with the Development Application. It should be noted that, prior to disturbing any land or stockpiling building materials, appropriate sediment and erosion controls are to be installed and continually maintained to prevent pollution of downstream waterways.
250 to 2,000	New house, commercial, dual occupancies, multi unit residential, small industrial complexes, subdivision and infrastructure construction. Alterations and additions that are: • adjacent to public open space or a watercourse, • on a slope exceeding 18 degrees, or • involves cutting or filling the land which may alter the rate, volume or direction of overland flow.	A Site Management Plan is to be submitted to Council for approval prior to issue of any Construction Certificate. The plan should specify proposed sediment and erosion control measures for each stage of the construction activity i.e. demolition, excavation and construction. Refer to Section 2.1 of this Technical Standard for submission details.
>2,000	Large multi unit residential, commercial, institutional, industrial developments or development containing more than 10 car parking spaces	A Soil and Water Management Plan is to be submitted with the Development Application specifying proposed measures for the control of erosion and pollution of water both during and after construction. Calculations as to the need for a sediment basin should be included. Refer to Section 2.2 of this Technical Standard for submission details.

Figure 11: Guide to Submission Requirements - Section 3. Technical Manual No.3.



9.1 Stormwater Drainage Infrastructure Inlets

Risk:

- Sediment from the construction site washing into the existing stormwater drainage inlet infrastructure.

Consequence:

- The sediment will then be conveyed into the downstream waterbody by stormwater runoff, contaminating the waterbody.
- The sediment will build up blocking the stormwater infrastructure and preventing stormwater conveyance to the downstream waterbody and impacting drainage upstream.

Mitigation:

- Sediment traps protection will be installed surrounding all existing stormwater drainage infrastructure inlets to prevent sediment entering the system.
- Temporary Stormwater Systems are to be installed where required to capture all site runoff within the zone of excavation. Runoff will be allowed to settle out suspended particles and debris, and an acceptable water of 50mg per litre of Non-Filterable Residues (NFR) is required to be achieved prior to discharge.
- Installation of a fence around the perimeter of the basin is required as well as a rip rap to allow for bobcat access for periodic removal of sediment. Also, a perforated riser outlet pipe needs to be placed for the connection and discharge to an existing pit.

Maintenance:

- Frequent inspection of the sandbags to ensure they are arranged in a manner that prevents sediment from accessing the drainage system. If sediment is building up on the sandbags they should be cleared of sediment and re-established.
- All soil erosion and sediment control structures including temporary sediment basins and sediment traps shall be inspected following each storm event and any necessary maintenance work shall be undertaken to ensure their continued proper operation.

9.2 Construction Exit Protection

Risk:

- Spoil such as soil being conveyed from the site on the wheels of vehicles.

Consequence:

- Spoil being tracked onto the public road corridors where it is then washed into the existing stormwater drainage infrastructure and is then washed downstream polluting the downstream waterbody.
- Spoil being tracked onto the public road creating dangerous driving conditions for other road users.

Mitigation:

- A shaker grid and wash down facility will be installed at all exits from the construction site. All vehicles leaving the site will have their wheels washed down and pass over the shaker grid to remove any spoil collected on their wheels and retaining the spoil on site.

Maintenance:

- Frequent inspection of the shaker grid to ensure it is clean and still functioning.



9.3 Downstream Site Boundaries

Risk:

- Rainfall runoff falling on the site collecting sediment from the construction site and conveying it overland onto downstream properties and waterbodies.

Consequence:

- Sediment discharge polluting downstream properties and waterbodies.

Mitigation:

- Installation of sediment fences on all downstream boundaries of the site to collect sediment and prevent it discharging onto downstream properties or waterbodies.

Maintenance:

- Regular inspection of the sediment fences to ensure they are functioning correctly and are intact.
- If sediment build up is present it should be removed to ensure correct functionality of the fences.

9.4 Sediment Runoff

Risk:

- Sediment from the construction site washing into the existing stormwater drainage inlet infrastructure.

Consequence:

- The sediment will build up blocking the stormwater infrastructure and preventing stormwater conveyance to the downstream waterbody and impacting drainage upstream.

Mitigation:

- One sediment basin will be installed, and all overland flow directed towards them. The basins will attenuate stormwater flows allowing for the settlement of sediment preventing discharge into the downstream infrastructure.

Maintenance:

- Frequent inspection of the basins to ensure there is sufficient volume for the storage of settlement. If there is insufficient storage the basins should be cleared of sediment and re-established.



10. Stormwater Network Maintenance Schedule

In order to ensure the ongoing effective operation of the stormwater network and water quality treatment devices, the devices must be maintained in accordance with manufacturer recommendations/requirements and general best practice. It is noted that all pits are to be inspected in a safe manner that assesses localised risk and in accordance with maintenance contractor safe work method statements. The below summarises the various stormwater network components that will need to be maintained, whilst Schedule 1 below details required maintenance of specific items within the network requiring maintenance.

10.1 Pit and Pipe Network

A general inspection of the stormwater pit network is to be undertaken every six (6) months and after major storm events. The general inspection involves visual inspection inside pits, removal and disposal of larger gross pollutants within pits in accordance with waste disposal regulations to prevent blockages, and minimal rectification works as required. Inspection of general pits can coincide with inspection and maintenance of water quality pit inlets (if applicable).

10.2 Water Quality Treatment Devices

The filtration inserts, located within the pits, are to undergo minor service every three (3) months and after major storm events or a hazardous material spill. This involves inspection and evaluation of the filter bad and its condition, removal of captured pollutants, and the appropriate disposal of captured material in accordance with waste disposal regulations. The minor service is designed to return the ocean guard back to optimal operating performance. An inspection of the condition is to be particularly undertaken following major storm events to check for damage and higher than normal sediment accumulation. Refer to manufacturer's maintenance procedures for details of safely undertaking hand maintenance or vacuum maintenance of the ocean guards.

A major service of the ocean guards is undertaken on an as-required basis and involves the inspection of ocean guards to determine the need for filter bag replacement and support frame rectification. Replacement is based on the outcomes from the minor service whereby damage is detected. Contact manufacturer for assessment and replacement components and refer to manufacturer's maintenance procedures for safely replacing components.

A general inspection of the filtration cartridges located in a Stormfilter chamber within the OSD tank, is to be undertaken every six (6) months and after major storm events or a hazardous material spill. The general inspection involves visual inspection of the Stormfilter cartridges and chamber, removal and disposal of larger gross pollutants from the device in accordance with waste disposal regulations to prevent blockages, and minimal rectification works as required. Cartridges are also to be checked to ensure they are all firmly connected to the connectors.

A minor service of the Stormfilters, undertaken every twelve (12) months and after major storm events or a hazardous material spill, involves the evaluation of the Stormfilter cartridges and media, removal of accumulated sediment and a wash-down of the Stormfilter chamber. Refer to Ocean Protect maintenance procedures for details of safely undertaking maintenance of the Stormfilter cartridges. During this service, the cartridge media is to be inspected and replaced if it is revealed that the cartridge media is exhausted. If this is the case, a major service is to be undertaken to replace the Stormfilter cartridge media. Contact manufacturer for assessment and replacement components and refer to manufacturer's maintenance procedures for details of safely replacing the media components.

10.3 Inground Rainwater Tank

A general inspection of the underground rainwater tank is to be undertaken every six (6) months and after major storm events, or a hazardous material spill. The general inspection requires an inspection and the first flush pit to ensure correct operation, a check for debris, litter or access by animals, birds or insects including the presence of mosquito larvae. If present, identify access point and close. If evidence of algal growth, find and close points of light entry.

A major inspection of the underground rainwater tank is to be undertaken every twelve (12) months and after major storm events or hazardous spill. The major inspection is to include a general wash down of the water tank, replacement of any damages done due to animal/insect presence and removal any debris accumulated in low spots of tank.



10.4 Stormwater Maintenance Schedule

Maintenance Action	Frequency	Responsibility	Procedure
Pit and Pipe Network			
Blockages of inlet and outlet pipes within pits	Six Monthly	Maintenance Contractor	Remove grate. Remove any debris/litter/sludge from within pits.
Condition of inlet grates	Six Monthly	Maintenance Contractor	Clear vegetation and any debris from the pit grate and repair as required.
Condition of pit structures and section of pipes at inlets/ outlets.	Two Years	Maintenance Contractor	Remove grate to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required. Notify structural engineer if detrimental features observed.
Overland flow paths and drainage swales	Six Monthly	Maintenance Contractor	Walk along the flow path and swale. Check batters and condition of path extent. Remove any debris/litter/sludge.
Survey pipe condition with CCTV's and repair defects as necessary	Five Years	Maintenance Contractor	Remove grate. Clear blockages for camera access. Operate camera in accordance with manufacturer specifications and operator standard procedures.
OSD and Discharge Control			
Blockage of orifice plate	Six Monthly	Maintenance Contractor	Remove grate and screen to inspect orifice. See attached Site Stormwater plan for location of Discharge Control Pit.
Orifice structure size and connection to wall	Five Years	Maintenance Contractor	Compare orifice diameter to approved design (see Works as Executed Drawing) and ensure edge of orifice is not pitted or damaged.
Trash rack blockage	Six Monthly	Maintenance Contractor	Remove grate and screen if required to clean it.
Trash rack condition and connection to wall.	Annually	Maintenance Contractor	Remove grate and rack screen. Check corrosion in particular corners. Check screen fixings to wall for stability and corrosion. Repair as required.
Condition and performance of flap valves	Annually	Maintenance Contractor	Remove grate. Test valve hinge by moving flap to full extent and allowing it to drop back into normal position. Flap should freely swing at hinge.



Blockage of overflow weirs	Six Monthly	Maintenance Contractor	Remove grate and open cover to ventilate underground storage if present. Ensure weir clear of blockages.
Tank and pit wall defects and structural adequacy.	Two Years	Maintenance Contractor	Remove grate to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Tank slab build-up of sediment and sludge.	Six Monthly	Maintenance Contractor	Remove grate and screen. Remove sediment/ sludge build up, check orifice and flap valves are clear.
Condition and fixing of step irons	Two Years	Maintenance Contractor	Remove grate to inspect step irons and connection into wall. Repair as required. Notify structural engineer if detrimental features observed.
OSD warning signage	Two Years	Maintenance Contractor	Remove grate to inspect signage and connections. Check for fading in sign and any vegetation growth over or near sign impacting visibility. Repair as required.
Water Quality Devices			
Blockages and debris within stormwater pit filtration inserts/ storm sacks	Six Monthly	Maintenance Contractor	Remove grate. Remove any debris/litter/sludge from within inserts.
Blockages and debris within filtration tanks and devices	Six Monthly	Maintenance Contractor	Remove grate. Remove any debris/litter/sludge. Hose out tank and devices from outside tank.
Blockages and debris within filtration cartridges inside storage tanks.	Six Monthly	Maintenance Contractor	Remove grate. Remove any debris/litter/sludge. Hose out tank and devices from outside tank.
Blockages and water conveyance within filtration stormwater lines	Annual	Maintenance Contractor	Remove grate. Flow water through filtration stormwater line from inspection openings to remove blockages.
Condition of stormwater pit filtration inserts/ storm sacks	Annual	Manufacturer's Contractor	Remove inserts from pit to inspect. Repair as required.
Condition and performance of treatment tank components	Annual	Manufacturer's Contractor	Remove grate and follow SWMS procedures to enter into the tank. View and repair damaged components.
Condition and performance of filtration cartridges	Annual	Manufacturer's Contractor	Remove cartridges from pit to inspect. Repair as required.



Appendix A Civil Design Documentation





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MIXED USE MULTI-STOREY
DEVELOPMENT
3-5 HELP STREET

3-5 HELP STREET,
CHATSWOOD,
NSW 2067

ISSUE FOR SSDA
18.02.2025

Stantec Project Number: 301351072

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DRAWING LIST	
NO.	DRAWING NAME
CI-000-001	COVER SHEET, DRAWING REGISTRY AND LOCALITY PLAN
CI-007-001	GENERAL NOTES
CI-030-001	DEMOLITION PLAN
CI-050-001	EXISTING CONDITIONS PLAN
CI-060-101	GENERAL ARRANGEMENT PLAN - BASEMENT
CI-060-201	GENERAL ARRANGEMENT PLAN - LOWER GROUND FLOOR
CI-060-301	GENERAL ARRANGEMENT PLAN - UPPER GROUND FLOOR
CI-070-001	EROSION AND SEDIMENT CONTROL PLAN
CI-076-001	EROSION AND SEDIMENT CONTROL DETAILS
CI-100-001	BULK EARTHWORKS PLAN
CI-400-001	PUBLIC DOMAIN AND PAVEMENT PLAN SHEET 1
CI-400-002	PUBLIC DOMAIN AND PAVEMENT PLAN SHEET 2
CI-406-001	CIVIL DETAILS
CI-500-001	STORMWATER DRAINAGE - CATCHMENT PLAN
CI-522-001	STORMWATER DRAINAGE - LONGITUDINAL SECTIONS
CI-526-001	STORMWATER DRAINAGE DETAILS SHEET 1
CI-526-002	STORMWATER DRAINAGE DETAILS SHEET 2



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Project No. 301351072	Scale NTS
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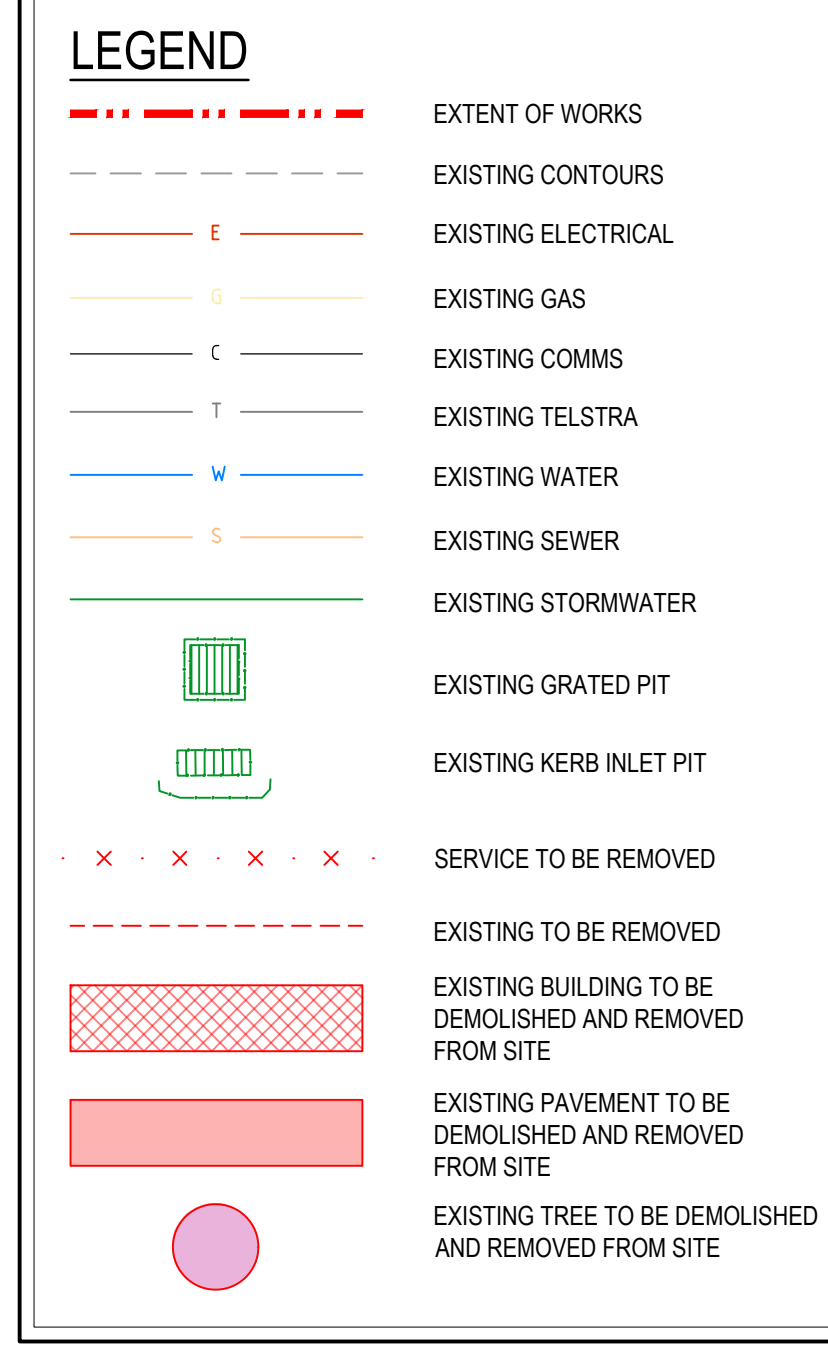
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D	ISSUE FOR DA	LPT	VE	2024.05.
C	ISSUE FOR DA	BCH	JMB	2023.06.
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.
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C	ISSUE FOR DA	BCH	JMB	2023.06.15
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.09
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.01
Issued/Revision		By	Appd	YYYY.MM.DD
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E	ISSUE FOR SSDA	PDP	JMB	2024.12.19				
D	ISSUE FOR DA	LPT	VE	2024.05.22				
C	ISSUE FOR DA	BCH	JMB	2023.06.17				
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.17				
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.17				
Issued/Revision				By	Appd	YYYY.MM.DD		
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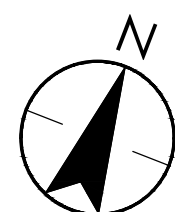
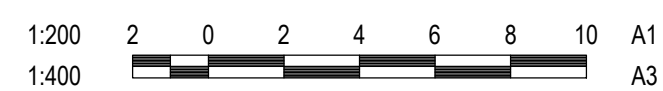
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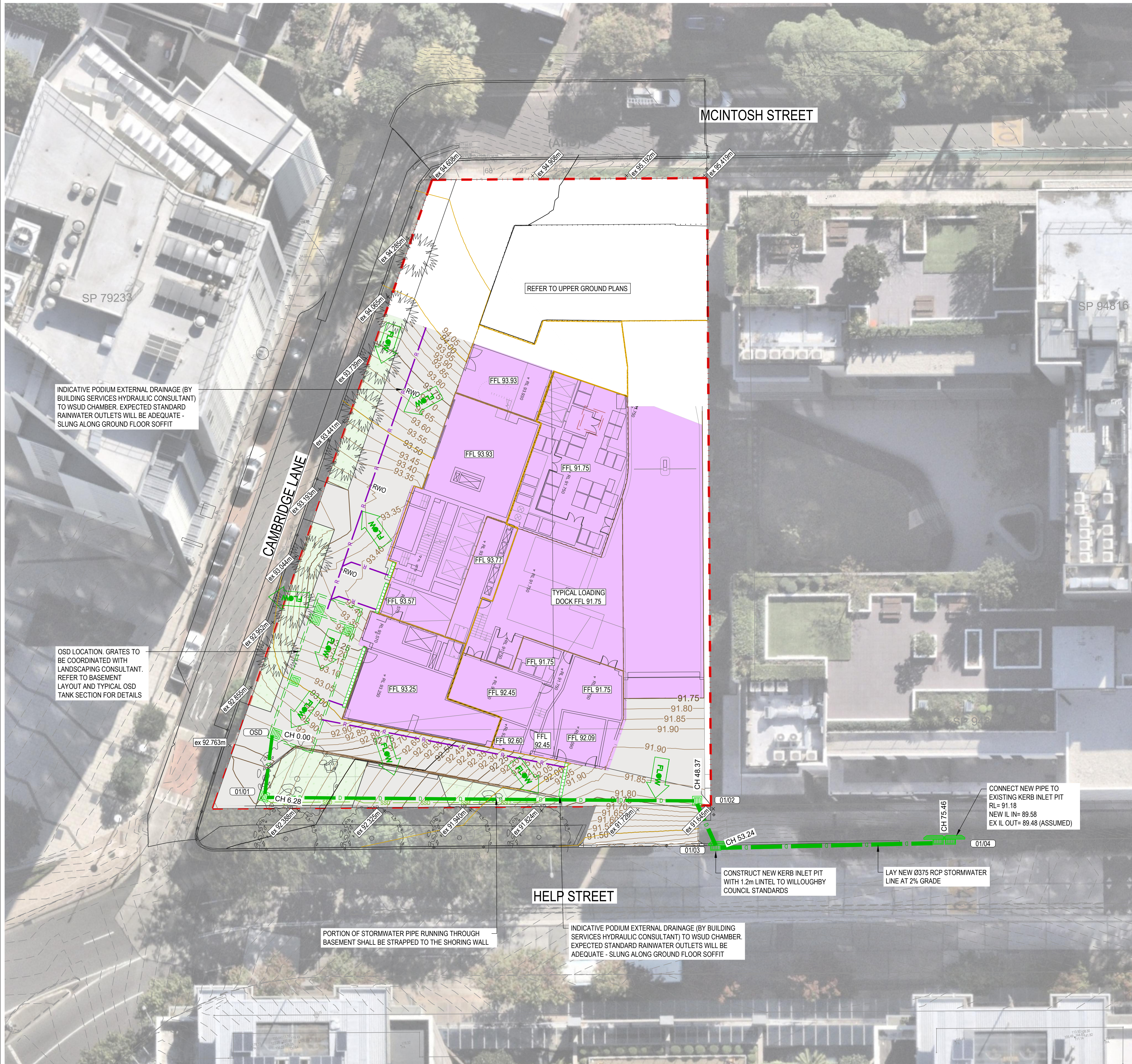
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Title
GENERAL ARRANGEMENT PLAN -
BASEMENT

Project No. 301351072	Scale 1:200
Revision F	Drawing No. CI-060-101





LEGEND

	PROPOSED SITE BOUNDARY
	PROPOSED BUILDING
	PROPOSED STORMWATER PIPE
	EXISTING STORMWATER PIPE
	PROPOSED JUNCTION PIT
	EXISTING JUNCTION PIT
	PROPOSED GRATED PIT
	EXISTING GRATED PIT
	PROPOSED KERB INLET PIT
	EXISTING KERB INLET PIT
	ON SITE DETENTION TANK
	RAINWATER TANK
	OVERLAND FLOW
	PROPOSED RAINWATER PIPE
	PROPOSED GRATED DRAIN
	PROPOSED SUBSURFACE DRAIN
	PROPOSED SWALE
	SERVICE TO BE REMOVED
	PIT LABEL
	RETAINING WALL
	PROPOSED RAINWATER OUTLET
	PROPOSED DOWNPIPE
	KERB AND GUTTER
	KERB ONLY

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Notes

I	ISSUE FOR SSDA	PDP	JMB	2025.02.18
H	ISSUE FOR SSDA	PDP	JMB	2024.12.13
G	COMMENTARY ON SHORING WALL	LPT	JMB	2024.05.12
F	ISSUE FOR DA	LPT	VE	2024.05.24
E	ISSUE FOR DA	LPT	JMB	2024.01.11
D	ISSUE FOR DA	LPT	JMB	2023.11.27
C	ISSUE FOR DA	BCH	JMB	2023.06.15
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.09
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.01

Issued/Revision By Appd YYYY.MM.DD

File Name: 301351072-CH060-201.DWG
Dwn. Dsgn. Chkd. 2023.06.01
YYYY.MM.DD

Issue Status

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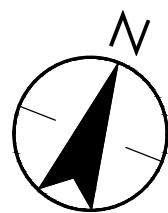
Client/Project
LOFTX CHATSWOOD PTY LTD

CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
GENERAL ARRANGEMENT PLAN -
LOWER GROUND FLOOR

Project No. 301351072 Scale 1:200
Revision 1 Drawing No. CI-060-201



Issued/Revision		By	Appd	YYYY.MM
File Name: 301351072-CI-060-301.DWG	-	-	-	2023.06
	Dwn.	Dsan.	Chkd.	YYYY.MM

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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
GENERAL ARRANGEMENT PLAN -
UPPER GROUND FLOOR

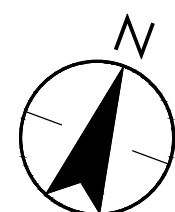
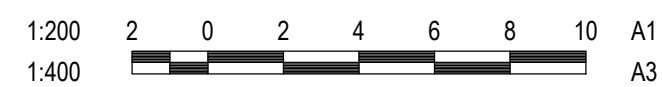
Project No.
301351072

Re

Drawing No.

Scale
1:20

CI-060-301



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Notes



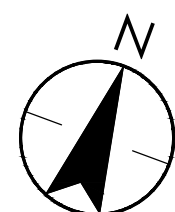
SP 79233
PROVIDE INLET PIT SEDIMENT BARRIERS
TO ALL PITS

CATCH DRAIN TO DIRECT RUNOFF TO
SEDIMENT BASIN

PROVIDE DUAL PUMPS FOR BASEMENT
DRAINAGE THROUGHOUT CONSTRUCTION

BASIN NOT REQUIRED BY BLUEBOOK FOR SITE UNDER 2500m², HOWEVER WE RECOMMEND SITE HOLDING BASIN TO BE INSTALLED WITH CAPACITY UP TO 10m³ THROUGHOUT BASEMENT CONSTRUCTION TO MANAGE HOLDING RUNOFF AND BASEMENT PUMP OUT DISCHARGE

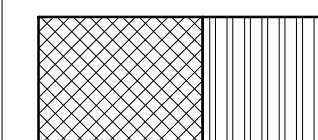
VEHICLE SHAKEDOWN DEVICE TO BE
INSTALLED, LOCATION TO BE
CONFIRMED ON SITE



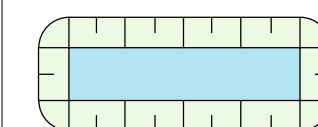
LEGEND



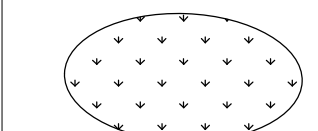
PROPOSED SITE BOUNDARY
EXISTING CONTOURS (0.5m INT.)



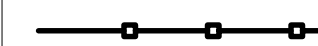
VEHICLE SHAKEDOWN DEVICE



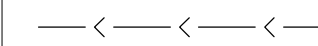
PROPOSED SEDIMENT BASIN



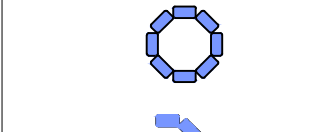
PROPOSED STOCKPILE



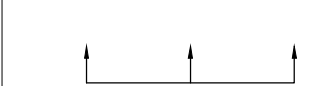
PROPOSED SILT FENCE



PROPOSED CATCH DRAIN



SANDBAG PIT PROTECTION



LEVEL SPREADER

NOTES

1. REFER DRAWING CI-076-01 FOR EROSION AND SEDIMENT CONTROL DETAILS.
2. MINIMISE THE AREA OF SITE BEING DISTURBED AT ANY ONE TIME.
3. WORKS IN PROXIMITY OF EXISTING TREES TO BE CARRIED OUT IN ACCORDANCE WITH ARBORIST CONSULTANT ADVICE.
4. SEDIMENT AND EROSION CONTROL PLAN IS INDICATIVE ONLY.

D	ISSUE FOR SSDA	PDP	JMB	2024.12.13
C	ISSUE FOR DA	BCH	JMB	2023.06.15
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.09
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.01
Issued/Revision		By	Appd	YYYY.MM.DD
File Name: 301351072-Cl-070-001.DWG		-	-	2023.06.01
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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
EROSION AND SEDIMENT
CONTROL PLAN

Project No.
301351072Revi
D

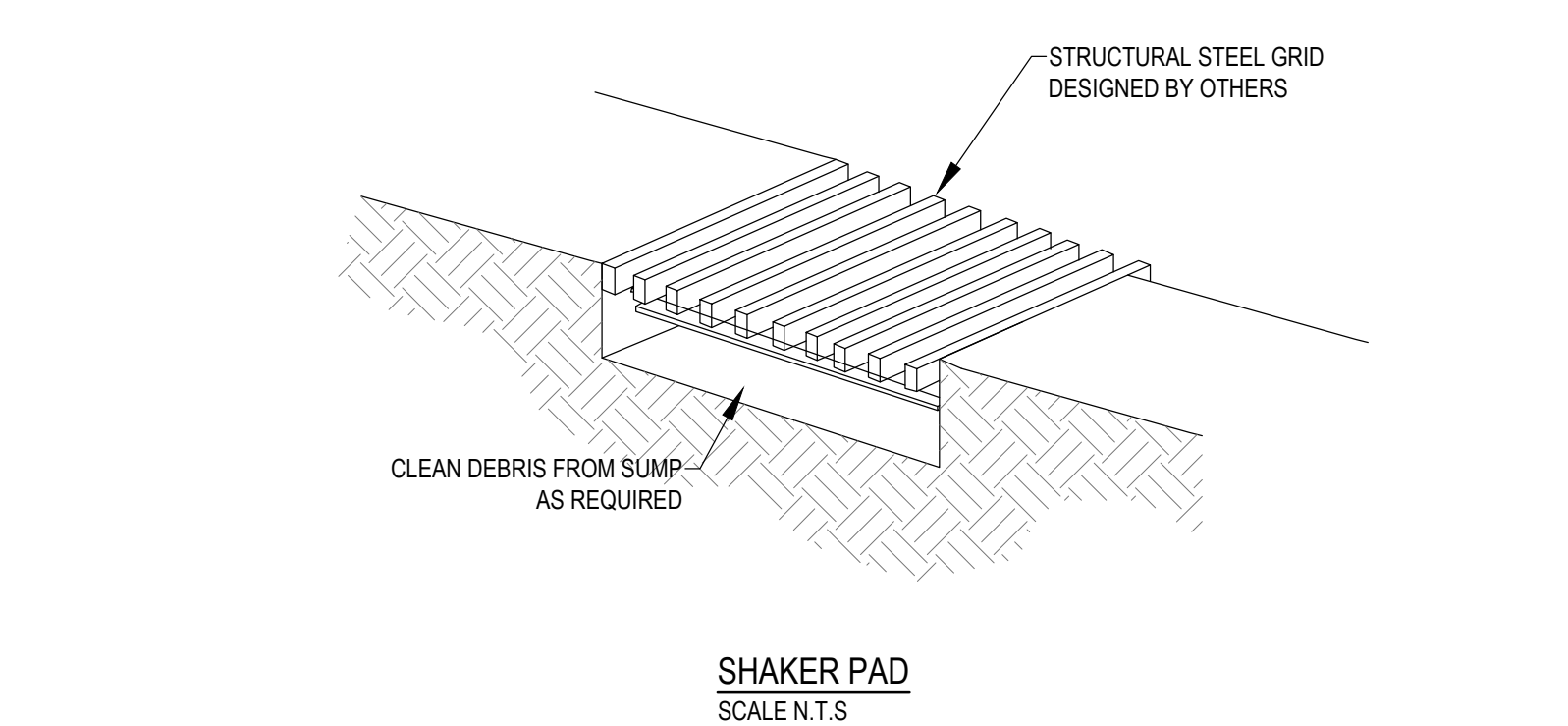
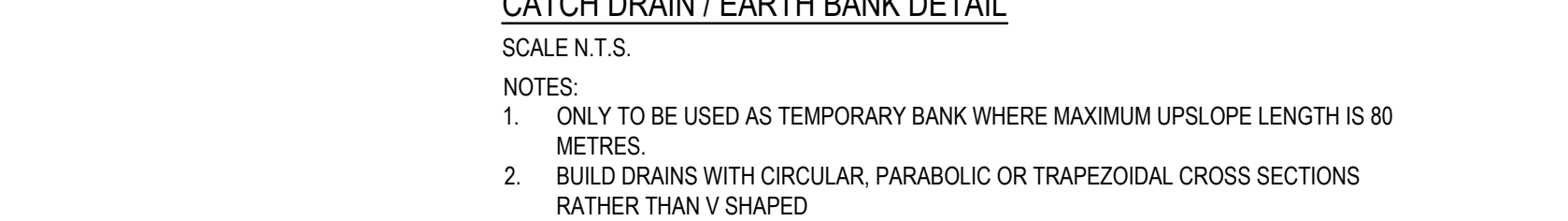
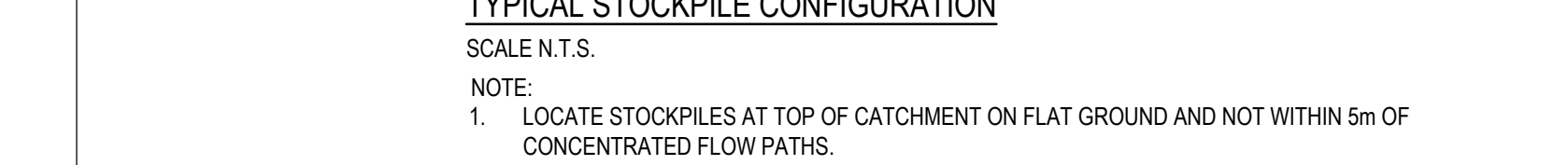
Drawing No.

Scale
1:20

CI-070-001

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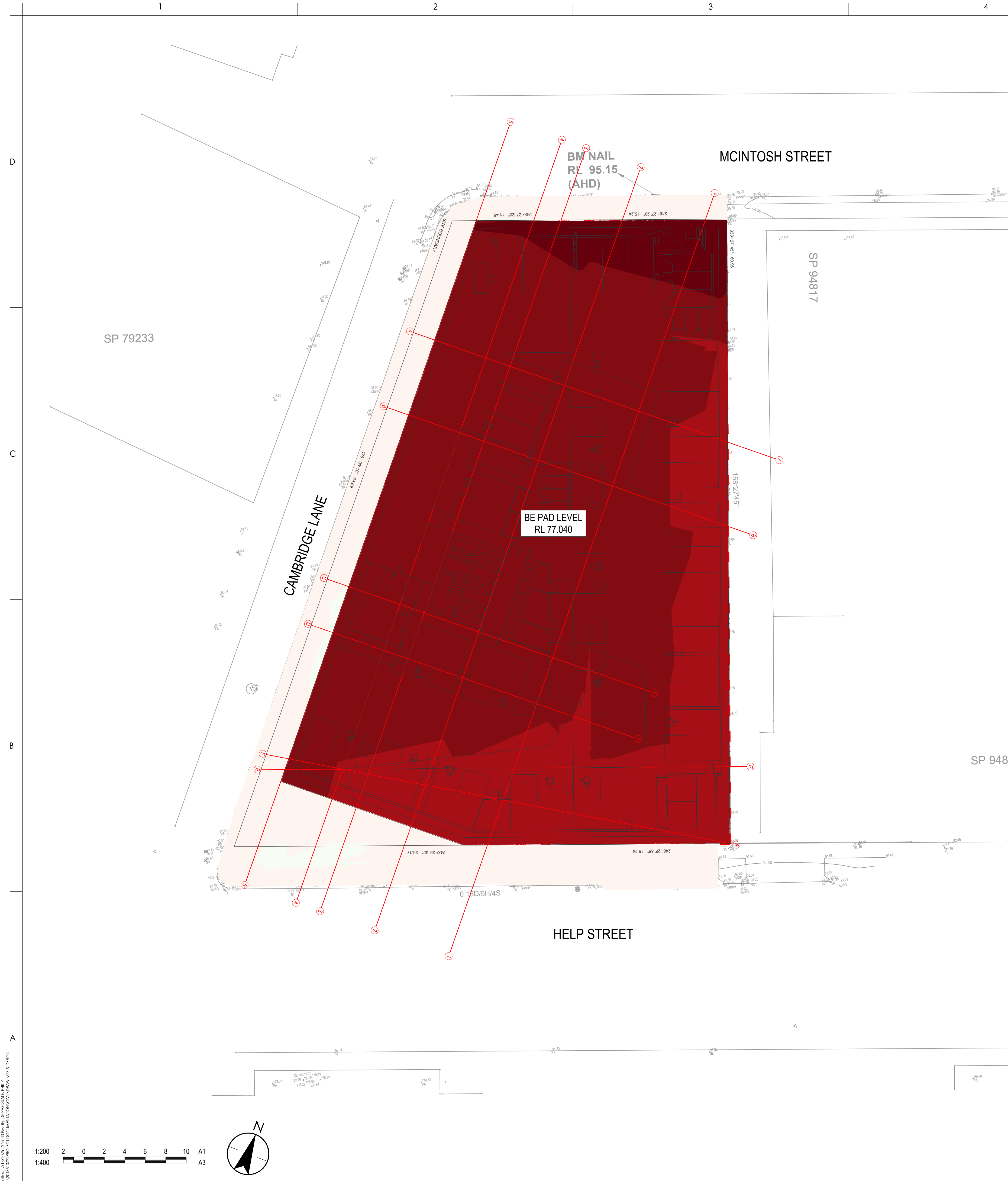
LOFTEX

CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
EROSION AND SEDIMENT
CONTROL DETAILS

Project No. 301351072	Scale NTS
Revision D	Drawing No. CI-076-001



Elevations Table			
Number	Minimum Elevation	Maximum Elevation	Color
1	-20.00	-18.00	
2	-18.00	-16.00	
3	-16.00	-14.00	
4	-14.00	-12.00	
5	-12.00	-10.00	
6	-10.00	-8.00	
7	-8.00	-6.00	
8	-6.00	-4.00	
9	-4.00	-2.00	
10	-2.00	0.00	
11	0.00	2.00	

NOTES

1. VOLUMES ARE INDICATIVE ONLY AND ARE BASED ON A COMPARISON BETWEEN THE DESIGN SURFACE AND THE SURVEYED SURFACE.

2. NOTE THAT ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.

3. NO BULKING OR COMPACTION FACTORS HAVE BEEN APPLIED TO VOLUMES.

4. BULK EARTHWORKS DRAWINGS ARE NOT TO BE USED FOR DETAILED EXCAVATION. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EXCAVATION INCLUDING TANKS, FOOTINGS, EDGE THICKENINGS, BEAMS, STAIR AND LIFT CORES, PILING PLATFORMS, SERVICES TRENCHING AND DEEP SOIL ZONES.

5. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.

6. NO TOPSOIL HAS BEEN ALLOWED FOR THE PURPOSE OF THE BULK EARTHWORKS.

THE SURVEY SURFACE AS PROVIDED HAS BEEN UTILISED FOR COMPARISON PURPOSES. SURVEY RECEIVED ON 15/03/23 PREPARED BY SDG, REFERENCE '8917', DATED 24/04/2023.

7. STANTEC DOES NOT TAKE RESPONSIBILITY FOR ACCURACY OF EXISTING SURVEY.

8. DOES NOT ALLOW FOR ANY UNSUITABLE MATERIAL FOUND ANYWHERE ON SITE.

9. EXCAVATED MATERIAL MAY BE USED AS STRUCTURAL FILL PROVIDED:

- IT COMPLIES WITH THE SPECIFICATION REQUIREMENTS FOR FILL MATERIAL

- THE PLACEMENT MOISTURE CONTENT COMPLIES WITH THE GEOTECHNICAL CONSULTANTS REQUIREMENTS, AND ALLOWS FILLING TO BE PLACES AND PROOF ROLLED IN ACCORDANCE WITH THE SPECIFICATION.

12. ENTIRE SITE WHERE PAVEMENT IS CONSTRUCTED IS TO ACHIEVE / HAVE MIN. CBR OF 3% AT COMPLETED SUB-GRADE LEVEL. PROVIDE GEOTECHNICAL ENGINEER INSPECTION REPORTS AND CERTIFICATION OF ENTIRE SITE ON CBR 3%, AND SLAB SETTLEMENT OF 5mm UNDER 3kPa LIVE LOAD ALONG WITH SUBGRADE COMPLICATION LEVEL OF 70% INDEX AND 5mm SLAB SETTLEMENTS

13. EXISTING GROUND WITHIN EXISTING RETAINING WALL. EXTENT AND OUTSIDE NEW STRUCTURAL BUILDING EXTENT HAS BEEN DROPPED MANUALLY APPROX. 1.5m FROM SURVEY LEVELS OBTAINED BASED ON OBSERVATIONS MADE FROM THE EXISTING HALL AND CANTEN STRUCTURAL DRAWINGS. THIS IS NOT AN ACCURATE REPRESENTATION OF EXISTING GROUND LEVELS AND IT IS RECOMMENDED THAT THE CONTRACTOR HAVE THE EXISTING GROUND SURVEYED FOLLOWING DEMOLITION OF RETAINING WALL IN THIS AREA AND PLACE FILL ACCORDINGLY TO ACHIEVE BULK EARTHWORKS LEVELS.

EARTHWORKS VALUES	
CUT	-34500m³
FILL	0m³
TOTAL	-34500m³ (CUT)



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Level 9, The Forum
203 Pacific Highway
St Leonards, NSW 2065
Tel: +61 2 8484 7000

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Notes

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D	ISSUE FOR SSDA	PDP	JMB	2024.12.13
C	ISSUE FOR DA	BCH	JMB	2023.06.15
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.09
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.01
Issued/Revision		By	Appd	YYYY.MM.DD
File Name: 301351072-CH-100-001.DWG		Dwn.	Dsgn.	Chkd.
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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
BULK EARTHWORKS PLAN

Project No. 301351072	Scale 1:200
Revision E	Drawing No. CI-100-001

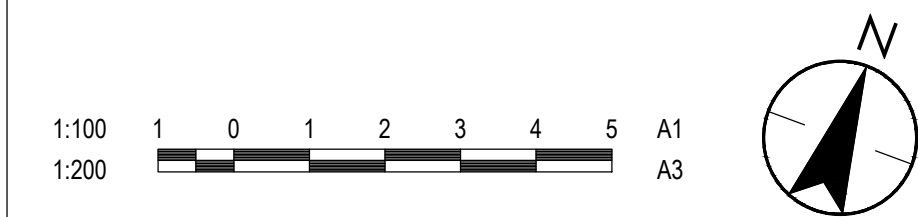
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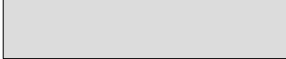
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Notes



LEGEND

	PROPOSED SITE BOUNDARY
	PROPOSED BUILDING
	HEAVY DUTY DRIVEWAY PAVEMENT. REFER TYPICAL DETAIL
	EXTERNAL PAVING. REFER TO LANDSCAPE ARCHITECTURE DETAIL
	LANDSCAPE AREA. REFER TO LANDSCAPE ARCHITECTURE DETAIL
	KERB AND GUTTER
 K&G	
	
 K&G	
	
	
	

	D	ISSUE FOR SSDA	PDP	JMB	2024.12.
C	-	ISSUE FOR DA	BCH	JMB	2023.06.
B	A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.
A	A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.
Issued/Revision			By	Appd	YYYY.MM.
			-	-	2023.06.
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					YYYY.MMM.

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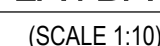
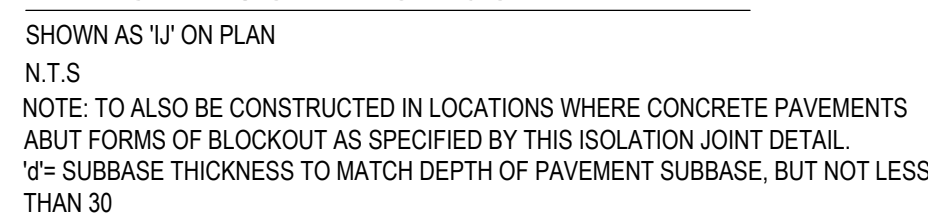
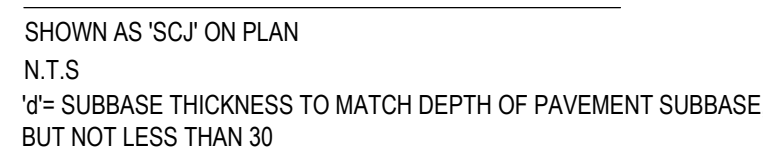
3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
PUBLIC DOMAIN AND
PAVEMENT PLAN
SHEET 1

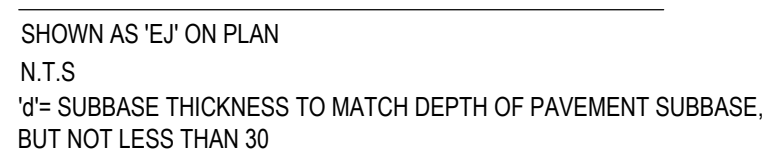
Project No. 301351072	Scale 1:100
Revision D	Drawing No. CI-400-001

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CONCRETE TO HAVE BROOM FINISH WITH SMOOTH TROWELLED EDGES.
SCJ- FOOTPATH SAWCUT JOINT. REFER TO DETAIL
EJ- FOOTPATH EXPANSION JOINT. REFER TO DETAIL



File Name: 301351072-CI-406-001.DWG	-	-	-	2023.06.01
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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
CIVIL DETAILS

Project No.
301351072

Drawing No.

Scale
NTS

CJ-406-001

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B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.08
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.05.31
Issue/Revision		By	Appd	YYYY.MM.DD
File Name: 301351072-Cl-522-001.DWG		-	-	2023.05.31
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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title

STORMWATER DRAINAGE - LONGITUDINAL SECTIONS

Project No.
301351072

Re

Drawing No. _____

Scale
AS SHOWN

CI-522-001

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NOTE: KERB INLET PIT WITHIN ROAD RESERVE TO BE IN ACCORDANCE WITH WILLOUGHBY COUNCIL STANDARDS

KERB INLET PIT
SCALE 1:20



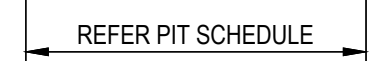
GRATE &
SPECIFIED.
MANUFACTURERS
FOR
DETAILS

PROVIDE 3m LENGTH OF Ø100mm
SUBSOIL DRAINAGE WRAPPED IN
GEOTEXTILE FILTER FABRIC TO
UPSTREAM SIDE OF PIT LAID
WITHIN PIPE TRENCHING

MINIMUM 50mm THICK MASS CONCRETE BENCHING TO ONE THIRD PIPE HEIGHT (MIN)	OVERALL PIPE SIZE + 300mm
--	------------------------------



GRATED PIT PLAN
SCALE 1:20



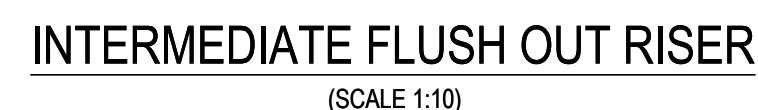
GRATED PIT PLAN
SCALE 1:20



LANDSCAPED SUBSOIL DRAINAGE TRENCH DETAIL



PAVED SUBSOIL DRAINAGE TRENCH DETAIL



INTERMEDIATE FLUSH OUT RISER

NOTE: FLUSH OUTS PROVIDED AT MIN 20m CENTRES
OR CHANGES IN DIRECTION OF SUBSOIL LINES

E	ISSUE FOR SSDA	PDP	JMB	2024.12.13
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A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.01
Issued/Revision		By	Appd	YYYY.MM.DD
File Name: 301351072-CI-526-001.DWG		-	-	2023.06.01
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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
STORMWATER DRAINAGE DETAILS
SHEET 1

Project No. 301351072	Scale AS SHOWN
Revision E	Drawing No. CI-526-001

WELDLOC-TOP TRENCH GRATE AND FRAME AS SPECIFIED, REFER MANUFACTURERS SPECIFICATIONS FOR INSTALLATION DETAILS

N12 BARS @ 450 CENTRES

5xN12 LONGITUDINAL BARS

100mm DGB20 BASE MATERIAL COMPACTED TO 98% MMDD

SUBGRADE MATERIAL COMPACTED TO 100% SMDD

GRATED TRENCH DRAIN

(SCALE 1:10)

LYSAGHT RH3030-MAXIMESH OR SIMILAR

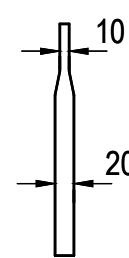
HANDLE

INVERT OF PIT

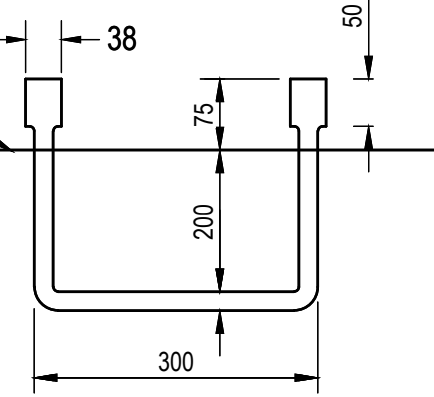
GALVANISED STEEL PLATE CUP WELDED TO BASKET(TYP.)

SCREEN MESH DETAIL

N.T.S.



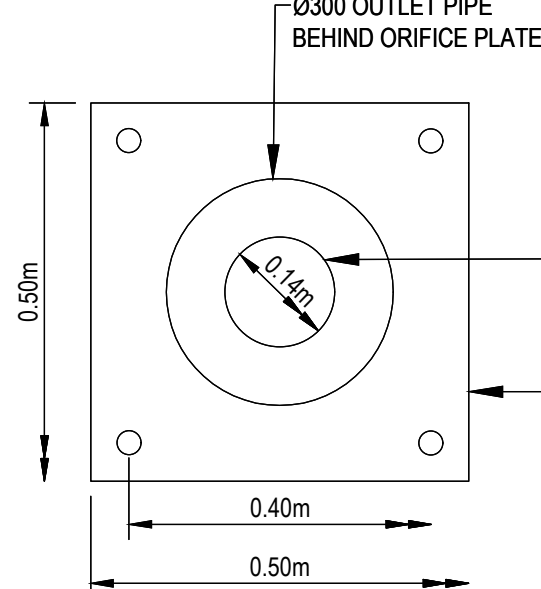
NOTE: FIRST RUNG 150mm DOWN FROM TOP, THEN SPACED AT 300 CENTRES.



MATERIAL : 20mm DIA MILD STEEL HEAVY GALVANIZED

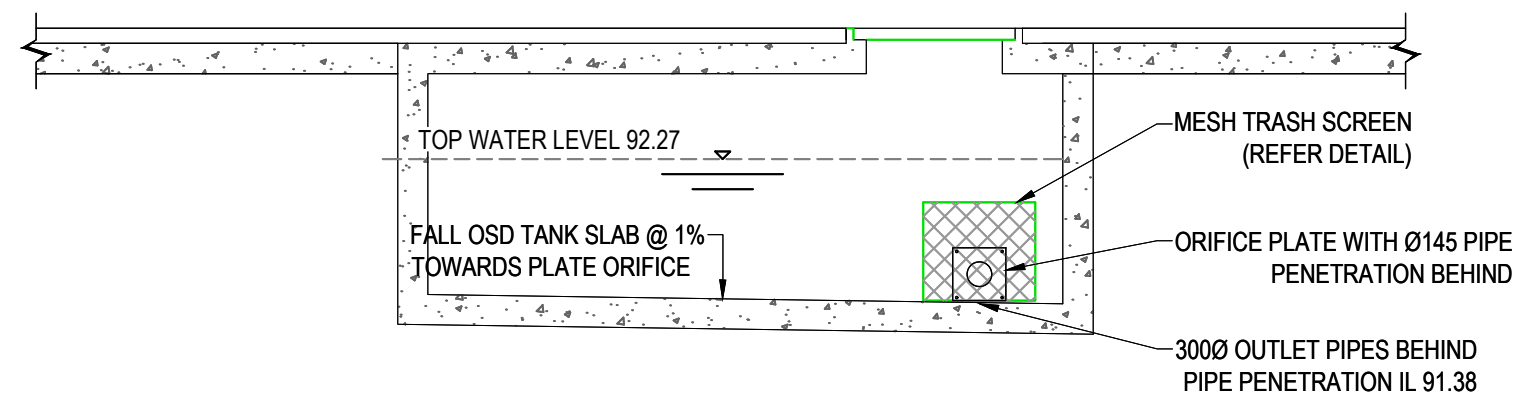
STEP IRONS FOR DRAINAGE PITS

N.T.S.



ORIFICE PLATE DETAIL

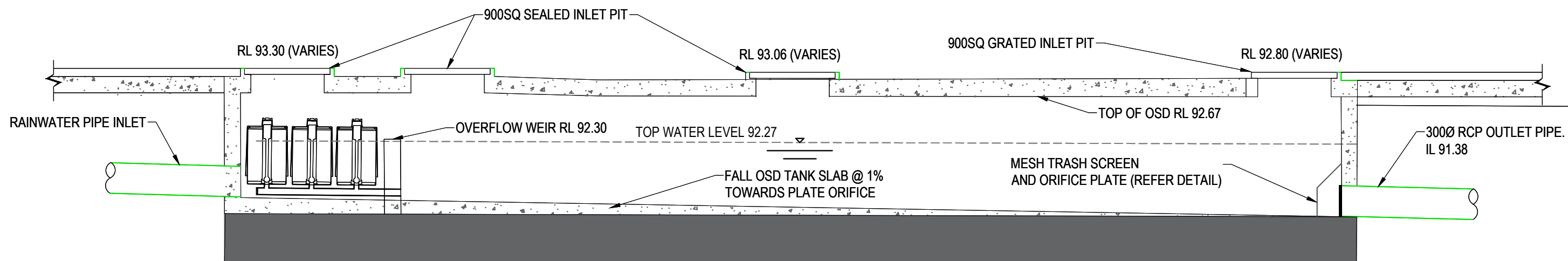
SCALE 1:10



ON-SITE DETENTION TANK STAGE 1 - SECTION A

(SCALE 1:100)

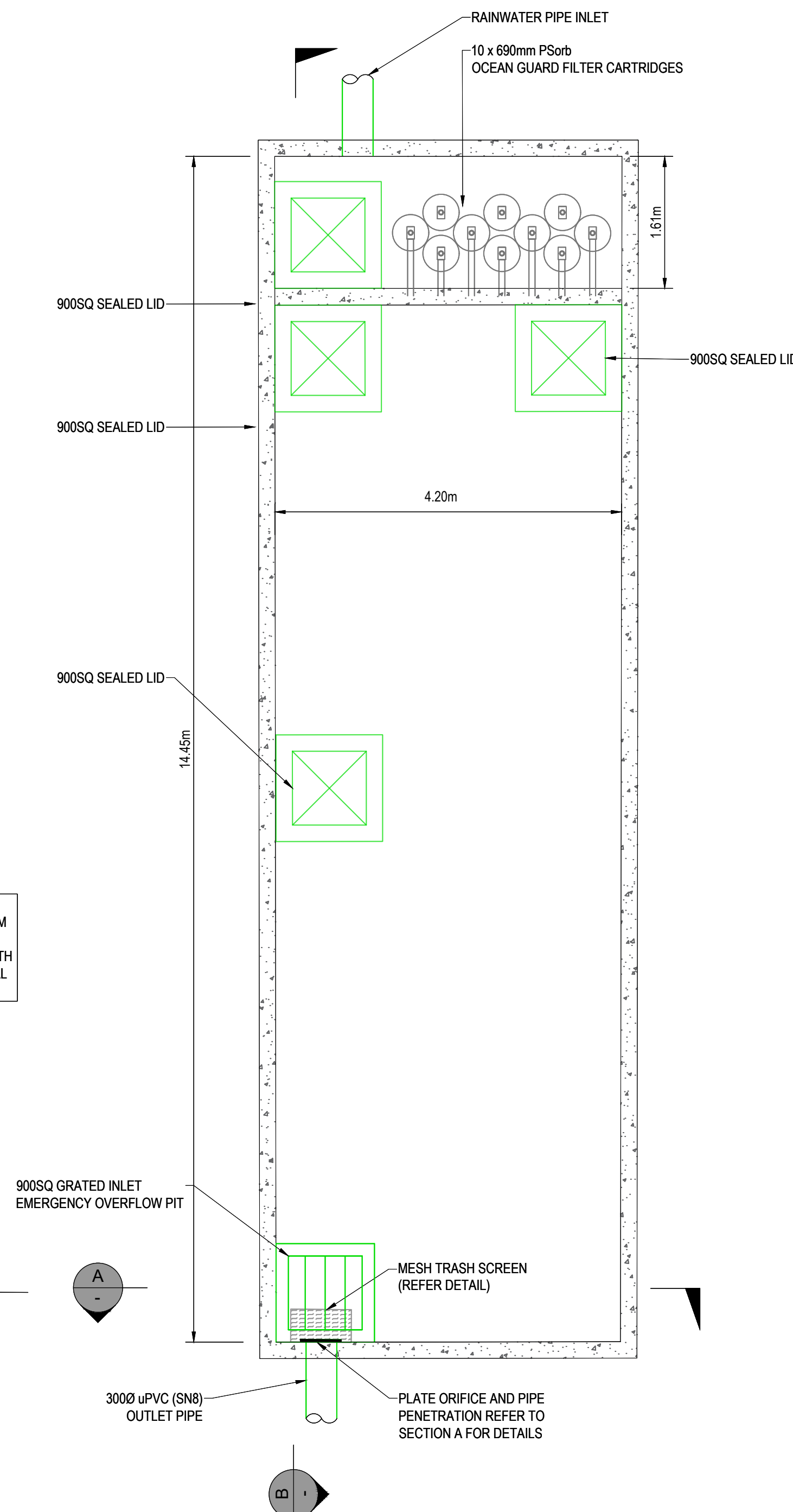
NOTE: ALL STORMWATER AND PODIUM DRAINAGE TO CONNECT INTO OSD TANK AT MIN IL 91.80. ALL PODIUM DRAINAGE TO CONNECT AT THE LOCATION OF WSUD CHAMBER. OSD TO BE DETAILED IN ACCORDANCE WITH BUILDING HYDRAULIC CONSULTANT AND STRUCTURAL ENGINEERING DURING CC PHASE OF WORKS



ON-SITE DETENTION TANK - SECTION B

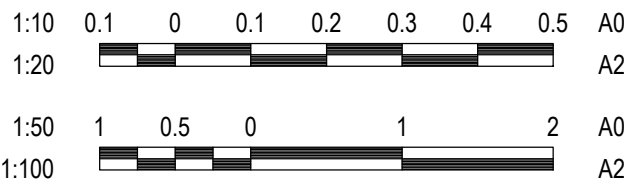
(SCALE 1:100)

OSD TO BE FOUNDED ON FALSE FLOOR FROM BASEMENT 1 SLAB TO ACHIEVE REQUIRED LEVELS FOR STORMWATER CONNECTIONS



ON-SITE DETENTION TANK - PLAN

(SCALE 1:50)



G	ISSUE FOR SSDA	PDP	JMB	2024.12.13
F	ISSUE FOR DA	LPT	VE	2024.05.24
E	ISSUE FOR DA	LPT	JMB	2023.01.11
D	ISSUE FOR DA	LPT	JMB	2023.11.27
C	ISSUE FOR DA	BCH	JMB	2023.06.15
B	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.09
A	DRAFT ISSUE FOR DA	BCH	JMB	2023.06.01
Issued/Revision		By	Appd	YYYY.MM.DD
File Name: 301351072-CI-526-001.DWG		Dwn.	Dsgn.	Chkd.
				YYYY.MM.DD

Issue Status

APPROVAL

NOT FOR CONSTRUCTION

This document is suitable only for the purpose noted above.
Use of this document for any other purpose is not permitted.

Client/Project Logo

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CIVIL WORKS

3-5 HELP STREET, CHATSWOOD, NSW 2067

Title
STORMWATER DRAINAGE DETAILS
SHEET 2

Project No.
301351072
Revision
G
Scale
AS SHOWN
Drawing No.
CI-526-002

Appendix B Willoughby City Council OSD Design Checklist



Appendix 2 – Onsite stormwater detention record of installation and certificate of hydraulic/hydrological compliance

Record of installation of onsite stormwater detention

Job number: 301351072

Development application number:

Drawing number: CI-060-101, CI-060-101, CI-060-201, CI-060-301, CI-526-002

Project at: 3-5 Help Street, Chatswood, NSW 2067

Table 13 On-site stormwater detention installation parameters

Attributes	Designed parameters	Constructed parameters
Tank dimensions (LxWxH) (m)	13.5m (length) x 4.50m (width) x approx 1.37m (height varies)	
Orifice size (mm)	145mm	
Orifice plate type	Concentric orifice plate	
Hydraulic head (m)	0.33m	
Storage volume (m ³)	83.23m ³	
Permissible site discharge (l/s)	35l/s	
Debris screen type	lysaght RH3030 Maximesh or similar	
Debris screen area (m ²)	0.2m ²	
Overland flow provided	Yes	
Number of access grates	5	
Plaque(s) attached to wall	1	
Step irons provided (over 0.9m grate-invert)	5	
Plumber's certificate number for rainwater tank installation	N/A	

Comments:

Certificate of hydraulic/hydrological compliance

I _____ of _____ (a professional engineer competent to practise in the field of stormwater drainage design) have inspected the above completed onsite stormwater detention system. This includes verification of the generally + or -10% acceptable limits and tolerances of the system in this policy.

I certify the works have been constructed in line with the approved design details for the project, subject to satisfactory maintenance. This is except for any variations that do not affect the performance of the system, which are highlighted in the works-as-executed drawings.

Signature:

Qualifications:

Position:

Membership number:

Telephone:

Design with
community in mind

Level 9, The Forum
203 Pacific Highway
St Leonards NSW 2065
Tel +61 2 8484 7000

For more information, please visit
www.stantec.com

