St Leonards South – Area 1, 2 & 4

Stormwater Management Report

Prepared for: New Hope Evergreen

Date: 17th June 2022

Prepared by: Renata Tracey

Ref: 301350653

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Revision

Site Address:	1, 3 & 5 Canberra Avenue 4, 6 & 8 Marshall Avenue 2, 4, 6 & 8 Holdsworth Avenue
Real Property Description:	Lot 1, DP7259 Lot 2, DP7259 Lot 3, DP7259 Lot 5, DP7259 Lot 6, DP7259 Lot 7, DP7259 Lot 39, DP7259 Lot 40, DP7259 Lot 41, DP7259 Lot 42, DP7259
Proposed Development:	High Density Residential Mixed Use
Client:	New Hope Evergreen
Local Authority	Lane Cove Council
Authority Reference #:	N/A
Stantec Reference:	301350653-SWMP_003

Renata Tracey
Civil Project Engineer
For and on behalf of
Stantec Australia Pty Ltd

Revision	Date	Comment	Prepared By	Approved By
001	14.02.22	Design Excellence Panel Submission	MDR	RET
002	05.05.22	Draft Development Application	MDR	RET
003	17.06.22	Development Application	MDR	RET

Contents

Contents

1. Introduction

Stantec have been commissioned by New Hope Evergreen to prepare this Stormwater Management Plan (SWMP) in support of a Development Application (DA) for the proposed redevelopment at:

- 1, 3 & 5 Canberra Avenue, St Leonards NSW
- 4, 6 & 8 Marshall Avenue, St Leonards NSW
- 2, 4, 6 & 8 Holdsworth Avenue, St Leonards NSW

This SWMP outlines the conceptual DA level stormwater design for the proposed development of the St Leonards Village site. This SWMP illustrates that the proposed development complies with the Lane Cove Council's requirements, Australian Rainfall and Runoff, Australian Standards and best engineering practice.

The purpose of this SWMP is to evaluate the quantity and quality of stormwater associated with the proposed development plan so as to demonstrate to Council that an appropriate stormwater management strategy has been adopted.

The DA seeks consent for the redevelopment of the site into a lush residential precinct. Specifically, the DA seeks consent for:

- Demolition works on existing structures and associated earthworks.
- Excavation and remediation.
- Augmentation of, and connection to, existing services as required.
- Environmental, stormwater water and sediment control design for demolition, construction and in the temporary condition

The SWMP specifically addresses the following items for both the construction and operation phases of the development:

- Stormwater runoff volumes, legal point of discharge and flood level;
- Existing Stormwater quality treatment measures (Stormwater quality);
- Water Sensitive Urban Design (WSUD) measures;
- Erosion and Sedimentation Control.
- Stormwater Network Maintenance during Operation

The following will be achieved with the correct application of this SMP report:

- Appropriate standards to be maintained on all aspects of stormwater within the site,
- Pollution control to be maintained,
- Establishment of a unified, clear and concise stormwater management strategy.

2. Abbreviations and Definitions

- **AEP** Annual Exceedance Probability
- **AHD** Australian Height Datum
- **ARI** Average Recurrence Interval
- **ARR** Australian Rainfall and Runoff
- **DA** Development Application
- **DCP** Development Control Plan
- **DN** Diameter Nominal (mm)
- **EY** Exceedances per Year
- **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
- **SID** Safety In Design
- **SQID's** Stormwater Quality Improvement Devices
- **SSR** Site Storage Requirement
- **WQO's** Water Quality Objectives
- **WSC** Water Services Coordinator
- **WSUD** Water Sensitive Urban Design

3. Relevant Policies, Standards and Guidelines

The following listed policies, standards and guidelines were referred to in the preparation of this report:

- Lane Cove Council Local Environmental Plan 2009 (Amendment No. 25) under the EPA 1979, published 31 August 2020
- Lane Cove Council Development Control Plan, (Amendment No. 2) 9 December 2011
    - Part O – Stormwater Management
- Lane Cove River Coastal Zone Management Plan, July 2013
    - Appendix B – Water Sensitive Urban Design
- St Leonards South – Development Control Plan, 13/10/2020
    - Part A, by Annand Associates Urban Design
    - Part B, by Annand Associates Urban Design
- St Leonards South – Landscape Master Plan, October 2020, by Oculus
- Australian Rainfall & Runoff 2016;
- AS3500 parts 0-5: 2013 Plumbing and Drainage
- Landcom Managing Urban Stormwater: Soils and Construction Volume 1 2004
- NSW Floodplain Development Manual 2005
- Guidelines for development adjoining land and water managed by DECCW (OEH, 2013)

4. Existing Site Characteristics

4.1 Property Detail

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

Address: 1, 3 & 5 Canberra Avenue, St Leonards NSW

4, 6 & 8 Marshall Avenue, St Leonards NSW

2, 4, 6 & 8 Holdsworth Avenue, St Leonards NSW

Real Property Description: Refer to Table 1 below

Development Area: 6,728m^2 (0.6728ha)

The proposed development can be seen on the design drawing documentation in Appendix A of this report.

Table 1: Real Property Description

Address	Title Details	Description	Land Size (m^2)
1 Canberra Avenue	Lot 5, DP7259	Acquired single dwelling lot	655.85
3 Canberra Avenue	Lot 6, DP7259	Acquired single dwelling lot	709.06
5 Canberra Avenue	Lot 7, DP7259	Acquired single dwelling lot	682.89
4 Marshall Avenue	Lot 3, DP7259	Acquired single dwelling lot	688.57
6 Marshall Avenue	Lot 2, DP7259	Acquired single dwelling lot	659.91
8 Marshall Avenue	Lot 1, DP7259	Acquired single dwelling lot	814.46
2 Holdsworth Avenue	Lot 42, DP7259	Acquired single dwelling lot	846.37
4 Holdsworth Avenue	Lot 41, DP7259	Acquired single dwelling lot	556.92
6 Holdsworth Avenue	Lot 40, DP7259	Acquired single dwelling lot	556.83
8 Holdsworth Avenue	Lot 39, DP7259	Acquired single dwelling lot	556.78

The proposed lush residential precinct consists of 3 buildings total incorporating residential tenancies.

The overall site is bounded by:

- Marshall Avenue to the North
- Residential Neighbouring Properties to the South
- Canberra Ave to the East
- Holdsworth Ave to the West

Refer to Figure 1 for locality plan.

Figure 1: Site Location Plan (Source: Nearmap 2021)

4.2 Topography

The local topography around the site shows that the site primarily falls North-West to South-East. The high point of the site is located in the North-West corner at a level of RL 72.0m AHD and the low point located in the South-East corner towards Canberra Avenue at a level of RL 63.0m AHD. This is an average slope of approx. 9.5% or 1:10.5.

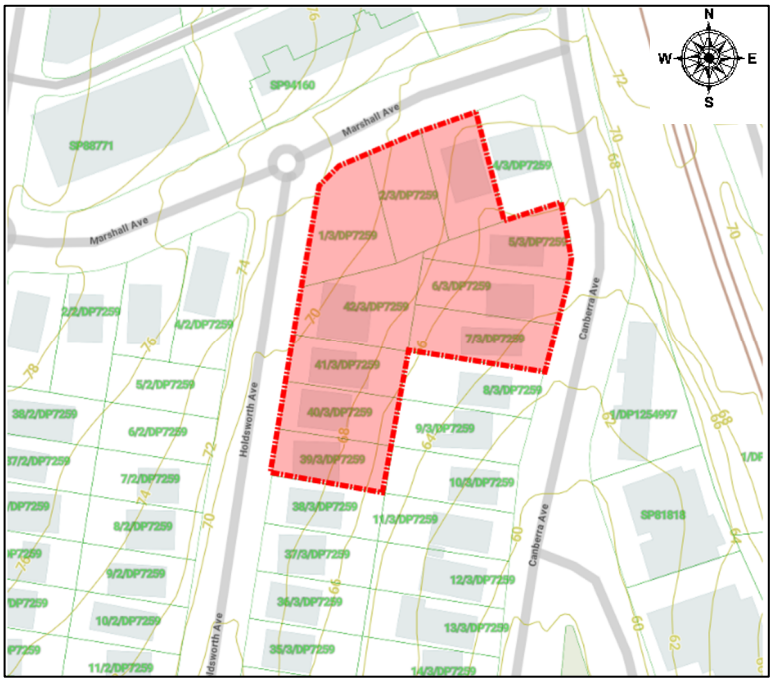


Figure 2: Site Topography (Mecone Mosaic 2021)

4.3 Stormwater Catchments

The surrounding area has been investigated to determine the likely impact of existing external stormwater catchments on the proposed site. The site is currently surrounded by developments and roadway, and there is evidence of formalised stormwater infrastructure within the road reserves around the site, so it is believed that overland flows from the upstream catchment are conveyed through the existing road networks and do not impact on the development site.

4.4 Existing Stormwater Infrastructure

Through review of survey information and DBYD information, it has been determined that there is pit and pipe infrastructure surrounding the site. It is assumed that all roof catchments are conveyed through formalised gutter and downpipe systems and discharged into on lot inground drainage infrastructure before discharging from the site. Through survey information formalised drainage surrounding the development site has been identified on Canberra Avenue and Marshall Avenue as seen below in Figure 3.

Figure 3: Existing Stormwater Infrastructure on Canberra Avenue and Marshall Avenue

4.5 Existing Stormwater Discharge

Analysis of survey information indicates there is currently no formalised drainage within the site. It is assumed that all existing roof catchments are conveyed through formalised gutter and downpipe systems and discharged into existing pits on Canberra Avenue, Holdsworth Avenue and Marshall Avenue.

5. Local Authority Requirements

Lane Cove Council specify stormwater management requirements for new developments within their LGA, in their Development Control Plan (2011) Part O Section 3.1 Stormwater Management. This DCP confirms the requirements for stormwater conveyance through the site and stormwater discharge controls. These requirements are summarised in the sections below.

5.1 Stormwater Conveyance Requirements

The Lane Cove Council's DCP (2011) Part O Stormwater Management specifies the requirements for stormwater conveyance:

- Drainage systems shall be designed to provide both minor and major flow conveyance systems as detailed in Australian Rainfall and Runoff (AR&R):

Table 2: Stormwater Drainage Serviceability

Element of Stormwater System	Design ARI
All pipes and all associated components	20 year
Overland flowpaths	100 year
Outflows into unstable watercourses	20 year
Flows along an unstable watercourse	5 year

Council's DCP (2011) also specifies the pipeline details in Part O Section 3.3 of the Stormwater Management Manual. These details are as follows:

- Minimum 90mm diameter uPVC pipe for property drainage systems;
- Minimum 375mm diameter reinforced concrete pipe for any system which drains public land or road reserves.
- The minimum pipe velocity should be 0.6m/s and a maximum velocity of 6.0m/s during the design storm.
- The minimum pipe grade shall be 1.0% for all pipes.
- Pipes with a gradient greater than 20% will require anchor blocks at the top and bottom of the inclined section; and at intervals not exceeding 3.0m.

5.2 On-Site Detention Requirements

The Lane Cove Council DCP (2011) Part O Section 7 of the Stormwater Management Drainage Manual states that the following properties must a have an On-Site Detention system:

- Dwelling houses and dual occupancies OSD will be required if one or more of the following criteria are satisfied:
  - All new residential developments where the proposed impervious area of the site exceeds 35%.

- All alterations or additions to residential dwellings where the impervious area (including roof area, paving, swimming pools and driveways) increases by more than 50m^2.
- All alterations or additions to residential dwellings where the impervious area (including roof area, paving, swimming pools and driveways) increases by less than 50m^2 and the total impervious area of the site is greater than 65% of the total site area.
- Where successive developments take place on a residential dwelling within a 5-year period and the cumulative increase in the built-upon site area exceeds 50m^2 or the total impervious area is greater than 65% of the total site area.

- Attached dwellings, multi-dwelling housing and residential flat buildings with more than two dwellings proposed on the site and the proposed impervious area of the site exceeds 35% will require OSD.
- All commercial and industrial developments and redevelopments where the footprint of the building is altered will require OSD.
- For a subdivision OSD will be required for any existing dwelling or structure on the site where the impervious area of that lot exceeds 35%.

Council's On-Site Stormwater Detention Systems policy states the following:

- OSD is required to limit discharges from developments to pre-development conditions. Council's OSD requirements have been formulated to ensure there is no increase in discharges from a site for rainfall events having a 1 in 100-year ARI.
- Sufficient storage shall be provided to ensure peak flowrates at any point within the downstream drainage system do not increase as a result of the development during storms from the 1 in 5-year ARI to the 1 in 100-year ARI storm events.
- The Permissible Site Discharge (PSD) from all developments shall not exceed one hundred and forty litres per second per hectare (140 l/s/ha).
- The Site Storage Requirement (SSR) shall be designed to provide for 0.025m^3 for each square metre of basin catchment.

Given that the site falls under the multi dwelling/ residential flat building definition, the on-site detention requirements are governed by the proposed impervious area, and whether it exceeds 35%. At this particular site, the impervious area of the lot is 71.6%, which exceeds 35%, therefore, an OSD tank is required.

5.3 Water Pollutant Reduction Targets

Suitable water quality systems will need to be provided to ensure that the quality of stormwater leaving the site have a minimal impact upon the receiving waters. A MUSIC stormwater quality model will be applied to help achieve a neutral or beneficial effect (NorBE) on water quality for the proposed development.

Water quality can be provided in the form of the following treatment method:

- Gross Pollutant Traps
- Rainwater Reuse Tank
- Grassed Swales

Selection of treatment methods will be heavily dependent on the proposed design layout of the site.

6. Flood Impact Assessment

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

Typical flood mechanisms affecting a specific site can be summarise below:

- Overland flows from the site itself and the local upstream catchment.
- Flood caused by surcharge pits or trapped low points generating flows from existing drainage network impacting the site.
- High tailwater conditions in nearby water courses causing upstream flows to back up onto the site.

6.1 Existing Flooding

6.1.1 Regional Flooding

GRC Hydro has been engaged to assess the local constraints surrounding and through the site to ascertain any areas where local flooding may be an issue.

Stantec have reviewed GRC Hydro's Flood Model Assessment, in particular the 1% AEP Peak Flood Depths and Levels results for the base case, and it has been noted that there are some flood considerations to take into account along Canberra Av, affecting the proposed legal point of discharge into Council's network. Refer to Figure 4 below and Appendix D for further information.

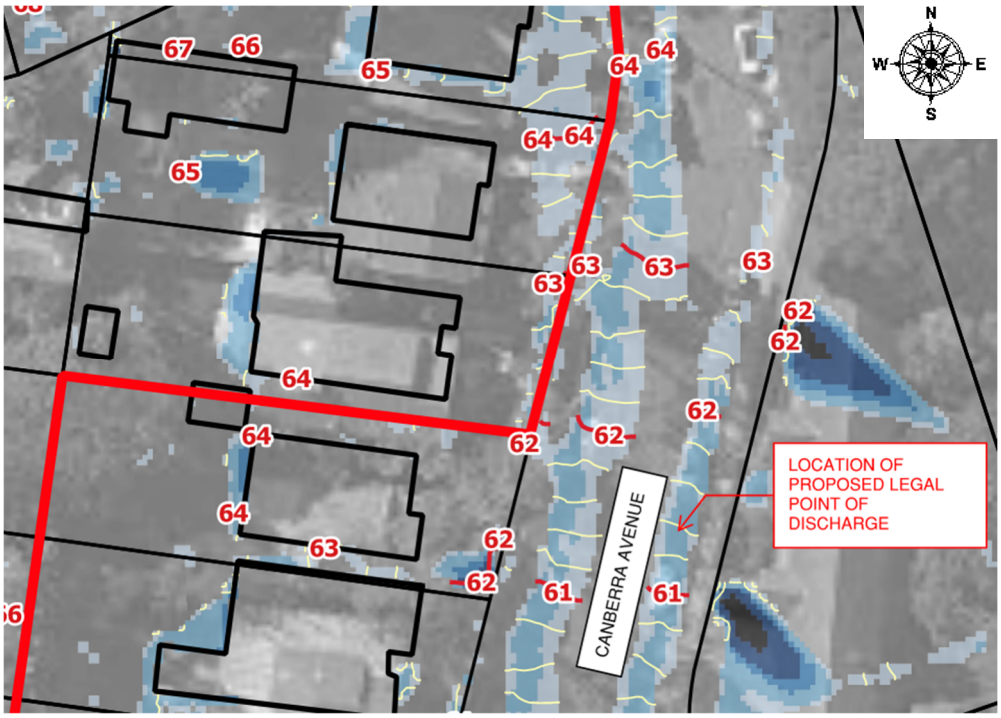


Figure 4: 1% AEP Flood Extents (Source: GRC Hydro, 2022)

It is also noted that there is a trapped low point along Marshall Avenue, that when the inground drainage network reaches capacity and ponding occurs in the roadway, the stormwater overtops the kerb and travels overland from 2 Marshall Ave towards lot at 1 Canberra Ave and ultimately discharges onto Canberra Avenue roadway. Refer to Figure 5 below.

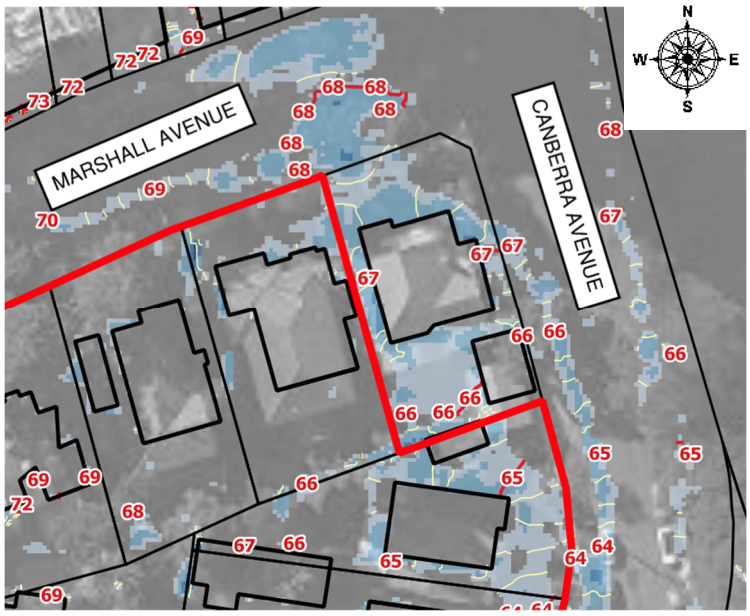


Figure 5: 1% AEP Flood Extents (Source: GRC Hydro, 2022)

Please refer to GRC Hydro Flood Impact Assessment for further information.

6.1.2 Local Flooding

Local or Nuisance flooding describes flooding occurring due to site specific constraints. Local flooding is often caused by local topographical constraints and stormwater drainage system capacity restrictions.

Stantec have assessed the local constraints surrounding and through the site to ascertain any areas where local flooding may be an issue.

The topography of the site is such that there is no risk of flooding on the site as it currently exists.

6.2 Flood Impacts

As previously mentioned, the proposed site is flood affected along the north eastern corner and sustains overland flows from Marshall Avenue. Finished Floor Levels (FFL) and overland flow paths were determined through further flood analysis specific to the site by GCR Hydro.

Stantec has worked together with the flood modeller in order to coordinate and incorporate in our design all their recommendations to mitigate any impact on neighbouring properties. As can be seen in the Flood Impact Map on Appendix D, the stormwater strategy proposed for the development won't have negative impacts.

Please refer to GRC Hydro Flood Impact Assessment for further information.

7. 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 5.1 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.

7.1 Roof Drainage

All roof areas will be drained through a traditional downpipe 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 on-site detention tank.

7.2 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.

7.2.1 In Ground Drainage

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

- In the minor design storm event (20-year ARI) there will be no surcharging of the in-ground drainage system and;
- In the major design storm event (100-year ARI) there will be no uncontrolled discharge from the site onto neighbouring properties or the surrounding street

Surface runoff from roof catchment and surrounding landscapes areas 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 tank and then the legal point of discharge using gravity and the geometric falls of the pipe system.

7.3 Legal Point of Discharge

The current proposed legal point of discharge is the existing council kerb inlet pit on Canberra Avenue as shown in Figure 6. For the connection a 375mm diameter pipe is proposed, a smooth connection into council's network needs to be provided.

In accordance with Lane Cove Council's Pre-DA Meeting Notes dated 13th of December 2021, Council will be installing a new pipe system around the site. Once information with regards to the proposed stormwater network is provided, a design review will be undertaken to check the viability of connecting the stormwater to this new pipe system along Canberra Avenue without the need of crossing the road reserve to connect into the existing kerb inlet pit as shown in Figure 6.

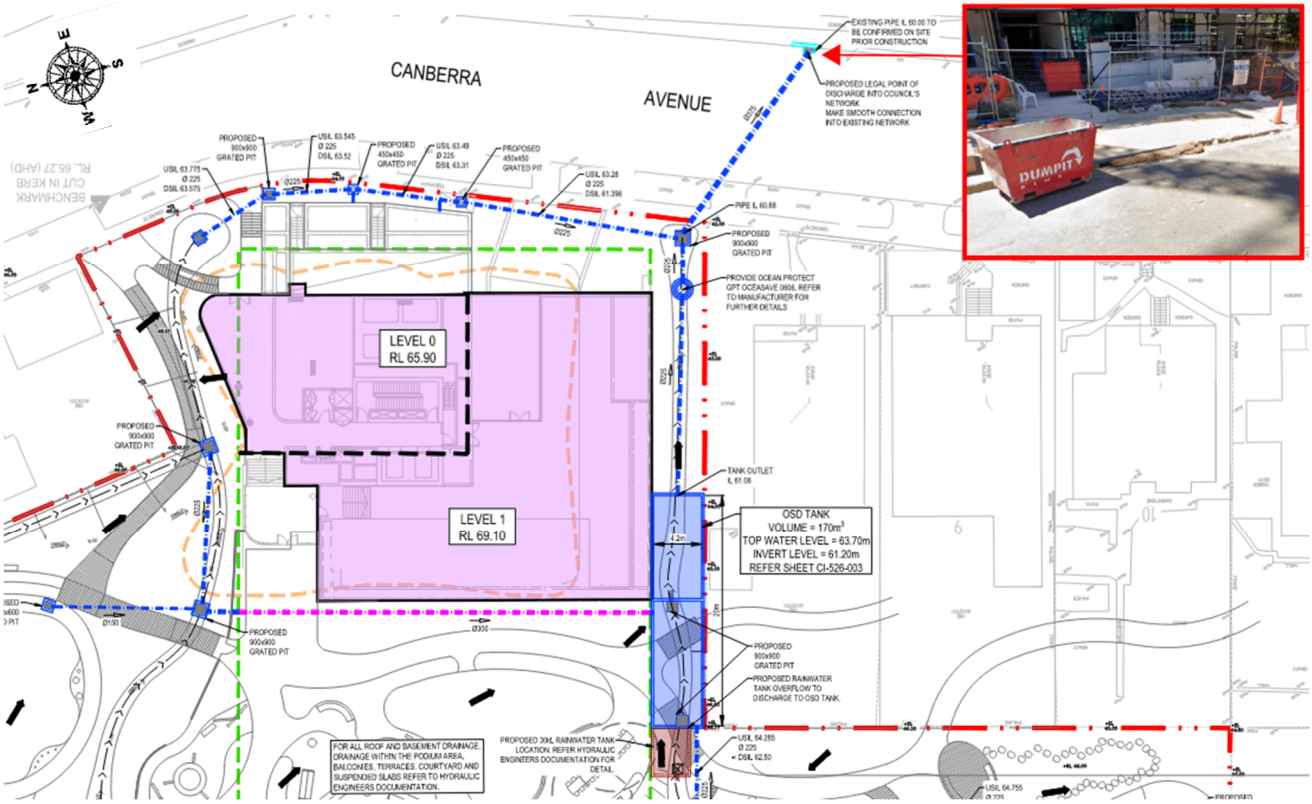


Figure 6: Stormwater Outlet on Canberra Avenue

8. Stormwater Attenuation

As discussed in Section 5.1 the attenuation of stormwater discharge from the site will be provided in accordance with The Lane Cove Council Development Control Plan (2011) requirements. Hydraulic calculations have determined the required on-site detention so as to restrict discharge from the development site back to pervious predevelopment discharge rates for all storm events from the 20-year ARI event up to the 100-year ARI event.

One OSD tank has been proposed for the site. The tank incorporates an orifice plate leading into a discharge control pit to control the minor (20-year ARI) storm events and an overflow weir for the major (100-year ARI) storm events. Details of tank and orifice sizes can be seen in the table below.

Table 3: Proposed On-Site Detention Tank Specifications

	Storage Volume per m^2	Orifice Plate Diameter (mm)
OSD Tank	0.0255	144

OSD calculation results show that the tanks indicated above adequately restrict discharge back to predevelopment fully pervious conditions. Results have been summarised in the table below.

Table 4: OSD Results Summary

	Permitted Site Discharge (L/s)	Site Storage Requirement (m^3)
OSD Tank	63.0	122.9

As mentioned in Section 6.1, for the 1% AEP there are existing flood issues along Canberra Avenue. Considering the peak flood depths and levels provided affecting the kerb inlet pit where the development will be discharging to, the proposed OSD tank has been designed so that the OSD outlet centreline RL is above the top of kerb level in the connection pit. Therefore, the OSD tank base RL has been set at 61.20m, which is above the kerb level RL 61.17m. Refer to Appendix A for further information.

9. Water Quality Treatment

As discussed in Section 5.3 of this report, The Lane Cove Council DCP (2011) require stormwater quality treatment on new developments to reduce the pollutant loading of stormwater discharged into the council drainage system.

This section of the report describes the proposed Stormwater Quality Improvement Devices (SQID's) and the effectiveness of the treatment system in achieving the reduction targets set by council for the proposed development.

9.1 Potential Pollutants

There are a wide range of potential stormwater pollutant sources which occur from urbanised catchments, many which can be managed through appropriate stormwater quality treatment. Typical urban pollutants may include:

- Atmospheric deposition
- Erosion (including that from subdivision and building activities)
- Litter and debris
- Traffic emissions and vehicle wear
- Animal droppings
- Pesticides and fertilisers
- Application, storage and wash-off of car oil, detergents and other household and commercial solvents and chemicals
- Solids accumulation and growth in stormwater systems
- Weathering of buildings

These pollutants in urban stormwater can be placed into various categories as follows. The pollutants underlined below are able to be readily modelled:

- Suspended Solids
- Litter
- Nutrients such as Nitrogen and Phosphorous
- Biological oxygen demand (BOD) and chemical oxygen demand (COD) materials
- Micro-organisms
- Toxic organics
- Trace metals
- Oils and surfactants

While only the key pollutants underlined above will be examined within the modelling, the stormwater Quality Improvement Devices implemented are expected to assist in reducing a wide range of pollutants. For example, heavy metals are commonly associated with, and bound to fine sediments thus, reducing the discharge of fine sediment during the construction and operational phases will also reduce the discharge of heavy metals to existing stormwater systems.

9.2 Pollutant Reduction System

In order to achieve the pollutant reduction targets specified in section 5.3 of this report a series of treatment devices are proposed which together form a treatment train. The proposed treatment train includes the following:

The diagram below shows a typical treatment train:

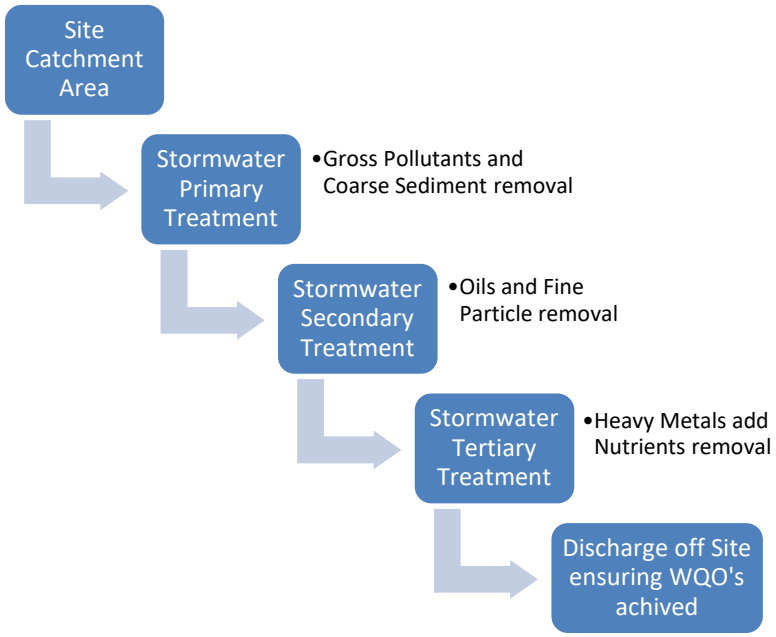


Figure 7: Proposed Water Quality Treatment Train

9.2.1 Water Treatment Modelling

In order to demonstrate that the proposed treatment train meets the required reduction targets, pollutants reduction modelling is proposed using the Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Software program Version 6.3 by eWater CRC. A MUSIC stormwater quality model is applied to help achieve a neutral or beneficial effect (NorBE) on water quality for the proposed development. NorBE is assessed by comparing the quality of runoff from the pre-development site with that from the post-development site, which includes proposed stormwater treatment measures that may be needed to mitigate pollutant loads and concentrations resulting from the proposed land use change.

To ensure that the development and its associated treatment measures have a neutral or beneficial effect on water quality, the associated MUSIC model must meet the following criteria:

- The mean annual pollutant loads for the post-development case (including mitigation measures) must be 10% less than the pre-development case for total suspended solids (TSS), total phosphorus (TP) and total nitrogen (TN). For gross pollutants, the post-development load only needs to be equal to or less than pre-development load.
- Pollutant concentrations for TP and TN for the post-development case must be equal to or better compared to the pre-development case for between the 50th and 98th percentiles over the five-year modelling period when runoff occurs. Periods of zero flow are not accounted for in the statistical analysis as there is no downstream water quality impact.

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 & GP 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.

A catchment plan showing the catchment areas details has been prepared and incorporated into the Appendix A.

The proposed treatment train includes the following:

- A Gross Pollutant Trap;
- Rainwater Re-use Tank
- Grassed Swales

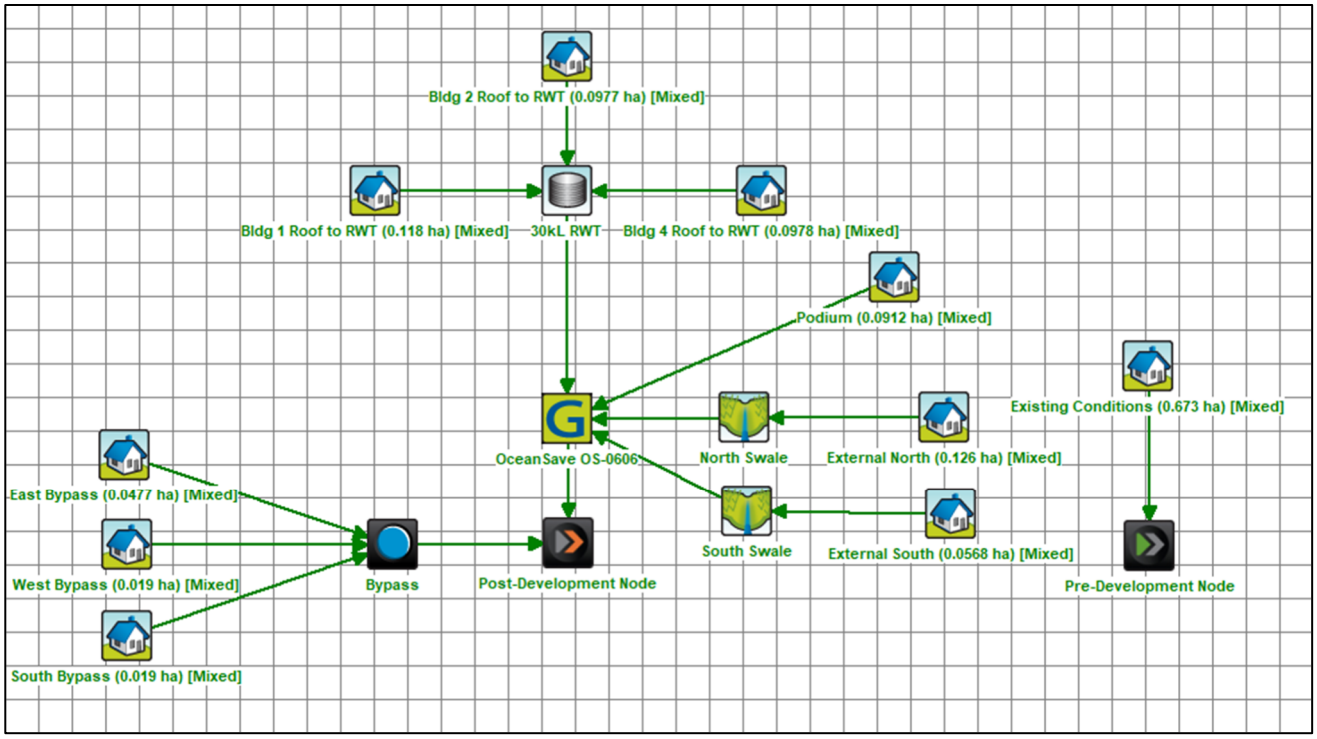


Figure 8: MUSIC Model Treatment Train

The following are the treatment rates as determined by the MUSIC model.

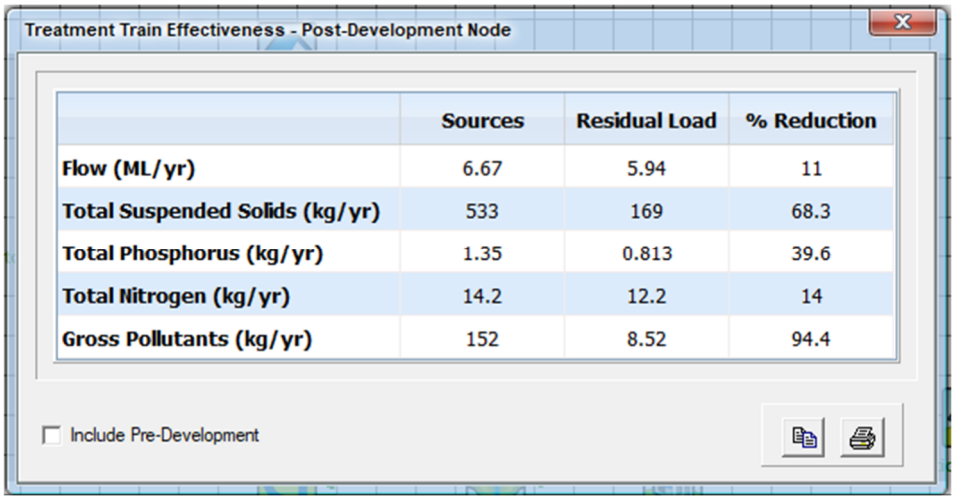


Figure 9: MUSIC Modelling Results

Table 5: MUSIC Results vs. Site Targets

Pollutant/Issue	Target	Pre-Development Load (kg/yr)	Post-Development Load (kg/yr)	% Pre Vs. Post Reduction	Target Achieved
TSS	10% less than the pre-development	533	169	68.3	YES
Total Phosphorus	10% less than the pre-development	1.35	0.813	39.6	YES
Total Nitrogen	10% less than the pre-development	14.2	12.2	14	YES
Gross Pollutants	≤ pre-development load	152	8.52	94.4	YES

As can be seen in the table above, the MUSIC model shows that the proposed design meets the NorBE reduction targets.

9.2.2 Gross Pollutant Traps

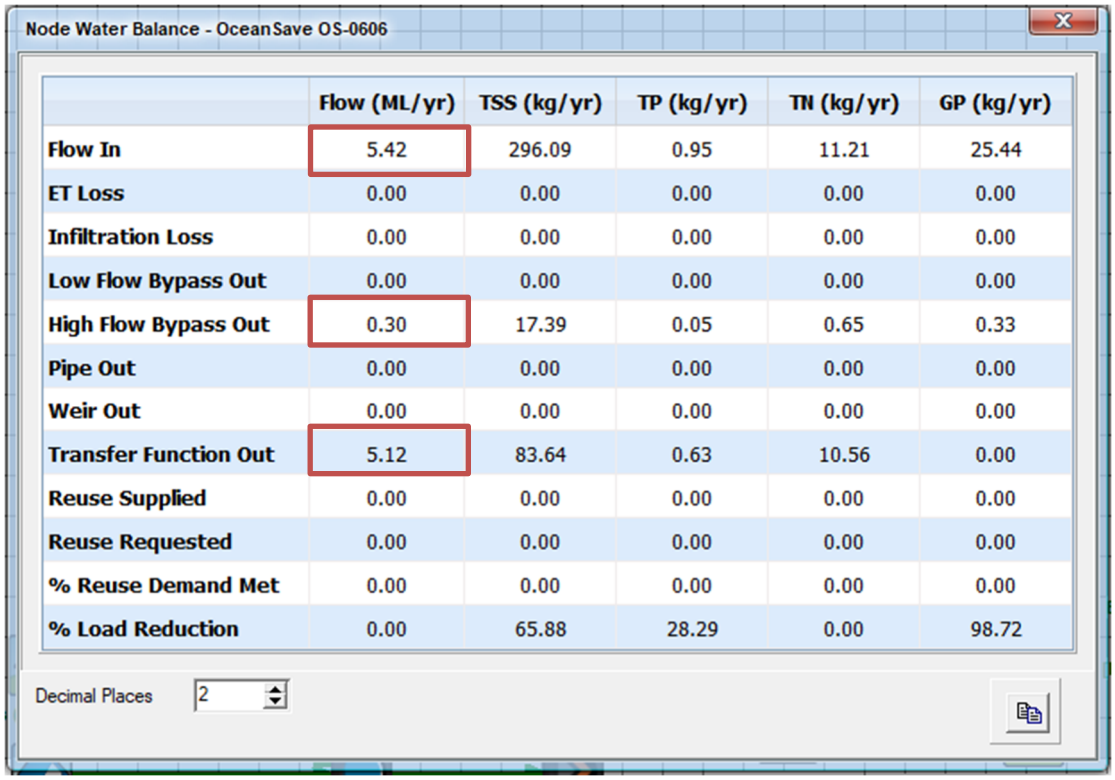
Gross Pollutant Traps (GPT's) are installed to remove contaminants such as sediment, oil, and other pollutants from the stormwater before it discharges into the receiving system.

According to the Lane Cove Council DCP (2011), GTP's must be installed for the following developments:

- Residential developments with more than six dwellings.
- All commercial Developments that may involve the use, storage or transportation of contaminants.
- Commercial developments on allotments greater than 5,000m^2.

- All industrial developments.

According to council, the installation of one GPT is required to remove contaminants. The proposed OS-0606 GPT has been incorporated into the MUSIC model. This GPT has a treatable flowrate of 28 L/s. In terms of analysing the 3-month flow versus the hydraulic effectiveness within MUSIC, the following results indicate that 94.5% of runoff is treated by this GPT.



	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	5.42	296.09	0.95	11.21	25.44
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	0.30	17.39	0.05	0.65	0.33
Pipe Out	0.00	0.00	0.00	0.00	0.00
Weir Out	0.00	0.00	0.00	0.00	0.00
Transfer Function Out	5.12	83.64	0.63	10.56	0.00
Reuse Supplied	0.00	0.00	0.00	0.00	0.00
Reuse Requested	0.00	0.00	0.00	0.00	0.00
% Reuse Demand Met	0.00	0.00	0.00	0.00	0.00
% Load Reduction	0.00	65.88	28.29	0.00	98.72

Figure 10: MUSIC Node Water Balance Results for GPT

9.2.3 Rainwater Reuse Tank

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, garden irrigation, washing cars, filling ornamental ponds, washing machines, in hot water systems, filling swimming pools and spas, and firefighting.

The Lane Cove Council's objective goal for rainwater tanks is for: Water tanks designed, constructed and installed so that they will be sited and screened so as not to materially impact on the environment and amenity of the neighborhood and to encourage water conservation.

The proposed Rainwater tank shall be incorporated into the stormwater drainage system, its size has been given considering BASIX's requirements and it will be 30m^3. The tank will retain and reuse rainwater for landscape irrigation.

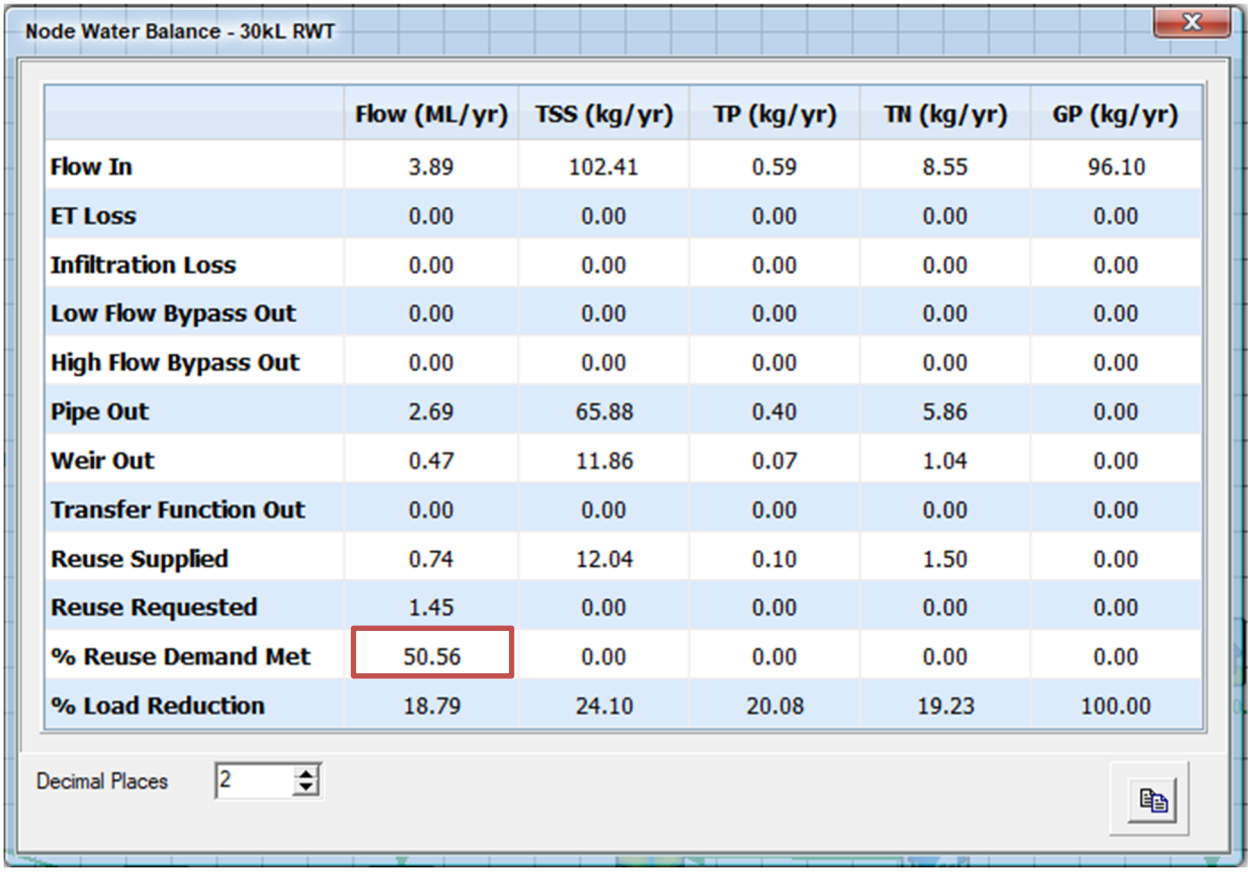
The RWT has been proposed to meet Council's encouragement for water conservation as stated in the Lane Cove DCP (2011) Part O Section 3.1 Stormwater Management. The effectiveness of the RWT at meeting the demand upon it has been evaluated using MUSIC.

The Total Recycle Water Demand for this site were calculated and are summarized below:

Table 6: Recycle Water Demand Rates

Landscape Irrigation Recycle Water Demand		
	Area (m^2)	Water Demand (kL/year)
Total	828.69	1,453

The MUSIC model designed for this site, as seen in Figure 11 below, demonstrates that 50.56% Reuse Demand is achieved. Therefore, the proposed Rainwater Tank conserves water.



	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	3.89	102.41	0.59	8.55	96.10
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	2.69	65.88	0.40	5.86	0.00
Weir Out	0.47	11.86	0.07	1.04	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.74	12.04	0.10	1.50	0.00
Reuse Requested	1.45	0.00	0.00	0.00	0.00
% Reuse Demand Met	50.56	0.00	0.00	0.00	0.00
% Load Reduction	18.79	24.10	20.08	19.23	100.00

Figure 11: MUSIC Node Water Balance Results for Rainwater Re-use Tank

9.2.4 Grassed Swales

A grassed swale is a deliberately formed surface depression for the conveyance of stormwater runoff that include a vegetated infiltration trench within the channel invert for the purpose of water quality treatment through the filtration of sediment and biological uptake of nutrients.

Two grassed swales have been proposed for the site and are to be positioned at external north and external south of the site, refer to Appendix A for swale locations.

These swales have also been incorporated into the MUSIC model and contribute to the systems pollution reduction.

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 (SWMS).

The below summaries 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 OSD Tanks

A general inspection of the OSD tank is to be undertaken at a minimum every six (6) months and after major storm events. The general inspection involves visual inspection inside the tank, condition of components such as orifice plates and valves, 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). It is expected that the tanks are hosed out and cleaned on an annual basis to ensure required performance can be achieved.

10.3 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.

10.4 Above Ground Storage and Biofiltration

A general inspection of above ground features and components within a stormwater network such as storage basins and biofiltration bases 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. Detailed inspections for treatment performance and stabilisation of earthworks structure should occur either annually or biannually.

10.5 Civil Structures

A general inspection of civil structures and associate drainage across a site should be undertaken annually. The general inspection involves visual inspection, with identified defects assessed by applicable qualified engineers.

10.6 Stormwater and OSD 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.
Above Ground Storage and Bioretention			
Blockages of inlet and outlet pipes within pits	Six Monthly	Maintenance Contractor	Blast with hose, water into inspection openings and pits to ensure conveyance through lines.
Condition of inlet grates	Six Monthly	Maintenance Contractor	Clear vegetation and any debris from the pit grate condition, inspect 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.
Embankments and storage area condition, in particular scour and vegetation loss in landscaped areas	Six Monthly	Maintenance Contractor	Walk along bottom of embankments where possible. Compare total above ground storage volume and levels to WAE documentation. Check batter stability and vegetation. Notify civil engineer if detrimental features observed, eg >5% storage lost, embankment destabilisation.
Subsoil line blockages	Annual	Maintenance Contractor	Blast with hose, water into inspection openings and pits to ensure conveyance through lines. Review outlets to ensure flow through line.
Planting condition within bioretention areas, including development of weeds.	Six Monthly	Maintenance Contractor	Physical inspection by qualified contractor to review vegetation growth, removal of weeds, removal of debris and soil arrangement.
Filtration media quality	Two Years	Maintenance Contractor	Inspection by qualified contractor. Samples to be taken of material to confirm requirements are achieved.
Civil Structures			
Check subsoil behind retaining walls drainage capacity via hose flushing	Annual	Maintenance Contractor	Blast with hose, water into inspection openings and pits to ensure conveyance through lines. Review outlets to ensure flow through line.
Condition of retaining walls and other structures, including cracking and stability	Annual	Maintenance Contractor	Walk along and inspect all visible faces of wall structure. Observe for cracking, crack width, any lean in on wall and moisture within structure. Notify structural engineer if detrimental features observed.

Check batters for signs of scour and erosion	Annual	Maintenance Contractor	Walk along bottom of embankments where possible. Check batter stability and vegetation. Notify civil engineer if detrimental features observed.

11. 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. Lane Cove Council specifies compliance with the Landcom design guide in their Stormwater and Floodplain Management Technical Manual.

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.

A Soil and Water Management Plan has been prepared as part of the development application documentation and is included in Appendix A of this report.

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:

- Sandbag protection will be installed surrounding all existing stormwater drainage infrastructure inlets to prevent sediment entering the system.

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.

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.

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.

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 temporary sediment basin will be installed, and all overland flow directed towards it. The basin 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.

Appendix A Civil Design Documentation

Stantec

NEW HOPE EVERGREEN Pty Ltd

DRAWING LIST	
NO.	DRAWING NAME
CI-000-001	COVER SHEET, DRAWING REGISTRY AND LOCALITY PLAN
CI-007-001	GENERAL NOTES
CI-050-001	EXISTING CONDITIONS PLAN
CI-060-001	GENERAL ARRANGEMENT PLAN
CI-070-001	EROSION AND SEDIMENTCONTROL PLAN
CI-076-001	EROSION AND SEDIMENTCONTROL DETAILS
CI-100-001	BULK EARTHWORKS PLAN
CI-500-001	STORMWATER DRAINAGE CATCHMENT PLAN
CI-520-001	STORMWATER DRAINAGE PLAN GROUND FLOOR
CI-526-001	STORMWATER DRAINAGE DETAILS SHEET 1
CI-526-002	STORMWATER DRAINAGE DETAILS SHEET 2
CI-526-003	STORMWATER DRAINAGE DETAILS SHEET 3

ST LEONARDS VILLAGE

St LEONARD'S SOUTH NSW - AREA 1,2 & 4

DEVELOPMENT APPLICATION 2022.06.17

Stantec Project Number: 30130653

GENERAL NOTES

1. ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH COUNCIL / RELEVANT AUTHORITY SPECIFICATIONS AND DETAILS.
2. THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH OTHER SUCH WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.
3. ALL DIMENSIONS ARE IN MILLIMETRES & ALL LEVELS ARE IN METRES, UNO (UNLESS NOTED OTHERWISE).
4. NO DIMENSION SHALL BE OBTAINED BY SCALING THE DRAWINGS.
5. ALL LEVELS AND SETTING OUT DIMENSIONS SHOWN ON THE DRAWINGS SHALL BE CHECKED ON SITE PRIOR TO COMMENCEMENT OF WORKS.
6. EXISTING SERVICES WHERE SHOWN HAVE BEEN PLOTTED FROM SUPPLIED DATA AND SUCH THEIR ACCURACY CAN NOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF WORK.
7. CAD FILES / DTM FILES TO BE SUPPLIED IN AUTOCAD FORMAT FOR SETOUT PURPOSES (UPON REQUEST).

SITEWORKS NOTES

1. ORIGIN OF LEVELS:- REFER SURVEY NOTES.
2. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO STANTEC.
3. CONTRACTOR TO CONFIRM ALL CBR VALUES PRIOR TO COMMENCEMENT OF WORKS.
4. MAKE SMOOTH CONNECTION WITH EXISTING WORKS.
5. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
6. ALL SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)
7. PROVIDE 10mm WIDE EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVEMENTS.
8. ASPHALTIC CONCRETE SHALL CONFORM TO RMS. SPECIFICATION R116.
9. ALL BASECOURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH RMS. FORM 3051 (UNBOUND), RMS. FORM 3052 (BOUND) COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
   FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m^3 BASECOURSE MATERIAL PLACED.
10. ALL SUB-BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH RMS. FORM 3051, 3051.1 AND COMPACTED TO MINIMUM 95% MODIFIED DENSITY IN ACCORDANCE WITH A.S 1289 5.2.1
    FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m^3 OF SUB-BASE COURSE MATERIAL PLACED.
11. AS AN ALTERNATIVE TO THE USE OF IGNEOUS ROCK AS A SUB-BASE MATERIAL IN (9) A CERTIFIED RECYCLED CONCRETE MATERIAL COMPLYING WITH RMS. FORM 3051 AND 3051.1 WILL BE CONSIDERED. SUBJECT TO MATERIAL SAMPLES AND APPROPRIATE CERTIFICATIONS BEING PROVIDED TO THE SATISFACTION OF STANTEC.
12. SHOULD THE CONTRACTOR WISH TO USE A RECYCLED PRODUCT THIS SHALL BE CLEARLY INDICATED IN THEIR TENDER AND THE PRICE DIFFERENCE BETWEEN AN IGNEOUS PRODUCT AND A RECYCLED PRODUCT SHALL BE CLEARLY INDICATED.
13. WHERE NOTED ON THE DRAWINGS THAT WORKS ARE TO BE CARRIED BY OTHERS, (eg. ADJUSTMENT OF SERVICES), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THESE WORKS.

SURVEY NOTES

1. THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN SHOWN AS PER THE TOPOGRAPHIC SURVEY RECEIVED ON 27/10/2021 PREPARED BY LTS LOCKLEY REGISTERED SURVEYORS NSW, REFERENCE '50275-003DT', DATED 25/02/21.
2. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. STANTEC DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT STANTEC.

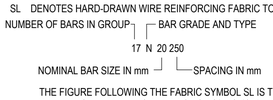
CONCRETE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. CONCRETE QUALITY ALL REQUIREMENTS OF THE CURRENT ACSE CONCRETE SPECIFICATION DOCUMENT 1 SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	AS 3600 F'c MPa AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
VEHICULAR BASE	32	60	20
KERBS, PATHS, AND PITS	25	80	20

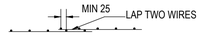
- CEMENT TYPE SHALL BE (ACSE SPECIFICATION) TYPE SL
- PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379.

3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY STANTEC.
4. CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 40mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.
6. THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH R.M.S. SPECIFICATION R83.
7. REINFORCEMENT SYMBOLS:
   N DENOTES GRADE 450 N BARS TO AS/NZS 4671 GRADE N
   R DENOTES 230 R HOT ROLLED PLAIN BARS TO AS/NZS 4671
   SL DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS/NZS 4671



   THE FIGURE FOLLOWING THE FABRIC SYMBOL SL IS THE REFERENCE NUMBER FOR FABRIC TO AS/NZS 4671.

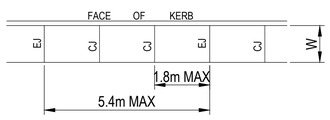
8. FABRIC SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING DETAIL:



JOINTING NOTES

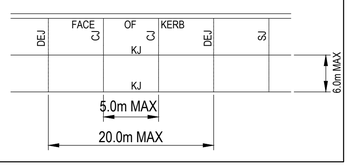
PEDESTRIAN PAVEMENT JOINTS

1. ALL PEDESTRIAN PAVEMENTS ARE TO BE JOINTED AS FOLLOWS. (U.N.O)
2. EXPANSION JOINTS ARE TO BE LOCATED WHERE POSSIBLE AT TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX. 5.4m CENTRES.
3. CONTRACTION JOINTS ARE TO BE LOCATED AT A MAX. SPACING OF 1.8m
4. WHERE POSSIBLE JOINTS SHOULD BE LOCATED TO MATCH KERBING AND OR ADJACENT PAVEMENT JOINTS.
5. PEDESTRIAN PAVEMENT JOINT DETAIL:



VEHICULAR PAVEMENT JOINTS

6. ALL VEHICULAR PAVEMENTS TO BE JOINTED AS FOLLOWS. (U.N.O)
7. CONTRACTION JOINTS SHOULD GENERALLY BE LOCATED AT A MAX OF 5.0m CENTRES WITH DOWELED EXPANSION JOINTS AT MAX 20.0m CENTRES
8. VEHICULAR PAVEMENT JOINT DETAIL.



KERBING NOTES

1. ALL CONCRETE TO HAVE A MINIMUM COMPRESSIVE STRENGTH OF 25 MPa U.N.O IN REINFORCED CONCRETE NOTES.
2. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSINGS TO BE CONSTRUCTED ON 100mm GRANULAR BASECOURSE COMPACTED TO MINIMUM 95% MODIFIED DRY DENSITY (AS 1289 5.2.1).
3. EXPANSION JOINTS (E.J) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILLER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT MAX 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
4. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN THE SLABS.
5. BROOMED FINISH TO ALL RAMPED AND VEHICULAR CROSSINGS. ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
6. IN THE REPLACEMENT OF KERB AND GUTTER :- EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm U.N.O FROM THE LIP OF GUTTER. UPON COMPLETION OF THE NEW KERB AND GUTTER NEW BASECOURSE AND SURFACE TO BE LAID 600mm WIDE U.N.O.
7. EXISTING ALLOTMENT DRAINAGE PIPES ARE TO BE BUILT INTO THE NEW KERB AND GUTTER WITH 100mm DIA HOLE.
8. EXISTING KERB AND GUTTER IS TO BE COMPLETELY REMOVED WHERE NEW KERB AND GUTTER IS SHOWN.

PROPOSED SERVICES NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT SERVICE AUTHORITY DOCUMENTATION AND CURRENT NSW STREETS OPENING CONFERENCE GUIDE TO CODES AND PRACTICES FOR STREETS OPENING LITERATURE.
2. THE CONTRACTOR SHALL ATTEND, MANAGE & SUPERVISE THE PROVISION OF PUBLIC UTILITY SERVICES TO THE WORKS GENERALLY AS INDICATED ON THE SERVICES PLANS, NOTING THAT PRIOR & DURING CONSTRUCTION THE PUBLIC UTILITY AUTHORITIES WILL FINALISE THEIR DOCUMENTATION TO CONSTRUCTION ISSUE STANDARD.
3. THE CIVIL CONTRACTOR (TRENCH PROVIDER) IS TO ARRANGE ON SITE MEETING WITH ALL SERVICE AUTHORITIES PRIOR TO THE INSTALLATION OF CONDUITS.
4. THE CIVIL CONTRACTOR TO CO-ORDINATE INSTALLATION OF ELECTRICITY, GAS,TELECOMMUNICATION, WATER AND SEWER SERVICES.
5. ELECTRICITY, GAS AND TELECOMMUNICATION SERVICES ARE TO BE LAID FOLLOWING THE INSTALLATION OF STORMWATER, SEWER AND WATER SERVICES AND KERB AND GUTTER.
6. ALL UTILITY AUTHORITY REPRESENTATIVES TO INSPECT ROAD CROSSINGS PRIOR TO SEALING.
7. ALL ELECTRICAL ROAD CROSSINGS TO BE CLASS 6 (ORANGE) uPVC CONDUITS.
8. ALL GAS ROAD CROSSINGS TO BE uPVC GREY SEWER GRADE CONDUITS.
9. ALL STREET POLES TO BE POSITIONED THE APPROPRIATE DISTANCE FROM FACE OF KERB TO FACE OF POLE ACCORDING TO THE CURRENT NSW STREETS OPENING CONFERENCE GUIDE TO CODES AND PRACTICES FOR STREETS OPENING LITERATURE. CONTRACTOR TO ALLOW TO EXCAVATE AND BACKFILL TRENCH GENERALLY IN ACCORDANCE WITH NOTE 2.
10. ALL SERVICE PIT COVERS AND MARKERS ARE TO BE LAID WHOLLY WITHIN THE CONCRETE FOOTPATH. CONTACT SUPERINTENDANT SHOULD DIFFICULTIES ARISE.

TELSTRA - DUTY OF CARE NOTE

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

EROSION AND SEDIMENT CONTROL NOTES

GENERAL INSTRUCTIONS

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

LAND DISTURBANCE

6. WHERE PRACTICAL, THE SOIL EROSION HAZARD ON THE SITE WILL BE KEPT AS LOW AS POSSIBLE. TO THIS END, WORKS SHOULD BE UNDERTAKEN IN THE FOLLOWING SEQUENCE:
   6.1. INSTALL A SEDIMENT FENCE ALONG THE BOUNDARIES AS SHOWN ON PLAN. REFER DETAIL.
   6.2. CONSTRUCT STABILISED CONSTRUCTION ENTRANCE TO LOCATION AS DETERMINED BY SUPERINTENDENT/ENGINEER. REFER DETAIL.
   6.3. INSTALL SEDIMENT BASIN AS SHOWN ON PLAN
   6.4. INSTALL SEDIMENT TRAPS AS SHOWN ON PLAN.
7. 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.

EROSION CONTROL

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

SEDIMENT CONTROL

10. STOCKPILES WILL NOT BE LOCATED WITHIN 2 METRES OF HAZARD AREAS, INCLUDING LIKELY AREAS OF CONCENTRATED OR HIGH VELOCITY FLOWS SUCH AS WATERWAYS. WHERE THEY ARE BETWEEN 2 AND 5 METRES FROM SUCH AREAS, SPECIAL SEDIMENT CONTROL MEASURES SHOULD BE TAKEN TO MINIMISE POSSIBLE POLLUTION TO DOWNSLOPE WATERS, E.G. THROUGH INSTALLATION OF SEDIMENT FENCING.
11. ANY SAND USED IN THE CONCRETE CURING PROCESS (SPREAD OVER THE SURFACE) WILL BE REMOVED AS SOON AS POSSIBLE AND WITHIN 10 WORKING DAYS FROM PLACEMENT.
12. WATER WILL BE PREVENTED FROM ENTERING THE PERMANENT DRAINAGE SYSTEM UNLESS IT IS RELATIVELY SEDIMENT FREE, I.E. THE CATCHMENT AREA HAS BEEN PERMANENTLY LANDSCAPED AND/OR ANY LIKELY SEDIMENT HAS BEEN FILTERED THROUGH AN APPROVED STRUCTURE.
13. TEMPORARY SOIL AND WATER MANAGEMENT STRUCTURES WILL BE REMOVED ONLY AFTER THE LANDS THEY ARE PROTECTING ARE REHABILITATED.

OTHER MATTERS

13. ACCEPTABLE RECEPTORS WILL BE PROVIDED FOR CONCRETE AND MORTAR SLURRIES, PAINTS, ACID WASHINGS, LIGHT-WEIGHT WASTE MATERIALS AND LITTER.
14. ANY EXISTING TREES WHICH FORM PART OF THE FINAL LANDSCAPING PLAN WILL BE PROTECTED FROM CONSTRUCTION ACTIVITIES BY:
    14.1. PROTECTING THEM WITH BARRIER FENCING OR SIMILAR MATERIALS INSTALLED OUTSIDE THE DRIP LINE
    14.2. ENSURING THAT NOTHING IS NAILED TO THEM
    14.3. PROHIBITING PAVING, GRADING, SEDIMENT WASH OR PLACING OF STOCKPILES WITHIN THE DRIP LINE EXCEPT UNDER THE FOLLOWING CONDITIONS.
    14.4. ENCROACHMENT ONLY OCCURS ON ONE SIDE AND NO CLOSER TO THE TRUNK THAN EITHER 1.5 METRES OR HALF THE DISTANCE BETWEEN THE OUTER EDGE OF THE DRIP LINE AND THE TRUNK, WHICH EVER IS THE GREATER
    14.5. A DRAINAGE SYSTEM THAT ALLOWS AIR AND WATER TO CIRCULATE THROUGH THE ROOT ZONE (E.G. A GRAVEL BED) IS PLACED UNDER ALL FILL LAYERS OF MORE THAN 300 MILLIMETRES DEPTH
    14.6. CARE IS TAKEN NOT TO CUT ROOTS UNNECESSARILY NOR TO COMPACT THE SOIL AROUND THEM.

BULK EARTHWORKS NOTES

1. REFER SPECIFICATIONS NOTES FOR EARTHWORKS GENERAL REQUIREMENTS.
2. STRIP EXISTING TOPSOIL IN CONSULTATION WITH THE GEOTECHNICAL ENGINEER / REPORT. FOR THE PURPOSES OF EARTHWORKS CALCULATIONS A TOPSOIL STRIPPING DEPTH OF XXXXmm HAS BEEN ASSUMED. GROUND SLAB DEPTH OF XXXXmm HAS BEEN ASSUMED WHERE REQUIRED.
3. NO ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS. NOTE ALL VOLUMES DEPICTED ARE SOLID VOLUMES ONLY AND MAY NOT REFLECT DETAILED EARTHWORKS.
4. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS; ie SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS AND THE LIKE.
5. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.
6. BULK EARTHWORKS ARE BASED ON THE SETDOWN TO UNDERSIDE OF PAVEMENT BUILDUPS AS SPECIFIED FROM FINISHED SURFACE LEVELS.
7. SITE STRIPPING VOLUMES HAVE NOT BEEN INCLUDED IN BULK EARTHWORKS CALCULATIONS.

STORMWATER DRAINAGE NOTES

1. ON COMPLETION OF STORMWATER INSTALLATION, ALL DISTURBED AREAS MUST BE RESTORED TO ORIGINAL CONDITION, INCLUDING KERBS, FOOTPATHS, CONCRETE AREAS, GRAVEL AND GRASSED AREAS AND ROAD PAVEMENTS, UNLESS DIRECTED OTHERWISE.
2. PIPES 300 DIA. AND LARGER TO BE REINFORCED CONCRETE CLASS '3' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS. U.N.O.
3. PIPES UP TO 300 DIA SHALL BE SEWER GRADE uPVC WITH SOLVENT WELDED JOINTS.
4. EQUIVALENT STRENGTH VCP OR FRC PIPES MAY BE USED.
5. ALL STORMWATER DRAINAGE LINES UNDER PROPOSED BUILDING SLABS TO BE uPVC PRESSURE PIPE GRADE 6. ENSURE ALL VERTICALS AND DOWNPIPES ARE uPVC PRESSURE PIPE, GRADE 6 FOR A MIN OF 3.0m IN HEIGHT.
6. PIPES TO BE INSTALLED TO TYPE HS3 (ROAD) HS2 (LOTS) SUPPORT IN ACCORDANCE WITH AS 3725 (2007) IN ALL CASES BACKFILL TRENCH WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% STANDARD MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 75)
7. ALL INTERNAL WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS 3500 3.1 (2006) AND AS/NZS 3500 3.2 (2010).
8. PRECAST PITS MAY BE USED EXTERNAL TO THE BUILDING SUBJECT TO APPROVAL BY STANTEC.
9. ENLARGERS, CONNECTIONS AND JUNCTIONS TO BE PREFABRICATED FITTINGS WHERE PIPES ARE LESS THAN 300 DIA.
10. WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED uPVC SEWER GRADE PIPE IS TO BE USED.
11. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL.
12. GRATES AND COVERS SHALL CONFORM TO AS 3996.
13. ALL INTERNAL PIT DIMENSIONS TO CONFORM TO AS3500.3 TABLE 7.5.2.1
14. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.
15. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS.
16. THE CONTRACTOR IS TO ORGANISE AND STAGE CONSTRUCTION WORK AND UNDERTAKE ANY DIVERSION WORKS TO ENSURE THE EXISTING DRAINAGE IS ABLE TO CONVEY ALL STORMWATER FLOWS THAT MAY OCCUR DURING THE PERIOD OF THE CONSTRUCTION WORKS.
17. ANY DAMAGE TO THE WORKS DUE TO STORMWATER FLOWS OR FLOODING DURING THE CONSTRUCTION PERIOD IS AT THE CONTRACTOR'S RISK.
18. SETOUT POINTS FOR STORMWATER STRUCTURES ARE AS INDICATED IN THE DRAWINGS UNLESS OTHERWISE NOTED.
19. ALL PAVED SURFACE LEVELS AND GRADES TO BE COORDINATED WITH GULLY PIT LEVELS TO ENSURE NO UNDRAINED AREAS OCCUR.
20. THE SIDES OF ALL PIPE TRENCH EXCAVATIONS DEEPER THAN 1.0m SHALL BE FULLY SUPPORTED AT ALL TIMES AND HAVE APPROPRIATE EDGE PROTECTION.
21. ALL NEW PIPES TO BE LAID IN AN UPSTREAM DIRECTION. THE LINE, LEVEL AND LOCATION OF EXISTING SERVICES CROSSING THE LINE OF THE PROPOSED STORMWATER PIPE SHALL BE DETERMINED BY EXCAVATION PRIOR TO THE LAYING OF THE PIPE. IF CONFLICT IS APPARENT, THE ENGINEER SHALL BE NOTIFIED AND INSTRUCTIONS AS TO WHETHER THE EXISTING SERVICE IS TO BE ADJUSTED OR THE PROPOSED PIPE INVERT ALTERED WILL BE ISSUED.
22. PIPE BEDDING, HAUNCH AND BACKFILL TO BE AS SHOWN ON THE CIVIL DETAILS DRAWINGS AND THE CIVIL SPECIFICATION.
23. SUBSOIL DRAINAGE PIPES TO BE SLOTTED PIPE AND FILTER SOCK CLASS 1000 TO AS2439 PART 1 LAID AT PREFERABLE MINIMUM GRADE 1 IN 100 OR ABSOLUTE MINIMUM 1 IN 200 WHERE LIMITED BY OUTFALL LEVELS.
24. STORMWATER STRUCTURES ARE TO BE CONSTRUCTED PERPENDICULAR TO THE INCOMING PIPEWORK UNLESS OTHERWISE NOTED.
25. PRECAST COMPONENTS SHALL BE CONNECTED BY MEANS OF EPOXY OR CHEMICAL GROUTED BARS OF THE SAME DIAMETER AND SPACING AS THE SMALLER BARS IN THE RESPECTIVE COMPONENTS.
26. PRE-CAST PITS MUST HAVE LIFTING ANCHORS.
27. WORKING LOADS ARE THOSE DUE TO FILL MATERIAL AND STANDARD HIGHWAY VEHICLES AS PER AS3725. CONSTRUCTION LOADS HAVE NOT BEEN ALLOWED FOR.
28. ALL EXPOSED EDGES ON STORMWATER PITS TO BE ROUNDED TO 5mm RAD. UNO.

1:1000 10 0 10 20 30 40 50 A1
1:2000 A3

Notes

C	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
B	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
A	DEP SUBMISSION	CPO	MDR	14.02.22
Issued/Revision		By	Appd	YYYY.MM.DD

Issue Status

PRELIMINARY

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NEW HOPE EVERGREEN Pty Ltd

St LEONARD'S SOUTH

St LEONARD'S NSW

File Name: 301350653-CI-007-001.DWG	-	-	-	14.02.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GENERAL NOTES

Project No. 301350653
Scale 1:1000
Revision C
Drawing No. CI-007-001

Plotted: 6/17/2022 11:44:47 AM By: POCOCK, CONOR
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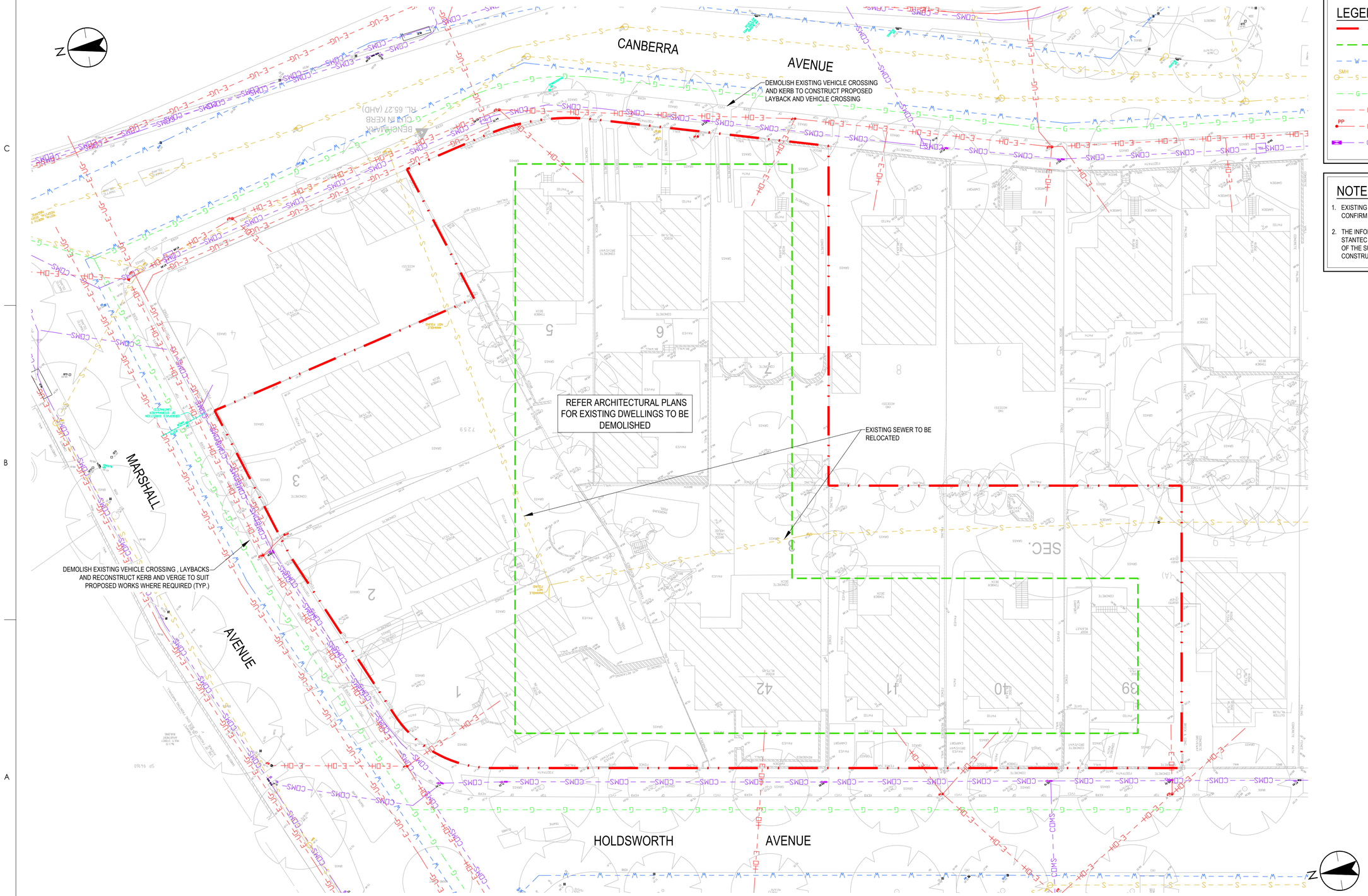

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BASEMENT OUTLINE
- EXISTING WATERMAIN
- EXISTING SEWER
- EXISTING GASMAIN
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING OVERHEAD ELECTRICAL
- EXISTING TELECOMMUNICATIONS

NOTES:

1. EXISTING SERVICES SHOWN IS INDICATIVE ONLY, CONTRACTOR TO CONFIRM SERVICES LOCATION PRIOR TO COMMENCEMENT OF WORK.
2. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. STANTEC DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.

Notes

C	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
B	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
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File Name: 301350653-CI-050-001.DWG	-	-	-	14.02.22
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Title

EXISTING CONDITIONS PLAN

Project No. 301350653

Scale 1:250

Revision C

Drawing No. **CI-050-001**

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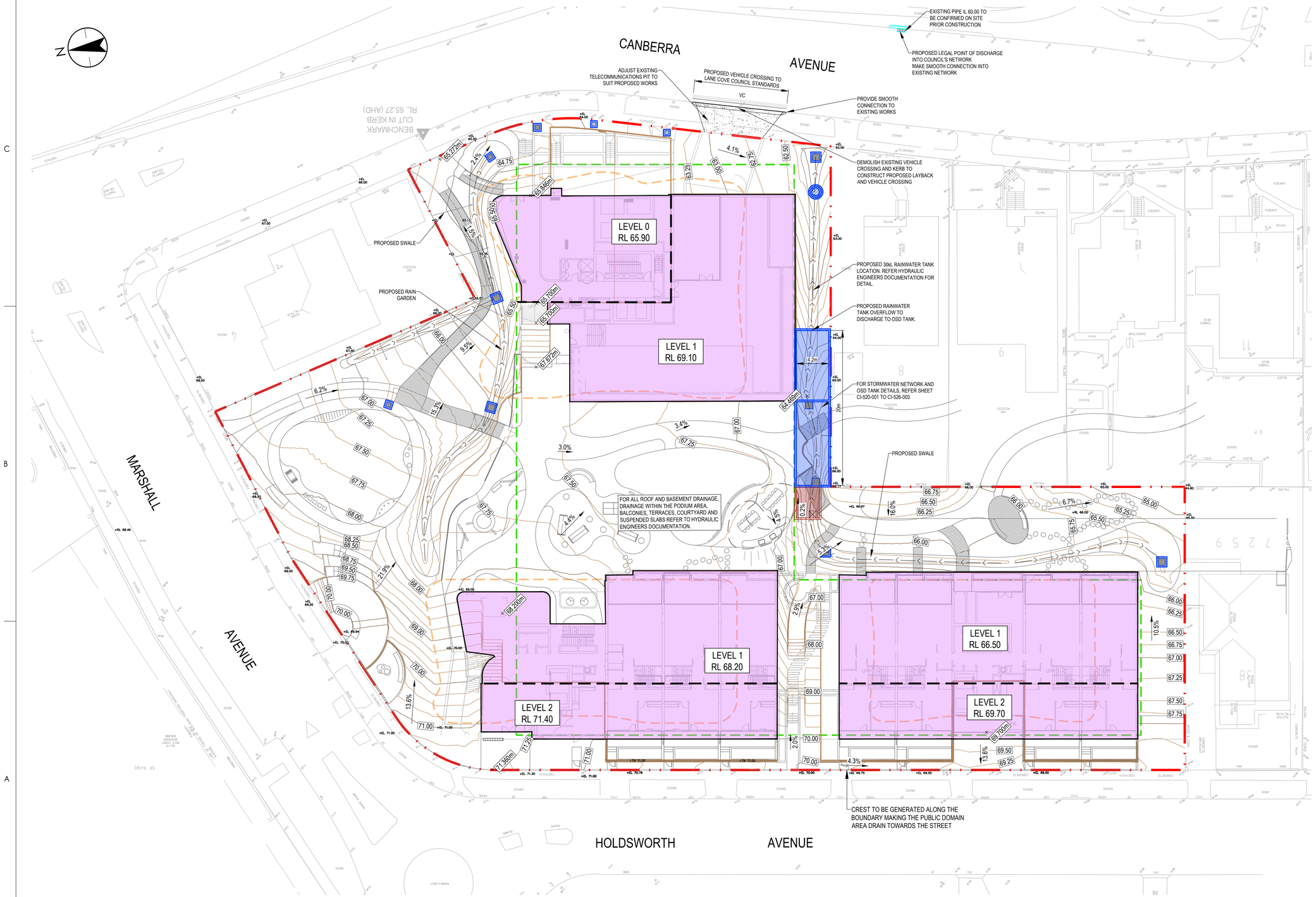

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BUILDING
- PROPOSED ACCESS DRIVEWAY
- PROPOSED BASEMENT EXTENT
- PROPOSED ROOF EXTENT
- 14.0 BULK EARTHWORKS CONTOUR
- 18.0 EXISTING CONTOURS
- 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
- PROPOSED GRATED DRAIN
- PROPOSED SWALE
- PROPOSED GROSS POLLUTANT TRAP
- VC VEHICLE CROSSING

NOTES

1. EXISTING SERVICES SHOWN ARE DRAWN INDICATIVELY ONLY.
2. CONTRACTOR TO ESTABLISH AND VERIFY EXISTING SERVICES AND PIPE CONNECTIONS PRIOR TO ANY WORKS.
3. CONTRACTOR TO PROTECT AND MAINTAIN EXISTING SERVICES ONSITE. GRADE LOCALLY TO MAINTAIN EXISTING SERVICE LEVEL. NOTIFY ENGINEERS FOR UNDOCUMENTED EXISTING SERVICES FOUND.
4. PLANS TO BE VIEWED IN CONJUNCTION WITH LANDSCAPE ARCHITECT PLANS

Notes

B	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
A	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
Issued/Revision		By	Appd	YYYY.MM.DD

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File Name: 301350653-CI-060-001.DWG	VI	MMM	MMM	05.05.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
GENERAL ARRANGEMENT PLAN

Project No. 301350653

Scale 1:250

Revision A

Drawing No. **CI-060-001**

Plotted: 6/7/2022 11:47:10 AM By: POCOCK, CONOR
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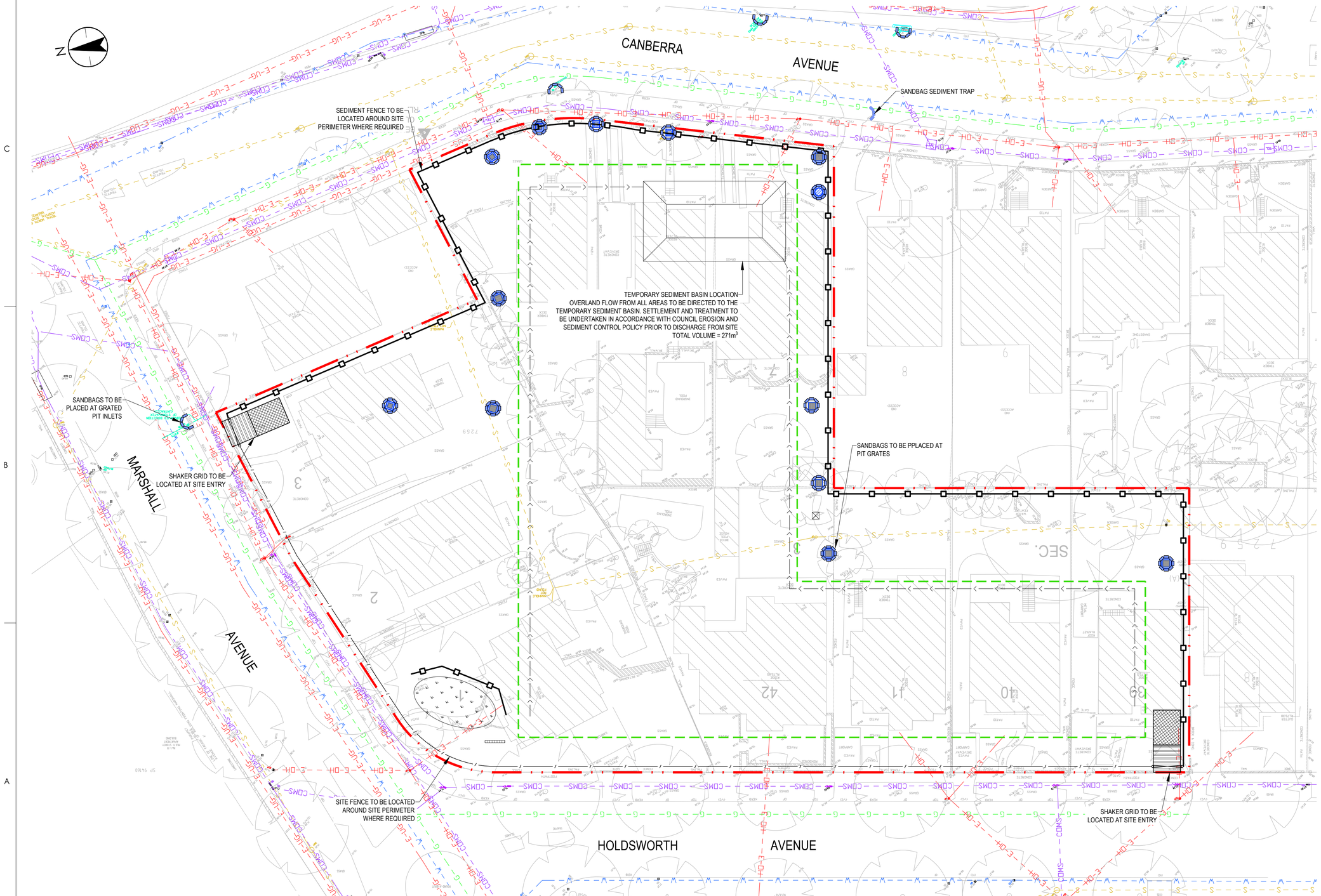

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BASEMENT OUTLINE
- VEHICLE SHAKEDOWN DEVICE
- PROPOSED SITE FENCE
- PROPOSED SILT FENCE
- SITE GATE
- SANDBAG PIT PROTECTION
- SEDIMENT TRAP FOR KERB INLET PITS
- PROPOSED JUNCTION PIT
- EXISTING JUNCTION PIT
- PROPOSED GRATED PIT
- EXISTING GRATED PIT
- PROPOSED KERB INLET PIT
- EXISTING KERB INLET PIT
- PROPOSED GRATED DRAIN
- PROPOSED CATCH DRAIN
- PROPOSED SEDIMENT BASIN
- PROPOSED STOCKPILE
- EXISTING WATERMAIN
- EXISTING SEWER
- EXISTING GASMAIN
- EXISTING UNDERGROUND ELECTRICAL
- EXISTING OVERHEAD ELECTRICAL
- EXISTING TELECOMMUNICATIONS

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.

Notes

C	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
B	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
A	DEP SUBMISSION	CPO	MDR	14.02.22
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File Name: 301350653-CI-070-001.DWG	-	-	-	14.02.22
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Title
EROSION AND SEDIMENT CONTROL PLAN

Project No. 301350653

Scale 1:250

Revision C

Drawing No. **CI-070-001**

Plotted: 6/7/2022 11:47:21 AM By: POCOCK, CONOR
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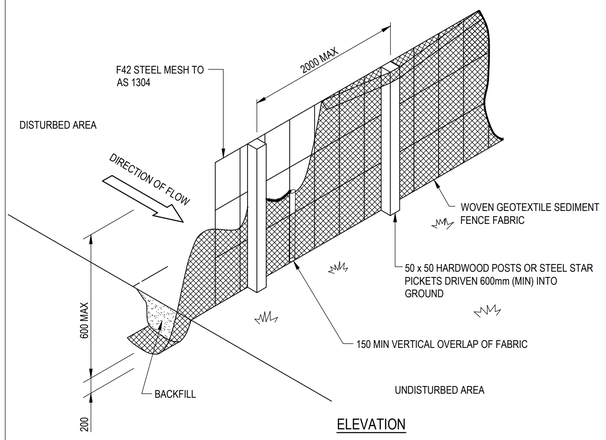
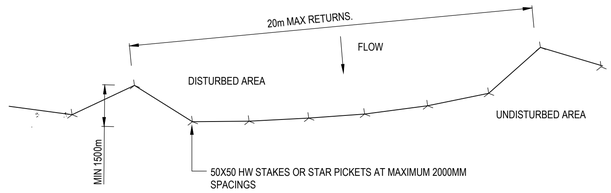
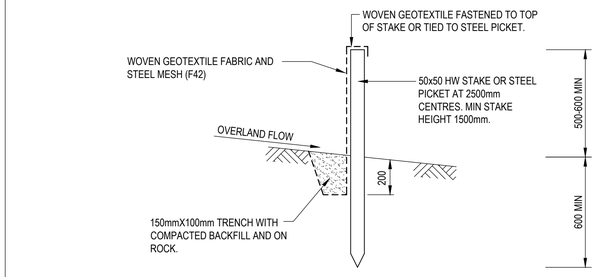


ELEVATION



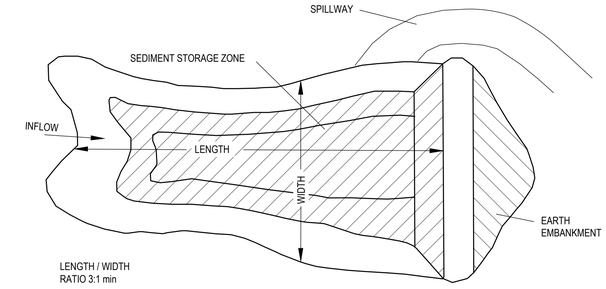
PLAN



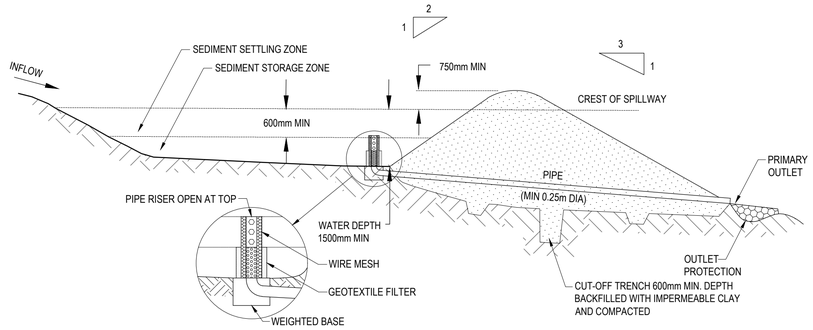
SECTION DETAIL

SEDIMENT FENCE DETAIL

SCALE N.T.S.



PLAN VIEW



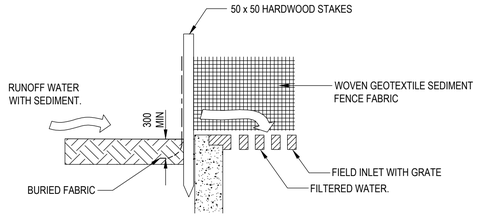
CROSS-SECTION

SEDIMENT BASIN DETAIL

SCALE N.T.S

SANDBAG KERB INLET SEDIMENT TRAP

SCALE N.T.S.



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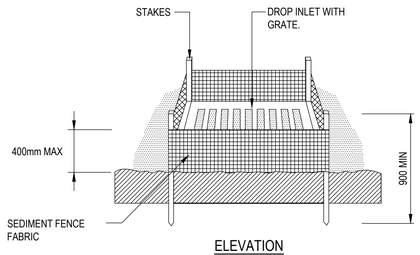
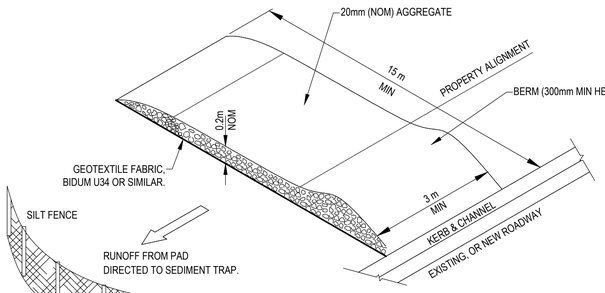


ELEVATION

GEOTEXTILE FILTER FABRIC

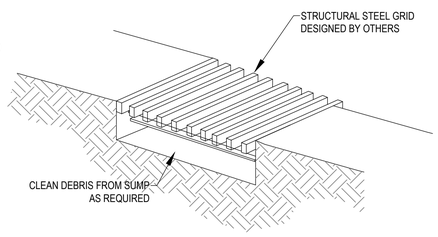
DROP INLET SEDIMENT TRAP

SCALE N.T.S.



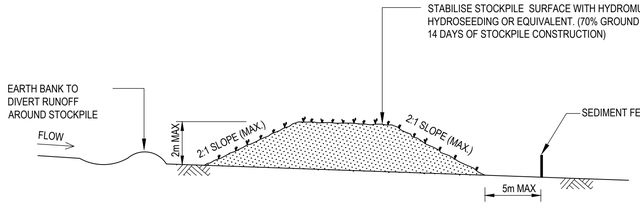
TEMPORARY CONSTRUCTION ENTRY/EXIT SEDIMENT TRAP

SCALE N.T.S.



SHARKER PAD

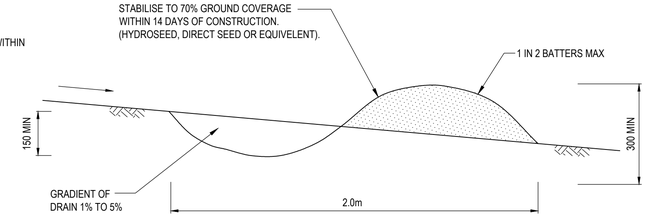
SCALE N.T.S



TYPICAL STOCKPILE CONFIGURATION

SCALE N.T.S.

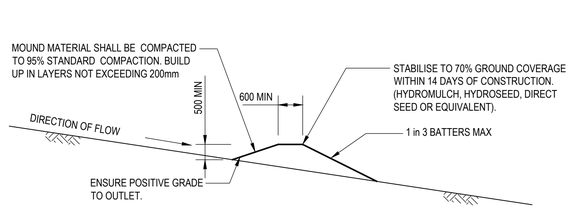
NOTE:
1. LOCATE STOCKPILES AT TOP OF CATCHMENT ON FLAT GROUND AND NOT WITHIN 5m OF CONCENTRATED FLOW PATHS.



CATCH DRAIN / EARTH BANK DETAIL

SCALE N.T.S.

NOTES:
1. ONLY TO BE USED AS TEMPORARY BANK WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.
2. BUILD DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS RATHER THAN V SHAPED



DIVERSION CHANNEL/ BANK DETAIL

SCALE: NTS

NOTES

1. THIS PLAN IS TO BE READ IN CONJUNCTION WITH OTHER ENGINEERING PLANS AND ANY WRITTEN INSTRUCTIONS THAT MAY BE ISSUED.
2. THE CONTRACTOR SHALL IMPLEMENT ALL SOIL EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO DISTURBANCE OF THE RELATED CATCHMENT AREA AND TO THE STANDARD OF 'MANAGING URBAN STORMWATER, SOIL & CONSTRUCTION' & COUNCIL SPECIFICATIONS.
3. ALL SUBCONTRACTORS SHALL BE INFORMED OF THEIR RESPONSIBILITIES IN MINIMISING THE POTENTIAL FOR SOIL EROSION AND POLLUTION TO DOWN SLOPE AREAS.
4. LAND DISTURBANCE SHALL BE LIMITED TO THAT NECESSARY FOR IMPLEMENTATION OF THE PLANS OF WORKS. BUFFER ZONES AND LAND NOT TO BE DISTURBED SHALL BE CLEARLY MARKED WITH BARRIER FENCE. 'SILT' FENCE FOR STRAW BALE SEDIMENT TRAPS SHALL BE PLACED AT REGULAR INTERVALS IMMEDIATELY DOWNSLOPE OF ALL UNPROTECTED DISTURBED LANDS.
5. THE LOCATION OF 'SILT' FENCES, BARRIER FENCES, SEDIMENT TRAPS AND OTHER DEVICES ARE INDICATIVE ONLY AND FINAL LOCATIONS ARE TO BE DECIDED ON SITE. VARIATIONS WILL BE PERMITTED TO BEST SUIT THE CIRCUMSTANCES. CONTRACTOR TO PREPARE DETAILED CONSTRUCTION SEDIMENT AND EROSION CONTROL PLAN.
6. ALL SOIL EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE INSPECTED FOLLOWING EACH STORM EVENT AND ANY NECESSARY MAINTENANCE WORK SHALL BE UNDERTAKEN TO ENSURE THEIR CONTINUED PROPER OPERATION. SEDIMENT SHALL BE REMOVED FROM THE SOIL EROSION & SEDIMENT CONTROL STRUCTURES WHEN
7. NO MORE THAN 40% CAPACITY HAS BEEN REACHED. THESE STRUCTURES SHALL CONTINUE IN PROPER OPERATION UNTIL ALL DEVELOPMENT ACTIVITIES HAS BEEN COMPLETED AND THE SITE FULLY ESTABLISHED.
8. WHERE THE AREA TO BE DISTURB CONTAINS TREES TO REMAIN, AN ARBORIST CONSULTANT SHOULD PROVIDE ADVICE ON PROCEDURES AND MEASURES TO BE PLACED.
9. TEMPORARY REHABILITATION SHALL BE UNDERTAKEN WITHIN 14 WORKING DAYS BEFORE EITHER WORKS CONTINUE OR PERMANENT REHABILITATION IS UNDERTAKEN.
10. ALL OF THE SOIL STORAGE, REVEGETATION AND SEDIMENT AND EROSION CONTROL MANAGEMENT DEVICES/MEASURES SHALL BE IMPLEMENTED TO NSW ENVIRONMENT PROTECTION AUTHORITY (EPA) AND DEPARTMENT OF LAND AND WATER REQUIREMENTS.
11. ALL SEDIMENT AND EROSION CONTROL MANAGEMENT MEASURES/DEVICES SHOWN ON THE PLANS SHALL BE IMPLEMENTED PRIOR TO CONSTRUCTION, AND MAINTAINED DURING AND AFTER.

Notes

C	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
B	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
A	DEP SUBMISSION	CPO	MDR	14.02.22
Issued/Revision		By	Appd	YYYY.MM.DD

Issue Status

PRELIMINARY

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NEW HOPE EVERGREEN Pty Ltd

St LEONARD'S SOUTH

St LEONARD'S NSW

File Name: 301350653-CI-076-001.DWG	-	-	-	14.02.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

EROSION AND SEDIMENT CONTROL DETAILS

Project No.	Scale
301350653	1:1000
Revision	Drawing No.
C	CI-076-001

Plotted: 6/7/2022 11:47:25 AM By: POCOCK, CONOR
P:\301350653\PROJECT DOCUMENTATION\CIVIL\DRAWINGS & DESIGN\SHEET SET

ORIGINAL SHEET - ISO A1 COORD - MGA/YYY-Zone DATUM - mAHD

LEGEND

- PROPOSED SITE BOUNDARY
- LIMIT OF WORKS BOUNDARY
- 14.0 BULK EARTHWORKS CONTOUR
- 18.0 EXISTING CONTOURS
- BEL BULK EARTHWORKS LEVEL

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 ALLOWANCE HAS BEEN MADE FOR BULKING FACTORS.
4. NO ALLOWANCE HAS BEEN MADE FOR DETAILED EARTHWORKS; ie SERVICE TRENCHING, DETAILED EXCAVATION, FOOTINGS, RETAINING WALLS, PAVEMENT BOXING, BUILDING SLABS AND THE LIKE.
5. THE CONTRACTOR SHALL USE FINAL SURFACE LEVELS AND TYPICAL PAVEMENT DETAILS FOR ACTUAL EARTHWORKS LEVELS.
6. THE SURVEY SURFACE AS PROVIDED HAS BEEN UTILISED FOR COMPARISON PURPOSES.
7. STANTEC DOES NOT TAKE RESPONSIBILITY FOR ACCURACY OF EXISTING SURVEY.
8. BULK EARTHWORKS CUT/FILL VOLUME CONSIDERATIONS:
   - 150mm TOPSOIL HAS BEEN CONSIDERED TO BE REMOVED.
   - 300mm STRUCTURAL SLAB UNDER BUILDING PADS.

CUT AND FILL VOLUME:
CUT: 51,900 m^3
FILL: 600 m^3
NET: 51,300m^3 (CUT)

CUT/FILL DEPTH RANGES

COLOUR	LOWER	UPPER
	-20.0	-19.0
	-19.0	-18.0
	-18.0	-17.0
	-17.0	-16.0
	-16.0	-15.0
	-15.0	-14.0
	-14.0	-13.0
	-13.0	-12.0
	-12.0	-11.0
	-11.0	-10.0
	-10.0	-9.0
	-9.0	-8.0
	-8.0	-7.0
	-7.0	-6.0
	-6.0	-5.0
	-5.0	-4.0
	-4.0	-3.0
	-3.0	-2.0
	-2.0	-1.0
	-1.0	0.0
	0.0	1.0
	1.0	2.0
	2.0	3.0
	3.0	4.0

Notes

B	ISSUED FOR DEVELOPMENT APPLICATION	CPO	17.06.22
A	ISSUED FOR DRAFT DA	VI	05.05.22
Issued/Revision		By	Appd YYYY.MM.DD

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File Name: 301350653-CI-100-001.DWG | Dwn. - | Dsgn. - | Chkd. - | 05.05.22 YYYY.MM.DD

Title
BULK EARTHWORKS PLAN

Project No. 301350653
Scale 1:250
Revision B
Drawing No. CI-100-001

Plotted: 6/7/2022 12:22:29 PM By: PCOCK, CONOR
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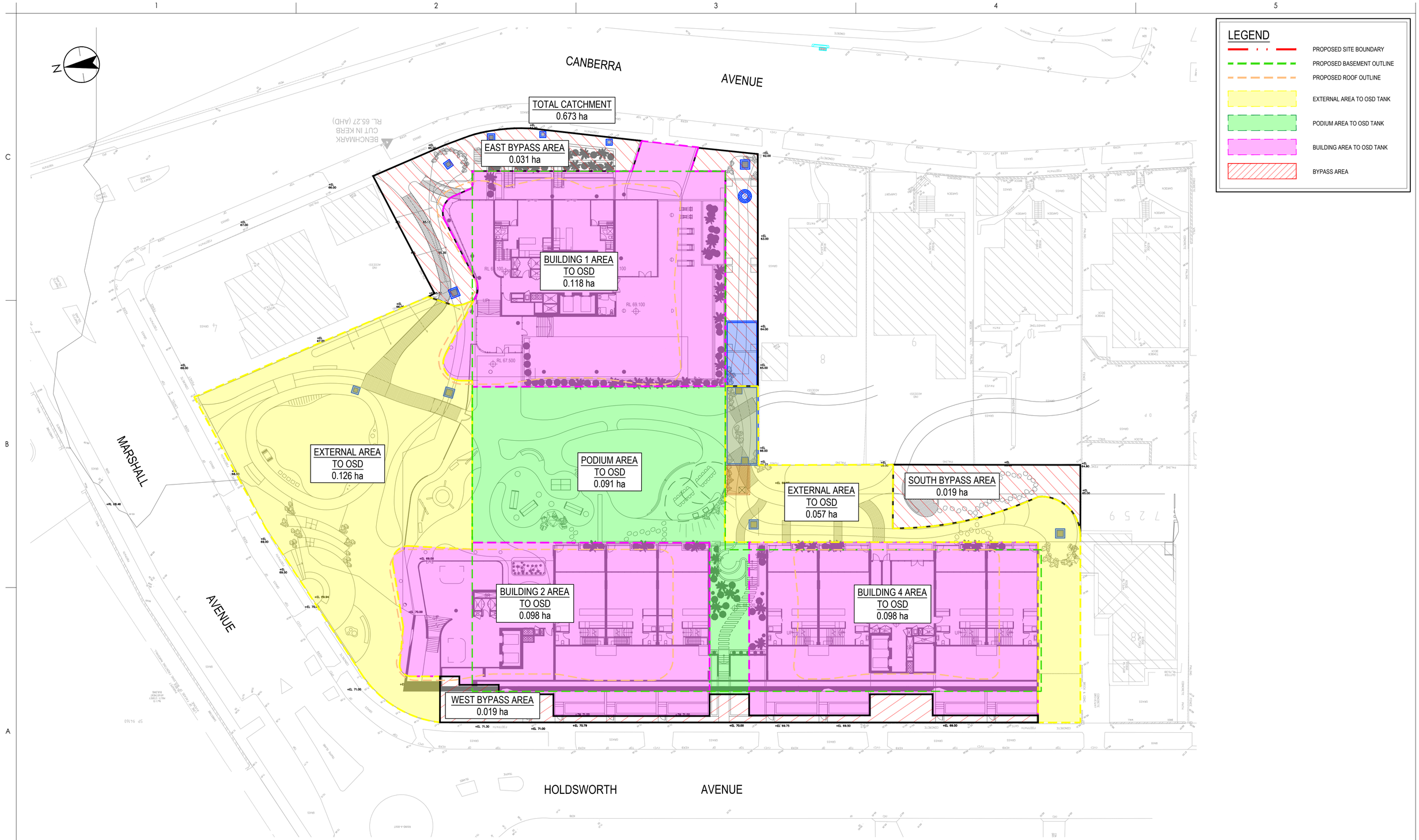
ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



Notes

C	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
B	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
A	DEP SUBMISSION	CPO	MDR	14.02.22
Issued/Revision		By	Appd	YYYY.MM.DD

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File Name: 301350653-CI-500-001.DWG	-	-	-	14.02.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title

STORMWATER DRAINAGE CATCHMENT PLAN

Project No. 301350653

Scale 1:250

Revision C

Drawing No. **CI-500-001**

Plotted: 6/7/2022 11:47:53 AM By: POCOCK, CONOR
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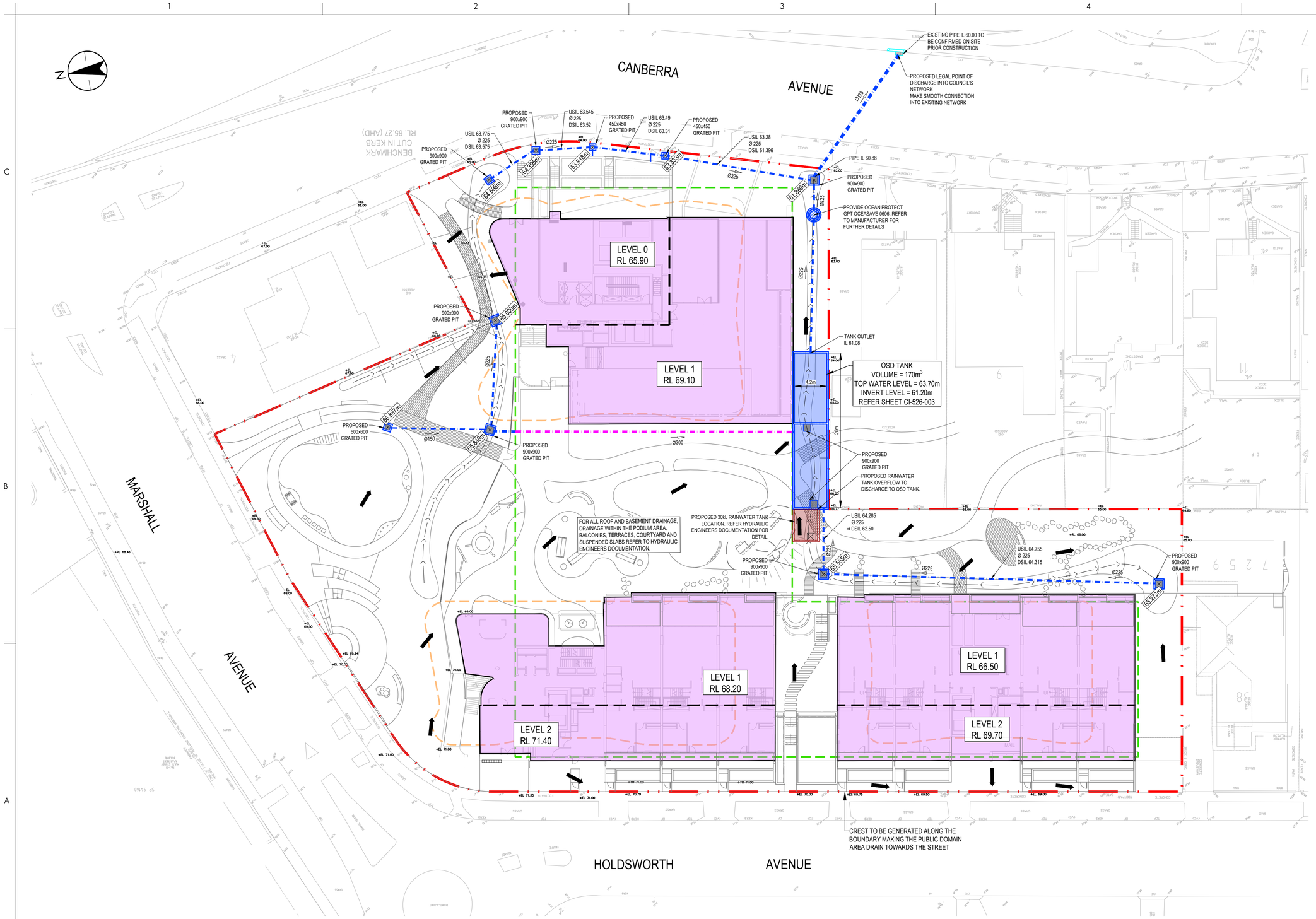

1:250 2.5 0 2.5 5 7.5 10 12.5 A1
1:500 A3

LEGEND

- PROPOSED SITE BOUNDARY
- PROPOSED BASEMENT OUTLINE
- PROPOSED ROOF OUTLINE
- PROPOSED BUILDING
- 14.0 DESIGN CONTOURS
- 18.0 EXISTING CONTOURS
- PROPOSED STORMWATER PIPE
- SUSPENDED 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
- RW RW PROPOSED RAINWATER PIPE
- PROPOSED GRATED DRAIN
- SSD SSD PROPOSED SUBSOIL DRAINAGE
- PROPOSED SWALE
- A.1 PIT LABEL
- RWO PROPOSED RAINWATER OUTLET
- PROPOSED GROSS POLLUTANT TRAP

NOTES

1. ALL STORMWATER PIPES TO HAVE A MINIMUM OF 0.5% SLOPE IN DIRECTION SHOWN UNO.
2. ALL IN-GROUND STORMWATER PIPES TO BE FRC CLASS 3 PIPES UNO.
3. ALL IN-GROUND STORMWATER PIPES TO BE MINIMUM 450 BELOW LANDSCAPED SURFACES AND 600 BELOW SURFACES IN TRAFFICABLE AREA.
4. GRATES, FRAMES AND COVERS IN ROADWAYS TO BE CLASS D.
5. GRATES AND FRAMES NOT IN ROADWAYS TO BE CLASS B.
6. STORMWATER PIPES ARE TO BE INSTALLED IN ACCORDANCE WITH AS 3725.
7. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH COUNCIL STANDARDS AND CONSTRUCTION SPECIFICATIONS.
8. THE CONTRACTOR SHALL VERIFY LOCATIONS OF EXISTING SERVICES WITH ALL RELEVANT AUTHORITIES BEFORE COMMENCING CONSTRUCTION.
9. EXISTING STORMWATER NETWORK NEED TO BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION. ALLOW FOR RECONSTRUCTION IF REQUIRED.
10. CONTRACTOR TO LOCATE AND EXPOSE ALL EXISTING SERVICES BEFORE CONSTRUCTION STARTS. EXISTING SERVICES TO BE RELOCATED WHERE NEEDED TO AVOID CLASHING.
11. ALL GRATED DRAINS WITHIN LANDSCAPE AREAS TO BE ACO DRAIN K200 AND WITHIN TRAFFICABLE AREAS TO BE ACO DRAIN K300 OR APPROVED EQUIVALENT.
12. ALL GRATED DRAINS WITH PEDESTRIAN ACCESS TO HAVE HEELSAFE GRATE.
13. BASEMENT SHORING WALLS AND RETAINING WALLS TO HAVE SUBSOIL LINES TO MANAGE HYDROSTATIC PRESSURE. CONNECT LINES INTO EXTERNAL STORMWATER NETWORK OR BASEMENT PUMP OUT PITS

Notes

D	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
C	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
B	DEP SUBMISSION	CPO	MDR	14.02.22
A	PRELIMINARY ISSUE	CPO	MMM	07.02.22
Issued/Revision		By	Appd	YYYY.MM.DD

Issue Status

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File Name: 301350653-CI-520-001.DWG	CPO	MMM	MMM	07.02.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
STORMWATER DRAINAGE PLAN
GROUND FLOOR

Project No. 301350653
Scale 1:250
Revision D
Drawing No. CI-520-001

Plotted: 6/7/2022 11:49:54 AM By: POCOCK, CONOR
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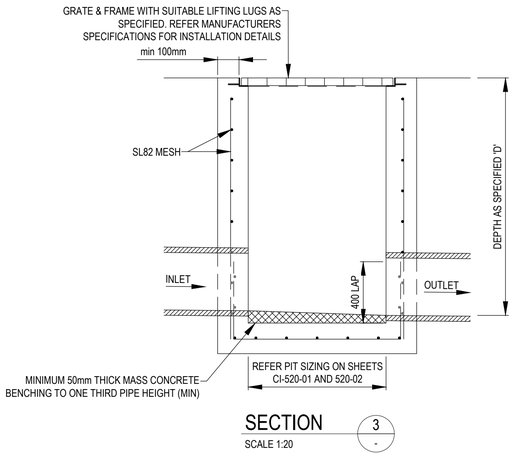
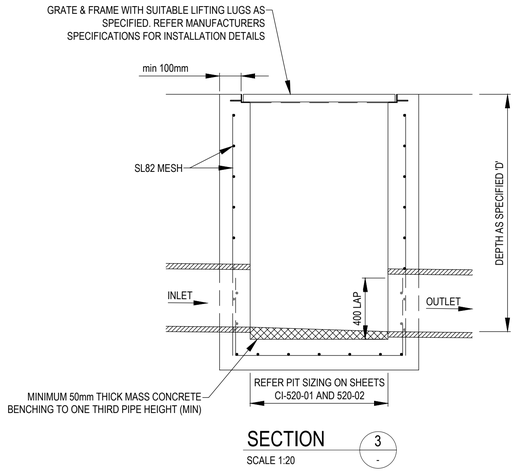


SECTION 3 / SCALE 1:20



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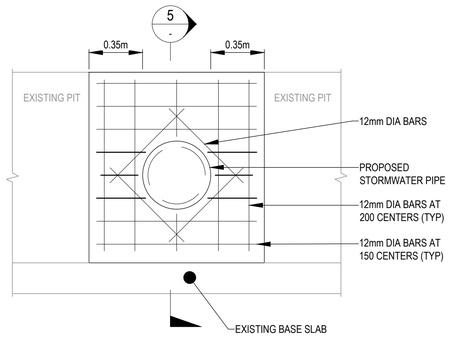
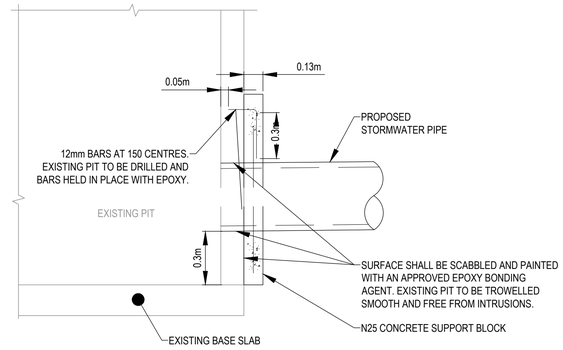


STORMWATER PIPE CONNECTION INTO EXISTING PIT
SCALE 1:20



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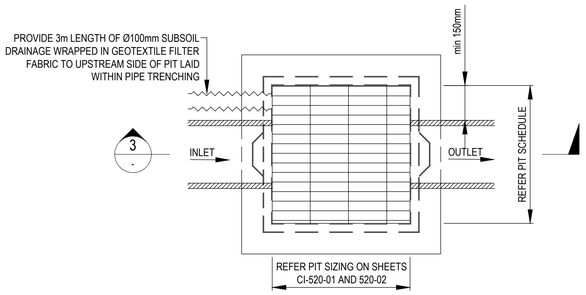
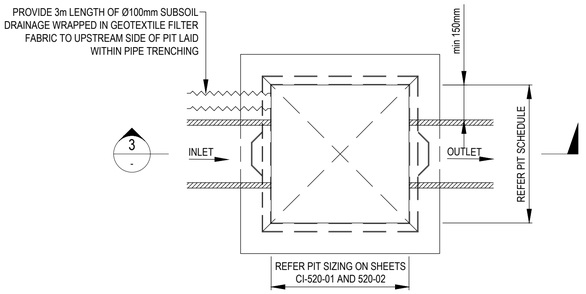
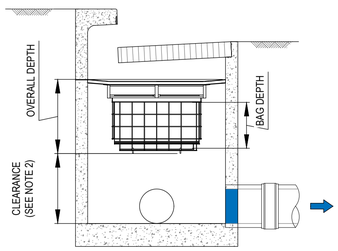


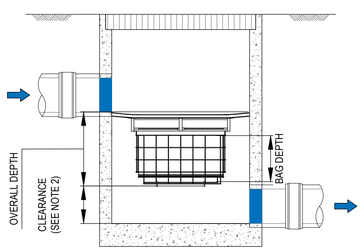
GRATED PIT PLAN
SCALE 1:20



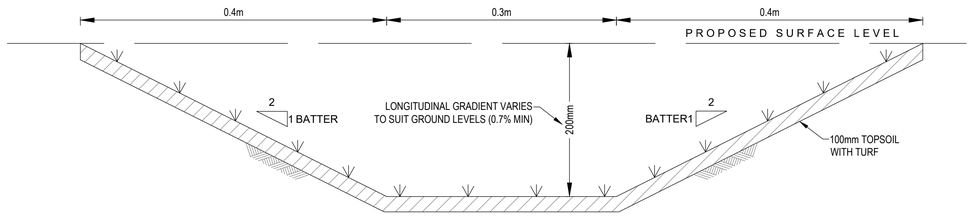
JUNCTION PIT PLAN
SCALE 1:20



ENVIROPOD
SURFACE FLOW CONFIGURATION
SCALE 1:20



ENVIROPOD
PIPE FLOW CONFIGURATION
SCALE 1:20



TYPICAL GRASS SWALE DETAIL
SCALE 1:20

Notes

B	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
A	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
Issued/Revision		By	Appd	YYYY.MM.DD

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File Name: 301350653-CI-526-001.DWG	-	-	-	05.05.22
	Dwn.	Dsgn.	Chkd.	YYYY.MM.DD

Title
STORMWATER DRAINAGE DETAILS SHEET 1

Project No.
301350653

Scale
1:20

Revision
B

Drawing No.
CI-526-001

Plotted: 6/7/2022 11:48:10 AM By: POCOCK, CONOR
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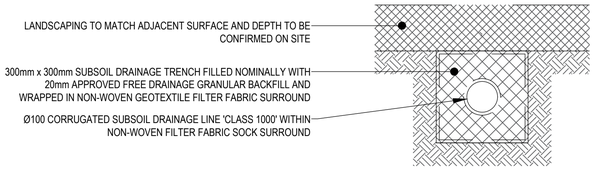
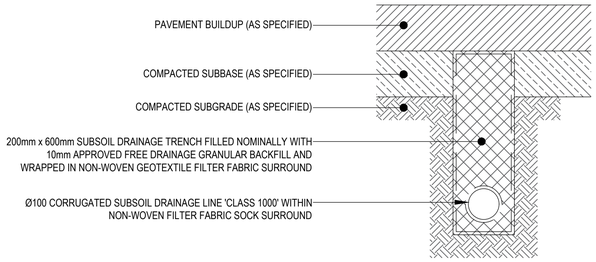


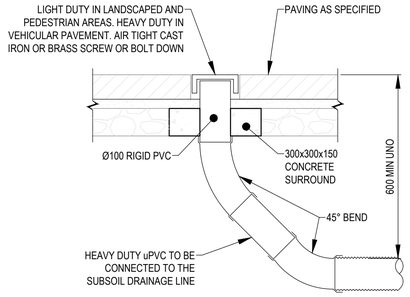
SUBSOIL DRAINAGE TRENCH DETAIL - UNDER LANDSCAPE AREAS

(SCALE 1:10)



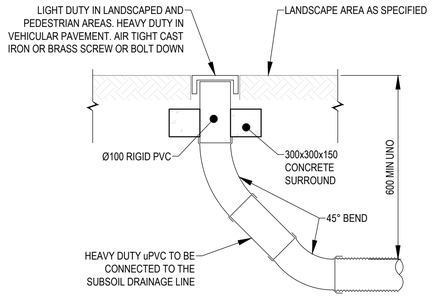
SUBSOIL DRAINAGE TRENCH DETAIL - UNDER PAVEMENT BUILTUP

(SCALE 1:10)



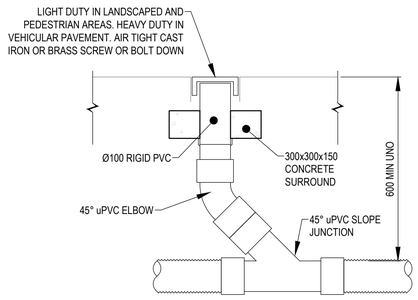
FLUSH OUT RISER IN PAVED AREAS

(SCALE 1:10)



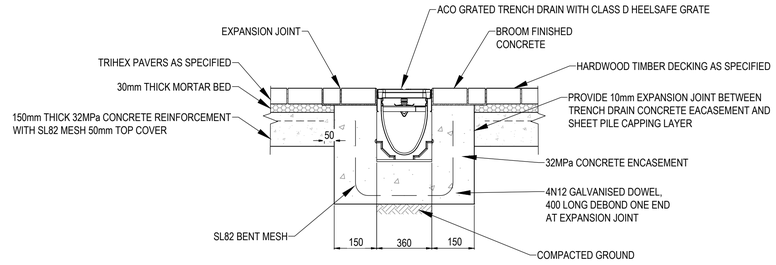
FLUSH OUT RISER IN LANDSCAPED AREAS

(SCALE 1:10)



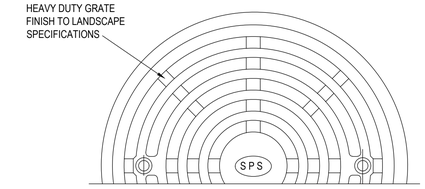
INTERMEDIATE FLUSH OUT RISER

(SCALE 1:10)



TRENCH DRAIN DETAIL

(SCALE NTS)



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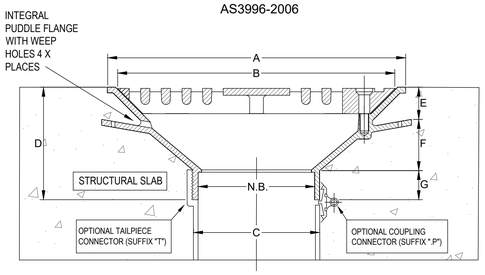
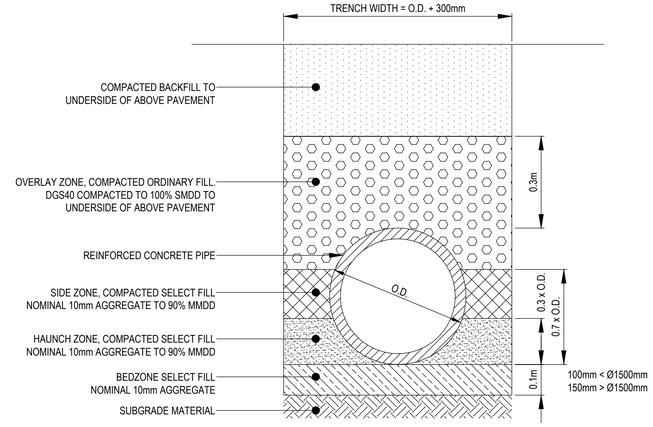


N.B	A	B	C	D	E	F	G	Flow rate* L/S
150	260	238	160	90	28	37	25	9.4

RWO VERTICAL DRAIN PUBLIC AREA

(SCALE 1:10)



TYPICAL PIPE TRENCH DETAIL

(SCALE 1:10)

Notes

B	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
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Title

STORMWATER DRAINAGE DETAILS SHEET 2

Project No. 301350653

Scale 1:###

Revision **B**

Drawing No. **CI-526-002**

Plotted: 6/17/2022 11:48:12 AM By: PCOCOCK, CONOR
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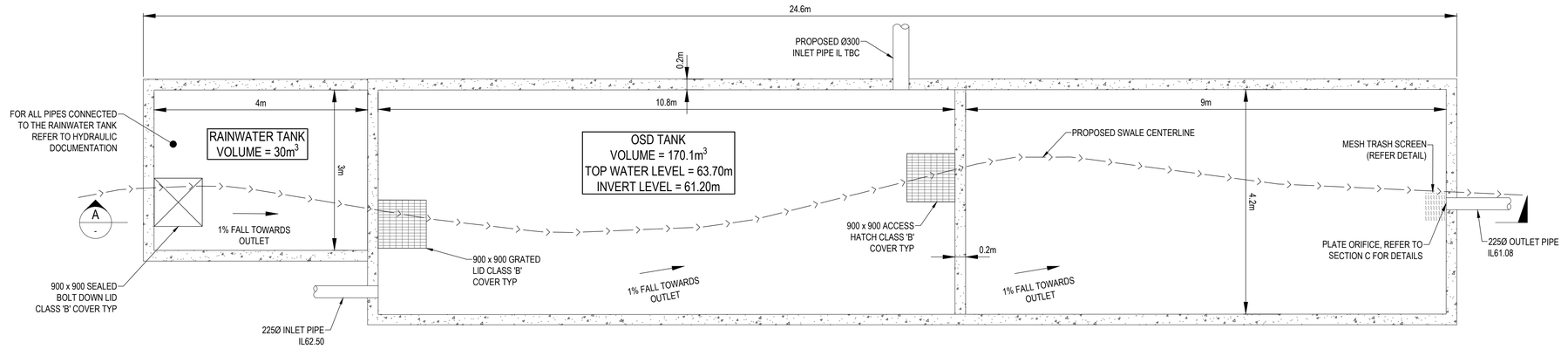
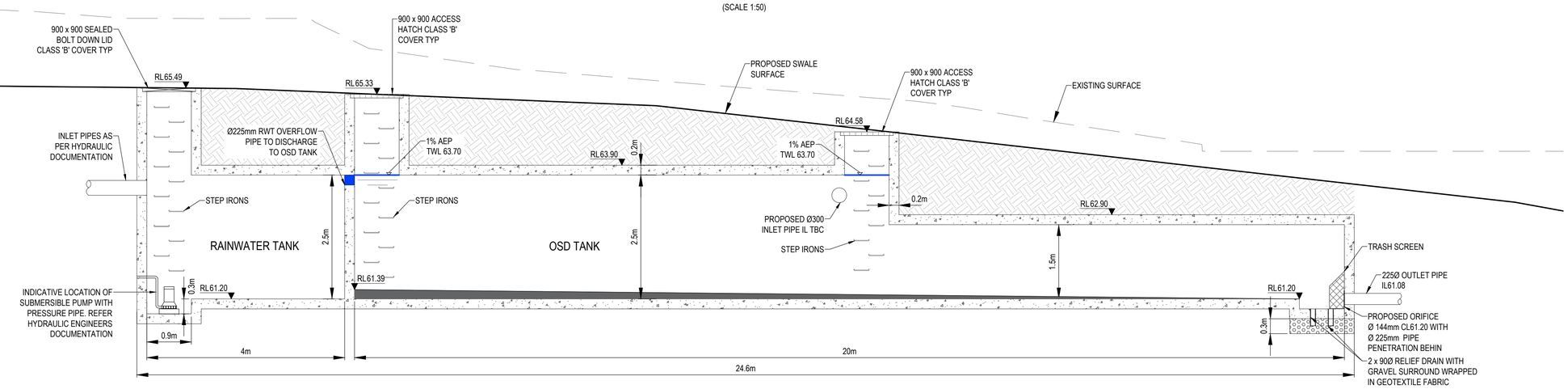
ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD



ON-SITE DETENTION TANK - PLAN

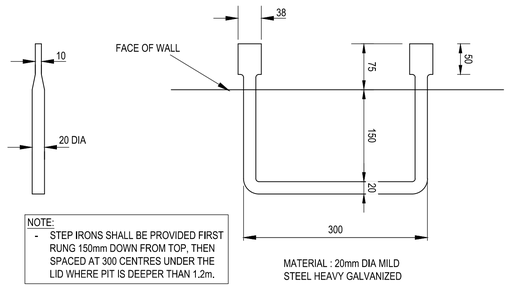
(SCALE 1:50)



OSD SECTION

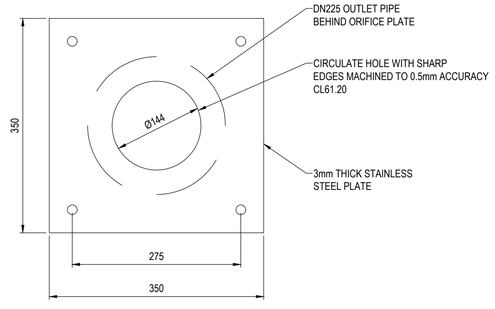
SCALE 1:50

A
-



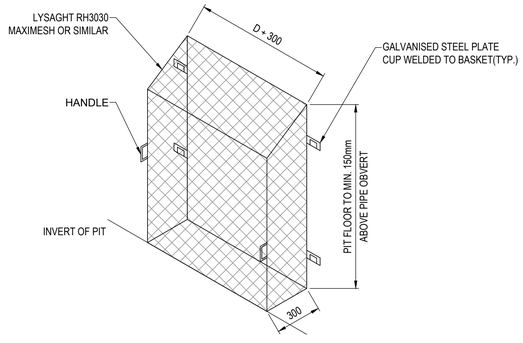
STEP IRONS DETAIL

N.T.S.



ORIFICE PLATE DETAIL

SCALE 1:5



SCREEN MESH DETAIL

N.T.S.

Notes

B	ISSUED FOR DEVELOPMENT APPLICATION	CPO	MDR	17.06.22
A	ISSUED FOR DRAFT DA	VI	MMM	05.05.22
Issued/Revision		By	Appd	YYYY.MM.DD

Issue Status

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File Name: 301350653-CI-526-001.DWG	-	-	-	05.05.22
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STORMWATER DRAINAGE DETAILS
SHEET 3

Project No.	Scale
301350653	1:100
Revision	**Drawing No.**
B	**CI-526-003**

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ORIGINAL SHEET - ISO A1 COORD - MGA/YY-Zone DATUM - mAHD

Appendix B OSD Calculations

Appendix 14 – OSD Calculation Sheet

ON-SITE DETENTION CALCULATION SHEET

DEVELOPMENT TYPE: Residential flat buildings

ADDRESS: 1, 3 & 5 Canberra Avenue, 4, 6 & 8 Marshall Avenue, 2, 4, 6 & 8 Holdsworth Avenue

Site Area (m²)	6727	(A)
Total Impervious Area (roofs, driveways, hardstand etc) (m²)	4146	(B)
Total Area draining to the Storage Facility (m²) (impervious and pervious areas)	4693	(C)
New Impervious Area bypassing the Storage Facility	127.7	(D)
$\frac{(B)+(D)}{(B)} =$	1.03	(E)

cannot be greater than 1.25.

Permitted Site Discharge (PSD) rate per m²

If (D) = 0 then PSD = 0.014 l/sec/m²

If (D) ≠ 0 then PSD = $0.014x(E)^{-1.37}$ l/sec/m² — 0.013 (F)

PERMITTED SITE DISCHARGE (l/s) (C) x (F) — **63.0 l/s**

Storage Volume per m²

(G) = 0.0255 m³/m² for all Catchments — ***0.0255*** (G)

SITE STORAGE REQUIREMENT (m³) ((C) + (D)) x (G) — **122.9 m³**

OUTLET CONTROL - using a Sharp Edged Orifice Plate

Height Difference between top water level and Centre of Orifice (m) 2.1 (H)

ORIFICE DIAMETER (mm)

144 mm $= 21.9\sqrt{\frac{PSD}{\sqrt{(H)}}}$

Should pipe and pit losses be used to control outflow, the calculations are to be attached.

Appendix C OSD Checklists

Appendix 13 – OSD Checklist for DA Submission

ON-SITE STORMWATER DETENTION CHECKLIST

This form is to be used to determine if OSD will be required for residential developments and must be completed before the submission of any application.

PART A. Address and type of proposed development

Street No……..Street Name 1, 3 & 5 Canberra Avenue, 4, 6 & 8 Marshall Avenue, 2, 4, 6 & 8 Holdsworth Avenue
Lot No…….. DP No……. Suburb St Leonards

Type of development (tick relevant box).

- [ ] Duplex Residential Building
- [ ] Extensions
- [ ] Commercial
- [ ] Other……
- [x] Multiple Occupancy Residential (villa, flats etc)
- [ ] Single Residential
- [ ] Garages

PART B. Exemption for discharge directly to Lane Cove River

Is the site within the designated exclusion zone along the foreshore of the Lane Cove River. (tick one only). (Confirm with Council's Urban Services Division).

- [x] No
- [ ] Yes

If yes, OSD is not required, If no go to part C

PART C. Exemption for minimum allowable size of site impervious area

(a)	Site Area	6727.6	m^2
(b)	Existing impervious area to be removed	3585.5	m^2
(c)	Existing impervious to be retained	0	m^2
(d)	Proposed new impervious area:		
	(d1) Roof area	3135.3	m^2
	(d2) Driveways	961.7	m^2
	(d3) Other paved area	726.4	m^2
	(d4) Supplementary areas (i.e Pervious paving area x 25%)		m^2
(e)	Total proposed NEW impervious area (d1) + (d2) + (d3) + (d4) – (b) =	1237.9	m^2
(f)	Total post development impervious area (c) + (d1) + (d2) +(d3) + (d4) =	4823.4	m^2
(g)	Post development impervious area (f) x 100 / (a) =	71.7	%

OSD will not be required if one or more of the following are satisfied

- [ ] (e) is less than $50m^2$ increase in site cover and (f) is less than 65% of the total site area. (only applicable for alterations and additions)
- [ ] (g) is less than 35% of site area

Note: If OSD is not required, then the collected stormwater runoff is to be directed to a 600x600mm environmental pollution control pit with sediment collection sump and drainage filter, prior to discharging to an approved outlet. The control pit is to be designed as a gross pollutant trap to remove pollutants from the stormwater flow.

PART D. Special Consideration

Where the applicant believes that special consideration should be given for exemption from OSD, even though Parts A, B, C, or D are not satisfied, they may request exemption from OSD. Consideration may only be given on reasonable grounds and should be discussed with Council's Development Engineer.

Appendix D Flood Maps

Flood Depths (m)
- 0.00 - 0.05
- 0.05 - 0.10
- 0.10 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- > 1.00

Subject Site

Cadastral Boundaries

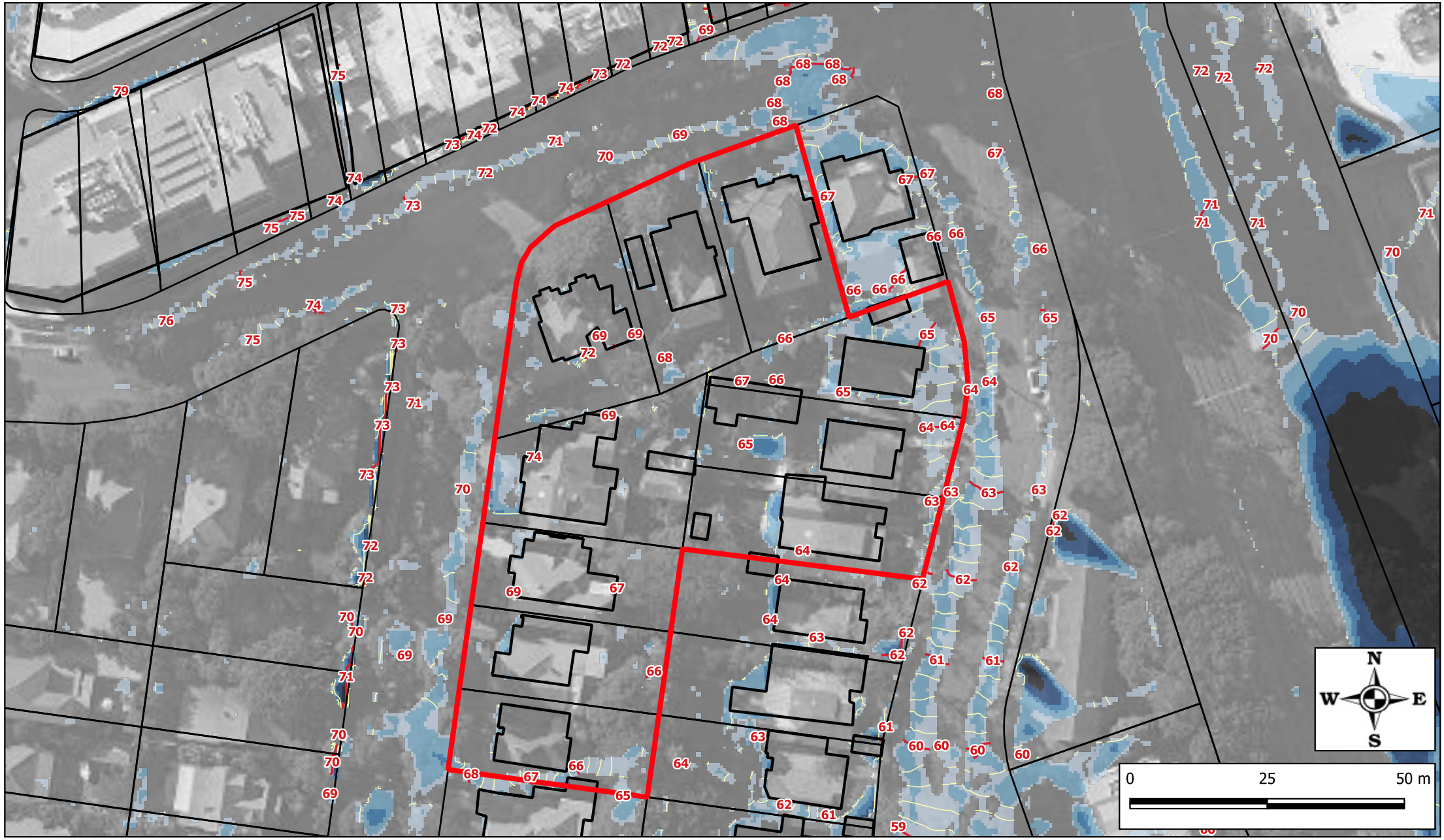
Major Flood Level Contours (Spacing = 0.5 m)

Minor Flood Level Contours (Spacing = 0.1 m)

Proposed Buildings

TITLE: **1% AEP Peak Flood Depths and Levels - Proposed**		
PROJECT **St Leonards South Village Development**		
PROJECT No. **220003**		
DATE: **06-2022**	SCALE: 1:900	FIGURE No. **02**

grc HYDRO



Flood Depths (m)
0.05 - 0.10
0.10 - 0.30
0.30 - 0.50
0.50 - 1.00
> 1.00

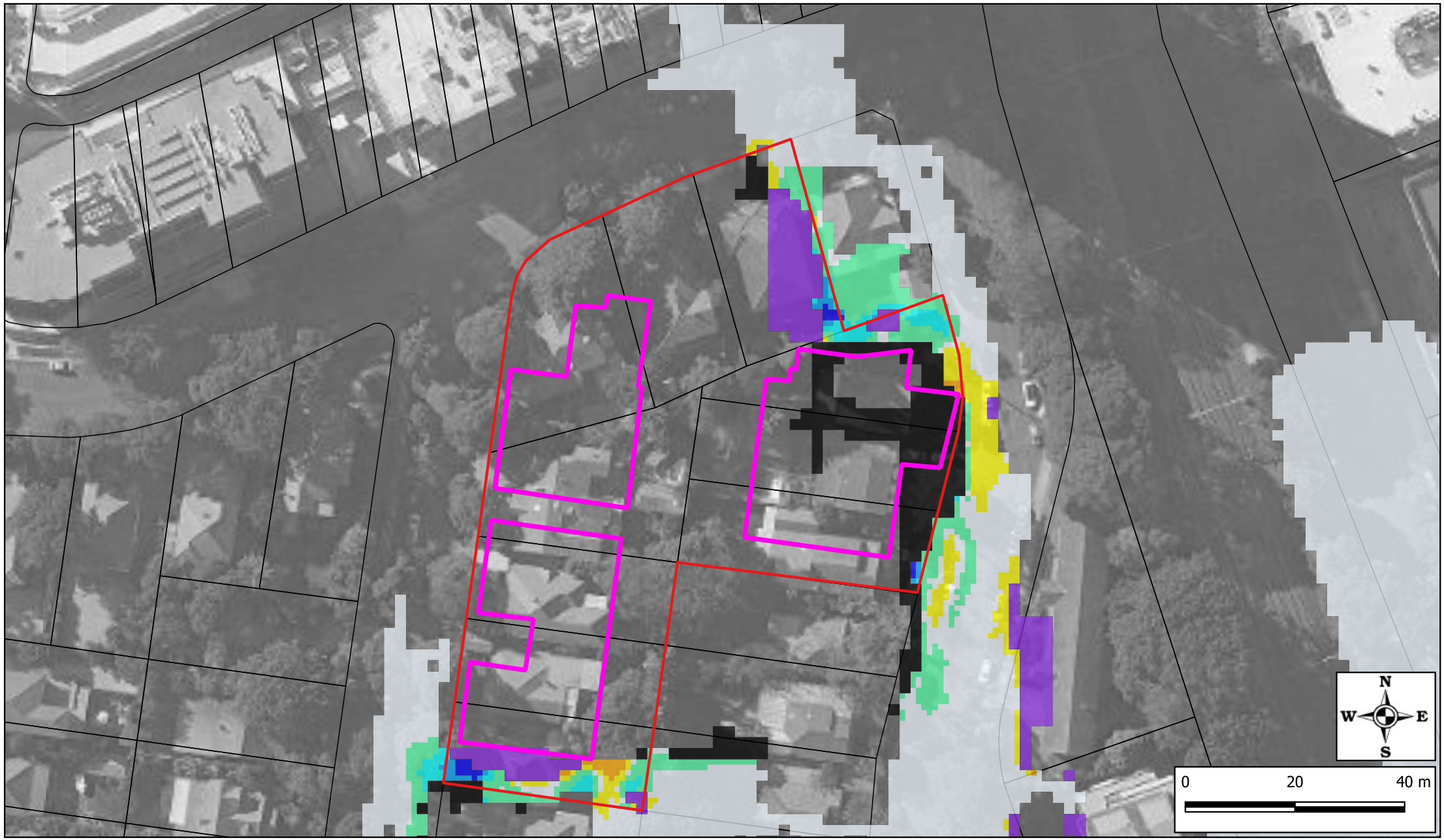
Note: Depths less than 0.05m not shown

Major Flood Level Contours (Spacing = 1m)
Minor Flood Level Contours (Spacing = 0.2m)

Existing Buildings
Subject Site
Cadastral Boundaries

TITLE: **1% AEP Peak Flood Depths and Levels**		
PROJECT **St Leonards South Village Development**		
PROJECT No. **220003**		
DATE: **05-2022**	SCALE: 1:900	FIGURE No. **01**

grc HYDRO



Change in Levels (m)
< -0.3
-0.3 to -0.2
-0.2 to -0.1
Subject Site
Cadastral Boundaries
-0.1 to -0.01
No Impact
0.01 to 0.1
0.1 to 0.2
0.2 to 0.3
> 0.3
No Longer Flooded
Newly Flooded
Proposed Buildings

TITLE: **1% AEP Peak Flood Level Impacts**		
PROJECT **St Leonards South Village Development**		
PROJECT No. **220003**		
DATE: **06-2022**	SCALE: 1:900	FIGURE No. **03**

grc HYDRO

Appendix E Sediment Basin Sizing

SWMP Commentary, Standard Calculation

Note: These "Standard Calculation" spreadsheets relate only to low erosion hazard lands as identified in figure 4.6 where the designer chooses to not use the RUSLE to size sediment basins. The more "Detailed Calculation" spreadsheets should be used on high erosion hazard lands as identified by figure 4.6 or where the designer chooses to run the RUSLE in calculations.

1. Site Data Sheet

Site name: St Leonards South

Site location: 1, 3 & 5 Canberra Avenue, 4, 6 & 8 Marshall Avenue, 2, 4, 6 & 8 Holdsworth Avenue, St Leonards

Precinct:

Description of site:

Site area	Site						Remarks
	C1						
Total catchment area (ha)	0.673						
Disturbed catchment area (ha)	0.673						

Soil analysis

Soil landscape							DIPNR mapping (if relevant)
Soil Texture Group	Type C						Sections 6.3.3(c), (d) and (e)

Rainfall data

Design rainfall depth (days)	5						See Sections 6.3.4 (d) and (e)
Design rainfall depth (percentile)	85						See Sections 6.3.4 (f) and (g)
x-day, y-percentile rainfall event	38.8						See Section 6.3.4 (h)
Rainfall intensity: 2-year, 6-hour storm	10.5						See IFD chart for the site
Rainfall erosivity (R-factor)	2420						Automatic calculation from above data

Comments:

Soil Texture Group: C | Soil Hydrology Group: B

Soil Group taken from Appendix C Table 20: Sydney Soil Landscape for Lane Cove.

Peak Flow Comments:
- 4.48 ARI rather than 5 ARI (20% AEP)
- 9.49 ARI rather than 10 ARI (10% AEP)
- 19.5 ARI rather than 20 ARI (5% AEP)
- 49.5 ARI rather than 50 ARI (2% AEP)

2. Storm Flow Calculations

Peak flow is given by the Rational Formula:

$$Qy = 0.00278 \times C_{10} \times F_Y \times I_{y,\,tc} \times A$$

where:
- Q_y is peak flow rate (m^3/sec) of average recurrence interval (ARI) of "Y" years
- C_{10} is the runoff coefficient (dimensionless) for ARI of 10 years. Rural runoff coefficients are given in Volume 2, figure 5 of Pilgrim (1998), while urban runoff coefficients are given in Volume 1, Book VIII, figure 1.13 of Pilgrim (1998) and construction runoff coefficients are given in Appendix F
- F_y is a frequency factor for "Y" years. Rural values are given in Volume 1, Book IV, Table 1.1 of Pilgrim (1998) while urban coefficients are given in Volume 1, Book VIII, Table 1.6 of Pilgrim (1998)
- A is the catchment area in hectares (ha)
- $I_{y,\,tc}$ is the average rainfall intensity (mm/hr) for an ARI of "Y" years and a design duration of "tc" (minutes or hours)

Time of concentration (t_c) = $0.76 \times (A/100)^{0.38}$ hrs (Volume 1, Book IV of Pilgrim, 1998)

Note: For urban catchments the time of concentration should be determined by more precise calculations or reduced by a factor of 50 per cent.

Peak flow calculations, 1

Site	A (ha)	tc (mins)	Rainfall intensity, I, mm/hr						C_{10}
			$1_{yr,tc}$	$5_{yr,tc}$	$10_{yr,tc}$	$20_{yr,tc}$	$50_{yr,tc}$	$100_{yr,tc}$	
C1	0.673	7	89.9	135	159	183	215	241	0.82

Peak flow calculations, 2

ARI yrs	Frequency factor (F_y)	Peak flows						Comment
		C1						
		(m^3/s)	(m^3/s)	(m^3/s)	(m^3/s)	(m^3/s)	(m3/s)	
$1_{yr,\,tc}$	0.8	0.110						
$5_{yr,\,tc}$	0.95	0.197						
$10_{yr,\,tc}$	1	0.244						
$20_{yr,\,tc}$	1.05	0.295						
$50_{yr,\,tc}$	1.15	0.379						
$100_{yr,\,tc}$	1.2	0.444						

3. Volume of Sediment Basins: *Type C* Soils

Basin volume = settling zone volume + sediment storage volume

Settling Zone Volume

The settling zone volume for *Type C* soils is calculated to provide capacity to allow the design particle (e.g. 0.02 mm in diameter) to settle in the peak flow expected from the design storm (e.g. 0.25-year ARI). The volume of the basin's settling zone (V) can be determined as a function of the basin's surface area and depth to allow for particles to settle. Peak flow/discharge for the 0.25-year, ARI storm is given by the Rational Formula:

$$Q_{tc,\,0.25} = 0.5 \times [0.00278 \times C_{10} \times F_y \times I_{1yr,\,tc} \times A\,] \ (m^3/sec)$$

where:

$Q_{tc,0.25}$ = flow rate (m^3/sec) for the 0.25 ARI storm event

C_{10} = runoff coefficient (dimensionless for ARI of 10 years)

F_y = frequency factor for 1 year ARI storm

$I_{1\,yr,tc}$ = average rainfall intensity (mm/hr) for the 1-year ARI storm

A = area of catchment in hectares (ha)

Basin surface area (A) = area factor x $Q_{tc,\,0.25}$ m^2

Particle settling velocities under ideal conditions (Section 6.3.5(e))

Particle Size	Area Factor
0.100	170
0.050	635
0.020	4100

Volume of settling zone = basin surface area x depth (Section 6.3.5(e)(ii))

Sediment Storage Zone Volume

In the standard calculation, the sediment storage zone is 100 percent of the setting zone. However, designers can work to capture the 2-month soil loss as calculated by the RUSLE (Section 6.3.5(e)(iv)), in which case the "Detailed Calculation" spreadsheets should be used.

Total Basin Volume

Site	$Q_{tc,\,0.25}$ (m^3/s)	Area factor	Basin surface area (m^2)	Depth of settling zone (m)	Settling zone volume (m^3)	Sediment storage volume (m^3)	Total basin volume (m^3)	Basin shape		
								L:W Ratio	Length (m)	Width (m)
C1	0.055	4100	226	0.6	136	136	271	3	26.0	8.7
		4100								
		4100								
		4100								
		4100								
		4100								

Design with
community in mind

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For more information, please visit
www.stantec.com

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