STORMWATER MANAGEMENT PLAN

FOR

14-16 MARSHALL AVENUE, 5-9 HOLDSWORTH AVENUE & 2-10 BERRY RD, ST LEONARDS

RESIDENTIAL APARTMENTS

REPORT NO. R02527-SWMP
REVISION C

APRIL 2023

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PROJECT DETAILS

Property Address: 14-16 MARSHALL AVENUE, 5-9 HOLDSWORTH AVENUE & 2-10 BERRY ROAD, ST LEONARDS

Development Proposal: RESIDENTIAL APARTMENTS

REPORT CERTIFICATION

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DOCUMENT CONTROL

REVISION	ISSUE DATE	ISSUED TO	ISSUED FOR
A	SEPTEMBER 2021	CLIENT	INFORMATION
B	APRIL 2023	CLIENT	REVIEW
		COUNCIL	APPROVAL
C	APRIL 2023	CLIENT	REVIEW
		COUNCIL	APPROVAL

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1. INTRODUCTION

1.1 Background

This Stormwater Management Plan has been prepared in accordance with the Lane Cove Council DCP to support the Development Application (DA) for the proposed development at 14-16 Marshall Avenue, 5-9 Holdsworth Avenue & 2-10 Berry Rd, St Leonards.

The scope of this report includes a comprehensive assessment of the stormwater management requirements for the proposed development. Accordingly, this report includes findings of the assessment and proposes a best practice stormwater management strategy.

The report describes the principles and operation of the proposed stormwater systems as well as the primary components of the drainage system. As the assessment is required under the conditions of consent, the final stormwater system layout may need to be revised in the future during the application for a Construction Certificate.

The following information and documents were utilised in this investigation:

- Concept Civil Engineering Drawings for the Development Application submission prepared by C&M Consulting Engineers;
- Architectural Plans by PTW Architects;
- Sydney Water – Water Quality Monitoring Program for Lane Cove Council (2019);
- Sydney Water – Stormwater Quality Target 2016;
- Lane Cove Council – Part O LCC Stormwater Management DCP;
- “Australian Runoff Quality – A Guide to Water Sensitive Urban Design”, Engineers Australia (2006)
- “Australian Rainfall and Runoff – A Guide to Flood Estimation”, Institute of Engineers, Australia (2016)

The increase in impervious areas and alteration of the natural topography due to land development has the potential to increase and concentrate peak storm flows. This has the potential to impact on flow regimes and cause erosion of the downstream drainage network and associated waterways.

To avoid any adverse impact on the downstream drainage systems, the site’s stormwater management system must be designed to ensure the safe conveyance of flows throughout the site and within the capacity of the downstream trunk drainage systems in a healthy environmental state for Ecological Sustainable Development.

1.2 The Site

The site is located at 14-16 Marshall Avenue, 5-9 Holdsworth Avenue & 2-10 Berry Rd, St Leonards. It is bound by Berry Rd to the West and Holdsworth Avenue to the East. There are currently 10 residential dwellings on the site (Refer to **Figure 1**).

Figure 1 - Aerial Photo of Existing Site
(Source: googlemaps.com)

The land falls gradually towards the South Eastern end of the Site. The proposed development includes the demolition of the existing infrastructure and the construction of a new residential apartments including basement levels, stormwater drainage infrastructure and utility services.

1.3 Key Issues

The key issues to be addressed in this report include:

- **Water Quantity** – Increases in impervious areas as a result of development (such as roofs, driveways, etc) has the potential to increase stormwater flows from the site during storm events. To avoid impacting on the site and downstream properties, the site stormwater system must be designed to safely convey flows through the site and within the capacity of the downstream drainage system.

- **Water Quality** – Urban developments have the potential to increase gross pollutants, sediments and nutrient concentrations in storm water runoff. To limit the impact on the downstream water quality, pollution control measures will be provided within the sites stormwater management system prior to discharging into the drainage network.

2. RELEVANT GUIDELINES

2.1 Design Guidelines

The site based stormwater management and planning elements are to be designed and constructed in accordance with the following:

Water Quantity

- Lane Cove Council Part O - Stormwater Management Development Control Plan

The proposed development increases the total impervious area of the existing site and therefore may increase the discharge rate to the downstream drainage network and waterways. The main objective is to achieve a natural water balance which seeks to approximate the pre-development site conditions to maintain existing conditions as well as controlling erosion and sediment removal.

Water Quality

- Lane Cove Council Part O - Stormwater Management Development Control Plan
- Sydney Water – Water Quality Monitoring Program for Lane Cove Council (2019)

The main objective for stormwater quality is to minimise the impacts on downstream water bodies. Lane Cove Council has adopted a stormwater management policy that incorporates “best practice” principles of Water Sensitive Urban Design and been monitored by Sydney Water.

Table 1 - Water Quality Reduction Targets

PARAMETERS	CRITERIA
Gross Pollutants (>5 mm)	90% reduction of the average annual load
Total Suspended Solids	85% reduction of the average annual load
Total Phosphorus	60% reduction of the average annual load
Total Nitrogen	45% reduction of the average annual load

2.2 Objectives and Targets

The objective is to provide stormwater controls that ensure that the proposed development does not adversely impact on the quantity or quality of stormwater flows within, adjacent and downstream of the site.

Compatible with the legislation, policy and requirements, the objectives and targets for stormwater management are as provided in Table 2.

Table 2 - Stormwater Management Objectives

STORMWATER MANAGEMENT	OBJECTIVES	TARGET
Quantity	▪ The existing runoff flow regimes for the full storm events should be maintained and provide safe conveyance system for the major storm events. ▪ The existing runoff from the external catchment be safely mitigated through the site.	▪ Maintain existing runoff from development: – Provide safe flood mitigation measures to minimise any impact on the site, and – No adverse impact on downstream properties.
Quality	▪ The full range of typical urban stormwater pollutants shall meet Council requirements.	▪ Runoff from site to achieve minimum reductions in total pollutant loads in accordance with Council's requirements.

2.3 Overall Strategies

The proposed stormwater management strategies to manage runoff and ensure no detriment to the receiving environments have been divided into both short and long term strategies are summarised in Table 3.

Table 3 - Stormwater Management Strategies

STRATEGY	DESCRIPTION
Short Term Strategies	Short term strategies generally refer to control of soil and water erosion during the construction phase. The primary risk occurs while soils are exposed during construction works when suspended sediment and associated pollutants can be washed into downstream waterways. The strategies to prevent this potential degradation include adequate provision of sediment and erosion control measures that should be documented prior to commencement of the works in a Soil and Water Management Plan (SWMP). The controls will limit movement of sediment in disturbed areas and will be designed to remove sediment from runoff prior to discharge from site.
Long Term Strategies	Long term strategies to maintain stormwater quality discharged from the site include utilisation of a number of permanent treatment measures to remove litter, suspended solids, and nutrients effectively. The main measures to be implemented are enviropods in stormwater pits, rainwater Reuse and Psorb stormfilters located within a manhole to further remove the TSS, nitrogen and phosphate nutrients removal.

This report addresses the long term impacts of the development. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the measures in the Sedimentation & Erosion Control Plans to be included with the Construction Certificate Application.

3. STORMWATER QUANTITY CONTROL

3.1 Introduction

The main criterion for the stormwater quantity control is to ensure that the post-developed peak flows do not cause detriment to the downstream waterways and Council's existing drainage network.

3.2 Proposed Drainage System

The drainage system for the proposed development will be designed to collect the majority of concentrated flows from impermeable surfaces such as access ways, parking areas and buildings. Where possible (and practical), runoff from pervious areas will also be collected.

The proposed stormwater management system for the development includes:

- A pit and pipe network to collect minor storm runoff from areas;
- Overland flow paths to carry major storms through the site;
- An on-site detention tank with orifice control and;
- A rainwater reuse tank to collect roof drainage.

3.2.1 On-Site Stormwater Detention Requirements

The OSD requirement for the development was calculated using On-site Detention calculation sheet – Appendix 14 shown on "Part O STORMWATER MANAGEMENT".

The calculation sheet including the results can be found attached to this report as Appendix B.

For the proposed development, it is recommended that OSD shall be provided in the form of one underground tank with a discharge control pit and orifice control. The tank will have a minimum storage volume of 135.6m^3.

A concept design for the OSD tank is shown on the concept civil engineering drawings submitted with the Development Application.

3.2.2 Rainwater Harvesting & Reuse (Water Balance)

As required by Lane Cove Council, a rainwater harvest and reuse strategy has been provided for the development.

The development adopts a WSUD strategy to reduce the loading placed on water and wastewater infrastructure. This strategy will give opportunities to reduce demand on potable water and to reduce wastewater discharged from the site.

The tank was designed for reuse by balancing the supply and demand and selecting the appropriate size. The following systems could potentially be supplied from a non-potable water source such as rainwater reuse:

- Landscape irrigation and two car wash bays.

A MUSIC model for the proposed development was created (in accordance with Lane Cove Council and Sydney Water's MUSIC modelling requirements) to perform a water balance to determine the most efficient rainwater tank size and roof catchment area to achieve the objective.

The following demands were input into the model:

- Landscape irrigation and two car wash bays – This will be provided for the ground landscape area of 1038m^2. Using the rate of 1.5mm/day/m^2, we get 568kL/yr.

It was assumed that water would be harvested from 725m^2 of roof near Area14. It was determined that a rainwater reuse tank of 15kL provides the best result averagely and achieves the required reuse target with a minimum effective volume 15KL.

Therefore, 15kL rainwater tank is required for proposed development at 14-16 Marshall Ave, 5-9 Holdsworth Ave & 2-10 Berry Road, St Leonards.

4. WATER QUALITY CONTROL

4.1 Introduction

The quality of runoff from a catchment depends upon many factors such as land use, degree of urbanisation, population density, sanitation, waste disposal practices, landform, soil types, and climate. Pollutants typically transported by runoff include litter, sediment, nutrients, oil, grease, and heavy metals. Whilst these pollutants have a deterious impact on the receiving water quality, suspended solids and nutrients cause the highest detrimental impact to the environment. Litter, oils, and other surfactants have an aesthetic impact.

Activity within a catchment during urbanisation includes the disturbance of vegetation, removal of topsoil, land shaping, road construction, installation of services, and building works. It is during this phase that the sediment movement is greatest and is estimated that the sediment production levels may be up to 6 times higher than under the existing conditions. However, once development is completed, the sediment loading may return to the existing level or remain at a higher level depending on land management practices.

As with all development projects, soil erosion during the construction phase presents a potential risk to water quality. The primary risk occurs while soils are exposed during earthworks when suspended sediment and associated pollutants can be washed into downstream watercourses.

This section of the report addresses the long term impacts of the development on water quality. For short term effects (i.e. during the construction phase) water quality control is achieved by implementing the measures in the Sedimentation & Erosion Control Plans to be included with future Construction Certificate submissions.

4.2 Water Quality Control Measures

There are a number of measures that can reduce pollutant loadings, varying in effectiveness depending on land use type, topography and the control target. There are no reduction targets specified in the Lane Cove Council DCP. However, we ensured pollutant loads in stormwater flows of the post developed site are governed by Sydney Water.

The measures proposed for the redevelopment are summarised in Table 4.

Table 4 - Water Quality Control Measures

MEASURES	DESCRIPTIONS
Gross Pollutant Traps	▪ An *EnviroPod* is a catch basin insert installed inside inlet pits. It is effective in removing trash, debris and other pollutants from runoff. ▪ *EnviroPods* proposed for the project utilise a 200 micron filter system. These filter baskets will be installed in indicated pits for the proposed development.
Rainwater Tank	▪ A rainwater tank is effective in the removal of pollutant loads at source. The pollutant removal process occurs by harvesting runoff for reuse, thereby limiting the nutrients that are discharged into the waterways. ▪ It is proposed to provide 1 x rainwater reuse tank with a minimum effective volume of 15kL plumbed for landscape irrigation and two car wash bays.
Filter Cartridges	▪ *StormFilter* is a proprietary device containing multiple cartridge units in a single system, thereby suitable for larger catchments. ▪ One of the advantages of using *StormFilter* is that the cartridges come with various filtration media available to target site-specific pollutants. ▪ Each cartridge consists of phosphorous media. ▪ It is proposed to provide 7 x 690mm PSORB cartridges within a stormfilter manhole as detailed in the engineering drawings.

4.3 Water Quality Modelling

4.3.1 *MUSIC Program*

The water quality model adopted for this project is the MUSIC (Model for Urban Stormwater Improvement Conceptualisation version 6) water quality numerical model developed by the MUSIC Development Team of the Cooperative Research Centre for Catchment Hydrology (CRCCH). MUSIC is an event basis model, and will simulate the performance of a group of stormwater management measures, configured in series or in parallel to form a "treatment train".

The MUSIC User Manual suggests that the time-step should not be greater than the time of concentration of the smallest sub-catchment, but consideration should also be given to the smallest detention time of treatment nodes in the system. To accurately model the performance of the treatment nodes, a 6-minute time step was chosen.

The MUSIC model was generated using the historical 6-minute rainfall and monthly evapotranspiration data for Sydney (BOM Station No. 66062) for a period of 10 years from 1980 to 1989.

Catchment characteristics were defined using a combination of roof areas and non-roof catchments with varying imperviousness ratios to replicate the catchment for the development condition. The respective catchment areas are shown in Table 6.

The MUSIC model layout and results are shown in Appendix A of this report.

4.3.2 *Event Mean Concentration*

MUSIC uses different event mean concentrations (EMC) to determine the pollutant loads generated by different land uses. The standard EMCs adopted within MUSIC were based on research undertaken by Duncan (1999) through the CRCCH and the results are reproduced in Australian Runoff Quality – A Guide to Water Sensitive Urban Design (ARQ). Table 5 summarises the parameters used for the development site.

Table 5 - EMC Parameters

LAND USE	MEAN BASE FLOW CONCENTRATION PARAMETERS Log_{10} (mg/L)			MEAN STORM FLOW CONCENTRATION PARAMETERS Log_{10} (mg/L)		
	TSS	TP	TN	TSS	TP	TN
Roof Areas	Not Applicable*Note 1			1.300	-0.890	0.300
Impervious Areas	1.200	-0.850	0.110	2.430	-0.300	0.340
Pervious Areas	1.200	-0.850	0.110	2.150	-0.600	0.300

*Note 1 – Roof areas consists of 100% impervious area so there is no base flow generated from this area.

4.3.3 *Configuration*

Table 6 and Table 7 provide the treatment configurations used in the MUSIC model:

Table 6 - Catchment Areas

LAND USE	DEVELOPED CONDITIONS		LAND USE CATCHMENTS (%)
	AREA (m^2)	IMPERVIOUSNESS (%)	
Roof Area to RWT	725	100	13.6
Roof Area	1753	100	33.0
Impervious Area	1387	100	26.1
Pervious Area	1038	0	19.5
Mixed Area (Bypass)	414	70	7.8
Totals	5317	74.0	100

Table 7 - Stormwater Quality Improvement Devices (SQID)

STORMWATER QUALITY IMPROVEMENT DEVICE (SQID)	QUANTITY OF SQID
Enviropods	4 x 200um
Rainwater Tank	15kL
Storm filter (Psorb)	7

4.3.4 *Results*

The results of the MUSIC modelling are summarised in Table 7. The total pollutant loads from the development are expressed in kilograms per year. The reduction rate is expressed as a percentage and compares the pollution from the post developed site to that of the existing developed state of the site.

Table 7 - Summary of Music Model Results

PARA-METER	EXISTING SITE LOADS (KG/YR)	POST DEVELOPMENT WITH TREATMENT (KG/YR)	REDUCTION %	TARGET ACHIEVED
GP	**120**	**9.82**	**91.8**	**Yes**
TSS	**2310**	**210**	**90.9**	**Yes**
TP	**1.65**	**0.592**	**64.1**	**Yes**
TN	**12**	**6.57**	**45.4**	**Yes**

GP = Gross Pollutants
TSS = Total Suspended Solids
TP = Total Phosphorus
TN = Total Nitrogen

5. RECOMMENDATIONS

The proposed development of the site could potentially lead to significant changes in water quantity and quality if a water sensitive urban design approach is not adopted as part of the development strategy. The traditional stormwater management and investigation that only considers impacts of flooding and flood mitigation is a thing of the past. Stormwater management practices must now also consider water quality, aquatic habitats, riparian vegetation, recreation, aesthetic and economic issues.

The key strategies to be adopted for this development include the following:

Water Quantity

- A pit and pipe network to collect storm runoff from ground surfaces;
- An OSD basin with orifice control with a minimum effective storage volume of 135.6m^3.

Water Quality

- 4 x STW360 EnviroPods in nominated inlet pits will form part of the water quality treatment train, removing gross pollutants;
- A 15kL rainwater reuse tank plumbed for landscape irrigation and two car wash bays;
- 7 x 690mm Psorb StormFilter cartridges to polish stormwater prior to discharge to the downstream drainage network.

The results from the investigations and modelling for this project that have been summarised in this report indicate that the development with the proposed WSUD strategy and management can provide a safe and ecologically sustainable environment.

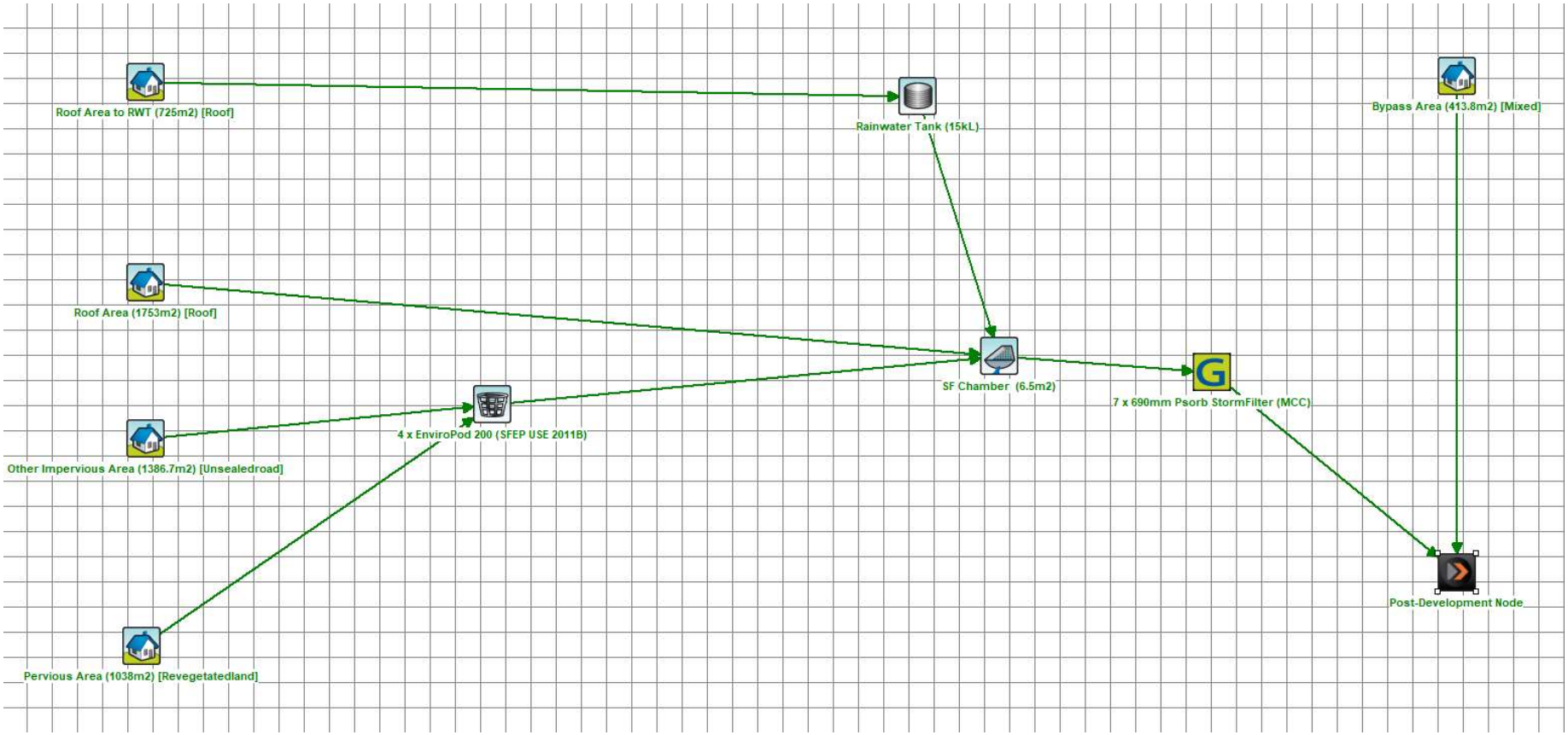
6. REFERENCES

- Concept Civil Engineering Drawings for the Development Application submission prepared by C&M Consulting Engineers;
- Architectural Plans by PTW Architects;
- Sydney Water – Water Quality Monitoring Program for Lane Cove Council (2019);
- Sydney Water – Stormwater Quality Target 2016;
- Lane Cove Council – Part O LCC Stormwater Management DCP;
- eWater – *MUSIC Version 6.2 (Build 1.1592)*

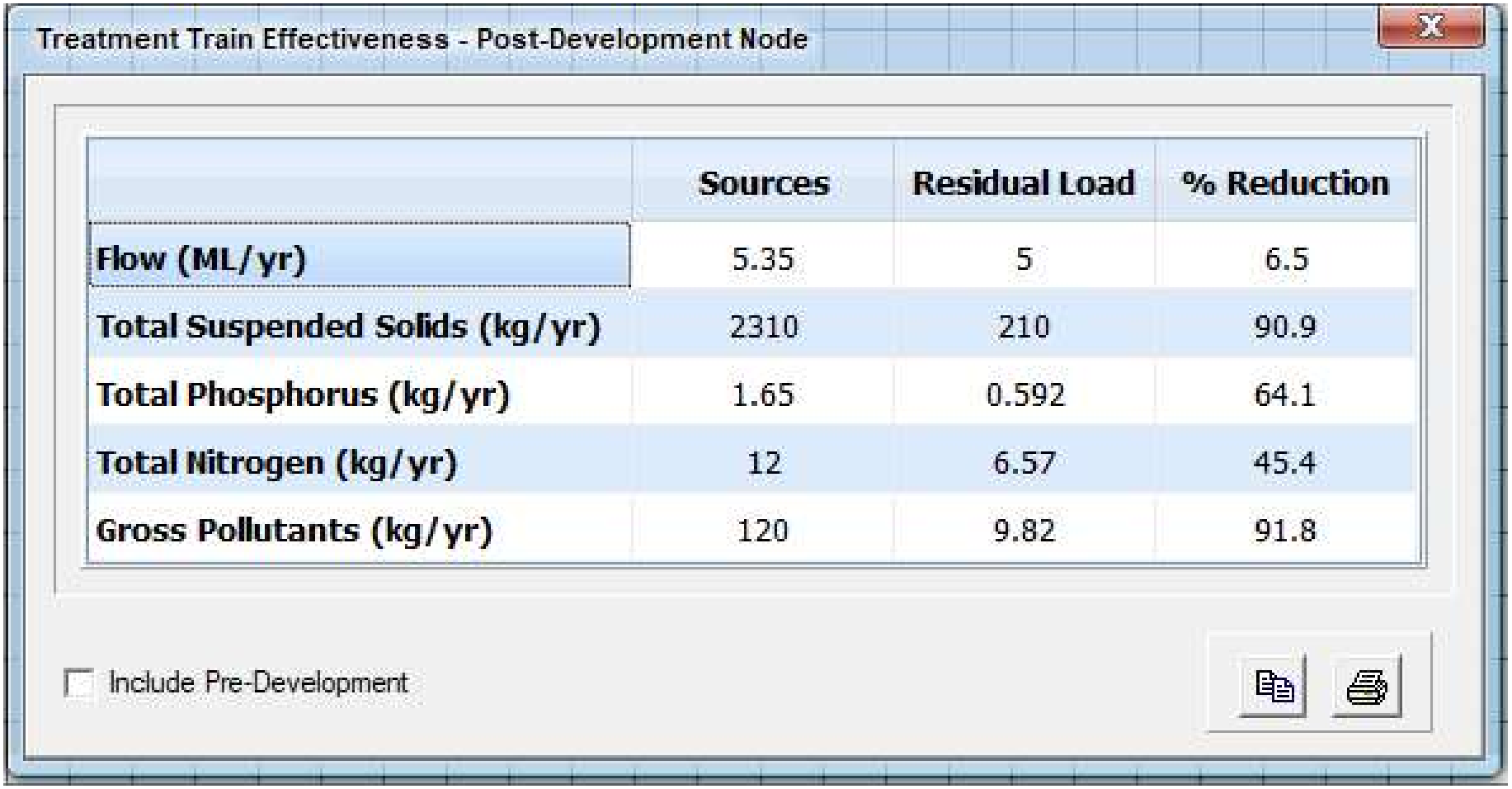
APPENDIX A

MUSIC MODEL LAYOUT & RESULTS

MUSIC MODEL LAYOUT



MUSIC MODEL RESULTS


Treatment Train Effectiveness - Post-Development Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.35	5	6.5
Total Suspended Solids (kg/yr)	2310	210	90.9
Total Phosphorus (kg/yr)	1.65	0.592	64.1
Total Nitrogen (kg/yr)	12	6.57	45.4
Gross Pollutants (kg/yr)	120	9.82	91.8

Include Pre-Development

APPENDIX B

OSD CALCULATION SHEET AND RESULTS

DRAINS OSD LAYOUT

Appendix 14 – OSD Calculation Sheet

ON-SITE DETENTION CALCULATION SHEET

DEVELOPMENT TYPE:_____

ADDRESS:_____

OSD AREA: 54.3 sq.m

Site Area (m²)	5317.7	(A)
Total Impervious Area (roofs, driveways, hardstand etc) (m²)	3865.9	(B)
Total Area draining to the Storage Facility (m²) (impervious and pervious areas)	4903.9	(C)
New Impervious Area bypassing the Storage Facility	413.8	(D)
$\frac{(B)+(D)}{(B)}$ =	1.1070	(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 0.01218 (F)

PERMITTED SITE DISCHARGE (l/s) (C) x (F) 59.72 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) 135.6 m³

OUTLET CONTROL - using a Sharp Edged Orifice Plate

Height Difference between top water level and Centre of Orifice (m) 2.5 (H)

ORIFICE DIAMETER (mm)

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

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

PART O: STORMWATER

A1

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE & 2-10 BERRY RD, ST LEONARDS
CONCEPT STORMWATER DRAINAGE PLANS FOR DA

DRAWING INDEX:

LEGEND

- BOUNDARY
- STORMWATER LINE
- FINISHED SURFACE CONTOUR (74.2)
- GRATED TRENCH DRAIN (GTD)
- GSIP — GRATED SURFACE INLET PIT
- JP — JUNCTION PIT / ACCESS LID
- DIRECTION OF FLOW
- DOWN PIPE
- DROPPER
- RL91.86 — FINISHED SURFACE LEVEL
- GRL91.86 — FINISHED STORMWATER PIT LID/GRATE LEVEL
- RISER / SERVICE TYPE / SERVICE SIZE / DROPPER
- RETAINING WALL

GENERAL NOTES:

1. ALL WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH LANE COVE COUNCIL WORKS STANDARD AND TO COUNCIL ENGINEERS REQUIREMENTS.
2. THE CONSTRUCTOR SHALL PREPARE A DILAPIDATION REPORT FOR THE EXISTING INFRASTRUCTURE WITHIN THE ROAD RESERVE, INCLUDING BUT NOT LIMITED TO KERBS, GUTTERS, FOOTPATHS, VEHICULAR CROSSINGS, STREET SIGNS, SERVICE FITTING COVERS, ETC.
3. THE CONSTRUCTOR SHALL REVIEW, BE AWARE AND AT ALL TIMES COMPLY WITH THE SPECIFIC REQUIREMENTS FOR THIS DEVELOPMENT AS SET OUT IN THE DEVELOPMENT APPROVAL FOR THE PROJECT.
4. ANY CHANGES MADE BY THE CONSTRUCTOR TO ANY LEVEL, DIMENSION, LOCATION, POSITION, ALIGNMENT ETC., OF ANY OF THE WORKS SHOWN ON THE DRAWINGS WITHOUT THE WRITTEN CONSENT OF C&M CONSULTING ENGINEERS PTY. LTD. AND OR THE COUNCIL ENGINEER IS DONE SO AT THE CONSTRUCTORS OWN RISK.
5. THE CONSTRUCTOR SHALL ALLOW TO LIAISE WITH AND PROVIDE SUFFICIENT NOTICE TO THE COUNCIL ENGINEER TO ENSURE THAT ALL WORKS ARE INSPECTED TO ENABLE COMPLIANCE CERTIFICATES TO BE ISSUED THROUGHOUT THE CONSTRUCTION PERIOD. THE CONSTRUCTOR SHALL LIAISE WITH THE COUNCIL ENGINEER PRIOR TO ANY CONSTRUCTION WORKS COMMENCING AND PREPARE AN INSPECTION AND TEST PLAN WITH A MUTUALLY AGREED WITNESS AND HOLD POINTS FOR THE CONSTRUCTION WORKS.
6. THE CONSTRUCTOR MUST CONTACT THE LANE COVE COUNCIL'S WORKS DIVISION TO ENABLE THEIR INSPECTION OF ALL WORKS (INCLUDING EROSION AND SEDIMENT CONTROL MEASURES) WITHIN THE ROAD RESERVE AREA.
7. ALL NEW WORKS SHALL MAKE A SMOOTH CONNECTION WITH ANY FORMATIONS, STRUCTURES, ETC.
8. ALL ALTERATIONS AND/OR ADDITIONS TO EXISTING WORK, THE CONTRACTOR SHALL VERIFY THE DIMENSIONS OF THE EXISTING WORK BEFORE PROCEEDING AND NOTIFY THE SUPERINTENDENT AND OR THE COUNCIL ENGINEER OF DISCREPANCIES.
9. THE CONTRACTOR SHALL USE MANUFACTURED ITEMS IN THE WORK ONLY IN ACCORDANCE WITH THE CURRENT PUBLISHED RECOMMENDATIONS OF THE MANUFACTURER RELEVANT TO SUCH USE.
10. THE WORKS SHALL BE CONSTRUCTED IN SUCH A MANNER THAT THERE IS MINIMUM DISTURBANCE TO EXISTING TREES AND VEGETATION.
11. ALL BOUNDARY LOCATIONS, DIMENSIONS, BEARINGS, AREAS, ETC., SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY AND ARE SUBJECT TO A FINAL SURVEY AND REGISTRATION OF THE FINAL PLAN OF SUBDIVISION WITH LAND AND PROPERTY INFORMATION NSW.
12. THE PUBLIC FOOTWAY AND ROADWAYS SHALL BE MAINTAINED IN A SAFE AND UNOBSTRUCTED MANNER AT ALL TIMES DURING THE CONSTRUCTION WORKS.
13. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR REPAIRING TO THE SATISFACTION OF THE ASSET OWNER, ANY DAMAGE CAUSED TO ANY EXISTING INFRASTRUCTURE WITHIN THE ROAD RESERVE, INCLUDING BUT NOT LIMITED TO KERBS, GUTTERS, FOOTPATHS, VEHICULAR CROSSINGS, STREET SIGNS, SERVICE FITTING COVERS, ETC.
14. THE SITE SHALL BE KEPT IN A TIDY CONDITION AT ALL TIMES. LITTER RUBBISH AND BUILDING RUBBLE SHALL BE PLACED IN CONTAINERS OR BINS AND REGULARLY REMOVED FROM SITE AS REQUIRED.

SETTING OUT NOTES:

1. THE CONSTRUCTOR SHALL USE A SUITABLY QUALIFIED SURVEYOR TO SET OUT ALL WORKS. THE SURVEYOR SHALL ISSUE A CERTIFICATE TO THE PRINCIPAL CERTIFYING AUTHORITY CERTIFYING THAT THE WORKS HAVE BEEN SET OUT IN ACCORDANCE WITH THE APPROVED DRAWINGS PRIOR TO THE WORKS BEING CONSTRUCTED.
2. THE SURVEY WORK ASSOCIATED WITH THE CONTRACT SHALL INCLUDE SETTING OUT THE FOLLOWING COMPONENTS OF THE WORK:
   - DRAINAGE STRUCTURES

SERVICES NOTES:

1. IT IS THE CONSTRUCTORS RESPONSIBILITY TO NOTIFY THE RELEVANT SERVICES AUTHORITIES OF THE WORKS AND VERIFY THE LOCATION OF ALL EXISTING SERVICES PRIOR TO ANY CONSTRUCTION ACTIVITIES COMMENCING.
2. THE CONSTRUCTOR SHALL LIAISE AND COORDINATE THE TIMING OF THE CONSTRUCTION OF THE WORKS WITH THE RELEVANT SERVICES AUTHORITIES AND/OR OTHER CONSTRUCTORS INSTALLING SERVICES CONCURRENTLY AT THIS SITE.
3. THE LOCATION OF ALL EXISTING SERVICES SHOWN ON THE DRAWINGS ARE APPROXIMATE ONLY AND HAVE BEEN TAKEN FROM INFORMATION PROVIDED BY THE RELEVANT SERVICE AUTHORITIES.
4. THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR ALL DAMAGE CAUSED TO EXISTING SERVICES AS A RESULT OF THE CONSTRUCTION WORKS.

STORMWATER NOTES:

1. STORMWATER DESIGN CRITERIA:
   MINOR STORM ARI: 20 YEARS
   MAJOR STORM ARI: 100 YEARS
2. IFD DATA LOCALITY: ST LEONARDS
3. PIPES DN375 AND LARGER TO BE STEEL REINFORCED CONCRETE PIPES CLASS '2' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS U.N.O.
4. PIPES DN300 AND SMALLER SHALL BE GRADE SH (SEWER GRADE) uPVC WITH RUBBER RING JOINTS.
5. EQUIVALENT STRENGTH FIBRE REINFORCED CONCRETE PIPES MAY BE USED UP TO DN450.
6. PIPES FOR SUB-SOIL DRAINS SHALL BE SLOTTED 100MM DIAMETER CLASS 1000 WRAPPED IN GEOFABRIC, U.O.N, COMPLYING WITH THE REQUIREMENTS OF AS 2439.
7. PRECAST PITS, WHERE ALLOWED, AND THE INSITU BASE SHALL COMPLY WITH THE REQUIREMENT OF THE MANUFACTURER.
8. STORMWATER KERB OUTLET TO BE INSTALLED ON THE LOWER SIDE OF EACH LOT.
9. PROVIDE STEP IRONS FOR PITS DEEPER THAN 1.2m.
10. COMPRESSIVE STRENGTH FOR CAST IN-SITU PITS SHALL BE 25MPa UNLESS NOTED OTHERWISE.
11. ALL PITS SHALL BE BENCHED AND FLOW STREAMLINED.
12. ALL MILD STEEL FIXTURES INCLUDING GRATES, FRAMES, STEP IRONS, LADDERS, ETC., SHALL BE HOT DIP GALVANISED. GALVANISING SHALL COMPLY WITH THE REQUIREMENTS OF AS 1214 OR AS 1650, AS APPROPRIATE.
13. GEOFABRIC FILTER SHALL BE PERMEABLE, NON-WOVEN FABRIC MANUFACTURED FROM A POLYMER SUCH AS POLYPROPYLENE OR POLYESTER OF MASS NOT LESS THAN 135G/M2.
14. THE MINIMUM TRENCH WIDTHS SHALL BE AS FOLLOWS:
    CONCRETE AND FRC PIPES: EXTERNAL PIPE DIAMETER PLUS 400MM.
    uPVC PIPE: EXTERNAL DIAMETER OF PIPE PLUS 200MM.
    SUBSOIL PIPE: 250MM.
15. ALL PIPES SHALL BE PLACED CENTRALLY WITHIN THE TRENCH WITH EQUAL CLEARANCE EACH SIDE.
16. 100mm DIA. SUBSOIL DRAINAGE PIPE 3m LONG WRAPPED IN FILTER SOCK TO BE PROVIDED IN PIPE TRENCHES UPSTREAM OF ALL PITS.
17. PIPE BEDDING MATERIAL SHALL BE CLEAN COARSE RIVER SAND WITH DEPTH AS FOLLOWS:
    CONCRETE AND FRC PIPES: 100MM (175MM IN ROCK)
    UPVC PIPE: 75MM (100MM IN ROCK)
    SUBSOIL DRAINS: 50MM
18. ALL PIPES SHALL BE BACKFILLED WITH GRANULAR MATERIAL SUCH AS QUARRY FINES OR COARSE RIVER SAND TO A MINIMUM OF 150MM ABOVE THE PIPE. THE GRANULAR MATERIAL SHALL BE PLACED IN 150MM THICK MAXIMUM LAYERS AND COMPACTED TO ACHIEVE A DENSITY INDEX (ID) OF 70%. FREQUENCIES OF COMPACTION TESTS FOR TRENCHES SHALL BE 1 TEST PER 2 LAYERS PER 40 LINEAR METRE.
19. BACKFILL THE REMAINDER OF THE TRENCH ABOVE THE SAND TO SUBGRADE LEVEL WITH TRENCH MATERIAL. PLACE AND COMPACT MATERIALS IN LAYERS NOT EXCEEDING 150MM LOOSE THICKNESS. MATERIAL LOWER THAN 500MM BELOW SUBGRADE LEVEL SHALL BE COMPACTED TO AT LEAST 95% OF STANDARD MAXIMUM DRY DENSITY. THE TOP 500MM BELOW PAVEMENT SUBGRADE LEVELS SHALL BE COMPACTED TO AT LEAST 100% STANDARD MAXIMUM DRY DENSITY.
20. SUBSOIL DRAINAGE SHALL BE PROVIDED ALONG THE CUT SIDE OF ALL NEW ROADS WHERE NO DRAINAGE IS PROVIDED, ALONG THE CENTRE LINE OF HALF ROAD CONSTRUCTION WORKS, AT LOW SPOTS, WHERE REQUIRED BY THE PAVEMENT DESIGN REPORT, AND WHERE DIRECTED BY COUNCIL'S ENGINEER.
21. FILTER MATERIAL FOR SUBSOIL SHALL BE COARSE SAND OR CRUSHED STONE COMPLYING WITH ONE OF THE GRADINGS IN THE TABLE BELOW. WHERE NOTED ON THE DRAWINGS THE 7MM CRUSHED ROCK FILTER MATERIAL SHALL BE ENCLOSED WITHIN FILTER FABRIC SHEET AS SPECIFIED. FILTER MATERIAL SHALL BE PLACED IN 250MM LAYERS AND COMPACTED TO DENSITY INDEX (ID) OF 60%.

AS SIEVE SIZE (mm)	SAND	7mm ROCK
9.5	100	100
6.7	-	75-100
4.75	90-100	20-55
2.36	75-100	0-15
1.18	50-90	
0.6	20-60	
0.3	10-30	
0.15	2-10	
0.075	0-3	0-2

22. UNLESS OTHERWISE DETAILED OR PERMITTED, THE MINIMUM GRADE OF ALL PIPE WORKS SHALL BE 1.0%.
23. PRIOR TO ISSUE OF PRACTICAL COMPLETION THE CONTRACTOR SHALL CARRY OUT CCTV SURVEY OF ALL PIPES AND SUBMIT DVD AND WRITTEN REPORT THAT ALL PIPES ARE FREE OF DEFECTS LAID TO THE SPECIFICATION.
24. OVERLAND FLOW PATHS TO BE FORMED AT TIME OF CONSTRUCTION.
25. ALL CHANNELS, OPEN DRAINS ETC. TO BE TURFED UNLESS NOTED OTHERWISE.
26. WHERE OVERLAND FLOW PATHS CROSS OVER FOOTPATHS THE CROSS FALL SHALL BE REVERSED.
27. STRUCTURAL CERTIFICATION REQUIRED FOR CONSTRUCTION OF MAJOR AND NON-STANDARD STRUCTURES.

ENVIRONMENTAL CONTROL NOTES:

EROSION AND SEDIMENT CONTROL

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONTROL OF EROSION AND SEDIMENTATION TO THE SATISFACTION OF COUNCIL, THE RELEVANT STATE AUTHORITIES AND THE SUPERINTENDENT. TO THIS END, THE EROSION AND SEDIMENTATION CONTROLS SHOWN ON THE DRAWINGS SHALL ONLY BE USED AS A GUIDE BY THE CONTRACTOR, AND SHALL REPRESENT THE MINIMUM REQUIREMENT ONLY.
2. NO CONSTRUCTION WORKS ARE TO COMMENCE ON SITE UNTIL ALL EROSION AND SEDIMENT CONTROL MEASURES ARE IN PLACE AND HAVE BEEN INSPECTED AND APPROVED BY THE COUNCIL ENGINEER AND/OR SUPERINTENDENT.
3. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REGULARLY INSPECTED, IN PARTICULAR AFTER STORMS, AND REPAIRED OR MAINTAINED AS REQUIRED TO ENSURE THE MEASURES CORRECT AND EFFICIENT FUNCTION THROUGHOUT THE DURATION OF THE WORKS, UNTIL SUCH TIME AS THE COUNCIL ENGINEER AND/ORSUPERINTENDENT AUTHORISES THE REMOVAL OF SUCH MEASURES.
4. ALL STOCKPILES SHALL BE CLEAR OF ALL TREES AND DRAINAGE LINES (INCLUDING OVERLAND FLOW PATHS) AND PROTECTED FROM EROSION.
5. N THE CASE OF THE TEMPORARY CONSTRUCTION EXIT, THE CONTRACTOR SHALL UNDERTAKE WEEKLY SURFACE CLEANING BY DRAG BROOM OR EQUIVALENT, TO REMOVE ALL BUILD UP OF FOREIGN MATERIAL TO THE SATISFACTION OF THE SUPERINTENDENT.

TRAFFIC CONTROLS

1. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR THE CONTROL OF TRAFFICS INCLUDING VEHICLES AND PEDESTRIANS TO THE SATISFACTION OF COUNCIL, THE RELEVANT STATE AUTHORITIES AND THE SUPERINTENDENT.
2. THE CONTRACTOR IS TO PREPARE A TRAFFIC MANAGEMENT PLAN TO THE REQUIREMENTS OF THE RMS - TRAFFIC CONTROL AT WORK SITE, AS 1742 - AUSTRALIAN STANDARD MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES, AND LOCAL COUNCIL STANDARDS.

OTHER ENVIRONMENTAL CONTROLS

1. OTHER ENVIRONMENTAL CONTROLS LIKE NOISE, DUST, VIBRATION, FLORA & FAUNA, FIRE, HAZMAT, AND CONTAMINATIONS MUST BE CONTROLLED TO THE REQUIREMENT OF THE COUNCIL AND THE RELEVANT STATE AUTHORITIES.

LOCALITY SKETCH
NOT TO SCALE

NOT FOR CONSTRUCTION

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SUITE 26
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ABN 21 118 134 240

DRAWN	A.H.
DESIGNER	P.O.
ENGINEER	G.C.
DATE 1st ISSUED	23/09/2021
LGA	LANE COVE
SCALE @ A1	NTS

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

COVER SHEET, GENERAL NOTES
DRAWING INDEX & LOCALITY SKETCH

STATUS	DRAWING No.	REVISION
DEVELOPMENT APPLICATION	02527_100	03

CAD FILENAME: D:\C&M\Projects\02501-02600\PN-02527 - BERRY ROAD 2-10 & HOLDSWORTH AVE 5-9, ST LEONARDS\ACAD\2527_100.dwg

A1

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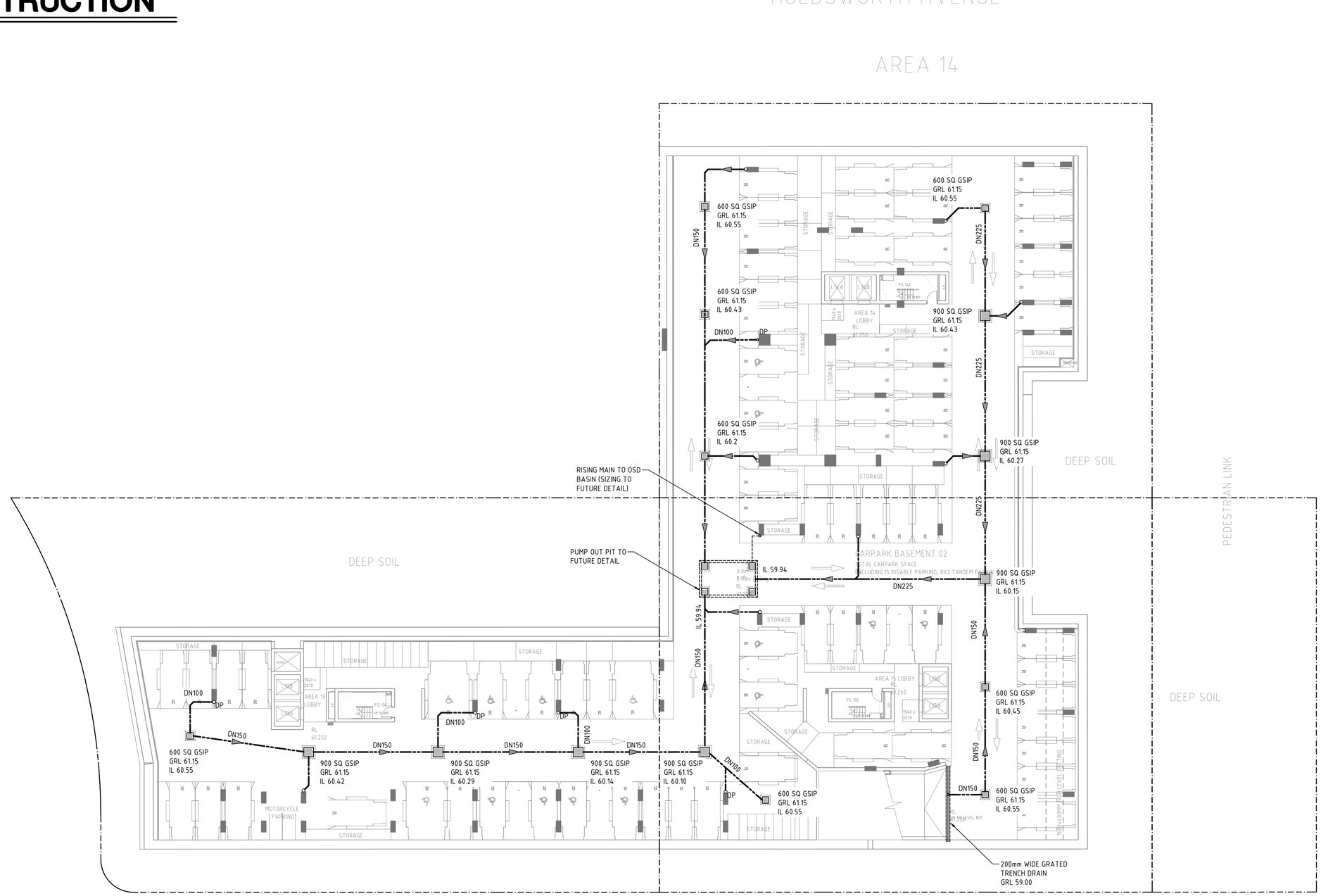

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SCALE 1:200

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SCALE @ A1	1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - BASEMENT 2 PLAN

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_201 | REVISION 03

A1

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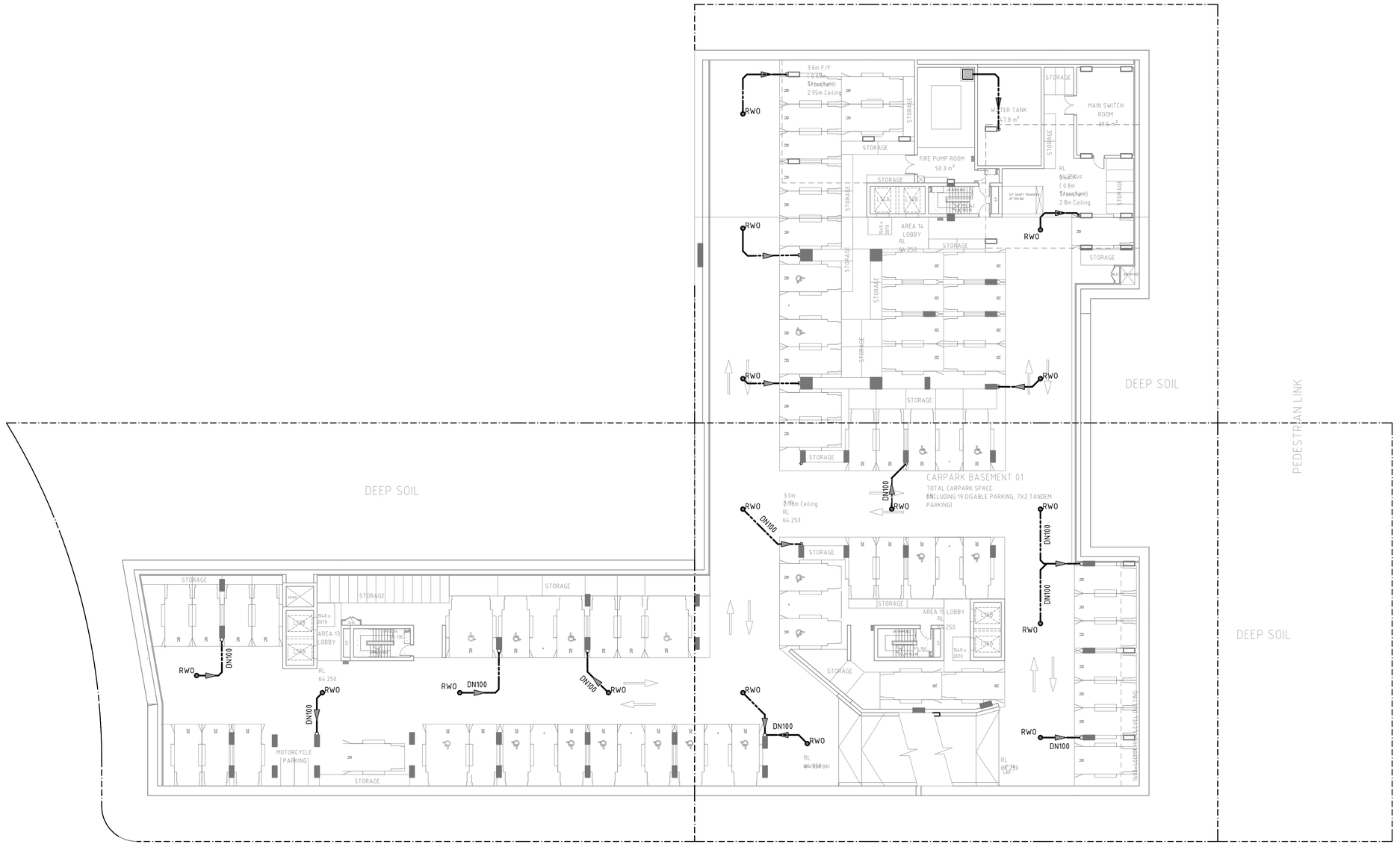
HOLDSWORTH AVENUE

AREA 14

MARSHALL AVENUE



AREA 13

AREA 15

BERRY ROAD

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4 2

SCALE 1:200

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SCALE @ A1	1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - BASEMENT 1 PLAN

STATUS	DRAWING No.	REVISION
DEVELOPMENT APPLICATION	02527_202	03

A1

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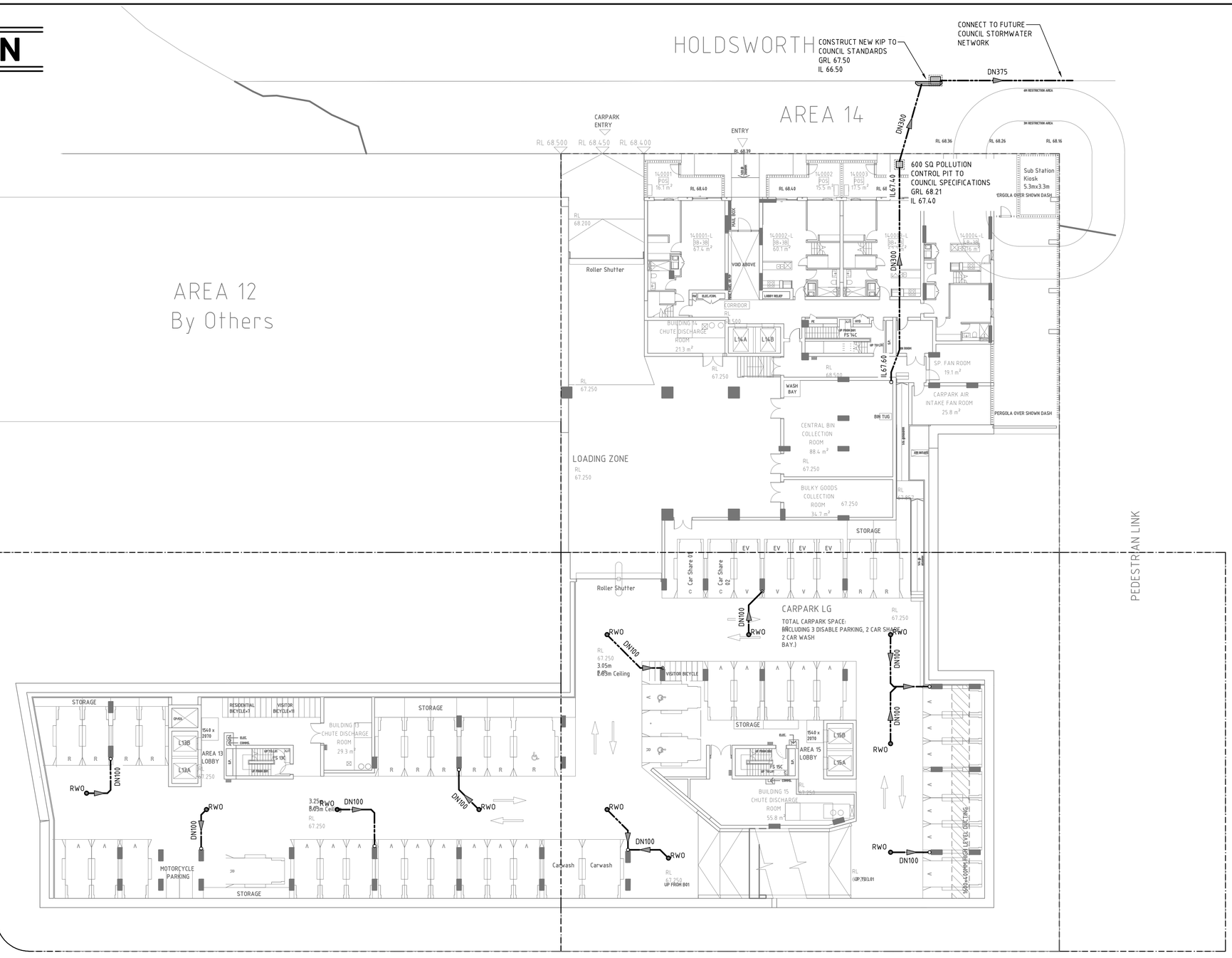

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4 2

SCALE 1:200

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ENGINEER	G.C.
DATE 1st ISSUED	23/09/2021
LGA	LANE COVE
SCALE @ A1	1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - GROUND FLOOR PLAN

STATUS	DRAWING No.	REVISION
DEVELOPMENT APPLICATION	02527_203	03

A1

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SCALE 1:200

REV.	DRN.	DATE	CHK.	DESCRIPTION
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DESIGNER	P.O.	LGA	LANE COVE
ENGINEER	G.C.	SCALE @ A1	1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - LEVEL 1 PLAN

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_204 | REVISION 03

A1

NOT FOR CONSTRUCTION

AREA 12
By Others

1800W x 600H HIGH WINDOW

CAR PARK ROOF REFER LANDSCAPE

DN225 ROOF DRAINAGE

COMMUNAL OPEN SPACE

ENTRY

CARPARK L02
TOTAL CARPARK SPACE: 17
3.2m CLR Ceiling

CARPARK SUPPLY FAN ROOM 30.1 m²

SP. FAN ROOM 22.2 m²

S.P. FAN ROOM 23.1 m²

RESIDENTIAL BICYCLE PARKING

MOTORCYCLE PARKING

STORAGE

SMALL PARKING

G.C. Transfer at high

FHBV

600 SQ GSIP GRL 76.45 IL 75.85

600 SQ GSIP GRL 76.30 IL 75.70

600 SQ GSIP GRL 76.30 IL 75.55

600 SQ GSIP GRL 76.30 IL 75.42

DN150

DN225

DN150

DN225

DN150

DN225

PERGOLA OVER SHOWN DASH

RL 74.60

RL 76.41

RL 76.09

RL 75.80

RL 75.53

0 4 8 12 16 20m
4 2
SCALE 1:200

CAD FILENAME G:\C&M\Projects\02501-02600\PN-02527 - BERRY ROAD 2-10 & HOLDSWORTH AVE 5-9 ST LEONARDS\ACAD\2527_201.dwg

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DESIGNER	P.O.	LGA	LANE COVE
ENGINEER	G.C.	SCALE @ A1	1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - LEVEL 2 PLAN

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_205 | REVISION 03

A1

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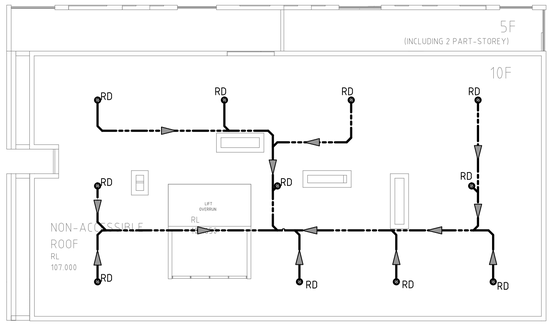
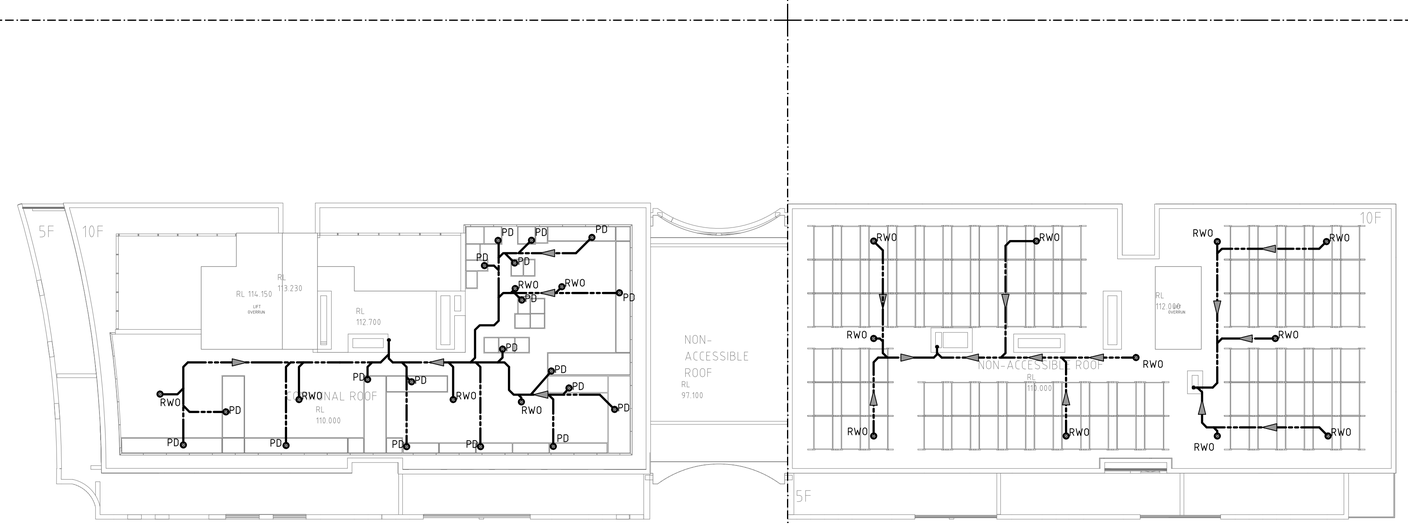
AREA 12
By Others





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SCALE 1:200

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DESIGNER P.O.	LGA LANE COVE
ENGINEER G.C.	SCALE @ A1 1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - ROOF PLAN

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_206 | REVISION 03

A1

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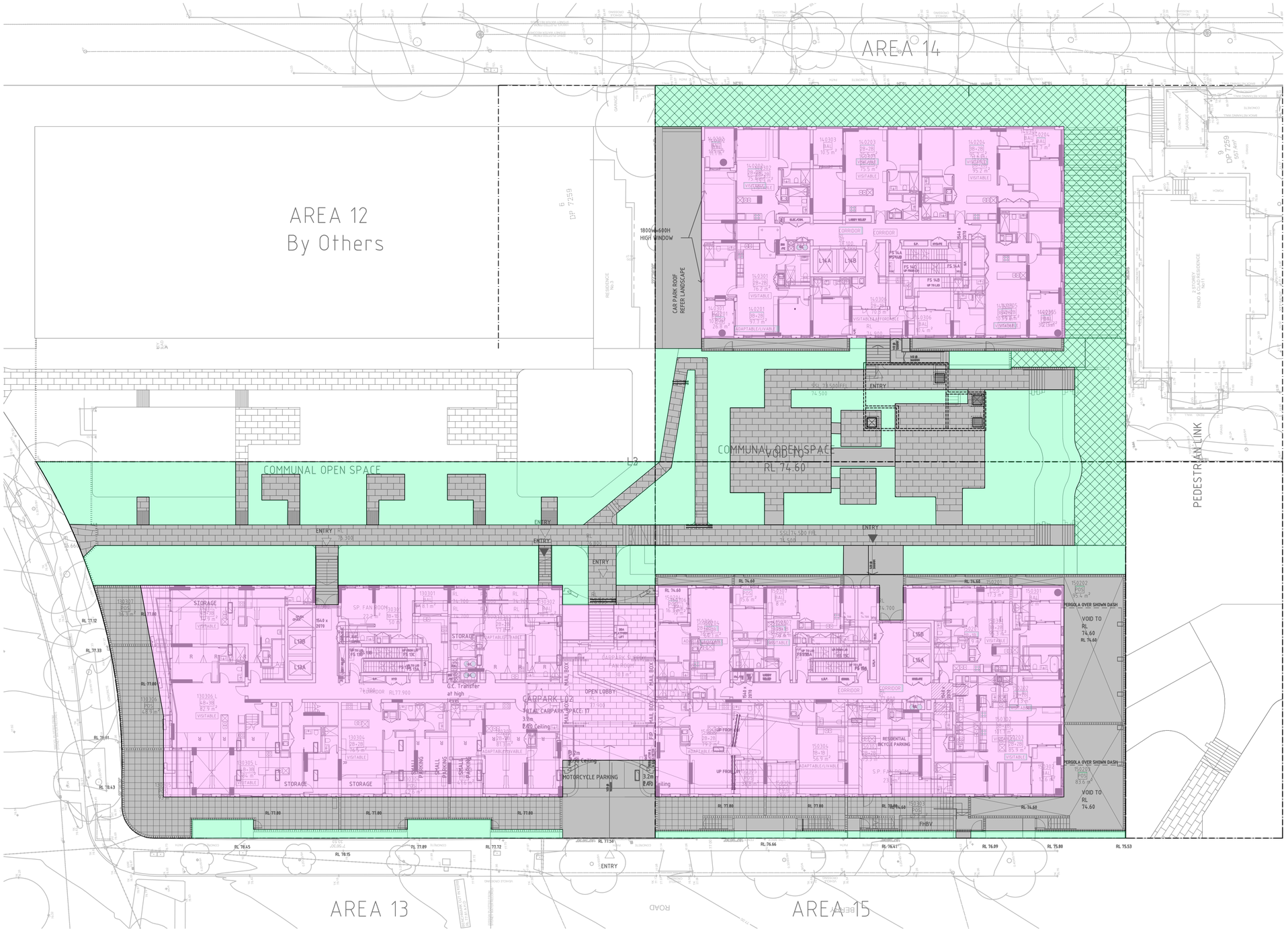
CATCHMENT LEGEND			
No.	Catchment Type	Colour	Area
1	Impervious - Roof		2479.2m²
2	Impervious - Other		1386.7m²
3	Pervious - Bypass		413.8m²
4	Pervious - Landscaping		1038.0m²
	TOTAL AREA		5317.7m²



STORMWATER CATCHMENT PLAN

SCALE 1:100

SCALE 1:200

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ENGINEER	G.C.
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LGA	LANE COVE
SCALE @ A1	1:200

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

STORMWATER DRAINAGE - CATCHMENT PLAN

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_601 | REVISION 03

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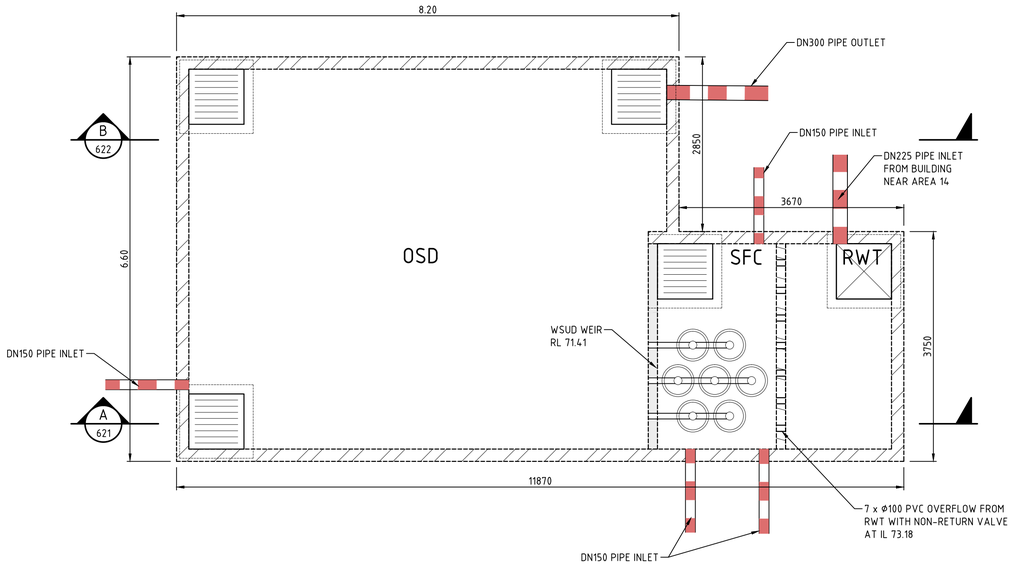
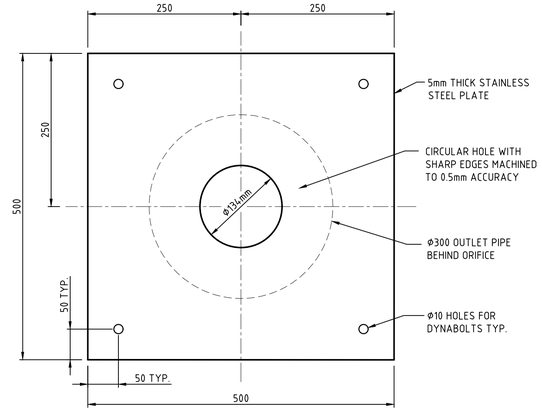
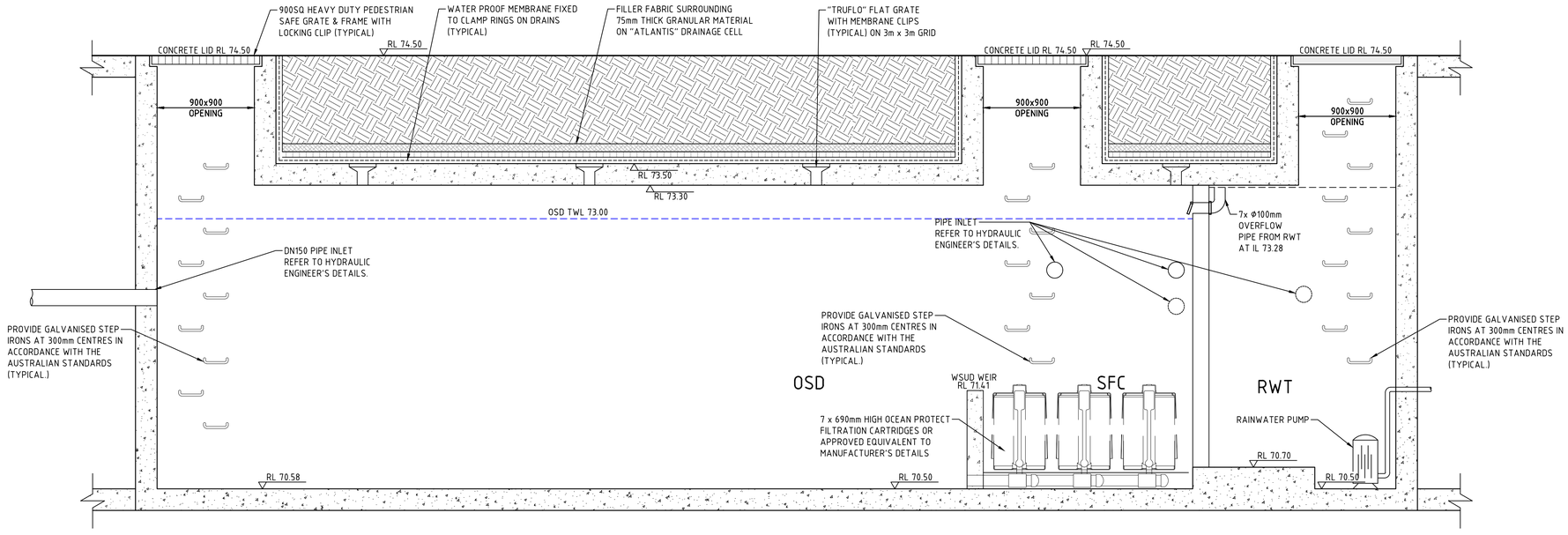
A1



OSD TANK PLAN
SCALE 1:50



ORIFICE PLATE DETAIL
SCALE 1:5



SECTION A/621
SCALE 1:25

0 1000 2000 3000 4000 5000mm
1000 500
SCALE 1:50

0 500 1000 1500 2000 2500mm
500 250
SCALE 1:25

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DESIGNER	P.O.	LGA	LANE COVE
ENGINEER	G.C.	SCALE @ A1	AS SHOWN

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

OSD TANK
PLAN, SECTION AND DETAILS-SHEET01

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_621 | REVISION 03

A1

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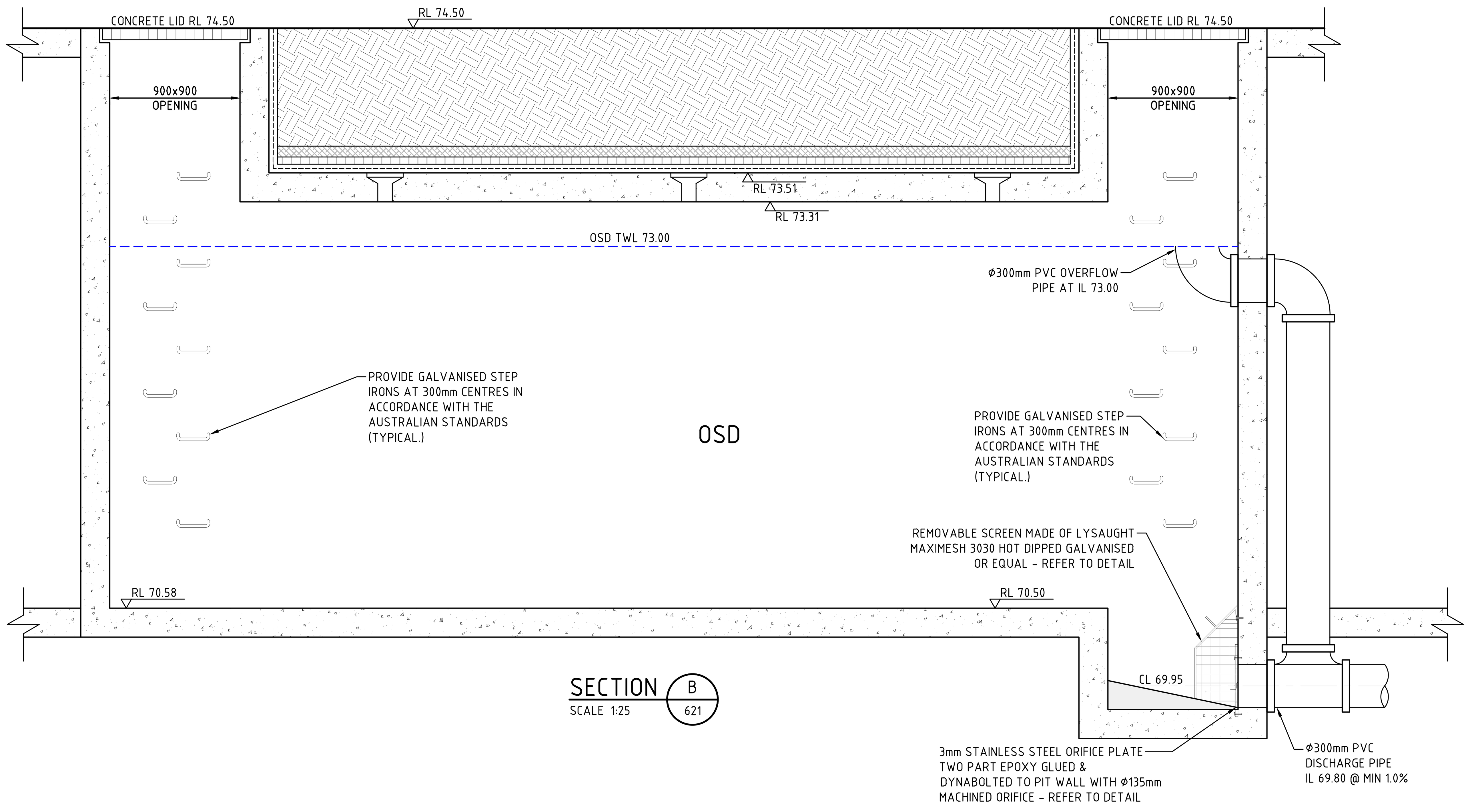

SECTION B/621
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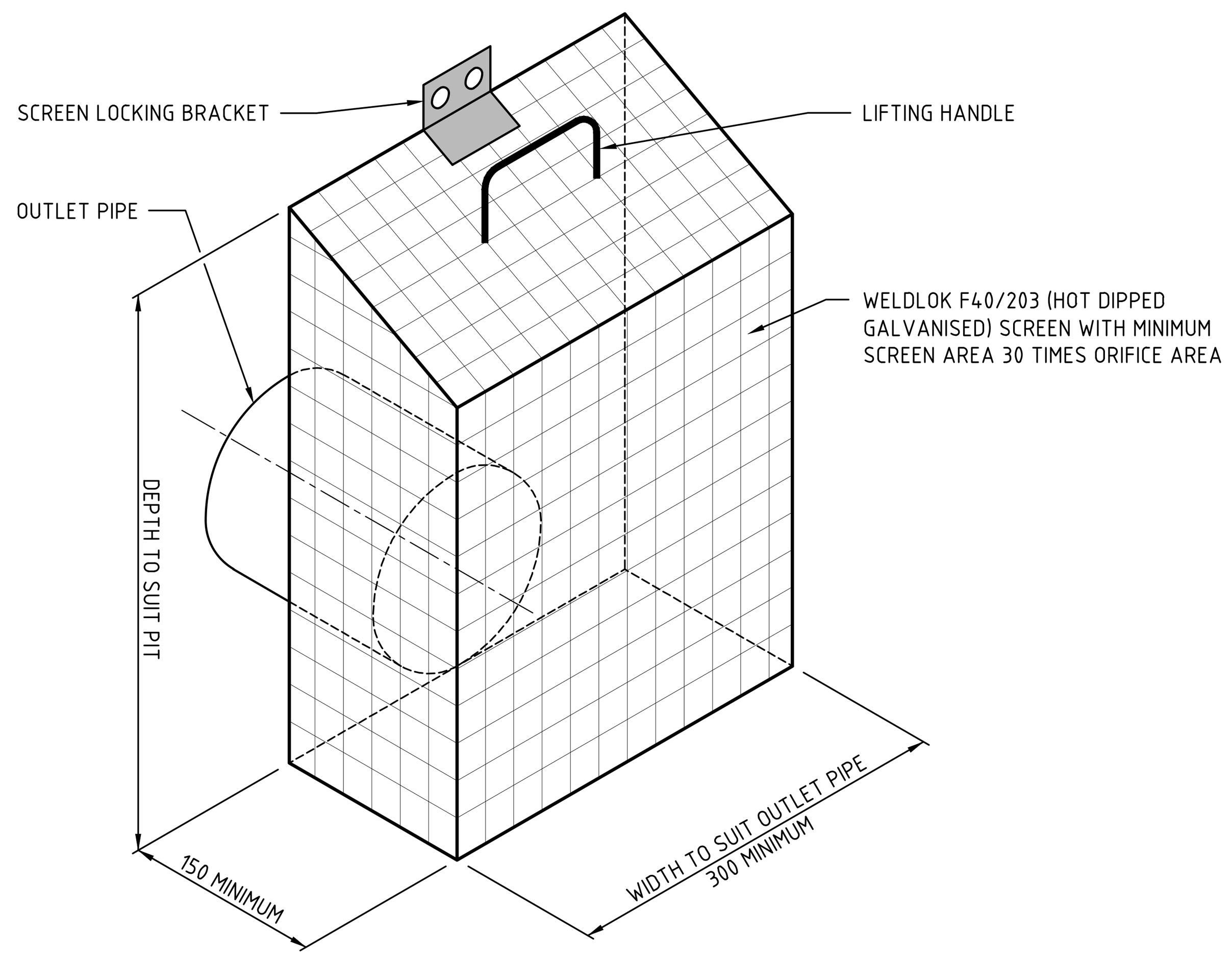
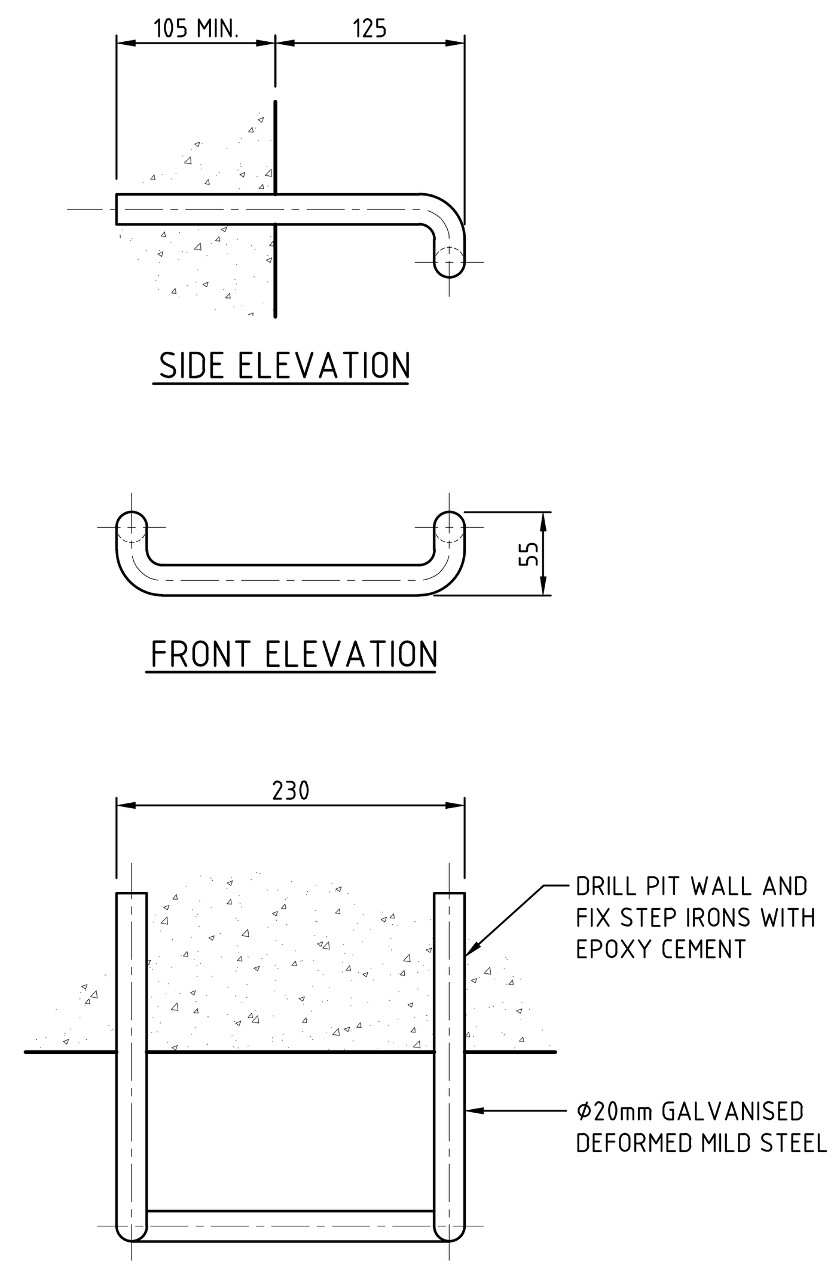


TRASH SCREEN DETAIL (TYPICAL)
SCALE 1:5



STEP IRON DETAIL (TYPICAL)
SCALE 1:5

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100 50
SCALE 1:5

0 500 1000 1500 2000 2500mm
500 250
SCALE 1:25

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02	A.H.	31/03/2023	G.C.	ISSUE FOR REVIEW
01	A.H.	23/09/2021	G.C.	ISSUE FOR DA APPROVAL

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PROJECT VERIFIER'S SIGNATURE: .... DATE: ....

CLIENT

C&M CONSULTING ENGINEERS
CIVIL AND HYDRAULIC ENGINEERING DESIGN AND PROJECT MANAGEMENT
SUITE 26
11 - 13 BROOKHOLLOW AVE
NORWEST NSW 2153
PHONE: (02) 9680 3100
FAX: (02) 9634 6989
ABN 21 118 134 240

DRAWN	A.H.	DATE 1st ISSUED	23/09/2021
DESIGNER	P.O.	LGA	LANE COVE
ENGINEER	G.C.	SCALE @ A1	AS SHOWN

14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

OSD TANK
PLAN, SECTION AND DETAILS-SHEET02

STATUS DEVELOPMENT APPLICATION | DRAWING No. 02527_622 | REVISION 03

A1

AREA 12
By Others

COMMUNAL OPEN SPACE

CAR PARK ROOF
REFER LANDSCAPE

1800 x 600H
HIGH WINDOW

ENTRY

SSL 73.500 FFL
74.500

SSL 74.500 FFL
74.500

CARPARK L02
TOTAL CARPARK SPACE: 17
3.2m
R/D Ceiling

CARPARK SUPPLY
FAN ROOM
30.1 m²

SP. FAN ROOM
22.2 m²

S.P. FAN ROOM
23.1 m²

RESIDENTIAL
BICYCLE PARKING

MOTORCYCLE PARKING

STORAGE

SMALL
PARKING

G.C. Transfer
at high
level

PERGOLA OVER SHOWN DASH

FHBV

AVENUE

HOLDSWORTH

MARSHALL

BERRY

ROAD

0 4 8 12 16 20m
4 2
SCALE 1:200

LEGEND
- SEDIMENT FENCE
- GEOTEXTILE INLET FILTER
- MESH & GRAVEL INLET FILTER
- STABILISED SITE ACCESS

NOT FOR CONSTRUCTION

CAD FILENAME: D:\C&M\Projects\02501-02600\PN-02527 - BERRY ROAD 2-10 & HOLDSWORTH AVE 5-9, ST LEONARDS\ACAD\2527_701.dwg

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DESIGNER	P.O.
ENGINEER	G.C.
DATE 1st ISSUED	23/09/2021
LGA	LANE COVE
SCALE @ A1	1:200

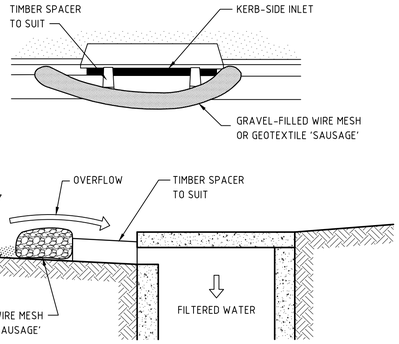
14-16 MARSHALL AVE, 5-9 HOLDSWORTH AVE, &2-10 BERRY ROAD, ST LEONARDS

SEDIMENT AND EROSION CONTROL PLAN

STATUS	DRAWING No.	REVISION
DEVELOPMENT APPLICATION	02527_701	03

A1

NOT FOR CONSTRUCTION

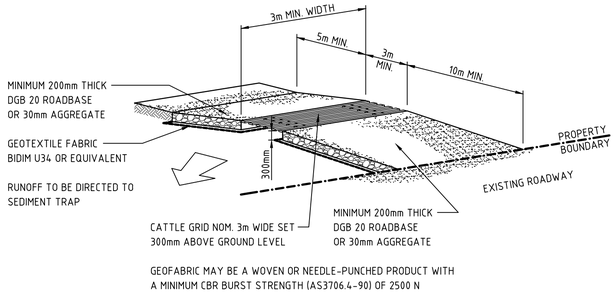


CONSTRUCTION NOTES:

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

MESH AND GRAVEL INLET FILTER DETAIL

NOT TO SCALE



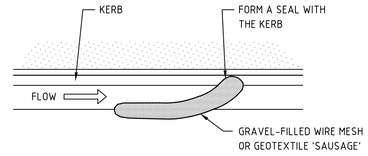
GEOFABRIC MAY BE A WOVEN OR NEEDLE-PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N

CONSTRUCTION NOTES:

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15m LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3m WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

STABILISED SITE ACCESS WITH SHAKER GRID DETAIL

NOT TO SCALE

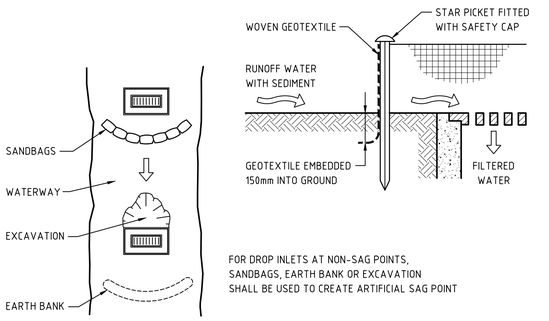


CONSTRUCTION NOTES:

1. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH APPROXIMATELY 1.0m IN LENGTH AND FILL IT WITH 25mm TO 50mm GRAVEL.
2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH x 400mm WIDE.
3. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE KERB.
4. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH AND GRAVEL KERB FILTER DETAIL

NOT TO SCALE



FOR DROP INLETS AT NON-SAG POINTS, SANDBAGS, EARTH BANK OR EXCAVATION SHALL BE USED TO CREATE ARTIFICIAL SAG POINT

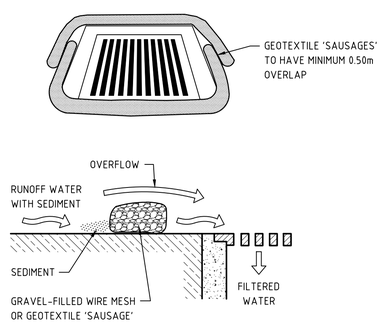
CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
3. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER DETAIL

FOR PITS WITHIN LANDSCAPED AREAS

NOT TO SCALE



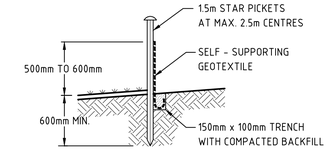
CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

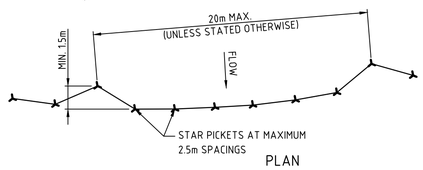
GEOTEXTILE INLET FILTER DETAIL

FOR PITS WITHIN PAVEMENT AREAS

NOT TO SCALE



SECTION DETAIL



PLAN

CONSTRUCTION NOTES:

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

SEDIMENT FENCE DETAIL

NOT TO SCALE

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SCALE @ A1	NTS

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SEDIMENT AND EROSION CONTROL DETAILS

STATUS	DRAWING No.	REVISION
DEVELOPMENT APPLICATION	02527_702	03