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STORMWATER MANAGEMENT PLAN FOR PROPOSED DEVELOPMENT AT 74 EDINBURGH ROAD, MARRICKVILLE NSW 2204

Job Ref: 190372

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1.0 INTRODUCTION

Richmond and Ross Pty Ltd, Consulting Engineers, has been commissioned by Woolworths Group Limited (the Applicant) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD- 10468 for the design, construction and operation of a warehouse and distribution centre with associated offices at 74 Edinburgh Road, Marrickville (the Site).

The warehouse will be fitted out for the purposes of a speculative warehouse(s) and Customer Fulfillment Centre which will service the inner west and city suburbs.

The requirements for the SEARs issued for SSD 10468 and where these requirements have been addressed are outlined in the table below:

Table 1 Secretary's environmental assessment requirements (SEARs)

Ref.	SEARs	Where addressed
7	Soils and Water assessment including:	
a	An assessment of potential surface and groundwater impacts associated with the development.	Sec 8.0 and Sec 11.0
b	A detailed site water balance, including a description of the development's water demands and associated servicing requirements (including any water licensing requirements).	Not within the scope of this assessment. Refer relevant documentation within the SEARs submission.
c	A description of the surface, stormwater and wastewater management systems, including on site detention, and measures to treat or reuse water	Sec 6.0, Sec 7.0 and Sec 8.0. Wastewater management systems are not within the scope of this assessment. Refer relevant documentation within the SEARs submission.
d	An indicative stormwater management plan prepared by a qualified engineer in accordance with relevant Inner West Council guidelines.	Sec 6.0, Sec 7.0 and Sec 8.0 and civil drawings C01 – C09 within the civil engineering design package
e	A description of the measures to minimize water use and promote water sensitive urban design (WSUD).	WSUD has been addressed in Sec 8.0
f	A description of the proposed erosion and sediment controls during construction.	Sec 10.0 and civil drawings C11-C16 within the civil engineering design package

2.0 DESCRIPTION OF SITE

The Site is legally described as Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969, commonly known as 74 Edinburgh Road, Marrickville (see Figure 1). The Site has an area of approximately 27,315sqm and has frontages to both Edinburgh Road (north) and Sydney Steel Road (east).

The key elements within and surrounding the Site include:

- The Site is located within the industrial area of Marrickville and currently accommodates several large freestanding industrial buildings and associated car parking and loading areas;
- Vehicular access to the Site is via an existing entry and exit driveway at the Edinburgh Road frontage. Access is also available from Sydney Steel Road;
- The Site contains minimal vegetation which is fragmented by buildings and areas of hardstand surfaces. Vegetation is limited to scattered trees and shrubs within the Site and planted within the nature strip;
- Is located within 1km of Sydenham Railway Station, which is currently being upgraded as part of the Sydney Metro Chatswood to Bankstown metro line; and
- The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville.



Figure 1 Aerial view of the Site (Source: SixMaps)



Figure 2 The Site: Location of proposed warehouse and CFC (Source: Nettleton Tribe)

3.0 THE SITE AND THE SURROUNDING CONTEXT

The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville. The Site is located on the northern periphery of the Sydenham Precinct which is part of the Sydenham to Bankstown Urban Renewal Corridor, earmarked for significant employment growth.

The Site also forms part of a large industrial precinct bounded by Edinburgh Road to the north, Railway Parade and the railway line to the east, Marrickville Road/the railway line to the south and Meeks Road/Farr Street/Shepherd Street to the west. The Industrial precinct includes:

- Large free standing industrial buildings;
- Industrial estates including smaller individual warehouse buildings to the south and east;
- Manufacturing, freight and logistics uses and includes storage facilities, car smash repairs, warehousing and factories.

The Marrickville Metro Shopping Centre also lies to north of the Site. Residential uses are well separated from the Site to the south and east. The Site is also physically separated from residential dwellings to the north and north-west by Edinburgh Road.

4.0 PROJECT DESCRIPTION

The proposed works comprise the following:

- Demolition of the existing buildings, associated structures and landscaping;
- Construction of a two storey warehouse comprising a speculative warehouse at level 1 (ground level) and Customer Fulfillment Centre (CFC) at level 2;
- Construction of associated offices across five levels to be used by Woolworths in conjunction with the warehouse and CFC;
- Two storey car park adjacent to Edinburgh Road;
- Two storey hardstand loading and delivery area adjacent Sydney Steel Road;
- Private vehicle access from two points on Edinburgh Road;
- Heavy vehicle / loading vehicle access from four points on Sydney Steel Road; and,
- Tree removal and landscaping works.

Use of the warehouse will be on a 24-hour, 7-day basis, consistent with surrounding operations.

5.0 EXISTING STORMWATER NETWORK

The site currently drains via an underground network of stormwater pit and pipes to council stormwater network on Sydney Steel Rd. There is no indication of an existing On-site detention (OSD) tank.

6.0 PROPOSED STORMWATER NETWORK

It is proposed to construct a new stormwater network to convey stormwater from the site on the following principles:

- A new network of pipes and pits is proposed to convey the runoff from the site to a stormwater treatment train prior to exiting the site at the legal point of discharge.
- The building roof area will drain to 2x 80kL onsite rainwater tanks (RWT). The collected water will be used for toilet flushing within the site with one RWT being used for office toilet flushing and the other for warehouse toilet flushing. Analysis from MUSIC indicates a minimum of 85% of non potable water demand (toilet flushing) of the site is achieved by this arrangement. See stormwater quality management in section 7 for more details.
- A system consisting of ocean guard pit inserts and filter cartridges is proposed to treat the stormwater runoff generated by the development prior to discharge into Sydney Water owned culvert on Sydney Steel Rd. The proposed treatment train achieves the pollutant removal targets as required by Part 2.17 of the DCP and as modelled in MUSIC. See stormwater quality management below.

- Consultation with Sydney Water has revealed an OSD requirement applies to the site. Therefore, underground OSD tanks are proposed to control the peak stormwater discharge rate generated by the development. See stormwater quantity management below.
- Humeceptors are proposed to treat stormwater prior to it leaving the site. This is to achieve two purposes. The first is to capture hydrocarbons from the vehicular trafficked areas. The second purpose is to reduce TSS.

7.0 STORMWATER QUANTITY MANAGEMENT

Consultation with Sydney Water has revealed that based on a site area of 28,000m², 427m³ of OSD (on site detention) storage is required for the site with a permissible site discharge (PSD) rate of 985l/s. Due to site constraints from the existing Sydney water culvert passing through the site, it is not feasible to have a single site discharge. It is therefore proposed to separate the area of the site into two separate catchments, North of culvert and south of culvert. The OSD applicable for each catchment has been propositioned based on the area of each catchment and the above Sydney Water OSD requirements.

	North catchment	South Catchment
Area (m ²)	2,130	25,870
Proportional OSD volume required (m ³)	32.5	395
Bypass Area (m ²)	-	1,510
Adjusted OSD volume required (m ³)	-	420
OSD volume provided	36	429
Proportional PSD rate applicable (l/s)	74.9	910
Adjusted PSD rate applicable (l/s)	-	810
Orifice proposed (mm)	191	648
Flow rate at design head (l/s)	74.9 (0.935m design head)	810 (0.826m design head)

8.0 STORMWATER QUALITY MANAGEMENT

A stormwater treatment train is proposed comprising of the following components.

8.1 RAINWATER TANKS

Rainwater tanks are proposed to allow for reuse of collected rainwater from roof areas for toilet flushing. Toilet flushing rates are allowed for at 0.1kL/day per pan. The proposed layout included 50x toilet pans within the office building and it is assumed that the warehouse will have approximately 50toilet pans for the purposes of modeling water reuse in MUSIC.

Table 2 Proposed rainwater tanks

	Size	Total re use rates			% Reuse
Rainwater tank for office use	80kL	Pans	50x	5kL/day	85.39
Rainwater tank for warehouse use	80kL	Pans	50x	5kL/day	86.76

8.2 GROSS POLLUTANT TRAPS (GPT)

8.2.1 Humeceptor

A Humeceptor has been proposed for each of the catchments to treat runoff entering prior to entering the filter cartridge chamber. PCSWMM calculator was used to determine the minimum humeceptor size requirement based on a TSS removal rate of 80%. A STC40 humeceptor is proposed for the Southern catchment (allowing for the office building RWT to bypass) whereas a STC3 is proposed for the northern catchment. For the purposes of modelling in PCSWMM, it is assumed that the whole site is impervious as a worst-case scenario condition.

The humeceptor will also aid in the removal of hydrocarbon from runoff in vehicle trafficked areas. The actual removal efficiency is dependent upon hydrocarbon concentration. The STC40 has an oil storage capacity of 10585l whereas the STC 3 has an oil storage capacity of 1020l. Both the humeceptors are situated adjacent to hard standard area for ease of maintenance.

8.3 FILTER CATRIDGES

The StormFilter, used on site, is a stormwater treatment system using rechargeable, self-cleaning, media-filled cartridges to absorb and retain required level of pollutants from stormwater runoff including total suspended solids, hydrocarbons, nutrients, soluble heavy metals, and other common pollutants. The filter cartridges clean stormwater through a passive filtration system and removes pollutants. Two filter cartridge chambers are proposed ie one for each of the catchments. The northern catchment filter chamber is 1.2m wide by 5.5m long and has 5x 690mm filter cartridges. The southern catchment filter cartridge chamber is 7.5m x 7.5m and has 10 x 690mm filter cartridges.

8.4 WATER QUALITY OUTCOME – MUSIC MODEL

A MUSIC model was prepared for the proposed treatment train. The MUSIC nodes for the treatment devices were obtained from the relevant manufacturers of the device. See figure below for treatment train as modelled in MUSIC.

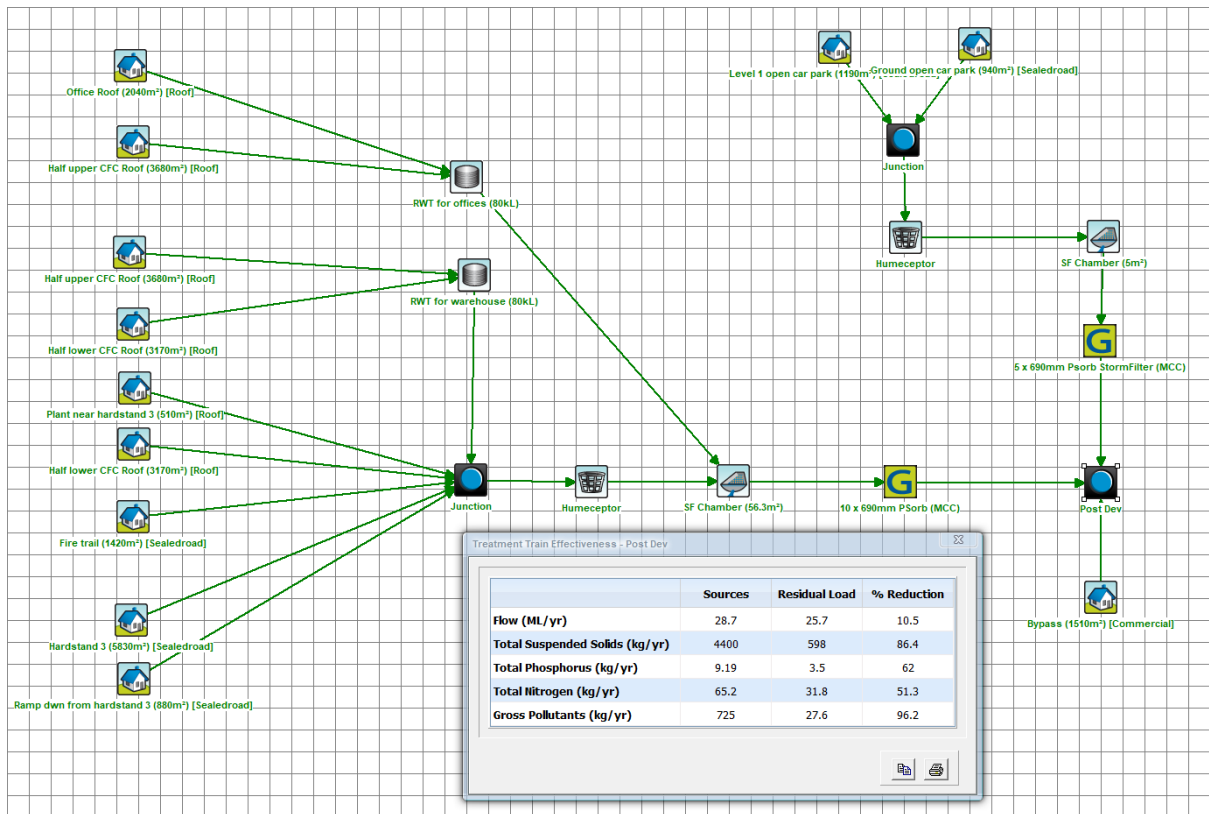


Figure 3 Treatment train and pollution removal as modelled in MUSIC

The overall pollutant removal for the site has been summarised in Table 2 below. An improvement in discharged water quality can be expected by installing the proposed treatment train.

Treatment Train Effectiveness - Post Dev			
	Sources	Residual Load	% Reduction
Flow (ML/yr)	28.7	25.7	10.5
Total Suspended Solids (kg/yr)	4400	598	86.4
Total Phosphorus (kg/yr)	9.19	3.5	62
Total Nitrogen (kg/yr)	65.2	31.8	51.3
Gross Pollutants (kg/yr)	725	27.6	96.2

Figure 4 Treatment train effectiveness as modelled in MUSIC

Table 3 Treatment levels for the site

	Sources	Residual Load	% Reduction	Inner West Council Targets (%)
TSS (kg/yr)	4400	598	86.4	85
TP (kg/yr)	9.19	3.5	62	60
TN (kg/yr)	65.2	31.8	51.3	45
GP (kg/yr)	725	27.6	96.2	90

9.0 OVERLAND FLOW PATHS

If storms higher than the design storm occur, the site is graded to allow an overland flow path to form which protects the buildings. Overland flows will exit the site via the main entry/exit on the Eastern boundary of the site. Refer to the flood assessment report for details about flood management.

10.0 SEDIMENT AND EROSION CONTROL MEASURES

Sediment and erosion control measures are proposed to limit the amount of sediment washoff from the site during construction. Refer to the civil drawings DWG C11-C16 for specific measures. If the site is expected to remain vacant for extended periods of time after demolition of existing structures, additional erosion control measures should be considered and should be in accordance with NSW Government's policy Managing Urban Stormwater: Soils and Construction (also known as The Blue Book).

11.0 GROUND WATER

Subject to water table depth from Geotech investigations carried out at the detailed design stage, minor ground water drawdown should be anticipated as a result of dewatering of the excavations for the proposed OSD and flood detention chambers during construction.

The existing site and proposed project are both highly impervious and therefore contribute little to groundwater recharge.

The project as a whole involves mostly filling of the site and as such negligible change to local groundwater drawdown is expected with the long term development of the site.

12.0 CONCLUSION

A system has been proposed for the control of stormwater on the subject site, which considers the requirements for water pollution control, stormwater reuse and quantity control.

The proposed system will result in adequate environment protection and reduction in water pollutant loads based on modelling. We believe the system satisfies the requirements of Inner West Council.

A reduction in peak stormwater runoff can also be expected and we believe the system satisfies the requirements of Sydney Water

13.0 GLOSSARY

Term	Definition
The Site	74 Edinburgh Road, Marrickville (Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969)
The Project	Demolition and the construction of a new warehouse and distribution centre with associated offices.
Customer Fulfilment Centre	The purpose built Woolworths occupied warehouse and distribution facility located on Level 2.
Associated Office	When referring to the office component of the development

14.0 ABBREVIATIONS

Abbreviation	Meaning
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
Council	Inner West Council
DCP	Development Control Plan
FFL	Finished Floor Level
GP	Gross Pollutants
MUSIC	Model for Urban Stormwater Improvement Conceptualisation

OSD	On Site Detention
PMF	Probable Maximum Flood
PSD	Permissible Site Discharge
RWT	Rain water tank
TN	Total Nitrogen
TP	Total Phosphorous
TSS	Total Suspended Solids

APPENDIX A – CIVIL DRAWINGS (SCALED DOWN VERSIONS FOR REFERENCE ONLY)

Refer to engineering drawings within the SEARs submission for the full scale drawings.



PART C - REFER DRAWING C04

PART A - REFER DRAWING C02

OSD 2 REFER
DRAWING C08

OSD 1 REFER
DRAWING C07

PART D - REFER DRAWING C05

PART B - REFER DRAWING C03

LEGEND	
	SITE BOUNDARY
	EXISTING CONTOUR
	PROPOSED CONTOUR
	PROPOSED STORMWATER DRAIN
	PROPOSED INLET PIT
	PROPOSED JUNCTION PIT
	PROPOSED STORMWATER DRAIN
	PROPOSED DRAIN CULVERT

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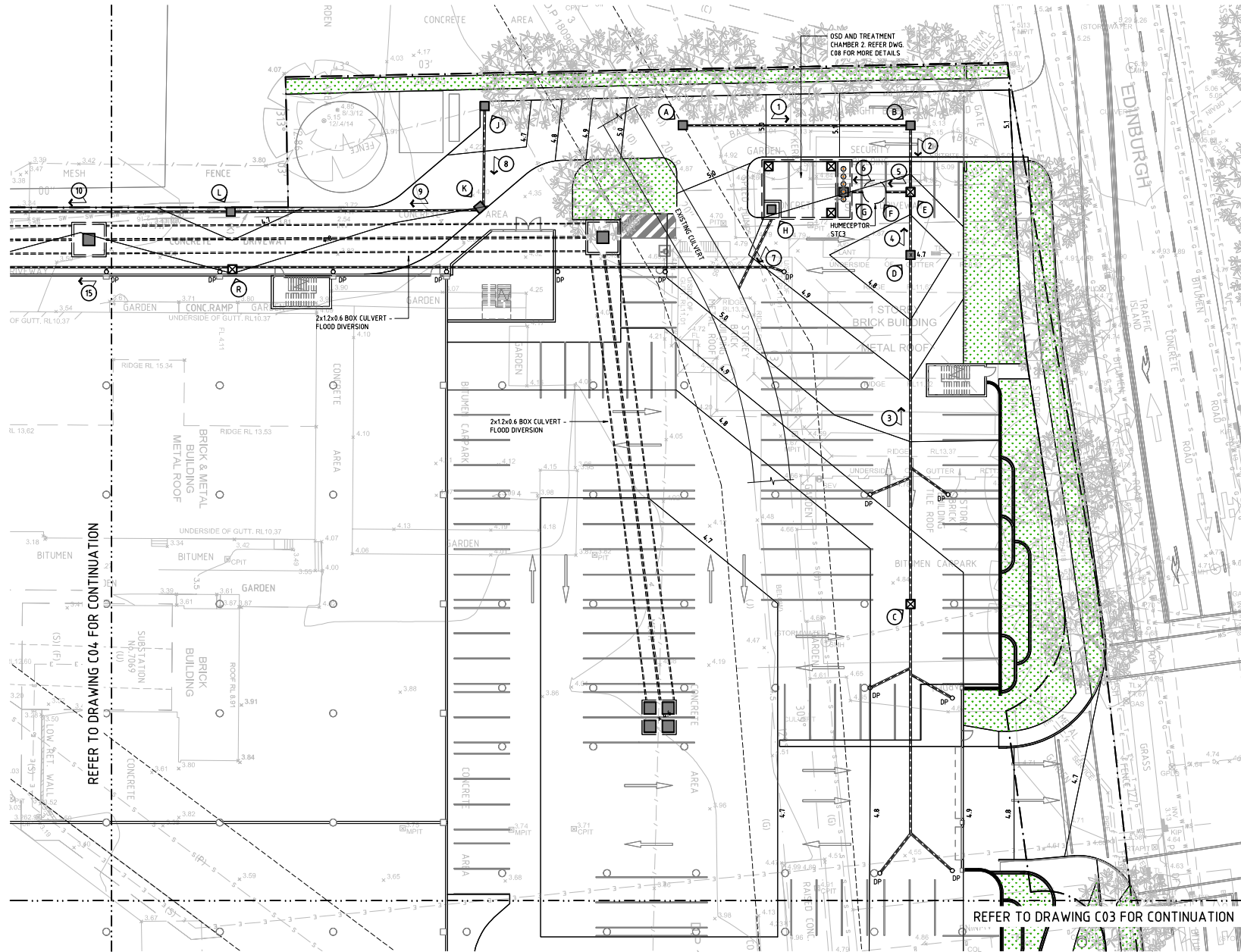
APPROVAL
ISSUE

REV No.	COMMENTS	DATE	INT.
A	PRELIMINARY ISSUE	13.08.20	MA
B	APPROVAL ISSUE	21.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204
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OVERALL STORMWATER PLAN GROUND LEVEL	
DATE:	AUGUST 2020
SCALE:	1:500 @A1
Project No.	190372
DRG.No.	C01
REV-B	



LEGEND

- SITE BOUNDARY
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED STORMWATER DRAIN
- PROPOSED INLET PIT
- ⊗ PROPOSED JUNCTION PIT
- PROPOSED STORMWATER DRAIN
- PROPOSED DRAIN CULVERT



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REV No.	COMMENTS	DATE	INT.
A	PRELIMINARY ISSUE	13.08.20	MA
B	APPROVAL ISSUE	21.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

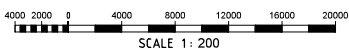
Richmond+Ross PTY LIMITED
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ABN 34 001 485 436

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STORMWATER PLAN GROUND LEVEL - PART A	
DATE:	AUGUST 2020
SCALE:	1:200 @A1
Project No.	190372
DRG.No.	C02
REV-B	



LEGEND	
	SITE BOUNDARY
	EXISTING CONTOUR
	PROPOSED CONTOUR
	PROPOSED STORMWATER DRAIN
	PROPOSED INLET PIT
	PROPOSED JUNCTION PIT
	PROPOSED STORMWATER DRAIN
	PROPOSED DRAIN CULVERT



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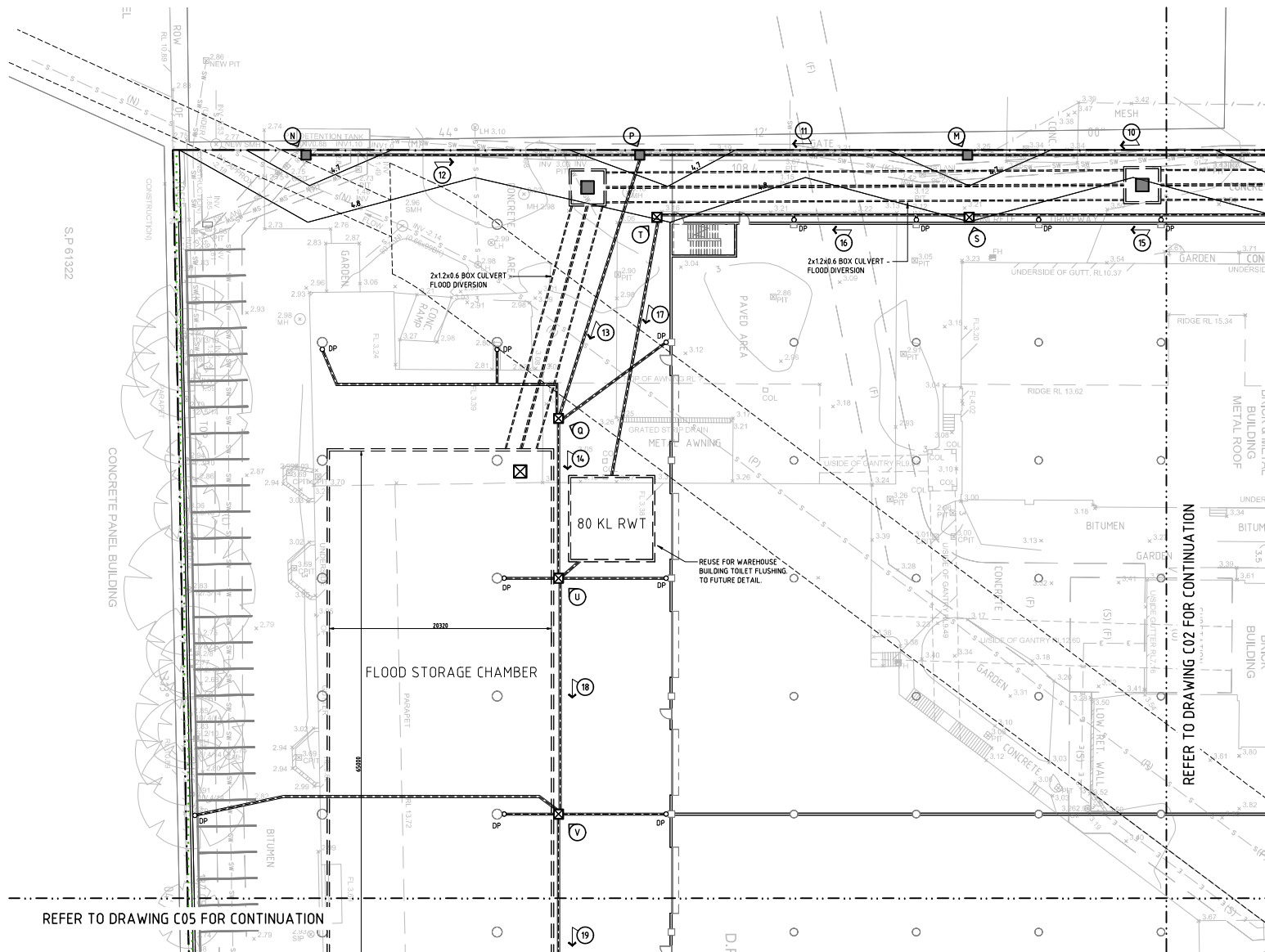
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WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

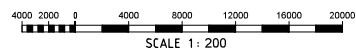
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STORMWATER PLAN GROUND LEVEL - PART B			
DATE:	AUGUST 2020	DRG.No.	
SCALE:	1:200 @A1	C03	
Project No.	190372	REV-B	



LEGEND	
	SITE BOUNDARY
	EXISTING CONTOUR
	PROPOSED CONTOUR
	PROPOSED STORMWATER DRAIN
	PROPOSED INLET PIT
	PROPOSED JUNCTION PIT
	PROPOSED STORMWATER DRAIN
	PROPOSED DRAIN CULVERT



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REV No.	COMMENTS	DATE	INT.
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WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

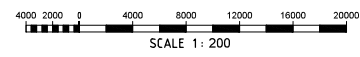
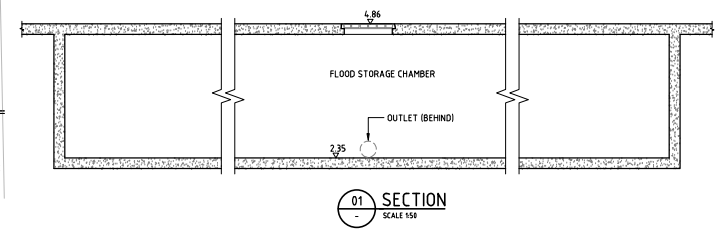
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STORMWATER PLAN GROUND LEVEL - PART C	
DATE: AUGUST 2020	DRG.No. C04
SCALE: 1:200 @A1	REV-B
Project No. 190372	



LEGEND

- SITE BOUNDARY
- EXISTING CONTOUR
- PROPOSED CONTOUR
- PROPOSED STORMWATER DRAIN
- PROPOSED INLET PIT
- PROPOSED JUNCTION PIT
- PROPOSED STORMWATER DRAIN
- PROPOSED DRAIN CULVERT



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PROJECT:
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STORMWATER PLAN GROUND LEVEL - PART D	
DATE: AUGUST 2020	DRG.No. C05
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Project No. 190372	



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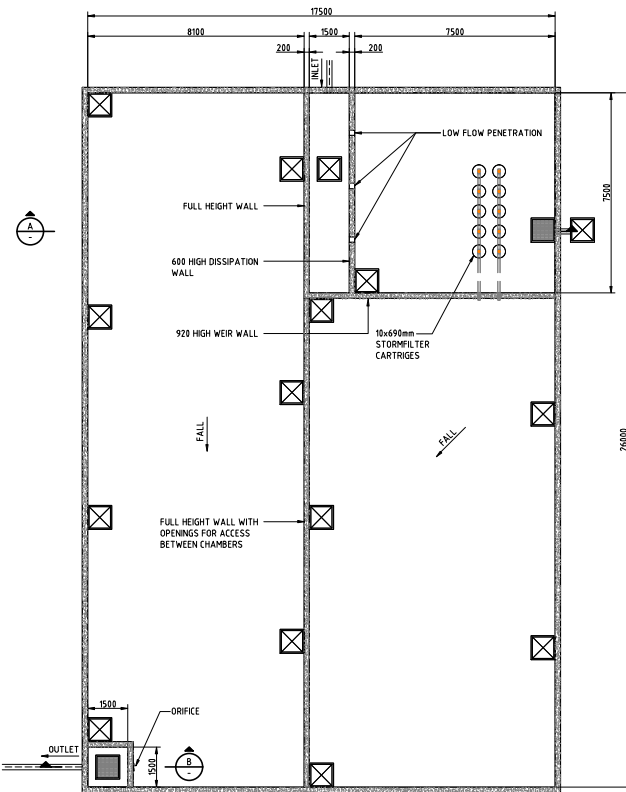
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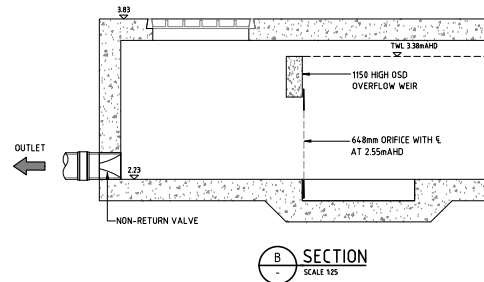
PROJECT:
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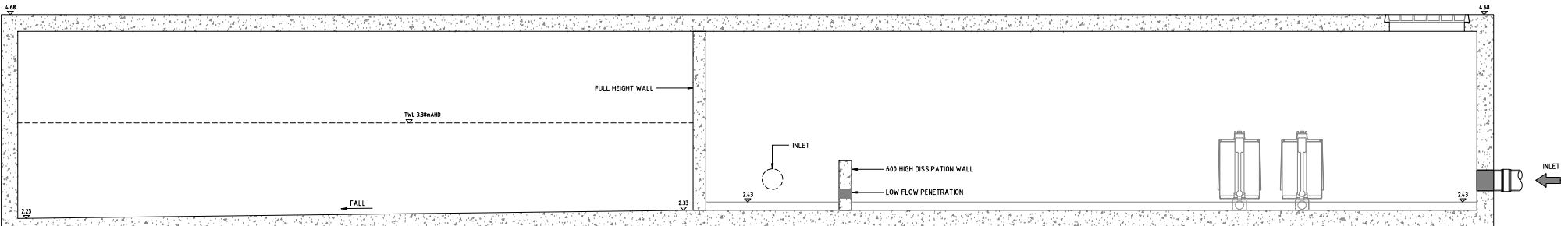
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ROOF LEVEL
DATE: AUGUST 2020
SCALE: 1:500 @A1
Project No. 190372
DRG.No. C06
REV-B



OSD 1
SCALE 1:100



SECTION B
SCALE 1:25



SECTION A
SCALE 1:25

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SCALE 1:100

APPROVAL
ISSUE

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A	PRELIMINARY ISSUE	13.08.20	MA
B	APPROVAL ISSUE	21.08.20	MA
C	APPROVAL ISSUE	31.08.20	MA

PROJECT:
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OSD 1 PLAN AND SECTIONS

DATE:	AUGUST 2020	DRG.No.	
SCALE:	AS SHOWN @A1	C07	
Project No.	190372	REV-C	

STORMFILTER DESIGN TABLE

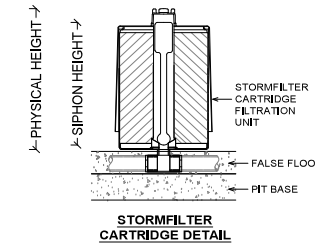
- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING, RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690	460	310
CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	1.6	1.1	0.7
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9	0.46	0.39

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
NUMBER OF CARTRIDGES REQ'D	
SIPHON HEIGHT (310 / 460 / 690)	
MEDIA TYPE (ZPG / PSORB)	
WATER QUALITY FLOW RATE (L/S)	
DIMENSION A	
DIMENSION B	

TOTAL CARTRIDGE BAY AREA (A x B)
TO MATCH AREA REQUIRED BY MUSIC
MODELLING OR COUNCIL SPECIFIC
REQUIREMENTS



GENERAL NOTES

- INLET AND OUTLET PIPES TO BE IN ACCORDANCE WITH APPROVED PLANS.
- A HIGH FLOW BYPASS ARRANGEMENT OR DISSIPATION STRUCTURE MAY BE REQUIRED TO MINIMISE RE-SUSPENSION OF SOLIDS OR ANY SIGNIFICANT INERTIAL FORCES ON THE CARTRIDGES.
- ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
- SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
- THE INVERT LEVEL OF THE INLET PIPE MUST BE GREATER THAN THE RL OF THE FALSE FLOOR WITHIN THE CARTRIDGE CHAMBER.
- CONCRETE STRUCTURE AND ACCESS COVERS DESIGNED AND PROVIDED BY OTHERS. ACCESS COVERS TO BE A MINIMUM 900 X 900 ABOVE CARTRIDGES. OH&S REGARDING ACCESS COVERS AND TANK ACCESS TO BE ASSESSED BY OTHERS ON SITE.
- THE STRUCTURE THICKNESSES SHOWN ARE FOR REPRESENTATIONAL PURPOSES.
- DRAWINGS NOT TO SCALE.

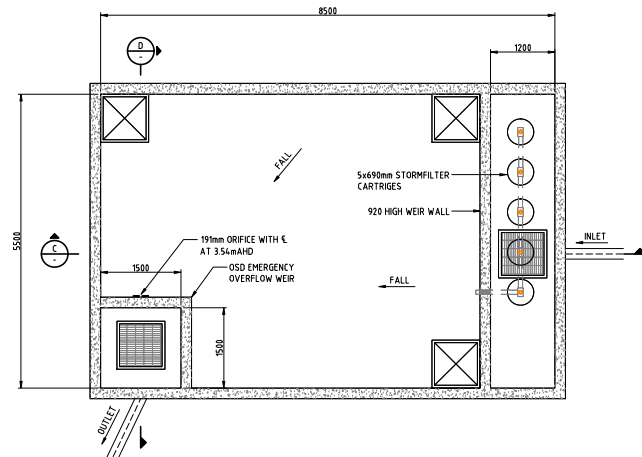
INSTALLATION NOTES

- UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.

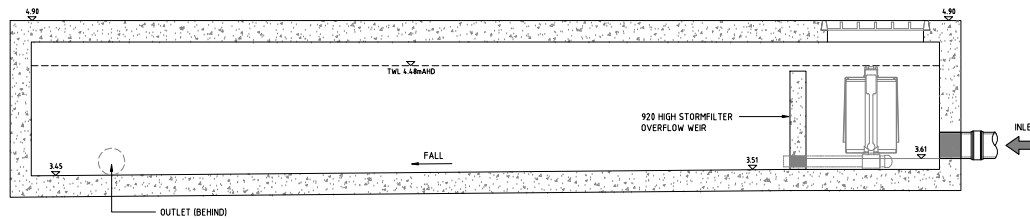


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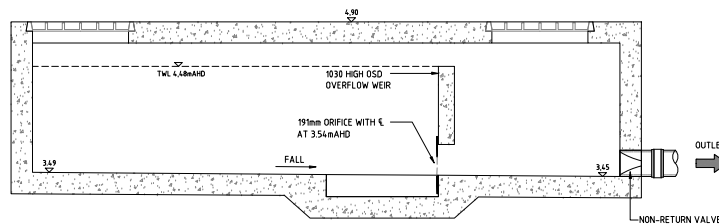
OCEAN PROTECT
STORMFILTER SYSTEM
DETENTION TANK ARRANGEMENT
SPECIFICATION DRAWING



OSD 2
SCALE 1:50



SECTION C-C
SCALE 1:25



SECTION D-D
SCALE 1:25

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

APPROVAL
ISSUE

REV No.	COMMENTS	DATE	INT.
A	APPROVAL ISSUE	21.08.20	MA
B	APPROVAL ISSUE	31.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204
CLIENT:
WOOL WORTHS

Richmond + Ross PTY LIMITED
CONSULTING ENGINEERS
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OSD 2 PLAN AND SECTIONS
DATE: AUGUST 2020 DRG.No.
SCALE: AS SHOWN @A1 C08
Project No. 190372 REV-B

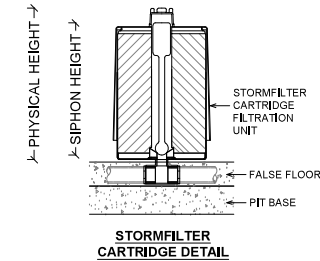
STORMFILTER DESIGN TABLE

- STORMFILTER TREATMENT CAPACITY VARIES BY NUMBER OF FILTER CARTRIDGES INSTALLED.
- THE STANDARD CONFIGURATION IS SHOWN. ACTUAL CONFIGURATION OF THE SPECIFIED STRUCTURE(S) PER CERTIFYING ENGINEER WILL BE SHOWN ON SUBMITTAL DRAWING(S).
- FILTER CARTRIDGES SHALL BE MEDIA-FILLED, PASSIVE, SIPHON ACTUATED, RADIAL FLOW, AND SELF-CLEANING, RADIAL MEDIA DEPTH SHALL BE 178mm.

CARTRIDGE NAME / SIPHON HEIGHT (mm)	690	460	310
CARTRIDGE PHYSICAL HEIGHT (mm)	840	600	600
TYPICAL WEIR HEIGHT [H] (mm)	920	690	540
CARTRIDGE FLOW RATE FOR ZPG MEDIA (L/s)	1.6	1.1	0.7
CARTRIDGE FLOW RATE FOR PSORB MEDIA (L/s)	0.9	0.46	0.39

SITE SPECIFIC DATA REQUIREMENTS

STRUCTURE ID	
NUMBER OF CARTRIDGES REQ'D	
SIPHON HEIGHT (310 / 460 / 690)	
MEDIA TYPE (ZPG / PSORB)	
WATER QUALITY FLOW RATE (L/S)	
DIMENSION A	
DIMENSION B	
TOTAL CARTRIDGE BAY AREA (A x B) TO MATCH AREA REQUIRED BY MUSIC MODELLING OR COUNCIL SPECIFIC REQUIREMENTS	



GENERAL NOTES

- INLET AND OUTLET PIPES TO BE IN ACCORDANCE WITH APPROVED PLANS.
- A HIGH FLOW BYPASS ARRANGEMENT OR DISSIPATION STRUCTURE MAY BE REQUIRED TO MINIMISE RE-SUSPENSION OF SOLIDS OR ANY SIGNIFICANT INERTIAL FORCES ON THE CARTRIDGES.
- ALL WATER QUALITY TREATMENT DEVICES REQUIRE PERIODIC MAINTENANCE. REFER TO OPERATION AND MAINTENANCE MANUAL FOR GUIDELINES AND ACCESS REQUIREMENTS.
- SITE SPECIFIC PRODUCTION DRAWING WILL BE PROVIDED ON PLACEMENT OF ORDER.
- THE INVERT LEVEL OF THE INLET PIPE MUST BE GREATER THAN THE RL OF THE FALSE FLOOR WITHIN THE CARTRIDGE CHAMBER.
- CONCRETE STRUCTURE AND ACCESS COVERS DESIGNED AND PROVIDED BY OTHERS. ACCESS COVERS TO BE A MINIMUM 900 X 900 ABOVE CARTRIDGES, OH&S REGARDING ACCESS COVERS AND TANK ACCESS TO BE ASSESSED BY OTHERS ON SITE.
- THE STRUCTURE THICKNESSES SHOWN ARE FOR REPRESENTATIONAL PURPOSES.
- DRAWINGS NOT TO SCALE.

INSTALLATION NOTES

- UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.



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OCEAN PROTECT
STORMFILTER SYSTEM
DETENTION TANK ARRANGEMENT
SPECIFICATION DRAWING

STORMWATER RUNOFF CALCULATIONS

USING FORMULA Q = 0.000278 CAI
WHERE Q = DISCHARGE IN LITRES PER SECOND
C = A RUNOFF COEFFICIENT (SEE TABLE)
A = CATCHMENT AREA IN SQ.M
I = RAINFALL INTENSITY IN MILLIMETRES PER HOUR
100 t_a = 236 MM/HR FOR 100 YEAR RETURN PERIOD

LINE	CATCHMENT AREA (SQM) (OVERLAND FLOWS)			FLOW INTO LINE FROM CATCHMENT (L/S)			TOTAL FLOW (L/S)	MINIMUM PIPE REQUIREMENT		
	ROOF	PAVE'T	USCAPE	ROOF	PAVE'T	USCAPE		SIZE (MM)	GRADE (V/H)	CAPACITY (L/S)
1		230			13.58		13.58	150	1/100	23.18
2		150			8.86		22.44	150	1/91	23.56
3		990			58.46		58.46	300	1/200	100.83
4		550			32.48		90.93	300	1/183	104.89
5							113.37	300	1/100	144.60
6							113.37	300	1/75	168.32
7							113.37	375	1/160	158.21
8		470			27.75		27.75	300	1/158	113.43
9							27.75	525	1/150	396.16
10		260			15.35		43.10	525	1/195	347.12
11		190			11.22		54.32	525	1/195	347.12
12		175			10.33		10.33	225	1/100	67.74
13		200			11.81		76.47	525	1/192	344.84
14		1210			71.45		147.91	525	1/200	342.71
15	584.0			383.15			383.15	600	1/195	493.00
16	1120			73.48			456.63	600	1/200	486.75
17							456.63	600	1/200	486.75
18		1000			59.05		663.59	675	1/191	678.68
19		1280			75.58		739.77	750	1/208	857.17
20		1000			59.05		798.22	750	1/200	874.26
21	704.0			661.88			661.88	525	1/92	506.63
22	224.0			146.96			608.84	600	1/138	586.72
23							608.84	600	1/150	977.18
24							608.84	600	1/150	977.18
25		64.0			37.79		836.01	675	1/125	840.03
26							836.01	675	1/130	823.62
27		1530			90.34		1535.19	750	1/21	2389.40
28							1535.19	750	1/30	2266.48

LINE SCHEDULE

TAG	UPSTREAM INVERT	SIZE	MATERIAL	LENGTH (M)	GRADE (ACTUAL)	DOWNSREAM INVERT	NOTES
1	4.300	150	UPVC	22.0	1/100	4.080	
2	4.060	150	UPVC	5.8	1/97	4.000	
3	4.100	300	UPVC	40.0	1/200	3.900	
4	3.880	300	UPVC	5.5	1/183	3.850	
5	3.830	300	UPVC	2.0	1/100	3.810	
6	3.780	300	UPVC	1.5	1/75	3.760	
7	3.450	375	RCP	8.0	1/160	3.400	
8	3.850	300	UPVC	9.5	1/158	3.790	
9	3.770	525	RCP	24.0	1/150	3.610	
10	3.550	525	RCP	29.2	1/195	3.440	
11	3.420	525	RCP	29.2	1/195	3.270	
12	3.920	225	UPVC	30.0	1/100	3.620	
13	3.250	525	RCP	25.0	1/192	3.120	
14	3.100	525	RCP	14.0	1/200	3.030	
15	3.770	600	RCP	29.2	1/195	3.620	
16	3.600	600	RCP	28.0	1/200	3.460	
17	3.44.0	600	RCP	24.0	1/200	3.320	
18	3.010	675	RCP	21.0	1/191	2.900	
19	2.880	750	RCP	20.8	1/208	2.780	
20	2.760	750	RCP	10.0	1/200	2.710	
21	3.650	525	RCP	46.0	1/92	3.150	
22	3.130	600	RCP	38.5	1/138	2.850	
23	2.830	600	RCP	29.0	1/138	2.620	
24	2.680	600	RCP	1.0	1/50	2.580	
25	2.690	675	RCP	2.5	1/125	2.670	
26	2.590	675	RCP	1.3	1/130	2.580	
27	2.230	750	RCP	4.7	1/27	2.053	
28	2.033	750	RCP	16.0	1/30	1.500	

PIT SCHEDULE

TAG	TYPE	SIZE	RL TOP	IL	COVER	NOTES
A	INLET	450x450	4.900	4.300	CLASS D GRATE	
B	INLET	600x900	5.000	4.660	CLASS D GRATE	
C	JUNCTION	600x600	4.850	4.100	CLASS D SEALED LID	
D	INLET	600x600	4.700	3.880	CLASS D GRATE	
E	JUNCTION	600x900	4.870	3.830	CLASS D SEALED LID	
F	HUMECEPTOR	STC 3	4.900	3.780	CLASS D SEALED LID	
G	ACCESS	900X900	4.900	3.760	CLASS D GRATE	
H	ACCESS	900x900	4.900	3.450	CLASS D GRATE	
J	INLET	600x600	4.600	3.850	CLASS D GRATE	
K	INLET	900x900	4.800	3.770	CLASS D GRATE	
L	INLET	900x900	4.600	3.590	CLASS D GRATE	
M	INLET	900x900	4.600	3.420	CLASS D GRATE	
N	INLET	600x600	4.600	3.920	CLASS D GRATE	
P	INLET	900x900	4.600	3.250	CLASS D GRATE	
Q	JUNCTION	900x900	4.860	3.100	CLASS D SEALED LID	
R	JUNCTION	900x900	4.800	3.770	CLASS D SEALED LID	
S	JUNCTION	900x900	4.800	3.600	CLASS D SEALED LID	
T	JUNCTION	900x900	4.800	3.440	CLASS D SEALED LID	
U	JUNCTION	900x900	4.860	3.010	CLASS D SEALED LID	
V	JUNCTION	900x900	4.860	2.880	CLASS D SEALED LID	
W	JUNCTION	900x900	4.860	2.760	CLASS D SEALED LID	
Y	JUNCTION	900x900	4.860	2.690	CLASS D SEALED LID	
Z	JUNCTION	900x900	4.750	3.650	CLASS D SEALED LID	
AA	JUNCTION	900x900	4.200	3.130	CLASS D SEALED LID	
AB	JUNCTION	900x900	3.900	2.830	CLASS D SEALED LID	
AC	JUNCTION	900x900	4.650	2.600	CLASS D SEALED LID	
AD	HUMECEPTOR	STC 4.0	4.860	2.590	CLASS D SEALED LID	
AE	ACCESS	900x900	4.800	2.430	CLASS D GRATE	
AF	ACCESS	900x900	4.660	2.430	CLASS D GRATE	
AG	ACCESS	900x900	3.850	2.230	CLASS D GRATE	
AH	JUNCTION	900x900	3.830	2.033	CLASS D GRATE	
AJ	EXISTING	EXISTING	3.350		EXISTING	EXISTING JUNCTION IN SYDNEY WATER STORMWATER TRUNK DRAIN

STORMWATER DISPOSAL

PHILOSOPHY

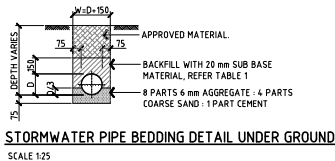
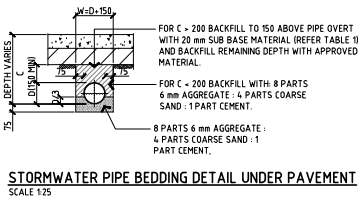
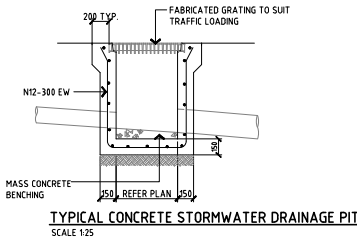
1. COLLECT ALL SITE RUNOFF FROM SURFACE GRADES, SUMPS AND UNDERGROUND DRAINS PRIOR TO DISCHARGE TO EXISTING OUTFALL.
2. ROOF RUNOFF TO BE DIRECTED INTO SITE STORMWATER SYSTEM.
3. UNDERCANOPY RUNOFF TO BE COLLECTED SEPARATELY AND DIRECTED TO CPS UNIT PRIOR TO DISCHARGE TO SYSTEM. SYSTEM APPROVAL TO BE OBTAINED FROM RELEVANT AUTHORITY.
4. ON-SITE UNDERGROUND DRAINAGE HAS BEEN DESIGNED FOR 1 IN 100 YEAR FLOWS, TO CONNECT INTO COUNCIL SYSTEM VIA EXISTING OUTFALL.

GENERAL NOTES

1. FIT STEP IRONS TO PITS DEEPER THAN 1000 EXCLUDING CPS PIT.
2. ALL GRATES TO BE WELDED CONSTRUCTION SUPPLIED COMPLETE WITH H.D. BOLTS AND FRAMES. PROVIDE FLATTENED EXPANDED METAL TO ALL GRATES
3. ALL PIT COVERS & GRATES TO BE SECURELY BOLTED DOWN.
4. ALL UPVC PIPES TO HAVE SOLVENT WELDED JOINTS.

STORMWATER NOTES

1. THIS IS A STORMWATER DRAINAGE PLAN ONLY. REFER TO ARCHITECTURAL DRAWINGS FOR ALL SETOUT INFORMATION.
2. ALL DRAINAGE LAYOUTS, LEVELS & DETAILS ARE DIAGRAMMATIC AND INDICATIVE ONLY.
3. DRAINAGE LAYOUTS SHOWN ARE DIAGRAMMATIC ONLY. NOTE ONLY MAJOR LINES ARE SHOWN.
4. ALL PIPES TO BE 150 DIA UPVC LAID AT 1.0% MIN GRADE. UPVC PIPES TO BE SOLVENT WELDED JOINTS U.N.O.
5. ALL PITS AND COVERS TO PROPRIETARY PRECAST ITEMS, COVER LEVELS TO MATCH SURFACE. ALL PITS IN ROADWAYS TO BE TO CURRENT RTA REQUIREMENTS.
6. ALL GRATED DRAINS TO HAVE BASE GRADED 1.0% MIN WITH NEEL GUARD TYPE GRATES.
7. IT IS THE BUILDERS RESPONSIBILITY TO LAY ALL PIPES IN ACCORDANCE WITH ALL RELEVANT AUTHORITY REQUIREMENTS (EG. COUNCIL, EPA, SYDNEY WATER).
8. FIT STEP IRONS TO PITS DEEPER THAN 1000 EXCLUDING CPS PITS



APPROVAL
ISSUE

REV NO	COMMENTS	DATE	INT.
A	APPROVAL ISSUE	21.08.20	MA
B	APPROVAL ISSUE	31.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

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CONSULTING ENGINEERS
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FAX: (02) 9438 1224

STORMWATER SCHEDULE
AND DETAILS

DATE: AUGUST 2020 DRG.No.
SCALE: 1:25 @A1 C09
Project No. 190372 REV-B

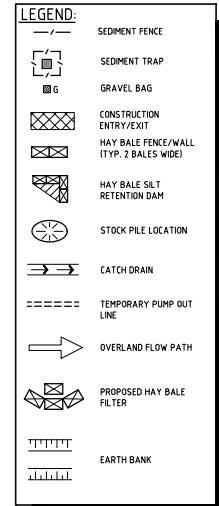


PART C - REFER DRAWING C14

PART A - REFER DRAWING C12

PART D - REFER DRAWING C15

PART B - REFER DRAWING C13



EROSION AND SEDIMENTATION CONTROL NOTES

1. BUILDER SHALL PROVIDE SEDIMENT FENCING MATERIAL DURING CONSTRUCTION TO THE LOW SIDE BOUNDARIES. THE SEDIMENT FENCING MATERIAL TO CYCLONE WIRE SECURITY FENCE. SEDIMENT CONTROL FABRIC SHALL BE AN APPROVED MATERIAL (E.G. HUMES PROPEX SILT STOP) STANDING 300 ABOVE GROUND AND EXTENDING 150 BELOW GROUND.
2. EXISTING DRAINS LOCATED WITHIN THE SITE SHALL ALSO BE ISOLATED BY SEDIMENT FENCING MATERIAL.
3. NO PARKING OR STOCKPILING OF MATERIALS IS PERMITTED ON THE LOWER SIDE OF THE SEDIMENT FENCE.
4. GRASS VERGES SHALL BE MAINTAINED AS MUCH AS PRACTICAL TO PROVIDE A BUFFER ZONE TO THE CONSTRUCTION SITE.
5. ROOF DRAINAGE, IF APPLICABLE, IS TO BE CONNECTED TO THE STORMWATER SYSTEM AS SOON AS PRACTICAL.
6. BUILDER SHALL CHECK ALL EROSION AND SEDIMENT CONTROL MEASURES EVERYDAY THERE IS ACTIVITY ON SITE AND AFTER EVERY STORM EVENT.
7. EROSION AND SEDIMENT CONTROL MEASURES TO BE INSTALLED BEFORE COMMENCEMENT OF WORKS. DISTURBED SURFACES ARE TO BE TREATED AS DETAILED WITH LINING INSTALLED AS SPECIFIED IN DETAIL.

10000 5000 0 10000 20000 30000 40000 50000
SCALE 1: 500

APPROVAL
ISSUE

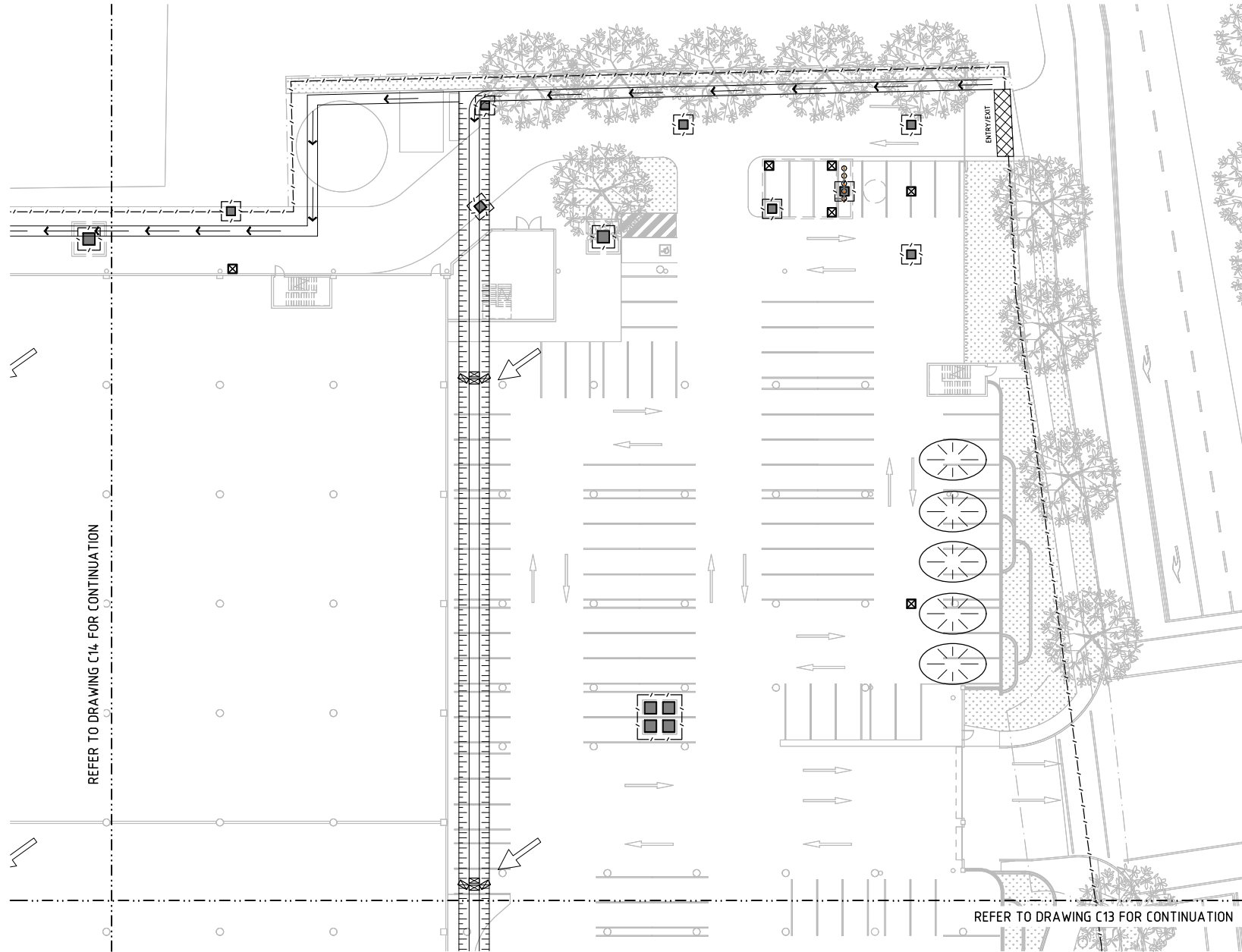
REV No.	COMMENTS	DATE	INT.
A	APPROVAL ISSUE	21.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

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OVERALL EROSION AND SEDIMENT CONTROL PLAN			
DATE:	AUGUST 2020	DRG.No.	C11
SCALE:	1:500 @A1	REV-A	
Project No.	190372		



REFER TO DRAWING C14 FOR CONTINUATION

REFER TO DRAWING C13 FOR CONTINUATION

LEGEND:	
	SEDIMENT FENCE
	SEDIMENT TRAP
	GRAVEL BAG
	CONSTRUCTION ENTRY/EXIT
	HAY BALE FENCE/WALL (TYP. 2 BALES WIDE)
	HAY BALE SILT RETENTION DAM
	STOCK PILE LOCATION
	CATCH DRAIN
	TEMPORARY PUMP OUT LINE
	OVERLAND FLOW PATH
	PROPOSED HAY BALE FILTER
	EARTH BANK



APPROVAL
ISSUE

REV No.	COMMENTS	DATE	INT.
A	APPROVAL ISSUE	21.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

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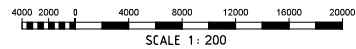
EROSION AND SEDIMENT CONTROL PLAN - PART A	
DATE:	AUGUST 2020
SCALE:	1:200 @A1
Project No.	190372
DRG.No.	C12
REV-A	



REFER TO DRAWING C12 FOR CONTINUATION

REFER TO DRAWING C15 FOR CONTINUATION

LEGEND:	
	SEDIMENT FENCE
	SEDIMENT TRAP
	GRAVEL BAG
	CONSTRUCTION ENTRY/EXIT
	HAY BALE FENCE/WALL (TYP. 2 BALES WIDE)
	HAY BALE SILT RETENTION DAM
	STOCK PILE LOCATION
	CATCH DRAIN
	TEMPORARY PUMP OUT LINE
	OVERLAND FLOW PATH
	PROPOSED HAY BALE FILTER
	EARTH BANK



APPROVAL
ISSUE

REV No.	COMMENTS	DATE	INT.
A	APPROVAL ISSUE	21.08.20	MA

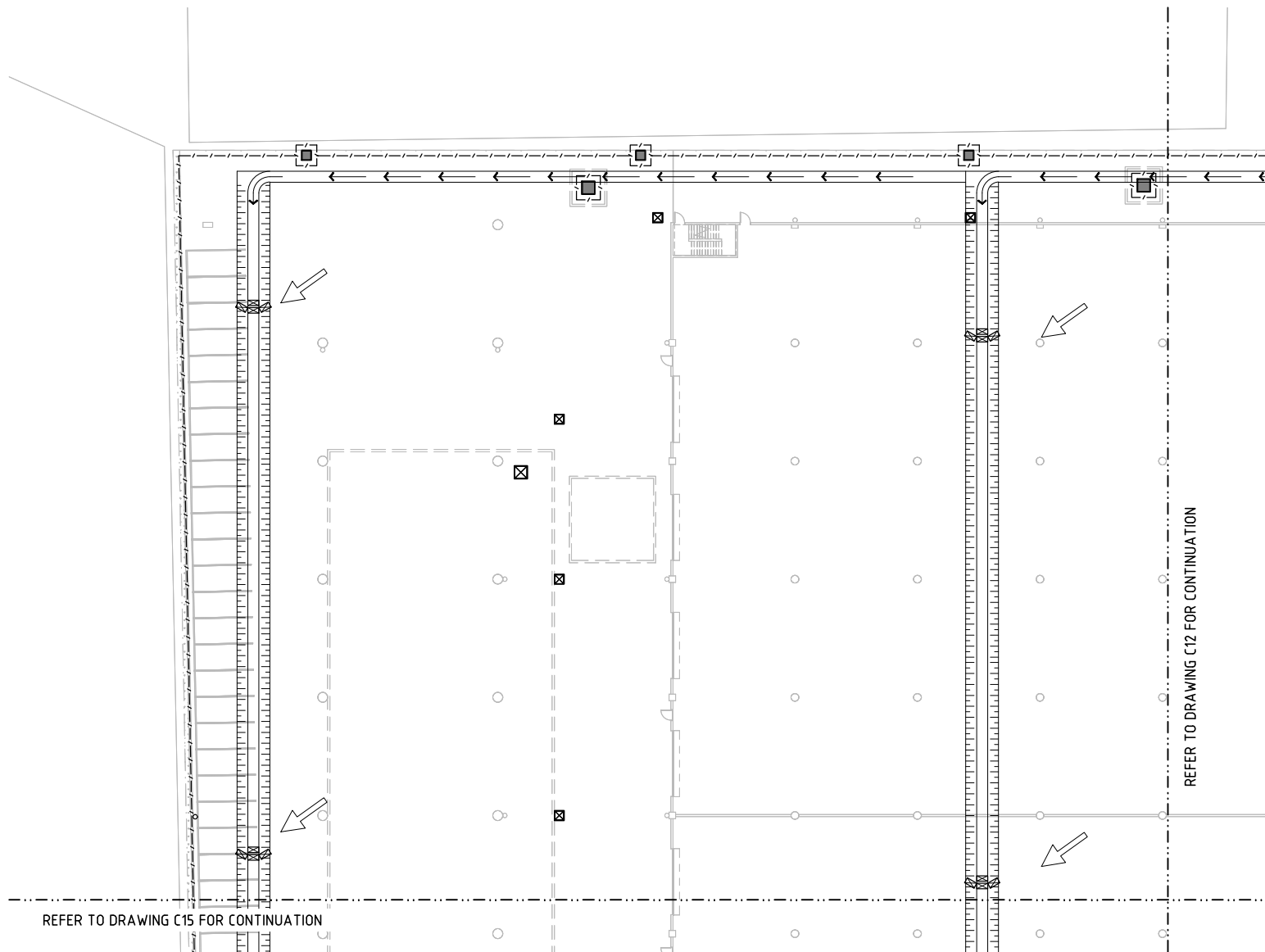
PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

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EROSION AND SEDIMENT CONTROL PLAN - PART B	
DATE:	AUGUST 2020
SCALE:	1:200 @A1
Project No.	190372
DRG.No.	C13
REV-A	



LEGEND:	
	SEDIMENT FENCE
	SEDIMENT TRAP
	GRAVEL BAG
	CONSTRUCTION ENTRY/EXIT
	HAY BALE FENCE/WALL (TYP. 2 BALES WIDE)
	HAY BALE SILT RETENTION DAM
	STOCK PILE LOCATION
	CATCH DRAIN
	TEMPORARY PUMP OUT LINE
	OVERLAND FLOW PATH
	PROPOSED HAY BALE FILTER
	EARTH BANK



APPROVAL
ISSUE

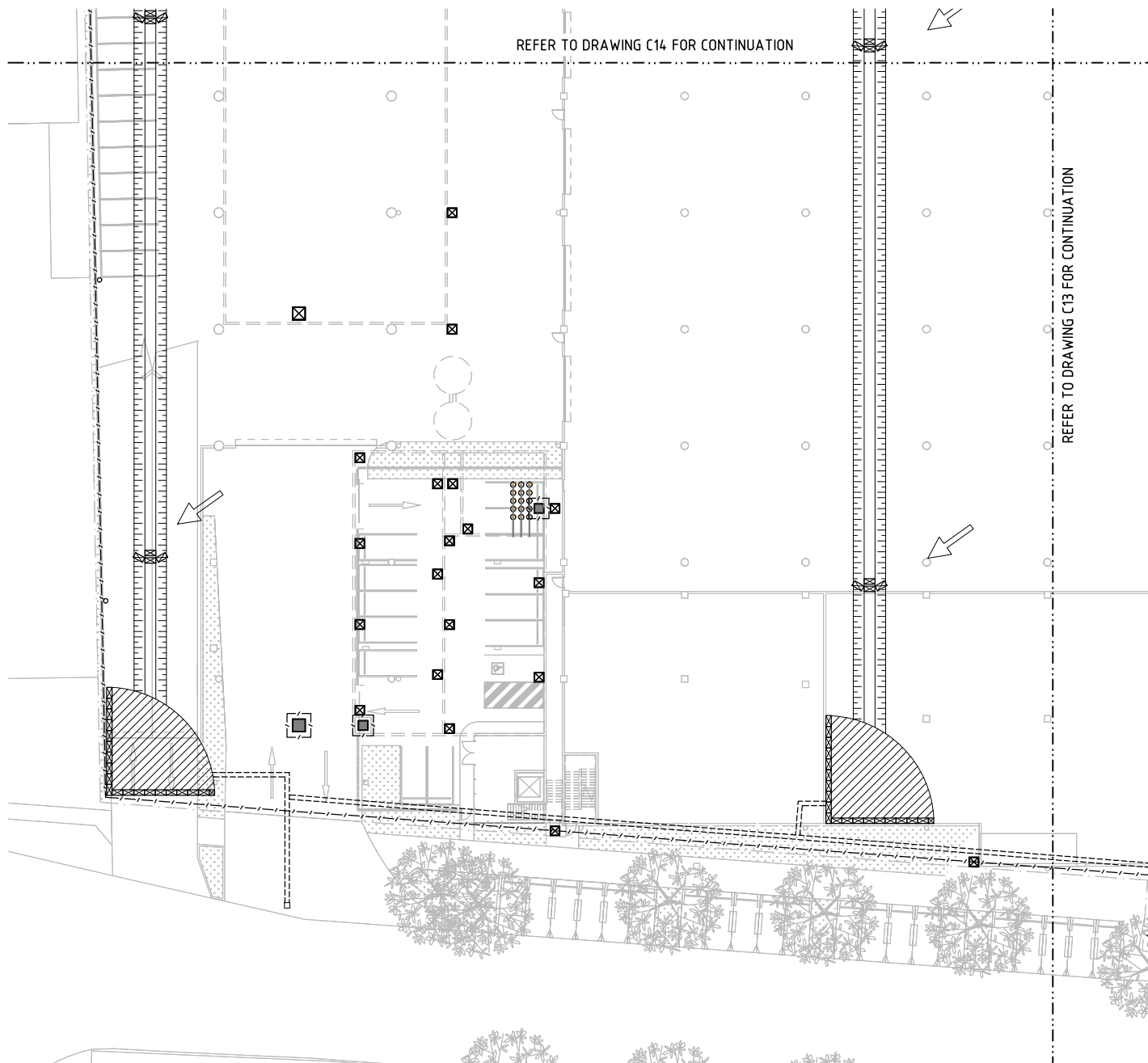
REV No.	COMMENTS	DATE	INIT.
A	APPROVAL ISSUE	21.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

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EROSION AND SEDIMENT CONTROL PLAN - PART C	
DATE: AUGUST 2020	DRG.No. C14
SCALE: 1:200 @A1	REV-A
Project No. 190372	

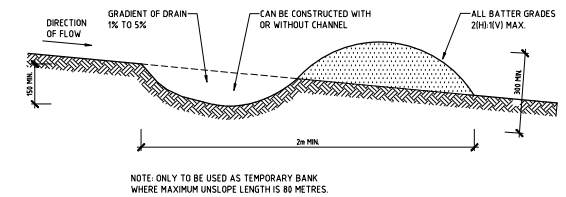
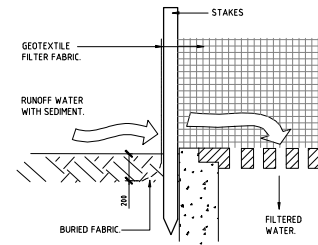
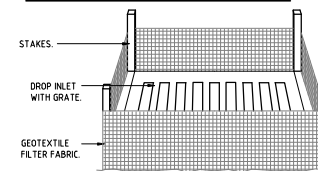
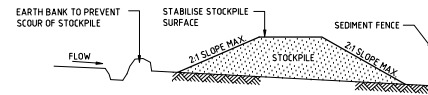
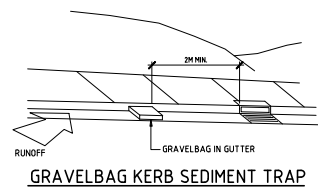
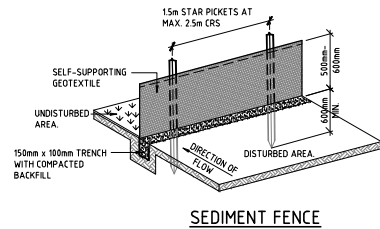
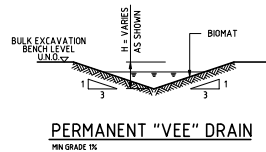
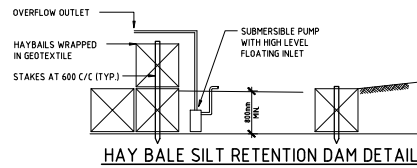
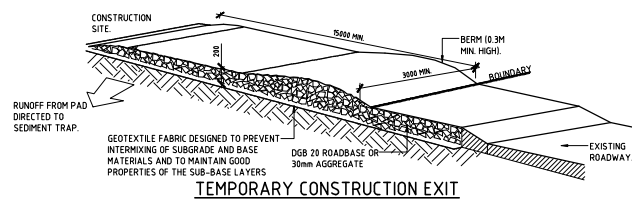


LEGEND:	
	SEDIMENT FENCE
	SEDIMENT TRAP
	GRAVEL BAG
	CONSTRUCTION ENTRY/EXIT
	HAY BALE FENCE/WALL (TYP. 2 BALES WIDE)
	HAY BALE SILT RETENTION DAM
	STOCK PILE LOCATION
	CATCH DRAIN
	TEMPORARY PUMP OUT LINE
	OVERLAND FLOW PATH
	PROPOSED HAY BALE FILTER
	EARTH BANK



APPROVAL
ISSUE

REV No.	COMMENTS	DATE	INT.	PROJECT:	Richmond+Ross PTY LIMITED CONSULTING ENGINEERS ABN 34 001 485 436 38 WILLOUGHBY ROAD, CROWS NEST, NSW 2065 TEL : (02) 9490 9600 FAX : (02) 9438 1224	EROSION AND SEDIMENT CONTROL PLAN - PART D	
A	APPROVAL ISSUE	21.08.20	MA	WOOL WORTHS MARRICKVILLE 74 EDINBURGH ROAD, MARRICKVILLE, NSW 2204		DATE: AUGUST 2020	DRG.No. C15
				CLIENT: WOOL WORTHS		SCALE: 1:200 @A1	REV-A
						Project No. 190372	



PRELIMINARY
ISSUE

REV No.	COMMENTS	DATE	INT.
A	PRELIMINARY ISSUE	xx.08.20	MA

PROJECT:
WOOL WORTHS MARRICKVILLE
74 EDINBURGH ROAD,
MARRICKVILLE, NSW 2204

CLIENT:
WOOL WORTHS

Richmond+Ross PTY LIMITED
CONSULTING ENGINEERS
ABN 34 001 485 436

38 WILLOUGHBY ROAD,
CROWS NEST, NSW 2065
TEL : (02) 9490 9600
FAX : (02) 9438 1224

EROSION AND SEDIMENT
CONTROL DETAILS

DATE: AUGUST 2020 DRG.No.
SCALE: 1:200 @A1 C16
Project No. 190372 REV-A

APPENDIX B – PCSWMM CALCULATOR REPORT

Humeceptor® Design Summary

PCSWMM for Humeceptor®

Project Information

Date	3/08/2020
Project Name	Warehouse - Marrickville
Project Number	190372
Location	74 Edinburgh Road, Marrickville

Designer Information

Company	Richmond + Ross Pty Ltd
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	1.86
Imperviousness (%)	100

The Humeceptor® System model STC 40 achieves the water quality objective removing 83% TSS for a MUSIC particle size distribution.

Rainfall

Name	SYDNEY (OBSERVATORY HILL)
State	NSW
ID	6606
Years of Records	1913 to 2006
Latitude	33°51'39"S
Longitude	151°12'18"E

Water Quality Objective

TSS Removal (%)	80
-----------------	----

Upstream Storage

Storage (cu-m)	Discharge (L/s)
0	0

Humeceptor® Sizing Summary

Humeceptor® Model	TSS Removal %
STC 2	48
STC 3	59
STC 5	61
STC 7	62
STC 9	68
STC 14	69
STC 18	74
STC 23	75
STC 27	78
STC 40	83
STC 50	84
STC 60	86

Particle Size Distribution

Removing finer sediment particles (<100 microns) from runoff ensures that more of the pollutants, such as hydrocarbons and heavy metals, are captured and are not discharged into our natural waterways. The table below lists the particle size distribution used to define the annual TSS removal.

MUSIC								
Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity m/s
1	0.1	1.1	0.0004		500	5	2.65	0.0848
2	1.9	1.2	0.0004					
4	1	1.5	0.0004					
8	2	1.8	0.0004					
16	5	1.8	0.0004					
32	10	2.2	0.0007					
64	25	2.2	0.0027					
128	32	2.65	0.0109					
256	18	2.65	0.0347					

Humeceptor® Design Notes

- **Humeceptor®** performance estimates are based on simulations using PCSWMM for **Humeceptor®** and historical rainfall data.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC2 and **Multiceptor™** units are adaptable to function with a grated inlet and/or inline pipes.
- Only the **Multiceptor™** models STC 3 to STC 27 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 2	STC 3 to STC 27	STC40 to STC60
Single inlet pipe	75 mm	25 mm	75 mm
Multiple inlet pipes	75 mm	75 mm	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the drainage network is not submerged during zero flows. For submerged applications, please contact your local **Humes™** Water Solutions representative for an **Aquaceptor™**.
- Design estimates may be modified for specific spills controls (**Humeceptor®** EOS). Please contact your local **Humes™** Water Solutions representative for further assistance.
- For pricing inquiries or assistance, please contact **Humes™** Water Solutions, Ph. 1300 361 601, www.humeswatersolutions.com.au

Humeceptor® Design Summary

PCSWMM for Humeceptor®

Project Information

Date	3/08/2020
Project Name	Warehouse - Marrickville
Project Number	190372
Location	74 Edinburgh Road, Marrickville

Designer Information

Company	Richmond + Ross Pty Ltd
Contact	N/A

Notes

N/A

Drainage Area

Total Area (ha)	0.21
Imperviousness (%)	100

The Humeceptor® System model STC 3 achieves the water quality objective removing 84% TSS for a MUSIC particle size distribution.

Rainfall

Name	SYDNEY (OBSERVATORY HILL)
State	NSW
ID	6606
Years of Records	1913 to 2006
Latitude	33°51'39"S
Longitude	151°12'18"E

Water Quality Objective

TSS Removal (%)	80
-----------------	----

Upstream Storage

Storage (cu-m)	Discharge (L/s)
0	0

Humeceptor® Sizing Summary

Humeceptor® Model	TSS Removal %
STC 2	77
STC 3	84
STC 5	85
STC 7	86
STC 9	89
STC 14	90
STC 18	92
STC 23	93
STC 27	94
STC 40	96
STC 50	96
STC 60	97

Particle Size Distribution

Removing finer sediment particles (<100 microns) from runoff ensures that more of the pollutants, such as hydrocarbons and heavy metals, are captured and are not discharged into our natural waterways. The table below lists the particle size distribution used to define the annual TSS removal.

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APPENDIX C – MUSIC MODEL RESULT

