CIVIL ENGINEERING SERVICES

University of New South Wales (UNSW) University Hall Precinct Site Redevelopment

Stormwater Management Report

Prepared for UNSW

Hydraulic Services Fire Protection Civil Engineering Sydney Water Accredited Water Servicing Co-ordinator - Design Project Management - Building Plan Approvals

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CIVIL ENGINEERING SERVICES

1. INTRODUCTION

Warren Smith and Partners (WS+P) has been engaged by Lendlease Group to prepare a Stormwater Management Report for the University of New South Wales (UNSW) University Hall Precinct site redevelopment.

1.1 BACKGROUND

The existing site is located within the University of New South Wales, Kensington, NSW, approximately 5km south of the Sydney CBD, and directly south of Randwick Racecourse. The development site is bound by the University Village and the Whitehouse to the north, Goldstein Hall to the east, UNSW Business School and the Quadrangle to the south and the Alumni lawn to the west. The existing site accommodates the University Hall (D14), which is a three (3) storey building and provides student accommodation. Please refer to Figure 1.1 below which shows the extent of the development site area in which the proposed works are to be undertaken.

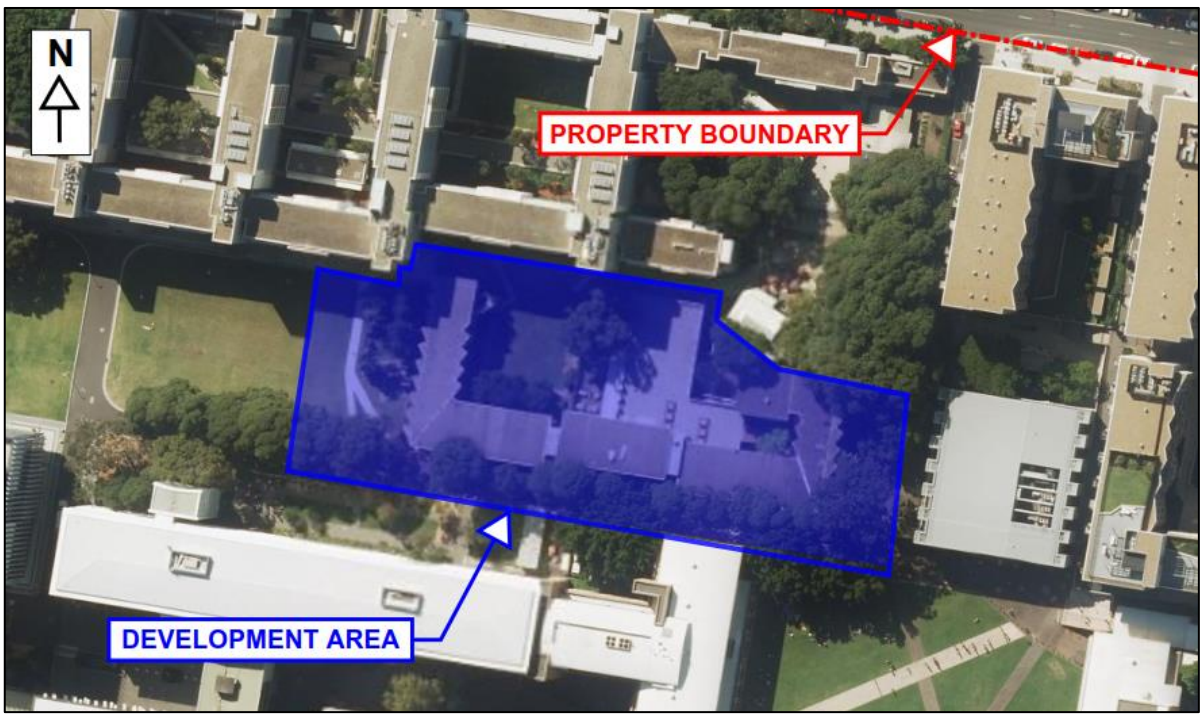


Figure 1.1: Aerial View of Property Boundary (Source: Google Maps)

2. ABBREVIATIONS AND DEFINITIONS

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff
DN	Diameter Nominal (mm)
EY	Exceedances per Year
GBCA	Green Building Council of Australia
GPT	Gross Pollutant Trap
IFD	Intensity-Frequency-Duration
IL	Invert Level
L/s	Litres per second
m/s	Metres per second
MUSIC	Model for Urban Stormwater Improvement Conceptualisation
OSD	On-Site Detention
PSD	Permissible Site Discharge
RCC	Randwick City Council
RCP	Reinforced Concrete Pipe
RL	Reduced Level
RWT	Rainwater Reuse Tank
SID	Safety In Design
SSR	Site Storage Requirement
UNSW	University of New South Wales
WSC	Water Services Coordinator
WS+P	Warren Smith and Partners
WSUD	Water Sensitive Urban Design

The Use of Must, Shall & Should:

In accordance with the International Organization for Standardisation (ISO) Directives, the word “shall” is used to state that a requirement is strictly to be followed in order to conform to a Performance Requirement. Consequently, there can be no deviation from that requirement, other than a specific tolerance.

It is noted that in legislation and specifications it is common to use the word “must” to express a requirement. The word “shall” in this document should be considered as equivalent to “must” in the legislation.

The word “should” introduces a suggestion or recommendation that is not a requirement. It is not necessary that such recommendations or suggestions be followed in order to comply with the Performance Requirement.

3. EXISTING STORMWATER DRAINAGE

A desktop review was undertaken to determine the existing drainage infrastructure within the site and development area. The desktop review revealed the following:-

- There are three (3) primary catchments within UNSW, the largest of which discharges to a grassed detention/percolation system below the Village Green;
- There are a number of stormwater lines which traverse the development site, the majority of which shall be disused and removed to cater for the proposed development, and;
- Two (2) existing stormwater lines, one (1) of which is in the north-western corner of the site and another in the south-eastern corner, shall be deviated around the proposed building footprint.

Please refer to Figure 3.1 for an illustration of the existing stormwater infrastructure located within the development site.

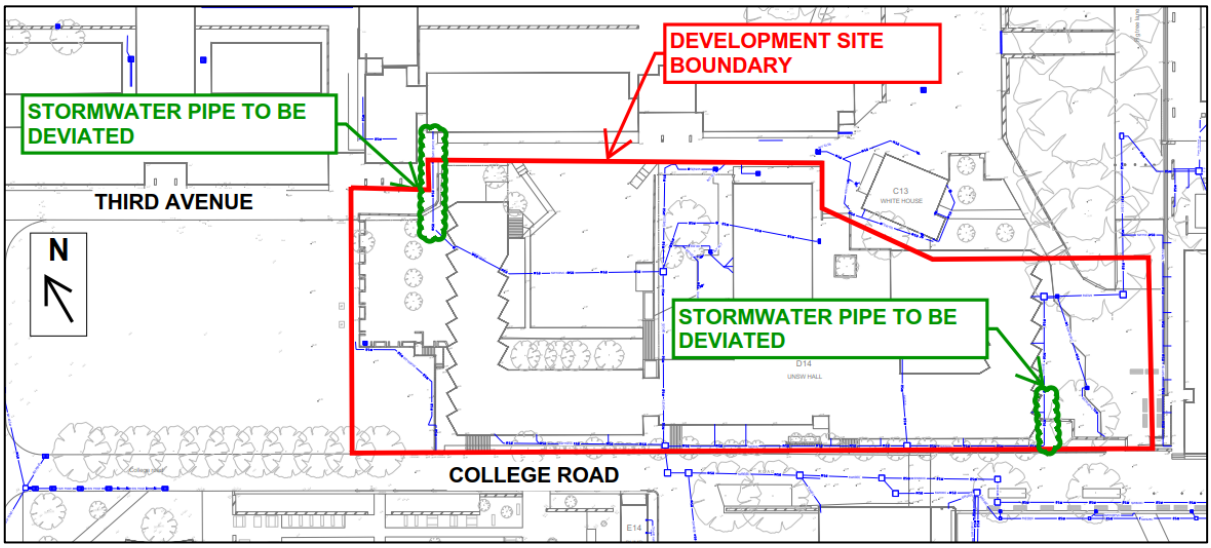


Figure 3.1: Existing UNSW Stormwater Infrastructure

UNSW has maintained extensive and up to date documentation of the stormwater network throughout the Campus, with Ove Arup & Partners having undertaken a stormwater management study in 1997, which was updated by ANA Technical Services having updated this study in 2005 to form the 'Campus 2020 Master Plan – Stormwater Strategy'. This study was reviewed and approved by Randwick City Council.

Kustom Engineering Pty Ltd were engaged in 2015 to undertake a review of the stormwater network within UNSW and determine the capacity, and any deficiencies, of the existing system. The review incorporated the 2005 Masterplan and was updated to include all developments that occurred between 2005 and 2016. The outcomes of this investigation were amalgamated with the existing 2020 Masterplan to form the 2025 Stormwater Strategy Management Plan.

4. AUTHORITY AND REGULATORY REQUIREMENTS

4.1 STORMWATER DRAINAGE REQUIREMENTS

While the UNSW Kensington Campus resides within the Randwick City Council LGA, UNSW has prepared a 2025 Stormwater Strategy Management Plan (July 2017) which shall serve as the basis for all future developments within the Campus. As stated in the 2025 Management Plan, "Kensington campus stormwater drainage is to be managed in accordance with this strategy masterplan document, as agreed by UNSW and Randwick City Council".

UNSW has split the campus into a number of catchments, each of which have their own stormwater management requirements due to the varying properties of the land. Refer to Figure 4.1 for an illustration of the existing catchment breakdown.

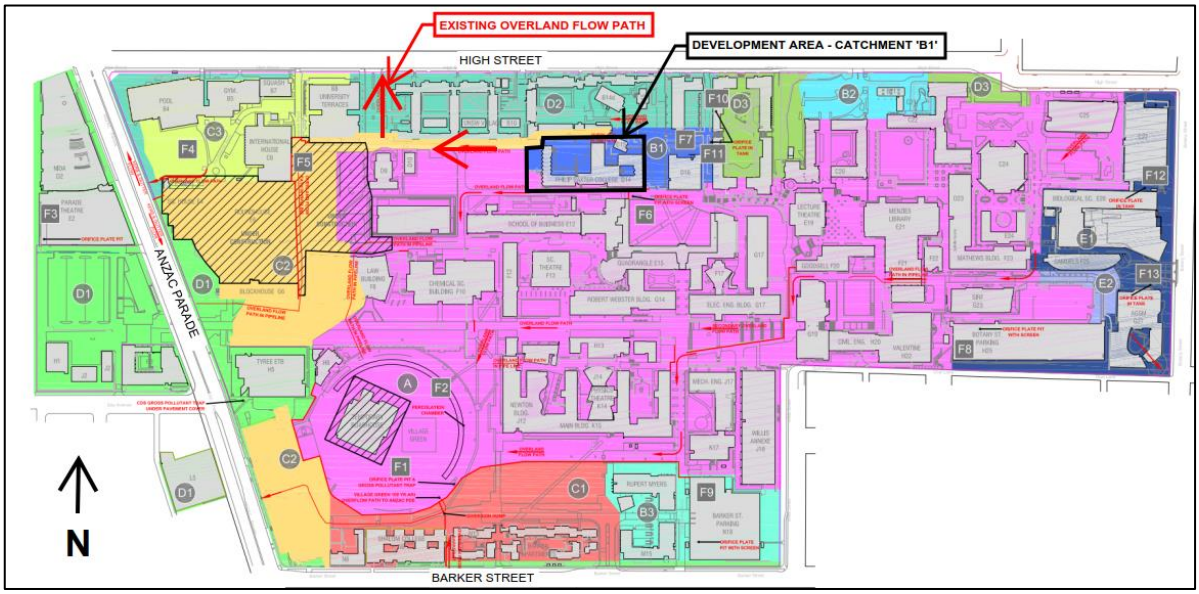


Figure 4.1: Existing UNSW Catchments (Source: UNSW 2025 Stormwater Strategy Management Plan)

The proposed development forms part of catchment 'B1'.

As specified in the UNSW 2025 Stormwater Strategy Management Plan, the site requirements for Catchment B1 are as follows:-

- Flows up to the 5yr ARI (20% AEP) storm event shall be piped to the Village Green Detention Basin;
- Flows between the 5yr ARI (20% AEP) and the 20yr ARI (5% AEP) storm event shall be piped to Council kerb;
- Flows exceeding the 20yr ARI (5% AEP) storm event shall overflow into the Anzac Parade North Catchment;
- Existing overland flow paths shall not be disturbed or altered in any way;
- Where practical, percolation/infiltration systems or detention tanks are to be designed to reduce stormwater discharge from the site, and;
- Diversion structures within the site are to be retained or suitable replacement management strategies are to be engineered to take their place.

The UNSW Management Plan is to be read in conjunction with the Randwick City Council DCP for the design of detention/percolation systems.

As specified in the RCC Private Stormwater Code 2013 and the UNSW 2025 Stormwater Strategy Management Plan, the following are the minimum requirements for the design of infiltration/percolation systems:-

- Should stormwater be discharged to an infiltration system, the infiltration area shall be sized for all storm events up to, and including, the 5% AEP storm event with provision for a formal overland flow path;
- Should no formal overland escape route be provided for storms greater than the 5% AEP storm event, the infiltration system shall be sized for the 1% AEP storm event, and;
- Sediment/silt arrestor pits are to be provided within the site prior to stormwater being discharged from the site or into any infiltration areas. The sediment/silt arrestor pits are to be constructed in accordance with RCC requirements.

4.2 WATER SENSITIVE URBAN DESIGN (WSUD) REQUIREMENTS

As Randwick City Council does not specify minimum pollutant reduction targets, the Green Building Council of Australia requirements for water quality that have been adopted. Refer to Table 4.1 for the pollutant reduction targets.

Table 4.1: WSUD Pollutant Reduction Targets (Source: GBCA)

Pollutant Type	Column A Target Reduction Percentage (%)	Column B Target Reduction Percentage (%)	Column C Target Reduction Percentage (%)
Gross Pollutants (GP)	85	90	95
Total Suspended Solids (TSS)	80	80	90
Total Phosphorus (TP)	30	60	70
Total Nitrogen (TN)	30	45	60

For the purpose of this development, Column B targets shall be adopted for the design.

5. CIVIL SERVICES GENERAL

5.1 PURPOSE OF THIS DOCUMENT

The purpose of this document is to describe the Civil stormwater services in relation to the UNSW University Hall building redevelopment.

5.1.1 REFERENCE DOCUMENTS

This report is based on the following reference documents:-

- Survey Plan;
- Tzannes Architectural Documentation;
- UNSW 2025 Stormwater Strategy Management Plan, and;
- Coffey Geotechnical Report (for adjacent site).

5.1.2 SCOPE OF WORK

The Civil Services scope consists of the following services:-

- Stormwater Drainage works and Infiltration System;
- Existing and proposed connections to UNSW drainage system;
- WSUD requirements, and;
- Sediment and erosion control.

The Civil scope for stormwater drainage will comprise of the infiltration system, located beneath the stairs on the western boundary of the site, and below ground pipework external to the building. For drainage associated with suspended slabs and pump systems, refer to the Hydraulic Engineer's documentation.

5.1.3 LIMITATIONS

This report is based on information provided by the Architects, Design Team, survey drawings, site inspections, and information communicated during the design development process. Any assumptions made in the design process have been communicated in this report.

In particular, it should be noted that the survey information provided was incomplete, with few ILs being provided for the existing stormwater drainage system. However, a partial DRAINS model was provided which confirmed ILs of the majority of the piped system within the vicinity of the development area, with some levels yet to be confirmed upon further investigation.

WS+P have based this report on the assumption that the information provided throughout the design development stage can be taken at face value and in general terms accurately reflects the installation on site. WS+P does not accept any liability in regard to the accuracy of the existing documentation.

5.1.4 DESIGN CRITERIA

Table 5.1: Design Critera

Item	Design Criteria
Stormwater Drainage Works	AS/NZS 3500.3 – 2015 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Randwick City Council Development Control Plan (DCP) UNSW Kensington Campus 2025 Stormwater Strategy Management Plan Randwick City Council Private Stormwater Code 2013
Detention/Infiltration System	AS/NZS 3500.3 – 2015 – Stormwater Drainage AS 2865 – 2009 Safe Working in a Confined Space Randwick City Council Development Control Plan (DCP) UNSW Kensington Campus 2025 Stormwater Strategy Management Plan Randwick City Council Private Stormwater Code 2013
Water Quality Requirements and Proposed Treatment System	Draft NSW MUSIC Modelling Guidelines 2010 Green Building Council of Australia
Sediment and Erosion Control	Landcom 'Blue Book' – Managing Urban Stormwater Soils and Construction Guideline Edition 4 Randwick City Council Sediment and Erosion Control *'Do It Right On Site'* Guides

6. STORMWATER DRAINAGE WORKS

The stormwater drainage system shall be designed in accordance with the UNSW Stormwater Strategy Management Plan and the RCC Private Stormwater Code 2013.

6.1 PROPOSED DRAINAGE INFRASTRUCTURE

The total site development area is 0.5555 Ha. Stormwater runoff from the majority of the site shall be captured via a pit and pipe network and shall reticulate to an infiltration located along the western boundary of the site. A small portion of the site shall bypass the piped network; refer to Table 6.1 for a catchment breakdown. Refer to Figure 6.1 for a stormwater drainage plan.

Table 6.1: Catchment Breakdown

Catchment	Impervious Area (Ha)	Pervious Area (Ha)	Total Area (Ha)
To OSD Tank			
Roof (incl. terrace/balcony)	0.2558	0.0087	0.2645
Ground Area	0.1430	0.0561	0.1991
Bypass			
Roof	0.0090	-	0.0090
Ground Area	0.0523	0.0306	0.0829
Total Area (Ha)	**0.4601**	**0.0954**	**0.5555**

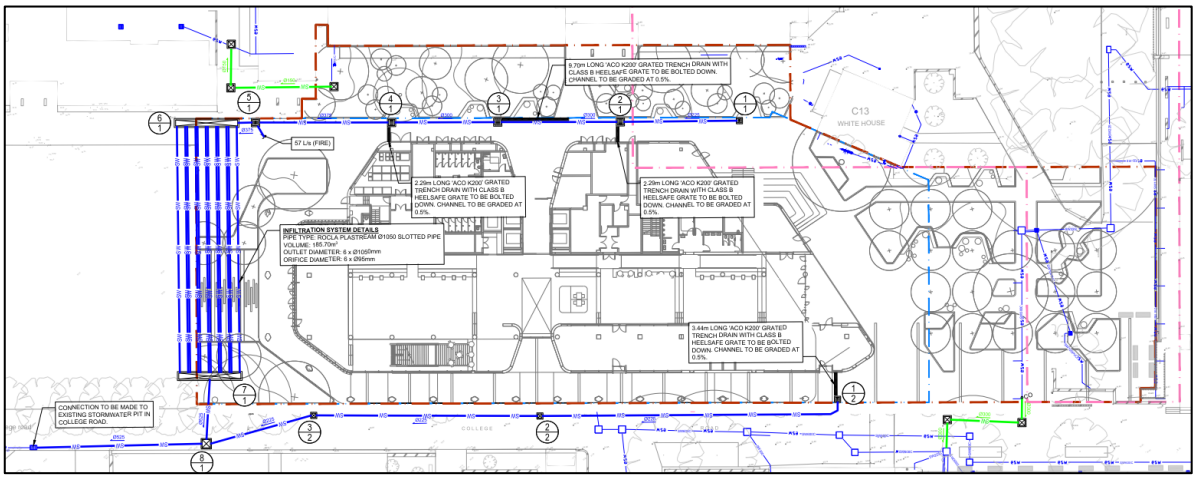


Figure 6.1: Proposed Stormwater Drainage Reticulation

To reduce the stormwater discharge from the site, it is proposed that an infiltration system, constructed from Rocla Plastream slotted pipes, be installed beneath the stairs along the western boundary of the site, with the system encroaching approximately 4m into the Alumni Lawn. Stormwater shall infiltrate to the Botany Sands Aquifer, from where it will be drawn for irrigation and other non-potable uses within the Campus. The

The Plastream pipes shall provide detention, while allowing stormwater to infiltrate into the ground. The pipes shall also be wrapped and sealed in one (1) layer of geotextile material to prevent the ingress of fine backfill material into the pipes. The piped infiltration system has been designed to cater for the 5% AEP storm event, with orifice plates being installed over the outlet pipes to limit the discharge into the Village Green to pre-development flows for the 5% AEP storm event. Any overflows from the system shall be safely conveyed west across College Road.

Access to the infiltration system shall be provided via large pits located at both the upstream and downstream ends of the pipes. These pits shall provide human access to allow for maintenance of the system, with a high-pressure hose being applied from either the upstream or downstream ends of the piped system. The stormwater pit immediately upstream of the infiltration system shall be a silt arrestor pit, in accordance with RCC requirements.

The design infiltration rate of 750mm/hr (k = 0.2L/m^2/sec) has been adopted in accordance with the 2025 Stormwater Strategy Management Plan. The discharges from the infiltration/detention system have been calculated using a DRAINS model. Refer to Section 6.2.2 for details of the infiltration system.

6.1.1 DRAINS INPUT PARAMETERS

The site discharges have been calculated using a DRAINS model, which is a stormwater drainage system design and analysis program. DRAINS performs hydraulic grade line analysis and generates flows that occur in a drainage system for a particular AEP storm event.

As previously mentioned, Kustom Engineering Pty Ltd were engaged in 2015 to undertake a review of the existing stormwater system. As part of this review, a DRAINS model was undertaken utilising ARR 1987 methods and ILSAX hydrology.

The catchment characteristic factor values for UNSW and used in the DRAINS model are listed below:-

- Soil Type – Normal 3.0
- Paved (Impervious) Area Depression Storage 1mm
- Supplementary Area Depression Storage 1mm
- Grassed (Pervious) Area Depression Storage 5mm
- Antecedent Moisture Condition 3.5
- Minimum Pit Blockage (Sag Pits) 50%
- Minimum Pit Blockage (On-Grade Pits) 0%
- Minimum Pit Freeboard 150mm
- Minimum Fall Across Pits 30mm

The rainfall data has been taken from the Bureau of Meteorology Rainfall IFD Data System using local coordinates, and ARR 2016 procedures have been adopted for modelling purposes.

6.1.2 INFILTRATION SYSTEM PROPERTIES

The proposed infiltration system details are presented in Table 6.2 below.

Table 6.2: Infiltration System Details

Item	Value
Total catchment area reticulating to Infiltration System (Ha)	0.4636
Area within development site bypassing Infiltration System (Ha)	0.0919
Percentage of development site bypassing Infiltration System	16.5%
Infiltration System Volume (m^3)	185.70
Outlet Pipe Diameter (mm)	6 x 1050mm
Outlet Pipe Orifice Diameter (mm)	6 x 95mm

6.2 SITE DISCHARGE RESULTS

As discussed previously, the piped discharge from the developed site has been limited to the pre-development discharge rate for all storm events to avoid overloading the Village Green detention and infiltration system. Refer to Table 6.3 for the site discharge results for both the piped systems and the total site discharge.

Table 6.3: Site Discharge Results

	20% AEP Storm Event (L/s)	5% AEP Storm Event (L/s)	1% AEP Storm Event (L/s)
Piped System (To Village Green)			
Pre-Development	68	96	129
Post Development	68	81	113
Total Site Discharge			
Pre-Development	105	152	211
Post Development	90	113	197

Any overflows from the system shall be safely conveyed along the existing flow path route on College Road.

7. WATER QUALITY REQUIREMENTS AND PROPOSED TREATMENT SYSTEM

In order to comply with the Green Star requirements for the adequate treatment of stormwater runoff, treatment solutions have been provided to remove suspended solids, hydrocarbons, and nutrients prior to being discharged from site.

The pollutants that could potentially be generated as a result of the development are as follows:-

- Litter;
- Sediments, and;
- Nutrients (Phosphorus and Nitrogen).

The development has been modelled to demonstrate the performance of the stormwater treatment system utilising a program called MUSIC. MUSIC models the proposed stormwater treatment devices and estimates their respective performance against the performance targets of the project. The pollutants modelled in MUSIC are Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

7.1 RAINFALL

A continuous simulation of ten (10) years was run with a six (6) minute time step, in accordance with the Green Star minimum requirements. The time period for which the model was run is 1st January 1970 to 31st December 1979. The rainfall station utilised was 066062 Sydney Observatory.

The average potential evapotranspiration (PET) data used in the MUSIC model was based on the average Sydney PET and is presented in Table 7.1 below.

Table 7.1: Evapotranspiration Data for MUSIC Modelling

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
PET (mm)	180	135	128	85	58	43	43	58	88	127	152	163

7.2 RAINFALL RUNOFF PROPERTIES

In accordance with the Draft NSW MUSIC Modelling Guidelines, dated August 2010, the following Table 7.2 and Table 7.3 presents the rainfall runoff properties which have been used in the MUSIC model.

Table 7.2: MUSIC Rainfall Runoff Properties

Parameter	Unit	Value
Impervious Area Parameters		
Rainfall Threshold	mm	1.0 (for roads/paths etc.) 0.3 (for roofs)
Pervious Area Parameters		
Soil Storage Capacity	mm	120
Initial Storage Capacity	%	25
Field Capacity	mm	80
Infiltration Capacity co-efficient a		200
Infiltration Capacity co-efficient b		1.0
Groundwater Properties		
Initial depth	mm	10
Daily recharge rate	%	25
Daily base seepage rate	%	5
Daily seepage rate (%)	%	0

Table 7.3: Pollutant Concentration Parameters for MUSIC Source Nodes

Land Use Category		Concentration (mg/L-log$_{10}$)					
		Total Suspended Solids		Total Phosphorus		Total Nitrogen	
		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
General Urban (incl public open space)	Mean	2.43	1.20	-0.30	-0.85	0.34	0.11
	Standard Deviation	0.32	0.17	0.25	0.19	0.19	0.12
Roofs	Mean	1.30	*	-0.89	*	0.30	*
	Standard Deviation	0.32	*	0.25	*	0.19	*

*Base flows are only generated from pervious areas; therefore these parameters are not relevant to impervious areas.

7.3 STORMWATER TREATMENT PLAN

The MUSIC model's total catchment area to be treated is 0.4913 Ha which shall ultimately reticulate to the infiltration system. The infiltration system shall provide filtration treatment, significantly reducing the stormwater suspended solid and nutrient content prior to infiltrating into the Botany Sands Aquifer.

Additionally, it is proposed that an Enviropod, supplied by Ocean Protect, be installed within Pit 1/2, which shall intercept surface runoff at the pit grates and filter the runoff prior to entering the piped stormwater system. The Enviropod is fitted with a monofilament 200 micron pore size filter bag that removes gross pollutants such as sediment, trash and debris, as well as suspended solids; please refer to Figure 7.1 for an illustration of a typical Enviropod.

Figure 7.1: Typical Enviropod

7.4 MUSIC MODEL TREATMENT RESULTS

The stormwater quality treatment system has been modelled using the MUSIC software. Please refer to Figure 7.2 for the treatment plan and Table 7.4 for the treatment results.

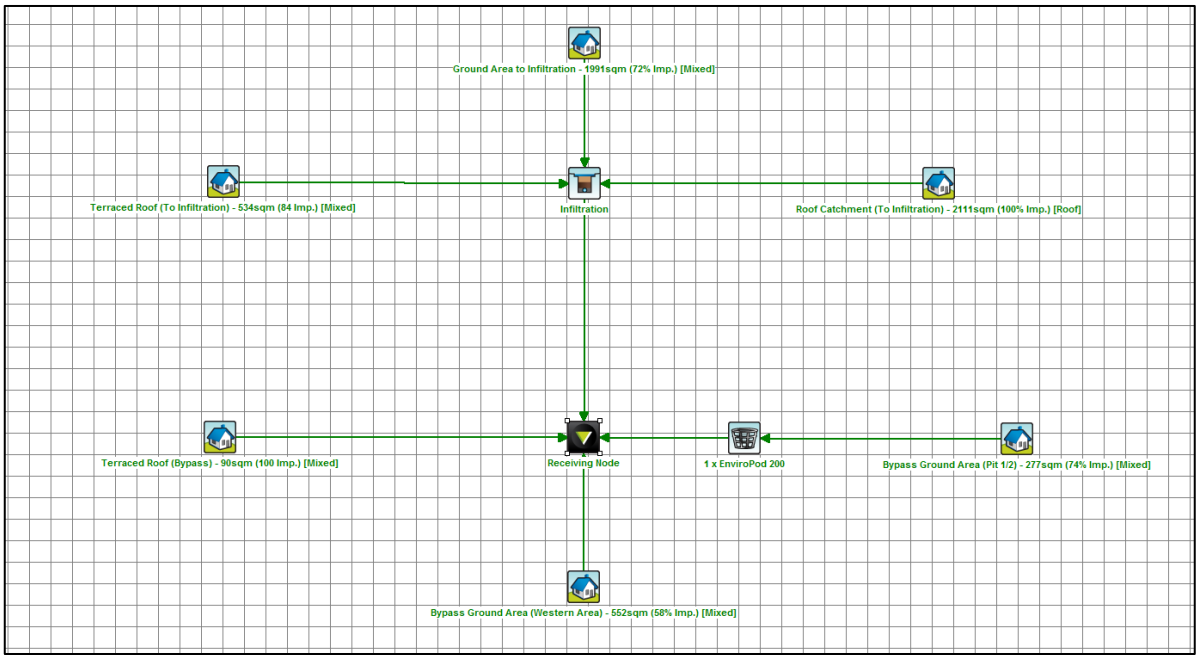


Figure 7.2: MUSIC Model Treatment Plan

Table 7.4: Percentage Based Load Reduction in Pollutant Results

Pollutant Type	Source (kg/yr)	Residual Load (kg/yr)	Reduction % Achieved	Column B Green Star Target Reduction (%)
Gross Pollutants (GP)	149	14.4	90.3	90
Total Suspended Solids (TSS)	714	121	83.0	80
Total Phosphorus (TP)	1.73	0.314	81.8	60
Total Nitrogen (TN)	15.1	2.42	84.0	45

As is demonstrated by the results, the development is achieving the Green Star Column B targets for pollutant load reduction.

7.5 MAINTENANCE

The infiltration system shall be inspected regularly to prevent any blockages of the system, with flushing out of the modules through the access pits, located on the upstream and downstream ends of the chamber, and standpipes every six months and after major storm events. A major storm event constitutes storm events equivalent to, and greater than, the 5% AEP storm event. The Enviropod too shall be inspected six-monthly and after major storm events.

8. SEDIMENT AND EROSION CONTROL

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the guidelines set out in Landcom's Managing Urban Stormwater Soils & Construction Guidelines, Randwick City Council's 'Do It Right On Site' Sediment and Erosion Control guides, and the general requirements outlined below.

8.1 SITE PROTECTION MEASURES

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the requirements outlined below to inhibit the movement of sediment off the site during demolition and construction phases.

8.1.1 SITE ACCESS

Site access shall be established from Third Avenue. Construction vehicles leaving the site shall be required to pass over a Temporary Construction Vehicle Entry consisting of a 1.5m long by 3m wide 'cattle rack'.

8.1.2 SEDIMENT CONTROL

All exposed earth areas where it may be possible for runoff to transport silt down slope shall be protected with a sediment and erosion control silt fence generally installed along the boundaries of the site.

The fence will be constructed in accordance with details provided by the Department of Conservation and Land Management incorporating geotextile fabric which will not allow suspended particles greater than 50mg/L non-filterable solids to pass through, and as such comply with the appropriate provisions of the Clean Waters Act 1970.

The construction of the silt fence will include the following: -

- Geotextile fabric buried to a maximum of 150mm below the surface. Refer to Figure 8.1 for details;
- Overlapping any joins in the fabric;
- Turning up on the ends for a length of 1 metre in order to prevent volumes of suspended solids escaping in a storm event;
- Any Council owned road kerb entry and or gully pits will be protected by Atlantis Filter Bales and EcoSock. Additional protection will be provided by inserting Water Clean Filter Cartridges into the gully opening, and;
- Internal site drainage pits shall be protected by Sediment Traps consisting of hay bales.

Refer to Figure 8.1, Figure 8.2, Figure 8.3 and Figure 8.4 for details.

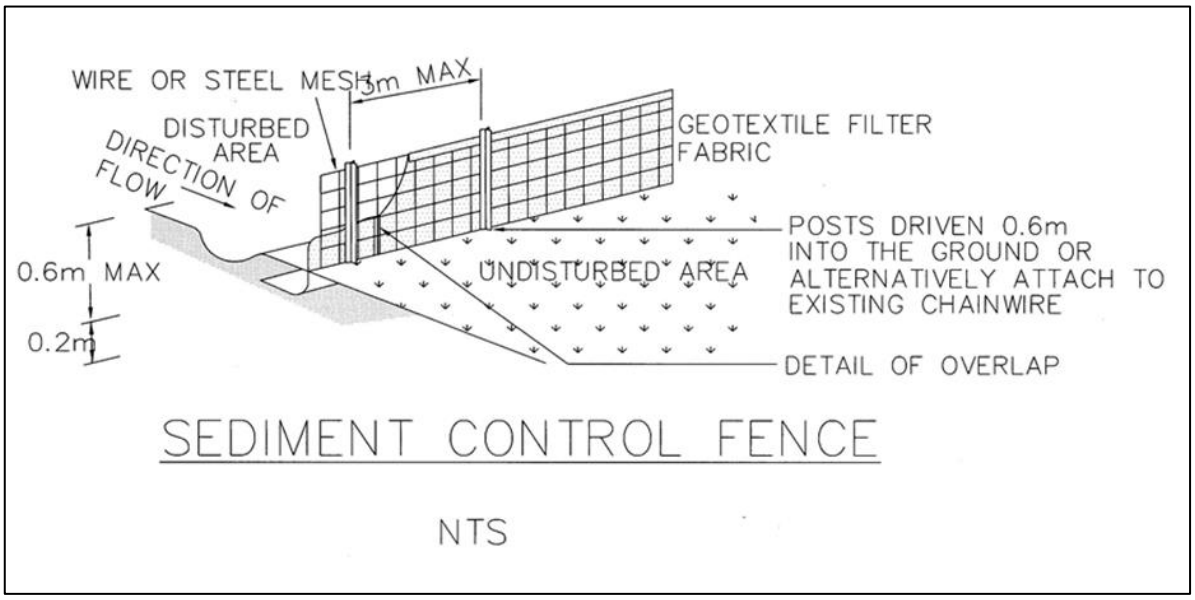


Figure 8.1: Sediment Control Fence Detail

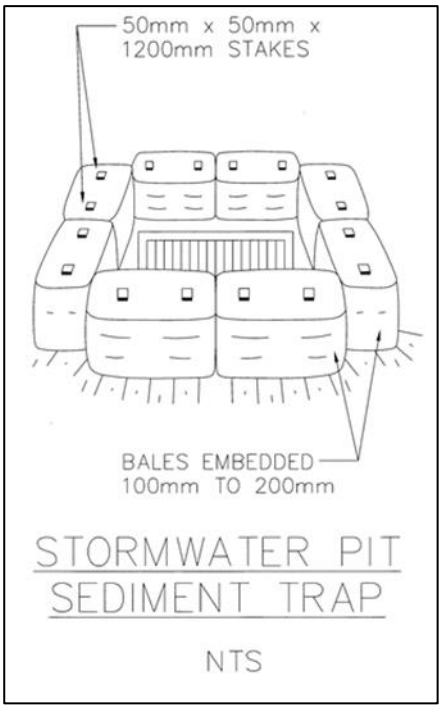


Figure 8.2: Stormwater Pit Sediment Trap Detail

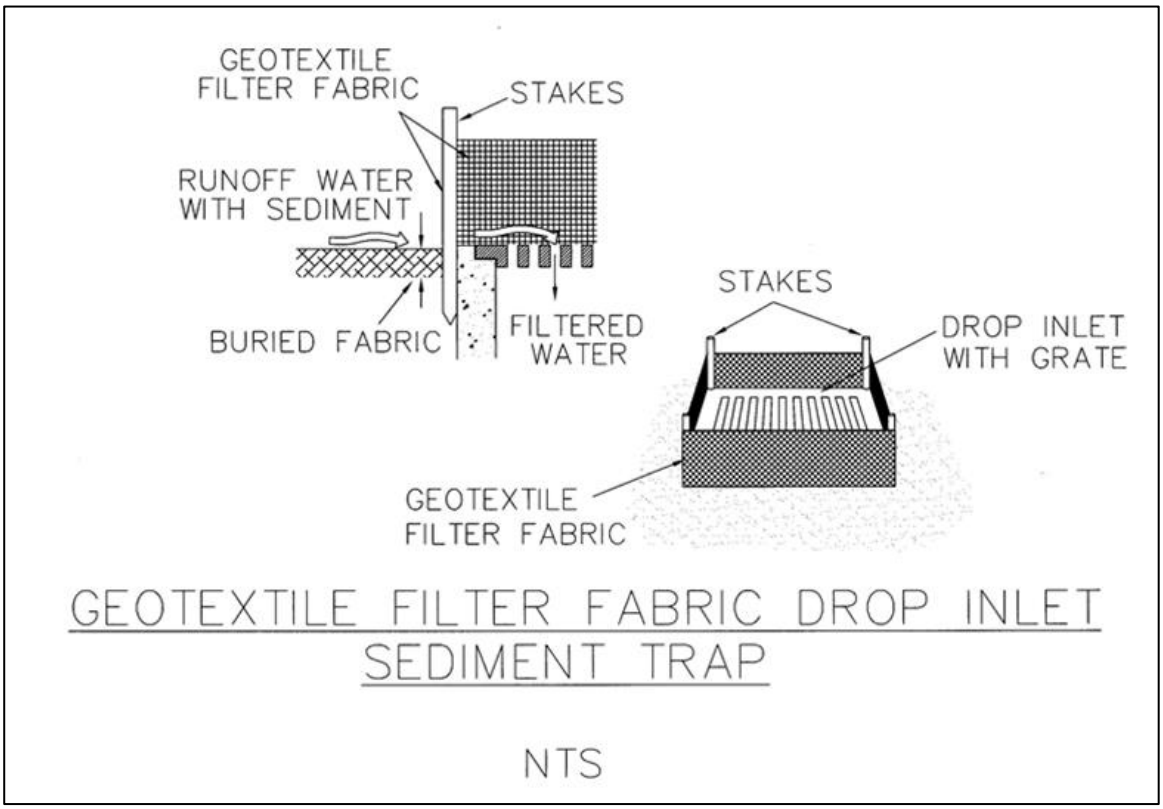


Figure 8.3: Geotextile Filter Fabric Drop Inlet Sediment Trap Detail

Atlantis Sediment Control Filter Bales

What are FilterBales?

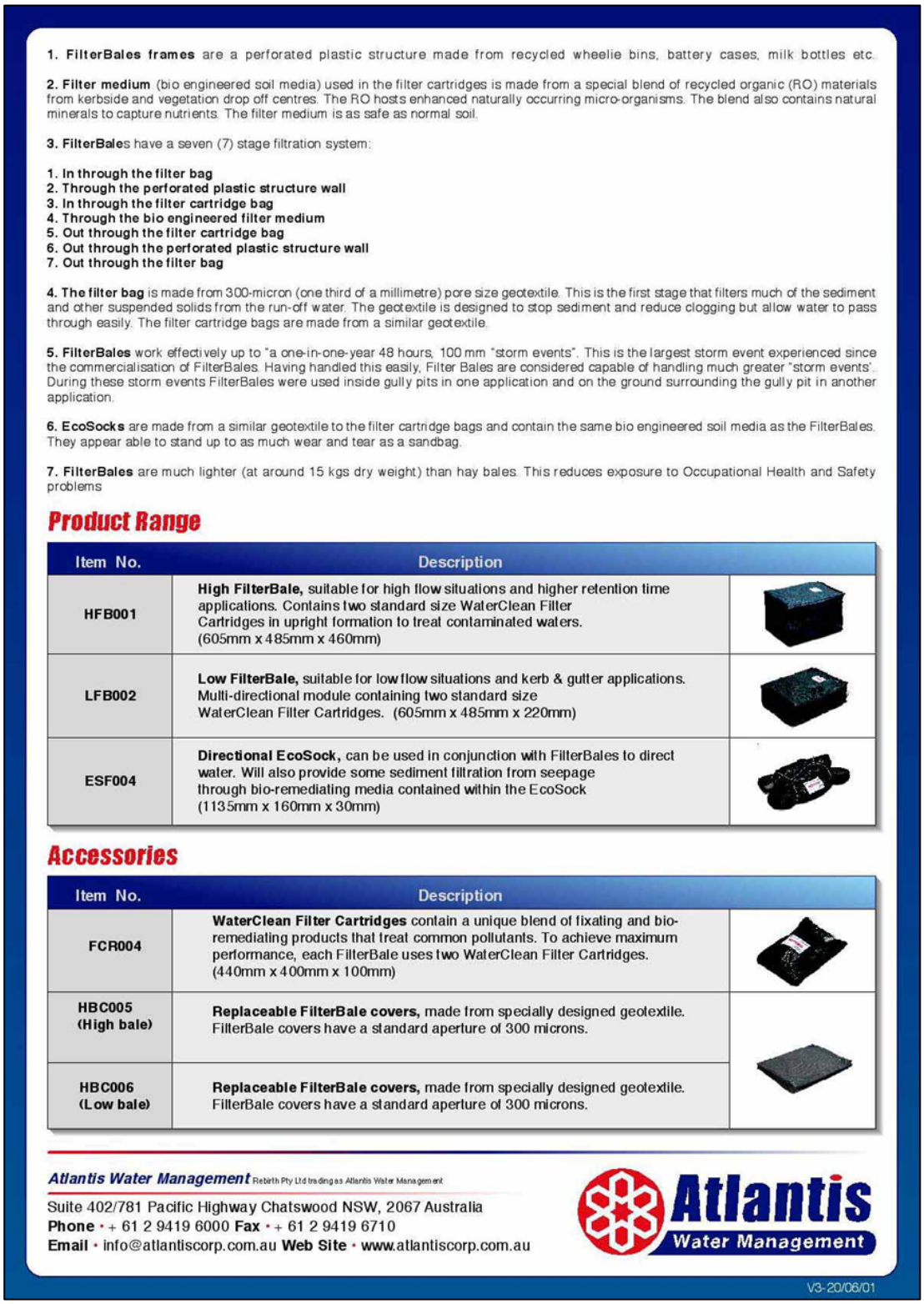
Water Clean FilterBales are a unique new patented 7 stage sediment filter device developed to substantially reduce the migration of sediment and contaminants into drainage systems while allowing filtered water to easily pass through. FilterBales reduce customers' time and money by providing solutions to comply witht environmental and regulatory requirements.

Durable, Dependable, Reusable.
Replacing hay bales and other inadequate attempts to stop sediment run-off, FilterBales are durable and re-useable, effectively stopping your money from "pouring down the drain". They are also lightweight and easy to handle. Replaceable Water Clean Filter Cartridges guarantee peak performance is maintained.

Ask your local FilterBales stockist about replacement frequencies in your area. Cartridges and filter covers should be changed when the infiltration rate decreases. Water Clean FilterBales are suitable for a wide range of sediment and water management situations and can be easily secured in place for long term use. The unique multi-directional filter system allows you to position Water Clean FilterBales in any direction without reducing performance.

Water Clean FilterBales can be fixed to concrete or bitumen surfaces using an epoxy mortar-binder or fixed to earth surfaces using 6-10 mm pegs or stakes. When positioning, the side with the red reflective marker should be facing traffic.

www.atlantiscorp.com.au



1. **FilterBales frames** are a perforated plastic structure made from recycled wheelie bins, battery cases, milk bottles etc.

2. **Filter medium** (bio engineered soil media) used in the filter cartridges is made from a special blend of recycled organic (RO) materials from kerbside and vegetation drop off centres. The RO hosts enhanced naturally occurring micro-organisms. The blend also contains natural minerals to capture nutrients. The filter medium is as safe as normal soil.

3. **FilterBale**s have a seven (7) stage filtration system:

1. **In through the filter bag**
2. **Through the perforated plastic structure wall**
3. **In through the filter cartridge bag**
4. **Through the bio engineered filter medium**
5. **Out through the filter cartridge bag**
6. **Out through the perforated plastic structure wall**
7. **Out through the filter bag**

4. **The filter bag** is made from 300-micron (one third of a millimetre) pore size geotextile. This is the first stage that filters much of the sediment and other suspended solids from the run-off water. The geotextile is designed to stop sediment and reduce clogging but allow water to pass through easily. The filter cartridge bags are made from a similar geotextile.

5. **FilterBales** work effectively up to "a one-in-one-year 48 hours, 100 mm "storm events". This is the largest storm event experienced since the commercialisation of FilterBales. Having handled this easily, Filter Bales are considered capable of handling much greater "storm events". During these storm events FilterBales were used inside gully pits in one application and on the ground surrounding the gully pit in another application.

6. **EcoSocks** are made from a similar geotextile to the filter cartridge bags and contain the same bio engineered soil media as the FilterBales. They appear able to stand up to as much wear and tear as a sandbag.

7. **FilterBales** are much lighter (at around 15 kgs dry weight) than hay bales. This reduces exposure to Occupational Health and Safety problems

Product Range

Item No.	Description	
HFB001	**High FilterBale,** suitable for high flow situations and higher retention time applications. Contains two standard size WaterClean Filter Cartridges in upright formation to treat contaminated waters. (605mm x 485mm x 460mm)	
LFB002	**Low FilterBale,** suitable for low flow situations and kerb & gutter applications. Multi-directional module containing two standard size WaterClean Filter Cartridges. (605mm x 485mm x 220mm)	
ESF004	**Directional EcoSock,** can be used in conjunction with FilterBales to direct water. Will also provide some sediment filtration from seepage through bio-remediating media contained within the EcoSock (1135mm x 160mm x 30mm)	

Accessories

Item No.	Description	
FCR004	**WaterClean Filter Cartridges** contain a unique blend of fixating and bio-remediating products that treat common pollutants. To achieve maximum performance, each FilterBale uses two WaterClean Filter Cartridges. (440mm x 400mm x 100mm)	
HBC005 (High bale)	**Replaceable FilterBale covers,** made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	
HBC006 (Low bale)	**Replaceable FilterBale covers,** made from specially designed geotextile. FilterBale covers have a standard aperture of 300 microns.	

Figure 8.4: Atlantis Sediment Control Filter Bale Detail

8.1.3 TEMPORARY STORMWATER SYSTEM (WHERE REQUIRED)

Site runoff within the zones of the excavation will be drained into a central holding well within the excavation. Runoff will be allowed to settle out suspended particles and debris, and an acceptable water of 50mg per litre of Non Filterable Residues (NFR) is required to be achieved prior to discharge.

8.1.4 DUST CONTROL

The following dust control procedures will be adhered to:

- Loose loads entering or leaving the site will be securely covered by a tarpaulin or like material in accordance with RMS and local Council Guidelines;
- Soil transport vehicles will use the single main access to the site (via the stabilised site access);
- There will be no burning of any materials on site;
- Vegetation shall be maintained on site where possible;
- Materials and stockpiles shall be covered;
- Water sprays will be used across the site to suppress dust. The water will be applied either by water sprinklers or water carts across ground surfaces whenever the surface has dried out and has the potential to generate visible levels of dust either by the operation of equipment over the surface or by wind. The watercraft will be equipped with a pump and sprays;
- Spraying water at the rate of not less than three (3) L/s and not less than 700kPa pressure. The area covered will be small enough that surfaces are maintained in a damp condition and large enough that runoff is not generated. The water spray equipment will be kept on site during the construction of the works;
- During excavation all trucks/machinery leaving the site will have their wheels washed and/or agitated prior to travelling on Council Roads, and;
- Fences will have shade cloth or similar fabric fixed to the inside of the fence.

Generally, if wind conditions are unsuitable, reasonable care shall be taken to ensure dust is controlled within the site. If it is unfeasible, work should be ceased until wind conditions are suitable.

8.1.5 SEDIMENT PUMP OUT PITS

Sediment pump out pits shall be installed where lift pits are to be excavated. A perforated riser outlet pipe shall be installed to pump any rainwater collected in these pits and shall discharge into a grated inlet pit as documented on the Soil and Water Management Plan. Refer to Figure 8.5 and Figure 8.6 for details of a perforated riser outlet pipe.

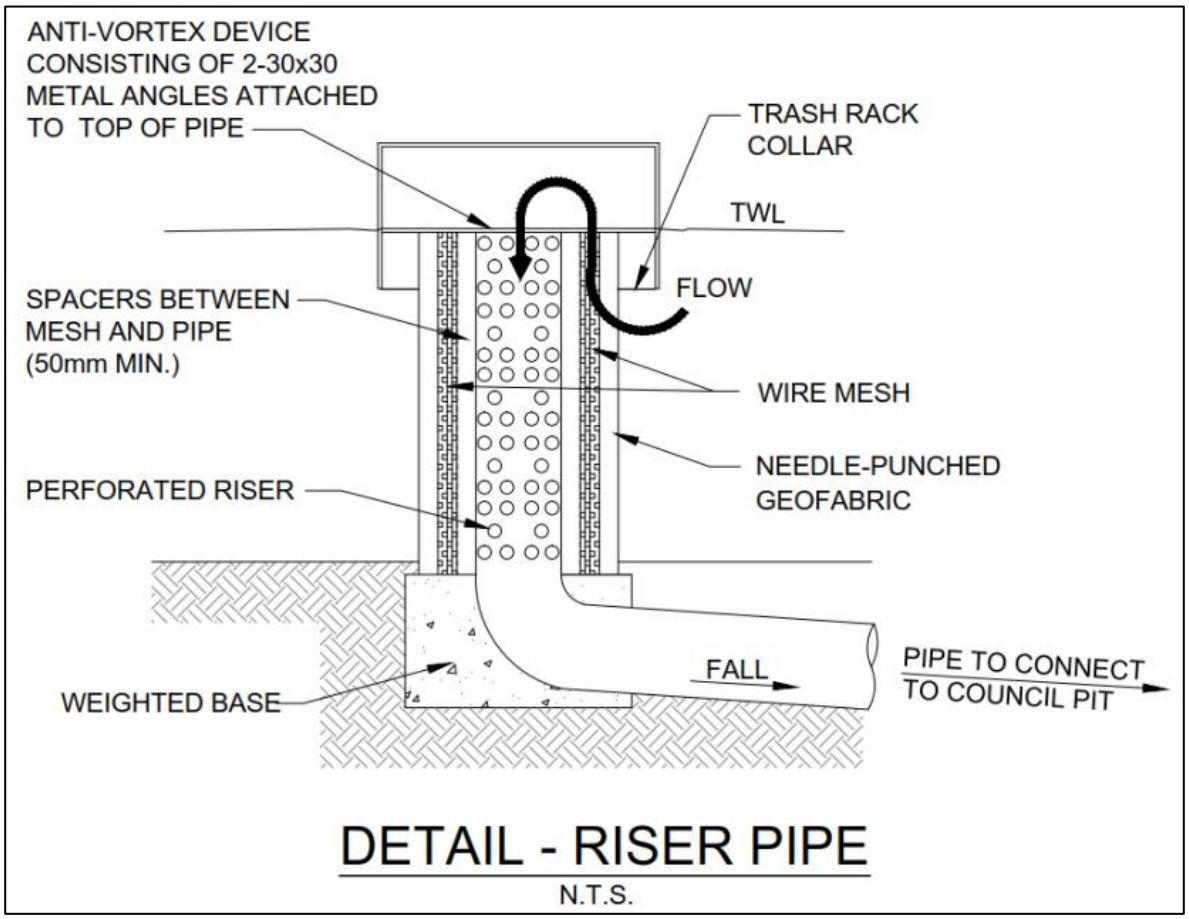


Figure 8.5: Pump Out Pit Outlet Pipe Detail

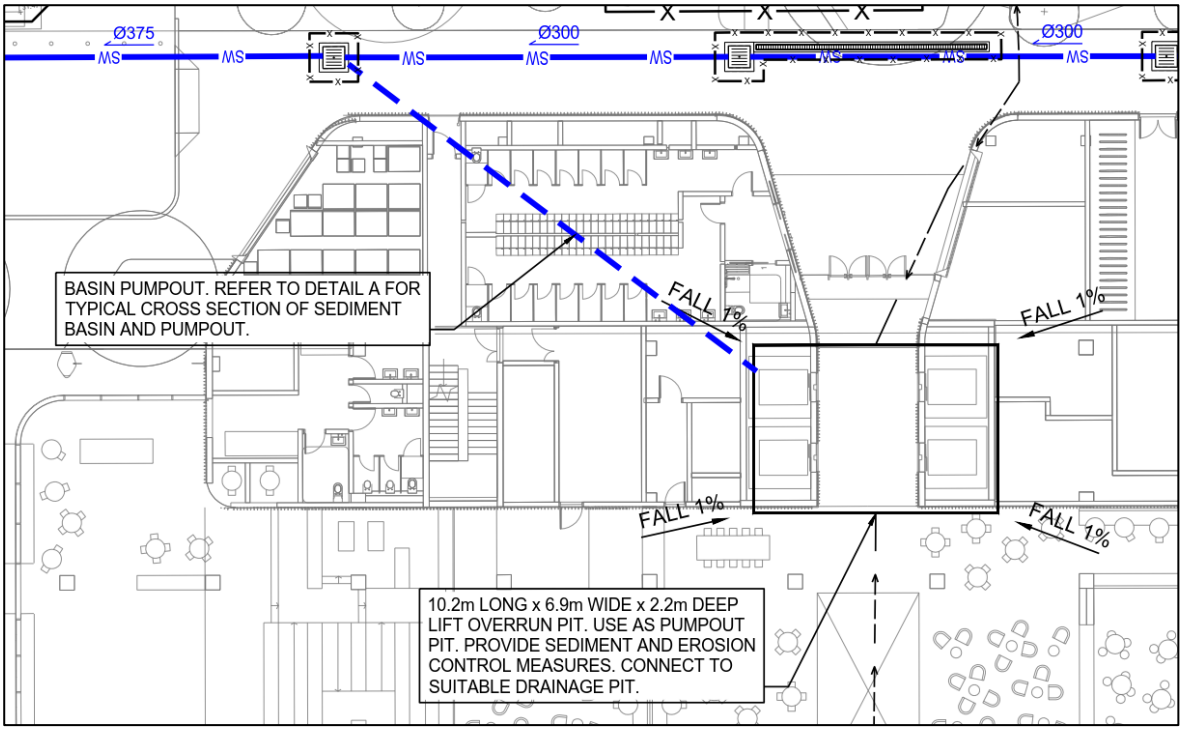


Figure 8.6: Pump Out Pit Outlet Pipe Plan Arrangement

8.1.6 MAINTENANCE

Generally, the following maintenance measures shall be adhered to during construction:-

- It will be the responsibility of the site foreman for the building contractor to ensure sediment and erosion control devices on site are maintained. The devices shall be checked daily and the appropriate maintenance undertaken as necessary;
- Prior to the closing of the site each day, the road shall be swept and materials deposited back onto the site;
- Gutters and roadways will be kept clean regularly to maintain them free of sediment;
- Appropriate covering techniques, such as the use of plastic sheeting will be used to cover excavation faces, stockpiles and any unsealed surfaces;
- If dust is being generated from a given surface, and water sprays fail;
- If fugitive emissions have the potential to cause the ambient as quality to foul the ambient air quality;
- The area of soils exposed at any one time will be minimised wherever possible by excavating in a localised progressive manner over the site,;
- Materials processing equipment suitable comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks, and;
- Suitable and approved bins shall be utilised for the containment of hard waste, including concrete slurries, building waste and litter. In the case of accidental spills, particularly within the public reserve, the material shall be swept and contained, and not washed into a gutter or waterway.

It is considered that by complying with the above, appropriate levels of protection are afforded to the site and the adjacent public roads, footpaths and environment.

UNIVERSITY HALL PRECINCT SITE REDEVELOPMENT

STATE SIGNIFICANT DEVELOPMENT APPLICATION

SOURCE : SIX MAPS

LOCALITY AERIAL

NOT TO SCALE

DRAWING SCHEDULE		
DRG No.	DRAWING TITLE	REV.
D14-CV-D-200-00-01	Cover Sheet	04
D14-CV-D-200-00-02	Specification Notes	04
D14-CV-D-200-00-03	Soil & Water Management Plan	04
D14-CV-D-200-00-04	Soil & Water Management Details	04
D14-CV-D-200-00-05	Stormwater Layout Plan	04
D14-CV-D-200-00-06	Stormwater Pit Schedule	04
D14-CV-D-200-00-07	Stormwater Catchment Plan	04
D14-CV-D-200-00-09	Stormwater Drainage Details	04

CLIENT UNSW SYDNEY

PROJECT MANAGER lendlease

ARCHITECT TZANNES

Warren Smith & Partners

Warren Smith & Partners Pty Ltd
Level 9, 233 Castlereagh Street, Sydney 2000 NSW Australia
02 9299 1312 wsp@warrensmith.com.au
www.warrensmith.com.au **ABN** 36 300 430 126

CONSULTING ENGINEERS
Hydraulic Services Fire Services Civil Services
Sydney Water Accredited Water Servicing Co-ordinator and Designer

GLOBAL COMPLIANCE CERTIFICATION GCC ISO 9001 Certified

Serving the Construction Industry since 1981.

TITLE: **COVER SHEET**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.Cz.	L.S.	M.C.	M.C.

JOB No.	DRAWING No.	ISSUE
5867012	D14-CV-D-200-00-01	04

DATE	STATUS
SEP 2018	SSDA SUBMISSION

Plot Date

GENERAL

G1. DESIGN HEREIN HAS BEEN PREPARED BY WARREN SMITH AND PARTNERS PTY LTD CONSULTING CIVIL ENGINEERS, LEVEL 9, 233 CASTLEREAGH ST, SYDNEY NSW 2000. TEL:- (02) 9299 1312

G2. THE DRAWINGS HEREIN SHALL BE READ AS REQUIRED IN CONJUNCTION WITH ARCHITECT DRAWINGS BY: TZANNES SUITE 2, LEVEL 5, 2-12 FOVEAUX ST, SURRY HILLS NSW 2010. TEL: (02) 9319 3744

G3. ALL DIMENSIONS IN MILLIMETRES UNO. REDUCED LEVELS AND CHAINAGES ARE IN METRES. DO NOT SCALE DRAWINGS. USE FIGURED DIMENSIONS.

G4. THE PROPOSED WORKS DETAILED HEREIN SHALL BE CONSTRUCTED TO THE REQUIREMENTS OF COUNCIL GENERALLY AS DETAILED HEREUNDER.

G5. ALL EXISTING SERVICES SHALL BE VERIFIED FOR DEPTH AND HORIZONTAL POSITION BY PHYSICAL MEANS PRIOR TO EXCAVATION. ANY DISCREPANCIES SHALL BE BROUGHT FORTHWITH TO THE PROJECT MANAGER'S ATTENTION.

G6. REFERENCE SHALL BE MADE TO THE CONSTRUCTION MANAGEMENT PLAN FOR ALL SITE WORKS DETAILED HEREIN.

STORMWATER & SUB-SOIL DRAINAGE

MATERIALS:

STW1. PIPES AND FITTINGS FOR STORMWATER DRAINAGE SHALL BE AS FOLLOWS UNO ON THE DRAWINGS:
A. SEWER GRADE uPVC (SN8) WITH SOLVENT WELDED JOINTS FOR BELOW GROUND DRAINAGE UP TO 225mm. FIBRE REINFORCED CEMENT WITH RUBBER RINGS, CLASS 3, FOR PIPE DIA'S GREATER THAN 225mm. UNO.
B. REINFORCED CONCRETE WHERE REQUIRED BY AS 3500 FOR EXCESSIVE DEPTH.
C. INSTALL IN ACCORDANCE WITH AUSTRALIAN STANDARD AS3500 EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.

STW2. PIPES & FITTINGS FOR SUBSOIL DRAINAGE SHALL BE SLOTTED POLYVINYL CHLORIDE (PVC) WITH SOLVENT WELDED JOINTS, MIN. 150mm DIAMETER.

STW3. IN GROUND DRAINAGE PIPEWORK SERVING DP's SHALL BE MINIMUM 150mm DIA. UNO.

STW4. GRATED DRAINS SHALL BE 150mm NOM.
A. 150mm NOM. WIDTH IN NON TRAFFICABLE AREAS.
B. 225mm NOM. WIDTH IN TRAFFICABLE AREAS.

STW5. STORMWATER PITS ARE AS SHOWN & SPECIFIED ON THE PLANS . PRECAST TYPE ACCEPTABLE WITH STEP IRONS FOR DEPTH GREATER THAN 1200. BENCH ALL PITS MIN. 30mm & FORM SMOOTH TRANSITION FROM INLET TO OUTLET.

STW6. SELECT FILL SHALL BE MATERIAL OBTAINED FROM EXCAVATION OF THE PIPE TRENCH OR IMPORTED WITH A PARTICLE SIZE FOR ROCK NOT GREATER THAN 75mm OR FOR OTHER THAN ROCK NOT GREATER THAN 150mm.

STW7. IMPORTED FILL SHALL BE EITHER, AND GENERALLY CONSIST OF SINGLE SIZED AGGREGATE WITH PARTICLE SIZE NOT GREATER THAN 5mm WRAPPED ALL ROUND WITH GEOTEXTILE FILTER FABRIC OR APPROVED HIGH COMPACTION SAND OR APPROVED CRUSHED ROAD GRAVEL CONFORMING TO RTA FORM 3051 OR SIMILAR.

STW8. STORMWATER PITS AND GRATES TO CONFORM WITH STANDARD COUNCIL REQUIREMENTS, WHERE ON PUBLIC LAND. GRATES TO BE SUPPLIED IN CLASS SHOWN ON THE DRAWINGS.

INSTALLATION REQUIREMENTS:

STW9. PIPES SHALL BE TRUE TO GRADES SHOWN AND ALIGNED SO THAT THE CENTRES OF THE INLET PIPES INTERSECT WITH THE CENTRE OF THE OUTLET PIPE AT THE DOWNSTREAM FACE OF THE PIT.

STW10. MINIMUM GRADES FOR GRAVITY STORMWATER DRAINAGE SHALL CONFORM TO AS3500 PART3 AS FOLLOWS, UNO:
1% FOR 100 AND 150 mm DIA.
0.5% FOR 225 mm DIA
0.5% FOR 300 mm DIA
0.4% FOR 375 mm DIA

STW11. MINIMUM DEPTH OF COVER SHALL BE :-
- 300mm IN PRIVATE PROPERTY (NON VEHICULAR TRAFFIC).
- 450mm IN PUBLIC AREAS.
- 600mm IN VEHICULAR TRAFFICABLE AREAS (FOOTWAY/ROADWAY)

STW12. BED ALL PIPES FIRMLY AND EVENLY ONTO IMPORTED BEDDING FILL MATERIAL.

STW13. LAY AND JOINT ALL PIPES IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS AND AS 3725-1989 BURIED FLEXIBLE PIPELINES AS 2566-1998 LOADS ON BURIED FLEXIBLE PIPELINES AS 1597.2-1996 PRECAST REINFORCED CONCRETE BOX CULVERTS. AS 3500-1990 NATIONAL PLUMBING & DRAINAGE CODE. PART 2, SANITARY PLUMBING AND SANITARY DRAINAGE. SYDNEY WATER REQUIREMENTS.

STW14. ALLOW TO TEST ALL PIPES AND PITS TO MANUFACTURERS REQUIREMENTS.

CONCRETE WORKS

C1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3600, THE STANDARDS ASSOCIATION AUSTRALIA, STANDARDS CITED IN AS3600, THE DRAWINGS AND THE SPECIFICATION.

C2. ALL CONCRETE SHALL BE 80mm NOMINAL SLUMP, 20mm MAXIMUM AGGREGATE WITH NO ADMIXTURES OR FLY ASH, UNLESS OTHERWISE APPROVED. ALL CONCRETE WORK IN CONTACT WITH SEWER TO HAVE TYPE SL PORTLAND CEMENT, OTHERWISE TYPE A CEMENT FOR BRIDGE WORKS, A MAXIMUM 56 DAYS SHRINKAGE OF 600 MICROSTRAIN, A MINIMUM CEMENT CONTENT 350kg/m3 AND MAXIMUM WATER:CEMENT RATIO OF 0.40.

C3. STRENGTH GRADE OF CONCRETE SHALL BE : 25 MPa (KERBS, EDGE STRIPS & CONCRETE ENCASEMENT) AND 32 MPa ELSEWHERE.

C4. CONSTRUCTION JOINTS SHALL BE PROPERLY FORMED AND USED ONLY WHERE SHOWN OR APPROVED. GENERALLY FOR HAND PLACED KERB & GUTTER 6mm THICK APPROVED BITUMINOUS MASTIC JOINTING MATERIAL SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 6m. FOR MACHINE PLACED KERB & GUTTER 6mm THICK APPROVED BITUMIOUS MASTIC JOINTING MATERIAL SHALL BE PROVIDED AT INTERVALS NOT EXCEEDING 12m & GUILLOTINED DUMMY GROOVED JOINTS, 25mm IN DEPTH, SHALL BE FORMED EVERY 3m OF GUTTER. JOINTS ARE ALSO REQUIRED AT EACH END OF GUTTER CROSSING AND GULLY PITS. JOINTS SHALL BE SET VERTICAL AND SQUARE TO THE KERB.

C5. REINFORCEMENT IS REPRESENTED DIAGRAMMATICALLY AND IS NOT NECESSARILY SHOWN IN TRUE PROJECTION.

C6. ELDING OR SPLICES IN REINFORCEMENT SHALL BE USED ONLY IN POSITIONS APPROVED BY THE ENGINEER.

C7. CONCRETE CURING SHALL BE IN ACCORDANCE WITH AS3600. CURING SHALL BE COMMENCED WITHIN TWO HOURS OF FINISHING OPERATIONS AND SHALL BE CONTINUED FOR A MINIMUM OF SEVEN DAYS BY AN APPROVED PROPRIETARY COMPOUND OR BY KEEPING CONTINUOUSLY WET.

C8. FORMWORK SHALL BE DESIGNED AND CONSTRUCTED IN ACCORDANCE WITH AS3610. FORMWORK SHALL NOT BE STRIPPED NOR PROPS REMOVED WITHOUT APPROVAL.

C9. FABRIC LAP DETAILS SHALL BE IN ACCORDANCE WITH FIG.13.2.4 OF AS3600.

C10. HOOKS, LAPS AND BENDS SHALL BE IN ACCORDANCE WITH AS3600 UNO.

C11. ALL CHEMICAL ANCHORS SHALL BE EITHER 'CHEMSET' BY "RAMSET" WITH THE GLASS CAPSULE SYSTEM INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS %%uOR HILTI HVU ADHESIVE ANCHOR WITH FOIL CAPSULE SYSTEM INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTION.

C12. ALL CHEMICAL ANCHORS SHALL BE HOT DIPPED GALVANIZED AND BE MIN M16 DIA. U.N.O.

GENERAL EARTHWORKS, SITEWORKS & FILLING:

FILLING:

SGE1. THESE CLAUSES SHALL BE READ IN CONJUNCTION WITH GEOTECHNICAL INVESTIGATION.

SGE2. THE RECOMMENDATIONS CONTAINED IN THE GEOTECH REPORT SHALL OVERRIDE THE CLAUSES PRESENTED HEREIN.

SGE3. STRIP ALL TOPSOIL AND UNDERLYING FILL AND STOCKPILE TOPSOIL FOR LATER REUSE FOR LANDSCAPING PURPOSES.

SGE4. NEW FILL REQUIRED TO REINSTATE CUT LEVELS TO PROPOSED BENCHING LEVELS SHALL BE SOURCED FROM OTHER PARTS OF THE EXCAVATION AS SELECT FILL OR IMPORTED FILL AS SPECIFIED BELOW IN SGE 4 AND SGE 5.

SGE5. SELECT FILL SHALL CONSIST OF LOCALLY DERIVED OR CUT NATURAL CLAYS.

SGE6. IMPORTED FILL SHALL CONSIST OF RIPPED SANDSTONE OR SHALE OR SIMILAR MATERIAL WITH MAXIMUM PARTICLE SIZE NOT GREATER THAN 120mm AND A MOISTURE CONTENT WITHIN 2-3% OF STANDARD OPTIMUM.

SGE7. ALL FILL (COHESIVE SOIL) SHALL BE PLACED IN LAYERS OF 200mm MAXIMUM THICKNESS, COMPACTED BY MACHINE ROLLING TO ACHIEVE A DRY DENSITY RATIO OF NOT LESS THAN 98% STANDARD MAXIMUM AT A CORRESPONDING MOISTURE CONTENT WITHIN 2-3% OF STANDARD OPTIMUM.

SGE8. IN AREAS WHERE HIGH IMPACT ROLLING IS USED TEST EACH FINAL LAYER OF NOT GREATER THAN 300mm TO 400mm TO ACHIEVE A DRY DENSITY SGE8. RATIO OF NOT LESS THAN 98% STANDARD MAXIMUM AT A CORRESPONDING MOISTURE CONTENT WITHIN 2-3% OF STANDARD OPTIMUM.

EXCAVATION BATTERS:

SGE9. ALL TEMPORARY BATTERS CUT IN CLAY SUBSTRATE SHALL BE 1 HORIZ : 1 VERT. ALL LONG TERM EXPOSED BATTERS CUT IN CLAY SUBSTRATE SHALL BE 2 HORIZ : 1 VERT. ALL DETENTION BASIN BATTERS IN CLAY SUBSTRATE SHALL BE 3 HORIZ : 1 VERT. ALL DETENTION BASIN BATTERS IN ROCK SUBSTRATE SHALL BE NEAR VERTICAL.

SGE10. GEOTECHNICAL TESTING IS TO BE UNDERTAKEN TO AT LEAST LEVEL 2 CONTROL OF FILL COMPACTION STANDARD, AS DEFINED IN AS. 3738 AS FOLLOWS:

- FOR GENERAL FILL OR CUT AREAS OVER THE AREA PROVIDE ONE (1) TEST PER 200mm LAYER, OVER AN AREA NOT GREATER THAN 500 m^2
- FOR GENERAL FILL AREAS IN CONCENTRATED AREAS ADJACENT TO AND BEHIND THE STRUCTURE AND ADJACENT TO AND BEHIND RETAINING WALLS PROVIDE ONE (1) TEST PER 200mm LAYER, OVER AN AREA NOT GREATER THAN 50m^2

SGE11. SUBMIT ALL GEOTECHNICAL TEST RESULTS TO WARREN SMITH & PARTNERS FOR REVIEW PRIOR TO CONTINUATION WITH SUBSEQUENT SECTION OF WORK.

EARTH WORKS FOR SERVICES

E1. EXCAVATE TRENCHES AND STOCKPILE ALL MATERIAL FOR INSPECTION WITH REGARD TO RE-USE FOR TRENCH BACKFILL. REMAINING MATERIAL TO BE REMOVED FROM SITE.

E2. BEDDING MATERIAL SHALL CONSIST OF IMPORTED FILL ONLY. THICKNESS OF BEDDING LAYER SHALL BE 75mm IN O.T.R. AND 200mm IN ROCK.

E3. EMBED ALL PIPES WITH IMPORTED FILL. PROVIDE 200mm SIDE SUPPORT AND 150mm OVERLAY ABOVE PIPE CROWN.

E4. TRENCH FILL ABOVE THE EMBEDMENT ZONE TO THE UNDERSIDE OF THE ROAD PAVEMENT OR FOOTWAY FILL MATERIAL SHALL BE AS FOLLOWS :

UNDER ROADWAY

TRENCH FILL MATERIAL SHALL CONSIST OF IMPORTED FILL AS SPECIFIED HEREIN OF EITHER HIGH GRADE COMPACTION SAND OR APPROVED CRUSHED ROAD GRAVEL CONFORMING TO RTA FORM 3051 OR SIMILAR.

OTHER THAN ROADWAY

TRENCH FILL MATERIAL EXCAVATED SHALL CONSIST OF SELECT FILL AS SPECIFIED HEREIN AND SHALL NOT CONTAIN MORE THAN 20% OF STONES OF SIZE BETWEEN 75mm & 150mm AND NONE LARGER THAN 150mm. PRIOR TO THE USE OF THE EXCAVATED MATERIAL IT SHALL BE INSPECTED AND APPROVED BY THE CONSULTANT.

E5. COMPACT BEDDING, EMBEDMENT AND TRENCH FILL MATERIALS AS FOLLOWS:

EMBEDMENT:-
FOR GRANULAR FILL MATERIAL (NON-COHESIVE SOILS) EG. COARSE AGGREGATE FILL, HIGH GRADE COMPACTION SAND, THE DENSITY INDEX (ID) SHALL BE NOT LESS THAN 70%.

TRENCH FILL:-
FOR GRANULAR MATERIAL (NON-COHESIVE SOILS), THE DENSITY INDEX (ID) SHALL BE NOT LESS THAN 70%.

FOR NON-GRANULAR FILL MATERIAL (COHESIVE SOILS), THE DRY DENSITY RATIO (RD) SHALL BE NOT LESS THAN 95%.

E6. MEASURE OF COMPACTION:-
THE DEGREE OF COMPACTION SHALL BE MEASURED BY ONE OF THE FOLLOWING PARAMETERS :-

GRANULAR FILL (NON-COHESIVE SOILS). THE DENSITY INDEX (ID) DETERMINED IN ACCORDANCE WITH AS 1289.E6.1 BASED ON THE MAXIMUM AND MINIMUM DRY DENSITIES IN ACCORDANCE WITH AS 1289.E5.1 AND THE FIELD DRY DENSITY IN ACCORDANCE WITH AS 1289.5.3.2, AS 1289.E3.5 OR AS 1289.E8.1.

NON-GRANULAR FILL (COHESIVE SOILS). THE DRY DENSITY RATION (RD) DETERMINED IN ACCORDANCE WITH AS 1289.5.4.1 BASED ON THE FIELD DRY DENSITY IN ACCORDANCE WITH AS 1289.5.3.2 AND THE MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289.5.1.1

E7. GEOTECHNICAL TESTING IS TO BE UNDERTAKEN TO AT LEAST LEVEL 2 CONTROL OF FILL COMPACTION STANDARD, AS DEFINED IN AS. 3738 AS FOLLOWS:

- TEST EACH 300mm LAYER ABOVE PIPE CROWN.
- TEST BASE & SUB-BASE LAYERS WHERE APPLICABLE.
- TESTS SHALL BE REQUIRED AT EACH 50m CENTRES WHERE THE LENGTH OF TRENCH IS WITHIN THE 50m REQUIREMENT.

E8. SUBMIT ALL GEOTECHNICAL TEST RESULTS TO WARREN SMITH & PARTNERS FOR REVIEW PRIOR TO CONTINUATION WITH SUBSEQUENT SECTION OF WORK.

RESTORATION:

RES1. RESTORE ALL TRAFFIC AREAS TO PRE EXISTING CONDITION.

RES2. FOR ALL SURFACES OTHER THAN IN TRAFFIC AREAS RESTORE DISTURBED SURFACES TO PRE-EXISTING CONDITIONS AND COMPACT AS SPECIFIED.

RES3. RESTORE ALL AUTHORITY OWNED AREAS TO COUNCIL STANDARDS.

ROAD WORKS, DRIVEWAYS & CARPARKS

R1. ALLOW FOR LEVEL 2 TESTING AND SUB-GRADE CONDITIONS & PAVEMENT THICKNESS TO BE VERIFIED BY GEOTECHNICAL CONSULTANT AFTER INSPECTION OF PRELIMINARY BOXING.

R2. ALLOW FOR ANY SUB-GRADE REPLACEMENT WORK TO BE DETERMINED AS REQUIRED BY GEOTECHNICAL CONSULTANT AT THE TIME OF PAVEMENT CONSTRUCTION.

R3. MINIMUM DRY DENSITY RATIOS (AS 1289 3.4.1-1993) TO BE:

BASE COURSE:	98% MODIFIED
SUB-BASE:	95% MODIFIED
SUB-GRADE:	100% STANDARD
SUB-GRADE REPLACEMENT:	100% STANDARD

R4. PAVEMENT MATERIALS TO COMPLY WITH RMS SPECIFICATION No. 3051 OR SIMILAR AS APPROVED BY GEOTECHNICAL CONSULTANT.

R5. PROVIDE (1) TEST FOR EACH LAYER NOT EXCEEDING 250mm THICK BEING BASECOURSE, SUB-BASE & SUB-GRADE OVER AN AREA NOT GREATER THAN 500m^2.

R6. SUBMIT ALL GEOTECHNICAL TEST RESULTS TO WARREN SMITH & PARTNERS FOR REVIEW PRIOR TO CONTINUATION WITH SUBSEQUENT SECTION OF WORK.

APPROVALS

A1. THE AS CONSTRUCTED WORKS SHALL BE INSPECTED BY DESIGN CONSULTANT. MINIMUM 48 HOURS NOTICE SHALL APPLY TO ALL INSPECTIONS.

A2. THE DESIGN PLANS HEREIN ARE SUBJECT TO COUNCIL APPROVAL PRIOR TO CONSTRUCTION. OBTAIN EXPRESS (WRITTEN) ADVICE TO PROCEED FROM PROJECT MANAGER PRIOR TO COMMENCEMENT.

A3. SUBMIT WORK-AS-EXECUTED DRAWINGS IN CIVILCAD OR DXF DIGITAL FORMAT AND HARD COPY FORMAT. VERIFY ALL CONSTRUCTION WORKS SHOWN HEREON.

A4. CERTIFY THAT THE AS CONSTRUCTED SYSTEM HAS BEEN BUILT IN ACCORDANCE WITH THE APPROVED PLANS ISSUED FOR CONSTRUCTION.

SERVICES UNDER ROAD SURFACES

S1. ALL OTHER SERVICES INCLUDING BUT NOT LIMITED TO WATER, HYDRANT, GAS, SEWER, ELECTRICAL AND COMMUNICATIONS CONDUITS OR CABLES SHALL BE LAID WITH MINIMUM 600mm U.N.O. COVER BELOW PROPOSED ROAD SURFACE OR APPROVED OTHER MEANS TO PROTECT DURING CONSTRUCTION.

ROAD SIGNS & LINE MARKING

RS1. ALL SIGNS AND LINEMARKING SHALL BE TO RMS STANDARDS AND SPECIFICATIONS AND AS.1742, MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES.

RS2. ALL LINEMARKING SHALL BE AUGMENTED BY RETROREFLECTIVE RAISED PAVEMENT MARKERS (RRPMs) AND ALL SHALL BE TO AS 1742.2 - 1994 AND AS 1742.2 /AMDT 1/1997-10-05

RS3. ALL ROAD SIGNS AND POSTS SHALL BE TO AS 1742.2 - 1994 AND AS 1742.2 /AMDT 1/1997-10-05

PROTECTION OF FLORA - REFER SPECIFICATION

1. ANY TRENCHES WITHIN 3m OF TREES SHALL BE HAND DUG TO AVOID DAMAGE TO TREE ROOTS.

2. THE SEWERAGE WORKS HAVE BEEN LOCATED TO MINIMISE CLEARING AND DAMAGE TO THE EXISTING FLORA ENVIRONMENT. NO TREES ARE PERMITTED TO BE REMOVED OR DAMAGED UNO. CONSTRUCTION OF THE SEWER GRAVITY OR RISING MAIN IN THE VICINITY OF EXISTING TREES SHALL BE HAND EXCAVATED ONLY, ENSURING IRREVERSIBLE DAMAGE OF THE ROOT SYSTEM DOES NOT OCCUR.

3. IF IT IS CONSIDERED NECESSARY TO PERFORM ANY WORK ON TREES, INCLUDING TRIMMING, LOPPING, ROOT CUTTING, REPAIR AND REMOVAL, APPLICATION IN WRITING SHALL BE MADE BY THE CONTRACTOR TO THE SUPERINTENDENT. ANY WORK PERMITTED TO BE DONE ON TREES TO BE RETAINED SHALL BE PERFORMED BY AN APPROVED TREE SURGEON.

4. NO MATURE TREES OR SHRUBS ARE TO BE REMOVED FOR THE PURPOSES OF THE WORKS WITHOUT PRIOR APPROVAL OF RANDWICK CITY COUNCIL.

AUTHORITY STANDARDS

LGA 1. THE DRAWINGS HEREIN SHALL BE READ IN CONJUNCTION WITH LOCAL AUTHORITY'S STANDARDS & SPECIFICATIONS WHICH SHALL OVERRIDE SPECIAL DETAILS SHOWN ON THE DRAWINGS.

.

CLOSED CIRCUIT COLOUR TV (CCTV)

CCTV1. UNDERTAKE A CCTV INSPECTION OF ALL THE COMPLETED DRAINAGE IN ACCORDANCE WITH THE GUIDELINES OF THE THE AUSTRALIAN CONDUIT CONDITION EVALUATION MANUAL (ACCEM).

CCTV2. APPLY THE FOLLOWING REQUIREMENTS TO THE CCTV INSPECTION:-
A. USE DATA CAPTURE SOFTWARE APPROVED BY SYDNEY WATER
B. USE CERTIFIED CCTV OPERATORS
C. THE CCTV VIDEOTAPE SHALL BE OF QUALITY TO ALLOW ACCURATE ASSESSMENT OF THE INTERNAL CONDITION OF THE PIPE.

CCTV3. FURNISH TO THE DESIGN OF THE CONSULTANT:-
A. VIDEOS IN MPG FORMAT FOR REVIEW
B. CCTV REPORT AND SURVEY DATA IN PDF FORMAT

PRELIMINARY - NOT FOR CONSTRUCTION

DO NOT SCALE FROM DRAWINGS, CHECK & VERIFY ALL DIMENSIONS & LEVELS BEFORE COMMENCEMENT OF ANY WORK.

THIS DRAWING IS NOT TO BE COPIED IN PART OR WHOLE WITHOUT WRITTEN PERMISSION FROM WARREN SMITH AND PARTNERS.

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
01	DRAFT SSDA SUBMISSION	25/10/18			
02	SSDA SUBMISSION	06/11/18			
03	SSDA RESUBMISSION	08/11/18			
04	SSDA RESUBMISSION RTS	03/04/19			

CLIENT: UNSW SYDNEY

PROJECT: UNIVERSITY HALL PRECINCT SITE REDEVELOPMENT

PREPARED BY
Warren Smith & Partners
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CONSULTING ENGINEERS
Hydraulic Services Fire Services
Civil Services Sydney Water Accredited Water Servicing Co-ordinator and Designer
SERVING THE CONSTRUCTION INDUSTRY SINCE 1981.

TITLE: SPECIFICATION NOTES

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.Cz.	L.S.	M.C.	M.C.

JOB No.	DRAWING No.	ISSUE
5867012	D14-CV-D-200-00-02	04

DATE	STATUS
SEP 2018	SSDA SUBMISSION

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Xref's: X:5867012\13 TB_SSDA
Plot Date: 03.04.2019@10:41:54

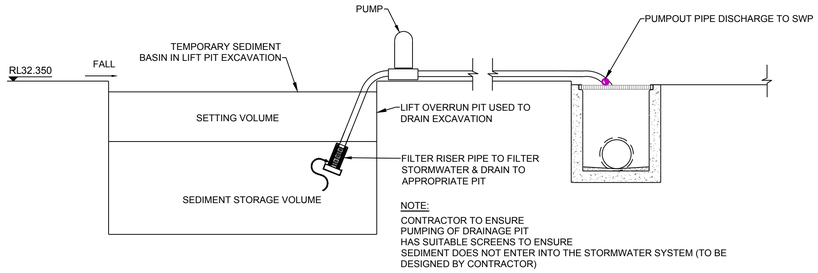
0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

LEGEND

- SITE FENCE
- SITE GATE
- SEDIMENT FENCE
- GEOTEXTILE INLET FILTER - DROP INLET SEDIMENT TRAP
- VEHICLE ENTRY SHAKER GRID
- SITE STOCKPILE
- CATCH DRAIN
- BASIN PUMPOUT PIPE

NOTES:

1. INSTALLATION OF ALL EROSION AND SEDIMENT CONTROL MEASURES IS TO BE IN ACCORDANCE WITH THE LATEST EDITION OF THE 'BLUE BOOK - MANAGING URBAN STORMWATER'. ALL CONTROLS ARE TO BE INSTALLED PRIOR TO CONSTRUCTION COMMENCING.
2. THE CONTRACTOR IS RESPONSIBLE FOR THE CORRECT INSTALLATION AND ONGOING MAINTENANCE OF THE CONTROLS. REFER TO DRG D14-CV-D-200-00-04 FOR MAINTENANCE REQUIREMENTS.
3. STOCKPILES ARE TO REMAIN CLEAR OF SITE ACCESS, DRAINS AND PAVED AREAS. HEIGHT OF STOCKPILE SHALL NOT EXCEED 2m.
4. SUITABLE AND APPROVED BINS SHALL BE UTILISED FOR THE CONTAINMENT OF ALL HARD WASTE, INCLUDING CONCRETE SLURRIES, BUILDING WASTE AND LITTER. IN THE CASE OF ACCIDENTAL SPILLS OF SOIL OR OTHER MATERIAL, PARTICULARLY IN THE PUBLIC RESERVE, THE MATERIAL SHALL BE SWEPT AND CONTAINED AND NOT WASHED INTO A GUTTER.
5. RANDWICK COUNCIL 'DO IT RIGHT ON SITE' GUIDES FOR SEDIMENT AND EROSION CONTROL TO BE ADHERED TO IN CONJUNCTION WITH SPECIFIED SEDIMENT AND EROSION CONTROL MEASURES.



DETAIL A: TYPICAL CROSS SECTION OF SEDIMENT BASIN & PUMPOUT

SCALE 1:40

VEHICLE ENTRY SHAKER GRID - TYP. LOCATION TO BE CONFIRMED ON SITE BY THE BUILDER DURING CONSTRUCTION PHASE.

STOCKPILE LOCATION IS INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE BUILDER DURING CONSTRUCTION PHASE.

BASIN PUMPOUT. REFER TO DETAIL A FOR TYPICAL CROSS SECTION OF SEDIMENT BASIN AND PUMPOUT.

10.2m LONG x 6.9m WIDE x 2.2m DEEP LIFT OVERRUN PIT. USE AS PUMPOUT PIT. PROVIDE SEDIMENT AND EROSION CONTROL MEASURES. CONNECT TO SUITABLE DRAINAGE PIT.

C13 WHITE HOUSE

College road

COLLEGE ROAD

PRELIMINARY - NOT FOR CONSTRUCTION

DO NOT SCALE FROM DRAWINGS, CHECK & VERIFY ALL DIMENSIONS & LEVELS BEFORE COMMENCEMENT OF ANY WORK.

THIS DRAWING IS NOT TO BE COPIED IN PART OR WHOLE WITHOUT WRITTEN PERMISSION FROM WARREN SMITH AND PARTNERS.

NORTH

PLAN SCALE 1:200 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
01	DRAFT SSDA SUBMISSION	25/10/18			
02	SSDA SUBMISSION	06/11/18			
03	SSDA RESUBMISSION	08/11/18			
04	SSDA RESUBMISSION RTS	02/04/19			

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TITLE: **SOIL & WATER MANAGEMENT PLAN**

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.Cz.	L.S.	M.C.	M.C.

JOB No.	DRAWING No.	ISSUE
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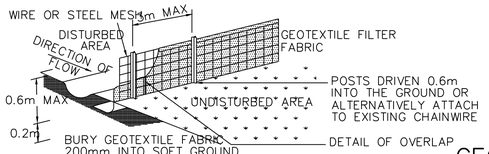
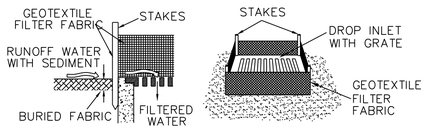
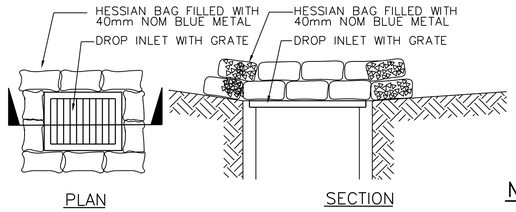


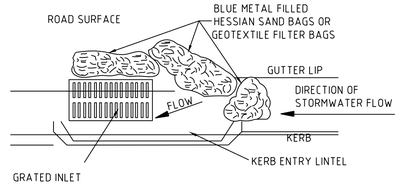
SEDIMENT CONTROL FENCE
NTS



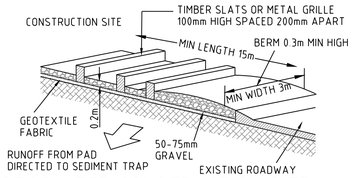
GEOTEXTILE FILTER FABRIC DROP INLET SEDIMENT TRAP
NTS



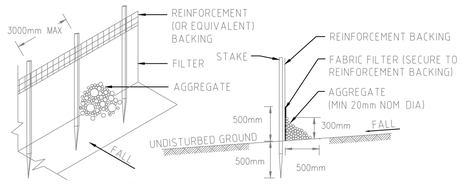
HESSIAN BAG DROP INLET SEDIMENT TRAP
NTS



NEW/EXISTING GRATED KERB ENTRY PIT SEDIMENT CONTROL BARRIER
NTS



STABILIZED CONSTRUCTION SITE VEHICLE ENTRY/EXIT
NTS



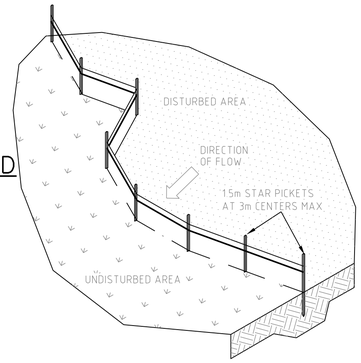
SEDIMENT FENCE DETAIL FOR ROCKY GROUND
NTS

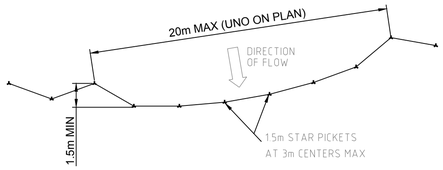
SEDIMENT FENCE NOTES: –

1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE OR AT THE TOE OF A SLOPE.
2. DRIVE 1.5 METRE LONG STAR PICKETS INTO GROUND SUFFICIENT TO PROVIDE RIGID SUPPORT, 3 METERS APART. WHERE THERE IS INSUFFICIENT SOIL DEPTH OVER ROCK, HOLES ARE TO BE DRILLED INTO ROCK TO ACCEPT THE STAR PICKETS.
3. ON SOFT GROUND MATERIALS, DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE
4. FABRIC TO BE ENTRENCHED.
5. BACKFILL TRENCH OVER BASE OF FABRIC & COMPACT.

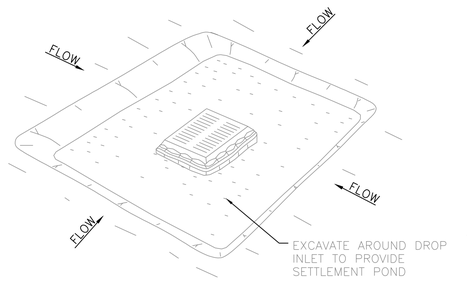
   FIX SELF–SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY THE GEOTEXTILE
6. MANUFACTURER. USE A REINFORCEMENT BACKING WITH NON SELF–SUPPORTING GEOTEXTILE FABRIC.
7. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
8. ON HARD OR ROCKY GROUND, SMOOTH A 500mm WIDE STRIP UPSLOPE OF THE FENCE LINE. TURN THE BOTTOM 500mm OF THE FABRIC UPSLOPE AND ANCHOR IN PLACE WITH SUITABLE AGGREGATE.

   WHERE A SEDIMENT FENCE IS CONSTRUCTED DOWN SLOPE FROM A DISTURBED BATTER THE FENCE SHOULD BE LOCATED 1.5 TO 2.0 METERS DOWN SLOPE FROM THE TOE OF THE BATTER.





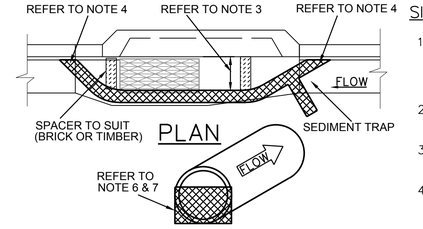
SEDIMENT FENCE LAYOUT PLAN
NTS



EXCAVATED SEDIMENT TRAP
NTS

EXCAVATED SEDIMENT TRAP NOTES: –

1. REMOVE THE SEDIMENT WHEN IT HAS ACCUMULATED TO HALF THE DESIGN DEPTH OF THE TRAP AND RESTORE THE TRAP TO ITS ORIGINAL DIMENSIONS.
2. PROVIDE 50 cu.m/Ha OF SEDIMENT STORAGE VOLUME.
3. REFER TO THE MAINTENANCE REQUIREMENTS.



GEOTEXTILE FILTER BAGS
NTS

SEDIMENT BARRIER FOR PITS & PIPES, NOTES: –

1. SLEEVES ARE TO BE MADE FROM GEOTEXTILE FABRIC LONGER THEN THE LENGTH OF THE INLET PIT.
2. FILL SLEEVE WITH 5 OR 10mm CLEAN GRAVEL.
3. PLACE THE SLEEVE AT THE OPENING OF THE KERB INLET LEAVING A 100mm GAP TO ACT AS AN EMERGENCY OVERFLOW.
4. SLEEVE MUST BE PLACED AGAINST THE KERB TO PREVENT
5. BYPASS.
6. FIT SLEEVE TO ALL INLETS DOWNSTREAM OF THE WORKS.

   FOR DRAINAGE WORKS FIT GEOTEXTILE FABRIC OR GEO
7. BAGS TO UPSTREAM FACE OF ALL OPEN PIPES.

   MAINTAIN AN OPENING AT THE TOP OF THE PIPE OF 1/3
8. OF THE PIPE DIAMETER.
9. THE FILTERS ARE TO BE CLEANED AND MAINTAINED DAILY.

   ALL CARE SHOULD BE TAKEN TO MINIMIZE SEDIMENT REACHING THE STORMWATER SYSTEM BY MINIMIZING EXCAVATION WORKS AND PREVENTING EXCESS WATER FLOW THROUGH WORKS.

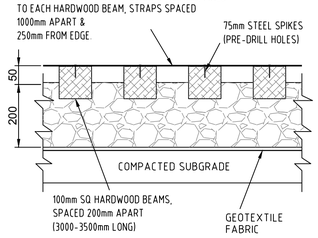
SITE ENTRY/EXIT NOTES: –

1. ALL VEHICLE ENTRANCES & EXITS TO THE CONSTRUCTION SITE MUST BE STABILIZED TO PREVENT THEM BECOMING A SOURCE OF SEDIMENT, BY PROVIDING A VEHICLE SHAKE AREA. THIS MAY CONSIST OF A TIMBER, CONCRETE OR STEEL SHAKER GRID OR RUBBLE AREA.
2. THE VEHICLE EXIT AREA IS TO BE MAINTAINED IN A CLEAN & SERVICEABLE CONDITION DURING THE TOTAL
3. TIME OF USAGE.

   ANY UNSEALED ROAD BETWEEN THE DEVICE AND
4. COUNCILS ROADWAY IS TO BE TOPPED WITH 100mm THICK, 40mm NOMINAL SIZE AGGREGATE.

   PUBLIC ROADS MUST BE KEPT FREE OF DIRT AND MUD.
5. SEDIMENT TRACKED ONTO THE PUBLIC ROADWAY BY VEHICLES LEAVING THE CONSTRUCTION SITE IS TO BE SWEPT UP IMMEDIATELY.

   FENCES SHOULD BE ERECTED TO ENSURE VEHICLES CAN NOT BYPASS THE STABILIZED ACCESS POINTS, UNLESS COMING FROM A STABILIZED AREA.

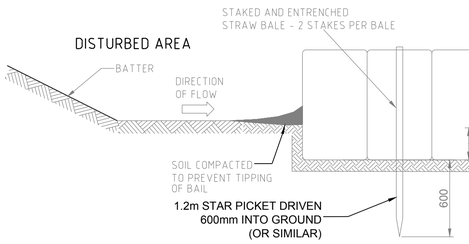


VEHICLE SHAKER GRID
NTS

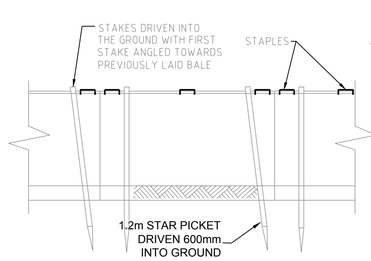
SITE ENTRY/EXIT CONSTRUCTION NOTES: –

1. STRIP TOP SOIL & LEVEL SITE. PROVIDE CATCH DRAIN AT SIDES TO DIRECT RUNOFF WATER TO SEDIMENT TRAPS.
2. COMPACT SUBGRADE AND REMOVE ANY HIGH POINTS.
3. COVER AREA WITH GEOTEXTILE FABRIC. THIS MAY BE WOVEN OR NEEDLE PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4–90) OF 2500 N.
4. CONSTRUCT 200mm THICK RUBBLE PAD OVER GEOTEXTILE USING ROAD BASE OR 30–40mm AGGREGATE. MINIMUM LENGTH 15 METRES OR TO BUILDING ALIGNMENT. MINIMUM WIDTH 3 METRES. CONSTRUCT 300mm HIGH HUMP IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT TRAP.
5. WHERE GRIDS ARE USED FIRST CONSTRUCT A 150 THICK PAD OVER GEOTEXTILE FABRIC. LEVEL THIS IN BOTH DIRECTIONS. LOWER GRID ON TO THE PREPARED BASE AND ENSURE THAT NO PART IS SITTING ON ANY HIGH POINTS. BACKFILL THE SPACES
6. BETWEEN THE GRIDS TO WITHIN 50mm OF THE TOP.

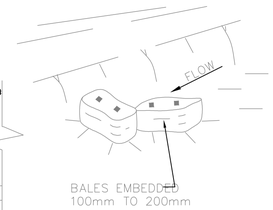
   PROVIDE RAMPS AT ENDS AND SIDE OF GRIDS. IF DEPRESSIONS OCCUR IN THE RAMPS DURING USE. ADD ADDITIONAL MATERIAL.



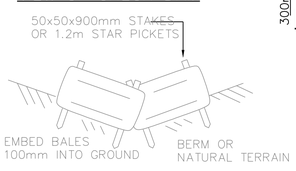
TYPICAL STRAW BALE SECTION
NTS



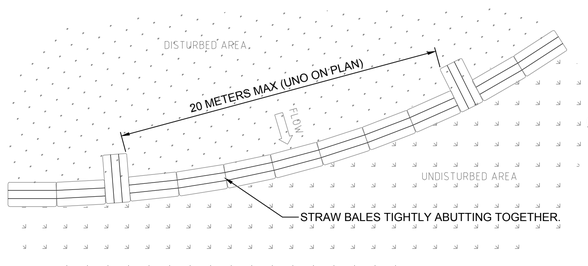
TYPICAL STRAW BALE DETAIL
NTS



VIEW OF CHECK DAM



CHECK DAM SECTION



TYPICAL STRAW BALE LAYOUT PLAN
NTS

STRAW BALE NOTES: –

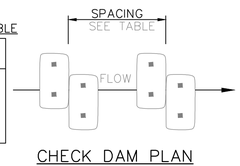
1. CONSTRUCT STRAW BALE FILTER AS CLOSE AS POSSIBLE TO PARALLEL TO THE CONTOURS OF THE SITE OR AT THE TOE OF A SLOPE.
2. PLACE BALES LENGTHWISE IN A ROW WITH ENDS TIGHTLY ABUTTING. USE STRAW TO FILL ANY GAPS BETWEEN BALES. STRAWS TO BE PLACED PARALLEL TO GROUND.
3. MAXIMUM HEIGHT OF FILTER IS ONE BALE.
4. ON SOFT MATERIALS, EMBED EACH BALE IN THE GROUND 75mm TO 100mm AND ANCHOR WITH TWO 1.2 METRE STAR PICKETS. ANGLE THE FIRST STAKE IN EACH BALE TOWARDS THE PREVIOUSLY LAID BAIL. DRIVE STAKES 600mm INTO THE GROUND AND FLUSH WITH THE TOP OF
5. THE BALES.

   WHERE A STRAW BALE FILTER IS CONSTRUCTED DOWN SLOPE FROM A DISTURBED BATTER THE BALES SHOULD BE
6. LOCATED 1.5 TO 2.0 METERS DOWN SLOPE FROM THE TOE OF THE BATTER.

   WHERE REQUIRED WRAP GEOTEXTILE FILTER FABRIC

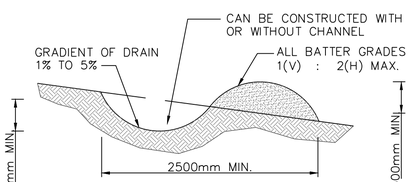
CHECK DAM SPACING TABLE

LONGITUDINAL GRADE (%)	SPACING (METERS)
0 – 5	40
5 –10	30
10 – 15	20
GREATER THAN 15	10



CHECK DAM PLAN

STRAW BALE CHECK DAM DETAILS
NTS



DIVERSION DRAIN (LOW FLOW)
NTS

DIVERSION DRAIN NOTES: –

1. CONSTRUCT WITH GRADIENT OF 1 PER CENT TO 5 PER CENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE.
3. DRAINS TO BE OF CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTION NOT V–SHAPED.
4. EARTH BANKS TO BE ADEQUATELY COMPACTED IN ORDER TO PREVENT FAILURE.
5. PERMANENT OR TEMPORARY STABILIZATION OF THE EARTH BANK TO BE COMPLETED WITHIN 10 DAYS OF
6. CONSTRUCTION.

   ALL OUTLETS FROM DISTURBED LANDS ARE TO FEED
7. INTO A SEDIMENT BASIN OR SIMILAR.

   DISCHARGE RUN OFF COLLECTED FROM UNDISTURBED LANDS ONTO EITHER A STABILIZED OR AN UNDISTURBED
8. DISPOSAL SITE WITHIN THE SAME SUBCATCHMENT AREA FROM WHICH THE WATER ORIGINATED.
9. COMPACT BANK WITH A SUITABLE IMPLEMENT IN SITUATIONS WHERE THEY ARE REQUIRED TO FUNCTION FOR MORE THAN FIVE DAYS.

   EARTH BANKS TO BE FREE OF PROJECTIONS OR OTHER

MAINTENANCE REQUIREMENTS: –

1. ACCUMULATED SILT & SEDIMENT MUST BE REMOVED AT REGULAR INTERVALS AND AFTER EACH MAJOR STORM.
2. SILT & SEDIMENT MUST BE REMOVED FROM OFF THE SITE OR TO A COUNCIL APPROVED LOCATION WITHIN THE SITE, WHERE IT WILL NOT ERODE.
3. THE SEDIMENT FENCES, BALES & TRAPS SHALL BE REGULARLY INSPECTED, ESPECIALLY AFTER RAIN AND KEPT IN GOOD REPAIR AND FUNCTIONING CONDITION AT ALL TIMES.
4. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT SEDIMENT, EROSION & WATER POLLUTION
5. SHALL BE MINIMIZED.

   THE SEDIMENT TRAPS SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE CONSTRUCTION AREA HAS BEEN PROPERLY STABILIZED

PRELIMINARY - NOT FOR CONSTRUCTION

NOT TO SCALE

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LEGEND

- SITE BOUNDARY
- SSD DEVELOPMENT BOUNDARY
- HERITAGE CONSERVATION BOUNDARY
- Ø225 — PIPE DIAMETER AND DIRECTION OF FLOW
- SW — PROPOSED STORMWATER PIPE
- JUNCTION PIT
- GRATED INLET PIT
- GRATED TRENCH DRAIN
- GD — PIT STRUCTURE NUMBER
- 1/1 — STORMWATER LINE NUMBER
- SW — PROPOSED STW PIPE TO BE INSTALLED AS PART OF EARLY WORKS

NOTES:

1. TRANSFER SLABS TO BE INSTALLED OVER 16.11m SECTION OF PIPE WITHIN ROADWAY/TRAFFICABLE AREAS.
2. PIT 1/2 TO BE FITTED WITH 1 x ENVIROPOD, SUPPLIED BY OCEAN PROTECT.

B10 UNIVERSITY VILLAGE

B14d FIG TREE THEATRE

B15 OLD TOTE BUILDING

B16 COLOMBO HOUSE

C13 WHITE HOUSE

D16 GOLDSTEIN HAL

E14

Fig tree lane

COLLEGE ROAD

College road

9.70m LONG 'ACO K200' GRATED TRENCH DRAIN WITH CLASS B HEELSAFE GRATE TO BE BOLTED DOWN. CHANNEL TO BE GRADED AT 0.5%.

57 L/s (FIRE)

2.29m LONG 'ACO K200' GRATED TRENCH DRAIN WITH CLASS B HEELSAFE GRATE TO BE BOLTED DOWN. CHANNEL TO BE GRADED AT 0.5%.

2.29m LONG 'ACO K200' GRATED TRENCH DRAIN WITH CLASS B HEELSAFE GRATE TO BE BOLTED DOWN. CHANNEL TO BE GRADED AT 0.5%.

3.44m LONG 'ACO K200' GRATED TRENCH DRAIN WITH CLASS B HEELSAFE GRATE TO BE BOLTED DOWN. CHANNEL TO BE GRADED AT 0.5%.

INFILTRATION SYSTEM DETAILS
PIPE TYPE: ROCLA PLASTREAM Ø1050 SLOTTED PIPE
VOLUME: 185.70m³
OUTLET DIAMETER: 6 x Ø1050mm
ORIFICE DIAMETER: 6 x Ø95mm

16.11m

CONNECTION TO BE MADE TO EXISTING STORMWATER PIT IN COLLEGE ROAD.

PERCOLATION CHAMBER

PRELIMINARY - NOT FOR CONSTRUCTION

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NORTH

5.0 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:250 A1 SHEET

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

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CLIENT
UNSW SYDNEY

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TITLE
STORMWATER LAYOUT PLAN

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.Cz.	L.S.	M.C.	M.C.

JOB No.	DRAWING No.	ISSUE
5867012	D14-CV-D-200-00-05	04

DATE	STATUS
SEP 2018	SSDA SUBMISSION

Xrefs: X:\5867\13-TB_SSDA_X-5867013-AR_Layout_X-5867012-AR_Property Boundary_X-5867013-SW_Layout_X-5867012-SU_Utilities SW_X-5867012-SU_Ground_X-5867013-SW_Diversion_X-5867012-AR_Landscape Ground Floor
Plot Date: 03.04.2019@14:18:40 Login Name: MCzarnecka Cad File: T:\5867\012\Drawings\AutoCAD\Civil\Dwgs\Civil 2015\SSDA\D14-CV-D-200-00-05 Stormwater Layout Plan.dwg

NAME	SURFACE ELEV. (m)	PIT DEPTH (m)	PIT SIZE AND TYPE	FROM	TO	LENGTH (m)	U/S IL (m)	D/S IL (m)	SLOPE (%)	PIPE TYPE	DIA (mm)	NO. PIPES
PIT 1/1	33.58	0.83	600SQ PIT, CLASS B GRATE	PIT 1/1	PIT 2/1	16.52	32.75	31.91	5.08	uPVC(SN8)	225	1
PIT 2/1	32.74	0.94	900SQ PIT, CLASS B GRATE	PIT 2/1	PIT 3/1	16.9	31.8	31.2	3.55	RCP (CLASS 3)	300	1
PIT 3/1	32.1	1.01	900SQ PIT, CLASS B GRATE	PIT 3/1	PIT 4/1	14.5	31.09	30.52	3.93	RCP (CLASS 3)	375	1
PIT 4/1	31.5	1.01	900SQ PIT, CLASS B GRATE	PIT 4/1	PIT 5/1	18.7	30.49	30.12	1.98	RCP (CLASS 3)	375	1
PIT 5/1	31.1	1.01	900SQ PIT, CLASS D COVER	PIT 5/1	PIT 6/1	2.15	30.09	29.97	5.58	RCP (CLASS 3)	375	1
PIT 6/1	30.95	2.25	9m x 0.9m PIT, CLASS D COVER	PIT 6/1	PIT 7/1	35.74	28.7	28.5	0.56	ROCLA PLASTREAM SLOTTED PIPE	1050	6
PIT 7/1	30	1.59	9m x 0.9m PIT, CLASS B COVER	PIT 7/1	PIT 8/1	4.78	28.41	28.39	0.42	RCP (CLASS 3)	525	1
PIT 8/1	30	1.64	900SQ PIT, CLASS D COVER	PIT 8/1	EXISTING PIT	24.51	28.36	28.24	0.49	RCP (CLASS 3)	525	1
PIT 1/2	34.05	0.83	600SQ PIT, CLASS B GRATE	PIT 1/2	PIT 2/2	44.09	33.22	31.47	3.97	RCP (CLASS 3)	225	1
PIT 2/2	32.3	0.86	600SQ PIT, CLASS D COVER	PIT 2/2	PIT 3/2	32.23	31.44	30.57	2.7	RCP (CLASS 3)	225	1
PIT 3/2	31.4	0.86	600SQ PIT, CLASS D COVER	PIT 3/2	PIT 8/1	15.25	30.54	29.17	8.98	RCP (CLASS 3)	225	1

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REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
01	DRAFT SSDA SUBMISSION	25/10/18			
02	SSDA SUBMISION	06/11/18			
03	SSDA RESUBMISSION	08/11/18			
04	SSDA RESUBMISSION RTS	03/04/19			

CLIENT

UNSW SYDNEY

PROJECT

UNIVERSITY HALL PRECINCT SITE REDEVELOPMENT

PREPARED BY

Warren Smith & Partners

Warren Smith & Partners Pty Ltd
Level 9, 233 Castlereagh St, Sydney 2000 NSW Australia
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CONSULTING ENGINEERS
Hydraulic Services Fire Services
Civil Services Sydney Water Accredited Water Servicing Co-ordinator and Designer

SERVING THE CONSTRUCTION INDUSTRY SINCE 1981.

TITLE

STORMWATER PIT SCHEDULE

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.CZ.	L.S.	M.C.	M.C.

JOB No.	DRAWING No.	ISSUE
5867012	D14-CV-D-200-00-06	04

DATE	STATUS
SEP 2018	SSDA SUBMISSION

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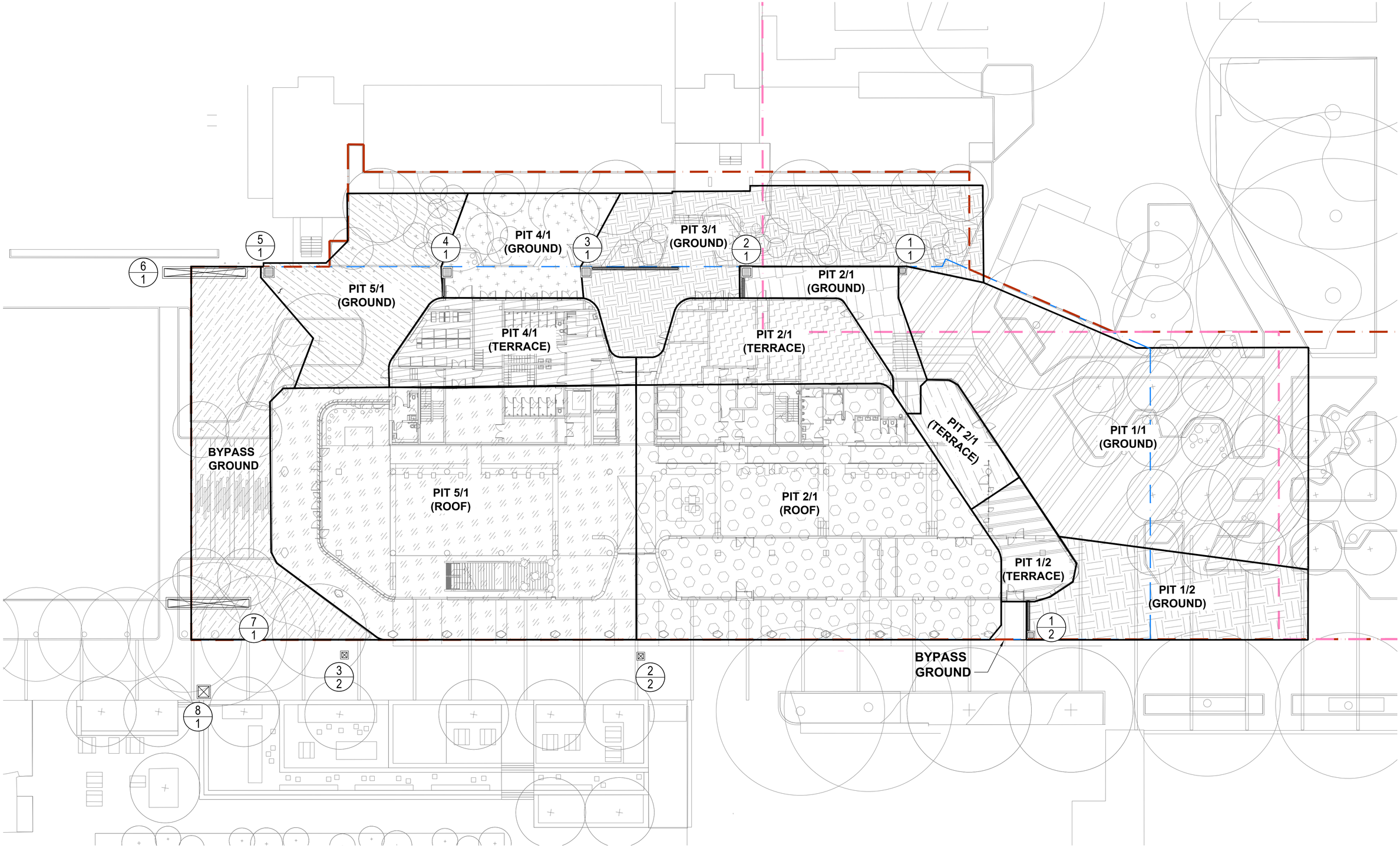

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NORTH

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

2.5 0 2.5 5.0 7.5 10.0m
PLAN SCALE 1:200 A1 SHEET

REVISION	AMENDMENT	DATE	REVISION	AMENDMENT	DATE
01	DRAFT SSDA SUBMISSION	25/10/18			
02	SSDA SUBMISSION	06/11/18			
03	SSDA RESUBMISSION	08/11/18			
04	SSDA RESUBMISSION RTS	03/04/19			

CLIENT
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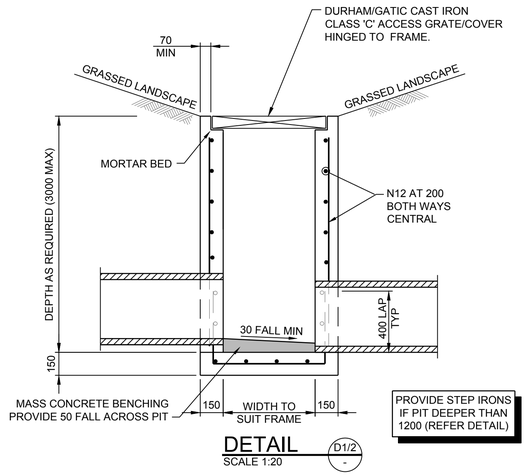
TITLE
STORMWATER CATCHMENT PLAN

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.Cz.	L.S.	M.C.	M.C.

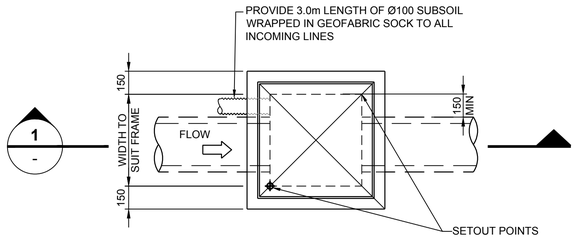
JOB No.	DRAWING No.	ISSUE
5867012	D14-CV-D-200-00-07	04

DATE	STATUS
SEP 2018	SSDA SUBMISSION

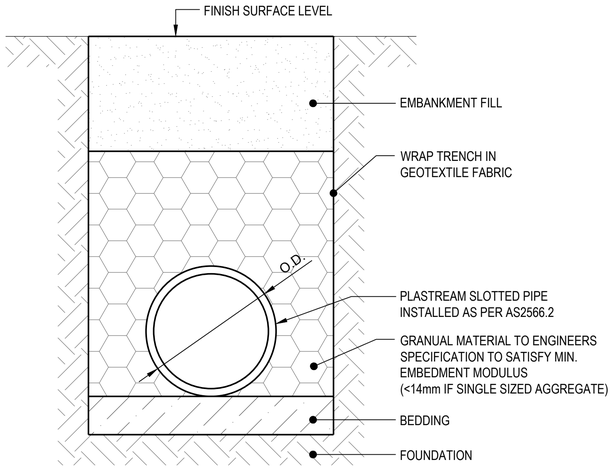
Xrefs: X-5867012-TB_SSDA; X-5867012-AR_Property Boundary; X-5867012-DE-Design Surface; X-5867012-SU_Ground; X-5867012-SW_Layout; X-5867012-AR_Landscape Ground Floor
Plot Date: 03.04.2019@14:21:42 Login Name: MCzarnota Cad File: T:\5867012\Drawings\AutoCAD\Civil\Design\Civil 2015\SSDA\D14-CV-D-200-00-07 Stormwater Catchment Plan.dwg



DETAIL (D1/2)
SCALE 1:20

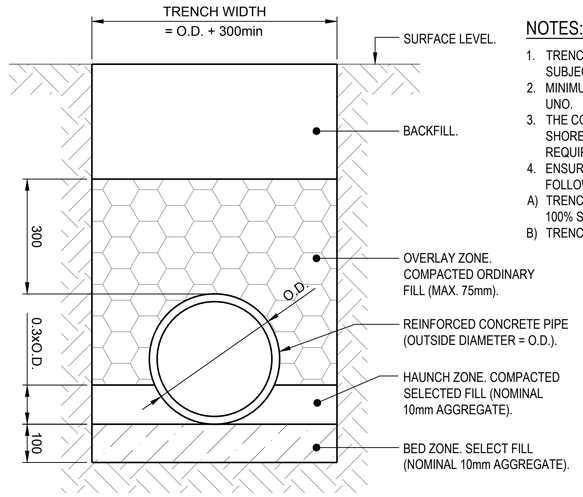


600 - 900SQ SURFACE INLET PITS



ROCLA PLASTREAM SLOTTED PIPE - TYPICAL TRENCH DETAIL

NOT TO SCALE



NOTES:

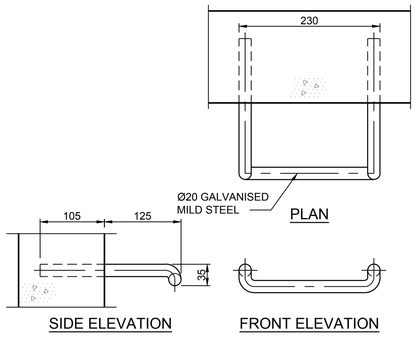
1. TRENCH WIDTH MAY NEED TO BE INCREASED SUBJECT TO ACHIEVING ADEQUATE COMPACTION.
2. MINIMUM PIPE COVER NOT UNDER ROADS = 300mm UNO.
3. THE CONTRACTOR SHALL ENSURE THAT THE SHOREING OF TRENCHES IS INSTALLED AS REQUIRED BY STATUTORY REQUIREMENTS.
4. ENSURE BACKFILLING COMPACTION MEETS THE FOLLOWING STANDARDS;

A) TRENCHES UNDER PAVED AREAS & BUILDINGS - 100% SMDD.
B) TRENCHES NOT UNDER PAVEMENTS - 90% SMDD.

GENERAL AREAS

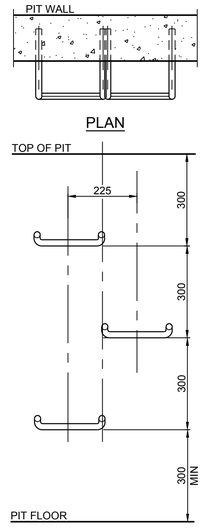
TYPICAL PIPE TRENCH

NOT TO SCALE



STEP IRON DETAIL

SCALE 1:5



ELEVATION

STEP IRON PLACEMENT TO PIT WALL

SCALE NTS

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CLIENT: UNSW SYDNEY

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TITLE: STORMWATER DRAINAGE DETAILS

SCALE	DRAWN	DESIGNED	CHECKED	APPROVED
AS SHOWN	M.CZ.	L.S.	M.C.	M.C.

JOB No.	DRAWING No.	ISSUE
5867012	D14-CV-D-200-00-09	04

DATE	STATUS
SEP 2018	SSDA SUBMISSION

0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

Xrefs: X:\5867012\13.TB_SSDA
Plot Date: 03.04.2019@14:23:08 Login Name: MCzarnota Cad File: T:\5867012\Drawings\AutoCAD\Civil Design\Civil 2D\SSDA\D14-CV-D-200-00-09 Stormwater Drainage Details.dwg