Warren Smith & Partners

20 JULY 2018

CIVIL ENGINEERING SERVICES

St. Anthony of Padua Catholic School, Austral

Development Application Report

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02	20th July 2018	Re- Issued for Development Application	Current
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APPROVALS

Rev #	Author	Reviewer	Approver
02	L. Singh *Civil Engineer*	N. McGowan *Civil Engineer*	M. Cahalane *Director – Civil & Water Engineering*
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Contents

Schedules

CIVIL ENGINEERING SERVICES

1. INTRODUCTION

Warren Smith and Partners (WS+P) has been engaged by Munns Sly Moore Architects to prepare a Development Application (DA) report for the proposed development at the St. Anthony of Padua Catholic School located in Austral. This report will address the following:-

- Proposed site levels;
- On-Site Detention (OSD) system and stormwater drainage system;
- Proposed connection to existing stormwater infrastructure;
- Water Sensitive Urban Design (WSUD) requirements, and;
- Sediment and Erosion Control.

1.1 Background

The development site is located at 140 Eleventh Avenue, Austral, approximately 42km south-west of the Sydney CBD. The site is bound by Eleventh Avenue to the north, Fourth Avenue to the east, Tenth Avenue to the south, and residential properties to the west. Please refer to Figure 1.1 for an aerial view of the development site boundary.

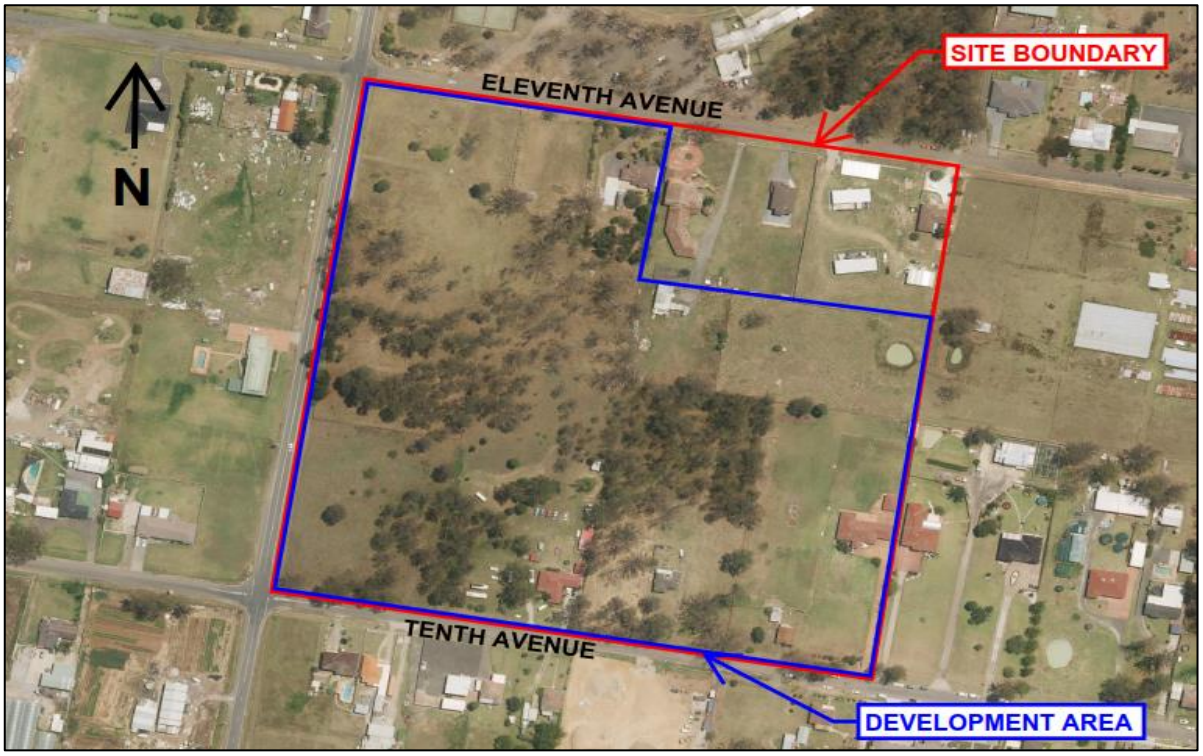


Figure 1.1: Aerial View of Property Boundary (Source: SIX Maps)

The site will see the construction of eleven (11) new buildings, two (2) carparks and nine (9) playing fields to as part of the St. Anthony of Padua Catholic School development. The school shall provide learning opportunities for children from early childhood education through to Year 12. A Development Application was submitted for Stage 1 of the works to provide learning spaces for the establishment of the school. Sydney Catholic Schools is now proceeding with the development of the Masterplan to prepare a submission for the approval of the entire school.

2. EXISTING STORMWATER DRAINAGE

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

- There are a number of residential buildings and garages within the development area which will be required to be demolished to make way for the new development;
- The development site currently grades in a south-westerly direction at a grade of up to 4%, with a total elevation change of up to 9 metres;
- A number of stormwater pit and pipe systems exist across the north-eastern section of the site which service the existing buildings and reticulate to the existing pit and pipe system in Eleventh Avenue, and;
- There is an existing dam located along the eastern boundary of the site which will be required to be dewatered to make way for the new development.

Please refer to Figure 2.1 for an illustration of the existing site grading and stormwater infrastructure, as discussed above.

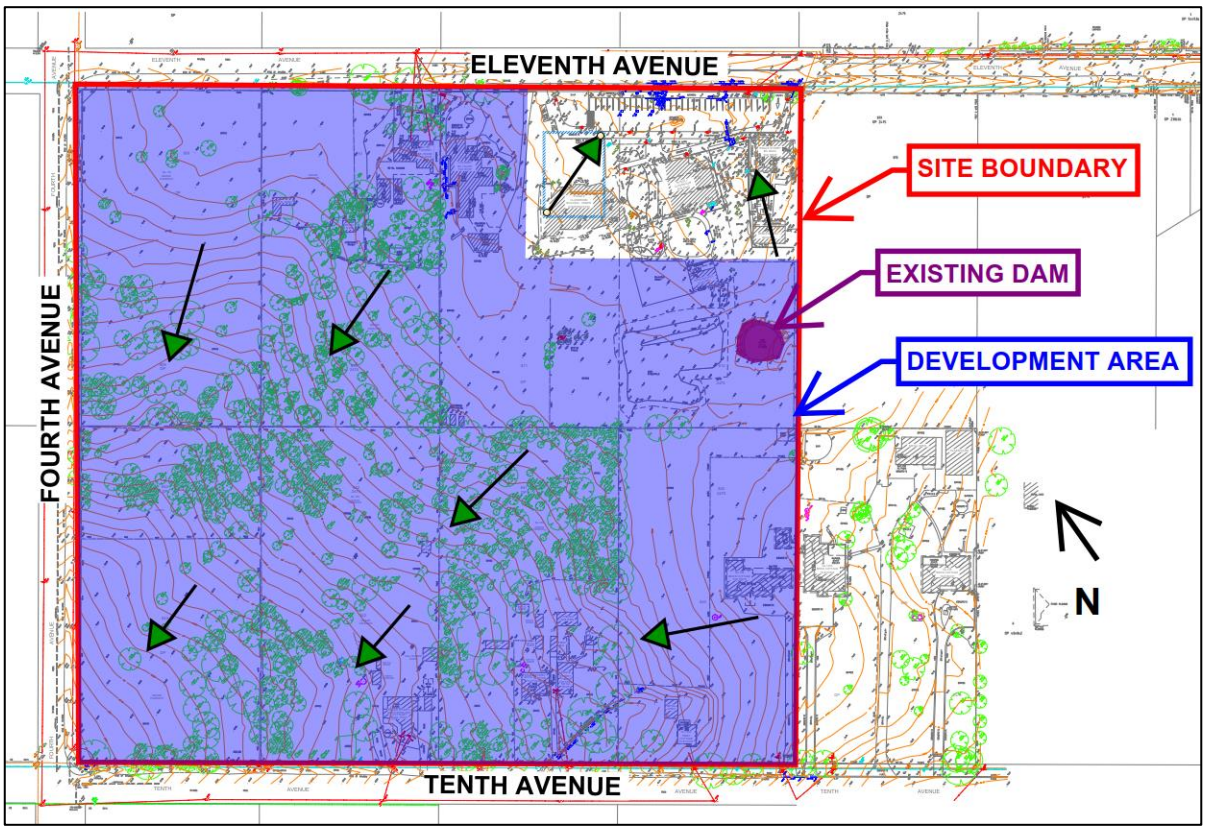


Figure 2.1: Aerial View of Property Boundary

3. AUTHORITY AND REGULATORY REQUIREMENTS

With reference to the following documents, the Council requirements are presented in the sub-sections below:-

- Liverpool City Council Development Control Plan (DCP), dated 2008
- Liverpool Growth Centre Precincts DCP, dated March 2013
- Liverpool City Council Development Design Specification, Section D5 Stormwater Drainage Design, dated January 2003, and;
- On-Site Stormwater Detention (OSD) Technical Specification, dated January 2003.

3.1 Stormwater Drainage Requirements

- The piped system must be capable of conveying stormwater up to, and including, the 10% AEP storm event, and overland flow paths must be capable of conveying stormwater up to, and including, the 1% AEP storm event, and;
- The maximum bypass flow from a pit in the minor storm is 10L/s.

3.2 OSD Requirements

- The developed 1%, 20% and 50% AEP peak flows are to be maintained at pre-development flows through the incorporation of stormwater detention and management devices;
- The site storage requirement (SSR) is to be determined using trial and error to achieve the above runoff constraints;
- Above ground storage shall not exceed a maximum ponding depth of 300mm within landscaped areas and 200mm in carparking areas

3.3 Water Sensitive Urban Design (WSUD) Requirements

Table 3.1: Liverpool City Council Pollutant Reduction Requirements

Pollutant	Reduction Percentage
Gross pollutants	90%
Total suspended solids	85%
Total Phosphorus	65%
Total Nitrogen	45%

3.4 Freeboard Requirements

- A minimum freeboard of 300mm must be provided for habitable floor levels for the development site and adjoining properties;
- A minimum freeboard of 150mm must be provided between the top water level (TWL) in the 1% AEP storm event and garages and other non-habitable floor levels

4. PROPOSED STORMWATER DRAINAGE

The total catchment area of the proposed development is 8.6494 Ha. An additional catchment area of 0.4091 Ha shall be captured by the proposed stormwater system which is to be installed in the location of the existing development in order to manage overland flow. A breakdown of the proposed development area is presented in Table 4.1 below.

Table 4.1: Breakdown of Proposed Development Site Catchment

Catchment	Total Area (Ha)
Development Area	
To OSD Tank 1	1.3882
To OSD 2 (Above Ground)	3.8030
To Tenth Ave (No OSD)	2.0791
To Eleventh Ave (No OSD)	1.1076
Bypass	0.2715
Existing Development	
To Eleventh Ave (No OSD)	0.4091
Total	**9.0585**

A total development area of 3.4582 Ha will bypass the formalised OSD systems, with 0.2715 Ha of that area bypassing all pit and pipe networks. This bypass area equates to 3% of the total development area. Please refer to Figure 4.1 for details of the proposed catchment areas.

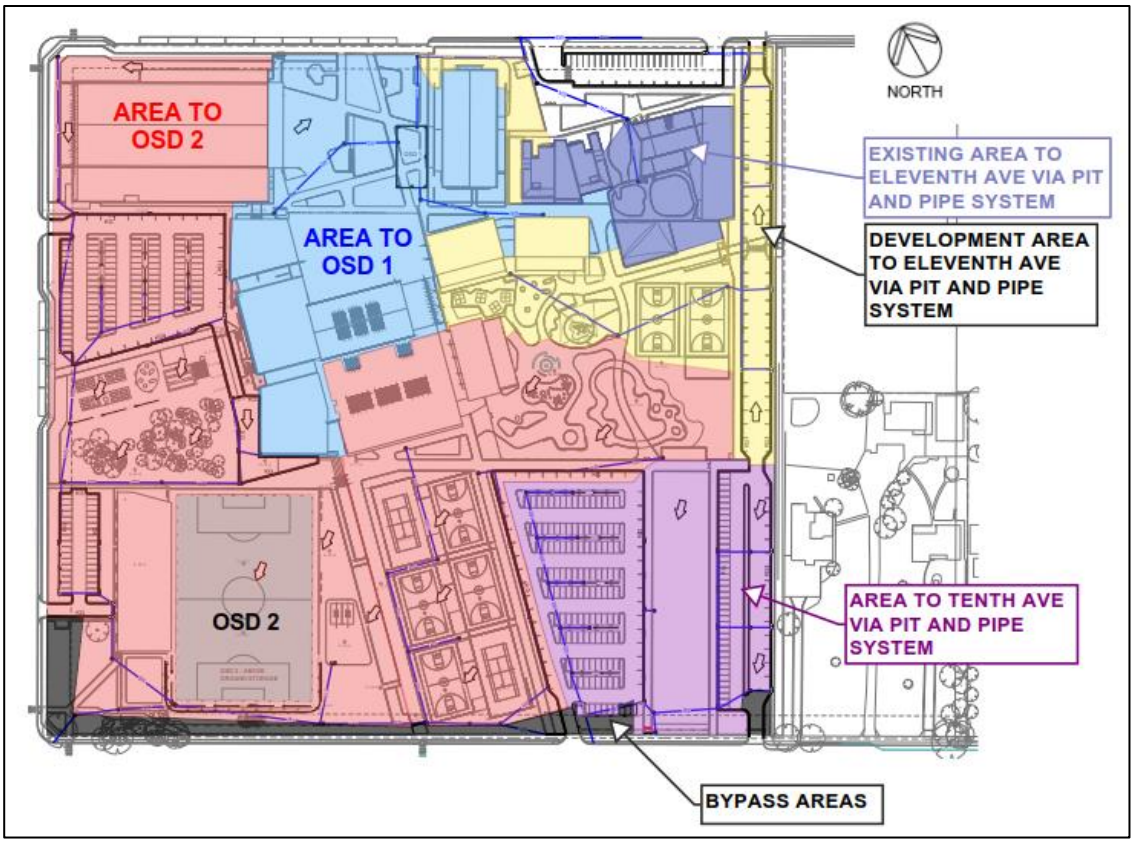


Figure 4.1: Proposed Catchment Plan

4.1 Stormwater and OSD Systems

Liverpool Council requires that the runoff from the developed site must not exceed the runoff from the total site prior to the development for the 50%, 20% and 1% AEP storm events.

To satisfy the above condition, it is proposed that two (2) OSD systems are installed within the development area, one (1) of which is a below ground tank (OSD 1) and one (1) of which is above ground (OSD 2), utilising the proposed sporting field. These OSDs shall provide sufficient storage to limit the discharge from the development as required.

It is proposed that the site discharge connects into the Council system in three (3) locations. One connection will be made to an existing pit on Eleventh Ave from OSD 1 and the other two (2) connections are to be made to the proposed stormwater network which will be constructed as part of the new Tenth Avenue road development. Please refer to Figure 4.2 for details.

For all freeboard requirements, please refer to Schedule 1 for the flood report issued by GRC Hydro.

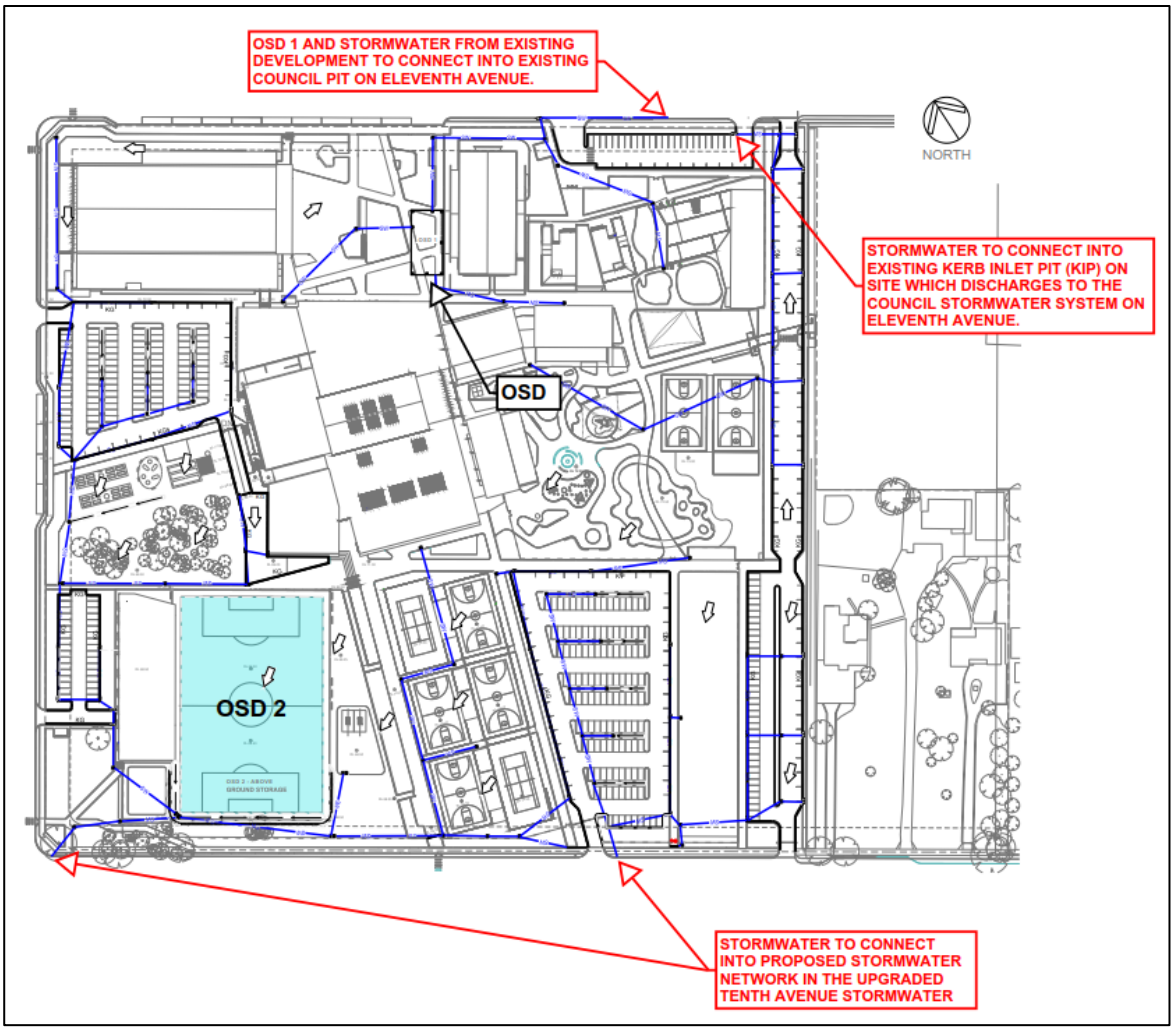


Figure 4.2: Proposed Points of Connection for Discharge

It is noted that there will be new road and stormwater infrastructure constructed in Fourth, Tenth and Eleventh Avenues. Connection details of the site stormwater shall be reviewed, with Council's approval, at detailed design stage.

4.2 DRAINS Model System Parameters

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

The catchment characteristic factor values 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 3.0
- Minimum Pit Freeboard 300mm
- Blockage Factor for On-Grade Pits 20%
- Blockage Factor for Sag Pits 50%

The rainfall data has been taken from the Bureau of Meteorology Rainfall IFD Data System using local coordinates.

4.2.1 OSD 1

OSD 1 is a below ground tank located in the proposed Piazza area.
A breakdown of the OSD 1 catchment area is presented in Table 4.2 below.

Table 4.2: Breakdown of OSD 1 Catchment Area

Catchment	Area (Ha)
Roof to OSD 1	0.7813
Impervious	0.4571
Pervious	0.1498
Total	**1.3882**

Details of the resultant OSD tank are presented in Table 4.3 below.

Table 4.3: OSD 1 Details

Item	Value
Average Base IL of OSD Tank (RL mAHD)	70.75
Orifice 1 – Low Level Orifice Diameter	525mm
IL of Orifice 1 (RL mAHD)	70.61
Orifice 2 – Low Level Orifice Diameter	375mm
IL of Orifice 2 (RL mAHD)	71.35
Top Water Level (RL mAHD)	71.83
Required OSD Tank Volume (m^3)	378.30

4.2.2 OSD 2

OSD 2 is above ground storage located in the south-western corner of the site within the proposed soccer field, which shall have a 300mm bund provided around it to allow for detention. It is proposed that a pit and pipe system shall reticulate to the OSD, which shall have a total above ground storage capacity of 1,602kL. The OSD will discharge to a proposed pit on Tenth Avenue. It is proposed that the above ground storage shall only be used for larger storm events to allow for generally uninterrupted use of the field. The proposed pipe system will reticulate flows for the minor storm event into the proposed pit and pipe system in Tenth Avenue.

A breakdown of the OSD 2 catchment area is presented in Table 4.4 below.

Table 4.4: Breakdown of OSD 2 Catchment Area

Catchment	Area (Ha)
Roof to OSD 2	0.6348
Impervious	1.5197
Pervious	1.6485
Total	**3.8030**

Details of the resultant OSD are presented in Table 4.5 below.

Table 4.5: OSD 2 Details

Item	Value
Surface Area (m^2)	5,342
Maximum Ponding Depth (m)	0.3
Above Ground Volume (m^3)	1,602
Outgoing Pipe Diameter (mm)	900

4.2.3 Results

The development area's OSDs have been designed to ensure that the post development discharge does not exceed the pre-development runoff from the site which emanates during the 50%, 20%, 10% and 1% storm events. Please refer to Table 4.6 for the development area's discharge results.

Table 4.6: Development Area Discharge Results

Scenario	50% AEP (L/s)	20% AEP (L/s)	10% AEP (L/s)	5% AEP (L/s)	2% AEP (L/S)	1% AEP (L/s)
Pre-Development Discharge	1,230	2,150	3,030	3,600	4,420	5,050
Post Development Discharge	1,228	1,929	2,285	2,477	2,664	2,701

5. WATER QUALITY MANAGEMENT

5.1 Potential Pollutants Generated

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

- Gross Pollutants, e.g. Litter;
- Sediments;
- Nutrients (Phosphorus and Nitrogen), and;
- Hydrocarbons.

The development has been modelled to demonstrate the performance of the stormwater treatment system utilising a program called MUSIC (Model for Urban Stormwater Improvements Conceptualisation). 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).

5.2 Rainfall

The rainfall data used in the MUSIC model was based on the Bureau of Meteorology data and is presented in Table 5.1 below.

Table 5.1: Rainfall Data for MUSIC Modelling

Rainfall Station	Rainfall Period	Rainfall Period Dates	Time Step (min)
Whitlam (67035)	10 year	1 Jan 1967 – 31 Dec 1976	6 minutes

The average monthly potential evapotranspiration (PET) data used in the MUSIC model was based on the average monthly PET data for the Sydney region and is presented in Table 5.2 below.

Table 5.2: Monthly 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

5.3 Rainfall Runoff Properties

In accordance with the Draft NSW MUSIC Modelling Guidelines, dated August 2010,

Table **5.3** and Table 5.4 present the rainfall runoff properties which have been utilised in the MUSIC model.

Table 5.3: Soil Properties for MUSIC Source Nodes

Parameter	Units	Rainfall Period Dates
Impervious Area Parameters		
Rainfall Threshold	mm	1.0 (for grassed areas/paths etc.) 0.3 (for roofs) & 1.5 (for driveways)
Pervious Area Parameters		
Soil Capacity	mm	120
Initial Storage	%	30
Field Capacity	mm	80
Infiltration Capacity Coefficient – a		200
Infiltration Capacity Coefficient – b		1.0
Groundwater Properties		
Initial Depth	mm	10
Daily Recharge Rate	%	25
Daily Baseflow Rate	%	5
Deep Seepage	%	0

Table 5.4: Stormwater Water Quality Parameters for MUSIC Source Nodes*

Land Use Category		Log_{10}TSS (mg/L)		Log_{10}TP (mg/L)		Log_{10}TN (mg/L)	
		Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow
Roofs	Mean	1.30	N/A	-0.89	N/A	0.30	N/A
	Std Dev	0.32	N/A	0.25	N/A	0.19	N/A
Sealed Roads with Pervious Fractions	Mean	2.43	1.20	-0.30	-0.85	0.34	0.11
	Std Dev	0.32	0.17	0.25	0.19	0.19	0.12
Landscaped Areas	Mean	2.15	1.20	-0.60	-0.85	0.30	0.11
	Std Dev	0.32	0.17	0.25	0.19	0.19	0.12

**These values have been taken from Approach 2 in the Draft NSW MUSIC Modelling Guidelines*

5.4 MUSIC Model Catchment Areas and Treatment Plan

The MUSIC model's total catchment area to be treated is 8.66 Ha. This area has been divided into four (4) main subcatchments, each of which have been further separated into subcatchments representing road areas, landscaped areas (including grassed areas and paths etc.), and roof areas. The existing development area has been excluded from MUSIC modelling. Please refer to Figure 5.1 for an illustration of the MUSIC model catchment plan.

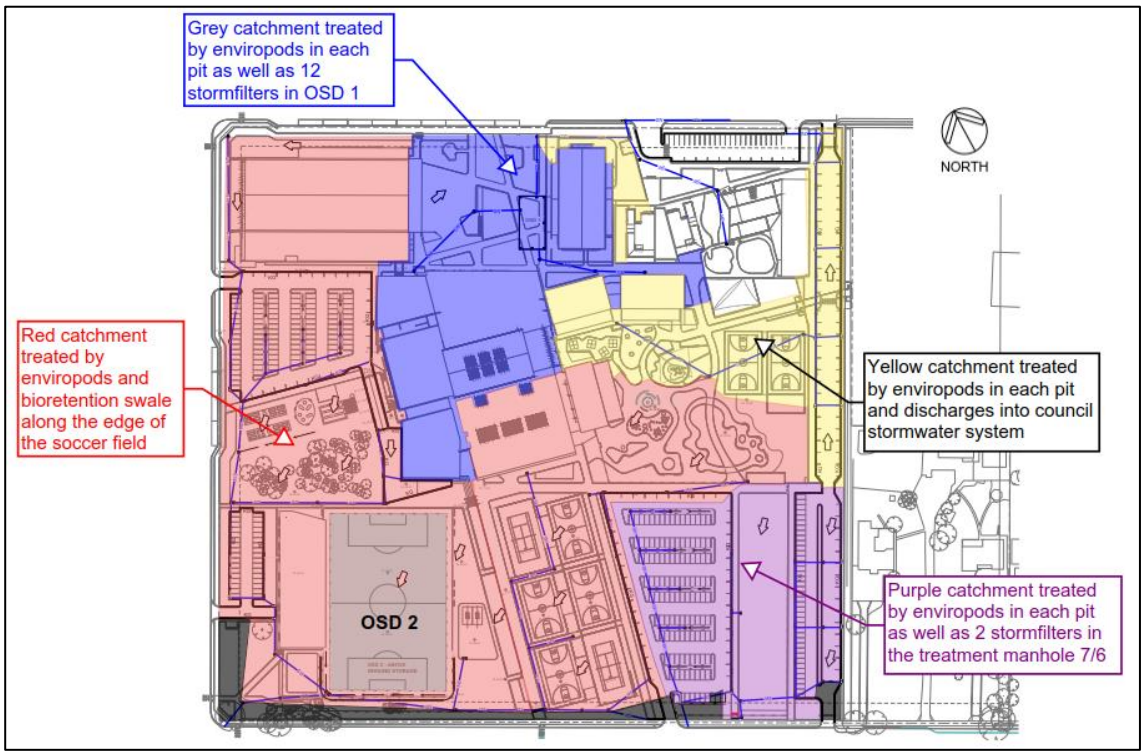


Figure 5.1: MUSIC Model Catchment Areas

The proposed site treatment will utilise two (2) products by Stormwater360. The first level of treatment will consist of Enviropods, which intercept surface runoff at the pit grates and filter the runoff prior to entering the piped stormwater system. It is proposed that ninety-five (95) grated stormwater pits on site will be fitted with enviropod filter baskets. 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 5.2 below for an illustration of a typical Enviropod.

Figure 5.2: Typical Enviropod Filter

The second level of treatment which will be incorporated into the system is a stormfilter system. The stormfilters will be contained within a sectioned area of the below ground OSD storage tanks. To achieve the reduction targets, 2 (two) and 12 (twelve) Stormwater360 690mm phosphorus absorption cartridges will need to be installed in the stormfilter manhole and OSD Tank 1 respectively. A PSorb stormfilter cartridge system is provided to remove and suspended sediments and nutrients which have entered the stormwater system. Please refer to Figure 5.3 for an illustration of a typical PSorb stormfilter.

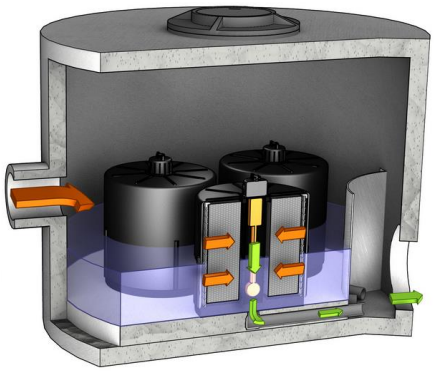


Figure 5.3: Typical PSorb Stormfilter

In addition to this, it is proposed that one (1) bioretention swale be installed on the site to capture and treat the majority of the stormwater reticulating to OSD 2, which will significantly reduce the nutrient content within the stormwater prior to being discharged from the site. Please refer to Table 5.5 for the bioretention filter and media properties.

Table 5.5: Bioretention Swale Properties

Item	Value
Extended Detention Depth (m)	0.2
Saturated Hydraulic Conductivity (mm/hour)	600
Filter Depth (m)	0.50
TN Content of Filter Media (mg/kg)	800
Orthophosphate Content of Filter Media (mg/kg)	55

It is also proposed that a 10kL rainwater tank be provided for each building within the development site to assist with the removal of pollutants from stormwater generated from the separate roof areas. The rainwater tanks shall be drawn from for irrigation purposes only. Any overflow from the rainwater tanks shall be directed into the proposed stormwater system and subsequently discharged from the site.

5.5 MUSIC Modelling Results

The stormwater quality treatment system has been modelled using the MUSIC software as shown in Figure 5.4. Please refer to Table 5.6 for the MUSIC modelling results.

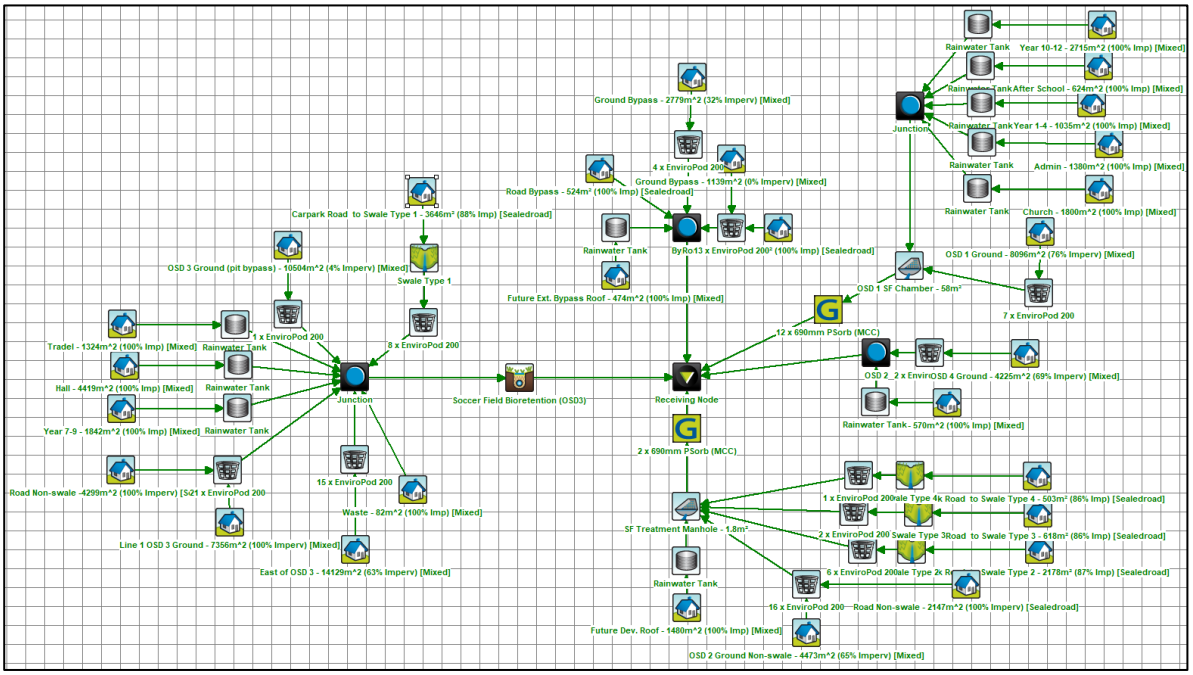


Figure 5.4: MUSIC Model Configuration

Table 5.6: MUSIC Model Results

Pollutant	Sources	Residual Load	% Reduction	Target (%)
Gross Pollutants (kg.yr)	1430	23.4	98.4	90
Total Suspended Solids (kg/yr)	12100	1460	87.9	85
Total Phosphorus (kg/yr)	23.5	8.20	65.1	65
Total Nitrogen (kg/yr)	144	62.1	56.8	45

6. PROPOSED UTILITY CONNECTIONS

6.1 Sydney Water Watermains

The proposed development site currently has frontage to two (2) Sydney Water assets, one (1) of which is a DN100 watermain located along Tenth Avenue and another DN100 watermain located along Eleventh Avenue.

To serve the proposed development, a new connection to the will be required from the DN100 watermain in Eleventh Avenue. There is an existing water meter set and dual RPZD installed within the site which will feed into the DN200 PCW line, as shown in Figure 6.1.

To provide adequate fire services water supply, a fire booster assembly will be required by the main entrance adjacent to the existing water meter which will feed the DN150 fire line. A 288kL fire hydrant tank with diesel pumps will only be required if the upgraded watermain does not provide sufficient pressure for the proposed development.

6.2 Gas Servicing

As illustrated in Figure 6.1 below, it is proposed that the DN200 gas line will connect to the 210kPa natural gas main on Tenth Avenue and reticulate at 35kPa. Private gas meters are to be provided at each building to ensure pressure does not exceed 7kPa.

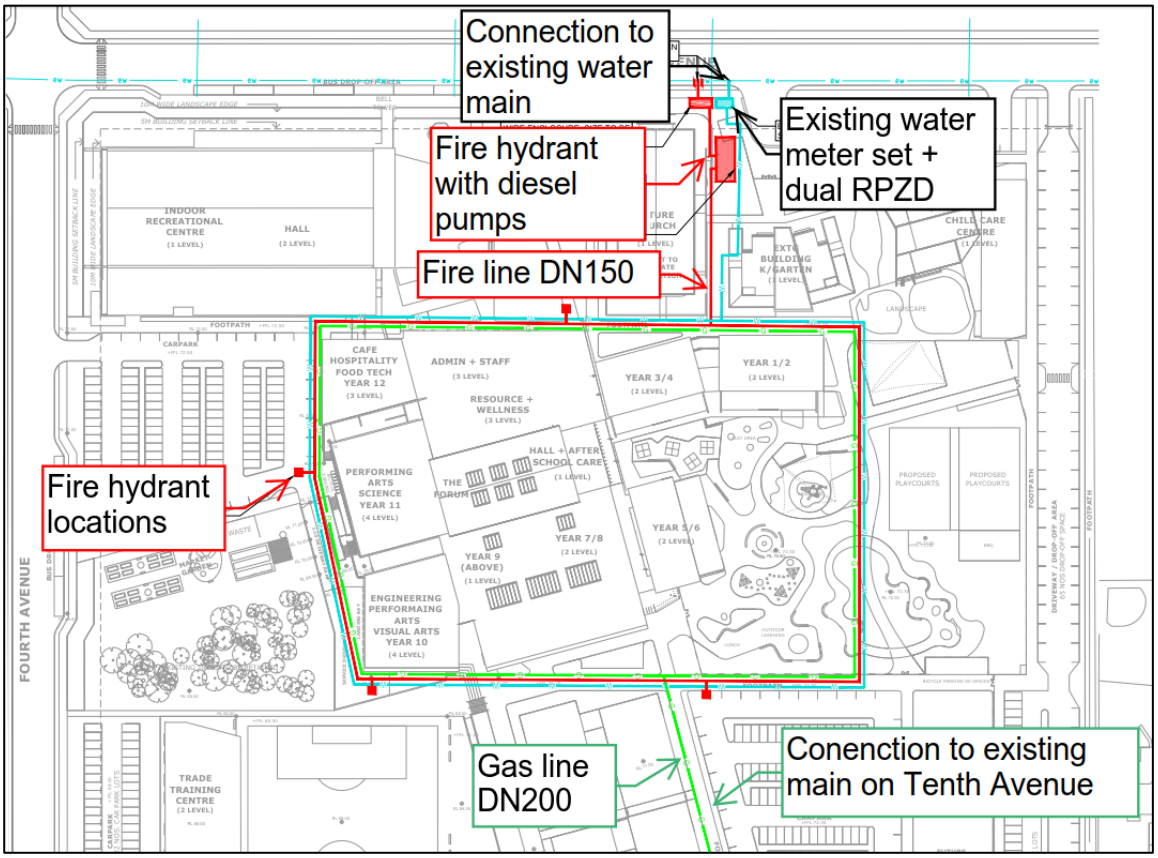


Figure 6.1: Ground Floor Services Plan

6.3 Sewer Servicing

The sewer servicing option shown in Figure 6.2 will provide all future and existing buildings with connections to the proposed Sydney Water sewer at the corner of Tenth Avenue and Fourth Avenue. This system will consist of eleven (11) sewer manholes and pipes ranging from DN150 to DN225 at the connection to the proposed Sydney Water main.

There will be a line along the southern boundary of the development site that extends to service the neighbouring Sydney Catholic Schools property at the south-eastern boundary.

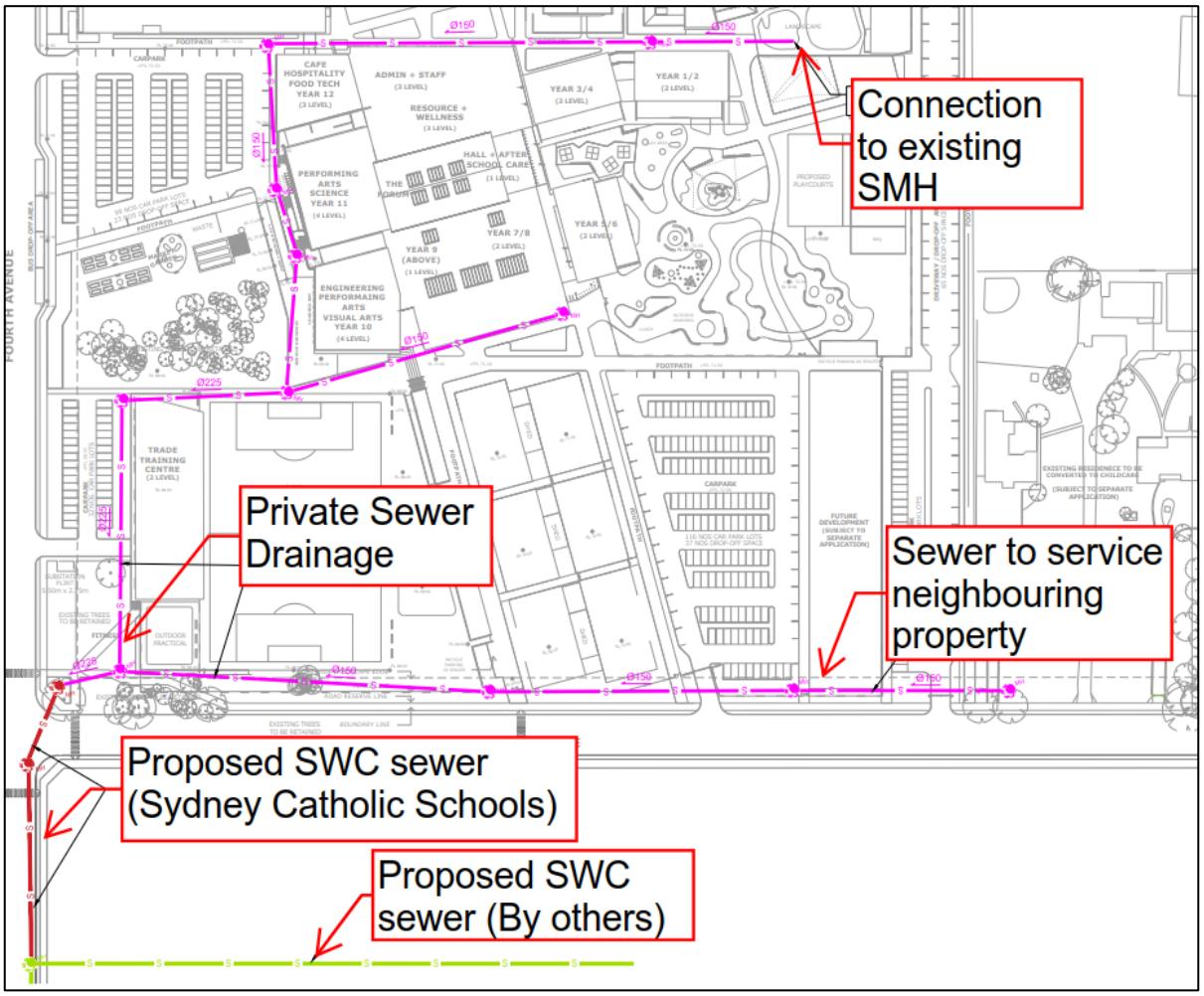


Figure 6.2: Sewer Servicing Plan

7. SEDIMENT AND EROSION CONTROL

The Contractor for the works is required to provide Sedimentation and Erosion Control in accordance with the general requirements outlined below.

7.1 Site Protection Measures

It is proposed to provide the following in order to inhibit the movement of sediment off the site during the demolition and construction phases.

7.1.1 Site Access

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'.

7.1.2 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 100mm below the surface;
- Overlapping any joins in the fabric, and;
- Turning up on the ends for a length of 1 metre in order to prevent volumes of suspended solids escaping in a storm event.

Please refer to Figure 7.1 for details.

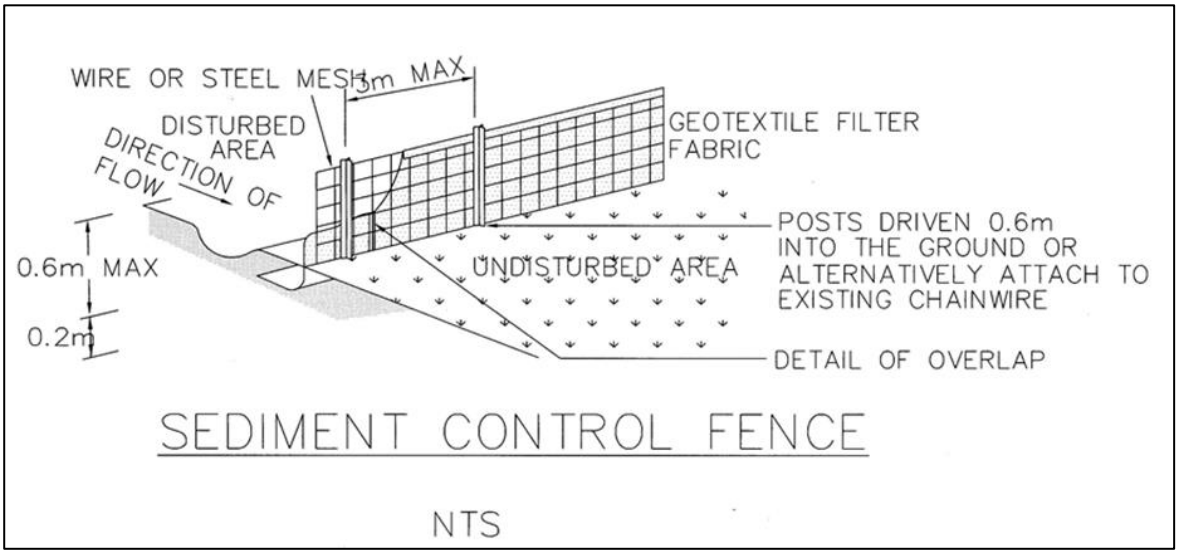


Figure 7.1: Sediment Control Fence Illustration

Existing stormwater infrastructure is also to be protected from incoming sediment using the following methods:-

- Any Council owned road kerb entry and/or gully pits will be protected by Filter Bales and EcoSocks. 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.

Please refer to Figure 7.2, Figure 7.3 and Figure 7.4 for details.

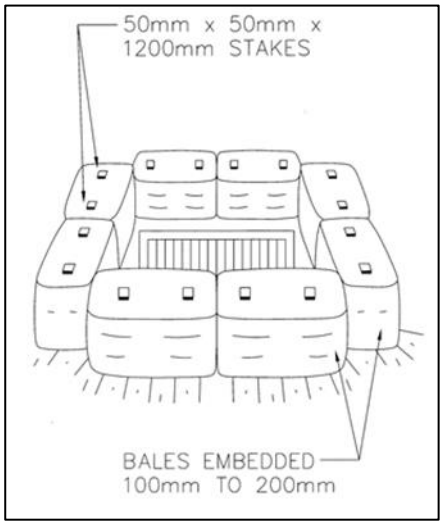


Figure 7.2: Stormwater Pit Sediment Trap (NTS)

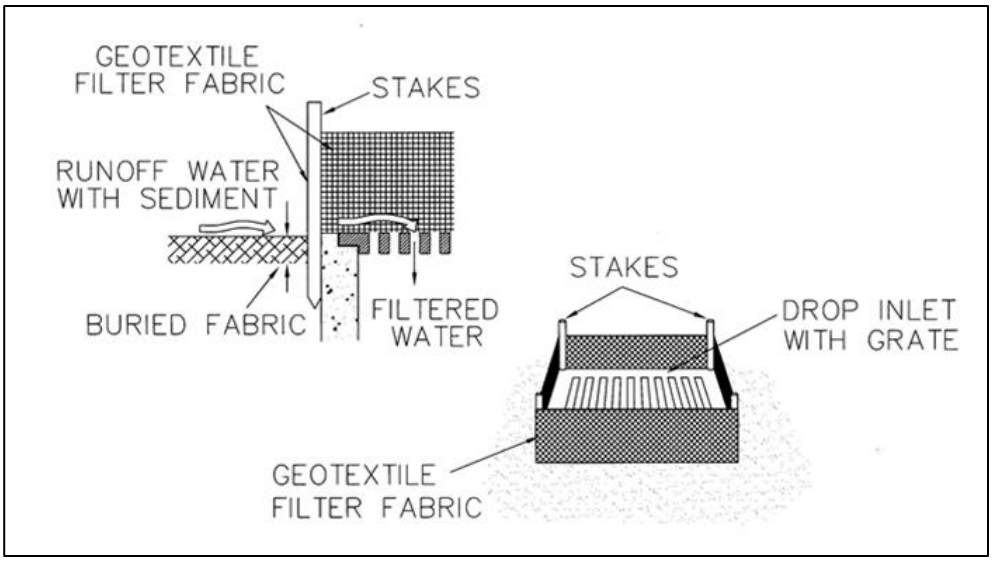


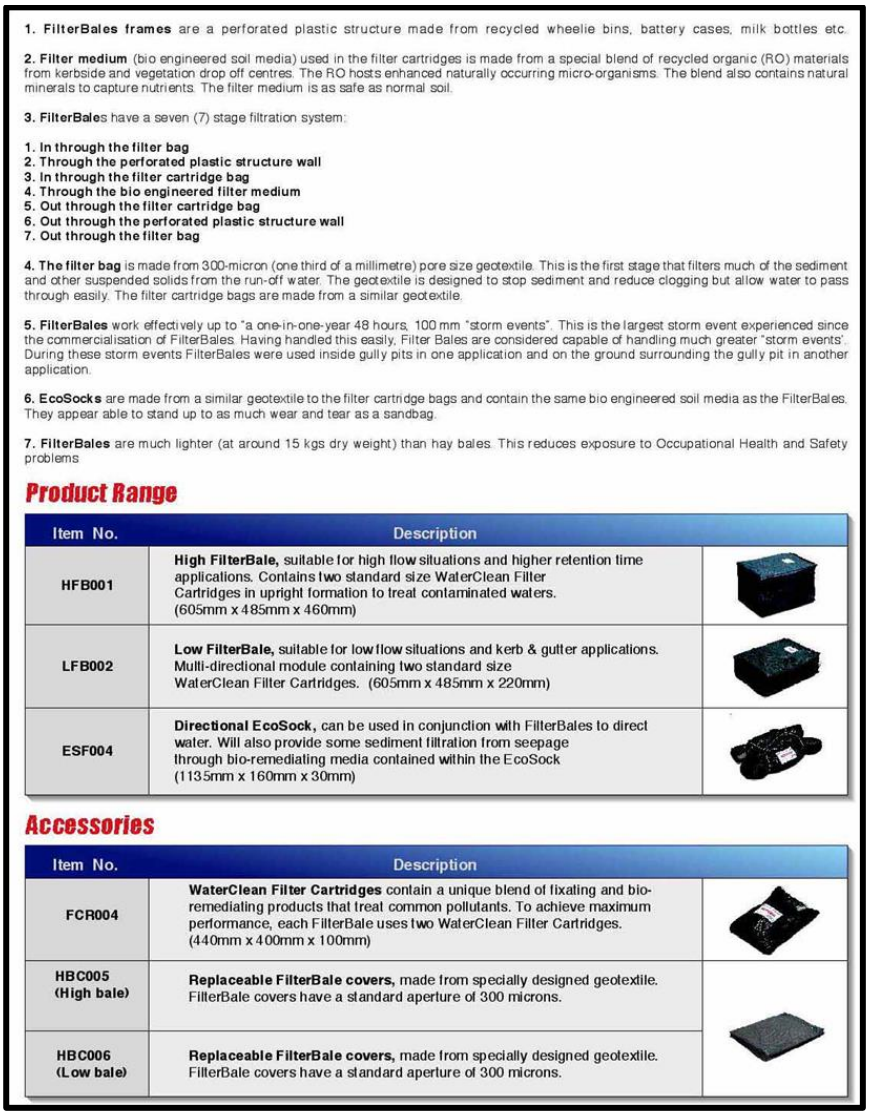
Figure 7.3: Geotextile Filter Fabric Drop Inlet Sediment Trap (NTS)

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.



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 7.4: Erosion Control Filter Products

7.1.3 Sediment Basin

In accordance with the Blue Book, if the disturbed area within the development site is greater than 0.25 Ha, the need for a sediment basin must be determined. To establish this, the Revised Universal Soil Loss (RUSLE) equation is used to compute the annual soil loss from the site. If the annual soil loss from the site is greater than 150m^3/Ha/yr, a sediment basin must be installed on site. The annual soil loss calculated for the site is 266m^3/Ha/yr. As a result, a sediment basin will be installed on site during the construction stage.

It is proposed that the sediment basin be located within the south-western corner of the site towards which the existing site grades.

The following works are required to be carried out during installation of the sediment basins:-

- Installation of a fence around the perimeter of the basin;
- Removal of existing reeds;
- Installation of rip rap to allow for bobcat access for periodic removal of sediment;
- Installation of a perforated riser outlet pipe as per the detail shown in Figure 7.5 and;
- Connection of the riser pipe to an existing pit.

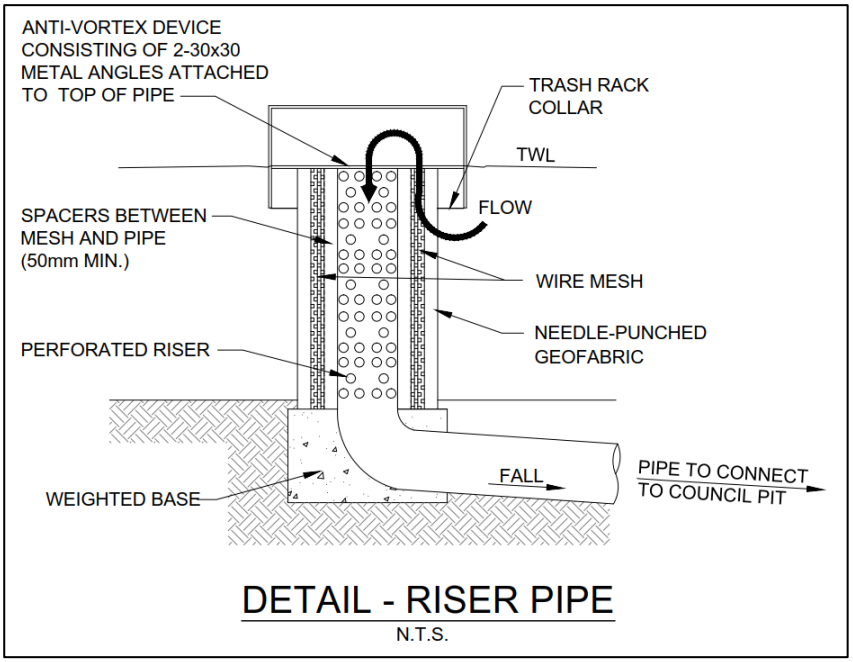


Figure 7.5: Sediment Basin Outlet Pipe Detail

7.2 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.

7.2.1 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 Guideline;
- Soil transport vehicles will use the single main access to the site;
- There will be no burning of any materials on site;
- 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.

7.2.2 Maintenance

- It will be the responsibility of the 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; and,
- Materials processing equipment suitably comply with regulatory requirements. The protection will include the covering of feed openings with rubber curtains or socks.

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

SCHEDULE 1 GRC HYDRO FLOOD REPORT