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Value in Engineering and Management

CIVIL ENGINEERING REPORT FOR STATE SIGNIFICANT DEVELOPMENT APPLICATION

FOOD PROCESSING AND PACKAGING FACILITY AT PART LOT 2304 DP 1172543 TEMPLAR ROAD ERSKINE PARK NSW

Prepared For:
Commercial & Industrial Property Pty Ltd
Suit 59, Jones Bay Wharf
26-32 Pirrama Road
PYRMONT NSW 2009

Prepared by:
Costin Roe Consulting
Level 1, 8 Windmill Street
WALSH BAY NSW 2000

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	Name	**Signature**
Prepared by	Mark Wilson	
Checked by	Grant Roe	
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1 INTRODUCTION

1.1 Background

Commercial & Industrial Property Pty Ltd (CIP), propose to construct a food processing and packaging facility at Part Lot 2304 DP 1172543, Templar Road, Erskine Park, NSW.

Works involve construction of a large single level processing facility with ancillary offices, truck circulation and loading areas and associated parking.

1.2 Scope

Costin Roe Consulting Pty Ltd has been commissioned by CIP to prepare this Engineering Report in support of the proposed application for development on the site.

This report provides a summary of the design principles and planning objectives for the following civil engineering components of the project:

- Earthworks & Retaining Walls;
- Stormwater Management including stormwater quantity and quality; and
- Erosion & Sediment Control.

The engineering objectives for the development are to create a site which, based on the proposed architectural layout, responds to the topography and site constraints, to provide an appropriate and economical stormwater management system which incorporates best practice in water sensitive urban design consistent with the requirements of council's water quality objectives.

A set of drawings have been prepared to show the proposed finished levels, retaining walls, stormwater drainage layout and water quantity and quality requirements for the development. These drawings are for development approval only and subject to change during detail design.

1.3 Authority Jurisdiction

The consent authority is The Director General NSW Planning as the proposal considered a State Significant Development (SSD). However as the subject site is located within Penrith City Council local government area, the requirements of the Penrith City Council (PCC) have also been addressed.

1.4 Proposed Development

The proposed development is for a single level processing facility. This will entail a purpose built fully accredited fresh food packing centre where fresh cuts of meat and poultry will be packaged and labelled before being distributed to stores, at Part Lot 2304 DP 1172543, Templar Road, Erskine Park (the Site).

The development will include ancillary office space, car parking areas and truck loading/ circulation areas.

2 SITE CHARACTERISTICS

2.1 Location

The proposed development is located on Part Lot 2304 DP 1172543 in the suburb of Erskine Park on Templar Road as shown in Figure 2.1.

The site is bounded by vacant industrial land to the north, existing industrial development to the east, Templar Road to the west and a riparian corridor to the south.

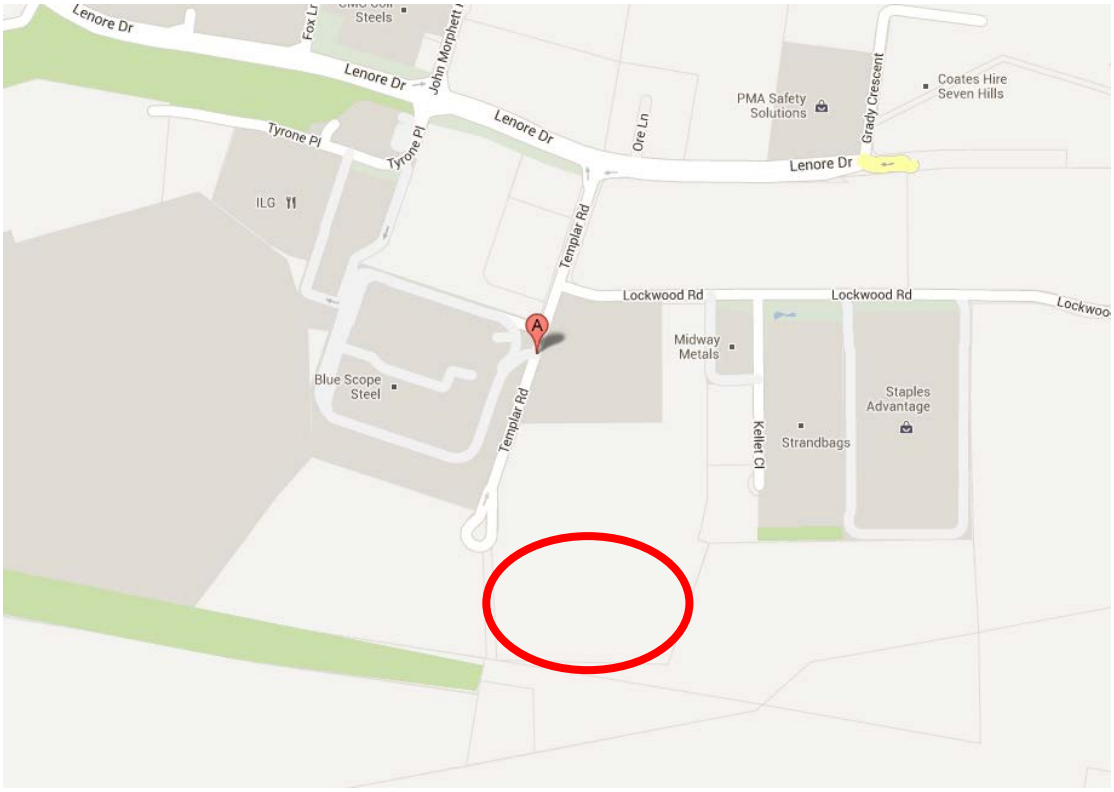

Figure 2.1. Locality Map

2.2 Topography & Description

The site has been cut and filled to its current levels under the concept plan approval (06_0216). The cut to fill site comprises a large pad at approximately RL 52.85m. The site is undeveloped and has a total area of approximately 4.33 Ha.

A riparian corridor and creek is located to the south and south-east of the site. Extensive works to the riparian zone including realignment, reshaping and revegetation work was completed as part of the estate works.

2.3 Existing Stormwater Drainage

There is no in-ground drainage on the site. Some stormwater management measures are present which are related to erosion & sediment control measures completed as part of the estate works. These measures comprise a sediment basin located in the south-

western corner of the site and open swale drains which direct water to this sediment basin.

2.4 Proposed Stormwater Drainage System

The proposed stormwater drainage system for the development will comprise a minor and major system to safely and efficiently convey collected stormwater run-off from the development.

The minor system will consist of a piped drainage system designed to accommodate the 1 in 20-year ARI storm event (Q20). This results in the piped system being able to convey all stormwater runoff up to and including the Q20 event. The major system has been designed to cater for storms up to and including the 1 in 100-year ARI storm event (Q100). This major system employs overland flow paths to safely convey excess run-off from the site.

The design of the stormwater system for this site is based on the following documents:

- Runoff from buildings will generally be designed in accordance with AS 3500.3 National Plumbing and Drainage Code Part 3 – Stormwater Drainage.
- Overall site runoff and stormwater management will generally be designed in accordance with the Institution of Engineers, Australia publication "Australian Rainfall and Runoff" (1988 Edition), Volumes 1 and 2 (AR&R).
- Design recurrence intervals for major and minor storms will be in accordance with Part C3 of PCC DCP2010.
- On-site detention, water quality measures and flooding requirements will be in accordance with Part C3 of PCC DCP2010.
- Stormwater harvesting is based on the requirement of PCC DCP2010 Part C3 and the NSW Department of Environment and Conservation document *Managing Urban Stormwater: Harvesting and Reuse*.

Water quality and re-use are to be considered in the design, throughout new paved areas, to ensure that any increase in the detrimental effects of pollution are mitigated, PCC Water Quality Objectives are met and that the demand on potable water resources is reduced.

Plans of the proposed stormwater drainage layout can be found on drawings **Co10047.03-DA40** through **DA44** located in **Appendix A**.

The objectives for the management of stormwater quantity and quality for the proposed Application are consistent with the management proposed under the current concept plan approval (06_0216) and PCC requirements. Section 5 of this report discusses the proposed water quantity management and Section 6 discusses the proposed water quality management. The means to which these objectives are achieved are as follows:

- Water Quantity – An on-site detention system is proposed for the site. This comprises an underground tank in the carpark area. The objective for water quantity is to attenuate the post development flows to less than or equal to the pre development flows from the site.

- Water Quality – Treatment of stormwater flows will be performed by a treatment train which comprises pit inserts, rainwater reuse and filtration using proprietary devices.

2.5 Legal Point of Discharge

The design of the proposed outlet structure has been assessed in accordance with the NSW Office of Water document *Controlled Activities: Guidelines for Outlet Structures.*

The legal point of discharge for the Site is the creek along the southern side of the development site. The proposed discharge point is the downstream end of the creek (within government property) adjacent to the south-west corner of the property as shown on drawing **Co10047.03-DA44**.

The stormwater outlet consists of one 1050mm diameter pipe and 'natural' energy dissipater. The outlet is aligned with the creek to remove the potential for bank scour and shall include rip rap energy dissipaters constructed in accordance with the *Outlet Structures Guidelines* as published by the Department of Water & Energy and The Blue Book. This is shown figuratively below in **Figure 2.2** below. Further construction details regarding the configuration of dimensions, rock size and scour protection can be seen on drawing **Co10047.03-DA46**.

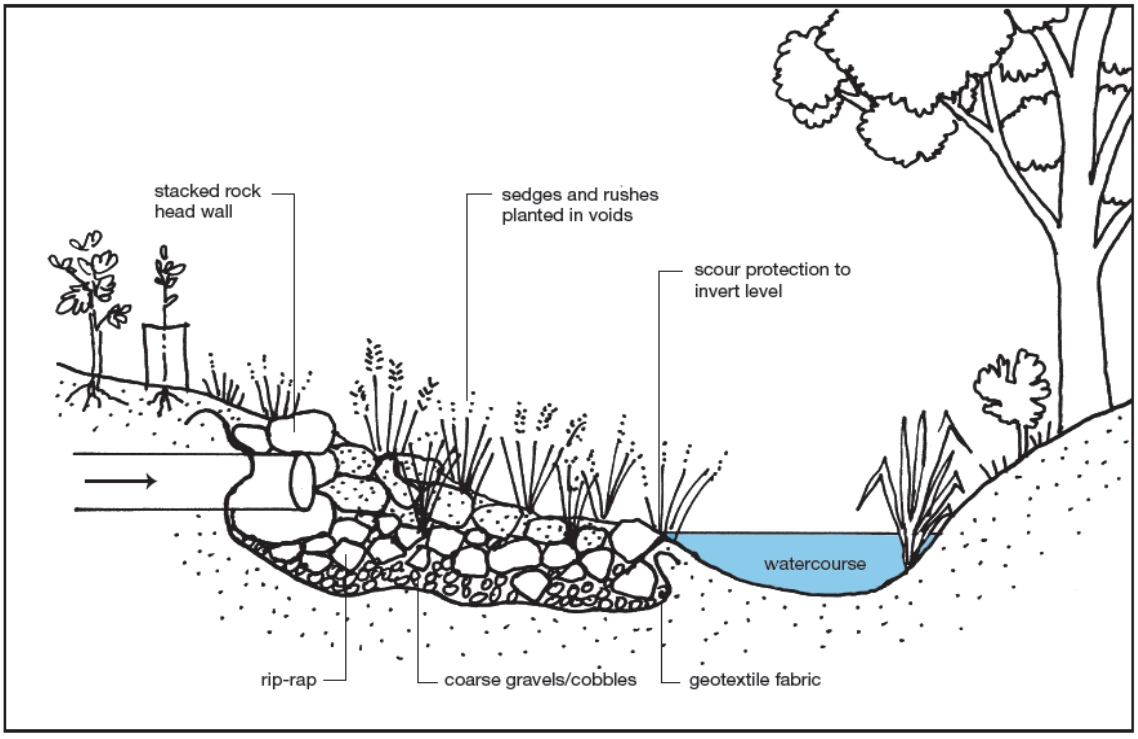

Figure 2.2. Outlet Structure Components

2.6 External Catchments

The Site is affected by the 6.2 Ha property directly to the north of the Site. A dedicated piped drainage system (in the order of 750mm) is required to drain the northern property through the Site. The proposed alignment of this pipe is adjacent to the western boundary within a 3m wide easement. This arrangement is shown on the stormwater drainage drawings.

Although stormwater from the northern property will be piped through the Site, no overland flow from this property will be conveyed through the Site. Overland flow from the northern property will be conveyed around the Site to either the creek adjacent to the north-eastern corner of the Site, or to the creek via Templar Road adjacent to the western boundary.

3 SITE WORKS

3.1 Bulk Earthworks

Minor bulk earthworks will be undertaken to facilitate the construction of the development. The objective for the site is to balance cut and fill earthworks volumes.

As discussed previously the Site has been cut and filled to its current configuration which contains a large single pad at approximate level of 52.85m.

Allowing for the structural zone for the facility floor, recess docks and falls in external levels some minor works will be required to the existing earthworks levels. Detailed assessment of the earthworks level will be completed during detailed design stage.

Soil erosion and sediment control measures including sedimentation basins will also be provided for the development – please refer to the Soil and Water Management Plan in Section 5 of this report.

Earthworks over the site will be minor and no impact on groundwater is expected as a result of these works.

3.2 Embankment Stability

To assist in maintaining embankment stability, permanent batter slopes will be no steeper than 3 horizontal to 1 vertical while temporary batters will be no steeper than 2 horizontal to 1 vertical. This is in accordance with the recommended maximum batter slopes for residual clays and shale which are present in the area.

Permanent batters will also be adequately vegetated or turfed which will assist in maintaining embankment stability.

Stability of batters and reinstatement of vegetation shall be in accordance with the submitted drawings and the Soil and Water Management Plan in Section 5.

3.3 Supervision of Earthworks

All geotechnical testing and inspections performed during the earthworks operations will be undertaken to Level 1 geotechnical control, in accordance with AS3798-1996.

3.4 Retaining Walls

The civil engineering objective is to minimise retaining walls within the constraints of the architectural layout and allowable grading (as per AS2890.1 and AS2890.2) through paved areas and batters in landscaped areas.

Retaining walls will be minimal. Retaining is confined to the western boundary adjacent to the carpark where sufficient landscape area is not available between the edge of carpark and external boundary levels to provide appropriate batters. Retaining in this area is a maximum of 1m in height. Location and indicative heights of retaining walls are shown on drawing **Co10047.03-DA50**.

4 STORMWATER HYDROLGICAL MODELLING AND ANALYSIS

4.1 General Design Principles

The design of the stormwater system for this site will be based on relevant national design guidelines, Australian Standard Codes of Practice, Penrith City Council and accepted engineering practice as discussed in Section 2.4 of this report.

Storm events for the 2 to 100 Year ARI events have been assessed.

4.2 Minor/ Major System Design

The piped stormwater drainage (minor) system has been designed to accommodate the 20-year ARI storm event (Q20). Overland flow paths (major) which will convey all stormwater runoff up to and including the Q100 event have also been provided which will limit major property damage and any risk to the public in the event of a piped system failure.

4.3 Rainfall Data

Rainfall Intensity Frequency Duration (IFD) data used as a basis for Drains modelling for the 2 to 100 Year ARI events, was taken from *The Bureau of Meteorology Online IFD Tool*.

4.4 Runoff Models

Calculation of the runoff from storms of the design ARI have been calculated with the catchment modelling software DRAINS.

The design parameters for the Drains model were based on typical values and parameters for the area and are as follows:

Model	Model for Design and analysis run	Rational method	
	Rational Method Procedure	ARR87	
	Soil Type-Normal	3.0	
	Paved (Impervious) Area Depression Storage	1	mm
	Supplementary Area Depression Storage	1	mm
	Grassed (Pervious) Area Depression Storage	5	mm
AMC	Antecedent Moisture Condition (ARI=1-5 years)	2.5	
AMC	Antecedent Moisture Condition (ARI=10-20 years)	3.0	
AMC	Antecedent Moisture Condition (ARI=50-100 years)	3.5	
	Sag Pit Blocking Factor (Minor Systems)	0	
	On Grade Pit Blocking Factor (Minor Systems)	0	
	Sag Pit Blocking Factor (Major Systems)	0.5	
	On Grade Pit Blocking Factor (Major Systems)	0.2	
	Minor Storm Pit Freeboard	150	mm

Table 4.1: DRAINS ILSAX Parameters

4.5 Hydraulics

4.5.1 General Requirements

Hydraulic calculations will be carried out utilising DRAINS modelling software during the detail design stage to ensure that all surface and subsurface drainage systems meet or exceed the required standard.

4.5.2 Freeboard

The calculated water surface level in open junctions of the piped stormwater system will not exceed a freeboard level of 150mm below the finished ground level, for the peak runoff from the Minor System runoff. Where the pipes and junctions are sealed, this freeboard is not required.

4.5.3 Public Safety

For all areas subject to pedestrian traffic, the Depth-Velocity product (dV) of the depth of flow, d (in metres), and the velocity of flow, V (in metres per second), will be limited to 0.4, for all storms up to the 100-year ARI.

For other areas, the dV product will be limited to 0.6 for stability of vehicular traffic (whether parked or in motion) for all storms up to the 100-year ARI.

4.5.4 Inlet Pit Spacing

The spacing of inlets throughout the site will be such that the depth of flow, for the major system design storm runoff, will not exceed the top of the kerb (150mm above gutter invert).

4.5.5 Overland Flow

Dedicated flow paths have been designed to convey all storms up to and including the 100-year ARI. These flow paths will convey stormwater from the site to the detention basin within the car park fronting Templar Road and the trunk drainage system.

5 WATER QUANTITY MANAGEMENT

5.1 General Design Principles

Penrith City Council adopts the principles of water quantity management, also known as "On-site Detention (OSD)", to ensure the cumulative effect of development does not have a detrimental effect on the existing stormwater infrastructure and watercourses located within their LGA downstream from the particular site.

Section 3.3.3 of Councils draft stormwater management policy requires that "*it will be necessary to demonstrate that there will be no increase in runoff from the site as result of the development for all storms up to and including the 100 year Average Recurrence Interval (ARI) event for all storm durations*".

5.2 Methodology

A hydrological analysis was undertaken to estimate the impact of the development of the site on peak flows at the downstream extent of the site. Modelling of stormwater runoff quantity was considered for the pre-existing case and for the operational phase of the development.

In order to assess the existing and operational phase peak discharges from the development site, a DRAINS hydrological model was used to estimate peak flows from catchments on the site for various storm durations for Q2 year ARI to Q100 year ARI events.

5.3 Existing & Post Development Peak Flows

Table 5.2 shows the existing and developed flows at the downstream boundary.

ARI	**Design Storm Duration**	**Peak Flow (m3/s)**		
		Undeveloped	**Developed**	
		Site	Site (no atten.)	**Site (+ atten.)**
2	30	0.334	0.890	**0.308**
	60	0.447	0.737	**0.333**
	120	0.514	0.858	**0.344**
20	30	1.26	1.66	**0.916**
	60	1.07	1.30	**1.03**
	120	1.33	1.50	**1.13**
100	30	1.730	2.02	**1.42**
	60	1.470	1.62	**1.45**
	120	1.710	1.87	**1.59**

Table 5.2. Q2, Q20 & Q100 ARI Peak Flows from Development

The post development (with site attenuation) flows can be seen to be lower than the pre-developed flows. The required detention storage for the development site is discussed in the following section.

5.4 Proposed Water Quantity Management

As previously discussed, detention storage on the development site is required to reduce local outflows. The proposed site layout allows for provision of an underground OSD system. The ultimate discharge location will be to the creek adjacent to the south-western corner of the Site.

The proposed OSD system is an underground tank located in the car park near the south-west corner of the site.

A number of combinations of storages and outlet arrangements have been modelled. The adopted arrangement models the basin configuration shown in **Table 5.3** and the development layout can also be observed on drawings **Co10047.03-DA41** through **DA44**.

ARI	Duration (mins)	Peak Flow (m3/s)				Depth (mm)	Storage (m3)
		No Atten.	With attenuation				
			Low	High	Total		
2	120	0.858	0.344	-	0.344	950	570
20	120	1.50	0.443	0.686	1.130	1400	840
100	120	1.87	0.468	1.120	1.590	1550	930

Table 5.3 OSD Characteristics (Post Development)

The hydrologic analysis shows that, with the provision of the on-site detention system detailed above, the post development peak flows from the site will be attenuated to less than pre-development, hence the requirements of PCC have been met.

6 STORMWATER QUALITY CONTROLS

6.1 Regional Parameters

There is a need to provide a design which incorporates the principles of Water Sensitive Urban Design (WSUD) and to target pollutants that are present in the stormwater so as to minimise the adverse impact these pollutants could have on receiving waters and to also meet the requirements specified by PCC.

PCC have nominated, in Section C3 of their *DCP 2010*, the requirements for stormwater quality to be performed on a catchment wide basis. These are presented in terms of annual percentage pollutant reductions on a developed catchment and are as follows:

Gross Pollutants	70%
Total Suspended Solids	80%
Total Phosphorus	45%
Total Nitrogen	45%
Free Oil and Grease	90%

6.2 Proposed Stormwater Treatment System

Roof, hardstand, car parking, roads and other extensive paved areas are required to be treated by the Stormwater Treatment Measures (STM). The STM shall be sized according to the whole catchment area of the Site. The STM for the development are based on a treatment train approach as discussed in the NSW EPA document *Managing Urban Stormwater: Treatment Techniques* to ensure that all of the objectives above are met.

Components of the treatment train for the development are as follows:

- Primary treatment to parking, hardstand areas is via Enviropod pit inserts;
- Secondary treatment is via trash screens and a sedimentation sump within the tanked OSD system in the car park;
- Tertiary treatment of all site water will be treated via a syphon actuated filtration system by Stormwater360 (SW360).
- Tertiary treatment of a portion of the roof will also be performed via the proposed rainwater reuse tanks.

6.3 Stormwater Quality Modelling

6.3.1 Introduction

The MUSIC model was chosen to model water quality. This model, released by the Cooperative Research Centre for Catchment Hydrology (CRCCH), is a standard industry model for this purpose. MUSIC (the Model for Urban Stormwater Improvement Conceptualisation) is suitable for simulating catchment areas of up to 100 km^2 and utilises a continuous simulation approach to model water quality.

By simulating the performance of stormwater management systems, MUSIC can be used to predict if the proposed systems and changes to land use are appropriate for their catchments and capable of meeting specified water quality objectives (CRC 2002). The water quality constituents modelled in MUSIC, of relevance to this report, include Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN).

The pollutant retention criteria set out in Part C3 of PCC's DCP and nominated in Section 6.1 of this report were used as a basis for assessing the effectiveness of the selected treatment trains.

The MUSIC model "*10047.03_Rev1.sqz*" was set up to examine the effectiveness of the water quality treatment train and to predict if PCC's requirements have been achieved. The layout of the MUSIC model is presented in Appendix B.

6.3.2 Rainfall Data

Six minute pluviographic data for the nearby Liverpool (Whitlam) weather station was sourced from the Bureau of Meteorology (BOM) as nominated below. Evapo-transpiration data for the period was sourced from the Sydney Monthly Areal PET data set supplied with the MUSIC software.

Input	**Data Used**
Rainfall Station	67035 Liverpool (Whitlam)
Rainfall Period	1 January 1967 – 31 December 1976 (10 years)
Mean Annual Rainfall (mm)	857
Evapotanspiration	Sydney Monthly Areal PET
Model Timestep	6 minutes

6.3.3 Rainfall Runoff Parameters

Parameter	**Value**
Rainfall Threshold	1.40
Soil Storage Capacity (mm)	170
Initial Storage (% capacity)	30
Field Capacity (mm)	70
Infiltration Capacity Coefficient a	210
Infiltration Capacity exponent b	4.7
Initial Depth (mm)	10
Daily Recharge Rate (%)	50
Daily Baseflow Rate (%)	4

Daily Seepage Rate (%) 0

6.3.4 Pollutant Concentrations & Source Nodes

Pollutant concentrations for source nodes are based on parameters adopted by the adjacent LGA Blacktown City Council land use parameters as per the Table 6.1.:

Flow Type	Surface Type	TSS (log_{10} values)		TP (log_{10} values)		TN (log_{10} values)	
		Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
Baseflow	Roof	1.20	0.17	-0.85	0.19	0.11	0.12
	Roads	1.20	0.17	-1.11	0.48	0.14	0.12
Stormflow	Roof	1.30	0.32	-0.89	0.25	0.30	0.19
	Roads	2.43	0.32	-0.30	0.25	0.34	0.19

Table 6.1. Pollutant Concentrations

The MUSIC model has been setup with a treatment train approach based on the pollutant concentrations in Table 6.1 above.

6.3.5 Treatment Nodes

Buffers, rainwater tank and SW360 nodes have been used in the modelling of the development.

6.3.6 Results

Table 6.2 shows the results of the MUSIC analysis. The reduction rate is expressed as a percentage and compares the post-development pollutant loads without treatment versus post-development loads with treatment.

	Source	**Residual Load**	**% Reduction**
Flow (ML/yr)	30.3	29.5	2.7
Total Suspended Solids (kg/yr)	6450	398	93.8
Total Phosphorus (kg/yr)	12.2	2.75	77.5
Total Nitrogen (kg/yr)	70.0	37.9	45.9
Gross Pollutants (kg/yr)	802	0.00	100.0

Table 6.2. MUSIC analysis results

The model results indicate that, through the use of the STM in the treatment train, pollutant load reductions for Total Suspended Solids, Total Phosphorous, Total Nitrogen and Gross Pollutants will meet the requirements of C3 of PCC's DCP 2010 on an overall catchment basis.

6.3.7 Modelling Discussion

MUSIC modelling has been performed to assess the effectiveness of the selected treatment trains and to ensure that the pollutant retention requirements of C3 of PCC's DCP2010 have been met.

The MUSIC modelling has shown that the proposed treatment train of STM will provide stormwater treatment which will meet PCC requirements in an effective and economical manner.

Hydrocarbon and oil & grease removal cannot be modelled with MUSIC software. The RRM facility is expected to have low source loadings of hydrocarbons. Potential sources of hydrocarbons and/ or oil & grease would be limited to leaking engine sumps or for accidental fuel spills/leaks and leaching of bituminous pavements (car parking only). The potential for these pollutants is low and published data from the CSIRO indicates that average concentrations from industrial sites are in the order of 10mg/L and we would expect source loading from this site to be near to or below this concentration. Hydrocarbon pollution would also be limited to surface areas which will be treated via SW360 filtration system which are predicted to achieve a 90% reduction of this pollutant.

Given the expected low source loadings of hydrocarbons and oil/grease and removal efficiencies of the treatment devices we consider that the requirements of the Penrith City Council have been met.

6.4 Stormwater Harvesting

Stormwater harvesting refers to the collection of stormwater from the developments internal stormwater drainage system for re-use in non-potable applications. Stormwater from the stormwater drainage system can be classified as either rainwater, where the flow is from roof areas only, or stormwater where the flow is from all areas of the development.

Rainwater harvesting is proposed for this development with re-use for non-potable applications. Internal uses include such applications as toilet flushing while external applications will be used for irrigation. The aim is to reduce the water demand for the development and to satisfy the requirements of PCC DCP2010.

In general terms the rainwater harvesting system will be an in-line tank for the collection and storage of rainwater. At times when the rainwater storage tank is full rainwater can pass through the tank and continue to be discharged via gravity into the stormwater drainage system. Rainwater from the storage tank will be pumped for distribution throughout the development in a dedicated non-potable water reticulation system.

Rainwater tanks have been sized with reference to the NSW Department of Environment and Conservation document *Managing Urban Stormwater: Harvesting and Reuse*, using a simple water balance analysis to balance the supply and demand, based on the base water demands and the requirement of PCC DCP2010 Part C3 to provide a reduction in non-potable water demand with a minimum 100,000 litre rainwater tank.

6.5 Maintenance and Monitoring

It is important that each component of the water quality treatment train is properly operated and maintained. In order to achieve the design treatment objectives, an indicative maintenance schedule has been prepared (refer to **Table 6.5** below).

Note that inspection frequency may vary depending on site specific attributes and rainfall patterns in the area. In addition to the maintenance requirements below it is also recommended that inspections are made following heavy rainfall or major storm events. Event heavy rain inspections should be carried out as soon as practicable following an intense period of rainfall, (i.e. greater than 100mm over 48 hours), as measured at Prospect Dam Weather Station No. 67019.

Table 6.5. Indicative Maintenance Schedule

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
SWALES/ LANDSCAPED AREAS			
Check density of vegetation and ensure minimum height of 150mm is maintained. Check for any evidence of weed infestation	Six monthly	Maintenance Contractor	Replant and/or fertilise, weed and water in accordance with landscape consultant specifications
Inspect swale for excessive litter and sediment build up	Six monthly	Maintenance Contractor	Remove sediment and litter and dispose in accordance with local authorities' requirements.
Check for any evidence of channelisation and erosion	Six monthly/ After Major Storm	Maintenance Contractor	Reinstate eroded areas so that original, designed swale profile is maintained
Weed Infestation	Three Monthly	Maintenance Contractor	Remove any weed infestation ensuring all root ball of weed is removed. Replace with vegetation where required.
Inspect swale surface for erosion	Six Monthly	Maintenance Contractor	Replace top soil in eroded area and cover and secure with biodegradable fabric. Cut hole in fabric and revegetate.

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
RAINWATER TANK			
Check for any clogging and blockage of the first flush device	Monthly	Maintenance Contractor	First flush device to be cleaned out
Check for any clogging and blockage of the tank inlet - leaf/litter screen	Six monthly	Maintenance Contractor	Leaves and debris to be removed from the inlet leaf/litter screen
Check the level of sediment within the tank	Every two years	Maintenance Contractor	Sediment and debris to be removed from rainwater tank floor if sediment level is greater than the maximum allowable depth as specified by the hydraulic consultant
INLET & JUNCTION PITS			
Inside Pit	Six Monthly	Maintenance Contractor	Remove grate and inspect internal walls and base, repair where required. Remove any collected sediment, debris, litter.
Outside of Pit	Four Monthly/ After Major Storm	Maintenance Contractor	Clean grate of collected sediment, debris, litter and vegetation.
STORMWATER SYSTEM			
General Inspection of complete stormwater drainage system	Bi-annually	Maintenance Contractor	Inspect all drainage structures noting any dilapidation in structures and carry out required repairs.
OSD TANK			
Inspect and remove any blockage from orifice	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen to inspect orifice.
Inspect trash screen and clean	Six Monthly	Maintenance Contractor/ Owner	Remove grate and screen if required to clean it.
Inspect flap valve and remove any blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate. Ensure flap valve moves freely and remove any

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
			blockages or debris.
Inspect pit sump for damage or blockage.	Six Monthly	Maintenance Contractor/ Owner	Remove grate & screen. Remove sediment/ sludge build up and check orifice and flap valve is clear.
Inspect storage areas and remove debris/ mulch/ litter etc likely to block screens/ grates.	Six Monthly	Maintenance Contractor/ Owner	Remove debris and floatable materials.
Check attachment of orifice plate and screen to wall of pit	Annually	Maintenance Contractor	Remove grate and screen. Ensure plate or screen mounted securely, tighten fixings if required. Seal gaps if required.
Check orifice diameter is correct and retains sharp edge.	Five yearly	Maintenance Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Check screen for corrosion	Annually	Maintenance Contractor	Remove grate and screen and examine for rust or corrosion, especially at corners or welds.
Inspect overflow weir and remove any blockage	Six monthly	Maintenance Contractor/ Owner	Ensure weir is free of blockage.
Inspect walls for cracks or spalling	Annually	Maintenance Contractor	Remove grate to inspect internal walls, repair as necessary.
Check step irons	Annually	Maintenance Contractor	Ensure fixings are secure and irons are free from corrosion.

7 EROSION & SEDIMENT CONTROL PLAN

An erosion and sediment control plan (ESCP) is included in drawings **Co10047.03-DA20, DA25 and DA26**. These plans show the works can proceed without polluting receiving waters. A detailed plan will be prepared after development consent is granted and before works commence.

7.1 General Conditions

1. The ESCP is to be read in conjunction with the engineering plans, and any other plans or written instructions that may be issued by the site manager, council inspector or other authorised representative in relation to development at the subject site.
2. Contractors will ensure that all soil and water management works are undertaken as instructed in this report and constructed following the guidelines stated in Managing Urban Stormwater, Soils and Construction (1998) and PCC's specifications.
3. All subcontractors will be informed by the site manager of their responsibilities in minimising the potential for sedimentation and soil erosion.

7.2 Land Disturbance

1. Where practicable, the soil erosion hazard on the site will be kept as low as possible and as recommended in Table 1

Land Use	Limitation	Comments
Construction areas	Limited to 5 (preferably 2) metres from the edge of any essential construction activity as shown on the engineering plans.	All site workers will clearly recognise these areas that, where appropriate, are identified with barrier fencing (upslope) and sediment fencing (downslope), or similar materials.
Temporary construction access	Limited to a maximum width of 5 metres	The site manager will determine and mark the location of these zones onsite. All site workers will comply with these restrictions.
Remaining lands	Entry prohibited except for essential management works	

Table 1 Limitations to access

7.3 Erosion & Sediment Control Conditions

1. Clearly visible barrier fencing shall be installed as shown on drawing **Co10047.03-DA20** and elsewhere at the discretion of the site superintendent to ensure traffic control and prohibit unnecessary site disturbance. Vehicular access to the site shall be limited to only those essential for construction work and they shall enter the site only through the stabilised access points.
2. Soil materials will be replaced in the same order they are removed from the ground. It is particularly important that all subsoils are buried and topsoils (landscaped areas only) remain on the surface at the completion of works.
3. The construction program should be scheduled so that period of time from starting land disturbance to stabilisation is minimised.
4. Notwithstanding this, schedule works so that the duration from the conclusion of land shaping to completion of final stabilisation is less than 20 working days.
5. Land recently established with grass species will be watered regularly until an effective cover has properly established and plants are growing vigorously. Further application of seed might be necessary later in areas of inadequate vegetation establishment.
6. Where practical, foot and vehicular traffic will be kept away from all recently established areas
7. Earth batters shall be constructed in accordance with the Geotechnical Engineers Report or with as law a gradient as practical but not steeper than:
    - 2H:1V where slope length is less than 7 metres
    - 2.5H:1V where slope length is between 7 and 10 metres
    - 3H:1V where slope length is between 10 and 12 metres
    - 4H:1V where slope length is between 12 and 18 metres
    - 5H:1V where slope length is between 18 and 27 metres
    - 6H:1V where slope length is greater than 27 metres
8. All earthworks, including waterways/drains/spillways and their outlets, will be constructed to be stable in at least the design storm event of 1 in 2 year ARI (Q2).
9. During windy weather, large, unprotected areas will be kept moist (not wet) by sprinkling with water to keep dust under control. In the event water is not available in sufficient quantities, soil binders and/or dust retardants will be used or the surface will be left in a cloddy state that resists removal by wind.

7.4 Pollution Control Conditions

1. Stockpiles will not be located within 5 metres of hazard areas, including likely areas of high velocity flows such as waterways, paved areas and driveways.
2. Sediment fences will:
   a) Be installed where shown on the drawings, and elsewhere at the discretion of the site superintendent to contain the coarser sediment fraction (including aggregated fines) as near as possible to their source.
   b) Have a catchment area not exceeding 720 square metres, a storage depth (including both settling and settled zones) of at least 0.6 metres, and internal dimensions that provide maximum surface area for settling, and
   c) Provide a return of 1 metre upslope at intervals along the fence where catchment area exceeds 720 square meters, to limit discharge reaching each section to 10 litres/second in a maximum 20 year t_c discharge.
3. Sediment removed from any trapping device will be disposed of in locations where further erosion and consequent pollution to down slope lands and waterways will not occur.
4. Water will be prevented from directly entering the permanent drainage system unless it is relatively sediment free (i.e. the catchment area has been permanently landscaped and/or likely sediment has been treated in an approved device). Nevertheless, stormwater inlets will be protected.
5. Temporary soil and water management structures will be removed only after the lands they are protecting are fully stabilised.

7.5 Waste Management Conditions

Acceptable bind will be provided for any concrete and mortar slurries, paints, acid washings, lightweight waste materials and litter. Clearance service are to be provided by the respective contractors at least weekly.

7.6 Site Inspection and Maintenance

1. A self-auditing program will be established based on a check sheet (refer **Appendix D**). A site inspection using the check sheet will be made by the site manager:
   - At least weekly;
   - Immediately before site closure; and
   - Immediately following rainfall events in excess of 5mm in any 24 hour period.

The self audit will include:

- Recording the condition of every sediment control device;
- Recording maintenance requirements (if any) for each sediment control device;
- Recording the volumes of sediment removed from sediment retention systems, where applicable;
- Recording the site where sediment is disposed; and

- Forwarding a signed duplicate of the completed Check Sheet to the project manager/developer for their recording.

2. In addition, the site manager will be required to oversee the installation and maintenance of all soil and water management works on the site. The person shall be required to provide a short monthly written report to the superintendant. The responsible person will ensure that:
   - The plan is being implemented correctly;
   - Repairs are undertaken as required; and
   - Essential modifications are made to the plan if and when necessary.

   The report shall include a certificate that works have been carried out in accordance with the plan.
3. Waste bins will be emptied as necessary. Disposal of waste will be in a manner approved by the Site Superintendent.
4. Proper drainage will be maintained. To this end, drains (including inlet and outlet works) will be checked to ensure that they are operating as intended, especially that:
   - No low points exist that can fill and overtop in a large storm event;
   - Areas of erosion are repaired (e.g. lined with a suitable material) and/or velocity of flow is reduced appropriately through construction of small check dams and installing additional diversion upslope; and
   - Blockages are cleared (these night occur because of sediment pollution, sand/soil/spoil being deposited in or too close to them, breached by vehicle wheels, etc.).
5. Sand/soil/spoil materials placed closer than 2 metres from hazard areas will be removed. Such hazard areas include areas of high velocity water flows (e.g. waterways and gutters), paved areas and driveways.
6. Recently stabilised lands will be checked to ensure that erosion hazard has been effectively reduced. Any repairs will be initiated as appropriate.
7. Excessive vegetation growth will be controlled through mowing or slashing.
8. All sediment detention systems will be kept in good working condition. In particular, attention will be given to:
   a) Recent works to ensure they have not resulted in diversion of sediment laden water away from them;
   b) Degradable products to ensure they are replaced as required; and
   c) Sediment removal, to ensure the design capacity remains in the settling zone.
9. Any pollutants removed from sediment basins or litter traps will be disposed of in areas where further pollution to down slope lands and waterways should not occur.
10. Additional erosion and/or sediment control works will be constructed as necessary to ensure the desired protection is given to down slope lands and waterways, i.e.

make ongoing changes to the plan where it proves inadequate in practice or is subjected to changes in conditions at the work site or elsewhere in the catchment.

11. Erosion and sediment control measures will be maintained in a functioning condition until all earthwork activities are completed and the site fully stabilised.
12. Litter, debris and sediment will be removed from the gross pollutant traps and trash racks as required.

8 CONCLUSION

This Civil Engineering Details Report has been prepared to support the application for a proposed processing and packaging facility on Part Lot 2304 DP 1172543, Templar Road, Erskine Park.

A civil engineering strategy for the site has been developed which provides a best practice solution within the constraints of the existing landform and proposed development layout. Within this strategy a stormwater quantity and quality management strategy has been developed to reduce both peak flows and pollutant loads in stormwater leaving this site. The stormwater management for the development has been designed in accordance with Penrith City Council's Section C3 of DCP2010.

The hydrological assessment proves local post development flows from the site will be less than pre-development flows and demonstrates that the site discharge would not adversely affect any land, drainage system or watercourse as a result of the development.

During the construction phase, a Sediment and Erosion Control Plan will be in place to ensure the downstream drainage system and receiving waters are protected from sediment laden runoff.

During the operational phase of the development, a treatment train incorporating the use of the proprietary filtration system is proposed to mitigate any increase in stormwater pollutant load generated by the development. MUSIC modelling results indicate that the proposed STM are effective in reducing pollutant loads in stormwater discharging from the site and meet the requirements of Council's pollution reduction targets. Best management practices have been applied to the development to ensure that the quality of stormwater runoff is not detrimental to the receiving environment.

It is recommended the management strategies in this report be approved and incorporated into the future detailed design.

9 REFERENCES

- Managing Urban Stormwater: Harvesting and Reuse – 2006 (NSW DEC);
- Managing Urban Stormwater: Source Control – 1998 (NSW EPA);
- Managing Urban Stormwater: Treatment Techniques – 1997 (NSW EPA);
- Managing Urban Stormwater: Soils & Construction – 2004(LANDCOM);
- Penrith City Council – DCP 2010 (Part C3); and
- Water Sensitive Urban Design – "Technical Guidelines for Western Sydney" by URS Australia Pty Ltd, May 2004

Appendix A

DRAWINGS BY COSTIN ROE CONSULTING

FOOD PROCESSING & PACKAGING FACILITY

PART LOT 2304 TEMPLAR ROAD, ERSKINE PARK, NSW

LIST OF DRAWINGS

DRAWING NO.	DRAWING TITLE
C010047.03-DA10	DRAWING LIST & GENERAL NOTES
C010047.03-DA20	EROSION AND SEDIMENT CONTROL PLAN
C010047.03-DA25	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 1
C010047.03-DA26	EROSION AND SEDIMENT CONTROL DETAILS - SHEET 2
C010047.03-DA40	STORMWATER DRAINAGE MASTERPLAN
C010047.03-DA41	STORMWATER DRAINAGE PLAN - SHEET 1
C010047.03-DA42	STORMWATER DRAINAGE PLAN - SHEET 2
C010047.03-DA43	STORMWATER DRAINAGE PLAN - SHEET 3
C010047.03-DA44	STORMWATER DRAINAGE PLAN - SHEET 4
C010047.03-DA45	STORMWATER DRAINAGE DETAILS - SHEET 1
C010047.03-DA46	STORMWATER DRAINAGE DETAILS - SHEET 2
C010047.03-DA47	STORMWATER DRAINAGE DETAILS - SHEET 3
C010047.03-DA50	FINISHED LEVELS PLAN

SITE PLAN
N.T.S

GENERAL NOTES:

G1 THESE DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL ARCHITECTURAL AND OTHER CONSULTANTS' DRAWINGS AND SPECIFICATIONS AND WITH SUCH OTHER WRITTEN INSTRUCTIONS AS MAY BE ISSUED DURING THE COURSE OF THE CONTRACT. ANY DISCREPANCY SHALL BE REFERRED TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

G2 ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE RELEVANT AND CURRENT STANDARDS AUSTRALIA CODES AND WITH THE BY-LAWS AND ORDINANCES OF THE RELEVANT BUILDING AUTHORITIES EXCEPT WHERE VARIED BY THE PROJECT SPECIFICATION.

G3 ALL DIMENSIONS SHOWN SHALL BE VERIFIED BY THE BUILDER ON SITE. ENGINEER'S DRAWINGS SHALL NOT BE SCALED FOR DIMENSIONS. ENGINEER'S DRAWINGS ISSUED IN ANY ELECTRONIC FORMAT MUST NOT BE USED FOR DIMENSIONAL SETOUT. REFER TO THE ARCHITECT'S DRAWINGS FOR ALL DIMENSIONAL SETOUT INFORMATION.

G4 DURING CONSTRUCTION THE STRUCTURE SHALL BE MAINTAINED IN A STABLE CONDITION AND NO PART SHALL BE OVERSTRESSED. TEMPORARY BRACING SHALL BE PROVIDED BY THE BUILDER TO KEEP THE WORKS AND EXCAVATIONS STABLE AT ALL TIMES.

G5 UNLESS NOTED OTHERWISE ALL LEVELS ARE IN METRES AND ALL DIMENSIONS ARE IN MILLIMETRES.

G6 ALL WORKS SHALL BE UNDERTAKEN IN ACCORDANCE WITH ACCEPTABLE SAFETY STANDARDS & APPROPRIATE SAFETY SIGNS SHALL BE INSTALLED AT ALL TIMES DURING THE PROGRESS OF THE JOB.

EROSION CONTROL NOTES

ALL CONTROL WORK INCLUDING DIVERSION BANKS AND CATCH DRAINS, V-DRAINS AND SILT FENCES SHALL BE COMPLETED DIRECTLY FOLLOWING THE COMPLETION OF THE EARTHWORKS.

1. SILT FENCES AND SILT FENCE RETURNS SHALL BE ERECTED CONVEX TO THE CONTOUR TO POND WATER.
2. HAY BALE BARRIERS AND GEOFABRIC FENCES ARE TO BE CONSTRUCTED TO TOE OF BATTER, PRIOR TO COMMENCEMENT OF EARTHWORKS, IMMEDIATELY AFTER CLEARING OF VEGETATION AND BEFORE REMOVAL OF TOP SOIL.
3. ALL TEMPORARY EARTH BERMS, DIVERSION AND SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED AND MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
4. CLEAR WATER IS TO BE DIVERTED AWAY FROM DISTURBED GROUND AND INTO THE DRAINAGE SYSTEM.
5. THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING AND PROVIDING ON GOING ADJUSTMENT TO EROSION CONTROL MEASURES AS REQUIRED DURING CONSTRUCTION.
6. ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING, TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE, APPROVED LOCATION.
7. ALL FINAL EROSION PREVENTION MEASURES INCLUDING THE ESTABLISHMENT OF GRASSING ARE TO BE MAINTAINED UNTIL THE END OF THE DEFECTS LIABILITY PERIOD.
8. ALL EARTHWORKS AREAS SHALL BE ROLLED ON A REGULAR BASIS TO SEAL THE EARTHWORKS.
9. ALL FILL AREAS ARE TO BE LEFT WITH A BUND AT THE TOP OF THE SLOPE AT THE END OF EACH DAYS EARTHWORKS. THE HEIGHT OF THE BUND SHALL BE A MINIMUM OF 200MM.
10. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND HYDROMULCHED WITHIN 10 DAYS OF COMPLETION OF FORMATION.
11. AFTER REVEGETATION OF THE SITE IS COMPLETE AND THE SITE IS STABLE IN THE OPINION OF A SUITABLY QUALIFIED PERSON ALL TEMPORARY WORK SUCH AS SILT FENCE, DIVERSION DRAINS ETC SHALL BE REMOVED.
12. ALL TOPSOIL STOCKPILES ARE TO BE SUITABLY COVERED TO THE SATISFACTION OF THE CONTRACT ADMINISTRATOR TO PREVENT WIND AND WATER EROSION.
13. ANY AREA THAT IS NOT APPROVED BY THE CONTRACT ADMINISTRATOR FOR CLEARING OR DISTURBANCE BY THE CONTRACTOR'S ACTIVITIES SHALL BE CLEARLY MARKED AND SIGN POSTED, FENCED OFF OR OTHERWISE APPROPRIATELY PROTECTED AGAINST ANY SUCH DISTURBANCE.
14. ALL STOCKPILE SITES SHALL BE SITUATED IN AREAS APPROVED FOR SUCH USE BY THE CONTRACT ADMINISTRATOR. A 6m BUFFER ZONE SHALL EXIST BETWEEN STOCKPILE SITES AND ANY STREAM OR FLOW PATH. ALL STOCKPILES SHALL BE ADEQUATELY PROTECTED FROM EROSION AND CONTAMINATION OF THE SURROUNDING AREA BY USE OF THE MEASURES APPROVED IN THE EROSION AND SEDIMENTATION CONTROL PLAN.
15. ACCESS AND EXIT AREAS SHALL INCLUDE SHAKE-DOWN OR OTHER METHODS APPROVED BY THE CONTRACT ADMINISTRATOR FOR THE REMOVAL OF SOIL MATERIALS FORM MOTOR VEHICLES.
16. THE CONTRACTOR IS TO ENSURE RUNOFF FROM ALL AREAS WHERE THE NATURAL SURFACE IS DISTURBED BY CONSTRUCTION, INCLUDING ACCESS ROADS, DEPOT AND STOCKPILE SITES, SHALL BE FREE OF POLLUTANTS BEFORE IT IS EITHER DISPERSED TO STABLE AREAS OR DIRECTED TO NATURAL WATERCOURSES.
17. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN SLOPES, CROWNS AND DRAINS ON ALL EXCAVATIONS AND EMBANKMENTS TO ENSURE SATISFACTORY DRAINAGE AT ALL TIMES WATER SHALL NOT BE ALLOWED TO POND ON THE WORKS UNLESS SUCH PONDING IS PART OF AN APPROVED ESCP / SWMP.

STORMWATER DRAINAGE NOTES:

1. ALL FINISHED PAVEMENT LEVELS SHALL BE AS INDICATED ON FINISHED LEVELS PLANS DA50.
2. PIT SIZES SHALL BE AS INDICATED IN THE SCHEDULE WHILE PIPE SIZES AND DETAILS ARE PROVIDED ON PLAN.
3. EXISTING STORMWATER PIT LOCATIONS AND INVERT LEVELS TO BE CONFIRMED BY SURVEY PRIOR TO COMMENCING WORKS ON SITE.
4. ALL STORMWATER PIPES Φ375 OR GREATER SHALL BE CLASS 2 REINFORCED CONCRETE WITH RUBBER RING JOINTS UNLESS NOTED OTHERWISE.
5. ALL PIPES UP TO AND INCLUDING Φ300 TO BE uPVC GRADE SN8.
6. ALL CONCRETE PITS GREATER THAN 1000mm DEEP SHALL BE REINFORCED USING N12-200 EACH WAY CENTERED IN WALL AND BASE. LAP MINIMUM 300mm WHERE REQUIRED. ALL CONCRETE FOR PITS SHALL BE F'c 32 MPA. PRECAST PITS MAY BE USED WITH THE APPROVAL OF THE ENGINEER.
7. IN ADDITION TO ITEM 6 ABOVE, ALL CONCRETE PITS GREATER THAN 3000mm DEEP SHALL HAVE WALLS AND BASE THICKNESS INCREASED TO 200mm.
8. PIPES SHALL BE LAID AS PER PIPE LAYING DETAILS. PARTICULAR CARE SHALL BE TAKEN TO ENSURE THAT THE PIPE IS FULLY AND EVENLY SUPPORTED. RAM AND PACK FILLING AROUND AND UNDER BACK OF PIPES AND PIPE FAUCETS, WITH NARROW EDGED RAMMERS OR OTHER SUITABLE TAMPING DETAILS.
9. WHERE PIPE LINES ENTER PITS, PROVIDE 2m LENGTH OF STOCKING WRAPPED SLOTTED Φ100 uPVC TO EACH SIDE OF PIPE.
10. ALL SUBSOIL DRAINAGE LINES SHALL BE Φ100 SLOTTED uPVC WITH APPROVED FILTER WRAP LAID IN 300mm WIDE GRANULAR FILTER UNLESS NOTED OTHERWISE. LAY SUBSOIL LINES TO MATCH FALLS OF LAND AND/OR 1 IN 200 MINIMUM. PROVIDE CAPPED CLEANING EYE (RODDING POINT) AT UPSTREAM END OF LINE AND AT 30m MAX. CTS. PROVIDE SUBSOIL LINES TO ALL PAVEMENT/ LANDSCAPED INTERFACES, TO REAR OF RETAINING WALLS (AS NOMINATED BY STRUCTURAL ENGINEER) AND AS SHOWN ON PLAN.
11. ALL PIPE GRADES 1 IN 100 MINIMUM UNO.
12. PROVIDE STEP IRONS IN PITS DEEPER THAN 1000mm.
13. MIN. 600 COVER TO PIPE OBVERT BENEATH ROADS & MIN. 400 COVER BENEATH LANDSCAPED AND PEDESTRIAN AREAS.
14. PIT COVERS IN TRAFFICABLE PAVEMENT SHALL BE CLASS D 'HEAVY DUTY', THOSE LOCATED IN NON-TRAFFICABLE AREAS SHALL BE CLASS B 'MEDIUM DUTY' U.N.O.
15. PROVIDE CLEANING EYES (RODDING POINTS) TO PIPES AT ALL CORNERS AND T-JUNCTIONS WHERE NO PITS ARE PRESENT.
16. DOWN PIPES (DP) TO BE AS PER HYDRAULIC ENGINEERS DETAILS WITH CONNECTOR TO MATCH DP SIZE U.N.O. ON PLAN. PROVIDE CLEANING EYE AT GROUND LEVEL.
17. PIPE LENGTHS NOMINATED ON PLAN OR LONGSECTIONS ARE MEASURED FROM CENTER OF PITS TO THE NEAREST 0.5m AND DO NOT REPRESENT ACTUAL LENGTH. THE CONTRACTOR IS TO ALLOW FOR THIS.

FOR DEVELOPMENT APPLICATION

AMENDMENTS	DATE	ISSUE
ISSUED FOR DEVELOPMENT APPLICATION	30.07.13	C
ISSUED FOR CLIENT REVIEW	22.07.13	B
ISSUED FOR CLIENT REVIEW	17.07.13	A

AMENDMENTS DATE ISSUE

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PROJECT
FOOD PROCESSING & PACKAGING FACILTY
PART LOT 2304 TEMPLAR ROAD
ERSKING PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MW	XC	06/2013		A1	AS SHOWN	C010047.03-DA10

CONSULT AUSTRALIA

Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 000 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

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DRAWING TITLE
DRAWING LIST
& GENERAL NOTES

DRAWING No C010047.03-DA10

ISSUE C

REALIGN EXISTING OPEN DRAIN OUTSIDE OF SITE BOUNDARY AS SHOWN.

PAD 5

OPEN DRAIN

OPEN DRAIN

SITE BOUNDARY

CONSTRUCTION ENTRY. REFER TO DETAIL ON DA25

SILT FENCE ONLY

SILT FENCE ONLY

TEMPLAR CRESCENT

SITE BOUNDARY

PAD 5B

LEGEND:

PROVIDE 1m RETURNS TO SILT FENCE AT 30m MAX. INTERVALS.
TYPICAL (N.S.O.P.)

- DENOTES DIRECTION OF OVERLAND FLOW
- DENOTES SILT FENCE WITH CATCH DRAIN
- DENOTES SILT FENCE ONLY
- DENOTES OPEN DRAIN

SILT FENCE, WITH CATCH. DRAIN

STOCKPILE TO BE REMOVED BY OTHERS PRIOR TO COMMENCEMENT OF WORKS.

STOCKPILE VOLUME 24650m³

SITE EASEMENT

SEDIMENT BASIN 1 (REFER NOTE)

DETENTION BASIN VOLUME 163

EMERGENCY SPILL WAY 3.0m WIDE

SITE EASEMENT

SITE BOUNDARY

EROSION AND SEDIMENT CONTROL PLAN

SCALE 1:500

NOTE:

REFER TO DRAWING C010047.03-DA10 FOR EROSION CONTROL NOTES.

SEDIMENTATION BASIN NOTE:

FOR SEDIMENT & EROSION CONTROL DETAILS REFER TO DRAWING C010047.03-DA25 & DA26.

SEDIMENTATION BASIN SIZING BASED ON RECOMMENDATIONS OF 'SOILS AND CONSTRUCTION, MANAGING URBAN STORMWATER-THE BLUE BOOK'. CAPACITY BASED UPON 5 DAY RAINFALL DEPTH AT 80th PERCENTILE INTENSITY (24.6mm).

APPROXIMATE AREA OF DISTURBED SITE = 4.34ha

SEDIMENT BASIN 1:

CATCHMENT AREA	= 4.34ha
REQUIRED BASIN VOLUME	= 800m³
BASE DIMENSIONS (L X W)	= 25m x 25m
TOP DIMENSIONS (L X W)	= 40m x 35m
MAX SIDE SLOPE	= 1V:3H
DEPTH	= 1.5m
PROVIDED BASIN VOLUME	= 1637m³

SEDIMENTATION BASINS TO COLLECT RUN-OFF IN EXTREME RAINFALL EVENTS. COLLECTED RUN-OFF TO BE ASSESSED BY A QUALIFIED LABORATORY FOR DOUSING RATES OF ALUM OR GYPSUM TO ENSURE COAGULATION OF SEDIMENTS PRIOR TO WATER BEING DISCHARGED TO COUNCIL STORMWATER SYSTEM.

EACH BASIN IS TO HAVE A MARKER PLACED AS PER THE DETAIL TO INDICATE WHEN SEDIMENT IS TO BE REMOVED. REMOVED SEDIMENT IS TO BE CLASSED AND DEWATERED PRIOR TO REMOVAL FROM SITE.

ALLOWANCE TO BE MADE DURING BENCHING OF SITE TO ENSURE RUN-OFF IS DIRECTED TO SEDIMENTATION BASINS.

NOTES:

1. ASSUME TYPE D SOIL (CLAY/SILTY CLAY)
2. ASSUME GROUP D SOIL (HIGH PLASTICITY AND SHRINK/SWELL PROPERTIES)

SOIL TYPE ASSESSED FROM GEOTECHNICAL REPORT NUMBER GT971 PROVIDED BY GROUND TECHNOLOGIES DATED IN MAY 2008

5m 0 10 20 30 40 50m

SCALE 1:500 AT A1 SIZE SHEET

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Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
email: mail@costinroe.com.au ©

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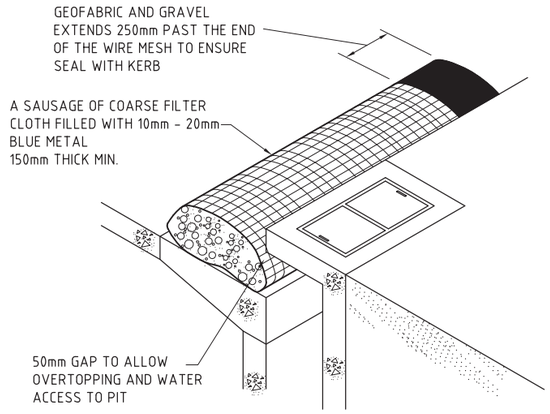
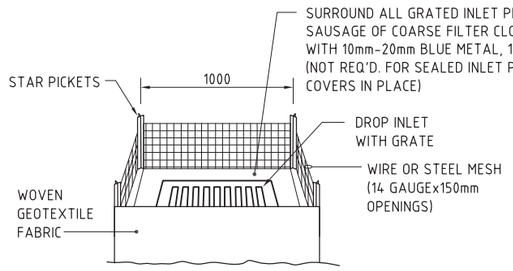
DRAWING TITLE
EROSION & SEDIMENT CONTROL PLAN

DRAWING No C010047.03-DA20

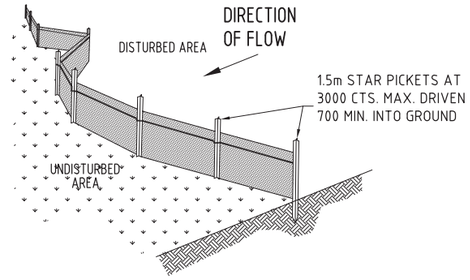
ISSUE C



KERB INLET PIT CONTROL
N.T.S

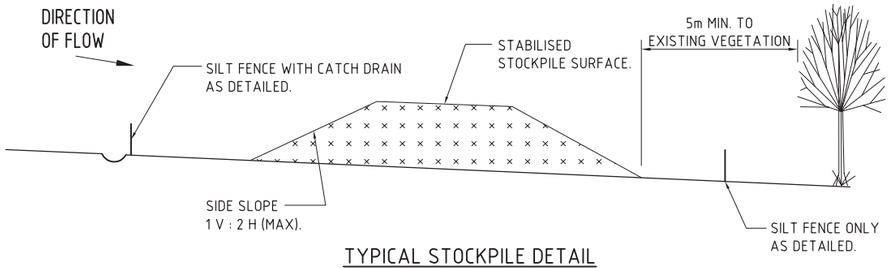


GRATED INLET PIT FILTER DETAIL
N.T.S



TYPICAL SILT FENCE DETAIL
N.T.S.
PROVIDE 1m RETURNS AT 30m INTERVALS.
TYPICAL

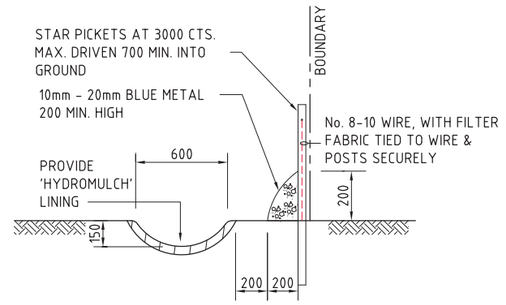
NOTE : ADOPT ABOVE DETAILS AROUND ALL PITS WITHIN AREA ENCOMPASSED BY SILT FENCE & TO PITS ON THE ROAD ADJACENT TO SITE BOUNDARY.



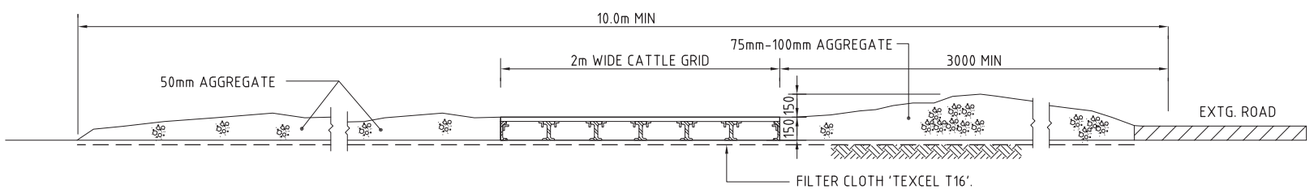
TYPICAL STOCKPILE DETAIL
N.T.S.

STOCKPILE NOTES

1. PLACE ALL STOCKPILES IN LOCATIONS MORE THAN 5m FROM EXISTING VEGETATION, ROADS & HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT ELONGATED MOUNDS. SIDE SLOPE TO BE 1 V: 2 H MAX.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE STOCKPILES ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE USING WOOD CHIP MULCH - 16 TONNE/Ha.
5. CONSTRUCT SILT FENCE WITH CATCH DRAIN ON UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES & SILT FENCE ONLY 1 TO 2m DOWNSLOPE AS SHOWN.



TYPICAL OPEN DRAIN & SILT FENCE
SCALE 1:20



SECTION 1:20 1 - : STABILISED CONSTRUCTION ENTRANCE 'TRUCK SHAKER'

200mm 0 500 1000 1500 2000mm
SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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ISSUED FOR DEVELOPMENT APPLICATION	30.07.13	C
ISSUED FOR CLIENT REVIEW	22.07.13	B
ISSUED FOR CLIENT REVIEW	17.07.13	A

AMENDMENTS DATE ISSUE

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PROJECT
FOOD PROCESSING & PACKAGING FACILTY
PART LOT 2304 TEMPLAR ROAD
ERSKING PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
MW	XC	06/2013		A1	AS SHOWN	C010047.03-DA25

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Costin Roe Consulting Pty Ltd.
Consulting Engineers ACN 000 086 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
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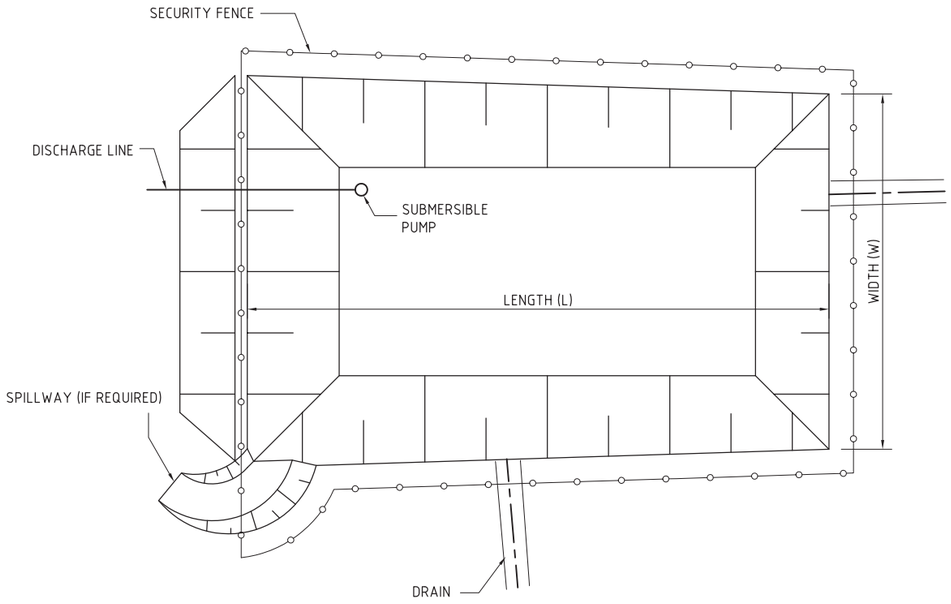
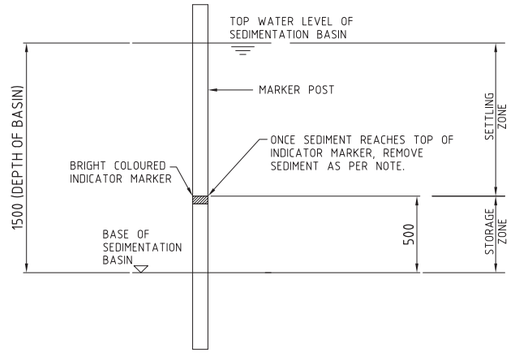
DRAWING TITLE
EROSION & SEDIMENT
CONTROL DETAILS
SHEET 1

DRAWING No C010047.03-DA25
ISSUE C



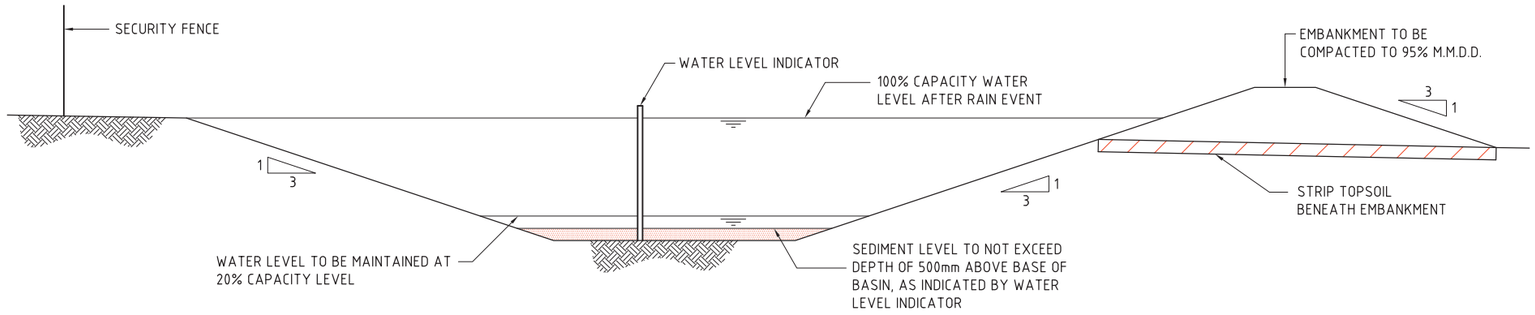
TYPICAL SEDIMENT CONTROL POND PLAN

SCALE 1:250



SEDIMENT STORAGE MARKER

SCALE 1:20



TYPICAL SEDIMENT CONTROL BASIN SECTION

SCALE 1:50

2m 0 5 10 15 20 25m

SCALE 1:250 AT A1 SIZE SHEET

500mm 0 1 2 3 4 5m

SCALE 1:50AT A1 SIZE SHEET

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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PART LOT 2304 TEMPLAR ROAD

ERSKING PARK, NSW

CONSULT AUSTRALIA

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Walsh Bay, Sydney NSW 2000
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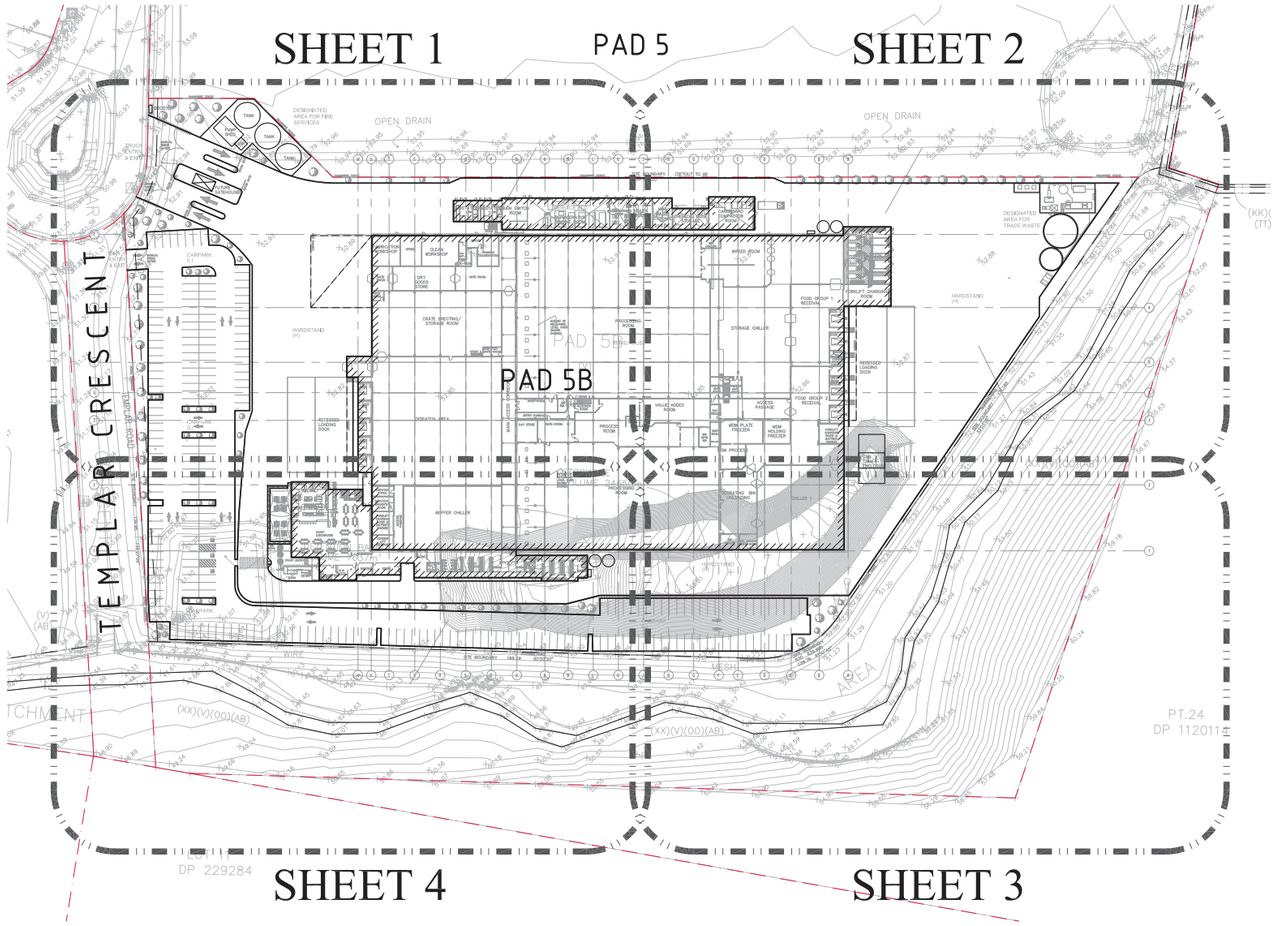
DRAWING TITLE

EROSION & SEDIMENT CONTROL DETAILS SHEET 2

DRAWING No C010047.03-DA26

ISSUE C



STORMWATER MASTERPLAN
SCALE 1:1000

LEGEND:

LEVELS DATUM IS AHD.

EXISTING SITE LEVELS AND DETAILS BASED ON SURVEY INFORMATION PROVIDED BY LAND PARTNERS TITLED 71718 REV. B DATED 17/08/11.

- SGGP, SINGLE GRATED GULLY PIT
- SJP, SEALED JUNCTION PIT
- KIP, KERB INLET PIT
- GD, GRATED DRAIN (300 WIDE U.N.O.)
- sw> - PROPOSED DRAINAGE LINE
- EXISTING DRAINAGE LINE
- sd> - ROOFWATER LINE (SYPHONIC)
- rw> - ROOFWATER LINE (IN-GROUND)
- DP - DOWNPIPE LOCATION
- ss> - SUBSOIL LINE
- 50.00 - FINISHED PAVEMENT CONTOUR (MAJOR) 0.5m INTERVALS
- 50.10 - FINISHED PAVEMENT CONTOUR (MINOR) 0.1m INTERVALS
- DENOTES OVERLAND FLOWPATH DIRECTION
- OH - OVERHEAD ELECTRICITY
- E - UNDERGROUND ELECTRICITY
- S - SEWER LINE
- SEWER MANHOLE
- W - WATER
- T - TELECOMMUNICATION
- G - GAS
- CUT-OFF DRAIN, REFER TO DRG. CC20

NOTE:

1. REFER TO DRAWING C010047.03-DA10 FOR STORMWATER DRAINAGE NOTES.
2. PIT SIZES NOMINATED IN SCHEDULE REFER TO GRATE OR LINTEL SIZE. REFER TO DRAWING C010047.03-DA45 & DA46 FOR STORMWATER DETAILS AND PIT INTERNAL CHAMBER DIMENSIONS.

PIT SCHEDULE

PIT No.	GRATE RL	DEPTH	TYPE	SIZE	COMMENT
P01	52.40	1000	SGGP	900x900	⊕
P02	52.40	1130	SGGP	900x900	⊕
P03	52.40	1260	SGGP	900x900	⊕
P04	51.60	850	SGGP	900x900	+ GD01 ⊕
P05	52.80	2240	SGGP	900x900	⊕
P06	52.15	1710	SGGP	900x900	⊕
P07	52.45	2130	SGGP	900x900	⊕
P08	52.60	2450	SGGP	900x900	⊕
P09	52.60	2670	SGGP	900x900	⊕
P10	52.60	2840	SGGP	900x900	⊕
P11	52.75	3080	SJP	900x900	
P12	52.40	1000	SGGP	900x900	⊕
P13	52.40	1180	SGGP	900x900	⊕
P14	52.40	1380	SGGP	900x900	⊕
P15	52.60	3060	SGGP	900x900	⊕
P16	52.60	3280	SGGP	900x900	⊕
P17	52.40	1000	SGGP	900x900	⊕
P18	52.10	1030	SGGP	900x900	⊕
P19	51.90	2800	SGGP	900x900	⊕
P20	52.80	1200	SGGP	900x900	⊕
P21	52.80	1430	SGGP	900x900	⊕
P22	52.80	1630	SGGP	900x900	⊕
P23	52.80	1830	SGGP	900x900	⊕
P24	52.80	2050	SJP	900x900	
P25	51.70	1000	SGGP	900x900	+ GD02 ⊕
P26	52.15	1610	SJP	900x900	
P27	52.60	2200	SGGP	900x900	⊕
P28	52.20	2040	SGGP	900x900	⊕
P29	52.20	2170	SGGP	900x900	⊕
P30	52.20	2290	SGGP	900x900	⊕
P31	51.60	1000	SGGP	900x900	+ GD03 ⊕
P32	52.20	2380	SGGP	900x900	⊕
P33	51.65	2010	SGGP	900x900	⊕
P34	51.00	1000	SGGP	900x900	+ GD04 ⊕
P35	51.00	1080	SGGP	900x900	⊕
P36	51.00	1210	SGGP	900x900	⊕
P37	51.00	1370	SGGP	900x900	⊕
P38	51.50	3350	SJP	900x900	DIV PIT
R01	53.05	TBC	SGGP	1200x1200	
R02	52.90	TBC	SGGP	1200x1200	
E01	51.71	3000	SJP	1200x1200	
E02	51.50	2930	SJP	1200x1200	
E03	51.00	2830	SJP	1200x1200	
E04	50.65	2880	SJP	1200x1200	

⊕ DENOTES PIT TO BE FITTED WITH ENVIROPOD SERIES 200 PIT INSERT

DIV PIT - DENOTES LOW FLOW DIVERSION PIT. LOW FLOW TO DIVERT TO FILTRATION UNIT

+ GD - DENOTES GRATED DRAIN/STORMWATER PIT WITH ENVIROPOD. REFER TO DETAIL ON DRG. DA46.

10m 0 10 20 30 40 50 60 70 80 90 100m

SCALE 1:1000 AT A1 SIZE SHEET

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PART LOT 2304 TEMPLAR ROAD
ERSKING PARK, NSW

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
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Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
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DRAWING TITLE
STORMWATER MASTERPLAN

DRAWING No C010047.03-DA40

ISSUE C

PAD 5

PROVIDE Ø825 CAPPED STUB. PROJECT 3m INTO ADJACENT PROPERTY.

DESIGNATED AREA FOR FIRE SERVICES

OPEN DRAIN

TANK

TANK

TANK

PUMP SHED

BOOSTER

TRUCK ENTRY & EXIT

MANUAL SWING GATES

FUTURE GATEHOUSE

BOOM GATE

CHAINWIRE FENCE

SITE BOUNDARY

Ø825
US IL 48.90
DS IL 48.76
26.5m @ 0.5%

Ø825
US IL 48.71
DS IL 48.62
17.0m @ 0.5%

Ø300
US IL 50.70
DS IL 50.57
25.0m @ 0.5%

Ø300
US IL 50.54
DS IL 50.43
21.0m @ 0.5%

Ø679
US IL 50.75
DS IL 50.65
20.0m @ 0.5%

Ø675
US IL 50.97
DS IL 50.78
37.5m @ 0.5%

Ø675
US IL 51.17
DS IL 51.00
35.0m @ 0.5%

PIT P25

PIT P26

PIT P27

PIT P24

PIT P23

PIT P22

PIT E01

PIT E02

GD02

SUBSTATION 2

SUBSTATION

MAIN SWITCH ROOM

SERVICE BLD

FFL 53.10

REFRIGERATION ENGINE ROOM

COMPRESSOR ROOM

BOILER ROOM

AIR LOCK

AWNING 24M

Ø225

FABRICATION WORKSHOP

STORE

CLEAN WORKSHOP

OFFICE

TRAINING DOCUMENTATION

WC

ENG ANTE-ROOM

ANTE ROOM

DRY GOODS STORE

ANTE ROOM

ANTE ROOM

FFL 53.10

CRATE ERECTING/ STORAGE ROOM

EXTENT OF MEZZANINE LEVEL OVER SHOWN DASHED

PROCESSING ROOM

PAD 5B

WAREHOUSE

(V)

STAIR 5

DISPATCH ANTE-ROOM

ANTE-ROOM

CAR ENTRY & EXIT

CARPARK (L)

MANUAL SWING GATES

GD04

Ø825
US IL 48.57
DS IL 48.22
70.0m @ 0.5%

Ø300
US IL 50.00
DS IL 49.95
12.0m @ 0.5%

Ø675
US IL 50.40
DS IL 50.19
42.0m @ 0.5%

PIT P34

PIT P28

PIT P35

PIT P29

PIT P36

PIT P30

PIT P37

PIT E03

Ø375
US IL 49.92
DS IL 49.82
20.0m @ 0.5%

Ø375
US IL 49.79
DS IL 49.66
26.0m @ 0.5%

Ø750
US IL 50.16
DS IL 50.06
20.0m @ 0.5%

Ø750
US IL 50.03
DS IL 49.94
18.5m @ 0.5%

Ø750
US IL 49.91
DS IL 49.85
17.0m @ 0.5%

HARDSTAND (H)

RECESSED LOADING DOCK

AWNING

GD03

DISPATCH DOCK 5

DISPATCH DOCK 4

DISPATCH DOCK 3

DISPATCH DOCK 2

DISPATCH DOCK 1

DISPATCH AREA

MAIN ACCESS CORRIDOR

STAIR 2

ANTE-ROOM

QA RM.

ALLERGEN ROOM

ENTRY PASSAGE

DAY STORE

ANTE-ROOM

BRINE TANKS

PROCESS ROOM

TEMPLAR CRESCENT

TEMPLAR ROAD

PROPOSED 3.0m WIDE DRAINAGE EASEMENT FOR PAD 5.

3000

BREAK LINE - REFER TO DRG. 42 (SHEET 2) FOR CONTINUATION

BREAK LINE - REFER TO DRG. 44 (SHEET 4) FOR CONTINUATION

NOTE:

1. REFER TO DRAWING C010047.03-DA10 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING C010047.03-DA40 FOR LEGEND & PIT SCHEDULE.

STORMWATER DRAINAGE PLAN - SHEET 1
SCALE 1:250

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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PROJECT
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PART LOT 2304 TEMPLAR ROAD
ERSKING PARK, NSW

CONSULT AUSTRALIA

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
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Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
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DRAWING TITLE
STORMWATER DRAINAGE PLAN
SHEET 1

DRAWING No C010047.03-DA41

ISSUE C

PAD 5

OPEN DRAIN

BREAK LINE - REFER TO DRG. 41 (SHEET 1) FOR CONTINUATION

BREAK LINE - REFER TO DRG. 43 (SHEET 3) FOR CONTINUATION

SITE BOUNDARY

CHAINWIRE FENCE

Ø600
US IL 51.37
DS IL 51.20
35.0m @ 0.5%

Ø600
US IL 51.60
DS IL 51.40
37.5m @ 0.5%

PIT P21

PIT P20

PIT R01

Ø225

PIT P01

PIT P02

PIT P03

PIT P04

PIT P05

Ø300
US IL 51.40
DS IL 51.30
20.0m @ 0.5%

Ø300
US IL 51.27
DS IL 51.17
20.0m @ 0.5%

Ø300
US IL 50.75
DS IL 50.58
30.0m @ 0.5%

Ø375
US IL 51.14
DS IL 50.94
40.0m @ 0.5%

Ø450
US IL 50.56
DS IL 50.46
20.0m @ 0.5%

DESIGNATED AREA FOR TRADE WASTE

FFL 53.10

FFL 53.10

HOT WATER STORAGE

CHEMICAL BULK STORAGE

CARDBOARD BALER ROOM

WIP CHILLER

INFEED ROOM

WIP ROOM

FORKLIFT CHARGING ROOM

FOOD GROUP 1 RECEIVAL

STORAGE CHILLER

DOCK 3

DOCK 2

DOCK 1

DRIVERS TOILET

COMBINED RECEIVAL OFFICE

DRIVERS ROOM

RECESSED LOADING DOCK

GD01

STAIR 2

INWARDS ANTE ROOM

INWARDS ANTE ROOM

FOOD GROUP 2 RECEIVAL

VALUE ADDED ROOM

DAY FREEZER

ACCESS PASSAGE

WIP ANTE RM

SKIP WASH

MDM PLATE FREEZER

MDM HOLDING FREEZER

MDM PROCESS

FORKLIFT CHARGING ROOM & BATTERY CHANGE

HARDSTAND (H)

SITE EASEMENT

PROPOSED RETAINING WALL EXTENT. REFER TO SHEET 3 (DRG.43)

GAS

AWNING

NOTE:

1. REFER TO DRAWING C010047.03-DA10 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING C010047.03-DA40 FOR LEGEND & PIT SCHEDULE.

STORMWATER DRAINAGE PLAN - SHEET 2

SCALE 1:250

2m 0 5 10 15 20 25m

SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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AMENDMENTS DATE ISSUE

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PROJECT
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PART LOT 2304 TEMPLAR ROAD
ERSKING PARK, NSW

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DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
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Consulting Engineers ACN 003 696 448
Level 1, 8 Windmill Street
Walsh Bay, Sydney NSW 2000
Tel: (02) 9251-7699 Fax: (02) 9241-3731
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DRAWING TITLE
STORMWATER DRAINAGE PLAN
SHEET 2

DRAWING No C010047.03-DA42

ISSUE C

BREAK LINE - REFER TO DRG. 42 (SHEET 2) FOR CONTINUATION

BREAK LINE - REFER TO DRG. 44 (SHEET 4) FOR CONTINUATION

DECRATING BIN UNLOADING

CHILLER 1

TANK ENCLOSURE

FFL 53.10

WIP CHILLER

ED ACCESS PLANT ROOM

HARDSTAND (H)

CARPARK

PROPOSED RETAINING WALL MAX. HEIGHT = 0.6m

SITE EASEMENT

CHAINWIRE FENCE

SITE BOUNDARY

PIT P06

PIT P07

PIT P08

PIT P09

PIT P10

PIT P12

PIT P13

ϕ450
US IL 50.44
DS IL 50.34
20.0m @ 0.5%

ϕ450
US IL 50.32
DS IL 50.17
30.0m @ 0.5%

ϕ450
US IL 50.15
DS IL 49.95
40.0m @ 0.5%

ϕ525
US IL 49.93
DS IL 49.78
30.0m @ 0.5%

ϕ300
US IL 51.40
DS IL 51.25
30.0m @ 0.5%

MESH

AREA

(XX)(V)(OO)(AB)

PT.24
DP 1120114

NOTE:

1. REFER TO DRAWING C010047.03-DA10 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING C010047.03-DA40 FOR LEGEND & PIT SCHEDULE.

STORMWATER DRAINAGE PLAN - SHEET 3
SCALE 1:250

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

FOR DEVELOPMENT APPLICATION

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PROJECT
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PART LOT 2304 TEMPLAR ROAD
ERSKING PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
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Walsh Bay, Sydney NSW 2000
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DRAWING TITLE
STORMWATER DRAINAGE PLAN SHEET 3

DRAWING No C010047.03-DA43

ISSUE C

BREAK LINE - REFER TO DRG. 41 (SHEET 1) FOR CONTINUATION

BREAK LINE - REFER TO DRG. 43 (SHEET 3) FOR CONTINUATION

BELOW GROUND OSD TANK
INV = 49.0mAHD
AREA = 30mx20m
DEPTH = 1.55m
VOLUME = 930m³

PROPOSED 3.0m WIDE DRAINAGE EASEMENT FOR PAD 5.

FILTRATION UNIT
23 TALL SW360 CARTRIDGES
NOM. PLAN DIM = 5.0mx2.1m
(LOW/HIGH FLOW BYPASS TO DETAILED DESIGN)

OUTLET 1
ENERGY DISSIPATER
(REFER TO DETAILS ON DRAWING DA46)

PROPOSED RETAINING WALL
MAX. HEIGHT 1.0m

FFL 53.10

SITE BOUNDARY

CHAINWIRE FENCE

SITE EASEMENT

CARPARK

STAFF LUNCHROOM

AMENITIES

DISPATCH OFFICE

DISPATCH DRIVER'S ROOM

FORKLIFT CHARGING ROOM & BATTERY CHANGE

SCISSOR LIFT STORAGE

ACCESS PASSAGE

BUFFER CHILLER

STOCKPILE VOLUME 2465C

EXTENT OF MEZZANINE LEVEL OVER SHOWN DASHED

PROCESSING ROOM

STAFF ENTRY

PUBLIC ENTRY

RECEPTION

STORE

AIR

NOTE:

1. REFER TO DRAWING C010047.03-DA10 FOR STORMWATER DRAINAGE NOTES.
2. REFER TO DRAWING C010047.03-DA40 FOR LEGEND & PIT SCHEDULE.

STORMWATER DRAINAGE PLAN - SHEET 4
SCALE 1:250

2m 0 5 10 15 20 25m
SCALE 1:250 AT A1 SIZE SHEET

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PROJECT
FOOD PROCESSING & PACKAGING FACILITY
PART LOT 2304 TEMPLAR ROAD
ERSKINE PARK, NSW

DESIGNED	DRAWN	DATE	CHECKED	SIZE	SCALE	CAD REF:
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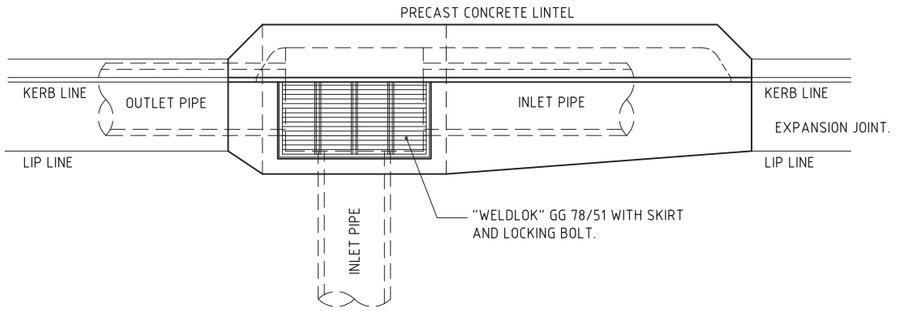
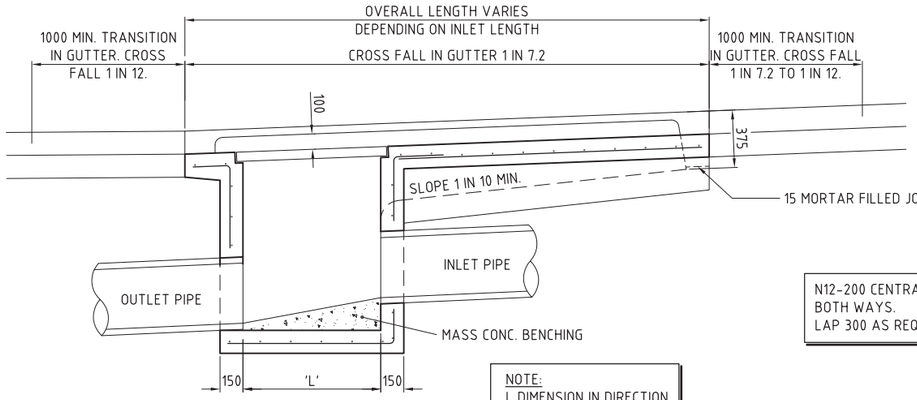
DRAWING TITLE
STORMWATER DRAINAGE PLAN SHEET 4

DRAWING No C010047.03-DA44

ISSUE C



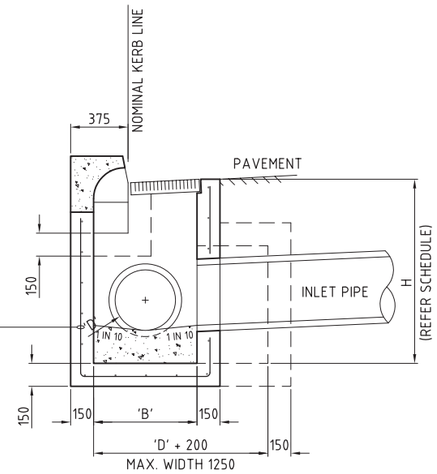
PLAN
SCALE 1:20



NOTE:
L DIMENSION IN DIRECTION
OF DOWNSTREAM PIPE

LONG SECTION.
SCALE 1:20

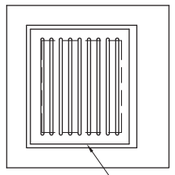
N12-200 CENTRAL
BOTH WAYS.
LAP 300 AS REQ'D.



CROSS SECTION.
SCALE 1:20

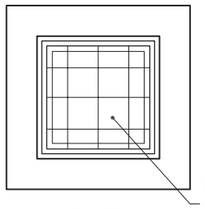
CONCRETE QUALITY					
ELEMENT	SLUMP	AGGREGATE (MAX. SIZE)	CEMENT TYPE	ADMIXTURE	F'c (MPa)
PIT	80	20	GP	NIL	32

KERB INLET PIT - KIP



PLAN
SCALE 1:20

H.D. CAST IRON GRATE & TEE
BAR FRAME 'GATIC' OR EQUAL
SEE SCHEDULE

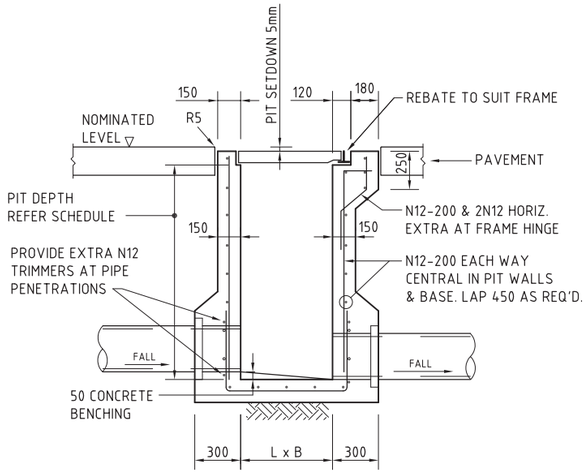


PLAN
SCALE 1:20

CONCRETE FILLED CAST IRON COVER
& FRAME (GATIC OR EQUAL) SEE
SCHEDULE

NOTES:

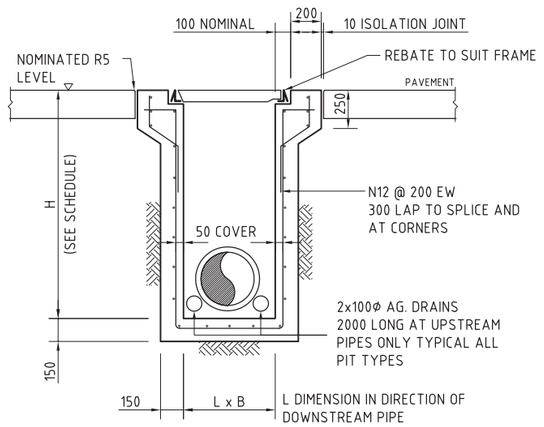
1. WHERE GULLY PIT IS LOCATED ON KERB RETURNS OR BULB OF CUL-DE-SACS PROVIDE CURVED PRECAST CONCRETE LINTELS.
2. SAG PITS SHALL HAVE LINTEL PLACED CENTRALLY ABOUT THE GRATE.
3. ALL REINFORCING TO HAVE 30 MIN. CLAER CONCRETE COVER.
4. FOR PITS DEEPER THAN 1200mm CLIMB RAILS SHALL BE PROVIDED.



SEE SCHEDULE
L DIMENSION IN DIRECTION OF DOWNSTREAM PIPE

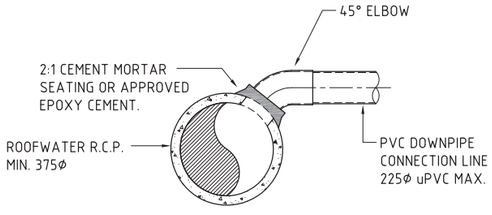
SECTION
SCALE 1:20

SINGLE GRATED GULLY PIT - SGGP



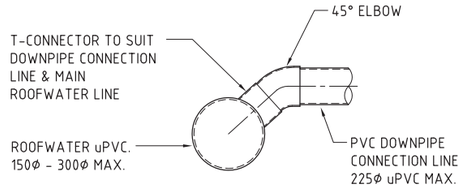
SECTION
SCALE 1:20

SEALED PIT - SJP



DOWN PIPE CONNECTION TO R.C.P. PIPE

1. THE R.C. STORMWATER PIPE SHALL BE PIERCED BY A NEAT OPENING TO ALLOW THE CONNECTION OF A PVC. PIPE.
2. THE EXPOSED R.C. PIPE REINFORCEMENT IS TO BE BENT OUTWARDS TO RETAIN THE MORTARTED JOINT.
3. THE PVC PIPE SHALL NOT PROTUDE BEYOND THE INNER SURFACE OF THE R.C. STORMWATER PIPE.
4. THE INTERNAL JUNCTION SHALL BE SMOOTHLY FINISHED SO AS TO PRESENT NO OBSTRUCTION WITHIN THE INTERNAL CHANNEL OF THE R.C. STORMWATER PIPE.
5. PROPRIETARY SADDLES MAY BE USED FOR THE CONNECTION SEATING. THE CONTRACTOR IS TO PROVIDE DETAILS OF THE PROPOSED CONNECTION TO THE ENGINEER FOR APPROVAL.



DOWN PIPE CONNECTION TO uPCV PIPE

1. PROPRIETARY T-PIECE CONNECTORS SHALL BE USED TO WHERE DIRECT CONNECTIONS ARE REQUIRED TO uPVC PIPES .
2. ALL JOINTS TO BE SEALED WITH SOLVENT WELDED JOINTS.
3. THE PVC PIPE SHALL NOT PROTUDE BEYOND THE INNER SURFACE OF THE STORMWATER PIPE.

DOWNPIPE CONNECTION DETAILS

SCALE 1:20

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

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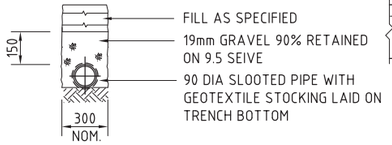
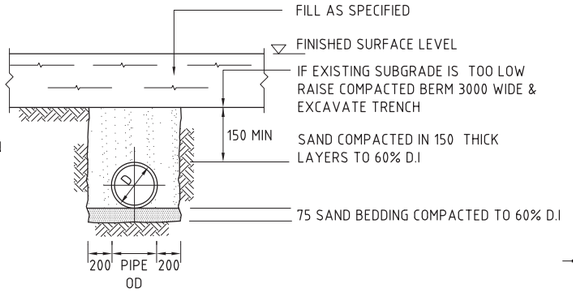
DRAWING TITLE
STORMWATER DRAINAGE
DETAILS
SHEET 1

DRAWING No C010047.03-DA45

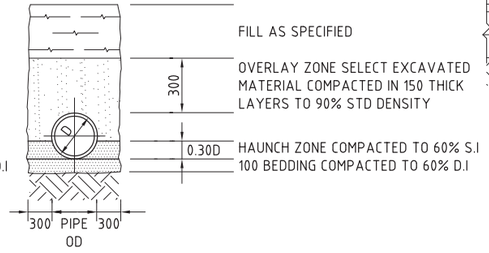
ISSUE C



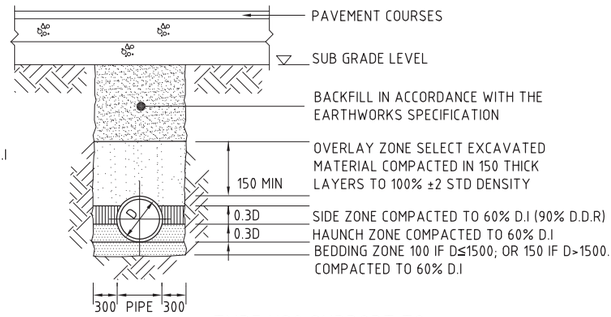
SUPPORT TO AG. DRAIN



SUPPORT TO uPVC PIPES



TYPE H1 SUPPORT TO CONCRETE PIPES AT LANDSCAPED AREAS



TYPE HS2 SUPPORT TO CONCRETE PIPES UNDER PAVEMENT

D≤ 1350, MAX FILL = 4.0m
D> 1350, MAX FILL = 3.0m

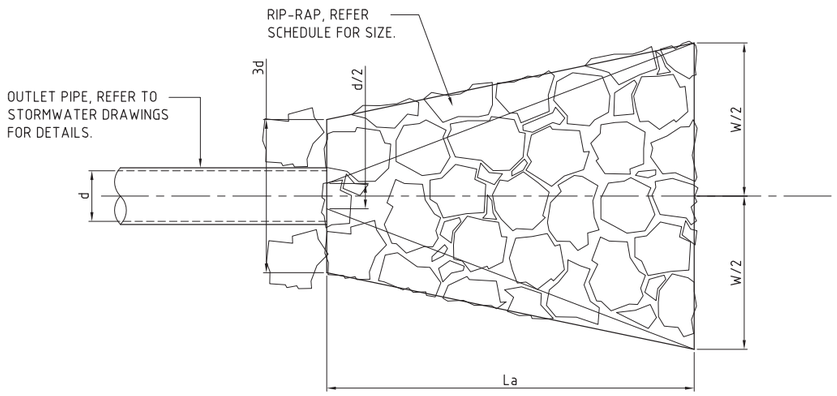
BEDDING & HAUNCH MATERIAL GRADING	
SIEVE SIZE	WEIGHT PASSING(%)
19	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

SIDE ZONE MATERIAL GRADING	
SIEVE SIZE	WEIGHT PASSING(%)
75	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

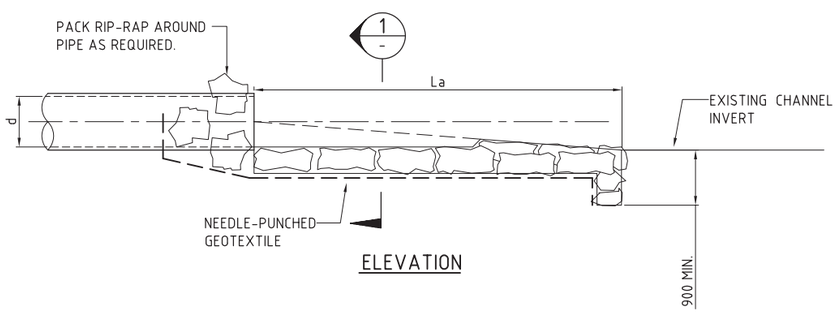
SELECT FILL MATERIAL IN ACCORDANCE WITH TABLE 1 AS 3725

PIPE LAYING DETAILS

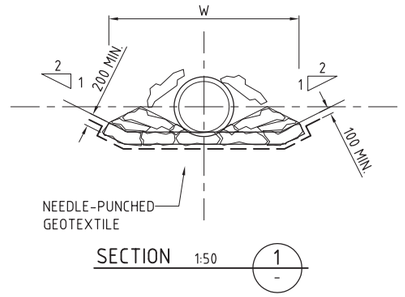
SCALE 1:20



PLAN VIEW



ELEVATION



SECTION 1:50 (1 / -)

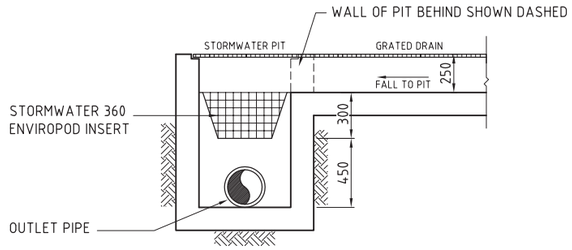
DISSIPATER NOTES:

1) ALIGN STRUCTURE EVENLY WITH BANK.
2) LOCATE STRUCTURE AT INVERT LEVEL OF STREAM AND POINT IN A DOWNSTREAM DIRECTION.
3) PIPE TO REST ON, AND BE PACKED IN, BY RIP-RAP (SIZE AS NOTED).
4) DISCHARGE INTO STREAM WHERE BEDROCK IS PRESENT, OTHERWISE SCOUR PROTECT AS REQUIRED.
5) SCOUR PROTECT THE OPPOSITE BANK AS REQUIRED.
6) RIP-RAP TO CONSIST OF ANGULAR RUN-OF-QUARRY ROCK AS NOTED PLACED OVER A 200mm LAYER OF 140mm COBBLES OVER NEEDLE-PUNCHED GEOFAB A44.
7) GAPS IN RIP-RAP TO BE PLANTED WITH NATIVE SEDGES & RUSHES.

DISSIPATER SCHEDULE				
DISCHARGE POINT	d	La	W	RIP-RAP
OUTLET 1	1050	8000	4200	250

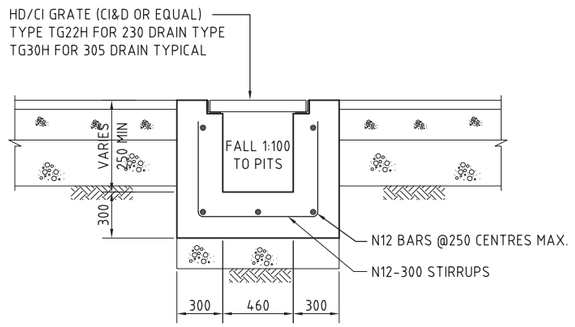
STORMWATER OUTLET DISSIPATER

SCALE 1:50



GRATED DRAIN/STORMWATER PIT WITH ENVIROPOD CONFIGURATION

SCALE 1:20



TYPICAL GRATED DRAIN DETAIL

SCALE 1:10

500mm 0 1 2 3 4 5m

SCALE 1:50 AT A1 SIZE SHEET

200mm 0 500 1000 1500 2000mm

SCALE 1:20 AT A1 SIZE SHEET

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Walsh Bay, Sydney NSW 2000
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DRAWING TITLE
STORMWATER DRAINAGE DETAILS SHEET 2

DRAWING No C010047.03-DA46

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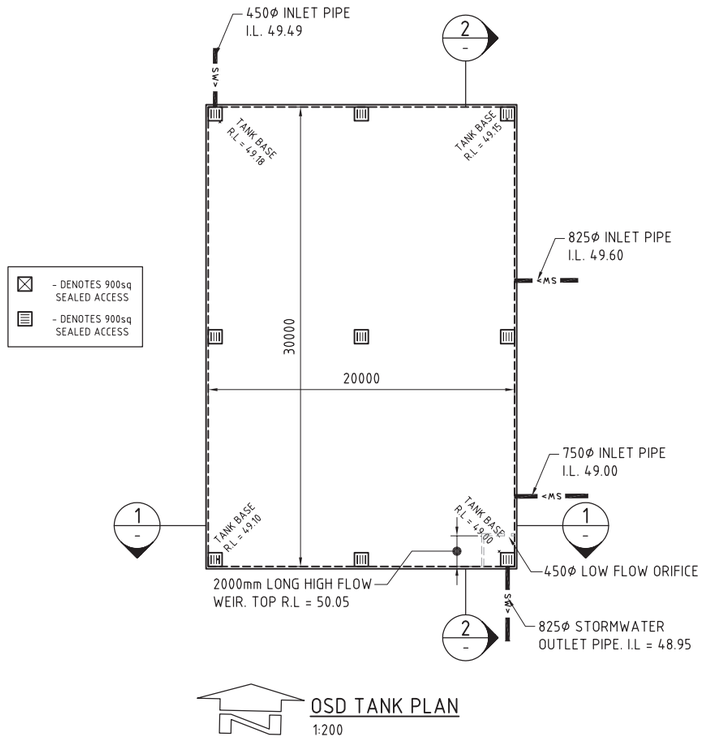
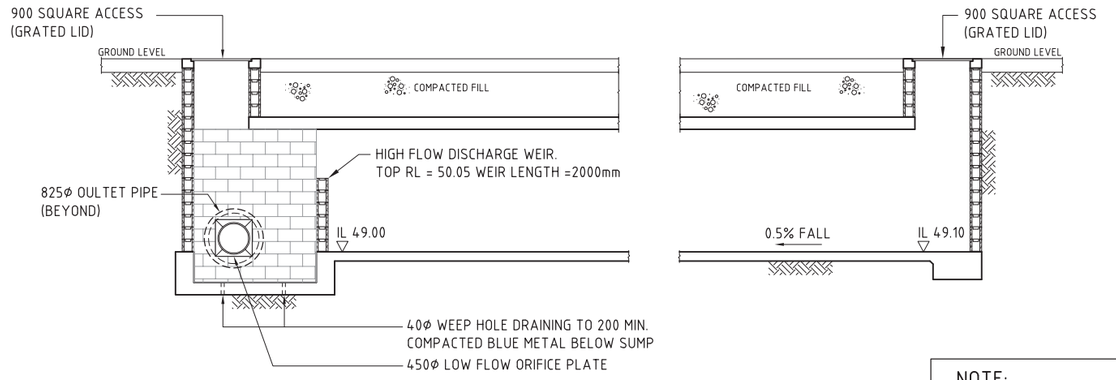
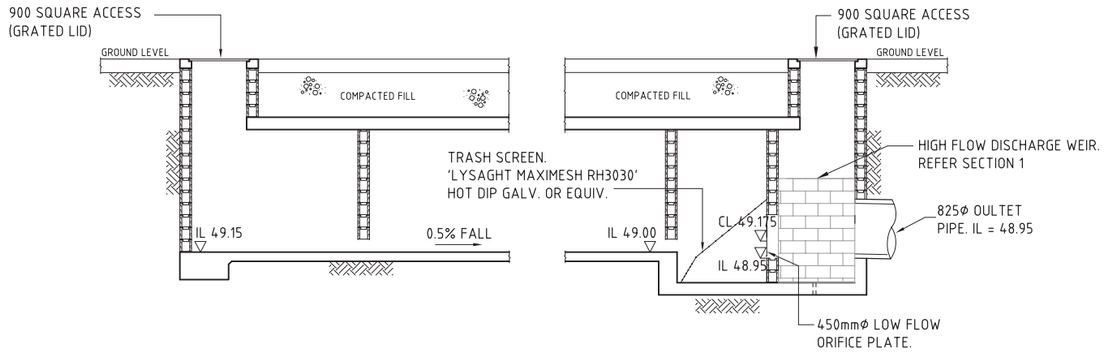


OSD TANK PLAN
1:200



SECTION 1:50 1 - : TYPICAL THRU' TANK

NOTE:
TANK TO BE DESIGNED
BY STRUCTURAL ENGINEER



SECTION 1:50 2 - : TYPICAL THRU' TANK

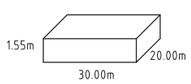
OSD TANK DETAILS

SITE AREA	
TOTAL SITE AREA	43,364m^2
TOTAL SITE AREA DRAINING TO STORAGE (90% IMPERVIOUS)	43,364m^2

STORAGE

LOW FLOW ORIFICE Ø	450mm
VOLUME PROVIDED	930m^3

INTERNAL TANK DIMENSIONS
(INC. HIGH FLOW CHAMBERS)



ON SITE DETENTION - HYDROLOGIC DETAILS

ARI (yrs)	Storm Duration (hrs)	Flow (m^3/s) Pre - Devel.	Post Devel. (un-attenuated)	Post Devel. (with attenuation)	Depth (mm)	Storage (m^3)
2	2	0.514	0.858	0.344	950	570
20	2	1.330	1.500	1.130	1400	840
100	2	1.710	1.870	1.590	1550	930

500mm 0 1 2 3 4 5m
SCALE 1:50 AT A1 SIZE SHEET

2m 0 5 10 15 20m
SCALE 1:200 AT A1 SIZE SHEET

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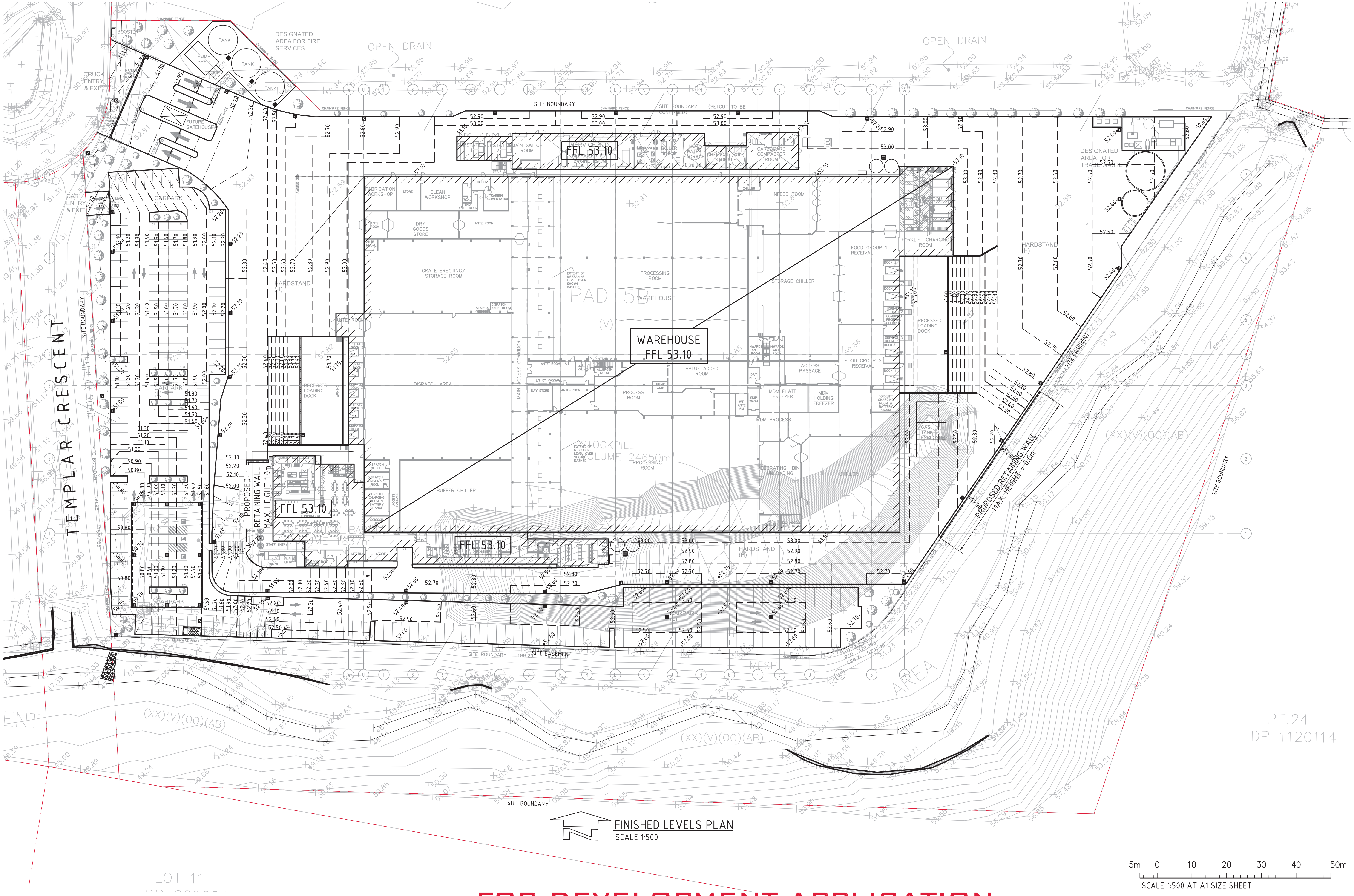
DRAWING TITLE
STORMWATER DRAINAGE
DETAILS
SHEET 3

DRAWING No C010047.03-DA47
ISSUE C



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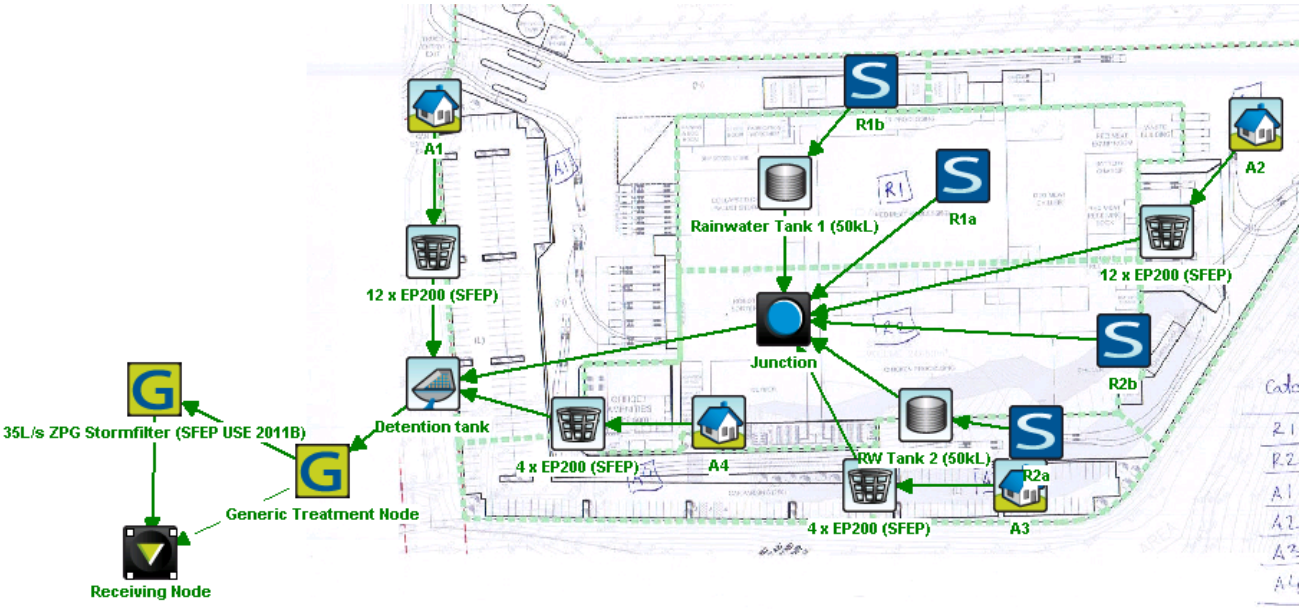
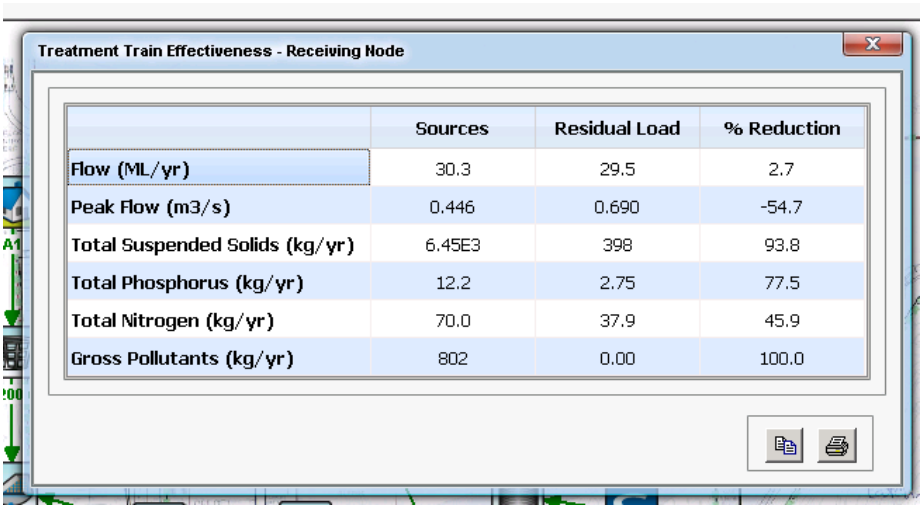
DRAWING TITLE
FINISHED LEVELS PLAN

DRAWING No C010047.03-DA50 | ISSUE C

Appendix B

MUSIC MODEL CONFIGURATION



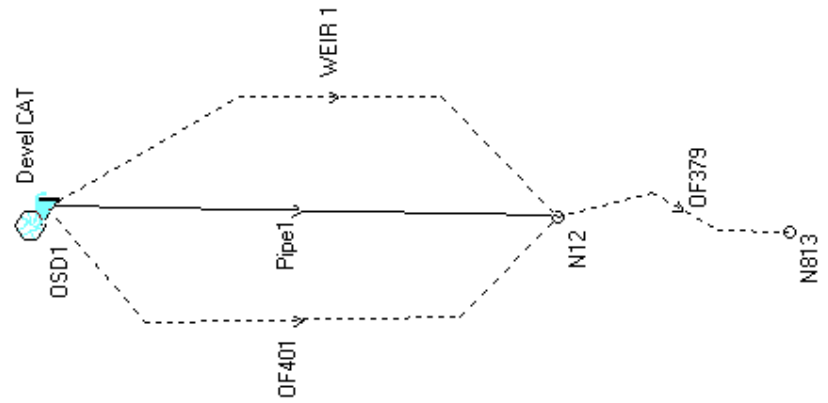


Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	30.3	29.5	2.7
Peak Flow (m3/s)	0.446	0.690	-54.7
Total Suspended Solids (kg/yr)	6.45E3	398	93.8
Total Phosphorus (kg/yr)	12.2	2.75	77.5
Total Nitrogen (kg/yr)	70.0	37.9	45.9
Gross Pollutants (kg/yr)	802	0.00	100.0

Appendix C

DRAINS MODEL CONFIGURATION



Appendix D

EROSION CONTROL CHECK SHEET

EROSION AND SEDIMENT CONTROL

WEEKLY SITE INSPECTION SHEET

LOCATION . . . . . .

INSPECTION OFFICER . . . . . **DATE** . . . . . .

SIGNATURE . . . . . .

Legend: 4 OK 7 Not OK N/A Not applicable

Item	Consideration	Assessment
1	Public roadways clear of sediment.	. . . . .
2	Entry/exit pads clear of excessive sediment deposition.	. . . . .
3	Entry/exit pads have adequate void spacing to trap sediment.	. . . . .
4	The construction site is clear of litter and unconfined rubbish.	. . . . .
5	Adequate stockpiles of emergency ESC materials exist on site.	. . . . .
6	Site dust is being adequately controlled.	. . . . .
7	Appropriate drainage and sediment controls have been installed prior to new areas being cleared or disturbed.	. . . . .
8	Up-slope "clean" water is being appropriately diverted around/through the site.	. . . . .
9	Drainage lines are free of soil scour and sediment deposition.	. . . . .
10	No areas of exposed soil are in need of erosion control.	. . . . .
11	Earth batters are free of "rill" erosion.	. . . . .
12	Erosion control mulch is not being displaced by wind or water.	. . . . .
13	Long-term soil stockpiles are protected from wind, rain and stormwater flow with appropriate drainage and erosion controls.	. . . . .
14	Sediment fences are free from damage.	. . . . .
15	Sediment-laden stormwater is not simply flowing "around" the sediment fences or other sediment traps.	. . . . .
16	Sediment controls placed up-slope/around stormwater inlets are appropriate for the type of inlet structure.	. . . . .
17	All sediment traps are free of excessive sediment deposition.	. . . . .
18	The settled sediment layer within a sediment basin is clearly visible through the supernatant prior to discharge such water.	. . . . .
19	All reasonable and practicable measures are being taken to control sediment runoff from the site.	. . . . .
20	All soil surfaces are being appropriately prepared (i.e. pH, nutrients, roughness and density) prior to revegetation.	. . . . .
21	Stabilised surfaces have a minimum 70% soil coverage.	. . . . .
22	The site is adequately prepared for imminent storms.	. . . . .
23	All ESC measures are in proper working order.	. . . . .