ARCADIS Design & Consultancy for natural and built assets

SITE BASED STORMWATER MANAGEMENT PLAN

50-56 DERBY ROAD, LOGAN RESERVE

MWB FUND 31 PTY LTD

50-56 DERBY ROAD, LOGAN RESERVE

SITE BASED STORMWATER MANAGEMENT PLAN

Author	Gabby Djelovic	
Checker	Ashley Shepard	
Approver	Darlan Castro RPEQ19918	

Project No	30216791
Report No	GA0002
Revision	01
Date	24/06/2024

This report has been prepared for MWB Fund 31 Pty Ltd ATF MWB Fund 31 Unit Trust in accordance with the terms and conditions of appointment. Arcadis Australia Pacific Pty Limited (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

Revision	Date	Description	Prepared by	Approved by
01	24/06/2024	Issue for Approval	GD	DC

CONTENTS

APPENDICES

GLOSSARY OF TERMS

Australia Rainfall and Runoff (ARR) 2019 recommends adaptation of new terminology relating to storm events summarised in Table A below. As recommended, this report documents data with respect to AEP (%).

The following definitions should be noted:

EY = Number of exceedances per year.

AEP = Annual Exceedance Probability.

AEP (1 in x) = 1/AEP.

ARI = Average Recurrence Interval (years).

The below table should be refereed to for a comparison of storm events.

Table A – Adopted Terminology

EY	AEP (%)	AEP (1 in ….)	ARI
1	63.21	1.58	1
0.69	50	2	1.44
0.5	39.35	2.54	2
0.22	20	5	4.48
0.2	18.13	5.52	5
0.11	10	10	9.49
0.05	5	20	20
0.02	2	50	50
0.01	1	100	100

ASSOCIATED MODELLING FILES

For internal reference, the following modelling file packages are associated with this report.

- Stormwater Quality – ‘ED1001-30216791-D MUSIC Model’
- Stormwater Quantity – ‘ED2001-30216791-DRAINS-Model 04’

1 EXECUTIVE SUMMARY

MWB Fund 31 Pty Ltdhas commissioned Arcadis to prepare a Site Based Stormwater Management Plan (SBSMP) for a development application for the site located over the following allotments:

- Lot 37 on RP108311 (50-56 Derby Road, Logan Reserve).

The proposed development intended for the site is for the creation of 36 residential dwellings, inclusive of road and services network, amenities and stormwater management areas.

This report demonstrates the proposed development will be constructed and operated in accordance with the Water Sensitive Urban Design (WSUD) Requirements of Council, the South-East Queensland State Planning Policy (SPP), the Queensland Development Code, the Queensland Urban Drainage Manual (QUDM), Australian Rainfall and Runoff (2019) and the Environmental Protection (Water) Policy (2009). The primary objectives of this Site Based Stormwater Management Plan (SBSMP) are achieved as follows:

Lawful Point of Discharge (LPoD)

Stormwater will be discharged to the lawful point of discharge, which is the dam and its downstream area located within the site. From the point of discharge, flows are conveyed via overland to the north.

Stormwater Quantity

The site proposes to mitigate the increase in peak runoff, which is expected to occur at Legal Points of Discharge through the use of a detention basin.

Stormwater Quality

A stormwater quality assessment is provided, demonstrating that a combined bioretention and detention basin will be required to meet Logan City Council's pollutant removal targets during the proposed development's operational phase.

Erosion and Sediment Control

Erosion and sediment control measures during construction shall be undertaken in accordance with the SPP and Council requirements.

.

2 SITE CHARACTERISTICS

2.1 Location Details

The subject site is located within South-East Queensland, Australia over the following allotments:

- Lot 37 on RP108311 (50-56 Derby Road, Logan Reserve).

The site is currently bordered by a rural land to the north, east and west. It is noted that there is an approved residential subdivision to the north.

Lot 1 & 2 on RPRP97736, lot 5, 6, 7 & 8 on RP182452 and lot 3 & 4 on RP182451 to the north of the site is currently subject to development approval COM/66/2017/A. Refer Figure 2-1 below.

Derby Road borders the site's southwestern boundary.

The total area of the site is approximately 30,190m².

2.2 Land Usage

In its current state, the project site consists of rural land, featuring a dwelling with other miscellaneous uses. Figure 2-1 below provides a current locality plan of the site.

Figure 2-1 Site Locality Plan (Aerial Imagery Courtesy of Nearmap)

2.3 Topography

The site topography consists of relatively low slopes, the average site slope is approximately 1-5%. The site has a high point of RL34.5m AHD in the southwestern corner and a low point of RL25.5m AHD in the northern corner. Currently, the site consists of a small dwelling and the remaining area of the site is low to medium dense vegetation. The site also contains part of an existing dam.

In the existing state the external catchments south and west of the site slope towards the subject site.

3 PROPOSED DEVELOPMENT

The proposed development involves the construction of residential dwellings, including:

- 36 residential allotments.
- Residential road network.
- Stormwater management areas.

A plan extract of the proposed development has been provided in Figure 3-1.

The development application package includes a full set of development proposal plans, which should be referred to for further information.

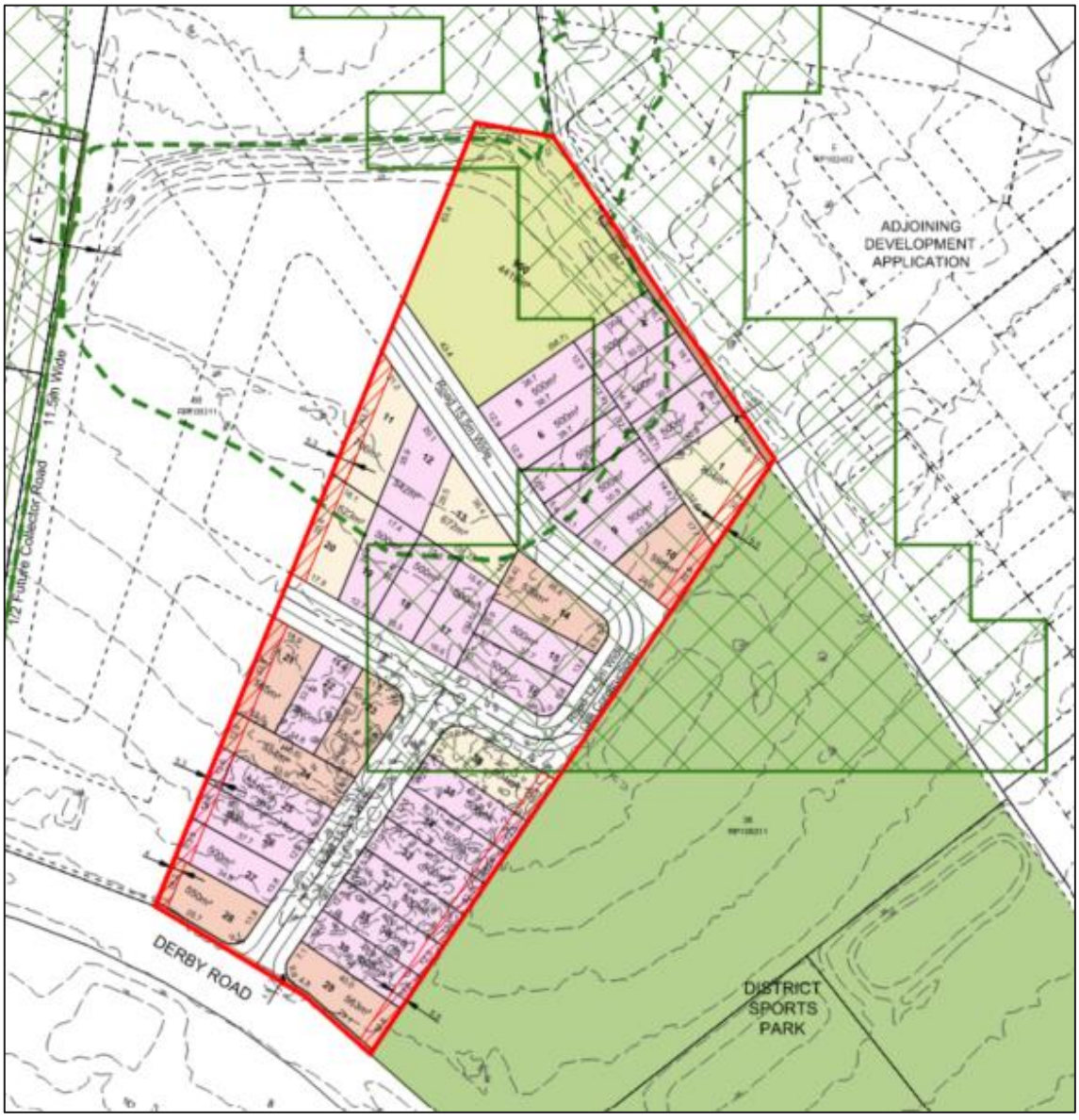


Figure 3-1 Proposed Development Proposed Plans

4 LAWFUL POINT OF DISCHARGE AND DRAINAGE

4.1 Existing Stormwater Drainage

Stormwater will be discharged to the lawful point of discharge, which is the dam and its downstream area located within the site. From the point of discharge, flows are conveyed via overland to the north. Currently, there are a number of external catchments that drain through the subject site shown in Figure 4-1 below.

This information is derived from Queensland lidar data.

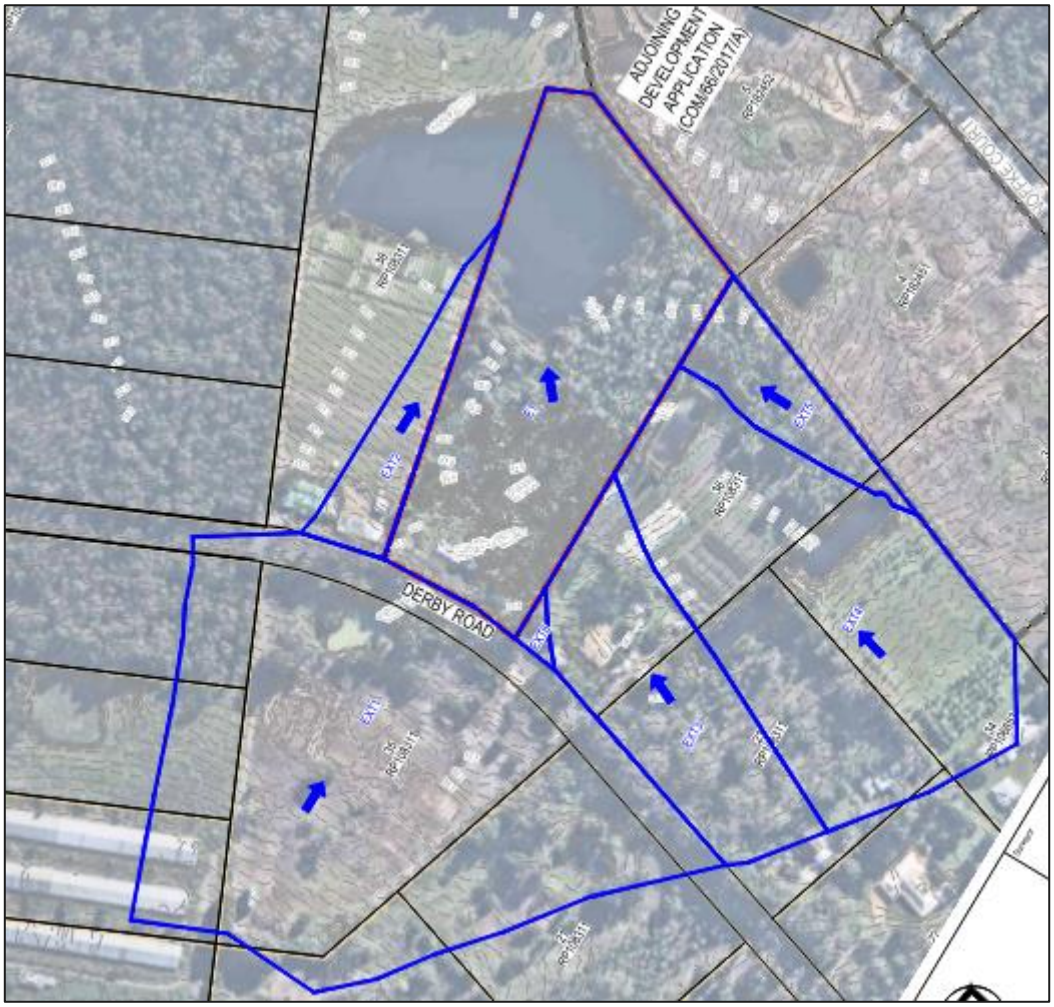


Figure 4-1 Existing Stormwater Catchments

4.2 Proposed Drainage Characteristics and LPOD Test

The proposed development will capture and convey stormwater via the use of a pit and pipe drainage network. A combined detention and bio-retention basin will provide suitable management of stormwater prior to release from the site. A small portion of the site, catchments D2a and D2b will not be captured by the pit and pipe drainage network; therefore, it will bypass the basin without treatment. It is noted that D2c will also bypass detention, however, low flows will be captured by the pit and pipe network for stormwater quality treatment. .

Given the number of existing external catchments that discharge through the development, a number of conveyance measures have been put in place to manage the flows through the site. Drainage channels within easements and internal roads have been designed to convey the external flow through the development site. The proposed stormwater treatment basin has been designed to allow these external catchments to discharge through the basin and then to the LPoD. It is noted that the drainage channels have been designed to convey existing condition 1% AEP flow. No allowance for increase in flows due to upstream urbanisation has been allowed in this assessment. Refer to Engineering drawings in Appendix A for further details on the channels.

Refer to Figure 4-2 for a conceptual indicative location of the proposed stormwater catchments.

Figure 4-2 Drainage Schematic

The site will demonstrate compliance with QUDM (2017) by maintaining as much as practically possible the existing discharge characteristics, by discharging controlled flows to the existing drainage corridor to the north.

Sections 5, 6, 7 and 8 of this report provide detailed calculations and discussions illustrating no actionable nuisance anticipated. It is noted that optimisation of the development sites drainage system will be undertaken during the operational works phase of the development.

Engineering drawings in Appendix A provide further details of the proposed system.

5 STORMWATER QUANTITY

5.1 Objective

The following assessment has been undertaken to demonstrate that the proposed development will not adversely affect the existing drainage conditions adjacent to the site. Existing drainage characteristics are assessed to determine flow rates for the median storm event up to and including the 1% AEP.

5.2 Temporal Patterns

In accordance with Logan's City Plan SC6.11.4.4.3 & ARR2019, Rainfall Intensities Frequency Duration data were obtained from The Bureau of Meteorology (http://www.bom.gov.au/water/designRainfalls/revised-ifd/?year=2016). The Latitude and Longitude of used for the site is summarised in Table 5-1 below.

Table 5-1 Site Latitude and Longitude

Parameter	Value
Latitude	-27.7235
Longitude	153.0953

5.3 Catchments

Two hydrologic conditions were modelled to appropriately demonstrate the stormwater quantity objective:

Existing Scenario (E) – The catchment including the site in its existing state.

Developed Scenario (D) – The catchment including the site in its developed state as per the proposal. With the following clarifications

- Lots were assumed to be 50% roof cover at 100% impervious with remaining area assumed to be ground at 50% impervious.
- Road corridor measured 70% impervious.
- Park and basin areas assumed to be 20% impervious.

The following catchment details in Table 5-2 were determined.

Table 5-2 Modelling Catchment Details – Existing Case

Catchment	Area (ha)	Slope (%)	Impervious Area (%)	Manning's (n)
E1	3.02	2%	1%	0.08
EXT1	5.39	2%	23%	0.04
EXT2	0.50	3%	9%	0.06
EXT3	1.44	3%	7%	0.06
EXT4	3.19	3%	7%	0.06
EXT5	0.52	4%	0%	0.08
EXT6	0.04	5%	0%	0.06

Table 5-3 Modelling Catchment Details – Developed Case

Catchment	Area (ha)	Slope (%)	Impervious Area (%)	Manning's (n)	Time of Concentration (min)
D1	2.48	-	67%	-	5,7
D2a	0.12	-	0%	-	5,7
D2b	0.17	-	76%	-	5,7
D2c	0.25	-	74%	-	5,7
EXT1	5.39	2%	23%	0.04	-
EXT2	0.50	3%	9%	0.06	-
EXT3	1.44	3%	7%	0.06	-
EXT4	3.19	3%	7%	0.06	-
EXT5	0.52	4%	0%	0.08	-
EXT6	0.04	5%	0%	0.06	-

5.3.1 Detention System Design

Table 5-4 presents the design details for the proposed onsite detention system which is required to achieve the objective of no post development increase up to the 1% AEP event at the assessment point. The detention system has been iteratively optimised to ensure peak performance. It is noted that the extended detention area has been assumed to be full and therefore provides no attenuation volume.

Table 5-4 Summary of Proposed Detention Basin A Parameters

Parameters	Detention System
Min. area at RL27.2m (Detention base) (m^2)	1400
Min. area at RL28.3 of detention (m^2)	2138
Batters	1:4
Required Internal Basin Depth (m)	0.3m Extended Detention 1.1m Detention 0.3m Freeboard
Min. Detention Volume (m^3)	1932
Outlet Orifices	1500x1500 pit with an inlet of @ RL27.2m and DN525 outlet pipe @ RL25.8m, 1500x1500 pit with an inlet of @ RL27.5m and 2 x DN375 outlet pipes @ RL26.1m, 1500x1500 pit with an inlet of @ RL27.8m and 2 x DN525 outlet pipes @ RL26.4m
Weir Control	5.0m weir @ RL28.0

5.3.2 Model Results

A DRAINS model has been developed to assess the proposed development site.

The following results have been captured from the DRAINS model as a result of implementing the above detention system. Table 5-5 below summarises the peak flow rates for each identified critical storm across the assessed AEP range at the assessment point for the catchment.

Table 5-5 Summary of DRAINS Hydrologic/Hydraulic Results at the LPoD

Scenario	AEP (%)	63.2	39.4	18.1	10	5	2	1
Existing	Median Flow (m^3/s)	1.066	1.581	2.309	2.837	3.413	4.398	5.081
Mitigated	Median Flow (m^3/s)	0.963	1.549	2.174	2.671	3.381	4.178	5.068
Height*	(m)	0.28	0.44	0.56	0.72	0.8	0.96	1.05

*All heights excluded extended detention depth

5.3.3 Objective Discussion

The above hydraulic investigation and runoff-routing exercise has demonstrated that suitable measures can be included in the design of the proposed development to ensure that there is no increase in median discharge flow rates being directed off-site to existing infrastructure for 63.2% AEP events to 1% AEP events in accordance with QUDM and ARR2019.

6 STORMWATER QUALITY (OPERATION)

6.1 Objectives

The following operational water quality objectives are set out by Council:

Gross Pollutants (>5mm) – 90% reduction in mean annual load.

Total Suspended Solids (TSS) – 80% reduction in mean annual load.

Total Phosphorous (TP) – 60% reduction in mean annual load.

Total Nitrogen (TN) – 45% reduction in mean annual load.

6.2 Proposed Stormwater Treatment Devices

WSUD aims to minimise the impact of a development on the natural water cycle by reducing the export of pollutants, sediments and nutrients from the site into the natural watercourse. In order to treat the stormwater runoff from the site, various treatment devices can be used throughout the development area and these concepts can be integrated into the overall design of the road layouts, road cross sections, stormwater layouts and water supply reticulation systems. Stormwater from the development will follow a specially designed stormwater quality treatment train prior to discharge from the site, which will ensure compliance with the water quality objectives.

A treatment train has been proposed for the site which comprises of a number of individually designed treatment devices that collectively contribute to the achievement of whole site water quality objectives. A copy of the treatment devices information can be seen in Appendix B.

6.2.1 Bio-Retention Areas

A bio-retention area is a vegetated region where runoff is filtered through a filter media layer (e.g. sandy loam) as it percolates downwards to receiving underlying drainage. Specific vegetation is to be incorporated into the landscaping of bio-retention areas which effectively reduce nutrient loads. Appendix A of Healthy Waterways' Water Sensitive Urban Design Technical Guidelines for South East Queensland provides guidance on selecting appropriate plant species for systems where plants have a functional role in stormwater treatment.

A typical example of a bio-retention area in operation with suitable vegetation is presented in Figure 6-1 below. A typical section and further standard details and maintenance checklist are provided in Appendix B.

Figure 6-1 Example of Urban Bio-Retention Basin (Courtesy Water by Design)

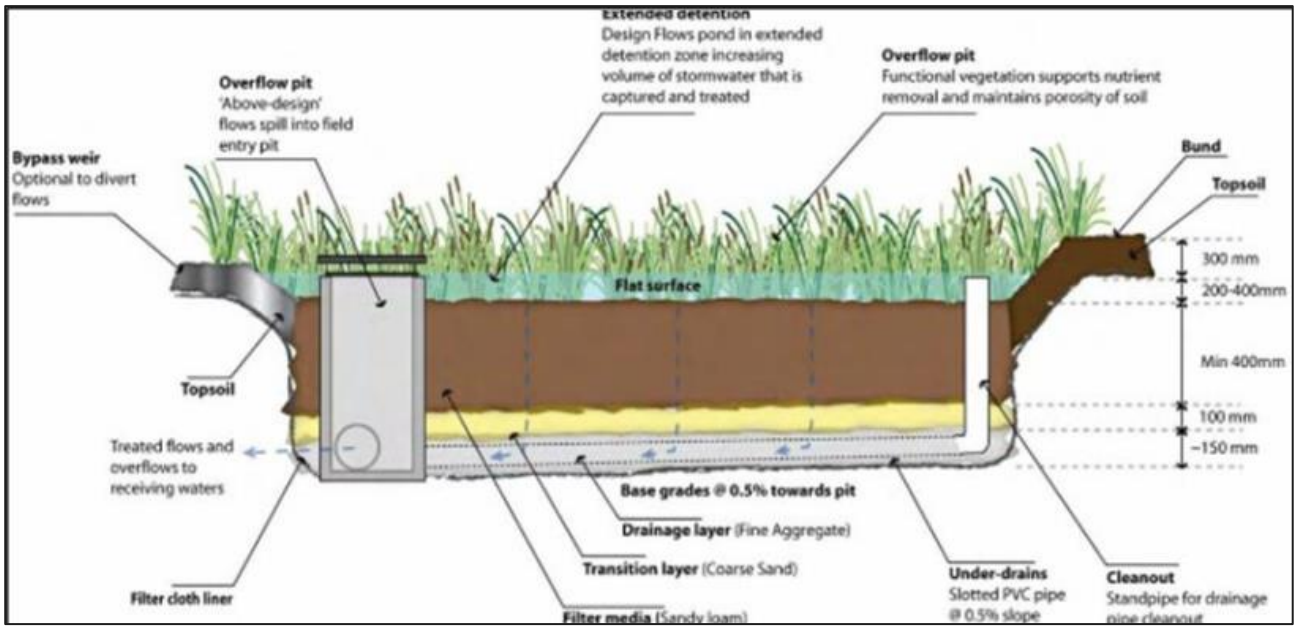


Figure 6-2 Example of Urban Bio-Retention Garden-Bed (Courtesy Water by Design)

6.3 Modelling

Modelling of the site was undertaken using the 'Model for Urban Stormwater Improvement Conceptualisation (MUSIC)' as promoted by LCC and the South East Queensland Healthy Waterways Partnership. The development was modelled using the split catchment approach. An appropriate type of land use was applied to all surface types within the developed catchments; where individual treatment devices were assigned the relevant modelling treatment parameters. Consequently, a treatment train was established for the site, ensuring that water discharging from site adheres to the specified Water Quality Objectives.

Meteorological data for input into MUSIC was obtained from Shailer Park Station 40715 from the Bureau of Meteorology. Six-minute time step rainfall data was obtained for the climate period from 01/01/1990 to 31/12/1999. The catchment parameters of the MUSIC modelling are specified within the South East Queensland Healthy Waterways Partnerships' Water by Design MUSIC Modelling Guidelines for South East Queensland Version 3 (2018), and have been modelled as such.

6.3.1 Pollutant Source Node Details

The pollutant source node parameters input into the MUSIC model were determined using the South East Queensland Healthy Waterways Partnership's Water by Design MUSIC Modelling Guidelines for South East Queensland version 3 (2018), specifically Tables 3.7 and 3.8 for urban residential surface types. It is noted that all base flow parameters for roof surfaces are adopted as 0.00 or N/A.

A summary of the source these nodes have been provided in Table 6-1 below.

Table 6-1 Summary of Source Node Details

Catchment	MUSIC Source Node	Area (ha)*	Imperviousness (%)
D1, D2b & D2c - Roof	Urban Residential Roof	0.941	100%
D1, D2b & D2c - Road	Urban Residential Ground	0.587	70%
D1, D2b & D2c - Ground	Urban Residential Ground	0.941	50%
D1, D2b & D2c – Stormwater Basin	Urban Residential Ground	0.318	20%
D2a & b - Bypass	Urban Residential Ground	0.231	7%
EXT 1, 3, 4, 5 & 6 - External	Rural Residential Ground	10.584	15%

**Stormwater quality modelling has not considered EXT2 as it bypasses the basin.*

6.3.2 Treatment Device Node Details

The bio-retention area has been designed specifically in accordance with the Bio-retention Technical Design Guidelines (2014) and local data testing of soil parameters. Details of the location and standard design of the proposed treatment devices areas are presented in the Engineering Drawings in Appendix A of this report.

Once the site is fully developed, the stormwater run-off from sub-catchments will be collected via a drainage system and directed to the relevant areas per Figure 4-2.

General parameters for the Bio-retention treatment system have been modelled as per Table 6-2.

Table 6-2 Bio-Retention Design Parameters

Parameter	Requirements
Minimum Filter Media Area (m²)	325
Minimum Ponding Surface Area (m²)	325
Extended Detention Depth Within Ponding Area(m)	0.30
Minimum Filter Media Depth (m) (excluding transition layer and under drainage)	0.50
Underdrainage Layers (m)	0.30
Minimum Saturated Hydraulic Conductivity (mm/hour)	200
Maximum Filter Media Total Nitrogen (mg/kg)	400
Maximum Filter Media Orthophosphate (mg/kg)	30

Table 6-3 Sediment Forebay Parameters

Parameter	Requirements
Catchment Area (Ac) (ha) *Includes basin Area*	2.73
Coarse Sediment Removal	Forebay
Capture Efficiency (R) *	0.8
Sediment Loading Rate (Lo) (m³/ha/year) *	0.6
Desired Clean out Frequency (Fc) (years)	1
Volume of Forebay (Vs) (m³)	1.4
Forebay Depth (m)	0.20
Minimum Forebay Area (m²)	7

* in accordance with WSUD bio-retention technical guidelines table 13

6.3.3 Model Layout and Results

A diagrammatical view and pollutant reduction results can be found in Figure 6-3 below.

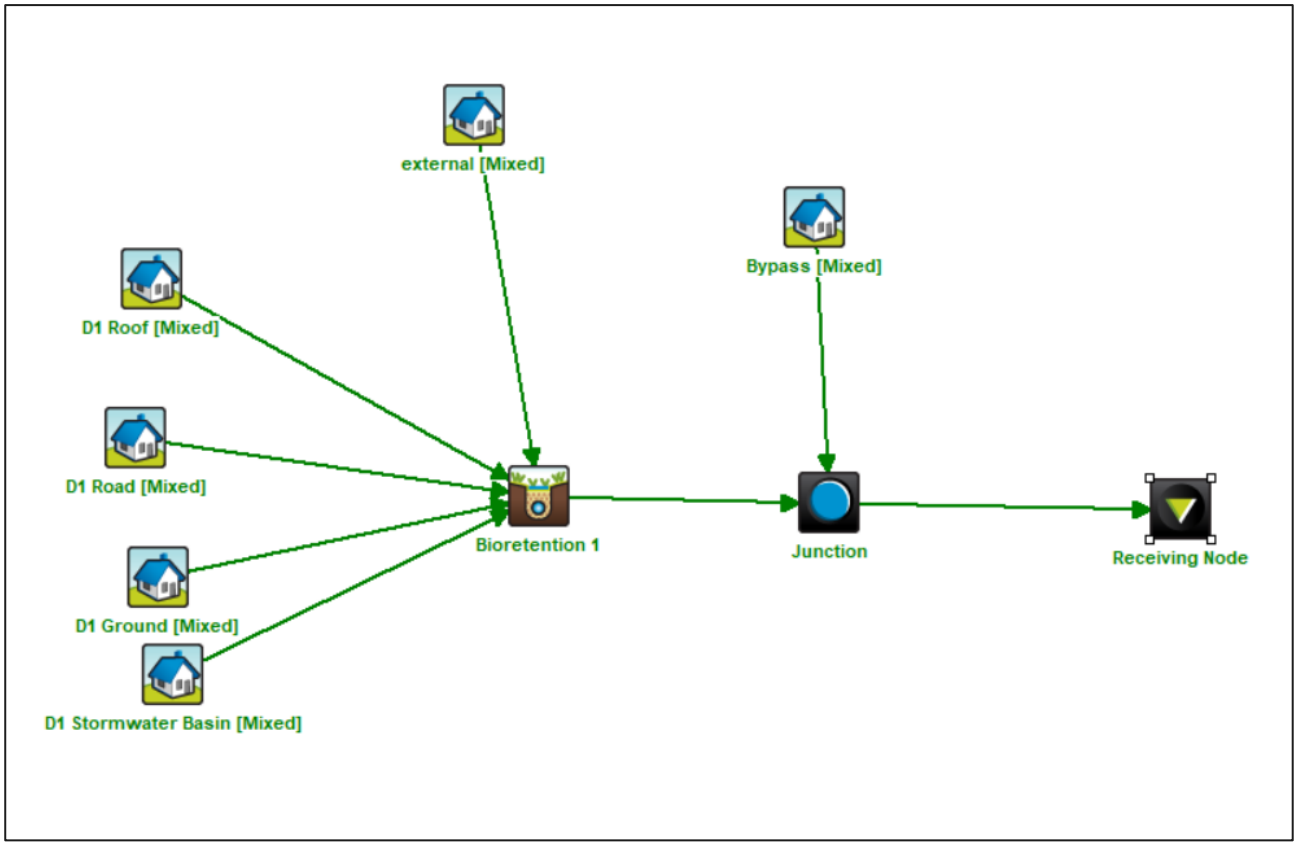


Figure 6-3 MUSIC Model Layout LPoD

Table 6-4 Results at LPoD Without External Catchments

Pollutant	Source	Target Reduction	Required Reduction	Residual Load	Reduction%
Flow (ML/yr)	22.1	-	-	21.2	3.9
Total Suspended Solids (kg/yr)	3730	80%	2984.00	721	80.7
Total Phosphorus (kg/yr)	7.75	60%	4.65.00	2.09	73
Total Nitrogen (kg/yr)	46.1	45%	20.75	22.5	51.1
Gross Pollutants (kg/yr)	524	90%	471.60	11.7	97.8

Table 6-5 Results at LPoD With External Catchments

Pollutant	Total Sources	Required Reduction	Reduction Achieved
Total Suspended Solids (kg/yr)	3730.00	2984.00	10810.00
Total Phosphorus (kg/yr)	7.75	4.65.00	10.20
Total Nitrogen (kg/yr)	46.10	20.75	45.00
Gross Pollutants (kg/yr)	524.00	471.60	1298.30

7 STORMWATER QUALITY (CONSTRUCTION)

7.1 Water Quality Objectives

Table 7-1 Construction Phase Quality Objectives (SPP and LCC LDG)

Pollutant	Criteria
Drainage Control	Design life and design storm of temporary drainage works: Disturbed area open for <12 months—1 in 2 ARI. Disturbed area open for 12-24 months—1 in 5 ARI. Disturbed area open for > 24 months—1 in 10 ARI.
Erosion Control	Minimise exposure of disturbed soils at any time. Avoid or minimise large construction activities in the wet season. Divert water run-off from undisturbed areas around disturbed areas. Use erosion risk ratings to determine appropriate erosion control measures.
Sediment Control	Use soil loss rates to determine appropriate sediment control measures Design storm for sediment control basins should be based on retaining the maximum sediment quantity for the maximum volume of water run-off Site discharge during sediment basin dewatering should not exceed 50 mg/L TSS and pH between 6.5–8.5
Stormwater Drainage / Flow Management	Hydraulics and hydrology—Take all reasonable and practicable measures to minimise significant changes to the natural waterway hydraulics and hydrology from: peak flow for the one-year and 100-year ARI event (respectively for aquatic ecosystems and flood protection). run-off frequency and volumes entering receiving waters. Uncontrolled release of contaminated stormwater.
Water Quality Outcomes	Stormwater flows from undisturbed and disturbed areas—manage to help protect environmental values Coarse sediment—coarse sediment is retained on site Fine sediment—Site discharge during sediment basin dewatering has a TSS concentration less than 50 mg/L Turbidity—Site discharge during sediment basin dewatering has a turbidity (NTU) less than 10% above receiving waters turbidity— measured immediately upstream of the site Nutrients (N & P)—Nitrogen and phosphorus are managed through sediment control. pH—Site discharge during sediment basin dewatering has a pH range 6.5–8.5 Litter and other waste—Prevent litter/waste entering the site, the stormwater system or watercourses that discharge from the site. Also minimise or sufficiently contain on-site litter and waste production and regularly clear waste bins Hydrocarbons and other contaminants—Hydrocarbons and other contaminants are prevented from entering the stormwater system or internal watercourses that discharge from the site. Wash down water—Wash down water is prevented from entering the stormwater system or internal watercourses that discharge from the site Cations and anions—Cations and anions including aluminium, iron and Sulfate are managed as required under an approved acid Sulfate soil management plan

Table 7-1 provides the construction phase stormwater quality objectives outline by the State Planning Policy. Additional relevant acts, policies and information that may be useful for construction phase planning include:

Environmental Protection Act (1994).

Environmental Protection (Water) Policy (2009).

Queensland Development Code, Sediment and Erosion Control (2010).

Best Practice Erosion and Sediment Control for Building and Construction Sites Guidelines (2008).

7.2 Erosion and Sediment Control Plan Purpose

During the construction phase it shall be the Principal Contractor's responsibility to ensure the objectives of Table 7-1 are achieved.

The following section of this report provides a suggested framework for an Erosion and Sediment Control Plan. This includes recommended actions and responses for specific activities; monitoring and reporting; and construction of specifically designed site-specific sediment basins.

7.3 Specific Activities

7.3.1 Erosion and Sediment Control of Disturbed Land

During the construction phase it shall be the Principal Contractor's responsibility to ensure the following:

Diversion of any clean water runoff that may interfere with land disturbance by the use of earth bunds, or other control devices deemed appropriate by a suitable supervisor.

Reduction of sediment migration from disturbed land parcels by implementing silt fences, sediment basins or other control devices as deemed appropriate by a suitable supervisor.

Where cut to fill operations produce a spoil it is recommended that the excess material be placed upstream of the excavation location to ensure any sediment runoff is directed back into the trench. Earth bunds or sediment fences may be required to control direction of sediment flow should the spoil be placed on the downstream side of the excavation site.

Control measures such as a gully pit sediment barrier (see Arcadis drawings attached) shall be installed around inlet pits where required reducing the potential for sediment discharge into the surrounding stormwater system.

Any sediment deposited from construction vehicles will be swept up and removed.

Erosion and sediment control devices may only be removed once disturbed lands which they are protecting are rehabilitated and capable of resisting further erosion.

7.3.2 Spoil and Stockpile Management

It shall be the Principal Contractor's responsibility to oversee the following controls during the construction phase unless otherwise specified:

The placement of spoil and stockpile material shall be kept at a maximum distance from stormwater inlets, gutters and stormwater pipes to reduce unnecessary sediment migration into nearby infrastructure.

Spoil and stockpile material shall be placed in a way that reduces the likelihood of sedimentation, erosion and slippage. Advice from an appropriate project manager/representative shall be sought in this instance.

Spoil or stockpile material that is deemed a contaminant shall be placed on a designated zone of either fill material, plastic or concrete with the installation of appropriate containment devices. Advice from an appropriate project manager/representative shall be sought in this instance as the resulting control will be highly dependent on the severity of contamination.

It shall be the Project Manager's responsibility to foresee and develop appropriate control measures to prevent the impacts of spoil and stockpile material prior to construction activities. Monitoring and reporting shall also be required during the implementation of any given device associated with spoil and stockpile management.

7.3.3 Erosion Control

It shall be the Principal Contractor's responsibility to oversee the following controls during the construction phase:

Traffic of any type shall be kept away from areas of rehabilitation to promote stabilisation of the zone.

Where wind and water are acknowledged as potential erosion sources temporary protection shall be installed. Such measures only apply to zones of spoil, stockpile and land disturbance which are unlikely to receive works within a period of 6-8 weeks. Further advice from an appropriate project manager/representative shall be sought in this instance as the resulting control will be highly dependent on the disturbance type and erosion source.

Once viable, final landscaping shall be undertaken on applicable zones to increase stability.

7.3.4 Personnel Training

It shall be the Principal Contractor's responsibility to oversee the following training protocols during the construction phase:

Environmental management and incident reporting is to be included on all site induction courses.

All personnel are to receive adequate training in; workplace health and safety issues, environmental management, best practice erosion and sediment control practices, incident reporting procedures and where applicable site inspection and maintenance procedures.

7.3.5 Miscellaneous

It is the Principal Contractor's responsibility to ensure erosion and sediment controls are operated and maintained in an effective operational condition. These structures are not allowed to accumulate sediment volume in excess of 70% sediment storage design capacity as per Section 6 of the Urban Stormwater Quality Planning Guidelines 2010.

Sediment removed from control measures must be disposed of in a manner approved by the local Council that does not cause pollution and forms part of the Contractor's obligation.

Any chemicals, fuel or oil stored on site shall be stored under cover in a bounded area or placed sufficiently above ground level to prevent contamination of surface water.

A waste concrete receptor (disposal area) must be established if significant concreting is to occur on site. The site must be surrounded by perimeter bunds and be clearly signed.

A general waste collection area shall be established which is to include appropriate pollutant runoff controls, dependent on the nature of the waste.

7.4 Project Personnel Responsibilities

A description of the key personnel involved with implementing the Erosion and Sediment Control Plan are listed in Table 7-2. It is recommended that all parties involved attend a pre-construction conference to discuss and clarify all issues associated with sediment and erosion control as well as this plan.

Table 7-2 Project Personnel Responsibilities

Project Role	Responsibilities
Superintendent	Authorisation of this plan; and Review and monitoring of this plan.
Contractor / Site Manager	Implementation of this plan; Monitoring of this plan; Supervising any activities or requirements required by this plan; and Ensuring all personnel are aware of the contractual agreements associated with this plan.
All Personnel	Ensuring they are aware of the contractual agreements associated with this plan; and Informing appropriate personnel of any issues that may arise with respect to the desired sediment and erosion control measures.

7.5 Monitoring and Responsibility

7.5.1 All Personnel

It is the obligation of all personnel to report any failures in the erosion and sediment control works utilised during the projects life cycle. Any identified errors within the sediment and erosion control system shall be reported in writing to a relevant project manager. A formal inquiry shall be undertaken in accordance with the reported issue as well as the relevant party procedures (i.e. Principal Contractor).

7.5.2 Contractor/Contractor's Foreman

It shall be the responsibility of the Contractor and Contractor's Foreman to monitor and report on the erosion and sediment control measures utilised in the construction phase. Inspections are to be undertaken:

On a daily basis during earthworks, land disturbance, spoil or stockpile activities and rain events.

Weekly during site inactivity.

Within 24 hours prior to expected rainfall and 18 hours prior to intense rainfall events.

The following shall be inspected or reported on:

Erosion and sediment control devices are in the correct location and are working as defined by this plan.

Drainage systems both internal and external to the site are operating effectively or to pre-construction efficiencies.

Spilled material is removed if it can potentially mobilise via stormwater runoff or wind.

Stabilisation of disturbed land parcels has been undertaken in an effective manner.

Excess sediment has been removed from erosion and sediment measures appropriately if the device is operation ineffectively or requires decommissioning.

It is understood that repairs, maintenance or reinstallation may be required if any control measures are operating inadequately, or if infrastructure is damaged due to inefficient operation of the outlined measures.

7.5.3 Environmental Representative

It shall be the responsibility of the environment representative to periodically inspect and report on the effectiveness of the erosion and sediment controls during the construction phase of the project. Technical advice shall be given to personnel outlying any uncertainty with regards to the, applicability, installation, operation, maintenance, removal or rehabilitation of any sediment and erosion control.

7.6 Construction Phase Sediment Control Devices

As the site has been assessed as multiple catchments, it is appropriate to approach the assessment of construction phase sediment devices in a similar manner.

In accordance with the Best Practice Erosion and Sediment Control Manual (ICEA 2009) the construction phase catchment has been classified to determine the level of sediment and erosion control techniques required. The site is identified as per Table 4.4.6 (ICEA 2009) to be closest to the Salisbury locality and therefore attracts an average monthly rainfall depth of 36m to 143mm.

As the extent of soil disturbance is widespread, Type 1 techniques will be used in accordance with Table 4.5.3. This will require control techniques such as a vehicle shakedown at the site entry, sediment fences, sediment basins and check dams. Preliminary explanations of the measures can be found in the engineering drawings in Appendix A.

8 ASSET MAINTENANCE AND HANDOVER

All the stormwater quantity controls detailed in this document are contained within the development site and will be transferred to Council as a public asset.

Additional information including standard integration drawings and maintenance requirements can be found in Appendix B.

9 CONCLUSION

This SBSMP has been prepared to provide a design proposal and guide to the stormwater quantity and quality management techniques for the site.

The primary objectives of this report are achieved as follows:

Lawful Point of Discharge (LPoD)

Stormwater will be discharged to the lawful point of discharge, which is the dam and its downstream area located within the site. From the point of discharge, flows are conveyed via overland to the north.

Stormwater Quantity

The site proposes to mitigate the increase in peak runoff, which is expected to occur at Legal Points of Discharge through the use of a detention basin.

Stormwater Quality

A stormwater quality assessment is provided, demonstrating that a combined bioretention and detention basin will be required to meet Logan City Council's pollutant removal targets during the proposed development's operational phase.

Erosion and Sediment Control

Erosion and sediment control measures during construction shall be undertaken in accordance with the SPP and Council requirements.

APPENDIX A

Engineering Drawings

LEGEND:

- EXISTING SURFACE CONTOURS (10.0)
- EXISTING CATCHMENT BOUNDARY
- EXT1 — EXISTING CATCHMENT LABEL
- FLOW ARROW
- SITE BOUNDARY
- ADJOINING DEVELOPMENT APPLICATION

NOTES:

1. AERIAL IMAGERY COURTESY OF NEARMAP.COM
2. DETAILED SURVEY REQUIRED TO CONFIRM SERVICE LOCATIONS AND SITE LEVELS.

Issue	Description	DR	CH	VE	Date
01	ORIGINAL ISSUE	JM	AS	AS	20.06.24

Scales

0 30 60 90 120 150m

1 : 1500

100mm on Original

Surveyor: saunders havill group

Client: ZOO PROPERTY WEALTH BUILDER PTY LTD

Status: CONCEPTUAL DESIGN ONLY
NOT TO BE USED FOR CONSTRUCTION

Original Issue Signatures

Drawn	J. VARGAS	Original Size	A1
Designed	E. ANLACAN	Height Datum	AHD
Project Manager	A. SHEPHERD	Grid	LOCAL
Verified	A. SHEPHERD		

Project: 50-56 DERBY ROAD, LOGAN RESERVE

Title: EXISTING STORMWATER CATCHMENT PLAN

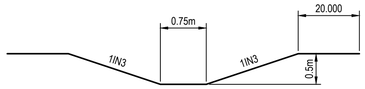
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 7, Seabank Building, 12-14 Marine Parade
SOUTHPORT QLD 4215
ABN 76 104 485 289
Tel No: +61 7 5503 4800
www.arcadis.com/au

Project Number: 30216791

Drawing No.: DRB-AAP-BE-00-SKE-CV-0421

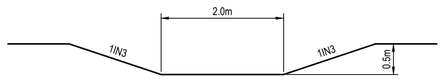
Issue: 01

Date Plotted: 24 Jun 2024 - 11:17AM File Name: C:\Users\jvmn0894\DC\ACCDocs\Arcadis ACC US\AAU-30216791-50 To 56 Derby Rd Logan Reserve\Project Files\10_WIP\10_ARC_Civil_CI\Stage_BE\Drawings\DRB-AAP-BE-00-SKE-CV-0421-ExistingCatchmentPlan.dwg



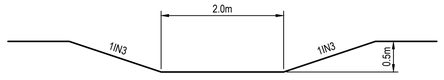
Min. 0.5m deep
Min. 0.75m wide base
1in3 Batters for tie in

SWALE DETAIL A
1:50



Min. 0.5m deep
Min. 2.0m wide base
1in3 Batters for tie in

SWALE DETAIL B
1:50



Min. 0.5m deep
Min. 2.0m wide base
1in3 Batters for tie in

SWALE DETAIL B
1:50

LEGEND:

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- NOMINAL KERB LINE
- TOP/TOE OF BATTER
- SWD — PROPOSED STORMWATER DRAINAGE
- PROPOSED CATCHMENT BOUNDARY
- EXTERNAL CATCHMENT BOUNDARY
- D1b — CATCHMENT LABEL
- EXT1 — EXTERNAL CATCHMENT LABEL
- FLOW ARROW
- ADJOINING DEVELOPMENT APPLICATION

NOTES:

1. AERIAL IMAGERY COURTESY OF NEARMAP.COM
2. SITE LEVELS & EXTERNAL LEVELS BASED ON LIDAR INFORMATION
3. PROPOSED CONTOURS AND STORMWATER RETICULATION LAYOUT IS CONCEPTUAL AND SUBJECT TO DETAILED DESIGN.

Issue	Description	DR	CH	VE	Date
01	ORIGINAL ISSUE	JM	AS	AS	20.06.24

100mm on Original

Scales

0 30 60 90 120 150m

1 : 1500

0 0.5 1 2 3 4 5m

1 : 50

Surveyor: saunders havill group

Client: ZOO PROPERTY WEALTH BUILDER PTY LTD

Status: CONCEPTUAL DESIGN ONLY
NOT TO BE USED FOR CONSTRUCTION

Original Issue Signatures

Drawn	J. VARGAS	Original Size	A1
Designed	E. ANLACAN	Height Datum	AHD
Project Manager	A. SHEPHERD	Grid	LOCAL
Verified	A. SHEPHERD		

Project: 50-56 DERBY ROAD, LOGAN RESERVE

Title: DEVELOPED STORMWATER CATCHMENT PLAN

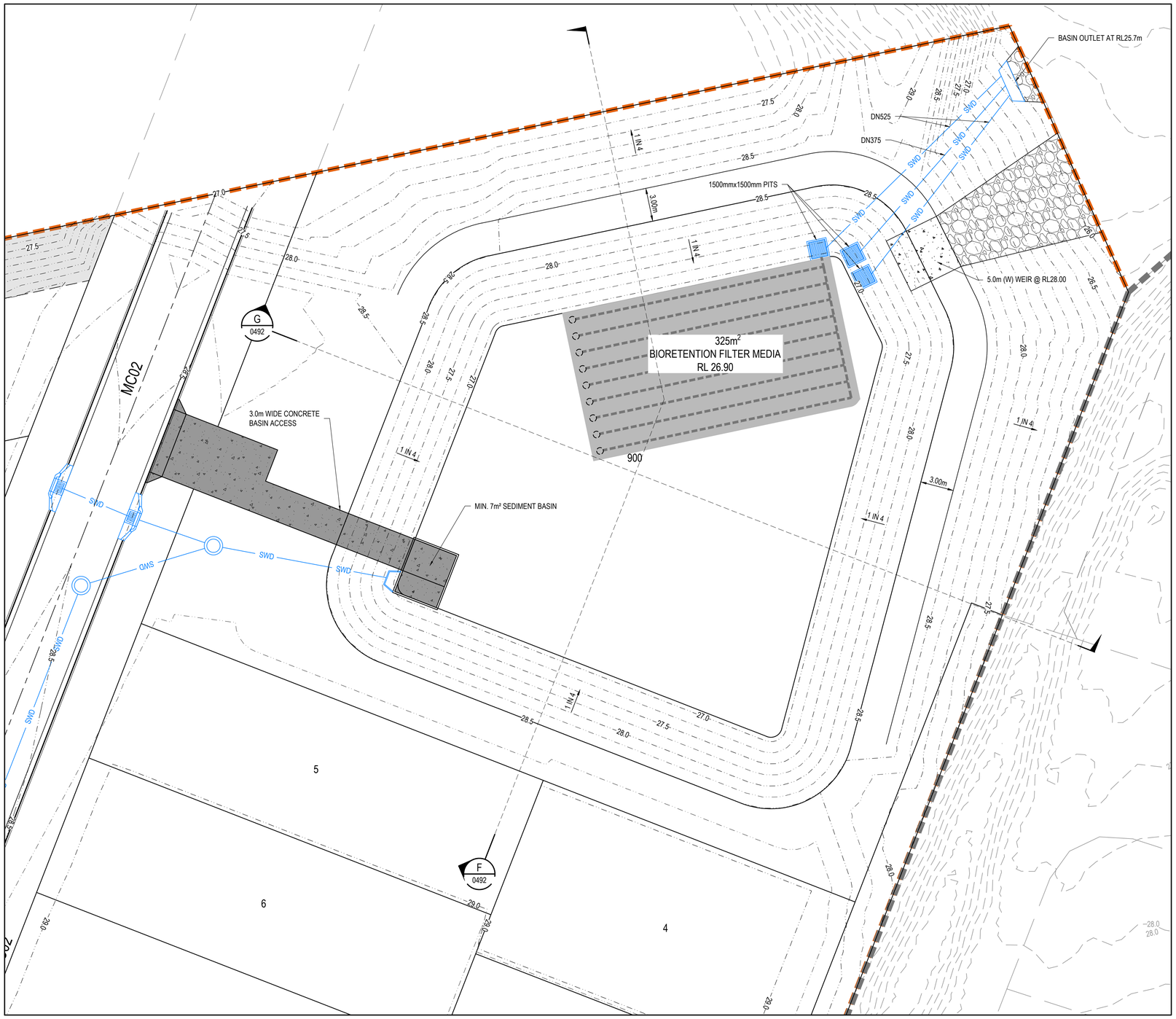
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 7, Seabank Building, 12-14 Marine Parade
SOUTHPORT QLD 4215
ABN 76 104 485 289
Tel No: +61 7 5503 4800
www.arcadis.com/au

Project Number: 30216791

Drawing No.: DRB-AAP-BE-00-SKE-CV-0422

Issue: 01

Date Plotted: 24 Jun 2024 - 11:18AM File Name: C:\Users\jvmn0894\DC\ACCDocs\Arcadis ACC US\AAU-30216791-50 To 56 Derby Rd Logan Reserve\Project Files\10_WIP\10_ARC_Civil_CI\Stage_BE\Drawings\DRB-AAP-BE-00-SKE-CV-0422-CatchmentPlan.dwg



DETENTION BASIN A
1 : 200

LEGEND:

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- NOMINAL KERB LINE
- TOP/TOE OF BATTER
- PROPOSED STORMWATER DRAINAGE
- Ø100mm SLOTTED PVC PIPE 0.5% FALL WITH C.I. CAP SUBSOIL CLEAN OUT POINT
- EXTENT OF FILTER MEDIA
- CONCRETE MAINTENANCE ACCESS
- SCOUR PROTECTION
- SITE BOUNDARY
- ADJOINING DEVELOPMENT APPLICATION

NOTES:

1. REFER TO REPORT (30216791-GA0002-SBSMP) FOR DETENTION AND QUALITY REQUIREMENTS.

Issue	Description	DR	CH	VE	Date
01	ORIGINAL ISSUE	JM	AS	AS	20.06.24

100mm on Original

Scales

0 5 10 15 20m

1 : 200

Surveyor

saunders havill group

Client

ZOO PROPERTY WEALTH BUILDER PTY LTD

Status

CONCEPTUAL DESIGN ONLY
NOT TO BE USED FOR CONSTRUCTION

Original Issue Signatures			
Drawn	J. VARGAS	Original Size	A1
Designed	E. ANLACAN	Height Datum	AHD
Project Manager	A. SHEPHERD	Grid	LOCAL
Verified	A. SHEPHERD		

Project

50-56 DERBY ROAD, LOGAN RESERVE

Title

CONCEPT DETENTION BASIN PLAN

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 7, Seabank Building, 12-14 Marine Parade
SOUTHPORT QLD 4215
ABN 76 104 485 289
Tel No: +61 7 5503 4800
www.arcadis.com/au

Project Number: 30216791

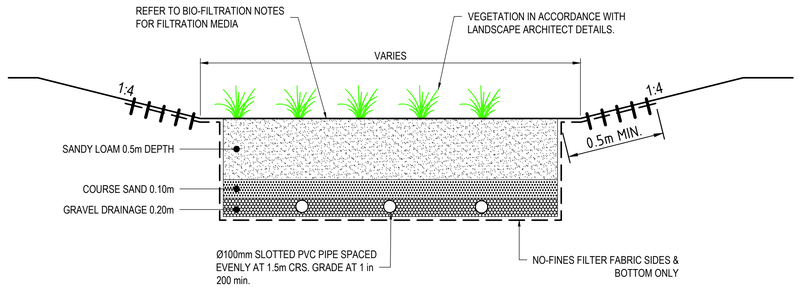
Drawing No.: DRB-AAP-BE-00-SKE-CV-0491

Issue: 01

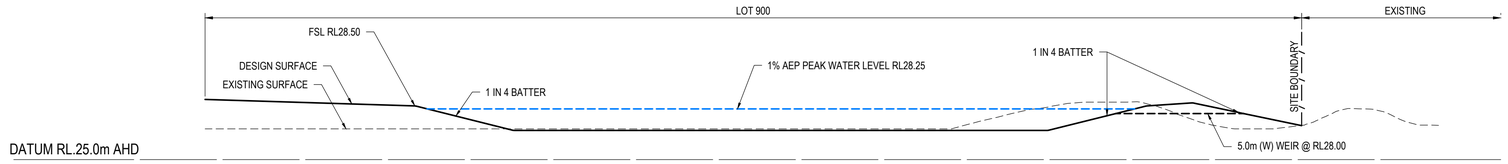
Date Plotted: 24 Jun 2024 - 11:59AM File Name: C:\Users\jvmn0894\DC\ACCDocs\Arcadis ACC US\AAU-30216791-50 To 56 Derby Rd Logan Reserve\Project Files\10_WIP\10_ARC_Civil_CIStage_BE\Drawings\DRB-AAP-BE-00-SKE-CV-0491-DetentionPlan.dwg

NOTES:

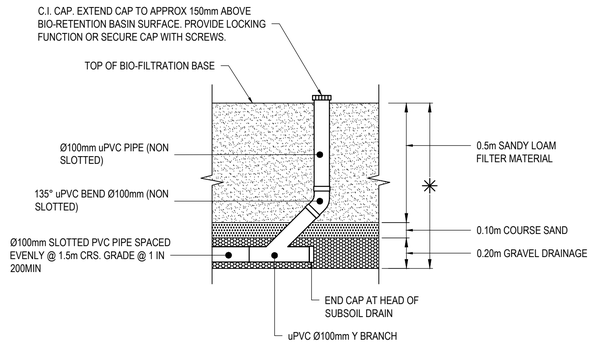
1. FILTER MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIO-FILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO-RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1". THE MINIMUM ORGANIC CONTENT OF THE FILTER MEDIA SHALL BE 3%.
2. TRANSITION & DRAINAGE MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIO-FILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO-RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1".
3. THE CONTRACTOR IS RESPONSIBLE FOR UNDERTAKING DETAILED SURVEY OF EACH LAYER OF THE MEDIA INSTALLED INCLUDING THE SUBGRADE & FINISHED LEVEL SURVEYS. THE DIGITAL SURVEY DATA FOR EACH LAYER IS TO BE ISSUED TO THE SUPERINTENDENT FOR REVIEW PRIOR TO THE SUBSEQUENT LAYER BEING INSTALLED. THE REQUIRED TOLERANCES FOR CONSTRUCTION OF THE MEDIA LAYERS IS INCLUDED IN THE WATER BY DESIGN CONSTRUCTION & ESTABLISHMENT SIGN OFF FORMS – BIO-RETENTION SYSTEMS (VERSION 1.1). ALL COSTS ASSOCIATED WITH THE DETAILED SURVEY OF THE BIO-RETENTION SYSTEMS, THE STAGED CONSTRUCTION APPROACH DUE TO THE SURVEY REVIEW PROCESS, & ANY REWORKS REQUIRED AS A RESULT OF THE SURVEY REVIEWS ARE DEEMED INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR THE PROJECT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CO-SIGNING THE WATER BY DESIGN CONSTRUCTION & ESTABLISHMENT SIGN OFF FORMS – BIO-RETENTION SYSTEMS (VERSION 1.1) AT THE TIME OF CONSTRUCTION OF THE BIO-RETENTION SYSTEMS AS WELL AS MANAGING & COMPLYING WITH THE RELEVANT HOLD & WITNESS POINTS SPECIFIED IN THESE FORMS.
5. ALL UNDER DRAINAGE CONNECTIONS TO BE Y JUNCTIONS.



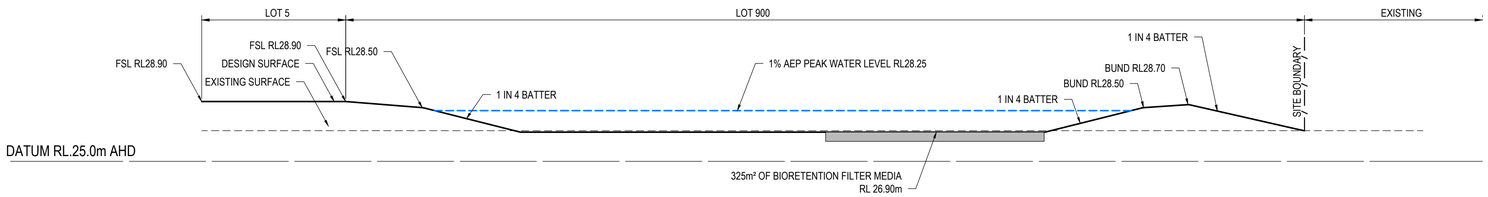
TYPICAL BIO-RETENTION/DETENTION BASIN SECTION
NTS



SECTION G
1 : 200
0491



TYPICAL FLUSHING END DETAIL
NTS



SECTION F
1 : 200
0491

SOIL FILTER MEDIA NOTES		
PARAMETER	TEST METHOD IN ACCORDANCE WITH	REQUIREMENT
SATURATED HYDRAULIC CONDUCTIVITY	ASTM f1815-11	50 - 500 mm/hr (200 PREFERRED)
pH	AS 4419	5.5 - 7.5
ELECTRICAL CONDUCTIVITY	AS 4419	<1.2 dS/m
NITROGEN CONTENT	AS 4419	<400 mg/kg
PHOSPHORUS CONTENT	AS 4419	<30 mg/kg
ORGANIC CONTENT	AS 4419	3% - 10%, WHERE ORGANIC CONTENT IS BELOW THIS THRESHOLD, THE FILTER MEDIA MAY BE AMELIORATED BY ADDING 50mm OF COMPOST AND TINING IT INTO THE TOP 150mm OF FILTER MEDIA.
PARTICLE SIZE DISTRIBUTION	AS 1289.3.6.1 - 1995	CLAY & SILT 3 - 6% (<0.05mm) VERY FINE SAND 5 - 30% (0.05 - 0.15mm) FINE SAND 10 - 30% (0.15 - 0.25mm) MEDIUM TO COARSE SAND 40 - 60% (0.25 - 1.0mm) COARSE SAND 7 - 10% (1.0 - 2.0mm) FINE GRAVEL <3% (2.0 - 3.4mm)

Issue	Description	DR	CH	VE	Date
01	ORIGINAL ISSUE	JM	AS	AS	20.06.24

Scales: 0 5 10 15 20m — 1 : 200

Surveyor: saunders havill group

Client: ZOO PROPERTY WEALTH BUILDER PTY LTD

Status: CONCEPTUAL DESIGN ONLY
NOT TO BE USED FOR CONSTRUCTION

Original Issue Signatures			
Drawn	J. VARGAS	Original Size	A1
Designed	E. ANLACAN	Height Datum	AHD
Project Manager	A. SHEPHERD	Grid	LOCAL
Verified	A. SHEPHERD		

Project: 50-56 DERBY ROAD, LOGAN RESERVE

Title: CONCEPT DETENTION BASIN SECTION AND DETAILS

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 7, Seabank Building, 12-14 Marine Parade
SOUTHPORT QLD 4215
ABN 76 104 485 289
Tel No: +61 7 5503 4800
www.arcadis.com/au

Project Number: 30216791

Drawing No.: DRB-AAP-BE-00-SKE-CV-0492

Issue: 01

100mm on Original

Date Plotted: 24 Jun 2024 - 11:19AM File Name: C:\Users\jvmn0894\DC\ACCDocs\Arcadis ACC US\AAU-30216791-50 To 56 Derby Rd Logan Reserve\Project Files\10_WIP\10_ARC_Civil_CI\Stage_BE\Drawings\DRB-AAP-BE-00-SKE-CV-0492-DetentionSections.dwg

APPENDIX B

Bio Checklist

BIORETENTION BASIN CONSTRUCTION INSPECTION CHECKLIST

Asset I.D.		Inspected By:	
Site:		Date:	
		Time:	
Constructed By:		Weather:	
		Contact During Visit:	

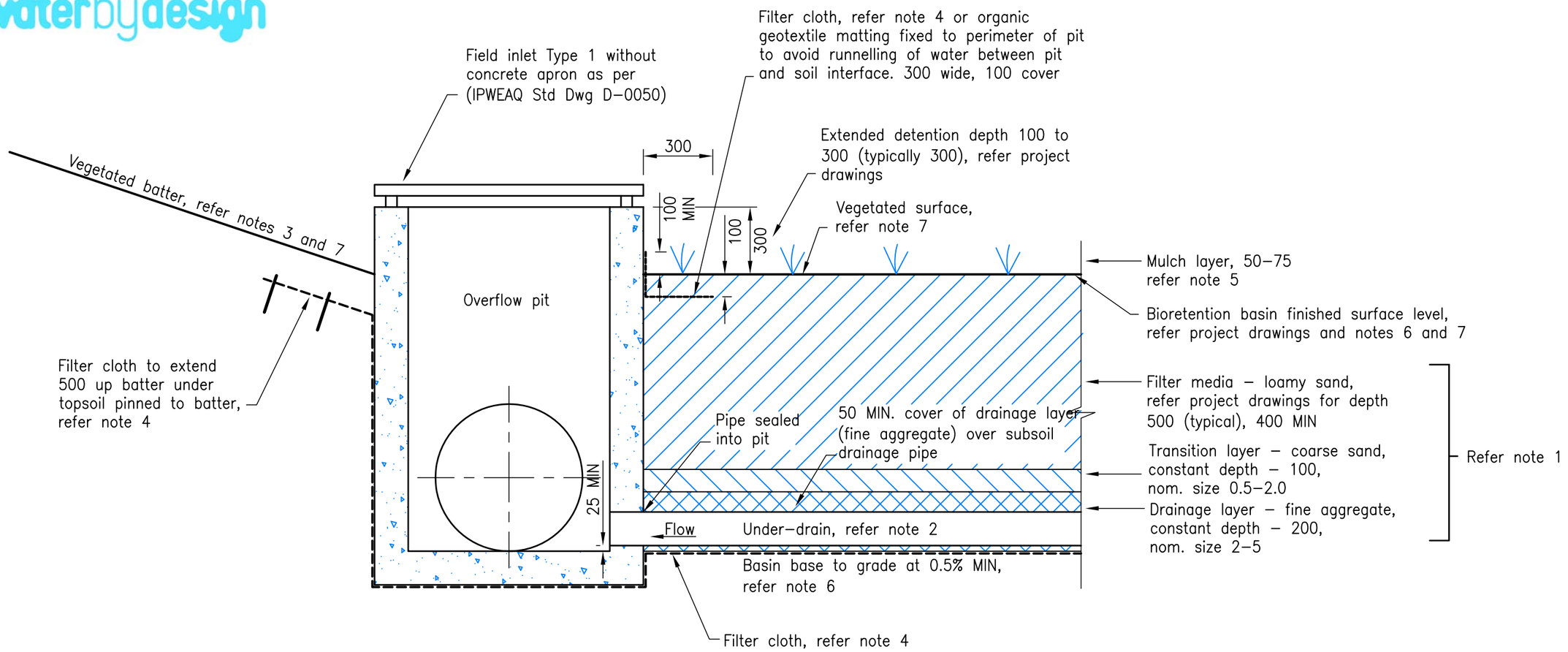
Items inspected	Checked		Satisfactory		Items inspected	Checked		Satisfactory	
	Y	N	Y	N		Y	N	Y	N
DURING CONSTRUCTION & ESTABLISHMENT									
A. FUNCTIONAL INSTALLATION					**Structural components**				
Preliminary Works					15. Location and configuration of inflow systems as designed				
1. Erosion and sediment control plan adopted					16. Location and levels of overflow pits as designed				
2. Temporary traffic/safety control measures					17. Under-drainage connected to overflow pits as designed				
3. Location same as plans					18. Concrete and reinforcement as designed				
4. Site protection from existing flows					19. Set down to correct level for flush kerbs (streetscape applications only)				
Earthworks and Filter Media					20. Kerb opening width as designed				
5. Bed of basin correct shape and slope									
6. Batter slopes as plans					**B. SEDIMENT & EROSION CONTROL (IF REQUIRED)**				
7. Dimensions of bioretention area as plans					21. Stabilisation immediately following earthworks and planting of terrestrial landscape around basin				
8. Confirm surrounding soil type with design					22. Silt fences and traffic control in place				
9. Confirm filter media specification in accordance with Step 4					23. Temporary protection layers in place				
9. Provision of liner (if required)									
10. Under-drainage installed as designed					**C. OPERATIONAL ESTABLISHMENT**				
11. Drainage layer media as designed					24. Temporary protection layers and associated silt removed				
12. Transition layer media as designed (if required)					**Vegetation**				
14. Extended detention depth as designed					25. Planting as designed (species and densities)				
					26. Weed removal and watering as required				

FINAL INSPECTION									
1. Confirm levels of inlets and outlets					6. Check for uneven settling of banks				
2. Confirm structural element sizes					7. Under-drainage working				
3. Check batter slopes					8. Inflow systems working				
4. Vegetation as designed					9. Maintenance access provided				
5. Bioretention filter media surface flat and free of clogging									

COMMENTS ON INSPECTION
ACTIONS REQUIRED
Inspection officer signature:

BIORETENTION BASIN MAINTENANCE CHECKLIST				
Inspection Frequency:	1 to 6 monthly	Date of Visit:		
Location:				
Description:				
Asset I.D.				
Site Visit by:				
INSPECTION ITEMS:		Y	N	Action Required (details)
Sediment accumulation at inflow points?				
Litter within basin?				
Erosion at inlet or other key structures?				
Traffic damage present?				
Evidence of dumping (e.g. building waste)?				
Vegetation condition satisfactory (density, weeds etc)?				
Watering of vegetation required?				
Replanting required?				
Mowing/slashing required?				
Clogging of drainage points (sediment or debris)?				
Evidence of ponding?				
Damage/vandalism to structures present?				
Surface clogging visible?				
Drainage system inspected?				
Resetting of system required?				
COMMENTS				

BIORETENTION BASIN ASSET TRANSFER CHECKLIST		
Asset I.D.		
Asset Location:		
Construction by:		
'On-maintenance' Period:		
TREATMENT	Y	N
System appears to be working as designed visually?		
No obvious signs of under-performance?		
MAINTENANCE	Y	N
Maintenance plans and indicative maintenance costs provided for each asset?		
Vegetation establishment period completed (2 years)?		
Inspection and maintenance undertaken as per maintenance plan?		
Inspection and maintenance forms provided?		
ASSET INSPECTED FOR DEFECTS AND/OR MAINTENANCE ISSUES AT TIME OF ASSET TRANSFER	Y	N
Sediment accumulation at inflow points?		
Litter within basin?		
Erosion at inlet or other key structures?		
Traffic damage present?		
Evidence of dumping (e.g. building waste)?		
Vegetation condition satisfactory (density, weeds etc)?		
Watering of vegetation required?		
Replanting required?		
Mowing/slashing required?		
Clogging of drainage points (sediment or debris)?		
Evidence of ponding?		
Damage/vandalism to structures present?		
Surface clogging visible?		
Drainage system inspected?		
COMMENTS/ACTIONS REQUIRED FOR ASSET TRANSFER		
ASSET INFORMATION	Y	N
Design Assessment Checklist provided?		
As constructed plans provided?		
Copies of all required permits (both construction and operational) submitted?		
Proprietary information provided (if applicable)?		
Digital files (e.g. drawings, survey, models) provided?		
Asset listed on asset register or database?		



BIORETENTION BASIN OVERFLOW PIT DETAIL

NOTES:

1. Bioretention media specification shall be in accordance with the Facility for Advancing Biofiltration "Guidelines for Soil Filter Media in Bioretention Systems". Bioretention hydraulic conductivity shall be in accordance with the Facility for Advancing Biofiltration 'Practice Note 1: In Situ Measurement of Hydraulic Conductivity". The number of samples to be tested shall be in accordance with the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands (Water by Design).
2. Under–drain: slotted rigid pipe (uPVC or similar to AS 2439.1) or approved equivalent, 0.5% MIN. grade. Refer project drawings for diameter and invert level (Typically ø100–150). Pipe should not be installed with a filter sock surrounding pipe. Under–drainage pipes shall be sealed into pits using grout or other approved watertight seal.
3. Refer to project drawings for vegetated batter slopes (1 in 3 MAX, 1 in 4 typical) and batter topsoil requirements.
4. Filter cloth – non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
5. Basin finished surface level is top of filter media. Surface to be mulched and planted as per landscape drawings.
6. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits, pipes and base levels must be noted on project drawings.
7. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
8. All dimensions are in millimetres unless otherwise noted.

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION STANDARD PROFILE
OVERFLOW PIT

DRAWING No.
WSUD–001
A

NOTES:

1. Bioretention media specification shall be in accordance with the Facility for Advancing Biofiltration "Guidelines for Soil Filter Media in Bioretention Systems". Bioretention hydraulic conductivity shall be in accordance with the Facility for Advancing Biofiltration "Practice Note 1: In Situ Measurement of Hydraulic Conductivity". The number of samples to be tested shall be in accordance with the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design).

2. Under–drain: slotted rigid pipe (uPVC or similar to AS 2439.1) or approved equivalent, 0.5% MIN. grade. Refer project drawings for diameter and invert level (typically Ø100–150). Pipe joins should be glued using plumbing cement. Pipe should not be installed with a filter sock surrounding pipe. Under–drainage pipes shall be sealed into pits using grout or other approved watertight seal.

3. Refer to project drawings for vegetated batter slopes (1 in 3 MAX, 1 in 4 typical) and batter topsoil requirements.

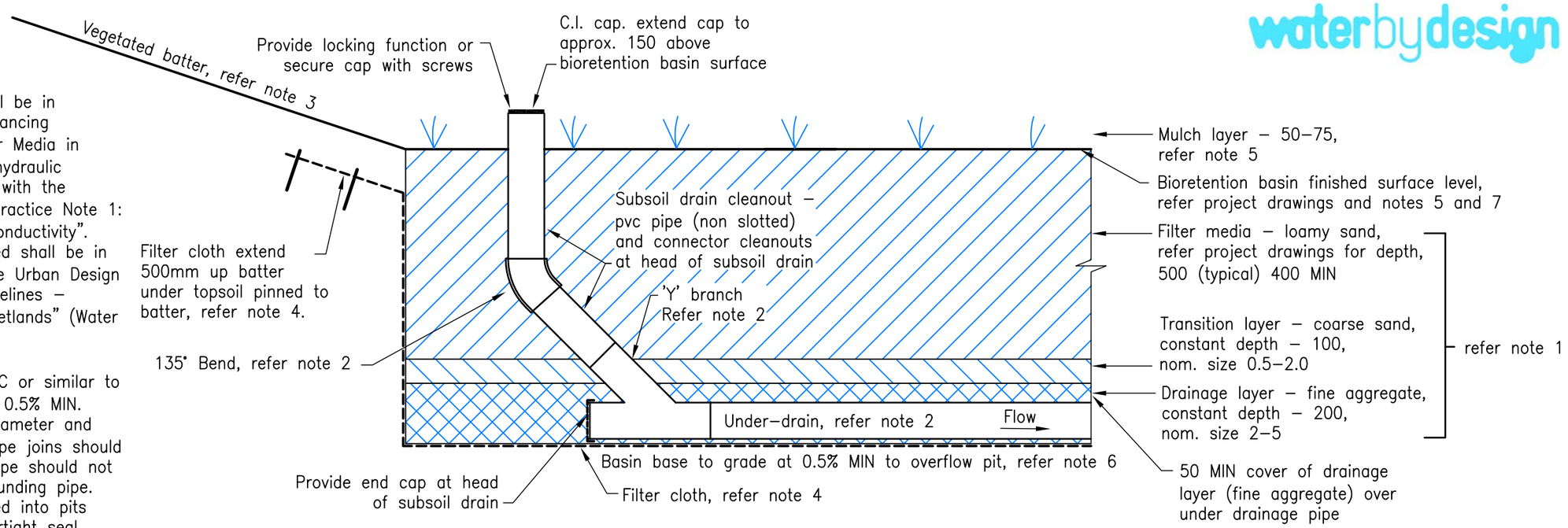
4. Filter cloth – non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the 'Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).

5. Basin finished surface level is top of filter media. Surface to be mulched and planted as per landscape drawings.

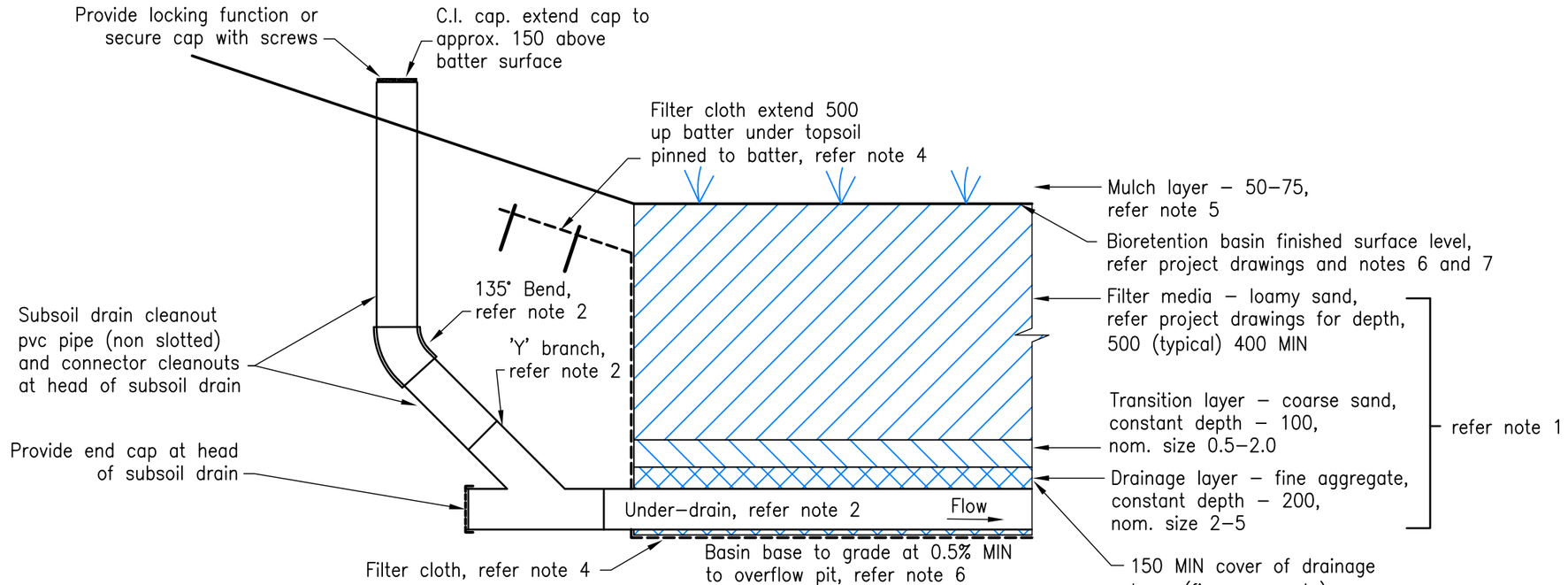
6. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances must be noted on project plans. Invert levels of pits and pipes and base levels must be shown on project drawings.

7. Refer landscape drawings for plant specification. Plant specification and density shall be in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).

8. All dimensions are in millimetres unless otherwise noted.



BIORETENTION UNDER–DRAIN CLEANOUT – IN BASIN



BIORETENTION UNDER–DRAIN CLEANOUT – IN BATTER

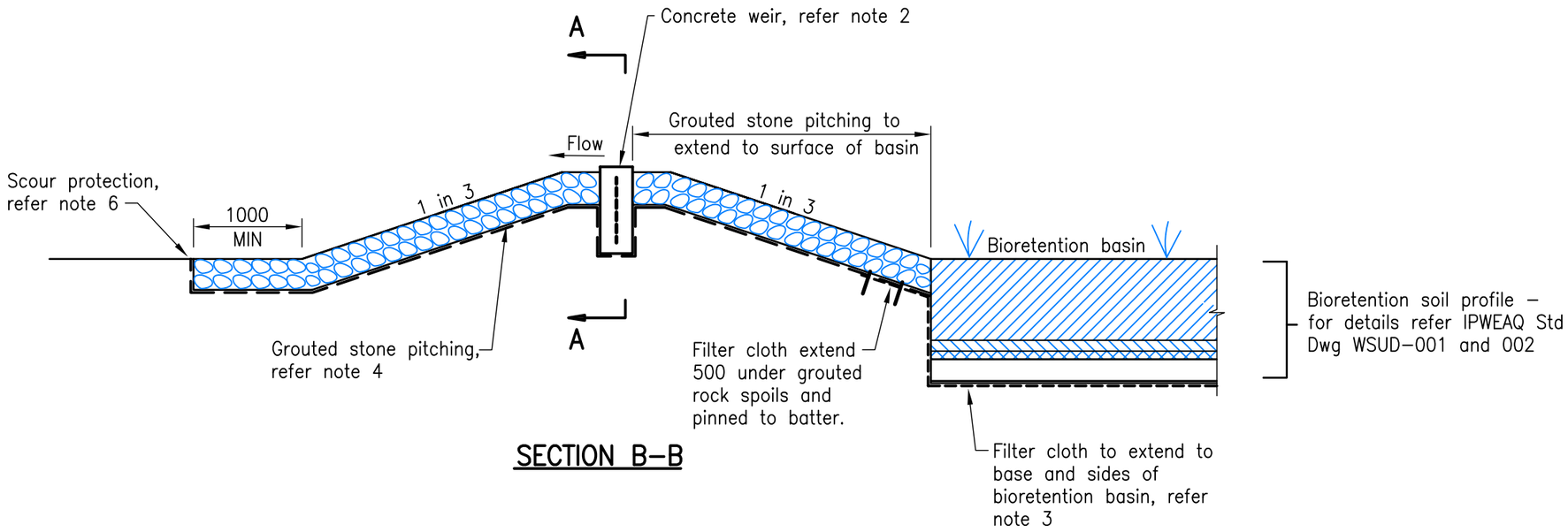
These drawings have been developed in consultation between the participating councils.
BEFORE USE, the user shall confirm that the drawing has been adopted by the appropriate council

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

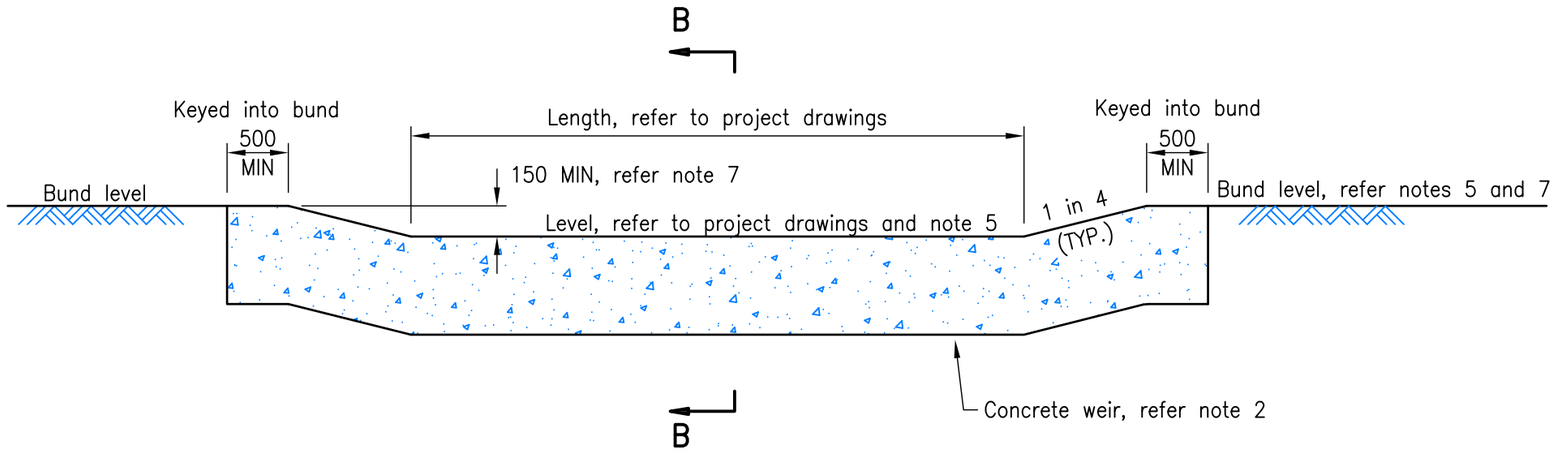
INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION STANDARD PROFILE
UNDERDRAIN CLEANOUT

DRAWING No.
WSUD–003
A



SECTION B–B



SECTION A–A

NOTES:

1. Insitu material to be tested and approved by geotechnical engineer prior to weir construction.
2. Concrete weir – 300 wide x 800 high concrete (N32) with SL81 mesh placed centrally.
3. Filter cloth – non–woven geotextile. Filter cloth not to be placed between any filter layers. Impervious liner may be required subject to soil testing requirements in accordance with the "Water Sensitive Urban Design Technical Design Guidelines" (Water by Design).
4. Grouted stone pitching – stones 75–100, 300 thick on filter cloth, refer note 3. Refer landscape drawings and project drawings for plant specification and details. Geotechnical engineer to confirm compaction requirements for bund subsoil. Option to drill 100 cores through to subsoil to provide voids for planting (subject to flow velocities and local government requirements). Refer landscape drawings for planting details.
5. Construction tolerances as documented in the "Water Sensitive Urban Design Construction and Establishment Guidelines – Swales, Bioretention Systems and Wetlands" (Water by Design) must be achieved. Construction tolerances and bund levels must be noted on project plans.
6. For extent and details of scour protection refer to project drawings.
7. Bund level, refer to project drawings for minimum freeboard requirements. Bund levels must be noted on project drawings.
8. All dimensions are in millimetres unless otherwise noted.

Rv.	DATE	REVISIONS
A	13/01/2010	ORIGINAL ISSUE

INSTITUTE OF PUBLIC WORKS ENGINEERING AUSTRALIA
QUEENSLAND DIVISION INC.
STANDARD DRAWINGS

BIORETENTION BASIN
WEIR DETAILS

DRAWING No.
WSUD–006
A