Appendix J: Revised Water Management Plan & Water Balance

20/10/2020

Project Number: 180009

WATER MANAGEMENT PLAN and WATER BALANCE

at

16 KERR ROAD INGLEBURN

for

BULK RECOVERY SOLUTIONS

Project No. 180009

Revision: H – Final Issue

10 October 2020

hello@drbengineering.com.au | www.drbengineering.com.au

DRB Consulting Engineers PTY LTD | PO BOX 4105 Kotara East 2305 | 0402 915 549 | ABN 64 625 755 482

TABLE OF CONTENTS

1. INTRODUCTION

DRB Consulting Engineers (DRB) were engaged by Bulk Recovery Solutions to undertake a Water Management Plan and Water Balance for the proposed submission to the Department of Planning to increase operating capacity of the existing Bulk Recovery Solutions facility, located at 16 Kerr Road, Ingleburn.

The purpose of this report is to investigate the civil engineering items outlined in the Secretary's Environmental Assessment Requirements (SEARs) and provide recommendations on inclusions within the proposed submission to ensure all relevant guidelines have been met.

Specifically, this report will provide comment on the impacts the proposed development will have on the following existing water elements:

- Stormwater Drainage Network and Overland Flow Paths.
- Onsite Stormwater Detention and Water Quality.
- Water Reuse and Demand on Mains Supply.
- Flood Levels and Conveyance.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The site is located on the eastern side of the Kerr Road cul-de-sac, Ingleburn. The site is bordered by Kerr Road to the west, Henderson Road to the northeast, an existing railway line to the south east and by existing industrial developments on the remaining sides.

At the time of this investigation, the site supported an existing industrial building with concrete hardstand area covering the remainder of the site.

The site currently supports the existing Bulk Recovery Solutions (BRS) operation.

It is proposed that the development involves the following:

- Increase the volumes of waste that can be processed on site from up to 30,000 tonnes per annum (tpa) to up to 225,000 tpa of liquid and solid waste;
- Store up to 8,000 tonnes (t) of waste and / or waste for transfer at any one time;
- Vary the waste types that can be accepted on site
- Solid waste processing including screening and crushing;
- Liquid waste processing including oily water, sewer, silt and debris;
- Solid and liquid waste transfer;
- 24 hour operation of liquid and muddy waste processes;
- Extended operation of concrete batching from 3am; and
- Upgrade of approved concrete batching equipment with continued production of approved 50,000tpa.

It is our understanding that in order to meet the demands of the proposed expansion, the modification to existing plant and introduction of new plant will be required. However, there will only be minor modification to the interior of the existing building. The external impervious areas on the site will not change as part of this proposal.

3. EXISTING STORMWATER DRAINAGE NETWORK AND OVERLAND FLOW PATHS

3.1. Information Provided

The following documents and information was provided to help determine the existing stormwater drainage flow regimes for the site.

- Detailed Site Survey – Prepared by Delfs Lascelles – Reference 18171.1.Rev1 – Dated 26.03.18
- Plan for Stormwater Collection – Prepared by BRE – Provided on 20.06.18
- Email correspondence between DRB and BRE dated 2.06.18 and 3.06.18.

Furthermore, a meeting was held between DRB and BRE on 11.07.18. During this meeting, information was provided verbally outlining the location of existing stormwater catchment areas and clarification on existing stormwater drainage pits and pipes.

3.2. Existing Easements

A series of easements were identified as burdening the existing site. The easements are summarised below, and shown diagrammatically in Figure 1.

(A) – EASEMENT TO DRAIN WATER 30 WIDE (DP 260710)
(B) – EASEMENT FOR GAS PIPELINE 2 WIDE (DP 717203)
(C) – EASEMENT TO DRAIN WATER 10 WIDE (DP 717203)
(D) – EASEMENT FOR WATER SUPPLY WORKS 2.5 WIDE (DP 717203)
(E) – EASEMENT TO DRAIN WATER 30 WIDE (DP 717203)

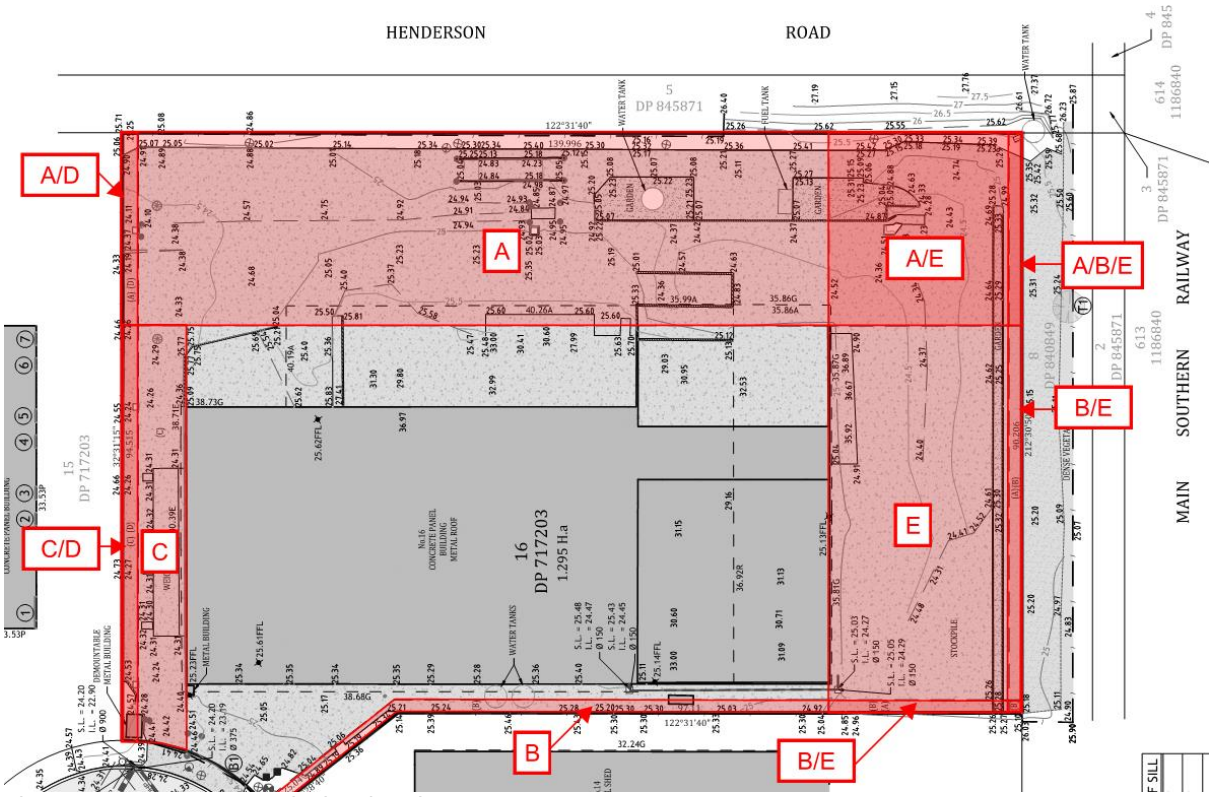


Figure 1 – Easements Burdening the Site.

3.3. *Existing Stormwater Management Strategy*

A summary of the existing stormwater drainage regime and overland flow paths, as identified using the information above and visual inspection, can be seen below:

- The roofwater from 3,036 m^2 of roof area is directed to 2 x 10kL above ground rainwater tanks. Water contained within these tanks are used for external irrigation, with overflow directed to the existing stormwater drainage network.

- The roofwater from the remaining 2,607 m^2 is conveyed directly to the existing stormwater drainage network.

- The pavement hardstand areas are separated into two catchments; **Dirty** and **Clean** water catchments. These catchments have been outlined in Figure 2 below.

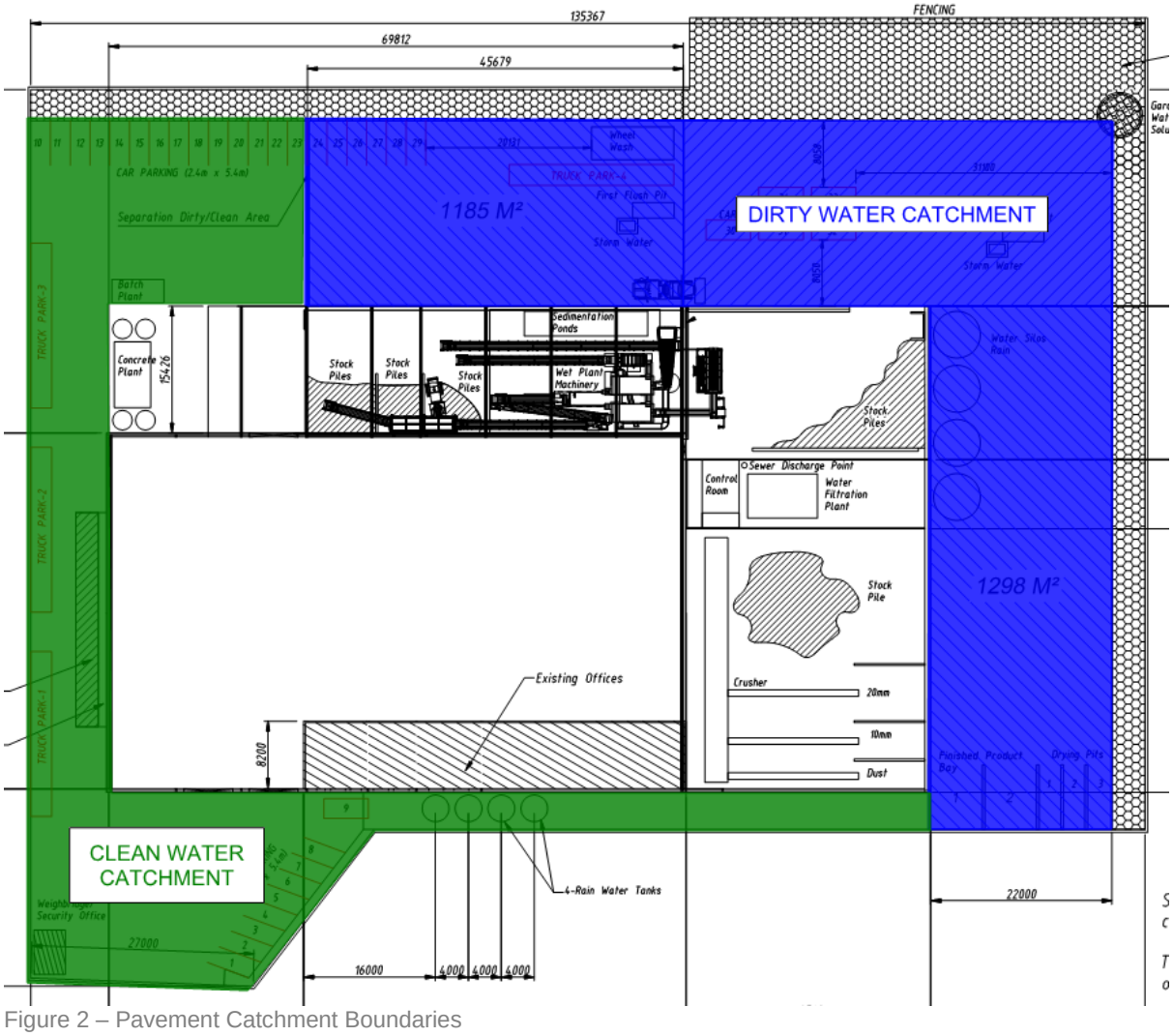


Figure 2 – Pavement Catchment Boundaries

- The **Clean** water catchment has an area of approximately 3,369 m^2. Stormwater runoff from this area is collected in a series of stormwater drainage pits, and conveyed via subsurface pipe to the existing pit located in the northern corner of the site.

- The **Dirty** water catchment has an area of approximately 3,932 m^2. Stormwater runoff from this catchment is conveyed via First Flush pits to the adjacent existing stormwater drainage pits located in the eastern portion of the site. The outlet pipe from these pits has been blocked to allow as much retention of rainwater runoff as possible. Review of the survey plan indicates approximately 426.5 kL of informal above ground storage is available in the **Dirty** water catchment.

  The water captured within this area is pumped to Water Silo storages (245 kL) for use in site operations and dust suppression.

  In the event that the **Dirty** water pavement storage area is filled to capacity during a major storm event, overflow is directed to the existing stormwater drainage network.

3.4. *Existing Overland Flow Paths*

As referenced in Section 3.2 above, the northeastern and southeastern portion of the site was burdened by a 30m wide easement. It is understood that these easements were created to allow overland flow from the railway line land to traverse the site, over the northernwestern boundary however, approvals by Council to construct Finished Goods Bays across this southern boundary imply that the overland flow path is no longer relevant/critical.

A 10m wide easement to drain water was also located adjacent to the northwestern boundary. It is understood that this easement contained a subsurface 900mm diameter pipe, conveying flows from the Kerr Road cul-de-sac, whilst also providing an overland flow path from Kerr Road.

Figure 3 below shows the location of the overland flow paths and Council piped infrastructure.

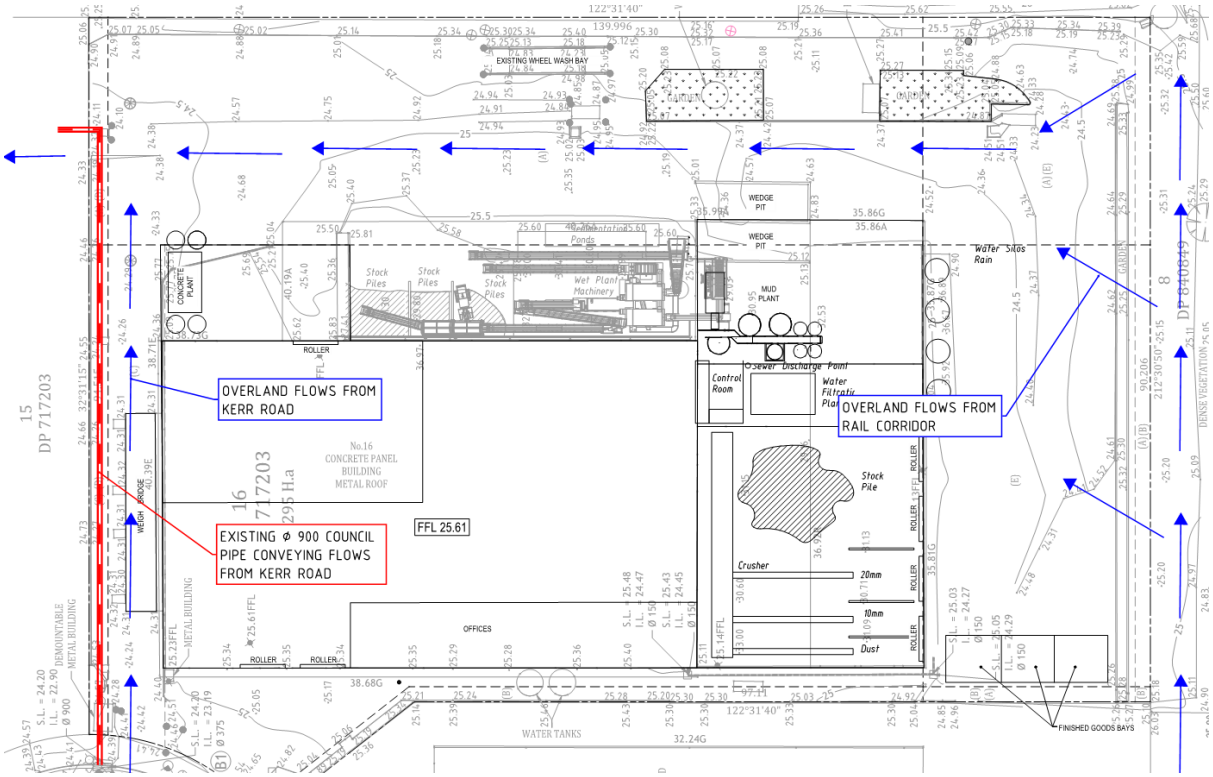


Figure 3 – Overland Flow Path and Council Infrastructure

4. PROPOSED STORMWATER MANAGEMENT PLAN

4.1. Requirements and Guidelines

Consultation was undertaken with Campbelltown City Council, the Department of Planning, Industry and Environment and Water NSW. Based on these conversations, the following requirements and guidelines were developed.

4.1.1. Campbelltown City Council

The proposed development involves the upgrade and expansion of the existing Resource Recovery Facility, as outlined in Section 2 of this report. Whilst the proposed upgrade does not involve the modification to existing hardstand areas, or building footprint, advice received from Campbelltown Council confirmed that Council's Onsite Stormwater Detention and Water Quality requirements must be met. As such: -

(i) The maximum discharge from the post-development site is not to exceed the pre-developed flows for all storms up to the 100-year ARI storm and concentrated flows must be managed;

(ii) The water quality for stormwater runoff from the post-development site must achieve the water quality reduction targets as shown in Table 1.

Pollutant	Reduction Target
Total Suspended Solids (TSS)	80%
Total Phosphorous (TP)	45%
Total Nitrogen (TN)	45%
Gross Pollutants	90%

Table 1 – Water Quality Objectives

(iii) The proposed development does not impact the existing overland flow paths, and therefore, there is no increase in flood levels affecting neighbouring properties.

4.1.2. Department of Planning, Industry and Environment and Water NSW

Further to Campbelltown City Council's requirements outlined in Section 4.1.1 above, The Department of Planning, Industry and Environment (DPI), in conjunction with Water NSW, has expressed concerns over the contamination of water prior to leaving the site. Generally, DPI's concerns were related to uncontained and uncharacterised waste stockpiles. Particularly those proposed within the overland flow paths.

Any proposed development must look at the anticipated contaminants in the surface runoff and provide information on how this will be treated prior to entering the stormwater drainage network.

4.2. *Proposed Stormwater Management Philosophy*

The site will be designed to ensure there are two (2) distinct catchments, 'Clean' and 'Dirty' Water. Runoff from each of the catchment areas will have specific treatment processes and discharge requirements. Site bunding, crests and surface falls will ensure each of the catchments are directed to their specific treatment areas. The catchments can be seen in Figure 4 below.

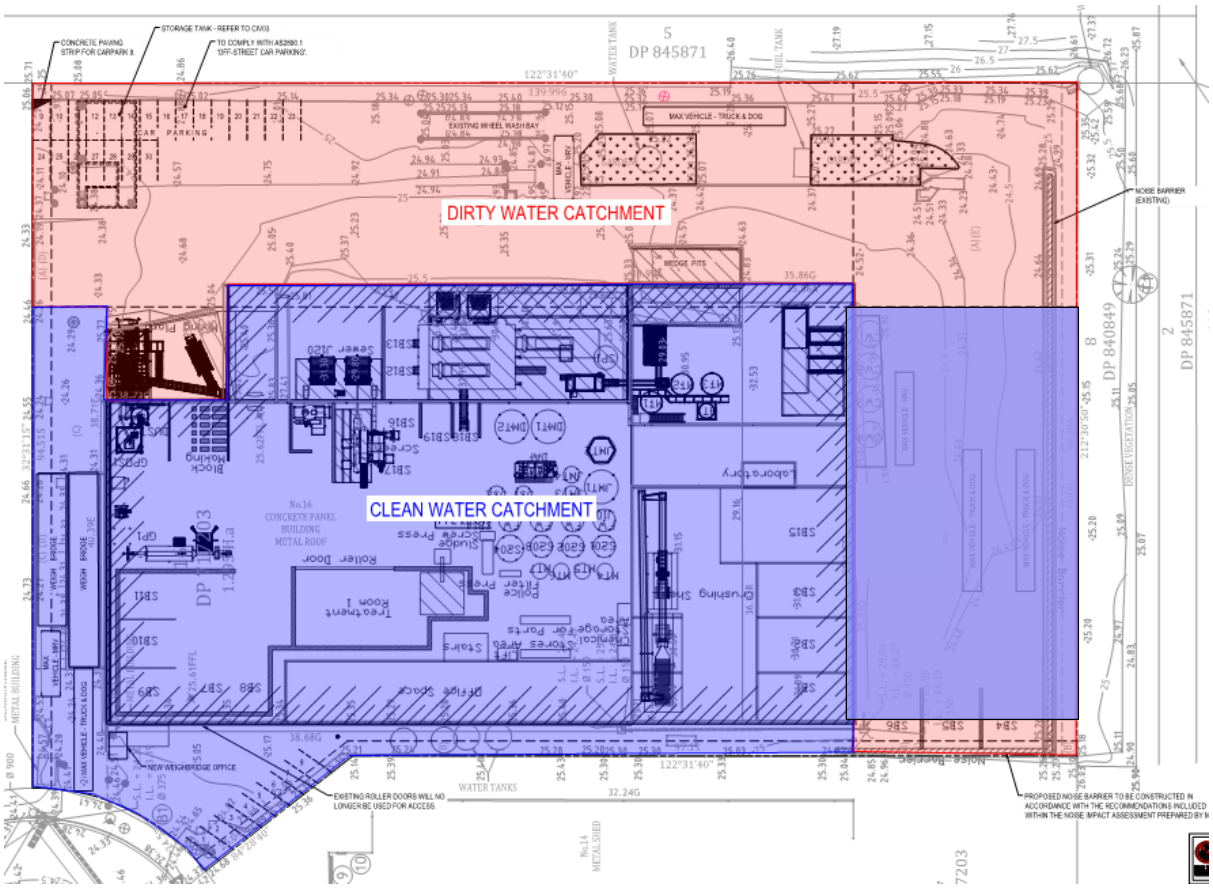


Figure 4 – Proposed Development Catchment

- The 'Clean' water catchment consists of areas of the facility where stormwater runoff is unlikely to become contaminated with pollutants related to the site operations. The 'Clean' water catchment consists of the entry road carpark and weighbridge, as well as the existing and proposed roof areas.

- The ‘Dirty’ water catchment consists of areas of the site where stormwater runoff is likely to become polluted with sediment including, sand, soil and materials. The ‘Dirty’ water catchment consists of the majority of the pavement hardstand areas on the northern side of the building. This area is approximately 4,700m^2 in area. Runoff from the ‘Dirty’ water catchment area will be passed through a series of treatment devices to be treated prior to reuse / discharge to stormwater. The treatment process of the ‘Dirty’ water catchment consists of:

  - Runoff from the ‘Dirty’ water hardstand area of Catchments C2 and C3 will be directed to first flush pits. The first flush pits will collect the larger sediment before runoff overflows into the adjacent stormwater system where it is directed to the underground Settling Tank. The first flush pits are existing and have been designed to allow for clean out and disposal of sediments via Positrack, or similar.

  - Runoff from the ‘Dirty’ water hardstand area of Catchment C4 will be directed to a new surface inlet pit before being directed to the adjacent Settling Tank. The proposed pit will be 1200SQ with a 300mm diam pipe to ensure no blockage in conveying runoff from C4 to the Settling Tank.

  - The proposed Settling Tank has been designed to take, as a minimum, the first 10mm of rainfall that falls on the 4,700m^2 ‘Dirty’ water catchment. Industry guidelines suggest 10mm is sufficient for a resource recovery centre, and this is in line with the current approval guidelines. The operation and maintenance plan developed for the site will require a minimum of 10mm of rainfall volume to be available at the end of every days operation.

  - The proposed Settling Tank will be designed at CC stage. However, conceptually, the larger sediments will drop out of the stored water to allow easy removal off site. Any rainfall event greater than 10mm would be considered low risk for pollutants due to the dilution of the runoff, and would overtop to stormwater. Any water captured and stored in the Settling Tank would be flocculated and reused within the plant operations.

    BRS identified a need for as much water reuse as possible. As such, roofwater from catchments R1, R2, and R4, as well as the hardstand runoff from catchment C1, are also directed to the underground Settling Tank. Although this water is considered ‘clean’, the Setting Tank has been made large enough to capture at least 10mm of the total catchment draining to it (11,094m^2).

With reference to the catchment descriptions above, and the attached civil engineering drawings 180009/CIV01 – CIV03, the Conceptual Stormwater Management strategy for the site will be maintained in accordance with its current operation and configuration with the following amendments:

- All drop off's will be internal to the building.

- The existing inground stormwater drainage network will be unblocked to allow stormwater runoff to convey through the existing subsurface pipes to the outlet pit located in the northern portion of the site. This will include maintaining the first flush tanks as a means to polish large sediments before runoff enters the drainage system.

- Although the existing stormwater drainage system is now unblocked and open to freely discharge, the existing 150mm diam. pipes will restrict flows, providing above ground storage within the existing pavement for onsite stormwater detention.

- Ocean Protect Oceanguard pit inserts will be installed in all surface inlet pits collecting runoff from the pavement areas. Refer to the attachment section of this report for details of Ocean Protects Oceanguard pit inserts.

- The existing outlet pit located adjacent to the northwestern corner of the site will have a new concrete sealed lid to prevent capturing 'dirty' water, with a new Surface Inlet Pit installed to capture 'dirty' water and direct to the underground tank.

- A new underground tank will be constructed in the northwestern portion of the site, immediately upstream of the outlet pit. The storage tank will have three (3) chambers:

  - 120kL Settling Tank. The Settling Tank will capture runoff from the 'dirty' water catchment areas, as well as overflow from the above ground storage tanks. The water captured in the Settling Tank will be held to allow any remaining sediments to settle out and will be pumped to the aboveground silos at a rate of 120kL per day for reuse in site operations. Pumping out at a rate of 120kL per day will ensure that the tank is empty at the end of every 24 hours.

  - Should the Settling Tank overflow in a major rainfall event, the overflow will discharge into a 10m2 Stormfilter Chamber with 14 x Ocean Protect 690mm Cartridges. All overflow from the Settling Tank will be filtered through the cartridges before being transferred to the Onsite Stormwater Detention Tank. Refer to the attachment section of this report for details of Ocean Protects 690mm Cartridges.

  - A 34kL Onsite Stormwater Detention (OSD) Tank will control Post-Development peak flows to the Pre-Development peak flows for all storm events up to and including the 1% Annual Exceedance Probability (AEP) event.

4.3. *Water Quantity*

4.3.1. *Design Requirements*

Campbelltown City Council's Development Control Plan 2014 – Volume 3 – Engineering Development states that: *the maximum discharge from the post-development site is not to exceed the pre-developed flows for all storms up to the 100-year ARI storm and concentrated flows must be managed;*

Although the proposed development does not result in an increase in impervious area, consultation with Council Engineers confirmed that Onsite Stormwater Detention will be required for the site.

The runoff routing program DRAINS by Watercom was used for the OSD calculations.

4.3.2. *DRAINs Results*

The DRAINs model was prepared using the BOM 2016 IFD data with the Pre-Development model replicating a greenfield site, and the Post-Development model corresponding with the proposed development, including the new underground storage, and the existing above ground storage areas.

The site was broken up into nine (9) sub-catchments. The catchment plan can be seen on Civil Drawing 180009/CIV01.

The DRAINs model was run for the 1EY (1 exceedance per year), 0.5EY, 0.2EY, 10% AEP, 5% AEP and 1% AEP events, and analysed for the following storm durations.

5 minutes	30 minutes	6 hours
10 minutes	45 minutes	9 hours
15 minutes	1 hour	12 hours
20 minutes	2 hours	18 hours
25 minutes	4.5 hours	24 hours

The results of the DRAINS model can be seen in Table 2 below:

Storm Event	Peak Discharge (m^3/s)	
	Pre-Development	Post-Development
1 EY	0.071	0.050
0.5 EY	0.175	0.077
0.2 EY	0.262	0.098
10% AEP	0.341	0.121
5% AEP	0.428	0.154
1% AEP	0.559	0.413

Table 2 – DRAINs Results

The DRAINs model can be provided on request.

4.4. Water Quality

4.4.1. Design Requirements

To meet the water quality requirements of the Campbelltown (sustainable City) Council's Stormwater Policy, stormwater treatment is required for the proposed development. The reduction targets have been outlined in Table 1 below.

Pollutant	Reduction Target
Total Suspended Solids (TSS)	80%
Total Phosphorous (TP)	45%
Total Nitrogen (TN)	45%
Gross Pollutants	90%

Table 1 – Water Quality Objectives

The commercially available Water Quality modelling software MUSIC was used, in consultation with Ocean Protect, to ensure the proposed development achieved the required reduction targets.

4.4.2. Management of Surface Runoff

Sediment-laden runoff from the existing 'dirty' water catchment hardstand areas is collected in the stormwater drainage network and treated prior to leaving the site. Sediment is mostly transferred to the hardstand areas by vehicle tyres as they move around the site, as well as management of bulk materials of the existing approved soil bays in the southeastern portion of the site.

Prevention measures that are applied to minimise sediment pick up by stormwater includes, as a minimum, the following:

- With reference to civil plan 180009.CIV01, Catchments C2 and C3 are directed to existing first flush tanks to capture coarse sediment prior to entering the stormwater drainage system. The first flush pits are open and accessible for easy clean out.
- Sediment Laden runoff from Catchment C4 is expected to have considerably less vehicle movements, and therefore, the Settling Tank and Stormfilter Chamber is considered suitable to treat this runoff. A new 1200SQ surface inlet pit and 300mm diameter pipe is proposed to ensure no blockage in conveying runoff from C4 to the Settling Tank.
- Water captured in the Settling Tank will be reused in site operations.
- All drainage pits are to be fitted with Ocean Protect Oceanguard pit inserts to retain coarse sediments and gross pollutants;
- On a daily basis and after each significant rainfall event the drainage pits are inspected and retained sediment and other debris removed as appropriate
- Undercover storage areas are to be maintained in as dry condition as possible;
- Site sweepers clean the hardstand areas;
- Wheel washer prior to leaving the site removes sediment from tyres;
- Waste storage and processing occurs within the building, or under cover, except for the approved finished goods soil bays for the crushing and screening plant.

4.4.3. *Management of Subsurface Runoff*

It is proposed that the following treatment devices will be implemented within the stormwater management strategy to achieve Council's stormwater quality targets:

- All drainage pits are to be fitted with Ocean Protect Oceanguard pit inserts to retain coarse sediments and gross pollutants;
- A 20kL above ground rainwater tank collecting 3,036m^2 roof area will be used for external irrigation.
- A 120kL underground settling tank collecting runoff from 11,784m^2 of the site. Water captured in this tank will be pumped out and used in the processing operations, including dust suppression.
- A 10m^2 Stormfilter Chamber with 14 x Ocean Protect 690mm Cartridges. All overflow from the Harvesting Tank will be filtered through the cartridges before leaving the site.

4.4.4. *Leachate Management*

Waste materials are tipped, processed and stored inside the building to prevent leachate generation. The waste material stored inside the shed is protected from rainwater by the building and, where required, bunding and graded to ensure surface water drains away from the areas where waste is stored and processed.

4.4.5. *MUSIC Results*

The results of the MUSIC model can be seen in Figure 5 below:

	Sources	Residual Load	% Reduction
Flow (ML/yr)	9.88	9.81	0.7
Total Suspended Solids (kg/yr)	1870	170	90.9
Total Phosphorus (kg/yr)	3.68	1.16	68.6
Total Nitrogen (kg/yr)	22.7	12.4	45.4
Gross Pollutants (kg/yr)	260	0.00168	100

Figure 5 – MUSIC Results

4.4.6. Site Discharge Monitoring Program

Further to the treatment of surface water runoff, as discussed above, due to the nature of the operations that are proposed for the site, it is possible that other contaminants may be present in the stormwater runoff during its operation. As such, a Conceptual Site Monitoring Program has been prepared.

On DPI approval, a Detailed Discharge Monitoring Plan should be developed and approved by DPI and NSW EPA. This will form the basis of operational monitoring onsite during construction and Operational Activities.

The below sections describe the anticipated monitoring program and suite of analytes that would be tested as part of the Detailed Discharge Monitoring Program. This information is conceptual only, and subject to modification following consultation with NSW EPA and DPI.

Monitoring Locations

The monitoring locations can be seen on the attached Conceptual Stormwater Management Plan 180009/CIV02, and have been referred to as M1 and M2.

- **Monitoring Location M1** has been proposed in the Kerb Inlet Pit immediately upstream of the proposed development. The location was chosen as this is the last point in the stormwater drainage network capturing the upstream catchment before entering the BRS site. The analyses of the water levels at M1 are considered to be the benchmark levels the site needs to achieve.

- **Monitoring Location M2** has been proposed on the outlet pipe of Pit 7. This location is downstream of all the site treatment train devices and storage areas. The analyses of the water levels at M2 are considered to represent the quality of the water leaving the site.

As the Council drainage system conveys water from Kerr Road through the site, it was appropriate to compare the discharge from the site downstream to what the water quality is entering the site.

Testing of Samples

Surface water monitoring will include sampling and analyses specific to the proposed development. Typically, the following analytes are known to impact local river ecosystems as a result of Industrial Development. As such, these analytes will form the basis of site monitoring.

- Total Recoverable Hydrocarbons
- Oil and Grease
- Heavy Metals (incl Aluminium, Arsenic, Cadmium, Chromium, Copper, Iron, Mercury, Nickel, Lead, Zinc
- Turbidity
- Total Suspended Solids (TSS)
- Nutrients (Total Nitrogen and Total Phosphorous)
- Chlorophyll
- Bacteria
- Dissolved Oxygen
- pH
- Total Acidity

Frequency of Sampling

The frequency of testing will be limited to rainfall events that result in sediment-laden runoff leaving the site. As such it is proposed that whenever more than 5mm of rainfall is recorded onsite testing of the monitoring locations, M1 and M2, should occur.

Water sampling is to be undertaken by trained site staff once rainfall exceeding 5 mm is observed with sampling occurring on a 2-hourly basis until the completion of the rainfall event.

Further to rain event triggered sampling, additional sampling should occur where a spill has occurred on site.

All samples collected will be sent to a NATA accredited laboratory for analysis and comparison.

Sampling Results

The performance of the site measures should ensure water quality leaving the site is less than or equal to the benchmark levels identified in the monitoring location M1 upstream for the ongoing operations of the site. The monitoring should be implemented for a minimum 12 months post commissioning with all results recorded over this time.

Should any benchmarks be exceeded in this time, investigations should be undertaken to understand why there has been an exceedance.

If required, additional mitigation measures may need to be adopted within the site to ensure exceedance of the benchmark levels does not occur again.

5. WATER REUSE AND DEMAND ON MAINS SUPPLY

5.1. Existing Site Operations

In order to reduce the facilities demand on water mains Bulk Recovery Solutions collects as much water as possible, treats it and reuses it within the site for irrigation, dust suppression via sprinklers and dust suppression via water cartage.

Once used for dust suppression, the remaining portion of water that is collected on the surface will be collected again, before being treated again, and reused again for dust suppression.

A flow model was provided by Bulk Recovery Solutions which indicated the existing operations, whilst a meeting was held onsite between BRS and DRB to discuss these operations, specifically with reference to input parameters and values for the water balance equation. Table 3 below outlines the operations. This information formed the basis of the Water Balance Calculations (See Section 5.2.1) for the existing site operations. Please note, the water balance ignored catchments that were conveyed directly to stormwater.

Rainwater Tank	The rainwater tanks are 20kL in size and collect runoff from 3,036 m^2 of roofwater. Overflow from this tank is conveyed directly to the stormwater drainage network. The water captured and stored within this tank is used in external irrigation of 180m^2 of garden beds. An irrigation rate of 3mm/day was adopted for the water balance calculations. This represented an average of anticipated irrigation rates of 0mm/day (wet periods) to 5mm/day (dry periods). If this tank is empty, irrigation does not occur.
Pavement Storage Area	The pavement storage area collects runoff from 3,932m^2 of pavement area and has a storage capacity (above ground) of 426.5kL. Further to rainfall, the pavement area also collects a percentage of the water used for dust suppression within its catchment. For the purposes of the water balance calculations, it was assumed that 25% of all water discharged from the sprinkler system and 75% of all the water discharge directly to pavement (truck cartage) was returned to the system. The pavement storage area is pumped to the silo storage tanks at a rate of 40kL/day. If the storage area is empty, water is not pumped to the silos. If the pavement storage area is full, 340kL of water cartage trucks are be made available to store the excess water and feed it back into the system once permanent water storage is made available. It has been assumed that the pump rate will increase, as required, to ensure all stored water is fed back into the system asap. In the event of a major storm event where the cartage trucks cannot handle the excess volumes, the overflow will be discharged direct to the stormwater drainage network.

Silo Storage Tanks	The silos have a combined storage volume of 245kL. Water collects in the pavement surface storage area (and subsequent water cartage trucks if utilised) before being pumped to the silos at a rate of 40kL/day. Once the Silo storage is full, the secondary storage tanks (see mixing/sludge tanks below) accepts the water. If the secondary storage tanks, and Silo storage is full, water is then discharged to sewer. The maximum allowable discharge to sewer is 2L/s, or 172.8kL/day. Water storage volumes and pump rates must be managed carefully onsite to ensure this limit is not exceeded. The water stored in the silos is used for dust suppression via sprinklers and water cartage. There are 11 sprinklers located on site which run 24 hours a day and require 71.5kL/day of water supply (combined). Water cartage is run sporadically throughout the day, as required, with 120kL of water supply required. If reused water is not available, water cartage will stop, however, mains supply will be used to ensure the sprinklers continue to operate at full capacity.
Flocculation and Mixing/Sludge Tanks	The flocculation tank is filled once a day with 990L of mains water before being pumped to the mixing and sludge tanks. The mixing and sludge tanks have a combined storage of 115kL. As discussed above, if the Silos are full, the excess water is directed to these storage tanks. Within these tanks suspended solid particles are removed (20%) and the water (80%) is directed, via a filter press, to the pavement storage area.

Table 3 – Existing Operations

5.2. *Water Balance Calculations*

5.2.1. *Existing Site Operations*

A water balance was prepared using Microsoft Excel. The water balance used 150 years of daily rainfall data obtained from the Bureau of Meteorology (BOM) from the weather stations:

- 67015 - Bringelly (Maryland) – 1967 – 1991
- 66190 - Ingleburn - 1992-2018

The assumptions and parameters provided by Bulk Recovery Solutions, and as summarised in Table 3 above, formed the basis of the Water Balance analysis.

The results of the water balance can be seen summarised in Table 4 below.

Average daily top up from mains supply	44.9 kL/day
Reuse efficiency	37.6%
Number of days (over 150 years) runoff overtops pavement storage	20 days
Smallest rainfall event that results in runoff overtopping pave. storage	91.90 mm (in 24hrs)
Maximum daily discharge to sewer (allowable 172.8kL/day)	74.49 kL/day
How often all storage tanks are empty at end of 24hr period	69%

Table 4 – Water Balance - Existing Operations

Due to the size of the file, a copy of the water balance spreadsheet has not been provided within this report. However, should the full water balance spreadsheet be required, please let DRB Consulting Engineers know.

5.2.2. *Proposed Site Operations*

The proposed development involves the following:

- Increase the volumes of waste that can be processed on site from up to 30,000 tonnes per annum (tpa) to up to 225,000 tpa of liquid and solid waste;
- Store up to 8,000 tonnes (t) of waste and / or waste for transfer at any one time;
- Vary the waste types that can be accepted on site
- Solid waste processing including screening and crushing;
- Liquid waste processing including oily water, sewer, silt and debris;
- Solid and liquid waste transfer;
- 24 hour operation of liquid and muddy waste processes;
- Extended operation of concrete batching from 3am; and
- Upgrade of approved concrete batching equipment with continued production of approved 50,000tpa.

With regard to water reuse and the demand on mains supply, the proposed development will include a new liquid waste resource recovery operation. The liquid waste operation will increase water supply by approximately 208 kL/day.

Additionally, the following items have been proposed that will affect the water reuse efficient on the site:

- The existing pipes will be unblocked and therefore, the surface pavement storage removed.
- The reliance on pumping to temporary truck storage (340kL) has been ignored in the water balance calculations to assess the ability of the site to manage mains demand if these trucks are not available.
- A new permanent underground storage tank (120kL) has been proposed. Due to the increase in available water from the liquid waste operation, the capture of runoff from the pavement is less critical. 120kL allows for the first 10mm of any rainfall event to be captured.

The results of the water balance for the proposed operations can be seen summarised in Table 5 below.

Average daily top up from mains supply	0 kL/day
Reuse efficiency	100%
Number of days (over 150 years) runoff overtops pavement storage	3250 days
Smallest rainfall event that results in runoff overtopping pave. storage	10.20 mm (in 24hrs)
Maximum daily discharge to sewer (allowable 518.4kL/day)	22.64 kL/day
How often all storage tanks are empty at end of 24hr period	0%

Table 5 – Water Balance - Proposed Operations

5.3. *Proposed Site Operations Outcomes*

With reference to the Water Balance analysis, and the results outlined in Table 4 and Table 5 above, the following conclusions can be made with regard to the introduction of the liquid waste operation:

- The water reuse efficiency will increase to 100% with no top up from the mains supply required.
- The maximum daily discharge to sewer will decrease to 22.64 kL/day.
- The storage tanks will never be empty.
- The number of times the pavement storage area will overflow to stormwater will increase to 3250 individual days, with the minimum rainfall event required to overtop reducing to 10.20mm (in 24 hours).

  It should be noted that, the development has proposed 120kL underground to allow for an industry acceptable 10mm First Flush from runoff from the pavement area. This is in accordance with EPA requirements and the current site operation approvals.

5.4. *Water Balance Limitations*

The Water Balance spreadsheets have been prepared based on the assumptions, parameters, information and guidance provided by Bulk Recovery Solutions. Whilst due care has been undertaken by DRB to cross-reference the values provided with available information, DRB can not confirm the accuracy of the values provided.

Furthermore, the rainfall values are based on recorded daily rainfall obtained from the BOM, with all recorded rainfall falling consistently across the 24 hour period. The water balance has been prepared with this in mind, using 24 hours as the time increment for the assessment. However, it should be noted that this is theoretical only. The “real-life” behaviour of rainfall, as well as site operations and water usage, is not likely to be as consistent as the water balance projections.

6. FLOOD LEVELS AND CONVEYANCE

At the time of preparing this report, the Flood Study for the Bow Bowing Bunbury Curran Creek Catchment was still being finalised, and as such, the results were not available.

Council was contacted to discuss the site and whether or not flooding was an issue, however, the Council engineer confirmed that he could not provide any information.

Regardless, as discussed above, the proposed development does not propose any amendments to the existing hardstand areas. Furthermore, all stockpiles have been moved internally within the building, with the exception of the 3 approved stockpiles, ensuring that there are no impediments to the existing flood paths conveying through the site.

It can be concluded that, the proposed development:

- Will not increase flood levels on the site or its neighbouring sites.
- Will not have a negative effect on existing flood levels.
- Will not increase the risks to occupants of the site.

7. CONCLUSION

DRB Consulting Engineers prepared this Water Management Plan and Water Balance for the proposed submission to the Department of Planning to increase operating capacity of the existing Bulk Recovery Solutions facility, located at 16 Kerr Road, Ingleburn.

It can be concluded from the investigation that:

- The existing Stormwater Drainage Network has been modified to bring the site up to current standards meeting both Onsite Stormwater Detention Policy requirements and Water Quality Reduction Targets.
- A Site Discharge Monitoring Program will be developed and implemented to ensure the proposed development does not impact the existing water quality.
- Overland Flow Paths will not be affected as a result of the proposed development and therefore, the existing flood levels on adjacent sites has not been affected.
- The proposed operations will improve Water Reuse and therefore reduce the Demand on Mains Supply.

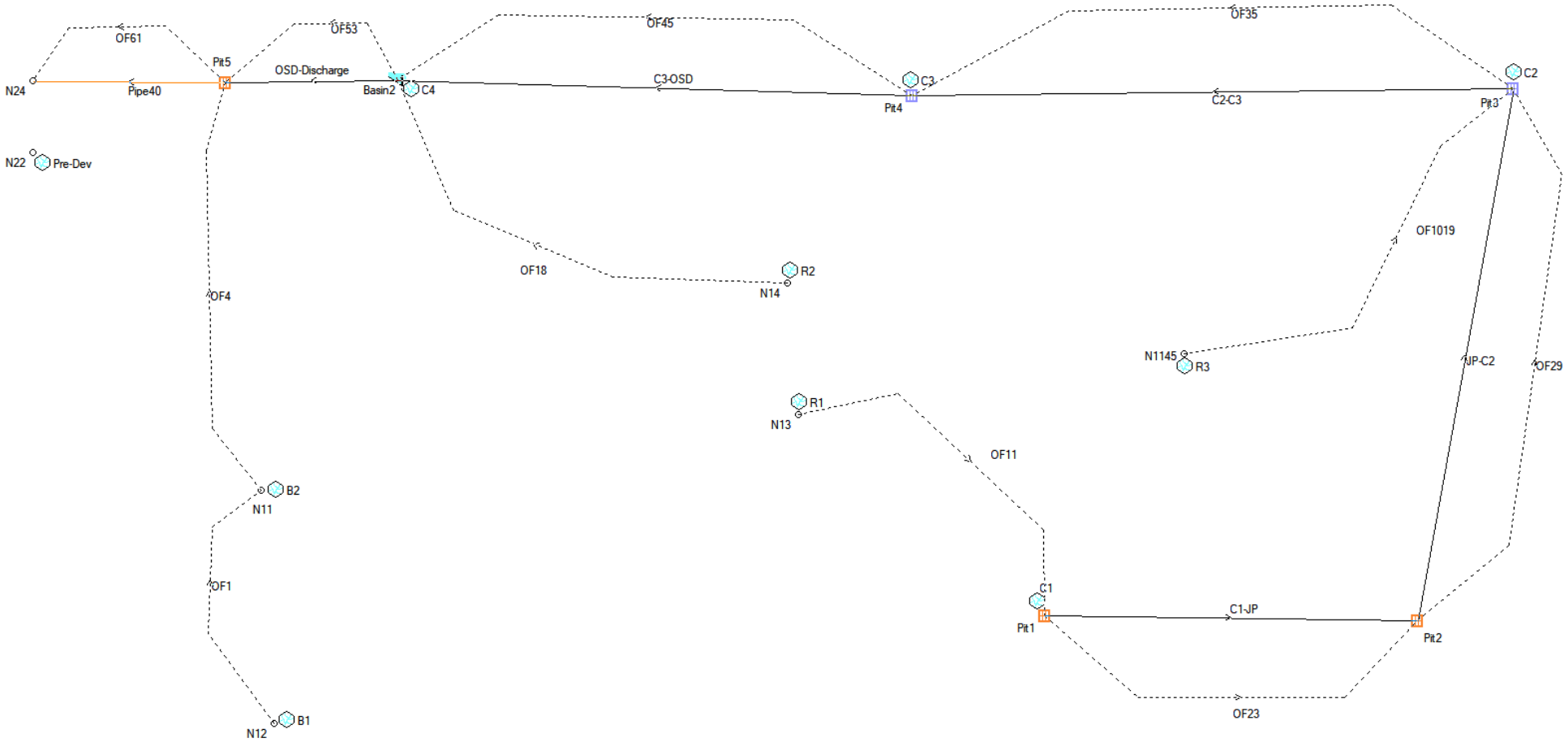
Should you require any further advice or clarification of any of the above, please do not hesitate to contact us.

Yours faithfully
DRB CONSULTING ENGINEERS PTY LIMITED

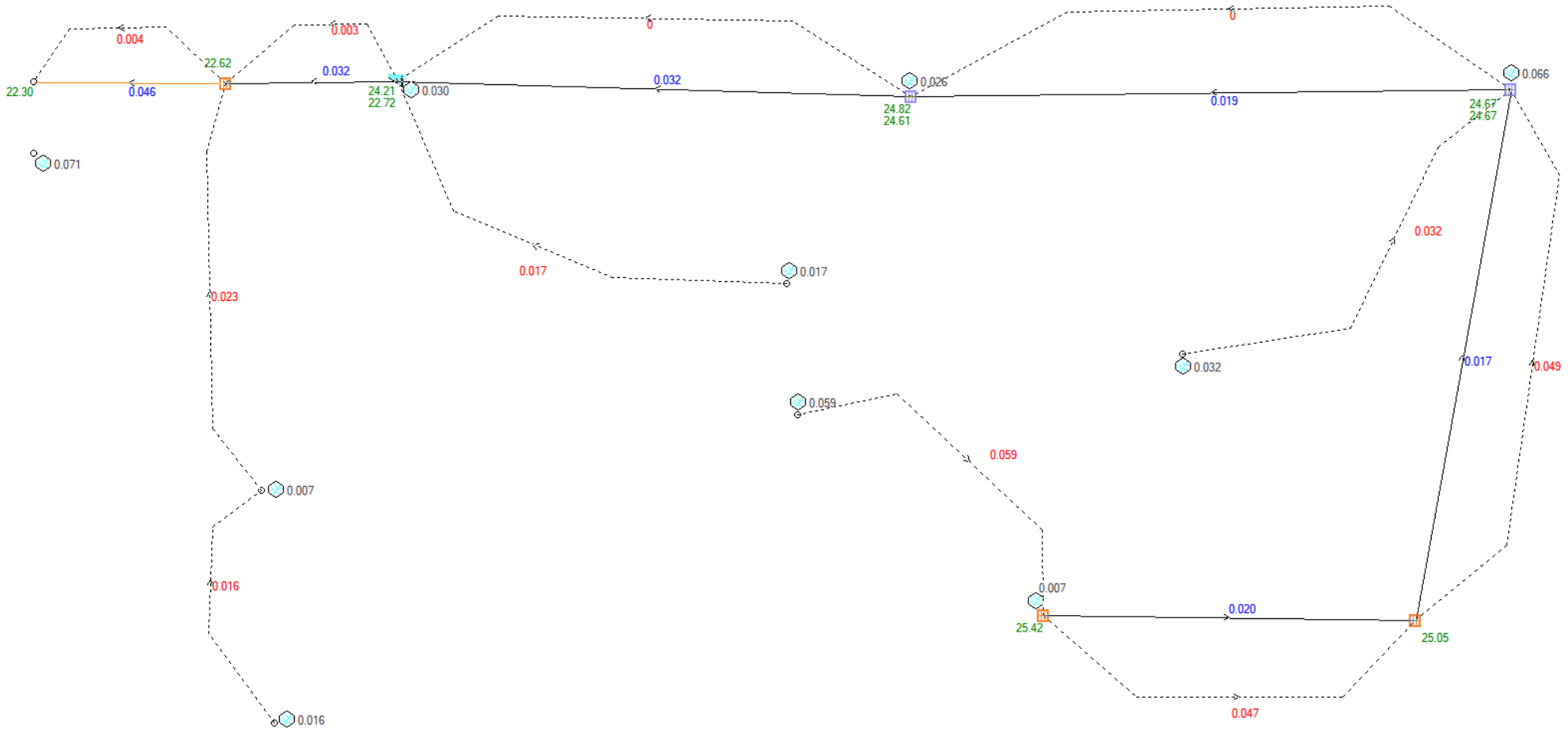
Mathew McNamara
BEng (Civil) Hons MIE Aust

Attachments

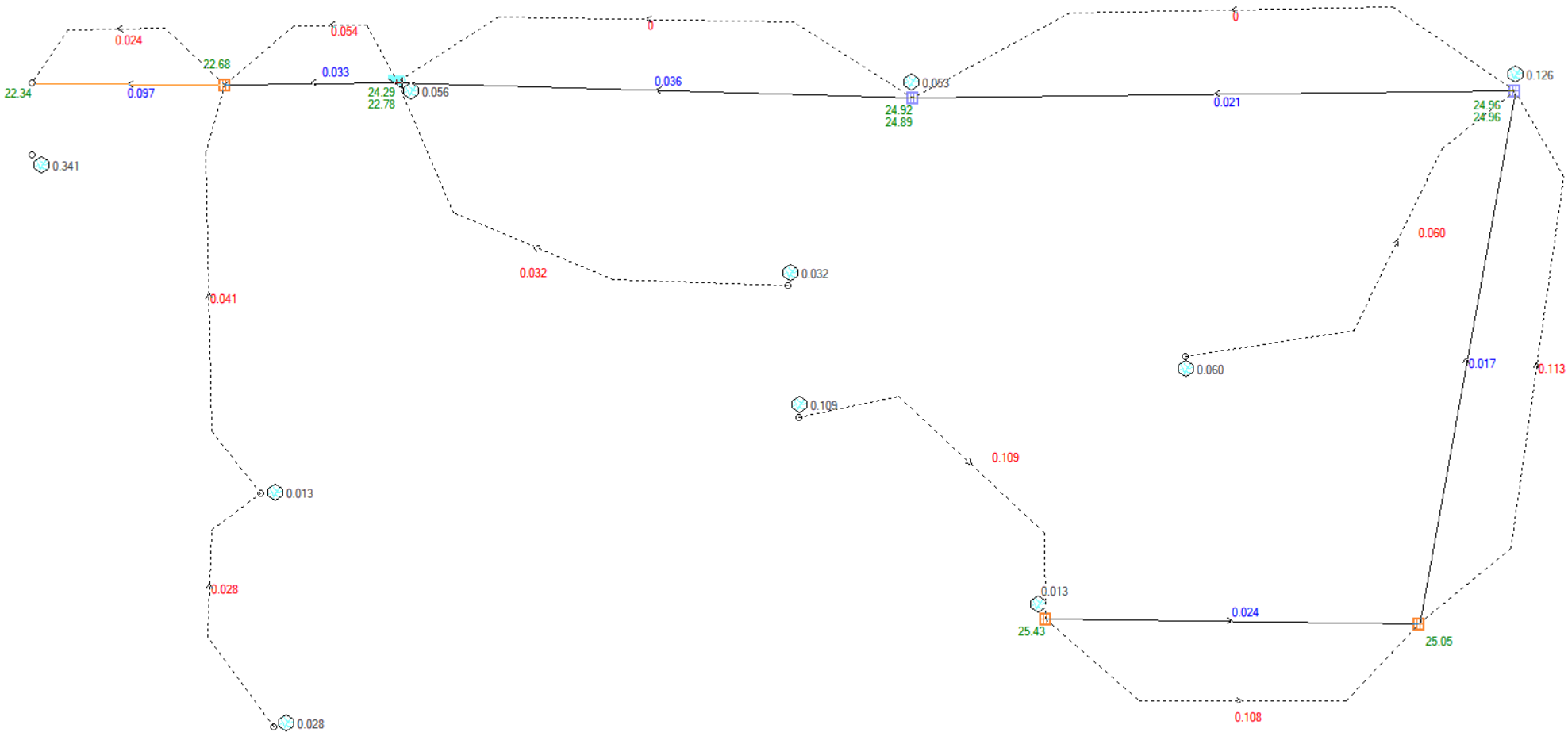
(i) Civil Engineering Drawings 180009/CIV01-CIV03
(ii) DRAINs Model
(iii) MUSIC Model
(iv) Ocean Protect Oceanguard Specifications
(v) Ocean Protect Cartridge Specifiactions.



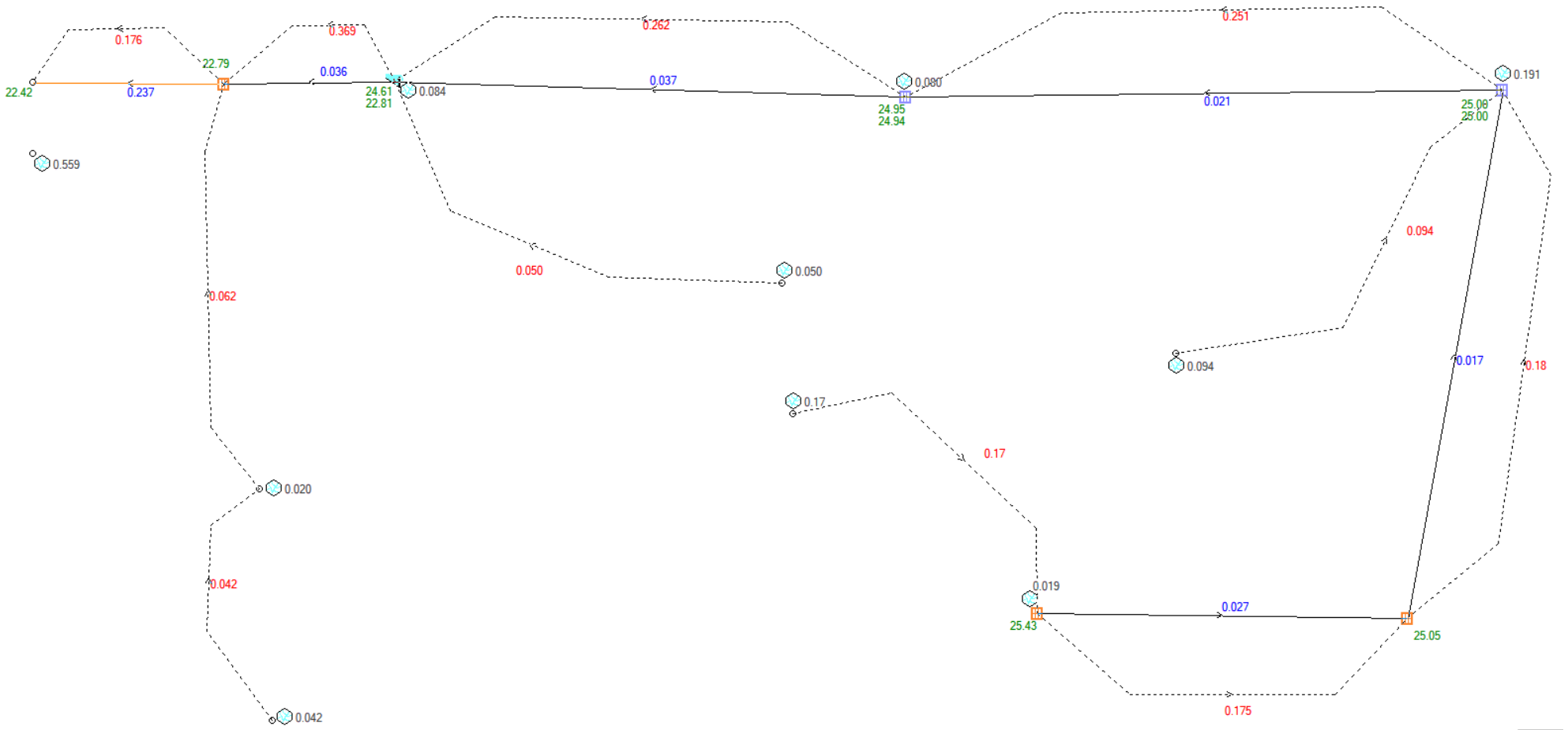
DRAINS model



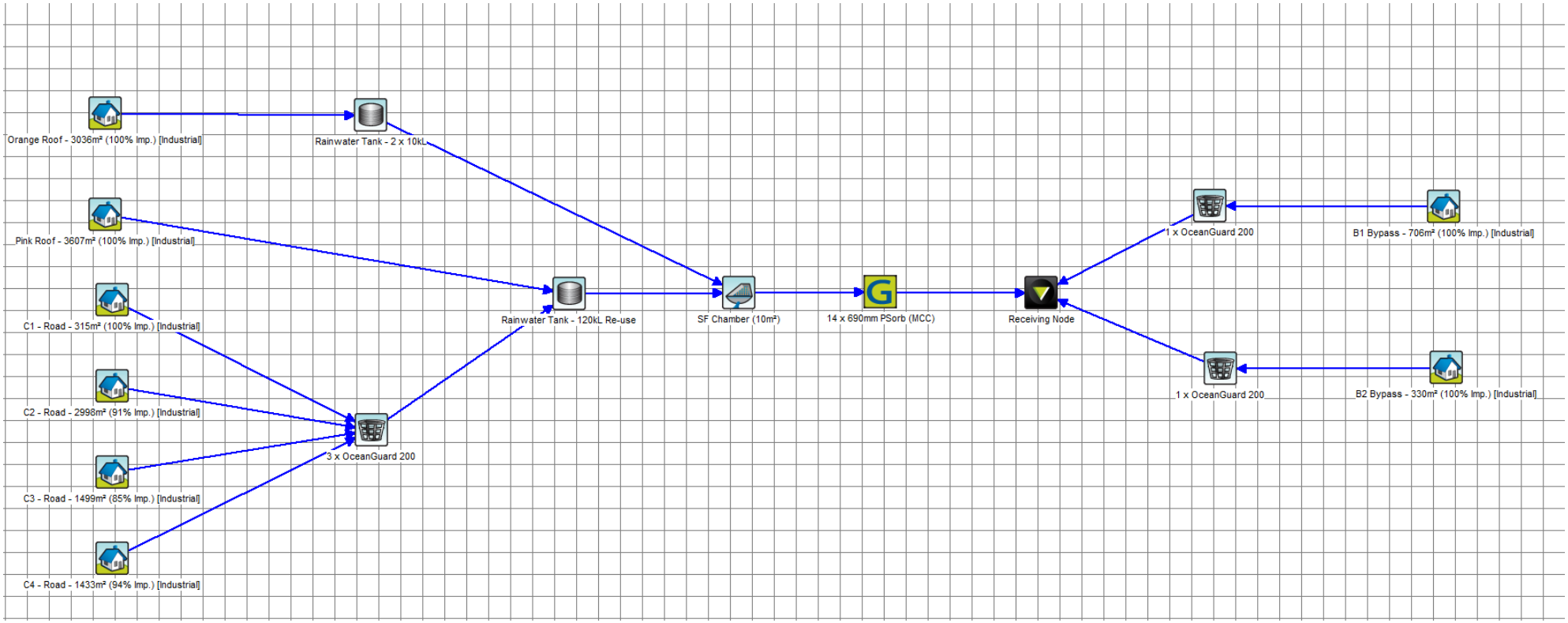
DRAINs Results – 1EY



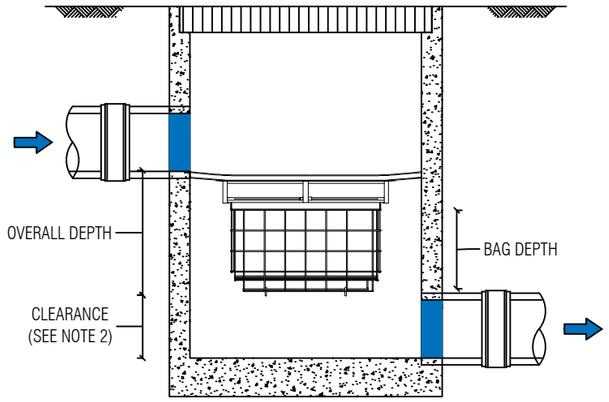
DRAINs Results – 10% AEP



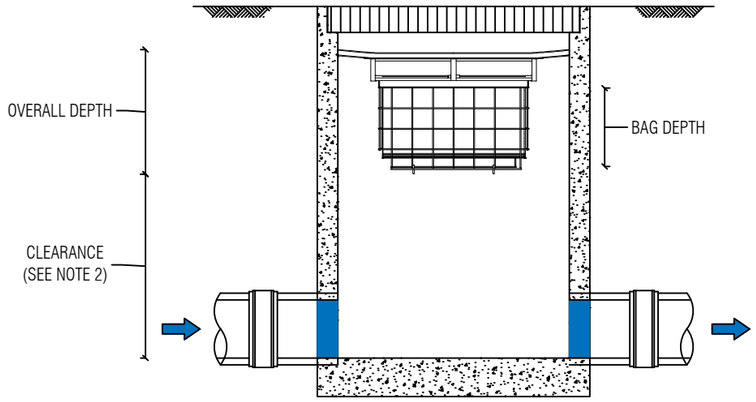
DRAINs Results – 1% AEP


Orange Roof - 3036m² (100% Imp.) [Industrial]
Rainwater Tank - 2 x 10kL
Pink Roof - 3607m² (100% Imp.) [Industrial]
C1 - Road - 315m² (100% Imp.) [Industrial]
C2 - Road - 2998m² (91% Imp.) [Industrial]
C3 - Road - 1499m² (85% Imp.) [Industrial]
C4 - Road - 1433m² (94% Imp.) [Industrial]
3 x OceanGuard 200
Rainwater Tank - 120kL Re-use
SF Chamber (10m²)
14 x 690mm PSorb (MCC)
Receiving Node
1 x OceanGuard 200
B1 Bypass - 706m² (100% Imp.) [Industrial]
1 x OceanGuard 200
B2 Bypass - 330m² (100% Imp.) [Industrial]

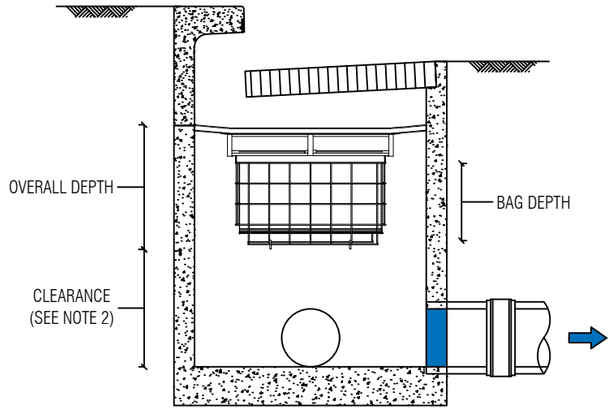
MUSIC Model



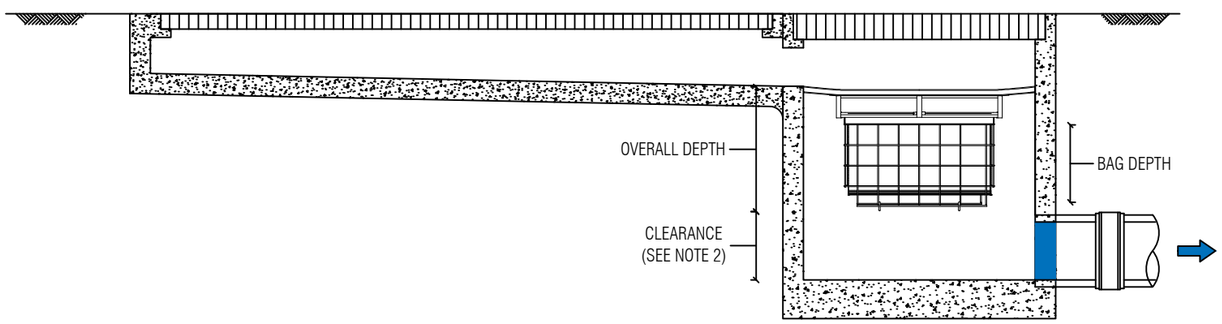
PIPE FLOW CONFIGURATION



SURFACE FLOW CONFIGURATION



SURFACE FLOW CONFIGURATION

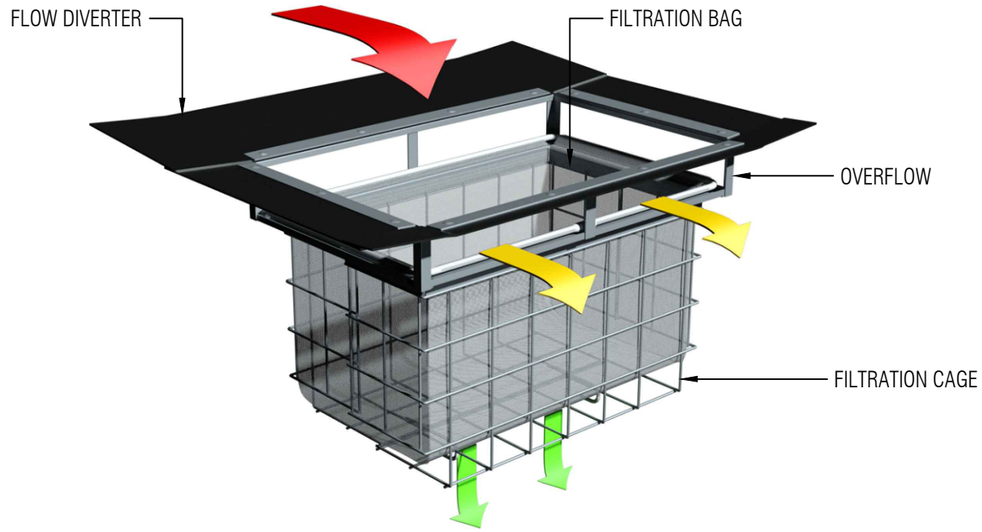


GRATED STRIP DRAIN CONFIGURATION

PLAN ID	MAXIMUM PIT PLAN DIMENSIONS
S	450mm x 450mm
M	600mm x 600mm
L	900mm x 900mm
XL	1200mm x 1200mm

DEPTH ID	BAG DEPTH	OVERALL DEPTH
1	170	270
2	300	450
3	600	700

		DEPTH ID		
		1	2	3
PLAN ID	S	■		
	M	■	■	
	L	■	■	■
	XL	■	■	■



GENERAL NOTES

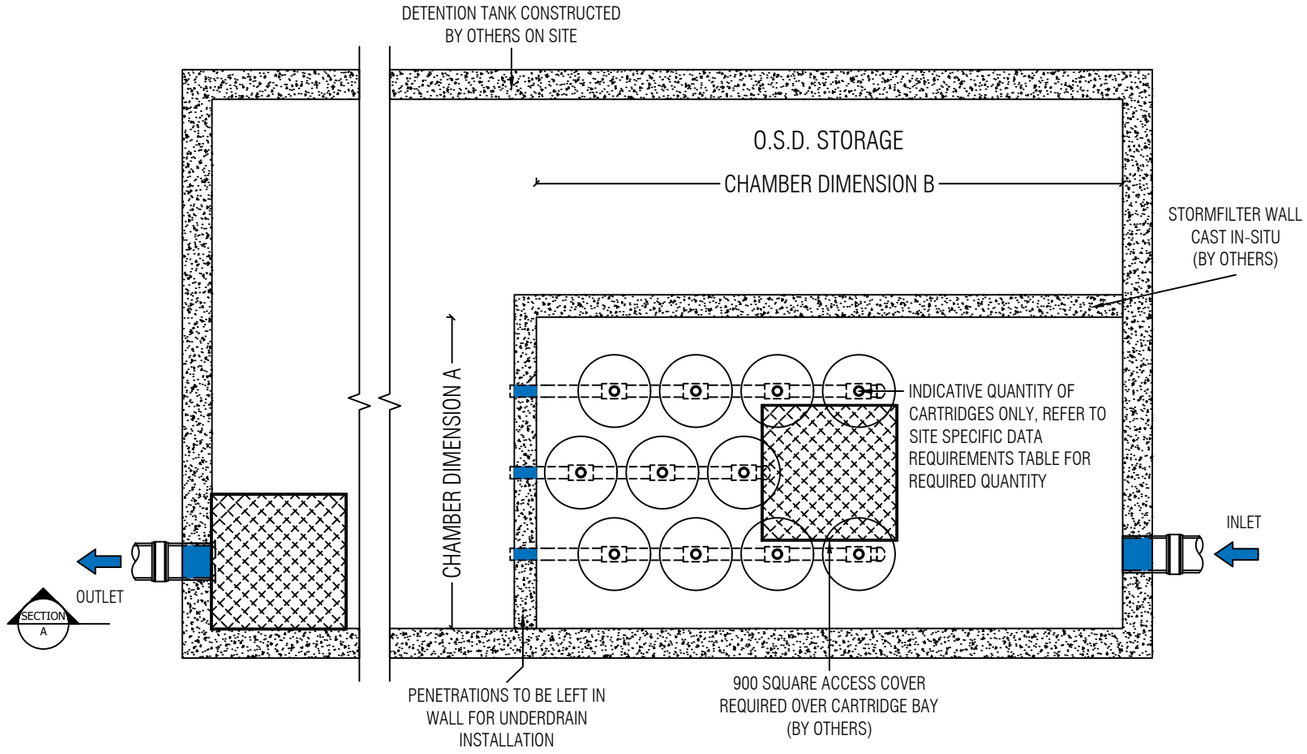
1. THE MINIMUM CLEARANCE DEPENDS ON THE CONFIGURATION (SEE NOTE 2) AND THE LOCAL COUNCIL REQUIREMENTS.
2. CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.
3. OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:- 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING AND A COARSE BAG FOR TARGETING GROSS POLLUTANTS.
4. DRAWINGS NOT TO SCALE.

OCEAN PROTECT
PHONE: 1300 354 722
www.oceanprotect.com.au

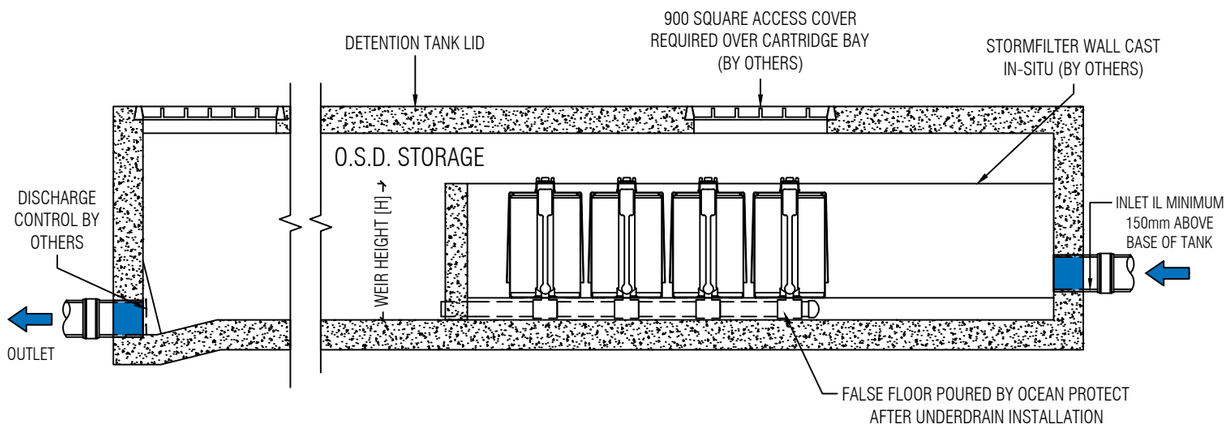
OCEAN PROTECT
OCEANGUARD
TYPCIAL ARRANGEMENTS
SPECIFICATION DRAWING

LAST MODIFIED: 15-10-19

NOT FOR CONSTRUCTION



PLAN LAYOUT

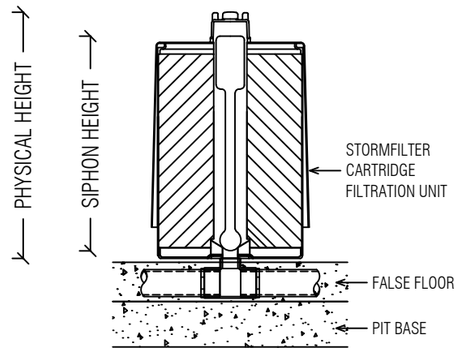


SECTION A

STORMFILTER DESIGN TABLE

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

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



STORMFILTER CARTRIDGE DETAIL

SITE SPECIFIC DATA REQUIREMENTS

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

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

GENERAL NOTES

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

INSTALLATION NOTES

1. UNDERDRAIN AND FALSE FLOOR INSTALLED BY OCEAN PROTECT.

OCEAN PROTECT
PHONE: 1300 354 722
www.oceanprotect.com.au

OCEAN PROTECT
STORMFILTER SYSTEM
DETENTION TANK ARRANGEMENT
SPECIFICATION DRAWING

LAST MODIFIED: 07-03-19

HENDERSON ROAD

C4
1433m²
(94% Imperv.)

C3
1380m²
(85% Imperv.)

C2
1574m²
(93% Imperv.)

R2
897m²

R1
3036m²

R3
1670m²

R4
1686m²

B2
330m²
(100% Imperv.)

B1
706m²

C1
315m² (1005 Imperv.)

(A) (B) (E)

(A) (D)

(A)

(A) (E)

(C) (D)

(B) (E)

(E)

(B)

122°31'40"

139.996

97.11

32.24G

WATER TANKS

No.16
CONCRETE PANEL
BUILDING
METAL ROOF

No.15
TWO STOREY
CONCRETE PANEL BUILDING

No.14
METAL SHED

DEMOUNTABLE
METAL BUILDING

DENSE VEGETATION

NOISE BARRIER

SOUTHERN RAILWAY

MAIN

KERR ROAD

DP 845871

DP 717203

DP 840849

1186840

REVISIONS						
E	20.10.20	R.F.	M.M.	M.M.	FINAL ISSUE - AMENDED
D	09.09.20	R.F.	M.M.	M.M.	FINAL ISSUE - AMENDED
C	15.06.20	R.F.	M.M.	M.M.	FINAL ISSUE - FOR APPROVAL
B	05.06.20	R.F.	M.M.	M.M.	CLIENT REVIEW
A	15.11.19	R.F.	M.M.	M.M.	ISSUED FOR DA
REV	DATE	DRN	CHK	APP	DRAWING STATUS

This drawing is not approved for construction unless signed.

Mathew McNamara
BEng (Civil) Hons MIE (Aust)

North

PO BOX 4105 Kotara East 2305
0402 915 549
ABN 64 625 755 482
DRB CONSULTING ENGINEERS

CATCHMENT PLAN
16 KERR ROAD,
INGLEBURN
BRS

DRAWING STATUS: NOT FOR CONSTRUCTION

SHEET SIZE: A1

SCALE: 1:250

PROJECT REF No.: 180009

DRAWING No.: CIV01

REVISION: E

IT IS THE BUILDERS RESPONSIBILITY TO CONFIRM DEPTH & LOCATION OF ALL SERVICES PRIOR TO CONSTRUCTION AS THIS MAY AFFECT THE DESIGN.

DIAL 1100 BEFORE YOU DIG

HENDERSON ROAD

CONSTRUCT NEW 1200SQ PIT IN EXISTING LOW POINT AND CONNECT TO STORAGE TANK.

STORAGE TANK - REFER TO CIV03

INDICATIVE LOCATION OF PUMP-OUT LINE. PUMP HARVESTING TANK TO SILOS AT NOMINAL 120kL/DAY TO ENSURE TANK IS EMPTY AT THE END OF EVERY 24 HRS.

PROVIDE SEALED CONCRETE LID OVER EXISTING PIT

ASSUMED LEGAL CONNECTION Ø900 (MIN)
SL 24.11
IL 22.50

EXISTING FIRST FLUSH PIT. (8.29m³)

2/Ø50mm LOW FLOW CONNECTION

PIT 4
SL 24.80
IL 23.00

EXISTING FIRST FLUSH PIT. (5.72m³)

2/Ø50mm LOW FLOW CONNECTION

PIT 3
EXISTING STORMWATER PIT
SL 24.30
IL 23.55

(A) (B) (E)

PROPOSED AWNING OVER (BEING ASSESSED BY CAMPBELLTOWN COUNCIL). ALL ROOFWATER DIRECTED TO PIT 3.

PROPOSED DOWNPIPES

PIT 7
SL 24.10
IL 22.50 (TBC)

PIT 6
(EXISTING SIP)

PIT 5
(EXISTING SIP)
S.L. = 24.20
I.L. = 22.90
Ø 900

EXISTING KIP
SL 24.20
IL 22.90

EXISTING DOWNPIPES

20kL TANKS

WATER TANKS

Ø150 OVERFLOW

EXISTING PIT 1
SL 25.43
IL 24.45

EXISTING PIT 2
SL 25.03
IL 24.27

EXISTING DOWNPIPES

NOTE: PITS 3,4,5,6,7 TO BE INSTALLED WITH OCEAN PROTECT OCEANGUARD PIT INSERTS.

(A) EASEMENT TO DRAIN WATER 30 WIDE (DP 260710)
(B) EASEMENT FOR GAS PIPELINE 2 WIDE (DP 717203)
(C) EASEMENT TO DRAIN WATER 10 WIDE (DP 717203)
(D) EASEMENT FOR WATER SUPPLY WORKS 2.5 WIDE (DP 717203)
(E) EASEMENT TO DRAIN WATER 30 WIDE (DP 717203)

LEGEND

SL	SURFACE LEVEL
IL	INVERT LEVEL
	SURFACE INLET PIT DETAILS PROVIDED AT CC STAGE
	uPVC STORMWATER PIPE
	uPVC CHARGED DOWNPIPE
	CONCEPTUAL PUMP OUT LINE
x 8.38	DESIGN FINISHED SURFACE LEVEL
x 36.89	EXISTING FINISHED SURFACE LEVEL, CONTOURS SHOWN ARE ALSO EXISTING
M1	WATER QUALITY MONITORING LOCATION

REVISIONS

REV	DATE	DRN	CHK	APP	DRAWING STATUS
E	20.10.20	R.F.	M.M.	M.M.	FINAL ISSUE - AMENDED
D	09.09.20	R.F.	M.M.	M.M.	FINAL ISSUE - AMENDED
C	15.06.20	R.F.	M.M.	M.M.	FINAL ISSUE - FOR APPROVAL
B	05.06.20	R.F.	M.M.	M.M.	CLIENT REVIEW
A	15.11.19	R.F.	M.M.	M.M.	ISSUED FOR DA

This drawing is not approved for construction unless signed.

Mathew McNamara
BEng (Civil) Hons MIE (Aust)

North

PO BOX 4105 Kotara East 2305
0402 915 549
ABN 64 625 755 482
DRB CONSULTING ENGINEERS

STORMWATER MANAGEMENT PLAN
16 KERR ROAD,
INGLEBURN
BRS

DRAWING STATUS: NOT FOR CONSTRUCTION

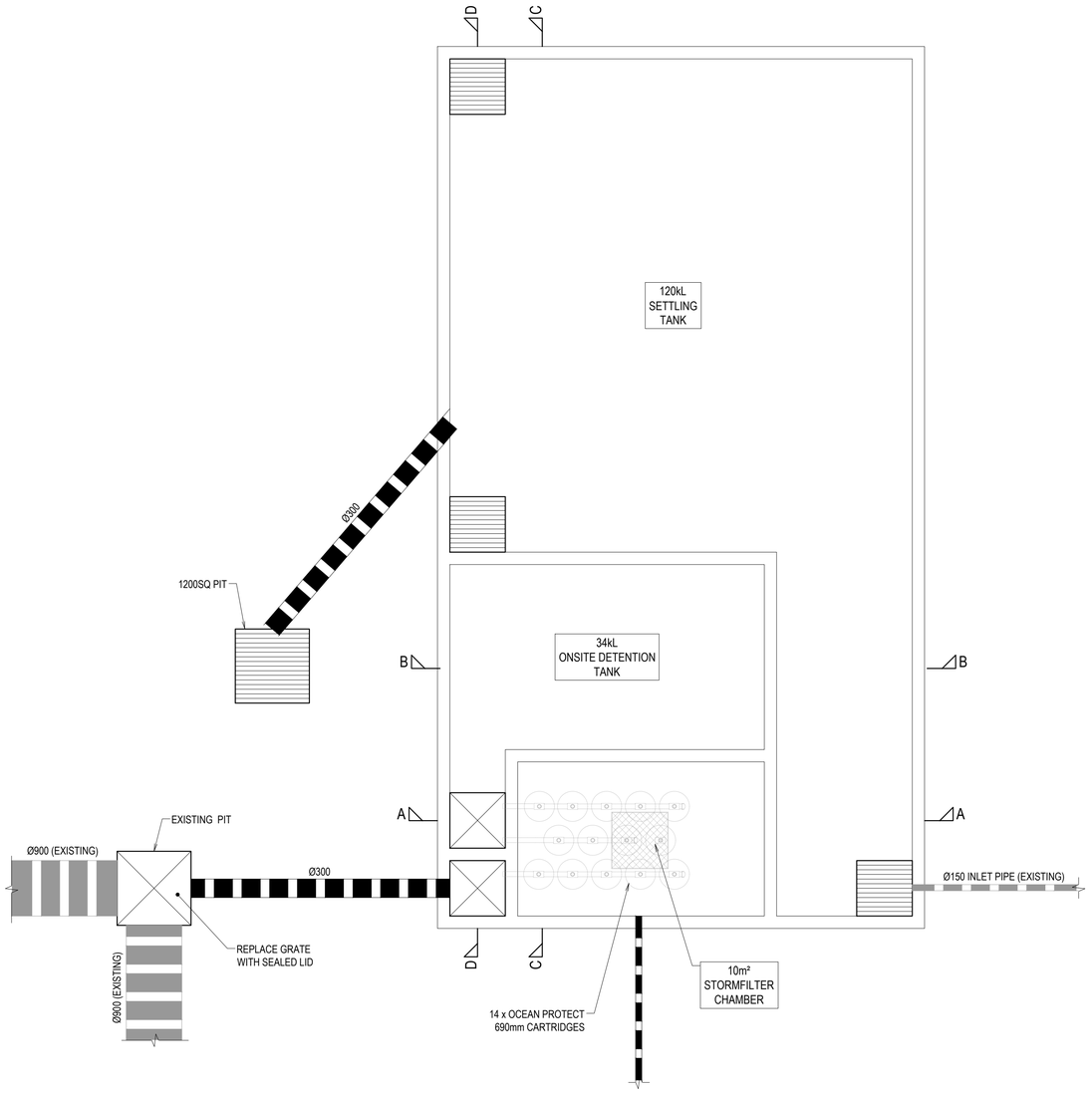
SHEET SIZE: A1

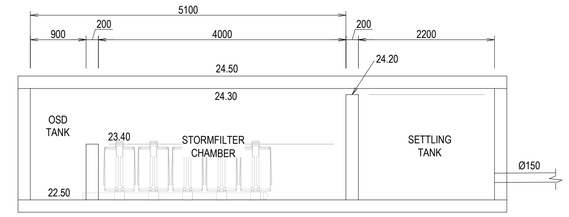
SCALE: 1:250

PROJECT REF No.: 180009

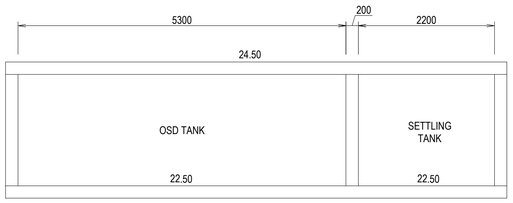
DRAWING No.: CIV02

REVISION: E

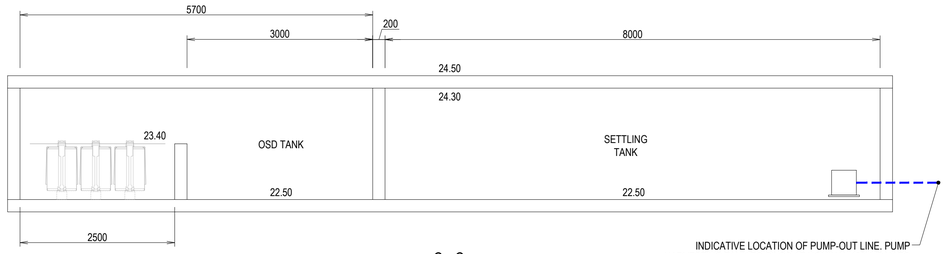




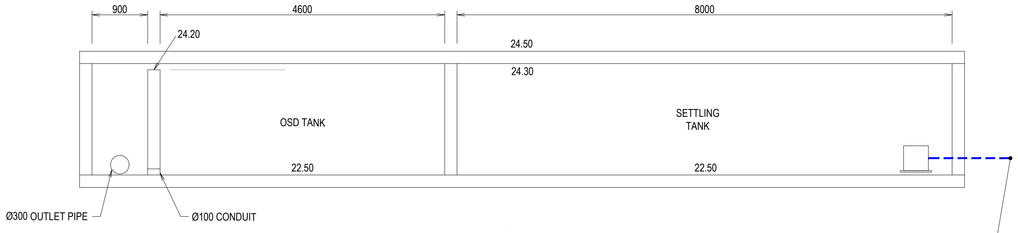
A - A
1:50



B - B
1:50



C - C
1:100



D - D
1:50

REVISIONS

REV	DATE	DRN	CHK	APP	DRAWING STATUS
D	09.09.20	R.F.	M.M.	M.M.	FINAL ISSUE AMENDED
C	15.06.20	R.F.	M.M.	M.M.	CLIENT REVIEW
B	05.06.20	R.F.	M.M.	M.M.	CLIENT REVIEW
A	15.11.19	R.F.	M.M.	M.M.	ISSUED FOR DA

This drawing is not approved for construction unless signed.

Mathew McNamara
BEng (Civil) Hons MIE (Aust)

PO BOX 4105 Kotara East 2305
0402 915 549
ABN 64 625 755 482
DRB CONSULTING ENGINEERS

OSD PLAN & SECTIONS
16 KERR ROAD,
INGLEBURN
KDC PTY LTD

DRAWING STATUS
NOT FOR CONSTRUCTION

SHEET SIZE
A1

SCALE
1:50

PROJECT REF No.
180009

DRAWING No.
CIV03

REVISION
D