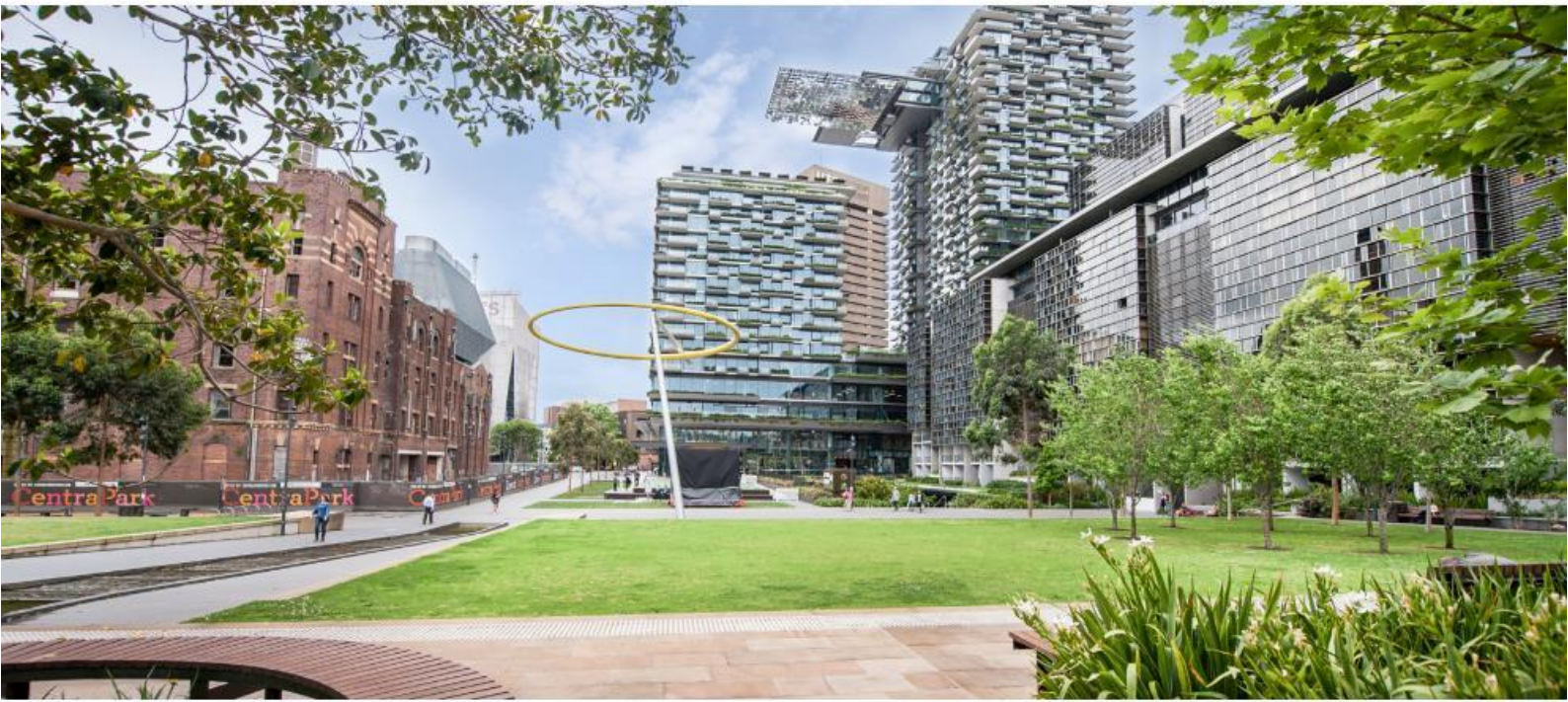




Autorecyclers Pty Ltd

Soil and Water Report

State Significant Development - Waste Metal Recovery,
Processing and Recycling Facility

57 - 69 Tattersall Road, Kings Park

Our Ref: CC160136

October 2019

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TABLE OF CONTENTS

1 Introduction	4
2 Proposed Development	5
2.1 Existing Site Drainage	5
2.2 Proposed Development Drainage	6
3 Water Quantity Management.....	8
3.1 OSD Tank Design	8
3.2 Internal Drainage System.....	9
4 Water Quality Management	12
4.1 Management of Existing Contamination	12
4.2 Management of Future Contamination	12
4.3 Water Conservation	16
5 Maintenance Schedule.....	17
6 Erosion and Sediment Controls.....	19
7 Conclusion.....	20
Appendix A – Existing Site Drainage Plan	21
Appendix B – Proposed Site Drainage Plan	22
Appendix C – S3QM Deemed to Comply Certificate	23
Appendix D – Jellyfish Filter Details.....	24
Appendix E – StormFilter Operations & Maintenance Manual	25

1 Introduction

Auto-recyclers Pty Ltd, operating as Pick 'n' Pay Less Self-Serve Auto Parts, proposes to construct and operate a waste metal recovery, processing and recycling facility at 57-69 Tattersall Road, Kings Park. The proposed expansion of the existing facilities will be state significant development (SSD) under Division 4.7 of the Environmental Planning and Assessment Act 1979 (EP&A Act), with a processing capacity of 130,000 tonnes per year. The NSW Government's Department of Planning and Environment has provided the Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an EIS for the proposed development, SSD 8375 issued on 21 July 2017. This Soil and Water Report supports a Development Application to Blacktown City Council for the project under Part 4 of the EP&A Act.

In determining the management of stormwater on the site, this Soil and Water Report will consider the following:

- The existing site conditions and constraints.
- A system that complies with statutory requirements outlined in the Department of Planning and Environment's SEARs (Secretary's Environmental Assessment Requirements).
- Blacktown City Council's DCP and engineering requirements for stormwater quantity and quality management.
- Water sensitive urban design (WSUD) using Small Scale Stormwater Quality Model (S3QM) to assist in the planning, design and maintenance of stormwater drainage infrastructure.
- The provision of on-site detention to attenuate post-development peak flows from the site to pre-development levels for all storm events ranging from the 1.5-year Average Recurrence Interval (ARI) up to and including the 100-year ARI, in accordance with the minor/major criteria.
- A suitable water quality treatment train to maintain post development site discharge water quality to Council's requirements for controlled release into Breakfast Creek.
- Sustainable reuse of rainwater to the extent practicable.
- Overland flow paths during the 100-year Annual Recurrence Interval (ARI) storm.

2 Proposed Development

2.1 Existing Site Drainage

The subject site is situated within an existing industrial area, located at 57-69 Tattersall Road, Kings Park and is known as Lot 100 in Deposited Plan 792731. The location of the site is shown in Figure 1 below. The site currently operates as a car dismantling and recycling facility approved under development consent DA-96-185 issued by Blacktown City Council on 8 March 1996. The existing drainage system was installed prior to the occupation of the site by Auto Recyclers Pty Ltd and the issue of Notice of Determination No. 14314 (DA 96-185) on 23rd May 1996. The existing site drainage system was shown on approved Drawing No. NBT-0002 (condition no. 5 of NoD No. 14314).



Figure 1: Aerial Photo of Locality

Subsequent Development Consent DA-18-01273 was issued on 15 December 2017 for a scrap metal recycling facility for a 24-month period to a capacity of 30,000 tonnes per year.

Stormwater runoff from the car recycling yard drains via overland flow towards an existing stormwater pit located approximately in the middle of the site. This pit is connected to a large open on-site detention and water quality tank which contains an oil and water separator. Stormwater is treated within this tank by a series of sand filled baffles before being discharged into Breakfast Creek via a single 600mm diameter pipe.

Stormwater runoff from a newly constructed concrete slab that contains machinery for shredding metal is directed into a small on-site detention basin located adjacent to the concrete slab. Sediment and gross pollutant are captured in this basin by a trash screen and sediment sump prior to the stormwater being discharge via a pit and pipe system into Breakfast Creek. The stormwater discharge from the basin is further treated by a Spel Ecoceptor Gross Pollutant Trap which removes sediment, gross pollutants and hydrocarbons prior to the stormwater entering Breakfast Creek.

The site is bounded by Breakfast Creek to the south and the southern portion of the site is affected by local catchment flooding. A 1 in 100year flood assessment has been undertaken to assess the potential impacts and ensure that there is no loss in flood storage volume as a result of the proposed works. The proposed earthworks and changes to the existing natural ground levels has been minimised to avoid disturbance of any potentially contaminated land where possible, whilst allowing for a new concrete slab and accessway to be constructed at a consistent grade. It is therefore anticipated that any changes to the net flood storage volume will be negligible to the broader regional catchment.

A plan showing the existing site drainage is attached in Appendix A.

2.2 Proposed Development Drainage

The proposed SSD application will seek a new development consent for the operation of a metal recovery, processing and recycling facility. The new scrap metal processing facility will be located on the western side of the site away from Breakfast Creek.

The application will seek approval for:

- a processing capacity of 130,000 tonnes of scrap metal per year; and
- the processing and recycling of metal from sources including motor vehicles, structural metals and whitegoods.

The total area of the subject site is 63,290m² and falls generally towards the southwestern corner of the site. The proposed development has an overall footprint area of 14,472m² which represents less than one quarter of the site. The proposed works entails the construction of a new concrete slab from machinery and storage of goods, a new access driveway with associated drainage infrastructure and minor battering earthworks to support the access driveway.

Vehicular access to the site is from Tattersall Road along the site's northern frontage via three existing driveways. The eastern driveway is for heavy vehicle access to the weigh bridge and proposed metal recycling facility. This driveway also provides access to a staff carpark at the front of the site. The driveway in the middle of the site also provides entry and egress to the staff carpark. The western driveway provides access to a parking area for customers and staff.

The development area is currently 100% impervious and as such, development would not ordinarily necessitate the provision of further OSD and water quality controls. However, mitigation measures have been provided for both stormwater quantity and quality management to bring the new development into compliance with Council's current engineering standards.

The shredder, shear, associated floc separating equipment, loading/unloading areas and material stockpiles will all be located on a level 65m by 33.5m concrete slab with a finished surface level at RL 40.2. The remainder of the concrete slab has been graded to closely follow the natural terrain in order to minimise earthworks as well as ensure that the entire development footprint can be captured and drained to the new on-site detention and water quality devices for stormwater treatment.

As there will be no buildings constructed with this proposed development no rainwater reuse tanks are required for compliance with Blacktown City Council's S3QM deemed to comply provisions for reduction in potable water demand.

Stormwater runoff from the proposed development will be collected via a system of pits and pipes constructed along the new access driveways and by 900mm wide concrete dish drains on the downstream side of the new concrete slabs. Stormwater runoff will be directed to a below-ground on site detention tank (OSD) with a storage volume of 658.6m³. Discharge from the on-site detention tank will be directed to Breakfast Creek at the south-west corner of the site via a new drainage line. All existing redundant stormwater infrastructure as shown on the engineering site plan is to be demolished and removed.

The internal drainage network includes provision of an upright kerb along the southern edge of the new perimeter access driveway to capture stormwater runoff collected by the hardstand areas for detention. This will also serve to capture and direct all stormwater to the proposed treatment train for water quality control. Overflows arising from pit surcharge during the larger storm events will sheet flow into Breakfast Creek without nuisance to any downstream properties. It is important to note that the design follows WSUD principles of capturing initial first flush stormwater for treatment whilst subsequent rainfall above the design event carrying negligible levels of pollutants will be allowed to overflow into the designated route.

The proposed stormwater system for the development is attached in Appendix B.

3 Water Quantity Management

3.1 OSD Tank Design

The existing on-site detention (OSD) tank will be utilized and converted to comply with Blacktown City Council's latest engineering standards for stormwater. The OSD tank has been designed in accordance with the Upper Parramatta River Catchment Trust On-site Detention guidelines version 3 using Blacktown City Council's parameters for site storage requirement (SSR) and permissible site discharge (PSD) in the calculations to size the volume of the tank and the required orifice diameter. The S3QM Deemed to Comply Certificate is attached in Appendix C.

The detention tank has been modeled using S3QM with the following characteristics in accordance with the deemed to comply provisions:

Item	Level
RL Top of Tank	39.00
Base RL (m)	35.99
Top Water Level RL (m)	39.20
RL of 1.5year Orifice Centerline	36.40
RL of 100year Orifice Centerline	36.35
Tank Volume (m ³)	639.4
1.5-year Weir Height RL (m)	37.76
1.5-year ARI Orifice Diameter (mm)	150.5
100-year Weir Height RL (m)	38.675
100-year ARI Orifice Diameter (mm)	287

Table 1: Proposed OSD Tank Details

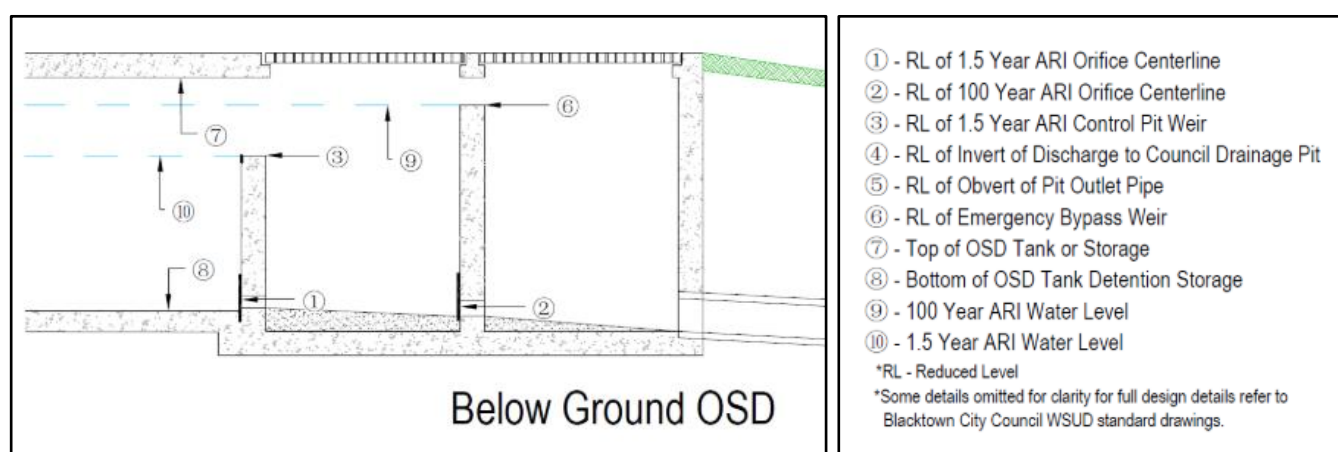


Figure 2: Typical Section – Below Ground OSD, Source: S3QM

Modification of the existing OSD tank will generally be in accordance with the typical section shown in Figure 2 above. Detailed design of the OSD tank will be subject to structural certification by a suitably qualified Structural Engineer, as part of the Construction Certificate application. The proposed concrete slab will extend over the top of the OSD tank, thereby converting it into a below-ground OSD tank.

3.2 Internal Drainage System

The proposed catchments have been modelled using the DRAINS program incorporating the latest Australian Rainfall and Runoff 2016 (ARR 2016) procedures with 2016 IFD rainfall data provided by the Bureau of Meteorology (BOM) as shown in Figure 3. A drainage analysis using DRAINS standard hydraulic analysis, has been undertaken to design a new piped drainage system for the proposed works within the site in accordance with Council's DCP - Engineering Guide for Development. A schematic of the DRAINS model is shown below in Figure 4.

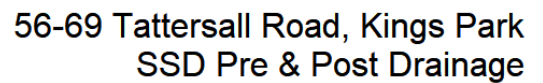
The following design parameters have been adopted in the DRAINS model:

- Design rainfall data (2016 IFDs) for the site location provided by the Bureau of Meteorology and AR&R website.
- Existing catchment time of concentration determined by the kinematic wave equation.
- The pre-developed catchment has been modelled as 100% impervious for analysis and comparison of pre-development versus post-development peak flows.
- Suitability and functionality for the minor storm event (10% AEP) has been analysed in accordance with the new AR&R 2016 methodologies. The major storm has been modelled as 100-year ARI event under the major/minor system criteria specified in Council's DCP - Engineering Guide for Development.
- 12 storm durations were considered: 5 minutes, 10 minutes, 15 minutes, 30 minutes, 1 hour, 2 hours, 3 hours, 6 hours, 12 hours, 24 hours, 48 hours, 72 hours. A total of 111 storms were analysed for each storm frequency in accordance with AR&R 2016 methodologies.
- Blockage factors adopted as per BCC's Engineering Guide for Development. Major Storm – 50% blockage for sag pits, 20% blockage factor for on-grade pits. Minor Storm – no blockage.

The screenshot shows the 'Design Rainfall Data System (2016)' web application. The header includes the Australian Government logo and navigation links. The main content area is titled 'Design Rainfall Data System (2016)' and includes a search bar, a 'New Search >' button, and a 'Analysis - Single Point' section. The 'Analysis - Single Point' section contains a 'Design Rainfalls' section with radio buttons for 'Very Frequent', 'IFDs (Frequent and Infrequent)', and 'Rare'. Below this is a 'Standard Durations' section with checkboxes for '1 - 45 minutes', '1 - 18 hours', and '24 - 168 hours'. The 'Location' section displays the label '57 Tattersall Rd, Kings Park', the latitude '-33.7499 [Nearest grid cell: 33.7375 (S)]', and the longitude '150.9092 [Nearest grid cell: 150.9125 (E)]'. A map shows the location in NSW, VIC, and ACT. The 'IFD Design Rainfall Depth (mm)' section is also visible, along with a 'Conditions of Use' link and a 'New IFD feedback' link.

Duration	Annual Exceedance Probability (AEP)						
	63.2%	50%#	20%*	10%	5%	2%	1%
1 min	2.10	2.36	3.22	3.81	4.39	5.18	5.80
2 min	3.42	3.79	5.00	5.86	6.73	7.90	8.85
3 min	4.77	5.30	7.04	8.27	9.51	11.2	12.5
4 min	6.00	6.71	8.98	10.6	12.2	14.4	16.1
5 min	7.12	7.99	10.8	12.7	14.7	17.3	19.4
10 min	11.3	12.8	17.5	20.8	24.0	28.4	31.8
15 min	14.1	16.0	21.9	26.0	30.1	35.5	39.7
20 min	16.2	18.3	25.0	29.7	34.3	40.4	45.2
25 min	17.8	20.1	27.4	32.5	37.5	44.2	49.4
30 min	19.1	21.5	29.3	34.7	40.0	47.2	52.7
45 min	22.1	24.8	33.5	39.5	45.5	53.7	60.0
1 hour	24.4	27.3	36.5	43.0	49.5	58.4	65.4
1.5 hour	27.9	31.0	41.2	48.5	55.8	65.9	74.0
2 hour	30.7	34.1	45.1	53.0	61.0	72.2	81.3
3 hour	35.3	39.1	51.7	60.8	70.2	83.5	94.3
4.5 hour	41.0	45.5	60.3	71.2	82.6	98.7	112
6 hour	45.9	51.0	68.1	80.7	93.9	113	128
9 hour	54.0	60.4	81.7	97.7	115	138	157
12 hour	60.8	68.3	93.7	113	133	161	183
18 hour	71.8	81.3	114	139	165	200	228
24 hour	80.5	91.7	130	160	192	232	264
30 hour	87.5	100	144	178	214	259	294
36 hour	93.4	107	156	193	233	282	320
48 hour	103	118	174	217	264	317	359
72 hour	115	133	197	247	302	360	406
96 hour	123	142	210	264	322	383	429
120 hour	128	148	219	273	333	394	440
144 hour	132	153	223	278	337	399	444
168 hour	136	156	226	280	338	400	444

Figure 3: IFD Rainfall Data, Source: Bureau of Meteorology



The internal pit and pipe drainage system has been sized to achieve compliance with Council's Engineering Guide for Development for both the minor and major storm events. The provision of on-site detention will successfully attenuate post-development peak discharge to pre-development levels for all storms up to and including the 100-year ARI major storm event. Results of the modelling are shown in Table 2 below:

	Pre-Development	Post-Development	Compliance
	Peak Flow (m³/s)	Peak Flow (m³/s)	
Minor Storm 10% AEP (9.49YR ARI)	0.322	0.260	Yes
Major Storm 1% AEP (100YR ARI)	0.431	0.385	Yes

Page 11

4 Water Quality Management

4.1 Management of Existing Contamination

A comprehensive contamination investigation was undertaken for the development site by a contamination specialist consultant, as documented in the Contamination Investigation – Final Report (Revision A dated 24 October 2018) prepared by Sullivan Environmental Sciences. The investigation found that concentrations of contaminants in both soil and groundwater samples met the adopted investigation levels, indicating that generally on-site soils and groundwater are unlikely to pose an unacceptable health risk. The investigation also found that the site contained a vast number of oil stained patches which individually were insignificant and did not present a health risk. However, in a collective sense the oil staining was considered significant and should be rectified as they pose a long-term contamination source. It was found that surface water discharging into Breakfast Creek from the two stormwater outlets contains heavy metals and total petroleum hydrocarbons (TPHs). Heavy metals were at concentrations of up to two orders of magnitude greater than the adopted water quality criteria.

To manage the existing site contamination, it is recommended that each oil patch be excavated and removed offsite to a waste disposal facility. An oil absorbent mat should be placed beneath each vehicle that is stored on unsealed ground to absorb drips and leaks from engine parts as an interim measure until the soils can be excavated.

In accordance with industry best practice the proposed new access driveways, areas of operation, storage of goods and the flock waste area will be constructed from concrete which will serve as a barrier between the existing and new development. This represents the most efficient method of addressing the issue of existing contamination at the site and will ensure that these existing contaminants will not be collected by stormwater runoff from the proposed metal recycling facility.

4.2 Management of Future Contamination

The nature of the proposed development varies greatly from the existing use of the site from a contamination generation potential perspective. All potentially contaminating materials used or stored on the site (eg. fuel, oils) will be prevented from entering the groundwater system by the concrete seal. It is envisaged that the main source of contamination post-development will be oils and hydrocarbons collected by the access driveway and other external hardstand areas from truck and vehicle movements to and from the metal recycling facility which is considered inherent to most industrial developments.

The development site is located within a Section 94 Contribution area and as such, the Developer may choose to pay a compulsory Water Quality contribution in lieu of providing on-site water quality treatment devices. The attached S3QM Certificate in Appendix C confirms that no further on-site water quality devices are required for this development apart from a Gross Pollutant Trap (GPT) and a Hydrocarbon trap.

A MUSIC water quality model has been undertaken to ensure compliance with Council's WSUD pollutant reduction targets shown in Figure 5 below.

All developments shall achieve a minimum percentage reduction of the post development average annual load of pollutants in accordance with Table 2.

Table 2 Required pollutant reduction targets

Pollutant	% post development average annual load reduction
Gross pollutants	90
Total suspended solids	85
Total phosphorous	65
Total nitrogen	45
Total hydrocarbons	90

Figure 5: Blacktown City Council DCP – Pollutant Reduction Targets

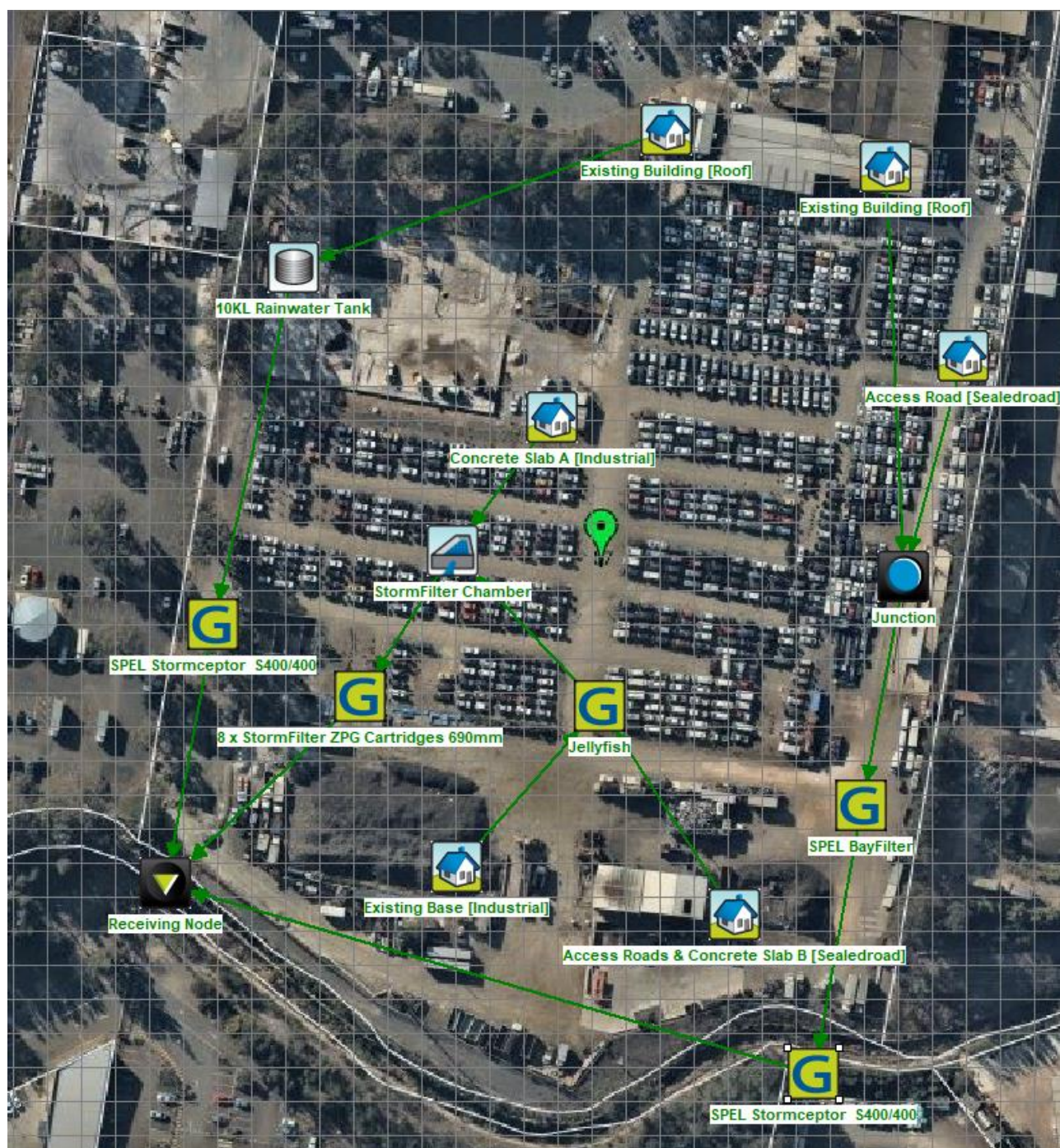


Figure 6: MUSIC Model

A customised treatment train has been designed and analysed using the MUSIC program for the proposed development. A 2-staged treatment train has been devised using the following proprietary water quality devices by Stormwater 360 and SPEL Environmental:

- Jellyfish Filter – Primary Treatment

The Jellyfish Filter is a stormwater quality GPT device featuring high surface area and high flow rate membrane filtration at low driving head. By incorporating pre-treatment with light-weight membrane filtration, the Jellyfish Filter removes floatables, trash, oil, debris, TSS, fine silt-sized particles, and a high percentage of particulate-bound pollutants; including phosphorus and nitrogen, metals and hydrocarbons. The high surface area membrane cartridges, combined with up flow hydraulics, frequent backwashing, and rinseable/reusable cartridges ensures long-lasting performance. An appropriately sized Jellyfish Filter GPT will be provided directly upstream of the OSD tank and tertiary treatment system so that stormwater is treated prior to entering the OSD tank. See Appendix D for further product information.

- StormFilter – Secondary Treatment

The final stage of the treatment train will be the StormFilter device which uses a variety of media to separate and remove target pollutants including total suspended solids (TSS), phosphorous (TP), nitrogen (TN), fine solids, soluble heavy metals, oil, and total nutrients. StormFilter cartridges will be installed in the OSD tank which will be converted into a below-ground tank with the construction of the concrete slab creating a roof. Grated pits will be provided for access and maintenance. Stormwater360's customised calculator spreadsheet was used to determine the number and configuration of StormFilter cartridges. The design requires 8 x 690mm Full Flow ZPG StormFilter cartridges to meet Council's DCP pollutant reduction targets. See Appendix E for further product information.

In addition, stormwater runoff from the main building and existing access driveway adjacent to the eastern boundary will be collected by three new surface inlet pits and routed through a SPEL Filter and Stormceptor to remove gross pollutants, total suspended solids, hydrocarbons, total phosphorous and total nitrogen from this portion of the site.

A SPEL Stormceptor will be installed on the existing stormwater drainage line that runs parallel with the western boundary of the site. This water quality device has the capacity to store contaminated fire-retardant water in the event of a fire. This contaminated water will be disposed of through the sewer trade waste system. Ordinary stormwater will be treated and discharge into Breakfast Creek.

The performance of these proprietary GPT systems in removing pollutants, hydrocarbons, oils and greases has been proven through laboratory and field testing, with the results adopted for the modelling. The effectiveness of the overall treatment train was assessed using a MUSIC model utilising Blacktown City Council's MUSIC-LINK. The results of the MUSIC model (Figure 7 below) shows that Council's DCP Water Quality Targets will be achieved or exceeded for Total Suspended Solids (TSS), Total Phosphorus (TP), Total Nitrogen (TN) and Gross Pollutants:

	Sources	Residual Load	% Reduction
Flow (ML/yr)	15.4	15.4	0.2
Total Suspended Solids (kg/yr)	4050	574	85.8
Total Phosphorus (kg/yr)	6.88	2.12	69.2
Total Nitrogen (kg/yr)	35.7	17.9	49.9
Gross Pollutants (kg/yr)	403	0.688	99.8

Figure 7: MUSIC Model – Pollutant Reduction Results

4.3 Water Conservation

In addition to the water quality requirements, 80% of the non-potable water use for the site needs to be met through rainwater. This includes usage such as toilet flushing and landscape watering. As the proposed development does not require any toilets and there is minimal landscaping of the site, the proposed non-potable use will be dust suppression during the summer months. Currently during the months of summer, the recycling plant uses 3,000 litres of water twice a week for dust suppression. By providing concrete pavement over 14,200m² of the existing site the demand for dust suppression during the summer months will be reduced to 3,000 litres once a week. This non-potable demand equates to 39kL/year. This demand has been modelled within the MUSIC program using a monthly distribution pattern to determine the rainwater tank volume and roof area required to capture and store rainwater. To provide 80% of the non-potable water use for the development a 10kL rainwater tank needs to be installed and connected to all the roof of Building B which has a catchment area of 237m².

Figure 8 below shows that 81.9% of the non-potable reuse demand will be met by the 10kL rainwater tank connected to Building B.

Node Water Balance - 10KL Rainwater Tank					
	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	0.175	4.602	0.027	0.388	4.573
ET Loss	0.000	0.000	0.000	0.000	0.000
Infiltration Loss	0.000	0.000	0.000	0.000	0.000
Low Flow Bypass Out	0.000	0.000	0.000	0.000	0.000
High Flow Bypass Out	0.000	0.000	0.000	0.000	0.000
Pipe Out	0.143	2.400	0.020	0.271	0.000
Weir Out	0.000	0.000	0.000	0.000	0.000
Transfer Function Out	0.000	0.000	0.000	0.000	0.000
Reuse Supplied	0.032	0.416	0.004	0.056	0.000
Reuse Requested	0.039	0.000	0.000	0.000	0.000
% Reuse Demand Met	81.907	0.000	0.000	0.000	0.000
% Load Reduction	18.208	47.838	25.981	30.218	100.000

Figure 8: MUSIC Model – Rainwater Tank Water Balance

5 Maintenance Schedule

Inspection and maintenance of the proposed water quality devices should be undertaken as per the manufacturer's directions for the life of the development.

To ensure the stormwater and water quality system functions efficiently over the short and long term, it will be necessary to carry out regular maintenance on the stormwater system and the water quality devices.

Table 3 below sets out the frequency of maintenance inspections and actions required to be undertaken.

Device or Structure	Inspection Items	Frequency of Maintenance	Action Required
Rainwater Tank	Roof Gutters	6 months	Remove leaves and debris in gutters
Rainwater Tank	First Flush Device	1-3 months	Inspect and clean first flush device from debris
Rainwater Tank	Contamination (Mosquito/vermin breeding or algae growth)	6 months	Disinfection of tank
Rainwater Tank	Inlet/Outlet screen	6 months	Remove leaves and debris on surface.
Rainwater Tank	Pump strainer	6 months	Inspect and clean pump strainer from debris
Rainwater Tank	Tank Structure	2 years	Check footings and fittings for signs of corrosion
Rainwater Tank	Depth of sediment within tank	5 years	De-sludge tank by engaging a professional tank cleaner
OSD Basin	Outlet overflow pit & weir wall	Yearly	Repair where cracking or spalling of concrete surfaces is identified.
OSD Tank	Trash Screens	6-12 months	Inspect and clean out if necessary
OSD Tank	Sump below outlet	6-12 months	Inspect and clean out sediment/debris build-up.

Jellyfish Filter (GPT)	Cartridge Lids, & Maintenance access wall	6 months	- Visual inspection of the unit, vault and filter. - Vacuum extraction of oil, floatable trash/debris, pollutants and sediment from manhole sump. External rinsing and re-installing filter cartridges. Replace filter cartridge tentacles as needed.
Stormfilter	Stormfilter Chamber & Cartridges	6 months	Visual inspection of cartridges & chamber. Remove larger gross pollutants and perform rectification works if required
Stormfilter	Stormfilter Cartridges & Filter Media	Yearly	- Remove accumulated sediment. Wash-down stormfilter chamber. - Replace stormfilter cartridge media as required
SPELL Filter	Filter Chamber & Cartridges	6 months	Visual inspection of cartridges & chamber. Remove larger gross pollutants and perform rectification works if required
SPELL Filter	Filter Chamber & Cartridges	Yearly	- Remove accumulated sediment. Wash-down stormfilter chamber. - Replace stormfilter cartridge media as required
SPELL Stormceptor	Depth of sediment & gross pollutants within tank	6 months	- Visual inspection of the unit. - Vacuum extraction of oil, floatable trash/debris, pollutants and sediment from manhole sump. External rinsing of unit.

Table 3: Stormwater Quality Device Maintenance Schedule

During periods of increased rain fall it may be necessary to increase the period between inspections of the stormwater system.

6 Erosion and Sediment Controls

The construction phase approach adopted for this site will incorporate principles recommended by the NSW Department of Housing / Landcom, namely:

- Plan for erosion and sediment control concurrently with engineering design and in advance of earthworks. Assessment of site constraints and integration of the various needs.
- Minimise the area of disturbance to and plan construction works to limit the amount of disturbed area at any one time.
- Control water flow from the top of the development area, through the works and downstream of the site, for example:
 - Minimise slope gradient and length
 - Keep runoff at non-erodible velocities
 - Trap soil and water pollutants
 - Rehabilitate disturbed lands quickly

A preliminary design of erosion and sediment controls for the proposed development has been provided on Sheets 801-811 of the appended engineering plans. Controls will be provided on the site prior to and during all earthworks in accordance with Landcom's Managing Urban Stormwater: Soils and Construction, 4th Edition. Features of the construction phase erosion and sediment controls adopted for this site include:

- Prevention of sediment and polluted runoff water from entering the existing adjacent watercourse. This involves the provision of sediment fences, sediment traps and sausage barriers.
- Stabilised stockpile areas to prevent wind and water erosion. Any excess stockpiled material to be removed from the site is to be sampled and analysed in accordance with Wasted Classification Guidelines and upon receipt of the analysis results, disposed of at an appropriately licenced facility.
- Scour protection at discharge locations.
- Stabilised access to provide a firm base for vehicle entry/exit and to prevent the main access from becoming a source of sediment.

7 Conclusion

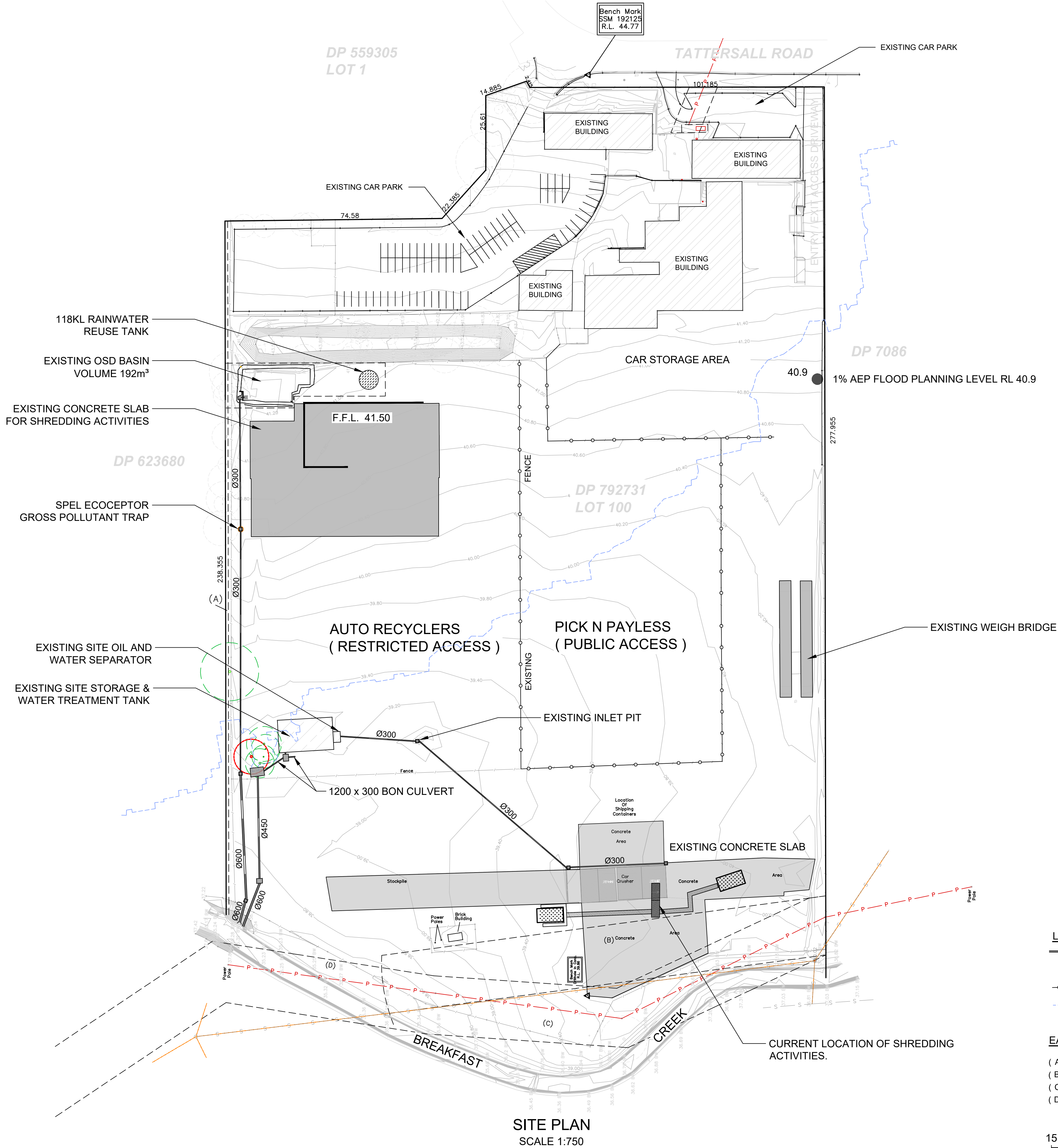
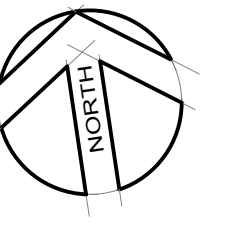
This report has reviewed the stormwater management strategy for the proposed metal recycling development on Lot 100, DP 792731 located at 57-69 Tattersall Road, Kings Park.

The specific findings of the soil and water report are:

- A Small Scale Stormwater Quality Model (S3QM) analysis has been conducted for the proposed development with supporting certificate demonstrating compliance with Blacktown City Council's stormwater quantity and quality requirements. The OSD has been sized to cater for all storm events up to and including the 100-year ARI in accordance with Council's DCP. The total developable catchment area for the site is 14,472m² and will generate a site discharge of 55.3 litres per second in a 1.5-year ARI storm event and 251.2 litres per second in a 100-year ARI storm event, with provision of on-site detention.
- The internal drainage network has been designed and modelled using DRAINS to ensure efficient capture of stormwater runoff in accordance with Council's major/minor criteria.
- The proposed new development works on the site will be concrete-capped in accordance with the latest environmental industry best practice standards. This will serve to protect the proposed development from existing contamination at the site and control water quality prior to discharge into Breakfast Creek.
- A customised treatment train has been designed and analysed using MUSIC software for the proposed development demonstrating compliance with Council's current water quality targets. This treatment train incorporates 2 stages of treatment (primary and secondary) and will utilise the latest proprietary water quality devices available in the WSUD market.

It is expected that if the stormwater management measures discussed in this report are appropriately implemented, they will provide an effective means of controlling stormwater quantity and quality management for the development site.

Appendix A – Existing Site Drainage Plan



SITE PLAN
SCALE 1:750

- LEGEND**
- EXISTING DRAINAGE LINE
 - EXISTING DRAINAGE PIT
 - EXISTING FENCE
 - 1% AEP FLOOD EXTENTS

- EASEMENTS**
- (A) EASEMENT FOR SEWERAGE & DRAINAGE 0.915 WIDE (VIDE H854441)
 - (B) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE (VIDE H478705)
 - (C) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE AND VARIABLE
 - (D) FORMER BANK OF CREEK



No	DATE	AMENDMENT
A	21/06/19	



**BARKER
RYAN
STEWART**

TOTAL PROJECT SOLUTIONS
PLANNING - PROJECT MANAGEMENT - ENGINEERING - CERTIFICATION

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HUNTER
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mail@barkerryanstewart.com.au

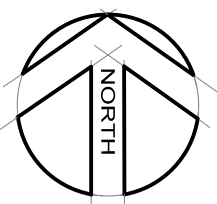
Client:	AUTORECYCLERS PTY LTD
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57- 69 TATTERSALL ROAD KINGS PARK EXISTING CAR DISMANTLING AND RECYCLING FACILITY.
EXISTING SITE DRAINAGE PLAN

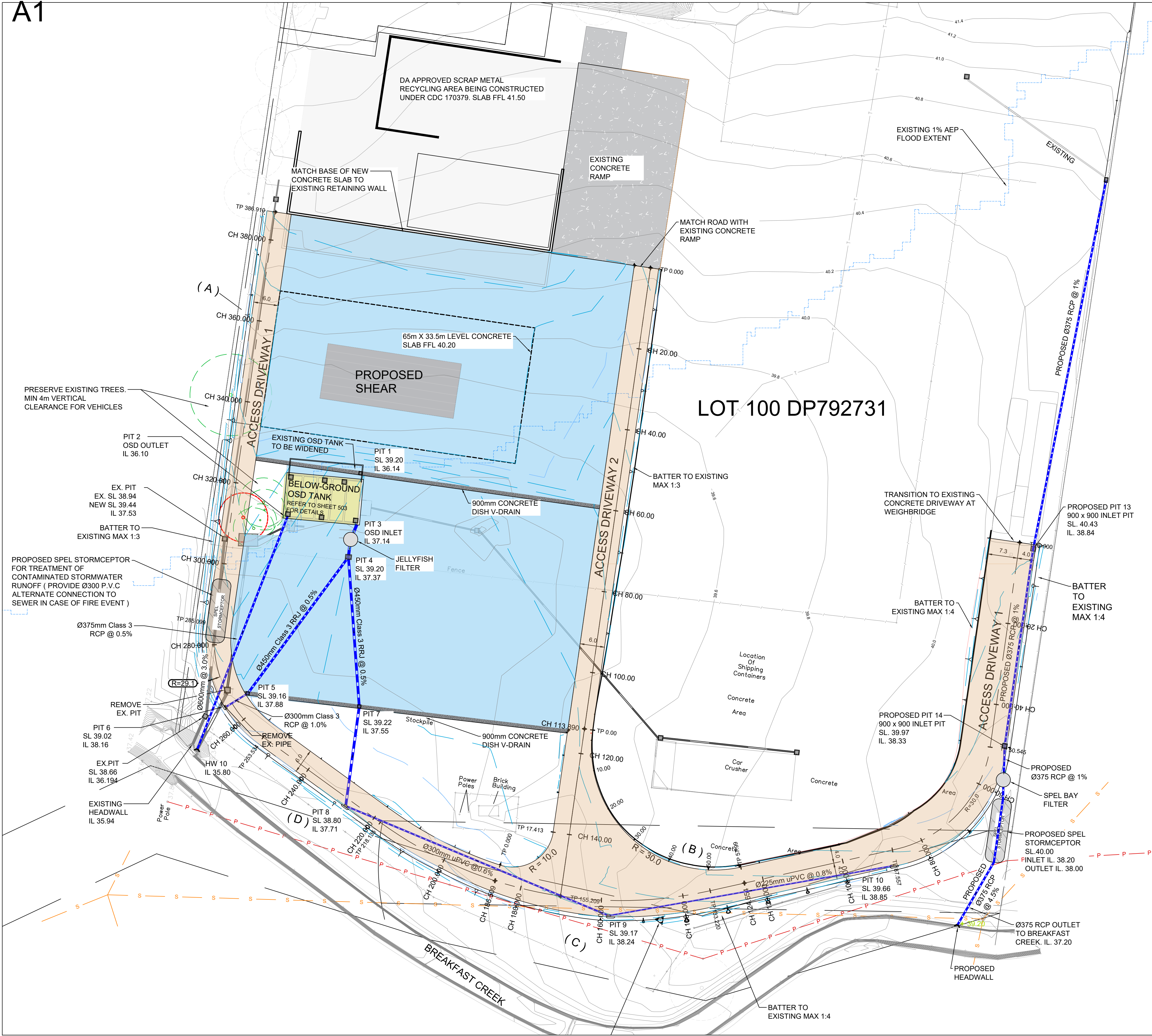
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	Datum: A.H.D.

Plan No.	160136SK1.01	REV.
File Ref.	CC160136SK1.dwg	
SHEET 1 OF 1 SHEETS		A

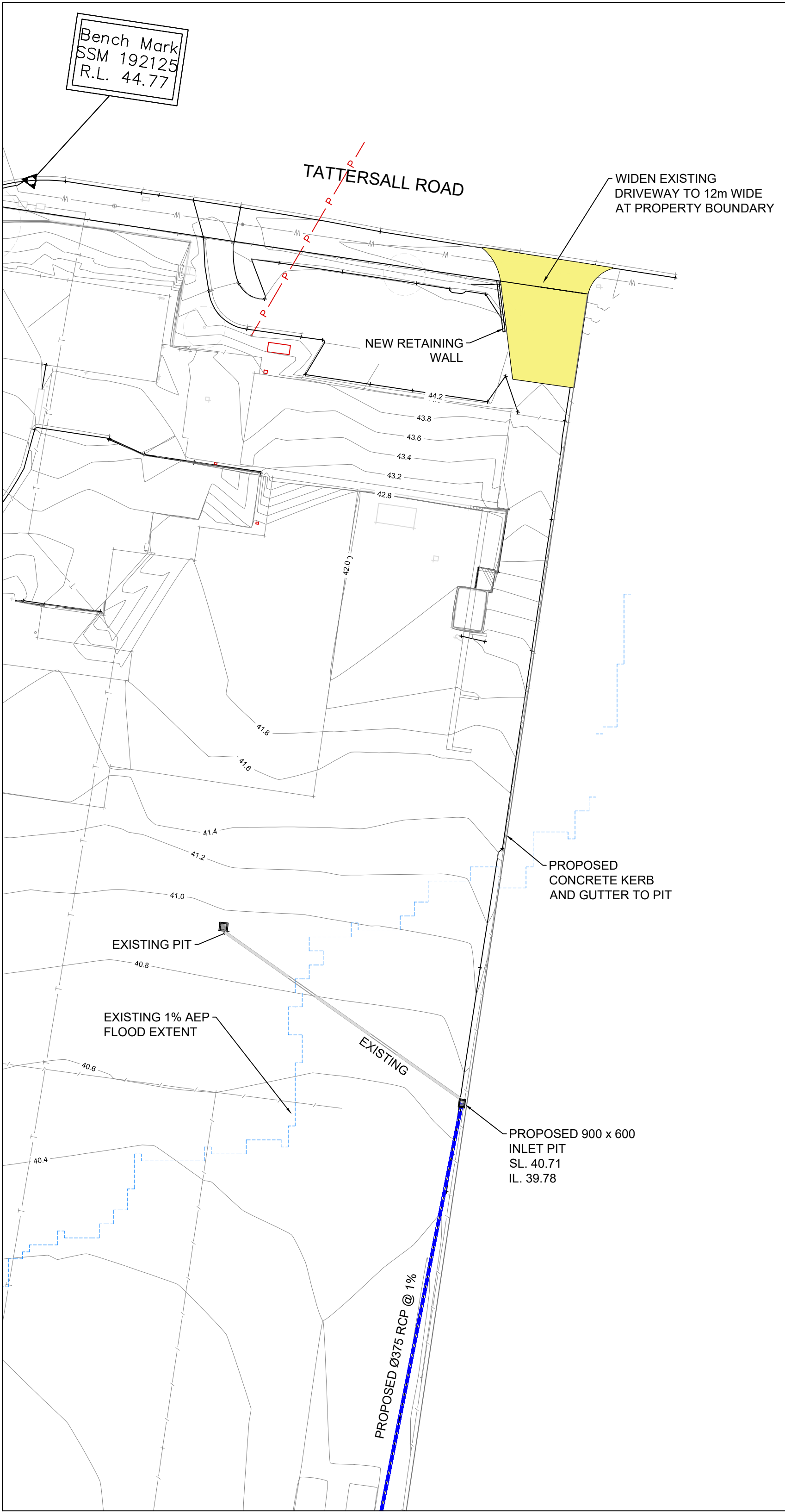
Appendix B – Proposed Site Drainage Plan



CONCEPT DESIGN ONLY
SUBJECT TO FINAL DESIGN
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CONSTRUCTION



PLAN
SCALE 1:500



LEGEND

- EXISTING DRAINAGE LINE
- EXISTING DRAINAGE PIT
- PROPOSED DRAINAGE LINE

EASEMENTS

- (A) EASEMENT FOR SEWERAGE & DRAINAGE 0.915 WIDE (VIDE H854441)
- (B) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE (VIDE H478705)
- (C) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE AND VARIABLE
- (D) FORMER BANK OF CREEK

10 0 10 20 30 40 50
METRES

1:500

REV	AMENDMENT	ISSUED	DATE
A	PRELIMINARY ISSUE	TW	08/07/19

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**57-69 TATTERSALL RD, KINGS PARK
INTERNAL ACCESS ROAD**

SITE PLAN

Designed: TW
Drawn: TW
Checked: AD

Scales: Plan 1:500
Horiz. -
Vert. -
X-Sect. -

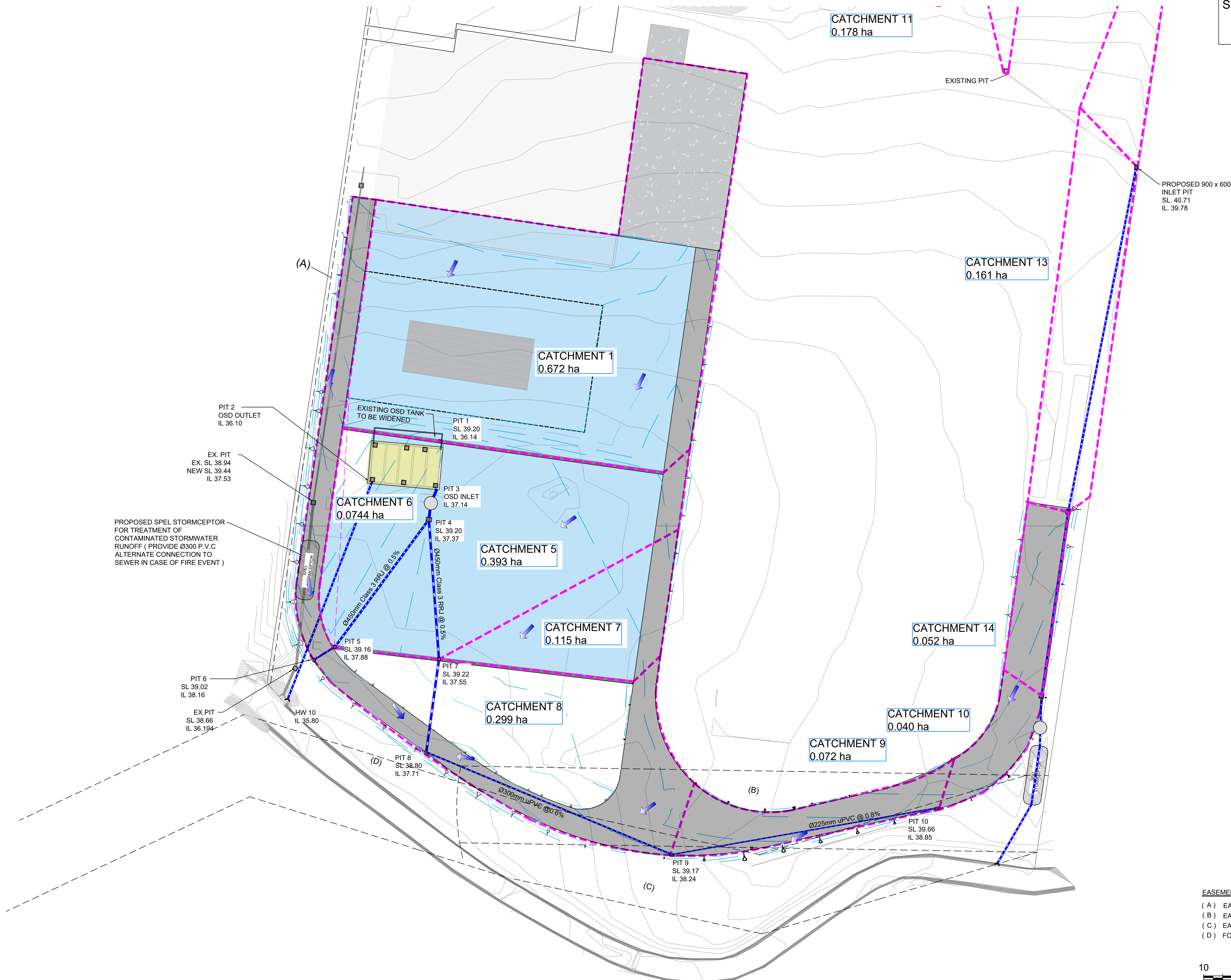
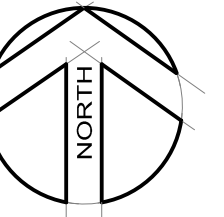
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Plan No.
CC160136-1-101

File Ref.
CC160136 - DA SHEETS

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- EASEMENTS
- (A) EASEMENT FOR SEWERAGE & DRAINAGE 0.915 WIDE (VIDE H854441)
 - (B) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE (VIDE H478705)
 - (C) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE AND VARIABLE
 - (D) FORMER BANK OF CREEK



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57-69 TATTERSALL RD, KINGS PARK
INTERNAL ACCESS ROAD

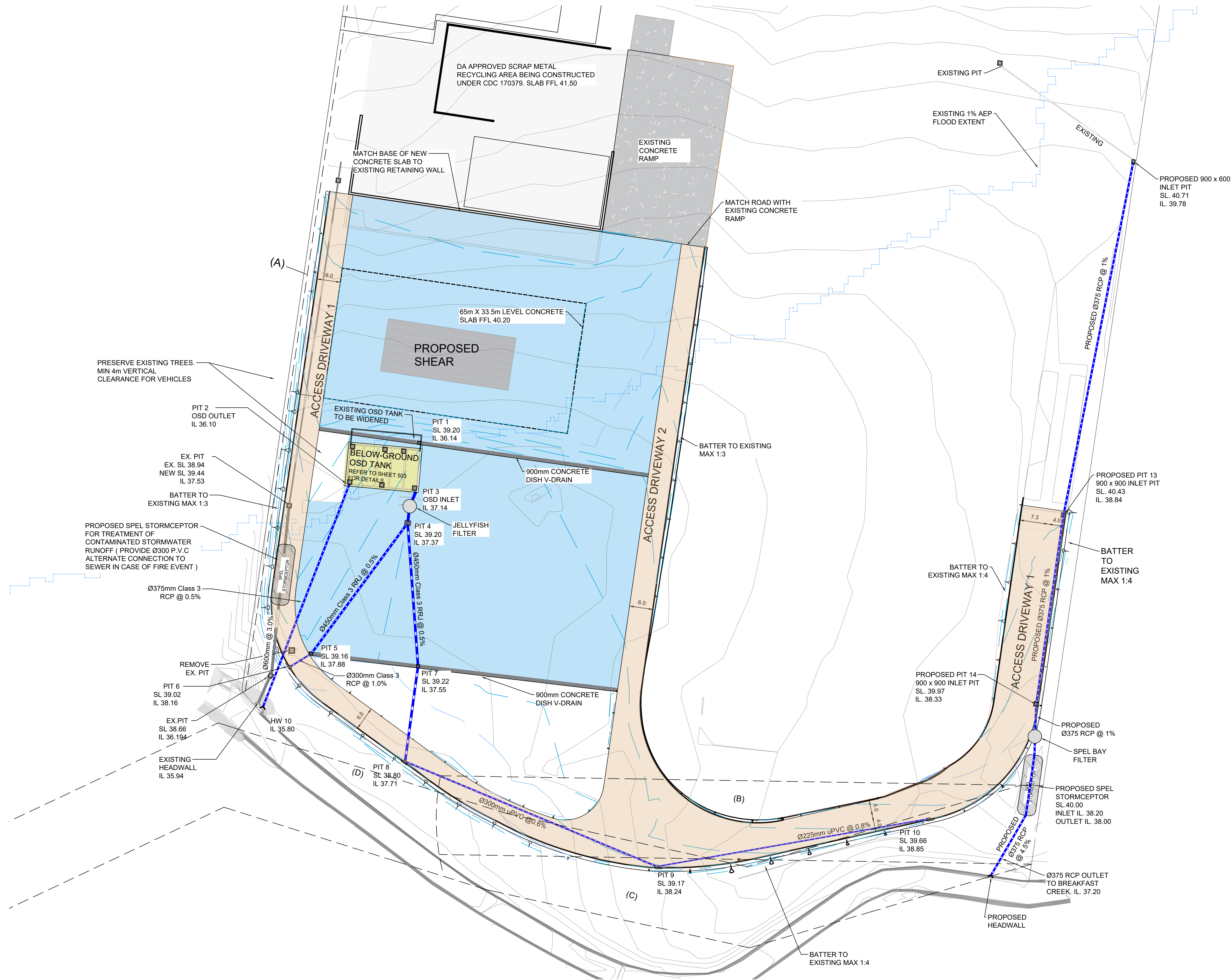
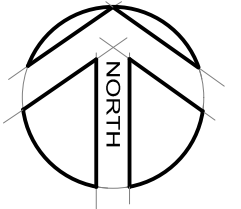
CATCHMENT PLAN

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Horiz. -
Vert. -
X-Sect. -

Datum: A.H.D.

Plan No.
CC160136-1-501
File Ref.
CC160136 - DA SHEETS
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- EASEMENTS**
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 - (B) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE (VIDE H478705)
 - (C) EASEMENT FOR TRANSMISSION LINE 20.115 WIDE AND VARIABLE
 - (D) FORMER BANK OF CREEK



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INTERNAL ACCESS ROAD

PROPOSED DRAINAGE WORKS

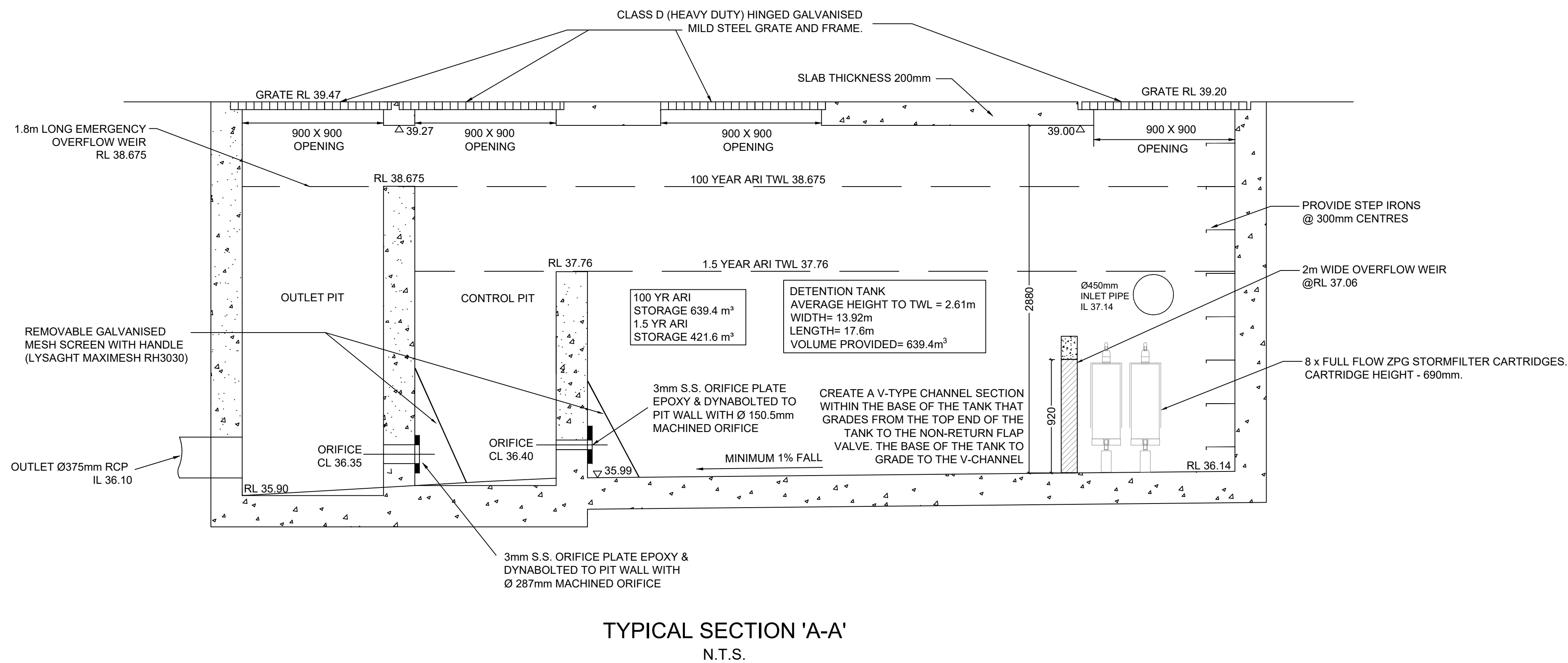
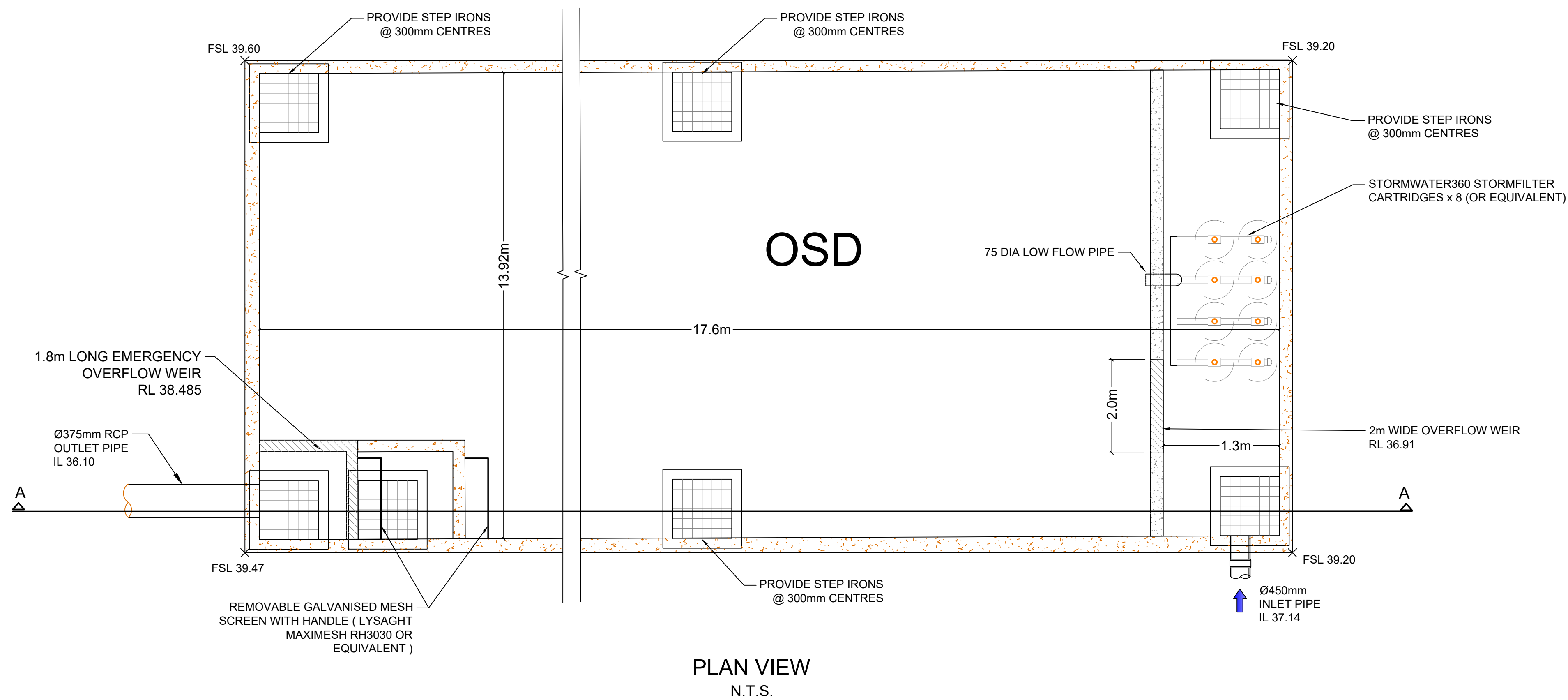
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Datum: A.H.D.

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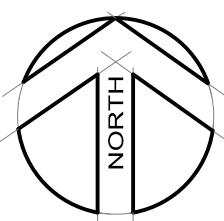
Client:
AUTORECYCLERS PTY LTD

**57-69 TATTERSALL RD, KINGS PARK
INTERNAL ACCESS ROAD**

ON-SITE DETENTION TANK DETAILS

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			X-Sect.	N.T.S.
		Datum:	A.H.D.	

Plan No.	CC160136-1-503	REV. A
File Ref. CC160136		



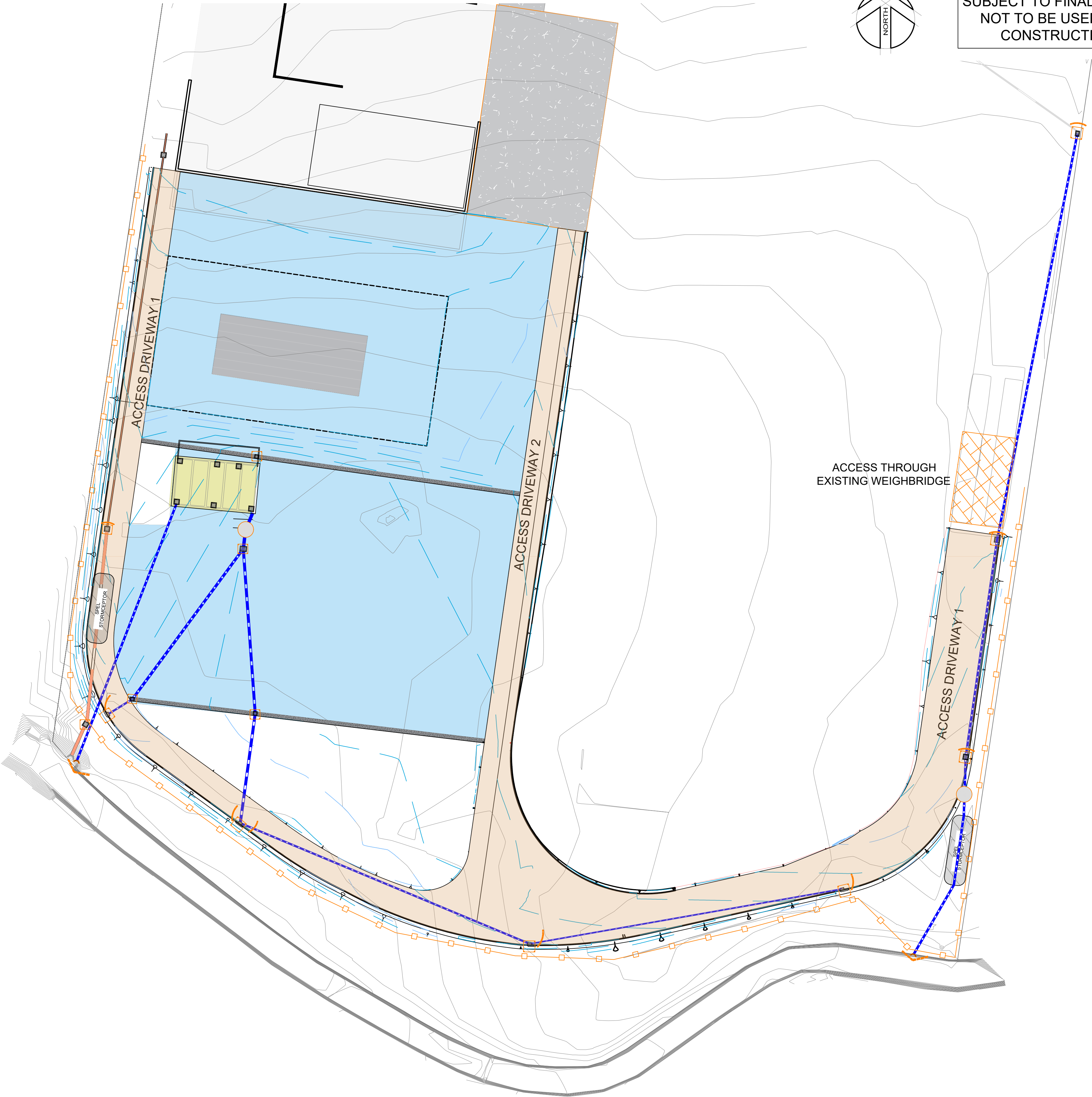
CONCEPT DESIGN ONLY
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CONSTRUCTION

LEGEND

- SEDIMENT FENCE
- STABILISED SITE ACCESS
AT ENTRANCE TO WORKS
- SURFACE INLET PIT SEDIMENT TRAP
- DURING CONSTRUCTION
- HAY BALE SEDIMENT TRAP
- MESH AND GRAVEL SAUSAGE BARRIER AROUND EXISTING
PITS & AFTER CONSTRUCTION OF NEW PITS

EROSION AND SEDIMENTATION CONTROL NOTES

1. PRIOR TO THE COMMENCEMENT OF SITE DISTURBANCE, THE CONTRACTOR SHALL ESTABLISH ALL NECESSARY EROSION AND SEDIMENTATION CONTROL MEASURES IN ACCORDANCE WITH THIS PLAN, COUNCIL'S "CIVIL WORKS SPECIFICATION, PART 2 -CONSTRUCTION", AND THE NSW DEPARTMENT OF HOUSING'S PUBLICATION "MANAGING URBAN STORMWATER - SOILS AND CONSTRUCTION".
2. THE LOCATION OF EROSION AND SEDIMENTATION CONTROL DEVICES SHOWN ON THIS PLAN ARE INDICATIVE ONLY AND SHOULD BE ADJUSTED TO SUIT SITE CONDITIONS.
3. WHERE WORKS ARE DELAYED OR IN ABEYANCE AND DISTURBED AREAS ARE LIKELY TO BE EXPOSED FOR A PERIOD OF TWO MONTHS OR MORE, TEMPORARY REHABILITATION WORKS SHALL BE UNDERTAKEN TO PROTECT THE SITE.
4. SANDBAGS SHALL BE PLACED ACROSS THE END OF ROAD CONSTRUCTION AT THE COMPLETION OF EACH DAYS WORK TO PREVENT EROSION OF THE CONSTRUCTED MATERIAL..
5. THE CONTRACTOR SHALL CONDUCT WEEKLY INSPECTIONS OF THE SITE TO ENSURE THAT ALL DEVICES AND REHABILITATION AREAS HAVE BEEN ADEQUATELY MAINTAINED, THE CONTRACTOR SHALL ALSO KEEP A LOG BOOK DETAILING SUCH INSPECTIONS, AND RECORDING RAINFALL EVENTS AND OTHER RELEVANT EVENTS.
6. TOPSOIL SHALL BE STOCKPILED IN THE LOCATIONS SHOWN ON THIS PLAN OR AS DIRECTED BY COUNCIL'S ENGINEER. WHERE IT IS LIKELY THAT STOCKPILES WILL REMAIN IN PLACE FOR A PERIOD EXCEEDING 4 WEEKS, THEN THE STOCKPILE SHALL BE STABILISED BY SEEDING OR EQUIVALENT METHODS.
7. THE MOVEMENT OF VEHICULAR TRAFFIC ON THE SITE SHALL BE CONFINED TO DESIGNATED AREAS DURING CONSTRUCTION WORKS. VEHICULAR ACCESS SHALL BE DENIED TO AREAS TO BE LEFT UNDISTURBED.
8. SITE ACCESS SHALL BE LIMITED TO THE LOCATIONS SHOWN ON THIS PLAN. SHAKE-DOWN AREAS SHALL BE CONSTRUCTED AS SHOWN.
9. DURING CONSTRUCTION WORKS, DUST CONTROL MEASURES SHALL BE IMPLEMENTED TO MINIMISE THE AMOUNT OF DUST GENERATED FROM THE SITE. THESE MEASURES TO BE IMPLEMENTED TO COUNCIL'S SATISFACTION.
10. MAINTENANCE AND CLEANING OF CONSTRUCTION PLANT SHALL BE CARRIED OUT IN AN AREA WHERE RUNOFF CAN BE CONTAINED AND APPROPRIATELY TREATED AND DISPOSED OF.
11. ALL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL REMAIN IN PLACE UNTIL ALL DISTURBED AREAS HAVE ADEQUATELY REGENERATED. THIS STAGE SHALL BE DETERMINED BY THE CERTIFIER.



EROSION & SEDIMENT CONTROL PLAN

SCALE 1:500



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INTERNAL ACCESS ROAD

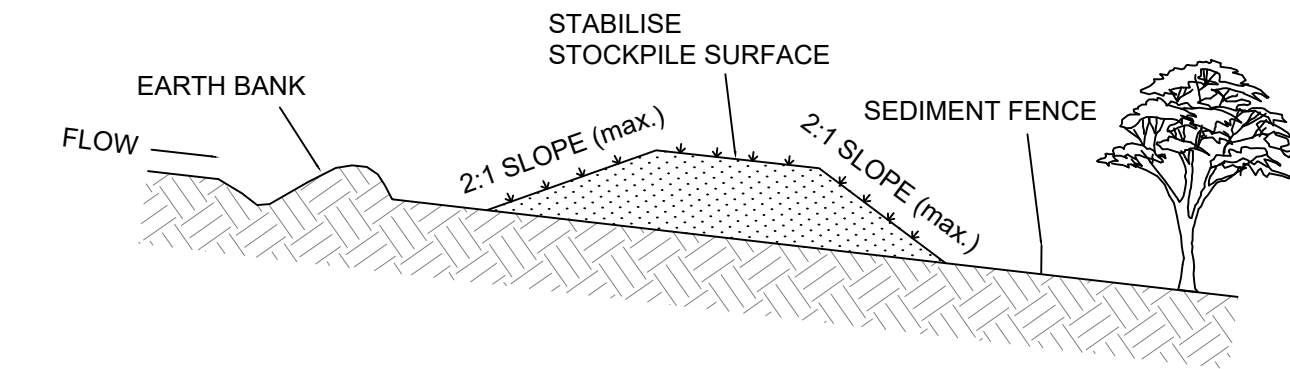
EROSION AND SEDIMENT CONTROL PLAN

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Drawn: TW
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Scales: Plan 1:500
Horiz. -
Vert. -
X-Sect. -

Datum: A.H.D.

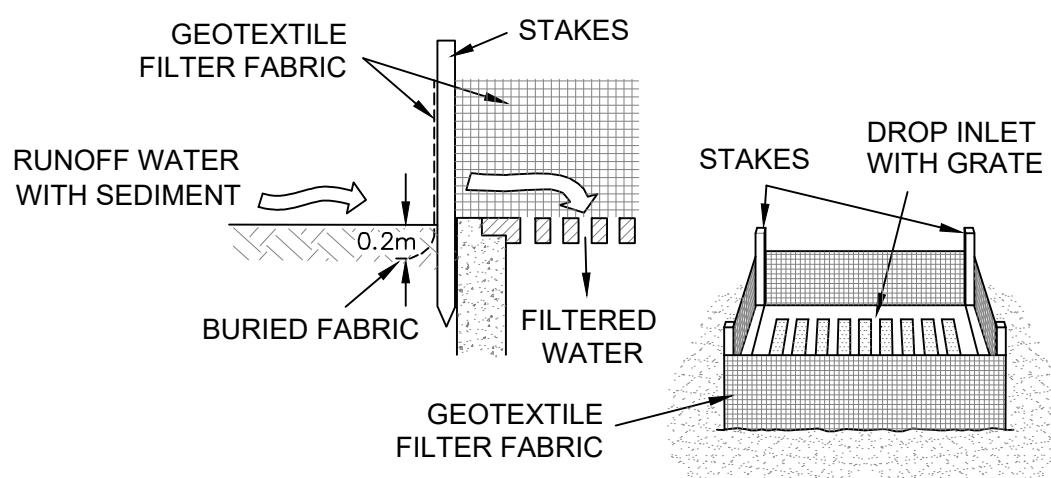
Plan No.
CC160136-1-801
File Ref.
CC160136 - DA SHEETS
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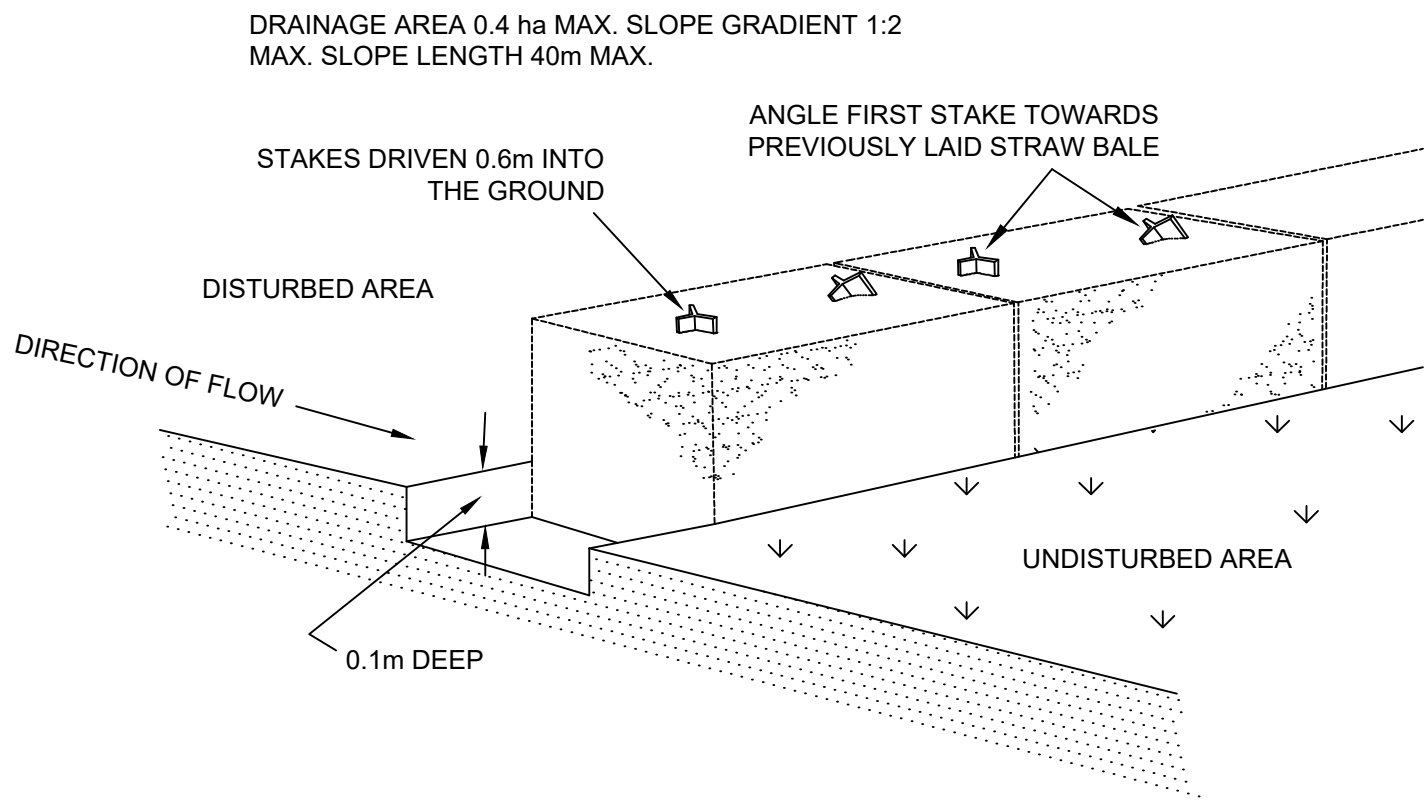
CONSTRUCTION NOTES

- 1. WHERE POSSIBLE LOCATE STOCKPILE AT LEAST 5 METRES FROM EXISTING VEGETATION, CONCENTRATED WATER FLOWS, ROADS, HAZARD AREAS AND MIN. 1.5m AWAY FROM EMBANKMENTS.
- 2. CONSTRUCT ON THE CONTOUR AS A LOW, FLAT ELONGATED MOUND.
- 3. WHERE THERE IS SUFFICIENT AREA TOPSOIL STOCKPILES SHALL BE LESS THAN 2 METRES IN HEIGHT.
- 4. REHABILITATE IN ACCORDANCE WITH THE SWMP/ESCP.
- 5. CONSTRUCT EARTH BANK (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT RUN OFF AROUND THE STOCKPILE AND A SEDIMENT FENCE (STANDARD DRAWING 6-8) 1 TO 2 METRES DOWNSLOPE OF STOCKPILE.

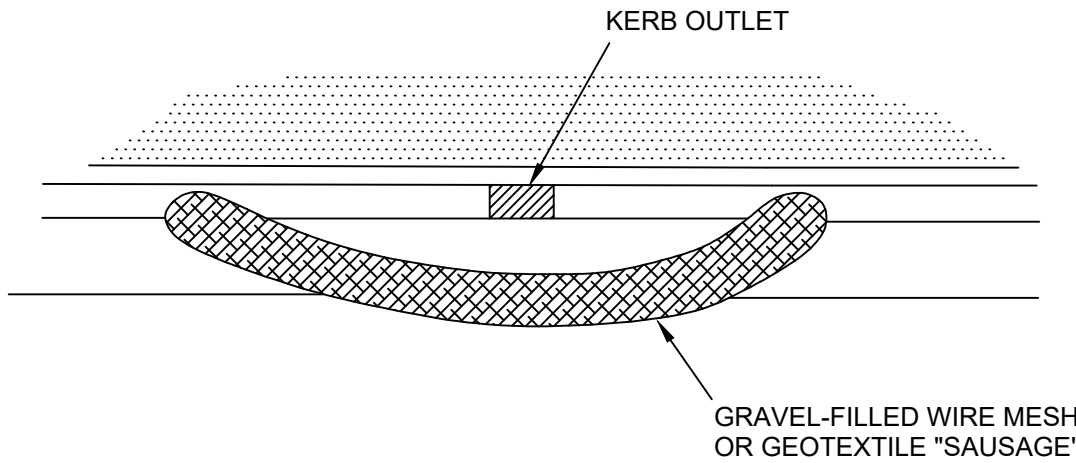
TOPSOIL STOCKPILE



SURFACE INLET PIT SEDIMENT TRAP



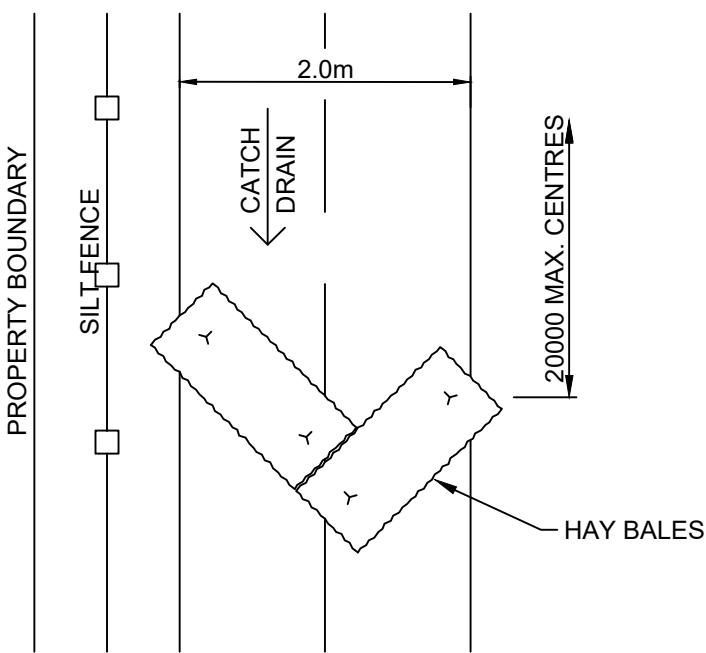
STRAW BALE SEDIMENT FILTER



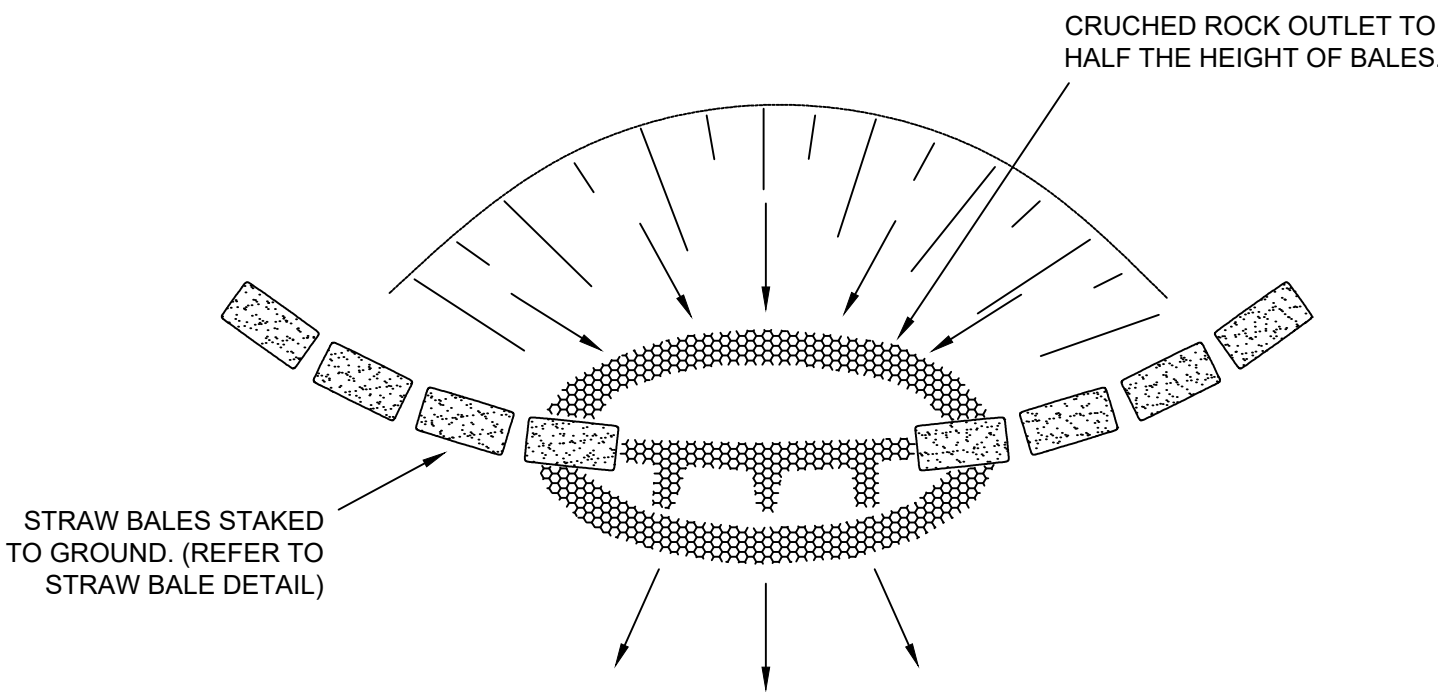
CONSTRUCTION NOTES

- 1. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH AND FILL IT WITH 25mm TO 50mm GRAVEL.
- 2. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH X 400mm WIDE.
- 3. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING FILTER.
- 4. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

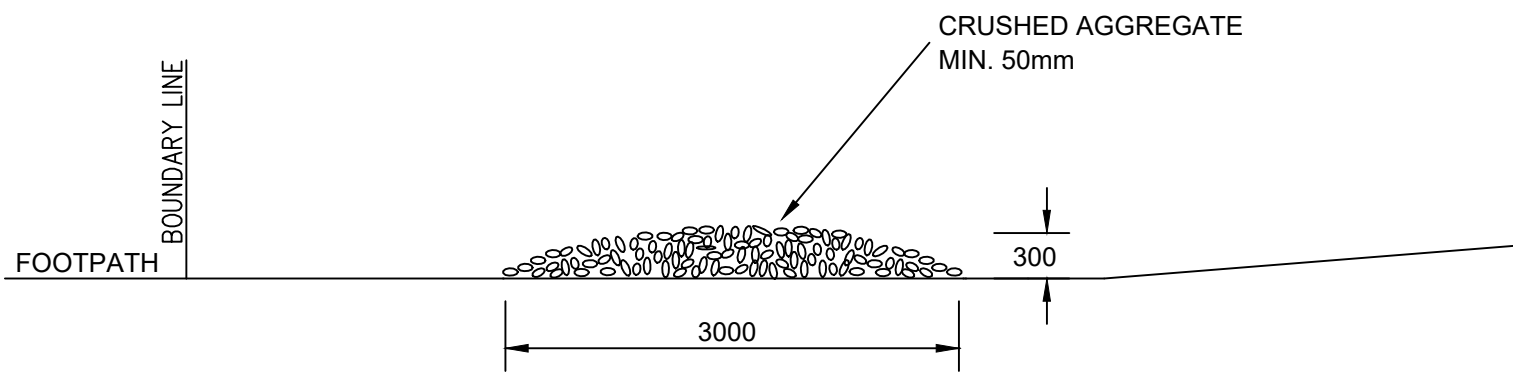
MESH & GRAVEL FILTER "SAUSAGE" BARRIER



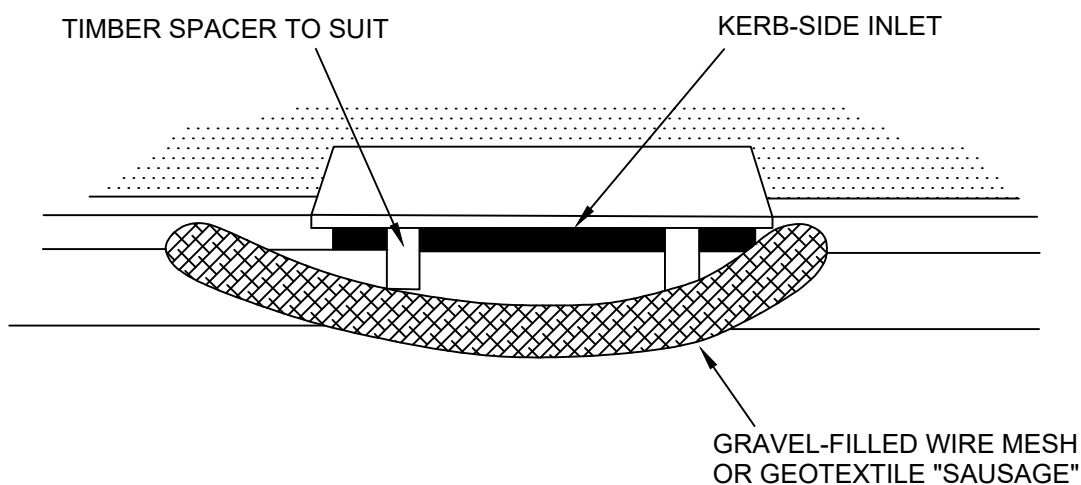
CATCH DRAIN DETAIL



STRAW BALE & CRUSHED ROCK SEDIMENT FILTER



VEHICLE DUST SHAKE DOWN DETAIL



CONSTRUCTION NOTES

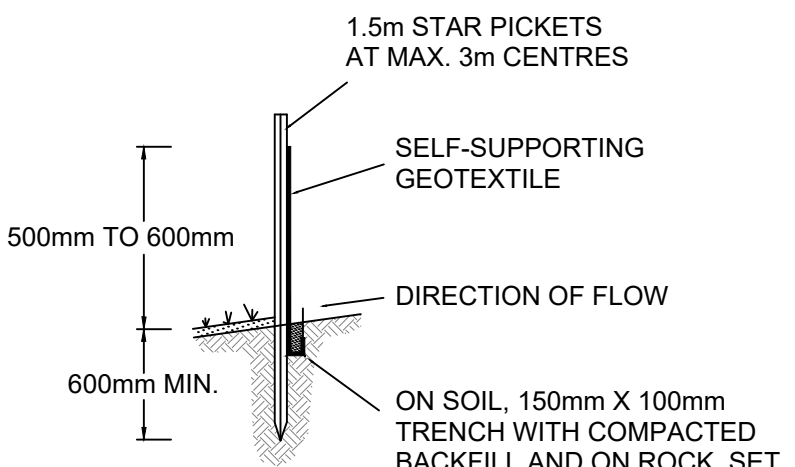
- 1. INSTALL FILTERS TO KERB INLET ONLY AT SAG POINTS.
- 2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
- 3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH X 400mm WIDE.
- 4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET MAINTAIN THE OPENING WITH SPACER BLOCKS.
- 5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING FILTER.
- 6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

MESH & GRAVEL INLET "SAUSAGE" FILTER

CONSTRUCTION NOTES

- 1. CONSTRUCT SEDIMENT FENCE AS CLOSE AS POSSIBLE TO PARRALLEL TO THE CONTOURS OF THE SITE.
- 2. DRIVE 1.5m LONG STAR PICKETS INTO GROUND 2.5 METRES APART (MAX.)
- 3. DIG A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
- 4. FIX SELF-SUPPORTING GEOTEXTILE TO UPSLOPE SIDE OF POSTS WITH WIRE TIES OR AS RECOMMENDED BY GEOTEXTILE MANUFACTURER.
- 5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
- 6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

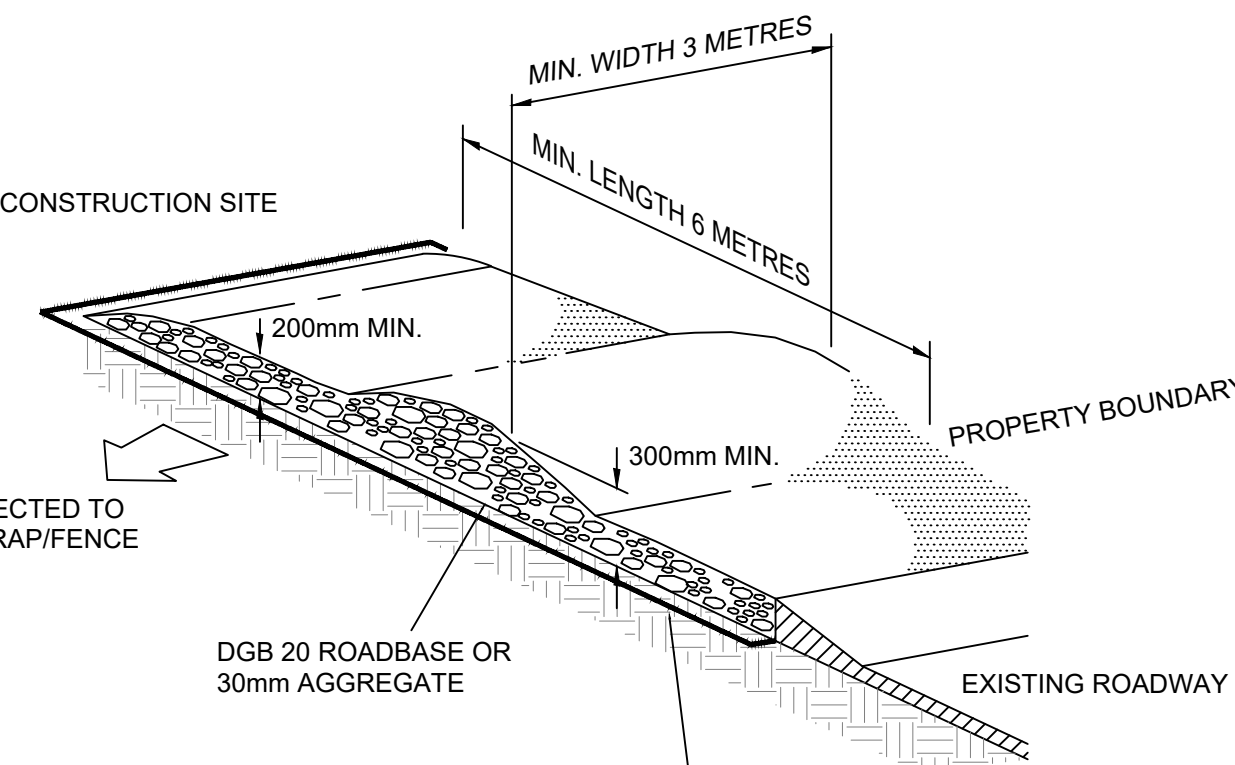
SEDIMENT FENCE



SECTION DETAIL

CONSTRUCTION NOTES

- 1. STRIP TOPSOIL AND LEVEL SITE.
- 2. COMPACT SUBGRADE.
- 3. COVER AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
- 4. CONSTRUCT 200mm THICK PAD OVER GEOTEXTILE USING ROADBASE OR 30mm AGGREGATE. MINIMUM LENGTH 15 METRES OR TO BUILDING ALIGNMENT. MINIMUM WIDTH 3 METRES.
- 5. CONSTRUCT HUMPS IMMEDIATELY WITHIN BOUNDARY TO DIVERT WATER TO A SEDIMENT FENCE OR OTHER SEDIMENT TRAP.



STABILISED SITE ACCESS

REV	AMENDMENT	ISSUED	DATE
A	PRELIMINARY ISSUE	TW	08/07/19



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Client:

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57-69 TATTERSALL RD, KINGS PARK
INTERNAL ACCESS ROAD

EROSION AND SEDIMENT CONTROL DETAILS

Designed: TW
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Checked: AD
Scales: Plan -
Horiz. -
Vert. -
X-Sect. -
Datum: A.H.D.

Plan No.
CC160136-1-811
File Ref.
CC160136
REV.
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Appendix C – S3QM Deemed to Comply Certificate

S3QM Deemed to Comply Certificate

Certificate Number: **4066**

This certificate confirms that the proposed development will meet Blacktown City Council's requirements for water sensitive urban design described in Blacktown Development Control Plan (Part J) 2015.

Terms used in this certificate or in the commitments have the meaning given by Blacktown Development Control Plan (Part J) 2015.

General Manager

Blacktown City Council

Date of Issue: **Mon Jul 01 2019**

To be valid this certificate must be lodged within 3 months of the date of issue:

Project Summary

Author	alan@barkerryanstewart.com.au
Project Name	Autorecyclers Pty Ltd
Site Address	57-69 Tattersall Road, Kings Park
Lot/DP Number	100/792731
Project Number	CC160136
Land use	Industrial

Compliance

Does the project comply with all relevant criteria?	Yes
---	-----

Site Details

Site Area (m ²)	14052
Roof Area (m ²)	237
Road Area (m ²)	8559
Other Impervious Area (m ²)	5256
Pervious Area (m ²)	0

Applicable Development Controls

Water Conservation	Yes
On-site water quality	No
On-site works, Section 94 or VPA	Section 94 mandatory contribution required and the construction of a Gross Pollutant Trap and a Hydrocarbon Trap.
On-site detention	Yes
Groundwater (more than 1.5m of cut or fill or more than 1m of cut or fill if development is on waterfront land)	Yes
Waterfront Land (within 40m of a waterway)	Yes

Statement of Commitments

OSD Commitments

Site	
<i>Site Area (m²)</i>	14052
<i>Site Area NOT draining to OSD (m²)</i>	0
Reduced Levels (AHD)	
<i>RL of Top of Tank (m)</i>	39
<i>RL of Bottom of OSD Tank (m)</i>	35.99
<i>RL of 1.5 Year ARI Overflow Weir (m)</i>	37.525
<i>RL of Emergency Overflow Weir (m)</i>	38.315
<i>RL of 1.5 Year ARI Orifice Centreline (m)</i>	36.4
<i>RL of 100Year ARI Orifice Centreline (m)</i>	36.35
<i>RL of Invert of Discharge to Council Drainage (m) Pit</i>	35.8
<i>RL of obvert of Pit outlet pipe (m)</i>	36.175
<i>Minimum RL of Garage Floor (m)</i>	39.09
<i>Minimum RL of House Floor (m)</i>	39.19
OSD Details	
<i>Internal Height (m)</i>	3.01
<i>Required Storage BELOW 1.5 Year ARI Overflow Weir (m³)</i>	422.12
<i>Required Storage BELOW Emergency Overflow Weir (m³)</i>	639.37
Additional Details	
<i>Length of Emergency Overflow Weir (m)</i>	1.8
<i>Number of 1.5 Year ARI Orifices</i>	1
<i>Number of 100 Year ARI Orifices</i>	1
<i>1.5 Year ARI Orifice Size (mm)</i>	158
<i>100 Year ARI Orifice Size (mm)</i>	299.5
Discharge Details	
<i>Using Filter Cartridges to manage Water Quality</i>	No
<i>1.5 Year ARI Discharge (l/s)</i>	56.2
<i>1.5 Year ARI Orifice Discharge (l/s)</i>	56.2
<i>100 Year ARI Discharge (l/s)</i>	267
<i>100 Year ARI Orifice Discharge (l/s)</i>	267

Water Conservation Commitments

Catchment 1

Roof area connect to tank	100 %
Total Tank Capacity	10.0 kl
Irrigated Area	0 m ²
Number of Toilets and Urinals	0
Non Potable Demand	0.08 kl/day

Water Quality Commitments

Water Quality Commitments	Not Required
---------------------------	--------------

Below Ground OSD Summary with calculated values**Site:** 56-69 Tattersall Road Kings Park SSD.

Site Area	14052 m ²
Site Area NOT Draining to OSD	0 m ²

Reduced Levels (AHD):

RL of Top of Tank	39
RL of Bottom of OSD Tank	35.99
RL of 1.5 Year ARI Overflow Weir	37.76
RL of Emergency Overflow Weir	38.675
RL of 1.5 Year ARI Orifice Centerline	36.4
RL of 100 Year ARI Orifice Centreline	36.35
RL of Invert of Discharge to Council Drainage Pit	35.8
RL of obvert of Pit outlet pipe	36.175
Minium RL of Garage Floor	39.09
Minium RL of House Floor	39.19

OSD Volume:

Required Storage BELOW 1.5 Year ARI Overflow Weir	421.6 m ³
Required Storage BELOW Emergency Overflow Weir	639.4 m ³

Discharge Details:

Using Filter Cartridges to Manage Water Quality	No
Discharge Location	Council Drainage Pit
Length of Emergency Overflow Weir	1.80 m
Maximum 1.5 Year ARI Site Discharge	56.21 L/s
1.5 Year ARI Orifice Discharge	56.21 L/s
Maximum 100 Year ARI Site Discharge	266.99 L/s
100 Year ARI Orifice Discharge	266.99 L/s

Orifice Details:

Number of 1.5 Year ARI Orifices	1
Number of 100 Year ARI Orifices	1
1.5 Year ARI Orifice Size (mm)	150.5 mm
100 Year ARI Orifice Size (mm)	287.0 mm

Notifications:

Access grates to be provided such that the maximum reach from any point in the tank to the nearest grate is 6.0m.

Appendix D – Jellyfish Filter Details

Jellyfish® Filter

Highest Flow Rate/Lowest Head Loss



The Jellyfish Filter is a stormwater quality treatment technology featuring high surface area and high flow rate membrane filtration at low driving head. By incorporating pretreatment with light-weight membrane filtration, the Jellyfish Filter removes floatables, trash, oil, debris, TSS, fine silt-sized particles, and a high percentage of particulate-bound pollutants; including phosphorus and nitrogen, metals and hydrocarbons.

The high surface area membrane cartridges, combined with up flow hydraulics, frequent backwashing, and rinsable/reusable cartridges ensures long-lasting performance.

Features

- High surface area, high flow rate membrane filtration
- Highest design treatment flow rate per cartridge (5 L/S)
- Low driving head (typically 460 mm or 300)
- Lightweight cartridges with passive backwash
- Field performance verified

Benefits

- Long-lasting and effective stormwater treatment
- Compact system with a small footprint, lower construction cost
- Design Flexibility, lower construction cost
- Easy maintenance and low life-cycle cost
- Superior pollutant capture with confidence
-
-

Applications

- Urban development
- Highways, airports, seaports, and military installations
- Commercial and residential development, infill and redevelopment, and stormwater quality retrofit applications
- Industrial Sites



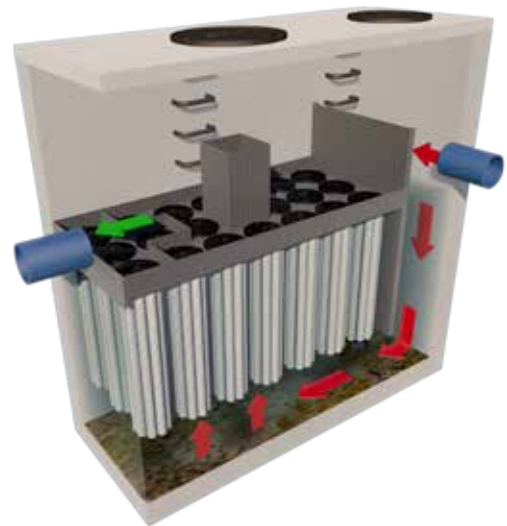
Kerb Inlet Jellyfish Filter is installed in a commercial development

Configurations

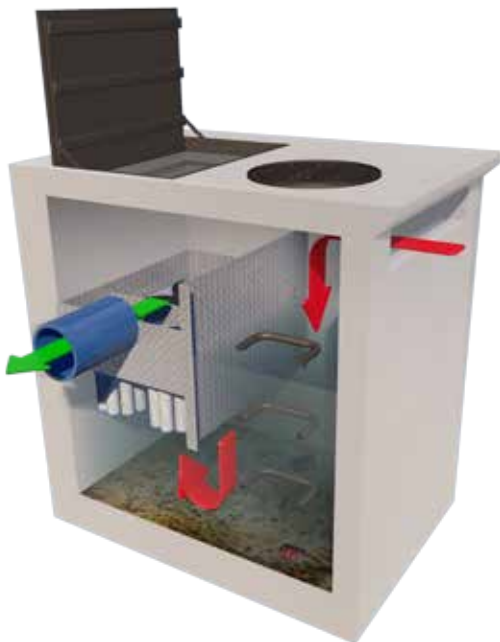
The Jellyfish Filter is available in a variety of configurations. Typically, 460 mm of driving head is designed into the system. For low drop sites, the designed driving head can be less.



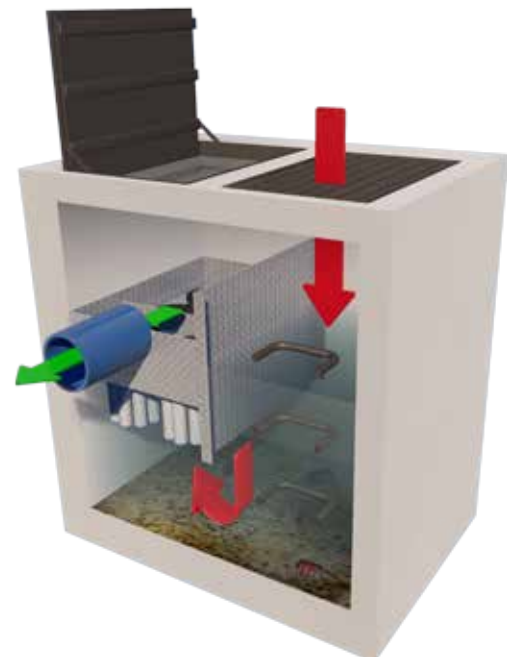
Manhole



Vault



Kerb Inlet



Grated Inlet

Inspection and Maintenance

Inspection and maintenance activities for the Jellyfish Filter typically include:

- Visual inspection of deck, cartridge lids, and maintenance access wall
- Vacuum extraction of oil, floatable trash/debris, pollutants and sediment from manhole sump.
- External rinsing and re-installing of filter cartridges.
- Replacement of filter cartridge tentacles as needed. Cartridge replacement intervals vary by site; replacement is anticipated every 2-5 years.



The Jellyfish Filter Cartridge Rinse



The Jellyfish Filter tentacle is light and easy to clean

Inspection Frequencies:

- A minimum of two inspections during the first year of operation to assess the sediment and floatable pollutant accumulation, and to ensure proper functioning of the system.
- Inspection frequency in subsequent years is based on the inspection and maintenance plan developed in the first year of operation. Minimum frequency should be once per year.
- Inspection is recommended after each major storm event.
- Immediately after an upstream oil, fuel or other chemical spill.

Appendix E – StormFilter Operations & Maintenance Manual



StormFilter

Operations & Maintenance Manual

Table of Contents

Introduction.....	2
Why do I need to perform maintenance?	2
Health and Safety	3
Personnel health and safety	3
How does it Work?	4
Maintenance Procedures	4
Primary Types of Maintenance.....	4
Inspection	5
Minor Service.....	5
Major Service (Filter Cartridge Replacement)	5
Additional Types of Maintenance	6
Hazardous Material Spill.....	6
Blockages	6
Major Storms and Flooding	6
Disposal of Waste Materials.....	6
Maintenance Services.....	6

Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter as recommended by the manufacturer.

The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, and soluble nutrients) using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter.

Health and Safety

Access to a StormFilter unit requires removing heavy access covers/grates, and it is necessary to enter into a confined space. Pollutants collected by the StormFilter will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the StormFilter, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

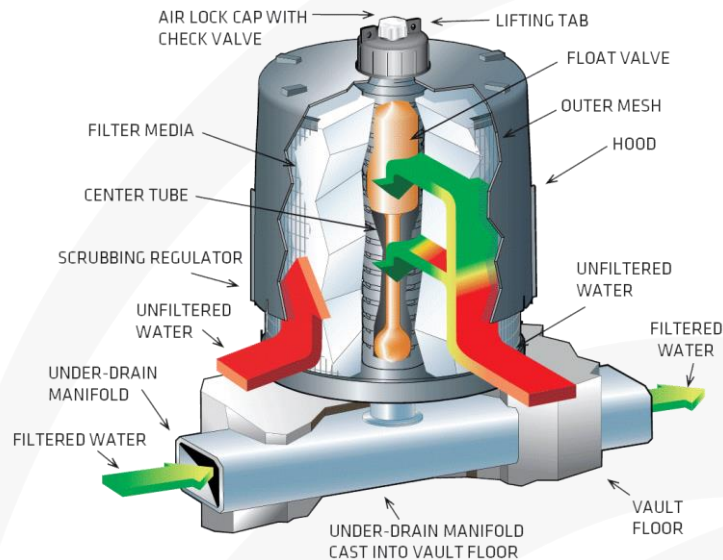
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter maintenance can be performed from surface level, there will be a need to enter the StormFilter system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

How does it Work?

Stormwater enters the cartridge chamber, passes through the filtration media and begins filling the cartridge center tube. When water reaches the top of the cartridge the float valve opens and filtered water is allowed to drain at the designed flow rate. Simultaneously, a one-way check valve closes activating a siphon that draws stormwater evenly throughout the filter media and into the center tube. Treated stormwater is then able to discharge out of the system through the underdrain manifold pipework.



As the rain event subsides, the water level outside the cartridge drops and approaches the bottom of the hood, air rushes through the scrubbing regulators releasing the water column and breaking the siphon. The turbulent bubbling action agitates the surface of the cartridge promoting trapped sediment to drop to the chamber floor. After a rain event, the chamber is able to drain dry by way of an imperfect seal at the base of the float valve.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter.

	Description of Typical Activities	Frequency
Inspection	Visual Inspection of cartridges & chamber Remove larger gross pollutants Perform minimal rectification works (if required)	Every 6 Months
Minor Service	Evaluation of cartridges and media Removal of accumulated sediment (if required) Wash-down of StormFilter chamber (if required)	Every 12 Months
Major Service	Replacement of StormFilter cartridge media	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Inspection

The purpose of the inspecting the StormFilter system is to assess the condition of the StormFilter chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter weir.

Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter system, whilst assessing the condition of the cartridge media.

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. Evaluate StormFilter cartridge media (if exhausted schedule major service within 6 months)
4. Measure and record the level of accumulated sediment in the chamber
(if sediment depth is less than 100 mm skip to step 9)
5. Remove StormFilter cartridges from the chamber
6. Use vacuum unit to removed accumulated sediment and pollutants in the chamber
7. Use high pressure water to clean StormFilter chamber
8. Re-install StormFilter cartridges
9. Replace access cover(s)

Major Service (Filter Cartridge Replacement)

For the StormFilter system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

Trigger Event	Maintenance Action
Cartridge media is exhausted ^[1]	Replace StormFilter cartridge media ^[2]

[1] Multiple assessment methods are available, contact Ocean Protect for assistance

[2] Replacement filter media and components are available for purchase from Ocean Protect.

This service is designed to return the StormFilter device back to optimal operating performance

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media.
4. Utilise a vacuum unit to remove exhausted media from each cartridge
5. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
6. Use high pressure water to clean StormFilter chamber
7. Inspect each empty StormFilter cartridges for any damage, rectify damage as required
8. Re-fill each cartridge with media in line with project specifications
9. Re-install replenished StormFilter cartridges
10. Replace access cover(s)

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the StormFilter unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination, depending on the type of spill event it may be necessary to replace the filtration media.

Blockages

In the unlikely event that flooding occurs upstream of the StormFilter system the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
2. Inspect the StormFilter unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the StormFilter must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter media has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our StormFilter system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement media for cartridges.

For more information please visit www.OceanProtect.com.au