APPENDIX 11

Integrated Water Cycle Management Strategy

J.J.Richards & Sons Pty Ltd

Total Waste Management

Integrated Water Cycle Management Strategy

Liquid Waste Facility and Depot at 14 Rayben Street, Glendenning

February 2016

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1 Background Information

This Integrated Water Cycle Management Strategy has been written Nick Brown of Duggan & Hede Pty Ltd. Nick is an experienced civil, water and environment engineer and has undertaken numerous integrated water cycle management strategies for residential, commercial and industrial developments. Nick completed his Bachelor of Civil Engineering at the University of Queensland in 2003. Nick is a member of the Stormwater Industry Association, a member of the Institution of Engineers, a Chartered Professional Engineer (CPEng), a Registered Professional Engineer of Queensland (RPEQ) and is on the National Professional Engineers Register (NPER).

2 Executive Summary

This Integrated Water Cycle Management Strategy has been prepared for JJ Richards & Sons Pty Ltd (J.J. Richards) for the establishment of a new Liquid Waste Facility and Depot at 14 Rayben Street, Glendenning.

This plan demonstrates that the proposed facility will achieve the requirements of Blacktown City Council's (BCC) DCP and the Secretary's Environmental Assessment Requirements (SEARs) (Ref SSD6767) including (with relevant sections of this report in brackets):

- Waterfront Land (**Section 5**);
- Flooding (**Section 6**);
- Stormwater Quantity (**Section 7**);
- Stormwater Quality (**Section 8);**
- Water Conservation (**Section 8.9**);
- Groundwater (**Section 9**);
- Process Water Issues (**Section 10**);
- Sediment and Erosion Control (**Section 11**);
- Lifecycle costs (**Section 12**);

Section 3.3 of this report provides a summary of how the above issues have been addressed.

The site is described as Lot 123 DP 870988 (formerly Lots 1-3 DP802117) Parish of Rooty Hill County of Cumberland (Figure 3.3) and has an area of 7,214 m2. There is an office and an industrial building in the south-western corner and a large expanse of concrete pavement in the eastern and northern parts of the site, which is used for vehicle parking and bin storage.

The proposed Organics Building (which will house equipment for loading/unloading, treatment and storage (of sludge)) will be located across the western half of site. The proposed Oil Storage Area including tank farm and loading bay will be located on the east of the site. A 20m long weighbridge is also proposed and will be positioned near the eastern boundary of site. The existing office building will be retained onsite, as will most the existing concrete pavement. The existing industrial building will be demolished.

The requirements of BCC and SEARs have been met by the proposed development. This Integrated Water Cycle Management Plan:

- Shows no impacts or works in the Drainage Reserve / Constructed Channel;
- Demonstrates that the proposed development is above the Probable Maximum Flood level;

- Demonstrates that the proposed development requires peak flow mitigation. This will be achieved through the use of detention storages sized according the detention requirements for developments within the *'All Other Hawkesbury River Sub –Catchments'*;
- Identifies the environmental values of the receiving environment;
- Achieves the stormwater quality load reduction targets and water conservation targets set for the development area;
- Achieves the requirements of 80% of non potable water uses supplied by non potable water sources;
- Shows that groundwater quality will remain unaffected by the development; and
- Addresses spill containment and process water issues;
- Shows how sediment and erosion will be limited during the construction phrase; and
- Provides life cycle cost analysis for the proposed stormwater quality improvement devices proposed;

This report has been prepared generally in accordance with Blacktown City Council requirements and Secretary's Environmental Assessment Requirements (SEARs) (Ref SSD6767). Accordingly, both the Blacktown City Council DCP Compliance Matrix and Sears Compliance Matrix are presented in **Attachments A** and **B** with relevant information or references provided.

3 Introduction

3.1 Background

In order to meet future commercial and environmental demand, J.J. Richards & Sons Pty Ltd proposes to establish a Liquid Waste Facility as an adjunct to its existing depot at 14 Rayben Street Glendenning. This site was developed in the 1990s and has since been used as a transport depot, including workshop and ancillary offices. J.J. Richards also has a transport depot, including workshop and ancillary offices at 7 Rayben Street (opposite this site).

J.J. Richards currently operate a similar (licenced) grease trap treatment plant at Units 23-24 / 20 Tucks Road, Seven Hills NSW 2147. Activities currently undertaken in this facility will be transferred to the proposed development site.

J.J. Richards, on its own and through Southern Oil Collection Services also operates used oil storage and aggregation facilities throughout New South Wales, Queensland, Victoria and South Australia. These facilities provide feedstock for Southern Oil and Northern Oil's used oil re-refineries at Wagga Wagga in NSW and Yarwun in central Queensland.

J.J. Richards has also recently acquired an interest in the liquid food waste collection business of Pulpmaster Australia. This provides for the onsite (at the customer's premises) processing of food waste for bulk collection. Such is then aggregated and transported for beneficial reuse in the cultivation of feed crops on farms in the Sydney region.

3.2 Project Overview

The proposed Liquid Waste Facility will:

- Store and treat grease trap waste that is liquid waste (K110 type waste*) as defined in the POEO Act. This treatment will generally involve separating liquids from solids and discharging treated liquids as trade waste to Sydney Water's sewer system. The resultant solids or sludge will then be transported for beneficial reuse in the cultivation of feed crops on farms in the Sydney region. The Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 (the Treated Grease Trap Waste Exemption 2014) exempts a consumer of treated grease trap waste from certain requirements under the POEO Act and the Waste Regulation in relation to the application of that waste to land, provided the consumer complies with the conditions of this exemption;
- Store food waste that is liquid waste (K120 type waste*) as defined in the POEO Act for aggregation and transport for beneficial reuse in the cultivation of feed crops on farms in the Sydney region. The Resource Recovery Exemption under Part 9, Clauses 91 and 92 of the Protection of the Environment Operations (Waste) Regulation 2014 (the Liquid Food

Waste Exemption 2014) exempts a consumer of liquid food waste from certain requirements under the POEO Act and the Waste Regulation in relation to the application of that waste to land, provided the consumer complies with the conditions of this exemption;

- Store used oil (J100 type waste*) – including mineral oils unfit for their original intended use, oil filters, transformer fluids (excluding PCB's), waste hydrocarbons for resource recovery, aggregation and transport to re-refining and other facilities for treatment and reuse;
- Store and treat industrial oily water (J120 type waste* - waste oil / hydrocarbons mixtures / emulsions in water). This treatment will generally involve separating used oils, hydrocarbons and solids and discharging treated liquids as trade waste to Sydney Water's sewer system. The resultant used oil will be stored for resource recovery, aggregation and transport to re-refining and other facilities for treatment.

The above asterisked waste types (J100, J120, K110 and K120) are based on the 'NEPM' Controlled Waste NEPM waste codes. NEPM is a National Environment Protection Measure made by the National Environment Protection Council (NEPC), a statutory body consisting of the environment ministers from each State and Territory, and the Commonwealth.

Liquid waste for the facility will be collected in tankers from premises throughout Sydney and transported to the proposed facility for storage, resource recovery, aggregation and possibly treatment.

Loading and unloading areas will have external bunding and inground sumps for adequate spill control.

Equipment for unloading, treatment, storing and loading of K110 liquid grease trap and K120 food waste will be located within the Organic Waste Building. The bunded tank farm within this building will also provide spill.

Equipment for unloading, treatment, storing and loading of J100 used oil and J120 industrial oily water, will be located within the Used Oil Roof Structure. The bunded tank farm within this structure will also provide spill protection.

The existing industrial building will be demolished and some existing concrete pavement will be removed to allow for the construction of these works.

There will be no discharge of process liquids or sludges from the facility to the northern drainage channel or from the site, other than to sewer etc as described above.

3.3 Key Issues and Objectives

Blacktown City Council, NSW EPA, NSW Office of Water, Sydney Water, the Department of Primary Industries and Sydney Catchment Authority have varying interest levels in relation to the management of water at the proposed site. The list

below identifies key issues for the site and provides an explanation of the level of analysis required to ensure the risk is mitigated to an acceptable level.

a) Waterfront Land:

The proposed development is considered to be on waterfront land due to the development site's close proximity to the adjacent drainage reserve / constructed channel. This IWCMS does not propose any works within the channel. Due to the degraded nature of the channel and surrounding catchment being industrial, the channel does not provide habitat for permanent aquatic fauna. The channel has a stream order of 1 and a classification Class of 4 to 3. The adjacent properties to the east and west have buildings directly adjacent to the northern property boundary. Reclamation of lands adjoining the drainage reserve / constructed channel for the extension of the riparian zone of the channel is not proposed and impractical, and would provide limited benefits to the local ecology. Refer to **Section 5** for further details regarding waterfront land.

b) Flooding:

The proposed site is affected by the Low Flood Risk Precinct of the Eastern Creek Floodplain. The Low Flood Risk Precinct is all land between the 1% and PMF flood events. The 1% AEP flood level at the site varies from 28.33 to 28.42m which is greater than 1m below the lowest elevation on site (29.46m), whilst the PMF flood level is 28.95m which is 0.5m below the lowest elevation on site (29.46m). Refer **Section 6** for further details regarding flooding.

c) Stormwater Quantity:

The property is within the Hawkesbury River Sub-Catchments. Onsite detention is required for industrial developments within this sub-catchment with an area exceeding 500m². The new development area is 2290m², therefore detention storage is required. The new development is broken into three areas and detention storage has been provided for each of these areas. **Section 7** provides detention storage volumes and permissible discharge and orifice sizing calculations for the proposed development, further details regarding stormwater quantity and how BCC requirements have been met. Note: the proposed development is not considered worsening in terms of peak flows as the fraction impervious of the site will not change. Detention storage has been provided as it is a requirement of BCC for industrial development areas that exceed 500m² within the Hawkesbury River Sub Catchment.

d) Stormwater Quality:

The proposed site is within an existing industrial precinct, and the drainage reserve / constructed channel adjacent to the north boundary is significantly degraded and provides little environmental values or human uses. The requirements of Blacktown DCP 2015 Part J, Section 2.1 states any industrial development with more than 150m² of new impervious area is required to meet the stormwater quality and waterway stability requirements. A discussion is presented in **Section 4.3** regarding the NSW Government is developing a Lower Hawkesbury-Nepean Nutrient Management Strategy. This will contribute to meeting the NSW Government's objective to manage nutrient

inputs so agreed environmental values can be achieved over time and regional water quality guidelines can be developed. The environmental values identified as applying for all of the lower Hawkesbury-Nepean catchment waterways are listed in **Section 4.3**. Blacktown City Council water quality targets set to the proposed site are tabulated below:

Table 3.1 – Load Reduction Targets

Pollutant	% Post development pollutant reduction target
Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorous	65%
Total Nitrogen	45%
Total Hydrocarbons	90%

These targets will be meet through the inclusion of stormwater quality improvements devices sized using MUSIC (Version 6). By meeting BCC load reduction targets the proposed site will be beneficial development in terms of stormwater quality.

Blacktown City Council sets strict assessment criteria for stormwater quality. The approach to address stormwater quality of the proposed site will utilise a full analysis approach whereby computer modelling will be used to size mitigation devices to ensure the best environmental outcome are achieved for the proposed site and receiving environment. Refer **Section 8** for further details.

e) Water Conservation:

The proposed site has limited water use onsite, with the main water demands being operational use during water processing, washdown and landscape irrigation. Blacktown City Council DCP 2015 Part J, Section 4.3 states industrial development must supply 80% of their non potable water demand using non potable sources. The department of primary industries and other state authorities seek a water balance analysis approach to show the review the effectiveness of water conservation at the proposed development area. Refer to **Section 8.9** for details of the water balance analysis for the proposed site. BCC requirements for industrial developments have been met.

f) Groundwater:

The proposed development is to be located within an existing site which has impervious surfaces across the entire site. This will be maintained. There is no proposal to discharge, infiltrate or release water to sub surface. Refer to **Section 9** for further details.

g) Process Water:

The proposed development will be located within a fully developed impervious site (all buildings and concrete pavement, except for perimeter landscaping).

All activities will be undertaken within bunded areas within buildings.

There are also adequate spill control mechanisms proposed and no process water will be discharged from the site other than to sewer.

As the development site and proposed building floor levels will be above the 1% AEP and PMF Eastern Creek flood level there is no potential risk of flood waters inundating the processing building and releasing effluent. The site has limited external catchments which contribute to site flows; hence it is unlikely that flash flooding could occur on site due to the local and site catchment characteristics. Refer to **Section 10** for further details.

h) Sediment and Erosion Control:

Sediment and erosion control for the development is addressed in accordance with the Landcom's Blue Book (Managing urban stormwater: soils and construction Vol. 1). The transport of sediment from the proposed site will be low risk as the area of exposed soil is limited to the area of the proposed shed. Refer to **Section 11** for further details.

3.4 Baseline Conditions and Water Monitoring

An assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions. The development will not affect any water resource as the development will be beneficial to the water quality of the receiving environment. Stormwater quality monitoring to determine baseline and operational water quality conditions is therefore not proposed for this development. The proposed development will not change the development type, nature, extent and imperviousness of the existing site. The development results in more trafficked areas across being roofed. The development will only provide improved water quality as the load reduction targets for the development as set by Blacktown City Council will be met.

4 Site Characteristics

4.1 Location

The development site is at 14 Rayben Street, Glendenning. It is described as Lot 123 DP 870988 (formerly Lots 1-3 DP802117) Parish of Rooty Hill, County of Cumberland (Figure 3.3) and has an area of 7,214 m^2. The site development area under this application is 2290m^2.

The existing site is an industrial lot which is currently used by JJ Richards as a depot for waste management activities (refer to **Figure 3.1)**. The site exists within an industrial estate with the surrounding lots all industrial. To the north of site is a drainage reserve / constructed channel which conveys flows from the surrounding industrial lots to Eastern Creek, 600m east of site. The Rayben Street frontage is along the southern property boundary.

4.2 Topography and Drainage

The topography of the site is described as flat and falling generally from West to East and South to North. The highest elevation across the subject site is 30.49m AHD adjacent to the existing shed buildings. The lowest elevation on the existing site is at the north eastern corner of site and is 29.46m AHD. The existing site is nearly entirely impervious with the exception of landscaping which borders the site's property boundaries.

The existing site stormwater drainage includes several stormwater pits and pipes (refer **Drawing No RI456-SW-01**). There is a drainage easement along the inside of the northern property boundary which conveys the existing site stormwater drainage to the east and then into a constructed drainage channel (to the immediate north of the site) downstream of the site.

This constructed drainage channel conveys flows from the surrounding industrial precinct to Eastern Creek, which is some 600m east of site. The channel is significantly degraded due to the contributing industrial type land uses. Due to the development sites close proximity to the adjacent drainage reserve / constructed channel the development is considered to be on waterfront land.

The development has no external catchments which contribute to surface flows across the proposed site.

The development site is within the Low Flood Risk Precinct of the Eastern Creek Floodplain and part of the Hawkesbury River Sub-Catchment in accordance with Blacktown City Council Development Control Plan.

4.3 Catchment and Downstream Receiving Waters Ecological Values

The development site is within the Hawkesbury-Nepean catchment which covers over 21,400km^2. In 2011, more than 60% of the population of NSW lived in the Hawsbury-Nepean region. The catchment includes the Sydney Metropolitan region

and the catchment for Warragamba, the Upper Nepean and the Mangrove Creek dams which are the main supply reservoirs for the Sydney Metropolitan area. Natural resources in the region support a diverse range of livelihoods, lifestyles, recreational activities and provide safe drinking water for the region. Industries supported include fisheries, power generation, tourism, agriculture, viticulture and market gardening.

The NSW Government is developing a Lower Hawkesbury-Nepean Nutrient Management Strategy which will contribute to meeting the NSW Government's objective to manage nutrient inputs so agreed environmental values can be achieved over time and regional water quality guidelines can be developed. Hawkesbury-Nepean catchment involves many Authorities and Partnerships at State, Regional and Local levels.

The environmental values that have been identified as applying to all of the lower Hawkesbury-Nepean catchment waterways are:

- Protection of aquatic ecosystems;
- Secondary contact recreation (such as boating);
- Visual Amenity;

Although some sections of the river and tributaries have been recognised as providing additional environmental values such as water for irrigation and general use, human consumption of aquatic foods and primary contact recreation, the site does not discharge directly to receiving waters which involve these additional environmental values.

The land surrounding the site is heavily industrial and the drainage reserve / constructed channel adjacent to the north boundary is significantly degraded. For details regarding stream order and classification class of the drainage reserve refer **Section 5**.

An Ecological Assessment of the drainage channel has been undertaken and is included as **Appendix 13** of the Environmental Impact Statement by Duggan & Hede Pty Ltd. This included a macroinvertebrate survey, which only identified a limited number (< 50) of very pollutant tolerant macroinvertebrates. As such, a stream pollution index (SPI) could not be determined although it (and the water quality) is obviously low.

This assessment concurs with the Blacktown City Council Waterway Health Report Card 2014-2015 (refer **Attachment E**) which observes poor macroinvertebrates diversity is present in all waterways upstream and downstream of site.

5 Waterfront Land

The proposed development is considered to be on waterfront land due to the development site's close proximity (i.e. within 40m) to the adjacent drainage reserve / constructed channel. As a result, the development is required to address several criteria in regards to impacts the adjoining drainage reserve / constructed channel.

The existing site stormwater drainage includes several stormwater pits and pipes. There is a drainage easement along the inside of the northern property boundary which conveys the existing site stormwater drainage to the east and then into the constructed drainage channel (to the immediate north of the site) downstream of the site.

As the proposed development is outside the North West Growth Centre boundary, the Water Management Act 2000 requires the adjoining drainage reserve / constructed channel to be classified under the Strahler system. In accordance with the Strahler system the adjoining drainage reserve / constructed channel is at the top of the catchment and therefore has a stream order of 1. Using the waterway classification system (Table A2: I&I NDW classification of fish habitat in NSW waterways and recommended crossing type. From Fairfull and Witheridge (2003)) the adjoining constructed channel has a classification Class of 4 to 3 as the drainage channel experiences intermittent flow and there is some semi-permanent pools within the channel after a rain event. The drainage reserve /constructed channel is degraded and only provides limited potential refuge and is unlikely to provide breeding or feeding areas for aquatic fauna.

An Ecological Assessment of the drainage channel has been undertaken and is included as **Appendix 13** of the Environmental Impact Statement by Duggan & Hede Pty Ltd. The assessment included a macroinvertebrate survey, which only identified a limited number (< 50) of very pollutant tolerant macroinvertebrates. As such, a stream pollution index (SPI) could not be determined although it (and the water quality) is obviously low.

In accordance with BCC DCP Part J Section 4.2 a category 3 watercourse with a stream order of 1 (in general) must have a 10 metre wide core riparian zone. The riparian zone for the adjoining channel is approximately 6-8m wide. This Integrated Water Cycle Management Strategy proposes that the existing riparian zone width remain unchanged. This has been determined in consideration of the following (in regards to the constructed channel):

- The channel as a stream order of 1;
- The upstream catchment is an industrial precinct;
- The channel is heavily degraded;
- The channel has a low stream pollution index;

- The constructed channel does not provide habitat for permanent aquatic fauna;
- The development proposal does not involve any changes to the constructed channel; and
- The existing site and channel hydrology will not change significantly as a result of the proposed development;

In addition to the above reasons, both the properties to the east and west of site have existing buildings constructed on or within 3m of the northern property boundary. The reclamation of site land for riparian purposes would achieve limited effectiveness as the adjoining properties would not be able to duplicate the riparian zones due to the location of existing buildings.

As the site is an existing site, there is no proposal to change services such as sewer, electricity, gas or communication. There is no proposal to undertake any works within the riparian zone of the constructed channel.

The proposed development will result in no changes to existing peak flows and the existing site regimes will be maintained. There will be no changes to the existing site infrastructure. This Integrated Water Cycle Management Strategy does not propose any treatment measures within the riparian zone of the constructed channel. No environmental protection works are required as a result of the proposed development.

6 Flooding

A drainage reserve / constructed channel exists along the site's northern boundary. This drainage reserve / constructed channel conveys flows to Eastern Creek which is some 600m east of site.

The proposed site is shown to be affected by the Low Flood Risk Precinct of the Eastern Creek Floodplain in accordance with Blacktown City Council Flood Risk Map. The Low Flood Risk Precinct is all land between the 1% and Probable Maximum Flood (PMF) events. A survey plan showing the existing site levels is provided in **Figure 3.3.**

The 1% AEP flood level at the site varies from 28.33 to 28.42m (east to west) whilst the lowest elevation onsite is 29.46m. Blacktown City Council recommends that a minimum floor level of 0.5m above the 1% AEP flood be adopted for the development. The existing site levels are over 0.5m above the minimum floor level set by Blacktown Development Control Plan (DCP) 2006. The PMF level for the subject site is 28.95m. This level is 0.5m below the lowest surveyed elevation on site. The existing site is not flood impacted during the Probably Maximum Flood event.

As the development site and proposed building floor levels will be above the 1% AEP and PMF Eastern Creek flood level, there is no potential risk of flood waters inundating the Organics and Tank Farm building and releasing oils/effluent. Additionally, as the site has no external catchments which contribute to site flows, it is unlikely that flash flooding could occur onsite due to the local and site catchment characteristics. The Organics and Tank Farm buildings will be bunded to contain spills within the building/farm. The bunding will also prevent surface water from entering the building.

Refer to **Section 10** for further details regarding spill containment within the Organics and Used Oil Tank Farm buildings.

7 Stormwater Quantity / Mitigation Measures

The proposed development will not result in a change to the fraction impervious across the site. The existing site is fully developed and the proposed development area will effectively be replacing concrete pavement for colorbond roof sheeting. The existing site flow regimes will be maintained across the proposed site.

There is no proposal to change any existing site stormwater drainage infrastructure. The proposed development will connect to existing stormwater as shown on **Drawing No RI456-SW-01**. The existing site stormwater drainage includes several stormwater pits and pipes. There is a drainage easement along the inside of the northern property boundary which conveys the existing site stormwater drainage to the east and then into a constructed drainage channel to the immediate north of the site.

In accordance with Blacktown City Council DCP 2015 Part J, a detention system is required for industrial development within the Hawkesbury River Sub-Catchments with a new development area exceeding 500m². The area of new development proposed is 2290m², therefore onsite detention will be provided to meet the requirements of Blacktown City Council Engineering Guide for development 2005.

7.1 Calculation of Onsite Detention Storage Requirements

Blacktown City Council Engineering Guide for Development 2005 sets Onsite Detention (OSD) parameters of maximum Permissible Discharge (PSD) and Site Storage Requirement (SSR) for industrial developments defined as *'All Other Hawkesbury River Sub – Catchments'*. These values vary based on the percentage of the site area draining to the OSD and are presented below in **Table 7.1**:

Table 7.1 – OSD Parameters – All Other Hawkesbury River Sub-Catchments

	Site Area Draining		
	100%	**90%**	**80%**
Maximum PSD (l/s/ha)	147	101	56
SSR (m³/ha)	264	301	473

The development in terms of stormwater quantity and quality has been broken into three different site areas:

- The organics building;
- The tank farm building; and
- New pavement areas;

The new pavement areas are across three areas of site, these being the new pavement area in front of the organics building, the new cross over extension near the south eastern corner of site and the proposed weighbridge. As the new pavement area is spread across three areas of site it is difficult to provide detention storage and stormwater quality improvement to each of these areas individually, the existing pavement area to the north east corner of site has been nominated as an offset area. This means the offset area nominated on **Drawing No. RI456-SW-01** will be used to offset the treatment and detention storage requirements of the new pavement areas across the proposed site. **Table 7.2** below shows the required Maximum PSD and SSR for each of the three different site areas described above.

Table 7.2 – Maximum PSD and SSR for Organics Building, Tank Farm Building and New Pavement Areas

Site Area	Area (ha)	% of Area Draining to OSD	PSD (l/s)	SSR (m^3)
Organics Building Roof A1	0.049	100%	7.2	12.9
Organics Building Roof A2	0.059	90%	5.3	15.7
Tank Farm Building	0.073	100%	10.7	19.3
New Pavement Areas	0.048	100%	7.1	12.7

As the table above shows the PSD and SSR calculations have been based on 100% of the catchment draining to the OSD, except for the Organics Building Roof A2 catchment which has 90% of the catchment area draining to the OSD. The required storage volumes for the organics and tank farm buildings will be provided within rainwater tanks as nominated on **Drawing No. RI456-SW-01**. OSD storage for the new pavement area will be provided within the landscaped area along the northern property boundary.

Table 7.3 below presents orifice sizing calculations in order to achieve the permissible discharges calculated in **Table 7.2** for each of the storages.

Table 7.3 – Permissible Discharge – Orifice Sizing Calculations

Site Area	Allowable PSD (l/s)	Height above centre of orifice (m)	Orifice Size (mm)	Calculated PSD (l/s)
Organics Building Roof A1	7.2	2.075	**49**	7.0
Organics Building Roof A2	5.3	2.48	**47**	5.3
Tank Farm Building	10.7	2.27	**66**	10.7
New Pavement Areas	7.1	0.47	**73**	7.0

The above orifice sizes are to be reviewed at detailed design stage to ensure the outlet configuration and orifice sizes are correct. Refer to **Drawing No.s RI456-SW-02 & 03** for outlet configuration details for each of the proposed development areas.

With the inclusion of the above detention storages, no worsening for the proposed site has been achieved in accordance with the requirements of Blacktown City Council. The total detention storage volume to be provided by the new development totals 60.6m³. Orifice sizing calculations have been undertaken and achieve the permissible discharge requirements for each detention storage. The proposed development achieves the requirements of Council for stormwater quantity and ensures that the storage and discharge requirements for new development have been met.

8 Stormwater Quality and Water Conservation

Blacktown DCP 2015 Part J, Section 2.1 states that any industrial development with more than 150m² of additional impervious is required to meet the stormwater quality and waterway stability requirements.

Water Sensitive Urban Design principles will used to mitigate the pollutant load to achieve the water quality load reduction targets set for the proposed development and to protect the downstream receiving waters.

As there is a potential for the proposed development to increase the export of pollutants in stormwater runoff leaving the proposed site, this section will:

- Identify Environmental Values listed for the catchment relevant to the development area and provide details of the ecological significance of receiving waters;
- State the load reduction targets set by Blacktown City Council for the site;
- Devise a Stormwater Quality Management Strategy and determine treatment methods to achieve the load reduction targets for the development area;
- Undertake MUSIC Modelling in accordance with Council's WSUD and IWCM Handbook;
- Highlight that the water stability requirements for the site have been achieved by determining Stream Erosion Index (SEI) for the proposed development area; and
- Review stormwater quality monitoring requirements for the proposed site;

Blacktown DCP 2015 Part J, Section 4.3 states industrial developments must supply 80% of their non potable water demand using non potable sources.

Water conservation requirements set by local, regional and state authorities have been addressed by the proposed development. Water balance information and calculations are provided in **Section 8.9** within this section of IWCMS. **Section 8.9** identifies the water requirements for the life of the project in terms of both volume and timing.

8.1 Environmental Values and Ecological Significance of Receiving Waters

The development site is within the Hawkesbury-Nepean catchment which covers over 21,400km². In 2011, more than 60% of the population of NSW lived in the Hawsbury-Nepean region. The catchment includes the Sydney Metropolitan region and the catchment for Warragamba, the Upper Nepean and the Mangrove Creek dams which are the main supply reservoirs for the Sydney Metropolitan area. Natural resources in the region support a diverse range of livelihoods, lifestyles, recreational activities and provide safe drinking water for the region.

Industries supported include fisheries, power generation, tourism, agriculture, viticulture and market gardening.

As discussed in **Section 4.3** the NSW Government is developing a Lower Hawkesbury-Nepean Nutrient Management Strategy which will contribute to meeting the NSW Government's objective to manage nutrient inputs so agreed environmental values can be achieved over time and regional water quality guidelines can be developed. The environmental values identified as applying for all of the lower Hawkesbury-Nepean catchment waterways are:

- Protection of aquatic ecosystems;
- Secondary contact recreation (such as boating);
- Visual Amenity;

Although some sections of the river and tributaries have been recognised as providing additional environmental values such as water for irrigation and general use, human consumption of aquatic foods and primary contact recreation, the site does not discharge directly to receiving waters which involve these additional environmental values.

The land surrounding the site is heavily industrial; the drainage channel adjacent to the north boundary is significantly degraded and provides little environmental values or human uses.

By meeting BCC load reduction targets the proposed site will be beneficial development in terms of water quality and volumetric flows.

Blacktown City Council sets strict assessment criteria for stormwater quality. The approach to address stormwater quality of the proposed site will utilise a full analysis approach whereby computer modelling will be used to size mitigation devices to ensure the best environmental outcome are achieved for the proposed site.

The proposed development is outside the North West Growth Centre boundary. According to the requirements of the Water Management Act 2000 the adjoining constructed channel is required to be classified under the Strahler system. In accordance with the Strahler system the adjoining constructed channel is at the top of the catchment and therefore has a stream order of 1. Using the waterway classification system (Table A2: I&I NDW classification of fish habitat in NSW waterways and recommended crossing type. From Fairfull and Witheridge (2003)) the adjoining constructed channel has a classification Class of 4 to 3 as the drainage reserve / constructed channel experiences intermittent flow and there is some semi-permanent pools within the drainage channel after a rain event. The drainage reserve / constructed channel only provides limited potential refuge and is unlikely to provide breeding or feeding areas for aquatic fauna.

An Ecological Assessment of the drainage channel has been undertaken and is included as **Appendix 13** of the Environmental Impact Statement by Duggan &

Hede Pty Ltd. This included a macroinvertebrate survey, which only identified a limited number (< 50) of very pollutant tolerant macroinvertebrates. As such, a stream pollution index (SPI) could not be determined although it (and the water quality) is obviously low.

8.2 Load Reduction Targets

The requirements of Blacktown DCP 2015 Part J, Section 2.1 states any industrial development with more than 150m² of new impervious areas is required to meet the stormwater quality and waterway stability requirements. As discussed in **Section 4.3** the NSW Government is developing a Lower Hawkesbury-Nepean Nutrient Management Strategy which will contribute to meeting the NSW Government's objective to manage nutrient inputs so agreed environmental values can be achieved over time and regional water quality guidelines can be developed. The environmental values identified as applying for all of the lower Hawkesbury-Nepean catchment waterways are listed in **Section 8.1**. Blacktown City Council water quality targets set to the proposed site are tabulated below:

Table 8.1 – Load Reduction Targets

Pollutant	% Post development pollutant reduction target
Gross Pollutants	90%
Total Suspended Solids	85%
Total Phosphorous	65%
Total Nitrogen	45%
Total Hydrocarbons	90%

These targets will be meet through the inclusion of stormwater quality improvement devices sized using MUSIC (Version 6). By meeting BCC load reduction targets the proposed site will be beneficial development in terms of stormwater quality.

8.3 Potential Impacts

Possible sources of contamination to stormwater runoff from activities on the site include:

- Liquid waste discharging from the site and entering Council's drainage system or the waterway to the north;
- Washdown water entering Council's drainage system;
- Stormwater coming in contact with dust, oil etc on trafficked areas and entering Council's drainage system or the waterway to the north prior to treatment;
- Oil and petroleum spillages from equipment and vehicles;

8.4 Stormwater Quality Management Strategy / Mitigation Measures

A stormwater quality management strategy has been developed for the proposed new development areas of Lot 123. The development in terms of stormwater quantity and quality has been broken into three different site areas:

- The organics building (Roof Area A1 & A2);
- The tank farm building (Roof Area B); and
- New pavement areas (Road Area A & B);

The new pavement areas are across three areas of site, these being the new pavement area in front of the organics building, the new cross over extension near the south eastern corner of site and the proposed weighbridge.

As the new pavement area is spread across three areas of site it is difficult to provide detention storage and stormwater quality improvement to each of these areas individually, the existing pavement area to the north east corner of site has been nominated as an offset area. This means the offset area nominated on **Drawing No. RI456-SW-01** will be used to offset the treatment and detention storage requirements of the new pavement areas across the proposed site.

The development of the stormwater quality management strategy for Lot 123 has been based on maintaining existing site flow regimes. The stormwater quality management strategy proposes to utilise rainwater tanks, SPEL StormSack and SPELFilters to achieve the load reduction targets set for the development.

Three rainwater tanks are proposed to be connected to the proposed buildings. The rainwater tanks were initially sized based on 30L/m² of roof area initially and then adjusted to match operational requirements of the development and to assist in achieving the design objectives. It is expected that the size of the rainwater tanks will reduce the potable water demand for the site. The captured roofwater will be utilised for washdown and irrigation. A water balance for the proposed development was undertaken which shows that 80% of the proposed development non potable water demand, can be supplied the proposed rainwater tanks (refer **Section 8.9** for details).

SPELFilters are proposed to be connected to the rainwater tank / detention tank overflows for the two roof areas of the organics building and tank farm roof. For the offset pavement area, a SPEL StormSack will be incorporated into the treatment train as a primary treatment device. Downstream of the SPEL StormSack is proposed a half height SPELFilter vault. The SPELFilters will be cleaned yearly and replaced every 10 years in accordance with the SPELFilter Inspection and Maintenance Manual provided in **Attachment D**.

The SPELFilter will act as end of line solutions, trapping and filtering fine sediment, heavy metals, hydrocarbons and nutrients before discharging via the drainage easement to the drainage reserve / constructed channel which then connects to Eastern Creek.

The organics and tank farm buildings have been designed to ensure that any spillages or contamination from the proposed activities are contained and treated

prior to discharge to the sewer. There will be no discharge to the stormwater system from the processing building. Refer to **Section 10** for further details regarding process water.

The proposed treatment train will assist to enhance the environmental outcomes of the downstream receiving waters of Eastern Creek.

Drawing No. RI456-SW-01 illustrates the treatment train discussed above refer drawings section of this report.

An inspection and maintenance manual for the proposed stormwater quality improvement devices included in the Stormwater Quality Management Strategy is presented in **Attachment D**.

The sizes of the proposed Stormwater Quality Improvement Devices (SQIDs) modelled in MUSIC are discussed below. Procedures and design requirements for the following treatment devices are in accordance with BCC WSUD and IWCM Handbook.

Treatment Nodes:

(a) *Rainwater Tank*

Three rainwater tanks will be used to capture roofwater for reuse within the facility. The location of the rainwater tanks are shown on **Drawing No. RI456-SW-01**. The tanks will reduce runoff volumes, therefore reducing contaminant loads. The rainwater tanks will also help reduce mains water consumption by providing a water supply for operational purposes such as wash down and irrigation of landscaping. The rainwater tank was initially sized based on a minimum of 30L/m² of roof area. The proposed tank sizes tabulated below were input into MUSIC taking into account the requirement of BCC for a 20% loss of storage to allow for anaerobic zones and mains water top up with the tank. Daily demands as tabulated below were applied to the rainwater tank treatment nodes in MUSIC. These demand rates apply a daily washdown and irrigation demand of 1.3kL/day. This demand rate adopts Councils landscape irrigation demand of 0.4kL/yr/m² and applies a daily washdown water demand of 7.5 mins at a rate 20L/min. The area of landscaping to be irrigated is 1050m² (90% of total landscape area) (1.15kL/day).

Table 8.2 – Rainwater Tank Details

Rainwater Tank	Tank Volume (kL)	Re-use Demand (kL/day)
Roof A1	13.6	0.4
Roof A2	13.6	0.4
Roof B	18.0	0.5

(b) SPELFilter- Vault

Four SPELFilter Vaults have been modelled in MUSIC using the generic node (for filter component) and detention basin node (for vault component). These nodes were provided by SPEL and have been modelled in accordance with advice and

model requirements provided to SPEL by BCC. **Tables 8.3** and **8.4** below set out the input parameters modelled in MUSIC for the SpelFilter and Vaults respectively.

The locations of the SPELFilter vaults are shown on **Drawing No. RI456-SW-01**. A typical section detail of each of the treatment trains is presented on **Drawing No.s RI456-SW-02 & 03.**

An Inspection and Maintenance Manual for the proposed stormwater quality improvement devices included in the Stormwater Quality Management Strategy is presented in **Attachment D**.

Table 8.3 – SPELFilter and vault input parameters

Location	No. of Filters	Highflow Bypass (l/s)	Surface Area (m^2)	Extended Detention Depth (m)	Low Flow Pipe Dia	Overflow Weir Width
Roof A1	1	2.8	1.4	0.85	50	0.5
Roof A2	1	2.8	1.4	0.85	50	0.5
Roof B	1	2.8	1.4	0.85	50	0.5
Road A &B	3 (0.5 filters)	4.2	1.4	0.50	50	0.5

(c) SPEL StormSack

A SPEL StormSack will be provided on the offset pavement area (Road A & B). The StormSack will act as a primary treatment device by reducing the gross pollutant and sediment load entering the downstream SPELFilter Vault. The SPEL StormSack has been modelled in MUSIC using the GPT Node. The node was provided by SPEL and has been modelled in accordance with advice and model requirements provided to SPEL by BCC. The highflow bypass for the StormSack was entered as 12l/s in MUSIC. The location of the SPEL StormSack is shown on **Drawing No. RI456-SW-01**. A typical section detail is presented on **Drawing No. RI456-SW-03.** An Inspection and Maintenance Manual for the proposed stormwater quality improvement devices included in the Stormwater Quality Management Strategy is presented in **Attachment D**.

8.5 MUSIC Model

The Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 6.1.0, developed by the Cooperative Research Centre for Catchment Hydrology (CRCCH) was used to model water quality for the proposed site. MUSIC provides the ability to simulate pollutant transfer through numerous catchments. This allows the effectiveness of a stormwater quality treatment train to be analysed to determine the reduction of pollutant loads. The key pollutants usually modelled are Total Suspended Solids (TSS), Total Phosphorous (TP) and Total Nitrogen (TN).

The MUSIC model developed for the proposed development area was configured according to the BCC WSUD and IWMP Handbook. The model used to analyse the proposed site is called 'RI456 MUSIC Model' and can be provided for review.

Meteorological Data

A MUSIC template was obtained from Blacktown City Council.

The template provided had rainfall set to six minute pluviographic data for the 10 year period from 1st of January 1967 to 31st December 1976. As recommended within BCC WSUD Handbook the template used the 6 minute rainfall station for use within Blacktown LGA is 067035 Liverpool (Whitlam Centre). The chosen rainfall station and period has an annual rainfall of 857mm.

Evapo-transpiration data for the 10 year period is in accordance with *Table 4* of the BCC WUSD Handbook.

Source Nodes

The Urban source node used for the modelling of the proposed development was adopted from the MUSIC model template supplied by BCC. The chosen source nodes of roof and road areas are configured to the stormwater quality parameters in Table 5 of BCC WSUD Handbook. The rainfall-runoff parameters for the source node were configured in accordance with Table 6 of BCC WSUD Handbook. The roof and road source nodes were set to 100% impervious. The development area modelled in MUSIC is shown on the Stormwater Quality Management Plan **Drawing No. RI456-SW-02**. **Table 8.4** below shows the catchment name and catchment area for development catchment. A schematic layout of the MUSIC model has been provided in **Attachment C**.

Stochastic generation estimation and serial autocorrelation set to zero has also been adopted.

Table 8.4 – Source Node Catchment Areas

Catchment Name	Area
BCC Road Area A & B	0.048
BCC Roof Area A1	0.049
BCC Roof Area A2	0.052
BCC Roof Area A2 Bypass	0.007
BCC Roof Area B	0.073
Total	**0.229**

Drainage Links

No routing has been adopted for all drainage links within each model.

8.6 MUSIC Modelling Results

Results from modelling the proposed development treatment train are presented in **Tables 8.5**. Detailed results are presented in **Attachment C**.

Table 8.5: Development Site - MUSIC Modelling Results

	GP	TSS	TP	TN
BCC Load Reduction Target (% Reduction)	90%	85%	65%	45%
Source Loads (kg/yr)	43.6	159	0.406	3.76
Residual Loads (kg/yr)	1.33	24.7	0.128	1.52
%Reduction Achieved	**96.9%**	**84.5%**	**68.4%**	**59.5%**

The modelled treatment train achieves the Load Based Reduction Targets, for Gross Pollutants (GP), Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN). The load reduction requirements for Total Hydrocarbons have been targeted using a SPELFilter Vault for the new trafficable pavements area. The SPELFilter cartridges are capable of removing hydrocarbons, with the inclusion of three half filter cartridges to filter pavement surface runoff hydrocarbon reduction targets can be met.

The total treatment train proposed for the development area includes three rainwater tanks, three one cartridge SPELFilter Vaults and one SPELFilter Vault containing three half filters. An Inspection and Maintenance Manual is provided in **Attachment D**, refer to this manual for details of inspection and maintenance procedures for the proposed devices.

8.7 Stream Erosion Index (SEI)

Blacktown City Council (BCC) requires that the post development duration of stream forming flows shall be no greater than 3.5 times the pre developed duration of stream forming flows with a stretch target of 1. BCC's Developer Handbook for Water Sensitive Urban Design Version 1.1 November 2013 sets out four steps for estimating Stream Erosion Index. These four steps are followed below to determine SEI. Note the SEI is calculated for the development area not the entire site.

1. Estimate the critical flow for the receiving waterway above which mobilisation of bed material or shear erosion of bank material commences:

a) Calculate Time of Concentration using the probabilistic rational method from equation 1.4 of AR&R Volume 1, Book 4.

$tc = 0.76A^{0.38}$ (A(km² = Ha /100), tc (hour))

= 0.76 x 0.00229 ^ (0.38)

= 0.075 hours

b) *Select I_2 (mm/hr) from the Rainfall Intensity Chart in Engineering Guide for Development based on the 2 year ARI and the calculated tc in minutes.*

I_2 (mm/hr) = 100mm/hr

c) *Determine the two year ARI runoff coefficient C_2.*

$C_2 = C_{10} \times FF_2 = 0.90 \times 0.74 = 0.666$ where Fraction Imp. is 100% and

FF2 = the 2 year frequency factor from Table 1.1 of AR&R Volume 1, Book 4 = 0.74.

d) *Using the rational method $Q_2 – 0.278 \times C_2 \times I_2 \times A$, substitute results from 2 and 3 above.*

Q_2 (m^3/s) = 0.278 x 0.666x I2 x A = 0.185 x I2 (mm/hr) x A(km^2) =

= 0.185 x 100 x 0.075

= 1.395m^3/s

e) $Q_{critical} = Q_2 \times 25\%$

= 0.349m^3/s

2. Develop and run a calibrated MUSIC Model of the area of interest for pre-development conditions to estimate the mean annual runoff volume above the critical flow:

   Pre-development mean annual runoff volume above critical flow = 1.67m^3/s

   Refer Attachment C for MUSIC model output.

3. Develop and run a MUSIC model for the post developed scenario to estimate the mean annual runoff volume above the critical flow:

   Post development mean annual runoff volume above critical flow = 1.23m^3/s

   Refer Attachment C for MUSIC model output.

4. Use the Outputs from steps 3 and 4 to calculate the SEI for the proposed scenario.

   $SEI = Sum (Q_{post} – Q_{critical}) / Sum(Q_{pre} – Q_{critical})$

   = (1.67 – 0.349) / (1.23 – 0.349)

   = 1.321 / 0.881

   = 1.499

As the above results shows the post development flows for the development area will be a two-third that of the pre-development scenario. This is because the development area is mostly roof areas which will be connected to rainwater tanks. The proposed development achieves the requirements for Stream Erosion Index as the SEI is less than 3.5.

8.8 Stormwater Quality Monitoring

There is no proposal for stormwater quality monitoring under this Integrated Water Cycle Management Strategy. The development will not affect any water resource

as the development will be beneficial to the water quality of the receiving environment. Stormwater quality monitoring to determine baseline and operational water quality conditions is therefore not proposed for this development.

The proposed development will not change the development type, nature, extent and imperviousness of the existing site. The development will only provide improved water quality as the load reduction targets for the development as set by Blacktown City Council will be achieved, refer **Section 8.6**.

8.9 Water Conservation

The proposed site has limited water use on site, with the non potable water demands being operational use for washdown and landscape irrigation. The development will not require much potable water during daily operations as the development is a Liquid Waste Facility, with a main objective being reduction in water discharged to sewer. The facility will not greatly increase existing site staff numbers. It is anticipated that a slight increase in water demand will result from the proposed development for the site resulting from a slight increase in staff numbers. The anticipated increase will however be offset by the proposed reduction in irrigation demand through the use of captured rainwater from the proposed facilities roof area.

Blacktown City Council DCP 2015 Part J, Section 4.3 states industrial development must supply 80% of their non potable water demand using non potable sources. The department of primary industries and other state authorities seek a water balance analysis approach to show the effectiveness of water conservation for the proposed development area.

8.9.1 Daily and Annual Non Potable Reuse Demands

The non potable water demand for the life of the proposed development is washdown and landscape irrigation. The water demand for washdown is calculated based on a washdown flow rate of 20L/min, with washdown occurring for 7.5mins during a business day. This equates to a daily washdown water demand of 150L/day. The annual wash down water demand for the development is 54.8kL/yr.

The irrigation demand for the development is based on an assumed irrigation area of 1050m², which is 90% of the landscape area of the entire lot. BCC requirement for irrigation demand is 0.4kL/yr/m². This equates to a daily irrigation demand of 1150L/day and an annual demand of 419.8kL/yr.

It is anticipated that the above non potable water demands will be required for the life of the development.

8.9.2 Water Balance

In order to determine whether the Blacktown City Council requirement for industrial development to supply 80% of their non potable water demand using non potable sources; a water balance was undertaken.

Using a simplistic approach, the average annual rainfall for Blacktown is 857mm. The roof area connected to the proposed rainwater tank is 1810m². The annual

potential rainfall capture volume is 1551.2kL/yr. The annual non potable reuse demand for the development is 474.6kL/yr. The simplistic approach water balance therefore shows that the development has an annual excess of 1076.6kL of captured rainfall and can supply 100% of the developments non potable water demand.

MUSIC can also provide water balance statics for rainwater tank treatment nodes. In accordance with BCC WSUD Handbook, the effectiveness of a rainwater tank at meeting the demands can be evaluated by clicking on the Rainwater Tank Node after running MUSIC. Utilising the Node Water Balance option under "Statistics" it was determined that when the washdown water and irrigation demand are both input into MUSIC, the % Reuse Demand Met is 82.88%, 85.32% and 89.61% for rainwater tanks A1, A2 and B respectively. Node Water Balance summaries for each of the rainwater tanks is presented in **Attachment C**.

As MUSIC node water balance summaries show, the requirements of Blacktown City Council for industrial development to supply 80% of their non potable water demand using non potable water sources has been met.

Water conservation requirements set by local, regional and state authorities have been addressed by the proposed development. The proposed development will assist in reducing the potable water demand for the site as the existing site irrigation demand can be met and the proposed facility will only require minimal additional potable water for staff.

9 Groundwater

9.1 Existing Environment

A Geotechnical Investigation has been undertaken and is included as Appendix 10 of the Environmental Impact Statement by Duggan & Hede Pty Ltd. No groundwater was encountered to depths of 4.5m at the time of the field investigation for this investigation on 1 April 2015.

9.2 Potentials Impacts

Possible sources of contamination to the groundwater from activities on the site include:

- Liquid waste or washdown water discharging from the site into the groundwater system;
- Stormwater coming in contact with dust, oil etc on trafficked areas and discharging into the groundwater system;
- Oil and petroleum spillages from equipment and vehicles;

9.3 Mitigation Measures

Major pollution controls incorporated in the facility's design include:

Site Layout and Civil Works

- Trafficked areas are sealed;

Organics Building

- The building will be roofed and walled to prevent the ingress of rain and generation of additional trade waste; and egress of odours and unacceptable air and noise emissions;
- Electric operated roller shutters to prevent the ingress of rain and egress of odours and unacceptable air emissions
- The unloading and loading bays will be bunded (including 200mm edge bunding a 75mm high drive over bund at the entrance) and drain to inground sumps to collect any spillage during unloading activities;
- Any liquids from the inground sumps will then be transferred to the process tanks for treatment;
- Floor levels within the existing building are greater than 0.5m above the Blacktown City Council Probable Maximum Flood (PMF) event;
- Roofwater will be collected in a water tank for reuse in washdown and irrigation;

- Overflow from the water tank will be treated prior to discharge from the site;
- All storage tanks and the DAF will be within a 400mm high bunded tank farm (approximate capacity 218 m3);

Oil Storage Area

- The building will be roofed (with overhangs) to prevent the ingress of rain and generation of additional trade waste; and egress of odours and unacceptable air and noise emissions;
- The unloading and loading bays will be bunded (including 200mm edge bunding a 75mm high drive over bund at the entrance) and drain to inground sumps to collect any spillage during unloading activities;
- Any liquids from the inground sumps will then be transferred to the used oil or oily water tanks for aggregation and transport to an appropriately licenced facility;
- Floor levels within the existing building are greater than 0.5m above the Blacktown City Council Probable Maximum Flood (PMF) event;
- Roofwater will be collected in a water tank for reuse in washdown and irrigation;
- Overflow from the water tank will be treated prior to discharge from the site;

Operational measures to minimise unacceptable emissions include:

- Implementation of established systems and procedures, including driver inductions and ongoing training (refer Section 8 and Appendix 17);
- Trafficked areas are to be kept clean;
- All on site equipment and vehicles will be properly maintained;
- Spill kits to be kept on site, and where possible used for mopping up any spillages;
- Where possible, wash down will be limited to within bunded areas;
- Only material in accordance with specific acceptance criteria will be permitted at the facility;
- Treated liquids will be discharged to Sydney Water's sewer system;
- The resultant solids or sludge from grease trap waste and aggregated liquid food waste will be transported for beneficial reuse in the cultivation of feed crops on farms in the Sydney region;

9.4 Conclusions

The proposed development will be located within a fully developed impervious site (all buildings and concrete pavement, except for perimeter landscaping). It will

involve the removal of some concrete pavement for the construction of the Organics Building and Oil Storage Area.

All activities will be undertaken within bunded areas within buildings.

There is also adequate spill control mechanisms proposed and no process water will be discharged from the site other than to sewer.

As such, no changes to groundwater conditions will result from the development.

10 Process Water from Operations

10.1 Infrastructure

Proposed infrastructure is described in Sections 10.1.1 and 10.1.4 below:

10.1.1 Organics Building

The proposed Organics Building is shown in Drawings RI456-D0-11 to 15 and described below:

- 20m x 26m x 8.5m eave height steel portal frame and colorbond walls plus 10m x 21m x 6m unloading bay annex and 10.5m x 28m x 6m loading bay annex;
- Bunded loading and unloading bays, including 75mm high driveover bunds and spill control sumps;
- 400mm high bunded tank farm (218m3 capacity);

10.1.2 Oil Storage Area

The proposed Oil Roof Structure is shown in Drawings RI456-D0-21 to 25 and described below:

- 19m x 28.5m x 8.5m eave height steel portal frame and colorbond walls plus 10.5m x 20m x 6m loading and unloading bay annex;
- Bunded loading and unloading bay, including 75mm high driveover bunds and spill control sumps;
- 600mm high bunded tank farm (300m3 capacity) and 4m x 10m bunded pump area;

10.1.3 Plant and Equipment

Grease Trap Waste Treatment

Typical plant and equipment proposed for the facility is presented as Drawings RI456-D0-14 and 15 and in Figures 4.10 to 4.13 and described below:

- Solids strainer;
- Vacuum pump;
- 2 x 30 kL Vacuum Tanks (Receival);
- 3 x 30 kL Vacuum Tanks (Process);
- 2 x 30 kL Vacuum Tanks (Process Water);
- 5 x 30 kL Vacuum Tanks (Sludge);
- 1 x 30 kL Vacuum Tanks (Lime);
- Carbon filter;

- Dissolved Air Flotation (DAF) unit*;
- DAF enclosure;
- Associated pipework and valves;

Key aspects of a Dissolved Air Flotation (DAF) unit (refer Figure 4.12) include:

- Feed water may be dosed with a coagulant (such as ferric chloride or aluminium sulfate) to flocculate the suspended matter;
- A portion of the clarified effluent water leaving the DAF tank is then pumped into a small pressure vessel (called the air drum) into which compressed air is also introduced. This results in saturating the pressurized effluent water with air;
- The air-saturated water stream is recycled to the front of the float tank and flows through a pressure reduction valve just as it enters the front of the float tank. This results in the air being released in the form of tiny bubbles;
- The bubbles adhere to the suspended matter, causing the suspended matter to float to the surface and form a froth layer which is then removed by a skimmer;
- The froth-free water exits the float tank as the clarified effluent from the DAF unit;

This includes provision for an additional 3 tanks for Process Water and Sludge in the future (refer RI456-D0-15).

A Grease Trap Waste Treatment Flowchart is provided in Figure 4.20.

Liquid Food Waste Storage

Typical plant and equipment proposed for the food waste facility is presented as Drawings RI456-D0-14 and 15 and in Figure 4.13 and described below:

- Solids strainer;
- Vacuum pump;
- 3 x 30 kL Vacuum Tanks (Food Waste);
- Associated pipework and valves;

This includes provision for an additional two tanks for Food Waste in the future (refer RI456-D0-15).

A Liquid Food Waste Flowchart is provided in Figure 4.21.

Used Oil Storage

Typical plant and equipment proposed for the used oil facility is presented as Drawings RI456-D0-24 and 25 and in Figures 4.15 and 4.16 and described below:

- Solids strainer;
- Vacuum pump;
- 3 x 40 kL Tanks (Receival);
- 1 x 60 kL Tanks (Oily Water);
- 4 x 120 kL Tanks (Storage);
- Associated pipework and valves;

This includes provision for an additional tank for Used Oil Receival in the future (refer RI456-D0-25).

A Used Oil Flowchart is provided in Figure 4.22.

Industrial Oily Water Treatment – Stage 1

Typical plant and equipment proposed for the industrial oily water facility is presented as Drawing RI456-D0-25 and described below:

- Strainer;
- Pumps;
- 2 x 60 kL Tank;
- Dissolved Air Flotation (DAF) unit*;
- Associated pipework and valves;

An Industrial Oily Water Flowchart is provided in Figure 4.23.

10.2 Operations

10.2.1 Grease Trap Waste

Acceptance Criteria

Waste acceptance criteria will include wastes as defined in the POEO Act, in force from time to time including:

- Grease trap waste that is liquid waste (K110 type waste);

Sales personal and customer service personal are responsible for evaluating all waste prior to quotation of waste entering the site. This evaluation is to ensure that the waste meets the required waste acceptance criteria. Potential customers are to be made aware of the customer's responsibilities in the Terms and Conditions of the Sale.

Delivery and Unloading Method

Waste will be delivered in collection tankers of up to 24,000 L capacity (refer Figure 4.31). Initially, collection vehicles will drive into the Unloading Bay (which is bunded) within the Organics Building (refer Drawings RI456-D0-11 to 15);

- Vehicles and equipment will undergo a series of pre-start and completion checks;
- They then discharge by vacuum pressure through a static strainer into a Receival Tank where the load is weighed (each tank is on static load cells);
- Expressed air passes through an activated carbon filter prior to discharge into the atmosphere;
- Following unloading, vehicles will drive out of the Unloading Bay;

Treatment Method

Grease trap waste handling operations (refer Section 4.2 for proposed infrastructure) are shown in the flowchart in Figure 4.20, Drawings RI456-D0-11 to 15 and described below:

- After settling for 10 minutes, the liquid waste is transferred (by vacuum pumps) to one of the Process Tanks, where a lime and coagulant is added to facilitate the separation of liquids;
- Sludge from the Process Tank(s) is then transferred by vacuum pumps to one of the Sludge Tanks;
- Liquids in the Process Tank(s) are then decanted to one of the Water Tanks where polymers are added to accelerate the formation of floc;
- Flocs in the Water Tanks are removed to one of the Sludge Tanks, whilst water is pumped at approximately 10,000 L per hour into the Dissolved Air Flotation (DAF) System;
- The chemical mix tank / reaction chamber of the DAF will incorporate pH correction, whilst the floatation / dissolved air chamber will further remove solids and sludges;
- These sludges will be transferred to one of the Sludge Tanks; whilst the treated effluent will flow to a water drop tank from which it can be tested and discharged to sewer;
- All tanks will be vented to an appropriately sized carbon filter; expressed air passes through an activated carbon filter prior to discharge into the atmosphere;
- The DAF unit will be fully enclosed and will vent to the carbon filter;
- Sludge from Sludge Tanks will be removed for disposal;

If the waste does not comply with the licensed acceptance criteria, the waste is not to be accepted and returned to the client or to an appropriately licensed facility.

Spill Containment

Spill containment measures are shown in Drawing RI456-D0-11.

Unloading activities of liquid waste will be undertaken in the unloading bay, which will be enclosed, and have a bunded concrete floor which drains to a two blind sumps. Any liquids from the inground sumps will be transferred to the process tanks for treatment.

Loading activities of waste (sludge) will be undertaken in the loading bay, which will be enclosed, and have a bunded concrete floor which drains to blind sumps. Any liquids from the inground sumps will be transferred to the process tanks for treatment.

All treatment equipment and chemicals / additives will be located within the within the 400mm high tank farm (with a capacity approximately 218m3) within the buildings. Such will also drain to a blind sump and any liquids from the inground sumps will be transferred to the process tanks for treatment.

Disposal – Liquid

Trade waste discharges will result from the treatment of grease trap wastes. The discharge would be in keeping with the quality limits determined by Sydney Water, with monitoring and verification as required by that Authority.

Forecast trade waste / sewer discharges from activities on the site will be up to 15.6 million litres per annum (average 300,000 litres per week).

Sydney Water confirmed on 30 April 2015 that the receiving sewer at the proposed Glendenning site has the capacity to accept the requested max 180 kL/day discharge, at a maximum instantaneous rate of 5 litres/second.

Disposal – Sludges

Sludges will be removed in tankers and beneficially reused for the cultivation of feed crops on farms in the Sydney region.

Sites currently used for land application of these sludges are in the Southern Highlands region.

10.2.2 Liquid Food Waste

Acceptance Criteria

Waste acceptance criteria will include wastes as defined in the POEO Act, in force from time to time including

- Food waste that is liquid waste;

Sales personal and customer service personal are responsible for evaluating all waste prior to quotation of waste entering the site. This evaluation is to ensure that the waste meets the required waste acceptance criteria. Potential customers are to

be made aware of the customer's responsibilities in the Terms and Conditions of the Sale.

Delivery and Unloading Method

Waste will be delivered in collection tankers of up to 25,000 L. Initially, collection vehicles will drive into the bunded Unloading Bay within the Organics Building (refer Drawings RI456-D0-11 to 15);

- Vehicles and equipment will undergo a series of pre-start and completion checks;
- They then discharge by vacuum pressure into one of the Food Waste Tanks where the load is weighed (each tank is on static load cells);
- Expressed air will pass through an activated carbon filter prior to discharge into the atmosphere;

If the waste does not comply with the licensed acceptance criteria, the waste is not to be accepted and returned to the client or to an appropriately licensed facility.

If required, all future loads from this source would be either pre treated (at the source) or diverted to another waste facility.

Aggregation and Transfer Method

Liquid food waste handling operations are shown in the flowchart in Figure 4.21, Drawings RI456-D0-11 to 15 and described below:

- Liquid waste is transferred (by vacuum pumps) to one of the two Receival/Storage tanks;
- All tanks will be vented to an appropriately sized carbon filter;
- Expressed air will pass through an activated carbon filter prior to discharge into the atmosphere;

If an odorous load is received, work procedures will be in place to minimise any potential impact. These will include shutting any open doors; dousing the load with an odour neutraliser; identifying the waste source and investigating.

Disposal Destination

Liquid food waste will be removed in tankers and beneficially reused for the cultivation of feed crops on farms in the Sydney region.

Sites currently used for land application of these sludges are in the Southern Highlands region.

Spill Containment

Spill containment measures are shown in Drawing RI456-D0-11.

Unloading activities of liquid waste will be undertaken in the unloading bay, which will be enclosed, and have a bunded concrete floor which drains to a two blind sumps. Any liquids from the inground sumps will be transferred to the process tanks for treatment.

Loading activities of waste (sludge) will be undertaken in the loading bay, which will be enclosed, and have a bunded concrete floor which drains to blind sumps. Any liquids from the inground sumps will be transferred to the process tanks for treatment.

All treatment equipment and chemicals / additives will be located within the within the 400mm high tank farm (with a capacity approximately 218m3) within the buildings. Such will also drain to a blind sump and any liquids from the inground sumps will be transferred to the process tanks for treatment.

10.2.3 Used Oil

Acceptance Criteria

Waste acceptance criteria for the used oil resource recovery and aggregation facility will include waste lubricating oil, oil water emulsions and oily water.

Sales personal and customer service personal are responsible for evaluating all waste prior to quotation of waste entering the site. This evaluation is to ensure that the waste meets the required waste acceptance criteria. Potential customers are to be made aware of the customer's responsibilities in the Terms and Conditions of the Sale.

Delivery and Unloading Method

Used oil will be delivered in collection tankers of up to 15,000 L capacity (refer Figure 4.32). Used oil delivery and unloading operations (refer Section 4.2 for infrastructure requirements) are described below:

- Drivers are to make a preliminary assessment of oils prior to loading eg uncharacteristic odour, colour, viscosity etc;
- If uncertain, the driver is to notify the Supervisor for directions;
- Upon arrival at the site, collection vehicles will drive into the bunded Loading and Unloading Bay within the Oil Storage Area (refer Drawings RI456-D0-21 to 23);
- A representative sample of used oil will be initially taken from the collection vehicle;
- If used oil meets acceptance criteria (<61^{o}C by a flash test), commence the unloading process;
- If used oil does not meet acceptance criteria, the Supervisor will be notified for directions;

- These directions will be to unload the load into in the 20 kL non-compliant product tank to the north of the Oil Storage Roof Structure OR to remove the load to another appropriately licenced site;
- Vehicles and equipment will undergo a series of pre-start checks, including tanks, valves, filters and flexible pipework;
- Used oil will then be pumped into a Receival Tank and water allowed to separate (by gravity);
- Vehicles and equipment will undergo a series of completion checks, including tanks, valves, filters and flexible pipework;
- All details of unloading are to be recorded;
- Following unloading vehicles will drive out of the Loading and Unloading Bay;

If the waste does not comply with the licensed acceptance criteria, the waste is not to be accepted and returned to the client or to an appropriately licensed facility.

If an odorous load is received, work procedures will be in place to minimise any potential impact. These will include:

- Shutting any open doors;
- Dousing the load with an odour neutraliser;
- Identifying the waste source and investigating;

If required, all future loads from this source would be either pre treated (at the source) or diverted to another waste facility.

Aggregation and Transfer Method

Used oil will be stored as follows (refer Figures 4.14 to 4.16 and Drawing RI456-D0-25):

Material	Class / Package Group	UN Number	No of Containers / Packages	Quantity of Containers/ Packages	Amount	Location/Safety Measures
Used Oil	C1	1071	4	120,000 L	480,000 L	Vertical steel tanks to AS1692 and AS1940
Used Oil	C1	1071	4	40,000 L	200,000 L	Vertical steel tank to AS1692 and AS1940
Oily Water	C1	-	1	40,000 L	40,000 L	Vertical steel tanks to AS1692 and AS1940

Used oil aggregation and transfer operations are described below:

- Water will then be removed from the Receival Tank to an Oily Water Tank (within the same bunded compound);
- The tanks will be inter-connected by a network of pipes and valves so they are able to be used individually or in banks of two or more tanks as determined from time to time by the liquid type and the chosen destination;
- Used oil from the Receival Tank will then be transferred to a Storage Tank;
- Used oil from Storage Tanks will then be reloaded into larger vehicles for transport to appropriately licensed facilities;
- Oily water will also be reloaded into larger vehicles for transport to appropriately licensed facilities for treatment and reuse;
- Upon arrival at the site, line haul vehicles will drive into the Loading and Unloading Bay (which is bunded) within the Oil Storage Area (refer Drawings RI456-D0-21 to 23);
- Line haul vehicles and equipment will undergo a series of pre-start and completion checks, including tanks, valves, filters and flexible pipework;
- Following loading, vehicles will drive out of the Unloading Bay;

Disposal Destinations

Where possible; used oil will be transported to the Southern Oil Re-refinery at Wagga Wagga.

Decanted water will be transported to an appropriately licenced facility for further treatment.

Spill Containment

Spill containment measures are shown in Drawings RI456-D0-21.

Unloading and loading activities of liquid waste will be undertaken in the Loading and Unloading Bay, which will be roofed, and have a bunded concrete floor which drains to blind sumps. Any liquids from the inground sumps will be transferred to the process tanks for treatment and disposal.

All treatment equipment and chemicals / additives will be located within the within the 600mm high tank farm (with a capacity approximately of approximately 300m3) within the buildings. Such will also drain to a blind sump and any liquids from the inground sumps will be transferred to the process tanks for treatment and disposal.

10.2.4 Industrial Oily Water

Acceptance Criteria

Waste acceptance criteria for industrial oily water will include washdown water and contaminated stormwater from commercial enterprises, vehicle washdown waters and other dirty waters.

Sales personal and customer service personal are responsible for evaluating all waste prior to quotation of waste entering the site. This evaluation is to ensure that the waste meets the required waste acceptance criteria. Potential customers are to be made aware of the customer's responsibilities in the Terms and Conditions of the Sale.

Delivery and Unloading Method

Industrial oily water will be delivered in collection tankers of up to 15,000 L capacity (refer Figure 4.32). Industrial oily water delivery and unloading operations are described below:

- Drivers are to make a preliminary assessment of industrial oily water prior to loading eg uncharacteristic odour, colour, viscosity etc;
- If uncertain, the driver is to notify the Supervisor for directions;
- Upon arrival at the site, collection vehicles will drive into the bunded Loading and Unloading Bay within the Oil Storage Area (refer Drawings RI456-D0-21 and 22);
- Vehicles and equipment will undergo a series of pre-start checks, including tanks, valves, filters and flexible pipework;
- Industrial oily water will then be pumped into the Industrial Oily Water Tank and water allowed to separate (by gravity);
- Vehicles and equipment will undergo a series of completion checks, including tanks, valves, filters and flexible pipework;
- All details of unloading are to be recorded;
- Following unloading vehicles will drive out of the Loading and Unloading Bay;

Aggregation and Transfer Method

Industrial oily water will be stored as follows (refer Figures 4.14 and 4.15 and Drawing RI456-D0-23):

Material	Class / Package Group	UN Number	No of Containers / Packages	Quantity of Containers/ Packages	Amount	Location/Safety Measures
Industrial Oily Water	C1		2	60,000 L	120,000 L	Vertical steel tanks to AS1692 and AS1940

Industrial oil aggregation and transfer operations are described below:

- Industrial oily water will be allowed to settle and oil will be removed from the Industrial Oily Water Tank to an Oil Storage Tank;
- Industrial oily water will then be pumped at into the Dissolved Air Flotation (DAF) System;

- The chemical mix tank / reaction chamber of the DAF will incorporate pH correction, whilst the floatation / dissolved air chamber will further remove solids and oils;
- These oils will be transferred to an Oil Storage Tank; whilst the treated liquid will flow to a water drop tank from which it can be tested and discharged to sewer;
- Stored used oil will then be reloaded into larger vehicles for transport to appropriately licensed facilitiesables;

Disposal Destination

Where possible; used oil will be transported to the Southern Oil Re-refinery at Wagga Wagga.

Decanted water will be transported to an appropriately licenced facility for further treatment.

Spill Containment

Spill containment measures are shown in Drawings RI456-D0-21.

Unloading and loading activities of liquid waste will be undertaken in the Loading and Unloading Bay, which will be roofed, and have a bunded concrete floor which drains to blind sumps. Any liquids from the inground sumps will be transferred to the process tanks for treatment and disposal.

All treatment equipment and chemicals / additives will be located within the within the 600mm high tank farm (with a capacity approximately 300m3) within the buildings. Such will also drain to a blind sump and any liquids from the inground sumps will be transferred to the process tanks for treatment and disposal.

10.3 Conclusions

The proposed development will be located within a fully developed impervious site (all buildings and concrete pavement, except for perimeter landscaping).

All activities will be undertaken within bunded areas within buildings. There is also adequate spill control mechanisms proposed and no process water will be discharged from the site other than to sewer.

As such, there will be no adverse impacts as a result of process water from the development.

11 Sediment and Erosion Control

Sediment and erosion control for the development is addressed in accordance with the Landcom's Blue Book (Managing urban stormwater: soils and construction Vol. 1). The transport of sediment from the proposed site will be low risk as the area of exposed soil is limited to the proposed building areas. A sediment and erosion control plan for the development has been prepared and is presented as **Drawing Noes RI456-D0-50 and 51.**

A Construction Environmental Management Plan has also been prepared and is included as Appendix 16 of the Environmental Impact Statement by Duggan & Hede Pty Ltd.

Stream Erosion Index calculations have been undertaken for the proposed site and are presented in **Section 8.7**. Calculations show that the post development flows for the development area will be two thirds that of the pre-development scenario. The proposed development achieves the requirements for Stream Erosion Index as the SEI is less than 3.5.

The main environmental impacts identified during field inspections and development of this management plan will be:

- Sediment movement to the drainage reserve to the north of the site;
- Build-up of sediment on surrounding access roads leading to potential contamination of stormwater runoff;
- Dust emissions construction and operational works on the nearby premises;
- Noise from construction and operational works on the nearby premises;

The salient actions, to minimise impacts during construction, proposed in the Construction Environmental Management Plan are:

- Specific site inductions for all employees and contractors;
- Prior to construction commencing sediment fences are to be installed along part of northern and western perimeter boundaries of the site;
- A construction exit / vehicle shakedown device shall also be installed near the construction area;
- Areas of bare soil should be minimised and existing vegetation maintained and protected where possible;
- Stockpiles of soil are to be located on available flat areas at a minimum buffer distance of 5m from any boundary;
- Ensure that all affected persons have been informed about the project and are aware of the potential impacts;
- Cover the loads of all vehicles leaving the site with overburden or soil, if required;

- In dry and windy conditions, trafficked and exposed areas and stockpiles of soil are to be kept damp by watering;
- Police on site speed limit of 10km/hr;
- Construction activities should not occur outside the hours of 6.00am to 6.00pm Monday to Saturday. No activity should occur on Sundays;
- Machinery and equipment generating excessive noise (eg due to poor maintenance) will not be used;
- Domestic refuse to be collected in a suitable container and removed from the site weekly;
- Soil wastes created during construction are not to be stored on site;
- Excess wet concrete is to be removed off site by the concrete supplier;
- Steel will be collected in separate bins and removed for recycling;
- Other solid wastes (e.g. timber formwork, waste set concrete, etc) to be removed to an approved landfill;
- All refuelling is to take place off site if possible;
- Refuelling is to be supervised by a designated member of staff to reduce the risk of spills;
- Any fuel or oil spills are to be cleaned up immediately and contaminated soils to be removed off site for disposal at an appropriately licensed landfill;

12 Life Cycle Costs

The proposed development incorporates three rainwater tanks, four SPELFilter Vaults and a StormSack in order to achieve the load reduction targets set by Blacktown City Council. These devices will be constructed and maintained by J.J. Richards & Sons. The proposed rainwater tanks, SPELFilter Vaults and SPEL StormSack will not be subject to maintenance by Council nor will any life cycles costs be payable by Council. The proposed stormwater quality improvement devices will be constructed, owned and maintained by JJ Richards.

Below sets out typical capital, operational and maintenance costs for the proposed stormwater quality treatment devices.

Rainwater Tanks:

	13.6kL Rainwater Tank	**31.8kL Rainwater Tank**	**46.8kL Rainwater Tank**
Capital Cost (incl installation of commissioning of tanks)	$8,000	$12,000	$15,000
Operational Cost	-	-	-
Maintenance Cost	$500/ annum	$500/ annum	$500/ annum

SPEL Filter Vaults:

	1200x1200mm Vault 1xSPEL Filter EMC-45	**3000x1800mm Vault 3x0.5xSPEL Filter EMC-45**
Capital Cost (incl installation of commissioning of tanks)	$6,350	$21,600 (Pit)
Operational Cost	-	-
Maintenance Cost	$800/ annum	$1,000/ annum

SPEL StormSack:

	SPEL StormSack
Capital Cost (incl installation of commissioning of tanks)	$500
Operational Cost	-
Maintenance Cost	$200/ annum

13 Conclusion

This Integrated Water Cycle Management Strategy has been prepared for JJ Richards & Sons Pty Ltd for the establishment of a new Liquid Waste Facility and Depot at 14 Rayben Street, Glendenning. This plan demonstrates that the proposed facility will achieve the requirements of Blacktown City Council's (BCC) DCP and the Secretary's Environmental Assessment Requirements (SEARs) (Ref SSD6767). This Integrated Water Cycle Strategy shows:

- No impacts or works in the Drainage Reserve / Constructed Channel;
- That proposed development is above the Probable Maximum Flood level;
- That proposed development requires peak flow mitigation, this has been achieve for the development through the use of detention storages sized according the detention requirements for developments within the *'All Other Hawkesbury River Sub –Catchments'*;
- Identifies the environmental values of the receiving environment;
- Achieves the stormwater quality load reduction targets and water conservation targets set for the development area;
- Achieves the requirements of 80% of non potable water uses supplied by non potable water sources;
- Shows that groundwater quality will remain unaffected by the development;
- Addresses spill containment and process water issues;
- Shows how sediment and erosion will be limited during the construction phrase; and
- Provides life cycle cost analysis for the proposed stormwater quality improvement devices proposed;

This report has been prepared generally in accordance with Blacktown City Council requirements and Secretary's Environmental Assessment Requirements (SEARs) (Ref SSD6767). Accordingly, both the Blacktown City Council DCP Compliance Matrix and Sears Compliance Matrix are presented in **Attachments A** and **B** with relevant information or references provided.

An Inspection and Maintenance Manual for the proposed devices is provided in **Attachment D**.

14 References

- Australian Government Bureau of Meteorology, Climate Data online, http://www.bom.gov.au/climate/data/index.shtml;
- Blacktown City Council, Engineering Guide for Development 2005, Nov 2012;
- Blacktown City Council, DCP 2015 Part A Introduction and General Guidelines;
- Blacktown City Council, DCP 2015 Part E Development in the Industrial Areas;
- Blacktown City Council, DCP 2015 Part J Water Sensitive Urban Design and Integrated Water Cycle Management;
- Blacktown City Council, Works Specification Civil 2005, June 2009;
- Blacktown City Council, Developer Handbook for Water Sensitive Urban Design, Version 1.1 Nov. 2013;
- Blacktown City Council, Waterway Health Report Card 2013-2014;
- Blacktown City Council, Waterway Health Report Card 2014-2015;
- CSIRO Urban Stormwater: Best Practice Environmental Management Guidelines 2006;
- Draft NSW MUSIC Modelling Guidelines for New South Wales, NSW Government / Sydney Metropolitan CMA;
- Department of Environment and Conservation (NSW), Marine Water Quality Objectives for NSW Ocean Waters, Sydent Metropolitan and Hawkesbury-Nepean, Oct 2005;
- Department of Local Government Circular to Councils, Statement of Joint Intent for the Hawkesbry Nepean River System, March 2001;
- Engineers Australia, Australian Runoff Quality A Guide to Water Sensitive Urban Design, 2006;
- eWater Pluviograph rainfall data tool;
- NSW EPA Water Quality and River Flow Objectives website, http://www.environment.nsw.gov.au/ieo/;
- NSW Government – Environment, Climate Change & Water, Lower Hawkesbury-Nepean River nutrient management strategy, 2010;
- NSW Government, State of the catchments 2010, Riverine ecosystems Hawkesbury-Nepean region, Nov 2010;
- Upper Parramatta River Catchment Trust, On-site Stormwater Detention Handbook, Fourth Edition, Dec 2005;
- Water By Design MUSIC Modelling Guidelines V1.0;

ATTACHMENT A

Blacktown City Council DCP Part R Table 6 Compliance Matrix

Blacktown City Council DCP Compliance Matrix

Section	When to include	Information to be Provided	Where Information is Provided
Background information	All development to which this Part of the DCP applies. See Section 2.1	The name, qualifications and a brief outline of relevant experience of person(s) involved in the preparation of the Strategy.	Section 1 of this IWCMS
Proposed development	All development to which this Part of the DCP applies. See Section 2.1.	This section must describe the proposed development including allotment boundaries, adjoining properties and reference any relevant information from Precinct wide strategies or plans.	Section 3.2 of this IWCMS
Objectives	All development to which this Part of the DCP applies. See Section 2.1.	This section must identify the development objectives that apply to the proposed development consistent with this Part and any relevant Precinct wide strategies or plans.	Section 3.3 of this IWCMS
Constraints and opportunities	All development to which this Part of the DCP applies. See Section 2.1.	This section must identify any additional constraints and opportunities presented by the allotment with the potential to impact upon or enhance the integrated water cycle management that may not have been addressed or addressed in appropriate detail in the relevant Precinct wide strategies or plans.	Section 3.3 of this IWCMS
Waterfront Lands	All development to which the waterfront lands controls of this Part of the DCP applies. See Section 2.1.	This section must describe how the proposed development and the proposed conservation/ mitigation/ management measures meet the relevant requirements of the relevant Precinct wide strategies or plans. This section must include, or have included as an appendices any calculations and results of any modelling conducted and identify the size, location, indicative level, volume and configuration of any	Section 5 of this IWCMS for details regarding the Waterfront Lands, stream order and compliance with Section 4.2 of Part J of the BCC DCP 2015
Water	All development		Section 3.3 (e)

conservation	to which the water conservation controls of this Part of the DCP applies. See Section 2.1.	measures proposed. This section must include an assessment of all potential strategies that were considered if the measures proposed are inconsistent with the approach of the relevant Precinct wide strategy or plan. This must include the impacts of vegetation and/or potential rehabilitation / restoration of core riparian zones and vegetated buffers in any flood modelling.	and Section 8.9 of this IWCMS
Stormwater (water quality and waterway stability)	All development to which the stormwater (water quality and waterway stability) controls of this Part of the DCP applies. See Section 2.1.		Section 3.3 (d) of this IWCMS for brief summary and Section 8 to 8.7 of this IWCMS for complete details
Stormwater (detention)	All development of which the stormwater (detention) controls of this Part of the DCP applies. See Section 2.1.		Section 3.3 (c) of this IWCMS for brief summary and Section 7 of this IWCMS for complete details
Stormwater (erosion, sediment and pollution control)	All development to which the stormwater (erosion sediment and pollution control) controls of this Part of the DCP applies. See Section 2.1.		Section 3.3 (h) of this IWCMS for brief summary and Section 11 of this IWCMS for complete details
Groundwater	All development to which the groundwater controls of this Part of the DCP applies. See Section 2.1.	This section must describe how the proposed development and the proposed conservation /mitigation/ management measures meet the relevant requirements of the relevant Precinct wide strategies or plans. This section must include an assessment of all potential strategies that were considered if the measures proposed are inconsistent with the approach of the relevant Precinct wide strategy or plan including	Section 3.3 (f) of this IWCMS for brief summary and Section 9 of this IWCMS for complete details

		potential impacts and how they integrate with other water cycle management measures.	
Integration with urban design and the environment	All development to which this Part of the DCP applies. See Section 2.1.	This section must describe how the proposed development and the proposed conservation/mitigation. Management measures meet the relevant requirements of the relevant Precinct wide strategies or plans.	Section 8 to 8.7 of this IWCMS
Assessment of potential strategies as an integrated system including costs	All development to which this Part of the DCP applies. See Section 2.1.	This section must describe how the proposed development and the proposed conservation / mitigation / management measures meet the relevant requirements of the relevant Precinct wide strategies or plans. This section must identify capital, operational and maintenance costs of the proposed mitigation/conservation /management measures. The cost estimates must include typical annual maintenance costs and corrective maintenance or renewal / adaptation costs (that is a whole of life cycle cost estimate). If the measures proposed are inconsistent with the approach of the relevant Precinct wide strategy or plan, this section must also identify and demonstrate how issues such as land take requirements, expected reliability, likely level of community acceptance and future management responsibilities have been considered and addressed.	Section 12 of this IWCMS
Maintenance and monitoring plan	All development to which this Part of the DCP applies. See Section 2.1.	This section must identify any inspection and maintenance requirements for the proposed mitigation/conservation/management measures to ensure the proposed measures remain effective. This must include the submission of an annual maintenance and monitoring report. Where vegetation is included in the proposed measures the monitoring and the maintenance plan must include a harvesting schedule for example a macrophyte harvesting	Section 8.8 of this IWCMS regarding water quality monitoring Attachment D for Inspection and Maintenance Manual

		schedule for a wetland. This information must demonstrate that the measures are performing to the design criteria and/or those areas being rehabilitated are establishing and meeting the requirements for their enhancement.	

ATTACHMENT B

(Water Related Issues) SEARS Compliance Matrix

SEAR's Compliance Matrix

1. Department of Planning and Environment

Application Number	SSD 6767
Development	Glendenning Liquid Waste Facility up to 50 megalitres per year
Location	14 Rayben Street, Glendenning
Applicant	Mr Kurt Whalan, JJ Richards & Sons Pty Ltd
Date of Issue	December 2014

References

EIS	EIS	Environmental Impact Statement by Duggan & Hede Pty Ltd
IWCMS	EIS (Appendix 11)	Integrated Water Cycle Management Strategy
EA	EIS (Appendix 13)	Ecological Assessment

Heading	Requirements	Applicant's Reference/Comments
General Requirements	The Environmental Impact Statement (EIS) must meet the minimum form and content requirements in clauses 6 and 7 of Schedule 2 the *Environmental Planning and Assessment Regulation 2000*. The EIS must include:	Not Applicable
	• Detailed assessment, where relevant, of the key issues below, and any other potential significant issues identified in the risk assessment, must include: (a) A description of the existing environment, using adequate baseline data; (b) Consideration of potential cumulative impacts due to other development in the vicinity; and Measure to avoid, minimise and if necessary, offset the predicted impacts, including detailed contingency plans for managing any significant risks to the environment.	Refer Sections 3.4, 4.3, 7, 8 of this IWCMS
	• Consolidated summary of all the proposed environmental management and monitoring measures, highlighting commitments included in the EIS.	Refer Sections 7, 8 and Attachment D of this IWCMS

Key Issues	*The EIS must include an assessment of the potential impacts of the proposal (including cumulative impacts) and develop appropriate measures to avoid, mitigate, manage and / or offset these impacts. The EIS must address the following specific matters:* • **Waste and Wastewater Management –** *including:* *(a) Identification and classification of all waste streams that would be treated and generated at the site;* *(b) Description of waste transport, storage, handling, processing and disposal;* *(c) A description of wastewater management and trade waste specifications;* *(d) A description and appraisal of impact mitigation and management; and* *An appraisal of the development under the NSW Waste Avoidance and Resource Recovery Strategy;*	Refer Section 10 of this IWCMS
	• **Soils and Water –** including: (a) A description of the water demands and a breakdown of water supplies including any water licensing requirements; (b) A description of the measures to minimise water use; (c) A description of surface, groundwater and stormwater management, including on site detention, flood impact mitigation and measures to treat or reuse water; (d) An assessment of any potential existing soil contamination; and A description and appraisal of impact mitigation, management and monitoring measures.	Refer Sections 7, 8, 9, 13 of this IWCMS

2. NSW EPA Requirements – (Notice No. 1526211)

Heading	Requirements	Applicant's Reference
Executive Summary	*The executive summary should include a brief discussion of the extent to which the proposal achieves identified environmental outcomes.*	Refer Section 2 of this IWCMS
The Proposal	**Description of the Proposal** **General** • *Outline cleaner production actions, including:* *(e) Water management system including all potential sources of water pollution, proposals for re-use, treatment etc, emission levels of any wastewater discharged points, summary of options explored to avoid a discharge, reduce its frequency or reduce its impacts, and rationale for selection of option to discharge;*	Refer Section 10 of this IWCMS Spill containment systems will be utilised within the proposed facility. There will be no release of wastewater to the stormwater system. All effluent will be discharged to sewer.
	Water • *Provide details of the project that are essential for predicting and assessing impacts to waters:* *(a) Including the quantity and physio-chemical properties of all potential water pollutants and the risks they pose to the environment and human health, including the risks they pose to Water Quality Objectives in the ambient waters (as defined on http:www.environment.nsw.gov.au/ieo/index.htm, using technical criteria derived from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC 2000);* *(c) The management of discharges with potential for water impacts;* *(d) Drainage works and associated infrastructure; land-forming and excavations; working capacity of structures; and water resource requirements of the proposal;*	Refer Section 8 of this IWCMS for details regarding stormwater quality management Spill containment systems will be utilised within the proposed facility. There will be no release of wastewater to the stormwater system. All effluent will be discharged to sewer.
	• *Outline site layout, demonstrating efforts to*	Refer Section 6 of

	avoid proximity to water resources (especially for activities with significant potential impacts eg effluent ponds) and showing potential areas of modification of contours, drainage etc;	this IWCMS The proposed development areas are above the PMF flood level. The proposed facility is within buildings that have spill containment system to ensure no release of effluent to stormwater.
	• *Outline how total water cycle considerations are to be address showing total water balances for the development (with the objective of minimising demands and impacts on water resources). Include water requirements (quantity, quality and source (s)) and proposed storm and wastewater disposal, including type, volumes proposed treatment and management methods and re-use options;*	Refer Section 8.9 of this IWCMS for details regarding overall water cycle considerations Refer Section 7 of this IWCMS for details regarding stormwater quantity Refer Section 8 of this IWCMS for details regarding stormwater quality and water conservation Refer Section 10 of this IWCMS for details regarding wastewater processing
The Location	**General** • *Provide an overview of the affected environment to place the proposal in its local and regional environmental context including:* *(a) Meteorological data (eg rainfall, temperature and evaporation, wind speed and direction);* *(b) Topography (landform element, slope type, gradient and length);* *(d) Geomorphology (rates of landform change and current erosion and deposition processes);* *(f) Ecological information (water system habitat, vegetation, fauna);*	(a) Refer Appendix 12 of the EIS (b) Refer Section 4.2 of this IWCMS (d) Refer Section 11 of this IWCMS for sediment and erosion details (f) Refer Sections 4.3 and 8.1 of this IWCMS and Appendix 13 of the EIS for Ecological Report

	Water • *Describe the catchment including proximity of the development to any waterways and provide an assessment of their sensitivity/significance from a public health, ecological and/or economic perspective. The Water Quality and River Flow Objectives on the website: http:www.environment.nsw.gov.au/ieo/index.htm should be used to identify the agreed environmental values and human uses for any affected waterways. This will help the description of the local and regional area;*	Refer Sections 4.3 and 8.1 of this IWCMS
Identification and Prioritisation of Issues / Scoping of Impact Assessment	• *Provide an overview of the methodology used to identify and prioritise issues. The methodology should take into account:* *(c) Relevant NSW government guidelines;* *(d) Industry guidelines;* *(e) EISs for similar projects;* *(f) Relevant research and reference material;* *(g) Relevant preliminary studies or reports for the proposal;* *(h) Consultation with stakeholders;*	Refer Sections 3.3 and 14 of this IWCMS
	• *Provide a summary of the outcomes of the process including:* *(i) All issues identified including local, regional and global impacts (eg increased / decreased greenhouse emissions);* *(j) Key issues which will require a full analysis (including comprehensive baseline assessment);* *(k) Issues not needing full analysis though they may be addressed in the mitigation strategy;* *(l) Justification for the level of analysis proposed (the capacity of the proposal to give rise to high concentrations of pollution compared with the ambient environment or environmental outcomes is an important factor in setting the level of assessment);*	Refer Section 3.3 of this IWCMS
The	**1. General**	Refer Section 3.3 of

Environmental Issues	• The potential impacts identified in the scoping study need to be assessed to determine their significance, particularly in terms of achieving environmental outcomes, and minimising environmental pollution;	this IWCMS
	• Identify gaps in information and data relevant to significant impacts of the proposal and any actions proposed to fill those information gaps so as to enable development of appropriate management and mitigation measures. This is in accordance with ESD requirements; *Note: The level of detail should match the level of importance of the issue in decision making which is dependent on the environment risk.*	No information or data gaps have been identified.
	Describe Baseline Conditions • Provide a description of existing environmental conditions for any potential impacts.	Refer Section 3.3 of this IWCMS
	Assess Impacts • For any potential impacts relevant for the assessment of the proposal provide a detailed analysis of the impacts of the proposal on the environment including the cumulative impact of the proposal on the receiving environment especially where there are sensitive receivers;	Refer Sections 5, 6, 7, 8 of this IWCMS
	• Describe the methodology used and assumptions made in undertaking this analysis (including any modelling or monitoring undertaken) and indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the predicted impacts;	Refer Sections 5, 6, 7, 8 of this IWCMS
	• The analysis should also make linkages between different areas of assessment where necessary to enable a full assessment of environmental impacts e.g. assessment of impacts on air quality will often need to draw on the analysis of traffic, health, social, soil and/or ecological systems impacts; etc.;	Refer Sections 5, 6, 7, 8 of this IWCMS
	• Proponents are expected to implement a	Refer Sections 5, 6, 7,

	'reasonable level of performance' to minimise environmental impacts. The proponent must indicate how the proposal meets reasonable levels of performance. For example, reference technology based criteria if available, or identifies good practice for this type of activity or development. A 'reasonable level of performance' involves adopting and implementing technology and management practices to achieve certain pollutant emissions levels in economically viable operations. Technology-based criteria evolve gradually over time as technologies and practices change;	8 of this IWCMS
	• Use environmental impacts as key criteria in selecting between alternative sites, designs and technologies, and to avoid options having the highest environmental impacts;	Refer Sections 5, 6, 7, 8 of this IWCMS
	• Outline any proposed approach (such as an Environmental Management Plan) that will demonstrate how commitments made in the EIS will be implemented. Areas that should be described include: (a) Operational procedures to manage environmental impacts; (b) Monitoring procedures; (c) Training programs; (d) Community consultation; (e) Complaint mechanisms including site contacts; (f) Strategies to use monitoring information to improve performance; (g) Strategies to achieve environmental impacts and to respond in event of exceedences.	Refer EIS
	Water **Water Describe Baseline Conditions** • *Describe existing surface and groundwater quality – an assessment needs to be undertaken for any water resource likely to be affected by the proposal and for all conditions (e.g. a wet weather sampling program is needed if runoff events may cause impacts);* *Note: Methods of sampling and analysis*	Refer Sections 4.3 and 8 of this IWCMS There is no proposal to undertake water monitoring / sampling for the proposed development area

	need to conform with an accepted standard (e.g. Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004) or be approved and analyses undertaken by accredited laboratories).	
	• *Provide site drainage details and surface runoff yield;*	Refer Sections 4.2 and 7 of this IWCMS
	• *State the ambient Water Quality and River Flow Objectives for the receiving waters. These refer to the community's agreed environmental values and human uses endorsed by the Government as goals for the ambient water. These environmental values are published on the website: http://www.environment.nsw.gov.au/ieo/index.htm. The EIS should state the environmental values listed for the catchment and waterway type relevant to your proposal. NB: A consolidated and approved list of environmental values are not available for groundwater resources. Where groundwater may be affected the EIS should identify appropriate groundwater environmental values and justify the choice;*	Refer Sections 4.3 and 8 of this IWCMS
	• *State the indicators and associated trigger values or criteria for the identified environmental values. This information should be sourced from the ANZECC 2000 Guidelines for Fresh and Marine Water Quality (http://www.environment.gov.au/water/publications/quality/nwgms-guidelines-4-vol1.html) (Note that, as at 2004, the NSW Water Quality Objectives booklets and website contain technical criteria derived from the 1992 version of the ANZECCA Guidelines. The Water Quality Objectives remain as Government Policy, reflecting the*	Refer Sections 4.3 and 8 of this IWCMS

	community's environmental values and long-term goals, but the technical criteria are replaced by the more recent ANZECC 2000 Guidelines). NB: While specific guidelines for groundwater are not available, the ANZECC 2000 Guidelines endorse the application of the trigger values and decision trees as a tool to assess risk to environmental values in groundwater;	
	• *State any locally specific objectives, criteria or targets, which have been endorsed by the government e.g. the Healthy River Commission Inquiries or the NSW Salinity Strategy (DLWC, 2000) (http://www.environment.nsw.gov.au/salinity/government.nswstrategy.htm);*	Refer Sections 4.3 and 8 of this IWCMS
	• *Where site specific studies are proposed to revise the trigger values supporting the ambient Water Quality and River Flow Objectives, and the results are to be used for regulatory purposed (e.g. to assess whether a licensed discharge impacts on water quality objectives), then prior agreement from the EPA on the approach and study design must be obtained;*	Not Applicable
	• *Describe the state of the receiving waters and relate this to the relevant Water Quality and River Flow Objectives (i.e. are Water Quality and River Flow Objectives being achieved?)/ Proponents are generally only expected to source available data and information. However, proponents of large or high risk developments may be required to collect some ambient water quality /river flow / groundwater data to enable a suitable level of impact assessment. Issues to include in the description of the receiving water could include:* *a) lake or estuary flushing characteristics;* *b) specific human uses (e.g. exact location of drinking water offtake);* *c) sensitive ecosystems or species*	Refer Sections 4.3 and 8 of this IWCMS

	conservation values; *d) a description of the condition of the local catchment e.g. erosion levels, soils, vegetation cover, etc;* *e) an outline of baseline groundwater information, including, but not restricted to, depth to watertable, flow direction and gradient, groundwater quality, reliance on groundwater by surrounding users and by the environment;* *f) historic river flow data where available for the catchment;*	
	Assess impacts • *No proposal should breach clause 120 of the Protection of the Environment Operations Act 1997 (i.e. pollution of waters is prohibited unless undertaken in accordance with relevant regulations);*	Not Applicable - the proposal will not release effluent to the stormwater system or receiving environment
	• *Identify and estimate the quantity of all pollutants that may be introduced into the water cycle by source and discharge point including residual discharges after mitigation measures are implemented;*	Not Applicable - the proposal will not release effluent to the stormwater system or receiving environment
	• *Include a rationale, along with relevant calculations, supporting the prediction of the discharges;*	Not Applicable - the proposal will not release effluent to the stormwater system or receiving environment
	• *Describe the effects and significance of any pollutant loads on the receiving environment. This should include impacts of residual discharges through modelling, monitoring or both, depending on the scale of the proposal. Determine changes to hydrology (including drainage patterns, surface runoff yield, flow regimes, wetland hydrologic regimes and groundwater);*	Not Applicable - the proposal will not release effluent to the stormwater system or receiving environment. The proposed development area will achieve the load reduction targets set by BCC.
	• *Describe water quality impacts resulting from changes to hydrologic flow regimes (such as nutrient enrichment or turbidity resulting from changes in frequency and*	Not Applicable - the proposed development area is across an existing impervious

	magnitude of stream flow);	surface. The existing site flow regimes will be maintained.
	• *Identify any potential impacts on quality or quantity of groundwater describing their source;*	Refer Section 9 of this IWCMS for sediment and erosion details
	• *Identify potential impacts associated with geomorphological activities with potential to increase surface water and sediment runoff or to reduce surface runoff and sediment transport. Also consider possible impacts such as bed lowering, bank lowering, instream siltation, floodplain erosion and floodplain siltation;*	Not Applicable - the proposed development does not involve geomorphological activities
	• *Identify impacts associated with the disturbance of acid sulfate soils and potential acid sulfate soils;*	Refer Section 11 of this IWCMS for sediment and erosion details
	• *Containment of spills and leaks shall be in accordance with the technical guidelines section 'Bunding and Spill Management' of the Authorised Officers Manual (EPA, 1995) (http://www.epa.nsw.gov.au/mao/bundingspill.htm) and the most recent versions of the Australian Standards referred to in the Guidelines. Containment should be designed for no-discharge;*	Refer Section 8 of this IWCMS
	• *The significance of the impacts listed above should be predicted. When doing this it is important to predict the ambient water quality and river flow outcomes associated with the proposal and to demonstrate whether these are acceptable in terms of achieving protection of the Water Quality and River Flow Objectives. In particular the following questions should be answered:* *a) will the proposal protect Water Quality and River Flow Objectives where they are currently achieved in the ambient waters; and;* *b) will the proposal contribute towards the achievement of Water Quality and River*	Not Applicable - the proposed development will not release effluent to the downstream receiving environment. The development will discharge treated waste water to sewer. Refer Section 8 of this IWCMS. The proposed development meets the load reduction targets set by Blacktown City

	Flow Objectives over time, where they are not currently achieved in the ambient waters;	Council.
	• *Consult with the EPA as soon as possible if a mixing zone is proposed (a mixing zone could exist where effluent is discharged into a receiving water body, where the quality of the water being discharged does not immediately meet water quality objectives. The mixing zone could result in dilution, assimilation and decay of the effluent to allow water quality objectives to be met further downstream, at the edge of the mixing zone). The EPA will advise the proponent under what conditions a mixing zone will and will not be acceptable, as well as the information and modelling requirements for assessment;* *Note: The assessment of water quality impacts needs to be undertaken in a total catchment management context to provide a wide perspective on development impacts, in particular cumulative impacts.*	Not Applicable - the proposed development will not release effluent to the downstream receiving environment. The development will discharge treated waste water to sewer.
	• *Where a licensed discharge is proposed, provide the rationale as to why it cannot be avoided through application of a reasonable level of performance, using available technology, management practice and industry guidelines;*	Not Applicable - the proposed development will not release effluent to the downstream receiving environment. The development will discharge treated waste water to sewer.
	• *Where a licensed discharge is proposed, provide the rationale as to why it represents the best environmental outcome and what measures can be taken to reduce its environmental impact;*	Not Applicable - the proposed development will not release effluent to the downstream receiving environment. The development will discharge treated waste water to sewer.
	• *Reference should be made to Managing Urban Stormwater: Soils and Construction (DECC, 2008), Guidelines for Fresh and*	Not Applicable

	Marine Water Quality ANZECC 2000), Environmental Guidelines: Use of effluent by Irrigation (DEC, 2004);	
	Describe management and mitigation measures • *Outline stormwater management to control pollutants at the source and contain them within the site. Also describe measures for maintaining and monitoring any stormwater controls;*	Refer Section 8 of this IWCMS
	• *Outline erosion and sediment control measures directed at minimising disturbance of land, minimising water flow through the site and filtering, trapping or detaining sediment. Also include measures to maintain and monitor controls as well as rehabilitation strategies;*	Refer Section 11 of this IWCMS
	• *Describe waste water treatment measures that are appropriate to the type and volume of waste water and are based on a hierarchy of avoiding generation of waste water; capturing all contaminated water (including stormwater) on the site; reusing/recycling waste water; and treating any unavoidable discharge from the site to meet specified water quality requirements;*	Refer Section 10 of this IWCMS
	• *Outline pollution control measures relating to storage of materials, possibility of accidental spills (eg preparation of contingency plans), appropriate disposal methods, and generation of leachate;*	Refer Section 8 of this IWCMS
	• *Describe hydrological impact mitigation measures including:* *a) site selection (avoiding sites prone to flooding and waterlogging, actively eroding or affected by deposition);* *b) minimising runoff;* *c) minimising reductions or modifications to flow regimes;* *d) avoiding modifications to groundwater;*	Refer Sections 6, 7 and 9 of this IWCMS. The proposed development area is across existing impervious surfaces. The existing site flow regimes will be maintained.
	• *Describe groundwater impact mitigation measures including:* *a) site selection;* *b) retention of native vegetation and revegetation;*	Refer Section 9 of this IWCMS for groundwater details. The proposed development area is

	c) artificial recharge; *d) providing surface storages with impervious linings;* *e) monitoring program;*	across an existing impervious surface. The existing site flow regimes will be maintained.
	• *Describe geomorphological impact mitigation measures including:* *a) site selection;* *b) erosion and sediment controls;* *c) minimising instream works;* *d) treating existing accelerated erosion and deposition;* *e) monitoring program;*	Not Applicable - the proposed development does not involve geomorphological activities. The proposed development area is across an existing impervious surface. The existing site flow regimes will be maintained. Refer Section 9 of this IWCMS for groundwater details.
	• *Any proposed monitoring should be undertaken in accordance with the Approved Methods for the Sampling and Analysis of Water Pollutants in NSW (DEC 2004);*	There is no proposal for water quality sampling / monitoring. The proposed development will not release effluent to the downstream receiving environment. The development will discharge treated waste water to sewer.
	Cumulative impacts • *Identify the extent that the receiving environment is already stressed by existing development and background levels of emissions to which this proposal will contribute;*	Refer Sections 4.3 and 8.1 of this IWCMS
	• *Assess the impact of the proposal against the long term air, noise and water quality objectives for the area or region;*	Refer Sections 4.3 and 8 of this IWCMS for details regarding the development area adopted load reduction targets set by BCC
	• *Identify infrastructure requirements flowing*	Not Applicable - this

	from the proposal (eg water and sewerage services, transport infrastructure upgrades);	proposal will not require infrastructure upgrades

3. Blacktown City Council Requirements – (MCU-14-2158)

Heading	Requirements		Applicant's Reference
Planning	*Documentary evidence that the operation of this facility 24 hours a day will not impact on the amenity of the residential area 420m away from the site;*		
Engineering and Drainage	*The development should be as per "Blacktown City Council, Engineering Guide for Development – 2005" to facilitate the efficient processing of engineering plan submissions, and to ensure that infrastructure associated with the development is designed and constructed to safe, serviceable, economical to maintain and meets community expectations;*		Refer Drawings Section of this report. The development is generally in accordance with Blacktown City Council, Engineering Guide for Development – 2005.
	Stormwater water quality improvement targets are to be achieved on-site prior to discharge for the new building and any disturbed areas around the new building accounting for all bypass. The targets are to be assessed using MUSIC and in accordance with all the requirements of Blacktown City Council's Water Sensitive Urban Design. An electronic copy of MUSIC is to be provided to Council for assessment. The required percentage reductions in post development average annual load of pollutants are:		Refer Section 8 of this IWCMS. The development achieves Blacktown City Council requirements.
	Pollutant	*% post development pollutant reduction targets*	Refer Section 8.6 of this IWCMS. The development achieves Blacktown City Council requirements.
	Gross Pollutants	*90*	
	Total Suspended Solids	*85*	
	Total Phosphorous	*65*	
	Total Nitrogen	*45*	
	Total Hydrocarbons	*90*	
	Note: As MUSIC does not assess hydrocarbons, a gross pollutant trap targeting hydrocarbons and		The development proposal incorporates

	designed to treat the minimum 6 month flow from any newly disturbed areas is deemed to comply.	SPELFilter Cartridges which will remove hydrocarbons from the new pavement areas
	The development should achieve a minimum of 80% (assessed using MUSIC) of the non-potable water uses on-site for the new building and processes being met using rainwater. Non-potable uses include toilet flushing, any new industrial processes and landscape watering. Allow for toilet reuse of 0.1 KL/day per any new toilet / urinal, ignoring any disabled toilet. For watering landscaped areas (ignoring turf areas) allow 0.4 kl/year/m² as PET-Rain. Allow for a 20% losss in rainwater tank size volume in MUSIC compared to that shown on the design plans to allow for anaerobic zones, mains water top up levels and overflow levels.	Refer Section 8.9 of this IWCMS. The development achieves Blacktown City Council requirements.
Environmental Health	*Stormwater – Stormwater management plan required to address potential sources of contamination from stormwater runoff;*	Refer Section 8 of this IWCMS. The development proposal is two bunded buildings. There will be no potential for contamination of stormwater runoff from the proposal. All waste water treatment will occur within the buildings. The development achieves Blacktown City Councils load reduction targets.
	Wastewater – Trade Waste Agreement is required with Sydney water;	Refer Section 3.5 of the EIS. A tradewaste agreement will be negotiated with Sydney Water.

4. Sydney Water Requirements (PCU 56719)

Heading	**Requirements**	**Applicant's comments**
Sydney Water Requirements	*Sydney Water requests Secretary Environment Assessment Requirements include the following:*	

for Environmental Assessment	***1***. *The proponent should include any proposed alternative water supply, proposed and uses of potable and non-potable water, demonstration of water sensitive urban design and any water conservation measures. This will allow Sydney Water to determine the impact of the proposed project on its existing services and identify any augmentation requirements;*	Refer Section 8.9 of this IWCMS for details regarding water conservation. The development supplies more than 80% of its non potable water demand through rainwater reuse. Refer Section 8 of this IWCMS. The development includes water sensitive urban detail.
	2. *When determining landscaping options, the proponent should take into account that certain tree species can cause cracking or blockage of Sydney Water pipes and therefore should be avoided.*	The development proposal is two new buildings on an existing site. There is no proposal to remove or change existing landscape (shrubs and trees).

5. Department of Primary Industries (OUT14/38641)

Heading	Requirements	Applicant's Reference
Comment by NSW Office of Water	*The NSW Office of Water (Office of Water) has reviewed the supporting documentation accompanying the request for Secretary's Environmental Assessment Requirements (SEAARs) and provides the following comments below, and further detain in* ***Attachment A.*** *It is recommended that the EIS be required to include:*	
	• *Details of water proposed to be taken (including through inflow and seepage) from each surface and groundwater source as defined by the relevant water sharing plan;*	Refer Section 8 of this IWCMS. Rainwater will be collected from the proposed development roof areas via a rainwater tank. The roof area is approx. 1810m². The rainwater will be used to supply non potable

		uses such as landscape irrigation and washdown.
	• *Assessment of any volumetric water licensing requirements (including those for ongoing water take following completion of the project);*	Not Applicable
	• *The identification of an adequate and secure water supply for the life of the project. Confirmation that water can be sourced from an appropriately authorised and reliable supply. This is to include an assessment of the current market depth where water entitlement is required to be purchased;*	Not Applicable
	• *A detailed and consolidated site water balance;*	Refer Section 8.9 of this IWCMS for water conservation details. The development proposal is for water treatment. Over 80% of the developments non potable water use will be supplied by three rainwater tanks totalling 45.2kL. The potable water sources of the development are limited to staff use purposes. There is no proposal for water to be added to the water treatment process, as this would increase operational and treatment costs.
	• *Assessment of impacts on surface and ground water sources (both quality and quantity), related infrastructure, adjacent licensed water users, basic landholder rights, watercourses, riparian land, flood risk and groundwater dependent ecosystems, and measures proposed to reduce and mitigate these impacts;*	The development proposal is two bunded buildings. There will be no potential for contamination of stormwater runoff from the proposal. All

		waste water treatment will occur within the roofed structures. The development achieves Blacktown City Councils load reduction targets.
	• *Full technical details and data of all surface and groundwater modelling if appropriate;*	Not Applicable
	• *Proposed surface and groundwater monitoring activities and methodologies;*	Refer Section 3.4 of this IWCMS. There is no proposal for water monitoring activities.
	• *Assessment of any potential cumulative impacts on water resources, and proposed options to manage the cumulative impacts;*	Refer Section 8.6 of this IWCMS. The development proposal is two bunded buildings. There will be no potential for contamination of stormwater runoff from the proposal. All waste water treatment will occur within the roofed structures. The development achieves Blacktown City Councils load reduction targets. There will be no cumulative impacts on water resources.
	• *Consideration of relevant policies and guidelines, as applicable;*	The proposed development is generally in accordance with the governing authorities requirements, polices and guidelines
	• *A statement of where each element of the SEARs is addressed in the EIS (i.e. in the form of a table).*	Refer Appendix 6 of the EIS
Comment by Agriculture	*Agriculture NSW advise that the applicant will need to address the following critical aspects:*	

NSW	• *Biosecurity assessment and proposed management due to close proximity of tributary to Eastern Creek;*	All activities, including loading and unloading will occur in bunded, roofed buildings. There is no potential for contaminates to enter the adjacent concrete drainage channel. The development will meet the load reduction requirements set by Blacktown City Council.
	• *Flood risk and Effluent management during flash flooding given proximity to tributary of Eastern Creek which supplies irrigators in Eastern and South Creeks.*	Refer Sections 6 and 10 of this IWCMS. The development is above the PMF and is not affected by flooding of Eastern Creek. The development has no external catchments which contribute to flows within the proposal site. The development is two bunded buildings. There is no potential for effluent to enter Eastern Creek.

Attachment A - Additional Comment by NSW Office of Water

	The EIS should take into account the objects and regulatory requirements of the Water Act 1912 (WA 1912) and Water Management Act 2000 (WMA 2000), and associated regulations and instruments, as applicable.	
	Water Management Act 2000 (WMA 2000) *Key points:* • *Volumetric licensing in areas covered by water sharing plans;*	Not Applicable
	• *Works within 40m of waterfront land;*	Refer Section 11 of this IWCMS and Appendix 16 of the

		EIS. The proposed construction works will be undertaken in accordance with the latest sediment and erosion control requirements. The site drains internally to existing stormwater infrastructure, which then discharges to the drainage easement that exists along the Northern Boundary. This drainage easement includes piped infrastructure that connects the surrounding industrial properties to the concrete drainage channel beyond the drainage easement. The site does not discharge directly to the concrete drainage channel.
	• *SSD & SSI projects are exempt from requiring water supply work approvals and controlled activity approvals as a result of the Environmental Planning & Assessment Act 1979 (EP&A Act);*	
	• *No exemptions for volumetric licensing apply as a result of the EPA&A Act;*	
	• *Basic landholder rights, including harvestable rights dams;*	The proposal does not involve harvestable rights dams
	• *Aquifer interference activity approval and flood management work approval provisions have not yet commenced and are regulated by the Water Act 1912;*	The proposal does not involve aquifer or flood management work
	• *Maximum penalties of $2.2 million plus $264,000 for each day an offence continues apply under the WMA 2000;*	Not Applicable
	Water Act 1912 (WA 1912) *Key points:*	The proposal does not involve volumetric

	• *Volumetric licensing in areas where no water sharing plan applies;*	licensing
	• *Monitoring bores;*	The proposal does not involve monitoring bores
	• *Aquifer interference activities that not regulated as a water supply work under the WMA 2000;*	The proposal does not involve aquifer interference activities
	• *Flood management works;*	The proposal does not involve flood management works
	• *No exemptions apply to licences or permits under the WA 1912 as a result of the EP&A Act;*	Not Applicable
	• *Regulation of water bore driller licensing;*	The proposal does not involve water bore driller licensing
	Water Management (General) Regulation 2011 *Key points:* • *Provides various exemptions for volumetric licensing and activity approvals;*	The proposal does not involve volumetric licensing
	• *Provides further detail on requirements for dealings and applications;*	Not Applicable
	Water Sharing Plans – these are considered regulations under the WMA 2000 *Access Licence Dealing Principles Order 2004.*	The proposal does not involve water sharing
Water Sharing Plans	*The proposal is located within the area covered by the Greater Metropolitan Region Unregulated River Water Sources Water Sharing Plan, and the Greater Metropolitan Region Groundwater Sources Water Sharing Plan. The EIS is required to:*	Not Applicable
	• *Demonstrate how the proposal is consistent with the relevant rules of the Water Sharing Plan including rules for access licences, distance restrictions for water supply works and rules for the management of local impacts in respect of surface water and groundwater sources, ecosystem protection (including groundwater dependent ecosystems), water quality and surface-groundwater connectivity;*	Refer Section 8.9 of this IWCMS for water conservation details. The proposal does not involve water sharing. In accordance with Blacktown City Council requirements the development roof area will be connected to a rainwater tank achieve greater than 80% of the

		developments non potable water demand supplied by non potable sources.
	• *Provide a description of any site water use (amount of water to be taken from each water source) and management including all sediment dams, clear water diversion structures with detail on the location design specifications and storage capacities for all the existing and proposed water management structures;*	Refer Section 8.9 of this IWCMS for water conservation details
	• *Provide an analysis of the proposed water supply arrangements against the rules for access licences and other applicable requirements off any relevant WSP, including:* *(a) Sufficient market depth to acquire the necessary entitlements for each water source;* *(b) Ability to carry out a "dealing" to transfer the water to relevant location under the rules of the WSP;* *(c) Daily and long-term access rules;* *(d) Account management and carryover provisions;*	Refer Section 8.9 of this IWCMS for water conservation details. The development seeks no water supply / access licences. The development proposal is for water treatment. Over 80% of the developments non potable water use will be supplied by three rainwater tanks with a combined total volume of 45.2kL. The potable water sources of the development are limited to staff use purposes. There is no proposal for water to be added to the water treatment process, as this would increase operational and treatment costs.
	• *Provide a detailed and consolidated site water balance;*	Refer Section 8.9 of this IWCMS for water conservation details. The development proposal is for water treatment. Over 80% of the developments non potable water use will be supplied by

		three rainwater tanks with a combined total volume of 45.2kL. The potable water sources of the development are limited to staff use purposes. There is no proposal for water to be added to the water treatment process, as this would increase operational and treatment costs.
	• *Further detail on licensing requirements is provided below;*	The proposal does not involve any water licensing
Relevant Policies and Guidelines	*The EIS should take into account the following policies (as applicable):*	
	• *NSW Guidelines for Controlled Activities on Waterfront Land (NOW, 2012);*	Refer Section 11 of this IWCMS and Appendix 16 of the EIS. The proposed construction works will be undertaken in accordance with the latest sediment and erosion control requirements. The site drains internally to existing stormwater infrastructure, which then discharges to the drainage easement that exists along the Northern Boundary. This drainage easement includes piped infrastructure that connects the surrounding industrial properties to the concrete drainage channel beyond the

		drainage easement. The site does not discharge directly to the concrete drainage channel.
	• *NSW Aquifer Interference Policy (NOW, 2012);*	The proposal does not involve interference with an Aquifer
	• *Risk Assessment Guidelines for Groundwater Dependent Ecosystems (NOW, 2012);*	Refer Section 9 of this IWCMS
	• *Australian Groundwater Modelling Guidelines (NWC, 2012);*	Refer Section 9 of this IWCMS The proposal does not involve interference with groundwater
	• *NSW State Rivers and Estuary Policy (1993);*	The proposal does not involve or interference with the natural hydrology of a river or estuary
	• *NSW State Groundwater Policy Framework Document (1997);*	Refer Section 9 of this IWCMS
	• *NSW State Groundwater Quality Protection Policy (1998);*	Refer Section 9 of this IWCMS
	• *NSW State Groundwater Dependent Ecosystems Policy (2002);*	Refer Section 9 of this IWCMS
	• *NSW Water Extraction Monitoring Policy (2007).*	The proposal does not involve any water extraction activities
Licensing Considerations	*The EIS is required to provide:*	
	• *Identification of water requirements for the life of the project in terms of both volume and timing (including predictions of potential ongoing groundwater take following the cessation of operations at the site – such as evaporative loss from open*	Refer Section 8.9 of this IWCMS for water conservation details. The development proposal is for water treatment. Over 80%

	voids or inflows);	of the developments non potable water use will be supplied by three rainwater tanks with a combined total volume of 45.2kL. The potable water sources of the development are limited to staff use purposes. There is no proposal for water to be added to the water treatment process, as this would increase operational and treatment costs.
	• *Details of the water supply source(s) for the proposal including any proposed water and groundwater extraction from each water source as defined in the relevant Water Sharing Plan/s and all water supply works to take water;*	The proposal does not involve any water extraction activities
	• *Explanation of how the required water entitlements will be obtained (i.e. through a new or existing licence/s, trading on the water market, controlled allocations etc);*	The proposal does not involve any application for water entitlements
	• *Information of the purpose, location, construction and expected annual extraction volumes including details on all existing and proposed water supply works which take surface water, (pumps, dams, diversions etc);*	The proposal does not involve any water extraction activities
	• *Details on all bores and excavations for the purpose of investigation, extraction, dewatering, testing and monitoring. All predicted groundwater take must be accounted for through adequate licencing;*	The proposal does not involve any water extraction activities
	• *Details on existing dams/storages (including the date of construction, location, purpose, size and capacity) and any proposal to change the purpose of existing dams/storages;*	The proposal does not involve any dams/storages
	• *Details on the location, purpose, size and capacity of any new proposed*	The proposal does not involve any

	dams/storages.	dams/storages
Surface Water Assessment	*The predictive assessment of the impact of the proposed project on surface water sources should include the following:*	
	• *Identification of all surface water features including watercourses, wetlands and floodplains transected by or adjacent to the proposed project;*	The development site has no external contributing catchments
	• *Identification of all surface water sources as described by the relevant water sharing plan;*	The proposal does not involve any water sharing activities / plans
	• *Detailed description of dependent ecosystems and existing surface water users within the area, including basic landholder rights to water and adjacent/downstream licensed water users;*	Refer Ecological Assessment Appendix 13 of the EIS Refer Section 4.3 of this IWCMS. This section has some catchment wide details regarding receiving environment and ecological values of the receiving waters. Details regarding water users have not been included in this IWCMS as the hydrology of the proposed site has not changed.
	• *Description of all works and surface infrastructure that will intercept, store, convey, or otherwise interact with surface water resources;*	Refer Section 8.9 of this IWCMS for water conservation details. The development proposal is for water treatment. Over 80% of the developments non potable water use will be supplied by three rainwater tanks with a combined total volume of 45.2kL.

		The potable water sources of the development are limited to staff use purposes. There is no proposal for water to be added to the water treatment process, as this would increase operational and treatment costs.
	• *Assessment of predicted impacts on the following:* *(a) Flow of surface water, sediment movement, channel stability, and hydraulic regime;* *(b) Water quality;* *(c) Flood regime, and consideration of flood risk;* *(d) Dependent ecosystems;* *(e) Existing surface water users; and* *(f) Planned environmental water and water sharing arrangements prescribed in the relevant water sharing plans.*	Refer Sections 5, 6, 7, 8 of this IWCMS
	• *Measures to ensure any tailwater discharge from the site has appropriate water quality for receiving waters;*	The proposal does not involve tailwater discharge
Groundwater Assessment	*To ensure the sustainable and integrated management of groundwater sources, the EIS needs to include adequate details to assess the impact of the project on all groundwater sources. Where it is considered unlikely that groundwater will be intercepted or impacted (for example by infiltration), a brief site assessment and justification for the minimal impacts may be sufficient, accompanies by suitable contingency measures in place in the event that groundwater is intercepted, and appropriate measures to ensure that groundwater is not contaminated.* *Where groundwater is expected to be intercepted or impacted, the following requirements should be used to assist the groundwater assessment for the proposal;*	Refer Section 9 of this IWCMS
	• *Works likely to intercept, connect with or infiltrate the groundwater sources;*	Refer Section 9 of this IWCMS. The existing site is fully

		impervious. The development proposal will replace impervious pavement with impervious roof. Therefore no changes in groundwater infiltration will result from this development proposal.
	• *Any proposed groundwater extraction, including purpose, location and construction details of all proposed bores and expected annual extraction volumes;*	The proposal does not involve groundwater extraction
	• *Bore construction information is to be supplied to the Office of Water by submitting a "Form A" template. The Office of Water will supply "GW" registration numbers (and licence/approval numbers if required) which must be used as consistent and unique bore identifiers for all future reporting;*	The proposal does not involve groundwater extraction
	• *A description of the watertable and groundwater pressure configuration, flow directions and rates and physical and chemical characteristics of the groundwater source (including connectivity with other groundwater and surface water sources);*	
	• *Sufficient baseline monitoring for groundwater quantity and quality for all aquifers and GDEs to establish a baseline incorporating typical temporal and spatial variations;*	The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes in groundwater infiltration will result from this development proposal. There is no proposal for groundwater monitoring.
	• *The predicted impacts of any final landform on the groundwater regime;*	The proposal does not involve any changes to landform on site

		catchments
	• *The existing groundwater users within the area (including the environment), any potential impacts on these users and safeguard measures to mitigate impacts;*	The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes in groundwater infiltration will result from this development proposal.
	• *An assessment of groundwater quality, its beneficial use classification and prediction of any impacts on groundwater quality;*	The proposal does not involve any changes to groundwater or groundwater quality. The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes in groundwater infiltration will result from this development proposal.
	• *An assessment of the potential for groundwater contamination (considering both the impacts of the proposal on groundwater contamination and the impacts of contamination on the proposal);*	The proposal does not involve any changes to groundwater or groundwater quality. The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes in groundwater infiltration will result from this development proposal. The development proposal is two

		bunded shed structures. There will be no potential for contamination of stormwater runoff from the proposal. All waste water treatment will occur within the bunded buildings.
	• *Measure proposed to protect groundwater quality both in the short and long term, and isolate aquifers from potential contamination;*	The proposal does not involve any changes to groundwater or groundwater quality. The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes in groundwater infiltration will result from this development proposal. The development proposal is two bunded shed structures. There will be no potential for contamination of stormwater runoff from the proposal. All waste water treatment will occur within the roofed structures.
	• *Measure for preventing groundwater pollution so that remediation is not required;*	The proposal does not involve any changes to groundwater or groundwater quality. The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes

		in groundwater infiltration will result from this development proposal. The development proposal is two bunded shed structures. There will be no potential for contamination of stormwater runoff from the proposal. All waste water treatment will occur within the roofed structures.
	• *Protective measures for any groundwater dependent ecosystems (GDEs);*	The proposal does not involve any changes to groundwater or groundwater quality. The existing site is fully impervious. The development proposal will replace impervious pavement with impervious roof or new pavement. Therefore no changes in groundwater infiltration will result from this development proposal. The development proposal is two bunded shed structures. There will be no potential for contamination of stormwater runoff from the proposal. All waste water treatment will occur within the roofed structures.
	• *Proposed methods of the disposal of waste water and approval from the relevant authority;*	Refer Section 3.5 of the EIS. A tradewaste agreement will be negotiated with Sydney Water.

	• *The results of any models or predictive tools used;*	Modelling of groundwater is not applicable to this application
	Where potential impact/s are identified the assessment will need to identify limits to the level of impact and contingency measures that would remediate, reduce or manage potential impacts to the existing groundwater resource and any dependent groundwater environment or water users, including information on:	Refer Section 10 of this IWCMS. No potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within the bunded buildings and inground sumps.
	• *Any proposed monitoring programs, including water levels and quality data;*	There is no proposal for groundwater monitoring
	• *Reporting procedures for any monitoring program including mechanism for transfer of information;*	There is no proposal for groundwater monitoring
	• *An assessment of any groundwater source/aquifer that may be sterilised from future use as a water supply as a consequence of the proposal;*	Not Applicable - no potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within bunded roofed buildings.
	• *Identification of any nominal thresholds as to the level of impact beyond which remedial measures or contingency plans would be initiated (this may entail water level triggers or a beneficial use category);*	Not Applicable - no potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within bunded roofed buildings.
	• *Description of the remedial measures or contingency plans proposed;*	Not Applicable
	Any funding assurances covering the anticipated post development maintenance cost, for example on-going groundwater monitoring for the nominated period.	Not Applicable
Groundwater Dependent	*The EIS must consider the potential impacts on any Groundwater Dependent Ecosystems (GDEs)*	Refer Ecological Assessment Appendix

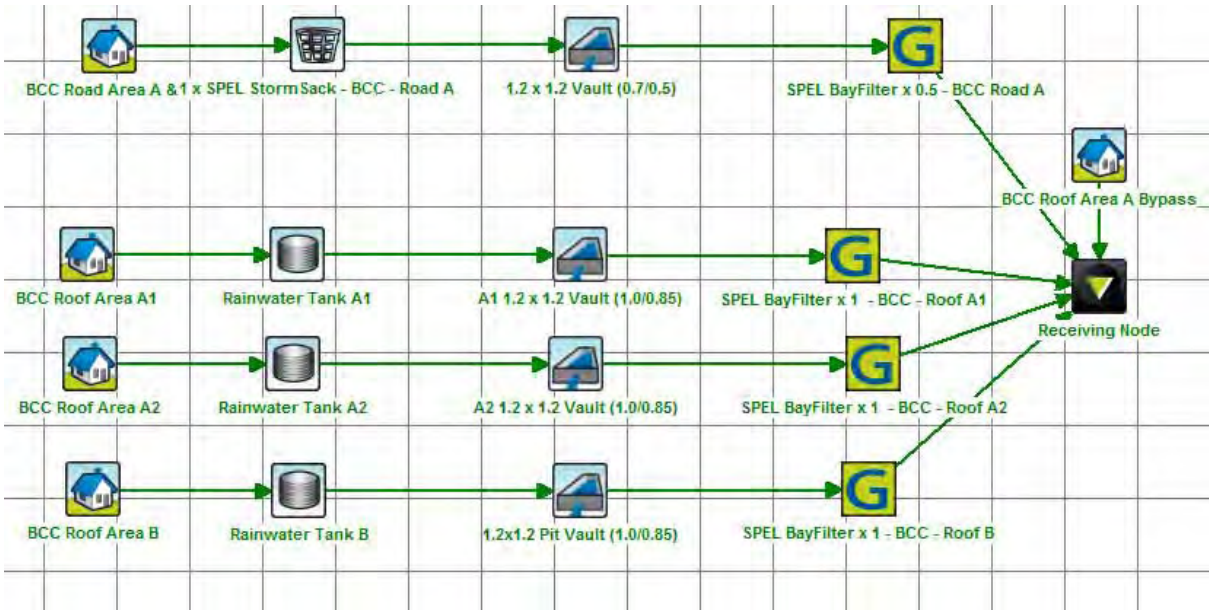
Ecosystems	*at the site and in the vicinity of the site and:*	13 of the EIS. No potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within the bunded buildings.
	• *Identify any potential impacts on GDEs as a result of the proposal including:* *(a) The effect of the proposal on the recharge to groundwater systems;* *(b) The potential to adversely affect the water quality of the underlying groundwater system and adjoining groundwater systems in hydraulic connection; and* *(c) The effect on the function of GDEs (habitat, groundwater levels, connectivity);*	No potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within bunded roofed buildings.
	• *Provide safeguard measures for and GDEs.*	Not Applicable
Watercourses, Wetlands and Riparian Land	*The EIS should address the potential impacts of the project on all watercourses likely to be affected by the project, existing riparian vegetation and the rehabilitation of riparian land. It is recommended the EIS provides details on all watercourses potentially affected by the proposal including:*	No potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within bunded roofed buildings.
	• *Scaled plans showing the location of:* *(a) Wetlands/ swamps, watercourses and top of bank;* *(b) Riparian corridor widths to be established along the creeks;* *(c) Existing riparian vegetation surrounding the watercourses (identify any areas to be protected and any riparian vegetation proposed to be removed);* *(d) The site boundary, the footprint of the proposal in relation to the watercourses and riparian areas; and* *(e) Proposed location of any asset protection zones;*	Refer Ecological Assessment Appendix 13 of the EIS
	• *Photographs of the watercourses/wetlands and a map showing the pint from which the photos were taken;*	Refer Ecological Assessment Appendix 13 of the EIS

	• *A detailed description of all potential impacts on the watercourses/riparian land;*	No potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within bunded roofed buildings.
	• *A detailed description of all potential impacts on the wetlands, including potential impacts to the wetlands hydrologic regime; groundwater recharge; habitat and any species that depend on the wetlands;*	Not Applicable - the site discharges to a constructed channel
	• *A description of the design features and measures to be incorporated to mitigate potential impacts;*	Refer Section 10 of this IWCMS. No potential impacts to groundwater have been identified. All operational, loading and unloading activities will occur within the bunded buildings and inground sumps.
	• *Geomorphic and hydrological assessment of water courses including details of stream order (Strahler System), river style and energy regimes both in channel and on adjacent floodplains.*	Refer to Section 4.3 of this IWCMS for details regarding stream order (Strahler System). A geomorphic and hydrological assessment of the degraded constructed channel adjacent to the development site has not been undertaken as no changes to hydrology will occur as a result of the development proposal. In accordance with BCC requirements Detention storages have been provided to account for the new impervious area. The

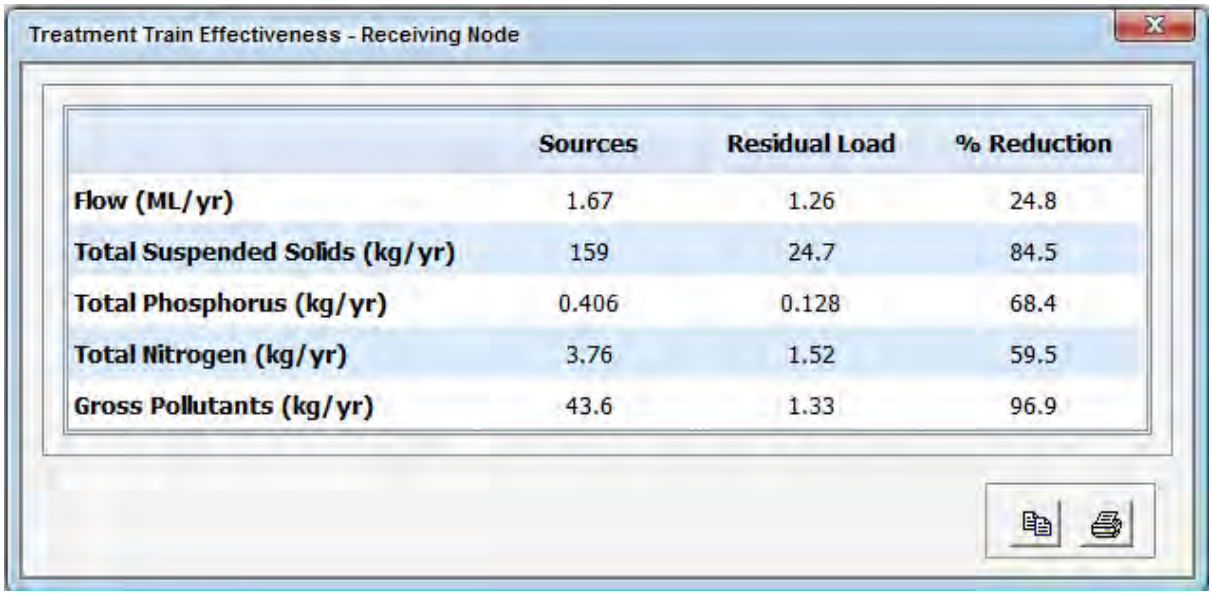
		new impervious area in the proposed development will be across existing impervious areas within the existing development.

ATTACHMENT C
MUSIC Model and Water Balance Node Results

MUSIC MODEL – RI456 MUSIC Model



MUSIC Model Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.67	1.26	24.8
Total Suspended Solids (kg/yr)	159	24.7	84.5
Total Phosphorus (kg/yr)	0.406	0.128	68.4
Total Nitrogen (kg/yr)	3.76	1.52	59.5
Gross Pollutants (kg/yr)	43.6	1.33	96.9

Rainwater Tank Node Water Balance
Reuse Demand including Wash Down

Rainwater Tank A1

Node Water Balance - Rainwater Tank A1

	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	0.36	9.29	0.05	0.79	9.34
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	0.24	4.79	0.03	0.49	0.00
Weir Out	0.00	0.00	0.00	0.00	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.12	1.58	0.02	0.21	0.00
Reuse Requested	0.15	0.00	0.00	0.00	0.00
% Reuse Demand Met	82.88	0.00	0.00	0.00	0.00
% Load Reduction	33.60	48.39	37.13	37.12	100.00

Decimal Places 2

Rainwater Tank A2

Node Water Balance - Rainwater Tank A2

	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	0.38	9.92	0.06	0.83	9.91
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	0.26	4.84	0.04	0.52	0.00
Weir Out	0.00	0.00	0.00	0.00	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.12	1.58	0.02	0.21	0.00
Reuse Requested	0.15	0.00	0.00	0.00	0.00
% Reuse Demand Met	85.32	0.00	0.00	0.00	0.00
% Load Reduction	32.63	51.19	36.97	37.69	100.00

Decimal Places 2

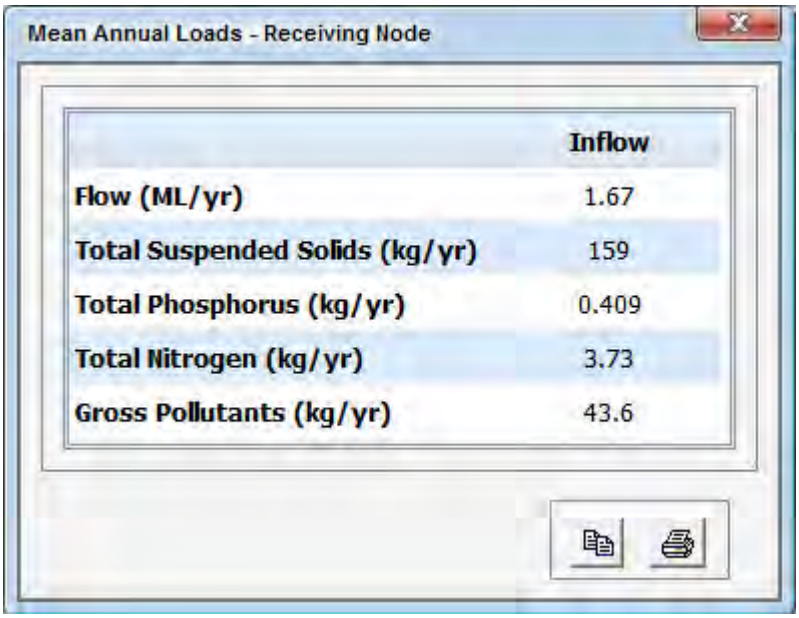
Rainwater Tank B

Node Water Balance - Rainwater Tank B

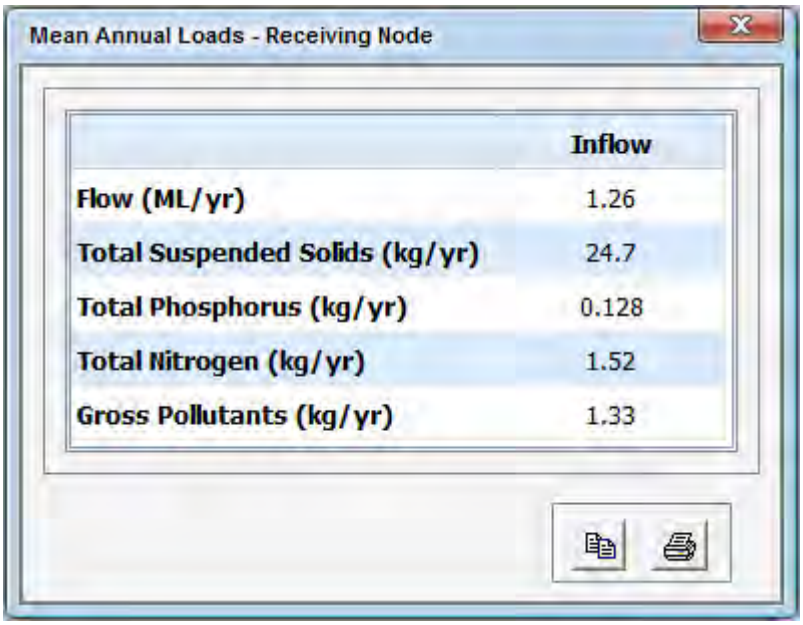
	Flow (ML/yr)	TSS (kg/yr)	TP (kg/yr)	TN (kg/yr)	GP (kg/yr)
Flow In	0.53	14.14	0.08	1.18	13.91
ET Loss	0.00	0.00	0.00	0.00	0.00
Infiltration Loss	0.00	0.00	0.00	0.00	0.00
Low Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
High Flow Bypass Out	0.00	0.00	0.00	0.00	0.00
Pipe Out	0.37	7.24	0.05	0.77	0.00
Weir Out	0.00	0.00	0.00	0.00	0.00
Transfer Function Out	0.00	0.00	0.00	0.00	0.00
Reuse Supplied	0.16	2.10	0.02	0.28	0.00
Reuse Requested	0.18	0.00	0.00	0.00	0.00
% Reuse Demand Met	89.61	0.00	0.00	0.00	0.00
% Load Reduction	30.59	48.75	34.63	35.15	100.00

Decimal Places 2

Pre-Developed Mean Annual Runoff



Post Developed Mean Annual Runoff



ATTACHMENT D

Inspection and Maintenance Manual

J.J.Richards & Sons Pty Ltd

Total Waste Management

Inspection and Maintenance Manual for Water Quality Improvement Devices

Liquid Waste Facility and Depot at 14 Rayben Street, Glendenning

Issue A February 2016

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ATTACHMENTS

SPELFilter – Operation and Maintenance Manual
SPEL StormSack – Operation and Maintenance Manual

DRAWINGS

RI456-SW-02 Sections 1 of 2
RI456-SW-03 Sections 2 of 2

1 INTRODUCTION

This inspection and maintenance manual has been developed for the stormwater quality improvement devices proposed for the Liquid Waste Facility and Depot at 14 Rayben Street, Glendenning.

The purpose of this plan is to describe:

- The stormwater quality treatment devices used on the site; and
- Maintenance and inspection procedures for each of these devices;

The following runoff treatment devices are used on this site:

- Rainwater Tank;
- Detention Tank / Detention Pit;
- SPEL Filter Vault; and
- SPEL Storm Sack

The following washdown water storage devices are used on this site:

- Inground Sumps;

If the above devices are well maintained and inspected regularly the benefits to the downstream receiving waters of Eastern Creek will be reflected through the enhancement of recreational activities and improved natural ecology. The importance of improving stormwater quality is vital for all Australians and the local community now and into the future. The accumulative effect of achieving the Water Quality Objectives for all new re-development and development sites across Australia will over time improve our local waterways.

2 DESCRIPTION OF DEVICES

2.1 Stormwater

The following provides a brief description of how the stormwater quality improvement devices at the Liquid Waste Facility and Depot function and operate to improve water quality:

- Rainwater Tanks – Rainwater tanks are connected to roof areas to collect roofwater for storage and reuse. Rainwater tanks will reduce runoff volumes, therefore reducing contaminant loads. Rainwater tanks also help to reduce mains water consumption by providing a water supply for operational purposes;
- Detention Tank / Detention Pit – In order to achieve onsite detention requirements, detention tanks and detention pits are use to mitigate site flows prior to discharging offsite;
- SPEL StormSack –StormSacks a priority product by SPEL Environmental and are specifically designed for the capture of gross pollutants – sediment, litter and oil/grease. The Stormsacks fit into grated inlet pits and are known called 'Baskets';
- SPELFilter / Vault – SPELFilter Cartridges are a propriety product by SPEL Environmental and are used for tertiary stormwater treatment. SPELFilters use hydraulic pressure to force water through the filter media, discharging through the centre tube and out through the outlet collection manifold pipe work. SPEL Filter Cartridges remove up to 80% TSS, 60% TP and 48% TN;

2.2 Washdown Water

The following provides a brief description of how the washdown water spillage control sumps at the Liquid Waste Facility function and operate to improve water quality:

- Inground Sumps (Organics Building Unloading Bays) – removes additional silts and provide a reservoir for spillage control;
- Inground Sumps (Organics Building Loading Bays) – removes additional silts and provide a reservoir for spillage control;
- Inground Sumps (Oil Storage Loading / Unloading Bays) – removes additional silts and provide a reservoir for spillage control;

3 MAINTENANCE REQUIREMENTS OF DEVICES

3.1 Stormwater

This section details the maintenance requirements of the stormwater quality improvement devices at the Liquid Waste Facilityand Depot, 14 Rayben Street, Glendenning.

3.1.1 Rainwater Tanks

Frequency: 3 monthly Inspection and Maintenance as required

Responsibility: Site Supervisor

Strategy: Maintenance of rainwater tanks revolves around ensuring that the rainwater tank, roof catchment and gutters, and drainage pipes are clear of leave litter and other debris/contaminants. This is important to ensure that the collected rainwater supply is clean and safe. Maintenance on the rainwater tanks and collection system should be carried out near the end of winter before the onset of rainy seasons. The following are presented to assist in the inspection/maintenance process and represent the typical maintenance requirements for rainwater tanks:

- Remove leave litter and other material from gutters and downpipes;
- Clear and inspect leave litter screens;
- Identify areas of ponded or trapped water within the collection system remove blockages, this will reduce the potential of mosquito breeding sources;
- Inspect rainwater tank and collections for potential mosquito entrance sites, close entrances once identified;
- Inspection of the rainwater tanks should be undertaken at least every 2 years to determine whether sludge has accumulated. Accumulated sludge should be removed by draining or siphoning of rainwater tank. Clean inside of tank as required, follow safety procedures for cleaning supplied by rainwater manufacture or employ professional tank cleaners; and
- If first flush devices are installed as part of the roof collection system, these devices must be checked regularly. Malfunctioning first flush devices will reduce the collection potential of the rainwater tanks;

3.1.2 Detention Tank / Detention Pit

Onsite Detention tank and detention pit maintenance is to be in accordance with the requirements of the Upper Parramatta River Catchment Trust, Onsite Stormwater Detention Handbook. **Table 3.1** below reflects this maintenance schedule presented in the Handbook.

Table 3.1 – OSD Maintenance Schedule

MAINTENANCE ACTION	FREQUENCY	RESPONSIBILITY	PROCEDURE
Outlets			
Inspect & remove any blockage of orifices	Six monthly	Owner	Remove grate & screen to inspect orifice. See plan for location of outlets
Check attachment of orifice plates to wall of chamber and/or pit (gaps less than 5 mm)	Annually	Maintenance Contractor	Remove grate and screen. Ensure plates are mounted securely, tighten fixings if required. Seal gaps as required.
Check orifice diameters are correct and retain sharp edges	Five yearly	Maintenance Contractor	Compare diameter to design (see Work-as-Executed) and ensure edge is not pitted or damaged.
Inspect screen and clean	Six monthly	Owner	Remove grate(s) and screens if required to clean them.
Check attachment of screens to wall of chamber or pit	Annually	Maintenance Contractor	Remove grate(s) and screen(s). Ensure screen fixings are secure. Repair as required.
Check screen(s) for corrosion	Annually	Maintenance Contractor	Remove grate(s) and examine screen(s) for rust or corrosion, especially at corners or welds.
Inspect walls (internal and external, if appropriate) for cracks or spalling	Annually	Maintenance Contractor	Remove grate(s) to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Inspect outlet sumps & remove any sediment/sludge	Six monthly	Owner	Remove grate(s) and screen(s). Remove sediment/sludge build-up and check orifices are clear.
Inspect grate(s) for damage or blockage	Six monthly	Owner	Check both sides of a grate for corrosion, (especially corners and welds) damage or blockage.
Inspect outlet pipe & remove any	Six monthly	Maintenance Contractor	Remove grate(s) and screen(s). Ventilate underground storage if

blockage			present. Check orifices and remove any blockages in outlet pipe. Flush outlet pipe to confirm it drains freely. Check for sludge/debris on upstream side of return line.
Check step irons for corrosion	Annually	Maintenance Contractor	Remove grate. Examine step irons and repair any corrosion or damage.
Check fixing of step irons is secure	Six monthly	Maintenance Contractor	Remove grate(s) and ensure fixings are secure prior to placing weight on step iron
MAINTENANCE ACTION FREQUENCY RESPONSIBILITY PROCEDURE Storage			
Inspect storage & remove any sediment/sludge in pit	Six monthly	Owner	Remove grate(s) and screen(s). Remove sediment/sludge build-up.
Inspect internal walls of storage (and external, if appropriate) for cracks or spalling	Annually	Maintenance Contractor	Remove grate(s) to inspect internal walls. Repair as required. Clear vegetation from external walls if necessary and repair as required.
Inspect & remove any debris/litter/mulch etc blocking grates	Six monthly	Owner	Remove blockages from grate(s) and check if storage is blocked.
Inspect areas draining to the storage(s) & remove debris/mulch/litter etc likely to block screens/grates	Six monthly	Owner	Remove debris and floatable material likely to be carried to grates.
Compare storage volume to volume approved. (Rectify if loss > 5%)	Annually	Maintenance Contractor	Compare actual storage available with Work-as Executed plans. If volume loss is greater than 5%, arrange for reconstruction to replace the volume lost. Council to be notified of the proposal.
Inspect storages for subsidence near pits	Annually	Maintenance Contractor	Check along drainage lines and at pits for subsidence likely to indicate leakages.

3.1.3 SPELFilter Vault

Maintenance and Operation requirements are detailed in the SPELFilter Operation and Maintenance manual. The manual is presented within the Attachments of this inspection and maintenance manual.

3.1.4 SPEL StormSack

Maintenance and Operation requirements are detailed in the SPEL StormSack Operation and Maintenance manual. The manual is presented within the Attachments of this inspection and maintenance manual.

3.2 Washdown Water

This section details the maintenance requirements of the washdown water quality improvement devices at the Liquid Waste Facilityand Depot at 14 Rayben St, Glendenning.

3.2.1 Inground Sumps (Organics Building Unloading Bays)

Frequency: Monthly or after a spill

Responsibility: Site Supervisor

Inspection: Level of liquids

Maintenance Criteria: Depth of liquids > 500mm

Action: Clean out with vacuum truck – dispose of in Grease Trap Receival Tank for treatment

3.2.1 Inground Sumps (Organics Building Loading Bays)

Frequency: Monthly or after a spill

Responsibility: Site Supervisor

Inspection: Level of liquids

Maintenance Criteria: Depth of liquids > 500mm

Action: Clean out with vacuum truck – dispose of in Grease Trap Receival Tank for treatment

3.2.1 Inground Sumps (Oil Storage Unloading/Loading Bays)

Frequency: Monthly or after a spill

Responsibility: Site Supervisor

Inspection: Level of liquids

Maintenance Criteria: Depth of liquids > 500mm

Action: Clean out with vacuum truck – dispose of in Used Oil Receival Tank for aggregation etc and removal from the site

4 REFERENCES

- Brisbane City Council Water Sensitive Urban Design Practice Note 4 Sedimentation Basins;
- Brisbane City Council Water Sensitive Urban Design Practice Note 5 Bio Retention Basins;
- Hastings Council Maintenance and Operational Procedures Manual for Stormwater Quality Improve Devices
- Water Sensitive Urban Design Technical Design Guidelines for South East Queensland Version 1 June 2006;
- www.healthywaterways.org;

ATTACHMENTS

Operation and Maintenance Manuals for Spel Filter and SPEL StormSack

CHAPTER 4

MAINTENANCE

The SPELFilter system requires periodic maintenance to continue operating at the design efficiency. The maintenance process comprises the removal and replacement of each SPELFilter cartridge and the cleaning of the vault or manhole with a vacuum truck. SPELFilter maintenance should be performed by a SPEL Environmental certified maintenance contractor.

The maintenance cycle of the SPELFilter system will be driven mostly by the actual solids load on the filter. The system should be periodically monitored to be certain it is operating correctly. Since stormwater solids loads can be variable, it is possible that the maintenance cycle could be more or less than the projected duration.

The SPELFilter systems in New Development applications are designed to treat the WQv in 24 hours initially. Later in the cycle these cartridges will flow at a slower rate, and when the WQv does not drain down within +/- 40 hours after the storm event, the system must be maintained.

When a SPELFilter system is first installed, it is recommended that it be inspected every six (6) months. When the filter system exhibits flows below design levels the system should be maintained. Filter cartridge replacement should also be considered when sediment levels are at or above the level of the 4 inch manifold system. Please contact SPEL Environmental for maintenance cycle estimations or assistance at 13 SPEL.

MAINTENANCE

1. Remove the manhole covers and open all access hatches.
2. Before entering the system make sure the air is safe per OSHA Standards or use a breathing apparatus. Use low O2, high CO, or other applicable warning devices per regulatory requirements.
3. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry.
4. Using a small lift or the boom of the vacuum truck, remove the used cartridges by lifting them out.
5. Any cartridges that cannot be readily lifted directly out of the vault should be removed from their location and carried to the lifting point using the Trolley system installed in the Vault (if applicable).
6. When all cartridges are removed, remove the balance of the solids and water; then loosen the stainless clamps on the couplings in the pipe manifold; remove the drain pipes as well. Carefully cap the manifold and rinse the floor removing the balance of the collected solids.
7. Clean the manifold pipes, inspect, and reinstall.
8. Install the exchange cartridges and close all covers.
9. The used cartridges must be sent back to SPEL Environmental for exchange/recycling and credit on undamaged units.

Model Number

Job Number

SPEL StormSack

OPERATIONS & MAINTENANCE

www.spel.com.au

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS

Manual Introduction

CHAPTER 1

Maintenance of the SPEL StormSack is essential to preservation of its condition to ensure lifetime operational effectiveness.

The SPEL StormSack is a highly engineered water quality device that is deployed directly in the stormwater system as primary treatment to capture contaminants close to the surface. To ensure full operational capacity, it is vital to ensure that the pollutants it captures are periodically removed, and filtration components are thoroughly cleaned.

Maintenance frequencies and requirements of the SPEL StormSack are dependent on the biological factors of the site in which it is situated. These factors can include excessive sediment loading or occurrence of toxic chemicals due to the natural and unnatural factors such as site erosion, chemical spills or extreme storms.

This manual has been designed by the SPEL StormSack Manufacturer the client or device owner in the maintenance of the SPEL StormSacks.

This manual should be used in conjunction with the relevant site traffic management and safety plans, as well as any other provided documentation from SPEL.

SPEL StormSack Specifications/Features

CHAPTER 2

General Description

The SPEL StormSack provides effective filtration of solid pollutants and debris typical of urban runoff, while utilising the existing or new storm drain infrastructure. The StormSack is designed to rest on the flanges of conventional catch basin frames and is engineered for most hydraulic and cold climate conditions.

Components:

a. Adjustable Flange and Deflector: Aluminium Alloy 6063-T6
b. Splash Guard: neoprene rubber
c. StormSack: woven polypropylene geotextile with US Mesh 20
d. Corner Filler: Aluminium Allow 5052-H32
e. Lifting Tabs: Aluminium Allow 5052-H32
f. Replaceable Oil Boom: polypropylene 3 inch (76 mm) diameter
g. Mesh Liner: HDPE, diamond configuration
h. Support Hardware: CRES 300 Series

Sizes:

STANDARD SPEL STORMSACK TO SUIT PIT SIZES

- 450x450mm
- 600x600mm
- 900x600mm
- 900x900mm

Custom sizes (i.e. 1200x900mm) can be manufactured on short lead times.

Health and Safety

CHAPTER 3

Maintenance of the SPEL StormSacks is a specialist activity.

When carrying out maintenance operations of the SPEL StormSack, factors such as equipment handling methods, pollutants and site circumstances can impose potential risks to the maintainer and nearby civilians.

Captured Pollutants

The material captured by the SPEL StormSack can be harmful and needs to be handled correctly. The nature and amount of the captured pollutants depends on the characteristics of the site. Pollutants can include from organic material such as leaves and sticks through to debris such as plastics, glass and other foreign objects such as syringes.

Site Circumstances

It is essential that Occupational Safety and Health guidelines and site specific safety requirements are followed at all times. It is important that all following steps specified by SPEL are carried out to ensure safety in the entire maintenance operation. The general workplace hazards associated with working outdoors also need to be taken into account.

Equipment Handling

Handling activities such as a removing the drain grate a well as managing pedestrians and other non-worker personnel at the site should be exercised in accordance with specified safety procedures and guidelines.

Personal Health & Safety

When carrying out maintenance operations of the SPEL StormSack all contractors and staff personnel must comply with all current workplace health and safety legislation.

The below measures should be adhered as practically as possible:

- Comply with all applicable laws, regulations and standards
- All those involved are informed and understand their obligations in respect of the workplace health and safety legislation.
- Ensure responsibility is accepted by all employees to practice and promote a safe and healthy work environment.

Personal Protective Equipment

When carrying out maintenance operations of the SPEL StormSack, wearing the appropriate personal protective equipment is vital to reducing potential hazards. Personal protective equipment in this application includes:

- Eye protection
- Safety apron
- Fluorescent safety vest
- Form of skin protection
- Puncture resistant gloves
- Steel capped safety boots

CHAPTER 3

Confined Spaces

Confined space entry procedures are not covered in this manual. It is requested that all personnel carrying out maintenance of the SPEL StormSack must evaluate their own needs for confined space entry and compliance with occupational health and safety regulations

When maintenance operations cannot be carried out from the surface and there is a need to enter confined space, only personnel that currently hold a Confined Space Entry Permit are allowed to enter the confined space. All appropriate safety equipment must be worn, and only trained personnel are permitted to use any required breathing apparatus gear. Necessary measures and controls must always be exercised to meet the confined space entry requirements. Non trained staff are not permitted to participle in any confined space entries.

Traffic Management

Typically stormwater gully pits are situated on roads and carparks, or adjacent to roads in a footpath or swale. As traffic requirements vary depending on the circumstance of the site, separate traffic control plans should be prepared for each site.

The specific road safety requirements for each site can be obtained from the relevant road authority to ensure all maintenance operations comply with the laws and regulations. State government publications can also be useful to find out the signage requirements, placement of safety cones and barricades that are required when working on public roads.

Operations

CHAPTER 4

General Monitoring

The SPEL Stormsack must be checked on a regular basis to analyse whether it requires maintenance or cleaning.

As gully pit grates are usually quite heavy, it is vital to exercise the correct lifting techniques and also ensure that the area surrounding the open pit is shielded from access of non-work personnel.

To ensure optimal performance of the SPEL Stormsack, the material collected by the filter bag should not exceed the level of approximately a half to two thirds of the total bag depth. When this material collected is showing signs of exceeding this level they should be scheduled to be emptied.

It is also recommended that additional monitoring is conducted following moderate to extreme rainfall events, especially when previous months have had little or no rainfall.

Gully Pit Cover Removal

Opening a Hinged Pit Cover

1. Insert the lifting hooks beneath the grate
2. Check hinge points are not damaged and debris is not caught in the hinge area
3. Fully open pit grate, ensuring that the grate will stay in the open position without any external forces applied. Grates that do not remain open without being held, should be removed or secured during maintenance activities.

Opening a Non-Hinged Pit Cover

1. Place lifting hooks beneath grate, where possible in the four corners of the grate. Concrete lids may have Gatic lifting points, a key arrangement or holes in the lid, which may require special equipment such as Gatic lifters.
2. Position each person on either side of the grate.
3. Lift the grate, ensuring that good heavy lifting posture is used at all times.
4. Place the grate on angle on the gutter, to allow for the lifting hooks to be removed.
5. For extremely heavy one-piece grates and concrete Gatic covers, insert the lifters in place and slide the lids back.

CHAPTER 4

Cleaning Methods

Cleaning using an inductor truck

1. Open Gully pit
2. Place the indicator hose, suck out all of the sediment, organic leaf material, litter and other materials that were collected in the filter bag
3. Allow the filter bag to be sucked up in the inductor hose for a few seconds to allow for the filter mesh pores to be cleaned.
4. Use the inductor hose to remove any build-up of material around the overflows and in the bottom of the pit.
5. Remove filter back from pit
6. Remove an sediment and litter caught in the Gully pit grate
7. Back opening channels are to be cleared of any debris to ensure flow is not hindered.
8. Thoroughly examine the structural integrity of the filter bag and frame.
9. Reinstate filter bag and gully pit covers

Hand Maintenance

1. Open Gully pit
2. Using the correct lifting technique, lift the StormSack out by the diagonal lifting corners fitted to the frame.
3. For extremely heavy and overfilled bags either use a hydraulic lifting arm to lift the StormSack, or remove excess material using a shovel or etc. Take care not to damage the bag when removing litter form the bag.
4. Lift the StormSack clear of the stormwater pit.
5. Position the StormSack over the collection bin or vehicle.
6. Lift and empty the bag by holding the bottom lifting loops only.
7. Brush the StormSack with a stiff brush to remove the sediment from the filter pores.
8. Thoroughly examine the structural integrity of the filter bag and frame.
9. Reinstate StormSack and gully pit covers.

SPEL StormSack Post Maintenance Inspection

After the SPEL Stormsack has been removed, emptied and cleaned, it should be thoroughly examined to sure that:

- There is no movement or damage to the Cage
- There is no movement or damage to the plastic pit seals
- Structural integrity is in good condition including all fixings, joints and connections.
- The filter bag pores are not clogged
- The filter bag is not damaged in anyway.

The gully pit, pipe inlet/outlets and its cover should also be inspected to ensure there is no damage, debris build up or any potential to cause the SPEL StormSack to operate inefficiently.

CHAPTER 4

SPEL StormSack Repairs

Depending on the extent of the damage to the SPEL StormSack unit, it can usually be repaired.

Small tears to the filter bag can be repaired by either sewing the tear back together with additional fabric to increase the strength of the stitching, or by sewing a patch of filter material onto the filter bag.

If large tears or irreparable damage to the frame and structure are present, it is advisable to replace the components.

All required spare parts can be sourced from SPEL Environmental at a cost to the owner of the SPEL Stormsack.

Material Disposal

Collected materials can be potentially harmful to humans and the environment.

Once all captured material from the SPEL Stormsack has been removed, it must be taken off site and disposed of at a transfer station or a similar approved disposal site.

Emergency Procedures

Spills and blockages can be detrimental to the performance of a stormwater management system, potentially damaging the surrounding built infrastructure, waterways and environment.

Spill Procedures

In the event of a spill discharging into a gully pit, all effected sediment must be removed from the filter bags and the filter bags are to be removed and replaced with new filter bags. All additional cleaning as a result of the spill should also be carried out in accordance with the normal operation procedures.

Blockages

In the unlikely event of surface flooding around a gully pit which has a SPEL StormSack fitted, the following steps should be carried out:

1. Check the overflow bypass.
2. If overflow is clear and surface flooding still exists remove the SPEL StormSack and check the outlet pipe for blockages. Removal of the SPEL StormSack can be difficult if clogged with sediment and holding water.
3. If the filter is clogged brush the side walls to dislodge particles trapped at the interface allowing water to flow through the filter.
4. If the outlet pipe is blocked, it is likely that a gully sucker truck will be required to unblock it. Litter can be removed from the SPEL StormSack using the gully sucker truck before the SPEL StormSack is removed. If a gully sucker truck is not available and the SPEL StormSacks need to be removed by hand follow the below steps.

a. Remove excess debris by hand or brush the side of the filter bag

b. Remove entire SPEL Stormsack by taking hold of the inside of the frame.

c. Unblock the outlet pipe

HEAD OFFICE

PO Box 6144
Silverwater NSW 1811

100 Silverwater Rd
Silverwater NSW 2128

Phone: +61 2 8705 0255
Fax: +61 2 8014 8699

DESIGN OFFICES

New South Wales	61 2 8705 0255
Canberra	61 2 6128 1000
Queensland	61 7 3271 6960
Victoria & Tasmania	61 3 5274 1336
South Australia	61 8 8275 8000
West Australia	61 8 9350 1000
Northern Territory	61 2 8705 0255
New Zealand	64 9 276 9045

www.spel.com.au

SPEL ENVIRONMENTAL
INTEGRATED WATER SOLUTIONS

CHAPTER 4

MAINTENANCE

The SPELFilter system requires periodic maintenance to continue operating at the design efficiency. The maintenance process comprises the removal and replacement of each SPELFilter cartridge and the cleaning of the vault or manhole with a vacuum truck. SPELFilter maintenance should be performed by a SPEL Environmental certified maintenance contractor.

The maintenance cycle of the SPELFilter system will be driven mostly by the actual solids load on the filter. The system should be periodically monitored to be certain it is operating correctly. Since stormwater solids loads can be variable, it is possible that the maintenance cycle could be more or less than the projected duration.

The SPELFilter systems in New Development applications are designed to treat the WQv in 24 hours initially. Later in the cycle these cartridges will flow at a slower rate, and when the WQv does not drain down within +/- 40 hours after the storm event, the system must be maintained.

When a SPELFilter system is first installed, it is recommended that it be inspected every six (6) months. When the filter system exhibits flows below design levels the system should be maintained. Filter cartridge replacement should also be considered when sediment levels are at or above the level of the 4 inch manifold system. Please contact SPEL Environmental for maintenance cycle estimations or assistance at 13 SPEL.

MAINTENANCE

1. Remove the manhole covers and open all access hatches.
2. Before entering the system make sure the air is safe per OSHA Standards or use a breathing apparatus. Use low O2, high CO, or other applicable warning devices per regulatory requirements.
3. Using a vacuum truck remove any liquid and sediments that can be removed prior to entry.
4. Using a small lift or the boom of the vacuum truck, remove the used cartridges by lifting them out.
5. Any cartridges that cannot be readily lifted directly out of the vault should be removed from their location and carried to the lifting point using the Trolley system installed in the Vault (if applicable).
6. When all cartridges are removed, remove the balance of the solids and water; then loosen the stainless clamps on the couplings in the pipe manifold; remove the drain pipes as well. Carefully cap the manifold and rinse the floor removing the balance of the collected solids.
7. Clean the manifold pipes, inspect, and reinstall.
8. Install the exchange cartridges and close all covers.
9. The used cartridges must be sent back to SPEL Environmental for exchange/recycling and credit on undamaged units.

DRAWINGS (refer IWCMP)

ATTACHMENT E

Blacktown City Council Waterway Health Report Card 2014-2015

State of our waterways

Blacktown City is growing rapidly and by 2036 it will be home to more than 500,000 residents. Much of the growth in population will be due to the transformation of 7,500ha of rural land into urban development in the northern half of the Blacktown Local Government Area as part of the North West Growth Centre. This urbanisation will accommodate 70,000 new homes and around 200,000[1] people.

The expansion of the City will increase the amount of hard surfaces such as roofs, paths, driveways, roads and car parks. These hard surfaces are mostly impervious which prevent rainwater from absorbing into the ground. These hard surfaces direct large volumes of fast moving "stormwater" into our waterways through the gutters and drainage pipes. This stormwater carries with it pollutants from urban areas which flow into our creeks, rivers and wetlands, degrading the health of our waterways.

To combat this issue, Blacktown's Community Vision 2030 states Council's intent to "pursue best practice sustainable water management to protect and improve the water quality of the local environment". We are actively undertaking various projects to protect and enhance our waterways in the face of continued urban development.

We periodically monitor the quality of our waterways and the results for the 2014/15 financial year are included in this report card. Overall, most urban waterways within Blacktown City are in fair condition, with several creeks in less developed areas of the City in good condition.

In the west of the City lies a small tributary of Little Creek. This creek is in excellent condition and is surrounded by undisturbed bushland which is home to over 300 species of native wildlife and endangered plants.

[1] NSW Department of Planning and Environment n.d, North West Priority Growth Area, accessed 26 August 2015, <http://growthcentres.planning.nsw.gov.au/PriorityGrowthAreas/NorthWestPriorityGrowthArea.aspx>

Ropes Creek - North

2014 C 2015 B

There has been an improvement in the diversity and abundance of waterbugs which has led to an improvement in the waterway's health. Water quality remained consistent with the results from last year. Weeds continue to dominate the riparian vegetation.

Little Creek Tributary

2014 A 2015 A

An excellent example of a minimally disturbed Western Sydney creek that has healthy riparian vegetation with a good diversity of native species. Good water quality has enabled a diverse and abundant waterbug community that includes species which aren't present in other creeks in Blacktown City due to pollution.

Eastern Creek - North

2014 B 2015 B

There is a low abundance of waterbugs that are sensitive to pollution at this site. This is reflective of the variability found in the water quality results found during this year. The riparian vegetation includes some native species but invasive weeds are having an impact.

Quakers Hill Creek

2014 C 2015 C

The riparian vegetation is regenerating following rehabilitation works which will in time improve the health of the creek. However, at present, the waterbug community is dominated by species that are tolerant to pollution, which is reflective of poorer water quality.

Lalor Creek

2014 D 2015 D

This creek has periods of poor water quality, has waterbugs that are more tolerant to pollution, and riparian vegetation that is dominated by weeds. This is reflected in the degraded condition of the creek.

South Creek

2014 B 2015 B

The riparian vegetation at this site is dominated by native species and the abundance and diversity of waterbugs has improved. However periods of poor water quality over the last year leave this site with the same waterway health as last year.

Bells Creek

2014 C 2015 B

Better water quality this year has helped improve the waterway health grade for this creek. However the waterbug community indicates that there are some water quality issues, and riparian vegetation at the site is dominated by weeds.

Breakfast Creek

2014 C 2015 C

Variable water quality and high nutrient levels mean that the waterbugs present are more tolerant to pollution. A narrow riparian buffer with remnant native vegetation, however, helps enhance the overall health of the creek.

Blacktown Creek

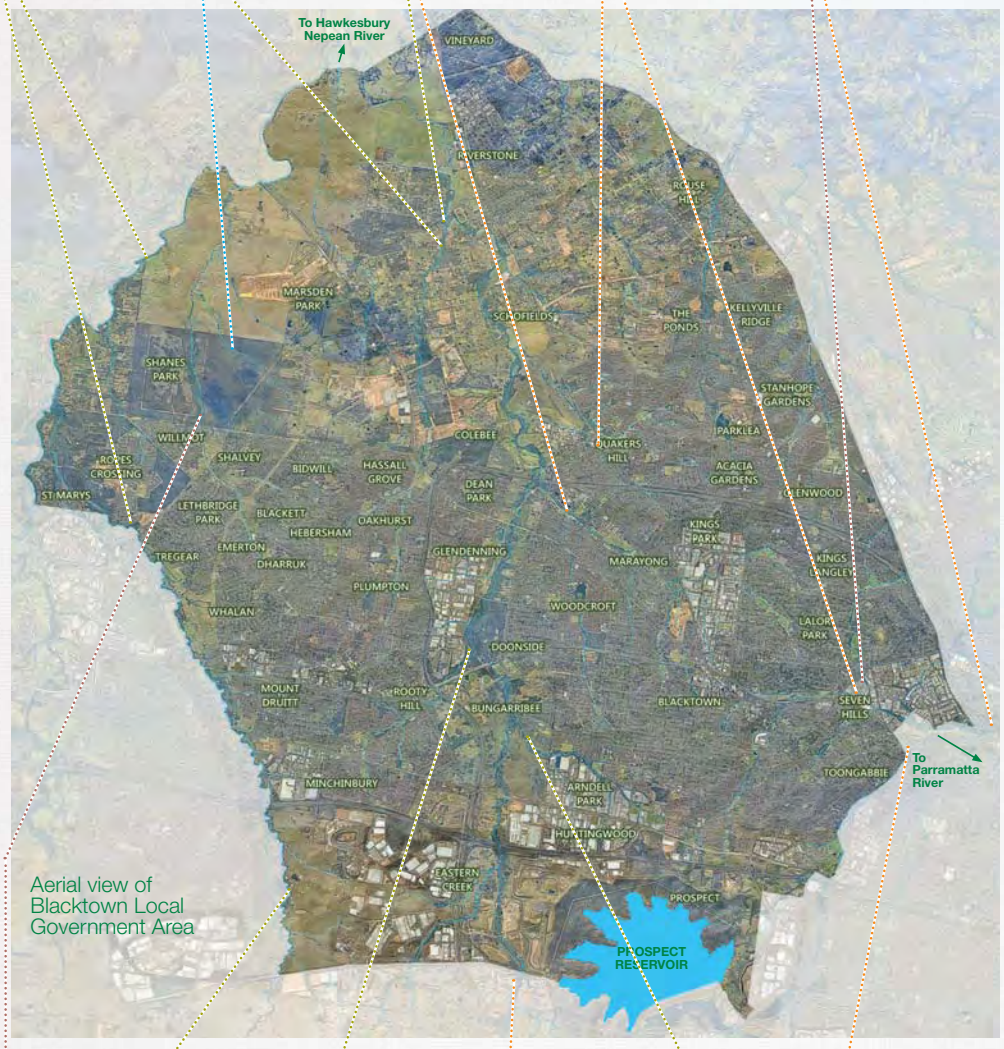
2014 C 2015 C

Variable water quality and high nutrient levels prevent waterbugs that are sensitive to pollution from colonising in this creek. However, the presence of a narrow strip of riparian vegetation that contains remnant native vegetation enhances the overall health of the creek.

Toongabbie Creek

2014 C 2015 C

Variable water quality and high nutrient levels in this creek are reflected in the waterbug community, which does not contain any species that are sensitive to pollution. The riparian vegetation community, however, retains some native species, but weeds are prolific.



Aerial view of Blacktown Local Government Area

Little Creek

2014 D 2015 D

Water quality is poor and nutrient levels are frequently in excess of the guideline limits. Riparian vegetation is weed dominated and provides little instream habitat. The waterbugs present are species that are more tolerant to pollution.

Ropes Creek - South

2014 B 2015 B

The diversity and abundance of waterbugs and water quality are consistent with last year. The riparian vegettation is in good condition.

Angus Creek

2014 C 2015 B

An improved waterway health grade reflects better water quality this year. However, the waterbug community lacks species that are sensitive to pollution and the riparian vegetation is dominated by weeds which continues to impact on the health of the creek.

Eastern Creek - South

2014 B 2015 C

Remnant patches of native vegetation enhance the condition of the creek. However, a decline in the diversity of waterbugs indicates that the creek is affected by water pollution, which has resulted in a reduced waterway health grade this year.

Bungarribee Creek

2014 B 2015 B

The macroinvertebrate community is dominated by waterbugs that are tolerant to pollution. There have been periods of poor water quality this year. However, the riparian vegetation community retains a high coverage of native species, which enhances the health of the creek.

Greystanes Creek

2014 C 2015 C

The waterbug community is diverse, but variable water quality and degraded riparian vegetation mean that more pollution sensitive waterbugs are absent. The result reflects the degraded condition of the creek.

Waterway health

What do we monitor and why?

The health of a waterway is measured using a variety of methods. The report card scores rely on three key indicators to assess the condition of Blacktown City's creeks which include:

- Water quality (physical and chemical factors)
- Waterbugs (macroinvertebrates)
- Creek bank (riparian) vegetation

Water quality

Water quality is an important factor associated with aquatic ecosystem health. We regularly monitors water quality in many waterways throughout our local area. We measure pH, salinity, nutrients and turbidity.

Waterbugs

Waterbugs, or aquatic macroinvertebrates, form an important part of the aquatic ecosystem and are widely used as indicators of waterway health. Certain waterbugs are more tolerant to water pollution and environmental change than others, so by monitoring the waterbug communities we gain more of a snapshot of current waterway health.

Riparian vegetation

Native riparian vegetation along creek banks is beneficial to maintaining water quality, bank stability and regulating water temperature. It also provides important habitat and a major role in the food chain of creek ecosystems.

Grading system

A ····· **Excellent:** Water quality indicators are within guideline limits more than 90% of the time. Diverse waterbug community with species sensitive to pollution present. Good riparian vegetation with native plant diversity and coverage.

B ····· **Good:** Water quality indicators are within guideline limits 85% of the time. Moderately diverse waterbug community with some pollution sensitive species not present. Riparian vegetation has moderate native plant diversity and coverage, with some weed infestation.

C ····· **Fair:** Water quality indicators are within guideline limits 70% of the time. Waterbug community only contains pollution tolerant species. Riparian vegetation is lacking native diversity and coverage, and weeds are likely to be present and possibly dominating.

D E F ···· **Poor:** Water quality indicators are within guideline limits less than 50% of the time. Waterbug community only contains pollution tolerant species. Riparian vegetation is lacking native plant diversity, and weeds are most likely to be dominating.

ATTACHMENT F

Flow and Pressure Test

Sydney WATER

Statement of Available Pressure and Flow

Duggan & Hede Pty Ltd
1 Lewis St
Clayfield, 4011

Attention: Nick

WMS No: **352691**
Contact No: 02 8849 3531
Fax No: 02 8849 3071

Date: 01/08/2014

Pressure & Flow Application Number: 8840557
Your Pressure Inquiry Dated: Thu July 24 2014
Property Address: 14 Rayben St Glendenning 2761

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Rayben St	Side of Street: North
Distance & Direction from Nearest Cross Street	245 metres East from Owen Street
Approximate Ground Level (AHD):	30 metres
Nominal Size of Water Main (DN):	150 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	110 metre head
Minimum Pressure	48 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	48
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20 30	48 45 42 38 28
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5 10 15 20 30	47 44 40 36 26
Maximum Permissible Flow	34	20

(Please refer to reverse side for Notes)

Robert Wickham
Principal Planner
Urban Growth – Asset Services

RECEIVED
05 AUG 2014

Sydney WATER

Statement of Available Pressure and Flow

Duggan & Hede Pty Ltd
1 Lewis St
Clayfield, 4011

WMS No: **352671**
Contact No: 02 8849 3531
Fax No: 02 8849 3071

Attention: Nick

Date: 01/08/2014

Pressure & Flow Application Number: 8840550
Your Pressure Inquiry Dated: Thu July 24 2014
Property Address: 14 Rayben St Glendenning 2761

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Rayben	Side of Street: North
Distance & Direction from Nearest Cross Street	213 metres East from Owen
Approximate Ground Level (AHD):	30 metres
Nominal Size of Water Main (DN):	150 mm

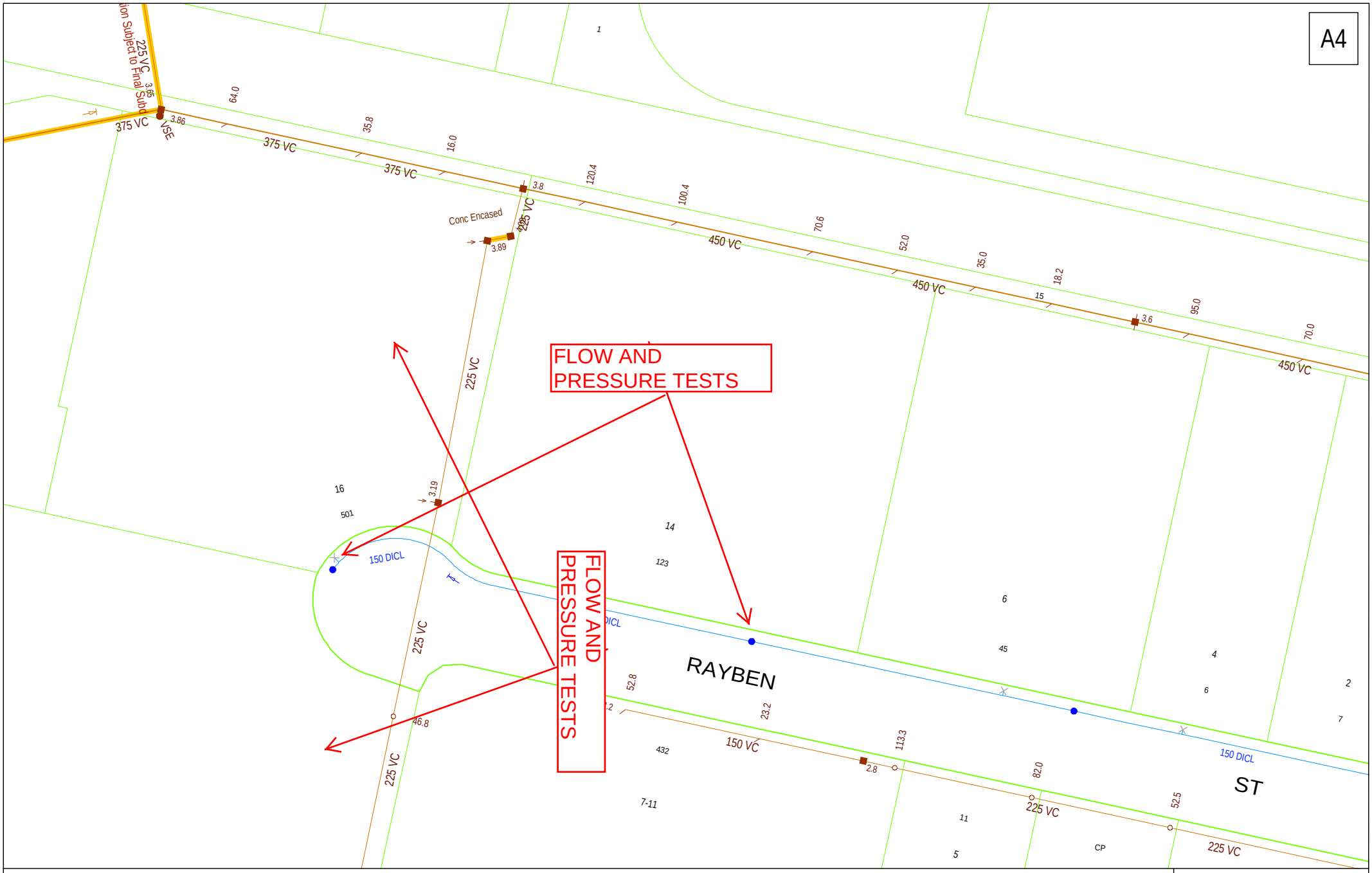
EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	110 metre head
Minimum Pressure	49 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	49
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20 30	48 46 42 38 29
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5 10 15 20 30	47 44 41 36 27
Maximum Permissible Flow	34	21

(Please refer to reverse side for Notes)

for **Robert Wickham**
Principal Planner
Urban Growth – Asset Services



DBYD Address:
14 Rayben Street
Glendenning NSW
2761

DBYD Job No: 8111843

DBYD Sequence No: 40520904

SYDNEY WATER CORPORATION

Scale: 1:1000

Date of Production: 16/07/2014

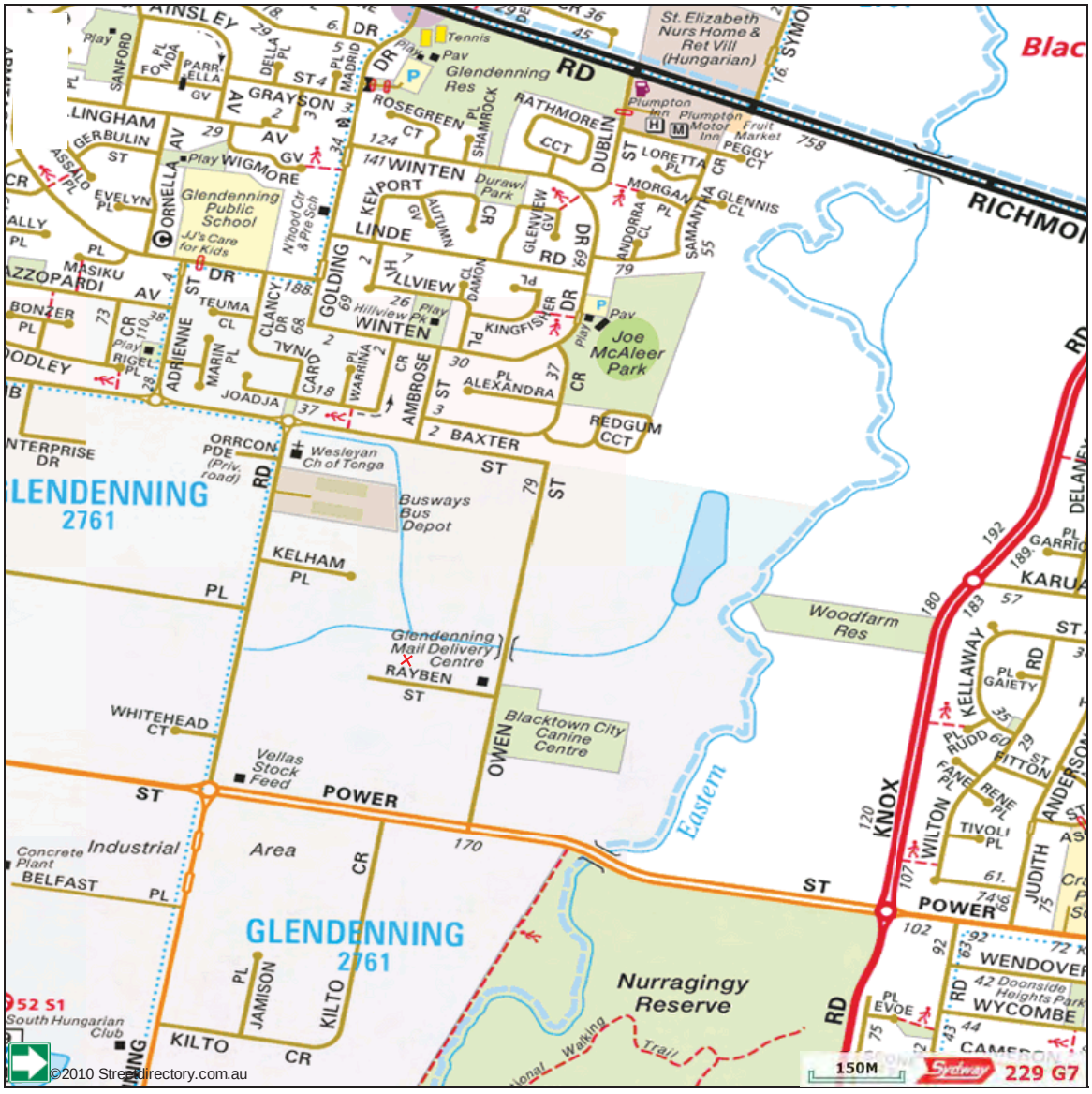
Plan 1 of 1

N

0m 5m 10m 15m 20m

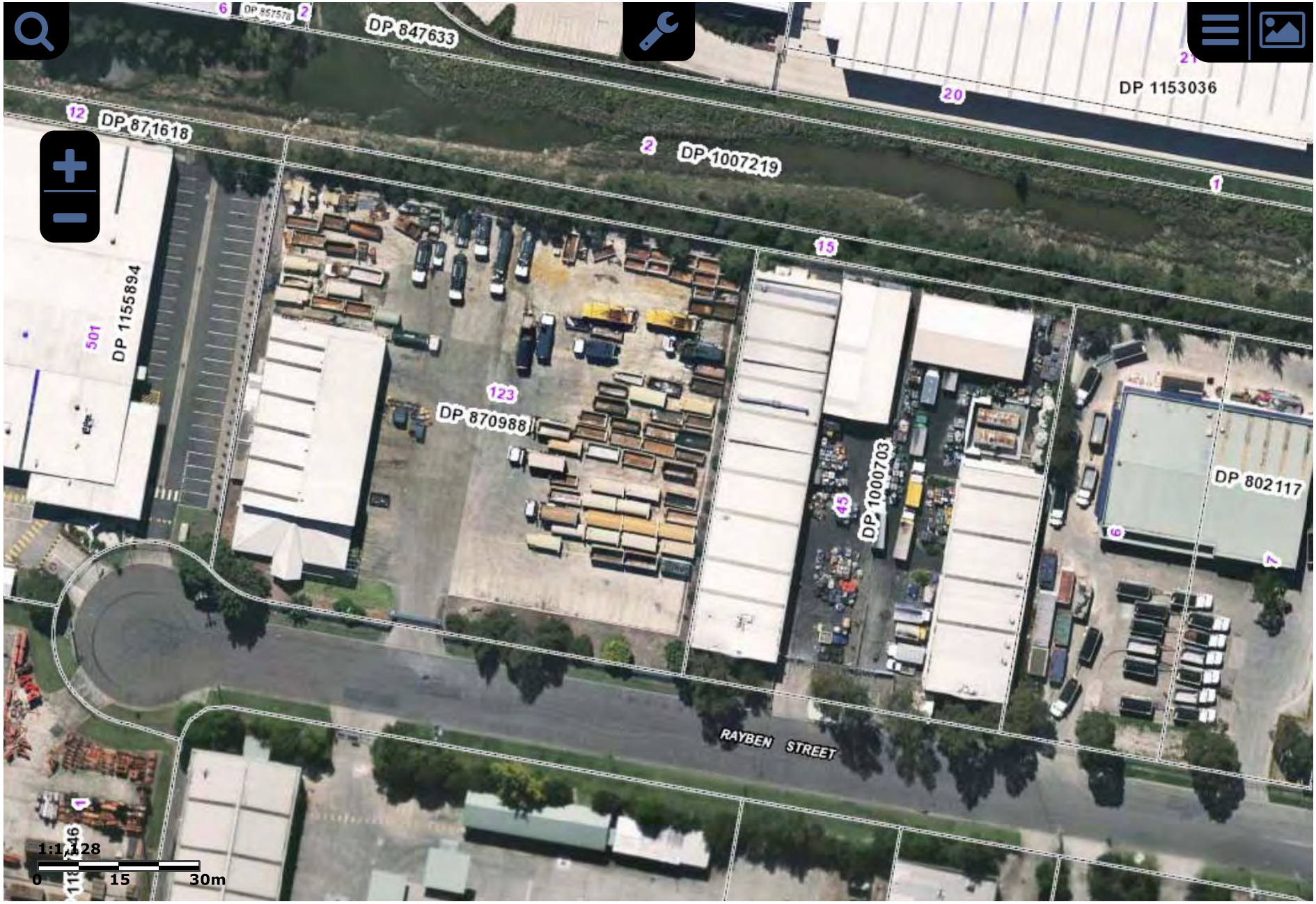
FIGURES

Print this page



DUGGAN & HEDE Pty Ltd
Professional Engineers, Planners, Environmental Consultants
PO Box 496 Clayfield Qld 4011
Telephone (07) 3357 3666
Facsimile (07) 3857 6233
e_mail dh@dhenv.com.au

JJ RICHARDS & SONS PTY LTD	SCALE
LIQUID WASTE FACILITY & DEPOT AT 14 RAYBEN ST, GLENDENNING SITE LOCATION	SHEET
	FIGURE 3.1



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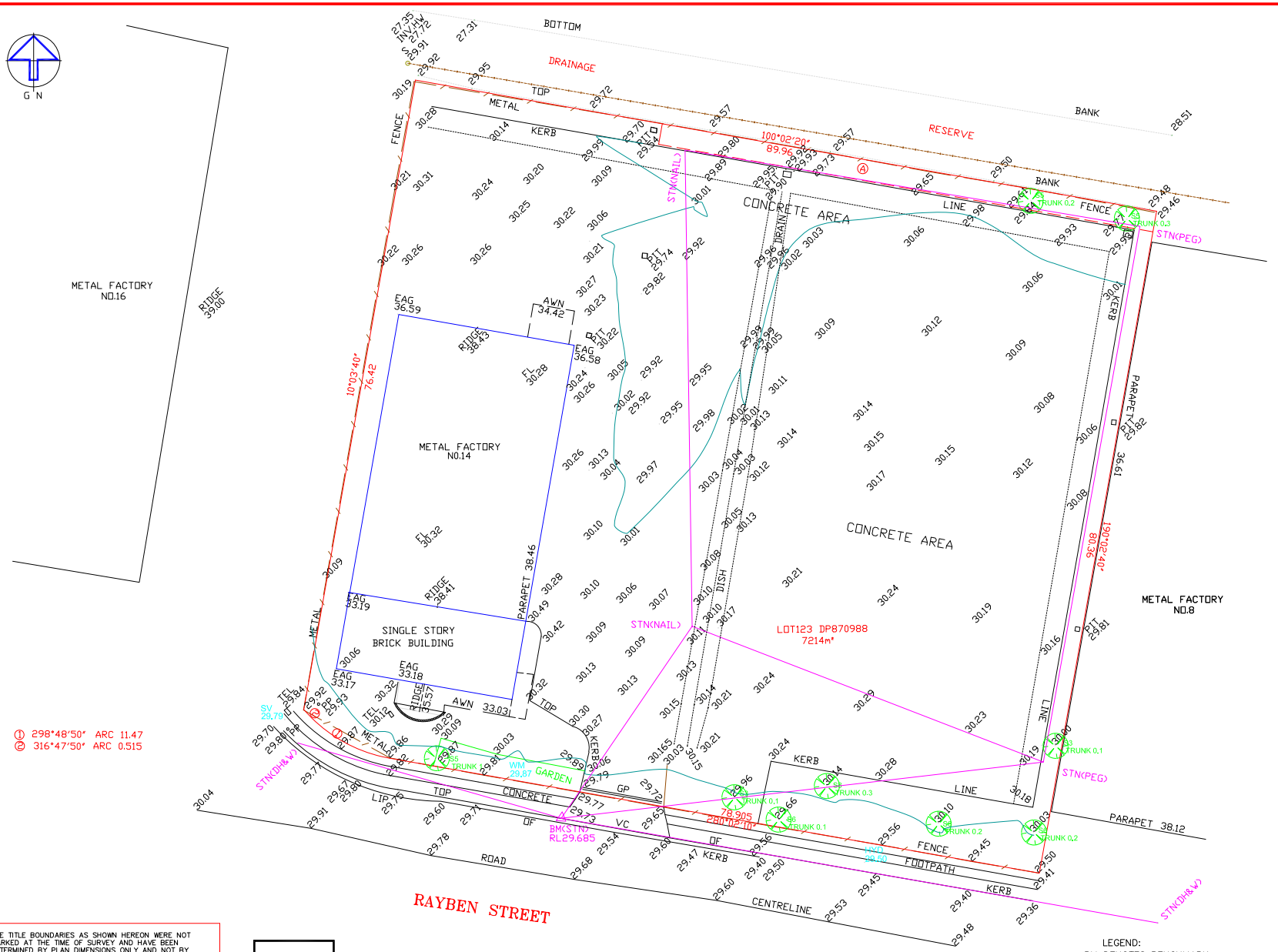
JJ RICHARDS & SONS PTY LTD	SCALE	
LIQUID WASTE FACILITY & DEPOT AT 14 RAYBEN ST, GLENDENNING AERIAL PHOTOGRAPH	REF.	
	FIGURE	3.2

DRAWINGS

A1



THE TITLE BOUNDARIES AS SHOWN HEREON WERE NOT MARKED AT THE TIME OF SURVEY AND HAVE BEEN DETERMINED BY PLAN DIMENSIONS ONLY AND NOT BY FIELD SURVEY.

SOME SERVICES SHOWN HEREON HAVE BEEN LOCATED BY FIELD SURVEY.

NOTE: LOCATIONS OF DOMESTIC SERVICE CROSSINGS ARE UNKNOWN.

PRIOR TO EXCAVATION THE CONTRACTOR MUST:
- NOTIFY A.G.L. ON 0419527919
- OBTAIN TELSTRA'S "DUTY OF CARE" DOCUMENT REGARDING WORKING IN THE VICINITY OF TELSTRA PLANT.
- VERIFY CO-AXIAL/OPTIC FIBRE CABLE LOCATION

PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES.

DIAL 1100 BEFORE YOU DIG

Ⓐ EASEMENT TO DRAIN WATER 2.5M WIDE

LEGEND:
BM DENOTES BENCHMARK
TK DENOTES TOP OF KERB
EAG DENOTES EAVE AND GUTTER
GP DENOTES GRATED PIT
HYD DENOTES HYDRANT
PP DENOTES POWER POLE
TEL DENOTES TELSTRA PIT
SV DENOTES STOP VALVE
WM DENOTES WATER METER
AWN DENOTES AWNING
S DENOTES SEWER
VC DENOTES VEHICLE CROSSING
INV.HW DENOTES INVERT HEAD WALL

EAST coast POSITIONING

SURVEYORS

NORTHWEST
P.O. BOX 7388, BAULKHAM HILLS
N.S.W. 2153, Australia
Mob: 0408556914 or 0418416285
Email: ms@ecpsurveyors.com.au

CLIENT/PROJECT

DUGGAN & HEDE

14 RAYBEN STREET, GLENDENNING

SURVEYOR:	BK/DC
CHECK:	MS
AUTHORISED:	MS

DETAIL SURVEY

AUTHORITY	BLACKTOWN
PROPERTY	LOT 123 DP 870988
LOCALITY	GLENDENNING
ORIGIN OF LEVELS	SSM 64074
DATUM	AHD
DATE	27/03/2015
DRAWN BY	AH
SHEET	1 OF 1
DRAWING No.	ECP568.D.01
AMENDMENT	A

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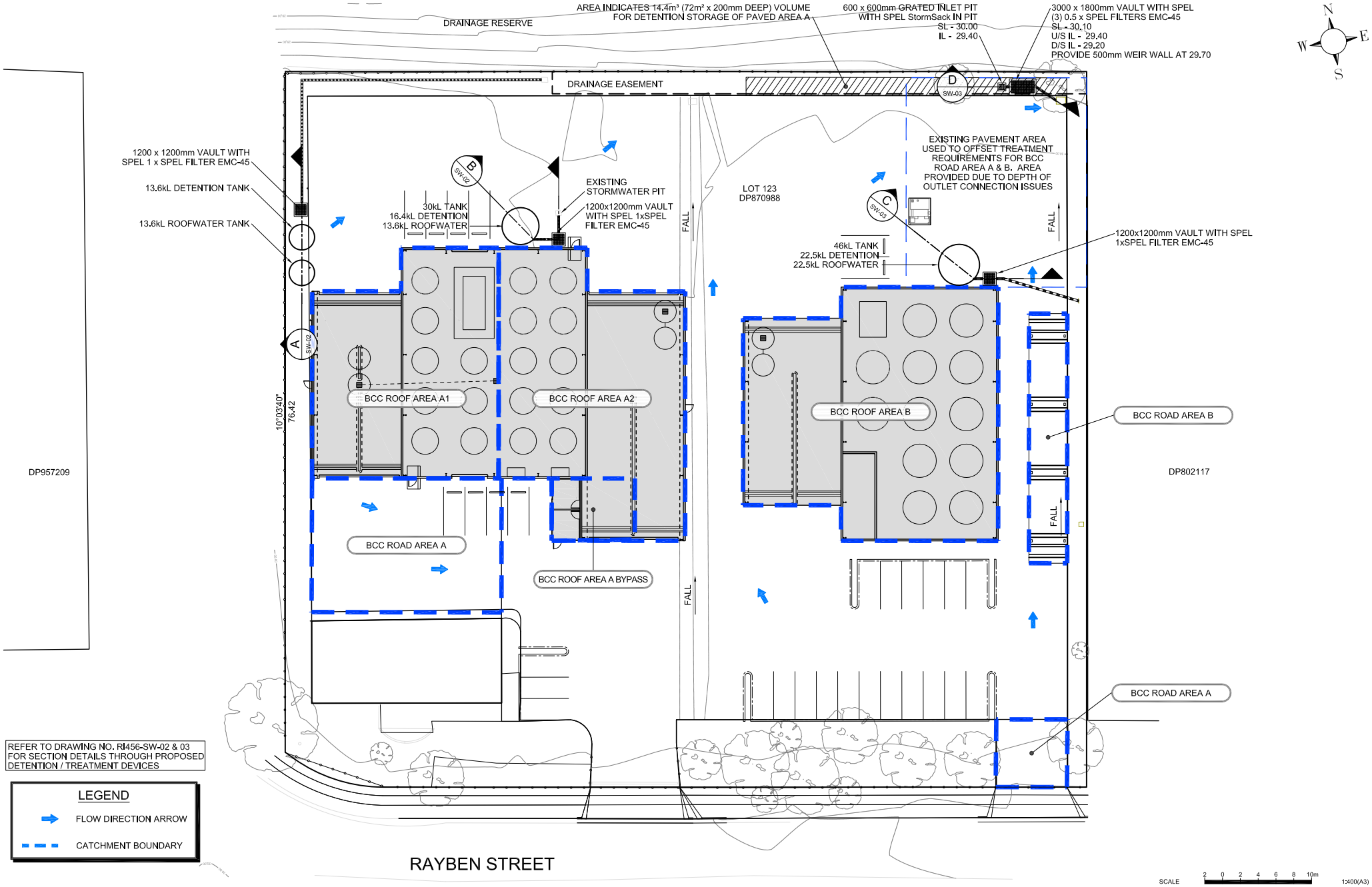
No.	AMENDMENTS	DRAWN	DATE:
A	MORE LEVELS ADDED	MS	13/04/2015

FILE NAME: ECP568.D.01A



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A	N.B.	12.15	REVISED DEVICES		DES. CHK.		
No.	BY	DATE	DESCRIPTION		DWG. CHK.		

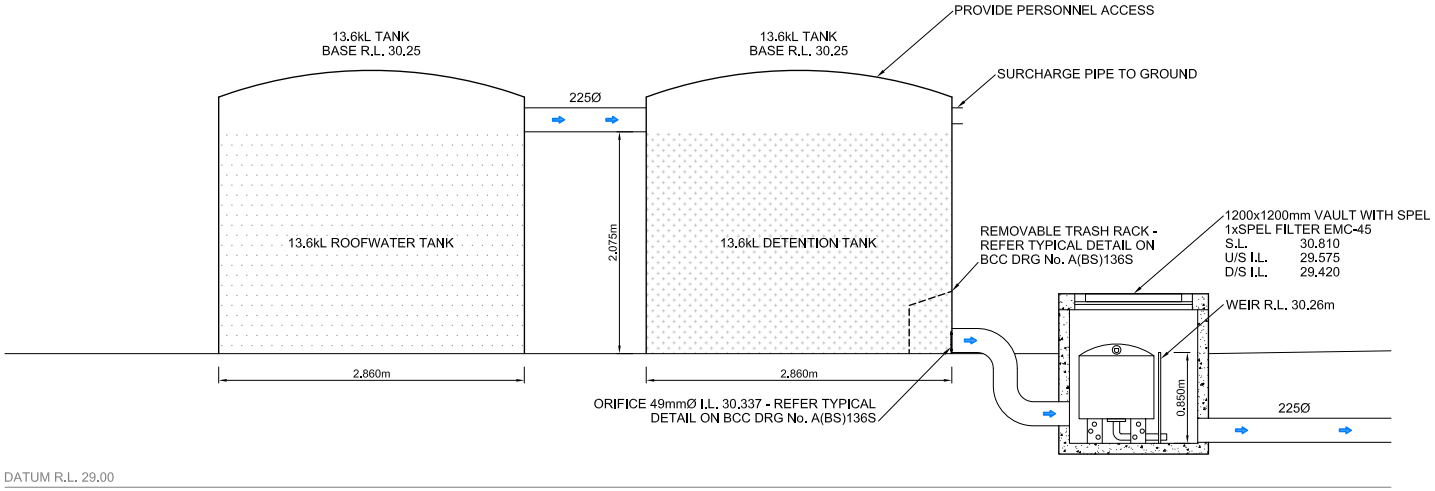
TECHNICALLY APPROVED:

DUGGAN & HEDE PTY LTD
ACN 077 618 663
Professional Engineers, Planners and Environmental Consultants
PO Box 496 Clayfield Qld 4011
Telephone (07) 3357 3666
Facsimile (07) 3857 6233
e_mail dh@dhenv.com.au

JJ RICHARDS & SONS PTY LTD

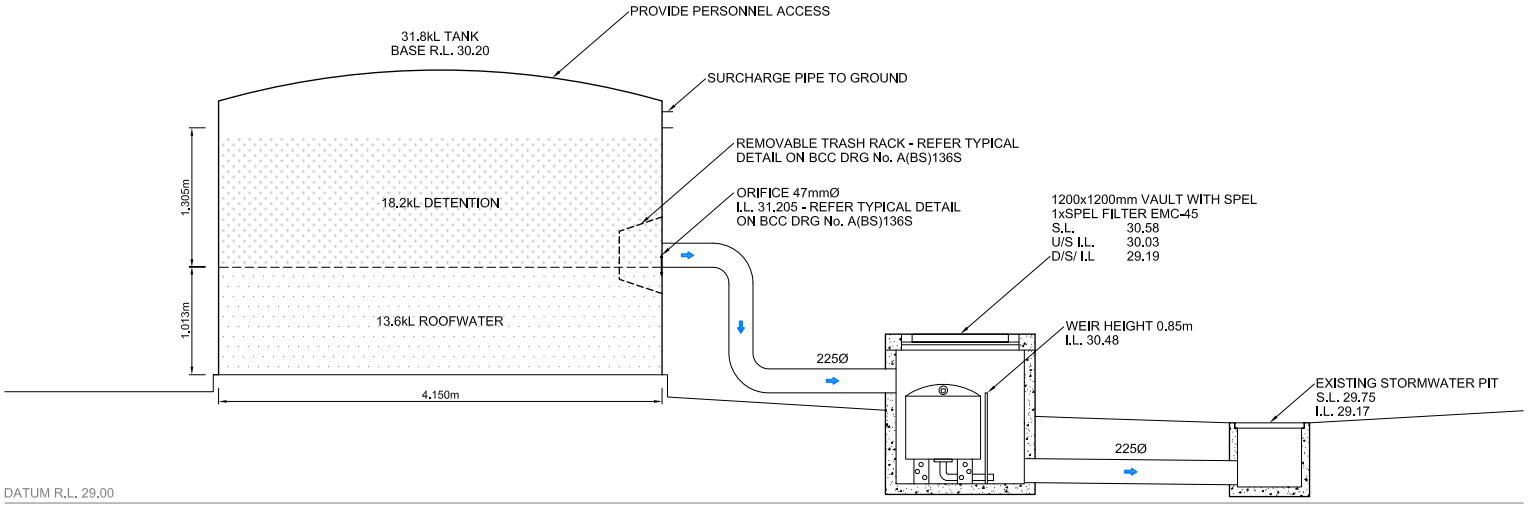
WASTE MANAGEMENT FACILITY & DEPOT
14 RAYBEN ST, GLENDENNING
STORMWATER QUALITY MANAGEMENT STRATEGY

SCALE	AS SHOWN
SHEET	01 of
DRG No.	REVISION | B
	RI456-SW-01



SECTION A-A - ORGANICS BUILDING ROOF A1

1:100 (A3)



SECTION B-B - OGANICS BUILDING ROOF A2

1:100 (A3)

SCALE 0.25 0 0.5 1m 1:50(A3)

REVISIONS					PLOT FILE	RI456-00-Base.dwg	DATE
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B	N.B.	02.16	APPROVAL		DRAWN	S.M.	11/15
A	N.B.	12.15	REVISED DEVICES		DES. CHK.		
No.	BY	DATE	DESCRIPTION		DWG. CHK.		

TECHNICALLY APPROVED:

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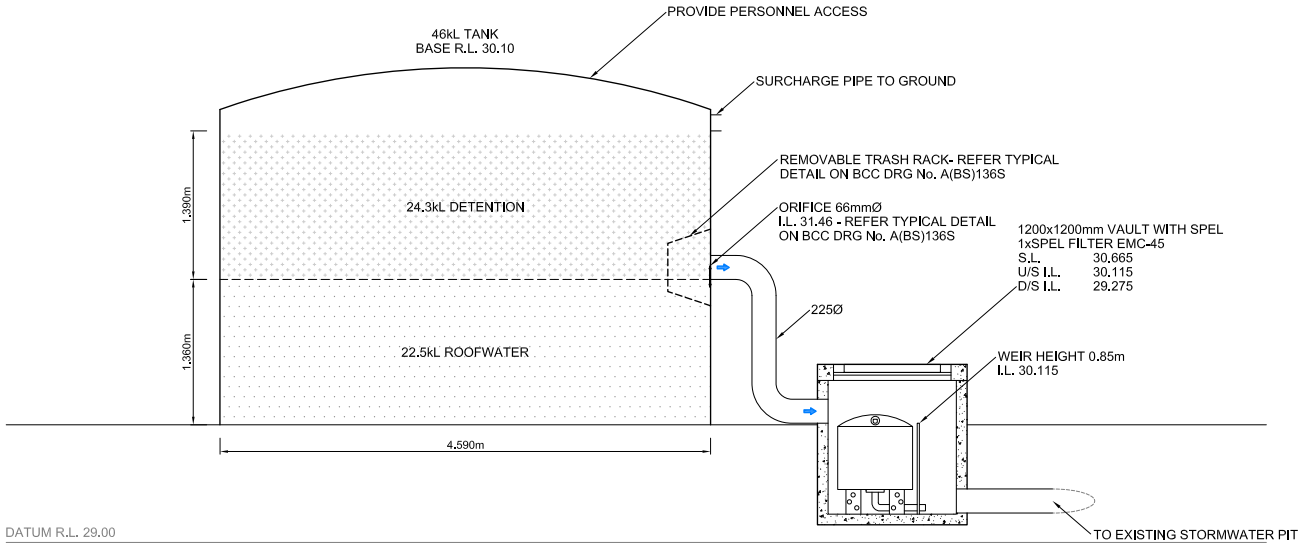
JJ RICHARDS & SONS PTY LTD

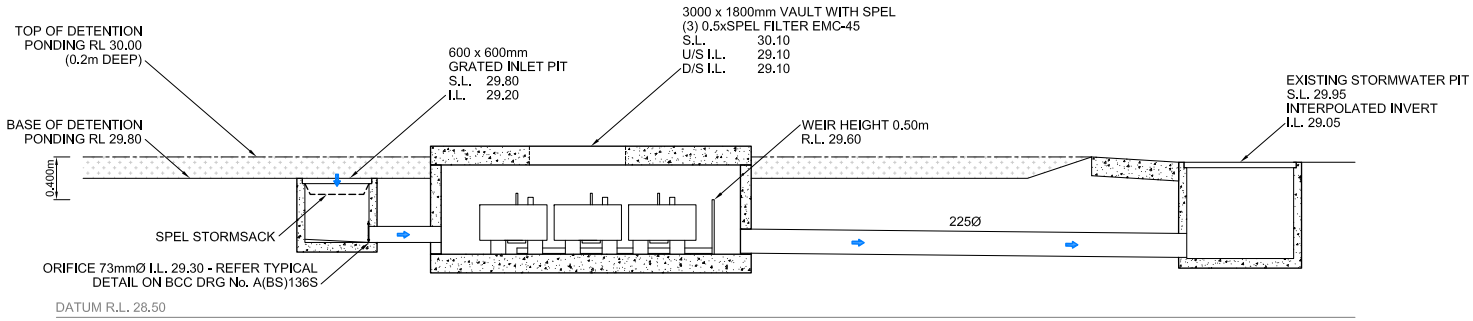
WASTE MANAGEMENT FACILITY & DEPOT
14 RAYBEN ST, GLENDENNING
SECTIONS (1 of 2)

SCALE	AS SHOWN
SHEET	01 of
DRG No.	REVISION B
	RI456-SW-02



SECTION C-C - TANK FARM BUILDING

1:100 (A3)



SECTION D-D - NEW PAVEMENT AREAS

1:100 (A3)

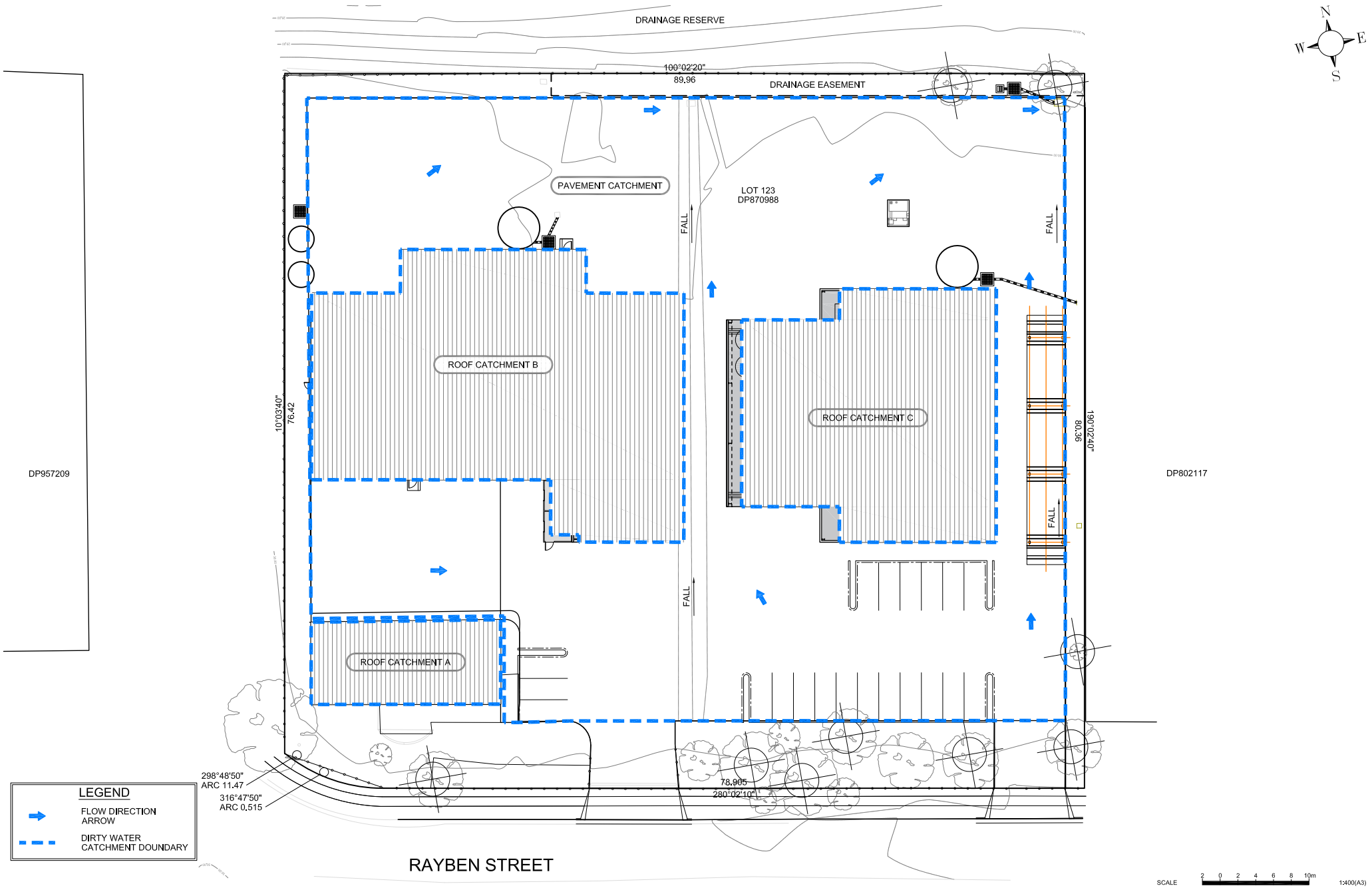
SCALE 0.25 0 0.5 1m 1:50(A3)

REVISIONS								
No.	BY	DATE	DESCRIPTION	DWG. CHK.				
A	N.B.	12.15	REVISED DEVICES	DES. CHK.				
B	N.B.	02.16	APPROVAL	DRAWN	S.M.	11/15		
				DESIGN	R.D.	11/15		
				PLOT FILE	RI456-DD-Base.dwg	DATE		

TECHNICALLY APPROVED:

DUGGAN & HEDE PTY LTD
ACN 077 618 663
Professional Engineers, Planners and Environmental Consultants
PO Box 496 Clayfield Qld 4011
Telephone (07) 3357 3666
Facsimile (07) 3857 6233
e_mail dh@dhenv.com.au

JJ RICHARDS & SONS PTY LTD	SCALE	AS SHOWN	
WASTE MANAGEMENT FACILITY & DEPOT 14 RAYBEN ST, GLENDENNING SECTIONS (2 of 2)	SHEET	01 of	
	DRG No.	REVISION B	RI456-SW-03



REVISIONS								
					PLOT FILE	RI456-D0-Base.dwg	DATE	
					DESIGN	R.D.	11/15	
					DRAWN	S.M.	11/15	
					DES. CHK.			
No.	BY	DATE	DESCRIPTION		DWG. CHK.			

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WASTE MANAGEMENT FACILITY & DEPOT
14 RAYBEN ST, GLENDENNING
EROSION AND SEDIMENT CONTROL PLAN

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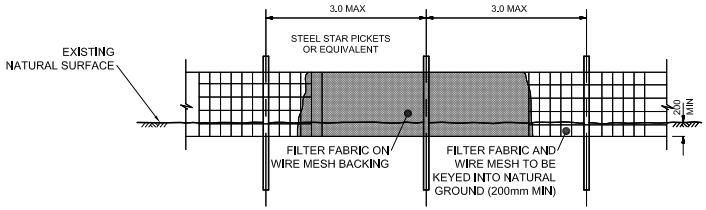
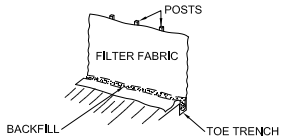
DRG No.	REVISION RI456-D0-50





MAINTENANCE PROGRAM FOR SILT FENCES

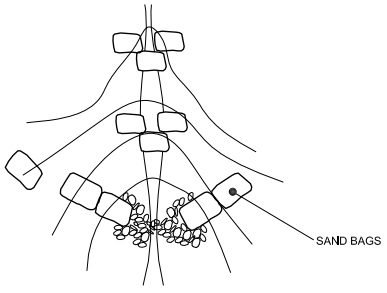
1. REGULAR INSPECTIONS WILL BE REQUIRED TO CONTROL DAMAGE CAUSE BY ON SITE VEHOCLES OR MOVEMENT OF STOCKPILES.
2. INSPECTED AFTER EACH STORM EVENT THAT RESULTS IN RUN-OFF.
3. REMOVE EXCESS SEDIMENT DEPOSITS.
4. INVESTIGATE THE SOURCE OF ANY EXCESSIVE SEDIMENT. (REFER B.C.C. EBMP GROUP 5 FIG.5.6).

NOTE : SILT MANAGEMENT

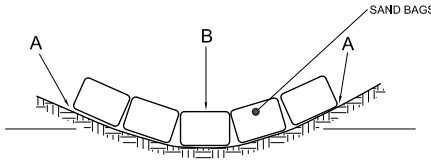
SILT FENCES ARE TO BE EMPLOYED WHERE CONDITIONS DURING CONSTRUCTION REQUIRE THE CONTROL OF ANY POSSIBLE SILT MOVEMENT ON THE SITE AS DIRECTED BY THE SUPERVISOR.

TYPICAL SEDIMENT FENCE DETAIL

NTS



PLAN

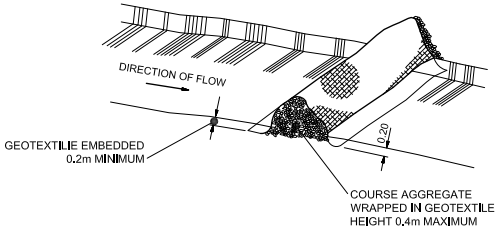


SECTION

'A' TO BE HIGHER THAN 'B' TO PREVENT SEDIMENT BYPASS

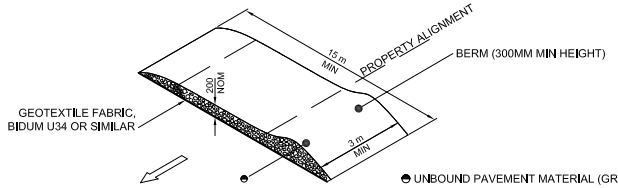
CHECK DAM DETAIL

NTS



TYPICAL SECTION ROCK CHECK DAM

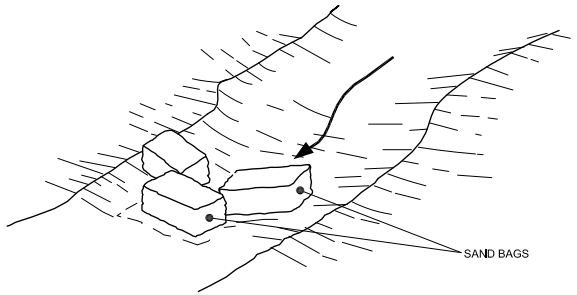
NTS



◓ UNBOUND PAVEMENT MATERIAL (GRAVEL TO GRADING B, TABLE 9 OF QT SPECIFICATION MRS11.05. EXCLUDE MATERIAL FINER THAN AS SIEVE 2.36mm

VEHICLE SHAKEDOWN

NTS



SAND BAG OPEN DRAIN DETAIL

NTS

REVISIONS								
	No.	BY	DATE	DESCRIPTION	PLOT FILE	RI456-DO-Base.dwg	DATE	TECHNICALLY APPROVED:
					DESIGN	R.D.	11/15	
					DRAWN	S.M.	11/15	
					DES. CHK.			
					DWG. CHK.			

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EROSION AND SEDIMENT CONTROL DETAILS

SCALE	AS SHOWN
SHEET	01 of
DRG No.	REVISION RI456-D0-51