SOIL AND WATER MANAGEMENT PLAN

OEMP-010 App C

May 2019

SOIL AND WATER MANAGEMENT PLAN (OEMP-010)

Occupant:	Kembla Grange Recycling Pty Ltd
Postal Address:	PO BOX 7, Enfield NSW 2136
Street Address:	50 Wyllie Road Kembla Grange NSW
Version:	Revision 02: 25 May 2019
Contact:	Bingo Industries – PH: 02 9737 0308 I FAX: 02 9737 0351

DISCLAIMER:

VERSION CONTROL

Date	Doc Version	Authorised by
22 December 2017	00	Environment Manager
12 February 2018	1	Environment Manager
25 May 2019	2	Environment Manager

THIS REVISION

Date	Revision #	Section / Paragraph	Description of Change	Authorised by
22 December 2017	00	Document review	Final	Env. Manager
12 February 2018	01	Document review	Final	Env. Manager
25 May 2019	02	Document update	Final	Env. Manager

AUTHORS

Revision	**Author**	**Title/Organisation**	**Experience**
01	Dr Mark Jackson	Director Jackson Environment and Planning Pty Ltd	BSc (Hons), PhD, Grad. Cert. Mgmt., Exec. Masters Public Admin 24 years' experience in environmental management, waste infrastructure and planning
01	Rylan Loemker	Senior Consultant Jackson Environment and Planning Pty Ltd	BEnvSc (Hons), Grad Di Bus and Tech 14 years' environmental management experience
01	Ros Dent (Authoriser)	Environmental Manager Bingo Industries	B. App Sci (Env Health) 30 years environmental management, waste, compliance and development experience
02	Rylan Loemker	Senior Consultant Jackson Environment and Planning Pty Ltd	BEnvSc (Hons), Grad Di Bus and Tech 14 years' environmental management experience

TABLE OF CONTENTS

1 INTRODUCTION

This Soil and Water Management Plan (SWMP) has been prepared to ensure that soil and water quality issues are identified, planned, managed and monitored during the Resource Recovery Project (the Project) to minimise adverse impacts on the downstream environment. This SWMP will interrelate with other relevant plans.

This plan has been prepared to ensure compliance with Condition B6 and B7 of the State Significant Development consent (Consent SSD 5300 and sSD5300 Mod 1) and ensure consistency with the Statement of Commitments 4.2(2), 4.2(3) and 4.8(5) for upgrading of the Kembla Grange Resource Recovery Facility. Further details in relation to the design of the stormwater management structures, and management of erosion and surface waters is provided in the EIS and contained in the Water Sensitive Urban Design and Flood studies.

The facility is licensed by the NSW EPA under the *Protection of the Environment Operations Act* 1997 and Kembla Grange Recycling Pty Ltd (WRPL) is the licensee of Environment Protection Licence 20601 (EPL: 20601)

1.1 Scope and objectives

This Plan provides procedures and techniques to ensure that the Project mitigation and protection measures achieve soil stability and protect local water quality. The objectives of the SWMP are to:

- present overall soil and water management principles and guidelines for the construction phase of the project;
- describe how the practical measures and best management practices will be implemented to prevent or mitigate potential downstream impacts relating to soil and groundwater;
- outline the roles and responsibilities of those involved in the design and implementation of soil and water management controls;
- outline an effective monitoring, auditing and reporting framework to assess the effectiveness of the controls implemented; and
- provide an organised, integrated and systematic approach to effectively address and monitor erosion, sedimentation and surface and groundwater quality issues during the term of the project.

WRPL is committed to environmental sustainability through sustainable water use. A sustainable water management system has been developed to capture stormwater runoff from within the site for use in the processing of recycled product, dust suppression and environmental controls.

Note that the Soil and Water Management Plan has been prepared in accordance with the Erosion and Sediment Control Plans (Appendix A) and best practice guidelines as documented in *Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).

1.2 Performance goals

The performance goals of this SWMP include:

- prevent degradation of the surrounding environment through the application of best management practices and innovation;
- no decrease in downstream water quality;

- all water discharged from the site is to comply with the EPL discharge limits;
- sediment deposited offsite is kept to an absolute minimum;
- work areas will be kept to the minimum area necessary for safe working operations to minimise exposed surfaces.

1.3 Site description and operations

The facility is located on 50 Wyllie Road Kembla Grange NSW (Lot 10 in 878167), 12 km south of Wollongong (see Figure 1). The site is located within the Wollongong City Council Municipality.

Surrounding properties are zoned as recreation (RE2 and RE1), light industrial (IN2) and environment conservation (E2). The upgrade of the Resource Recovery Facility is proposed to occur at the southwestern portion of the site. This proposed development area is currently zoned as light industrial (IN2).

The facility accepts a range of waste materials including for example:

- asphalt, concrete, rock, brick and tile;
- building and demolition waste;
- green and timber waste;
- soils and mixed fill;
- steel;
- virgin excavated natural material (VENM)/ excavated natural material (ENM);
- other materials classified as general solid waste (non-putrescible).

This facility previously operated with consent subject to the conditions of Development Application (DA) No. DA-2009/1153 and Environmental Protection Licence (EPL) No. 20601. This DA was surrendered and the site operates in accordance with SSD 5300. The facility is supported by infrastructure including weighbridges, road networks, signage, truck wash facilities, sediment basin, telecommunications, power and water.

The following changes have been made to the Site under SSD5300 Modification 2:

- Installation of rainwater storage tanks on the premises in a location which differs from the approved plans under SSD 5300 Mod 1;
- Installation of firewater storage tanks and a pump room on the premises;
- An outdoor picking station and associated processing equipment (including de-stoning screen and generator) in the central processing area of the site, installed above a push wall structure built on the premises; and
- An Indoor processing plant (to be located within the processing shed).

This SWMP has been updated to Revision 2 to reflect these changes.

Figure 1. 50 Wyllie Road Kembla Grange

1.4 Site upgrades

The Resource Recovery Facility will operate at a maximum annual volume capacity of 230,000 tonnes of waste, including brick, concrete, soils, timber, general/solid waste, and non-putrescible organic waste.

The main elements of the Project which have received consent from the NSW Department of Planning and Environment are listed below:

- Construction of a material storage, waste storage, and processing/stockpiling areas;
- Ancillary infrastructure including plant and equipment such as crushers, screens and front-end loaders;
- The redesign and expansion of the footprint of storage areas on site, thereby providing a more functional operational arrangement;
- Expansion of the footprint of the operations;
- Development of an upgraded stormwater management system;
- Construction of new buildings on the site including office/amenities, OHS training room and workshop; and
- Construction of supporting services including weighbridges / office; the provision of additional and/or relocated car parking spaces; the authorisation of the weighbridge; the provision of a truck parking area, skip bin storage area and an additional equipment storage area.
- Construction of a fully enclosed outdoor picking station and associated processing equipment including de-stoning screen, generator and fixed plant involving:
    - Terex screen (TRS550);
    - Conveyors (x2);
    - Air blower (for plastics separation and a cage for capturing plastic films);
    - De-stoning screen (for separating >80mm aggregate from plastics);
    - Diesel generator; and

Up to 47,500 tonnes per year of eligible mixed C&D waste and household waste from municipal clean-up will be processed by the Outdoor Picking Station. A breakdown of the output product types and estimate of tonnes is provided in Table 2.1 below noting that product mix is a factor of the inbound material mix.

1.5 Overview of installation of soil and water management controls

Soil and water management and mitigation measures were constructed as per Table 1.

Table 2. Installation of Soil and Water Management Controls

Activity	Duration			Mitigation Measures
	Days	From	To	
Start Construction		30-May-16		Training and inductions in environmental management issues
Establish Soil & Water Management Measures	3	30-May-16	2-Jun-16	Construct temporary sediment ponds - Refer to Appendix A
Batter catch drains	3	30-May-16	2-Jun-16	Progressively stabilise catch drains
Construct Retaining Walls	20	2-Jun-16	22-Jun-16	Inspect and monitor control measures
Strip topsoil area A	2	2-Jun-16	4-Jun-16	
Strip topsoil area B	2	3-Jun-16	5-Jun-16	
Bulk earthworks area A	55	6-Jun-16	31-Jul-16	Inspect and monitor control measures
Bulk earthworks area B	55	6-Jun-16	31-Jul-16	Undertake progressive reshaping and rehabilitation works
Install new weighbridge	20	6-Jun-16	26-Jun-16	
Stormwater pits and pipes	10	15-Jun-16	25-Jun-16	Inspect and monitor control measures
Install leachate tanks and alarm system	10	15-Jun-16	25-Jun-16	
Install Humeceptors	2	15-Jun-16	17-Jun-16	
Respread Topsoil Area A	12	1-Aug-16	13-Aug-16	Stabilise topsoil with temporary cover crop and progressively complete landscape plantings
Shape and Trim Ponds	12	1-Aug-16	13-Aug-16	Inspect and monitor control measures
Green waste shredding area pavement	10	1-Aug-16	11-Aug-16	
Complete landscaping	10	1-Aug-16	11-Aug-16	Undertake progressive reshaping and rehabilitation works
Respread topsoil Area B	121	2-Aug-16	1-Dec-16	

Activity	Duration			Mitigation Measures
	Days	From	To	
Trim access roads and works area	10	2-Aug-16	12-Aug-16	
Trim car parking areas	10	2-Aug-16	12-Aug-16	
Construct kerbs and table drains	10	2-Aug-16	12-Aug-16	
Install bollards to gas easement boundary	3	2-Aug-16	5-Aug-16	
Install biofilters and walls inside compost shed	5	10-Aug-16	15-Aug-16	
Place pavement materials	5	12-Aug-16	17-Aug-16	Inspect and monitor control measures
Wet weather allowance	25			
End construction			22 December 2017	Decommission temporary erosion and sediment control measures

2 LEGISLATIVE AND REGULATORY COMPLIANCE

2.1 Relevant Legislation

Key environmental legislation relating to waste management includes the following:

- *Protection of the Environmental Operations Act* 1997 (POEO Act);
- *Environmental Planning and Assessment Regulation*, 2000;
- *Water Management Act* 2000; and
- *Water Act* 1912.

2.2 Conditions of Approval

Approval of this Project was granted by the Department of Planning and Environment in 2016 (Application No. SSD 5300), with a modification approved to the weighbridge and office in 2017 (SSD5300 Mod 1). The Minister's Conditions of Approval were issued for the approval and those conditions relevant to construction waste have been incorporated in this Plan.

Table 2 Conditions of Approval.

Reference	Condition
B6	*The Applicant shall carry out the Development in accordance with the Water Management Plan approved by the Secretary (as revised and approved by the Secretary from time to time), unless otherwise agreed by the Secretary*
B7	*The Applicant shall operate Water Management Plan for the site. The system must:* *a) be designed by a suitably qualified and experienced person(s) in consultation with the EPA and Council;* *b) control surface water so that it does not mix with waste on the site;* *c) include surface water and leachate detention;* *d) be consistent with the guidance in Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004);* *e) divert clean surface water around operational areas of the site* *f) include water quality monitoring that can determine the performance of the water management system against any EPL discharge limits* *g) include water reuse based on a risk assessment of environment and human health impacts.*
B8	*The Applicant shall implement erosion and sediment control measures on-site in accordance with Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004)*

Table 3 Statement of Commitments.

Reference	Condition
4.2(2)	Quarterly testing of groundwater on the site will be undertaken to identify trends and characterise the groundwater within the local area. Monitoring will commence at least three months prior to construction commencing and the results of the groundwater monitoring programme will be provided to the Office of Water
4.2(3)	Development of a Soil and Water Management Plan to minimise the amount of surface runoff and potential mitigation of contamination
4.8(5)	Implementation of an Operation and Maintenance Plan for WSUD in regard to weekly and monthly inspection and maintenance, as well as after every rainfall event >25mm, in addition to six monthly inspections and maintenance.

3 ENVIRONMENTAL ASPECTS

3.1 Major Environmental Risks

On-site erosion will generate coarse and suspended sediment that could adversely affect water quality in local and regional waterways, land and river use, and ecological systems. For this reason, effective erosion, sedimentation and water quality control is critical to minimising any adverse water quality and sedimentation impacts on downstream waterways and adjacent environments.

Project activities in addition to those that cause erosion and generate sedimentation, can also affect local watercourses and are therefore also addressed in this SWMP. These activities include fuel and chemical storage.

3.2 Water Management System

The Water Management System has been designed around the capture of run-off from within the site and re-use on the site or release to the Unnamed Creek as environmental flows.

Runoff from the undisturbed areas will be diverted around the operational areas wherever practical. This will reduce the risk of flooding in the operational areas as well as reduce the potential for clean run-off to be polluted by site activities. Diversion of clean water will be effected by diversion drains, contour drains, and where necessary, bunds, levees, weirs and pipe culverts and be diverted to the Unnamed Creek wherever possible.

During operation of the site, drainage will convey water from disturbed areas of the site to the water recycling pond (3,248 m^3) and shredding runoff pond (780 m^3) to prevent sediment laden or contaminated runoff leaving the site. Sediment traps and settling ponds form part of the site water management system and improve water quality at various points along both clean and dirty water drainage networks.

Four (4) 46,500 litre rainwater storage tanks have been installed and one (1) 14,000 litre rainwater storage tanks have been installed at the northern end of the processing shed. A small 500 L will be installed to capture rainwater from the weighbridge office.

Water from the water recycling pond, shredding runoff pond and rainwater tanks will primarily be used directly on site. The daily dry weather demand for dust suppression and site operations is in the order of 40,000 litres/day. Demand from each rainwater source is as follows:

- Permanent Water Recycling Pond, supplied with additional water from the Shredding Runoff Pond: 38,500 L/d
- Processing shed tanks: 1,400 L/d
- Equipment area tank: 100 L/d

Two (2) 150,000 litre firewater storage tanks and a pump room have been installed in the northwest corner of the premise as a means of fire suppression.

Rainwater from the rainwater tanks can be plumbed into toilets and decanted by the site water tanker for dust suppression. Captured water will also be used in the crusher to maintain moisture content and manage generation of dust.

3.3 Environmental Control Measures

The following site-specific environmental control measures and safeguards will be implemented in order to minimise waste generated during with the Project. In addition, Appendix A contains the erosion and sediment control plan for the site.

No.	Aspect	Impact	Mitigation Measures
SWM1	Over clearing of vegetation	Unnecessary exposure of erodible soil surfaces	• Prepare progressive erosion and sediment controls (ESCs) for all impacted areas that comply with *Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004)* • Works will not commence prior to ESCs being developed and adequately implemented on site. • Clearing and grubbing limits will be established and clearing will be undertaken in a controlled manner to limit areas of disturbance • Access tracks will be delineated and sign posted to prevent unnecessary ground disturbance.
SWM2	Uncontrolled discharge of sediment laden water into a waterway.	Environmental degradation/ pollution of adjacent water body or land.	• Prepare progressive erosion and sediment controls (ESCs) for all impacted areas that comply with *Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004)* and Erosion and Sediments Control Plans given in Appendix A. • Works will not commence prior to ESCs being developed and adequately implemented on site. • ESCs will be inspected prior to predicted rainfall, prior to long work breaks and after rainfall events to ensure they are fully functional. If required, initiate any repair or maintenance requirements • ESCs will be progressively updated as construction activities change and distributed to relevant site personnel for reference and implementation. • Site personnel will be kept informed of relevant environmental issues through the implementation of environmental training and toolboxes. • Where appropriate, water from the OSDs will be utilised for construction purposes, such as compaction and dust suppression.
SWM3	The inappropriate stockpiling of material (overburden, topsoil etc).	Sediment discharge into the receiving environment	• Prepare progressive erosion and sediment controls (ESCs) for all impacted areas that comply with *Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004)* • Works will not commence prior to ESCs being developed and adequately implemented on site. • Control measures will be implemented at site exits to minimise tracking of sediment onto public roads and identified in relevant • Regular inspections will be undertaken, at least weekly, to ensure erosion and sediment control structures are effective (including following significant rain events). If improvements are identified, these will be documented in an inspection report which is to be closed out within designated times • Stockpiles (Topsoil/ spoil) will be located away from drainage lines.

No.	Aspect	Impact	Mitigation Measures
SWM4	Chemical / Fuel spills and leaks.	Environmental degradation/ pollution of adjacent water body or land.	• Oils, fuels and solvents will be stored in allocated areas and bunded • Site personnel undergo training on appropriate spill management and emergency response procedures. • Works involving the use of chemicals, dangerous goods or other potential contaminants, will be planned and implemented to minimise the possibility of spillage • The use and storage of chemicals and dangerous goods will be strictly in accordance with relevant legislation, manufacturer's instructions, SDS and the relevant Safe Work Method Statements • Adequate quantities of emergency response materials such as oil spill kits, absorbent materials, sand bags will be readily available and kept in designated compounds. • Temporary bunding will be provided for all refuelling or maintenance of plant and equipment or any other activity onsite that could result in spillage of a chemical, fuel or lubricant (especially where the activity is undertaken in a location with direct drainage to a waterway or environmentally sensitive area). • Where chemical drums (greater than 20 litres) are removed from bunded areas, they will be placed in temporary bunds and returned to the bunded area by the end of the day • Machinery, pumps and other equipment will be checked regularly for excessive wear and leaks, and if required, repaired promptly. • Permanent storage of chemicals fuels and oils used on site in appropriately bunded areas in accordance with the requirements of all relevant Australian Standards and or EPA's *Storing and Handling Liquids: Environmental Protection – Participants Manual 2007*. (condition B9). • Water captured in a bunded area will be monitored and drained (if uncontaminated) after each rain event to ensure bund capacity is maintained at all times. If contamination is evident the contaminant will be absorbed using remediation products (absorbent pads, etc.) and disposed to an appropriate waste management facility. • Records of water quality checks, discharges and any remedial actions taken will be recorded • Where safe to do so, containment measures such as sandbags, booms, earth bunds or cut drains will be installed to capture and retain spilled material and prevent it from leaving site, entering any watercourse or impacting on vegetation stands. • No refuelling will occur within 30m of a riparian management zone or in a location where fuel may enter a water body. • Spill kits will be maintained at identified site facilities where significants spills may occur (e.g. workshops)

No.	Aspect	Impact	Mitigation Measures
SWM5	Implementation of erosion and sediment control measures.	Environmental degradation/ pollution of adjacent water body or land.	• Works will not commence prior to ESCs being developed and adequately implemented on site. • Regular inspections will be undertaken, at least weekly, to ensure erosion and sediment control structures are effective (including following significant rain events). If improvements are identified, these will be documented in an inspection report which is to be closed out within designated times frames.
SWM6	Inadequate or inappropriate implementation and maintenance of erosion and sediment controls	Environmental degradation/ pollution of adjacent water body or land.	• Erosion and sediment controls will be inspected prior to predicted rainfall, prior to long work breaks and after rainfall events to ensure they are fully functional. If required, initiate any repair or maintenance requirements • ESCP's will be progressively updated as construction activities change and distributed to relevant site personnel for reference and implementation • Site personnel (in particular ERSED crews) will be provided with training on sound environmental practice and the implementation of effective Erosion and Sediment Control structures • Specific site personnel will be trained and/or toolboxed on correct coffer dam management prior to any discharge. • Control measures will be implemented at site exits to minimise tracking of sediment onto public roads and identified in relevant ESCs • Regular inspections will be undertaken, at least weekly, to ensure erosion and sediment control structures are effective (including following significant rain events). If improvements are identified, these will be documented in an inspection report which is to be closed out within designated timeframes.
SWM7	Tracking of sediment onto public roads	Pollution of adjacent road side table drains	• Control measures will be implemented at site exits to minimise tracking of sediment onto public roads and identified in relevant ESCs
SWM8	Exposure of large areas of loose material susceptible to erosion	Uncontrolled discharge of sediment laden water into a Waterway compromising environmental quality	• Prepare progressive erosion and sediment controls (ESCs) for all impacted areas that comply with Managing Urban Stormwater – Soils and Construction Vol. 1 (Landcom, 2004) • Works will not commence prior to ESCs being developed and adequately implemented on site. • Clearing and grubbing limits will be established and clearing will be undertaken in a controlled manner to limit areas of disturbance • Access tracks will be delineated and sign posted to prevent unnecessary ground disturbance. • Progressive rehabilitation will occur during construction activities to stabilise exposed areas and minimise erosion potential.

No.	Aspect	Impact	Mitigation Measures
			• Undertake progressive reshaping and rehabilitation works in conjunction with the completion of bulk excavation and land shaping, and in accordance with the Landscape Rehabilitation Management Plan
SWM11	Inappropriate management of OSDs.	Uncontrolled discharge of sediment laden water into the receiving environment	• The OSDs will be inspected after each rain event (greater than 25mm in 24 hours) and discharged as required. All appropriate recording will be undertaken prior to discharge. Inside the OSDs will be kept as clean as possible (e.g. Machinery, equipment or excess dirt will not be stored in the OSDs) to minimise flood damage and potential waterway pollution. • Records regarding water quality and functionality of erosion and sediment control devices will be kept, including details of rain events, discharge, and sediment removal and dewatering activities with controls updated if ineffective.
SWM12	Removal or damage to installed erosion and sediment control measures	Environmental degradation	• Works will not commence prior to ESCs being developed and adequately implemented on site. • ESCs will be progressively updated as construction activities change and distributed to relevant site personnel for reference and implementation. • Regular inspections will be undertaken, at least weekly, to ensure erosion and sediment control structures are effective (including following significant rain events). If improvements are identified, these will be documented in an inspection report which is to be closed out within designated timeframes
SWM13	Slow or failed implementation of rehabilitation activities	Increased erosion risk and potential environmental degradation and/ or pollution of adjacent water body.	• Establish a program for the implementation of revegetation and topsoiling works along the site and in/adjacent to water courses (refer to the Landscape Management Plan, Appendix B). • Undertake progressive reshaping and rehabilitation works in conjunction with the completion of bulk excavation and land shaping, and in accordance with the Landscape Rehabilitation Management Plan • Topsoil will be reused in areas as close as possible to its source location to maximise the benefits available from the existing seed bank. • Weed management strategies will be implemented in newly rehabilitated areas to control weed infestation and propagation • Appropriate endemic and native species will be used wherever possible particularly those that will provide future habitat for endangered fauna

No.	Aspect	Impact	Mitigation Measures
SWM14	Impacts on groundwater quality within the local area	Verify effectiveness of site management by regular groundwater monitoring	• Establish a program of groundwater well monitoring at least 3 months prior to construction. • Wells to be positioned upstream and downstream of the development to evaluate net impacts on groundwater quality over time, and to ensure that no net migration of contaminants occurs to groundwater. • Feedback on groundwater sampling plan to be sought from the Office of Water and NSW EPA. • Supply results to the Office of Water.

4 OPERATION AND MAINTENANCE OF ONSITE STORMWATER DETENTION

The Operation and Maintenance Plan for the OSD is as follows:

4.1 Weekly Inspection / Maintenance

- Collect accumulated surface litter from the whole of the site. Dispose to garbage.
- Inspect surface inlet grates and grated drains and remove accumulated litter and dispose to garbage debris and silt and dispose to garbage.
- Removal of debris from pit grates.
- Inspect recycled water pump system for serviceability.

4.2 Monthly Inspection / Maintenance and after every rainfall event > 25mm

- Inspect rainwater tank filters and inlet pipes. Remove accumulated litter and debris and dispose to garbage.
- Inspect permanent pond overflow. Remove accumulated debris as required.
- Inspect permanent pond control pit. Remove accumulated debris as required.
- Inspect OSD mesh screens.
- Remove accumulated litter and debris. Removal of leaf litter and vegetation build up. Trim vegetation as required.
- Ensure rainwater tanks are drawing down.
- Inspect Downstream Defenders and Humeceptor.
- Remove accumulated oils/grease and dispose to accredited disposal site.
- Remove accumulated sediment and dispose to accredited disposal site.

4.3 Site Monthly Inspection / Maintenance

- Inspect and clean gutters of all buildings. Dispose of debris to garbage.
- Inspect rainwater tanks internally and externally for leaks and damage.
- Inspect tank filters and inlet pipes. Remove accumulated litter and debris and dispose to garbage.
- Inspect OSD basin internally and repair scour, trim vegetation.
- Inspect batter drains, repair scour, trim vegetation.
- Inspect OSD outlet screens and trim vegetation
- Inspect all stormwater pits and grates. Remove accumulated litter and debris and dispose to garbage. Replace damaged grates.
- Remove, clean and refit mesh screens from OSD outlets
- Inspect Downstream Defenders and Humeceptor.
- Remove accumulated oils/grease and dispose to accredited disposal site.
- Remove accumulated sediment and dispose to accredited disposal site.

4.4 Site quarterly groundwater monitoring

- Groundwater wells to be sampled once every three months upstream and downstream of the development. Quarterly reports to be provided to the Office of Water.

5 STAFF TRAINING

All employees, contractors and utility staff working on site will undergo site induction training (which includes environmental due diligence training) and environmental training in relation to waste management issues. The induction will address:

- This management plan
- Relevant legislation
- Waste minimisation
- Waste recognition and recycling
- Available recycling facilities
- Energy and water minimisation measures

Records would be kept of all personnel undertaking the site induction and training, including the contents of the training, date and name of trainer/s.

Key staff will undertake more comprehensive training relevant to their position and/or responsibility. This training may be provided as “toolbox” training or specific training tailored by the Environment and Quality Manager.

Further details regarding the content of staff induction and training are outlined in the CEMP.

6 MONITORING, AUDITING AND REPORTING

This SWMP has been designed to adequately address these risks and ensure that the controls are properly implemented and are regularly monitored and audited to assess their effectiveness. Changes to the stipulated controls will be instigated if they are not achieving their objectives.

6.1 Inspections and Monitoring

Regular monitoring will be undertaken to track waste management on site. This will be through a series of formal and informal inspections at regular intervals.

Activity	Resources	Responsibility	Frequency
Daily Site inspections (work area)	Site Supervisor Checklist	Site Supervisor	Daily Issues recorded in Site Diary (by exception)
Weekly Environmental Inspection	Site Audit	Environment Manager (or delegate)	Weekly

Surface water monitoring will be undertaken within the OSD immediately prior to the overflow point and every six months, in accordance with M2 of EPL 20601. Grab samples will be collected from the OSD and samples analysed for pH and total suspended sediment concentrations. Concentrations will be compared to the concentration limits specified for that pollutant under EPL 20601.

Groundwater wells upstream and downstream of the development will be sampled and tested on a quarterly basis, with results provided to the Office of Water as required.

6.2 Reporting

A biannual report will be produced by the Environment Manager to summarise all monitoring results.

6.3 Auditing

Audits will be undertaken to assess the effectiveness of environmental controls and compliance with this plan and other relevant guidelines. Any audit of this plan would be part of an overall audit of the OEMP. The following elements may be included in the audit of the overall SWMP:

- Compliance with statutory obligations
- Compliance with environmental standards, guidelines, specifications and contract conditions
- Compliance with the OEMS and sub plans
- Adequacy of monitoring and operational reports
- Completion of environmental actions
- Adequacy of environmental training records
- Adequacy of environmental records, checklists and document management systems
- Preparation of environmental reports
- Recording and completion of corrective actions following environmental incidents and complaints
- Achievement of environmental performance objectives
- Implementation of actions from previous audits.

7 REVIEW AND IMPROVEMENT OF THE SWMP

7.1 Environmental Management Review

The effectiveness and proper implementation of the SWMP will be reviewed by WRPL in accordance with the SEQ Management System requirements i.e. at least biennially or sooner as necessary. Review will be undertaken by the Compliance team and relevant Managers. The review will comprise:

- Reviewing the results of audits.
- Evaluation of the system, which improvements and corrective actions will be sought.
- Evaluation of the operation of the SWMP.

7.2 Continual Improvement

Continual improvement of the SWMP will be achieved by the continual evaluation of environmental management performance against environmental policies, objectives and targets for the purpose of identifying opportunities for improvement. The continual improvement process will:

- At least monthly (or as incidents / non-conformances occur):
  - Determine the root cause or causes of non-conformances and deficiencies.
  - Develop and implement a plan of corrective and preventative action to address non-conformances and deficiencies.
  - Verify the effectiveness of the corrective and preventative actions.

Outcomes of these reviews shall be documented and retained for the duration of the project.

APPENDIX A EROSION AND SEDIMENT CONTROL PLAN

SEQUENCE OF OPERATIONS

STEP 1
PROVIDE TEMPORARY CONSTRUCTION ENTRY/EXIST SHAKER PAD AND SILT STOP FENCING ALONG BOUNDARY AS SHOWN. INSTALL STRAWBALE CHECK DAMS IN THE WATERCOURSE BELOW THE BRIDGE AS SHOWN. INSTALL STRAWBALE BARRIERS ON THE EASTERN SIDE OF THE WATERCOURSE ADJACENT TO THE BRIDGE AS SHOWN

STEP 2
CONSTRUCT CLEAN WATER DIVERSION DRAIN AT THE NORTHERN END OF THE SITE ABOVE THE PROPOSED BATTER. DRAIN TO THE NEAREST SECTION OF THE WATERCOURSE

STEP 3
CONSTRUCT THE PROPOSED OSD, WATER QUALITY POND, SHREDDING AREA RUNOFF POND AND LANDSCAPING MOUND. THE PONDS WILL BE TEMPORARY SEDIMENT PONDS DURING CONSTUCTION, UNTIL SITE IS STABILISED, AND THE MOUND WILL DIVERT DIRTY WATER TO THE PONDS

STEP 4
EXCAVATE FOR BULK EARTHWORKS AND REVEGETATE BATTERS

STEP 5
CONSTRUCT BUILDINGS, ROADS AND DRAINAGE LINES

STEP 6
CONSTRUCT BRIDGE WORKS

STEP 7
MAINTAIN SOIL AND WATER MANAGEMENT FEATURES THROUGH OUT THE CONSTRUCTION PERIOD.

STEP 8
DUST SUPPRESSION TO BE CONDUCTED THROUGHOUT CONSTRUCTION PHASE. A WATER CART TO BE ON SITE AND AVAILABLE AT ALL TIMES, APPROX. 40,000 LITRES/DAY.

STEP 9
CLEAR OUT ALL PIPEWORK PRIOR TO REMOVAL OF SOIL AND WATER MANAGEMENT DEVICES

STEP 10
CLEAR OUT OSD BASIN AND COMPLETE CONSTRUCTION OF BASIN INFRASTRUCTURE.

STATEMENT OF SOIL MANAGEMENT

1. ALL TOPSOIL IS TO BE STOCKPILED IN AREAS DESIGNATED ON PLAN.
2. ALL FORMED EMBANKMENTS (CUT & FILL) ARE TO BE LANDSCAPED WITHIN 7 DAYS.
3. ALL DISTURBED AREAS, INCLUDING ANY CONTROLLED FILL ARE TO BE TOPSOILED & SEEDED PRIOR TO COMPLETION OF WORKS. ALL DISTURBED AREAS THAT WILL NOT BE STABILIZED WITHIN 2 MONTHS MUST BE TEMPORARILY REVEGETATED WITHIN 7 DAYS OF CLEARING. AREAS THAT FAIL TO ESTABLISH MUST BE RESOWN IMMEDIATELY.
4. THE GROUND SHALL BE TYNED / SCARIFIED TO A MIN DEPTH 100mm PRIOR TO SEEDING.
5. ANY SEEDED AREAS WHICH FAIL TO GERMINATE OR WHERE GERMINATION IS SPARSE AFTER 21 DAYS FROM INITIAL SEEDING AREA MUST BE RESEEDED.
6. FOR TEMPORARY REVEGETATION PURPOSES, THE REVEGETATION MIXTURE SHOULD INCLUDE THE FOLLOWING SPECIES FOR BOTH AUTUMN & SPRING SOWINGS - DURATURF PARK BLEND (Wright Stephenson Seed Mix) THOROUGHBRED TURF TALL FESCUE (35kg/ha) UNHULLED COUCH (4kg/ha) PERENNIAL RYEGRASS (25kg/ha) CHEWINGS FESCUE (5kg/ha) MULTIGROW / ENRICH FERTILISER AT 50kg/ha
7. REVEGETATION AND STABILIZATION WILL NOT BE CONSIDERED SATISFACTORY UNLESS A MIN 70% GROUND COVER, AT LEAST 100mm HIGH IS ACHIEVED OVER ALL DISTURBED AREAS
8. ALL GULLY PITS ARE TO BE PROVIDED WITH SEDIMENT FILTER BARRIERS SUCH AS SANDBAGS OR FILTER SOCKS.
9. TRENCHES FOR DRAINAGE LINES ARE TO BE REINSTATED WITH TOPSOIL FOLLOWING PIPE INSTALLATION & BACKFILLING & IMMEDIATELY SEEDED/FERTILIZED.
10. DESIGNATED PLANT AND MACHINERY ACCESSWAYS TO BE DEFINED ONSITE BY THE INSTALLATION OF PARAWEBBING FENCING TO MINIMISE UNNECESSARY SITE DISTURBANCE.

MAINTENANCE PROCEDURES DURING CONSTRUCTION

1. ALL EROSION CONTROL MEASURES ARE TO BE MAINTAINED AT ALL TIMES SO THAT THOSE MEASURES ARE FULLY FUNCTIONAL / OPERATIONAL DURING THE CURRENCY OF WORKS. ALL SUCH CONTROLS MUST ALSO BE FULLY FUNCTIONAL / OPERATIONAL SHOULD WORK OPERATIONS CEASE TEMPORARILY, (e.g. WEEKENDS, ROSTERED DAYS OFF, etc.)
2. REPREAD MATERIAL GAINED DURING MAINTENANCE OPERATION OR ALTERNATIVELY PLACE ON STOCKPILES.

SITE MANAGEMENT DETAILS

THE MAJORITY OF SITE MANAGEMENT DETAILS ARE SHOWN ON THE SOIL AND EROSION CONTROL MANAGEMENT PLAN. PLEASE NOTE

A) ACCESS TO THE SITE WILL BE VIA WYLLIE ROAD. ANY DAMAGE TO THIS ROADWAY IS TO BE RESTORED.

B) CONSTRUCTION MACHINERY & MATERIALS ARE TO BE LOADED AND UNLOADED WITHIN THE SITE.

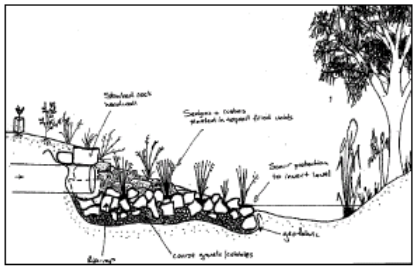
C) STORAGE AREAS ARE INDICATED ON THE SOIL & EROSION CONTROL PLAN.

D) SOIL AND EROSION CONTROL PLAN ALSO INDICATED THE PROPOSED EXIT CONTROL DEVISES.

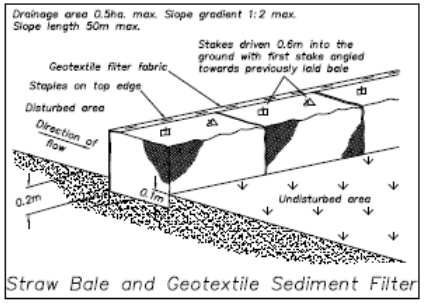
MATERIAL STORAGE VOLUMES

Material	Volume Stored on Site (litre)	Method of Storage	Spill Tray Volume (litre)	Spill Tray Type	Comments
Petrol	20	20 Litre Drum	22	Steel Tray	Transtank T 20 SS
Diesel	9,000	On site tank bulk tank	9,900	Steel Tray	Transtank T 20 SS
Lubricants	1,000	5 x 200 litre drum	500	Steel Tray	Transtank T 20 SS
Solvents	100	5 x 20 litre drum	25	Steel Tray	Transtank T 20 SS
Liquid Waste	0	N/A	N/A	N/A	N/A
	10120				

Notes:
Oils, Fuel and Solvents will be stored in a Transtank T 20 SS

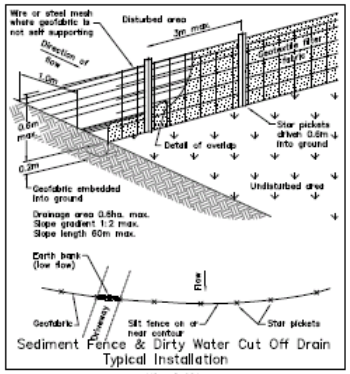


SCOUR PROTECTION HEADWALL



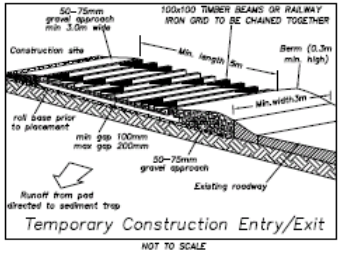
Straw Bale and Geotextile Sediment Filter

NOT TO SCALE



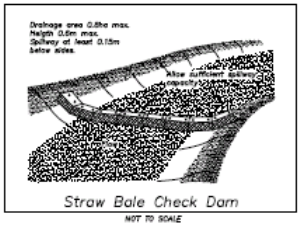
Sediment Fence & Dirty Water Cut Off Drain
Typical Installation

NOT TO SCALE



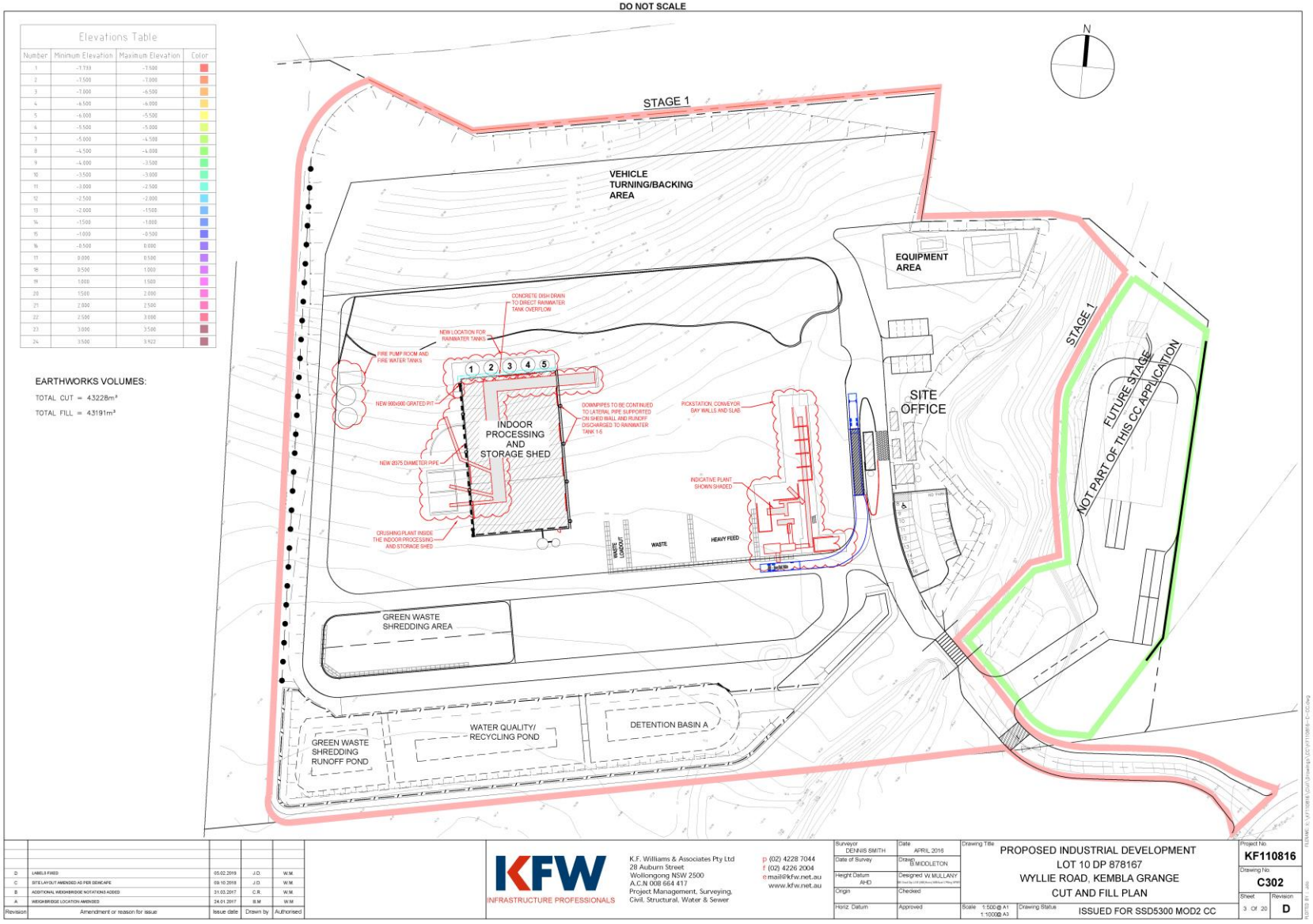
Temporary Construction Entry/Exit

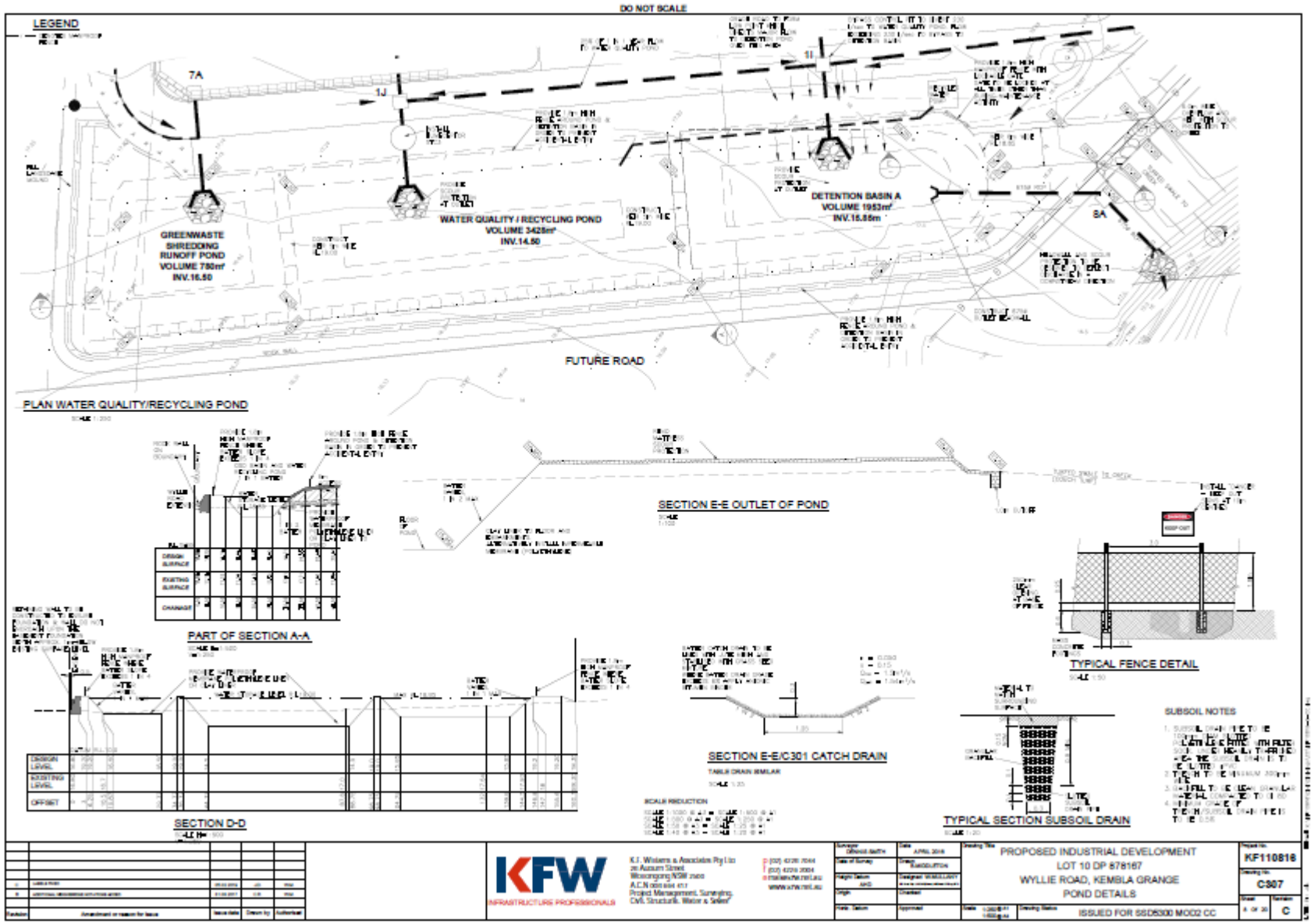
NOT TO SCALE



Straw Bale Check Dam

NOT TO SCALE


DO NOT SCALE
Elevations Table
Number | Minimum Elevation | Maximum Elevation | Color
1 -7.793 -7.500
2 -7.500 -7.000
3 -7.000 -6.500
4 -6.500 -6.000
5 -6.000 -5.500
6 -5.500 -5.000
7 -5.000 -4.500
8 -4.500 -4.000
9 -4.000 -3.500
10 -3.500 -3.000
11 -3.000 -2.500
12 -2.500 -2.000
13 -2.000 -1.500
14 -1.500 -1.000
15 -1.000 -0.500
16 -0.500 0.000
17 0.000 0.500
18 0.500 1.000
19 1.000 1.500
20 1.500 2.000
21 2.000 2.500
22 2.500 3.000
23 3.000 3.500
24 3.500 3.922
EARTHWORKS VOLUMES:
TOTAL CUT = 43228m³
TOTAL FILL = 43191m³
N
STAGE 1
VEHICLE TURNING/BACKING AREA
EQUIPMENT AREA
SITE OFFICE
STAGE 1
FUTURE STAGE
NOT PART OF THIS CC APPLICATION
INDOOR PROCESSING AND STORAGE SHED
CONCRETE DISH DRAIN TO DIRECT RAINWATER TANK OVERFLOW
NEW LOCATION FOR RAINWATER TANKS
FIRE PUMP ROOM AND FIRE WATER TANKS
NEW 900x600 GRATED PIT
NEW Ø375 DIAMETER PIPE
DOWNPIPES TO BE CONTINUED TO LATERAL PIPE SUPPORTED ON SHED WALL AND RUNOFF DISCHARGED TO RAINWATER TANK 1-5
PICKSTATION, CONVEYOR BAY WALLS AND SLAB
INDICATIVE PLANT SHOWN SHADED
CRUSHING PLANT INSIDE THE INDOOR PROCESSING AND STORAGE SHED
WASTE
HEAVY FEED
GREEN WASTE SHREDDING AREA
GREEN WASTE SHREDDING RUNOFF POND
WATER QUALITY/ RECYCLING POND
DETENTION BASIN A
D LABELS FIXED 05.02.2019 J.O. W.M.
C SITE LAYOUT AMENDED AS PER DEMCAPE 09.10.2018 J.O. W.M.
B ADDITIONAL WEIGHBRIDGE NOTATIONS ADDED 31.03.2017 C.R. W.M.
A WEIGHBRIDGE LOCATION AMENDED 24.01.2017 B.M W.M
Revision | Amendment or reason for issue | Issue date | Drawn by | Authorised
KFW
INFRASTRUCTURE PROFESSIONALS
K.F. Williams & Associates Pty Ltd
28 Auburn Street
Wollongong NSW 2500
A.C.N 008 664 417
Project Management, Surveying, Civil, Structural, Water & Sewer
p (02) 4228 7044
f (02) 4226 2004
e mail@kfw.net.au
www.kfw.net.au
Surveyor: L. DENNIS SMITH
Date of Survey
Height Datum: AHD
Origin
Horiz. Datum
Date: APRIL 2016
Drawn: S MIDDLETON
Designed: W MULLANY
Checked
Approved
Drawing Title
PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878167
WYLLIE ROAD, KEMBLA GRANGE
CUT AND FILL PLAN
Scale: 1:500@A1 1:1000@A3
Drawing Status: ISSUED FOR SSD5300 MOD2 CC
Project No: KF110816
Drawing No: C302
Sheet: 3 Of 20
Revision: D


DO NOT SCALE
LEGEND
7A
1J
1I
8A
GREENWASTE SHREDDING RUNOFF POND VOLUME 750m³ INV.16.50
WATER QUALITY / RECYCLING POND VOLUME 3428m³ INV.14.50
DETENTION BASIN A VOLUME 1953m³ INV.15.88m
FUTURE ROAD
PLAN WATER QUALITY/RECYCLING POND
SECTION E-E OUTLET OF POND
PART OF SECTION A-A
TYPICAL FENCE DETAIL
SECTION E-E/C301 CATCH DRAIN
SECTION D-D
TYPICAL SECTION SUBSOIL DRAIN
SUBSOIL NOTES
KFW
INFRASTRUCTURE PROFESSIONALS
PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878167
WYLLIE ROAD, KEMBLA GRANGE
POND DETAILS
KF110816
C307
C
ISSUED FOR SSD6300 MOD2 CC

DO NOT SCALE

LEACHATE CONTROL NOTES

1. Working surfaces
EPA Goal
To ensure storage areas, active composting surfaces, and associated access roads are constructed to prevent the pollution by leachate of subsoil, groundwater and surface water bodies and to allow all-weather vehicular access to any part of the processing site that needs to be reached by vehicles.

Minimum Design Requirement is met as follows:

The green waste shredding area will have an impervious concrete or asphalt concrete layer to prevent infiltration from the shredding surface.

The green waste shredding area has a perimeter drain to collect and direct runoff to the green waste runoff collection pond.

Composting and storage will be undertaken in a weatherproof shed which will have a concrete floor.

2. Leachate barrier system
EPA Goal
To prevent the pollution by leachate of subsoil, groundwater and surface water bodies over the period of time that raw organics or products remain on the premises, beyond the closure of the facility, and until the premises has ceased to pose potential environmental threats.

Minimum Design Requirement is met as follows:

The green waste shredding area has an impervious layer to prevent infiltration from the shredding surface. The impervious layer will be concrete or asphalt cement (AC) pad of a thickness of at least 100 mm is to be constructed

The concrete or AC pavement will be designed for a traffic loading of 1 x 105 ESA. Assuming a CBR of 5, the pavement thickness will be in the order of 340 mm including a minimum of 100 mm concrete of AC thickness.

A 100mm concrete or AC layer will withstand the loads from all machines, vehicles and equipment that are required to operate the facility.

3. Leachate collection system
EPA Goal
To ensure that leachate is collected efficiently at the composting and related processing facility for further management, thereby avoiding water pollution and/or odour problems.

Minimum Design Requirement is met as follows:

The composting process will occur under cover in a weather-proof building and will produce no or at worst a small volume of leachate.

The composting process shed will have a concrete floor underlain by a polyethylene membrane in order to prevent leachate infiltration into the groundwater.

The compost process leachate collection system will consist of the following:

- A primary concrete tank with a volume of 5,000 litres. The concrete tank will be fitted with a watertight lid and internally sealed with an epoxy coating to ensure watertightness.
- A secondary concrete tank with a volume of 2,500 litres. The concrete tank will be fitted with a watertight lid and internally sealed with an epoxy coating to ensure watertightness.
- The secondary tank will be connected to the primary tank at the level where the primary tank is at 4,000 litre storage (80%) capacity.
- The primary collection tank will be fitted with a sensor to indicate 75% capacity (ie 3,750 litres. At this point the site manager shall arrange to have the primary tank pumped out by a liquid waste tanker and disposed of at an appropriate treatment facility.

4. Leachate storage system
Goal
To ensure that leachate is stored efficiently at the composting and related processing facility for further management, thereby avoiding water pollution and/or odour problems.

Minimum Design Requirement is met as follows:

The compost process leachate collection and storage system will consist of the following:

- A primary concrete tank with a volume of 5,000 litres. The concrete tank will be fitted with a watertight lid and internally sealed with an epoxy coating to ensure watertightness.
- A secondary concrete tank with a volume of 2,500 litres. The concrete tank will be fitted with a watertight lid and internally sealed with an epoxy coating to ensure watertightness.
- The secondary tank will be connected to the primary tank at the level where the primary tank is at 4,000 litre storage (80%) capacity.
- The primary collection tank will be fitted with a storage level sensor to indicate 75% capacity (ie 3,750 litres. At this point the site manager shall arrange to have the primary tank pumped out by a liquid waste tanker and disposed of at an appropriate treatment facility.

A weekly inspection of the level in the leachate storage tank is to be performed.

Six monthly testing of the storage level sensor is to be performed.

It is noted that above ground tanks are preferred, however underground tanks are proposed in this case because the composting area is within a weather proof shed which will mean that the generation of leachate will be nil or very small.

The composting process will be undertaken in a weatherproof shed. There will therefore be no need to make provision for rainwater inflow to the leachate storage system. It is noted that rainwater from the weatherproof shed will be harvested for use on site for dust suppression.

5. Surface water controls
Goal
To avoid the generation of excessive leachate and to prevent any sediment or pollutants from being carried off the premises.

Minimum Design Requirements met as follows:
The surface water controls must at least meet the following requirements:

For composting and storage;
prevention of surface water mixing with organics will achieved by undertaking the composting process within a weatherproof building. The building will effectively prevent surface water mixing with the composting material.

For green waste shredding;
prevention of surface water mixing with organics will be achieved by:

- elevating the green waste shredding area above the internal road system in order to ensure that surface water does not run onto the green waste shredding area.
- the internal road and stormwater system is designed to collect and divert surface water away from the green waste shredding area. The internal road has a central V drain in order to ensure that surface water runs away from the shredding area.

For composting;
contamination of runoff will be prevented by undertaking the composting process and storage within a weatherproof building. The building will effectively prevent surface water mixing with the composting material.

For green waste shredding handling;
treatment of runoff from the shredding area will be achieved by:

- elevating the green waste shredding area above the internal road system in order to ensure that surface water does not run onto the green waste shredding area.
- the internal road and stormwater system is designed to collect and divert surface water away from the green waste shredding area. The internal road has a central dish-drain in order to ensure that surface water runs away from the shredding area.

For composting;
management of surface water generated from the design of a 1-in-10 year, 24-hour-period storm event will not be required because the composting operations are within a weatherproof building. The building will effectively prevent surface water mixing with the composting material.

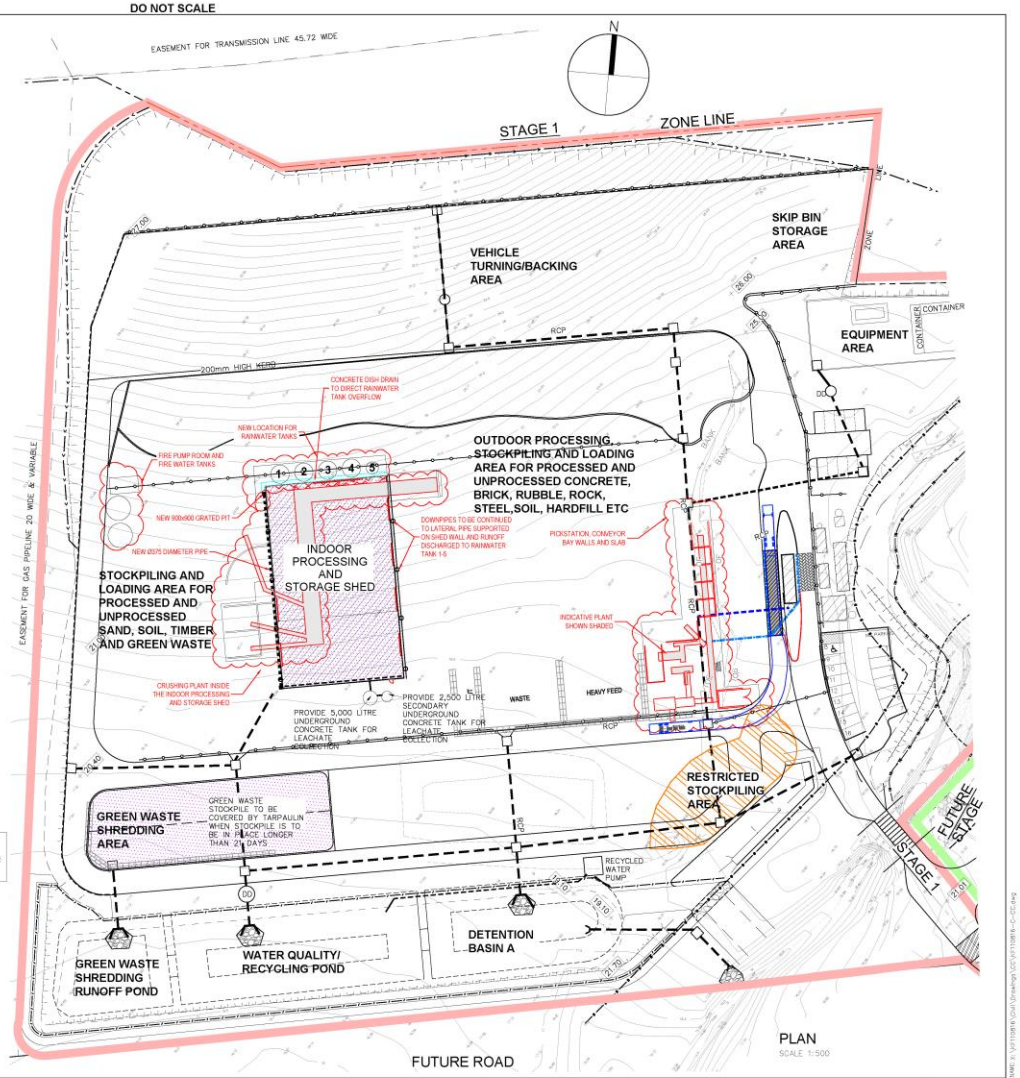
For green waste shredding;
management of surface water generated from the design of a 1-in-10 year, 24-hour-period storm event will be achieved by minimising the area of green waste exposed to rainfall and ensuring the shredding pond has sufficient volume. As runoff will not be heavily loaded with organic matter, water retained in the green waste shredding pond may be used a supplementary supply for dust suppression on site.

The internal road and stormwater system is designed to collect and divert surface water away from the green waste shredding area. The internal road has a central V drain in order to ensure that surface water runs away from the shredding area.

LEGEND

- DENOTES PROPOSED BUILDING
- DENOTES EXISTING CONTOURS
- DENOTES PROPOSED SURFACE LEVELS
- DD — DENOTES HUMECEPTOR DOWNSTREAM DEFENDER
- COMPOSTING AND STORAGE SHED, CONCRETE FLOOR, DRAIN TO UNDERGROUND LEACHATE COLLECTION TANKS
- GREEN WASTE SHREDDING AREA, CONCRETE OR ASPHALT SURFACE, REFER TO DRAWING KF110816/C17
- DETENTION POND
- DENOTES STORMWATER PITS AND PIPES
- DENOTES STAGE 1 LIMITS
- DENOTES FUTURE STAGE LIMITS

NOTE:
COMPOSTING OPERATIONS APPROVED UNDER SSD5300 IN SHED ARE TO BE REPLACED BY PROPOSED SORTING AND CRUSHING PLANT.



Revision	Amendment or reason for issue	Issue date	Drawn by	Authorised
D	LABELS FIXED	05.02.2019	J.D.	W.M.
C	SITE LAYOUT AMENDED AS PER DEWCAPE	09.10.2018	J.D.	W.M.
B	ADDITIONAL WIDE/HERDGE NOTATIONS ADDED	31.03.2017	C.R.	W.M.

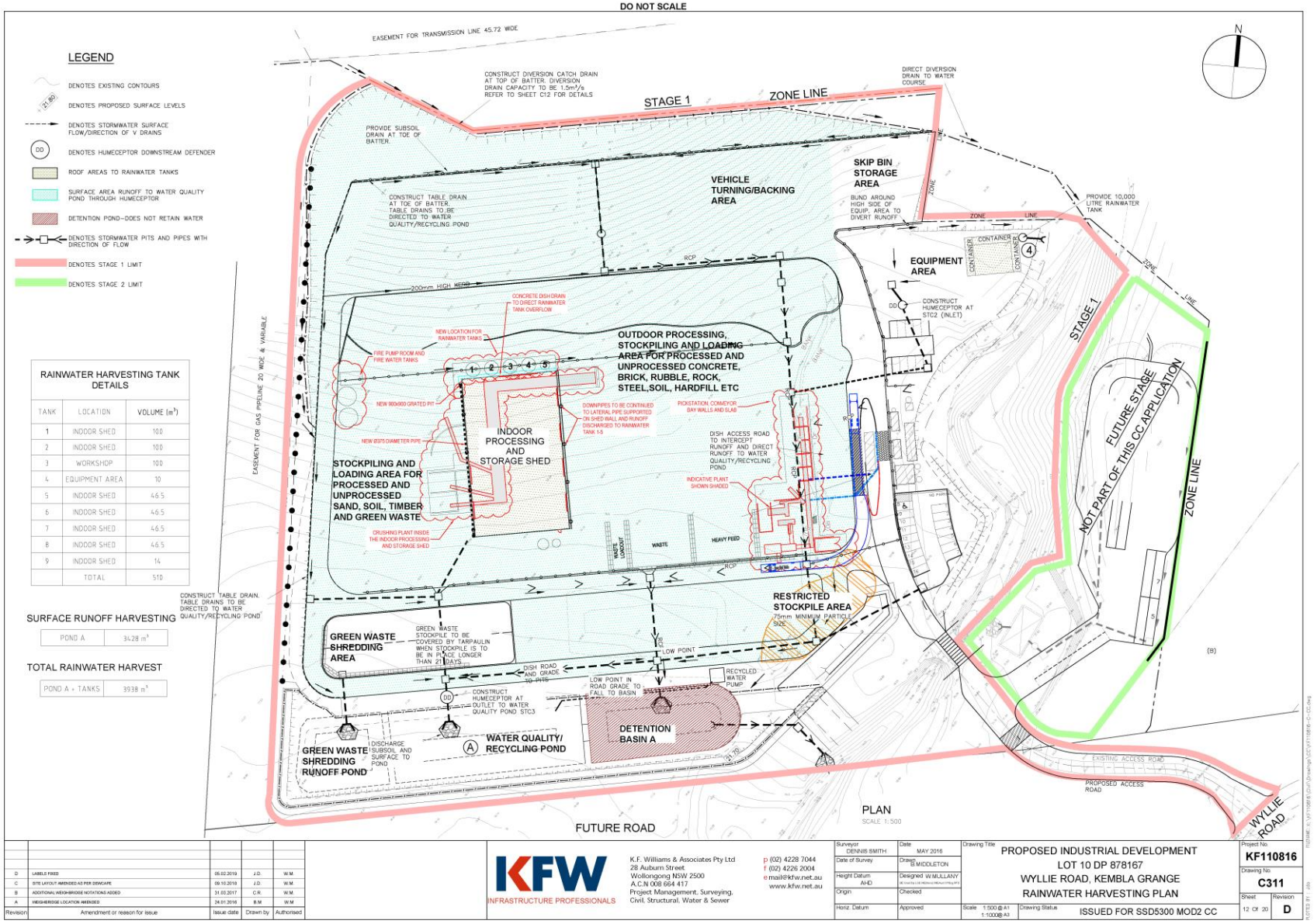
KFW INFRASTRUCTURE PROFESSIONALS

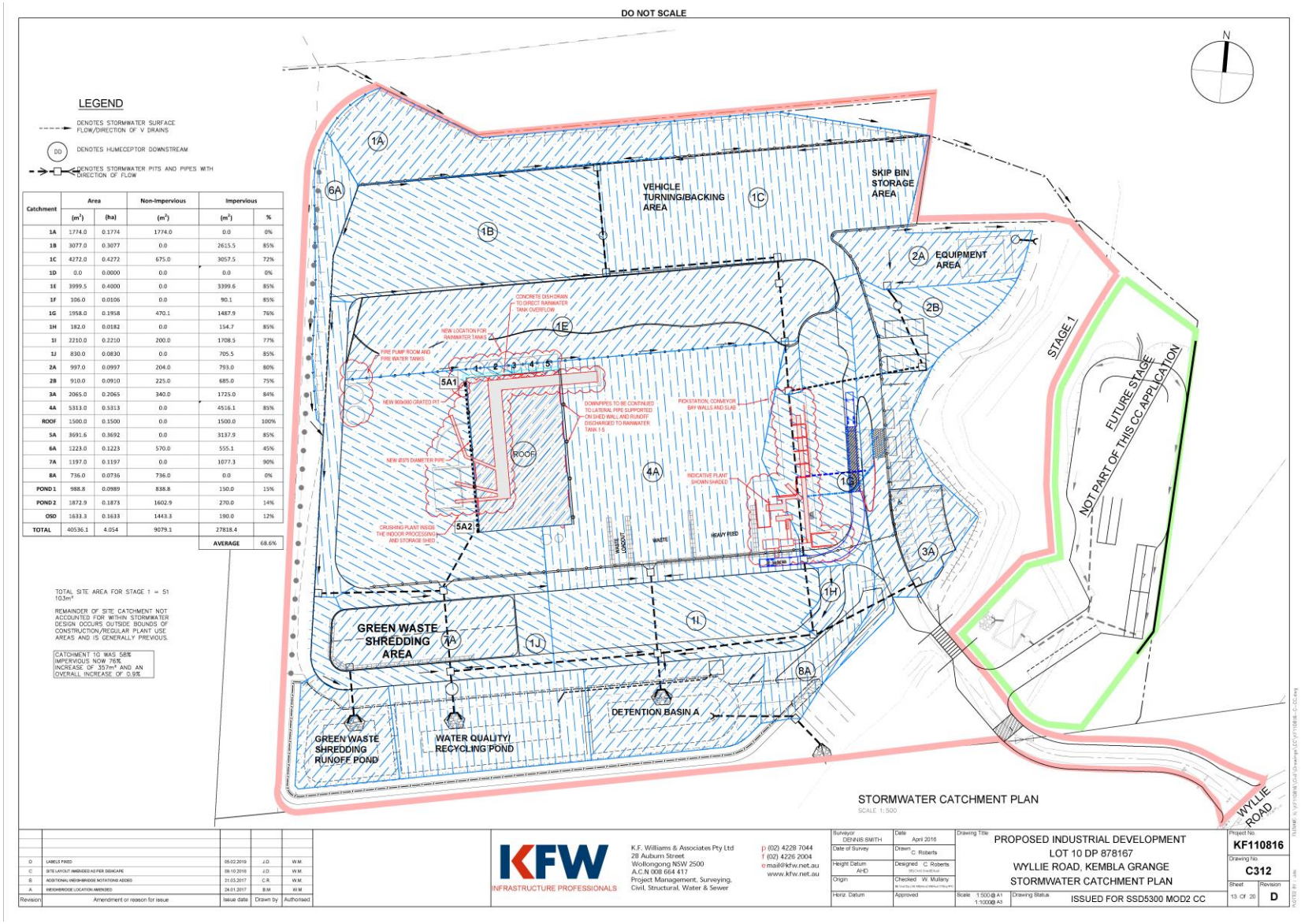
K.F. Williams & Associates Pty Ltd
28 Auburn Street
Wollongong NSW 2500
A.C.N 008 664 417
Project Management, Surveying, Civil, Structural, Water & Sewer
p (02) 4228 7044
f (02) 4226 2004
e mail@kfw.net.au
www.kfw.net.au

Surveyor	DENNIS SMITH
Date of Survey	
Height Datum	AHD
Origin	
Horiz. Datum	
Date	APRIL 2016
Drawn	B MIDDLETON
Designed	W MULLANY
Checked	
Approved	
Scale	1:500 @ A1, 1:1000 @ A3
Drawing Status	ISSUED FOR SSD5300 MOD2 CC

Drawing Title: PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878167
WYLLIE ROAD, KEMBLA GRANGE
LEACHATE CONTROL PLAN

Project No. KF110816
Drawing No. C310
Sheet 11 Of 20
Revision D

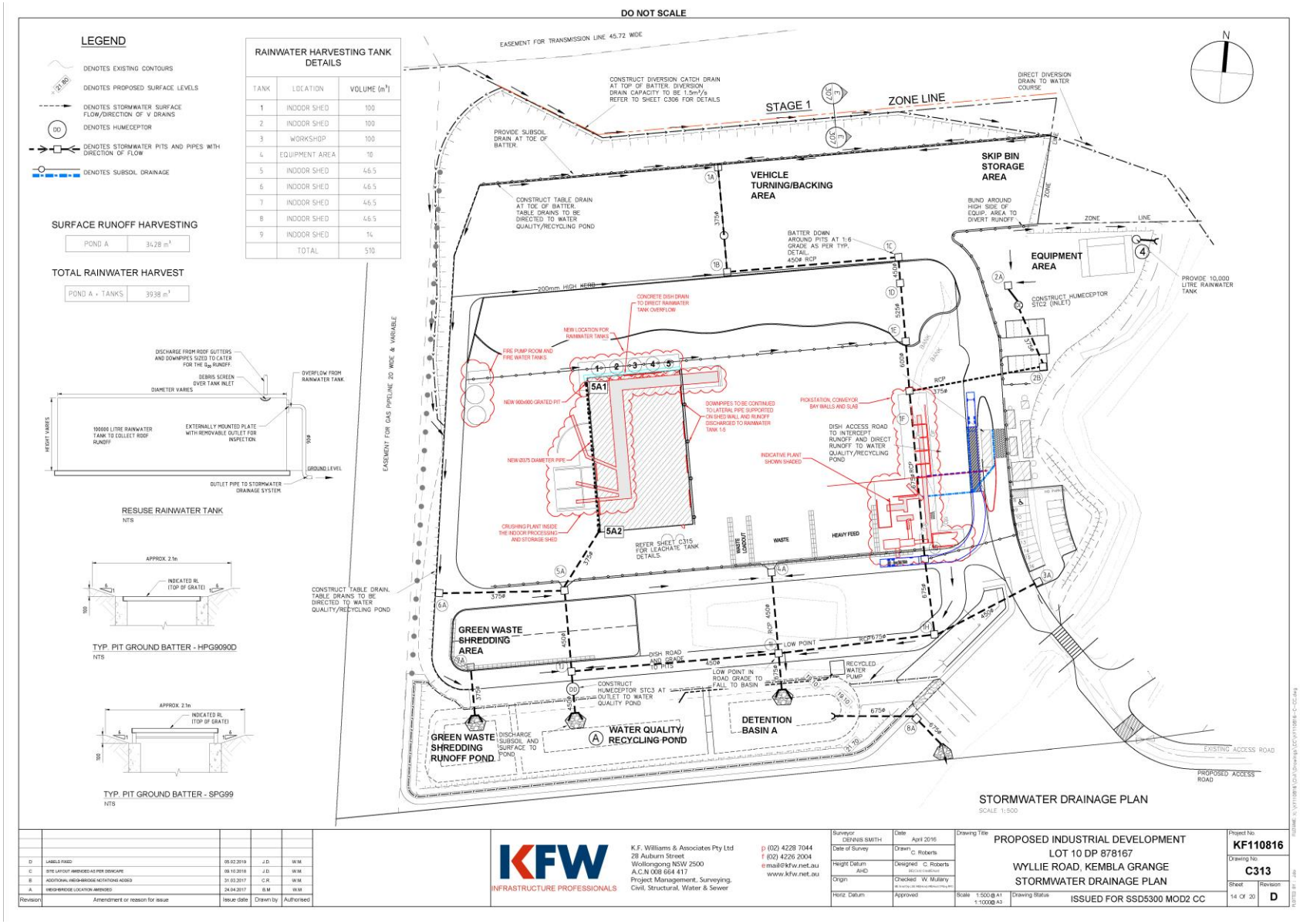

DO NOT SCALE
LEGEND
DENOTES EXISTING CONTOURS
DENOTES PROPOSED SURFACE LEVELS
DENOTES STORMWATER SURFACE FLOW/DIRECTION OF V DRAINS
DENOTES HUMECEPTOR DOWNSTREAM DEFENDER
ROOF AREAS TO RAINWATER TANKS
SURFACE AREA RUNOFF TO WATER QUALITY POND THROUGH HUMECEPTOR
DETENTION POND–DOES NOT RETAIN WATER
DENOTES STORMWATER PITS AND PIPES WITH DIRECTION OF FLOW
DENOTES STAGE 1 LIMIT
DENOTES STAGE 2 LIMIT
RAINWATER HARVESTING TANK DETAILS
TANK | LOCATION | VOLUME (m³)
1 | INDOOR SHED | 100
2 | INDOOR SHED | 100
3 | WORKSHOP | 100
4 | EQUIPMENT AREA | 10
5 | INDOOR SHED | 46.5
6 | INDOOR SHED | 46.5
7 | INDOOR SHED | 46.5
8 | INDOOR SHED | 46.5
9 | INDOOR SHED | 14
TOTAL | 510
SURFACE RUNOFF HARVESTING
POND A | 3428 m³
TOTAL RAINWATER HARVEST
POND A + TANKS | 3938 m³
EASEMENT FOR TRANSMISSION LINE 45.72 WIDE
CONSTRUCT DIVERSION CATCH DRAIN AT TOP OF BATTER. DIVERSION DRAIN CAPACITY TO BE 1.5m³/s REFER TO SHEET C12 FOR DETAILS
DIRECT DIVERSION DRAIN TO WATER COURSE
STAGE 1
ZONE LINE
PROVIDE SUBSOIL DRAIN AT TOE OF BATTER.
CONSTRUCT TABLE DRAIN AT TOE OF BATTER. TABLE DRAINS TO BE DIRECTED TO WATER QUALITY/RECYCLING POND
VEHICLE TURNING/BACKING AREA
SKIP BIN STORAGE AREA
BUND AROUND HIGH SIDE OF EQUIP. AREA TO DIVERT RUNOFF
PROVIDE 10,000 LITRE RAINWATER TANK
CONTAINER
EQUIPMENT AREA
CONSTRUCT HUMECEPTOR AT STC2 (INLET)
RCP
200mm HIGH KERB
CONCRETE DISH DRAIN TO DIRECT RAINWATER TANK OVERFLOW
NEW LOCATION FOR RAINWATER TANKS
FIRE PUMP ROOM AND FIRE WATER TANKS
OUTDOOR PROCESSING, STOCKPILING AND LOADING AREA FOR PROCESSED AND UNPROCESSED CONCRETE, BRICK, RUBBLE, ROCK, STEEL,SOIL, HARDFILL ETC
NEW 900x900 GRATED PIT
NEW Ø375 DIAMETER PIPE
DOWNPIPES TO BE CONTINUED TO LATERAL PIPE SUPPORTED ON SHED WALL AND RUNOFF DISCHARGED TO RAINWATER TANK 1-5
PICKSTATION CONVEYOR BAY WALLS AND SLAB
INDOOR PROCESSING AND STORAGE SHED
STOCKPILING AND LOADING AREA FOR PROCESSED AND UNPROCESSED SAND, SOIL, TIMBER AND GREEN WASTE
DISH ACCESS ROAD TO INTERCEPT RUNOFF AND DIRECT RUNOFF TO WATER QUALITY/RECYCLING POND
INDICATIVE PLANT SHOWN SHADED
CRUSHING PLANT INSIDE THE INDOOR PROCESSING AND STORAGE SHED
WASTE LAYDOWN
WASTE
HEAVY FEED
RESTRICTED STOCKPILE AREA
75mm MINIMUM PARTICLE SIZE
GREEN WASTE SHREDDING AREA
GREEN WASTE STOCKPILE TO BE COVERED BY TARPAULIN WHEN STOCKPILE IS TO BE IN PLACE LONGER THAN 21 DAYS.
DISH ROAD AND GRADE TO PITS
LOW POINT
LOW POINT IN ROAD GRADE TO FALL TO BASIN
RECYCLED WATER PUMP
CONSTRUCT HUMECEPTOR AT OUTLET TO WATER QUALITY POND STC3
DETENTION BASIN A
WATER QUALITY/ RECYCLING POND
GREEN WASTE SHREDDING RUNOFF POND
DISCHARGE SUBSOIL AND SURFACE TO POND
CONSTRUCT TABLE DRAIN. TABLE DRAINS TO BE DIRECTED TO WATER QUALITY/RECYCLING POND
EASEMENT FOR GAS PIPELINE 20 WIDE & VARIABLE
FUTURE ROAD
EXISTING ACCESS ROAD
PROPOSED ACCESS ROAD
WYLLIE ROAD
FUTURE STAGE
NOT PART OF THIS CC APPLICATION
ZONE LINE
PLAN
SCALE 1:500
N
Revision | Amendment or reason for issue | Issue date | Drawn by | Authorised
D | LABELS FIXED | 05.02.2019 | J.D. | W.M.
C | SITE LAYOUT AMENDED AS PER DEWCAPE | 09.10.2018 | J.D. | W.M.
B | ADDITIONAL WEIGHBRIDGE NOTATIONS ADDED | 31.03.2017 | C.R. | W.M.
A | WEIGHBRIDGE LOCATION AMENDED | 24.01.2016 | B.M. | W.M.
KFW INFRASTRUCTURE PROFESSIONALS
K.F. Williams & Associates Pty Ltd
28 Auburn Street
Wollongong NSW 2500
A.C.N 008 664 417
Project Management, Surveying, Civil, Structural, Water & Sewer
p (02) 4228 7044
f (02) 4226 2004
e mail@kfw.net.au
www.kfw.net.au
Surveyor DENNIS SMITH
Date of Survey
Height Datum AHD
Origin
Horiz. Datum
Date MAY 2016
Drawn B MIDDLETON
Designed W MULLANY
Checked
Approved
Drawing Title
PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878167
WYLLIE ROAD, KEMBLA GRANGE
RAINWATER HARVESTING PLAN
Scale 1:500 @ A1 1:1000 @ A3
Drawing Status ISSUED FOR SSD5300 MOD2 CC
Project No. KF110816
Drawing No. C311
Sheet 12 Of 20
Revision D

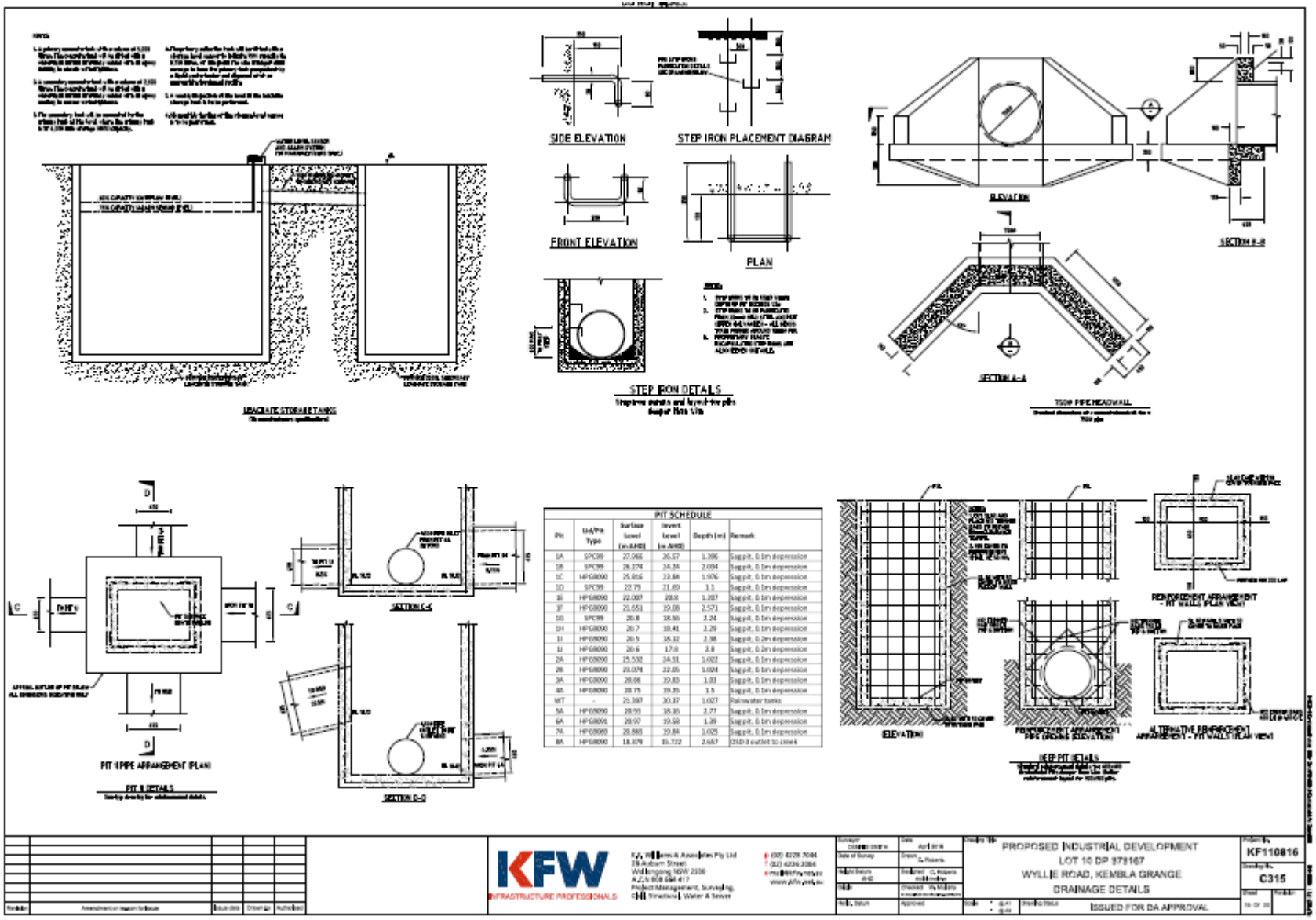


Catchment	Area (m²)	Area (ha)	Non-Impervious (m²)	Impervious (m²)	Impervious %
1A	1774.0	0.1774	1774.0	0.0	0%
1B	3077.0	0.3077	0.0	2615.5	85%
1C	4272.0	0.4272	675.0	3057.5	72%
1D	0.0	0.0000	0.0	0.0	0%
1E	3999.5	0.4000	0.0	3399.6	85%
1F	106.0	0.0106	0.0	90.1	85%
1G	1958.0	0.1958	470.1	1487.9	76%
1H	182.0	0.0182	0.0	154.7	85%
1I	2210.0	0.2210	200.0	1708.5	77%
1J	830.0	0.0830	0.0	705.5	85%
2A	997.0	0.0997	204.0	793.0	80%
2B	910.0	0.0910	225.0	685.0	75%
3A	2065.0	0.2065	340.0	1725.0	84%
4A	5313.0	0.5313	0.0	4516.1	85%
ROOF	1500.0	0.1500	0.0	1500.0	100%
5A	3691.6	0.3692	0.0	3137.9	85%
6A	1223.0	0.1223	570.0	555.1	45%
7A	1197.0	0.1197	0.0	1077.3	90%
8A	736.0	0.0736	736.0	0.0	0%
POND 1	988.8	0.0989	838.8	150.0	15%
POND 2	1872.9	0.1873	1602.9	270.0	14%
OSD	1633.3	0.1633	1443.3	190.0	12%
TOTAL	40536.1	4.054	9079.1	27818.4	
				AVERAGE	68.6%

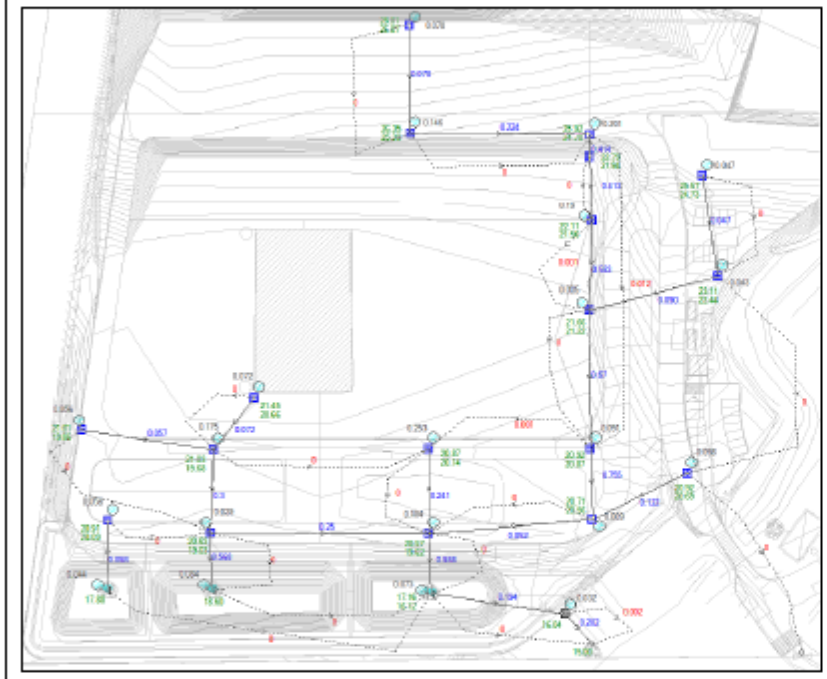
Revision	Amendment or reason for issue	Issue date	Drawn by	Authorised
D	LABELS FIXED	05.02.2019	J.D.	W.M.
C	SITE LAYOUT AMENDED AS PER DEWCAPE	09.10.2018	J.D.	W.M.
B	ADDITIONAL WEIGHBRIDGE NOTATIONS ADDED	31.03.2017	C.R.	W.M.
A	WEIGHBRIDGE LOCATION AMENDED	24.01.2017	B.M	W.M.

Surveyor	DENNIS SMITH
Date of Survey	
Height Datum	AHD
Origin	
Horiz. Datum	
Date	April 2016
Drawn	C. Roberts
Designed	C. Roberts
Checked	W. Mullarky
Approved	
Scale	1:500@A1 1:1000@A3
Drawing Status	ISSUED FOR SSD5300 MOD2 CC
Sheet	13 Of 20
Revision	D

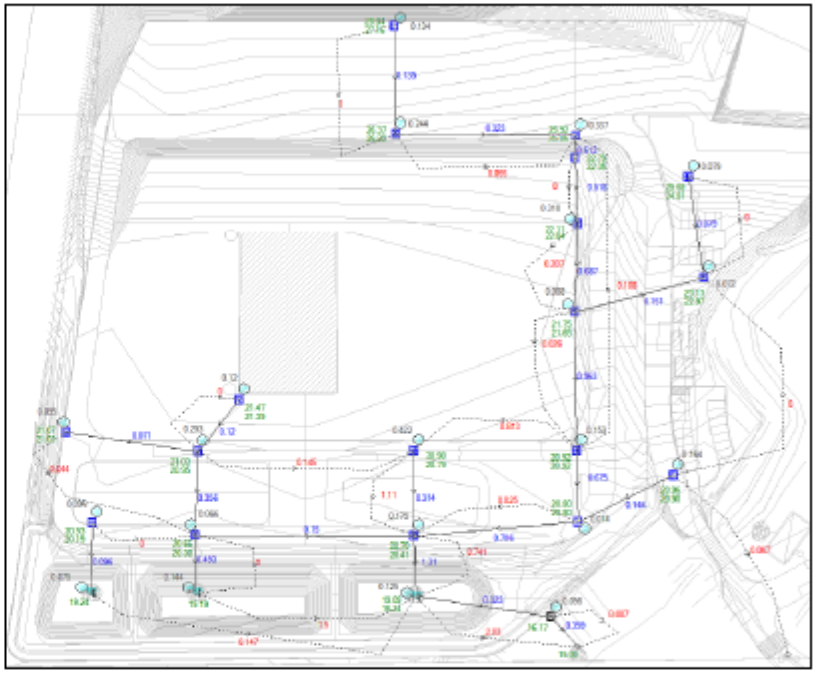

DO NOT SCALE
LEGEND
DENOTES EXISTING CONTOURS
DENOTES PROPOSED SURFACE LEVELS
DENOTES STORMWATER SURFACE FLOW/DIRECTION OF V DRAINS
DENOTES HUMECEPTOR
DENOTES STORMWATER PITS AND PIPES WITH DIRECTION OF FLOW
DENOTES SUBSOIL DRAINAGE
RAINWATER HARVESTING TANK DETAILS
TANK | LOCATION | VOLUME (m³)
1 | INDOOR SHED | 100
2 | INDOOR SHED | 100
3 | WORKSHOP | 100
4 | EQUIPMENT AREA | 10
5 | INDOOR SHED | 46.5
6 | INDOOR SHED | 46.5
7 | INDOOR SHED | 46.5
8 | INDOOR SHED | 46.5
9 | INDOOR SHED | 14
TOTAL | 510
SURFACE RUNOFF HARVESTING
POND A 3428 m³
TOTAL RAINWATER HARVEST
POND A + TANKS 3938 m³
RESUSE RAINWATER TANK
NTS
TYP. PIT GROUND BATTER - HPG9090D
NTS
TYP. PIT GROUND BATTER - SPG99
NTS
EASEMENT FOR TRANSMISSION LINE 45.72 WIDE
CONSTRUCT DIVERSION CATCH DRAIN AT TOP OF BATTER. DIVERSION DRAIN CAPACITY TO BE 1.5m³/s REFER TO SHEET C306 FOR DETAILS
STAGE 1
ZONE LINE
DIRECT DIVERSION DRAIN TO WATER COURSE
PROVIDE SUBSOIL DRAIN AT TOE OF BATTER.
VEHICLE TURNING/BACKING AREA
SKIP BIN STORAGE AREA
CONSTRUCT TABLE DRAIN AT TOE OF BATTER. TABLE DRAINS TO BE DIRECTED TO WATER QUALITY/RECYCLING POND
BUND AROUND HIGH SIDE OF EQUIP. AREA TO DIVERT RUNOFF
BATTER DOWN AROUND PITS AT 1:6 GRADE AS PER TYP. DETAIL. 450ø RCP.
EQUIPMENT AREA
PROVIDE 10,000 LITRE RAINWATER TANK
CONSTRUCT HUMECEPTOR STC2 (INLET)
200mm HIGH KERB
CONCRETE DISH DRAIN TO DIRECT RAINWATER TANK OVERFLOW
NEW LOCATION FOR RAINWATER TANKS
FIRE PUMP ROOM AND FIRE WATER TANKS
NEW 900x900 GRATED PIT
DOWNPIPES TO BE CONTINUED TO LATERAL PIPE SUPPORTED ON SHED WALL AND RUNOFF DISCHARGED TO RAINWATER TANK 1-5
PICKSTATION, CONVEYOR BAY WALLS AND SLAB
DISH ACCESS ROAD TO INTERCEPT RUNOFF AND DIRECT RUNOFF TO WATER QUALITY/RECYCLING POND
INDICATIVE PLANT SHOWN SHADED
NEW Ø375 DIAMETER PIPE
CRUSHING PLANT INSIDE THE INDOOR PROCESSING AND STORAGE SHED
REFER SHEET C315 FOR LEACHATE TANK DETAILS
WASTE
HEAVY FEED
WASTE LOADOUT
EASEMENT FOR GAS PIPELINE 20 WIDE & VARIABLE
CONSTRUCT TABLE DRAIN. TABLE DRAINS TO BE DIRECTED TO WATER QUALITY/RECYCLING POND
GREEN WASTE SHREDDING AREA
DISH ROAD AND GRADE TO PITS
LOW POINT
LOW POINT IN ROAD GRADE TO FALL TO BASIN
RECYCLED WATER PUMP
CONSTRUCT HUMECEPTOR STC3 AT OUTLET TO WATER QUALITY POND
GREEN WASTE SHREDDING RUNOFF POND
DISCHARGE SUBSOIL AND SURFACE TO POND
WATER QUALITY/ RECYCLING POND
DETENTION BASIN A
EXISTING ACCESS ROAD
PROPOSED ACCESS ROAD
STORMWATER DRAINAGE PLAN
SCALE 1:500
KFW
INFRASTRUCTURE PROFESSIONALS
K.F. Williams & Associates Pty Ltd
28 Auburn Street
Wollongong NSW 2500
A.C.N 008 664 417
Project Management, Surveying, Civil, Structural, Water & Sewer
p (02) 4228 7044
f (02) 4226 2004
e mail@kfw.net.au
www.kfw.net.au
Surveyor DENNIS SMITH
Date of Survey
Height Datum AHD
Origin
Horiz. Datum
Date April 2016
Drawn C. Roberts
Designed C. Roberts
Checked W. Mullany
Approved
Drawing Title
PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878167
WYLLIE ROAD, KEMBLA GRANGE
STORMWATER DRAINAGE PLAN
Scale 1:500@A1 1:1000@A3
Drawing Status ISSUED FOR SSD5300 MOD2 CC
Project No. KF110816
Drawing No. C313
Sheet 14 Of 20
Revision D
D LABELS FIXED 05.02.2019 J.D. W.M
C SITE LAYOUT AMENDED AS PER DEWCAPE 09.10.2018 J.D. W.M
B ADDITIONAL WEIGHBRIDGE NOTATIONS ADDED 31.03.2017 C.R. W.M
A WEIGHBRIDGE LOCATION AMENDED 24.04.2017 B.M W.M
Revision | Amendment or reason for issue | Issue date | Drawn by | Authorised



Pit	Unit/Pit Type	Surface Level (m AHD)	Invert Level (m AHD)	Depth (m)	Remark
1A	SPC99	27.966	26.57	1.396	Sag pit, 0.1m depression
1B	SPC99	26.374	24.34	2.034	Sag pit, 0.1m depression
1C	HPG8000	25.856	23.84	1.976	Sag pit, 0.1m depression
1D	SPC99	22.79	21.69	1.1	Sag pit, 0.1m depression
1E	HPG8000	22.087	20.8	1.287	Sag pit, 0.1m depression
1F	HPG8000	21.651	19.08	2.571	Sag pit, 0.1m depression
1G	SPC99	20.8	18.96	1.24	Sag pit, 0.1m depression
1H	HPG8000	20.7	18.41	2.29	Sag pit, 0.1m depression
1I	HPG8000	20.5	18.12	2.38	Sag pit, 0.2m depression
1J	HPG8000	20.6	17.9	2.8	Sag pit, 0.1m depression
2A	HPG8000	25.532	24.51	1.022	Sag pit, 0.1m depression
2B	HPG8000	26.074	22.05	1.024	Sag pit, 0.1m depression
3A	HPG8000	26.06	19.83	1.03	Sag pit, 0.1m depression
4A	HPG8000	20.75	19.25	1.5	Sag pit, 0.1m depression
WT		21.367	20.37	1.027	Rainwater tanks
5A	HPG8000	28.93	25.16	3.77	Sag pit, 0.1m depression
6A	HPG8000	28.97	26.98	1.99	Sag pit, 0.1m depression
7A	HPG8000	28.985	23.84	1.025	Sag pit, 0.1m depression
8A	HPG8000	18.378	15.722	2.657	DSD 3 outlet to creek



DRAINS DATA, POST DEVELOPMENT
5 YEAR ARI

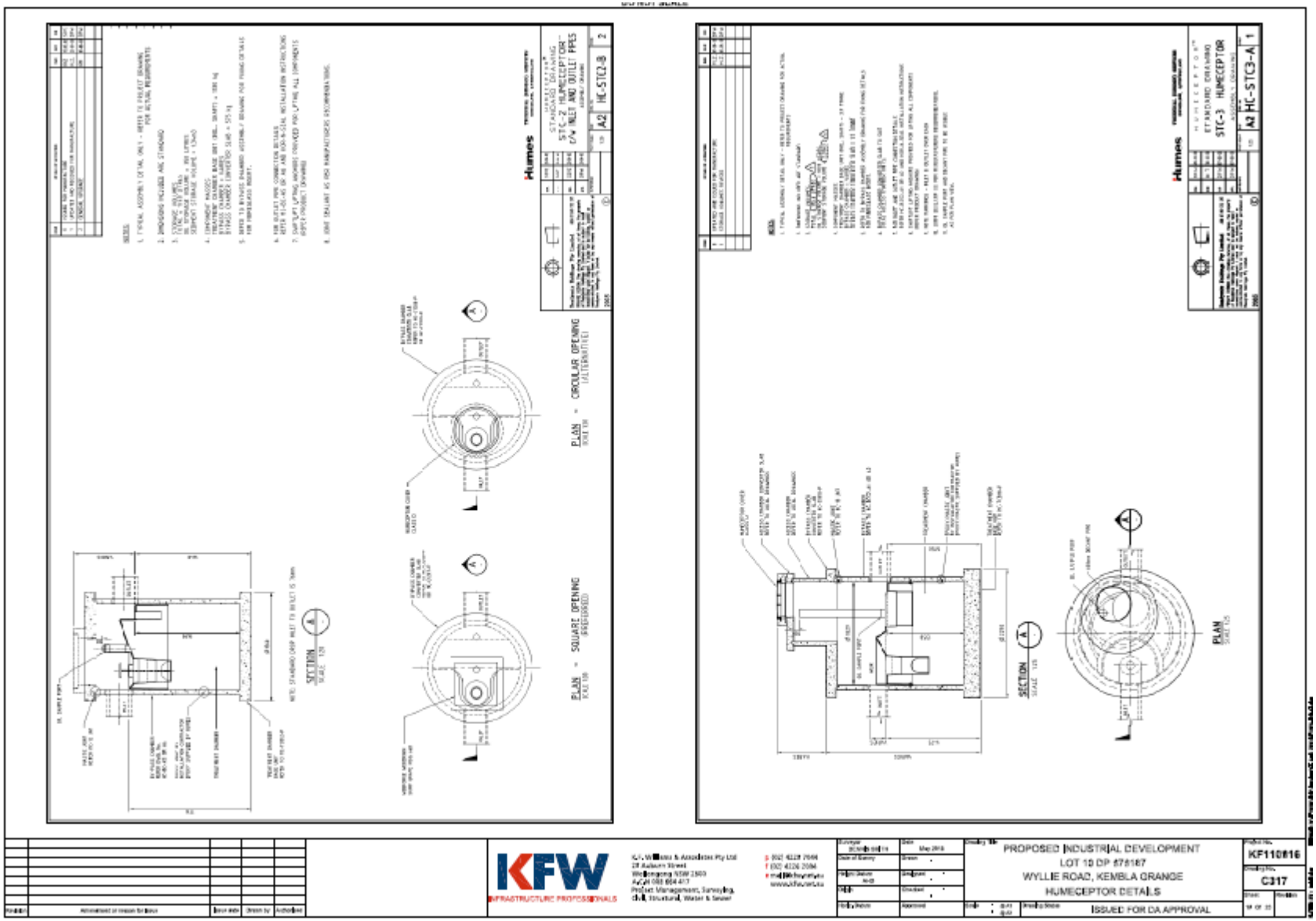


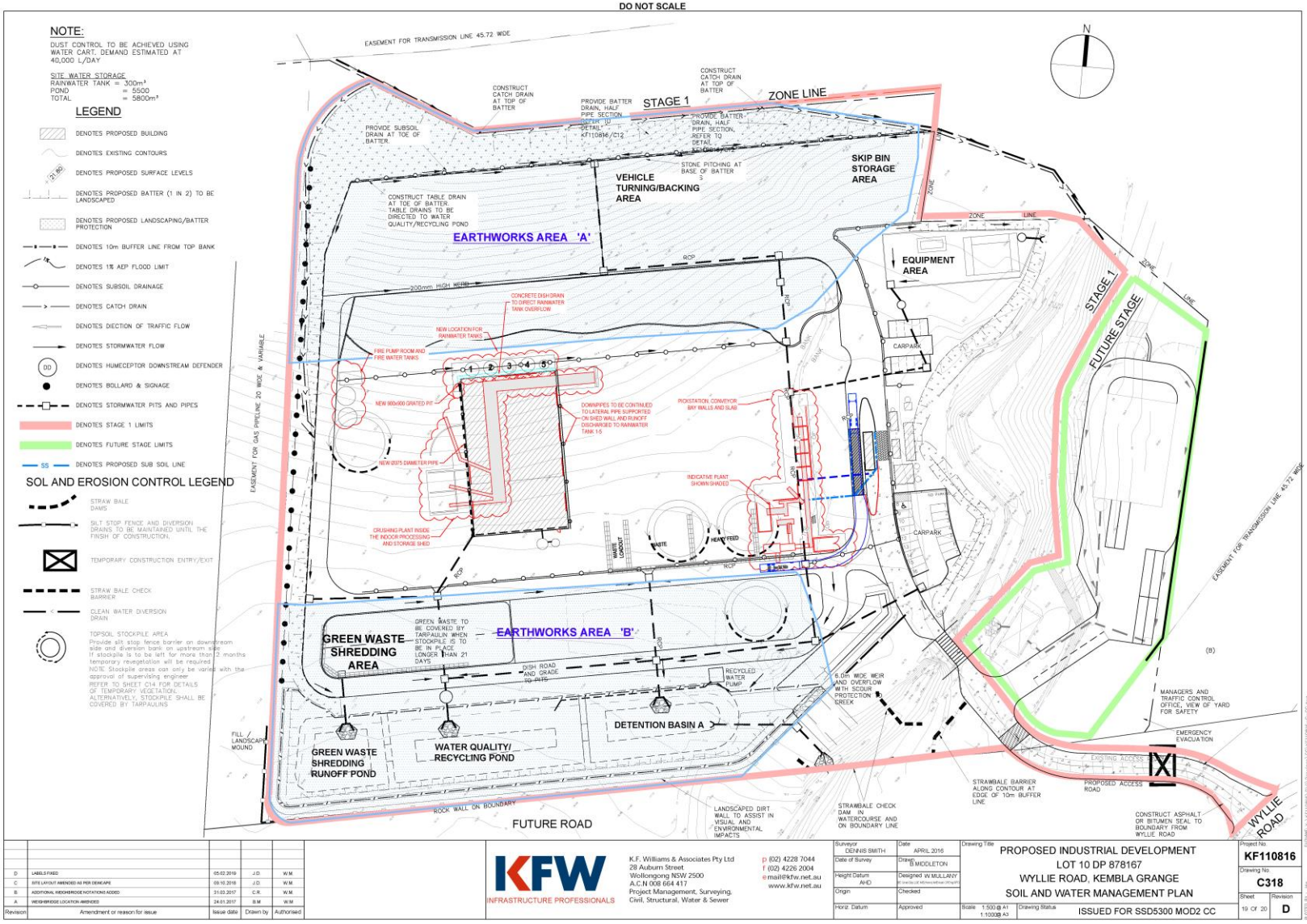
DRAINS DATA, POST DEVELOPMENT
100 YEAR ARI

KFW
INFRASTRUCTURE PROFESSIONALS

PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 979167
WYLLIE ROAD, KEMBLA GRANGE
DRAINS DATA
ISSUED FOR DA APPROVAL

KF110816
C316


PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 876187
WYLLIE ROAD, KEMBLA GRANGE
HUMECEPTOR DETAILS
ISSUED FOR DA APPROVAL
KF110816
C317
PLAN - CIRCULAR OPENING
PLAN - SQUARE OPENING
SECTION
PLAN


DO NOT SCALE
NOTE:
DUST CONTROL TO BE ACHIEVED USING WATER CART. DEMAND ESTIMATED AT 40,000 L/DAY
SITE WATER STORAGE
RAINWATER TANK = 300m³
POND = 5500
TOTAL = 5800m³
LEGEND
SOIL AND EROSION CONTROL LEGEND
EASEMENT FOR TRANSMISSION LINE 45.72 WIDE
STAGE 1
ZONE LINE
FUTURE STAGE
SKIP BIN STORAGE AREA
VEHICLE TURNING/BACKING AREA
EQUIPMENT AREA
CARPARK
EARTHWORKS AREA 'A'
EARTHWORKS AREA 'B'
GREEN WASTE SHREDDING AREA
GREEN WASTE SHREDDING RUNOFF POND
WATER QUALITY/ RECYCLING POND
DETENTION BASIN A
FUTURE ROAD
WYLLIE ROAD
EASEMENT FOR GAS PIPELINE 20 WIDE & VARIABLE
MANAGERS AND TRAFFIC CONTROL OFFICE, VIEW OF YARD FOR SAFETY
EMERGENCY EVACUATION
PROPOSED ACCESS
EXISTING ACCESS
KFW
INFRASTRUCTURE PROFESSIONALS
K.F. Williams & Associates Pty Ltd
28 Auburn Street
Wollongong NSW 2500
A.C.N 008 664 417
Project Management, Surveying, Civil, Structural, Water & Sewer
p (02) 4228 7044
f (02) 4226 2004
email@kfw.net.au
www.kfw.net.au
PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878167
WYLLIE ROAD, KEMBLA GRANGE
SOIL AND WATER MANAGEMENT PLAN
ISSUED FOR SSD5300 MOD2 CC
Project No. KF110816
Drawing No. C318
Sheet 19 Of 20
Revision D

SEQUENCE OF OPERATIONS

STATEMENT OF SOIL MANAGEMENT

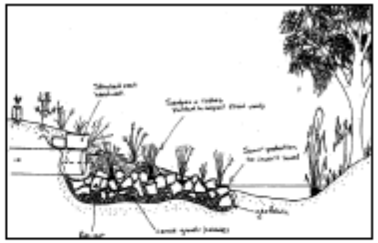
MAINTENANCE PROCEDURES DURING CONSTRUCTION

SITE MANAGEMENT DETAILS

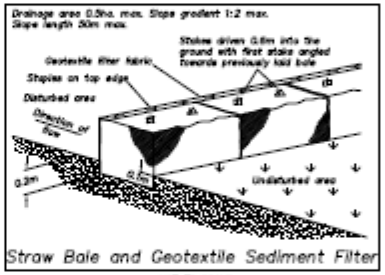
MATERIAL STORAGE VOLUMES

Material	Volume Stored on Site (litre)	Method of Storage	Spill Tray Volume (litre)	Spill Tray Type	Comments
Petrol	20	20 Litre Drum	22	Steel Tray	Transtank T 20 55
Diesel	9,000	On site tank bulk tank	9,900	Steel Tray	Transtank T 20 55
Lubricants	1,000	5 x 200 litre drum	500	Steel Tray	Transtank T 20 55
Solvents	100	5 x 20 litre drum	25	Steel Tray	Transtank T 20 55
Liquid Waste	0	N/A	N/A	N/A	N/A
	10120				

Notes:
Oils, Fuel and Solvents will be stored in a Transtank T 20 55

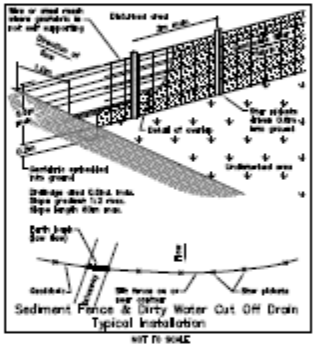


SCOUR PROTECTION HEADWALL



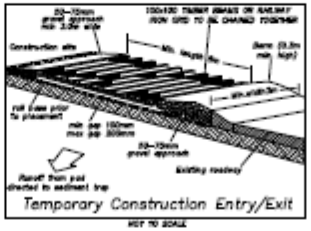
Straw Bale and Geotextile Sediment Filter

NOT TO SCALE



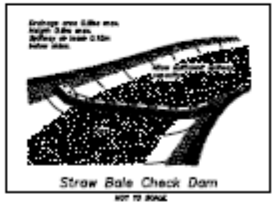
Sediment Fence & Dirty Water Cut Off Drain
Typical Installation

NOT TO SCALE



Temporary Construction Entry/Exit

NOT TO SCALE



Straw Bale Check Dam

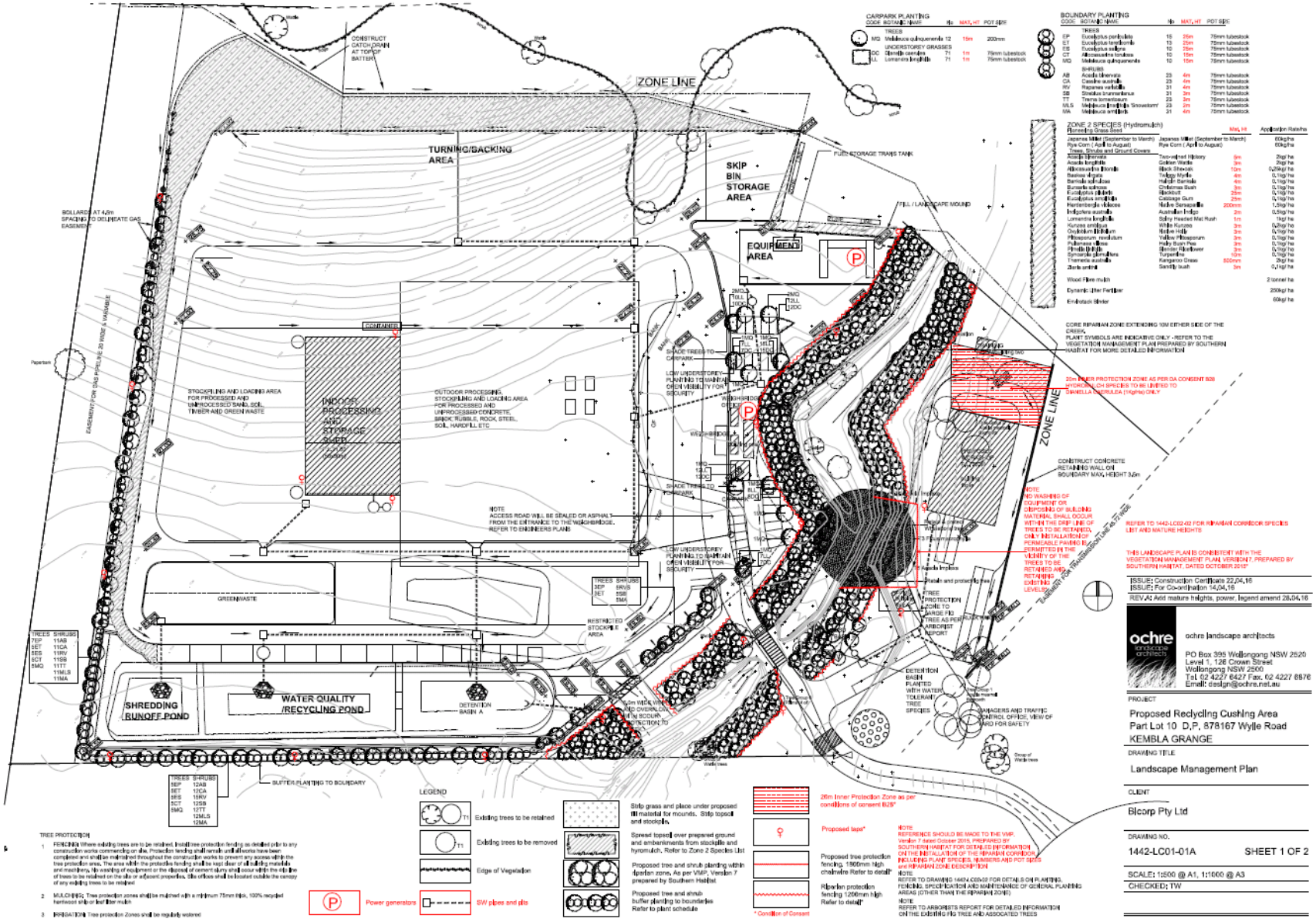
NOT TO SCALE

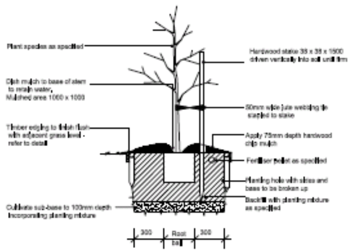
KFW INFRASTRUCTURE PROFESSIONALS

PROPOSED INDUSTRIAL DEVELOPMENT
LOT 10 DP 878187
WYLLIE ROAD, KEMBLA GRANGE
SOIL AND WATER MANAGEMENT DETAILS
ISSUED FOR CC APPROVAL

KF110816
C319

APPENDIX B LANDSCAPE MANAGEMENT PLAN


ZONE LINE
TURNING/BACKING AREA
SKIP BIN STORAGE AREA
EQUIPMENT AREA
INDOOR PROCESSING AND STORAGE SHED
WATER QUALITY /RECYCLING POND
SHREDDING RUNOFF POND
DETENTION BASIN A
CONSTRUCT CATCH DRAIN AT TOP OF BATTER
BOLLARDS AT 4.2m SPACING TO DELINEATE GAS EASEMENT
STOCKPILING AND LOADING AREA FOR PROCESSED AND UNPROCESSED SAND, SOIL, TIMBER AND GREEN WASTE
OUTDOOR PROCESSING STOCKPILING AND LOADING AREA FOR PROCESSED AND UNPROCESSED CONCRETE, BRICK RUBBLE, ROCK, STEEL, SOIL, HARDFILL ETC
NOTE ACCESS ROAD WILL BE SEALED OR ASPHALT FROM THE ENTRANCE TO THE WEIGHBRIDGE. REFER TO ENGINEERS PLANS
GREENWASTE
BUFFER PLANTING TO BOUNDARY
FUEL STORAGE TRAILS TANK
FILL / LANDSCAPE MOUND
CONSTRUCT CONCRETE RETAINING WALL ON BOUNDARY MAX. HEIGHT 3.2m
CORE RIPARIAN ZONE EXTENDING 10M EITHER SIDE OF THE CREEK.
PLANT SYMBOLS ARE INDICATIVE ONLY - REFER TO THE VEGETATION MANAGEMENT PLAN PREPARED BY SOUTHERN HABITAT FOR MORE DETAILED INFORMATION
20m RIPER PROTECTION ZONE AS PER DA CONSENT 828
HYDROCLOCH SPECIES TO BE LIMITED TO DIANELLA CAERULEA (10g/Ha) ONLY
NOTE NO WARNING OF EQUIPMENT OR DISPOSING OF BUILDING MATERIAL SHALL OCCUR WITHIN THE DRIP LINE OF TREES TO BE RETAINED, ONLY INSTALLATION OF PERMEABLE PAVING IS PERMITTED IN THE VICINITY OF THE TREES TO BE RETAINED AND RETAINING EXISTING LEVELS
REFER TO 1442-LC02-02 FOR RIPARIAN CORRIDOR SPECIES LIST AND MATURE HEIGHTS
THIS LANDSCAPE PLAN IS CONSISTENT WITH THE VEGETATION MANAGEMENT PLAN, VERSION 7, PREPARED BY SOUTHERN HABITAT, DATED OCTOBER 2015*
ISSUE: Construction Certificate 22.04.16
ISSUE: For Co-ordination 14.04.16
REV.A: Add mature heights, power, legend amend 28.04.16
ochre landscape architects
PO Box 395 Wollongong NSW 2520
Level 1, 126 Crown Street
Wollongong NSW 2500
Tel: 02 4227 6427 Fax: 02 4227 8876
Email: design@ochre.net.au
PROJECT
Proposed Recycling Cushing Area
Part Lot 10 D.P. 878167 Wylie Road
KEMBLA GRANGE
DRAWING TITLE
Landscape Management Plan
CLIENT
Bicorp Pty Ltd
DRAWING NO.
1442-LC01-01A
SHEET 1 OF 2
SCALE: 1:500 @ A1, 1:1000 @ A3
CHECKED: TW
LEGEND
Existing trees to be retained
Existing trees to be removed
Edge of Vegetation
Power generators
SW pipes and pits
Proposed tree protection fencing, 1800mm high chainwire Refer to detail*
Riparian protection fencing 1200mm high Refer to detail*
26m Inner Protection Zone as per conditions of consent 825*
Proposed tree and shrub buffer planting to boundaries Refer to plant schedule
* Condition of Consent
TREE PROTECTION
1 FENCING: Where existing trees are to be retained, install tree protection fencing as detailed prior to any construction works commencing on site. Protection fencing shall remain until all works have been completed and shall be maintained throughout the construction works to prevent any access within the tree protection areas. The area within the protective fencing shall be kept clear of all building materials and machinery. No washing of equipment or the disposal of cement slurry shall occur within the drip line of trees to be retained on the site or adjacent properties. Site offices shall be located outside the canopy of any existing trees to be retained
2 MULCHING: Tree protection zones shall be mulched with a minimum 75mm thick, 100% recycled hardwood chip or leaf litter mulch
3 IRRIGATION: Tree protection Zones shall be regularly watered



NOTES:

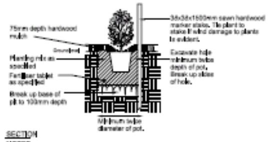
1. The tree pit should be excavated to allow adequate clearance between the perimeter of the ball and the side of the pit.
2. The depth of the pit should be a minimum of 700mm and at least 150mm greater than the depth of the root-ball.
3. Fork the bottom and sides of the pit to break up the subsoil.
4. Drive in the stakes so that they are a minimum of 300mm below the bottom of the pit and 650mm above ground level. The stakes are to be hardwood poles, pointed at one end, preserved to resist rot for their intended lifespan, and strong enough to take nails without splitting.
5. Plant the tree, ensuring that the original depth is maintained and the soil is carefully firmed back up to the existing ground level.
6. Secure the tie to the stakes with 2 x 30mm galvanised staples per stake.
7. Spread 75mm depth of mulch over an area of 1000mm diameter around the tree, and maintain it.
8. The stakes are to be removed as soon as the tree is anchored securely by its own roots - normally at the start of the second growing season after planting.
9. Water tree thoroughly prior to removing from container and immediately following planting.

The above detail is to also apply to general tree planting in garden beds without the timber edge either side of the tree.

DETAIL 01: Tree Planting In Grass

TREE PROTECTION

1. FENCING: Where existing trees are to be retained, install tree protection fencing as detailed prior to any construction works commencing on site. Protection fencing shall remain until all works have been completed and shall be maintained throughout the construction works to prevent any access within the tree protection area. The area within the protective fencing shall be kept clear of all building materials and machinery. No washing of equipment or the disposal of cement slurry shall occur within the drip line of trees to be retained on the site or adjacent properties. Site offices shall be located outside the canopy of any existing trees to be retained
2. MULCHING: Tree protection zones shall be mulched with a minimum 75mm thick, 100% recycled hardwood chip or leaf litter mulch
3. IRRIGATION: Tree protection Zones shall be regularly watered

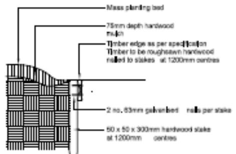


SECTION

NOTES:

1. Dig pit 100mm deeper & 200mm wider than growtube for 150mm pot
   Dig pit 150mm deeper & 300mm wider than container for 200mm pot
   Dig pit 200mm deeper & 300mm wider than container for 15litre container
   Break up the soil in the base of the hole to 100mm depth
2. Prepare the plants a) prune back damaged roots to healthy growth; b) ensure plant is well watered prior to planting;
3. Plant in prepared pit checking that the soil mark on the stems is at ground level.
4. Backfill the pit to half its depth and firm by treading. Continue planting the pit.
5. Once planted, backfill with the remaining soil and firm as before.
6. EITHER Topdress the planting area with a 75mm depth x 500mm diameter of hardwood chip mulch when planting in grass. Do not allow mulch to touch stem.
   OR Topdress the planting area with 75mm depth of hardwood chip mulch in mass planting beds. Do not allow mulch to touch stem.

DETAIL 02: Shrub Planting Detail



SECTION : TIMBER EDGING

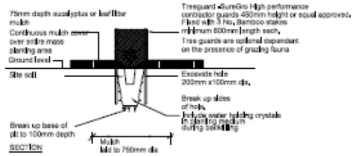
NOTES:

1. Timber edge shall be 100mm x 38mm sawn hardwood strips and of minimum 3000mm lengths.
2. Timber edge to be fixed with 2 no. nails per fixing to each 50x50x300mm hardwood stakes at 1200mm centres.
3. Stakes to be on inside of planting bed.
4. Top edge of timber edge to be flush with finished level of adjacent grass.

DETAIL 03: Timber edge

Species type	Species	Common Name	QTY	Contribution within Species Type (%)	Height at Maturity
Ground Covers					
	Carex longebrachiata	Bergalia Tussock	1150	27.1%	n/a
	Commelina cyanea	-	800	18.8%	n/a
	Dichondra repens	Kidney Weed	800	18.8%	n/a
	Oplismenus imbecillis	Basket Grass	1150	27.1%	n/a
	Pseuderanthemum variabile	Pastel Flower	350	8.2%	n/a
		Sub-total	4250	100%	
Vine and Climbers					
	Aphanopetalum resinosum	Gum Vine	150	20%	n/a
	Cayratia clematidea	Slender Grape	150	20%	n/a
	Maclura cochinchinensis	Cockspur Thorn	150	20%	n/a
	Pandorea pandorana	Wonga Vine	150	20%	n/a
	Smilax australis	-	150	20%	n/a
		Sub-total	750	100%	
Shrubs/Mid Canopy					
	Abutilon oxycarpum	Lantern Bush	80	11.27%	2m
	Breynia oblongifolia	Coffee Bush	60	8.45%	2.5m
	Cassine australis	Red Fruited Olive	40	5.63%	3.5m
	Livistona australis	Cabbage Palm	100	14.08%	8m
	Pittosporum multiflorum	Orange Thorn	40	5.63%	1.5m
	Rapanea variabilis	Muttonwood	60	8.45%	3m
	Rubus parvifolius	Native Raspberry	120	16.90%	1m
	Streblus brunonianus	Whalebone	90	12.68%	3m
	Synoum glandulosum	Rosewood	60	8.45%	4m
	Trema tomentosa	Native Peach	60	8.45%	3.5m
		Sub-total	710	100.00%	
Canopy Tree					
	Acacia maidenii	Maiden's Wattle	60	8.63%	7m
	Alectryon subcinereus	Native Quince	60	8.63%	8m
	Alphitonia excelsa	Red Ash	60	8.63%	8m
	Doryphora sassafras	Sassafras	50	7.19%	15m
	Eucalyptus quadrangulata	White Box	120	17.27%	25m
	Ficus coronata	Sand paper Fig	40	5.76%	10m
	Ficus macrophylla	Moreton Bay Fig	5	0.72%	20m
	Glochidion ferdinandi	Cheese Tree	40	5.76%	15m
	Guioa semiglauca	Guioa	35	5.04%	12m
	Planchonella australis	Black Apple	60	8.63%	15m
	Syzygium smithii	Lillypilly	75	10.79%	10m
	Toona ciliata	Red Cedar	90	12.95%	25m
		Sub-total	695	100.00%	

EXTRACT FROM THE VMP VERSION 7



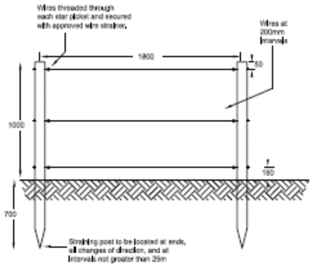
SECTION

NOTES:

Installation of the recommended species shall conform to the following guidelines:
o Planting of the subject area is to be undertaken by experienced bush regenerators with strict adherence to the approved VMP;
o Plants to be moist in pots prior to planting;
o Planting holes to be dug to depth of 200mm and diameter of 100mm;
o Water retaining granules (such as 'Deboo', 'Saturaid' or 'Terracottem') to be incorporated into soil prior to planting;
o After planting, the soil is to be gently firmed down, allowing for a slight depression around each plant for water collection;
o Plants are to be watered generously after installation;
o Plant guards and stakes installed to tree and shrub units to deter grazing deer and rabbits (refer section 3.12).
o Plants to receive additional watering until deemed to be successfully established.

Should it be deemed necessary for the survival and healthy establishment of plant material, plant protection shall be installed to reduce the impact of herbivory. The use of 'Sure-gro' High Performance Contractor Guards 450mmx900mm is recommended with 3x 12mm x750mm dia bamboo stakes.

DETAIL 04: Riparian Tubestock Planting Detail



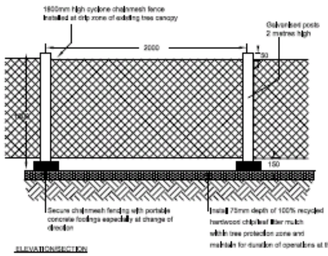
ELEVATION/SECTION

NOTES:

1. Posts are to be softwood treated with approved preservative 1800mm long
2. Wires are to be threaded through each star picket and secured with an approved wire strainer.
3. Straining posts at changes in direction.
4. Install fencing prior to the commencemnt of any construction works and maintain thoroughout the period of construction to prevent any access within the tree protection area.

CONDITION OF DEVELOPMENT CONSENT

DETAIL 05: Riparian Zone Protection Detail



ELEVATION/SECTION

NOTES:

1. Prior to the commencement of any work whatsoever, or any materials being brought on site, existing trees to be retained are to be protected from damage by fence as per detail (left). This shall be maintained in good and effective condition until the work is completed.
2. The protective fencing is to be located at the drip zone of the canopy.
3. The following measures are particularly important:
   a) Materials are never to be stacked within the root spread of the tree.
   b) No oil, tar, bitumen, cement or other materials is to be allowed to contaminate the ground within the root spread of the tree.
   c) No fires shall be lit beneath or in close proximity to the tree canopy.
   d) Trees to be retained should not be used as anchorages for equipment used for removing stumps, roots or other trees, or for other purposes.
   e) No notice boards, telephone cables, or other services should be attached to any part of the tree.
   f) Cement mixing should not be carried out within the canopy/protected area of the tree.
   g) Soil levels are to maintained as existing within the root spread of the tree. Any alteration to soil levels in an area up to one and a half times the diameter of the tree canopy must be agreed with the landscape architect.
   h) Mulch beneath the trees to be protected with 100% recycled wood chip/leaf litter mulch or approved equivalent to a depth of 75mm. Maintain for the operational life of the facility

CONDITION OF DEVELOPMENT CONSENT

Detail 06: Tree Protection Fencing

SPECIFICATION

1 GROUND PREPARATION: Eradicate grass and weeds using a non residual glyphosate herbicide at the recommended rate.
All mass planted beds shall be cultivated by ripping or harrowing. Do not rip within the dripline of trees and shrubs to be retained. If necessary, cultivate these areas by hand.
Remove stones exceeding 25mm and weeds, rubbish or other deleterious material.
Trim the surface to the required design levels after cultivation. Excessive clay content shall be ameliorated by incorporating gypsum at a rate of 0.25kg/square metre.

2 PLANTING MIXTURE shall be three parts by volume on-site topsoil and one part organic compost mixed to a homogenous blend prior to installation and spread to a minimum depth of 250mm. Test pH levels to ensure a reading of between 6 - 7. Higher or lower pH levels shall be adjusted in consultation with the project Landscape Architect.
Planting mix in raised planters shall be equal to Australian Native Landscapes or Sollco Planter mix.

3 Spread planting mixture or topsoil on the prepared subsoil and grade evenly. Ensure that finished levels are achieved after light compaction. Grass areas shall be finished flush with adjacent hard surfaces including paths, kerbs and mowing strips or garden edging.

4 Compact lightly in uniform 150mm layers and ensure final surface is graded to drain freely without ponding. Topsoil shall be spread to typical depths; 225mm for planting areas, 100mm for grass areas.

5 TURF shall be of an even thickness, free from weeds and other foreign matter and shall be layed within 36 hours of cutting. Lay turf in stretcher bond pattern to finish flush after tamping with adjacent finished surfaces. Water immediately after laying until the topsoil is moistened to full depth.

6 PLANTS shall have large healthy root systems with no root curl, restriction or damage. Plants shall be vigorous, well established, free from pests and disease, of good form, consistent with species. Plants will be hardened off and trees, unless required to be multi-stemmed, shall have a single leading shoot. Do not plant in extreme heat, cold, wind or rain. Thoroughly water plants before and immediately after planting.

7 FERTILISER shall be slow release type 'Agriform' (R) 21 gram size (or equal approved) pellets of NPK analysis 20:10:5.

8 MULCH shall be placed evenly to a consolidated depth of 75mm over all mass planted areas and shall be equal to hardwood chip or as otherwise specified. Place mulch clear of stems, rake surface flush with the surrounding finished levels.

9 STAKES shall be straight hardwood, free from knots or twists and pointed at one end. Drive stakes into the ground at least one third of their length, avoiding damage to the root system. Provide 50mm hessian webbing stapled to the stake to stabilise the plant. Refer to plant schedule for plants to be staked.

MAINTENANCE

1 Watering sufficient to maintain continuous vigorous growth of plant material.
2 Remove all weeds and make good mulch in garden beds as necessary.
3 Spray to control pests and diseases with non residual chemical.
4 Replace plants which fail to establish with plants of similar size and quality as the originals.
5 Adjust stakes and ties to plants as necessary. Ensure that strangulation of plants does not occur.
6 Prune and shape trees and plants as directed or where necessary to maintain shape.
7 Check once a week to ensure irrigation system is operating correctly (if installed).
8 Make good any defects or faults arising out of defective workmanship or materials.
9 Make good any erosion or soil subsidence which may occur.
10 Remove all rubbish from garden beds on a weekly basis.
11 Maintain 75mm depth mulch layer in planting areas. Replace mulch as necessary with the same materials to maintain 75mm depth over the soil surface.
12 Maintain works for the operational life of the facility*

* Condition of development consent

ISSUE: Amended Construction Certificate 28.04.16
ISSUE: Construction Certificate 22.04.16
ISSUE: For Co-ordination 14.04.16
REV.A: Add riparian species and heights 28.04.16

ochre landscape architects
PO Box 395 Wollongong NSW 2520
Level 1, 128 Crown Street
Wollongong NSW 2500
Tel. 02 4227 6427 Fax. 02 4227 6876
Email: design@ochre.net.au

PROJECT
Proposed Recycling Cushing Area
Part Lot 10 D.P. 878167 Wylie Road
KEMBLA GRANGE

DRAWING TITLE
Landscape Details

CLIENT
Bicorp Pty Ltd

DRAWING NO.
1442-LC02-02A SHEET 2 OF 2

SCALE: 1:100 @ A1, 1:200 @ A3

CHECKED: TW

DATE. 14.04.16