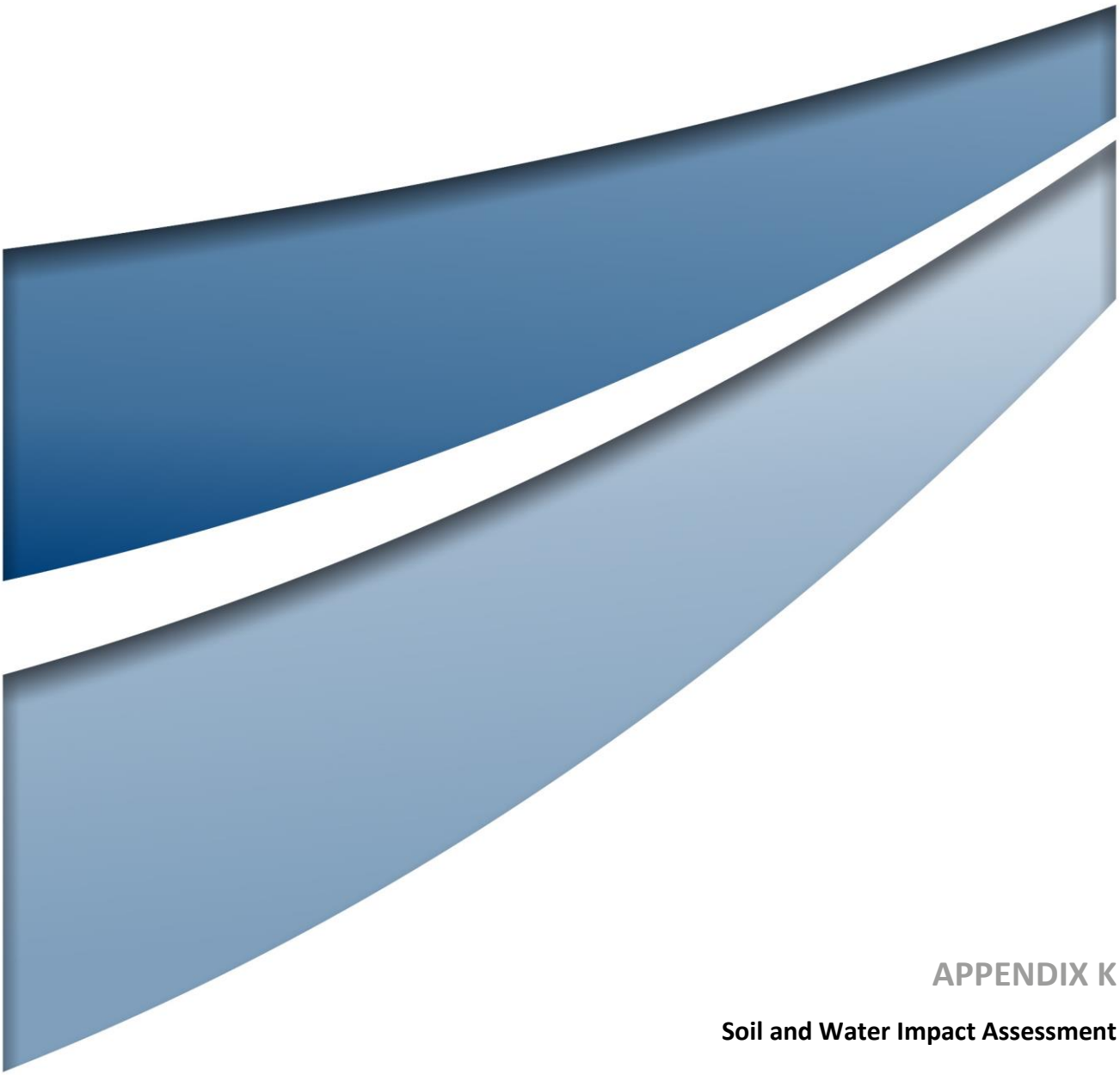
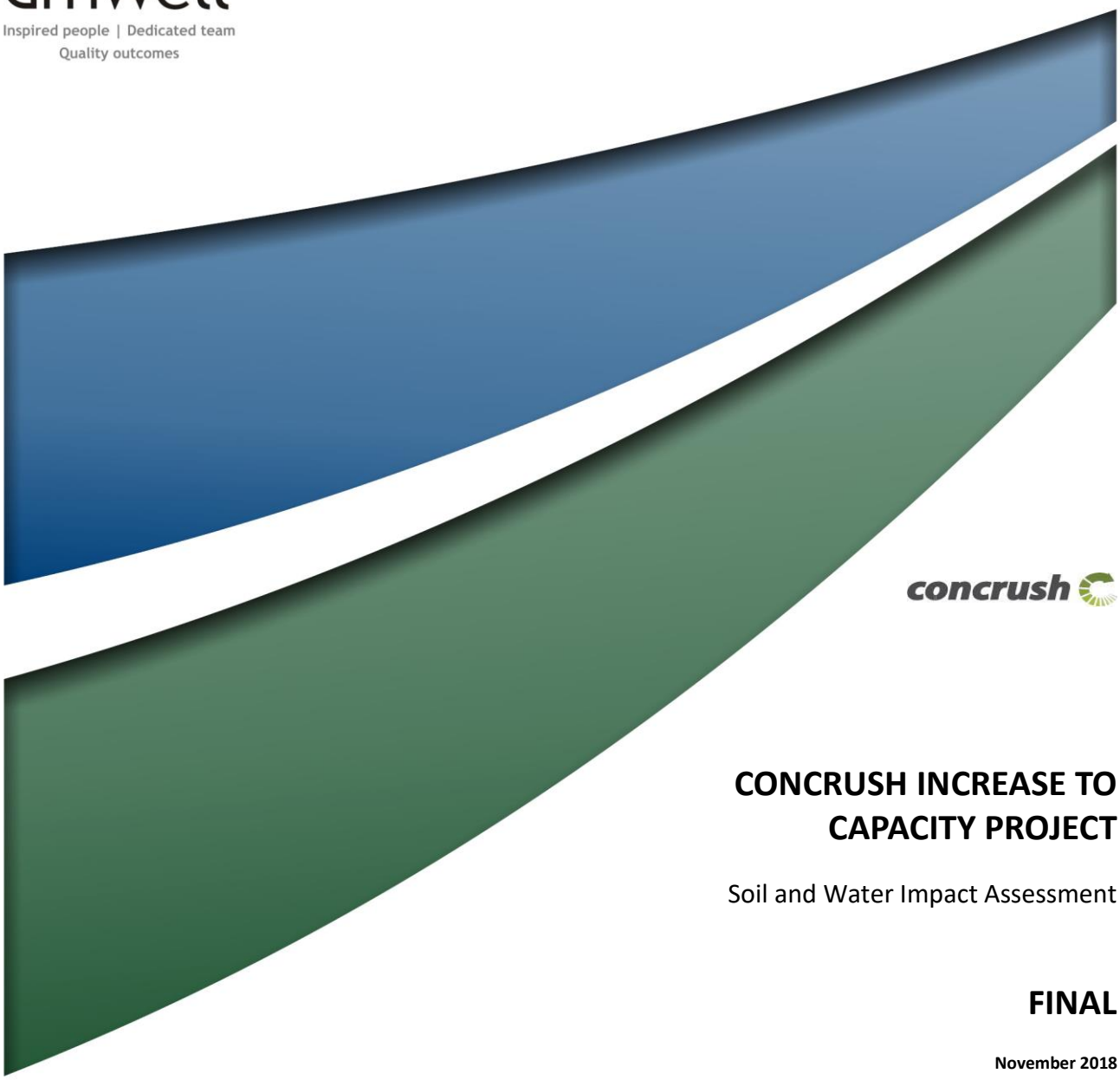


APPENDIX K

Soil and Water Impact Assessment

umwelt

Inspired people | Dedicated team
Quality outcomes



concrush

CONCRUSH INCREASE TO CAPACITY PROJECT

Soil and Water Impact Assessment

FINAL

November 2018

CONCRUSH INCREASE TO CAPACITY PROJECT

Soil and Water Impact Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Concrush Pty Ltd

Project Director:	Tim Browne
Project Manager:	Lachlan Sweeney
Technical Director:	Saul Martinez
Technical Manager:	Chris Bonomini
Report No.	3972/R05
Date:	November 2018

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

www.umwelt.com.au

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	**Date**	**Name**	**Date**
Final	Chris Bonomini	29 August 2018	Tim Browne	3 September 2018
Final_1	Chris Bonomini	08 November 2018	Tim Browne	08 November 2018

Table of Contents

Figures

Tables

Appendices

1.0 Introduction

Concrush Pty Ltd (Concrush) is seeking development consent to increase the processing and storage capacity of the existing resource recovery facility located on part of Lot 2 DP 220347 at 21 Racecourse Road, Teralba, New South Wales (NSW) (refer to **Figure 1.1**). The Concrush increase to capacity project (the Project) will involve alterations and additions to the existing facility in order to provide greater on-site storage capacity that is sufficient for the increased level of throughput.

The Project is a State Significant Development (SSD) and requires approval under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), for which the Minister for Planning is the consent authority.

This Soil and Water Impact Assessment (SWIA) has been prepared by Umwelt on behalf of Concrush to assess the potential impacts of the Project on soil and water resources. This SWIA has been prepared in accordance with the requirements of the Secretary of NSW Department of Planning and Environment (DPE) as detailed in **Section 1.4**.

1.1 The Proponent

The proponent for the Project is Concrush. Concrush was established in 2002 after recognising the need for a construction and demolition recycling facility in the Lake Macquarie region. Concrush is a locally owned and operated business based at Teralba.

The Concrush facility provides cost effective options for recycling of concrete, asphalt, bricks, pavers, roof tiles, wall and floor tiles, rock, sand, plasterboard and green waste for domestic households and commercial industry. These materials are then recycled into specification and non-specification quality products such as: roadbase, drainage aggregates, pipe bedding and haunch, packing fines, decorative aggregates and mulches. These products are used within the civil and construction industries or for commercial, domestic and household applications.

1.2 Description of Project

- Following strong demand for their recycling service, Concrush is seeking an increase to the processing and storage capacity of the existing facility. Concrush currently recycles approximately 108,000 tonne (t) of waste material per annum. Concrush is seeking approval for an increase in throughput capacity to up to 250,000 t of waste material recycled per annum (pa), including both construction and demolition waste and green waste. Concrush will require a waste storage capacity on-site that is sufficient for this level of throughput.

- The Project will be constructed over two stages to allow for the proposed Project elements to come online as required in line with increasing production.

A description of the individual elements of the proposed Project including additional plant and equipment are summarised below.

Table 1.1 Proposed Project Components

Component	Description
Hardstand areas	Hardstands will be constructed in material processing areas and stockpile areas (will require some site levelling). Hardstands will consist of 200 mm thick recycled roadbase). Internal access roads will have a two coat seal.
Material Processing Areas	Processing areas for the crushers and screens.

Component	Description
Waste and Product Stockpile Areas	Waste and product stockpiles will be established with a stockpile height of up to 10 metres (m). It is anticipated that up to 150,000 t of material will be stored onsite.
Upgrade of existing facilities	The existing weighbridge and office will be upgraded, and the existing lunch room and maintenance shed will be relocated to facilitate the new site layout.
Waste Tracking System	The existing Wasteman software will be used to track the details of all inbound and outbound loads
Production Compound	The relocated lunch room, toilet and maintenance shed will be grouped together to form a compound for production staff.
Retail Area	This area will be restricted to light vehicles and small trucks and will include an area for tipping and an area containing concrete bays of products for sale.
Storage Bays	Concrete storage bays will be constructed using 1 m^3 concrete blocks.
Concrete Walls	A two metre high concrete wall will be constructed close to the southern Project site boundary using 1 m^3 concrete blocks. The wall will prevent stockpiled material encroaching on swale drains and moving offsite. Concrete walls may also be used to delineate other areas of the site.
Green Waste Pasteurisation	An aeration system using four electronically driven and computer controlled fans to push air through movable perforated pipes underneath the pasteurisation piles will be implemented in the green waste area. This system allows more control of oxygen levels in the pasteurisation process compared to the tradition turnover process.
Wheel Wash	A vehicle wheel wash bay will be constructed immediately after the exit weighbridge to reduce tracking of material onto public roads.
Concrete Washout Bay	A wet concrete washout bay will be constructed consisting of a bunded, impermeable area with an isolated catchment. Wet concrete and agitator washout will be captured in the concrete washout bay.
Water Management System	The existing Water Management System (WMS) will be upgraded involving resizing of existing sediment basins, new sediment basins, swale drains and a leachate dam and artificial wetland to treat nutrient runoff. Water tanks and associated poly pipe and pumps will be installed to allow collection and re-use of stormwater for dust suppression.
Trommel Screening Machine	Addition of a Trommel screening machine for sorting of green waste.
Primary Jaw Crusher	The primary jaw crusher will be replaced on a like for like basis as part of future operations.
Perimeter Landscaping - Mounds, Fencing and Lighting	Landscape mounds will be established on the perimeter to limit visibility. 1.8 m high security fencing and security lighting are also to be installed.
Utilities	The existing Ausgrid connection is via a power pole in the north east corner of the site. The power supply will be extended to the south west corner of the site via an underground connection.
Pug mill	A pug mill may be installed in the future to allow fast mixing of materials to produce products such as road base.
Ballast wash facility	A processing area may be dedicated to a ballast wash facility to allow for processing of rail ballast.

1.3 Project Staging

It is anticipated that the volume of materials recycled and products sold will increase over a period of time up to the maximum production level of 250,000 tpa. To most efficiently meet the increase in demand for recycling of materials and Concrush products, it is proposed to stage the Project by undertaking some elements of the site upgrade early and implementing other elements of the Project as required when a certain production level is reached. Two Project stages and the associated approximate production level have been identified as follows:

- Stage 1 – upon receipt of all approvals required for the Project
- Stage 2 – at approximately 200,000 tpa up to 250,000 tpa.

The key components of the two Project stages are described below.

Stage 1

Stage 1 would be implemented once all approvals have been granted. The key elements of Stage 1 are:

- Construction of all hardstand areas (processing areas and waste and product stockpiles)
- Creation of the retail area
- Widen site access and install sliding gate
- Re-configuration of existing exit only weighbridge to allow for vehicle exit and entry to facilitate entry to the site
- Construct production compound by relocating maintenance shed and lunch room and toilet
- Augment the existing water management system to incorporate the leachate dam, constructed wetland, additional sediment basins, drainage swales, flood mitigation bund, water storage tanks and sprinkler systems
- Establish wheel wash, landscaping mounds, fencing, power line extension and lighting
- Two coat seal of internal access roads
- Replace primary jaw crusher.

Stage 2

Stage 2 would be implemented when production reaches approximately 200,000 tpa up to the Project limit of 250,000 tpa. The key elements of Stage 2 are:

- Relocation of the existing exit weighbridge, construction of a new entry weighbridge and establishment of the new weighbridge office
- The existing entry weighbridge becomes the retail area weighbridge and the existing weighbridge office becomes the retail area weighbridge office
- Construction of a new exit onto Racecourse Road from retail area for light vehicles (less than 2 t) only
- Establish pug mill
- Establish ballast wash facility
- Establish trommel screening machine for green waste
- Establish aeration system for green waste pasteurisation.

Image Source: Nearmap (May 2017)

0 0.25 0.5 1.0km

1:25 000

Legend

Project Site

FIGURE 1.1

Locality Plan

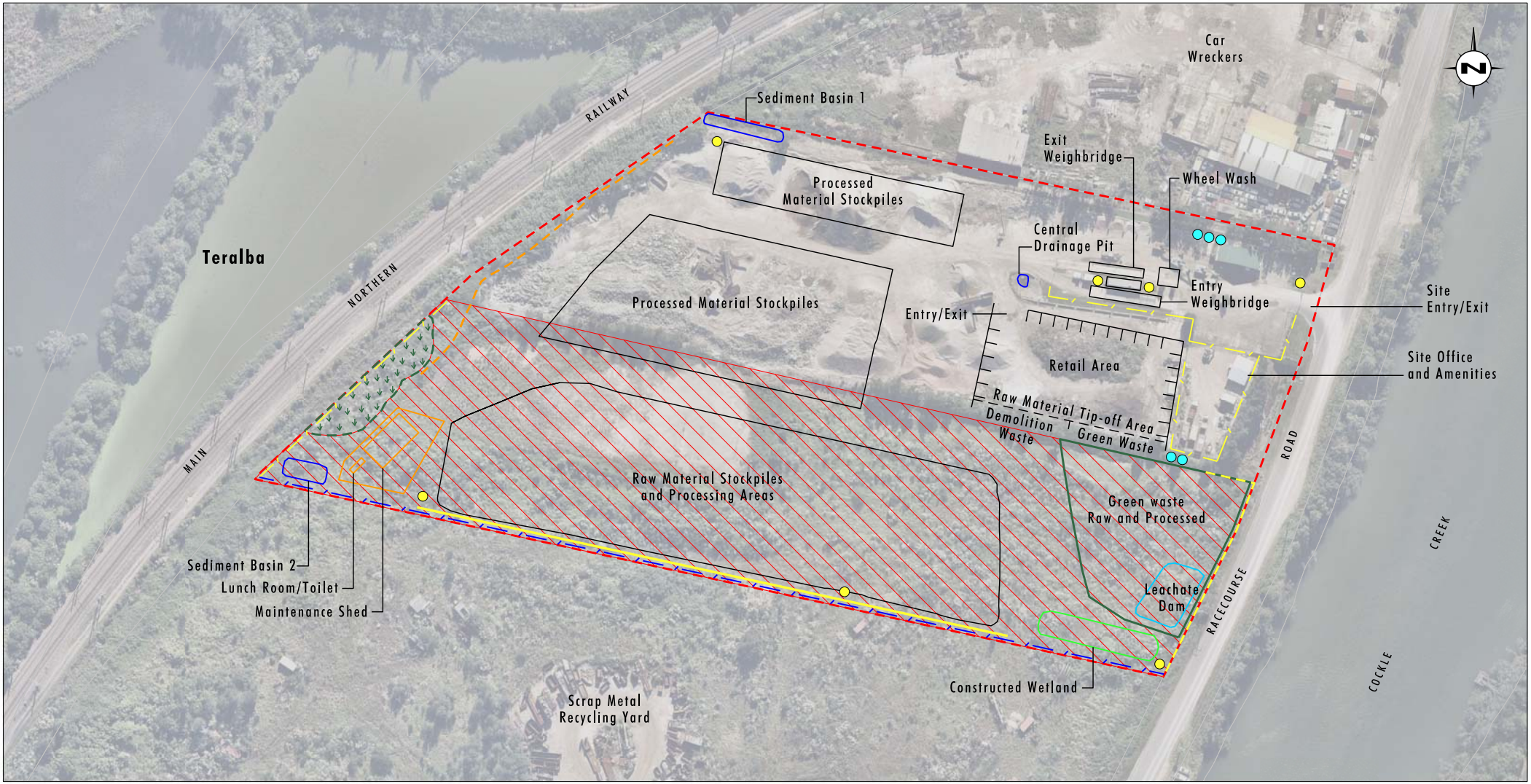


Image Source: Nearmap (May 2017)
Data Source: Concrush (2018)

0 25 50 100m
1:2 000

Legend

- Project Site
- Proposed Extension Area
- Production Compound
- Processing and Stockpile Areas
- Sediment Basin
- Green Waste Area
- Existing Wetland Area with Buffer
- Landscaped Earth Bund (1 in 100 Year Flood Mitigation)
- Existing Earth Bund
- Existing 2m High Fence
- Proposed 2m High Fence
- Proposed 2m High Concrete Block Wall
- Existing Water Tanks
- Proposed Security Lighting

FIGURE 1.2

The Project - Overview

File Name (A4): R05/3972_059.dgn
20180827 11.13

1.4 Secretary's Environmental Assessment Requirements

Table 1.2 contains the Secretary's Environmental Assessment Requirements (SEARs) relating to soil and water for the Project and where each requirement is addressed in this SWIA.

Table 1.2 Secretary's Environmental Assessment Requirements – Soil and Water

Requirement	SWIA Section
Characterisation of the nature and extent of contamination on the site and a description of proposed management measures;	Section 2.6.2
A description of water and soil resources, topography, hydrology, watercourses and riparian lands on or nearby to the site;	Section 2.0
A detailed site water balance including identification of water requirements for the life of the project, measures that would be implemented to ensure an adequate and secure water supply is available for the proposal and a detailed description of the measures to minimise the water use at the site;	Section 4.0
Characterisation of water quality at the point of discharge to surface and/or groundwater against the relevant water quality criteria (including details of the contaminants of concern that may leach from the waste into the wastewater and proposed mitigation measures to manage any impacts to receiving waters);	Section 5.1
Detailed flooding assessment;	Section 5.3
Details of stormwater/wastewater/leachate management systems including the capacity of onsite detention system/s, onsite sewage management and measures to treat, reuse or dispose of water;	Sections 3.2
A description of erosion and sediment controls;	Section 3.3
An assessment of potential impacts to soil and water resources, topography, drainage lines, watercourses and riparian lands on or nearby to the site; and	Section 5.0
Consideration of salinity and acid sulphate soil impacts.	Sections 2.6 and 5.5

1.5 Potential Soil and Water Impacts

The following potential impacts to soil and water resources associated with the Project were identified:

- soil erosion and off-site sediment transport to the receiving environment
- disturbance of acid sulphate soils and/or existing contamination during the construction phase of the Project and contamination of stormwater runoff
- discharge of stormwater with low pH and elevated concentrations of nutrients, sediment or other contaminants from the site water management system (WMS) to the receiving environment
- contamination of groundwater from leachate infiltration
- acid generation from exposure of potential acid sulphate soils during Project construction
- exposure or disturbance of contamination during Project construction
- loss of floodplain flood storage capacity.

2.0 Existing Environment

The Project site is situated in the suburb of Teralba, within the Lake Macquarie LGA with the existing Concrush operation covering an area of approximately 2.4 hectares (ha) and the proposed Project to cover a total area of 4.8 ha. The Project site is bound to the west by the Main North Rail Line and to the east by Racecourse Road and Cockle Creek. The land uses surrounding the Project site include a wrecker's yard, a scrap metal recycling yard to the south and Teralba Colliery and Macquarie Coal Preparation Plant to the west. The proposed Bunderra residential estate is located approximately 200 m to the east of the Project site. Access to the Project site is via a driveway on Racecourse Road.

The northern portion of the Project site is predominantly devoid of vegetation while the southern portion is dominated by exotic vegetation that has invaded previously disturbed areas. There are trees planted along parts of the existing site boundaries which act as a wind break and visual screen for adjacent properties.

2.1 Legislative

The Project site is located in the Cockle Creek Estuary catchment that forms part of the broader Lake Macquarie catchment. This catchment is within the North Lake Macquarie Water Source within the Lake Macquarie Extraction Management Unit that is managed under the *Hunter unregulated and alluvial water sources Water Sharing Plan (WSP), 2009*. As such, water management and water access licensing for the Project falls under the *Water Management Act 2000*.

The existing Concrush operation is covered by NSW Environment Protection Licence (EPL) 13351 issued under the *Protection of the Environment Operations Act 1997* (POEO Act). With respect to water, Condition L1.1 in Section L1 of EPL 13351 states that:

Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

2.2 Surface Hydrology

The Project site is located in the Cockle Creek Estuary catchment that forms part of the broader Lake Macquarie catchment and is classified as having a high flood risk based Lake Macquarie City Council (LMCC) flood risk mapping. The Project site is flat with the majority of stormwater runoff draining to the west naturally or via the Central Drainage Pit. The Central Drainage Pit flows to a vegetated surface drain running along the northern site boundary to discharge into a drainage depression at the north eastern corner of the Project site which in turn drains to the south prior to discharging into Cockle Creek approximately 1.5 kilometres (km) downstream. A relatively smaller section at the eastern end of the site catchment drains to the local stormwater system along Racecourse Road.

The Project site is situated in the Lower Cockle Creek Floodplain (the Floodplain) with lower portions of the Project site within the 1% Average Exceedance Probability (AEP) flood extent as determined by the Winding Creek and Lower Cockle Creek Floodplain Risk Management Study and Plan (BMT WBM, 2016). A flood impact assessment is presented in **Section 5.3**.

2.3 Climate

Lake Macquarie has a humid subtropical climate typical of the eastern Australia coastline. Summers are typically warm and humid with occasional periods of very hot and dry weather resulting from hot westerly and north westerly winds. Rainfall is highest in late autumn to early winter with the second half of the year typically drier. Winters are cool and on average drier than Summer. The region can also experience east coast lows with extremely high rainfall and winds on excess of 100 km/h.

The Bureau of Meteorology (BoM) station nearest to the Project is located approximately 1.5 km to the north at the Edgeworth Wastewater Treatment Works (WWTW) (station 061393). **Table 2.1** presents the monthly rainfall statistics for the Edgeworth WWTW BoM station (station 061393).

Table 2.1 Edgeworth WWTW Monthly Rainfall (mm), 1990 – 2017

Statistic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean	98.1	151.6	117.9	128.2	98.0	117.9	57.0	54.4	61.6	70.0	98.5	87.0
10th Percentile	16.8	38.0	36.2	23.9	15.9	25.8	12.5	5.7	10.4	18.2	3.8	32.8
Median	81.1	130.9	111.4	111.0	93.2	102.2	42.2	35.8	46.7	55.5	83.5	70.1
90th Percentile	207.7	262.1	200.1	239.9	170.9	195.5	121.2	110.1	120.5	155.3	174.4	167.9

2.4 Water Quality

2.4.1 Cockle Creek Estuary

Turbidity levels and chlorophyll-a concentrations are monitored by LMCC in the Cockle Creek estuary to provide an indication of ecosystem health. The results are used to prepare a lake health scorecard that is published in the annual LMCC State of the Environment Report. In the 2016-2017 LMCC State of the Environment Report turbidity and chlorophyll-a concentrations continued to be highly variable on both long and short time scales with ecological health remaining the same as the previous year. Chlorophyll-a was the indicator of greatest concern, with concentrations exceeding the trigger value most frequently (LMCC, 2017). The concentration of chlorophyll-a in the water column is a biological indicator reflecting phytoplankton biomass, and typically reflects the nutrient load (Office of Environment and Heritage (OEH, 2017). That is, high chlorophyll-a concentrations indicate elevated nutrient loads in the waterway.

Five rounds of water quality monitoring have been undertaken in Cockle Creek upstream and downstream of Concrush (refer to **Figure 2.1**) in 2018. One monitoring round was undertaken during routine site water quality monitoring (on 7 February 2018) and four rounds were undertaken during rainfall events (on 21 February 2018, 26 February 2018, 14 May 2018, and 4 June 2018). The water samples were analysed for a range of nutrients, pH, EC and TSS. The average monitoring results are presented in **Table 2.2** along with the NSW Water Quality Objectives for Aquatic Ecosystems which are based on the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council (ANZECC), 2000) default trigger values for slightly disturbed aquatic ecosystems (estuarine) where available. Results reported to be below the laboratory limit of reading (LOR) were assigned a value equal to 50% of the LOR for the purpose of calculating the average. It should be noted that the downstream water quality monitoring location is only downstream of the stormwater discharge point from the relative small section of catchment draining to the front of the Concrush site. Future downstream water quality monitoring will be undertaken in Cockle Creek at a location downstream of the confluence of the drainage line that receives stormwater discharges from the Project site as well as properties to the south of the Project site (refer to **Section 2.2**).

The health scorecard for the Cockle Creek Estuary (LMCC, 2017), in conjunction with the water quality monitoring undertaken by Concrush, indicate that the estuary has an existing significant level of disturbance. However, a significant level of disturbance in the estuary is not unexpected given the historical industrial land use (e.g. the former Pasminco smelter and Incitec fertiliser manufacturing facility) and present land use activities (light industrial, commercial and urban) in the catchment.

Table 2.2 Cockle Creek Water Quality Monitoring Results, 2018

Analyte	Units	Upstream		Downstream		NSW Water Quality Objectives – Aquatic Ecosystems
		Average	Maximum	Average	Maximum	
pH	-	7.77	8.05	7.19	7.83	7.0 – 8.5
EC	µS/cm	10,818	17,270	5,426	11,900	-
TSS	mg/L	21.8	57	33.2	60	-
Ammonia as Nitrogen (N)	mg/L	0.04	0.09	0.04	0.06	0.015[1] (0.900[2])
Nitrite as N	mg/L	0.01	0.02	0.01	0.005	-
Nitrate as N	mg/L	0.31	0.56	0.30	0.67	-
Nitrate + Nitrate	mg/L	0.32	0.56	0.30	0.67	0.015
Total Nitrogen	mg/L	0.82	1.20	0.78	1.30	0.300
Total Phosphorus	mg/L	0.08	0.14	0.07	0.11	0.025

Note: [1] Stressor default trigger value for slightly to moderately disturbed Estuarine systems
[2] Toxicant default trigger value for 95% species protection in Marine systems

2.4.2 Site Water Quality

Site stormwater samples at the existing Concrush site (refer to **Figure 2.1**) were collected in November 2017, February 2018, May 2018 and June 2018 and analysed for a range of nutrients, pH, electrical conductivity (EC), total suspended solids (TSS) and turbidity. Statistics for the aggregated monitoring results is presented in **Table 2.3**.

Table 2.3 Concrush Site Water Quality, November 2017 to February 2018

Analyte	Units	Minimum	Average	Maximum
pH	-	6.95	8.20	9.72
EC	µS/cm	188	1,298	2,541
TSS	mg/L	9	145	608
Ammonia as Nitrogen (N)	mg/L	0.04	0.15	0.46
Nitrite as N	mg/L	0.08	4.61	17.6
Nitrate as N	mg/L	0.06	13.02	70
Nitrate + Nitrate	mg/L	0.06	17.12	76.7
Total Nitrogen	mg/L	1.0	21.7	87.3
Total Phosphorus	mg/L	0.07	0.62	1.77

The site water quality results exhibit elevated concentrations of TSS and nutrients in addition to a wide range of pH values. Green waste storage and processing is the primary source of nutrients in water sampled within the WMS. Presently runoff from the green waste storage and processing area collects in the Central Drainage Pit (refer to **Section 3.1**) equipped with a pump to allow reuse of the captured water for irrigation of vegetated areas. The implementation of the conceptual proposed WMS incorporating additional stormwater storage for reuse, a constructed wetland and improved operational management practises (refer to **Section 3.2**) will ensure nutrient concentrations in stormwater runoff will be significantly reduced for the Project.

Processing and handling of concrete, bricks and tiles is the primary source of TSS in water sampled within the WMS. The implementation of the proposed site WMS incorporating improved erosion and sediment controls and additional stormwater storage for reuse (refer to **Section 3.2**) will ensure TSS concentrations in site runoff will be significantly reduced for the Project.

Elevated pH levels may primarily be attributed to concrete agitator wash out material. The proposed site WMS will incorporate a separate bay for this material which will be designed with a minimal catchment with all runoff from this area being contained so that it does not discharge to the site stormwater system (refer to **Section 3.2**). Reclaimed water from the wash out bay will be reused as a first priority in the production of road base products.

Image Source: Nearmap (May 2017)
Data Source: Concrush (2018)

0 25 50 100m
1:2 000

Legend

- Project Site
- Proposed Extension Area
- Existing Wetland Area with Buffer
- Water Quality Monitoring Location

FIGURE 2.1

Water Quality Monitoring Locations

2.5 Water Users

Water use downstream of the Project in Cockle Creek and Lake Macquarie is primarily for recreational purposes including fishing, boating and swimming. No water is abstracted from Cockle Creek or Lake Macquarie for industrial or agricultural purposes.

2.6 Topography and Soils

The Project site is located on the alluvial flats of Cockle Creek with slope gradients of 0 to 2% (Soil Conservation Service of NSW, 1991). Landform ranges from moderately broad (<500 m) alluvial flats to broad (up to 1 000 m) deltaic deposits on lower Cockle Creek, with some relict terrace and levee deposits and point bar deposits (local relief up to 3 m, 5 to 10 m in width) (Soil Conservation Service of NSW, 1991).

Soils are deep (>200 cm), imperfectly to poorly drained yellow Soloths and Yellow Podzolic Soils on floodplains and deep (>200 cm), moderately well to poorly drained Yellow Earths, and Grey Earths on delta and fan deposits, with deep (>200 cm) imperfectly drained, to well-drained Yellow Podzolic Soils (Soil Conservation Service of NSW, 1991). Soils have a moderate to high erodibility and a moderate to high erosion hazard under concentrated flows. The K-factor (soil erodibility factor which represents the susceptibility of the soil to erosion) for these soils ranges from 0 to 0.032 (Soil Conservation Service of NSW, 1991).

2.6.1 Acid Sulphate Soils

Acid sulphate soils (ASS) mapping (LMCC, 2014) shows that the Project site is located in a Class 2 zone where ASS is likely to be encountered. Online Office of Environment ASS risk maps classify the Project site as *HAp1 - High Probability of occurrence; Alluvial process; Plain; 1 – 2 m*. Works that may present an environmental risk on Class 2 lands include works below the natural ground surface and works by which the water table is likely to be lowered.

RCA Australia was engaged to undertake a Baseline Contamination Assessment (including an assessment of acid sulphate soils) (RCA, 2018) for the Project Site. In this assessment samples were taken for four boreholes across the site. The field pH (pH_F) of all tested samples was found to be greater than pH 4 (RCA, 2018) and as such are not classified as actual acid sulphate soils (RCA, 2018).

Notwithstanding this, when pyrite material is contained below the water table (i.e. saturated) and has not been oxidised (exposed to oxygen), it is termed potential acid sulphate soils (PASS) and typically has a pH greater than 4.0. After oxidation with 30% hydrogen peroxide all soil samples returned pH_{FOX} results of less than 4.0, a significant drop in pH from field value (pH_F) (e.g. from pH_F 7 to pH_{FOX} 3.5 for Borehole TP4) and, as such, net acid generating ability is considered likely. Therefore, the soils on the Project site should be considered PASS and, if exposed, they are likely to generate acid leachate which may cause potential environmental harm. RCA (2018) concluded that if excavation into natural soils to depths near to the groundwater table (approximately 3.0 to 5.0 m below ground level) is required, an Acid Sulfate Soils Management Plan will be required for the Project.

2.6.2 Contamination

As discussed in **Section 2.6.1**, RCA Australia was engaged to undertake a Baseline Contamination Assessment (RCA, 2018) for the Project Site. The objective of this assessment was to assess the suitability of the Project site for its proposed use and establish baseline conditions prior to undertaking the proposed development with regards to contamination potential and the associated risks in accordance with State Environmental Planning Policy (SEPP) 55.

RCA's contamination assessment also included a review of a soil contamination assessment undertaken by Coffey in 2013 and a subsequent Environmental Site Management Plan (ESMP) (also prepared by Coffey, 2014). The ESMP was to be utilised by the site subcontractor in conjunction with an occupational hygienist to manage the asbestos contamination on the site. The Council required the ESMP (Coffey, 2014) to include the placement of a marker fabric layer under a 0.5 m thick capping layer on the site.

RCA's assessment consisted of a site inspection and onsite sampling and analysis of twenty two (22) samples from thirteen (13) locations and the collection of groundwater from two (2) locations on the project site for analysis of potential contaminants of concern (RCA, 2018). The potential contaminants of concerned tested for included TRH, BTEX, PAH, phenols, cyanide, metals and asbestos. Fragments of potential asbestos material were identified at three (3) locations and samples were submitted for laboratory testing. No soil or groundwater contamination was found in excess of the commercial / industrial human health criteria relevant for the current or future use of the site. Asbestos was confirmed to be present within identified fragments, however asbestos fibres were not identified within the soils proximal to the fragments or in any other soil samples.

Six (6) soil samples (BH1/a, TP7/a, TP8/a, TP9/a, TP9/b and TP12/b) had zinc concentrations in excess of the Ecological Investigation (EIL) criterion, while one (1) soil sample, BH2/a, had a B(a)P concentration in excess of the Ecological Screening Level (ESL) criterion as defined in the National Environment Protection (Assessment of Site Contamination) Measure (ASC NEPM) (National Environment Protection Council (NEPC), 1999 and amended 2013). In the contamination assessment, however, RCA concluded that the detection of zinc and B(a)P to be a "negligible risk to the ecological receptors due to the proposed industrial use of the site, lack of a significant ecological population requiring protection on site and the distance to the nearest offsite receptors." (RCA, 2018). RCA considers, based on their investigations and previously completed investigations (Coffey, 2013 & 2014), which also reported concentrations of metals, TRH and PAH below the relevant criteria, that the baseline conditions at the site are "commensurate with the land zone as IN1 – General Industrial and the site would be suitable for the proposed commercial/industrial development provided that:

- the stockpiles for fill, concrete and metal are characterised for onsite reuse or classified for offsite waste removal (or otherwise); and

- the marker layer is placed across the entire site in accordance with the ESMP." Additional assessment and management was also identified as a potential requirement to mitigate the risks of the asbestos fragments found on site if the development requires excavation.

3.0 Surface Water Management

3.1 Existing Water Management

The majority of the existing Project site catchment drains to the northwest of the property boundary either directly, or via the central stormwater collection pit that is piped to a vegetated swale running along the northern boundary (refer to **Figure 3.1**). Runoff from the central area of the site which incorporates the green waste storage and processing area reports to the Central Drainage Pit (refer to **Figure 3.1**). The Central Drainage Pit contains a submersible pump that discharges to an irrigation system to water the vegetated areas. Excess water from the Central Drainage Pit drains via and underground pipe to the vegetated swale running along the northern boundary. Stormwater runoff from the vegetated swale drains to south in a drainage depression running south along the Main Northern Railway Line until it joins Cockle Creek approximately 1.5 km downstream. Runoff from a small section of catchment at the eastern end of the site drains via the driveway to the off-site stormwater system adjacent to the north east corner of the site on Racecourse Road.

Water for material processing and dust suppression is sourced from either captured stormwater that is stored in 5 tanks with a total capacity of 110 kL or from the reticulated Hunter Water Corporation (HWC) potable supply. The majority of the potable water is collected in Concrush's 8.5 kL and 12 kL water carts via a standpipe adjacent to Teralba Oval on York Street, Teralba, approximately 2 km to the south east of Concrush.

Potable water for amenities usage is via a HWC piped supply to the premises and amenities wastewater is collected in a storage tank and removed from site by a licensed waste contractor..

3.2 Proposed Water Management

The conceptual proposed Stage 2 WMS for the Project will comprise of three main catchments as presented in **Figure 3.2**. **Table 3.1** provides the conceptual catchment areas, potential pollutants contained in runoff from the catchment, associated pollution controls and where off-site discharges will report to. **Figure 3.3** presents a schematic of the conceptual proposed Stage 2 WMS.

The overall water management strategy is to retain as much runoff from catchments with a higher likelihood of elevated contaminants in runoff for on-site reuse in material processing and dust suppression. Primary controls on site will comprise sediment dams, a Leachate Dam and a Constructed Wetland. Site water storage tank capacity will be increased by at least 200 kL to 310 kL. The maximum quantity of green waste to be stored and processed at the Project will be unchanged from the existing operation. Green waste storage inventories will be maintained below 200 tonnes and the processing rate will be approximately 3,000 tpa. As such the green waste storage and processing component of the Project is below the inventory and processing thresholds in Schedule 1 of the POEO Act 1997.

In addition to the three primary catchments, the Project will have two isolated catchments; the Concrete Agitator Washout Bay and the Wheel Wash (refer to **Figure 3.2**). Concrete agitator washout is received as a relatively dry solid product but has a high proportion of fine solids and an elevated pH. The isolated Concrete Agitator Washout Bay catchment will be located within the raw materials stockpile area (refer to **Figure 1.2**). Wheel Wash water will have a high concentration of sediment. Any runoff in the Concrete Agitator Washout Bay and used Wheel Wash water will be contained on site and used as a first priority for operating demands

Runoff and seepage from the Green Waste catchment will be contained in the Leachate Dam which will be lined with a flexible membrane liner with a permeability of less than 10^{-14} m/s and will be sized to accommodate the runoff from a 1 in 10 year, 24 hour duration storm event in accordance with the *Environmental Guidelines for Composting and Related Organics Processing Facilities* (NSW Department of Conservation, 2004). Water captured in the Leachate Dam will be transferred to the Constructed Wetland (which will also incorporate a membrane liner with a permeability of less than 10^{-14} m/s) for nutrient and sediment removal. Discharge from the Leachate Dam to the Constructed Wetland will be at a rate to ensure the design capacity (i.e. runoff from a 1 in 10 year, 24 hour duration storm event) will be restored within 5 days of a rainfall event. Treated water from the constructed wetland will be transferred by pump to water storage tanks for reuse.

The Green Waste storage and processing catchment will also be designed and constructed in accordance with the *Environmental Guidelines for Composting and Related Organics Processing Facilities* (NSW Department of Conservation, 2004). The green waste storage and handling area will incorporate a leachate barrier equivalent to a 600 mm clay liner with an in-situ permeability of less than 10^{-7} m/s and be bunded and graded to ensure all runoff reports to the Leachate Dam.

Treated runoff containing reduced nutrient concentrations discharging from the constructed wetland will be retained for reuse as a first priority. The constructed wetland is expected to achieve a reduction of approximately 75% in Total Nitrogen (TN) and 50% in Total Phosphorus (TP) concentrations based on the likely Green Waste catchment runoff water quality to be collected in the Leachate Dam (refer to **Section 2.4.2**).

Runoff from the Northern Catchment (i.e. the existing portion of the site) will drain to the existing vegetated swale running east to west along the northern site boundary to Sediment Basin 1 which will be constructed as part of the Project. Runoff from the Southern Catchment (i.e. the proposed site extension) will drain to a vegetated swale east to west running along the southern site boundary to Sediment Dam 2. Excess water discharging from the Constructed Wetland during rainfall events will also drain to the southern vegetated swale and into Sediment Dam 2 and be diluted by runoff from the Southern Catchment. As such Sediment Dam 2 has been sized to accommodate runoff from the Green Waste catchment. Sediment dams have been sized in accordance with *Managing Urban Stormwater Volume 1* (The Blue Book) (Landcom, 2004). Given the materials to be stored and processed in the Northern and Southern catchments (processed and unprocessed waste concrete, bricks, tiles, processed construction waste and road base) will have less than 33% of particles finer than 0.02 mm and less than 10% dispersible material, the basins have been sized as Type C sediment basins.

Water for material processing and dust suppression will be reticulated on site via a new pump and pipe system. A new 12 kL water cart has been purchased to assist the existing 8.5 kL water cart supply the increased processing, stockpile dust suppression and internal road dust suppression demands. During dry periods where the Project has a water deficit, the water carts will continue to collect water from the Hunter Water potable supply adjacent to Teralba Oval.

The Concrush site WMP will be update to incorporate all aspects of the new WMS should the Project be approved.

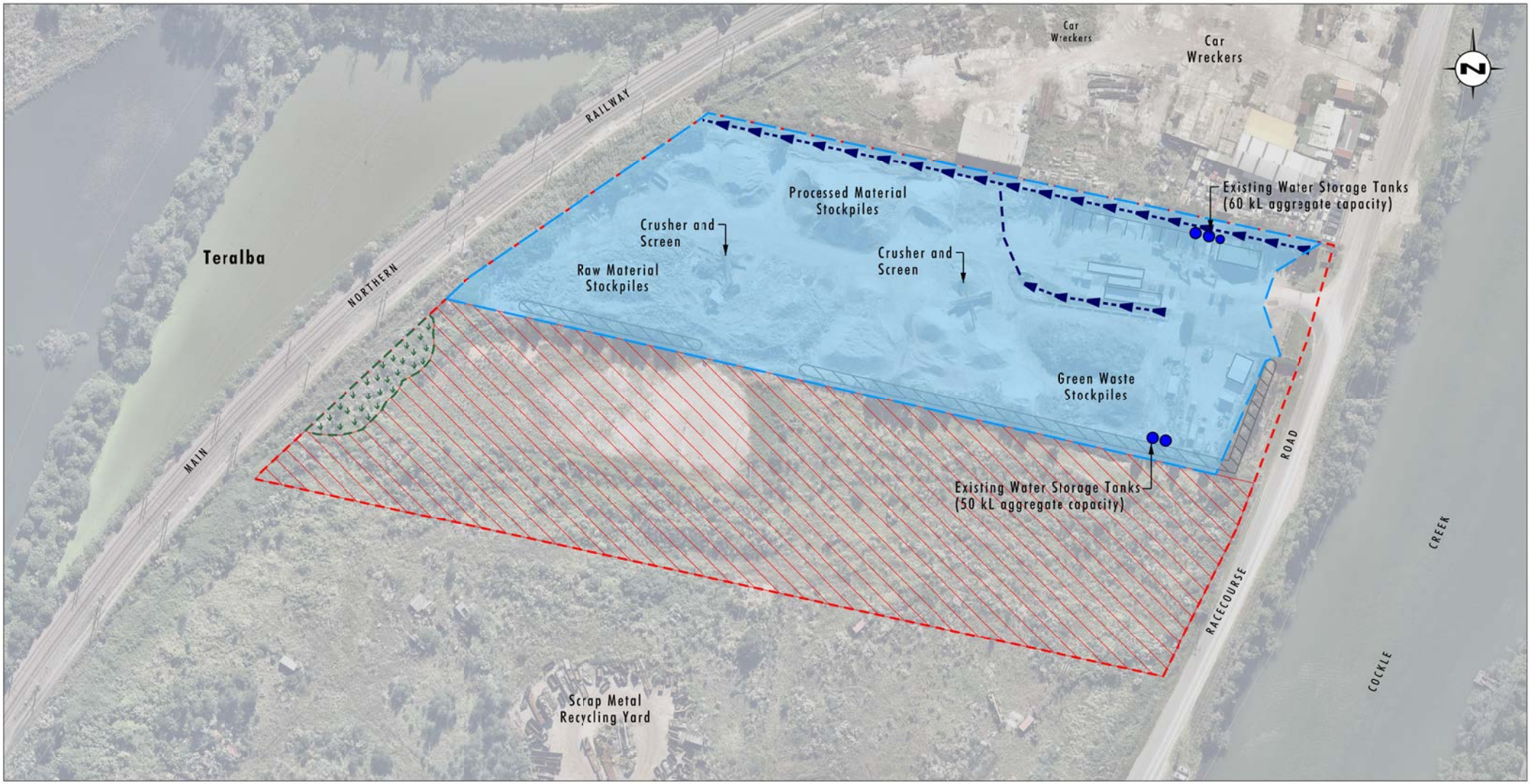


Image Source: Nearmap (May 2017)
Data Source: Concrush (2018)

0 25 50 100m
1:2 000

Legend

- Project Site
- Proposed Extension Area
- Existing Wetland Area with Buffer
- Northern Catchment Boundary
- Drain Pipe
- Surface Drain
- Existing Storage Water Tank

FIGURE 3.1

Existing Surface Water Management System

File Name (A4): R05/3972_060.dgn
20180822 13.06

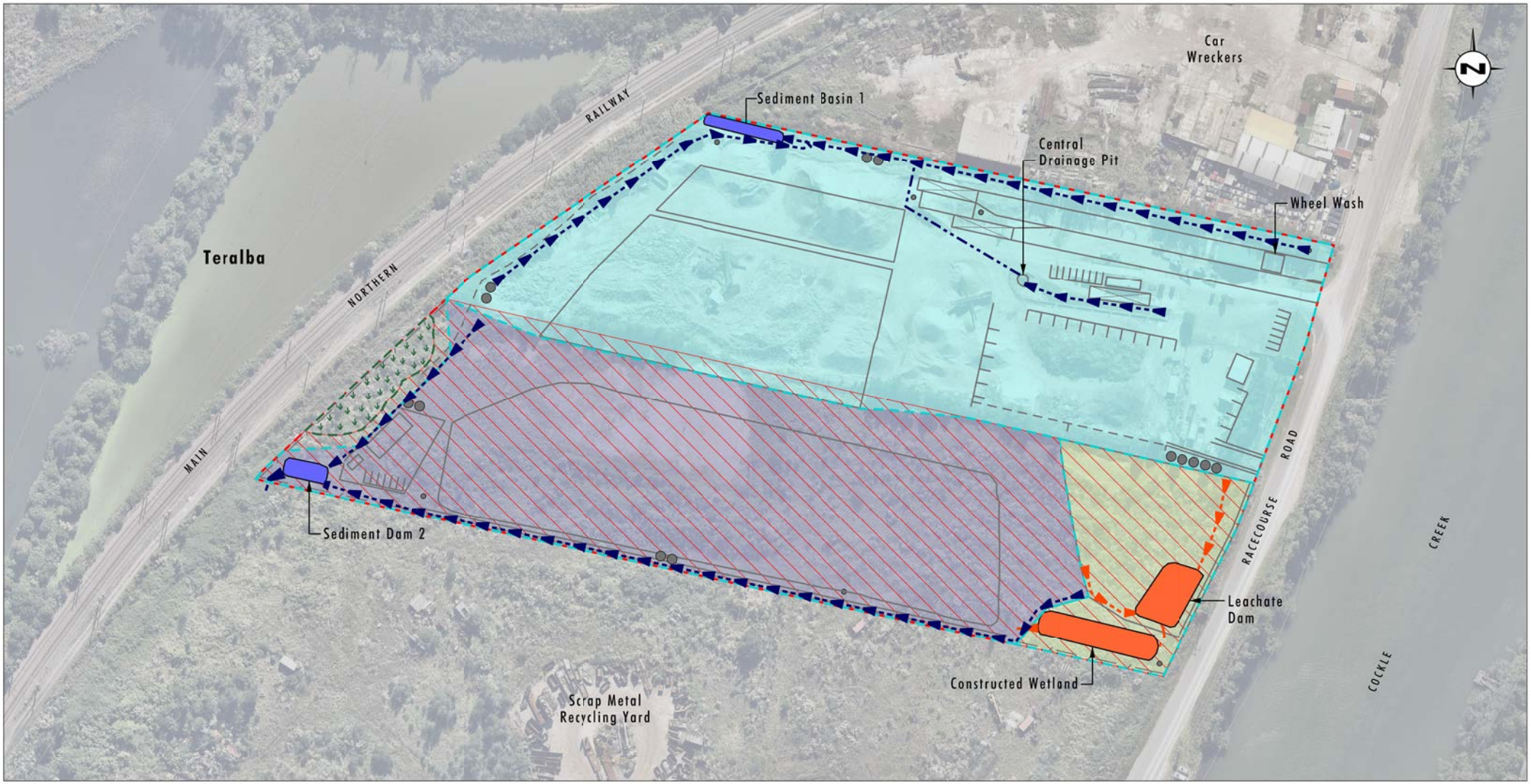


Image Source: Nearmap (May 2017)
Data Source: Concrush (2018)

0 25 50 100m
1:2 000

Legend

- Project Site
- Proposed Extension Area
- Existing Wetland Area with Buffer
- Northern Catchment Boundary
- Southern Catchment Boundary
- Green Waste
- Sediment Dam
- Drain Pipe
- Surface Drain
- Leachate Dam
- Leachate Pipe
- Leachate Drain

FIGURE 3.2

Conceptual Stage 2 Water Management Plan

File Name (A4): R05/3972_063.dgn
20181108 11.14

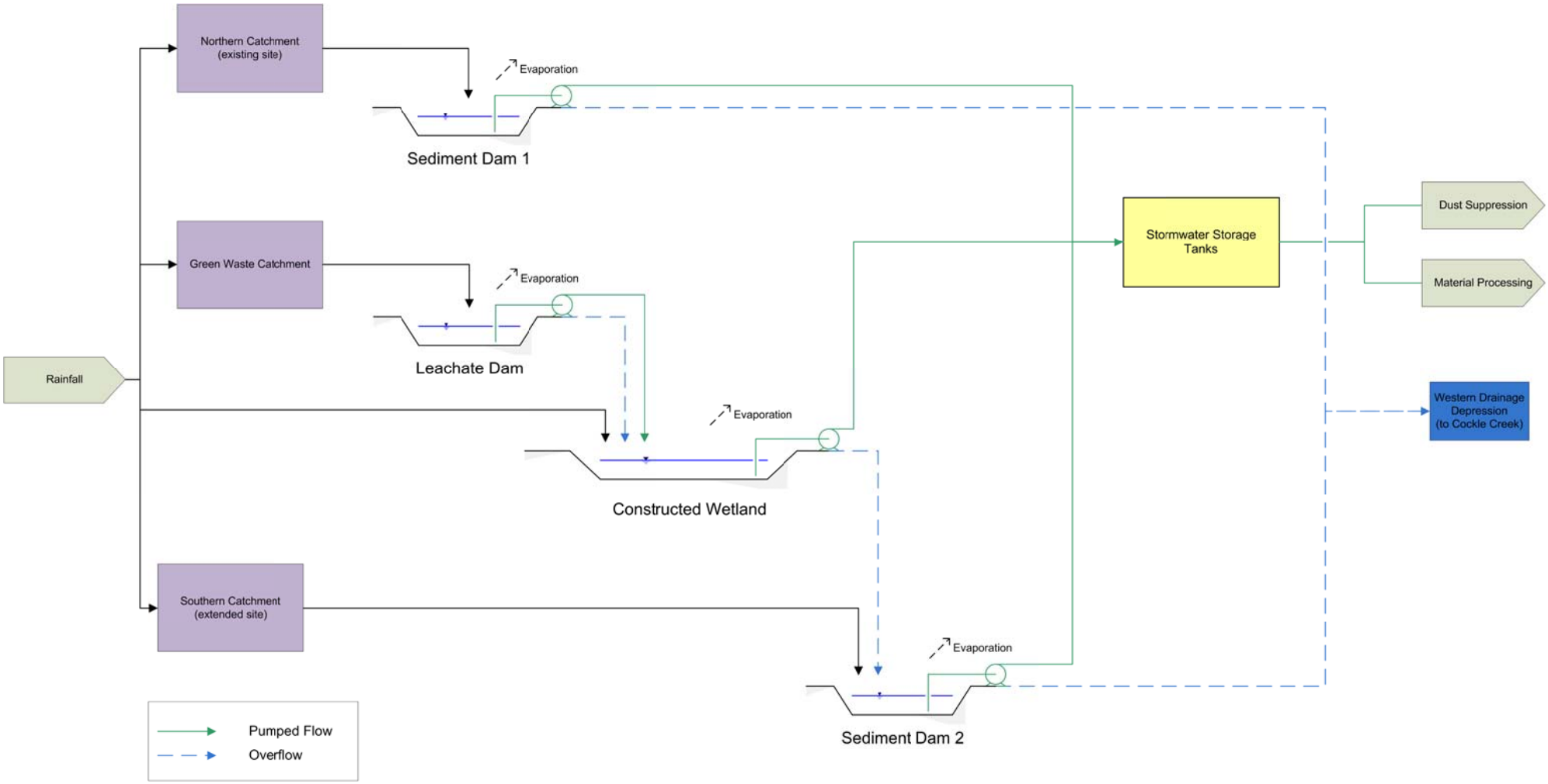


FIGURE 3.3

Conceptual Stage 2 Water Management System Schematic

Table 3.1 Proposed WMS Catchments

Catchment	Area (ha)	Potential Pollutants in Runoff	Controls	Discharges to
Green Waste	0.3	Nutrients Sediment	Leachate containment dam sized to contain runoff from the 24 hour 10 year average recurrence interval storm event Water from the leachate dam will be treated in a constructed wetland to reduce nutrient concentrations Untreated water from Leachate Dam will be used for dust suppression and pasteurisation moisture control in the Green Waste catchment Treated water will be retained on site in storage tanks and reused for dust suppression on the remainder of the site	Sediment Dam 2
Northern Catchment (office, workshop, retail sales, weighbridge, construction material stockpiles)	2.4	Sediment Oil and Grease Nutrient	Roadways and car parking areas will be sealed Workshop is covered, incorporates an oil sump to contain spills and is equipped with spill kits Product bays containing mulch will be roofed Runoff to be treated in a Type C flow through sediment basin Treated water will be retained on site in storage tanks and reused for dust suppression on the remainder of the site	Vegetated drainage depression to the west of the Project site that reports to Cockle Creek
Southern Catchment (construction material processing and stockpiles, amenities block)	1.9	Sediment	Sealed roadways Runoff to be treated in a Type C flow through sediment basin Treated water will be retained on site in storage tanks and reused for dust suppression on the remainder of the site	Vegetated drainage depression to the west of the site that reports to Cockle Creek
Concrete Agitator Wash Out	0.01	Sediment, elevated pH	Minimised and isolated catchment area Sealed hardstand catchment Material is utilised for production of road base as soon after receipt as possible Material will not be received during rainfall events All water captured will be reused in road base production, i.e. no release to site stormwater system	-
Wheel Wash	0.01	Sediment	Minimised catchment area Sealed concrete surface All water captured for operational reuse, i.e. no release to site stormwater system.	-

3.3 Erosion and Sediment Control

Activities which have the potential to cause erosion and generate sediment include:

- Clearing and stripping ahead of construction activities
- Construction of hardstand areas and site roads
- Rainfall/runoff on active work construction areas
- Runoff flowing across the disturbed areas into drains
- Runoff flowing across hardstand areas and off material (raw and processed) stockpiles.

Practical erosion and sediment controls will be implemented to minimise the generation of sediment on site and transport of sediment around and off-site, as described in the following sections.

3.3.1 Sediment Basins

After construction of the Project, the site will be comprised almost entirely of hardstand areas and material stockpiles. The materials to be stored and processed in the construction materials catchments will have less than 33% of particles finer than 0.02 mm and less than 10% dispersible material and as such the dams have been sized as Type C sediment basins in accordance with Volume 2E of the Blue Book (DECC, 2008).

Sediment control in the green waste catchment will be achieved by the containment of runoff in the leachate dam (sized for a 10 year, 24 hour duration ARI rainfall event) and treatment of the captured water in a constructed wetland.

Water levels in the sediment basins will be managed to enable suitable storage capacity is available to accommodate the runoff from the associated catchments based on the volume of runoff required to be captured for a Type C sediment basin sized for a 2 year average recurrence interval (ARI) time of concentration rainfall event with the following parameters:

- Particle size of 0.02 mm
- Settling zone depth of at least 0.6 m
- Length to width ratio of 3 : 1 or more.

The volume of runoff required to be contained in the sediment dams and the leachate dam for their respective design rainfall events are presented in **Table 3.2**.

Table 3.2 Dam Capacity Requirements

Dam	Catchment (ha)	Settling Zone (kL)	Sediment Zone (kL)
Sediment Dam 1	2.4	124	42
Sediment Dam 2	1.9	102	34
Leachate Dam	0.3	235	100

Construction of Sediment Dam 1, Sediment Dam 2 and the Leachate Dam will be undertaken in the initial stages of Project construction to provide sediment control during the construction phase of the Project.

3.3.1.2 Erosion and sediment control measure design criteria

As the duration of the disturbance at the Project will be greater than 3 years, sediment basins will be designed to the following standard as detailed in **Table 3.3** in accordance with Landcom's Managing Urban Stormwater Volume 2E Table 6.1 (DECC, 2008):

Table 3.3 Sediment Basin Design Criteria

Design Parameter	Design Criteria
Basin Type	"Type C" basins capable of capturing a "design particle" of 0.02 mm diameter
Design Flow	Equal to the 2 year Average Recurrence Interval (ARI) as per Table 6.1 of Volume 2E of the Blue Book (DECC, 2008).
Minimum Settling Zone Depth	0.6 m
Length : width Ratio	>3 : 1
Primary Outlet	Grass or rock protection on both primary and emergency outlets to ensure minimisation of scour.
Emergency Spillway	Designed to be structurally sound in the 100 year ARI storm event.
Internal Batter Gradients	Internal batter gradients to be a maximum of: 2.5(H) : 1(V) on earth structures 0.5(H) : 1(V) on rock gibber structures 1(H) : 4(V) on gabion baskets 1(H) : 4(V) on stacked (rough squared) rock structures

Temporary drainage (erosion) (e.g. diversion banks, perimeter banks, catch drains, level spreader, check dams and batter drains and chutes) and sediment controls (e.g. sediment fences, stacked rock sediment traps etc. on small catchments where used as a 'last line of defence' (i.e. without a down slope sediment basin) will be designed to have a non-erosive hydraulic capacity to convey the 20 year ARI storm event.

3.3.2 General Erosion and Sediment Control Measures

Water quality measures will be implemented for the Project to minimise impact on the surrounding environment. These controls are designed and constructed to a standard consistent with:

- Managing Urban Stormwater – Soils and Construction, Volume 1 (the Blue Book) (Landcom, 2004)
- Managing Urban Stormwater – Soils and Construction, Volume 2E: Mines and Quarries (DECC, 2008).

The measures are designed to minimise erosion and transport of sediment around and off-site and include:

- Clearly identifying and delineating areas required to be disturbed and ensuring that disturbance is limited to those areas
- clearing as little vegetation as required and minimising machinery disturbance outside of these areas
- Installing appropriate erosion and sediment controls prior to stripping topsoil or disturbing areas
- limiting the number of roads and tracks established
- Stabilising site entry/exit points to ensure sediment is not tracked onto sealed roadways

- construction of drains upslope of areas to be disturbed to convey clean runoff away from most disturbed areas where required
- reshaping, topsoiling and vegetating road and cut and fill batters as soon as practical
- construction of sediment dams where required to capture and treat runoff from disturbed catchment areas. Further details regarding construction and management of sediment dams can be found in **Section 3.3.1.2**
- Regular maintenance of all erosion control works and rehabilitated areas.

3.3.2.1 Erosion and Sediment Control Plans

A construction erosion and sediment control plan (ESCP) will be developed in accordance with Managing Urban Stormwater (Landcom, 2004) for detailing the specific erosion and sediment controls, rehabilitation, monitoring and maintenance requirements for the construction phase of the Project. The construction ESCP will:

- Be prepared on relevant copies of drainage drawings for:
  - Different construction stages
  - Areas of high erosion hazard.
- Show sizing and design details for all sediment basins and erosion and sediment controls (such as diversion drains).
- Be revised when required by changing circumstances, if the site conditions change or if installed controls are not operating effectively.
- Be integrated with work procedures, construction method statements, activity statements and their scheduling.
- Be site specific and will not generally repeat the information contained in the primary ESCP.

Additional erosion and/or sediment control works will be constructed as might become necessary to ensure adequate protection is given to downslope lands and waterways, i.e. making ongoing changes to the construction ESCP where it proves inadequate in practice or is subjected to changes in conditions or elsewhere in the catchment.

An operational ESCP will be incorporated into an updated version of the Concrush Site Water Management Plan.

3.3.2.2 Soil and stockpile management

Ensure stockpiles of erodible material that have the potential to cause environmental harm if displaced are:

- constructed in accordance with Standard Drawing SD 4-1 Stockpiles (Managing Urban Stormwater (Landcom, 2004)) (included in **Appendix 1**)
- appropriately protected (for example, seeded or covered) from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows
- constructed on the contour at least 2 m (preferably 5 m from hazard areas), particularly likely areas of concentrated water flows

- stabilised (provided with an appropriate protective cover (synthetic, mulch, or vegetative)) if they are to be in place for more than 10 days
- protected from run-on water by installing water diversion structures upslope
- formed with sediment filters placed immediately downslope to protect other lands and waterways from pollution.

3.3.2.3 Diversion Banks and Channels

Diversion banks and channels will be implemented and maintained in accordance with Managing Urban Stormwater (Landcom, 2004 and DECC, 2008) (refer to Blue Book standard drawings SD 5-5 and SD 5-6 included in **Appendix 1**). All diversion banks and channels will be constructed to remain stable whilst conveying peak discharges during a 20 year ARI storm event at less than erosive velocities for the channel construction materials.

3.3.2.4 Inspections and Maintenance

Regular inspections of all disturbed areas and access tracks/roads will be undertaken to ensure drainage is working effectively and disturbed areas and tracks/roads are stable, particularly after rain. These inspections will be undertaken:

- During construction all temporary controls will be inspected:
  - Daily for high risk controls such as within drainage lines
  - Weekly for all other controls
  - Prior to forecasted rainfall events great than or equal to 10 mm
  - After rainfall events greater than or equal to 10 mm in a 24 hour period.
- During the operational phase, monthly inspections of long-term erosion and sediment controls will be undertaken as well as inspections prior to and after forecasted rainfall events greater than or equal to 10 mm.

All erosion and sediment control measures, including drainage control measures, will be maintained in proper working order at all times during their operational lives. All construction erosion and sediment control measures will be maintained in a functioning condition until all construction activities are completed.

All sediment fences and detention systems (sediment basins) will be kept in good working condition. In particular, attention will be given to:

- Recent works to ensure that they have not resulted in diversion of sediment laden water away from them.
- Degradable products (i.e. sediment fence) to ensure they are replaced as required.
- Sediment removal as required.

4.0 Water Balance

A daily time step water balance model (the Model) for the Project was prepared in Microsoft Excel. The Model is based on 27 years of daily rainfall data from the BoM Edgeworth WWTW (station 061393) station and mean monthly evaporation from the BoM Williamtown Station (station 61078). The Model has been calibrated by adjusting dust suppression demands to match the recorded site water demand.

4.1 Water Demands

Water demands for the Project modelled were:

- Evaporative losses from water storages.
- Dust suppression of stockpiles, roads and open areas.
- Processing equipment dust suppression.
- Losses as product moisture.

The existing average operational water demand is approximately 8,000 kL/year with a peak water demand of approximately 100 kL/day during hot and dry weather. This demand will increase as a result of the larger Project catchment area (stockpiles, open areas), increased dust suppression application rates to improve air quality performance and higher material processing rates.

4.2 Water Sources

Water to supply operational demands will be sourced from captured stormwater runoff on site (refer to **Section 3.2**) and the HWC potable supply.

4.3 Basis and Assumptions

The following bases and assumptions were used in the water balance model:

- A maximum Project road and hardstand area dust suppression application rate of 10 mm/day accounting for rainfall.
- A maximum Project stockpile dust suppression application rate of 5 mm/day accounting for rainfall.
- Project dusts suppression demands based on a 2 ha stockpile catchment and a 2 ha road/hardstand catchment.
- Water is imported from the HWC supply to meet operational demands when harvested stormwater is unavailable.
- The existing operation has a total stormwater tank storage capacity of 110 kL.
- A total Project stormwater tank storage capacity of 310 kL.

4.4 Results

Average water balance results for the existing Concrush operation and the Project are presented in **Table 4.1.**

Table 4.1 Average Water Balance Results

Parameter		Existing Result (kL)	Project Result (kL)
Inflows	Rainfall and Runoff	11,770	31,197
	Imported Potable Water	8,076	53,759
	Total Inflows	**19,846**	**84,976**
Outflows	Evaporation from Water Storage Surfaces	-280	-1,576
	Dust Suppression and Product Moisture	-11,655	-68,500
	Off-site Discharge	-7,940	-14,965
	Total Outflows	**-19,876**	**-85,041**
Change in Storage		-30	-63
Net Water Balance		0	0

The predicted range in import water demands and off-site discharges are presented in **Table 4.2** and **Table 4.3** respectively.

Table 4.2 Imported Water Demand

Statistic	Existing Result (kL)	Project Result (kL)
Minimum	6,607	46,746
10th Percentile	7,208	48,848
Median	8,216	54,104
90th Percentile	9,009	57,842
Maximum	9,355	58,227

Table 4.3 Off-site Discharge

Statistic	Existing Result (kL)	Project Result (kL)
Minimum	-4,008	-4,597
10th Percentile	-5,398	-9,060
Median	-7,460	-13,860
90th Percentile	-1,387	-23,498
Maximum	-14,337	-30,984

The average water balance results (refer to **Table 4.1**) demonstrate an increase rainfall/runoff inflow for the Project as a consequence of the additional catchment area and dam surface area compared to the existing operation as well as a significant increase in Project dust suppression demand. Off-site discharge volumes are also shown to increase by almost 100% which is a result of increase rainfall/runoff inflows.

Significant increases in dust suppression demands can be attributed to an approximate threefold increase in watering application rates and an approximate doubling of the catchment requiring dust suppression. The associated increase in water import demand will be sourced from an increase in stormwater capture and potable water supplied by the existing water carts from the HWC supply adjacent to Teralba Oval (refer to **Section 3.0**).

5.0 Impacts and Mitigation Measures

5.1 Water Quality

5.1.1 Surface Water

Concrush is proposing the following surface water quality mitigation measures for the Project:

- construction of appropriately designed and managed Type C sediment basins (Sediment Dam 1 and Sediment Dam 2)
- separation of the green waste storage and processing catchment and the construction of the Leachate Dam to capture a 1 in 10 year 24 hour duration storm event from the Green Waste Catchment
- installation of a Constructed Wetland to treat water captured in the Leachate Dam
- roofing the retail area mulch storage bays
- increased on-site stormwater storage to increase reuse of captured stormwater and the prioritised reuse of water discharged from the Constructed Wetland
- the containment of the concrete wash out bay catchment and reuse of the reclaimed water will minimise the risk of elevated pH in stormwater discharges

The conceptual proposed WMS incorporating the mitigation measures listed above is detailed in **Section 3.2** and **Section 3.3**. **Table 5.1** presents the estimated water quality at the point of discharge from the Project.

Table 5.1 Estimated Project Discharge Water Quality

Parameter	Units	Value
pH	-	7.0 – 8.5
TSS	mg/L	<50
TN	mg/L	1.14[1]
TP	mg/L	0.19[2]

Notes:

[1] Based on average measured TN concentration in site water and 75% reduction from treatment in the Constructed Wetland and dilution with runoff from the Southern Catchment

[2] Based on average measured TP concentration in site water and 50% reduction from treatment in the Constructed Wetland and dilution with runoff from the Southern Catchment

The estimated average discharge nutrient concentrations presented in **Table 5.1** are comparable with baseline nutrient water quality results measured in Cockle Creek (refer to **Table 2.2**) during rainfall events and are therefore the water quality impacts associated with the Project are likely to be negligible. Stormwater discharging from Sediment Dam 1 and Sediment Dam 2 will then flow south along the drainage depression adjacent to the Main Northern Rail Line toward Cockle Creek. This 1.5 km vegetated drainage path will result in additional sediment and nutrient removal prior to any discharged stormwater from the Project entering Cockle Creek. Given the prioritised reuse of Constructed Leachate treated leachate for site operational demands and the significant increase in operational water demands, site discharges containing treated leachate are expected to be infrequent. It is expected that discharges containing treated leachate will only occur in significant rainfall events where substantial dilution of the treated leachate will occur.

5.1.2 Groundwater

Incorporation of a leachate barrier system for Project green waste storage and handling area and the lining of the Leachate Dam and Constructed Wetland in accordance with the *Environmental Guidelines for Composting and Related Organics Processing Facilities* (NSW Department of Conservation, 2004) will ensure that the Project will have a very low risk of impacting groundwater water quality.

5.2 Water Quantity

The volume of water discharged from the Project is predicted to increase relative to the existing operation as a result of the larger catchment and increased water storage surfaces for the Project and the increased proportion of hardstand area on the land to be developed (refer to **Section 4.4**).

While import of potable water will be minimised by reuse of captured stormwater, it is predicted that there will be a significant increase in the overall volume of imported potable water compared to existing operation due to increased dust suppression demands to achieve air quality targets (refer to **Section 4.4**).

5.3 Flooding

The Project site is situated in the Lower Cockle Creek Floodplain (the Floodplain) with lower portions of the site within the 1% Average Exceedance Probability (AEP) flood extent as determined by the Winding Creek and Lower Cockle Creek Floodplain Risk Management Study and Plan (BMT WBM, 2016). The maximum flood depth for the 1% AEP based on the existing site landform is presented in **Figure 5.1**.

The 1% AEP flood levels as quoted in the Lake Macquarie Council's Property Enquiry tool quote the following levels:

- 2.35 mAHD for catchment flooding (Winding Creek and Lower Cockle Creek Flood Study, 2013), and
- 1.50 mAHD for Lake flooding (Lake Macquarie waterway Flood Study).

Most of the site is above RL 1.50 mAHD (LiDAR survey dated by September 2014) and hence not subject to Lake flooding. The applicable flooding envelope is therefore RL 2.35 mAHD.

It is proposed to fill the majority of the expanded portion of the site above RL 2.35mAHD through site levelling and placement of the 0.5 m capping layer, thereby meeting the 1% AEP flood standard. Filling represents a loss of flood storage of approximately 1 ML, mostly located on the eastern boundary of the site.

The proposed Leachate Dam and Sediment Dams to be constructed will provide an on-site stormwater detention capacity of approximately 0.3 ML which offsets approximately 30% of the flood storage loss. The remaining 0.7 ML storage loss is considered insignificant in comparison with the broader catchment flood volume from the 1% AEP flood of approximately 35,640 ML (when assuming a 36 hour triangular flood hydrograph at the site). The site is also located outside the Cockle Creek conveyance area thereby assuring that hydraulic effects of any filling are not significant.

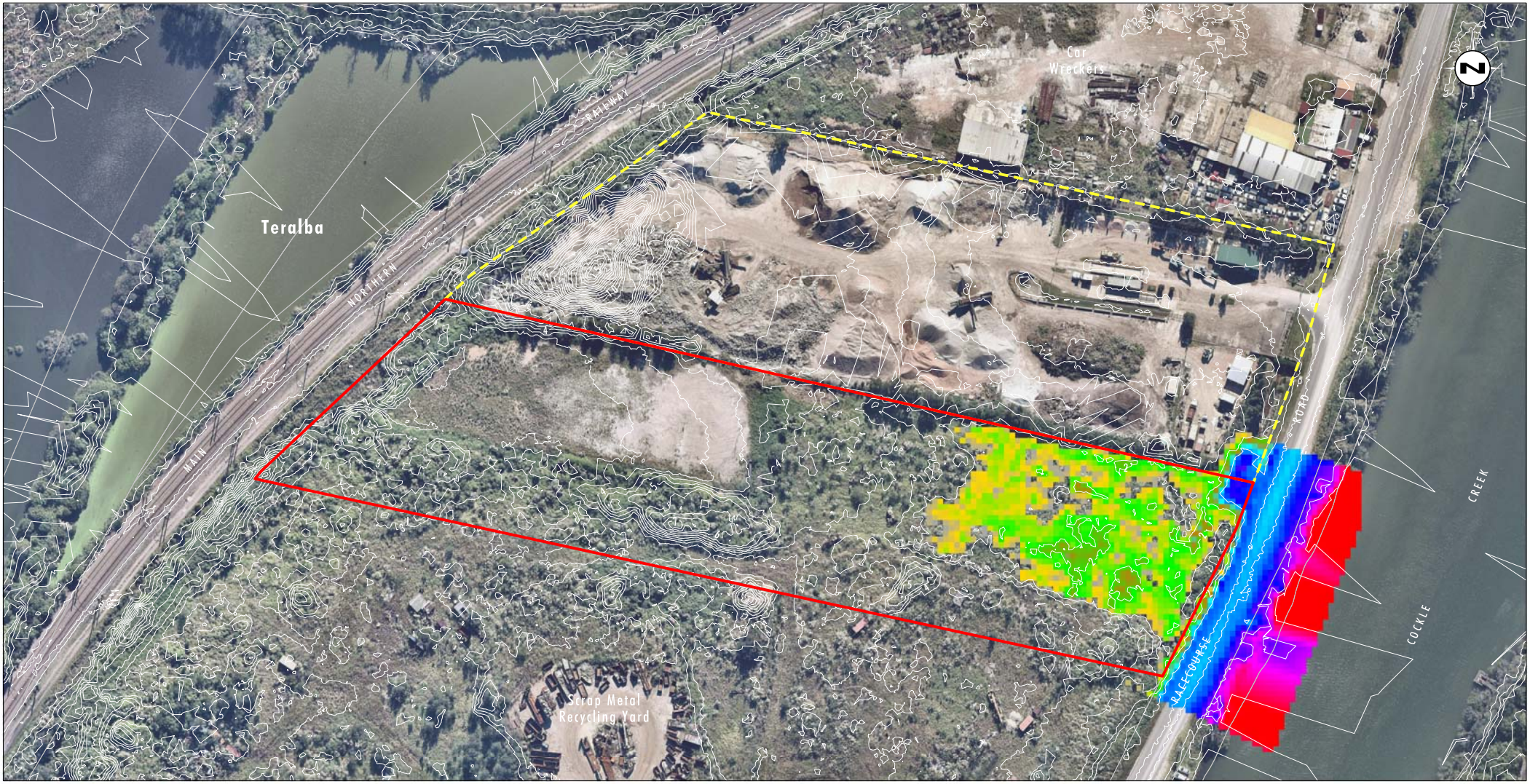


Image Source: Nearmap (May 2017)
Data Source: Lidar Survey (Sept. 2014)
Note: Contour Interval 0.5m

0 25 50 100m
1:2 000

Legend

- Existing Site
- Proposed Extension Area
- Contours, Existing Landform

Depth (metres)

1.9	1.1	0.3
1.7	0.9	0.1
1.5	0.7	0.001
1.3	0.5	

FIGURE 5.1

Proposed Development Site, 1% AEP Flood Max Depth

5.4 Water Users

Given the predicted water quality of water discharged from the Project and the relatively small catchment area impacted with respect to runoff volumes, impacts on downstream water users are likely to be negligible.

5.5 Soils

As outlined in **Section 2.6** the southern section of the Project site is underlain by PASS, has surface contamination with asbestos fragments and a number of material stockpiles (fill, concrete, metal) requiring classification for either on-site reuse or disposal. The Project is not expected to have any impacts on soil salinity.

During Project development some excavation will be required to allow the construction of dams and drains leading to potential exposure of PASS. If excavation or earthworks into natural soils to depths near to the groundwater table (approximately 3.0 to 5.0 m below ground level) are required an Acid Sulfate Soils Management Plan (ASSMP) will be prepared for the Project to ensure there are no environmental impacts associated with acid generation from any excavated PASS. It is anticipated that the ASSMP will include measures to neutralise the PASS on site for reinstatement in areas of the site requiring filling.

RCA (2018) concluded that the proposed maker layer and 0.5 m capping of the southern section of the Project site proposed by Coffey (2013) should be implemented during Project construction. Concrush will engage a suitably qualified consultant to revise the ESMP prepared by Coffey (2013) and implement the control measures in the ESMP during Project construction and for any future site works that may disturb the capping layer.

6.0 Monitoring, Licensing and Reporting

6.1 Surface Water Monitoring Program

6.1.1 Erosion and Sediment Controls

ESC monitoring is detailed in **Section 3.3.2.4**

6.1.2 Water Quality

6.1.2.1 Surface Water

Concrush will undertake surface water quality monitoring presented in **Table 6.1** and **Table 6.2**.

Table 6.1 Site Surface Water Quality Monitoring

Water Source	Frequency	Parameters
Constructed Wetland	Monthly	TSS, EC, pH, TN, TP, NOx, NH_4
Sediment Dams		

Table 6.2 Baseline Surface Water Quality Monitoring

Water Source	Frequency	Parameters
Upstream Cockle Creek	Monthly	TSS, EC, pH, TN, TP, NOx, NH_4
Downstream Cockle Creek		

Baseline surface water quality monitoring will initially be undertaken on a monthly basis for a period of 24 months to establish site specific trigger values in accordance with ANZECC water quality guidelines. The site specific triggers will allow Concrush to identify any trends or step changes in Cockle Creek water quality and assess whether Project operations could have impacted the water quality result.

6.1.2.2 Groundwater

Monitoring bores will be installed up and down the hydraulic gradient from the green waste storage and processing area in accordance with the *Environmental Guidelines for Composting and Related Organics Processing Facilities* (NSW Department of Conservation, 2004). Water quality samples will be collected from the monitoring bores on a monthly basis and analysed for TSS, EC, pH, TN, TP, NOx and NH_4.

6.1.3 Water Quantity

Concrush will monitor the following water volumes:

- Monthly potable water imported via water cart
- Monthly water storage inventories.

6.2 Licensing

6.2.1 Environment Protection Licence

The existing Concrush operation is covered by EPL 13351 issued under the POEOAct Condition L1.1 in Section L1 of EPL 13351 states that:

Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

6.2.2 Surface Water Licensing

All dams (sediment and leachate) on the Project site capturing surface water runoff are for the purpose of pollution control and are therefore the dams are considered exempt from licensing based on item 12 (Excluded Works) of Schedule 5 (Exemptions) and item 3 of Schedule 1 (Excluded Works) of the Water Management (General) Regulation 2011.

6.3 Reporting

Under EPL 13351 Concrush are required to submit an Annual Return to the NSW EPA that includes:

- a Statement of Compliance
- a Monitoring and Complaints Summary
- a Statement of Compliance - Licence Conditions
- a Statement of Compliance - Load based Fee
- a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan
- a Statement of Compliance - Requirement to Publish Pollution Monitoring Data
- a Statement of Compliance - Environmental Management Systems and Practices.

The Annual Return must be provided within 60 days of after the end of the reporting period. Concrush are also required to provide a report to the NSW EPA in the following circumstances:

- Notification of environmental harm
    - Notifications must be made by telephoning the Environment Line service on 131 555
    - The licensee must provide written details of the notification to the EPA within 7 days of the date on which the incident occurred.
- Where an authorised officer of the EPA suspects on reasonable grounds that:

    a) where this licence applies to premises, an event has occurred at the premises

    b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence, and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.

    The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.

7.0 Conclusion

This SWIA has considered the potential impacts on surface water, groundwater and soils associated with the proposed Project. Based on the outcomes of the impact assessment the following conclusions are made:

- All stormwater captured onsite will be reused as a priority, minimising the volume of stormwater that discharges from the Project site.
- Any stormwater discharged from the Project site will have comparable water quality to the measured receiving water quality (Cockle Creek) during significant rainfall events.
- The volume of stormwater discharging from the Project site will increase as a result of the approximate doubling of catchment area which will primarily be hardstand.
- Issues with identified asbestos contamination on the Project site extension area will be managed in accordance with the ESMP. The primary management control will be the implementation of a 0.5 m cap.
- Site soils at depths near to the groundwater table (approximately 3.0 to 5.0 m below ground level) have been identified as PASS. If excavations to depths that will expose PASS are required, an ASSMP will be prepared detailing management measures to address potential acid generation impacts associated with any excavated PASS.
- There will be a loss of flood storage of approximately 1 ML associated with the 0.5 m capping layer. However, this will be partly off-set by the approximate total 0.3 ML freeboard capacity of the proposed Leachate Dam and Sediment Dams. The loss of flood storage volume is considered insignificant with respect to the total flood volume for the broader catchment associated with a 1% AEP event.

The SWIA has identified a range of potential impacts on soil and water resources associated with the Project, however, with the implementation of the propose mitigation measures and monitoring program the impacts are likely to be negligible.

8.0 References

Managing Urban Stormwater, Landcom, 2004

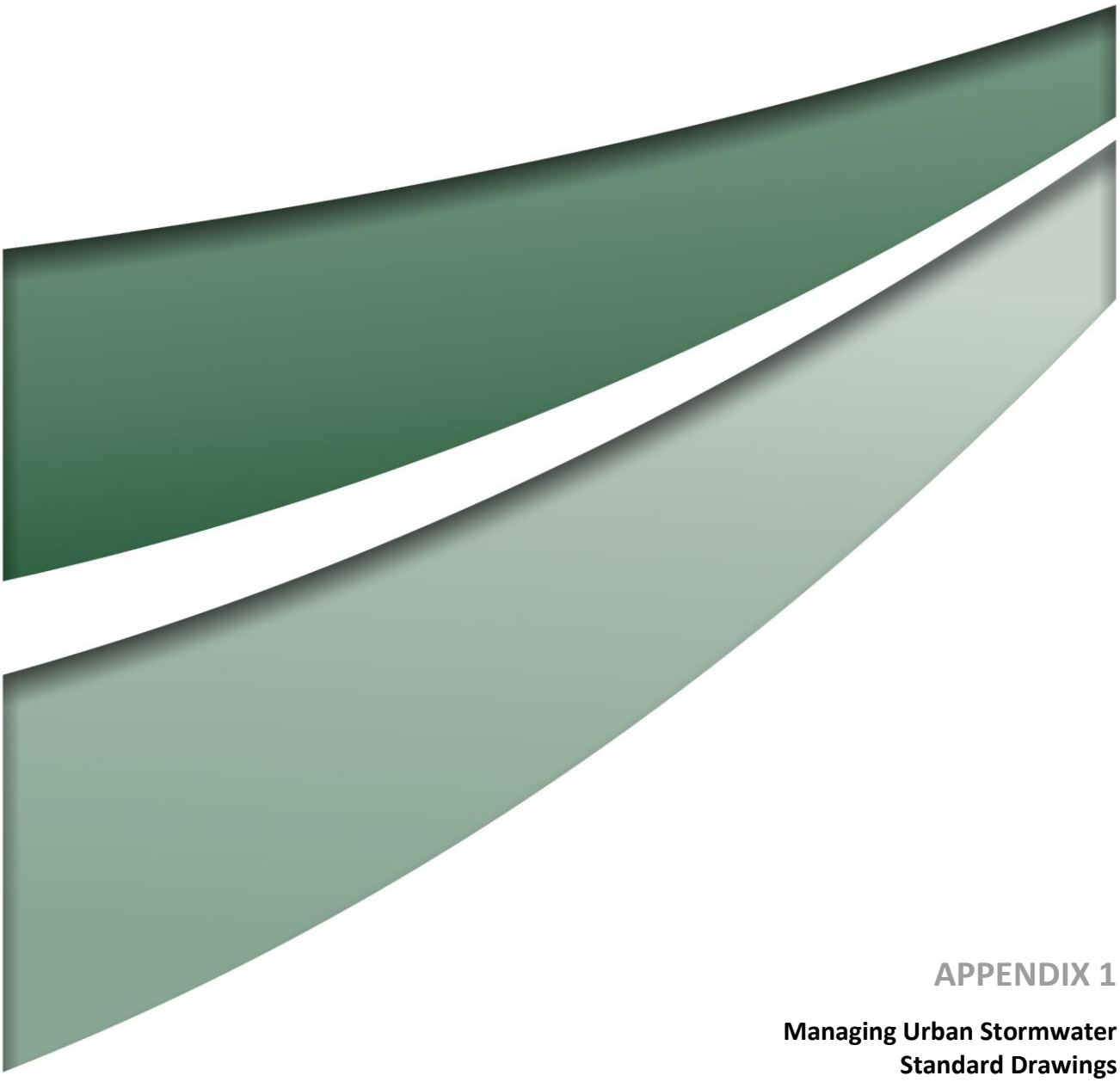
NSW Environment Protection Licence 13351, NSW Environment Protection Authority, November 2017

Acid Sulfate Soil Manual, NSW Acid Sulfate Soil Management Advisory Committee, August 1998

Lake Macquarie City Statement of the Environment Report 2016-2016, LMCC 2017

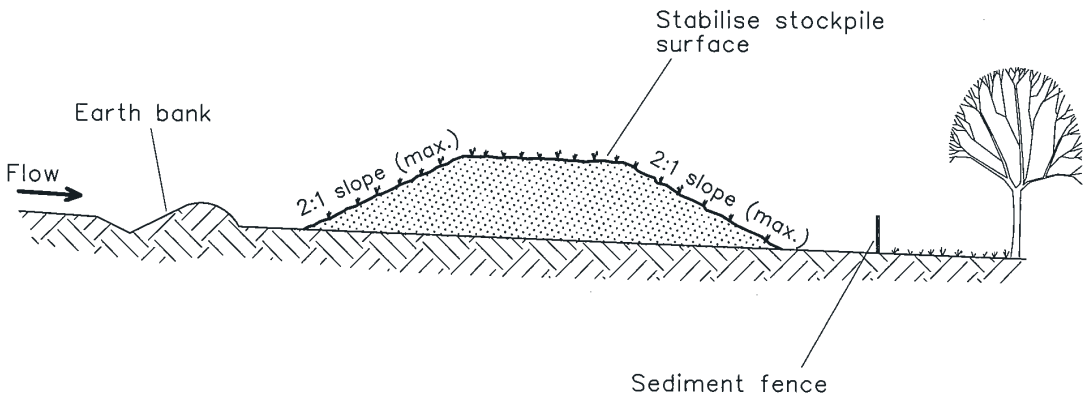
Australian and New Zealand Guidelines for Fresh and Marine Water Quality, ANZECC, 2000

Baseline Contamination Assessment, Proposed Concrush Facility Expansion, Racecourse Road, Teralba, RCA Australia, 2018



APPENDIX 1

Managing Urban Stormwater
Standard Drawings

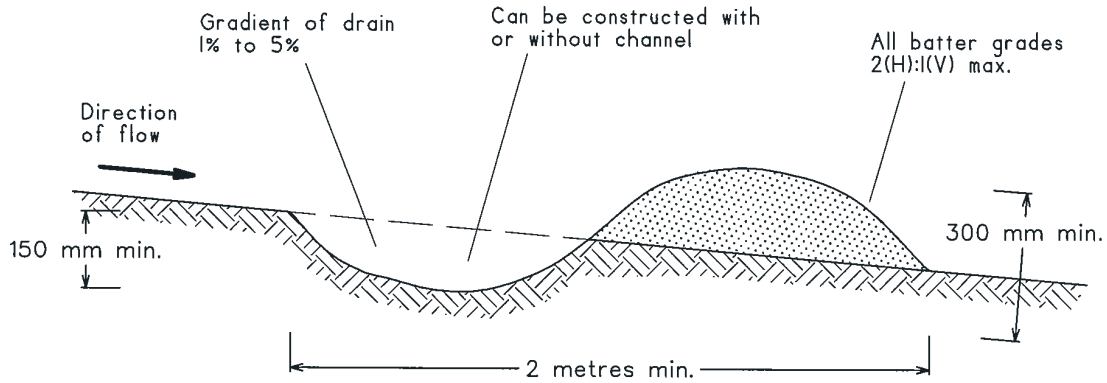


Construction Notes

1. Place stockpiles more than 2 (preferably 5) metres from existing vegetation, concentrated water flow, roads and hazard areas.
2. Construct on the contour as low, flat, elongated mounds.
3. Where there is sufficient area, topsoil stockpiles shall be less than 2 metres in height.
4. Where they are to be in place for more than 10 days, stabilise following the approved ESCP or SWMP to reduce the C-factor to less than 0.10.
5. Construct earth banks (Standard Drawing 5-5) on the upslope side to divert water around stockpiles and sediment fences (Standard Drawing 6-8) 1 to 2 metres downslope.

STOCKPILES

SD 4-1

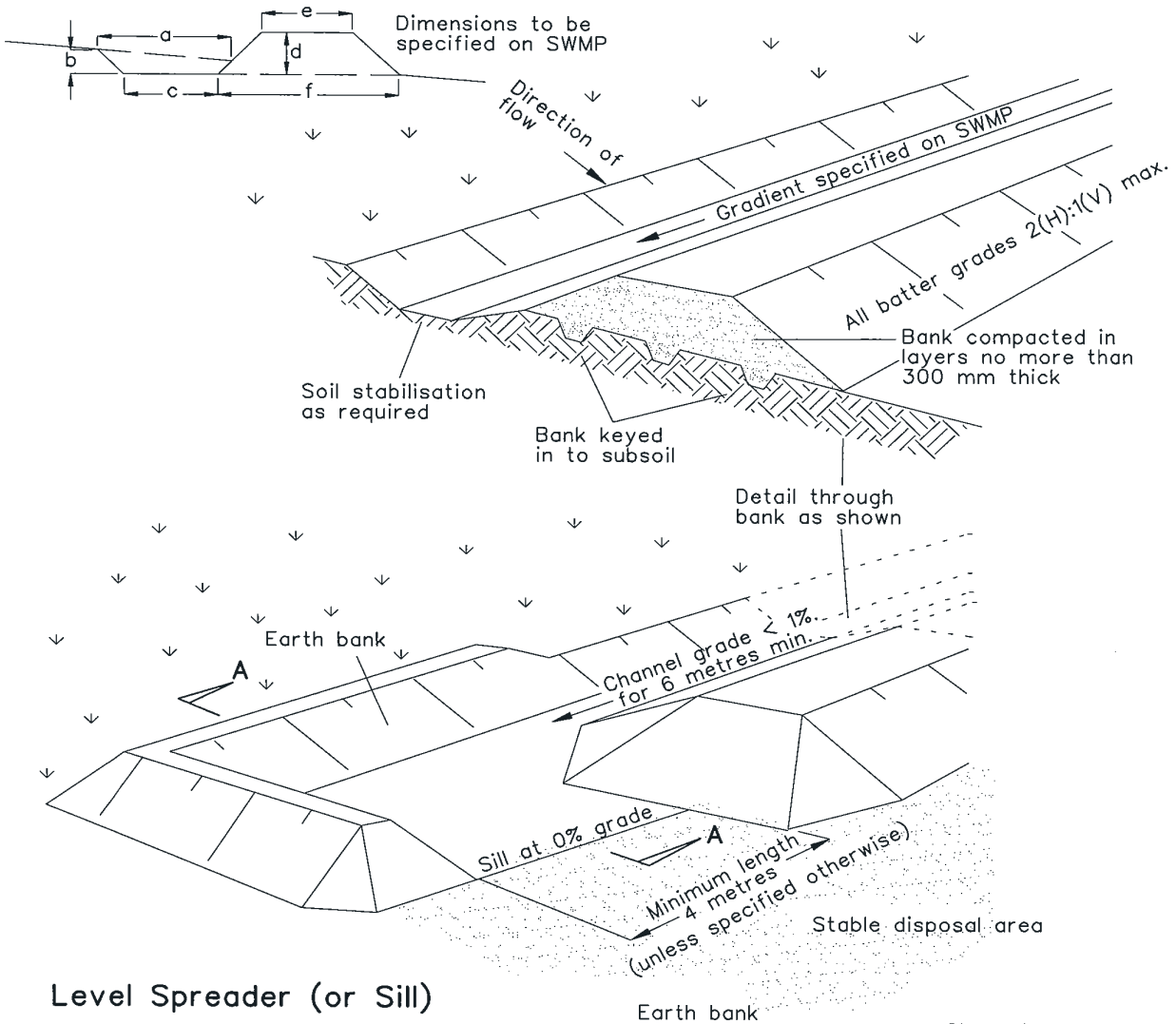


NOTE: Only to be used as temporary bank where maximum upslope length is 80 metres.

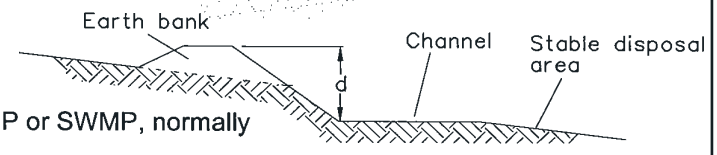
Construction Notes

1. Build with gradients between 1 percent and 5 percent.
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V shaped.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction.

EARTH BANK (LOW FLOW) SD 5-5



Level Spreader (or Sill)



Section AA

Construction Notes

1. Construct at the gradient specified on the ESCP or SWMP, normally between 1 and 5 percent
2. Avoid removing trees and shrubs if possible - work around them.
3. Ensure the structures are free of projections or other irregularities that could impede water flow.
4. Build the drains with circular, parabolic or trapezoidal cross sections, not V-shaped, at the dimensions shown on the SWMP.
5. Ensure the banks are properly compacted to prevent failure.
6. Complete permanent or temporary stabilisation within 10 days of construction following Table 5.2 in Landcom (2004).
7. Where discharging to erodible lands, ensure they outlet through a properly constructed level spreader.
8. Construct the level spreader at the gradient specified on the ESCP or SWMP, normally less than 1 percent or level.
9. Where possible, ensure they discharge waters onto either stabilised or undisturbed disposal sites within the same subcatchment area from which the water originated. Approval might be required to discharge into other subcatchments.

EARTH BANK (HIGH FLOWS) SD 5-6

Newcastle

75 York Street
Teralba NSW 2284

Ph. 02 4950 5322

Perth

PO Box 783
West Perth WA 6872
12 Prowse Street
West Perth WA 6005

Ph. 1300 793 267

Canberra

PO Box 6135
56 Bluebell Street
O'Connor ACT 2602

Ph. 02 6262 9484

Sydney

50 York Street
Sydney NSW 2000

Ph. 1300 793 267

Brisbane

Level 13
500 Queen Street
Brisbane QLD 4000

Ph. 1300 793 267

www.umwelt.com.au