

GROUNDWATER MANAGEMENT PLAN EXPANSION OF THE CONCRUSH RESOURCE RECOVERY FACILITY, TERALBA

Prepared for CONCRUSH PTY LIMITED Prepared by RCA Australia RCA ref 13589-805/1 SEPTEMBER 2020





## **RCA AUSTRALIA**

ABN 53 063 515 711

92 Hill Street, CARRINGTON NSW 2294

Telephone: +61 2 4902 9200 Facsimile: +61 2 4902 9299 Email: <u>administrator@rca.com.au</u> Internet: www.rca.com.au

This document is and shall remain the property of RCA Australia. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

DOCUMENT STATUS						
Rev	Comment	Author	Reviewer	Approved for Issue (Project Manager)		
No				Name	Signature	Date
/0	Final	F Brooker	K Davies	F Brooker		31.07.2020
/1	Revised to address NSW EPA comments	F Brooker	K Davies	F Brooker	Porsocker	11.09.2020

DOCUMENT DISTRIBUTION						
Rev No	Rev Copies Format Issued to		Date			
/0	1	Electronic (email)	Concrush – Kevin Thompson – Kevin@concrush.com.au	31.07.2020		
/0	1	Electronic (email)	NSW EPA – Steven James – C/- waste.operations@epa.nsw.gov.au	31.07.2020		
/0	1	Electronic report	RCA – job archive	31.07.2020		
/1	1	Electronic (email)	Concrush – Kevin Thompson – Kevin@concrush.com.au			
/1	1	Electronic (email)	NSW EPA – Steven James – C/- waste.operations@epa.nsw.gov.au	11.09.2020		
/1	1	Electronic report	RCA – job archive	11.09.2020		





# Contents

1					
	1.1 1.2	SITE IDENTIFICATION AND DESCRIPTION PROJECT DESCRIPTION	2 4		
2	HYDR	OGEOLOGY AND BASELINE GROUNDWATER CONDITIONS	7		
3	DEVEL	OPMENT INTERACTION WITH GROUNDWATER	.11		
4	GROU	NDWATER MONITORING	.15		
	4.1 4.2	DURING CONSTRUCTION DURING OPERATIONS	.15 .16		
5	INVES	TIGATION PROTOCOL	.18		
6	CONT	NGENCY PLAN	.19		
7	REVIE	W OF THIS PLAN	.21		
REFE	ERENC	ES	.21		
GLO	SSARY		.22		

## APPENDIX A

**REGISTERED GROUNDWATER BORE DETAILS** 

# APPENDIX B

**GROUNDWATER MONITORING WELL LOGS** 

## APPENDIX C

**GROUNDWATER MONITORING RESULTS** 

## APPENDIX D

SUMMARY OF MONITORING REQUIREMENTS



# 1 INTRODUCTION

Concrush Pty Limited (Concrush) have recently been provided Approval with regards to the Expansion of the Concrush Resource Recovery Facility ("the Project") as State Significant Development (SSD 8753).

The existing Concrush facility is situated at 21 Racecourse Road, part Lot 2 DP220347 Teralba and provides recycling of concrete, asphalt, other building materials and green waste into products such as roadbase, drainage aggregates, pipe bedding and haunch, packing fines, decorative aggregates and mulches. These products are then sold for commercial, domestic and household applications. The existing Concrush site operates under Environment Protection Licence (EPL) 13351 which allows the recycling of 108,000t of waste per annum and the storage of up to 40,000t of waste material at any one time.

The Project will increase capacity up to 250,000t of waste processing per year with a maximum storage of 150,000t per year and will utilise a portion of land adjoining the southern boundary of the current facility.

SSD 8753 Approval Condition B20 states that "prior to the commencement of Stage 1 construction, the Applicant must prepare a Groundwater Management Plan (GMP) to the satisfaction of the Planning Secretary. The GMP must form part of the Construction Environmental Management Plan (CEMP) required by condition C2 and be prepared in accordance with C1." The Approval Condition also states that the document must be:

- Prepared by a suitably qualified and experienced person(s) whose appointment has been endorsed by the Planning Secretary. This document has been prepared by an environmental engineer with over twenty years' experience, in the assessment, remediation and management of contaminated land. The Planning Secretary provided endorsement of their qualifications on 14 May 2020 (Ref [1]).
- Prepared in consultation with the EPA. This document will be reviewed by the NSW EPA prior to submission.

The Approval Condition included the requirements of the GMP: these have been reconciled with the contents of this GMP in **Table 1** below.



Table 1	Approval Condi	tions Address	in this	GMP
	rippiovai Oona	10/10 / 100/000	111 0110	0.000

SSD Approval Condition B20 Requirement	Section Addressed
Details of the installation of a third groundwater well.	
Baseline data on groundwater levels and quality for the existing and newly installed third groundwater well.	Section 2
Details of the water table depth compared to the excavation depths of the leachate dam and artificial wetland.	Section 3, Table 5
A programme to monitor groundwater levels and quality.	Section 4
Impact assessment criteria, including trigger levels for investigating any potentially adverse groundwater impacts.	Section 4.2, Table 7
A protocol for the investigation and mitigation where the groundwater impact assessment criteria has been exceeded.	Section 5
Monitor the effectiveness of management measures and contingency actions for reducing impacts.	Section 4.2 and Section 6

SSD 8753 Approval Condition B21 states that Stage 1 construction is not to commence until the GMP "is approved by the Planning Secretary". As such, following concurrence with the NSW EPA based on revisions made since their review, this GMP will be submitted to the Department of Planning, Division of Environment, Energy and Science (EES).

# 1.1 SITE IDENTIFICATION AND DESCRIPTION

The Project site is identified as part Lot 2 DP 220347, Racecourse Road Teralba.

Additional site details are shown in Table 2 and Figure 1 below.



Table 2	Site Details
---------	--------------

Current zoning (Ref [2])	IN1 – General Industrial	
Current and proposed use	Current: Existing Concrush facility and vacant/unused land	
Current and proposed use	Proposed: Expanded Concrush facility (see <b>Section 1.2</b> ).	
	Approximately 4.8ha	
Size of Site	(inclusive of the 2.4ha existing Concrush facility)	
Surrounding land use to the:	Lot 1 DP220347	
North	Industrial – car wreckers operated by others.	
	Part of Lot 2 DP220347	
South	Industrial – scrap metal recycling yard operated by others	
East	Racecourse Road and then Cockle Creek	
West	Main Northern Rail line and then wetlands	
Nearest sensitive receptor (human health)	Residential housing located approximately 360m south east across Cockle Creek.	
Nearest sensitive receptor (environmental)	Cockle Creek located approximately 35m east and a waterbody approximately 30m west	



Figure 1Project Site Location and Layout (as at June 2018)



The existing Concrush facility comprises an active industrial site which is predominantly unsealed hardstand surfacing. There is one entrance/exit at the north eastern portion off Racecourse Road and all customer traffic is directed over the weighbridge upon entry to a number of stockpiling areas in either the western portion of the site (inert materials waste materials such as concrete, tiles and bricks) or the south eastern portion of the site (green waste). There are two (2) crusher/screen machines which process the inert waste materials such as concrete, tiles and bricks in the western portion of the site and transfer the material into stockpiles or product bays in the northern portion of the site. The section of road between the raw and processed stockpiles is two (2) way. There is also an office and maintenance area, and landscaped bunds situated along the southern boundary and part of the eastern boundary.

The proposed expansion portion of the Project currently comprise vacant / unused land, with long grass and scattered shrubs and trees throughout. A cleared, predominantly gravelled area is located in the north western portion of the site and an unpaved road runs along the site's northern boundary. There are a number of fill and other anthropogenic waste stockpiles including concrete, brick, timber and metal throughout the site. The majority of these stockpiles were situated along the southern portion of site. The western portion of the site is generally flat and the eastern portion of the site gently slopes to the east and Cockle Creek.

The expansion portion of the Project has been characterised (Ref [3]) as contaminated with bonded asbestos containing material (ACM) at, and below, the surface of the site. Concentrations of hydrocarbons, phenols, cyanide and metals in soil were either not detected or were detected at low concentrations below the relevant human health commercial/industrial land use criteria (Ref [4]). There were some concentrations of hydrocarbons and metals in excess of ecological criteria (Ref [4]) however due to the proposed use of the site and the absence of a correlation between concentrations in groundwater to these concentrations, they were not considered to present a risk to the environment.

Groundwater has been assessed within the expansion component of the Project at three (3) locations. Concentrations of hydrocarbon, phenols and metals in groundwater were either not detected or were detected at low concentrations below the relevant criteria with the exception of total recoverable hydrocarbons and chromium at one (1) location and zinc at all locations in excess of the ecological criteria (Ref [5]), noting that the criteria have been identified as conservative.

Acid sulfate soil was identified (Ref [6]) at depths as shallow as 0.7m below the surface and the Wallsend acid sulfate soils risk map indicates there is a high probability of acid sulfate soil materials.

## 1.2 **PROJECT DESCRIPTION**

The Project will be constructed over two (2) stages: this GMP applies to both stages however some elements of the GMP may not apply equally to both stages.

Stage 1 comprises:

- Works on the existing Concrush facility including:
  - Deconstruction of existing maintenance shed / amenities.
  - Construction of new entry and exit point to the north eastern corner of the site including a wheel wash for exiting traffic.



- Formalisation of a tip-off area for light vehicles depositing demolition and green waste.
- Removal of landscape bund walls from southern boundary.
- Consolidation of the inert waste stockpiling and processing area to remove the central trafficable road and to re-purpose solely for processed stockpiles.
- Construction of a wet concrete wash out bay in the south western corner.
- Construction of a sediment basin in the north western corner of the site.
- Works on the expansion portion of the Project including construction of:
  - A pad for green waste storage and processing in the eastern portion of the site.
  - A leachate dam in the south east portion of the site.
  - A constructed wetland in the south eastern corner of the site.
  - A pad for raw materials and processing area and construction of a concrete block noise wall on the eastern and southern extents.
  - A maintenance shed in the south western portion of the site including car parking spaces and amenities.
  - A sediment basin in the south western corner.
  - A trafficable route from the northern portion of the site in a clockwise direction.

The schematic of Stage 1 is presented in Figure 2 below.





**Figure 2** Stage 1 of the "Increase to Capacity" Project (approximate boundary between current facility and expansion portion in red dashed line).

It is noted that prior to any works being undertaken on the expansion portion of the Project, remediation will have to be completed.

Stage 2 comprises:

- Works on the existing Concrush facility including:
  - Alteration of the light vehicle tip-off area.
  - Addition of an exit for light vehicles only to Racecourse road adjacent the tip-off area.
  - Alteration to the orientation and size of the processed inert waste material areas.
  - Construction of two (2) weighbridges and associated office and amenities adjacent the northern boundary. These will be used exclusively for commercial vehicles. The existing weighbridges will be re-purposed for light vehicle traffic only.
  - Construction of an internal sealed haul road between the new weighbridges and the site access point. This will necessitate the relocation of three (3) water tanks currently situated at the northern boundary to one of the locations at which water tanks are to be located.
  - Alteration to the carparking areas adjacent the existing site office and amenities.
  - Installation of two (2) water tanks near the new weighbridge.



- Works on the expansion portion of the Project including:
  - Installation of two (2) water tanks on the southern boundary, two (2) adjacent to the maintenance shed and two (2) adjacent to the wet concrete washout bay (total of six (6)).
  - Minor alteration to the orientation and size of the inert waste raw stockpile and processing area.

The schematic of Stage 2 is presented in **Figure 3** below.





## 2 HYDROGEOLOGY AND BASELINE GROUNDWATER CONDITIONS

Seven (7) registered groundwater bores were found within 500m of the site based on a search of the WaterNSW groundwater bore data map (realtimedata.watercomau/water.stm) as presented in **Appendix A**. These bores are stated as being installed in 2004 within or in the vicinity of the existing Concrush facility, and were registered in one block. The bores are referred to as test bores, however no further information is provided on work summaries and Concrush have stated that current personnel have no knowledge of these bores. As such it is considered that these bores may have been mapped in the wrong location.

It is noted that there is a possibility for unregistered bores to be used in the wider area.



Two (2) groundwater wells were installed as part of an assessment (Ref [7]) of the proposed expansion component of the Project and a further well was installed as part of this GMP. The locations of the monitoring wells are presented in **Figure 4** below and the logs for these wells are included as **Appendix B**.



Figure 4Groundwater Flow based on Data from Monitoring Wells 22 May 2020

Groundwater was encountered at between 2m and 2.5m below the surface level during drilling and at between 1.03m and 2.7m below the surface during gauging / sampling events. Survey of the monitoring wells was undertaken in June 2020 and the latest groundwater levels have been adjusted to AHD as detailed in **Table 3** below.



	During Drilling (mbgs)	Sampling 27 June 2018		Gauging 22 May 2020		Sampling 29 May 2020		Sampling & Gauging 4 September 2020	
рци	2.0	1.03mbgs	1.15mAHD	1.7mbgs	0.48mAHD	1.25mbgs	0.93mAHD	1.03mbgs	1.15mAHD
BH1	2.0	0.6 at low tide		1.3 & dropping		0.6 & rising		1.5 at high tide	
BH2	2.5	2.47mbgs	1.03mAHD	2.5mbgs	1.0mAHD	2.45mbgs	1.05mAHD	2.27mbgs	1.23AHD
		0.7 & c	Iropping	1.3 & 0	dropping	0.6	& rising	1.2 & d	ropping
BH3	2.2			2.7mbgs	-0.58mAHD	1.47mbgs	0.65mAHD	1.18mbgs	0.94mAHD
		2.2		1.3 & 0	dropping	1.1	& rising	1.2 & d	ropping

Groundwater Depths

Table 3

mbgs = metres below ground surface

Tide depths and status based on Newcastle Tide Heights and Times.



It is noted that depths to groundwater during drilling are considered approximate.

Based on this, groundwater flow has been estimated as presented in **Figure 4** above, noting that the layout and number of the groundwater monitoring wells may not provide sufficient information to understand the specific groundwater flows at the site.

Based on the contours it is considered that the groundwater flow direction is predominantly towards the east towards Cockle Creek however that some groundwater also flows in a westerly direction to the wetland. It is noted that the contours derived with the data from 29<sup>th</sup> May, 30<sup>th</sup> June and 4<sup>th</sup> September were generally consistent with those derived from 22<sup>nd</sup> May, albeit at different levels.

Groundwater monitoring wells have been sampled as part of the previous assessment (Ref [7]) and this GMP: results are compared to the relevant water guidelines in **Appendix C**. Whilst the drinking water criteria (Ref [8]) have been included in **Appendix C**, RCA does not consider that these are relevant to the site. The 95% protection value for fresh water has been chosen to assess the ecological risks associated with groundwater, noting that this is conservative as Cockle Creek is tidal and has been identified to be highly disturbed (Ref [9]).

Groundwater concentrations of hydrocarbons and phenols in BH1 and BH2 were not detected in either sampling round and are therefore considered below the human health and ecological criteria (Ref [4] and Ref [5]). Concentrations of total recoverable hydrocarbons (TRH) were in excess of the ecological criterion in BH3: concentrations of other hydrocarbons were not detected and sampling in September indicated that the hydrocarbon concentrations are either not consistent or are related to non-petroleum sources. Concentrations of nutrients and metals were also non detected or at low levels below the ecological criteria (Ref [5]) with the exception of:

- Ammonia in BH3 which was in excess of ecological criteria.
- NO<sub>x</sub> (nitrate + nitrite) in BH3 which was in excess of the ecological criterion.
- Phosphorous in BH1 which was in excess of the ecological criterion.
- Chromium in excess of the ecological criterion in BH3 only.
- Zinc in excess of the ecological criterion in four (4) of the five (5) samples from the locations in the sampling events to date.

Samples in excess of the criteria are presented in **Table 4** below. It is noted that the groundwater level in BH1 and BH3 is shallower than the applicable depth (2m) for assessment of risk from hydrocarbon vapour. As there have been no volatile fractions of hydrocarbons detected this is not considered to indicate uncertainty in the assessment. It is noted that following the application of fill to the site in accordance with the remedial action plan (RAP, Ref [3]), the groundwater will be at a depth greater than 2m below the surface.



Sample Identification (depth of aquifer)	Analyte	Criteria as relevant for depth and stratum of the sample	Concentration(s)
	Phosphorous	0.025 <sup>b</sup>	0.24
BH1 (1.25m)	Zinc	0.008ª	0.007 0.025
BH2 (2.45m)	Zinc	0.008ª	0.009 0.012
	Ammonia	0.9ª	1.38
	NOx	0.4 <sup>b</sup>	0.06
BH3 (1.47)	TRH C6-C40	0.07ª	0.34
	Chromium	0.001ª	0.002
	Zinc	0.008ª	0.118

 Table 4
 Groundwater Results above Relevant Criteria

All concentrations in mg/L.

<sup>a</sup> Ecological Protection Level for Fresh Receiving Water (Ref [5]).

<sup>b</sup> Lowland river criterion with coastal river environment criterion used where available (Ref [10]).

## 3 DEVELOPMENT INTERACTION WITH GROUNDWATER

The site will be trafficked by vehicles, operated by Concrush and customers, and there will be a workshop for vehicle maintenance in the western portion of the site. There is potential for contamination to arise from leaks and spills from the vehicles, whilst operating and during refuelling, and from the workshop. Soil and surface water are considered to be more at risk than groundwater from hydrocarbons from vehicles and workshops, however groundwater contamination could result if the leak/spill was persistent and/or undetected. Groundwater contamination would be more likely to result if surface water contamination was present in the wetlands to the west of the site: the potential for this will be limited due to the access restrictions (no operations in the wetland) and the presence of the landscaped bund which will prevent surface water directly entering the wetland.

The current proposed surfacing across the site will be a well graded material with between 10-40% fines in accordance with the recommendations for an unsealed road wearing course (Ref [11]) and a plasticity index of between 8 and 12. It is considered that this material will compact to a relatively low permeability material ( $x10^{-6}-x10^{-7}m/s$ ) such that the infiltration through the fill materials will be reduced compared to the current levels. The site will also be graded to encourage the dispersal of surface water for operational purpose, further minimising the infiltration potential.

There are a number of excavations, refer **Figure 3**, which will be undertaken at the site during the construction, some of which will remain as part of the site features. The design depth of the excavations has been considered with the modelled depth of groundwater, refer **Figure 4**, at the location in **Table 5** below.



Construction Element	Base of Excavation (mAHD)	Modelled Depth of Groundwater (mAHD)	Groundwater likely to be Encountered?
Sediment Basin 1	0.25	Presumed 1.3 maximum	Yes
Sediment Basin 2	1.3	<0.4	No
Leachate Dam	2.05	-0.6	No
Constructed Wetland	2.8	-0.6	No
Wheel Wash	1.5	Presumed 1.3 maximum	Unlikely
Concrete Washout Bay	2.0	~0.5	No

 Table 5
 Details of Proposed Excavations

Whilst there is some uncertainty regarding groundwater levels on the existing Concrush facility, based on the information it is considered that all excavations will be situated above the groundwater table with the exception of Sediment Basin 1 which will be excavated below the depth of groundwater. As such, some extraction of groundwater is considered likely: monitoring of extracted groundwater will be required as detailed in **Section 4.1** below. It is envisaged that there may be some seepage into the excavation for the installation of the wheel wash, depending on how long it is kept open during construction and some groundwater extraction may be required for logistical purpose.

Potential groundwater contamination is considered to comprise:

- pH impacted waters from concrete fines.
- Nutrient impacted waters from the green waste area.
- Hydrocarbon impacted waters due to general trafficking of the site surface by vehicles and from the maintenance area.

Sediment is also considered to potentially accumulate within the sedimentation dams, although this would primarily be a concern during construction, and to a lesser extent the leachate pond and constructed wetlands. The presence of sediment is not considered to pose a potential risk to groundwater as it would not be considered likely to migrate through the soil strata: the potential risk to surface water has been addressed in the Water Discharge Management Plan (Ref [12]).

The leachate pond and constructed wetland will be lined with a 0.6m thick geocomposite clay liner (GCL) with a low permeability (x10<sup>-7</sup>m/s) and as such it is considered that, as long as the GCL remains intact, that there is negligible potential for leachate to enter the groundwater table. In the event that there is a structural issue with the liner that results in a leak, the leachate may migrate through the strata to groundwater approximately 2m and more below the base of the structures. In the event that the leachate pond is overtopped groundwater may potentially be impacted, although it is noted that this would only be possible in a high rainfall event / period which would dilute the leachate and likely represents more of a potential impact to surface water than groundwater. The potential contaminants are considered to be hydrocarbons, ammonia, nitrate and phosphorous.



The sedimentation dams will be lined with a high visibility marker layer below the depth of material imported for the purpose of remediation (Ref [3]) however this material is not intended to restrict flow of water into the underlying surface and subsequently into groundwater. The base of both Basins, and the wall of Sediment Basin 1 to 1.3m AHD will be lined with concrete to prevent the interaction of groundwater with the water within the Basins. Potential contaminants are considered to be limited to hydrocarbons: contaminants associated with green waste are not considered to potentially impact at the sedimentation dams.

Management measures for the protection of groundwater quality are detailed in Table 6.



Potential Source of Contamination	Management Measure			
Petroleum fuels from Concrush vehicles	Routine maintenance. Daily vehicle check for indications of leaks. Refuelling of mobile and fixed plant and equipment to use modern, well maintained specialised refuelling pumps and systems. A spill kit at hand during all refuelling works.			
Petroleum fuels from customer vehicles	Concrush personnel to observe vehicles on weigh bridge for potential leaks. Concrush personnel to be vigilant for indications of leaks on site in customer areas.			
	Appropriate receptacles for all types of wastes which will be generated to be available within an appropriately sized (1.5 x volume) bunded area.			
	Personnel to be trained in the appropriate use and disposal of fuels, oils and other chemicals.			
Workshop Operations	Waste removal protocol to be implemented and managed by Ya Manager.			
	Spill kits to be available at all refuelling stations and at areas where chemicals are being used and stored.			
	Spill response protocol to be implemented.			
Green waste area	Grading of the site to promote runoff from the green waste areas (customer drop off, stockpile and processing) leachate into the leachate pond.			
	Base and walls to be lined with a GCL to minimise infiltration from the base of the pond.			
Leachate Pond	Piped discharge to constructed wetlands to facilitate treatment of leachate.			
	Spillway to facilitate discharge to sediment basin 2 in high rainfall events.			
	Site inspections (refer Section 4.1).			
	Base and walls to be lined with a GCL to minimise infiltration from the base of the wetland.			
Constructed wetlands	Vegetation and depth control within wetland to facilitate treatment of leachate.			
	Evaporation and evapotranspiration of water such that there is no discharge.			
	Site inspections (refer Section 4.1).			
Sedimentation Dam	Concrete base in Sediment Basin 2, concrete base and walls in Sediment Basin 1 to minimise infiltration and separate water from groundwater.			

## Table 6 Management Measures for Groundwater Protection



# 4 GROUNDWATER MONITORING

## 4.1 DURING CONSTRUCTION

No monitoring of groundwater contamination is considered to be required during the construction of the Project with the exception of the collection of samples from BH1 and BH3 and analysis for ammonia, nitrate and phosphorous to provide further baseline information for later comparison as discussed in **Section 4.2** below. Samples should be collected on a monthly basis for the construction period (currently envisaged to be five (5) months).

Monitoring of the groundwater level is to be undertaken at the three (3) existing monitoring wells once a week with a weighted tape or water level monitor during construction. This information will be used to inform the construction process about the likelihood of encountering groundwater during excavations and to provide information regarding the change to groundwater levels, currently not anticipated to be significant (Ref [13]), due to the application of fill at the site. The log will be required as part of the validation of the remediation (Ref [3]).

Monitoring of groundwater pH is to be undertaken at the three (3) existing monitoring wells once a week with a calibrated water quality meter. The readings are to be recorded on a register and be available for inspection as required: the log will be required as part of the validation of the remediation (Ref [3]).

Monitoring of the pH in water collected within excavations (either due to groundwater or surface/rain water) is to be undertaken on a daily basis and recorded in a log to be used as part of the validation of the remedial works (Ref [3]). If the monitoring programme shows that pH of the water in the excavations has fallen to below pH 6 then the water will require treatment by lime dosing to achieve a target pH of 6 to 8 prior to removal of water. Collected water can be discharged onto site as long as it does not enter the wetlands in the west of the site or the stormwater system.

During groundwater extraction the following is required:

- Groundwater levels are to be checked twice daily (~9am and ~3pm) in the three (3) groundwater monitoring wells prior to, during and following groundwater extraction. Groundwater levels are to be recorded on a register and be available for inspection as required: the log will be required as part of the validation of the remediation (Ref [3]).
  - In the event that groundwater levels drop by more than 0.3m from the previous reading, the groundwater extraction is to cease and not to recommence until the groundwater level has recovered to its previous level. Groundwater extraction is to recommence at a lower rate to minimise the potential for significant drawdown reoccurring.
- The pH of the water to be extracted must be checked with a calibrated water quality meter. The readings are to be recorded on a register and be available for inspection as required: the log will be required as part of the validation of the remediation (Ref [3]).
  - If the pH is between 6 and 8, the groundwater may be discharged onto the surface of the site. The extraction volume is to be recorded by a calibrated flow meter. No water is to be discharge beyond the site boundaries.



If less than 6, the groundwater is to be treated with lime in accordance with the ASSMP (Ref [13]). This should be applied in a liquid form and allowed to mix through the groundwater or be actively mixed. The pH must be checked at four (4) separate locations within the excavation to confirm the successful mixing and neutralisation prior to the extraction of groundwater. The pH at the existing three (3) groundwater monitoring wells are to be checked in the event that lime application has been required.

Groundwater is not be discharged from site without a licence (from NSW EPA and/or Lake Macquarie Council) for the discharge.

A summary of the monitoring requirements is included as **Appendix D**.

## 4.2 DURING OPERATIONS

Following the completion of construction, monitoring will be required primarily to assess for potential leaks from the leachate pond and constructed wetlands. It is anticipated that BH2 will be decommissioned during the placement of fill at the proposed expansion component of the Project. It is not considered necessary to replace this well as it is not situated near potential contamination sources to groundwater and because long term monitoring of groundwater levels is not considered to be required.

Visual assessment of the water depth within the leachate pond and constructed wetlands is to be undertaken on a daily basis by the Yard Manager (or delegate). The assessment is to consider whether there is a noticeable depth change since the previous day's observations and take into account any rainfall between the observations. The observation is also to assess any indications of liner rupture / damage (such as objects in the ponds, visible GCL or marker layer). In the event that a potential issue is observed, the contingency plan as detailed in **Section 6** is to be implemented.

The visual inspection should also consider the potential for sedimentation of the leachate pond and the constructed wetlands to be occurring such that there may be a decreased capacity.

Monitoring of groundwater quality is to be undertaken on a monthly basis at BH1 and BH3 and is to comprise:

- Groundwater level gauging. This is recommended as part of standard industry best practice: monitoring of groundwater level data is not considered to be an area of concern for the operational site.
- Depth of well. This is recommended to assess potential sedimentation of the wells: if the well is identified to be adversely affected by silt (>0.3m loss of bore depth) the sediment is to be removed.
- Volume purged prior to collection of the sample.
- Field readings for general water quality (pH, electrical conductivity, turbidity, temperature, salinity) with a calibrated water quality meter. This is recommended as part of standard industry best practice, although the pH results would be considered a potential indicator of leachate impact and may require the implementation of the contingency plan as detailed in **Section 6**.
  - Purging is to continue until pH and EC readings have stabilised.
  - These readings are to be recorded for inclusion in the Annual Report.



- Collection and analysis of water samples for ammonia, nitrogen (nitrate and nitrite) and phosphorous. Hydrocarbons (TRH, BTEX, PAH) will be included in the analytical suite once every quarter.
  - Sampling is to be undertaken by a low flow pump: all monitoring wells will have designated tubing from the original sampling works.
  - Sampling is to be undertaken after the relevant monthly sampling of surface water in accordance with the Water Discharge Management Plan (Ref [12]) to facilitate consideration of additional potential contaminants.
  - In the event that surface water monitoring indicates the presence of other contaminants, such as metals, in excess of the criteria, these may be added to the scope of the analysis. Samples for metals are to be field filtered (0.45μm) prior to preservation in laboratory supplied containers.
  - Duplicates are to be collected at a frequency of one intralaboratory and one interlaboratory duplicate per year.
  - An equipment wash is to be collected in the event that observable hydrocarbon impact is identified within the groundwater.
- Comparison of the results to the ecological criteria for fresh and marine waters (Ref [5]) as presented in **Table 7** below. If there is contamination identified in excess of the criteria where there wasn't prior to the development commencing and/or if there is a greater than 30% increase to the average of the pre-development concentration for that sampling location, further assessment as detailed in **Section 5** is to be implemented.
- Reporting of the results in the Annual Report<sup>1</sup> as required by the site's EPL.

A summary of the monitoring requirements is included as **Appendix D**.



<sup>&</sup>lt;sup>1</sup> It is noted that the EPL has not been issued for the expanded operations at the time of writing and as such the extent of reporting required by the EPL is unknown.

Analyte	Fresh Water Criterion	Marine Water Criterion	
TRH	0.007		
Benzene	0.95	0.7	
Toluene	0.18	0.18	
Ethylbenzene	0.08	0.005	
meta- and para-Xylene	0.275	0.275	
ortho-Xylene	0.35	0.35	
Naphthalene	0.016	0.07	
Phenanthrene	0.0006	0.0006	
Anthracene	0.00001	0.00001	
Fluoranthene	0.001	0.001	
Benzo(a) pyrene	0.0001	0.0001	
Ammonia	0.9 0.91		
Nitrate	2.4		
NO <sub>x</sub> (nitrate + nitrite)	0.04		
Phosphorous	0.025		

## **Table 7**Groundwater Analyte Criteria

Criteria from ANZG (Ref [5]) with the exception of NO<sub>x</sub> and phosphorous for Lowland Rivers (coastal environment where available) (Ref [10]).

## 5 INVESTIGATION PROTOCOL

Incidents identified with relation to groundwater during construction will be managed under the CEMP (Ref [14]) and the ASSMP (Ref [13]).

In the event that groundwater concentrations of contaminants trigger the requirement for further assessment, refer **Section 4.2**, , an investigation is to be implemented by the Business Manager. The investigation will comprise:

- Discussion with the contaminated land consultant regarding the significance of the concentration of concern. Actions may include:
  - Re-sampling to confirm concentrations.
  - Speciation testing of TRH to identify whether the identified concentrations are natural hydrocarbons or related to petroleum hydrocarbons.
  - Further sampling before the next scheduled monitoring round.
  - No action. This may be the case if the concentrations exceed low reliability criteria for marine water however are below the criteria for fresh water and/or if the upgradient monitoring well indicates similar impact as the downgradient well.
- Discussion with Yard Manager re any incidents and site activities to assess whether these are the potential source of contamination.



- Site inspection to assess for potential causes of the contamination. This will include:
  - The condition of the liner within the leachate pond and constructed wetlands where the contaminant of concern is nutrients.
  - All operational machinery at site and at the workshop where hydrocarbons are the contaminant of concern.
- Actions to ensure that there is no on-going contamination of the groundwater if the source is identified. This may include:
  - Pumping of leachate / water from the leachate pond or constructed wetland to allow for repair of the liner.
  - Training of personnel with regards to appropriate use and disposal of petroleum products / use of spill kit.
  - Excavation of contaminated soil and replacement with certified material. Excavated material would be removed to a licensed waste facility based on classification as assessed by the contaminated land consultant.
  - Remediation of groundwater. This would be based on the recommendations of the contaminated land consultant and would generally only be required for groundwater concentrations which were considered to pose a risk to human health or the environment. The NSW EPA would be notified of these conditions in accordance with the requirements of the Contaminated Land Management Act.
- Preparation of an incident report for inclusion with the Annual Report.

## 6 CONTINGENCY PLAN

Some incidents at site may give rise to the potential for groundwater contamination and there may be actions required following the investigation protocol as identified in **Section 5**. **Table 8** below identifies the potential contingency actions.



Unexpected event and possible impact	Contingency action for Concrush
Fuel look / apill from machinery	Implementation of clean-up procedures.
Fuer leak / spill from machinery	Re-training of personnel if incident related to procedure.
	Implementation of clean-up procedures.
Chemical leak / spill from Workshop	Re-training of personnel if incident related to procedure.
	Augmentation of bunded area / storage receptacles if incident related to infrastructure.
Surface water from green waste area not entering leachate pond	Regrading of area / installation of bunds to direct surface water to leachate pond.
Water level in leachate pond / constructed wetlands dropping unexpectedly.	Detailed inspection of GCL to be undertaken. May require pumping of water from affected area to other leachate containment facility.
Sedimentation in leachate pond / constructed wetlands.	Removal of sediment back to design level to be undertaken with appropriate care to ensure integrity of GCL is not compromised.
Domono identified in loophote nand/	Damage to be repaired as soon as practicable.
constructed wetlands GCI	Investigation to be undertaken as to cause of damage.
	Augmentation of protective layer over GCL if required.
Contaminants identified in Sodimentation	Contaminants to be added to the groundwater sampling programme for next three (3) events.
Dam	Investigation to be undertaken regarding potential source of contaminants and any associated actions considered necessary undertaken.
	Consultation with contaminated land consultant regarding significance of issue.
	Actions required to confirm significance of issue.
Contaminants identified in groundwater	Investigation to be undertaken regarding potential source of contaminants including consultation with Yard Manager and detailed site inspection.
	Actions required to stop continuation of contamination migration to groundwater.
	Remediation of groundwater as assessed necessary by the contaminated land consultant and/or the NSW EPA.

#### **Table 8**Contingency Plan Actions for Groundwater Contamination



# 7 REVIEW OF THIS PLAN

Concrush have as part of their ongoing business programme, a protocol to review all management plans with the objectives of meeting environmental standards including those for water quality. The operational component of this GMP will be incorporated into the Operational Environmental Management Plan (OEMP, Ref [15]) which Concrush will review annually at the time of the Order and Exemption renewal.

The review will consider:

- Observations at the site re work practices and environmental controls;
- Comments provided by Concrush, Council or others;
- Records of environmental non-conformance;
- Changes in organisational structure;
- Changes in construction methodology;
- Changes in legislation and standards;
- Opportunities for improvement / refinement of the management of groundwater quality at the Concrush Teralba site.

Continual improvement of the OEMP 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:

- Identify areas of opportunity for improvement of environmental management which leads to improved environmental performance.
- Determine causes of non-conformances and deficiencies.
- Develop and implement a plan of corrective and preventative action to address nonconformances and deficiencies.
- Verify the effectiveness of the corrective and preventative actions; and document any changes in procedures resulting from process improvement.

## REFERENCES

- [1] Department of Planning, Industry & Environment, SSD-8753 Concrush Resource Recovery Facility, Endorsement of experts to prepare a Water Discharge Management Plan, Groundwater Management Plan and Operational Noise Management Plan, 14 May 2020.
- [2] Lake Macquarie City Council Local Environmental Plan 2014, under the Environmental Planning and Assessment Act 1979, published 2014
- [3] RCA Australia, *Remedial Action Plan, Expansion Component, Expansion of the Concrush Resource Recovery Facility, Racecourse Road, Teralba,* RCA ref:13589-803/2, June 2020.



- [4] NEPC, National Environment Protection (Assessment of Site Contamination) Measure, 1999 as amended 2013.
- [5] ANZG, Australian and New Zealand Guidelines for Fresh and Marine Water Quality Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia., August 2018. Available at www.waterquality.gov.au/anz-guidelines.
- [6] NSW Acid Sulfate Soil Management Advisory Committee, *Acid Sulfate Soil Manual*, August 1998.
- [7] RCA Australia, Baseline Contamination Assessment, Proposed Concrush Facility Expansion, Racecourse Road, Teralba, RCA ref:13589-401/3, November 2018.
- [8] National Health and Medical Research Council, *Australian Drinking Water Guidelines*, 2011 updated 2019.
- [9] Umwelt, Concrush Increase to Capacity Project, Environment Impact Statement, November 2018.
- [10] ANZECC, Australian and New Zealand Guidelines for Fresh and Marine Water Quality, October 2000.
- [11] Austroads, Guide to Pavement Technology, Part 6: Unsealed Pavements, 2009.
- [12] Umwelt, Water Discharge Management Plan, Concrush Resource Recovery Facility, Report No: 4987/ R01, May 2020.
- [13] RCA Australia, Acid Sulfate Soil Management Plan, Expansion of the Concrush Resource Recovery Facility, Teralba, RCA ref:13589-804, July 2020.
- [14] RCA Australia, Construction Environmental Management Plan, Expansion of the Concrush Resource Recovery Facility, Teralba, RCA ref: 13589-801/0, September 2020.
- [15] WSP, Operational Environment Management Plan for Resource Recovery Facility, Racecourse Road, Teralba NSW (Development Consent SSD8753), ref: PS120189-ENV-REP-001 Rev B, July 2020.

### GLOSSARY

BTEX	Benzene, toluene, ethylbenzene, xylene.
РАН	Polycyclic aromatic hydrocarbons. Multi-ring compounds found in fuels, oils and creosote. These are also common combustion products.
TPH	Total petroleum hydrocarbons.
TRH	Total recoverable hydrocarbons



# Appendix A

**Registered Groundwater Bore Details** 



# NSW Office of Water Work Summary

#### GW200158

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose (s): Intended Purpose(s):	TEST BORE
Work Type: Work Status: Construct.Method: Owner Type:	Bore		
Commenced Date: Completion Date: Contractor Name: Driller:	10/12/2004	Final Depth: Drilled Depth:	
Assistant Driller:			
Property: GWMA: GW Zone:	N/A 21 RACECOURSE ROAD TERALBA 2284 - -	Standing Water Level: Salinity: Yield:	

#### Site Details

Site Chosen By:

		Form A: Licensed:	<b>County</b> NORTH NORTHUMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region:	20 - Hunter	CMA Map:			
River Basin: Area/District:	- Unknown	Grid Zone:		Scale:	
Elevation: Elevation Source:	0.00 m (A.H.D.) Unknown	Northing: Easting:	6353961.0 370941.0	Latitude: Longitude:	32°56'42.1"S 151°37'09.7"E
GS Map:	-	MGA Zone:	0	Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From <sup>-</sup> (m) (	To (m)	Thickness (m)	WBZ Туре	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
----------------------------	-----------	------------------	----------	---------------	---------------	----------------	----------------------	------------------	--------------------

# Geologists Log

Drillers Log

Page	2	of 2	
	_		

From	То	Thickness	Drillers Description	Geological Material	Comments
(m)	(m)	(m)		_	

#### Remarks

10/12/2004: Form A Remarks: No Form A received Bore location map received Bore A of 7 bores (A - G)

\*\*\* End of GW200158 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# NSW Office of Water Work Summary

#### GW200159

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose	TEST BORE
		(s): Intended Purpose(s):	
Work Type:	Bore		
Work Status:			
Construct.Method:			
Owner Type:			
Commenced Date: Completion Date:	12/12/2004	Final Depth: Drilled Depth:	
Contractor Name:			
Driller:			
Assistant Driller:			
Property:	N/A 21 RACECOURSE ROAD TERALBA 2284	Standing Water Level:	
GWMA:	-	Salinity:	
GW Zone:	-	Yield:	

## **Site Details**

Site Chosen By:

		Form A: Licensed:	<b>County</b> NORTH NORTHUMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region:	20 - Hunter	CMA Map:			
River Basin: Area/District:	- Unknown	Grid Zone:		Scale:	
Elevation: Elevation Source:	0.00 m (A.H.D.) Unknown	Northing: Easting:	6353979.0 370946.0	Latitude: Longitude:	32°56'41.5"S 151°37'09.9"E
GS Map:	-	MGA Zone:	0	Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From <sup>-</sup> (m) (	To (m)	Thickness (m)	WBZ Туре	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
----------------------------	-----------	------------------	----------	---------------	---------------	----------------	----------------------	------------------	--------------------

# Geologists Log

Drillers Log

Page	2	of 2	
	_		

From	То	Thickness	Drillers Description	Geological Material	Comments
(m)	(m)	(m)	-	-	

#### Remarks

12/12/2004: Form A Remarks: No Form A received Bore location map received Bore B of 7 bores (A - G)

\*\*\* End of GW200159 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# NSW Office of Water Work Summary

#### GW200160

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose (s): Intended Purpose(s):	TEST BORE
Work Type: Work Status: Construct.Method: Owner Type:	Bore		
Commenced Date: Completion Date:	10/12/2004	Final Depth: Drilled Depth:	
Contractor Name: Driller: Assistant Driller:			
Property: GWMA: GW Zone:	N/A 21 RACECOURSE ROAD TERALBA 2284 - -	Standing Water Level: Salinity: Yield:	

### **Site Details**

Site Chosen By:

		Form A: Licensed:	<b>County</b> NORTH NORTHUMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region:	20 - Hunter	CMA Map:			
River Basin: Area/District:	- Unknown	Grid Zone:		Scale:	
Elevation: Elevation Source:	0.00 m (A.H.D.) Unknown	Northing: Easting:	6353964.0 370960.0	Latitude: Longitude:	32°56'42.0"S 151°37'10.4"E
GS Map:	-	MGA Zone:	0	Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From <sup>-</sup> (m) (	To (m)	Thickness (m)	WBZ Туре	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
----------------------------	-----------	------------------	----------	---------------	---------------	----------------	----------------------	------------------	--------------------

# Geologists Log

Drillers Log

Page	2	of 2	
	_		

From	То	Thickness	Drillers Description	Geological Material	Comments
(m)	(m)	(m)	-	_	
<i>,</i>					

#### Remarks

10/12/2004: Form A Remarks: No Form A received Bore location map recieved Bore C of 7 bores (A - G)

\*\*\* End of GW200160 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# NSW Office of Water Work Summary

#### GW200161

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose (s): Intended Purpose(s):	TEST BORE
Work Type:	Bore		
Work Status:			
Construct.Method:			
Owner Type:			
Commenced Date: Completion Date:	10/12/2004	Final Depth: Drilled Depth:	
Contractor Name:			
Driller:			
Assistant Driller:			
Property:	N/A 21 RACECOURSE ROAD TERALBA 2284	Standing Water Level:	
GWMA:	-	Salinity:	
GW Zone:	-	Yield:	

#### Site Details

Site Chosen By:

		County Form A: NORTH Licensed: NORTHUMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region:	20 - Hunter	СМА Мар:		
River Basin: Area/District:	- Unknown	Grid Zone:	Scale:	
Elevation: Elevation Source:	0.00 m (A.H.D.) Unknown	Northing: 6353941.0 Easting: 370978.0	Latitude: Longitude:	32°56'42.8"S 151°37'11.1"E
GS Map:	-	MGA Zone: 0	Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From <sup>-</sup> (m) (	To (m)	Thickness (m)	WBZ Туре	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
----------------------------	-----------	------------------	----------	---------------	---------------	----------------	----------------------	------------------	--------------------

# Geologists Log

Drillers Log

From	То	Thickness	Drillers Description
(m)	(m)	(m)	-

Comments

#### Remarks

10/12/2004: Form A Remarks: No Form A received Bore location map only received Bore D of 7 bores (A - G)

#### \*\*\* End of GW200161 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# NSW Office of Water Work Summary

#### GW200162

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose (s): Intended Purpose(s):	TEST BORE
Work Type: Work Status: Construct.Method: Owner Type:	Bore		
Commenced Date: Completion Date:	10/12/2004	Final Depth: Drilled Depth:	
Contractor Name: Driller: Assistant Driller:			
Property: GWMA: GW Zone:	N/A 21 RACECOURSE ROAD TERALBA 2284 - -	Standing Water Level: Salinity: Yield:	

## **Site Details**

Site Chosen By:

		County Form A: NORTH Licensed: NORTH	UMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region:	20 - Hunter	СМА Мар:			
River Basin: Area/District:	- Unknown	Grid Zone:		Scale:	
Elevation: Elevation Source:	0.00 m (A.H.D.) Unknown	Northing: 635393 Easting: 370980	9.0 .0	Latitude: Longitude:	32°56'42.9"S 151°37'11.2"E
GS Map:	-	<b>MGA Zone:</b> 0		Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From	То	Thickness	WBZ Type	S.W.L.	D.D.L.	Yield	Hole	Duration	Salinity
(m)	(m)	(m)		(m)	(m)	(L/s)	Depth (m)	(hr)	(mg/L)

# Geologists Log

Drillers Log

Page	2	of 2	
	_		

From	То	Thickness	Drillers Description	Geological Material	Comments
(m)	(m)	(m)	-	-	

#### Remarks

10/12/2004: Form A Remarks: No Form A received Bore location map received Bore E of 7 bores (A - G)

\*\*\* End of GW200162 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# NSW Office of Water Work Summary

#### GW200163

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose (s): Intended Purpose(s):	TEST BORE
Work Type: Work Status: Construct.Method: Owner Type:	Bore		
Commenced Date: Completion Date: Contractor Name:	10/12/2004	Final Depth: Drilled Depth:	
Assistant Driller:			
Property: GWMA: GW Zone:	N/A 21 RACECOURSE ROAD TERALBA 2284 - -	Standing Water Level: Salinity: Yield:	

## **Site Details**

Site Chosen By:

		Cou Form A: NOF Licensed: NOF	n <b>ty</b> RTH RTHUMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region:	20 - Hunter	CMA Map:			
River Basin: Area/District:	- Unknown	Grid Zone:		Scale:	
Elevation: Elevation Source:	0.00 m (A.H.D.) Unknown	Northing: 6353 Easting: 3709	3939.0 960.0	Latitude: Longitude:	32°56'42.8"S 151°37'10.4"E
GS Map:	-	<b>MGA Zone</b> : 0		Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From <sup>-</sup> (m) (	To (m)	Thickness (m)	WBZ Туре	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
----------------------------	-----------	------------------	----------	---------------	---------------	----------------	----------------------	------------------	--------------------

# Geologists Log

Drillers Log

Page	2	of 2	
	_		

From	То	Thickness	Drillers Description	Geological Material	Comments
(m)	(m)	(m)		-	

#### Remarks

10/12/2004: Form A Remarks: No Form A received Bore location map received Bore F of 7 bores (A - G)

\*\*\* End of GW200163 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# NSW Office of Water Work Summary

#### GW200164

Licence:	20BL169523	Licence Status:	ACTIVE
		Authorised Purpose (s): Intended Purpose(s):	TEST BORE
Work Type: Work Status: Construct.Method: Owner Type:	Bore		
Commenced Date: Completion Date:	10/12/2004	Final Depth: Drilled Depth:	
Contractor Name: Driller: Assistant Driller:			
Property: GWMA: GW Zone:	N/A 21 RACECOURSE ROAD TERALBA 2284 - -	Standing Water Level: Salinity: Yield:	

## **Site Details**

Site Chosen By:

		Coun Form A: NORT Licensed: NORT	<b>ty</b> ГН ГНUMBERLAND	<b>Parish</b> NORTH.59 TERALBA	<b>Cadastre</b> 2 220347 Whole Lot 2//220347
Region: 2	20 - Hunter	CMA Map:			
River Basin: - Area/District:	- Unknown	Grid Zone:		Scale:	
Elevation: ( Elevation Source:	0.00 m (A.H.D.) Jnknown	Northing: 63538 Easting: 37101	936.0 10.0	Latitude: Longitude:	32°56'43.0"S 151°37'12.3"E
GS Map:		<b>MGA Zone:</b> 0		Coordinate Source:	Map Interpretation

#### Construction

Negative depths indicate Above Ground Level; C-Cemented; SL-Slot Length; A-Aperture; GS-Grain Size; Q-Quantity; PL-Placement of Gravel Pack; PC-Pressure Cemented; S-Sump; CE-Centralisers

Hole	Pipe	Component	Туре	From	То	Outside	Inside	Interval	Details
		-		(m)	(m)	Diameter	Diameter		
						(mm)	(mm)		

#### Water Bearing Zones

From <sup>-</sup> (m) (	To (m)	Thickness (m)	WBZ Туре	S.W.L. (m)	D.D.L. (m)	Yield (L/s)	Hole Depth (m)	Duration (hr)	Salinity (mg/L)
----------------------------	-----------	------------------	----------	---------------	---------------	----------------	----------------------	------------------	--------------------

# Geologists Log

Drillers Log

Page	2	of 2	
	_		

From	То	Thickness	Drillers Description	Geological Material	Comments
(m)	(m)	(m)			

#### Remarks

10/12/2004: Form A Remarks: No Form A received Bore location map received Bore G of 7 bores (A - G)

#### \*\*\* End of GW200164 \*\*\*

Warning To Clients: This raw data has been supplied to the NSW Office of Water by drillers, licensees and other sources. The NOW does not verify the accuracy of this data. The data is presented for use by you at your own risk. You should consider verifying this data before relying on it. Professional hydrogeological advice should be sought in interpreting and using this data.

# Appendix B

Groundwater Monitoring Well Logs

		RCA	4			ENVIRONI	MEN	TAI	BC	DREHOLE LOG BH1
G P C P	EOTEC ROJE LIENT ROJE OCAT	CT No: 1356 CT No: 1356 CT: Concrush CT: Contam	RALI ARONMEN 89 Pty Ltd ination A ourse Ro	Assess bad, Te	ment eralba	DATE COI DATE COI SURFACE COORDS: DRILL MC DRILLER	MMENC MPLETE RL: DEL: G NAME:	ED: 18/ D: 18/0	06/2018 6/2018 6712	SHEET 1 OF 1
	В	orehole Info	rmation			Field Material In	formatio	n		
METHOD	WATER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	(mqq) OI9	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	BORE CONSTRUCTION
RCA NON CORED LOG 13589-LOGS GPJ < <drawingfile>&gt; 20/07/2018 12:40 Produced by gNT Professional, Developed by Datgel</drawingfile>			BH1a QA2 0.10m	-0.5 		FILL, Sandy CLAY, brown, with some sandstone and igneous gravel NATURAL, Sandy CLAY, grey Saturated at 2.0m	-0	W S		← Backfill
3.1_RCA_STANDARD.GLB_Lo				- 4.50) - - -		BOREHOLE BH1 TERMINATED AT 4.50 m				
RCA_LIB_06	LOGO	GED: RJL				CHECKED: FB		DA	TE: 20/0	)7/2018

1



# **ENVIRONMENTAL BOREHOLE LOG**

BH2 SHEET 1 OF 2

DATE COMMENCED: 18/06/2018 DATE COMPLETED: 18/06/2018 SURFACE RL: COORDS: DRILL MODEL: Geoprobe 6712 DRILLER NAME:

PROJECT No: 13589 CLIENT: Concrush Pty Ltd PROJECT: Contamination Assessment LOCATION: Racecourse Road, Teralba

Borehole Information						Field Material Information					
METHOD	WATER	FIELD TEST	SAMPLE	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppm)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	BORE CONSTRUCTION	
			BH2a QA1 0.10m	_		FILL, Clayey SAND, brown, with some igneous gravel	-0	D			
				-							
				- 0.40 - 0.5		FILL, Sandy CLAY, dark brown, with some igneous gravel and trace of coal and timber					
				-							
			1 00m	-							
			BH2b 1.10m	- 1.0			-0				
				- 1.5							
gel				-						-	
ped by Dat										_ <del>⊲</del> Bentonite	
nal, Develo				-		NATURAL, Sandy CLAY, grey				-	
Profession				-						-	
ed by gINT				- 2.5		Saturated at 2.5m		S	-		
:40 Produc				-						- Gravel	
07/2018 12			3.00m BH2c				-0				
-ile>> 20/0			3.10m	-						이는 이	
ChawingF				-							
GS.GPJ <				- 3.5							
13589-LO				-							
RED LOG				-4.0							
A NON CO				-							
3 Log RC				4.5							
DARD.GL				-4.5							
RCA_STAN											
LIB_08.1_F	1										
RCA	LOGO	GED: RJL				CHECKED: FB		DA	TE: 20/0	07/2018	

RCA	
GEOTECHNICAL • ENVIRONMENTAL	
PROJECT No: 13589 CLIENT: Concrush Pty Ltd PROJECT: Contamination Assessment	

# **ENVIRONMENTAL BOREHOLE LOG**

BH2

SHEET 2 OF 2

DATE COMMENCED: 18/06/2018 DATE COMPLETED: 18/06/2018 SURFACE RL: COORDS: DRILL MODEL: Geoprobe 6712 DRILLER NAME:

LOCATION: Racecourse Road, Teralba

L		Bore	ehole Inform	mation			Field Material Information					
METHOD		WATER	FIELD	SAMPLE	DEPTH (m)	GRAPHIC LOG	DESCRIPTION (SOIL NAME; plasticity/grain size, colour, particle shape, secondary components, minor constituents) (ROCK NAME; grain size, colour, minor constituents)	PID (ppm)	MOISTURE/ WEATHERING	CONSISTENCY/ RELATIVE DENSITY/ STRENGTH	E	SORE CONSTRUCTION
					- - - 5.5 - -		NATURAL, Sandy CLAY, grey		S			
					6.00	15 · 1 · 18	BOREHOLE BH2 TERMINATED AT 6.00 m					
y Datgel					- - - 6.5 - -							
ped by					-7.0							
Develo					-							-
INT Professional, I												-
ed by gl					- 1.5							-
2018 12:40 Produce					-							-
1gFile>> 20/07/2					- 8.0							-
<drawir<< td=""><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td></drawir<<>					-							-
GPJ <					- 8.5							-
13589-LOGS.					-							-
ED LOG					-9.0							-
N CORI					-							-
CA NO												-
Log R					-							-
KD.GLB					- 9.5							
ANDAF					-							-
RCA_ST												-
68.1_F												
RCA_LIB	LC	OGGEI	D: RJL				CHECKED: FB		DAT	re: 20/0	07/201	8

# Appendix C

Groundwater Monitoring Results

Groundwater Results Summary

HSL Comparison

Sample Identification		Human Health (Vapo		BH1	BH1	BH1	BH2	BH2	BH2	BH3	BH3
1		Based) G	uideline ^							-	
Sample Depth (m) <sup>B</sup>	PQL	HSL 'D'		1.03	1.25	1.03	2.47	2.45	2.27	1.47	1.2
Date		SAND 2-<4m	SAND 4-<8m	27/6/18	29/5/20	4/9/20	27/6/18	29/5/20	4/9/20	29/5/20	4/9/20
Sample Description			Turbid, dark grey, no odour	Cloudy, moderately turbid, no odour, no sheen.	Pale yellow, moderately turbid, no odour, no sheen	Turbid, dark grey, no odour	Clear, low turbidity, no odour, no sheen.	Nil collected	Pale brown turbid, no odour, no sheen	Pale brown, high turbidity, no odour, no sheen	
Dominant Stratum <sup>C</sup>			Sand	Sand	Sand	Sand	Sand	Sand	Sand	Sand	
Sample Purpose			Investigation	Investigation	Investigation	Investigation	Investigation	Gauging	Investigation	Investigation	
		Sample collect	cted by	RCA - ZL	RCA - RJL	RCA - RJL	RCA - ZL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)											
Benzene	0.001	5	5	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001
Toluene	0.002	NL	NL	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
Ethylbenzene	0.002	NL	NL	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
meta- and para-Xylene	0.002			<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
ortho-Xylene	0.002			<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
Total Xylenes	0.004	NL	NL	0.002	0.002		0.002	0.002		0.002	0.002
Polycyclic Aromatic Hydrocarbons (PAH)							-				
Naphthalene	0.005	NL	NL	<0.005	<0.005		<0.005	<0.005		<0.005	<0.005
Total Recoverable Hydrocarbons (TRH)					1		r				
TRH C <sub>6</sub> -C <sub>10</sub>	0.02			<0.02	<0.02		<0.02	<0.02		<0.02	
TRH >C <sub>10</sub> -C <sub>16</sub>	0.1			<0.1	<0.1		<0.1	<0.1		<0.1	
TRH >C <sub>16</sub> -C <sub>34</sub>	0.1			<0.1	<0.1		<0.1	<0.1		0.23	
TRH >C <sub>34</sub> -C <sub>40</sub>	0.1			<0.1	<0.1		<0.1	<0.1		<0.1	
F1	0.02	6	6	<0.02	<0.02		<0.02	<0.02		<0.02	
F2	0.1	NL	NL	<0.1	<0.1		<0.1	<0.1		<0.1	
Total Recoverable Hydrocarbons (TRH) silica gel cleanup					-	-					-
TRH C <sub>6</sub> -C <sub>10</sub>	0.02										<0.02
TRH <sub>sg</sub> >C <sub>10</sub> -C <sub>16</sub>	0.1										<0.1
TRH <sub>sg</sub> >C <sub>16</sub> -C <sub>34</sub>	0.1										<0.1
TRH <sub>sg</sub> >C <sub>34</sub> -C <sub>40</sub>	0.1										<0.1
F1	0.02	6	6								<0.02
F2 <sub>sg</sub>	0.1	NL	NL								<0.1

All results are in units of mg/L

Blank Cell indicates no criterion available

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory

F1 = TRH  $C_6$ - $C_{10}$  minus BTEX. F1 PQL deemed equal TRH  $C_6$ - $C_{10}$ .

 $F2/F2_{sq} = TRH/TRH_{sq} > C_{10}-C_{16} minus naphthalene. F2/F2_{sq} PQL deemed = TRH/TRH_{sq} > C_{10}-C_{16}.$ 

A ASC NEPM 1999 (as amended 2013) Vapour Based Health Screening Level (HSL) 'D' (Commercial/Industrial). It is noted that these criteria are intended for groundwater at depths of greater than 2m below the surface.

<sup>B</sup> Sample depths presented are as encountered prior to commencement of sampling

<sup>C</sup> Note that this is a generalisation for the purpose of comparing to the HSL criteria. Where two strata equally represented, most conservative criterion used

NL designates 'Not Limiting' indicating that the pore water concentration required to constitute a vapour risk is higher than the solubility capacity for that compound based on a petroleum mixture. Vapour is therefore not a risk for this compound.

Results for TRH have been compared to TPH guidelines.

Results shown in shading are in excess of the HSL

Where summation required (Xylene, F1, F2) calculation includes components reported as non detected as 1/2 PQL.

Concrush Pty Limited Groundwater Management Plan Expansion of the Concrush Resource Recovery Facility, Teralba RCA ref:13589-805/1, Sept 2020

#### Groundwater Results Summary Ecological and Drinking Water Comparison

Sample Identification		Aquatic Ecosystem Guideline <sup>A</sup> Human Health			Human Health	BH1	BH1	BH1	BH2	BH2	BH2	BH3	BH3	
Sample Depth (m) <sup>C</sup>	PQL	99%	95%	99%	95%	(Ingestion)	1.03	1.25	1.03	2.47	2.45	2.27	1.47	1.18
Date		Fresh	Fresh	Marine	Marine	Guideline <sup>B</sup>	27/6/18	29/5/20	4/9/20	27/6/18	29/5/20	4/9/20	29/5/20	4/9/20
Sample Description							Turbid, dark grey, no odour	Cloudy, moderately turbid, no odour, no sheen.	Pale yellow, moderately turbid, no odour, no sheen	Turbid, dark grey, no odour	Clear, low turbidity, no odour, no sheen.	Nil collected	Pale brown turbid, no odour, no sheen	Pale brown, high turbidity, no odour, no sheen
					Sample	Purpose	Investigation	Investigation	Investigation	Investigation	Investigation	Gauging	Investigation	Investigation
				Sa	ample col	ected by	RCA - ZL	RCA - RJL	RCA - RJL	RCA - ZL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL
Nutrients														
Ammonia as N	0.01	0.32	0.9	0.5	0.91	0.5			0.29					1.38
Nitrite as N	0.01					3			<0.01					<0.01
Nitrate as N <sup>D</sup>	0.01	1	2.4	1	2.4	50			0.04					0.06
Nitrite + Nitrate as N <sup>E</sup>	0.01		0.0	)4					0.04					0.06
Total Phosphorus as P <sup>E</sup>	0.01		0.0	25					0.24					<0.10
Benzene, Toluene, Ethylbe	nzene, Xylene (I	BTEX)				•								
Benzene	0.001		0.95		0.7	0.001	<0.001	<0.001		<0.001	<0.001		<0.001	<0.001
Toluene	0.002		0.18		0.18	0.8	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
Ethylbenzene	0.002		0.08		0.005	0.3	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
meta- and para-Xylene	0.002		0.275		0.275		< 0.002	< 0.002		< 0.002	<0.002		<0.002	< 0.002
ortno-Xylene	0.002		0.35		0.35	0.6	<0.002	<0.002		<0.002	<0.002		<0.002	<0.002
Total Recoverable Hydrocy	arbons (TPH)			1		0.0	0.002	0.002		0.002	0.002		0.002	0.002
TRH Co-Co							<0.02	<0.02		<0.02	<0.02		<0.02	
	0.02						NU.UZ	-0.02		-0.02	-0.02		-0.02	
	0.1						<0.1	<0.1		<0.1	<0.1		<0.1	
$1RH > C_{16} - C_{34}$	0.1						<0.1	<0.1		<0.1	<0.1		0.23	
TRH >C <sub>34</sub> -C <sub>40</sub>	0.1						<0.1	<0.1		<0.1	<0.1		<0.1	
TRH C <sub>6</sub> -C <sub>40</sub>	0.32		0.007		0.007		0.16	0.16		0.16	0.16		<u>0.34</u>	
Total Recoverable Hydroca	arbons (TRH) sil	ica gel clea	anup			-								
TRH C <sub>6</sub> -C <sub>10</sub>	0.02													<0.02
TRH <sub>sq</sub> >C <sub>10</sub> -C <sub>16</sub>	0.1													<0.1
TRH <sub>sq</sub> >C <sub>16</sub> -C <sub>34</sub>	0.1													<0.1
TRH., >CoC.o	0.1													<0.1
	0.1		0.007		0.007									0.16
Polycyclic Arometic Hydro			0.007	l	0.007									0.16
Nanhthalene			0.016		0.07	[	<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Acenaphthylene	0.001/0.0001		0.010		0.07		<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Acenaphthene	0.001/0.0001						< 0.001	<0.0001		< 0.001	<0.0001		<0.0001	
Fluorene	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Phenanthrene <sup>D</sup>	0.001/0.0001	0.0006		0.0006			<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Anthracene <sup>D</sup>	0.001/0.0001	0.00001		0.00001			<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Fluoranthene <sup>D</sup>	0.001/0.0001	0.001		0.001			<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Pyrene	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Benz(a)anthracene	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Chrysene	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Benzo(b)&(j)fluoranthene	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Benzo(k)fluoranthene	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Benzo(a) pyrene	0.0005/0.00005	0.0001		0.0001		0.00001	<0.0005	<0.00005		<0.0005	<0.00005		<0.00005	
Indeno(1,2,3-c,d)pyrene	0.001/0.0001						<0.001	<0.0001		< 0.001	<0.0001		<0.0001	
Dibenz(a,n)anthracene	0.001/0.0001						20 001			20 001	21 \ 1 \ 1 \ 1		0 0001	
DEUZULU II DOELVIENE	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001	
Motals	0.001/0.0001						<0.001	<0.0001		<0.001	<0.0001		<0.0001 <0.0001	-
Metals Arsenic	0.001/0.0001		0.013		0.0023	0.01	<0.001	<0.0001 <0.0001		<0.001	<0.0001 <0.0001 0.007		<0.0001 <0.0001 0.008	
Metals Arsenic Cadmium	0.001/0.0001		0.013		0.0023	0.01	<0.001 <0.001 0.006 <0.0001	<0.0001 <0.0001 <u>0.011</u> <0.0001		<0.001 <0.001 0.005 <0.0001	<0.0001 <0.0001 0.007 <0.0001		<0.0001 <0.0001 0.008 <0.0001	
Metals Arsenic Cadmium Chromium	0.001/0.0001		0.013 0.0002 0.001		0.0023 0.0055 0.0044	0.01 0.002 0.05	<0.001 <0.001 0.006 <0.0001 <0.001	<0.0001 <0.0001 0.011 <0.0001 0.001	    	<0.001 <0.001 0.005 <0.0001 0.001	<0.0001 <0.0001 0.007 <0.0001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002	
Metals Arsenic Cadmium Chromium Copper	0.001/0.0001		0.013 0.0002 0.001 0.0014		0.0023 0.0055 0.0044 0.0013	0.01 0.002 0.05 2	<0.001 <0.001 <u>0.006</u> <0.0001 <0.001 <0.001	<0.0001 <0.0001 <u>0.0011</u> <0.0001 <0.001 <0.001		<0.001 <0.001 <u>0.005</u> <0.0001 0.001 <0.001	<0.0001 <0.0001 <u>0.007</u> <0.0001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001	
Metals Arsenic Cadmium Chromium Copper Lead	0.001/0.0001		0.013 0.0002 0.001 0.0014 0.0034		0.0023 0.0055 0.0044 0.0013 0.0044	0.01 0.002 0.05 2 0.01	<0.001 <0.006 <0.0001 <0.001 <0.001 <0.001 <0.001	<0.0001 <0.0001 <u>0.011</u> <0.0001 <0.001 <0.001 <0.001		<0.001 <0.001 <0.0001 <0.001 <0.001 <0.001 <0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup>	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044	0.01 0.002 0.05 2 0.01 0.001	<0.001 <0.006 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.0001	<0.0001 <0.0001 <u>0.0011</u> <0.0001 <0.001 <0.001 <0.0001		<	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.0001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.007	0.01 0.002 0.05 2 0.01 0.001	<0.001 <0.006 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.0001 0.002	<0.0001 <0.0001 <0.0001 0.001 <0.001 <0.001 <0.001 <0.0001 0.004	          	<0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.0001 0.002		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel Zinc	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.0013 0.0044	0.01 0.002 0.05 2 0.01 0.001	<0.001 <0.001 <0.0001 <0.001 <0.001 <0.001 <0.0001 0.0002 0.007	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.0001 0.004 0.004 0.025		<0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.0001 0.005 0.009	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.0001 <0.0001 0.002 0.0012		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004 0.004 0.118	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel Zinc Phenols	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015	0.01 0.002 0.05 2 0.01 0.001	<0.001 <0.001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.0001 0.002 0.007	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.0001 0.004 0.004 0.025		<0.001	<0.0001 <0.0007 <0.0001 <0.001 <0.001 <0.001 <0.0001 0.002 0.012		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004 0.004 0.118	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel Zinc Phenols Phenols 2. Chlorophonol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.40	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015	0.01 0.002 0.05 2 0.01 0.001	<0.001 <0.001 <0.000 <0.0001 <0.001 <0.0001 <0.0001 0.002 0.007 <0.001 <0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.0001 <0.0001 0.004 0.004 0.025		<0.001 <0.001 <0.005 <0.001 <0.001 <0.001 <0.001 <0.005 <b>0.009</b> <0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 0.002 0.012 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004 0.118 <0.001 <0.001	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel Zinc Phenols P-Chlorophenol 2-Chlorophenol 2. Methylopopol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015	0.01 0.002 0.05 2 0.01 0.001 0.001	<0.001 <0.001 <0.0001 <0.001 <0.001 <0.001 <0.0001 0.002 0.007 <0.001 <0.001 <0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 0.004 0.025 <0.001 <0.001 <0.001		<0.001 <0.001 <0.005 <0.001 <0.001 <0.001 <0.001 <0.005 <b>0.009</b> <0.001 <0.001 <0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 0.002 0.012 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004 0.118 <0.001 <0.001 <0.001	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel Zinc Phenols P-Chlorophenol 2-Methylphenol 3- & 4.Methylphenol 3- & 4.Methylphenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015	0.01 0.002 0.05 2 0.01 0.001 0.001	<0.001 <0.001 <0.000 <0.0001 <0.001 <0.0001 <0.0001 <0.0007 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001	<0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0004 0.025 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004 0.118 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	
Metals Arsenic Cadmium Chromium Copper Lead Mercury <sup>D</sup> Nickel Zinc Phenols Phenols 2-Chlorophenol 2-Methylphenol 3- & 4-Methylphenol 2-Nitrophenol 2-Nitrophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015	0.01 0.002 0.05 2 0.01 0.001 0.001	<0.001 <0.001 <0.0001 <0.001 <0.001 <0.001 <0.0001 <0.002 0.007 <0.001 <0.001 <0.001 <0.002 <0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0001 <0.0004 <b>0.025</b> <0.001 <0.001 <0.001 <0.001 <0.002 <0.001		<0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.002 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.0001 0.004 0.118 <0.001 <0.001 <0.001 <0.001 <0.002 <0.001	
Metals         Arsenic         Cadmium         Chromium         Copper         Lead         Mercury <sup>D</sup> Nickel         Zinc         Phenols         Phenols         2-Chlorophenol         2-Methylphenol         3- & 4-Methylphenol         2-Nitrophenol         2-Nitrophenol         2-Nitrophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.015 0.4	0.01 0.002 0.05 2 0.01 0.001 0.001	<0.001 <0.001 <0.0001 <0.001 <0.001 <0.001 <0.0001 <0.002 0.007 <0.001 <0.001 <0.001 <0.002 <0.001 <0.002 <0.001 <0.001 <0.002	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.0001 <0.004 0.004 <0.001 <0.001 <0.001 <0.001 <0.002 <0.001 <0.002		<0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.002 0.002 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.001 0.004 0.118 <0.001 <0.001 <0.001 <0.001 <0.002 <0.001 <0.001	
Metals         Arsenic         Cadmium         Chromium         Copper         Lead         Mercury <sup>D</sup> Nickel         Zinc         Phenols         Phenols         2-Chlorophenol         2-Methylphenol         3- & 4-Methylphenol         2-Nitrophenol         2.4-Dimethylphenol         2,4-Dichlorophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015 0.4	0.01 0.002 0.05 2 0.01 0.001 0.001	<ul> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.006</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.002</li> <li>&lt;0.001</li> </ul>	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.002 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.0001 0.002 0.0012 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.001 0.004 0.118 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	
Metals         Arsenic         Cadmium         Chromium         Copper         Lead         Mercury <sup>D</sup> Nickel         Zinc         Phenols         2-Chlorophenol         2-Methylphenol         3- & 4-Methylphenol         2-Nitrophenol         2.4-Dimethylphenol         2.4-Dichlorophenol         2.6-Dichlorophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49 0.49	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.015 0.4	0.01 0.002 0.05 2 0.01 0.001 0.3 0.3	<ul> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.006</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.002</li> <li>&lt;0.001</li> </ul>	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.0001 <0.0001 <0.004 0.0025 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.001	<0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.001 <0.002 0.002 <0.001 <0.001 <0.002 <0.001 <0.002 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.001 0.004 0.118 <0.001 <0.001 <0.001 <0.002 <0.001 <0.002 <0.001 <0.001 <0.001 <0.001 <0.001	
Arsenic         Cadmium         Chromium         Copper         Lead         Mercury <sup>D</sup> Nickel         Zinc         Phenols         2-Chlorophenol         2-Methylphenol         3- & 4-Methylphenol         2-Nitrophenol         2.4-Dimethylphenol         2.4-Dichlorophenol         2.6-Dichlorophenol         4-Chlorophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49 0.49 0.16 0.22	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.07 0.015	0.01 0.002 0.05 2 0.01 0.001 0.3	<0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.002 0.007 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.0001 <0.004 0.005 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.0001 <0.0001 0.002 0.0012 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.002 <0.001 <0.001 <0.001 <0.001 <0.004 0.118 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	
Metals         Arsenic         Cadmium         Chromium         Copper         Lead         Mercury <sup>D</sup> Nickel         Zinc         Phenols         2-Chlorophenol         2-Methylphenol         3- & 4-Methylphenol         2Nitrophenol         2.4-Dimethylphenol         2.4-Dichlorophenol         2.6-Dichlorophenol         2.4-Dirophenol         2.4-Dirophenol         2.4-Dichlorophenol         2.4-Dichlorophenol         2.4-Dichlorophenol         2.4-Dichlorophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49 0.49 0.16 0.22	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.015 0.4	0.01 0.002 0.05 2 0.01 0.001 0.3 0.3 0.2 0.2	<ul> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.002</li> <li>&lt;0.007</li> <li>&lt;0.001</li> </ul>	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.0001 <0.004 0.005 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 0.002 0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	
Metals         Arsenic         Cadmium         Chromium         Copper         Lead         Mercury <sup>D</sup> Nickel         Zinc         Phenols         2-Chlorophenol         2-Methylphenol         3- & 4-Methylphenol         2.4-Dimethylphenol         2.4-Dimethylphenol         2.6-Dichlorophenol         2.6-Dichlorophenol         2.4,6-Trichlorophenol         2,3,4,6-Tetraclorophenol	0.001/0.0001	0.00006	0.013 0.0002 0.001 0.0014 0.0034 0.011 0.008 0.32 0.49 0.49 0.16 0.22	0.0001	0.0023 0.0055 0.0044 0.0013 0.0044 0.07 0.015 0.4	0.01 0.002 0.05 2 0.01 0.001 0.3 0.2 0.2 0.02	<ul> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.001</li> <li>&lt;0.007</li> <li>&lt;0.001</li> </ul>	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 <0.004 0.025 <0.001 <0.004 0.005 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0		<0.001	<0.0001 <0.0001 <0.0001 <0.0001 <0.001 <0.001 <0.001 0.002 0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001		<0.0001 <0.0001 0.008 <0.0001 0.002 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001 <0.001	

All results are in units of mg/L

Blank Cell indicates no criterion available

PQL = Practical Quantitation Limit. Where PQL is for a summation, PQL of all components is summed and may be different from that presented by laboratory

<sup>A</sup> Ecological criteria % Protection Level for Receiving Water Type.

<sup>B</sup> Australian Drinking Water Guidelines. Ammonia criterion is aesthetic based.

<sup>C</sup> Sample depths presented are as encountered prior to commencement of sampling <sup>D</sup> Updating nitrate toxicity effects on freshwater aquatic species as directed from the ANZG website  $^{\rm E}$  Guidelines for Lowland (Coastal) Rivers in NSW <sup>F</sup> Bioaccummulative Compounds Ecological guidelines in *italics* are low level reliability guidelines Ecological arsenic guideline based on As (III) for marine and As (V) for fresh, the lowest of presented guidelines. Drinking Water arsenic guidelines are based on total arsenic Guidelines for chromium are based on Cr (VI) Ecological guidelines for mercury are based on inorganic mercury. Drinking Water guidelines for mercury are based on total mercury. Results for TRH have been compared to TPH guidelines. Results shown in BOLD are those in excess of lowland (coastal) river guidelines Results shown in shading are in excess of the 99% fresh water aquatic ecosystems guidelines Results shown in BOLD ITALICS are in excess of the 95% fresh water aquatic ecosystems guidelines Results shown in pattern shading are in excess of the 99% marine water aquatic ecosystems guidelines Results shown in <u>UNDERLINE</u> are in excess of the 95% marine water aquatic ecosystems guidelines Results shown in DOUBLE UNDERLINE are in excess of the human health (ingestion) guideline Where summation required (Xylene, TRH, PAH) calculation includes components reported as non detected as 1/2 PQL.

Concrush Pty Limited Groundwater Management Plan Expansion of the Concrush Resource Recovery Facility, Teralba RCA ref:13589-805/1, Sept 2020 Prepared by: FB Checked by: KD. RCA Australia.

Page 1 of 1

# Appendix D

Summary of Monitoring Requirements

Location	Frequency	Monitoring				
BH1 and BH3	Monthly during construction	Ammonia, nitrate and phosphorous				
	Once a weak during construction	Water level				
DN1, DN2 , DN3	Once a week during construction	рН				
Within excavations	Daily during construction where water present	рН				
Within excavations	Daily during construction after lime treatment if undertaken	рН				
Within excavations	Prior to discharge during construction	рН				
	Prior to groundwater extraction commencing during construction	Water level and pH				
BH1, BH2*, BH3	During groundwater extraction during construction					
	24 hours after groundwater extraction during construction					
Leachate Pond and Constructed Wetlands	Daily	Visual assessment of water level change, condition of geomembrane and presence of sediment				
BH1 and BH3	Monthly	Groundwater level Depth of Well Field readings Ammonia, nitrate, phosphorous				
	Quarterly	TRH, BTEX, PAH				

\* BH2 to be included as long as it remains a viable monitoring well.

