REMEDIAL ACTION PLAN, EXPANSION COMPONENT

EXPANSION OF THE CONCRUSH RESOURCE RECOVERY FACILITY, TERALBA

Prepared for Concrush Pty Ltd

Prepared by RCA Australia

RCA ref 13589-803/2

June 2020

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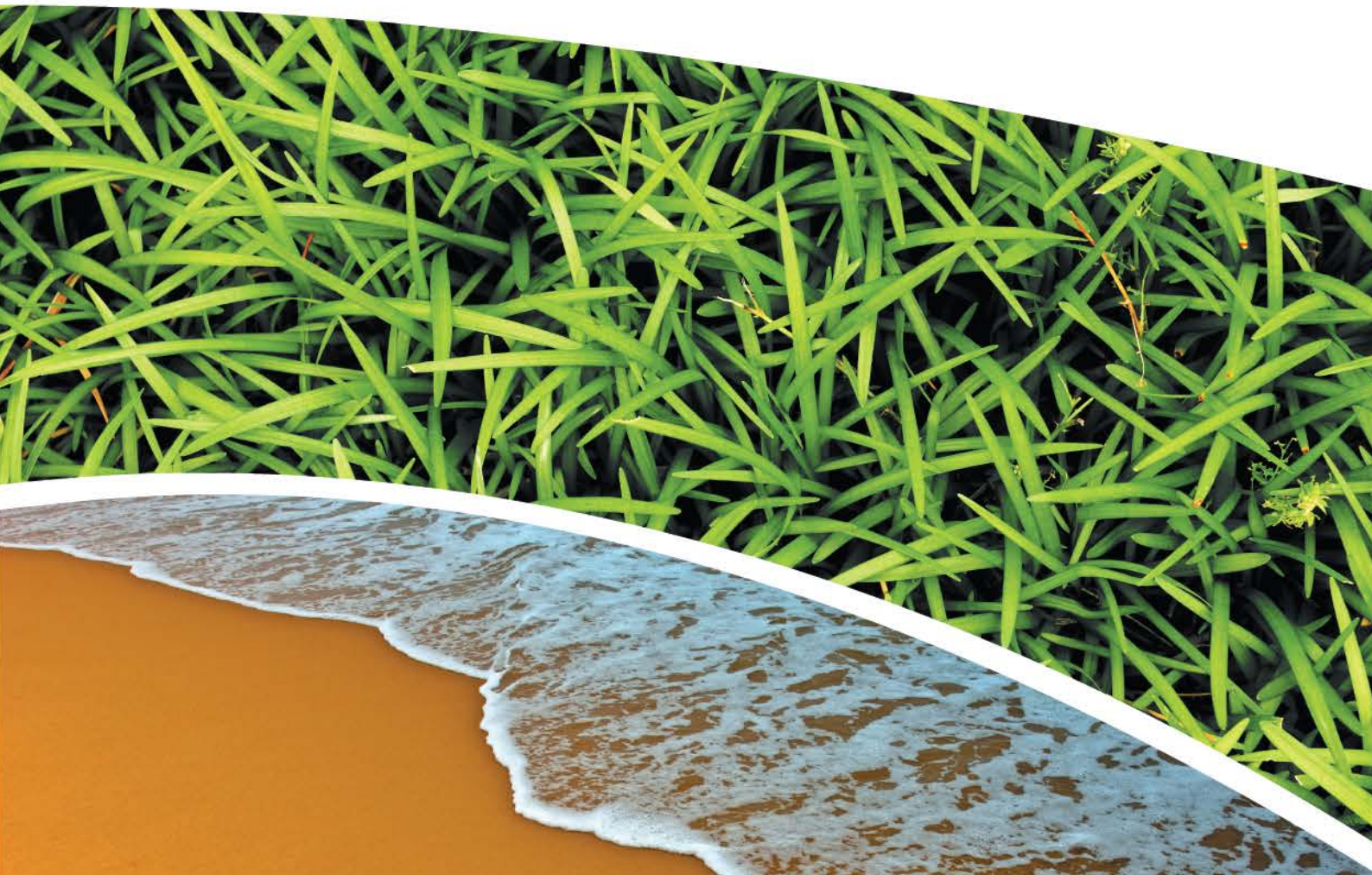
GEOTECHNICAL • ENVIRONMENTAL



RCA AUSTRALIA
ABN 53 063 515 711

92 Hill Street, CARRINGTON NSW 2294

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

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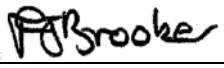
/2	Final for NSW EPA Review	K Nealon / F Brooker	F Brooker / K Nealon	F Brooker		30.06.2020

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RCA ref 13589-803/2
Client ref: SSD8753

30 June 2020

Concrush Pty Ltd
21 Racecourse Road
Teralba NSW 2284

Attention: Mr Kevin Thompson

RCA AUSTRALIA
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REMEDIAL ACTION PLAN
PROPOSED CONCRUSH FACILITY EXPANSION
RACECOURSE ROAD TERALBA

EXECUTIVE SUMMARY

Concrush Pty Limited 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 Project will increase the capacity of the recycling operations to up to 250,000t of waste processing per year with a maximum storage of 150,000t per year and will encompass a portion of land (approximately 2.4ha) adjoining the southern boundary of the current facility, as shown on **Drawing 1**, **Appendix A**.

Investigation in the proposed expansion component of the Project has identified the presence of fragments of asbestos containing materials. No asbestos fibres have been identified in the testing undertaken to date and no other chemical contamination has been identified at site which is considered to pose a risk to human health or the ecology. There is some potential for zinc concentrations in the soil to be contributing to the identified zinc concentrations in groundwater however groundwater remediation was not considered to be necessary. There are a number of stockpiles of material which haven't been classified to date and some uncertainties with regards to the distribution of contamination of the in-situ soils. Furthermore in situ soils have been identified to have acid sulfate soil properties which will need management.

The application for the Project included the remediation of the site by way of capping with a marker layer and a minimum of 0.5m of clean material over top the current site surface within the expansion component of the Project. SSD 8753 Approval Condition B49 required the preparation of a Remedial Action Plan (RAP) to manage contamination during Stage 1 construction and any remediation works.

This RAP documents the basis for the characterisation of the site based on the extent of investigation undertaken previously and as part of the application for the Project and has considered the available remedial options for the identified contamination. Two (2) technically feasible options, capping and removal of asbestos, were identified however based on other non-technical constraints it was considered that capping was the most appropriate remedial option.

This RAP has been prepared by personnel with more than ten (10) years' experience in the assessment, remediation and management of contaminated land and will, by the time of the final version of the document as identified by the document distribution list at the front of this document, have been reviewed by the appointed NSW EPA accredited auditor and the NSW EPA. The document must be approved by the Department of Planning: Division of Environment, Energy and Science prior to commencement of remedial works at the site.

The remedial process will broadly comprise:

- Assessment of stockpiles at the site to determine their suitability for use on site or otherwise.
- Excavation at any locations where it will be required below the existing surface such as potentially for dams, ponds and services.
- Management of any existing soils below the surface for acid sulfate potential.
- Earthworks to provide geotechnical preparation of the surface and to ensure there is a minimum of 0.5m to the finished surface levels over the site with the exception of the leachate pond, sedimentation dam and constructed wetlands for which there will be minimal material overtop the marker layer.
- Placement of a high visibility marker layer across all areas of the site. A geomembrane will be placed in the leachate pond and the constructed wetlands.
- Importation and placement of suitable and verified material to place over the top of the marker layer to achieve a minimum 0.5m capping layer.

The RAP has detailed the hold points and verification / validation requirements as well as the requirements for management during the construction.

Following the completion of the remediation, a validation report and long-term environmental management plan will be prepared by the contaminated land consultant and a site audit statement prepared by an NSW EPA accredited contaminated sites auditor. The existence of the long-term environmental management plan will be recorded on legal documents under the Environmental Planning and Assessment Act and the Conveyancing Act and will be attached to the Operational Environmental Management Plan which is required by SSD Approval Condition C5.

Contents

APPENDICES

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 as shown on **Drawing 1**, **Appendix A**.

SSD 8753 Approval Condition B49 states that "prior to the commencement of Stage 1 construction, the Applicant must submit a Remedial Action Plan (RAP) to manage contamination during Stage 1 construction and any remediation works. The RAP 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. This document has been prepared by an environmental scientist with over ten (10) years' experience and reviewed by an environmental engineer with over twenty (20) years' experience, in the assessment, remediation and management of contaminated land.
- Prepared in consultation with the EPA. This document will be reviewed by the NSW EPA prior to submission.

SSD 8753 Approval Condition B50 states that Stage 1 construction is not to commence until the RAP "is approved by the Planning Secretary". As such, following concurrence with the NSW EPA, this RAP will be submitted to the Department of Planning, Division of Environment, Energy and Science (EES).

1.1 OBJECTIVES

Previous site investigations have identified that the expansion portion of the Project, herein referred to as "the site" for the purpose of this document, has been characterised as contaminated with bonded asbestos containing material (ACM) at, and below the surface of the site.

The objectives of this RAP are to present a robust remedial strategy that will address the potential risk to human health and ensure that the site is suitable for the proposed development following remediation and validation.

1.2 SCOPE OF WORK

The scope of work for this RAP was as follows:

- Collate historical site contaminant information to characterise site contaminants.

- Undertake a remedial option study and identify a preferred remedial option.
    - It is noted that previous reports, including that submitted as part of the State Significant Development Application had recommended capping of the site as a suitable remedial strategy.
- Detail the preferred remedial option and how it would be implemented in the field through the RAP and how the remediation will be validated on completion.
- Detail environmental management requirements for management of the remediation of the site.

2 SITE IDENTIFICATION AND DESCRIPTION

The site is identified as part Lot 2 DP 220347 at Racecourse Road, Teralba. Additional site details are shown in **Table 1**.

Table 1 *Site Details*

Current zoning (Ref [1])	IN1 – General Industrial
Current and proposed use	Current: Vacant/unused land Proposed: Expansion of existing Concrush facility.
Size of site to which this RAP is applicable	Approximately 2.4ha
Surrounding land use to the: North	Industrial – current Concrush facility.
South	Industrial
East	Racecourse Road and then Cockle Creek
West	Main Northern Rail line and 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

Drawing 1, **Appendix A** shows the locality of the site, the site boundary and the existing Concrush facility.

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.

2.1 PROJECT DESCRIPTION

The Project will be constructed over two (2) stages on both the expansion component of the Project and the existing Concrush facility. This RAP applies only to works being undertaken on the expansion component of the Project and will be undertaken in the first stage.

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 1** below.

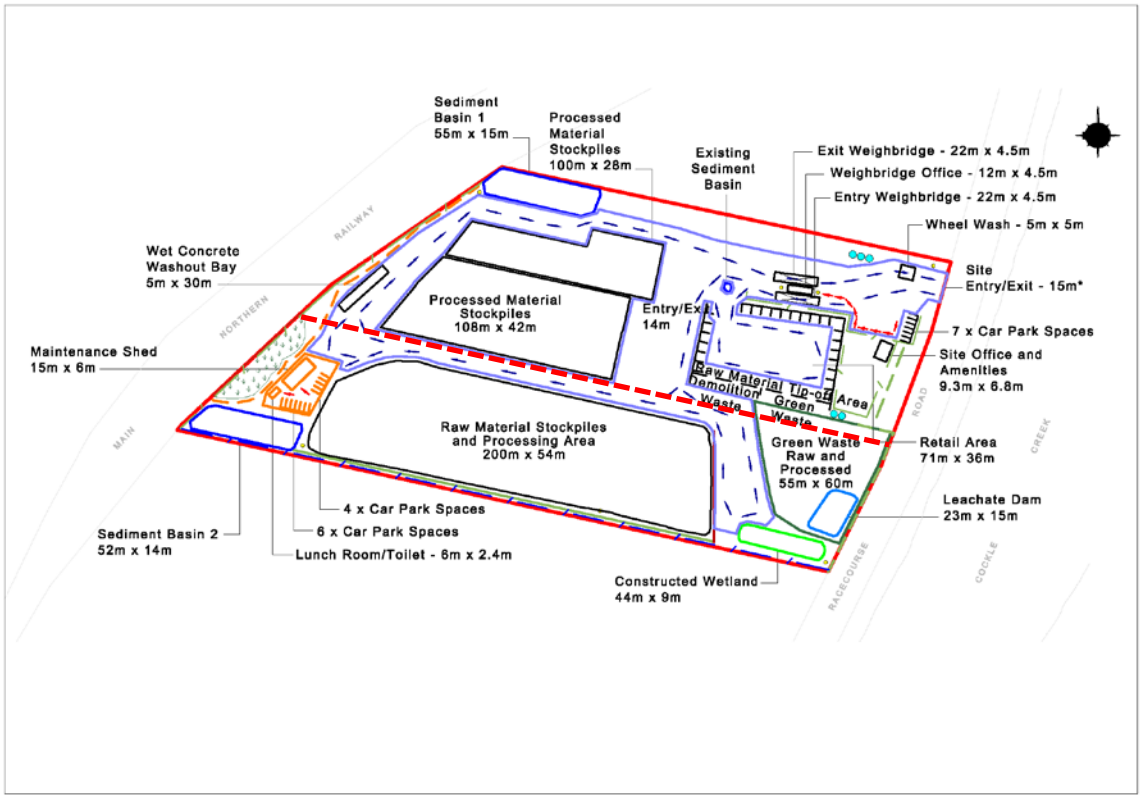


Figure 1 *Stage 1 of the "Increase to Capacity" Project (approximate boundary between current facility and expansion portion in red dashed line).*

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

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 2** below.

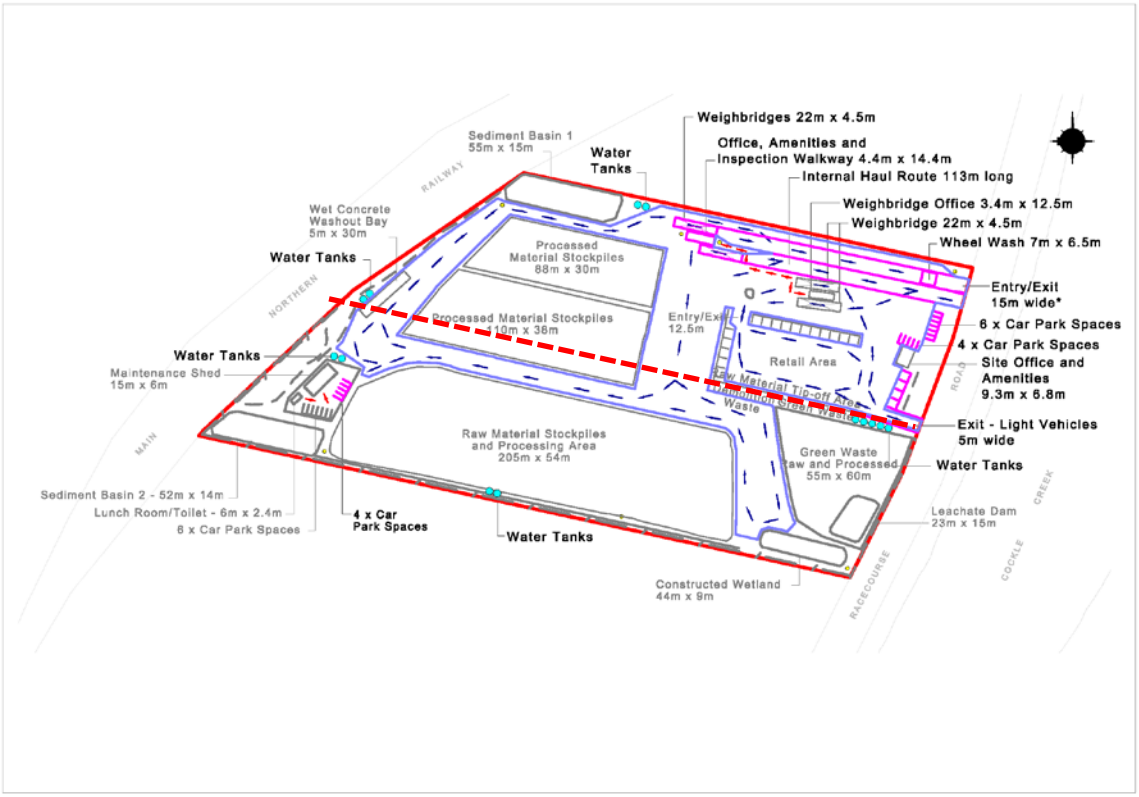


Figure 2 *Stage 2 of the "Increase to Capacity" Project (approximate boundary between current facility and expansion portion in red dashed line).*

3 SITE HISTORY AND BACKGROUND INFORMATION

3.1 HISTORICAL MAPS AND PHOTOGRAPHS

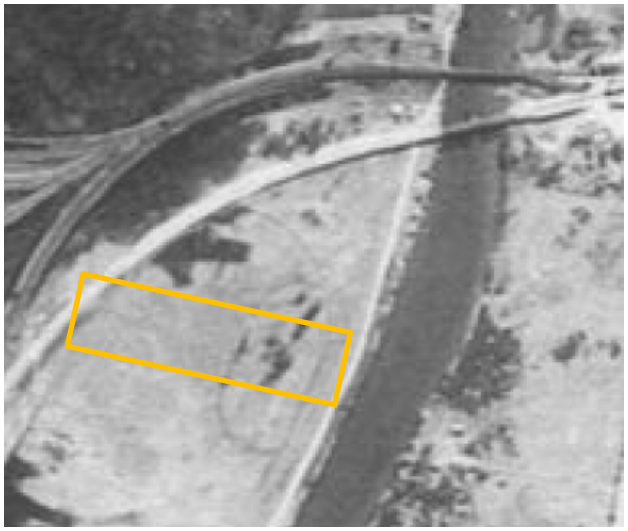
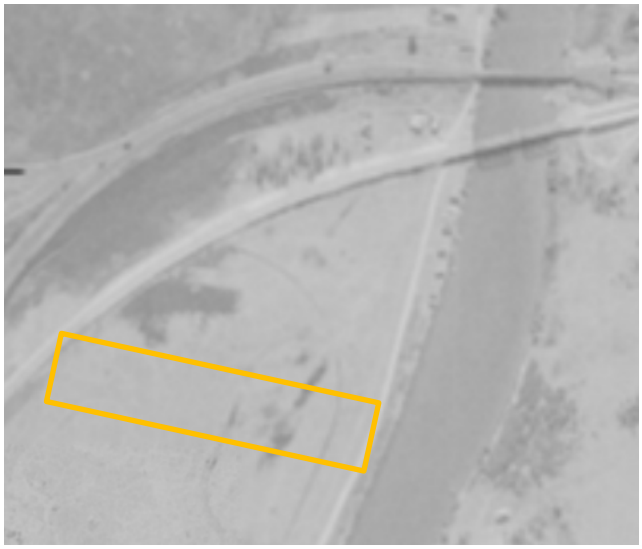
RCA undertook a search of the Lake Macquarie City Council history page for Cockle Creek (https://history.lakemac.com.au/page-local-history.aspx?pid=1085&vid=20&tmpt=narrative&narid=3533) however was unable to identify any photographs of the site.

RCA undertook a search through the collections of the State Library of NSW (http://archival.sl.nsw.gov.au/home), the Newcastle Library (http://www.newcastle.nsw.gov.au/Library/Heritage-History/Search-the-Collection/Hunter-PhotoBank and http://www.theherald.com.au/story/1723759/archival-revival-newcastle-in-the-1800s-photos/#slide=1): none were identified which include the site. One photograph, stated as being from 1950 and presented in **Figure 3** below, shows the site adjoining to the north as being an undeveloped area (in the bottom right of photograph). There are structures, potentially residences, along Cockle Creek.

Figure 3 *Cockle Creek and Railway Bridge - 1950 from Hunter Photo Bank*

RCA reviewed historical aerial photographs and **Table 3** summarises the observations at the site and the surrounding environment.

Table 1 *Aerial Photograph Review*

1954	 The site appears to be vacant with the exception of what may be a racecourse. There doesn't appear to be any significant development within the area.
1961	 The site appears to be unchanged: the definition of the presumed racecourse may be due to the photograph quality or it may be more formalised. There doesn't appear to be any significant development within the area.

1974	 The site appears to be unchanged: the definition of the racecourse may be due to the photograph quality or it may be more formalised. The site to the north has been established.
1979	 The site appears to be unchanged: the definition of the racecourse may be due to the photograph quality or it may be more formalised. There is no significant changes apparent in the surrounding area.
1983	 The racecourse appears to be disused and the site use appears to be informal material storage as part of the use of the site to the south, or potentially to the north. No other significant changes are apparent in the surrounding area.

1987	 There appears to have been some fill placed along the northern boundary of what is now the operational Concrush facility however the site, and the surrounding area do not appear to have changed use since 1983.
1993	 Additional fill appears to have been placed at the operational Concrush facility. The site appears to be overgrown with vegetation and not actively used by the operations of the site to the south, operations of which appears to be restricted to the south. There doesn't appear to be as much material scattered about the site about however this may be due to the definition of the photograph.
2007	 The Concrush facility appears to be generally consistent with current operations. The site has a trafficable route associated with the site to the south and appears to have some fill and materials situated on site.

3.2 CONTAMINATED LAND PUBLIC RECORD

RCA undertook a search of the NSW EPA public lands register (http://www.epa.nsw.gov.au/publicregister/) and found a number of records including three (3) which apply to the operational Concrush facility as detailed in **Table 2** below.

Table 2 *List of Licences at Teralba Sites*

Licence Number	Address	Activity
1360	West Wallsend Colliery, Macquarie Coal Preparation Plant and Westside Mine, Teralba, NSW 2284	Mining for coal Coal works
13351	21 Racecourse Rd, Teralba, NSW 2284	Waste storage - other types of waste Recovery of general waste
12088 – surrendered	1 Railway Street, Teralba, NSW 2284	Generation of electrical power from gas
1321 – no longer in force	Rhondda Road, Teralba, NSW 2284	Bitumen pre-mix or hot-mix production
2103 – no longer in force	Corner of Pitt & William Streets, Teralba, NSW 2284	Concrete works
4719 - surrendered	9 Park Street, Teralba, NSW 2284	Non-thermal treatment of hazardous and other waste
536	Rhondda Road, Teralba, NSW 2284	Extractive activities Crushing, grinding or separating
13105		Waste storage - other types of waste Recovery of general waste
21403 – pending	The Weir Road, Teralba, NSW 2284	Waste storage - other types of waste Recovery of general waste
12216 – surrendered	Main Road 217, Teralba, NSW 2284	Road construction

The Rhonda Road, Pitt Street and Park Street sites are considered too distant (>2km) to be a potential cause of contamination at the site. No contamination is considered to be potential from the Main Road construction works or the pending licence. Dust originating from the coal mining activities at the West Wallsend Colliery site is considered to be a potential hydrocarbon contaminant source. The operational activities of the Concrush facility are not considered to pose a potential contamination source at the site, however there may be dust impacts.

RCA undertook a search of sites notified to the NSW EPA as potentially requiring regulation (http://www.epa.nsw.gov.au/clm/publiclist.htm as updated 14 May 2020) and confirmed that the site is not notified, however that there are two (2) notified sites as included in **Table 3** below. The locations of these sites are included in **Drawing 1**, **Appendix A**.

Table 3 *List of Notified Sites within Teralba*

Site Name	Address	Activity	Regulation Required under CLM Act?
Lake Macquarie Teralba Sanitary Depot	Griffen Road Teralba, NSW 2284	Landfill	No
Lucky's Scrap Metal Yard	21 Racecourse Rd, Teralba, NSW 2284	Metal Industry	Yes

The Griffen Road site is identified as being approximately 900m to the north of the site however the extent of the landfill is unknown and as such the distance is unknown. The Racecourse site is identified as being immediately adjacent to the southern boundary of the site.

The nature of the contamination which was notified to the NSW EPA is unknown however it is considered that potential contamination associated with the landfill site is landfill gas and contaminated groundwater. Given the distance between the landfill and the site, the open aired nature of the area between and the presumption of groundwater flow to the east of the sites it is not considered that potential contamination from the landfill would be likely to impact at the site.

It is unknown what contamination is present at the Scrap Metal yard however the notification is considered to be likely related to a Notice issued under Section 35 of the Environmentally Hazardous Chemicals Act 1995 (EHC Notice) which remains in force. The Notice identifies contamination in the form of

- Numerous areas of localised contamination by hydrocarbons;
- Material such as foundry sand which is suspected of being contaminated by heavy metals, poly-aromatic hydrocarbons, phenols and cyanide.
- Material suspected to be contaminated with heavy metals have been used as fill on the premises.
- Numerous drums containing oils, fuels and a variety of chemicals (including dangerous goods) have and are being stockpiled on the premises and these have the potential to cause further contamination of the premises

The notified area was occupied by Metal Salvage at the time of the declaration notice in 1998 and is located in the southern portion of Lot 2 DP 220347 as shown on **Drawing 1**, **Appendix A**. The notified area is located approximately 150m to the south of the expansion component of the Project and is therefore not considered relevant as part of the RAP.

RCA undertook a search of the NSW EPA gasworks database (http://www.epa.nsw.gov.au/clm/gasworkslocation.htm) and determined that there are no known gasworks within vicinity of the site.

RCA undertook a search of the Department of Industry mapping of naturally occurring asbestos (https://trade.maps.arcgis.com/apps/PublicInformation/index.html?appid=87434b6ec7dd4aba8cb664d8e646fb06) and determined that there are no known point occurrences or geological units with medium to high asbestos potential.

3.3 PREVIOUS INVESTIGATIONS

3.3.1 SOIL CONTAMINATION ASSESSMENT – PROPOSED INDUSTRIAL SUBDIVISION

A soil contamination assessment (Ref [2]) was undertaken by Coffey in a portion of the expansion component of the Project in 2013. The objective of the assessment was to provide a baseline contamination status for the site. Coffey undertook a review of site topography, geological and hydrogeological information, field investigations including test pitting and soil sampling, laboratory analysis of selected samples, data assessment and preparation of a report.

A total of seventeen (17) test pits were excavated in an approximate 20m grid across the site (**Drawing 1**, **Appendix A**). Soil samples were collected from within fill material along with additional samples of suspected ACM fragments. Coffey stated that "*A number of fragments of potential Asbestos Containing Materials (ACM) were observed to be scattered across the surface of the site*". No information was provided regarding the physical state of the fragments.

Soil samples were analysed for a range of potential contaminants of concern including hydrocarbons, metals, pesticides, polychlorinated biphenyls (PCB) and asbestos. All analysed soil samples met the commercial/industrial land use criteria adopted at the time of reporting. No asbestos was detected in soil samples; however chrysotile asbestos was detected in the suspected ACM fragments subjected to analysis. The results of the soil testing have been transferred to summary results tables and compared to current criteria (refer **Appendix B**) in **Appendix C** and the locations at which ACM was identified are identified on **Drawing 2**, **Appendix A**.

The site was proposed to be filled with at least 0.5m of imported fill at the time of the Coffey assessment (Ref [2]). The report stated that due to the presence of asbestos on the surface, the site re-development would need to be appropriately managed.

Coffey considered the site to be suitable for commercial/industrial use, providing:

- Imported fill was classified as either Virgin Excavated Natural Material (VENM, as defined (Ref [3])) or Excavated Natural Material (ENM, as defined (Ref [4])).
- An Asbestos Management Plan prepared by a suitably qualified consultant or occupational hygienist was implemented prior to and during earthworks to fill the site.
- A Site Management Plan (SMP) was prepared following filling, which advised that asbestos was present at depth and outlined management methods for future excavations that may extend through the surface cap and into underlying fill.

Coffey (Ref [2]) noted that should the proposed filling not proceed, additional works may be required depending on the proposed future use of the site.

The proposed industrial subdivision did not proceed.

RCA considers the previous investigation to be suitable for the assessment of the area investigated by Coffey and defined by their objectives, due to sufficient characterisation of soils and appropriate management strategies recommended.

3.3.2 *Environmental Site Management Plan – Proposed Industrial Subdivision*

Coffey prepared an Environmental Site Management Plan (ESMP, Ref [5]) to address a requirement of Lake Macquarie City Council prior to issuing the Development Application consent, which was approved[1], for an industrial subdivision. The ESMP (Ref [5]) was to be utilised by the site subcontractor in conjunction with an occupational hygienist to manage the asbestos contamination. The ESMP (Ref [5]) included the placement of a marker fabric layer under the capping layer.

The objective of the ESMP (Ref [5]) was to outline the procedures and management measures to be undertaken during the construction of the cap, to protect construction worker health and the environment, and to ensure that the cap provided a suitable barrier to contamination.

No further contaminant information was provided in the ESMP (Ref [5]) and the proposed industrial subdivision did not proceed.

3.3.3 *Baseline Contamination Assessment – Proposed Concrush Facility Expansion*

A baseline contamination assessment was undertaken by RCA (Ref [6]) to determine the suitability of the site prior to the development of the site by Concrush for the Project. The assessment involved the collection of forty three (43) samples from thirteen (13) locations around the site as shown on **Drawing 1**, **Appendix A**. Eleven (11) of these locations comprised test pits and the remaining two (2) locations comprised boreholes which were converted into groundwater monitoring wells.

Twenty two (22) samples were selected for analysis covering a range of soil types and depths for laboratory analysis of hydrocarbons, phenols, cyanide, metals (arsenic, cadmium, chromium, copper, nickel, lead, zinc, mercury), asbestos and acid sulfate soils.

No gross contamination issues were identified on the site or within the surrounding areas during fieldwork, although stockpiles of concrete and metal were scattered throughout the site, with concrete, metal and other anthropogenic materials observed within the test pits. No potential ACM was observed on the ground surface or within stockpiles during the investigation however were observed in several of the test pits into the in-situ soil. Readings of the photoionisation detector (PID) of all samples report did not report any detection of hydrocarbon vapours.

Hydrocarbons, phenols, cyanide and metals concentrations in soil were either not detected or were detected at low concentrations below the relevant criteria with the exception of:

[1] Based on Lake Macquarie website accessed 17 August 2018

- Sample BH2/a which reported benzo(a)pyrene in excess of the general[2] ecological criterion (Ref [7]).
- Samples BH1/a, TP7/a, TP8/a, TP9/a, TP9/b and TP12/b which reported zinc in excess of the general[2] ecological criterion (Ref [7]).

Asbestos was not detected in any of the soil samples however chrysotile asbestos was detected within the submitted bonded material fragments from TP7, TP8 and TP9.

Acid sulfate screening indicated net acid generating ability was considered likely and soils near the groundwater table were considered to be potential acid sulfate soil (PASS).

Groundwater concentrations of hydrocarbons and phenols were not detected and concentrations of metals were either not detected or below the human health and ecological criteria (refer **Appendix B**) with the exception of zinc[3] which was in excess of the ecological criterion in one well.

The results of the sampling are presented in **Appendix C**: the locations at which ACM fragments were identified are identified on **Drawing 2**, **Appendix A**.

The report concluded that the site was considered to be suitable for the proposed development, provided the stockpiles of fill, concrete and metal were characterised for onsite reuse or classified for offsite waste removal (or otherwise) prior to the proposed expansion. The report also concluded that a construction management plan would also be required to address the asbestos which would include but not be limited to the recommendations of a marker layer placed across the entire site in line with the ESMP (Ref [5]). No further consideration of groundwater was considered necessary.

3.3.4 GEOTECHNICAL INVESTIGATION

RCA undertook a geotechnical investigation (Ref [8]) predominantly on the existing Concrush facility, for the purpose of road design. There was no consideration of contamination during the works however there was acid sulfate soil testing undertaken by way of:

- Acid sulfate screening tests on twelve (12) soil samples from depths ranging between 0.7m and 1.8m below the surface.
- Laboratory analysis by way of the chromium reducible sulfur (CRS) method on four (4) samples.

The screening tests indicated that all soil samples might be classified as PASS by the results of pH of soil in peroxide pHFox (<3.5) and/or the pH change during the test (>1).

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[2] The ASC NEPM (Ref [7]) provides methodology for the generation of site specific ecological criteria for some analytes based on additional soil data such as cation exchange capacity, pH and clay content. This was not undertaken and the ecological criteria used for the assessment were generally the most conservative for commercial / industrial land use. The ambient background concentration was presumed to be zero for the purpose of assessment.

[3] It is noted that there was an error in the report (Ref [6]) which identified arsenic in excess of the fresh water ecological criterion due to incorrect decimal place in the criterion. The arsenic concentrations of both wells were in excess of the marine water criterion, which is a low reliability criterion. The use of the fresh water criteria was considered conservative for the majority of analytes, and is considered appropriate as Cockle Creek is tidal and is unlikely to be representative of a fresh water environment except at high flows and low tides.

Three (3) of the four (4) samples tested had values of chromium reducible sulfur which exceeded the ASSMAC (Ref [9]) action criteria relevant for the encountered strata, however the net acidity of one sample was below the action criteria due to the acid neutralizing capacity of the material which cannot always be relied upon.

Results of the acid sulfate soil testing from this investigation (Ref [8]) are included within **Appendix C**. The one sample from the investigation within the site boundary is shown on **Drawing 1**, **Appendix A**.

As such the report recommended that any disturbance and excavation of the soil profile at the site as part of the proposed works be undertaken in accordance with an Acid Sulfate Soils Management Plan (ASSMP).

3.3.5 CONSIDERATION OF PFAS

As part of the assessment of the SSD8753 application, the NSW EPA requested information regarding the potential presence of PFAS, specifically as the site was considered (prior to clarification) to have been potentially part of a waste management facility. No specific assessment of PFAS has been undertaken at the site as it was considered:

- While the broader definition of the site was 'waste management facility' the previous business was titled 'Scrap Metals' and 'Metals Salvage'. These activities are not specifically identified as a credible source of PFAS (Ref [10]).
- The drums are considered to be the only potential source of PFAS of the potential contaminants identified on the EHC Notice as their contents are unknown and it is noted that these were identified at the 'Premises' as defined by the Notice and as such are unlikely to be relevant to the proposed Project site. Neither RCA (Ref [6]) nor Coffey (Ref [2]) identified the presence of chemical drums during investigations, although concrete, metal objects and bricks were identified.
- PFAS are non-volatile and as such would not present an inhalation risk from either soil or groundwater concentrations should these be present.
- The proposed Project will include a capping layer which will remove exposure routes (inhalation of dust, ingestion, dermal contact) after the completion of the construction phase as discussed in the above section.
- Groundwater will not be extracted for use as such there will be no potential ingestion or dermal contact.
- The management plans during construction and operation will manage potential exposure during any actions below the capping layer.

This rationale was provided (Ref [11]) to the NSW EPA prior to the Approval. The absence of PFAS assessment was not identified to be an issue which required further investigation in the SSD8753 Approval and as such it is considered that the above rationale was accepted by the NSW EPA.

3.4 INTEGRITY ASSESSMENT

The previous assessments have been completed by reputable consultants in general accordance with industry assessment practice. There have been legislative changes regarding guidelines since the Coffey (Ref [2]) report and as such the concentrations reported in the assessment have been assessed against the updated guideline criteria as presented in **Appendix C**.

It is noted that there is a substantial area in the southern part of the expansion component of the Project which was not assessed. Nor has there been detailed assessment within the 'hardstand' area in the north west area of the site. Given the absence of a formal historical use of the site, absence of any identifiable point sources of contamination and consistency of the analytical results of contamination in other areas of the site it is not considered that this represents a significant uncertainty in the characterisation of the site however this RAP has taken into account the uncertainty.

It is considered that these assessments are appropriate to provide a general characterisation of the potential contamination at the site as being limited to:

- Refuse and waste materials in stockpiles at the site.
- Presence of bonded ACM fragments at and below the surface across the site.
- Potential acid sulfate soils from the existing surface of the site.

Groundwater contamination was not considered to pose a constraint to the assessment however the SSD 8753 Approval included the further assessment of groundwater and preparation of a Groundwater Management Plan (GMP, Ref [12]). At time of writing this work is being undertaken in accordance with SSD Condition B20.

4 SITE CONDITION AND SURROUNDING ENVIRONMENT

4.1 SITE CONDITION

RCA undertook a site inspection on the 22 May 2020 and observations are detailed below in **Table 1**.

Table 4 *General Site Conditions and Observations*

Topography	The western portion of the site is generally flat. Standing surface water is more likely within the western portion of the site. The eastern portion of the site gently slopes to the east and Cockle Creek. The majority of stormwater runoff drains to the west naturally or via a central collection drain. A relatively smaller section at the eastern end of the site catchment drains to the local stormwater system along Racecourse Road (Ref [13]).
Site condition	The site is currently vacant, with long grass and scattered shrubs and trees throughout. A cleared gravelled area is located in the north western portion of the site. An unpaved road runs along the site's northern boundary. There were a number of fill and other anthropogenic waste mounds including concrete, brick, timber and metal throughout the site. The majority of these mounds were running along the southern portion of site.
Visual signs of potential impacts	Nil observed beyond the waste/fill mounds.
Signs of erosion	Nil observed.
Presence of drums or waste	Concrete slabs, metal pieces and machinery, brick fragments, were observed throughout the surface of the site. No drums were observed on the site.
Identification of potential asbestos bearing materials	Nil observed proximal to sampling locations and areas with little vegetation cover, although RCA did not undertake a hazardous materials audit.
Visible signs of plant stress	Nil observed.
Odours noticeable on site	Nil observed.
Evidence of current or former petroleum facilities	Nil observed.
Chemicals stored on site	Nil observed.
Evidence of waste burial: (anecdotal or otherwise)	Concrete slabs, metal pieces, brick pieces and other anthropogenic material observed at depth during test pitting.

It is noted that these observations are generally consistent with the observations previously made by RCA (Ref [6]) with the differences relating to:

- Control of vegetation and weeds by spraying in early May 2020.
- Removal of some stockpiles of steel pipes by the owner of the site prior to the commencement of the lease.

4.2 GEOLOGY AND HYDROGEOLOGY

RCA reviewed published geological and hydrogeological maps and summarise the findings in **Table 2**.

Table 5 *Geology and Hydrogeology*

<table>
<tr><td>Soil type</td><td>Quaternary Alluvium deposits consisting of sands, silts, gravels and clays.</td></tr>
<tr><td>Geology type</td><td>Permian aged Newcastle Coal Measures of coal, tuff, conglomerate, sandstone and shale of the Moon Island Beach Sub-Group.</td></tr>
<tr><td>Acid sulfate soil</td><td>According to Wallsend acid sulfate soils risk map there is a high probability of acid sulfate soil materials at or near the ground surface.</td></tr>
<tr><td>Groundwater use</td><td>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 D. 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.
This search is consistent with the findings of the previous assessment (Ref [6]).
It is noted that there is a possibility for unregistered bores to be used in the wider area.</td></tr>
<tr><td>Depth to groundwater</td><td>Groundwater was previously (Ref [6]) identified at 1.03m below the surface at BH1 and 2.47m below the surface at BH2.
The depth to groundwater (from ground level) was reassessed twice in May 2020 as part the implementation of a Groundwater Management Plan (Ref [12]) and is presented below:
<table>
<tr><td></td><td>22/05/2020</td><td>29/05/2020</td></tr>
<tr><td></td><td>Tide 1.3m and dropping</td><td>Tide 0.6 and rising for BH1 and BH2
1.1m and rising for BH3</td></tr>
<tr><td>BH1</td><td>1.7</td><td>1.25</td></tr>
<tr><td>BH2</td><td>2.5</td><td>2.45</td></tr>
<tr><td>BH3</td><td>2.7</td><td>2.47</td></tr>
</table>
The site was considered to have potential tidal impact on groundwater levels however this doesn’t appear to be significant.</td></tr>
<tr><td>Estimated Groundwater flow direction</td><td>Currently unknown, although presumed to be towards the east to Cockle Creek based on site topography and information provided in Coffey 2013 (Ref [2]).
The flow direction of groundwater will be assessed following a survey of the location and elevation of the monitoring wells as part of the Groundwater Management Plan (Ref [12]).</td></tr>
<tr><td>Background water quality</td><td>The RCA baseline assessment (Ref [6]) reported that TRH, BTEX, PAH, phenols and metals concentrations in groundwater were below the relevant criteria with the exception of zinc in BH2. Further sampling undertaken in May 2020 indicates the presence of TRH, chromium and zinc in BH3 in excess of the relevant ecological criteria.
The EIS (Ref [14]) indicates that the water quality in Cockle Creek was representative of a high level of disturbance. As such it is noted that the criteria used for the assessment of contaminant concentrations may be considered conservative.</td></tr>
</table>

The results of groundwater sampling undertaken in May 2020 as part of the GMP (Ref [12]) are included in **Appendix C**.

5 SITE CONTAMINATION CHARACTERISATION

A total of thirty (30) sampling locations have been undertaken across the site. This represents a slight shortfall to the recommended (Ref [15]) thirty four (34) sampling locations for an area of approximately 2.4ha. The areas of uncertainty are:

- An area of 'hardstand' material in the north western area of the site which covers an area of approximately 0.56ha.
    - The material is understood to have been imported by a civil contractor known to Concrush in 2011-2012 prior to Concrush making some informal use of that portion of the land during 2011-2012. Three (3) locations (TP3, TP4, and TP6) undertaken as part of the RCA baseline assessment were excavated near the edges of this material and the logs indicate that the material comprises a heterogeneous mix of clay and sand with gravel, metal, brick, concrete, timber, plastic and sandstone pieces extending to a maximum depth of greater than 4m depth from surface at TP6. Fill was encountered to a depth of approximately two (2) metres below the surface at TP5 and as such it is considered that this location is close to the edge of the area.
- The southern area of the site. There were limitations associated with the vegetation during the assessment (Ref [6]) of the site and the boundary placement has also been refined and includes some more land to the south than what had been understood to be the case in the assessment (Ref [6]). This area is topographically similar, or at a slightly lower level than observed in TP12 and TP13 (Ref [6]) in which natural sands were identified at between 1.6m and 2.7m below the surface. As such the extent of fill is considered likely to be lesser in this area and, with the possible exception of stockpiles of material in the area, the characterisation for the assessed portion of the site is likely to apply.

Given the absence of a formal use of the site, absence of any identifiable point sources of contamination and consistency of the analytical results in the analysed samples, RCA does not consider that this shortfall represents a significant uncertainty in the characterisation of the site. The uncertainty does need to be taken into account as part of the remedial strategy.

No soil concentrations of chemical compounds have been identified at levels considered to pose a risk to human health at the site.

Asbestos has been identified at the site in the form of bonded fragments: no asbestos fibres were identified in any of the analysed soil samples, including those from soil within close proximity to identified ACM fragments. While the absence of asbestos fibres in the soil is considered to indicate that bonded ACM fragments are not friable, it is noted that the proposed use of the site will include significant trafficking and heavy machinery from which it may be possible to generate fibres from the ACM fragments if subject to exposure during the operation of the site.

The benzo(a)pyrene and zinc concentrations in excess of the ecological guidelines have all been detected in soil within two (2) metres of the surface and therefore within the root zone and habitation zone of many species. However the proposed development is an industrial land use and does not include any vegetative areas, except limited landscaped areas, and as such the concentrations of benzo(a)pyrene and zinc are not considered to pose a risk to the environment with the potential exception of impact to water. No PAH was identified within the groundwater, including in the May 2020 samples for which analysis was undertaken at a lower detection limit, however the concentration of zinc in the groundwater was at levels close to and in excess of the 95% protection level criterion for fresh water in all samples: concentrations at BH1 and BH3 from the May 2020 samples were also in excess of the 95% marine water criterion. It is considered, based on the location of BH1 and BH2, presumed upgradient of the majority of the site, that the site is unlikely to be the sole cause of the identified zinc concentrations however, based on the results of BH3 it is considered that there is some contribution occurring via infiltration through the soil.

Acid sulfate soil has been identified from an elevation consistent with the existing surface of the site on the existing Concrush facility and in samples at depths of approximately two (2) to three (3) metres below the surface at the site. Based on these results it is considered that PASS will be encountered in excavations below the existing surface of the site except in the north western area of the site where the 'hardstand' has been constructed. No specific testing has been undertaken in this area however based on the understood source from Concrush processing it is considered likely that this material would not be representative of PASS. The SSD Approval included the preparation of an ASSMP: this has been compiled (Ref [16]) and the requirements have been taken into account in this RAP.

Groundwater has not indicated any concentrations that would be considered to pose a risk to human health however there are concentrations of hydrocarbon and metals in excess of the ecological criteria, the worst sample being that presumed downgradient of the majority of the site and within close proximity (~30m) to Cockle Creek. The Creek is highly disturbed (Ref [14]) and, based on RCA's experience regarding the groundwater quality in the catchment, the criteria are considered to be conservative and the detected concentrations are not considered to pose a risk to the water quality within the Creek. It is noted that there is no proposal for extraction of groundwater as part of the operations, however it may be encountered in deep excavations during construction.

Due to the presence of asbestos, and the potential for fibres to be generated by equipment to be used as part of the Concrush operations, it is considered that the site requires remediation to be made suitable for the proposed use.

A conceptual site model of the existing condition of the site is included as **Drawing 3**, **Appendix A.**

6 REMEDIAL ACTION PLAN

The Project involves the development of the site which is currently vacant to increase the capacity of the Concrush resource recovery operations. Filling of the site will be required as part of the development process to render the site levels suitable for inclusion in the operations of the existing facility and for flood protection at the eastern boundary.

6.1 REMEDIATION GOAL

The goal of remediation is to render the site suitable for the proposed expansion of the Concrush facility and to mitigate against potential exposure risks both currently, during construction and long-term.

6.2 EXTENT OF THE REMEDIATION REQUIRED

The lateral extent of impact requiring remediation is considered to be across the whole of the site footprint due to the heterogeneity of the uncontrolled fill material encountered across the site and the widespread identification of ACM fragments.

The vertical extent of the remediation is considered to comprise the depth of fill material on site. The depth of fill has been identified to be a minimum of 1.6m below the surface and to depths of at greater than four (4) metres below the surface. There has been limited assessment of the natural soils at the site, with the exception of acid sulfate soil assessment, however based on the proposed filling of the site it is not considered that further assessment is required.

Limited assessment of the groundwater on site suggests that there is no significant groundwater contamination. Concentrations of zinc and, to a lesser extent arsenic and chromium, in excess of ecological criteria are not considered to warrant active groundwater remediation as the concentrations are considered to be primarily related to regional groundwater quality, the ecological criteria are conservative for the highly disturbed (Ref [14]) receptor and as interaction with groundwater is not anticipated within the proposed development scope of works. Mitigation of the potential impact to groundwater quality by the condition of the site is considered to be required.

6.3 DISCUSSION OF POSSIBLE REMEDIAL OPTIONS

The options considered to be available for remediation of the identified contamination are described in the following sub-sections based on the preferred general remedial hierarchy and taking into account the guideline preference (Ref [7]) for remediation which minimises ground disturbance where asbestos is a contaminant of concern.

6.3.1 IN-SITU TREATMENT

There is no known in-situ treatment of asbestos which destroys or otherwise changes its nature so the associated risk is reduced to an acceptable level. As such, this option has not been considered further.

6.3.2 EX SITU TREATMENT

There is no known ex situ treatment, either on-site or off-site, of asbestos which destroys or otherwise changes its nature so the associated risk is reduced to an acceptable level. Furthermore, this would require significant ground disturbance which is counter to the recommended strategy for asbestos contamination (Ref [7]). As such, this option has not been considered further.

6.3.3 CONTAINMENT

Containment of contamination on site is achieved through the application of compacted soil, asphalt or concrete over impacted areas to remove the potential pathway between source of contaminant and the receptor. Containment can be undertaken over the whole site or can involve consolidation of the contaminated material into a portion of the site. This strategy requires ongoing management of the site through a long-term environmental management plan (EMP) to ensure the remediation undertaken is maintained and protection of receptors (human and the environment) continues and therefore some continued investment may be required. Containment is the preferred (Ref [7]) strategy for asbestos impacted soils.

In addition to the filling of the site for the purpose of flood protection, the plans of the proposed development (**Figures 1** and **2**) indicate that the site will predominantly comprise hardstand areas which will be constructed in material processing areas and stockpile areas. The hardstand is proposed to consist of 200mm thick recycled roadbase over the filling and would form an appropriate material for a capping layer. The remainder of the surface of the site will be internal roads which are proposed to have a two (2) coat asphalt seal over the 200mm thick roadbase, also considered appropriate as a capping material.

As such it is considered that a cap and contain strategy could be applied to the majority of the upgrade site area without significant alteration to the plans for the proposed development. Adjustment of the strategy will be required in the areas of the leachate dam, constructed wetland and sediment basin as well as for underground services. It is not considered feasible to consolidate the fill material into a portion of the site based on the extent of fill (greater than four (4) metres below the surface and the shallow depth of groundwater which does not allow for the placement of a cell above groundwater.

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 [10]) 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. As such there will be a physical separation from the ACM impacted material and the potential for the zinc concentrations in the soil to be impacting on the zinc concentrations in the groundwater will be minimised. The leachate dam is proposed to be lined with a low permeability geomembrane and as such will not pose a risk to groundwater: management measures are detailed in the Groundwater Management Plan (Ref [12]).

A validation report to verify the implementation of the remediation would be required, whilst long-term management would also be required following remediation to ensure that an exposure pathway is not re-established in future from site activities, maintenance or otherwise as the impacted material would remain on site. SSD Approval Condition B52 requires that a Site Audit Statement is prepared for the site and the validation report and long-term management plan will require concurrence by the auditor.

6.3.4 REMOVAL

Removal of the asbestos impacted material to a licensed waste facility would involve the excavation of impacted soil material and off site disposal to a suitably licensed facility: the presence of asbestos excludes options for recycling of material in its current state. The material could be processed to remove the ACM fragments: this would require excavation of the fill and processing through an appropriately sized sieve, validation of the removal of asbestos from the sieve passing material and placement back at the site, and removal of sieved material to a licensed waste disposal facility.

The asbestos impacted material would fall under a special asbestos waste classification and appropriate management controls would be required during the excavation, transport and or processing works. While the quantity of soil requiring removal or processing is not known, it does exceed the thresholds for licensing requirements for contractors transporting asbestos impacted soil and is considered likely to exceed the licensing requirements for contractors transporting asbestos. All material would have to be tracked through the *WasteLocate* system implemented by the NSW EPA.

Following removal, verification of asbestos removal would be required and a validation report would be required. Subject to successful validation of removal, no further or ongoing management would be necessary.

While wholesale removal of ACM is technically feasible it is considered that the quantity and scale of removal works for the site would be financially prohibitive. The separation of the ACM fragments from the site soils is not considered to be feasible due to the type of fill identified at the site. There would be risks associated with the handling of the asbestos wastes and there would be additional environmental impacts associated with transport of material, use of landfill waste and use of material to bring the site back to an appropriate elevation. The strategy is also counter to the recommendations (Ref [7]) for minimal soil disturbance for the purpose of asbestos remediation. As such this option is not considered viable.

6.3.5 NO ACTION

The no action approach assumed an acceptable risk to receptors from the identified soil contamination and is generally not considered to be a suitable remedial strategy. Based on the proposed re-development of the site and the nature of the contamination, this strategy is not considered to be a suitable option.

6.4 RATIONALE FOR THE SELECTION OF RECOMMENDED REMEDIAL OPTION

Based on a review of the suitable available strategies and based on the client's non-technical constraints, RCA considers that the remedial option most suitable to the site is capping and containment of material in-situ in a manner that will remove potential exposure to the fill and will also limit infiltration through the fill. This option has been chosen due to:

- The strategy is that as recommended (Ref [7]) for asbestos contamination. It is not the most preferred of the general remedial hierarchy options however the in-situ and ex-situ options are either not feasible for asbestos contamination or pose additional risks.

- The identified contamination is asbestos within the fill material, which is present across the site at depths of between 1.6m and greater than four (4) metres below the surface.
- The suitability of this remedial option addresses all contaminants present in all areas impacted.
- Minimal requirement for disturbance to the adjacent infrastructure on the adjacent existing Concrush facility.
- There is minimal environmental burden (ie, no off site transportation required, and limited required on site) and the use of additional resources (landfill space, imported fill) is reduced compared to other options.
- There is less risk of environmental damage and to human health than would otherwise be present with disturbance of asbestos.
- The compatibility of the proposed development to the remediation strategy:
    - Significant portions of the site are proposed to be covered with hard stand materials (refer to **Figure 1** and **Figure 2**). This will reduce the risk to site users whilst also limiting the potential for surface contamination to migrate offsite.
    - A cut/fill balance has not been provided however it is understood that minimal disturbance is required as the current surface levels, refer **Appendix E**, require significant filling. The existing stockpile will require levelling and some excavation will be required for the construction of the leachate dam, wetland and sediment basin. This option will allow for less importation of fill as material cut from the dams and basins can be used as fill in other areas of the site to bring the final design level where required.

A conceptual site model of the site following the completion of the remediation is included as **Drawing 4**, **Appendix A.**

6.5 REMEDIAL STRATEGY PROCESS

RCA considers that the remedial strategy will involve:

- Appointment of the earthworks contractor to oversee the remediation process in strict accordance with this RAP and to ensure that all records are kept for future validation of the site. This will include, but is not limited to, photographic records of daily activities during site works, survey of marker layer and final surface layer.
    - It is noted that a Construction Environmental Management Plan (Ref [18]) has been compiled for the construction period and the earthworks contractor must be familiar with the requirements of this CEMP (Ref [18]) as well as any specific plans to the remediation of the site.
- Set up works including the construction of fencing and the implementation of plans with regards to erosion control, water, dust, noise, traffic control as detailed in the CEMP (Ref [18]) and other Plans referred to within.
    - Water is not permitted to leave the site impacted by sediment or contamination, such as hydrocarbons from fuel spills.
    - Surface water discharge is to only occur from Sediment Basin 2 in accordance with the Water Discharge Management Plan (Ref [19]).

- Set up of the area for acid sulfate soil treatment in accordance with the ASSMP (Ref [16]).
- Assessment of the stockpiles at the site to identify the specific nature and disposal options of the stockpiles which are understood to comprise one or a mixture of the following:
    - Building rubble including concrete, bricks, tiles, timber and asphalt.
    - Soil. Stockpiles of soil will be designated for use under the marker layer and as such no assessment beyond the visual observation for suitability to compact will be undertaken.
    - Vegetation.
    - General refuse (plastics, furniture items).

    HOLD POINT No stockpiles are to be removed without the nature of the stockpile being assessed.
- Removal of stockpiles. The fate of material within the stockpile will depend on the nature of the material however efforts will be made to recycle the material to the extent practicable.
    - Some material may be suitable for spreading and levelling on the site surface to remain underneath the capping layer. Soil is to be placed in a manner such that dust does not result during placement and is not likely to result from the material.
    - Material tracking of all stockpiles is to be undertaken and to be provided for the purpose of the validation report. Refer **Section 6.9**.
- Survey and distinct physical identification of areas of the site where excavation is required below the existing surface of the site for the elements such as the leachate dam, sediment basin, constructed wetland and any services.
    - It is noted that at the time of writing, the details of the above elements have not yet been determined.
- Excavation as required below the existing surface.
    - Excavated soil, and the surface of the excavation, is to be managed in accordance with the ASSMP (Ref [16]). Following verification in accordance with the Plan (Ref [16]) the soil may be placed on the existing surface in a manner such that dust does not result during placement and is not likely to result from the material.

    HOLD POINT Soil is not to be placed until the acid sulfate potential of the excavated material and excavated surface has been verified.
- Grading, and compaction if required at the recommendation of the appointed geotechnical engineer, of the site surface as required for logistical purpose.
    - This will include the removal of material from the top of the ‘hardstand’ area (which has not been confirmed as being suitable to remain on site without capping) such that the surface level is a minimum of 0.5m below the final design level. This material may be used on the remainder of the site such that it is intended to be placed under the marker layer.

HOLD POINT Fill placement not to commence until the geotechnical requirements for compaction have been provided.

- Placement of the marker layer across the surface of the site to the extent as shown in **Drawing 2**, **Appendix A**.
  - An indication of the type of marker layer to be used in shown in **Figure 3** below.

Figure 4 *High Visibility Marker Layer*

- The wetland section at the western portion of the site, refer **Figure 1** previously, will be fenced off from the site and will not be included within the development or future operations as shown in **Figure 5** below.

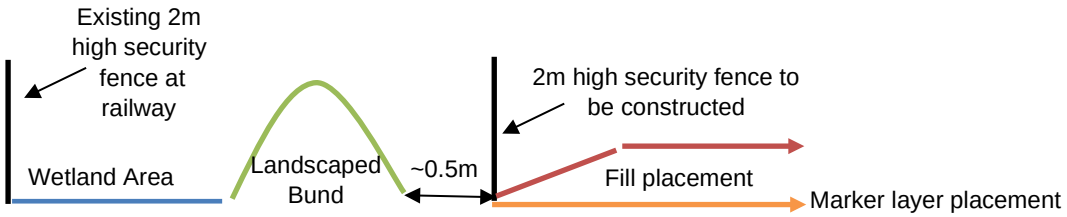


Figure 5 *General outline of works along western boundary.*

- Marker layer is to be placed up the base of the southern boundary fence on the expansion component of the Project as indicated by **Figure 6** below. There will be a landscaped area in between the boundary and the concrete block wall: the details of the landscaping are yet to be determined however will be restricted to those for which the rootball can be contained within the depth of fill. Some additional growing media may be required to be imported to the area.

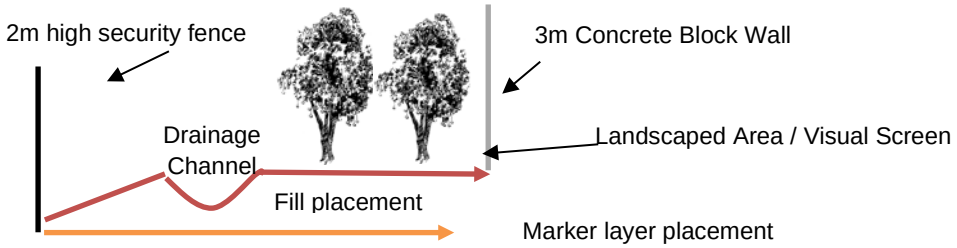


Figure 6 *General outline of works along southern boundary.*

- A strip along the eastern boundary will be fenced off from the site and will not be included within the development. There will be a landscaped bund built from imported material (refer **Section 6.6.1**) and placed in the area between the fence and the site boundary (refer **Figure 7** below).

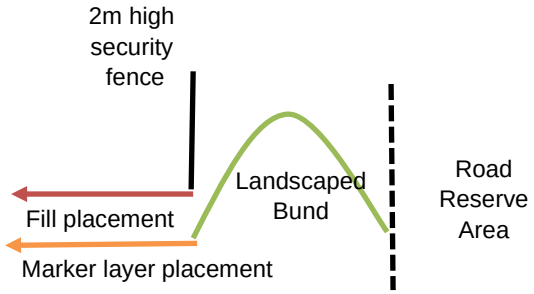


Figure 7 *General outline of works along eastern boundary.*

- Marker layer is to be placed on the walls and base of any excavations below the existing surface. A schematic of the treatment of services trenches below the potentially contaminated surface, if any, is shown in **Figure 8** below.

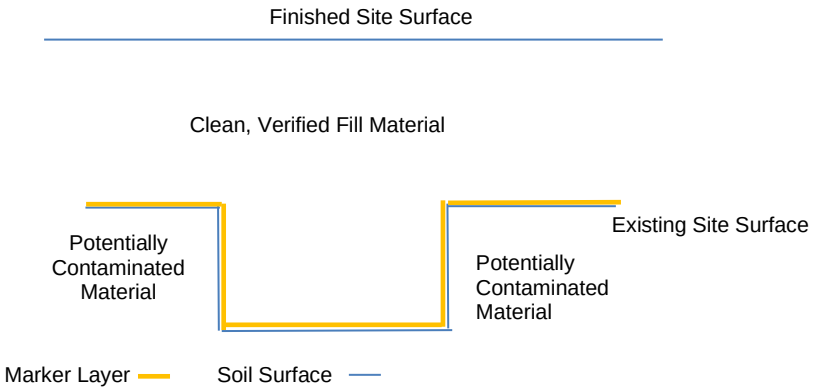


Figure 8 *Schematic of marker layer placement for service beneath existing surface*

- Placement of marker layer in the walls of the sediment pond where it is situated within the contaminated material. The details of the ponds are still being finalised and in the event that the pond is situated wholly within imported material (refer **Section 6.6.1**), no marker layer would be required. A general schematic of the ponds is presented in **Figure 9** below.

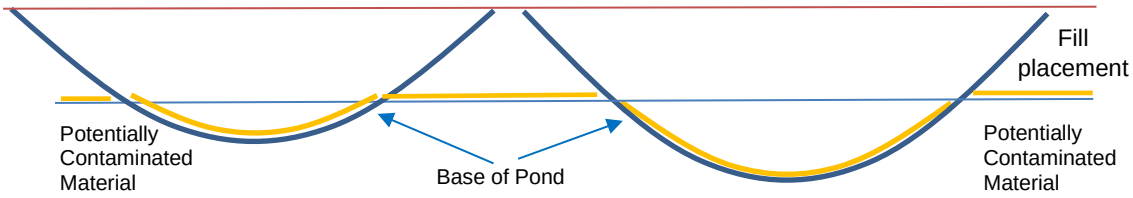


Figure 9 *Schematic of Marker Layer (—) Placement Within Sediment Pond*

- Placement of geomembrane (refer **Figure 10** below) in the leachate pond and constructed wetland.
  - Placement of an underlying geofabric protective layer may specified by the manufacturer. An indicative arrangement is shown in **Figure 11** below.

HOLD POINT At least one inspection by the contaminated land consultant is to sight placement of the membrane.

Figure 10 *Geomembrane*

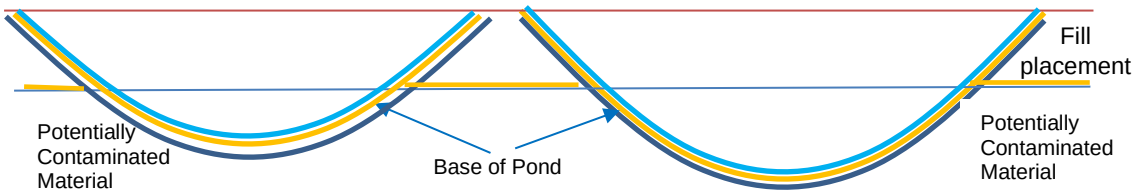


Figure 11 *Schematic of Liner (—) and Marker Layer (—) Placement Within Leachate Pond and Constructed Wetland*

- A photographic log of the material and its placement will be maintained for use in the validation report and final EMP. The contaminated land consultant will inspect the site on a number of occasions to observe the marker layer however this does not remove the requirement for the contractor to maintain a photographic log.

- Survey of the final placement of the marker layer. **HOLD POINT** Fill is not to be placed on marker layer until its location has been surveyed.
- Importation of material to achieve design surface levels.
  - Fill will be primarily sourced from Concrush and as such will be certified in accordance with the Concrush Recovered Aggregate Order (Ref [20]) which includes testing for metals (arsenic, cadmium, chromium, copper, nickel, lead, mercury), electrical conductivity, foreign materials (metal, plaster, rubber, plastic, paper, cloth, paint and wood) and asbestos in accordance with the NSW EPA requirements. Results of samples collected in accordance with the Order (Ref [20]) prior to the commencement and throughout the filling process will be supplied to the contaminated land consultant as part of the verification process. The results of testing on material imported to site will be included in the validation report.

- In the event that fill is required from other sources it must be certified, to an appropriate standard as deemed by the contaminated land consultant, to be VENM, ENM or otherwise suitable for use as fill in accordance with a general resource recovery Order and Exemption (Ref [21]).
- All imported material is to be tracked by the Site Supervisor from source to placement including:
  - Certification documents for each source.
  - Verification of truck movements from source to site.
  - Confirmation that material was visually verified as consistent with certification documents upon arrival.
  - Volumes imported.
  - General grid based location of placement.
- The minimum depth of fill is to be 0.5m above the marker layer, including the hardstand and road construction materials, within the development area of the site as shown on **Drawing 2**, **Appendix A** with the exception of the leachate pond, constructed wetland and the sedimentation dam.

  HOLD POINT No fill is to be brought onto site unless certification has been provided and accepted as adequate by the contaminated land consultant and can be verified as consistent with the verification documents. Sufficient time allowance must be made for the approval of certification prior to material being imported to site.

- Survey of the site to confirm design depths of capping have been achieved. Additional works to be undertaken where required.

Subject to concurrence by the contaminated land consultant, the completion of remediation is considered to be the completion of fill overtop the marker layer. The remainder of the construction works can then continue in accordance with the CEMP (Ref [18]). **HOLD POINT** No further works are to be undertaken at the expansion component of the Project until the contaminated land consultant and appointed auditor confirm that the remediation has been undertaken in accordance with the RAP.

The contaminated land consultant will compile a validation report and a long-term EMP which will be reviewed by the appointed auditor to enable the fulfilment of SSD Approval Condition 52. **HOLD POINT** Operations are not to commence until the validation report and the subsequent Site Audit Statement, have been submitted to the Planning Secretary.

6.6 PROPOSED VALIDATION TESTING

Validation of the remediation works is proposed to consist of:

- Site inspections during the works by the contaminated land consultant.
- Photographs provided by the Site Supervisor.
- Registered survey of the extent and elevation of the marker layer and geomembrane.
- Registered survey of the extent and elevation of the final surface level.

Hold Points are those times where it is considered crucial that third party verification is undertaken to facilitate the validation report. These are detailed in **Table 3** below.

Table 6 *List of Hold Points*

Item Hold Point Relates to	Items Held	Hold Point to be Released By	Option for Partial Hold Point Release?
Assessment of nature of stockpiles currently located on expansion component of Project.	Removal of stockpiles.	Contaminated Land Consultant	Yes – can be per stockpile.
Acid sulfate soil assessment of soil excavated from Deep Excavations.	Placement of soil on site.	Contaminated Land Consultant.	Yes – can be per stockpile / batch.
Assessment of lime treatment of deep excavation surface.	Compaction and/or placement of lining of deep excavation.	Contaminated Land Consultant.	Yes – can be per excavation.
Identification of compaction requirements.	Placement of fill below and over the marker layer on the expansion component of the Project.	Site Supervisor.	Yes – can be split between below and over the marker layer.
Survey of extent and elevation of geomembrane.	Placement of fill over the geomembrane.	Site Supervisor.	Yes – can be per Deep Excavation.
Sighting of geomembrane by Contaminated Land Consultant.		Site Supervisor in consultation with Contaminated Land Consultant.	
Survey of extent and elevation of marker layer.	Placement of fill over the marker layer.	Site Supervisor in consultation with Contaminated Land Consultant.	Yes. Release required each day prior to placement of fill over marker layer laid that day.
Verification that certification of fill proposed to be imported to site is suitable.	Importation of fill for placement over marker layer.	Contaminated Land Consultant prior to arrival. Site Supervisor (or delegate) upon arrival before deposition.	Yes – can be per source of material.
Verification that remediation has been completed.	Stage 2 works on expansion component of Project.	Contaminated Land Consultant in consultation with appoint Auditor.	No.
Submission of a validation report and site audit statement.	Commencement of Stage 1 Operations.	Project Manager and Contaminated Land Consultant in consultation with appoint Auditor.	No.

Documentation relating to the above hold points, noting that there may be more than one each in relation to the marker layer and importation of fill, is included in **Appendix F**.

6.6.1 IMPORTED MATERIAL

Verification of the suitability of the imported material will be required as part of the validation process and will comprise:

- Review of certification reports for adequacy by the contaminated land consultant prior to material being imported to site.
- Sampling and testing in accordance with the Concrush Order (Ref [20]) of all material sourced from Concrush. The testing includes asbestos.
- Tracking of material from source to site and inspection of material upon its arrival to ensure that it matches the certification.
- Collection of a minimum of three (3) samples from each source of material not sourced from the Concrush operations.
    - At minimum, samples will be analysed for the presence of hydrocarbons and metals, however other analytes, including the presence or absence of asbestos may be added to the suite depending on the source and type of material and specific potential contaminants of concern.
    - Any material suspected to be potentially impacted by asbestos (based on visual inspection) should be rejected and returned to the supplier.

6.7 REMEDIAL CONTINGENCY PLAN

The project has been given SSD Approval based on the implementation of a capping strategy. The overall remedial strategy is considered to be robust and there is limited potential for failure however there is the potential for unexpected incidents to occur during the remediation such as:

- Encountering unexpected contamination. In the sampling and analysis undertaken to date, asbestos has been the only contaminant of concern. Some anthropogenic waste has been identified in the fill layer however these have been inert building waste (bricks, concrete, timber, plastic etc) and not considered to pose a geotechnical or contamination risk.
    - The identification of odorous or visually impacted soil or groundwater would be considered to constitute an unexpected contamination find. Works in the area must cease and as assessment by the contaminated land consultant, and potentially the appointed Auditor, must be undertaken to ensure that the find did not represent a risk to the remedial strategy prior to works recommencing.
    - The identification of bulk buried items such as drums or larger items would be considered to constitute an unexpected find. Works in the area must cease and an assessment by the geotechnical engineer and/or the contaminated land consultant be undertaken prior to works recommencing.
- Proposed imported fill not suitable:
    - If doubt regarding suitability of fill is identified in the certification documents by the contaminated land consultant, the provider of the material is to provide additional / clarifying information such that the certification can be deemed suitable.

- If doubt regarding suitability of fill is identified as the material arrives on site, the Site Supervisor is to stop the deliveries of material from that source. The trucks may remain fully loaded at site or the trucks may be refused entry to the site until the situation is resolved.
- If doubt regarding suitability of fill is identified following the placement of the material at the site, all works associated with the material and any further importation of material from the source is to cease. The contaminated land consultant is to assess the material and collect samples for analysis if considered necessary. In the event that the material is deemed unsuitable for use it should be excavated and returned to the source, used underneath the marker layer or removed to a licensed waste facility in accordance with its waste classification (Ref [22]).

It is not considered that there is potential for material excess to the requirements of the works as there is a significant disparity in the quantity of soil currently designated as fill (1600m^3 will be excavated for underground elements and approximately 900m^3 of material is within the landscaped mounds) and the approximately 20,000m^3 required to bring the site to the appropriate levels (minimum 2.7m AHD).

It is not considered that there is potential for a lack of available fill to impact the remedial strategy as Concrush produces material under their license and as such will not encounter supply issues.

There is the potential for groundwater to be encountered during some of the excavations and if dewatering is required, assessment for the suitability of the groundwater will be required prior to extraction. Full details of this have been included in the Groundwater Management Plan (Ref [12]) and the CEMP (Ref [18]).

There is the potential for the generation of acid from the excavations being undertaken at the site. Full details of the controls, management measures and contingencies have been detailed in the ASSMP (Ref [16]) and the CEMP (Ref [18]).

The SSD Approval identifies requirements in the, considered unlikely, event that historical items are encountered during the works. The protocol is detailed in the CEMP (Ref [18]).

Potential environmental incidents, such as those associated with surface water, dust, noise, traffic is detailed in the CEMP (Ref [18]).

6.8 INTERIM SITE MANAGEMENT PLAN

The site is vacant and is not currently being used, although some preparatory works (survey, groundwater monitoring, weed maintenance) are being undertaken at the site. While the southern boundary is not specifically fenced, the expansion component of the Project is currently secured by the adjacent business operations and is not accessible to the public.

The current vegetation coverage is considered to prevent the potential risk to human health from the presence of asbestos. Vegetation clearance is included in the early stages of the site works (Ref [18] and **Section 4.1**) however these actions have been specifically restricted to ensure that risk is not increased during vegetation clearance.

As such, no interim site management plan is considered necessary.

6.9 REQUIREMENTS OF CONSTRUCTION PHASE MANAGEMENT PLAN

A general CEMP (Ref [18]) has been prepared for the overall construction works and the requirements for remediation are included in that document.

A specific remedial CPMP will be prepared to ensure that all workers are aware of controls required to protect human health and the environment during works until the completion of the capping layer. The CPMP must identify the process, procedures and protocols associated with undertaking the remedial works in accordance with this RAP.

The CPMP must be a logistical document which can be implemented by personnel undertaking the remedial works with specific consideration of the following:

- Remedial schedule.
- Hours of operation.
- Induction of personnel and register of inductions to be kept.
- WHS management plans for all activities, including those from external contractors.
- Processes for the event that unexpected finds of contamination are encountered.
- Identification of type and/or depth of capping across the site prior to works commencing.
- Identification of services which require excavation below the existing surface.
- Areas where impacted material is required to be excavated and the management and placement of that material.
- Identification of a marker/identifying layer (eg, highly visible and/or geotextile) to be used across the site and rationale for selection of type(s).
- Material control such as certification of imported fill and material tracking.
    - Material tracking records are to include source of material (off-site, on-site), type of material, quantity moved (based on excavation extent and/or truck capacity and/or survey), fate of material (off-site, under marker layer, above marker layer) and any testing results relevant for the movement of material (such as acid sulfate soil analysis).
    - An example of the records required is included as **Appendix G**. Ideally these will be maintained in a computer based spreadsheet to facilitate verification at time of the validation report.
- Requirements for documentation processes, hold points with relation to validation and certifying persons for relevant tasks.
- Sediment and erosion control such as silt fencing.
- Surface water control such as interim contouring and redirection of upgradient overland flow.
- Noise control such as the management of work hours especially in relation to sensitive receptors.
- Dust control such as the use of water sprays or suppressants.
- Controls to minimise potential risk to workers. At a minimum this should comprise:

- Closed cab machinery and recycled air-conditioning.
- Covering and/or dust suppression of contaminated or potentially contaminated material stockpiles.
- Wearing gloves and long sleeved clothing to minimise contact with potentially impacted soil. The use of P2 masks is required if visible dust is created when working in identified ACM soil.
- Maintaining good personal hygiene by washing hands and face prior to eating/smoking.

- Contingency planning for response, management and reparation for incidents in relation to the above management plans.
- Personnel contact details.
- Complaint management process.

6.10 REMEDIATION SCHEDULE

The remediation schedule is subject to approval of this RAP as well as the CEMP (Ref [18]) and other associated plans however is currently scheduled for late July until mid November 2020. The remainder of the construction of the Project is anticipated to continue until late December 2020.

6.11 HOURS OF OPERATION

The SSD Approval states the hours of operation for construction, of which the remediation is a part, to:

- Monday-Friday 7am-6pm
- Saturday 8am-1pm

The remedial specific CPMP should consider whether there are some aspects of the remediation works that should be restricted to alternative times.

6.12 IDENTIFICATION OF REGULATORY COMPLIANCE REQUIREMENTS

In addition to the SSD Approval Condition B49 requiring the compilation of this RAP, B51 states that all remediation works required by this RAP must be undertaken by suitably qualified and experienced contractors in accordance with the RAP and relevant guidelines. SSD Approval Conditions B52 and B53 relate to the audit of the remedial works.

Other SSD Approval Conditions for which consideration needs to be undertaken as part of the remedial works include:

B1 Classification of Waste	Refer below
B2 Records of Waste	Refer below
B11 Prohibition of Pollution of Waters	Refer **Section 6.5**
B12 Water Discharge Management Plan	Refer **Section 6.5**, Ref [19]
B20 Groundwater Management Plan	Ref [12]
B25 Acid Sulfate Soil Management Plan	Refer **Section 6.5**, Ref [16]

B36 Dust Minimisation	Refer **Sections 6.5** and **6.9**
B42 Hours of Work	Refer **Section 6.11**
B54 Asbestos Handling	Refer below, Ref [18]

The SSD Approval includes a number of other Conditions relevant to works at the site such as erosion and sediment control, traffic and parking management, noise management and consultation with Sydney Trains. These are detailed in the CEMP (Ref [18]) as these do not specifically relate to the remedial aspects of the work.

The following additional requirements apply:

- Material being imported, or being removed from site, must have been classified in accordance with NSW waste legislation. Relevant guidelines include the NSW EPA Waste Classification Guidelines (Ref [22]) and the NSW EPA resource recovery exemptions and orders (Ref [21]).
- Handling of asbestos must be in accordance with NSW EPA procedures (such as *WasteLocate* for transport of asbestos materials) and SafeWork NSW requirements (licensed removalists for soil quantities >100kg and for ACM quantities >10m^2) and Codes of Practice.

Records of material disposal are to be provided for inclusion in the validation report.

6.13 CONTACT PERSONS

The relevant personnel, and their roles with respect to remedial aspects of the construction are detailed in **Table 3**.

Table 7 *Relevant Personnel and responsibilities*

Name	Company	Position	Responsibility
Kevin Thompson	Concrush	Project Manager	• Appointment of appropriate subcontractors. • Strategic liaison with regulators (DPIE, LMCC, EPA). • Strategic liaison with subcontractors during construction to resolve issues and maintain programme. • Maintaining the Concrush website with all documentation relating to the Project.

Conaghan Civil	Ken Peddie	Site Supervisor	• Remedial works on expansion component of Project.
			• Day to day management of CEMP controls including:
			  • Work practices.
			  • Photographic records.
			• Co-ordination with Concrush and other subcontract personnel.
			Some responsibilities may be delegated to other Conaghan Civil personnel.

Fiona Brooker	RCA Australia	Contaminated Land Consultant	• Liaison with Conaghan Civil re the progress of works. • All verification requirements for works. • Provision of advice as required. • Inspection of the site on a routine basis and at any Hold Points (refer **Section 6.6**). • Liaison with Auditor. • Site meetings as required by Conaghan Civil or Concrush. • Preparation of validation report. • Preparation of long-term management plan. Some responsibilities may be delegated to other qualified RCA personnel.
Ian Gregson	GHD	Auditor	• Inspection of site as requested and where required to support the site audit statement and report. • Provision of advice regarding contamination issues. • Review of validation report and long-term management plan. • Provision of site audit statement and report at the completion of remediation.

6.14 COMMUNITY RELATIONS PLAN

The following information will be included in a community notice and distributed to neighbouring residents prior to the development of the site:

- The site is undergoing some remediation during development earthworks.
- Potential effects such as odours and dust and what is being done to prevent them.
- Contact numbers in the event of odour, dust or other concerns relating to the site activities.

6.15 LONG-TERM MANAGEMENT PLAN

A long-term EMP will be required for the site. This plan will then be included in the legal documents (Section 10.7 Certificate under the Environmental Planning and Assessment Act, Certificate 88b under the Conveyancing Act) associated with the site and will be managed by Concrush Pty Ltd as part of the Operational Environmental Management Plan, which is required by SSD Approval Condition C5.

The Plan must be written in accordance with the guidelines (Ref [23]) and will include, but not necessarily be limited to:

- Description of the contamination status of the site below the surface.
- Precautions and control measures that have been put in place during the development to ensure the safety of the workers and visitors to the site and how they work.
- Obligations of the owner in regard to those precautions and control measures, including maintenance of capping, prohibitions and approval requirements.
- Potential effects of non-compliance with the detailed obligations.
- Potential legal implications of non-compliance with the detailed obligations.

There must be a method to provide notification of restrictions to the site to future owners and occupiers.

There are currently no utilities situated at the site that will not be under direct control by Concrush. In the event that any services by external authorities, such as Telstra, Hunter Water or Energy Australia, are installed at the site the relevant authorities must be informed and/or provided with the Plan.

7 CONCLUSIONS

Previous assessment of the proposed expansion component of the Concrush operational site has identified the presence of bonded ACM fragments which are considered to require remediation prior to the use of the site as part of Concrush's Resource Recovery facility at Teralba.

The requirement for this RAP was included as SSD Approval Condition B49 and is required to be implemented by SSD Approval Condition B51. This RAP has been prepared by RCA Australia personnel with over ten years' experience in the assessment, remediation and management of contaminated land and has been reviewed by the appointed NSW EPA accredited contaminated sites auditor as part of the process of addressing SSD Approval Condition B52 and B53. This RAP has also been reviewed by the NSW EPA in accordance with SSD Approval Condition B49.

Based on the NSW EPA preferred remediation hierarchy and the preference (Ref [7]) for remediation which minimises ground disturbance for site where asbestos is a contaminant of concern, RCA have identified that a cap and contain strategy is the most appropriate. The strategy requires the placement of a high visibility marker layer and a minimum of 0.5m clean material across the site to form an identifiable barrier between the soils in which ACM was identified and the operational surface of the site. There are some water management features (leachate pond, sedimentation dam, constructed wetlands) in which there will not be 0.5m of clean soil due to the purpose of the features and there are two (2) areas: the wetlands in the west of the site and a strip along the eastern boundary which will not be included in the operational site and as such will not be actively remediated as part of this RAP. There are not considered to be potential risks associated with these areas as the wetland will not be disturbed or accessed and the eastern strip will be covered with a landscaped bund.

Management for excavated soil, and the face of excavations below the exiting pavement / hardstand construction material depths, will be required due to the presence of acid sulfate soils. These have been specified in full as part of the ASSMP (Ref [16]) prepared for the site in conjunction with this RAP.

No interim site management plan is considered necessary given the site's vacant, un-used status however there is a requirement for a construction phase management plan to be implemented specifically during the remedial works to manage:

- The remedial schedule.
- WHS management for all personnel and all activities.
- Environmental aspects associated with the earthworks such as dust, noise, surface water, groundwater.
- Requirements for documentation processes, hold points with relation to validation and certifying persons for relevant tasks.
- Material control such as certification of imported fill and material tracking.
- Contingency planning for response, management and reparation for incidents in relation to the above management plans.
- Complaint management process.

This will be prepared prior to the commencement of the remedial process.

The remediation of the site will be verified by a combination of site inspections, photography log and registered survey of the extent and elevation of the high visibility marker layer and overlying fill. Following the completion of the remediation a validation report detailing the methodology undertaken and the final remediated nature of the site will be prepared and included in an audit by the appointed NSW EPA accredited contaminated sites auditor in accordance with SSD Approval Conditions B52 and B53. A long-term EMP will also be prepared to manage the site such that the remedial strategy is not compromised during the operations of the site and this will be also included in the audit process.

8 LIMITATIONS

This report has been prepared for Concrush Pty Ltd in accordance with an agreement with RCA. The services performed by RCA have been conducted in a manner consistent with that generally exercised by members of its profession and consulting practice.

This report has been prepared for the sole use of Concrush Pty Ltd. The report may not contain sufficient information for purposes of other uses or for parties other than Concrush Pty Ltd. This report shall only be presented in full and may not be used to support objectives other than those stated in the report without written permission from RCA.

The information in this report is considered accurate at the date of issue with regard to the current conditions of the site. Conditions can vary across any site that cannot be explicitly defined by investigation.

Environmental conditions including contaminant concentrations can change in a limited period of time. This should be considered if the report is used following a significant period of time after the date of issue.

Yours faithfully

RCA AUSTRALIA

Kirsty Nealon
Senior Environmental Scientist

Fiona Brooker
Associate Environmental Engineer

REFERENCES

[1] Lake Macquarie City Council Local Environmental Plan 2014, under the Environmental Planning and Assessment Act 1979, published 2014

[2] Coffey Environments Australia Pty Ltd, *Soil Contamination Assessment – Proposed Industrial Subdivision, Racecourse Road, Teralba* NSW, 1 May 2013

[3] Protection of the Environment Operations Act 1997 (POEO Act)

[4] Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, *The excavated natural material order 2014*

[5] Coffey Environments Australia Pty Ltd, *Environmental Site Management Plan, Proposed Industrial Subdivision, Racecourse Road, Teralba NSW*, 9 July 2014

[6] RCA Australia, *Baseline Contamination Assessment, Proposed Concrush Facility Expansion, Racecourse Road, Teralba, November 2018*, RCA 13589-401/3

[7] ASC NEPC, National Environment Protection (Assessment of Site Contamination) Measure, 1999 as amended 2013.

[8] RCA Australia, *Geotechnical Investigation, Proposed Upgrade of Pavements, 21 Racecourse Road, Teralba*, RCA ref: 13589-201/1, June 2020.

[9] NSW Acid Sulfate Soil Management Advisory Committee, *Acid Sulfate Soil Manual*, August 1998.

[10] HEPA, *PFAS National Environmental Management Plan*, January 2018.

[11] RCA Australia, *Response to the NSW EPA following comments re Proposed Concrush Expansion, Racecourse Road, Teralba*, RCA ref: 13589-402/1, 1 March 2018.

[12] RCA Australia, *Groundwater Management Plan, Expansion of the Concrush Resource Recovery Facility, Teralba*, RCA ref: 13589-805/0, final pending.

[13] Umwelt, *Concrush Increase to Capacity Project, Soil and Water Impact Assessment*, 2018

[14] Umwelt, *Concrush Increase to Capacity Project, Environment Impact Statement*, November 2018

[15] NSWEPA, *Sampling Design Guidelines*, September 1995.

[16] RCA Australia, *Acid Sulfate Soil Management Plan, Expansion of the Concrush Resource Recovery Facility, Teralba*, RCA ref: 13589-804/0, final pending.

[17] Austroads, *Guide to Pavement Technology, Part 6: Unsealed Pavements*, 2009.

[18] RCA Australia, *Construction Environmental Management Plan, Expansion of the Concrush Resource Recovery Facility, Teralba*, RCA ref: 13589-801/0, final pending

[19] Umwelt, *Water Discharge Management Plan, Concrush Resource Recovery Facility*, Report No: 4987/ R01, May 2020.

[20] Resource Recovery Order under Part 9, Clause 93 of the Protection of the Environment Operations (Waste) Regulation 2014, Concrush Recovered Aggregate Order 2020.

[21] http://www.epa.nsw.gov.au/your-environment/recycling-and-reuse/resource-recovery-framework/current-orders-and-exemption

[22] NSW EPA, *Waste Classification Guidelines, Part 1; Classifying Waste*, November 2014.

[23] NSW EPA, *Consultants Reporting on Contaminated Land*, April 2020 (updated May 2020).

[24] CRC Care, *Technical Report 10, Health screening levels for petroleum in soil and groundwater*, September 2011.

[25] ANZECC, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, October 2000.

[26] ANZG, *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, August 2018. Available at www.waterquality.gov.au/anz-guidelines.

[27] National Health and Medical Research Council, *Australian Drinking Water Guidelines*, 2011.

[28] NHMRC, Guidelines for Managing Risks in Recreational Water, 2008.

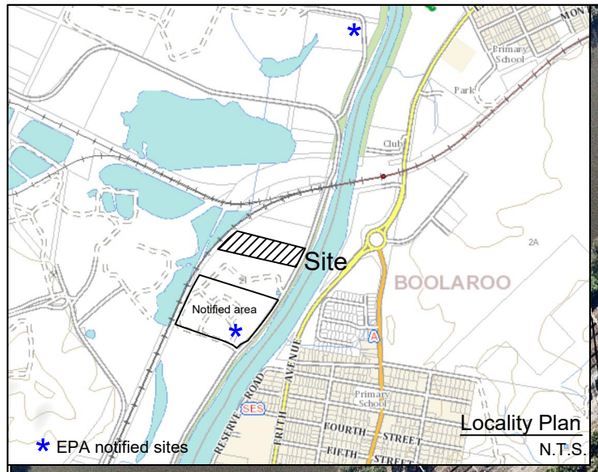
GLOSSARY

95%UCL_{ave}	A statistical calculation – 95% Upper Confidence Limit of the arithmetic mean of the data set.
ACM	Asbestos containing material.
AF	Asbestos fines
ASC NEPM	National Environment Protection (Assessment of Site Contamination) Measure.
EES	Department of Planning, Division of Environment, Energy and Science – formerly known as NSW Office of Environment and Heritage (OEH)
EIL	Ecological investigation level. Relates to soil concentrations which may pose a risk to ecological health.
EMP	Environmental management plan.
ENM	Excavated natural material.
ESL	Ecological screening level. Relates to vapour risk from petroleum hydrocarbons which may pose a risk to ecological health.
GIL	Groundwater investigation levels.
HIL	Health investigation level. Relates to soil concentrations which may pose a risk to human health in soil.
HSL	Health screening level. Relates to the vapour risk from petroleum hydrocarbons which may pose a risk to human health in soil. Also relates to exposure to asbestos fibres.
In-Situ	In place, without excavation.
ISL	Investigation screening levels for soil. Comprised of HIL/EIL and HSL/ESL
kg	kilogram, 1000 gram.
Leachate	Fluid that has passed through a soil stratum, possibly collects contaminants.
LEP	Local environment plan. A planning tool for the Local Government.

mg	milligram, 1/1000 gram.
NEPC	National Environment Protection Council.
NSW EPA	NSW Environment Protection Authority.
PID	Photoionisation detector. Measures volatile gases in air or emanating from soil or water.
VENM	Virgin excavated natural material.
Chemical Compounds	
BTEX	Benzene, toluene, ethylbenzene, xylene.
PAH	Polycyclic aromatic hydrocarbons. Multi-ring compounds found in fuels, oils and creosote. These are also common combustion products.
TRH	Total recoverable hydrocarbons.

Appendix A

Drawings



Current Concrush Facility

Wetland

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10 TP11 TP12 TP13 TP14 TP15 TP16 TP17

BH1 BH2 BH3

AS1 AS2 AS3

TP1 TP2 TP3 TP4 TP5 TP6 TP7 TP8 TP9 TP10 TP11 TP12 TP13

Racecourse Road

Cockle Creek

LEGEND

- Approximate site boundary location
- Approximate area of previous investigation - 2013
- Approximate borehole location - 2018/2020
- Approximate test pit location - 2018
- Approximate test pit location -2020
- Approximate extent of existing hardstand
- Approximate test pit locations - 2013 (position approximate only)
- Approximate asbestos fragment sample - 2013 (position approximate only)

Aerial image taken from Nearmap, June 15 2018
(used in accordance with commercial licence)
Boundary taken from drawing supplied by
Cadence Consulting Surveyors
(Dwg No. CCS-1711_Dwg.Detail.1A, dated 18/06/20)

0 10 20 30 40 50
metres

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

SITE LOCALITY, LAYOUT AND BOREHOLE AND TEST PIT LOCATION PLAN REMEDIAL ACTION PLAN RACECOURSE ROAD TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13589-803/2	
DRAWN BY	FB	SCALE	1 : 1000 (A3)	DRAWING No	1	REV 1
APPROVED BY	KN	DATE	30/06/2020	OFFICE	NEWCASTLE	

CDT-DWG-A3H-001/1

LEGEND

- Approximate site boundary location
- Approximate area of previous investigation
- Approximate test pit location
- Operational and accessible area of site for proposed development
- Approximate Coffey 2013 asbestos fragment sample (position approximate only)
- Approximate extent of existing hardstand
- Approximate extent of marker layer placement

Aerial image taken from Nearmap, June 15 2018
(used in accordance with commercial licence)
Boundary taken from drawing supplied by
Cadence Consulting Surveyors
(Dwg No. CCS-1711_Dwg.Detail.1A, dated 18/06/20)

0 10 20 30 40 50
metres

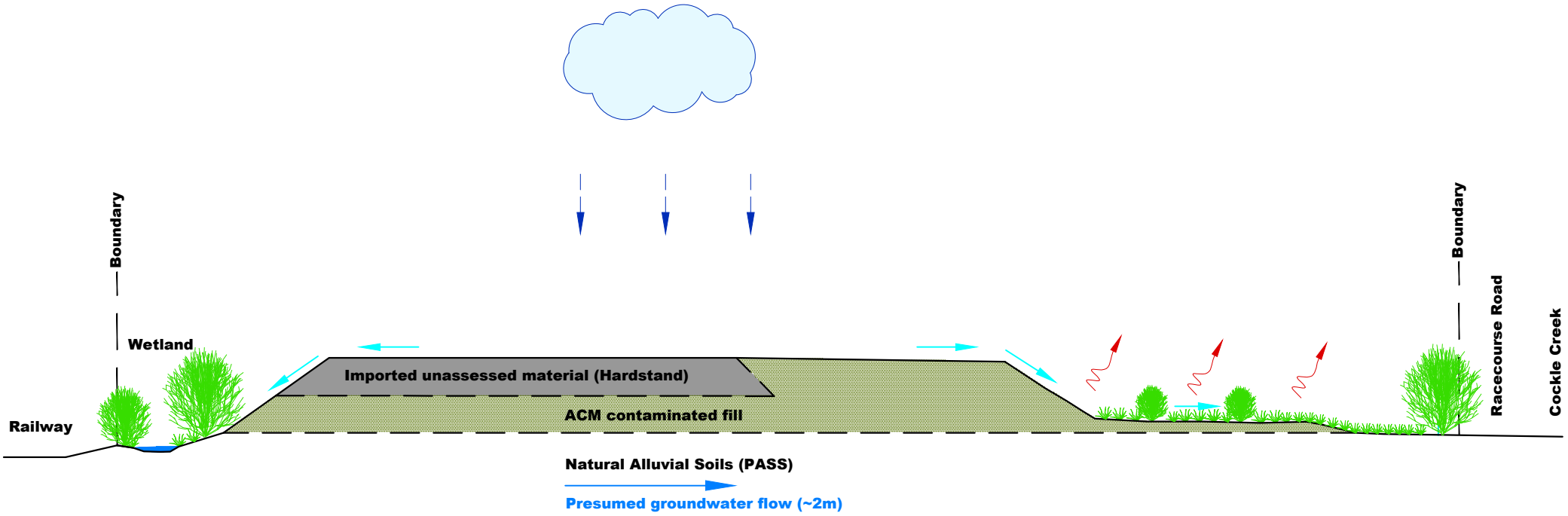
RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

LOCATIONS OF ASBESTOS IDENTIFICATION AND EXTENT OF REMEDIATION REMEDIAL ACTION PLAN RACECOURSE ROAD, TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13589-803/2
DRAWN BY	FB	SCALE	1 : 1000 (A3)	DRAWING No 2	REV 1
APPROVED BY	KN	DATE	30/06/2020	OFFICE	NEWCASTLE

CDT-DWG-A3H-001/1

CDT-DWG-A4H-001/1



LEGEND

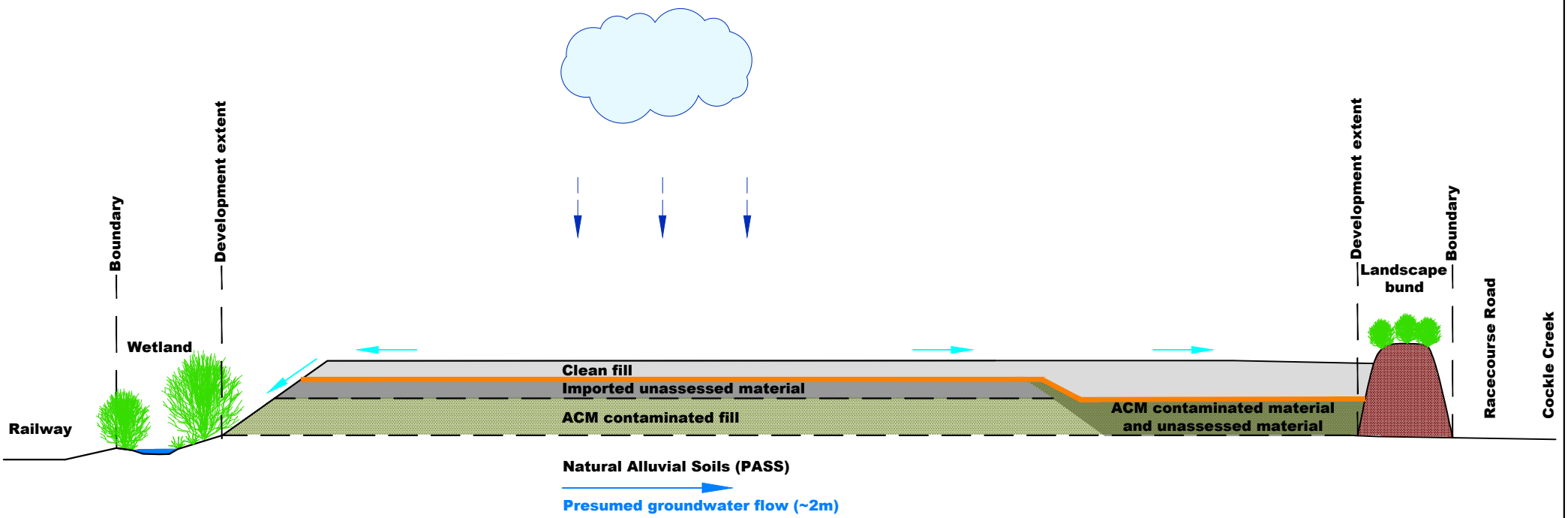
- Heavy vegetation
- Surface water
- Surface water flow
- Potential dust generation

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

EXISTING CONCEPTUAL SITE MODEL
REMEDIAL ACTION PLAN
RACECOURSE ROAD, TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13589-803/2
DRAWN BY	FB	SCALE	N.T.S.	DRAWING No 3	REV 0
APPROVED BY	KN	DATE	30/06/2020	OFFICE	NEWCASTLE

CDT-DWG-A4H-001/1



LEGEND

- Heavy vegetation
- Surface water
- Surface water flow
- High visibility marker layer

RCA AUSTRALIA
GEOTECHNICAL • ENVIRONMENTAL

REMEDIATED CONCEPTUAL SITE MODEL
REMEDIAL ACTION PLAN
RACECOURSE ROAD, TERALBA

CLIENT	Concrush Pty Ltd			RCA Ref	13589-803/2
DRAWN BY	FB	SCALE	N.T.S.	DRAWING No 4	REV 0
APPROVED BY	KN	DATE	30/06/2020	OFFICE	NEWCASTLE

Appendix B

Screening Levels and Guidelines

NATIONAL ENVIRONMENT PROTECTION (ASSESSMENT OF SITE CONTAMINATION) MEASURE 1999 AS AMENDED 2013

Soil

The investigation and screening levels (ISL) utilised for the assessment of the soil on site will be sourced from the National Environment Protection Measure for the Assessment of Site Contamination (ASC NEPM, Ref [7]). These ISL are not derived as acceptance criteria for contamination at a site, but as levels above which specific consideration of risk, based on the site use and potential exposure, is required. If a risk is determined as present, then remediation and/or management must be undertaken.

Assessment ISL are based on:

- Human Health.

  Intentionally conservative health investigation levels (HIL) have been derived for four (4) generic land use settings.

  - HIL 'A' - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry). This category includes children's day care centres, preschools and primary schools.
  - HIL 'B' - Residential with minimal opportunities for soil access includes dwellings with fully and permanently paved yard space such as high rise buildings and flats.
  - HIL 'C' - Public open space such as parks, playgrounds, playing fields (eg, ovals) secondary schools and footpaths. It does not include undeveloped public open space (such as urban bushland and reserves).
  - HIL 'D' - Commercial/industrial such as shops, offices, factories and industrial sites.

  Health screening levels (HSL) have been determined for risks associated from vapour intrusion from petroleum[4] compound contamination for the same land use settings. These HSL are additionally based on the fraction of compound, the soil texture and the depth of the encountered soil.

  Direct hydrocarbon contact criteria are not provided in the ASC NEPM, however these are provided in CRC Care Technical Report 10 (Ref [24]) which is the source document for the HSL.

  HSL have also been determined for asbestos containing materials. The HSL for bonded asbestos containing material is based on the land use settings detailed above, however the following HSL also apply:

  - Total of Fibrous asbestos and Asbestos fines – less than 0.001%.
  - No visible asbestos in surface soil – or where an area is likely to be disturbed during any proposed works.

[4] Laboratory analysis of hydrocarbons is being reported as total recoverable hydrocarbons (TRH). This testing method includes all forms of hydrocarbons, not just petroleum hydrocarbons and therefore can be considered a conservative measure against the chosen TPH criteria. Further laboratory analysis using a silica gel clean up (TRH_{sg}) is considered to enable a better identification of the extent of petroleum based contamination.

- Ecological Health -

  These levels are considered to apply to soil within two (2) metres of the surface, the root zone and habitation zone of many species.

  Ecological investigation levels (EIL) have been determined for arsenic, copper, chromium III, DDT, naphthalene, nickel, lead and zinc in soil based on species sensitivity model and for three (3) generic land use settings:

  - Areas of ecological significance – for areas where the primary intention is for the conservation and protection of the natural environment. Protection level of 99%.
  - Urban residential areas and public open space – broadly equivalent to the HIL 'A', HIL 'B' and HIL 'C' land use settings. Protection level of 80%.
  - Commercial and industrial land uses – considered to be broadly equivalent to HIL 'D' land use setting. Protection level of 60%.

  Methodology for the derivation of EIL for other contaminants is available in the ASC NEPM and requires additional soil character data.

  Ecological screening levels (ESL) have been determined for petroleum compound contamination. Due to limitations in the data only moderate reliability ESL have been determined for fractions $<C_{16}$, applied generically in fine and coarse grained soils. ESL for petroleum fractions > C_{16}, BTEX, benzo(a)pyrene and naphthalene are considered low reliability.

- Aesthetics -

  Aesthetic considerations operate separately to the HIL/HSL and EIL/ESL assessment. Issues to be considered include:

  - Highly malodorous soils or extracted groundwater (eg, strong residual petroleum hydrocarbon odours, hydrogen sulphide in soil or extracted groundwater, organosulfur compounds).
  - Hydrocarbon sheen on surface water.
  - Discoloured chemical deposits or soil staining with chemical waste other than of a very minor nature.
  - Large monolithic deposits of otherwise low-risk material, eg, gypsum as powder or plasterboard, cement kiln dust.
  - Presence of putrescible refuse including material that may generate hazardous levels of methane such as a deep-fill profile of green waste or large quantities of timber waste.
  - Soils containing residue from animal burial (eg, former abattoir sites).

  Site assessment requires consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity. For example, higher expectations for soil quality would apply to residential properties with gardens compared with industrial settings.

For the purpose of the Concrush Resource Recovery Facility Project, RCA considers that the criteria for commercial / industrial land use is appropriate for both the assessment of human health and ecological risk. The exposure scenario for the derivation of risk to human health for commercial / industrial land use is set out in the table below and the criteria used in the assessment are included in **Appendix C**.

Tier 1 assessment comprises the comparison of the soil data with the HIL/HSL and EIL/ESL. In the event that some concentrations are in excess of the relevant criteria, the summary statistics of the data set may be utilised for assessment purpose. Consideration of a range of statistics is recommended; at a minimum the 95%UCL_{ave} should be compared to the relevant criteria as long as:

- No single value exceeds 250% of the relevant criterion.
- The standard deviation of the results for each analyte is less than 50% of the relevant criterion.

In addition to appropriate consideration and application of the HSL and ESL, there are a number of policy considerations which reflect the nature and properties of petroleum hydrocarbons:

- Formation of observable light non-aqueous phase liquids (LNAPL).
- Fire and explosive hazards.
- Effects on buried infrastructure, eg, penetration of, or damage to, in-ground services by hydrocarbons.

The ASC NEPM (Ref [7]) has therefore provided management limits, the application of which will require consideration of site-specific factors such as the depth of building basements and services and depth to groundwater, to determine the maximum depth to which the limits should apply. The management limits may have less relevance at operating industrial sites (including mine sites) which have no or limited sensitive receptors in the area of potential impact. When the management limits are exceeded, further site-specific assessment and management may enable any identified risk to be addressed. RCA has used the management limits for commercial / industrial land use settings and these are included in **Appendix C**.

The presence of site hydrocarbon contamination at the levels of the management limits does not imply that there is no need for administrative notification or controls in accordance with jurisdiction requirements.

The following figure has been taken from the ASC NEPM (Ref [7]) to illustrate the assessment methodology in regard to petroleum contamination.

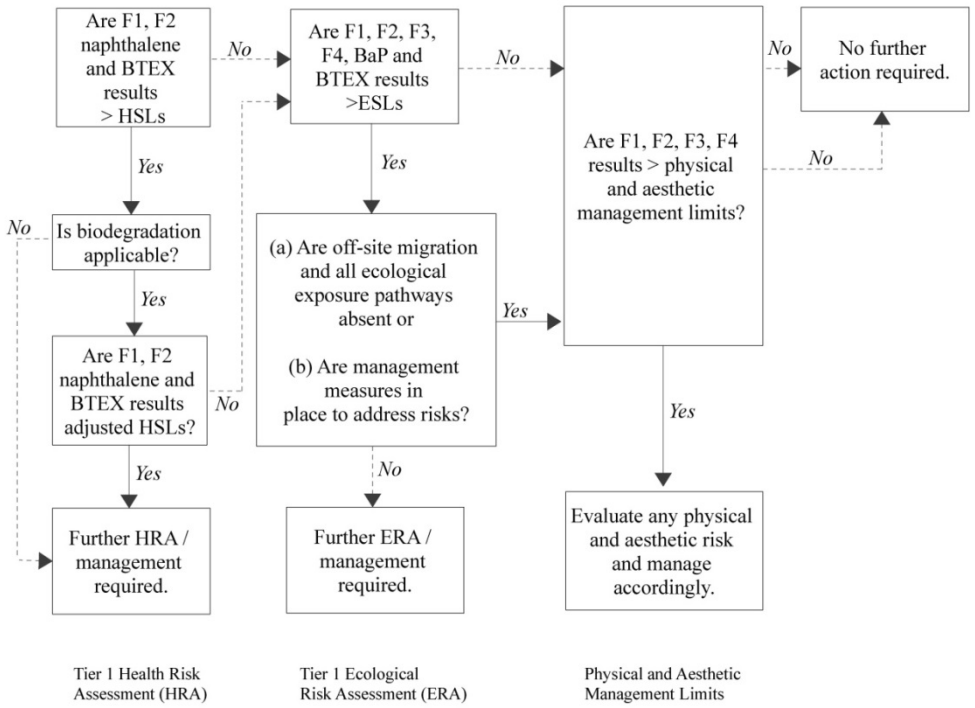


Figure 12 *Flowchart for the Tier 1 human and ecological risk assessment of petroleum hydrocarbon contamination – application of HSL and ESL and consideration of management limits*

Water

Schedule B6 of the ASC NEPM (Ref [7]) provides generic groundwater investigation levels (GIL) which are defined as 'the concentration of a contaminant in groundwater above which further investigation is required'. Selected GIL are tabulated in Table 1C of Schedule B1 and are sourced from the:

- Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Volume 1, (AWQ, Ref [25])). It is noted that these guidelines have since been replaced by ANZG (Ref [26]) and as such RCA have used the most recent guidelines.
- Australian Drinking Water Guidelines (ADWG, Ref [27]).
- Guidelines for Managing Risk in Recreational Water (Ref [28]).

The GIL are designed to avoid unacceptable impact to exposed populations or ecosystems under a range of circumstances. The aquatic ecosystem protection GIL presented in Table 1C of Schedule B1 are applicable to 'slightly - moderately disturbed' ecosystems. The AWQG should be consulted for additional values for protection of disturbed ecosystems and pristine ecosystems.

Schedule B1 of the ASC NEPM provides generic health screening levels (HSL) for groundwater, for protection of human health from petroleum hydrocarbon[5] vapours, based on the following land use scenarios as detailed earlier in the appendix.

RCA does not consider the ADWG (Ref [27]) or the Recreational water guidelines (Ref [28]) relevant for 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 at Cockle Creek is tidal and has been identified to be highly disturbed (Ref [14]).

[5] Laboratory analysis of hydrocarbons is reported as total recoverable hydrocarbons (TRH). This testing method includes all forms of hydrocarbons, not just petroleum hydrocarbons and therefore can be considered a conservative measure against the chosen TPH criteria. Further laboratory analysis using a silica gel clean up (TRH_{sg}) is considered to enable a better identification of the extent of petroleum based contamination

Commercial/Industrial Premises

Summary of Exposure Pathways	Abbreviations	Units	Parameters
			Adult
Body weight	BW_A or BW_C	kg	70
Exposure duration	ED_A or ED_C	years	30
Exposure frequency	EF	days	240
Soil/dust ingestion rate[1]	IR_{SA} or IR_{SC}	mg/day	25 [5]
Soil/dust to skin adherence factor	AF	$mg/cm^2/day$	0.5
Skin surface area	SA_A or SA_C	cm^2	20 000
Fraction of skin exposed	F_s	%	19
Dermal absorption factor	DAF	%	Chemical specific values applied
Time spent indoors on site each day	ET_i	hours	8
Time spent outdoors on site each day	ET_o	hours	1
Home-grown fraction of vegetables consumed	F_{HG}	%	0
Vegetable & fruit consumption rate	C_y (veg and fruit)	g/day	-
Averaging time for carcinogens ('lifetime')	AT_{NT}	years	70
Dust lung retention factor	RF	%	37.5

Soil ingestion rates for the HIL D scenario are based on the default soil/dust ingestion rates, corrected for an 8 hr/day daily exposure duration (50% of total waking hours)

NSW EPA 2014, WASTE CLASSIFICATION GUIDELINES

The waste classification guidelines (Ref [22]) are designed to ensure waste streams are managed appropriately and in accordance with the Protection of the Environment Operations Act 1997 (the POEO Act) and its associated regulations. The guidelines classify waste into groups which pose similar risks to the environment and human health; and facilitate their management and appropriate disposal.

Six (6) waste classes are used:

- Special waste:
    - Clinical or related waste, asbestos waste, waste tyres.
- Liquid waste:
    - As defined by angle of repose, temperature at which it is free flowing and physical composition.
- Hazardous waste.
- Restricted solid waste.
- General solid waste (putrescible).
- General solid waste (non-putrescible).

Classification begins with determination of whether the waste is 'special waste'. If not determination of whether material is classified as liquid waste is then required. Material which is not liquid waste, or is special waste due to asbestos content, must be compared to pre-classification definitions. Without pre-classification, the potential for hazardous characteristics (such as explosives, gases, flammable materials, oxidising, toxic and corrosive substances) must be established. If material cannot be classified as hazardous, assessment by chemical analysis must be undertaken. Without assessment, material must be managed as if hazardous waste.

Chemical classification is two tiered. The first set of criteria is based on total contaminant concentrations, whereas the second set of criteria is based on a leachable (TCLP) concentration and a total contaminant concentration. The total concentrations criteria are generally higher in conjunction with TCLP testing than if it was not undertaken.

RESOURCE RECOVERY ORDERS AND EXEMPTIONS

Resource recovery orders (orders) and resource recovery exemptions (exemptions) allow some wastes to be beneficially and safely re-used independent of the usual NSW laws that control applying waste to land, using waste as a fuel, or using waste in connection with a process of thermal treatment.

Existing Orders and Exemptions (Ref [21]) can be used without NSW EPA approval as long as all the conditions of the Order and Exemption being utilised are met in regard to the material and the proposed use. Record keeping requirements apply.

A specific Order/Exemption can be sought from the NSW EPA where there is none available for the material. If granted, the specific Order/Exemption will identify what the material is and how it can be used: the specific Order/Exemption cannot be applied to other material.

Appendix C

Summary of Results

Sample Identification	Sample Depth (m) [B]	Date	Sample Profile	Dominant Stratum [C]	Sample Purpose	Sample Collected by	Benzene, Toluene, Ethylbenzene, Xylene (BTEX)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Polycyclic Aromatic Hydrocarbons (PAH)	Naphthalene	Total Recoverable Hydrocarbons (TRH)	TRH C_6-C_{10}	TRH >C_{10}-C_{16}	TRH >C_{16}-C_{34}	TRH >C_{34}-C_{40}	F1	F2
Guideline [A]					HSL 'D'	SAND 0-<1m		3	NL	NL	230		NL						260	NL
						SAND 1-<2m		3	NL	NL	NL		NL						370	NL
						SAND 2-<4m		3	NL	NL	NL		NL						630	NL
					ESL C&I	Coarse		75	135	165	180		370			170	1700	3300	215	
					Non-sensitive	Coarse									700	1000	3500	10000		
					DC D			430	99000	27000	81000		11000		26000	20000	27000	38000		
TP1	0	27/03/2013	Fill: sandy clay, fine grained sand, dark brown. Some brick fragments, metal objects and glass.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP2	0	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some concrete boulders, metal rope, timber.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP3	0.4	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Concrete slab, brick fragments.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP4	0	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Brick and brick fragments.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP5	0.4	27/03/2013	Fill: clayed gravel, fine to coarse grained gravel, dark brown. Brick fragments, cobbles, cement fragments.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP6	0.9	27/03/2013	Fill: gravelly sand, fine to coarse grained, brown/orange, fine to coarse grained gravel. Some bricks and brick fragments.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP7	0.4	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown/orange. Some concrete fragments.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP8	0.9	27/03/2013	Fill: clayey sand, fine to coarse grained,dark brown. Some fine gravel, bricks, brick fragments, concrete slabs.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP9	0.4	27/03/2013	Fill: gravelly sand, fine to coarse grained, brown/orange, fine to coarse grained gravel.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP10	0.4	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some bricks, brick fragments and cement fragments.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP11	0.2	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, pale to dark brown. Some cobbles.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP12	0.9	27/03/2013	Fill: bricks, concrete slabs, fragments of bricks and concrete, metal wiring, plastic, fabrics. Some fine to coarse grained sand, dark brown.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP13	0.4	27/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown/orange. Bricks, wood, concrete slabs.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP14	0.4	28/03/2013	Fill: gravelly clay, fine to medium grained gravel, dark brown. Some brick and concrete fragments.	Sand	Investigation	Coffey		<0.1	<0.1	<0.1	0.15		<0.5		<20	<50	<100	<100	<20	<50
TP15	0.4	28/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some bricks and plastic.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP16	0.9	28/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some concrete and brick fragments.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
TP17	0.4	28/03/2013	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Bricks, wood, concrete fragments.	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
AS1	0	27/03/2013	Suspected ACM fragment	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
AS2	0	28/03/2013	Suspected ACM fragment	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
AS3	0	28/03/2013	Suspected ACM fragment	Sand	Investigation	Coffey		--	--	--	--		--		--	--	--	--	--	--
BH1/A	0.1	18/06/2018	Sandy Clay fill, brown with some sandstone and igneous gravel	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
BH2/A	0.1	18/06/2018	Clayey Sand fill, brown with some igneous gravel	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1	*	<10	<50	380	<100	<10	<50
TP3/A	0.5	18/06/2018	Clayey Sand fill, brown with metal, brick, concrete, sandstone and timber	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP4/B	1	18/06/2018	Sandy Clay fill, brown with metal, brick, concrete and igneous gravel	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP4/C	2	18/06/2018	Sandy Clay fill, grey with some brick and concrete	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP5/B	0.5	18/06/2018	Clayey Sand fill, brown with brick, concrete and some metal	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP6/A	0.5	18/06/2018	Sandey Clay fill, brown with terracotta pipe, some concrete and brick	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP6/B	1	18/06/2018	Sandy Clay fill, bown and pale brown with concrete, metal, brick and plastic	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP7/A	0.5	18/06/2018	Clayey Sand fill, brown with some concret, brick plastic pipe, trace metal	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP7/A ACM	0.5	18/06/2018	Bulk Material	Sand	Investigation	RCA - RJL		--	--	--	--		--		--	--	--	--	--	--
TP8/A	0.5	18/06/2018	Sandy Clay fill, brown with concrete, brick and some metal	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP8/0.5 ACM	0.5	18/06/2018	Bulk Material	Sand	Investigation	RCA - RJL		--	--	--	--		--		--	--	--	--	--	--
TP8/B	1	18/06/2018	Sandy Clay fill, brown with concrete, brick and some metal	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP9/A	0.5	18/06/2018	Sandy Clay fill, brown with concrete, brick, metal, igneous gravel, some plastic and tyre	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP9/0.5 ACM	0.5	18/06/2018	Bulk Material	Sand	Investigation	RCA - RJL		--	--	--	--		--		--	--	--	--	--	--
TP9/B	1	18/06/2018	Sandy Clay fill, brown with concrete, brick, metal, igneous gravel, some plastic and tyre	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP10/B	1	18/06/2018	Sandy Clay fill, brown with timber, some concrete, tile, plastic, igneous and sandstone gravel and tyre	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP11/C	2	18/06/2018	Sandy Clay fill, brown mottled green with some igneous gravel, concrete, brick, trace cloth and metal	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP12/B	1	18/06/2018	Sandy Clay fill, brown and pale brown with tree stump, brick, concrete, some metal	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
BH13/B	1	18/06/2018	Sandy Clay fill, dark brown with some igneous gravel	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50
TP13/C	2	18/06/2018	Sandy Clay, grey mottled pale brown	Sand	Investigation	RCA - RJL		<0.2	<0.5	<0.5	0.5		<1		<10	<50	<100	<100	<10	<50

All results are in units of mg/kg. 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 = TRH >C_{10}-C_{16} minus naphthalene. F2 PQL deemed = TRH >C_{10}-C_{16}.

[A] ASC NEPM 1999 (amended April 2013) Vapour Based Health Screening Levels (HSL) 'D' (Commercial/Industrial)

[A] ASC NEPM 1999 (amended April 2013) Ecological Screening Levels (ESL) C&I (Commercial and Industrial)

[A] ASC NEPM 1999 (amended April 2013) Management Limits (ML) Non-Sensitive Sites (Commercial and Industrial)

[A] CRC Care Technical Report 10, September 2011 Direct Contact (DC) Health Screening Levels 'D' (Commercial/Industrial)

[B] Note that this is a generalisation for the purpose of comparing to the HSL criteria. Where two strata equally represented, most conservative criterion used

[C] Start of sample, generally over a 0.1m interval

Results for TRH have been compared to TPH guidelines.

Presented ESL for naphthalene is an Ecological Investigation Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

ESL for TRH >C_{16}-C_{34} and >C_{34}-C_{40} are low reliability

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.

* Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

Results shown in **BOLD** are in excess of the vapour based HSL

Results shown in shading are >250% of the vapour based HSL

Results shown in underline are in excess of the ESL

Results shown in *italics* are in excess of the management limit

Results shown in patterned cells are in excess of the direct contact HSL

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

Sample Identification	Guideline [A]		TP1	TP2	TP3	TP4	TP5	TP6	TP7
Sample Depth (m) [B]	HIL 'D'	EIL C&I	0	0	0.4	0	0.4	0.9	0.4
Date			27/3/13	27/3/13	27/3/13	27/3/13	27/3/13	27/3/13	27/3/13
Sample Profile			Fill: sandy clay, fine grained sand, dark brown. Some brick fragments, metal objects and glass.	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some concrete boulders, metal rope, timber.	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Concrete slab, brick fragments.	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Brick and brick fragments.	Fill: clayed gravel, fine to coarse grained gravel, dark brown. Brick fragments, cobbles, cement fragments.	Fill: gravelly sand, fine to coarse grained, brown/orange, fine to coarse grained gravel. Some bricks and brick fragments.	Fill: gravelly clay, fine to coarse grained gravel, dark brown/orange. Some concrete fragments.
Sample Purpose			Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by			Coffey	Coffey	Coffey	Coffey	Coffey	Coffey	Coffey
Polycyclic Aromatic Hydrocarbons (PAH)									
Acenaphthene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	1.2	<0.5
Benz(a)anthracene			<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5
Benzo(a) pyrene		1.4	<0.5	<0.5	<0.5	<0.5	1.3	<0.5	<0.5
Benzo(b)&(k)fluoranthene			<1	<1	<1	<1	2.3	<1	<1
Benzo(g,h,i)perylene			<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5
Chrysene			<0.5	<0.5	<0.5	<0.5	1.1	<0.5	<0.5
Dibenz(a,h)anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene			<0.5	0.7	<0.5	0.6	3.4	<0.5	<0.5
Fluorene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene			<0.5	<0.5	<0.5	<0.5	0.9	<0.5	<0.5
Naphthalene		370	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene			<0.5	<0.5	<0.5	<0.5	1.4	1.2	<0.5
Pyrene			<0.5	0.7	<0.5	0.6	3.1	<0.5	<0.5
Carcinogenic PAH (B(a)P equivalent)	40		0.605	0.605	0.605	0.605	2.022	0.605	0.605
Sum of reported PAH	4000		4	4.9	4	4.7	17.4	5.9	4
Metals									
Arsenic	3000	160	6.9	2.9	8.2	9	11	17	3
Cadmium	900		0.4	<0.4	<0.4	0.5	0.4	<0.4	<0.4
Chromium	3600	310	<5	<5	<5	<5	6.1	<5	<5
Copper	240000	400	33	13	7	43	15	51	<5
Lead	1500	1800	89	37	35	130	55	72	7.4
Mercury	730		<0.05	<0.05	<0.05	0.06	<0.05	0.07	<0.05
Nickel	6000	55	<5	<5	<5	<5	<5	5.2	<5
Zinc	400000	360	430	160	170	910	180	710	12
Phenol									
Phenol	240000		--	<0.1	--	--	<0.1	0.5	--
Pentachlorophenol	660		--	--	--	--	--	--	--
Cyanide									
Free Cyanide	1500		--	--	--	--	--	--	--
Polychlorinated Biphenyls (PCB)									
Aroclor 1016			<0.5	--	<0.5	--	--	<0.5	--
Aroclor 1232			<0.5	--	<0.5	--	--	<0.5	--
Aroclor 1242			<0.5	--	<0.5	--	--	<0.5	--
Aroclor 1248			<0.5	--	<0.5	--	--	<0.5	--
Aroclor 1254			<0.5	--	<0.5	--	--	<0.5	--
Aroclor 1260			<0.5	--	<0.5	--	--	<0.5	--
Total PCB	50		1.5	--	1.5	--	--	1.5	--
Asbestos									
Detected Asbestos Weight			Nil detected	Nil detected	Nil detected	Nil detected	Nil detected	Nil detected	Nil detected
Sample weight			--	--	--	--	--	--	--

All results are in units of mg/kg, except for asbestos.

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

[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).

[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).

[B] Start of sample, generally over a 0.1m interval

[C] Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.

HIL for Chromium are for Chromium VI

Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

EIL for Naphthalene are for fresh (<2years) Naphthalene

EIL for Arsenic are for aged (>2years) Arsenic

EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative criteria.

EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.

EIL for Lead are the added contaminant limit for aged (>2years) Lead.

EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.

EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.

PCB analysis includes non-Dioxin like and Dioxin-like compounds compared to a guideline of non-Dioxin like PCB

Results shown in **BOLD** are in excess of the HIL

Results shown in shading are >250% of the HIL

Results shown in underline are in excess of EIL

Where summation required (PAH, PCB) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	Guideline [A]		TP8	TP9	TP10	TP11	TP12	TP13	TP14
Sample Depth (m) [B]	HIL 'D'	EIL C&I	0.9	0.4	0.4	0.2	0.9	0.4	0.4
Date			27/3/13	27/3/13	27/3/13	27/3/13	27/3/13	27/3/13	28/3/13
Sample Profile			Fill: clayey sand, fine to coarse grained,dark brown. Some fine gravel, bricks, brick fragments, concrete slabs.	Fill: gravelly sand, fine to coarse grained, brown/orange, fine to coarse grained gravel.	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some bricks, brick fragments and cement fragments.	Fill: gravelly clay, fine to coarse grained gravel, pale to dark brown. Some cobbles.	Fill: bricks, concrete slabs, fragments of bricks and concrete, metal wiring, plastic, fabrics. Some fine to coarse grained sand, dark brown.	Fill: gravelly clay, fine to coarse grained gravel, dark brown/orange. Bricks, wood, concrete slabs.	Fill: gravelly clay, fine to medium grained gravel, dark brown. Some brick and concrete fragments.
Sample Purpose			Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by			Coffey	Coffey	Coffey	Coffey	Coffey	Coffey	Coffey
Polycyclic Aromatic Hydrocarbons (PAH)									
Acenaphthene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene			<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene		1.4	<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene			<1	1.1	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene			<0.5	0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene			<0.5	0.6	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene			<0.5	1.6	<0.5	<0.5	<0.5	<0.5	<0.5
Fluorene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene		370	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene			<0.5	0.7	<0.5	<0.5	<0.5	<0.5	<0.5
Pyrene			<0.5	1.4	<0.5	<0.5	<0.5	<0.5	<0.5
Carcinogenic PAH (B(a)P equivalent)	40		0.605	1.066	0.605	0.605	0.605	0.605	0.605
Sum of reported PAH	4000		4	8.95	4	4	4	4	4
Metals									
Arsenic	3000	160	8.3	8.1	6.8	5	6.6	11	18
Cadmium	900		0.5	0.5	0.5	<0.4	<0.4	1.3	0.4
Chromium	3600	310	<5	<5	5.3	<5	<5	6.7	5.1
Copper	240000	400	34	19	35	144	22	53	30
Lead	1500	1800	89	46	85	36	170	130	75
Mercury	730		0.12	0.05	<0.05	<0.05	<0.05	0.6	<0.05
Nickel	6000	55	<5	6	<5	<5	<5	5.9	<5
Zinc	400000	360	390	170	690	85	220	430	360
Phenol									
Phenol	240000		--	--	--	<0.1	--	--	--
Pentachlorophenol	660		--	--	--	--	--	--	--
Cyanide									
Free Cyanide	1500		--	--	--	--	--	--	--
Polychlorinated Biphenyls (PCB)									
Aroclor 1016			--	--	--	--	--	--	--
Aroclor 1232			--	--	--	--	--	--	--
Aroclor 1242			--	--	--	--	--	--	--
Aroclor 1248			--	--	--	--	--	--	--
Aroclor 1254			--	--	--	--	--	--	--
Aroclor 1260			--	--	--	--	--	--	--
Total PCB	50		--	--	--	--	--	--	--
Asbestos									
Detected Asbestos Weight			Nil detected	Nil detected	Nil detected	Nil detected	Nil detected	Nil detected	Nil detected
Sample weight			--	--	--	--	--	--	--

All results are in units of mg/kg, except for asbestos.

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

[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).

[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).

[B] Start of sample, generally over a 0.1m interval

[C] Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.

HIL for Chromium are for Chromium VI

Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

EIL for Naphthalene are for fresh (<2years) Naphthalene

EIL for Arsenic are for aged (>2years) Arsenic

EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative criteria.

EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.

EIL for Lead are the added contaminant limit for aged (>2years) Lead.

EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.

EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.

PCB analysis includes non-Dioxin like and Dioxin-like compounds compared to a guideline of non-Dioxin like PCB

Results shown in **BOLD** are in excess of the HIL

Results shown in shading are >250% of the HIL

Results shown in underline are in excess of EIL

Where summation required (PAH, PCB) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	Guideline [A]		TP15	TP16	TP17	AS1	AS2	AS3	BH1/A
Sample Depth (m) [B]	HIL 'D'	EIL C&I	0.4	0.9	0.4	0	0	0	0.1
Date			28/3/13	28/3/13	28/3/13	27/3/13	28/3/13	28/3/13	18/6/18
Sample Profile			Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some bricks and plastic.	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Some concrete and brick fragments.	Fill: gravelly clay, fine to coarse grained gravel, dark brown. Bricks, wood, concrete fragments.	Suspected ACM fragment	Suspected ACM fragment	Suspected ACM fragment	Sandy Clay fill, brown with some sandstone and igneous gravel
Sample Purpose			Investigation	Investigation	Investigation	Investigation	Investigation	Investigation	Assessment
Sample collected by			Coffey	Coffey	Coffey	Coffey	Coffey	Coffey	RCA - RJL
Polycyclic Aromatic Hydrocarbons (PAH)									c
Acenaphthene			<0.5	<0.5	<0.5	--	--	--	<0.5
Acenaphthylene			<0.5	<0.5	<0.5	--	--	--	<0.5
Anthracene			<0.5	<0.5	<0.5	--	--	--	<0.5
Benz(a)anthracene			<0.5	<0.5	<0.5	--	--	--	<0.5
Benzo(a) pyrene		1.4	<0.5	<0.5	<0.5	--	--	--	<0.5
Benzo(b)&(k)fluoranthene			<1	<1	<1	--	--	--	<1
Benzo(g,h,i)perylene			<0.5	<0.5	<0.5	--	--	--	<0.5
Chrysene			<0.5	<0.5	<0.5	--	--	--	<0.5
Dibenz(a,h)anthracene			<0.5	<0.5	<0.5	--	--	--	<0.5
Fluoranthene			<0.5	<0.5	<0.5	--	--	--	0.8
Fluorene			<0.5	<0.5	<0.5	--	--	--	<0.5
Indeno(1,2,3-c,d)pyrene			<0.5	<0.5	<0.5	--	--	--	<0.5
Naphthalene		370	<0.5	<0.5	<0.5	--	--	--	<0.5
Phenanthrene			<0.5	<0.5	<0.5	--	--	--	<0.5
Pyrene			<0.5	<0.5	<0.5	--	--	--	0.8
Carcinogenic PAH (B(a)P equivalent)	40		0.605	0.605	0.605	--	--	--	0.605
Sum of reported PAH	4000		4	4	4	--	--	--	5.1
Metals									c
Arsenic	3000	160	7.2	2.2	23	--	--	--	11
Cadmium	900		0.5	<0.4	0.7	--	--	--	<1
Chromium	3600	310	<5	<5	10	--	--	--	10
Copper	240000	400	27	10	150	--	--	--	24
Lead	1500	1800	77	34	250	--	--	--	77
Mercury	730		<0.05	<0.05	0.07	--	--	--	<0.1
Nickel	6000	55	<5	<5	6.5	--	--	--	5
Zinc	400000	360	310	14	1400	--	--	--	664
Phenol									
Phenol	240000		<0.1	--	--	--	--	--	<0.5
Pentachlorophenol	660		--	--	--	--	--	--	<2
Cyanide									
Free Cyanide	1500		--	--	--	--	--	--	<1
Polychlorinated Biphenyls (PCB)									
Aroclor 1016			<0.5	--	--	--	--	--	--
Aroclor 1232			<0.5	--	--	--	--	--	--
Aroclor 1242			<0.5	--	--	--	--	--	--
Aroclor 1248			<0.5	--	--	--	--	--	--
Aroclor 1254			<0.5	--	--	--	--	--	--
Aroclor 1260			<0.5	--	--	--	--	--	--
Total PCB	50		1.5	--	--	--	--	--	--
Asbestos									
Detected Asbestos Weight			Nil detected	Nil detected	Nil detected	**Detected**	**Detected**	**Detected**	Nil detected
Sample weight			--	--	--	--	--	--	6.63g

All results are in units of mg/kg, except for asbestos.

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

[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).

[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).

[B] Start of sample, generally over a 0.1m interval

[C] Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.

HIL for Chromium are for Chromium VI

Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

EIL for Naphthalene are for fresh (<2years) Naphthalene

EIL for Arsenic are for aged (>2years) Arsenic

EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative criteria.

EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.

EIL for Lead are the added contaminant limit for aged (>2years) Lead.

EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.

EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.

PCB analysis includes non-Dioxin like and Dioxin-like compounds compared to a guideline of non-Dioxin like PCB

Results shown in **BOLD** are in excess of the HIL

Results shown in shading are >250% of the HIL

Results shown in underline are in excess of EIL

Where summation required (PAH, PCB) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	Guideline [A]		BH2/A	TP3/A	TP4/B	TP4/C	TP5/B	TP6/A	TP6/B
Sample Depth (m) [B]	HIL 'D'	EIL C&I	0.1	0.5	1	2	0.5	0.5	1
Date			18/6/18	18/6/18	18/6/18	18/6/18	18/6/18	18/6/18	18/6/18
Sample Profile			Clayey Sand fill, brown with some igneous gravel	Clayey Sand fill, brown with metal, brick, concrete, sandstone and timber	Sandy Clay fill, brown with metal, brick, concrete and igneous gravel	Sandy Clay fill, grey with some brick and concrete	Clayey Sand fill, brown with brick, concrete and some metal	Sandey Clay fill, brown with terracotta pipe, some concrete and brick	Sandy Clay fill, bown and pale brown with concrete, metal, brick and plastic
Sample Purpose			Assessment	Assessment	Assessment	Assessment	Assessment	Assessment	Assessment
Sample collected by			RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL
Polycyclic Aromatic Hydrocarbons (PAH)			c						
Acenaphthene			3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene			0.8	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene			9.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene			11.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene		1.4	11.6	<0.5	<0.5	<0.5	<0.5	0.5	<0.5
Benzo(b)&(k)fluoranthene			17.5	<1	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene			7.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene			10.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene			1.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene			37.4	0.6	<0.5	<0.5	1.4	0.7	<0.5
Fluorene			4.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene			5.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene		370	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene			40.6	<0.5	<0.5	<0.5	0.5	<0.5	<0.5
Pyrene			32.9	0.5	<0.5	<0.5	1.2	0.8	<0.5
Carcinogenic PAH (B(a)P equivalent)	40		16.356	0.605	0.605	0.605	0.605	0.855	0.605
Sum of reported PAH	4000		197.1	4.6	4	4	6.35	5.25	4
Metals			c						
Arsenic	3000	160	10	6	5	7	<5	6	6
Cadmium	900		<1	<1	<1	<1	<1	<1	<1
Chromium	3600	310	6	10	9	7	10	9	2
Copper	240000	400	119	19	5	15	17	10	<5
Lead	1500	1800	158	60	38	45	125	87	33
Mercury	730		0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	6000	55	10	4	2	4	5	<2	<2
Zinc	400000	360	257	108	133	160	145	42	<5
Phenol									
Phenol	240000		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	660		<2	<2	<2	<2	<2	<2	<2
Cyanide									
Free Cyanide	1500		<1	1	<1	<1	<1	<1	<1
Polychlorinated Biphenyls (PCB)									
Aroclor 1016			--	--	--	--	--	--	--
Aroclor 1232			--	--	--	--	--	--	--
Aroclor 1242			--	--	--	--	--	--	--
Aroclor 1248			--	--	--	--	--	--	--
Aroclor 1254			--	--	--	--	--	--	--
Aroclor 1260			--	--	--	--	--	--	--
Total PCB	50		--	--	--	--	--	--	--
Asbestos									
Detected Asbestos Weight Sample weight			Nil detected 25g	Nil detected 11.6g	Nil detected 9.12g	Nil detected 12g	Nil detected 16.3g	Nil detected 13.8g	Nil detected 8.68g

All results are in units of mg/kg, except for asbestos.

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

[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).

[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).

[B] Start of sample, generally over a 0.1m interval

[C] Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.

HIL for Chromium are for Chromium VI

Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

EIL for Naphthalene are for fresh (<2years) Naphthalene

EIL for Arsenic are for aged (>2years) Arsenic

EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative criteria.

EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.

EIL for Lead are the added contaminant limit for aged (>2years) Lead.

EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.

EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.

PCB analysis includes non-Dioxin like and Dioxin-like compounds compared to a guideline of non-Dioxin like PCB

Results shown in **BOLD** are in excess of the HIL

Results shown in shading are >250% of the HIL

Results shown in underline are in excess of EIL

Where summation required (PAH, PCB) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	Guideline [A]		TP7/A	TP7/A ACM	TP8/A	TP8/0.5 ACM	TP8/B	TP9/A	TP9/0.5 ACM
Sample Depth (m) [B]	HIL 'D'	EIL C&I	0.5	0.5	0.5	0.5	1	0.5	0.5
Date			18/6/18	18/6/18	18/6/18	18/6/18	18/6/18	18/6/18	18/6/18
Sample Profile			Clayey Sand fill, brown with some concret, brick plastic pipe, trace metal	Fragment	Sandy Clay fill, brown with concrete, brick and some metal	Fragment	Sandy Clay fill, brown with concrete, brick and some metal	Sandy Clay fill, brown with concrete, brick, metal, igneous gravel, some plastic and tyre	Fragment
Sample Purpose			Assessment	Assessment	Assessment	Assessment	Assessment	Assessment	Assessment
Sample collected by			RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL
Polycyclic Aromatic Hydrocarbons (PAH)									
Acenaphthene			<0.5	--	<0.5	--	<0.5	<0.5	--
Acenaphthylene			<0.5	--	<0.5	--	<0.5	<0.5	--
Anthracene			<0.5	--	<0.5	--	<0.5	<0.5	--
Benz(a)anthracene			<0.5	--	<0.5	--	<0.5	<0.5	--
Benzo(a) pyrene		1.4	<0.5	--	<0.5	--	<0.5	<0.5	--
Benzo(b)&(k)fluoranthene			<1	--	<1	--	<1	<1	--
Benzo(g,h,i)perylene			<0.5	--	<0.5	--	<0.5	<0.5	--
Chrysene			<0.5	--	<0.5	--	<0.5	<0.5	--
Dibenz(a,h)anthracene			<0.5	--	<0.5	--	<0.5	<0.5	--
Fluoranthene			<0.5	--	<0.5	--	<0.5	<0.5	--
Fluorene			<0.5	--	<0.5	--	<0.5	<0.5	--
Indeno(1,2,3-c,d)pyrene			<0.5	--	<0.5	--	<0.5	<0.5	--
Naphthalene		370	<0.5	--	<0.5	--	<0.5	<0.5	--
Phenanthrene			<0.5	--	<0.5	--	<0.5	<0.5	--
Pyrene			<0.5	--	<0.5	--	<0.5	<0.5	--
Carcinogenic PAH (B(a)P equivalent)	40		0.605	--	0.605	--	0.605	0.605	--
Sum of reported PAH	4000		4	--	4	--	4	4	--
Metals									
Arsenic	3000	160	9	--	<5	--	<5	20	--
Cadmium	900		<1	--	<1	--	<1	<1	--
Chromium	3600	310	12	--	4	--	11	15	--
Copper	240000	400	38	--	18	--	7	68	--
Lead	1500	1800	81	--	64	--	26	296	--
Mercury	730		<0.1	--	<0.1	--	<0.1	<0.1	--
Nickel	6000	55	4	--	<2	--	<2	4	--
Zinc	400000	360	552	--	526	--	75	1610	--
Phenol									
Phenol	240000		<0.5	--	<0.5	--	<0.5	<0.5	--
Pentachlorophenol	660		<2	--	<2	--	<2	<2	--
Cyanide									
Free Cyanide	1500		<1	--	<1	--	<1	<1	--
Polychlorinated Biphenyls (PCB)									
Aroclor 1016			--	--	--	--	--	--	--
Aroclor 1232			--	--	--	--	--	--	--
Aroclor 1242			--	--	--	--	--	--	--
Aroclor 1248			--	--	--	--	--	--	--
Aroclor 1254			--	--	--	--	--	--	--
Aroclor 1260			--	--	--	--	--	--	--
Total PCB	50		--	--	--	--	--	--	--
Asbestos									
Detected Asbestos Weight Sample weight			Nil detected 5.8g	**Chrysotile** **18.5g**	Nil detected 16.2g	**Chrysotile** **21g**	Nil detected 13.4g	Nil detected 12g	**Chrysotile** **98.8g**

All results are in units of mg/kg, except for asbestos.

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

[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).

[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).

[B] Start of sample, generally over a 0.1m interval

[C] Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.

HIL for Chromium are for Chromium VI

Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

EIL for Naphthalene are for fresh (<2years) Naphthalene

EIL for Arsenic are for aged (>2years) Arsenic

EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative criteria.

EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.

EIL for Lead are the added contaminant limit for aged (>2years) Lead.

EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.

EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.

PCB analysis includes non-Dioxin like and Dioxin-like compounds compared to a guideline of non-Dioxin like PCB

Results shown in **BOLD** are in excess of the HIL

Results shown in shading are >250% of the HIL

Results shown in underline are in excess of EIL

Where summation required (PAH, PCB) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	Guideline [A]		TP9/B	TP10/B	TP11/C	TP12/B	BH13/B	TP13/C
Sample Depth (m) [B]	HIL 'D'	EIL C&I	1	1	2	1	1	2
Date			18/6/18	18/6/18	18/6/18	18/6/18	18/6/18	18/6/18
Sample Profile			Sandy Clay fill, brown with concrete, brick, metal, igneous gravel, some plastic and tyre	Sandy Clay fill, brown with timber, some concrete, tile, plastic, igneous and sandstone gravel and tyre	Sandy Clay fill, brown mottled green with some igneous gravel, concrete, brick, trace cloth and metal	Sandy Clay fill, brown and pale brown with tree stump, brick, concrete, some metal	Sandy Clay fill, dark brown with some igneous gravel	Sandy Clay, grey mottled pale brown
Sample Purpose			Assessment	Assessment	Assessment	Assessment	Assessment	Assessment
Sample collected by			RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL	RCA - RJL
Polycyclic Aromatic Hydrocarbons (PAH)						c		
Acenaphthene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Acenaphthylene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benz(a)anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(a) pyrene		1.4	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzo(b)&(k)fluoranthene			<1	<1	<1	<1	<1	<1
Benzo(g,h,i)perylene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chrysene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenz(a,h)anthracene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene			<0.5	<0.5	<0.5	1.2	0.7	<0.5
Fluorene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Indeno(1,2,3-c,d)pyrene			<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene		370	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Phenanthrene			<0.5	<0.5	<0.5	1	<0.5	<0.5
Pyrene			<0.5	<0.5	<0.5	1.1	0.6	<0.5
Carcinogenic PAH (B(a)P equivalent)	40		0.605	0.605	0.605	0.605	0.605	0.605
Sum of reported PAH	4000		4	4	4	6.55	4.8	4
Metals						c		
Arsenic	3000	160	56	6	10	8	5	<5
Cadmium	900		<1	<1	<1	1	<1	<1
Chromium	3600	310	11	7	7	7	3	2
Copper	240000	400	75	22	6	34	<5	<5
Lead	1500	1800	647	68	8	131	21	8
Mercury	730		0.2	<0.1	<0.1	<0.1	<0.1	<0.1
Nickel	6000	55	3	3	<2	4	<2	<2
Zinc	400000	360	4150	292	15	925	44	5
Phenol								
Phenol	240000		<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Pentachlorophenol	660		<2	<2	<2	<2	<2	<2
Cyanide								
Free Cyanide	1500		<1	<1	<1	<1	2	1
Polychlorinated Biphenyls (PCB)								
Aroclor 1016			--	--	--	--	--	--
Aroclor 1232			--	--	--	--	--	--
Aroclor 1242			--	--	--	--	--	--
Aroclor 1248			--	--	--	--	--	--
Aroclor 1254			--	--	--	--	--	--
Aroclor 1260			--	--	--	--	--	--
Total PCB	50		--	--	--	--	--	--
Asbestos								
Detected Asbestos Weight Sample weight			Nil detected 9.63g	Nil detected 10.8g	Nil detected 6.75g	Nil detected 23g	Nil detected 15.8g	Nil detected 13.9g

All results are in units of mg/kg, except for asbestos.

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

[A] ASC NEPM 1999 (amended April 2013) Health Investigation Levels (HIL) 'D' (Commercial/Industrial).

[A] ASC NEPM 1999 (amended April 2013) Ecological Investigation Levels (EIL) C&I (Commercial and Industrial).

[B] Start of sample, generally over a 0.1m interval

[C] Duplicate sample value used where RPD result exceeds 30% and duplicate sample value is greater than test sample value

The Carcinogenic PAH value is calculated by multiplying the concentration of each of the 8 carcinogenic PAH compounds by its B(a)P toxic equivalence factor and summing these products.

HIL for Chromium are for Chromium VI

Presented ecological value for benzo(a)pyrene is a low reliability Ecological Screening Level

ESL are applicable for material at less than 2m depths below finished surface/ground level

For the purpose of the Tier 1 ESL/EIL assessment, all background concentrations are assumed to be zero

EIL for Naphthalene are for fresh (<2years) Naphthalene

EIL for Arsenic are for aged (>2years) Arsenic

EIL for Chromium are the added contaminant limit for aged (>2years) Chromium III in soils of 1% clay, the most conservative criteria.

EIL for Copper are the added contaminant limit for aged (>2years) Copper in soils of pH 6.5.

EIL for Lead are the added contaminant limit for aged (>2years) Lead.

EIL for Nickel are the added contaminant limit for aged (>2years) Nickel in soils of 5% CEC the most conservative of the criteria.

EIL for Zinc are the added contaminant limit for aged (>2years) Zinc in soils of 5% CEC and pH of 6.5, the most conservative of the criteria at pH 6.5.

PCB analysis includes non-Dioxin like and Dioxin-like compounds compared to a guideline of non-Dioxin like PCB

Results shown in **BOLD** are in excess of the HIL

Results shown in shading are >250% of the HIL

Results shown in underline are in excess of EIL

Where summation required (PAH, PCB) calculation includes components reported as non detected as 1/2 PQL.

Sample Identification	PQL	Human Health (Vapour Based) Guideline [A]		BH1	BH1	BH2	BH2	BH3
Sample Depth (m) [B]		HSL 'D'		1.03	1.3	2.5	2.5	1.5
Date		SAND 2-<4m	SAND 4-<8m	27/6/18	29/5/20	27/6/18	29/5/20	29/5/20
Sample Description				Turbid, dark grey, no odour	Cloudy, moderately turbid, no odour, no sheen.	Turbid, dark grey, no odour	Clear, low turbidity, no odour, no sheen.	Pale brown turbid, no odour, no sheen
Dominant Stratum [C]				Sand	Sand	Sand	Sand	Sand
Sample Purpose				Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by				RCA - ZL	RCA - RJL	RCA - ZL	RCA - RJL	RCA - RJL
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)								
Benzene	0.001	5	5	<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
Ethylbenzene	0.002	NL	NL	<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
ortho-Xylene	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
Polycyclic Aromatic Hydrocarbons (PAH)								
Naphthalene	0.005	NL	NL	<0.005	<0.005	<0.005	<0.005	<0.005
Total Recoverable Hydrocarbons (TRH)								
TRH C_6-C_{10}	0.02			<0.02	<0.02	<0.02	<0.02	<0.02
TRH >C_{10}-C_{16}	0.1			<0.1	<0.1	<0.1	<0.1	<0.1
TRH >C_{16}-C_{34}	0.1			<0.1	<0.1	<0.1	<0.1	0.23
TRH >C_{34}-C_{40}	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

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 = TRH >C_{10}-C_{16} minus naphthalene. F2 PQL deemed = TRH >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.

[B] Sample depths presented are as encountered prior to commencement of sampling

[C] 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.

Sample Identification	PQL	Aquatic Ecosystem Guideline [A]				Human Health (Ingestion) Guideline [B]	BH1	BH1	BH2	BH2	BH3
Sample Depth (m) [C]		99% Fresh	95% Fresh	99% Marine	95% Marine		1.03	1.3	2.5	2.5	1.5
Date							27/6/18	29/5/20	27/6/18	29/5/20	29/5/20
Sample Description							Turbid, dark grey, no odour	Cloudy, moderately turbid, no odour, no sheen.	Turbid, dark grey, no odour	Clear, low turbidity, no odour, no sheen.	Pale brown turbid, no odour, no sheen
Laboratory Report Reference							ES1818864001	ES2018650	ES1818864002	ES2018650	ES2018650
Sample Purpose							Investigation	Investigation	Investigation	Investigation	Investigation
Sample collected by							RCA - ZL	RCA - RJL	RCA - ZL	RCA - RJL	RCA - RJL
Benzene, Toluene, Ethylbenzene, Xylene (BTEX)											
Benzene	0.001		0.95		0.7	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
Ethylbenzene	0.002		*0.08*		*0.005*	0.3	<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
ortho-Xylene	0.002		0.35		*0.35*		<0.002	<0.002	<0.002	<0.002	<0.002
Total Xylenes	0.004					0.6	0.002	0.002	0.002	0.002	0.002
Total Recoverable Hydrocarbons (TRH)											
TRH C_6-C_{10}	0.02						<0.02	<0.02	<0.02	<0.02	<0.02
TRH >C_{10}-C_{16}	0.1						<0.1	<0.1	<0.1	<0.1	<0.1
TRH >C_{16}-C_{34}	0.1						<0.1	<0.1	<0.1	<0.1	0.23
TRH >C_{34}-C_{40}	0.1						<0.1	<0.1	<0.1	<0.1	<0.1
TRH C_6-C_{40}	0.32		*0.007*		*0.007*		0.16	0.16	0.16	0.16	***0.34***
Polycyclic Aromatic Hydrocarbons (PAH)											
Naphthalene	0.001/0.0001		0.016		0.07		<0.001	<0.0001	<0.001	<0.0001	<0.0001
Acenaphthylene	0.001/0.0001						<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 [D]	0.001/0.0001	*0.0006*		*0.0006*			<0.001	<0.0001	<0.001	<0.0001	<0.0001
Anthracene [D]	0.001/0.0001	*0.00001*		*0.00001*			<0.001	<0.0001	<0.001	<0.0001	<0.0001
Fluoranthene [D]	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 [D]	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,h)anthracene	0.001/0.0001						<0.001	<0.0001	<0.001	<0.0001	<0.0001
Benzo(g,h,i)perylene	0.001/0.0001						<0.001	<0.0001	<0.001	<0.0001	<0.0001
Metals											
Arsenic	0.001		0.013		*0.0023*	0.01	0.006	0.011	0.005	0.007	0.008
Cadmium	0.0001		0.0002		0.0055	0.002	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Chromium	0.001		0.001		0.0044	0.05	<0.001	0.001	0.001	<0.001	***0.002***
Copper	0.001		0.0014		0.0013	2	<0.001	<0.001	<0.001	<0.001	<0.001
Lead	0.001		0.0034		0.0044	0.01	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury [D]	0.0001	0.00006		0.0001		0.001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Nickel	0.001		0.011		0.07		0.002	0.004	0.005	0.002	0.004
Zinc	0.005		0.008		0.015		0.007	***0.025***	***0.009***	***0.012***	***0.118***
Phenols											
Phenols	0.001		0.32		0.4		<0.001	<0.001	<0.001	<0.001	<0.001
2-Chlorophenol	0.001		0.49			0.3	<0.001	<0.001	<0.001	<0.001	<0.001
2-Methylphenol	0.001						<0.001	<0.001	<0.001	<0.001	<0.001
3- & 4-Methylphenol	0.002						<0.002	<0.002	<0.002	<0.002	<0.002
2-Nitrophenol	0.001						<0.001	<0.001	<0.001	<0.001	<0.001
2.4-Dimethylphenol	0.001						<0.001	<0.001	<0.001	<0.001	<0.001
2,4-Dichlorophenol	0.001		0.16			0.2	<0.001	<0.001	<0.001	<0.001	<0.001
2.6-Dichlorophenol	0.001						<0.001	<0.001	<0.001	<0.001	<0.001
4-Chlorophenol	0.001		0.22				<0.001	<0.001	<0.001	<0.001	<0.001
2,4,6-Trichlorophenol [D]	0.001	0.003				0.02	<0.001	<0.001	<0.001	<0.001	<0.001
2,3,4,6-Tetraclorophenol [D]	0.001	0.01					<0.001	<0.001	<0.001	<0.001	<0.001
Pentachlorophenol [D]	0.002	0.0036		0.011		0.01	<0.002	<0.002	<0.002	<0.002	<0.002

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
[A] Ecological criteria % Protection Level for Receiving Water Type.
[B] Australian Drinking Water Guidelines.
[C] Sample depths presented are as encountered prior to commencement of sampling
[D] 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 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 UNDERLINE 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.

Test Pit	Depth (m)	Soil Type	pHF	pHFox	pH Change (pHF-phFox)	Chromium Reducible Sulfur (%S)	Chromium Reducible Sulfur (mole H+/ tonne)
TP4 (2018)	3.3	Sandy Clay	7.4	3.5	3.9		
TP5 (2018)	3	Sandy Clay	5.9	2.6	3.3		
TP12 (2018)	2	Sandy Clay	5.8	2.9	2.9		
TP13 (2018)	3	Sandy Clay	4.8	2	2.8		
TP1 (2020)	0.7	Silty Sand (Reworked alluvium)	4	2.49	1.54		
TP1 (2020)	0.9	Sandy Silt (Alluvium)	3.9	2.64	1.26		
TP2 (2020)	1.1	Sandy Silt (Reworked alluvium)	4.5	3.03	1.47		
TP2 (2020)	1.6	Clay (Alluvium)	4.1	2.29	1.83	0.023	15
TP6 (2020)	1.15	Silty Sand (Fill)	4.5	2.91	1.63		
TP7 (2020)	1.2	Silty Sand (Reworked alluvium)	4.3	3.1	1.22		
TP8 (2020)	1.2*	Silty Clay (Alluvium)	6	3.4	2.64		
TP9 (2020)	1.4	Silty Clay (Disturbed alluvium)	5.3	3.3	1.95		
TP10 (2020)	1.5	Gravelly Clay (Fill)	6.2	3.58	2.59	0.197	123

Results shown in shaded cells exceed the ASSMAC (1998) action criteria (Ref [3]) for 1-1000 tonne disturbed .

* Start of sample, however characterised material not present until 1.3m.

Appendix D

Registered Groundwater Map


GW200159
GW200158
GW200160
GW200162
GW200163
GW200161
GW200164

NSW Office of Water
Work Summary

GW200158

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353961.0
Easting: 370941.0
Latitude: 32°56'42.1"S
Longitude: 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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

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

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 *****

NSW Office of Water
Work Summary

GW200159

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353979.0
Easting: 370946.0
Latitude: 32°56'41.5"S
Longitude: 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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

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

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 *****

NSW Office of Water
Work Summary

GW200160

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
Intended Purpose(s):

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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353964.0
Easting: 370960.0
Latitude: 32°56'42.0"S
Longitude: 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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

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

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 *****

NSW Office of Water
Work Summary

GW200161

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
Intended Purpose(s):

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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353941.0
Easting: 370978.0
Latitude: 32°56'42.8"S
Longitude: 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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

From (m)	To (m)	Thickness (m)	Drillers Description	Geological Material	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 *****

NSW Office of Water
Work Summary

GW200162

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
Intended Purpose(s):

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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353939.0
Easting: 370980.0
Latitude: 32°56'42.9"S
Longitude: 151°37'11.2"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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

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

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 *****

NSW Office of Water
Work Summary

GW200163

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
Intended Purpose(s):

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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353939.0
Easting: 370960.0
Latitude: 32°56'42.8"S
Longitude: 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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

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

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 *****

NSW Office of Water
Work Summary

GW200164

Licence: 20BL169523 **Licence Status:** ACTIVE

Authorised Purpose(s): TEST BORE
Intended Purpose(s):

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
GWMA: -
GW Zone: -
Standing Water Level:
Salinity:
Yield:

Site Details

Site Chosen By:

	County	Parish	Cadastre
Form A:	NORTH	NORTH.59	2 220347
Licensed:	NORTHUMBERLAND	TERALBA	Whole Lot 2//220347

Region: 20 - Hunter
River Basin: - Unknown
Area/District:
CMA Map:
Grid Zone:
Scale:

Elevation: 0.00 m (A.H.D.)
Elevation Source: Unknown
Northing: 6353936.0
Easting: 371010.0
Latitude: 32°56'43.0"S
Longitude: 151°37'12.3"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	Type	From (m)	To (m)	Outside Diameter (mm)	Inside Diameter (mm)	Interval	Details

Water Bearing Zones

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

Geologists Log
Drillers Log

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

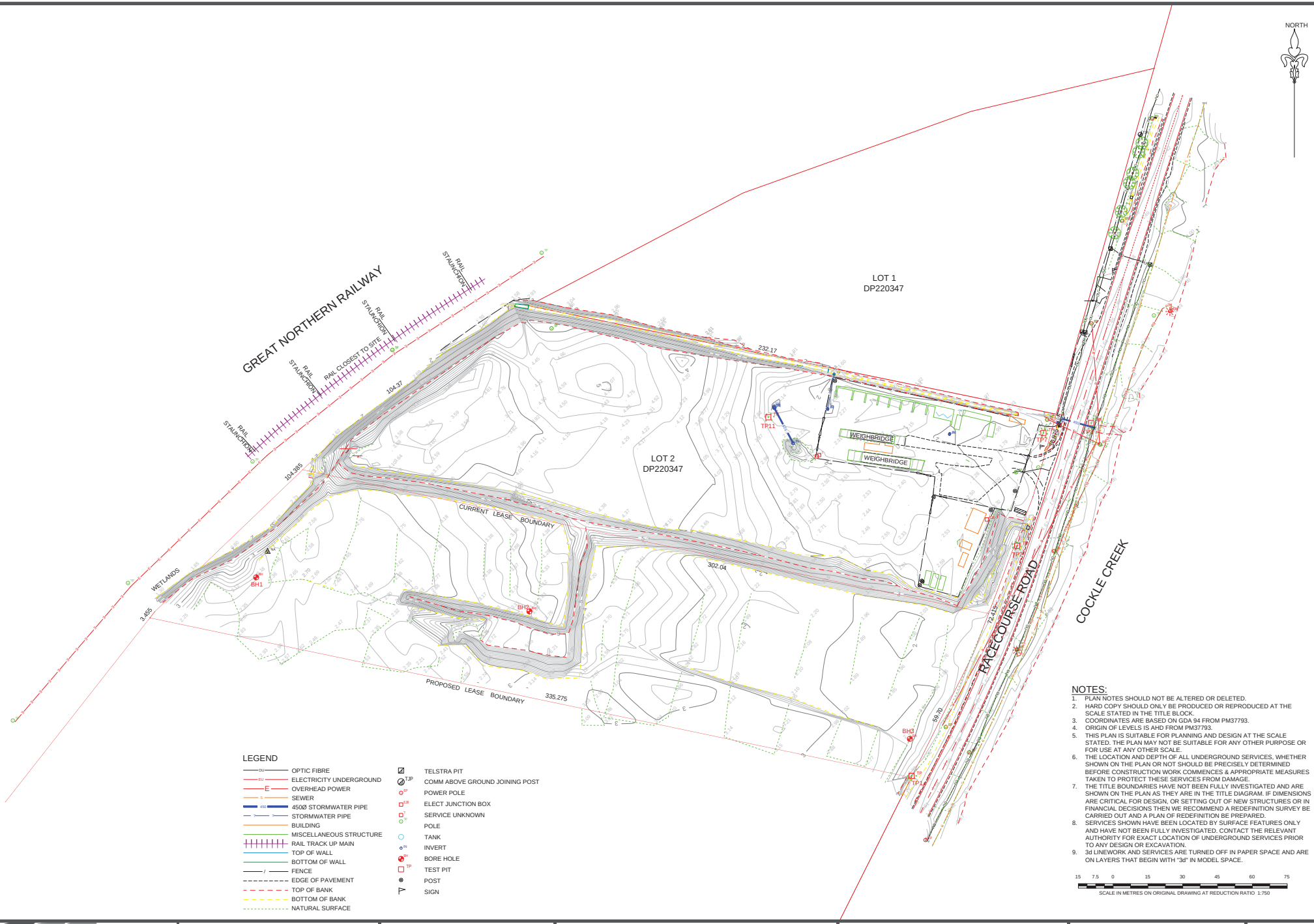
Remarks

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

***** End of GW200164 *****

Appendix E

Survey of Site



LEGEND

OPTIC FIBRE	TELSTRA PIT
ELECTRICITY UNDERGROUND	COMM ABOVE GROUND JOINING POST
OVERHEAD POWER	POWER POLE
SEWER	ELECT JUNCTION BOX
450Ø STORMWATER PIPE	SERVICE UNKNOWN
STORMWATER PIPE	POLE
BUILDING	TANK
MISCELLANEOUS STRUCTURE	INVERT
RAIL TRACK UP MAIN	BORE HOLE
TOP OF WALL	TEST PIT
BOTTOM OF WALL	POST
FENCE	SIGN
EDGE OF PAVEMENT	
TOP OF BANK	
BOTTOM OF BANK	
NATURAL SURFACE	

NOTES:

1. PLAN NOTES SHOULD NOT BE ALTERED OR DELETED.
2. HARD COPY SHOULD ONLY BE PRODUCED OR REPRODUCED AT THE SCALE STATED IN THE TITLE BLOCK.
3. COORDINATES ARE BASED ON GDA 94 FROM PM37793.
4. ORIGIN OF LEVELS IS AHD FROM PM37793.
5. THIS PLAN IS SUITABLE FOR PLANNING AND DESIGN AT THE SCALE STATED. THE PLAN MAY NOT BE SUITABLE FOR ANY OTHER PURPOSE OR FOR USE AT ANY OTHER SCALE.
6. THE LOCATION AND DEPTH OF ALL UNDERGROUND SERVICES, WHETHER SHOWN ON THE PLAN OR NOT SHOULD BE PRECISELY DETERMINED BEFORE CONSTRUCTION WORK COMMENCES & APPROPRIATE MEASURES TAKEN TO PROTECT THESE SERVICES FROM DAMAGE.
7. THE TITLE BOUNDARIES HAVE NOT BEEN FULLY INVESTIGATED AND ARE SHOWN ON THE PLAN AS THEY ARE IN THE TITLE DIAGRAM. IF DIMENSIONS ARE CRITICAL FOR DESIGN, OR SETTING OUT OF NEW STRUCTURES OR IN FINANCIAL DECISIONS THEN WE RECOMMEND A REDEFINITION SURVEY BE CARRIED OUT AND A PLAN OF REDEFINITION BE PREPARED.
8. SERVICES SHOWN HAVE BEEN LOCATED BY SURFACE FEATURES ONLY AND HAVE NOT BEEN FULLY INVESTIGATED. CONTACT THE RELEVANT AUTHORITY FOR EXACT LOCATION OF UNDERGROUND SERVICES PRIOR TO ANY DESIGN OR EXCAVATION.
9. 3d LINEWORK AND SERVICES ARE TURNED OFF IN PAPER SPACE AND ARE ON LAYERS THAT BEGIN WITH "3d" IN MODEL SPACE.

15 7.5 0 15 30 45 60 75

SCALE IN METRES ON ORIGINAL DRAWING AT REDUCTION RATIO 1:750

CADENCE CONSULTING SURVEYORS
UNIT 3, 73a ELIZABETH STREET,
TIGHES HILL, NSW 2297
P.O.BOX 2367, DANGAR NSW 2309
PH 02 4925 0500 FAX 02 4927 8850

PLAN OF:

DETAIL SURVEY CONCRUSH
21 RACECOURSE ROAD, TERALBA
LOT 2 DP220347

PREPARED FOR:

CONCRUSH

ORIGIN OF LEVELS: PM37793	SURVEY FILE: 1711MT200616.csv
ORIGIN OF COORDS: PM37793	SCALE: 1:750 (A1)
DATUM FOR LEVELS: AHD	JOB REF: CCS-1711
CONTOUR INTERVAL: 0.2m	DWG FILE: CCS-1711_DWG_DETAIL-1A
SURVEY COMPLETED: 17/06/2020	REVISION: A
SURVEYED BY: M.T. + F.S.	SHEET 1 OF 1

REV.	AMENDMENTS	DATE	DRAWN	CHECK	PM
A	FIRST ISSUE	18/06/20	M.T.	M.D.	M.D.

EXCAVATOR/CONTRACTOR/BUILDER MUST CONTACT 'DIAL BEFORE YOU DIG' BEFORE COMMENCING WORK ON SITE:
DIAL 1100
ISO 9001

Appendix F

Hold Point Form

HOLD POINT RELEASE FORM
EXPANSION TO CONCRUSH RESOURCE RECOVERY FACILITY
RACECOURSE ROAD, TERALBA

To: Ked Peddie (Conaghan Civil)

CC: Kevin Thompson (Concrush)
Ian Gregson (GHD)

From:

Date:

RELEASE OF HOLD POINT <REFERENCE>

Ken

RCA inspected/ verified xxx on the xxx in relation to hold point <relevant site milestone>. Photographs/ documents/ results verified relating to this hold point are included below/ attached to this letter.

Site specific details/ comments may be included, particularly if this only a partial release (i.e. marker layer/ importation of fill which may be staged).

In accordance with the deliverable and hold point schedule, RCA considers that the hold point for xxx may now be released.

Please confirm by return email that you concur.

Yours faithfully

RCA AUSTRALIA

xxx

Contaminated Land Consultant

Appendix G

Material Tracking Log

On-site Material Movement / Imported Material								
Source of Material (Grid # Excavated From, Stockpile # or Supplier)	**Description**	**Date of Excavation / Importation**	**Time** (if relevant)	**Estimated Volume**	**Registration # of Vehicle Importing Material**	**Actual Weight** (for imported materials)	**Classification and Certifying Document Reference Number**	**Destination** (Grid #, Under/Over Marker Layer or interim stockpile)

Off-site Material Movement								
Source of Material (Grid # Excavated From, Stockpile #)	**Description**	**Date of Excavation**	**Time** (if relevant)	**Estimated Volume**	**Classification and Certifying Document Reference Number**	**Destination**	**Registration # of Vehicle loaded**	**Actual Weight** (as printed on Docket)

Note: Log to be grouped based on Source of Material