Remediation Action Plan

327 – 335 Burley Road, Horsley Park, NSW 2175

CSR Limited

20 December 2019

Project No.: 0449086

Document Control No.: S010173

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Document details	
Document title	Remediation Action Plan
Document subtitle	327 – 335 Burley Road, Horsley Park, NSW 2175
Project No.	0449086
Date	20 December 2019
Version	1.0
Author	Amy Dorrington/Anthony Richard
Client Name	CSR Limited

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
1.0	00	Steve McAleer	David Lane	n/a	28/11/2014	Issued by DLA Environmental
2.0	00	Amy Dorrington	Anthony Richard/ Abhishek Joshi		20/12/2019	Revised following additional Investigation works

Signature Page

20 December 2019

Remediation Action Plan

327 – 335 Burley Road, Horsley Park, NSW 2175

Russell Jarman
Senior Consultant

Ashton Hincksman
Partner

Macquarie Park Office

Unit 11/277 Lane Cove Road

Macquarie Park, NSW 2113

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1. INTRODUCTION

ERM Services (formerly DLA Environmental) was commissioned by CSR Australia (the Client) in 2014 to prepare a Remediation Action Plan (RAP) to address identified contamination within the Site referred to as 327-335 Burley Road, Horsley Park, NSW, 2175.

A Remediation Action Plan was prepared in December 2014 by DLA Environmental (Ref: DLH1121_H0280) for Lot 1 DP106143 that incorporated the Stages 1, 2 and 3 of the site development area (Refer to Figure 2 for site development areas).

The RAP is being updated based on ERM's incremental understanding of the Site conditions since the drafting of the RAP in 2014 considering the additional investigations and ongoing remediation works within the Stage 2 area (refer to Figure 3 for the relevant updated RAP boundary). The updated RAP will address potential gaps in the previous RAP based on currently available information such that an updated remediation strategy is being implemented to meet the overall project objectives.

1.1 Background

The RAP (DLA, 2014) was prepared based on the remediation areas identified from the Phase 2 Environmental Assessment conducted by DLA Environmental in September 2013 (Ref: DLH1121_H0068). The RAP was approved in December 2014 and was required to be implemented as part of Development Approval (893.4/2013) - Section 127 and remains as a current condition for the Site development.

The first version of the RAP (DLA, 2014) was approved by Fairfield City Council, with Development Approval (893.4/2013) granted, subject to the recommendations within the RAP being implemented.

In terms of remediation, Section 172 of the consent states that:

All remediation work shall be carried out in accordance with the Remediation Action Plan prepared by DLA Environmental Services Pty Ltd (Reference: DLH11 21_H00280) dated 1 December 2014; State Environmental Planning Policy No.55 - Remediation of Land; and the Environment Protection Authority Contaminated Sites Guideline series.

In this regard, the Site Environmental Management Plan (which includes comments on an associated Workplace Health & Safety Plan and Remediation Works Management Plan) and Unexpected Findings Protocol which are provided as Appendices to the RAP shall be fully adhered to, so that remediation work is conducted in such a manner as not to interfere with or materially affect the amenity of neighbouring premises by way of noise, vibration, odours, dust, particulate matter, waste water, waste products or other impurities which are a nuisance or injurious to health.

Remediation works within Stage 1 were completed in late 2018 with a Validation Report Issued June 2019 (0449086_S009714 Revision 4). A Site Audit Statement was issued for Stage 1 of the works by a NSW EPA Accredited Site Auditor in August 2019. Although Stage 1 is still nominally within the site boundaries for the purposes of this report, no further remediation works are anticipated within the Stage 1 area.

The key activities undertaken at the Site post drafting of the RAP in 2014, include the following:

- *ERM Services (June 2018) Bund Wall Assessment Report;*
- *ERM Services (September 2019) Limited Detailed Site Investigation; and*
- *Ongoing Stage 2 Remediation Activities.*

1.2 Objectives and Scope

This purpose of this report is to set remediation goals and document the management procedures and environmental safeguards to be implemented to assess if the site will be rendered suitable for the proposed land use and will pose no unacceptable risk to human health or the environment generally.

The RAP (DLA, 2014) was developed in consideration of the request for further information under Section 6e of the Statement of Facts and Contentions following proceeding in the NSW Land and Environment court. The RAP has been revised following subsequent environmental assessment of previously unassessed portions of the Site and other observations made during the on-going remediation activities at the Site.

The objective of this updated RAP is to inform the legislative controls of changes to the remediation planned for the site based on updated site investigation information and to review the remedial approaches to meet the remediation goals identified in the initial RAP.

The scope of the updated RAP has been defined based on the findings of the following investigations:

- *Phase 2 Detailed Environmental Site Assessment*, Lot 1 in DP 106143, 327-335 Burley Road, Horsley Park (DLA Environmental, Dated September 2013, Ref: DLH1121_H0068);
- *Remediation Action Plan* , (DLA Environmental, Dated December 2014, (Ref: DLH1121_H0280)
- *Bund Wall Assessment Report*, 327-335 Burley Road, Horsley Park NSW 2175 (ERM Services, Dated June 2018, Ref: 0449086_S008491); and,
- *Limited Detailed Site Investigation*, Horsley Park Stage 3 Development Area (ERM Services, Dated September 2019, Ref: 0449086_S009904).

The scope of works considered for the purposes of updating the RAP include the following:

- A brief summary of the history and environmental setting of the site;
- A summary of the previous environmental investigations at the site;
- A review of the currently available remediation options with regards to current understanding of the Site to assess suitability of the current preferred remediation strategy;
- Details of the preferred remediation strategy and an outline of the methodology for the implementation of the selected strategy;
- Document appropriate procedures for the handling and tracking of materials;
- Details of the adopted validation programme;
- A brief outline of environmental pollution control, community health and safety, and occupational health and safety measures that should be implemented during remedial works; and,
- An outline of regulatory approvals and licenses which may be required to adopt the preferred remedial strategy.

1.3 Remediation Guidelines

The RAP has been prepared with consideration to the following guidelines and legislation:

- National Environment Protection (Assessment of Site Contamination) Measure (NEPM) (NEPC, 1999 as amended 2013);
- Managing Land Contamination, Planning guidelines, SEPP 55: Remediation of Land (DUAP, 1998);
- Contamination Sites: Sampling Design Guidelines (EPA, 1995);
- Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011);
- Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (DEC, 2006);

- Australian and New Zealand Guidelines for Assessment and Management of Contaminated Sites (ANZECC, 1992);
- Waste Classification Guidelines (NSW DECCW, 2014).
- Work Health and Safety Act 2011 and associated regulations;
- How to Safely Remove Asbestos: Code of Practice (SafeWork, 2018);
- Storage and Handling of Dangerous Goods Code of Practice 2005; and,
- Guidelines for Assessing Service Station Sites (1994).

1.4 Site Location, Identification and Description

Specific site identification details are summarised in **Table 1**. The Site Location is presented in Figure 1 and the Site Layout is presented in Figure 2.

Table 1: Site Identification

Item	Description
Site Address	327-335 Burley Road, Horsley Park NSW 2175
Lot/Deposited Plan	Lot 2 DP1228114, Lot 101, 102, 103 DP1214912
Local Government Authority	Fairfield City Council
Site Zoning – State Environmental Planning Policy (Western Sydney Employment Area) 2009	In1 – General Industrial E2 – Environmental Conservation
Relevant Development Stages	Stage 2 – 3
Total Site Area	Approximately 72ha
Area to which the updated RAP is applicable	Approximately 44ha
Site Elevation	Approximately 74-95m
Site Location	Refer to **Figure 1**
Site Layout	Refer to **Figure 2**
Updated RAP AEC's	Refer to **Figure 3**

1.5 Environmental Setting

1.5.1 Surrounding Land Use

The site is zoned under State Environmental Planning Policy (Western Sydney Employment Area) 2009. The majority of the Site is zoned IN1 – General Industrial, with a portion of the Site zoned E2 – Environmental Conservation. The surrounding land use at the site is outlined in **Table 2**.

Table 2: Surrounding Land Uses

Direction	Land Use
North	Burley Road, Old Wallgrove Road, Industrial warehouse and distribution buildings and a brick making facility.
East	Rural Residential Properties
South	Rural and Rural Residential Properties
West	Rural Property with warehouses beyond

1.5.2 Topography and Local Hydrology

The site topography comprises hills that slope gently to the west across the site with a stepped rise in the east. Broadly the site falls from an east-west trending ridge that lies to the north of the site.

Excavation and filling works have occurred on site since the 1960s. As the main factory building was constructed around the same time as the quarrying works commenced it is unlikely that substantial filling has occurred around the warehouse itself. The majority of filling works on site have occurred in the eastern portion of the site, where initial quarrying works began. The four central sediment dams were excavated in the 1970s or early 1980s with the large main dam not constructed until 2018 during works within earlier stages of the site redevelopment. The Stage 3 bund in the north east of the site appears to have been constructed in the 1980s, and construction of the Stage 2 southern bund expected to have been completed later.

A search of DIPNR records identified two registered groundwater bores (GW100290, GW100447) located within approximately 500 meter radius of the site. The bores are located approximately 400m north west of the site and are registered as private monitoring bores. The final depth of bore GW100290 was 80 metres and GW100447 was 29.6 metres. GW100447 reported a standing water level of 2.89m.

1.5.3 Geology and Soils

Previous investigations and site inspections have shown extensive excavation and earthworks have occurred over much of the site with little resemblance to the previous natural soil landscape. The 1:100,000 Soil Landscape Sheet for Penrith (9030, 1989) shows the landform to comprise the Blacktown Soil Landscape with gently undulating rises on Wianamatta Group bedrock with slopes usually <5% and broad round hill crests.

The Blacktown Soil Landscape is described as hard setting, mottled texture contrast soils, including shallow (<1.5m) red and brown podsols on the crests, grading to deeper (>2m) yellow podsols on the lower slopes and near drainage lines. This unit is associated with known salinity and dispersive hazard, particularly in lower slopes and streamlines where soils have the potential to become waterlogged.

The Department of Infrastructure, Planning and Natural Resources (DIPNR) Salinity Potential in Western Sydney 2002 risk map classifies area around the site as having a moderate salinity potential.

1.6 Limitations

The findings of this report are based on the scope of work summarised in Section 1.2. ERM performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties, express or implied, are made.

Although normal standards of professional practice have been applied, the absence of any identified hazardous or toxic materials on the subject site should not be interpreted as a guarantee that such materials do not exist on the site.

This assessment is based on site inspections conducted by ERM personnel, sampling and analyses described in the report, and information provided by people with knowledge of site conditions.

All conclusions and recommendations made in the report are the professional opinions of the ERM personnel involved with the project and, while normal checking of the accuracy of data has been conducted, ERM assumes no responsibility or liability for errors in data obtained from regulatory agencies or any other external sources, nor from occurrences outside the scope of this project.

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2. SUMMARY OF PREVIOUS INVESTIGATIONS

DLA Environmental (September 2013) Phase 2 Detailed Environmental Site Assessment: Lot 1 in DP 106143, 327-335 Burley Road, Horsley Park, NSW 2175, Ref: DLH1121_H0068

DLA conducted a site investigation of the brickworks and associated land at 327-335 Burley Road, Horsley Park. Main site features included:

- Process plant, office and amenities buildings;
- Raw material stockpile areas;
- Clay quarry;
- Sedimentation dams, settling ponds and storage dams;
- Former Camide landfill.

213 soil samples were collected from 112 sampling locations across the site, with 16 water samples collected from 11 dams and 4 monitoring wells.

One soil chemical hotspot of benzo(a)pyrene (BaP) was identified at TP3 (0.7m bgl), which exceeded the commercial/industrial land use criteria within NEPM (2013).

TRH was detected in multiple boreholes adjacent to the brick factory where former and current underground storage tanks (USTs) are located, however no exceedances of the commercial/industrial land use criteria was identified.

Hydrocarbon detections were noted within groundwater monitoring wells on the site. Exceedances of the site acceptance criteria were identified within MW2 for Total TRH and PAHs. This monitoring well is located adjacent to the factory and in the area of former chemical storage and USTs.

Minor metal exceedances were noted within the monitoring wells and surface water samples from the four dams. These were not deemed to pose a risk to human health in their current state at time of sampling.

All areas of environmental concern (AECs) were within the Stage 2 and Stage 3 areas, which included remediation of:

- Contamination associated with known Underground Storage Tank (UST) locations;
- Potential contamination associated with USTs in presently unknown locations;
- Minor hydrocarbon contamination from on-site Above ground Storage Tanks (ASTs);
- Identified Benzo(a)pyrene (BaP) TEQ contamination hotspot;
- Contamination from former oil storage areas and associated service lines; and,
- Surface water contamination in on-site dams;

Areas requiring further investigation (data gaps) included:

- Potentially asbestos containing materials used in on-site bunds;
- Sediment contamination in on-site dams.

ERM Services (June 2018) Bund Wall Assessment Report: 327-335 Burley Road, Horsley Park, Ref: 0449086_S008491

The southern bund wall was deemed a data gap requiring further investigation within the Phase 2 Assessment (DLA, 2013). As such it was assessed in order to characterise the comprising materials, through historical review as well as systematic and targeted soil sampling.

A total of 186 soil samples were collected from 36 test pit locations. Samples were collected at 1m intervals to a maximum depth of 5m. Due to asbestos detections and exceedances of the relevant land use criteria, the investigation concluded that:

Based on visual observations and the results of the laboratory analysis, it is concluded that the bund wall material is not currently suitable to be retained on-site in its entirely under a continued commercial / industrial land use scenario due to the presence of asbestos. It is recommended that a Remediation Action Plan (RAP) be developed in accordance with the relevant regulatory requirements to address the identified contamination issues so as to render the material suitable for on-site reuse.

The assessment only covered the first 5m below the top of the bund. Further assessment would be required of the underlying materials once the overlying 5m has been removed.

DLA Environmental (June 2019) Site Validation Report, Stage 1, 327-335 Burley Road, Horsley Park NSW 2175, Ref: 0449086_S009714

This validation report covered the Stage 1 area, located in the north western section of the wider development. During the Phase 2 Assessment (DLA, 2013), no areas requiring remediation were identified within the Stage 1 area.

However, the assessment required further investigation of groundwater due to elevated heavy metal detections. An additional assessment of groundwater within the Stage 1 transpiration area was conducted by DLA in 2018, with results indicating that the Stage 1 area did not pose an unacceptable risk to health or the environment.

Additional assessment of soils was recommended by the Phase 2 Assessment (DLA 2013) during cut to fill works, and sediments after dam dewatering. The procedure for additional material assessment is outlined within the Material Assessment and Importation Protocol for the site (DLA, 2018). Soils and sediments were moved between Stage 1 and 2, with tracking of these materials described within the report.

The validation report concluded that from a soil and groundwater perspective, the Stage 1 area is suitable for the future proposed commercial/industrial land use. The report also suggested that as the Stage 1 area is no longer associated with the brick factory or quarrying related activities, that it would be appropriate to surrender the EPL for the Stage 1 area.

The NSW EPA Accredited Site Auditor, James Davis of Enviroview, reviewed the Validation Report for Stage 1.

Enviroview (August 2019) Site Audit Report, Proposed Lot 101 and 102 of DP1214912, 327-335 Burley Road, Horsley Park NSW, Ref: 600105_0301-1619.

The objective and scope of the Site Audit was to independently review the assessment and validation works conducted at the site and the environmental consultant's reports that have been prepared for the site and to determine whether the site is suitable for the proposed land use. The site land use will remain unchanged; therefore, this Site Audit has been undertaken with consideration to commercial/industrial land use.

The report concluded that the Stage 1 area is suitable for commercial and industrial use subject to the implementation of the Environmental Management Plan (EMP).

Refer to Figure 3: To identify the extent of the Camide Landfill area applicable to the EMP

Biogas Systems Australia (July 2019) LFG Management Plan - Environmental Management Plan for Landfill Gas, Horsley Park Landfill, Ref:0103

The objective of this Environmental Management Plan (EMP) is to provide a landfill gas (LFG) management plan that can be enforced to ensure protection of surrounding land users from the former Camide Landfill. To achieve the objective of the EMP the following aspects of LFG management will be addressed to ensure ongoing suitability of the neighbouring sites for commercial/industrial land use including:

- Monitoring and management of subsurface emission in the perimeter well network
- Monitoring and management of surface emissions form the landfill cap and biofiltration trench
- Monitoring and management of service pits and enclosed spaces on the landfill and adjacent to the landfill (where possible).

The implementation of a gas interception biofiltration trench was initially installed along the western boundary of the landfill in June 2005 and after the success of this trial, was extended around the entire perimeter of the landfill. The construction of the biofiltration trench around the remainder of the landfill was commenced in July 2018 and completed in May 2019.

Results of the post installation monitoring at perimeter locations outside of the BT in May 2019 indicate a reduction of methane concentrations to below the threshold concentration of 1%v/v. This monitoring confirmed the effectiveness of the northern portion of the BT in the direction of the closest commercial / industrial land user.

The EMP was developed to reaffirm protection of the surrounding land users, prescribing monitoring, reporting and further mitigation actions (if required). To manage the risks to the surrounding land users, the monitoring of service pits and enclosed spaces (stormwater pits), surface emissions (landfill cap and biofiltration trench), subsurface migration and water levels (perimeter monitoring) is required.

The monitoring of these locations is required quarterly and compared against threshold criteria sourced from the Hazardous Ground Gas (NSW 2012) guidelines and reported both quarterly and annually. In the event that a threshold criterion is exceeded for methane or an increasing carbon dioxide trend is observed, additional investigation will be required to determine the course of action which may range from increased monitoring frequency to notification of the regulatory authorities in the event of explosive conditions or acute human health risk.

The intent of the EMP is to continue monitoring for at least a period of 24 months from commencement and reassess the stability of landfill gas generation and migration and there is no longer a risk to surrounding land users.

ERM Services (September 2019) Limited Detailed Site Investigation, Horsley Park – Stage 3 Development Area, Ref: 0449086_S009904

This Limited Detailed Site Investigation (LDSI) was restricted to the accessible portions of the Stage 3 development area, which covers approximately 25ha comprising of the operational brick making factory, brick and soil storage areas, as well as settling dams for process water. As the site was an operational factory during the LSDI works only part of the Site was available for purposes of investigation. The accessible portions of the site totalled 10.7ha, with the remainder classed as data gaps (DG) area for future assessment post demolition.

The investigation assessed soil, groundwater, surface water and dam sediments. Soil samples were collected in accordance with the *NSW EPA Sampling Design Guidelines* (1995), for the accessible areas.

Contaminants of concern included hydrocarbons, heavy metals and asbestos (ACM and AF/FA). Water samples were additionally analysed for a range of physical and microbiological parameters.

Seven soil AEC's were identified and the extent of contamination is required to be further delineated. These areas were noted as delineation areas (DL) (DL1 – DL7) once the Site operations have ceased and availability access to these areas.

- DL3 included TRH exceedances at approximately 2.5m below ground level (bgl) requiring further delineation and potential remediation.
- DL1 – DL2 and DL4 included asbestos and foreign materials detections and exceedances, requiring further investigation and potential remediation.
- DL5-DL7 reported foreign materials exceedance requiring additional investigation and potential remediation.

Limited surface water sampling was conducted due to active use of the ponds for dust suppression activities during bulk earthworks, however further assessment will be required prior to dewatering for application to land. Similarly the sediment samples indicate suitability for the proposed commercial/industrial land use, however further sampling of the deeper sediments should be undertaken post dewatering and prior to reuse on site.

Groundwater results indicated exceedances of heavy metals, thought to be indicative of background concentrations. TRH detections were also identified, thought to be associated with TRH impacted soil (MW2A / AEC DL3) and uncontrolled filling in the north east corner of site near MW7.

Based on the sample results and identified AECs the following actions were recommended:

- Hazardous Materials Survey
  - Undertake a hazardous materials survey of the existing structures on site. Emphasis to be placed on surveying building materials and any plant to remain on site at the time of demolition.
- Remediation Action Plan
  - Development of a RAP for AECs DL1, DL2, DL3, DL4, DL5, DL6 and DL7, including an Asbestos Management Plan (AMP) for asbestos remediation works.
- Data Gap Assessment
  - Inspection and assessment of data gap areas following demolition works, removal of stored finished products and removal of stockpiled brick making materials;
- Delineation of AEC DL3 following demolition works;
  - Assessment of any remaining brick making materials.
- Dam Dewatering Assessment
  - Dewatering assessment to confirm suitability of dam waters for discharge to land, with potential works required to reduce sediment load prior to dewatering.
- Sediment Assessment
  - Inspection and assessment of deeper sediments following dewatering to confirm suitability to remain on site.
- Validation Works and Reporting
  - Undertake validation works as specified as RAP;
- Documentation of validation works and findings of data gap and other assessments;
  - Final conclusion about site suitability for proposed land use.

3. CURRENT SITE STATUS AND EXTENT OF CONTAMINATION

The LDSI by ERM (September 2019) concluded that there are no Source-Pathway-Receptor (SPR) linkages under the current site use, in the context of the conceptual site model (CSM) developed.

Due to the reported observations of ACM, AF/FA and fill materials, BaP and TRH hotspot exceeding the adopted site assessment criteria, it was reported the site could be made suitable for the intended land use, through implementation of the recommendations within the Phase 2 Assessment (DLA, 2013), Bund Wall Assessment (ERM, 2018) and the LDSI (ERM, 2019).

The Petroleum Hydrocarbons contamination in groundwater is currently known to be limited to two localized hotspots within the Stage 3 area of Site.

Further, it is to be noted that at the current Site condition, a portion of the Site is occupied by the brick factory and other operational infrastructure. These areas require further assessment to close the data gap in the overall understanding of the contamination at Site.

The details of the data gap investigation are outlined within the LDSI (ERM, 2019). The LDSI was deemed a limited investigation due to approximately half the Stage 3 area being accessible at the time of field works.

Prior to performing any remediation activities in the data gap and delineation areas, the following works are required to be conducted in the Stage 3 area, these include:

- Hazardous materials survey of the site structures within Stage 3.
- Following demolition of all existing structures within Stage 3. Investigation of building footprints and the inaccessible area surrounding the active work zone (includes locations of AST, potential decommissioned USTs and oil/chemical storage areas);
- Investigation of stockpiled brick making materials remaining at the conclusion of brick making works including footprints beneath currently existing brick making material stockpiles;
- Post decommission of active operation of existing infrastructure, investigation of footprint areas under the stored completed products and other stored items (equipment etc.), hardstand areas and internal access roads within the site;
- Post dewatering of the dams, investigation of base of the dams including bunds which were used for access and providing stability to the dams;
- Other areas previously requiring investigation or additional delineation that were inaccessible during the investigation and remediation works.

Refer to **Figure 3** for updated RAP AEC's.

A summary of the contaminant exceedances in Soil identified within the site by the previous investigations is provided in Table 3.

Table 3. Summary of Identified Contamination in Soil

AEC	DEVELOPMENT STAGE	DEPTH OF IMPACT (m bgl)	CONTAMINANT	CONCENTRATION	POTENTIAL SOURCE	PROPOSED REMEDIATION STRATEGY	INVESTIGATION REPORT
TP3	3	0.5 m	BaP	53 mg/kg > HIL	Uncontrolled fill	Excavate, classify, contain / reuse	Phase 2 Assessment (DLA, 2013)
Southern Bund	2	0.1 – 10 m	ACM and AF/FA	Asbestos detections and exceedances	Uncontrolled fill	Excavate, classify, contain / reuse	Bund Wall Assessment (ERM, 2018)
DL1	3	2.8 – 9m	ACM FM	ACM detections FM observed	Uncontrolled fill	Refer to **Section** Error! Reference source not found.	LDSI (ERM, 2019)
DL2	3	4.5 m	ACM	0.1609 % > HSL 0.0508 % > HSL	Uncontrolled fill	Refer to **Section** Error! Reference source not found.	LDSI (ERM, 2019)
DL3	3	3 m	TRH	2,010 mg/kg > HIL	UST / fuel infrastructure leak	Refer to **Section** Error! Reference source not found.	LDSI (ERM, 2019)*
DL4	3	0.7 m	AF FM	AF 0.04 % > HSL FM observed	Uncontrolled fill	Refer to **Section** Error! Reference source not found.	LDSI (ERM, 2019)
DL5-7	3	1.35 m	FM	Observed	Uncontrolled fill	Refer to **Section** Error! Reference source not found.	LDSI (ERM, 2019)

BaP = Benzo(a)pyrene, ACM = Asbestos containing material, AF = Asbestos fines, FA = Friable asbestos, FM = Foreign materials, TRH = Total recoverable hydrocarbons

HIL = Health Investigation Level, HSL = Health Screening Level

** Contamination within this area identified within the Phase 2 Assessment as well, however no exceedances of land use criteria were noted.*

Aesthetically concerning debris was noted within test pits advanced within the DL1, DL4 and DL5 AECs. Although not a contaminant in itself, these foreign materials indicate uncontrolled filling activities and warrant further material classification for potential reuse on site and geotechnical suitability.

4. CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) is a representation of an environmental system and the processes that determine the transport of contaminants from sources through environmental media to environmental receptors. The development of a CSM comprises an iterative process of characterising site contamination on the basis of historical, anecdotal, previous and current environmental data.

A CSM, as used herein, is the qualitative description of plausible mechanisms by which receptors may be exposed to contamination at a given site. For exposure to be considered possible, some mechanism ('pathway') must exist by which contamination from a given source can reach a given receptor. Such complete 'source-pathway-receptor' exposure mechanisms are commonly termed 'SPR linkages'. Potential exposure pathways are evaluated based on the existence of:

- A source of contamination/impact;
- A mechanism for release of contaminants from identified sources;
- A contaminant retention or transport medium (eg, soil, air, groundwater, etc.);
- Potential receptors of contamination; and
- A mechanism for chemical intake by the receptors at the point of exposure (ingestion, dermal contact or inhalation or a combination of).

Contaminant sources, exposure mechanisms and receptors at the site are discussed in the following sections, with a thorough understanding of the relationships between each considered fundamental in assessing potential risk.

4.1 Source of Contamination

The principal potential contamination sources are assumed to be associated with quarrying and brickmaking activities that occurred on site. Based on the results of the investigation, asbestos contamination within fill soils is present along with isolated hotspots of hydrocarbon contamination affecting both soil and groundwater. The hydrocarbon impacts are expected to be from former fuel storage tanks and infrastructure located near the factory.

4.2 Nature and Extent of Contamination

Based on the current understanding of the Site characterization, the primary contaminants of concerns identified for remediation at the Site include:

- Petroleum Hydrocarbons:
  - F2 range hydrocarbons are reported at one Soil hotspot (BH215_2);
  - F2 & F3 hydrocarbons in one monitoring well MW2A; and
  - F3 & F4 hydrocarbons in one monitoring well MW7.

  Considering the industrial setting of the Site and the depth of impact in Soil at 2m, the potential for exposure to soil vapour for F2 range hydrocarbons is considered to be low.
- Asbestos Contamination:
- Soil reportedly exceedance for bonded asbestos (ACM), friable asbestos (FA) and asbestos fines (AF). Polycyclic Aromatic Hydrocarbons:

  BaP was reported to exceed the assessment criteria at one location with the fill area in 2013.

4.3 Exposure Pathways and Potential Receptors

Samples reporting exceedances of the adopted site criteria for asbestos were found at depths greater than 0.5m bgl. The reported TRH exceedance was located at a depth of 2m bgl. Groundwater concentrations exceeding the adopted criteria for TRH were reported at 2m and 9.8m bgl. The BaP hotspot from the previous investigation (DLA, 2013) was at 0.7m bgl. No inhalation risk was reported present under a commercial/industrial land use scenario. Based on the depths of reported exceedances no exposure pathway exists between the reported contamination and potential receptors under the current site land use. Possible exposure pathways may be developed during redevelopment works due to potential disturbance of contaminated material currently located at depth. Remediation may be required to close exposure pathways prior to the redevelopment works depending on the development design. **Table 4** provides a summary of the current CSM for the site.

Table 4. Conceptual Site Model

MATRIX	SOURCE	PATHWAY	RECEPTORS
SOIL	**Former UST or industrial processes and storage** - Hydrocarbons	Inhalation and direct contact	Users, occupants, workers and visitors of the site and neighbouring properties during fill disturbance activities
	Historical uncontrolled filling - Asbestos	Inhalation
	- BaP	Direct contact and incidental ingestion

5. SELECTION OF PREFERRED REMEDIATION STRATEGY

5.1 Remediation Options

The *Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme* (NSW EPA, 3rd ed., 2017) outlines the hierarchical management of wastes as preferred by the NSW EPA. According to this document, the order of preference for soil remediation and management is:

1. On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site;
3. Consolidation and isolation of the soil on-site by containment within a council approved and suitably designed burial cell with a long term management plan and notification on the land title;. and,
4. Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill.

Review of the available remediation methods and technologies indicates that the following strategies may be applicable to the remediation of the site:

5.1.2 On-Site Treatment of Contaminated Media

Treatment of soil contamination is often the preferred strategy where large volumes of heavily contaminated soils require remediation.

On-site treatment of contaminated media may include in-situ methods such as stabilisation and oxidation, and ex-situ methods such as thermal treatment and bioremediation for TRH/TPH. The on-site treatment for Asbestos may be limited hen-picking of Bonded Asbestos, while AF/FA cannot be subjected to treatment and require either placement or disposal. Ex-situ on-site treatment requires sufficient land area to facilitate the process for the life of the remediation program.

Considering the estimated volume of material required to be remediated, both in-situ and ex-situ remediation methods often take an extended period of time to complete and have significant costs associated with mobilisation and monitoring. However, the benefits of on-site treatment of contamination are that off-site disposal of contaminated media is limited and in certain cases not typically necessary, and importation of soils to reinstate excavations is limited, thereby the approach is more sustainable.

This option for on-site treatment of contaminated media is considered suitable for implementation at the site for materials within uncontrolled fill areas due to the presence of bonded asbestos contamination that requires remediation. This remediation strategy may be suitable for TRH impacted material where volatiles are present, as the site has the required space for on-site management of the contaminated material.

5.1.3 Off-Site Treatment of Contaminated Media

Off-site treatment of contaminated media includes the same methods as on-site treatment however remediation is undertaken in an alternate location. This method is typically adopted when the remediation site has an insufficient land area to accommodate the remediation technology.

Unlike on-site treatment, off-site treatment requires excavation of contaminated soils, or extraction of contaminated groundwater, and transportation of the media to the treatment site. Reinstatement of on-site excavations is also required following treatment.

This option for off-site treatment of contaminated media is not considered suitable for implementation at the site due to the majority of contamination is Asbestos related and cannot be treated, the process is not well suited. Further additional resources will be required to replace the excavations with fresh soils.

5.1.4 On-Site Capping and Containment

On-site capping and containment involves the installation of a physical barrier around the contaminated area to prevent potential migration pathways of contaminants. The predominant contaminants of concern are associated with imported fill materials.

The inclusion of a low permeability capping system and appropriate surface water controls / management typically affords a sufficient level of protection to future site users from the underlying contamination. A site management plan must be implemented for capping to ensure that future excavation work is minimised and where necessary, carried out in strict accordance with appropriate occupational health and safety procedures.

Subject to Council approval, the on-site capping and containment option is considered suitable for implementation at the site for the contaminated materials within the bund walls/uncontrolled fill areas that do not meet the land use requirements for onsite reuse due to potential presence of ACM and asbestos fines. This option is considered suitable as the contaminant has been assessed as being non leachable or volatile and therefore suited to a cap and contain methodology. The methodology does not require off-site disposal of contaminated fill materials and the surface of the contaminated soils will be capped with validated materials. The surface of the contaminated material will be entirely sealed under the proposed redevelopment scenario. Long-term management of the containment measures would be required to mitigate the risk of contaminants being released into the environment.

Due to the anticipated small volumes of material requiring remediation within chemical (TRH and BaP) hotspots, these areas can be excavated, classified and removed from site to a licensed facility. Placement within the Burial Cell would require lining of the cell to ensure no seepage of leachate into the groundwater and underlying soils, or vapours escaping upwards into the future structure, and would be cost prohibitive for such a small volume of non-compliant material. However if further investigation of data gaps discovers that there is sufficient volume to make disposal cost prohibitive, land farming may be suitable to remove volatiles from the material, which can then be placed within the Burial Cell with no requirements for a gas blanket or risk of volatiles impacting the future structures within the lot.

5.1.5 Excavate and Off-Site Disposal

Landfill disposal is the simplest of all remediation methods, and involves the excavation of the contaminated materials, and disposal off-site to a NSW EPA approved landfill disposal site with appropriate environmental safeguards. The formed excavation is then backfilled using clean, validated clean fill materials as required.

The selection of an appropriate landfill will normally depend largely upon the results of classification of the wastes. It is sometimes necessary for heavily contaminated soils to be pre-treated prior to disposal, to reduce the concentrations or minimise the mobility of the contaminants. Special criteria are sometimes applicable to certain categories of waste. Contaminants covered by Chemical Control Orders have restrictions placed on their handling and disposal.

The option for bulk excavation and off-site disposal is considered suitable for implementation at the site for specific contaminants and may not be feasible for the large quantity of asbestos impacted material at the Site considering the duration and the costs associated with offsite disposal. Offsite disposal may be possible for smaller quantities of material, where this strategy is deemed the most appropriate.

5.2 Preferred Strategy

The remediation strategy must be capable of achieving the technical, environmental and economic objectives of the overall project, while being a cost-effective solution that does not bring about unacceptable long-term liabilities, and does not impose any unreasonable constraints on the present operations and/or future Site development. Based on the analysis of previous section, the preferred approach for soil remediation is:

Excavate, Classify, Reuse, Dispose

This formulation has been developed due to the potential designation of material reuse areas on-site where basement excavation is not proposed and over-excavation of VENM can occur. The steps of excavation, classification, reuse and disposal will be contingent upon contaminant type. This combination of remedial methods is considered to offer a more cost-effective outcome, whilst at the same time ensuring end land-use suitability with limited or no ongoing liability following remediation.

This approach comprises of excavation of asbestos contaminated soil followed by classification of soils for reuse of soils meeting the land use criteria and a combination of offsite disposal or on-site placement of non-compliant material within an on-site burial cell with capping.

The application of the preferred remediation strategy selected for hydrocarbon remediation will depend on the nature of contaminant, volume of material following the future investigation and time/budget considerations

Offsite disposal of small quantities of material may be warranted based on the geotechnical specifications and requirements for material placed at depth within the Burial Cell or placement areas for compliant material. This is assumed to be assessed out the scope of the RAP based on geotechnical suitability (independent of the environmental considerations). Any disposal will require preparation of suitable waste classification documentation prior to disposal.

Under Section 4.46 of the Environmental Planning and Assessment Act 1979, to EPA for an Environment protection licence to authorise carrying out of scheduled development work at the premises (under the provisions the Protection of the Environment Operations Act 1997), as per ERMs understanding of Scheduled activities (Schedule 1), which lists contaminated soil treatment as a scheduled activity as given below.

15 Contaminated soil treatment

1) *This clause applies to contaminated soil treatment, meaning the on site or off site treatment of contaminated soil (including, in either case, incineration or storage of contaminated soil but excluding excavation for treatment at another site).*
2) *The activity to which this clause applies is declared to be a scheduled activity if:*
    a. *in any case, it has the capacity to treat more than 1,000 cubic metres per year of contaminated soil received from off site, or*
    b. *where it treats contaminated soil originating exclusively on site, it has a capacity:*
        i. *to incinerate more than 1,000 cubic metres per year of contaminated soil, or*
        ii. *to treat (otherwise than by incineration) and store more than 30,000 cubic metres of contaminated soil, or*
        iii. *to disturb more than an aggregate area of 3 hectares of contaminated soil*.

The requirement for a contaminated soil treatment licence is unclear at the time of producing this RAP as asbestos is the primary contaminant of concern identified as requiring remediation. Asbestos or asbestos within soils cannot be treated, only removed or managed. A licence will be requested from the EPA with this RAP and subsequent NSW EPA site auditor endorsement and Fairfield City Council endorsement to support the application.

5.2.1 Data Gap Areas

Post investigation of the delineation and data gap area, considering there are no new contaminants of concern identified in these areas, the remediation works are anticipated to be conducted similar to the rest of the Site. If the chemicals of concern identified at the Site are different from the contaminants identified in Section 4.2 of this RAP, the Conceptual Site Model will need to be revised and the remediation strategy is to be revisited and updated as necessary.

6. REMEDIATION MANAGEMENT

Based on the current understanding of the extent of contamination and the requirement for remediation activities at the Site, a summary of the process of implementation of the preferred remediation strategy proposed to be adopted is presented in table below.

Table 5 Summary of Implementation Strategy

Potential Source of Contamination	Stage of Development & Location	Remediation Strategy	COC	Comments
Uncontrolled Fill	Stage 2 & 3: Fill Material Eastern Bund Southern Bund	Excavate, Classify, Reuse, Disposal	Asbestos (ACM/AF/FA) Foreign Material (FM) Benzo(a)Pyrene	Refer to Section 6.3.1
Delineation Area*	Stage 3- DL 1-7;	Excavate, Classify, Reuse, Disposal	***Potential:*** TRH, Asbestos & FM	Refer to Section 6.3.2
Data GAP Area*	Stage 3- DG1, DG2 Factory Shed & Work Zone Footprints	Excavate, Classify, Reuse, Disposal	***Potential:*** TRH, Asbestos & FM	Refer to Section 6.3.3
	Stage 3- DG1 Dam and associated Bund DG 3 Brick Material Stockpile	Excavate, Classify, Reuse, Disposal	***Potential:*** Asbestos, FM & Metals	Refer to Section 6.3.3
Groundwater Management*	Stage 3- Factory Shed & Uncontrolled Fill	Monitoring	***Potential:*** TRH & Metals	Refer to Section 6.3.4
Surface Water & Sediment Management*	Stage 3- DG1 Dam	No Action	***Potential:*** TRH & Metals	Refer to Section 6.3.5

BaP = Benzo(a)pyrene, Asbestos = Asbestos containing material (ACM), AF = Asbestos fines, FA = Friable asbestos; FM = Foreign materials, TRH = Total recoverable hydrocarbons

* The remediation strategy will remain the same or will be developed following investigation for delineation or data gaps with the assumption that the COCs do not change.

The on-site remediation strategy proposed incorporates the following elements:

1. Regulatory Approvals & Stakeholder consultation;
2. Overall Site establishment and pre-remedial works;
3. Remediation Implementation;
4. Waste Management;
5. Validation Plan; and
6. Contingency Plan.

6.1 Regulatory Approvals & Stakeholder Consultation

Prior to implementation of this updated RAP, it is necessary to secure all relevant approvals and licenses and submit notification to the Fairfield City Council and/or other Regulatory agencies including NSW EPA, Private Certifier and any other relevant approval authority. On approval of the strategies, the stakeholders including on-site management and relevant regulatory bodies, will be informed of the intentions and the progress at all stages of the remediation works.

For a list of potential environmental and planning approvals, refer to Section 12 of this RAP.

6.2 Overall Site Establishment and Pre-Remedial Works

6.2.1 Site Establishment & Pre-Works

Initial activities at the site shall involve the establishment of all plant and equipment necessary for the remediation works. This shall include:

- Establishment of a Project Manager/Contractor's site office of temporary work sheds and amenities for site workers;
- Establishment of a car parking area for site workers and visitors to the site;
- Establish Traffic routes including a management plan for the site to update and reflect the restricted access as well as new vehicle routes for remediation work;
- Exclusion areas including remediation areas, contamination reduction (decontamination zone) area, uncontaminated areas etc.
- Establishment of a designated Asbestos Treatment Area (ATA) and storage area post segregation to contain and minimise cross-contamination and/or run-off onto the surrounding areas;
- Establishment of designation of Material Reuse Consolidation Areas; and
- Establish the Site Environmental Management Plan (SEMP).

Implementation of Environmental Management Plan

A SEMP covering the remediation works has been prepared for the site and is included within Section 10 of this report. It is expected the appointed civil company will finalise the details of the SEMP prior to works commencing. Before work commences it is imperative that all issues relating to remediation works management, environmental pollution control and health and safety have been reviewed, planned and prepared.

6.2.2 Designation of Material Reuse Consolidation Areas

The RAP incorporates the reuse of excavated materials if land use suitability has been demonstrated following excavation and classification. Prior to the performance of any remediation steps outlined below, the reuse consolidation areas will require designation:

1. Designation of proposed Potential Material Reuse Areas. It is understood that there are no preliminary restrictions on re-use areas on-site.
2. Excavation of soils within the marked areas to the depth of natural soils or where visual or olfactory contaminant indicators are no longer present.
3. Segregation soils transported to designated Storage area;
4. Classification of Soils for placement in burial cell and/or disposal to off-site facility in accordance with Waste Classification Guidelines (NSW DECCW, 2014).

6.3 Remediation Implementation Works

The remediation strategies for the identified contamination (AECs) within the site are outlined within the following sections.

Refer to **Figure 3** for Updated RAP AEC areas.

6.3.1 Uncontrolled Fill Areas

Investigations of the stage 2 & stage 3 areas identified the fill material areas including the southern and eastern bund walls. These presence of identified AF/FA and bonded ACM in several locations and within different material types. Due to the size and shape of the contaminated fill material within the Site including bund walls and the nature of asbestos contamination, isolated hotspots of ACM and AF/FA are unable to be reliably identified. Additionally, it is possible that ACM and AF/FA is present in areas of the bund that were not identified during previous investigations.

Due to the difficulty in isolating hotspots of asbestos contaminated soils, ERM proposes a remediation approach consisting of 'excavate, segregate, contain/re-use'. Material will be excavated from the contaminated areas and segregated based on material type. A designated Asbestos Treatment Area (ATA) will be established within the exclusion zone for the segregation. The material will be assessed for land use suitability, and beneficially reused on-site where in compliance with the commercial/industrial land use criteria (NEPM, 2013). Where material is not compliant, contaminated soils will be temporarily stockpiled in a designated storage area on-site and sealed either for future placement within an engineered Burial Cell to be created on-site and managed under a Long-term Environmental Management Plan (LTEMP) or disposed to an off-site licensed facility.

Excavation Works

The areas where asbestos has been identified have been recorded using GPS and are therefore able to be relocated. Asbestos remediation areas are to be clearly demarcated using signage, barricades and plastic sheeting. The demarcated areas will form a single 'exclusion zone' where only authorised workers are permitted to enter.

The Traffic Management Plan for the site will be updated to reflect the restricted access as well as new vehicle routes for remediation work.

Personnel and vehicles exiting the exclusion zone will follow procedures listed in Section 10.3.3.4 of this document. Airborne fibre monitoring will be conducted during works in the exclusion zone in accordance Section 10.3.3 of this document. Erosion sedimentation controls (such as the use of silt fencing or hay bales) must be implemented in the exclusion zone. Sedimentation controls will prevent cross contaminated soils spreading throughout the site.

Due to the presence of AF/FA at the Site, a Class A licensed asbestos contractor must be engaged to conduct asbestos remediation works. The asbestos contractor will ensure appropriate controls (e.g. decontamination unit and PPE) are in place as per their Asbestos Removal Control Plan.

Segregation

Within the bund wall there are four types of material previously identified:

1. Soil with no asbestos identified, typically red/orange silty clay with no identified foreign material;
2. Soil with Bonded ACM identified, typically brown silty clay with minor amounts of foreign material;
3. Soil with compliant concentrations of AF/FA, typically brown silty clay with minor amounts of foreign material; and,
4. Soil with non-compliant concentrations of AF/FA, typically brown and black silty clay with minor amounts of foreign material.

During the remediation process material that contains ACM, AF/FA and material not identified to be impacted from asbestos will be segregated. Material will be appropriately barricaded and sign posted. If material impacted by AF/FA is to remain untouched for a period of greater than 3 days then it will be covered with plastic or geo-fabric to reduce the risk of erosion/dust migration. Prior to being covered, material will be regularly wet down. Should AF/FA material require relocation and long-term management this will be covered under the Asbestos Management Plan (Document Reference 0449086_S010075, November 2019) developed for the Site.

In order to separate and sort the different types of material, the following strategy is proposed:

1. Excavate under supervision of an asbestos contractor and sort visually similar materials in separate stockpiles (approximately 50m^3-150m^3) within the ATA. Stockpile volume will be determined through recording the dump truck loads of material transported by on-site machinery by the Civil Contractor.
2. If no ACM is visually identified during the supervised load out of materials and matches segmentation material type 1 above, soils can be placed on-site as fill without furhter assessment. If ACM is identified or suspected, the material is to be sorted and stockpiled in the ATA for assessment.
3. ERM recommends excavations take place in 1m to 2m layers to avoid creating large holes in the ground and to assist in identifying different material types throughout the soil profile. Dust mitigation activities such as water suppression and placing geofabric on exposed soils can also be used to reduce dust generation.
4. Once the previously assessed 5 meters of bund material has been removed further test pitting for chemical assessment of the soils is required to achieve the 1:1000m^3 sampling requirement. This should be conducted prior to the material being bulk excavated and stockpiles under contractor supervision.

Based on previous site assessments there have been 30 samples collected from the eastern bund permitting assessment of 30,000m^3 of non-asbestos containing material within the eastern bund and 35 samples from the southern bund totalling 35,000m^3 of non-asbestos containing materials,. These assessments have been limited to the top 5 meters of bund excavation, with the total southern bund volume estimated to be 300,000m^3 and the eastern bund being 60,000m^3. These volumes relate to the amount of fill being investigated, with only a portion likely to require remediation after the sorting of these soils.

In addition to the above strategy, excavation works will also be conducted in accordance with Conditions in the Development Application (DA) related to the excavations of the bund wall and identified fill areas and construction of replacement bund walls where required.

ERM will be on-site daily during remediation works to visually inspect the excavation works. During excavations, if material not consistent with the four material types is encountered, it will be excavated and stockpiled separately to other material for further assessment.

Remediation Process

Once material has been sorted and identified as potentially containing asbestos it is to be stockpiled in the ATA. , Asbestos quantification sampling will be conducted by a qualified environmental consultant and results will be screened against adopted land use criteria.

Soils that are assessed as meeting the land use requirements will be reused as fill onsite. Soils that do not meet this criteria for ACM will be subject to remediation to remove the ACM. Materials that fail due to the presence of AF/FA will be separated and combined for future site management within a burial cell.

Soils identified as containing ACM will be remediated as follows:

1. Spreading and hand-picking of the impacted soils by the removalist, until no visible ACM remains;

   a. Soils are to be spread into pads no thicker than 100mm. Material will be hand-picked with multiple transects walked by personnel of the Class A Licensed Removalist. Secondary transects perpendicular to the first are to be undertaken at the completion of picking works;

   b. At the completion of initial hand picking the material can be turned or tined with subsequent hand picking as per step 1;

2. At the completion of hand picking, the pad will be scraped up and re-placed into a stockpile. Each stockpile will be given an identification number and its location will be marked on a map.

    a. ERM will visually inspect the stockpile and subject it to sampling for ACM quantification and AF/FA analysis.

        i. Material passing visual inspection and quantification analysis will be placed at depth on-site (> 2.0 m below ground level);

        ii. Material failing either visual inspection or quantification for the presence of bonded ACM will require further handpicking and assessment until a time that validation sampling confirms the suitability of the material to remain on-site

6.3.1.2 Assessment Procedure

All stockpiles created in the ATA will be sampled for asbestos quantification. Sampling for asbestos quantification requires a minimum of 10L of soil collected from each stockpile. Soil will be passed through a 7 mm sieve with material retained on the sieve inspected for possible ACM fragments (known as an 'ACM sample'). Any suspected ACM will be collected in a polyethylene zip lock bag for laboratory analysis. Soil that passed through the sieve screen can then be sampled with a minimum of 500 mL collected for laboratory weight for weight percentage (w/w%) analysis of asbestos fines content (known as an 'AF/FA sample').

During this assessment, one ACM and one AF/FA sample will be collected per 70m^3. This sample rate is based on Table 7 of the Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (WA DoH, 2009).

If the material does not comply with land use criteria following additional assessment, the material will be temporarily stockpiled on-site and sealed for future placement within an engineered Burial Cell (refer to Section 6.3.1.4 of this document).

6.3.1.3 Bonded ACM Field Assessment

Bonded ACM collected during field assessment may be quantified in the field by ERM personnel by the following approach derived from NEPM (NEPM 2013) guidelines:

- A minimum of 10L of soil will be collected and screened through a 7mm sieve. Any potential ACM retained above the sieve will be collected and weighed in the field for quantification analysis.
- An asbestos content of 15% by weight will be assumed for fibre cement sheeting

    - Other potentially asbestos containing materials, such as vinyl floor tiles, may require different asbestos content percentages

- A bulk density factor of 1.7 kg/L will applied to the soils

Therefore 60 grams of bonded ACM (in the form of fibre cement sheeting) would result in an ACM w/w% of 0.048%. Field measurement of retained ACM will be used to screen stockpiles initially based on their remediation requirements.

6.3.1.4 Reuse of Material

Only material that complies with the land use criteria can be beneficially re-used on-site. ERM recommends soils containing asbestos at concentrations below the land use criteria be preferentially placed at depths >2.0 m below the final surface level. Furthermore, the top 100 mm of surface soils cannot have visible asbestos as outlined in Section 10.3.3 of this document. A visual inspection during the placement of the material within the designated consolidation areas will be required to confirm no visible asbestos is present.

It is also recommended that due to the presence of materials containing asbestos in the form of fragments of fibre cement still be present within the soils at levels compliant with the land use criteria, an unexpected finds protocol be established on the site for any excavation activities that extend beyond 2.0m below the final surface level of the site.

6.3.1.5 Management of Non-Compliant Material

Soils that contain asbestos concentrations exceeding the land use criteria will require suitable management. Short term management of material impacted by AF/FA will include covering with plastic or geofabric or the application of a soil stabilising spray polymer to reduce the risk of erosion/dust migration. Prior to being covered, material will be regularly wet down.

In order to minimise the volume of asbestos contaminated soils that require off-site disposal, longer-term management will include stockpiling of AF/FA impacted material in a designated location within the Stage 3 Area of the site. The management of this non-compliant material within the site is covered in the Asbestos Management Plan for the site (0449086_S010075, November 2019) which has been reviewed by the Site Auditor.

Following the receipt of Council approval, the stockpiled material will then be placed within a Burial Cell constructed on-site. Design and construction of the Burial Cell will be in general accordance with the *Guidelines for the Assessment of In-site Containment of Contaminated Soil* (ANZECC, 1999) and in compliance with all other regulatory approvals and requirements.

The dimensions of the cell will be sufficient accommodate the entire volume of AF/FA contaminated soils, as well as any other material deemed suitable to be contained within the cell, and will be determined in consultation with the final development design plans.

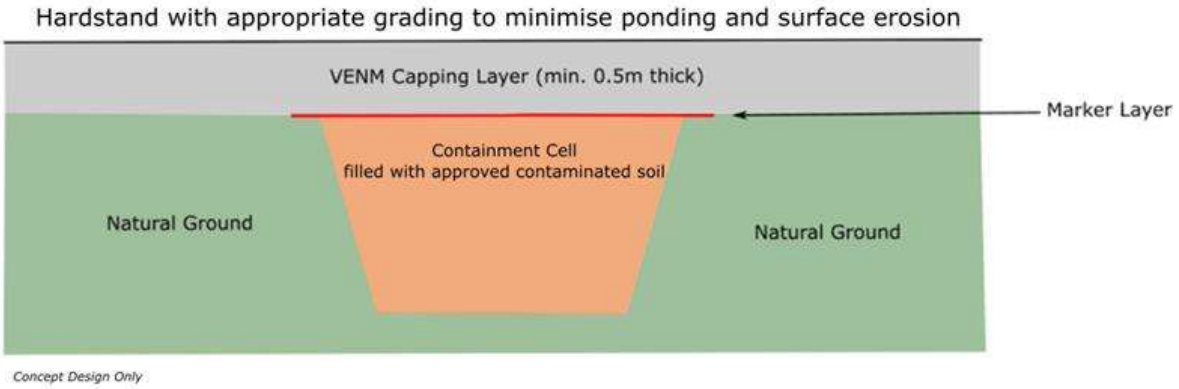
Soil excavated to create the Burial Cell will be stockpiled on-site and an assessment of the suitability of the material to remain on-site from a contamination perspective will be carried out. Where the soil is not considered suitable for beneficial on-site reuse from a contamination perspective, the material will be classified for on-site containment, and or off-site disposal to landfill.

Once constructed, the containment cell will be backfilled with the material which failed to meet the asbestos inspection / testing process and is deemed to be suitable for inclusion within the waste cell in accordance with acceptance criteria Capping material requirements and long term management will be detailed in the application for the construction of the containment cell for future review and approval.

Given the nature of the contamination to be contained on-site, contaminant mobilisation and the generation of leachate is not expected, therefore placement of geotextile lining along the base and walls of the cell, and installation of a leachate collection system, is not necessary at this time. Should the proposed nature of the contaminants to be placed in the cell be changed there may be additional requirements for cell construction and regulatory approvals.

Following filling and compaction of the containment cell with asbestos containing soils, a high visibility non-woven geotextile marker layer will be installed over the footprint of the cell such that it covers all approved ACM contaminated fill. The marker layer will extend at least 1 m beyond the perimeter of the cell. Where joins in the marker layer occur, an overlap of at least 200 mm is required.

Following installation of the marker layer, a minimum 0.5m thick capping layer, consisting of Virgin Excavated Natural Material (VENM), will be placed over the top of the marker layer. To reduce the potential for erosion or penetration of the capping layer, loose or unconsolidated sediments should not be used to create the cap.



The concept excavation and capping strategy subject to Council and regulatory authority approval is shown below.

The location for the burial cell will be selected to avoid the need for future access for service trenches to be installed. In the case that trenches are to be created for the installation of services, the marker layer will cover the walls and base along the length and breadth of each trench.

A Long-term Environmental Management Pan (LTEMP) will be prepared and implemented to ensure the capping is maintained to a standard that continues to protect human health.

Following installation and validation of the capping layer, and implementation of an approved Long-term Environmental Management Plan, this area will be suitable for future land use consistent with 'Commercial / Industrial' as defined in the NEPM (NEPC, 2013).

In the case that the containment cell is not of sufficient capacity to contain the entire volume of non-compliant materials generated during remediation works, the material will require classification and off-site disposal in accordance with NSW EPA (2014) Waste Classification Guidelines.

Chemical sampling will be required to confirm the classification of the material for disposal to landfill. Soil samples will be analysed for the following analytes:

- vTRH: Volatile Total Recoverable Hydrocarbons
- BTEX: Benzene, Toluene, Ethyl-Benzene, Xylenes
- TRH: Total Recoverable Hydrocarbons
- PAH: Polycyclic Aromatic Hydrocarbons
- Heavy Metals: Arsenic (As), Chromium (Cr), Cadmium (Cd), Copper, (Cu), Lead (Pb), Mercury (Hg), Nickel (Ni), Zinc (Zn)
- OCP: Organochlorine Pesticides
- OPP: Organophosphorus Pesticides; and
- PCB: Polychlorinated Biphenyls.

Samples will be collected at a rate of approximately 1/25m^3 with a minimum of three samples collected for material requiring off-site disposal. Due to the previous assessments conducted on the soil the material will be classified as special waste asbestos with the soils noted to contain friable asbestos.

6.3.1.6 Additional Land Use Suitability Assessment

ERM has currently assessed the top 5m of the bund wall material in accordance with the Material Assessment and Importation Procedure (DLA, 2018b). With the exception of asbestos, all soil samples from the bund wall complied with Commercial/Industrial land use criteria (NEPM 2013). As ERMs assessment was limited to the top 5m of the bund wall, material >5m below the current surface of the bund wall will require assessment in accordance with the Material Assessment and Importation Procedure (DLA, 2018b) which include the assessment requirements to confirm the relevant land use criteria.

The additional assessment will be conducted in-situ through the excavation of test pits down to natural ground. If this assessment identifies contaminants apart from asbestos exceeding land use criteria, a revision of this remediation strategy and consultation with the Site Auditor will be required.

6.3.1.7 Remediation of Identified BaP Hotspot

At one location TP03, a BaP exceedance (53 mg/kg) of the commercial/industrial HILs (40 mg/kg) was identified at 0.7m bgl. This hotspot was identified within the Phase 2 Assessment (DLA, 2013). During the most recent investigations works i.e. the LDSI (ERM 2019), this hotspot for BaP exceedance was not identified. Should BaP contamination is identified at the Site, the remediation strategy is outlined below:

- Delineation of excavation areas by marking a 5m x 5m grid around borehole TP3;
- Excavation of identified gridded area to the required depth of 1.0m;
- Excavated materials will be relocated and consolidated within a separate area;
- These soils will be sampled for waste classification purposes in accordance with *Waste Classification Guidelines* (NSW DECCW, 2014) and any WorkCover requirements;
- If waste characterisation results do not identify chemical contamination in exceedance of the Validation Criteria to be present, the material may be deemed suitable for reuse on-site. These soils will be placed within designated material reuse areas;
- If contaminants exist at concentrations unsuitable for the proposed land use, the material will be classified and disposed in accordance with the *Waste Classification Guidelines* (NSW DECCW, 2014), with samples collected at a rate of 1 per 25m^3 (minimum 3 per stockpile).

6.3.2 Delineation Areas (DL)

6.3.2.1 DL1 – Asbestos and Foreign Materials

This AEC comprises an area of former uncontrolled filling in the north eastern portion of the site, which has most recently been used for stockpiling of brick making materials. Fill containing compliant ACM and foreign material observations was identified between 2.8 and 9m below ground level over an area approximately 15,100 m^2 (volume estimated at 83,050 m^3). The edges of the fill area will require delineation as the exact extent was not identified during the LDSI. Proposed methodology for remediation of the material is outlined below:

- Stockpiling of identified ACM impacted soils using a gridded excavator bucket (75mm) to sift out large foreign materials such as building rubble for recycling;
- During stockpiling, segregation of visually distinct soil types should be undertaken to lessen the risk of further contaminating less impacted soils;
- Rubble generated from remediation works will be assessed as recyclable material (brick, concrete and steel) or waste (wood, plastic etc.) as per the *NSW Waste Classification Guidelines* (2014) and removed offsite;
- Establishment of a designated sorting area;

- Airborne asbestos monitoring will be undertaken by the consultant on a representative number of days during any potentially asbestos disturbing works;
- Spreading and hand-picking of the impacted soils by the licenced removalist, until no visible ACM or large foreign material remains;
  - Soils are to be spread into pads no thicker than 100mm and hand-picked with multiple transects walked by personnel of the Licensed Removalist. Secondary transects perpendicular to the first are to be undertaken at the completion of picking works;
  - At the completion of initial hand picking the material can be turned or tined with subsequent hand picking;
  - It is assumed the dimensions of the pad will be determined by the removalist, taking into account the space available in the treatment area, available plant and the number of workers available. To confirm thorough inspection and hand-picking a single pad should not exceed 60m^3 in volume. If possible however multiple pads are able to be picked and inspected per day;
- The consultant will visually inspect the stockpile and subject it to ACM quantification analysis. Quantification samples will be collected at a rate of no greater than one sample per 60m^3
  - Material passing visual inspection and quantification will be placed at depth within the designated consolidation area;
  - Material failing either visual or quantification for the presence of ACM will require further handpicking and assessment prior to placement. Material reporting the detection of non-compliant Asbestos Fines/Fibrous Asbestos (AF/FA) will require off-site disposal or placement within the Burial Cell, depending on time and cost benefit analysis by the Client.

Upon confirmation that the soils meet the land use criteria, soils can be reused on the Site.

Tracking of material reuse areas will be conducted by the civil contractor under geotechnical supervision to confirm material reuse suitability.

Alternatively, if sorting of the material is not desirable due to time or budget constraints, the material may be excavated and placed within the Burial Cell along with non-compliant material from Stage 2.

6.3.2.2 DL2 – Asbestos

This AEC encompasses the eastern bund wall within the Stage 3 area. The LDSI (ERM, 2019) identified ACM detections and exceedances, as well as observed foreign materials, between the surface and 5m bgl. The north western part of the bund exhibited less impact from foreign materials, with no asbestos reported. The entire bund area is included within this AEC as a precaution, and covers an approximate area of 6,030 m^2 (volume estimated at 27,135 m^3).

Remediation of this material should be undertaken in accordance with the methodology outlined above for AEC DL1. The exceedances were bonded in nature only and as such have not been deemed hotspots for isolated removal.

6.3.2.3 Delineation of AEC DL3

AEC DL3 is a TRH hotspot at the borehole BH215 location, with an approximate depth of 3.0m bgl. This area was also deemed an AEC within the Phase 2 Assessment (DLA, 2013), due to elevated TRH readings. Groundwater was identified to be impacted by hydrocarbons within the previous investigations. It is expected as a result of the removal of the impacted fill material (contaminant source) will remediate the groundwater in the vicinity, due to natural attenuation.

Due to the location of AEC DL3 in relation to the brick factory and associated infrastructure, delineation of the TRH impacts could not be undertaken during the LDSI (ERM, 2019).

Post demolition and removal of infrastructure, delineation of the hotspot will be required, as the source of the impact is not yet known. Delineation will involve:

- Excavation of a 5m x 5m grid centred around BH215/MW2A;
- Excavation in layers until contamination indicators observed (staining, odours, PID readings >20ppm);
- Stockpile of overlying 'clean' material on black plastic, separate to TRH impacted material;
- Excavation to a minimum depth of 3.5m bgl, or until contamination indicators are no longer observed;
- Expansion of the pit walls outwards, while continuing to segregate material based on level of contamination, until contamination indicators are no longer observed;
- Validation sampling of the walls and base will be conducted to confirm complete removal of overlying impacted material (refer to Section 8.4 for validation details).

The material excavated from the hotspot should be sampled for waste classification purposes at a sample rate of 1 per 25m^3 (with a minimum of 3 samples per stockpile) in accordance with the EPA Victoria *Industrial Waste Resource Guidelines* (June 2009). Stockpiles returning results below the commercial/industrial land use criteria may remain on site for reuse as fill. Stockpiles exceeding the commercial/industrial land use criteria shall be either classified in accordance with the *NSW Waste Classification Guidelines (2014)* and disposed from site to a licensed facility, or undergo bioremediation/land farming to remove volatiles from the material. Dependant on subsequent test results, the material may be suitable for containment on site within the Burial Cell.

6.3.2.4 DL4 – Asbestos and Foreign Materials

This AEC is an area of foreign material impacts (bricks) and one exceedance of AF/FA at test pit TP35 (0.7m bgl).

Remediation methodology for the asbestos hotspot is outlined below:

- Mark out a 5m x 5m grid centred on the location of TP35;
- Excavate to 1m bgl, and stockpile resultant soils on a marker barrier to avoid contamination of underlying soils;
- Visual inspection of walls and base by a Licensed Asbestos Assessor, for visual indications of remaining asbestos impacted material;
- Validation sampling of walls and base to confirm complete removal of hotspot (refer to Section 8.2 for validation details);
- Classification and disposal of stockpiled material to a licensed facility in accordance with the *NSW Waste Classification Guidelines (2014)* or encapsulation within the Burial Cell as appropriate.

Remediation methodology for the brick impacted fill is outlined below:

- Excavate material and use shaker bucket to remove foreign materials;
- Spotter should be in place to identify potential asbestos within the soil. The process should be halted and asbestos removed if observed;
- Resulting soil fines to be stockpiled and samples collected for AF/FA at a minimum rate of 1 per 70m^3;
- If the excavated material is compliant with commercial/industrial land use, it may be placed as fill in designated fill areas;
- If the excavated material is not compliant with commercial/industrial land use, it may be sampled and classified and disposed from site to a licensed facility in accordance with the *NSW Waste Classification Guidelines (2014),* or placed within the Burial Cell;
- The bricks and concrete separated from the soil are to be inspected to finem asbestos is not present. If no asbestos is observer the material can be removed from site as recyclable waste or recycled onsite as part of crushing and processing activities;

- Other foreign materials (plastic, wood etc.) should be disposed from site as General Solid Waste (GSW);
- The excavation pit will be validated through visual inspection and sampling (refer to Section 8.2 for details).

6.3.2.5 DL5, DL6 & DL7 – Foreign Materials

This AEC DL 5 comprises an area of uncontrolled filling in the north west section of the site, adjacent to the onsite dams. Foreign materials such as bricks and slag were noted from the surface to approximately 1.5m bgl (estimated volume of 1,550 m^3). No asbestos was noted within the fill materials.

Remediation methodology for the foreign material impacted fill at AEC DL5 should be undertaken in accordance with the methodology outlined above for the brick impacted fill in DL4.

6.3.3 Data GAP Areas

6.3.3.1 Brick Making Stockpiles

Any stockpiles of brick making material remaining within the site area post closure of the brick factory will be assessed for land use compliance and suitability to be used on site as fill material. The stockpiles will be assessed at a sampling density of 1 per 1000 m^3, due to the homogeneity of brick making material and testing conducted in previous development stages (Stage 2). However, a minimum of 3 samples per stockpile should be taken for statistical reliability.

Materials that meet the proposed land use of commercial/industrial may be used in fill works unrestricted on the site (with geotechnical approval).

Materials that do not meet the proposed land use of commercial/industrial may either be classified and disposed from site to a licensed facility, or contained within the Burial Cell on site that is constructed in accordance with the *Guidelines for the Assessment of In-Site Containment of Contaminated Soil* (ANZECC, 1999) and noted on the lot title.

The chosen strategy should take into consideration the cost of disposal versus burial, in terms of financial outlay and time factors. This will likely depend on the volume of material and contaminants of concern/concentrations.

If disposal is the chosen strategy, all waste disposal information (tip dockets, tracking) should be provided by the civil contractor. If the Burial Cell is constructed, the base, top of non-compliant material and finished surface level should be surveyed and provided by the civil contractor.

6.3.3.2 Footprints and Active Work Zones

All footprints, including previously inaccessible active work zones, will require assessment post demolition of building and removal of stockpiles/product. The area includes the factory, stockpile/product footprints, former oil storage area east of the factory, potential USTs west of the factory, and the AST located in the north west portion of Stage 3.

This area is expected to cover approximately 7.65 ha. These areas should be assessed in accordance with the *NSW EPA Sampling Design Guidelines (1995)* and screened against the relevant commercial/industrial land use criteria within the *National Protection Environment Measure (1999, amended 2013)*.

For an area covering 7.65 ha, a further minimum of 95 sample locations are required to meet the sampling density within the *NSW EPA Sampling Design Guidelines (1995).* Results of the data gap investigation, with clear descriptions of any additional identified AECs, should be provided within a Data Gap Assessment Report, and this RAP updated to include remediation strategies for the identified contamination within data gap areas.

6.3.3.3 Dams

Surface water, soil and sediment investigations are required within the onsite dam areas.

Preliminary results from the Phase 2 Assessment (DLA, 2013) and LDSI (ERM, 2019) indicate the water within the dams may be suitable for application to land. Presently the water is resused onsite for dust suppression and process water use. Should the dam require completed dewatering and decommissioning a Dam Dewatering Assessment is required which involves further sampling and comparison of results to ANZECC and NHMRC guidelines. A Dam Dewatering Report should be issued with the results of the assessment, potential dewatering/treatment options, discharge rates and erosion/sediment controls to be implemented during dewatering.

Due to the importance of the dam bunds and edges for geotechnical stability, these areas were not investigated within the LDSI (ERM, 2019). Post dewatering, the material is required to be assessed to confirm if previously unidentified filling has occurred in the area which may pose a contamination risk. The area covers approximately 2.45 ha, which requires a minimum 35 sample locations according to the *NSW EPA Sampling Design Guidelines (1995).* This will include sediment samples from within the dam footprint, which was inaccessible during the Phase 2 Assessment and LDSI sampling events, and requires assessment for commercial/industrial land use suitability. As with the footprint investigation, results should be compiled into a Data Gap Assessment Report, with updates to this RAP if additional AECs requiring remediation are discovered.

6.3.4 Remediation of groundwater hydrocarbon contamination

Previous investigations have identified that groundwater on-site may be contaminated with hydrocarbons from former and current USTs, in addition to the evidence that petroleum hydrocarbons were present in on-site monitoring wells A Groundwater Monitoring Program at the Site will be prepared and implemented in consultation with the Site Auditor. The requirement for further groundwater remediation will be discussed with the Site Auditor upon groundwater contamination delineation works in the Data Gap areas.

6.3.5 Surface Water & Sediment Contamination

Contamination within on-site dams has been detected, however as no water is being discharged from the dams, with the water being transferred between the dams to reduce suspended sediments prior to re-use in the factory, the water is deemed suitable for re-use on- site for dust suppression. As the water would not be discharged from the site, no further remediation action is considered necessary.

Sediments will be further analysed following dewatering or sufficient lowering of the dams with the results compared against the adopted site criteria

7. WASTE MANAGEMENT STRATEGY

All waste disposal activities will be undertaken in accordance with the Waste Classification Guidelines (NSW EPA, 2014), the Waste Avoidance and Resource Recovery Act 2001 (NSW), the Protection of the Environment Operations (POEO) Act 1997 (NSW), and other relevant legislation.

7.1 Waste Soil Classification

All asbestos impacted fill is proposed to be beneficially reused on site (compliant) or capped and contained within a Burial Cell (non-compliant).

However there is the potential that some of the fill may not meet geotechnical requirements for use as engineered fill, or unexpected finds are uncovered that do not meet land use / capping requirements. If this is the case, the material may be required to be classified and disposed to a licensed facility.

The sampling frequency and analytical schedule may need to be adjusted on a "case by case" basis, depending on factors such as:

- the volume of the material;
- the homogeneity of the material; and
- the visual assessment of the material.

Where possible, to assist in efficient classification and off-site disposal, less impacted soils will be segregated from those which have visual or olfactory indicators of contamination, or are suspected to contain asbestos.

Soil samples collected for waste classification purposes will be analysed for a typical suite of potential contaminants[1]. The analytical suite may be reduced where existing data is available, however this would be at the discretion of a suitably qualified and experienced environmental consultant.

The results of the laboratory analysis will be compared against Tables 1 and 2 of the *Waste Classification Guidelines* (NSW EPA, 2014). The existing analytical data for fill soils may also be considered when classifying soils for off-site disposal.

All soils that require off-site disposal as part of the remediation works will be disposed to an appropriately licensed landfill facility or beneficially re-used off-site (refer to Section 7.2 of this RAP). Copies of dockets pertaining to disposal of soils will be provided by the remediation contractor to confirm the source, type and quantities of materials, as well as waste tracking information. These will be included in the validation report.

7.2 Classification of Soil for Beneficial Off-Site Reuse

This section applies to soil that is to be excavated from the site and beneficially re-used off-site, where permitted, based on chemical concentrations.

Where natural in-situ soils are to be excavated and removed from the site (eg. for excavation of the Burial Cell), the material will be sampled for waste classification purposes in accordance with *The Excavated Natural Material Order* (NSW EPA, 2014) and then disposed off-site as VENM or Excavated Natural Material (ENM) if compliant with the relevant criteria.

Soil sampling for classification purposes will be carried out from stockpiles that have been flagged for offsite disposal, or in situ, depending on operational site requirements.

Schedule 1, Section 50 of the *POEO Act 1997* defines VENM as natural material (such as clay, gravel, sand, soil or rock fines) that:

[1] Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn), Total Recoverable Hydrocarbons (TRH), Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Polycyclic Aromatic Hydrocarbons (PAH), Organochlorine / Organophosphorus Pesticides (OC/OP), Polychlorinated Biphenyls (PCB), and asbestos (presence / absence).

a. has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and

b. does not contain any sulfidic ores or soils or any other waste.

Where off-site disposal to landfill is the preferred option, VENM has been pre-classified as General Solid Waste (non-putrescible) in accordance with Step 3 of the NSW EPA (2014) *Waste Classification Guidelines* (refer to Section 8.2 of this RAP).

The NSW EPA has the authority under the *POEO Regulation* to make certain materials exempt from being classified as waste. One such exemption relevant to the site is ENM.

ENM is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

a. been excavated from the ground;

b. contains at least 98% (by weight) natural material; and

c. does not meet the definition of VENM in the Act.

ENM does not include:

a. material located in a contamination hotspot;

b. material that has been processed; or

c. material that contains asbestos, acid sulfate soils, potential acid sulfate soils or sulfidic ores.

Material to be beneficially reused as ENM will be collected and analysed at the rate specified in Tables 1, 2 or 3 of the ENM Order (NSW EPA, 2014).

Assuming the material meets the above criteria, confirmation of the ENM classification is carried out by the comparison of contaminant concentrations against the thresholds presented in Table 4 of NSW EPA, *The excavated natural material order 2014.*

Where the results of the laboratory analysis indicate that the natural in-situ soils are not able to be classified as VENM or ENM from a contamination perspective, the material will be classified in accordance with the strategy presented in Section 7.1 of this RAP.

7.3 Classification of Soil for Beneficial On-Site Reuse

Material to be beneficially reused on site will be collected and analysed at a minimum rate of one sample per 1,000 m^3 of excavated material, in accordance with the *Material Assessment & Importation Procedure* (ERM, 2018b). Where no visual or olfactory evidence of contamination is noted, and the overlying material reported contaminant concentrations below the assessment thresholds, sampling and analysis of the material may not be required (particularly bedrock), however this would be assessed on a case-by-case basis by a suitably qualified and experienced environmental consultant.

An assessment of the top 5m of the southern bund has already been undertaken, with the remaining material to be assessed once the overlying 5m of soil has been removed. A similar approach is to be undertaken in the eastern bund, where test pits will be extended with samples collected every 1m interval, with the aim of a final sampling density of 1 per 1,000m^3.

7.4 Management of Asbestos

The asbestos impacted fill on the site will be placed within the consolidation area (compliant) or Burial Cell (non-compliant), and is not expected to be subjected to offsite disposal. Material that does not meet geotechnical requirements for placement at depth may be classified and removed from site.

Asbestos waste is pre-classified as Special Waste Asbestos in accordance with Step 1 of the *Waste Classification Guidelines* (NSW EPA, 2014). Therefore, asbestos impacted soil may be disposed to a landfill appropriately licensed for the receipt of Special Waste Asbestos. Asbestos impacted material will be handled, stored and transported in accordance with WorkCover NSW (2014) and the *Protection of the Environment Operations (Waste) Regulation 2005*, as follows:

- Waste will be stored on-site in an environmentally safe manner;
- Non-friable (bonded) asbestos will be securely packaged at all times;
- Asbestos waste will be transported in a covered, leak-proof vehicle; and
- Asbestos waste will be disposed to a landfill that can lawfully receive this waste. The landfill will be contacted prior to disposal to advise of the intention to dispose of asbestos waste.

The appointed contractor will provide the environmental consultant with tip dockets of all material disposed off-site to confirm the quantity of materials, and waste tracking information. These will be included in the validation report.

7.5 Importation of Soil

Where fill is to be imported to the site (i.e. to backfill service trenches), the material must be either VENM or ENM as defined in Section 7.2 of this RAP or specific construction material approved for use onsite. In accordance with the *Material Assessment & Importation Procedure* (ERM, 2018b), the VENM must be accompanied by a validation certificate from the supplier which adequately certifies that the material is VENM, or otherwise be subject to validation sampling prior to importation to the site. Other materials may be suitable for use as fill onsite, subject to approval and meeting relevant regulatory and engineering requirements.

Where validation of VENM is required, representative soil samples will be collected at the rate within the *Material Assessment & Importation Procedure* (ERM, 2018b). Soil samples collected for waste classification purposes will be analysed for a typical suite of potential contaminants: heavy metals, TRH, BTEX, PAH, OC/OP, PCB and asbestos.

Where material meets the ENM criteria provided in Section 7.2 of this RAP, confirmation of the ENM classification will be carried out by the comparison of contaminant concentrations against the thresholds presented in Table 4 of the *NSW EPA The excavated natural material order 2014.*

Imported soil will be observed by a suitably qualified and experienced environmental consultant as it is delivered to site to confirm:

- That it appears consistent with the source; and
- That there is no visual or olfactory evidence of contamination such as staining, anthropogenic materials or odours.

In the case that discrepancies exist, the imported material will be refused entry to the site and not considered suitable for use until appropriately validated.

The appointed contractor will provide the environmental consultant with copies of dockets pertaining to imported fill soils to confirm the source, type and quantities of materials. These are to be included in the validation report.

7.6 Stockpile Footprints

Stockpiles are expected to be generated from the southern and eastern bund remediation works. These stockpiles will require footprint clearances once the impacted material is moved to the designated consolidation area or Burial Cell. Any stockpiles generated for waste classification and disposal from site will be stockpiled on plastic or geofabric, therefore not requiring footprint clearances.

7.7 Materials Handling

Transport of waste and disposal of materials must be conducted in accordance with the requirements of the *POEO Act 1997*. Licences and approvals required for disposal of the material will be obtained prior to removal of materials from the site. Removal of waste materials from the site will only be carried out by contractors holding appropriate licences, consent and/ or approvals to manage, handle or dispose of the waste materials.

The contractor will track the movement of all materials excavated and handled as part of the remediation program. This will include tracking of (but is not limited to):

- Stockpile locations, with corresponding source of materials;
- Off-site disposal records for soils (trucking record, landfill dockets);
- Estimated volume(s) of material placed within Burial Cell and beneficially reused on the site;
- Estimated volume(s) of soils exported from the site; and
- Estimated volume(s) of fill imported to the site and validation records where available.

This information will be included in the validation report.

8. VALIDATION STRATEGY

8.1 Extent of Validation

Validation activities will be required for the following areas:

- Bap TEQ and PAH hot spot within the northwest of the former quarry at TP3;
- Southern Bund area;
- Eastern Bund (DL1) area for ACM and foreign materials;
- DL2 area for ACM and foreign materials;
- DL3 TRH hotspot post delineation;
- DL4 area for asbestos and foreign materials;
- DL5 area for foreign materials;
- Asbestos Treatment Area (and associated stockpile footprints);
- Any areas that require remediation as identified within the Data Gap Assessment (including the former oil storage area east of factory, chemical storage area west of factory, any USTs encountered, and after AST removal);
- Any unexpected finds discovered during site works.

8.2 Excavation Validation

At the completion of excavation of asbestos contaminated fill, and prior to backfilling of the resultant excavations (if required), a clearance inspection of the excavation faces will be carried out to assess whether visible fragments of bonded ACM and anthropogenic materials remain. The clearance inspection will be carried out by a suitably qualified and experienced environmental consultant. In the case that bonded asbestos fragments or anthropogenic materials are observed during the clearance inspection, further excavation will be carried out, followed by another clearance inspection.

The clearance inspection will be supplemented by a program of validation sampling and laboratory analysis which will conform to the validation plan presented in **Table 6**. The base of the excavation will be sampled at a rate twice that indicated within the *NSW EPA Sampling Design Guidelines* (1995). This is recommended for areas where asbestos is likely within the *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DOH, 2009). These results will be included within the final validation report for the site.

Table 6. Validation Plan for Asbestos Excavations

LOCATIONS	SAMPLING DENSITY	ANALYSIS
Base	2x *NSW EPA Sampling Design Guideline* sampling density.	Asbestos (presence / absence)
Walls (North, South, East, West)	One sample per 20 lineal metres of wall. Where a wall is greater than 1m high, or there is a change of strata, a greater number of samples may be collected in a vertical plane on the wall.	

For areas of aesthetic concern only, validation will be undertaken through visual inspection for any remaining foreign materials for fill soils within the excavation. Sampling will only be undertaken if asbestos or chemical contaminants of concern have been identified at the location.

8.3 Asbestos Treatment Area (ATA)

The area where asbestos impacted fill is stockpiled for spreading, hand picking and quantification sampling will require validation inspection and sampling post remediation. Additionally, during remediation works any stockpiles that fail for AF/FA and are consolidated prior to placement within the Burial Cell will require footprint validation. One sample per stockpile footprint is required (1 per 25m^2), with the footprint re-scraped if any AF/FA is detected.

The order for ATA validation is outlined below:

- Footprint validation for all AF/FA stockpiles moved;
- Consolidated stockpile of non-compliant material placed within Burial Cell, and footprint of temporary storage area stockpile validated at a sampling density of 1 per 25m^2;
- Visual inspection of the ATA by a Licensed Asbestos Assessor to confirm removal of all visual asbestos and potentially asbestos impacted material;
- Validation sampling of the surface of the ATA area, with any areas re-scraped that return positive asbestos results.

The sampling rate for the ATA surface will be twice that within the *NSW EPA Sampling Design Guidelines (1995).* This is recommended for areas where asbestos is likely within the *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (WA DOH, 2009).

8.4 Chemical Validation

Validation of chemical hotspots will be required post excavation, to confirm removal of overlying impacted material. This includes TP3, DL3, and any unexpected finds discovered during data gap assessments or delineation works.

Table 7 below shows the sampling rate for chemical hotspot validation.

Table 7. Validation Plan for Chemical Excavations

LOCATIONS	SAMPLING DENSITY	ANALYSIS
Base	1 sample per 25m^2 (or part thereof)	PAH (TP3) TRH (DL3)
Walls (North, South, East, West)	One sample per 20 lineal metres of wall (or part thereof). Where a wall is greater than 1m high, there is a change of strata or staining is evident, a greater number of samples may be collected in a vertical plane on the wall.	

8.5 Containment Cell Cap Validation

Validation will be required to confirm conditions below the capping installation can be managed to an appropriate standard that ensures there is no ongoing risk to human health or the environment.

A visual inspection will be carried out by a suitably qualified and experienced environmental consultant to document, via photographic evidence, the lateral extent of the marker layer following installation. A copy of the photographic record will be included in the validation report.

Surveys will be carried out by a suitably qualified and experienced contractor following the installation of the marker layer, identifying the lateral extent and elevation of the cap. The marker layer is to be a high-visibility nonwoven geotextile marker layer. This provides a barrier to underlying materials minimising potential exposure risks with the contained materials. The final surface of thesoil capping

layer to placed above the geofabric is to be survey and document the lateral extent and elevation of the cap. A copy of the survey figures will be included in the validation report.

Identified surveys required include:

- Base of excavation;
- Top of marker layer; and,
- Surface WAE (Works As Executed).

8.6 Long Term Management

To negate the risk of potentially contaminated soil being inadvertently disturbed in the future, a Long Term Environmental Management Plan (LTEMP) will be submitted to Fairfield City Council for approval. The LTEMP will be suitable for registration on Title under the Conveyancing Act, 1919 and with the Dial-Before-You-Dig (DBYD) service, and will include a characterisation of all contaminants of potential concern that have been identified at the site and appropriate methods of management.

8.7 Validation Acceptance Criteria

Validation criteria used to assess the success, or otherwise, of the remediation works was obtained from the following publications:

- *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) (NEPC, 2013);*
- *Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 2: Application document, CRC CARE Technical Report no. 10. (Friebel, E and Nadebaum, P, 2011);*
- *Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000)*

8.7.1 Health Investigation Levels

The Health Investigation Levels (HILs) are scientifically based, generic assessment criteria designed to be used in the first stage (Tier 1) of an assessment of potential risks to human health from chronic exposure to contaminants. They are intentionally conservative and are based on a reasonable worst case scenario for four generic land use scenarios. Considering the proposed land use, the following HIL has been adopted:

- Commercial / Industrial.

The adopted HILs, HIL-D from Table 1A(1) and Table 7, Schedule B1 of NEPM (NEPC, 2013), are shown in **Table 8** and are relevant for the proposed commercial/industrial land use**.**

Table 8. Soil Health Investigation Levels (mg/kg)

ANALYTES	HIL-D
HEAVY METALS	
Arsenic	3,000
Cadmium	900
Chromium	3,600
Copper	240,000
Lead	1,500
Mercury	730
Nickel	6,000
Zinc	400,000
PAH	
Benzo(a)pyrene TEQ	40
Total PAHs	4,000
PCB	
Total PCB	7
PESTICIDES	
DDT+DDE+DDD	3,600
Aldrin and Dieldrin	45
Chlordane	530
Endosulfan	2,000
Endrin	100
Heptachlor	50
HCB	80
Methoxychlor	2,500
Mirex	100
Toxaphene	160
ASBESTOS	
Bonded ACM	0.05 % w/w
AF / FA	0.001 % w/w
Surface Asbestos (0.1 m)	No visible

Health Investigation Levels soured from NEPM (NEPC, 2013) Table 1A(1)
Toxic Equivalence Quotient (TEQ) expresses an aggregate measure of toxicity based on a number of contributing PAH compounds.
Asbestos Health Screening Levels sourced from NEPM (NEPC, 2013) Table 7.

8.7.2 Health Screening Levels

Health Screening Levels (HSLs) are used to assess selected petroleum compounds and fractions to assess the risk to human health via inhalation and direct contact with affected soils. The HSLs were developed by the Co-operative Research Centre for Contamination Assessment and Remediation of the Environment (CRC CARE) and were derived through the consideration of health effects only, with particular emphasis on the vapour exposure pathway. Other considerations such as ecological risk, aesthetics, the presence of free phase product and explosive / fire risk are not addressed by the HSLs.

In order to determine whether the HSLs tabulated in Schedule B1 of NEPC (2013) are applicable or whether a site-specific determination is required, CRC CARE provide an application checklist which should be completed prior to using the HSLs. The following parameters were considered in completing the checklist:

- Potential Contaminants – Petroleum Hydrocarbons;
- Land use – HSL D – commercial/industrial land use;
- Potential Pathways – soil vapour intrusion, direct contact;
- Media – soil;
- Soil Types – clay is the dominant sub-surface profile; and
- Depth to Contamination – all data will be compared with the HSLs.

On the basis of these considerations, the following HSL has been adopted:

- HSL D– Commercial/Industrial for ‘clay’ (or ‘fine’).

The adopted soil HSLs for vapour intrusion from Table 1A(3), Schedule B1 of NEPM (NEPC, 2013) are shown in **Table 9**.

Table 9. Soil Health Screening Levels (mg/kg)

ANALYTES	HSL-D (Clay) 0 to <1m	HSL-D (Clay) 1 to <2m	HSL-D (Clay) 2 to <4m	HSL-D Direct Contact
Benzene	4	6	9	430
Toluene	NL	NL	NL	99,000
Ethylbenzene	NL	NL	NL	27,000
Xylene	NL	NL	NL	81,000
Naphthalene	NL	NL	NL	11,000
F1: C_6-C_{10}	310	480	NL	26,000
F2: C_{10}-C_{16}	NL	NL	NL	20,000
F3: C_{16}-C_{34}	NA	NA	NA	27,000
F4: C_{34}-C_{40}	NA	NA	NA	38,000

NL = Not Limiting (i.e. the soil vapour concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario).
NA = Not Applicable (i.e. NEPM (NEPC, 2013) does not provide HSLs for the F3 and F4 hydrocarbon fractions).
Vapour Intrusion Criteria sourced from NEPM (NEPC, 2013) Table 1A(3).
Direct Contact Criteria sourced from Friebel and Nadebaum 2011, Health Screening Levels for petroleum Hydrocarbons in Soil and Groundwater, Part 1: Technical Development Document, Table A4.

8.7.3 Management Limits

In addition to appropriate consideration and application of the HSLs, there are additional considerations which reflect the nature and properties of petroleum hydrocarbons, including:

- Formation of observable light non-aqueous phase liquids;
- Fire and explosion hazards; and
- Effects on buried infrastructure e.g. penetration of, or damage to, in-ground services.

Management limits to avoid or minimise these potential effects have been adopted in NEPM (NEPC, 2013) as interim Tier 1 guidance.

The adopted management limits from Table 1B(7), Schedule B1 of NEPM (NEPC, 2013) are shown in **Table 10.**

Table 10. Soil Management Limits (mg/kg)

ANALYTES	MANAGEMENT LIMIT (Fine) Commercial and Industrial
F1: C_6-C_{10}	800
F2: C_{10}-C_{16}	1,000
F3: C_{16}-C_{34}	5,000
F4: C_{34}-C_{40}	10,000
Management Limits soured from NEPM (NEPC, 2013) Table 1B(7)	

8.7.4 Ecological Investigation Levels

According to NEPM (NEPC, 2013), Schedule B (5a) – *Guideline on Ecological Risk Assessment*, factors that may influence a Risk Management Decision (and therefore determine Ecological Risk Assessment outcomes) are generally based on economic, ecological or societal considerations.

Examples include:

- The size of the site, land value, cost of remediation (economic);
- The type of contaminants present, current and potential site land use, surrounding land use (societal); and
- The ecological significance (e.g. a rare and endangered species or a species that supports a valued ecological process or a sensitive introduced species of low ecological significance) of the values identified in the Receptor Identification component of Ecological Risk Assessment to be protected.

Ecological Investigation Levels (EILs) have been implemented to environmentally manage the effect of contaminants on terrestrial ecosystems and species sensitivity. The EILs referenced in this report have been developed for an open space land use for the Ecological Conservation Zone and Commercial/Industrial land use for the developed portion of the site. It is important to note that the contamination is assumed to be aged (>2 years), as fresh contamination associated with current industrial / agricultural activity and chemical spills are not likely present on-site. EILs have been derived for arsenic (As), copper (Cu), chromium (CrIII), lead (Pb), nickel (Ni) and zinc (Zn). NEPM (NEPC, 2013), Schedule B (5a) states that: It is important to note that the EILs only apply to soil down to a depth of two metres below the current soil surface, which corresponds to the root zone and habitation zone of many species.

Ambient Background Concentration (ABC)

For Ni, CrIII, Pb and Zn (aged contamination), the EILs are the sum of Added Contaminant Limits (ACLs) and Ambient Background Concentrations (ABCs). To establish the ABC of a contaminant, the recommended method is to measure the ABC at an appropriate unpolluted reference point

For arsenic (aged contamination), the EILs are generically obtained (i.e. not dependent on soil type).

Added Contaminant Limit (ACL)

The Added Contaminant Limit (ACL) is the added contamination (in excess of the ABC) considered acceptable for the protection of ecological receptors. ACLs are applicable to Cr III, Cu, Ni and Zn and are based on soils properties of pH, Cation Exchange Capacity and clay content.

The EILs to be adopted for comparison purposes are based on the data presented in the previous investigation report (ERM, 2019) and are summarised in **Table 11** and **Table 12**.

Table 11. Soil Ecological Investigation Levels – Open Space (mg/kg)

ANALYTES	ABC	ACL	EIL
Arsenic	--	--	100[1]
Chromium	17	400[2]	420
Copper	12	190[3]	200
Lead	16	1,100[4]	1,100
Nickel	7	170[5]	180
Zinc	66	400[6]	470
DDT	--	--	180[7]
Naphthalene	--	--	170[8]

[1] NEPM (NEPC, 2013) Schedule B1 Table 1B(5).
[2] NEPM (NEPC, 2013) Schedule B1 Table 1B(3).
[3] NEPM (NEPC, 2013) Schedule B1 Table 1B(2). CEC has been used for this calculation.
[4] NEPM (NEPC, 2013) Schedule B1 Table 1B(4).
[5] NEPM (NEPC, 2013) Schedule B1 Table 1B(3).
[6] NEPM (NEPC, 2013) Schedule B1 Table 1B(1).
[7] NEPM (NEPC, 2013) Schedule B1 Table 1B(5).
[8] NEPM (NEPC, 2013) Schedule B1 Table 1B(5).

Table 12. Soil Ecological Investigation Levels – Commercial/Industrial (mg/kg)

ANALYTES	ABC	ACL	EIL
Arsenic	--	--	160[1]
Chromium	17	660[2]	680
Copper	12	280[3]	290
Lead	16	1,800[4]	1,800
Nickel	7	290[5]	300
Zinc	66	620[6]	690
DDT	--	--	180[7]
Naphthalene	--	--	170[8]

[1] NEPM (NEPC, 2013) Schedule B1 Table 1B(5).
[2] NEPM (NEPC, 2013) Schedule B1 Table 1B(3).
[3] NEPM (NEPC, 2013) Schedule B1 Table 1B(2). pH has been used for this calculation.
[4] NEPM (NEPC, 2013) Schedule B1 Table 1B(4).
[5] NEPM (NEPC, 2013) Schedule B1 Table 1B(3).
[6] NEPM (NEPC, 2013) Schedule B1 Table 1B(1).
[7] NEPM (NEPC, 2013) Schedule B1 Table 1B(5).
[8] NEPM (NEPC, 2013) Schedule B1 Table 1B(5).

8.7.5 Ecological Screening Levels

Ecological screening levels (ESLs) have been developed for selected petroleum hydrocarbon compounds and are applicable for assessing risk to terrestrial ecosystems. ESLs broadly apply to coarse and fine-grained soils and various land uses. They are generally applicable to the top 2 m of soil.

The adopted ESLs, from Table 1B(6), Schedule B1 of NEPM (NEPC, 2013) are outlined in **Table 13**.

Table 13. Soil Ecological Screening Levels (mg/kg)

ANALYTES	ESL (Fine) Public open space	ESL (Fine) Commercial / industrial
F1: C_6-C_{10}	180	215
F2: C_{10}-C_{16}	120	170
F3: C_{16}-C_{34}	1,300	2,500
F4: C_{34}-C_{40}	5,600	6,600
Benzene	65	95
Toluene	105	135
Ethylbenzene	125	185
Xylene	45	95
Benzo(a)pyrene	0.7	1.4

ESLs soured from NEPM (NEPC, 2013) Table 1B(6).

8.7.6 Soil Aesthetic Criteria

Although no specific numeric aesthetic guideline values are provided, the NEPM (NEPC, 2013) requires the consideration of aesthetic issues (as a result of contamination) arising from soils within the site. The following assessment criteria have been adopted when considering soil aesthetics:

- No highly malodourous soils, taking into consideration the natural state of the soil at the site;
- No staining or discolouration in soils, taking into consideration the natural state of the soil; and
- No large or frequently occurring anthropogenic materials present (to the extent practicable).

8.7.7 Groundwater Criteria

Currently, there is no requirement for active groundwater remediation of the Site with further investigators required within the footprint of the existing factory. As an outcome of this assessment the need for groundwater remediation warranted at the Site, the following criteria may be considered as a starting point to determine validation requirements.

Criteria for groundwater were obtained from various sources. Where available, Groundwater Investigation Levels provided in the NEPM (NEPC, 2013) and trigger levels provided in the Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000) have been referenced. HSLs for vapour intrusion from Table 1A(3), Schedule B1 of NEPM (NEPC, 2013) have also been used for groundwater assessment.

Concentrations in excess of the trigger values are not ‘clean-up’ thresholds and do not automatically indicate that management or remedial action is necessary; but instead show that further investigation and evaluation of potential risks will be required. ANZECC (2000) provides a range of trigger values which should be applied to different ecosystem conditions. ANZECC (2000) recognises three main ecosystem conditions:

1. High conservation/ecological value systems: effectively unmodified or other highly-valued ecosystems, typically (but not always) occurring in national parks, conservation reserves or in remote and/or inaccessible locations. While there are no aquatic ecosystems in Australia and New Zealand that are entirely without some human influence, the ecological integrity of high conservation/ecological value systems is regarded as intact;
2. Slightly to moderately disturbed systems: ecosystems in which aquatic biological diversity may have been adversely affected to a relatively small but measurable degree by human activity. The biological communities remain in a healthy condition and ecosystem integrity is largely retained. Typically, freshwater systems would have slightly to moderately cleared catchments and/or reasonably intact riparian vegetation; marine systems would have largely intact habitats and associated biological communities. Slightly-moderately disturbed systems could include rural streams receiving runoff from land disturbed to varying degrees by grazing or pastoralism, or marine ecosystems lying immediately adjacent to metropolitan areas; and
3. Highly disturbed systems: these are measurably degraded ecosystems of lower ecological value. Examples of highly disturbed systems would be some shipping ports and sections of harbours serving coastal cities, urban streams receiving road and stormwater runoff, or rural streams receiving runoff from intensive horticulture.

There are four different trigger values provided in ANZECC (2000). These trigger values range from most sensitive to least sensitive conditions: 99%, 95%, 90% and 80%. The site and the wider Horsley Park region has been disturbed by quarrying activities since the 1970s, with prior land clearance for agriculture occurring. Based on this the site is considered to be in a disturbed system. Therefore the 95% trigger values for assessment of water quality have been adopted at the site.

In the region, groundwater is also widely used for irrigation, domestic and recreational use. The GILs for recreational use were therefore also used in this investigation. The adopted GILs, from Table 1C, Schedule B1 of NEPM (NEPC, 2013) and from ANZECC (2000), are shown in **Table 14**.

Table 14: Groundwater Investigation/Screening Levels

Analyte	HSL-D (Clay)[1] 2.0 – <4.0m (mg/L)	NEPM 2013 Fresh Water GILs (µg/L)	ANZECC[2] 95% Fresh Water (µg/L)	ANZECC[2] Recreational (µg/L)
F1: C_6-C_{10}	NL	20[3]	20[3]	-
F2: C_{10}-C_{16}	NL	100[3]	100[3]	-
F3: C_{16}-C_{34}	-	100[3]	100[3]	-
F4: C_{34}-C_{40}	-	100[3]	100[3]	-
Benzene	30	950	950	10
Toluene	NL	-	180[LR]	-
Ethylbenzene	NL	-	80[LR]	-
O-Xylene	-	350	350	-
P-Xylene	-	200	200	-
Total Xylene	NL	-	-	-
Arsenic	-	13	13	50
Cadmium	-	0.2	0.2	5
Chromium (VI)	-	1	1	50
Copper	-	1.4	1.4	1,000
Lead	-	3.4	3.4	50

Analyte	HSL-D (Clay)[1] 2.0 – <4.0m (mg/L)	NEPM 2013 Fresh Water GILs (µg/L)	ANZECC[2] 95% Fresh Water (µg/L)	ANZECC[2] Recreational (µg/L)
Mercury	-	0.06	0.6	1
Nickel	-	11	11	100
Zinc	-	8	8.0	5,000
Phenol	-	320	320	2
Cyanide	-	7	7	100
Ammonia	-	900	900	10
Nitrate	-	-	700	10,000
Hydrogen Sulfide	-	1	1	-

LR – Low reliability trigger values for 95% protection level recommended for slightly to moderately disturbed system by ANZECC/ARMCANZ (2000), to be used as an indicative interim working level only.

NL = If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or NL.

1 – NEPM (NEPC, 2013) Table 1A(4) – Groundwater HSLs for Vapour Intrusion for sand in a Residential land use scenario.

2 – Australia and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000).

3 – In the absence of a nominated guideline value, the Laboratory Limit of Reporting (LOR) has been taken as the nominated trigger value for the presence of TRH compounds in groundwater.

8.7.8 Sediment and Surface Water Criteria

Seven dams currently exist within the Stage 3 development boundaries. All dams exist as sediment retention basins with current intentions to use water on the site for dust suppression and process water. Should dewatering of the dams be required this is instead to be conducted by discharging the water to the land surface within the existing site boundary with the residual sediments allowed to dry and be retained on site as fill soils.

Due to the temporary nature of the retention basins and the proposed use, the sediments within each of the existing dams on site will be assessed against the soil land use criteria provided in **Sections 8.7.1 – 8.7.6** as part of a data gap assessment.

Criteria for the discharge of the dam water to the site have been obtained from multiple sources, with the Irrigation, Recreational and 95% Fresh Water trigger values from ANZECC (2000) referenced. The adopted discharge criteria is shown in **Table 15**.

The site also currently hold an Environmental Protection Licence (#123), permitting the discharge of water from thee point accross the site provided the water meets the following conditions:

- pH between 6.5-8.5
- Total Suspended Soils (wet) <50 mg/L
- Turbidity in Nepelometric Turbidity Units <150 NTU

It is not envisaged these discharge point will be utilised during the dam dewatering works for decommissioning.

Table 15: Surface Water Discharge Criteria Levels

Analyte	ANZECC Irrigation (mg/L)	ANZECC Recreational (µg/L)	ANZECC 95% Fresh Water (µg/L)
F1: C_6-C_{10}	-	20[1]	20[1]
F2: C_{10}-C_{16}	-	100[1]	100[1]
F3: C_{16}-C_{34}	-	100[1]	100[1]
F4: C_{34}-C_{40}	-	100[1]	100[1]
Benzene	-	10	950
Toluene	-	-	180[LR]
Ethylbenzene	-	-	80[LR]
O-Xylene	-	-	350
P-Xylene	-	-	200
Arsenic	2	50	13
Cadmium	0.05	5	0.2
Chromium (VI)	1	50	1
Copper	5	1,000	1.4
Lead	5	50	3.4
Mercury	0.002	1	0.6
Nickel	2	100	11
Zinc	5	5,000	8.0
Phenol	-	2	320
BOD	<15	-	-
Faecal Coliforms (CFU/100mL)	-	1,000	-
E. Coli (CFU/100mL)	-	230	-
Cyanide	-	-	7
Phosphorus	0.8-12	-	-
Nitrogen	25-125	-	-
Suspended Solids	<40	-	-

LR – Low reliability trigger values for 95% protection level recommended for slightly to moderately disturbed system by ANZECC/ARMCANZ (2000), to be used as an indicative interim working level only.

NL = If the derived groundwater HSL exceeds the water solubility limit, a soil vapour source concentration for a petroleum mixture could not exceed a level that would result in the maximum allowable vapour risk for the given scenario. For these scenarios, no HSL is presented for these chemicals and the HSL is shown as 'not limiting' or NL.

1 – In the absence of a nominated guideline value, the Laboratory Limit of Reporting (LOR) has been taken as the nominated trigger value for the presence of TRH compounds in groundwater.

8.7.9 Waste Classification Assessment Criteria

The characterisation of materials for off-site disposal will be performed in accordance with:

- Waste Classification Guidelines (NSW EPA, 2014);
- Excavated Natural Material Order (NSW EPA, 2014) and Excavated Natural Material Exemption (NSW EPA, 2014);
- Protection of the Environment Operations Act 1997 (NSW) and associated regulations; and
- All other relevant resource recovery orders, resource recovery exemptions and approvals issued by the NSW EPA.

A selection of criteria from the aforementioned sources are summarised in **Table 16**.

Table 16: Soil Waste Classification Criteria

ANALYTE	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE			ENM	
	CT1[a]	TCLP1[b]	SCC1[c]	CT2[d]	TCLP2[e]	SCC2[f]	Ave. Conc.[g]	Max. Conc.[h]
	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg
BTEX								
Benzene	10	0.5	18	40	2	72	--	0.5
Toluene	288	14.4	518	1,152	57.6	2073	--	65
Ethylbenzene	600	30	1080	2,400	120	4320	--	25
Xylenes (total)	1000	50	1800	4,000	200	7200	--	15
TRH								
$C_6 – C_{10}$	NA	NA	650	NA	NA	2600	--	--
$>C_{10} – C_{36}$	NA	NA	10000	NA	NA	40000	250	500
PAH								
PAH (total)	NA	NA	200	NA	NA	800	20	40
Benzo(a)pyrene	0.8	0.04	10	3.2	0.16	23	0.5	1
Heavy Metals								
Arsenic	100	5.0	500	400	20	2000	20	40
Cadmium	20	1.0	100	80	4	400	0.5	1
Chromium	100	5	1900	400	20	7600	75	150
Copper	--	--	--	--	--	--	100	200
Lead	100	5	1500	400	20	6000	50	100
Mercury	4	0.2	50	16	0.8	200	0.5	1

ANALYTE	GENERAL SOLID WASTE			RESTRICTED SOLID WASTE			ENM	
	CT1[a]	TCLP1[b]	SCC1[c]	CT2[d]	TCLP2[e]	SCC2[f]	Ave. Conc.[g]	Max. Conc.[h]
	mg/kg	mg/L	mg/kg	mg/kg	mg/L	mg/kg	mg/kg	mg/kg
Nickel	40	2	1050	160	8	4200	30	60
Zinc	--	--	--	--	--	--	150	300
Other								
pH (pH units)	--	--	--	--	--	--	5 to 9	4.5 to 10
Foreign Materials	--	--	--	--	--	--	0.05%	0.10%
E.C. (dS/m)	--	--	--	--	--	--	1.5	3.0

CT – *Contaminant Threshold.*
TCLP – *Toxicity Characteristics Leaching Procedure.*
SCC – *Specific Contaminant Concentration*
E.C. – *Electrical Conductivity*
NA – *No applicable as these contaminants are only assessed using Specific Contaminant Concentrations.*
a – *Waste Classification Guidelines (NSW EPA, 2014), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 1: General Solid Waste.*
b – *Waste Classification Guidelines (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, General Solid Waste Column 1: Leachable concentration.*
c – *Waste Classification Guidelines (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, General Solid Waste Column 2: Specific Contaminant Concentration.*
d – *Waste Classification Guidelines (NSW EPA, 2014), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 2: Restricted Solid Waste.*
e – *Waste Classification Guidelines (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, Restricted Solid Waste Column 1: Leachable concentration.*
f – *Waste Classification Guidelines (NSW EPA, 2014), Table 2: TCLP and SCC values for classifying waste by chemical assessment, Restricted Solid Waste Column 2: Specific Contaminant Concentration.*
g – *Excavated Natural Material Order (NSW EPA, 2014), Table 4, Column 2 – Maximum Average Concentration for Characterisation.*
h – *Excavated Natural Material Order (NSW EPA, 2014), Table 4, Column 3 – Maximum Average Concentration for Characterisation.*

8.8 Quality Assurance / Quality Control

The Quality Assurance / Quality Control (QA/QC) program for the site will ensure the representativeness and integrity of samples and accuracy and reliability of the analysis results. This includes cleaning of tools before and between sampling, and delivery of samples to the laboratory within holding times and in good condition.

The QC program for the site will monitor and measure the effectiveness of the QA procedures. This will involve the collection of:

- Intra-laboratory field duplicate samples which will be collected at a rate of 10% of the total number of primary chemical samples collected; and,
- Inter-laboratory field duplicate samples which will be collected at a rate of 5% of the total number of primary chemical samples collected.

8.9 Application of Criteria

Validation for chemically tested soils will be determined when concentrations are reported below the criteria, thereby not posing an unacceptable risk. For chemical analysis, the following statistical criteria shall be adopted with respect to the validation criteria:

- The 95 % Upper Confidence Limit of the arithmetic mean for chemical contaminates does not exceed the validation criteria;
- The individual contaminant concentration should not exceed the validation criteria by more than 250 %; and
- The standard deviation of individual contaminants should not exceed 50 % of the validation criteria.

8.10 Validation Report

At the completion of the remediation and validation works, a Validation Report will be prepared. The Validation Report will be completed in accordance with NSW OEH (2011) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*, and will include:

- Executive summary;
- Scope of work;
- Site identification details;
- Summary of the site history;
- Summary of the site condition and surrounding environment;
- Summary of the site geology and hydrogeology;
- Remediation activities undertaken (including extent and observations of excavation/s, waste documentation and materials tracking);
- Waste classification sampling and analysis (including methodology);
- QA/QC protocols for field works and laboratory analysis;
- Validation results;
- Waste material tracking, if required, including stockpile locations and sources, off-site disposal records including waste transport records and disposal dockets, and estimated volume(s) of soils disposed off-site;
- Fill importation certificates, if required; and
- Conclusions and recommendations, including a clear justification as to the suitability of the site for the proposed use and the potential for off-site migration of any residual contaminants.

9. CONTINGENCY PLAN

9.1 Remediation Contingency

If there are events or discoveries made at the site by either the remediation contractor, the environmental consultant or another appropriately experienced party that would alter the known site conditions for the proposed works complying with the validation objectives, or if the selected remediation strategy is not able to proceed, then the following contingencies are devised:

Capping design is insufficient to contain contaminants:

Option A Controlled excavation and removal as required to accommodate revised design requirements.

Option B Re-assessment of remedial options including the feasibility of redesigning the capping system.

Capping and Management Strategy is discordant with Council development objectives:

Option A Controlled excavation and removal until non-compliant material is removed and validation is achieved.

Size of burial cell is insufficient to contain all material deemed suitable for containment:

Option A Enlarge the Burial Cell to hold the required volume

Option B Excavate a second Burial Cell to hold the additional material

Option C If material is not suitable to remain on site under a commercial/industrial land use scenario, the material will be classified and removed from site to a licensed facility

Land farming/bioremediation is unsuccessful at removing all volatiles from hydrocarbon impacted material:

Option A Material is classified for disposal from site to a licensed facility.

Option B Revision of cell design to incorporate features that would allow chemically contaminated material to be placed in cell.

In the case that amendments to the remediation strategy provided herein are required, an addendum to this RAP would be prepared by a suitably qualified and experienced environmental consultant. The addendum would provide specific details regarding the necessary changes to the remediation and validation scope to be implemented on-site.

9.2 Unexpected Finds

An Unexpected Finds Protocol (UFP) has been developed as part of the construction planning for implementation during site works, primarily associated with excavation and civil activities. It has been prepared to ensure appropriate management of natural soils / fill which may contain undefined levels of chemical or asbestos contamination and other possible contamination scenarios should they be encountered during site works.

Refer to **Appendix A** - Unexpected Finds Protocol.

10. SITE ENVIRONMENTAL MANAGEMENT PLAN

10.1 General

The Principal Contractor will be responsible for control of the site during remedial works.

The Principal Contractor will be responsible for preparing Remediation Work Method Statements (RWMS) that address environmental, health and safety hazards, and risks during the remediation. The RWMS shall address, but may not be limited to, the issues and controls presented in the following subsections.

10.2 Health and Safety

The Principal Contractor will prepare a project specific occupational health and safety plan for the remediation works. This plan shall identify the potential risks associated with the works and detail the health and safety measures and procedures that are to be adopted to protect both on site workers and the general public.

10.2.1 Hours of Operation

All remediation work shall be conducted in accordance with the DA Condition 28 hours of construction and work, which are:

Mondays to Fridays	7:00 am to 6:00 pm
Saturdays	8.00 am to 11.00 pm
Sundays and Public Holidays	No Work Permitted

10.2.2 Emergency and Out of Hours Contact Numbers

ERM	02 8586 8750	**NSW EPA**	131 555
		WorkCover NSW	13 10 50
Principal Contractor	Mulgoa Quarries	**Calibre Group**	02 8808 5000
Asbestos Contractor	Empire		

The RWMS will outline plans to respond to incidents associated with the works (e.g. fires, spills or other uncontrolled releases). As part of site induction procedures, all employees, sub-contractors and visitors to the site will be made aware of the emergency protocols in place.

10.2.3 Site Access

Access to the site will be restricted to authorised staff and contractors who have been inducted and appropriately trained for the works being undertaken. Fencing will be installed and maintained around the perimeter of the remediation area.

Signage, including site contact details, will be erected near the site entry gate. The signage will remain displayed at the entrance throughout the duration of the remediation works.

10.2.4 Personnel Protective Equipment (PPE)

All workers will be provided with and use the appropriate PPE.

The requirement for site specific PPE will be determined and enforced by the principle contractor. In addition to the site requirements ERM also recommends P2 dust mask be worn during disturbance of fill material areas due to potential generation of inhalable dust.All PPE shall conform to approved standards.

First aid and safety equipment will be provided within restricted zones for use in an emergency.

10.2.5 Training

All site personnel shall be informed and fully trained through an induction procedure in relation to the potential site hazards.

10.2.6 Safety Officer / First Aid Personnel

Designated Safety and First Aid Officer(s) shall be on-site at all times, and shall be trained for working on sites of a similar nature and be fully conversant with relevant procedures.

10.3 Asbestos Control Plan

Asbestos remediation will be carried out in general accordance with the following publications:

- Code of Practice: How to Safely Remove Asbestos (Safe Work Australia, 2019);
- Code of Practice: How to Manage and Control Asbestos in the Workplace (Safe Work Australia 2018); and
- Managing Asbestos in or on Soil (Workcover NSW, 2014).

To facilitate removal and off-site disposal of asbestos impacted soil, the following measures will be implemented:

10.3.1 Appropriate PPE

To reduce short and long-term health risks associated with the potential exposure to asbestos within the soil, the minimum level of PPE required for on-site personnel within the asbestos remediation areas is listed below:

- Body Protection. Disposable coveralls (Tyvek suits) are to be worn during excavation activities. Disposable coveralls are to be considered as potentially contaminated with asbestos and will therefore need to be disposed as asbestos contaminated waste.
- Respiratory Protection. Respiratory protection (P2 mask) is required during excavation works, as AF/FA has been detected on the site.

10.3.2 Restricted Access

A restricted access area will be established encompassing the area of the site where excavation of asbestos impacted soil is to occur. Access to restricted work areas will be determined and controlled by the Principal Contractor, or their nominated representative. Only authorised and inducted persons are to be permitted in the restricted work area. The general public is not permitted on-site.

Appropriate warning signs and/or barriers are to be placed around the work area maintaining at least 3m buffer from the impacted area.

10.3.3 Asbestos Management Controls

Excavation methodology

Excavation of asbestos impacted soils will be carried out by a suitably qualified and experienced contractor using an excavator / backhoe and transportation trucks. Excavation works will be supervised by a suitably qualified and experienced environmental consultant. Given that asbestos fibres and/or fines were identified on-site during previous investigations, supervision of excavation works by a Class A licensed asbestos contractor is required. Daily inspections will be conducted by the environmental consultant during air monitoring activities. The management of this non-compliant material within the site is covered in the Asbestos Management Plan for the site (0449086_S010075, November 2019)

During earthworks, dust generation and distribution will be minimised through the following:

- Dampening the surface of the site and working area with a water cart or similar control;
- Deploying covers over stockpiled or exposed soils, and
- Ceasing work in strong winds.

10.3.3.1 Air monitoring

Air monitoring is recommended during all asbestos remediation works, supervised by a Licensed Asbestos Assessor or a competent person. The purpose of the air monitoring will be to verify that the control measures in place are satisfactory and that there is no egress of fibres to adjacent occupied areas. The air monitoring device locations will be determined by a Licensed Asbestos Assessor due to the friable nature of the identified asbestos.

Sample collection and analysis will be conducted in accordance with the National Occupational Health and Safety Commission (NOHSC), *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition, 3003 - 2005*.

The analysis will be performed by a NATA registered laboratory and reported on endorsed certificates.

Where reportable asbestos fibres are detected in the samples, appropriate contingency actions will be implemented to address potential impacts to adjacent properties.

10.3.3.2 Transport and disposal of asbestos impacted soil

Any soil excavated from the site that will be required to be disposed, will be transported via truck to a landfill licensed for the receipt of General Solid Waste containing asbestos. Documentary evidence (waste disposal dockets) of the disposal will be collected and maintained as part of the material tracking system. The transportation of the waste must be in accordance with the NSW EPA's WasteLocate service.

10.3.3.3 Placing of soils

Soils identified as being suitable to remain on-site can be placed as fill at depths > 2.0 m below final surface level. The land use criteria requires no visible asbestos to be present in the top 100 mm of the site. Following completion of placing works, a visual inspection of the fill area will be conducted to confirm no visible ACM is present in the top 100 mm.

10.3.3.4 Decontamination Procedures

Machinery used for the excavation of asbestos impacted soil may become contaminated with asbestos and will need to be decontaminated by washing down prior to leaving the site. Decontamination will involve hosing / removal of soil from the tracks and bucket as far as reasonably practicable by the Principal Contractor, or their nominated representative. Tools used shall be hosed down / wiped clean with a damp cloth.

Upon completion of works decontamination will be undertaken in accordance with the *How to Safely Remove Asbestos Code of Practice* (2018) (eg. boots and clothing will be wiped down with a damp cloth, disposable PPE will be disposed as asbestos waste).

10.4 Erosion and Sediment Control

Erosion and sediment control measures to be implemented during the remediation program will be in accordance with *Managing Urban Stormwater, Soils and Construction, 4th edition* (Landcom 2004). A site-specific erosion and sediment control plan will be developed by the Principal Contractor, or their authorised representative. The plan will show the location of sediment control devices as required based on remediation works to be undertaken.

10.4.1 Excavation Management

To minimise erosion and sedimentation during the remediation works, where practicable, the area of exposed surfaces at any one time will be minimised through controlled sequencing of works and progressive excavation and restoration. Prior to the commencement of excavation works, sand bags or similar water diversion measures will be used to divert surface runoff away from work zones and proposed excavation areas towards any existing drains.

Activities that involve soil disturbance will be avoided during heavy rain periods.

Excavation areas will be isolated through the use of temporary barricades and fencing.

Suitable wetting down of asbestos impacted material should be undertaken throughout the remediation works.

10.4.2 Surface Water Management

In order to minimise the need for treatment/disposal of potentially contaminated surface water from excavations, controls shall be implemented to divert surface water away from the remediation areas.

10.4.3 Stockpile Management

Any stockpiles generated as a result of remediation works will be designated and handled to ensure that excavated material is properly tracked and classified to avoid mixing of potential different classes of waste.

Where possible, to assist in efficient classification and off-site disposal, less impacted soils will be segregated from those which may have visual or olfactory indicators of contamination, or suspected to contain asbestos. Stockpiles will be placed on plastic or geofabric.

Stockpiles will be bunded with sediment control barriers to mitigate runoff from the stockpile to surrounding areas.

Stockpiles will not be placed within or immediately adjacent to drainage lines, easements, footpaths, roadways or existing stormwater drains.

Stockpiles will be positioned and formed to minimise potential for stockpile erosion where possible.

Where stockpiles remain on-site for longer than one day, the stockpiled material will be covered using LDPE sheeting, or equivalent, that is secured in order to minimise the likelihood of wind-borne migration of asbestos fibres.

10.4.4 Haulage of Soils

Soil must not leave the site as a result of vehicle, plant and equipment movements. To limit the potential for tracking of soil or sediment off-site via vehicle, plant or equipment movement, the following controls should be implemented:

- Vehicles, plant and equipment on the site will be kept to a practical minimum;
- Vehicle, plant and equipment entry to and exit from the site will be kept to a practical minimum; and
- Plant and equipment will be washed down before it leaves the site.

Any vehicles carrying soil materials for off-site treatment or disposal will be covered in accordance with good industry practice, prior to leaving the site.

10.4.5 Inspection and maintenance

Erosion and sediment control measures will be inspected at the start of each day during remediation works and also during and immediately after periods of heavy rainfall to ensure they are in good condition.

Erosion and sediment controls will be maintained, as applicable, by ensuring silt fences are upright and securely fixed, and that any sediment or residue behind the fence or barrier is removed and disposed appropriately to maintain retention capacity of the structure.

Where control measures are found to be damaged, they will be either repaired or replaced promptly.

10.5 Noise Controls

Noise producing machinery and equipment will only be operated during working hours as approved by local Council and/or NSW EPA. Australian Standard *AS2436-1981 Guide to noise control on construction, maintenance and demolition sites,* outlines guidelines for the minimisation of noise on construction and demolition sites which are to be followed at all times. No 'offensive noise' as defined under the *POEO Act 1997* should be created during remediation works/activities.

Mechanical plant and equipment used during remediation works/activities will use practical and reasonable noise attenuating devices and measures to minimise noise being transmitted from the site. All equipment and machinery must be properly maintained and operated in an efficient manner to minimise the emission of noise. Plant and equipment shall be switched off or throttled to a minimum when not in use.

10.6 Odour and Dust Control

Controls to minimise dust and odour emissions from the site may include:

- Staging excavation works to minimise the disturbance of any contaminated soil surfaces as well as minimising the size of the excavation face open at any one time;
- Covering contaminated excavation faces and/or stockpiles with synthetic barriers or wetting down during periods of high wind

10.7 Communication and Complaints

Where complaints are made directly to the Principal Contractor, on site workers or sub-contractors, this will be documented on an Environmental Complaint Form and will be recorded on a complaint register. After initial recording, the Principal Contractor will forward all complaints to the the Client and their consultant (CSR/Calibre). Where complaints are received directly by Council, this would be communicated back to the Principal Contractor via the usual communication channels (e.g. email, phone, regular site meetings etc.)

Separate incident reporting will also be completed for complaints relating to environmental issues, which may include pollution arising from the works. Monitoring and/or corrective actions will be taken as soon as possible depending on the nature of the complaint and followed up on the incident report. The Principal Contractor will report to EPAas soon as practical following an incident.

11. ROLES AND RESPONSIBILITIES

11.1 Principal Contractor

The Principal Contractor will retain overall responsibility for ensuring that the RAP is appropriately implemented. The actual implementation of the RAP will be carried out by the Remediation Contractor on behalf of the Principal Contractor. The Principal Contractor will also be responsible for acquiring or organising the acquisition of all necessary approvals and licenses for the proposed remediation works.

The Principal Contractor will provide relevant information regarding site environmental management to contractors and subcontractors working at the site, and will ensure that they are fulfilling the responsibilities for the work.

11.2 Remediation Contractor

The Remediation Contractor is responsible for day-to-day environmental performance of the remediation works, including the implementation and maintenance of acceptable environmental controls and plans during all remediation works. The Remediation Contractor will nominate a Site Manager who will be responsible for initial response to any unexpected finds encountered during remediation works.

The Remediation Contractor will maintain records and documents produced as a result of this RAP, and will implement an inspection and maintenance program.

The Remediation Contractor may also take on the role of Principal Contractor.

11.3 Sub-Contractors

Subcontractors will be advised of required work procedures through induction, training, and meetings provided by the Principal Contractor. Maintenance of subcontractor equipment will be the responsibility of the subcontractors. The subcontractor is responsible for ensuring that all works executed by the subcontractor complies with relevant WorkCover NSW requirements, as necessary.

11.4 Environmental Consultant/Licensed Asbestos Assessor

It is envisioned that the role of environmental consultant and Licenced Asbestos Assessor (LAA) will be undertaken simultaneously. Should these roles be occupied separately, the LAA will oversee:

- Airborne asbestos monitoring;
- Asbestos clearance inspections and sampling; and
- Provision of any required interim asbestos clearances.

The environmental consultant will:

- Supervise, oversee and direct remediation works to assess compliance with RAP requirements;
- Undertake all validation assessment work in accordance with the RAP;
- Require copies of all clearance reporting by the LAA;
- Provide advice and recommendations based on inspections and validation results;
- Undertake assessments for the characterisation, classification and disposal of wastes; and,
- Provide advice on issues under the Protection of the Environment Operations Act 1997 (NSW).

12. APPROVALS AND LICENSES

12.1 Remediation Works Consent

State Environmental Planning Policy (SEPP) No.55 – *Remediation of Land,* relates to the decision-making process in undertaking remediation activities and making planning decisions in regard to contaminated and potentially contaminated land. It is understood that the proposed remediation works are considered to be classified as 'Category 2' Remediation Works (i.e., not requiring consent) by reference to the following:

- The work is not designated development under Schedule 3 of the *Environmental Planning and Assessment Act 1979* or under a planning instrument;
- The work proposed is not on land identified as critical habitat under the *Threatened Species Conservation Act 1995*;
- Consideration of Section 5 of the *Environmental Planning and Assessment Act 1979* indicates that the remediation work is not likely to have a significant effect on threatened species, populations or ecological communities;
- The work is not proposed in a zone identified in a planning instrument as being of environmental significance; and
- The work does not require consent under another SEPP.

The notification requirements of SEPP 55 require Council to be notified 30 days before Category 2 remediation works commence.

12.2 Development Approval Conditions

The *Environmental Planning and Assessment Act 1979* provides a framework for the development of land within NSW and indicates the level of assessment required and the consent authority responsible for assessing the development. The Act also specifies planning controls according to the nature and scale of development. Remediation and validation works are required to comply with SEPP No.55 and relevant conditions of the Development Application.

12.3 SafeWork NSW

SafeWork NSW must be notified a minimum of five business days prior to the commencement of licensed asbestos removal work.

12.4 Development Control Plan

The Fairfield Citywide Development Control Plan (2013) has been established to compliment the requirement of the following:

- State Environmental Planning Policy No.55 - Remediation of Land;
- Managing Land Contamination - Planning Guidelines (to be used in association with SEPP 55);
- Environmental Planning and Assessment Act 1979;
- Environmental Planning and Assessment Regulation 2000;
- Contaminated Land Management Act 1997; and
- Contaminated Land Management Regulation 1998;

The key objectives of the Development Control Plan are to:

- Ensure that changes of land use will not increase the risk to health or the environment;
- Avoid inappropriate restrictions on land use; and
- Provide information to support decision making and to inform the community.

13. CONCLUSION

The site can be made suitable for the intended land-use subject to appropriate remediation in accordance with this RAP and the *State Environmental Planning Policy No. 55 Managing Land Contamination: Planning Guidelines* (SEPP 55).

In conclusion, this RAP:

- Assumes all regulatory approval are provided for the proposed remediation works;
- Has been developed in a manner consistent with current industry practice;
- Has selected a preferred remediation strategy based on the site-specific issues and currently available technologies;
- Has presented an outline of the Site Environmental Management Plan (SEMP) and associated health and safety and remediation management plans to ensure human health and the environment are appropriately protected during the proposed works (Section 10);
- Has presented an information and consultation program to ensure the stakeholders are informed of the works as they proceed (Section 10); and,
- Has outlined the means of validation for the completed works.

Removal of friable asbestos containing material to an approved site or facility is considered by the client to be cost prohibitive in this instance due to the large estimated volume determined by site sampling. The client preferred remediation option of consolidation and isolation of the soil on-site by containment within a properly designed barrier (burial cell), and afforded under the Contaminated Land Management Guideline for the NSW Site Auditor Scheme, has been accordingly selected within this RAP.

14. REFERENCES

AS2436-1981 Guide to Noise Control on Construction, Maintenance and Demolition Sites.

ANZECC (2000). Australia and New Zealand Guidelines for Fresh and Marine Water Quality.

ANZECC (1999). Guidelines for the Assessment of In-Site Containment of Contaminated Soil.

DLA Environmental (2013). Phase 2 Detailed Environmental Site Assessment: Lot 1 in DP 106143, 327-335 Burley Road, Horsley Park, NSW 2175, Ref: DLH1121_H0068

ERM Services (2018). Bund Wall Assessment Report: 327-335 Burley Road, Horsley Park, Ref: 0449086_S008491

ERM Services (2019). Limited Detailed Site Investigation, Horsley Park – Stage 3 Development Area, Ref: 0449086_S009904.

Friebel, E and Nadebaum, P (2011). Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 2: Application document, CRC CARE Technical Report no. 10. CRC for Contamination Assessment and Remediation of the Environment.

Landcom (2004). Managing Urban Stormwater, Soils and Construction, 4th edition. Landcom.

NEPC (1999). National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1). National Environment Protection Council.

NSW EPA (2017). Contaminated Land Management: Guidelines for the NSW Site Auditor Scheme 3rd edition. New South Wales Environment Protection Authority.

NSW EPA (2014). Waste Classification Guidelines, Part 1: Classifying Waste. New South Wales Environment Protection Authority.

NSW OEH (2011). Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites. New South Wales Environment Protection Authority.

SWA (2018). Code of Practice: How to Safely Remove Asbestos. Safe Work Australia.

SWA (2016). Code of Practice: How to Manage and Control Asbestos in the Workplace. Safe Work Australia.

The Fairfield Citywide Development Control Plan 2013.

WorkCover (2014). Managing Asbestos in or on Soil. WorkCover NSW

APPENDIX A UNEXPECTED FINDS PROTOCOL

CSR Limited

Unexpected Finds Protocol

327-335 Burley Road, Horsley Park, NSW 2175

20 December 2019

Project No.: 0458289

The business of sustainability

ERM

Document details	
Document title	Unexpected Finds Protocol
Document subtitle	327-335 Burley Road, Horsley Park, NSW, 2175
Project No.	0449086
Date	20 December 2019
Version	1.0
Author	Amy Dorrington
Client Name	CSR Limited

Document history

				ERM approval to issue		
Version	Revision	Author	Reviewed by	Name	Date	Comments
1.0	00	Amy Dorrington	Russell Jarman		20/12/2019	

CONTENTS

1. INTRODUCTION

ERM Services Australia Pty Ltd (ERM) was commissioned by CSR Limited (the Client) to prepare an Unexpected Finds Protocol (UFP) for the land identified as 327-335 Burley Road, Horsley Park, NSW, 2175 (the site).

This UFP has been developed as part of the construction planning for implementation during site works primarily associated with remedial excavation activities. It has been prepared to ensure appropriate management of natural soils / fill which may contain undefined levels of asbestos and chemical contamination should they be encountered during site works.

The UFP has been provided to supplement the Remediation Action Plan (ERM, 2019b), and address any contamination identified on the site that is not covered by the RAP.

Historically, land use on the site has comprised quarrying works and the associated brick making factory. Previous investigations have identified that uncontrolled filling has taken place within the site, from at least the 1980's.

Due to the history of the site, and discoveries of asbestos contamination during previous environmental investigations, there is potential for previously unidentified contamination to be present on-site. These materials may require additional assessment or management. It is imperative that the potential for such material to impact site workers and the remainder of the site is minimised during remedial and construction works.

Only asbestos and hydrocarbon contamination has been identified to date, however the contaminants of potential concern within the LDSI (ERM, 2019a) included hydrocarbons, metals, pesticides, PCBs and asbestos, based on the history of the site and unknowns associated with uncontrolled filling. Hence this UFP is to be implemented to cover all possible potential contamination scenarios. Potential contamination on the site which may exist outside the scope of the past environmental investigations will be managed through the following UFP.

2. REVIEW OF PREVIOUS DOCUMENTS

DLA Environmental (September 2013) *Phase 2 Detailed Environmental Site Assessment: Lot 1 in DP 106143, 327-335 Burley Road, Horsley Park, NSW 2175*, Ref: DLH1121_H0068

DLA conducted a site investigation of the brickworks and associated land at 327-335 Burley Road, Horsley Park. Main site features included:

- Process plant, office and amenities buildings;
- Raw material stockpile areas;
- Clay quarry;
- Sedimentation dams, settling ponds and storage dams;
- Former Camide landfill.

213 soil samples were collected from 112 sampling locations across the site, with 16 water samples collected from 11 dams and 4 monitoring wells.

One soil chemical hotspot of benzo(a)pyrene (BaP) was identified at TP3 (0.7m bgl), which exceeded the commercial/industrial land use criteria within NEPM (2013).

TRH was detected in multiple boreholes adjacent to the brick factory where former and current underground storage tanks (USTs) are located, however no exceedances of the commercial/industrial land use criteria was identified.

Hydrocarbon detections were noted within groundwater monitoring wells on the site. Exceedances of the site acceptance criteria were identified within MW2 for Total TRH and PAHs. This monitoring well is located adjacent to the factory and in the area of former chemical storage and USTs.

Minor metal exceedances were noted within the monitoring wells and surface water samples from the four dams. These were not deemed to pose a risk to human health in their current state at time of sampling.

All areas of environmental concern (AECs) were within the Stage 2 and Stage 3 areas, which included remediation of:

- *Contamination associated with known Underground Storage Tank (UST) locations;*
- *Potential contamination associated with USTs in presently unknown locations;*
- *Minor hydrocarbon contamination from on-site Above ground Storage Tanks (ASTs);*
- *Identified Benzo(a)pyrene (BaP) TEQ contamination hotspot;*
- *Contamination from former oil storage areas and associated service lines; and,*
- *Surface water contamination in on-site dams;*

Areas requiring further investigation (data gaps) included:

- *Potentially asbestos containing materials used in on-site bunds;*
- *Sediment contamination in on-site dams.*

ERM Services (June 2018) *Bund Wall Assessment Report: 327-335 Burley Road, Horsley Park,* Ref: 0449086_S008491

The southern bund wall was deemed a data gap requiring further investigation within the Phase 2 Assessment (DLA, 2013). As such it was assessed in order to characterise the comprising materials, through historical review as well as systematic and targeted soil sampling.

A total of 186 soil samples were collected from 36 test pit locations. Samples were collected at 1m intervals to a maximum depth of 5m. Due to asbestos detections and exceedances of the relevant land use criteria, the investigation concluded that:

Based on visual observations and the results of the laboratory analysis, it is concluded that the bund wall material is not currently suitable to be retained on-site in its entirely under a continued commercial / industrial land use scenario due to the presence of asbestos. It is recommended that a Remediation Action Plan (RAP) be developed in accordance with the relevant regulatory requirements to address the identified contamination issues so as to render the material suitable for on-site reuse.

The assessment only covered the first 5m below the top of the bund. Further assessment would be required of the underlying materials once the overlying 5m has been removed.

ERM Services (September 2019) *Limited Detailed Site Investigation, Horsley Park – Stage 3 Development Area*, Ref: 0449086_S009904

This Limited Detailed Site Investigation (LDSI) was restricted to the Stage 3 development area, which covers approximately 25ha and includes an operational brick making factory, brick and soil storage areas, as well as settling dams for process water. The accessible portions of the site totalled 10.7ha, with the remainder classed as data gaps for future assessment post demolition of the brick factory and associated infrastructure, including storage areas and the onsite dam footprints.

The investigation assessed soil, groundwater, surface water and dam sediments. Soil samples were collected in accordance with the *NSW EPA Sampling Design Guidelines* (1995), for the accessible areas.

Contaminants of concern included hydrocarbons, heavy metals and asbestos (ACM and AF/FA). Water samples were additionally analysed for a range of physical and microbiological parameters.

Five soil AEC's were identified, DL1 – DL5. DL3 included TRH exceedances at approximately 3m below ground level (bgl). DL1 – DL2 and DL4 included asbestos and foreign materials detections and exceedances, requiring remediation. DL5 included foreign materials at approximately 1.35m bgl, requiring remediation.

Surface waters were found to be suitable for use in dust suppression activities during bulk earthworks, however further assessment will be required prior to dewatering for application to land. Similarly the sediment samples indicate suitability for the proposed commercial/industrial land use, however further sampling of the deeper sediments should be undertaken post dewatering and prior to reuse on site.

Groundwater results indicated exceedances of heavy metals, thought to be indicative of background concentrations. TRH detections were also identified, thought to be associated with TRH impacted soil (MW2A / AEC DL3) and uncontrolled filling in the north east corner of site near MW7.

Based on the sample results and identified AECs the following actions were recommended:

- Hazardous Materials Survey
  - Undertake a hazardous materials survey of the existing structures on site. Emphasis to be placed on surveying building materials and any plant to remain on site at the time of demolition.
- Remediation Action Plan
  - Development of a RAP for AECs DL1, DL2, DL3, DL4, and DL5, including an Asbestos Management Plan (AMP) for asbestos remediation works.
- Data Gap Assessment
  - Inspection and assessment of data gap areas following demolition works, removal of stored finished products and removal of stockpiled brick making materials;
  - Delineation of AEC DL3 following demolition works;
  - Assessment of any remaining brick making materials.
- Dam Dewatering Assessment
  - Dewatering assessment to confirm suitability of dam waters for discharge to land, with potential works required to reduce sediment load prior to dewatering.
- Sediment Assessment
  - Inspection and assessment of deeper sediments following dewatering to confirm suitability to remain on site.
- Validation Works and Reporting
  - Undertake validation works as specified as RAP;
  - Documentation of validation works and findings of data gap and other assessments;
  - Final conclusion about site suitability for proposed land use.

3. CURRENT ENVIRONMENTAL CONDITIONS

Groundwater:

The previous investigation (ERM, 2019a) recorded groundwater at depths between RL 71.689 and 87.495, for the seven monitoring wells gauged. Groundwater flow direction was determined to be towards the north west, consistent with the current elevation profile on site.

Two wells reported TRH concentrations above the laboratory LOR (limit of reporting), with both exceeding the Groundwater Investigation levels (GILs). Concentrations of ammonia exceeded the GILs in all samples, with all eight heavy metals reported to be present except for chromium, lead and mercury. Minor exceedances of the GILs were reported in four wells for arsenic, cadmium, copper, nickel and zinc, expected to be due to elevated background levels not indicative of site sourced contamination.

Known Fill Material:

Based on the intrusive investigation during the LDSI (ERM, 2019a), fill soils were observed in the majority of test pits and boreholes sampled in the area. Fill identified included a variety of residual brick making materials, as well as silty clays with anthropogenic inclusions such as bricks, concrete, timber, metals, tiles. Bonded ACM fragments were visually identified within fill soils at locations four locations within the bund wall along the north eastern site boundary. Bricks were noted to be used within fill materials at various locations adjacent to brickworks activities, however ACM was not visually identified within these locations. Natural soils comprised red, grey and orange clays with varying amounts of ironstone inclusions and light brown shales.

4. TYPICAL FEATURES OF 'UNEXPECTED FINDS'

The main features of an Unexpected Find is to establish a site protocol to guide site works to identify any sources of potential contamination. Typically this would include visual observations of:

- Material containing anthropogenic artefacts such as rubble, plastics, metal etc.;
- Material with an obvious unnatural odour, i.e. fuel, solvent, burnt odour;
- Material that is noticeably stained in colour;
- Materials that have an offensive odour (ie hydrocarbons or organic decay);
- Excavations that un-expectantly encounter groundwater;
- Asbestos or suspected asbestos containing material;
- Material with fibres visible; and,
- Any material that has evidently been dumped at the site.

Unexpected finds on the site will typically be uncovered during bulk excavating works with an increased risk when accessing materials within the fill profile of the site. During these works ERM recommend supervision during the removal of the overlying fill by an experienced earthworks supervisor to suitably separate the different soil profiles encountered.

5. IMPLEMENTATION OF THE PROTOCOL

5.1 General

Prior to the commencement of any excavation or construction works onsite, an occupational health and safety induction should be attended by all site staff. The aim and importance of the UFP and how it is to be implemented should be discussed at this time. Responsibility for its implementation will be assigned to the Principal Contractor which will be the civil company awarded the works.

Monitoring of environmental issues will be undertaken on a daily basis. If an unexpected find is revealed during site works, the following protocol is to be followed.

5.2 Implementation Process

1. Cease disturbance of the affected portion of the site and evacuate the immediate area.
2. Contact the Principal Contractor and the Contractors Environmental Representative (CER).
3. Principal Contractor and CER to conduct an assessment of the location and extent of the unexpected find.
4. High risk areas should be isolated and secured against unintended access.
5. Temporary encapsulation (sealing) of the high risk area to ensure no airborne spread of contamination occurs may be appropriate. This may involve clean soil, plastic sheeting, etc.
6. Dust should be prevented by wetting the soil and drainage controls should be arranged where there is a potential for runoff to occur (runoff should be minimised).
7. Warning signs should be placed in the vicinity.
8. If the Principal Contractor and CER considers that the material warrants further investigation, the area is to be barricaded to provide an exclusion zone.
9. If necessary, environmental controls should be established to minimise the potential for migration of contaminants from the impacted area.
10. Principal Contractor to complete UFP form (refer to Section 6.0) and issue to all relevant stakeholders.
11. Further visual assessment and sample collection and analysis undertaken by a qualified environmental consultant. If necessary, samples will be sent to a NATA registered laboratory.
12. Evaluation of analytical data with respect to specific health screening levels to be undertaken. Contaminated soil incident report amended with final classification of soils, including whether the soils are suitable for the proposed land use, need to be remediated or disposed of offsite to a suitably licensed facility. If soils are suitable to remain on-site and/or the area is found to be clean, a work instruction will be provided by the CER to this effect. A waste classification letter must be provided prior to any offsite disposal.
13. If the material is subsequently found to contain asbestos, an appropriately licensed contractor will be employed to remove it.
14. Affected areas will be reopened for earthworks following a clearance of the location and issuance of a report by CER.

5.3 Notes

1. Any suspected asbestos containing material should be left in place and not disturbed. The CER will organise appropriate environmental professionals for further investigation purposes.
2. It is essential that material of differing compositions not be mixed.
3. All sampling for validation, waste classification or characterisation purposes will be carried out in accordance with the following documents:
   - Contaminated Sites: Sampling Design Guidelines (NSW EPA, 1995);
   - National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1) (NEPC, 2013);
   - Contaminated Sites: Guidelines for Assessing Service Station Sites (NSW EPA, 1994);
   - Waste Classification Guidelines (NSW EPA, 2014).
4. Any unexpected finds encountered should be listed on a UFP register, which should include the action taken and the status of the unexpected find. A suitable register is included in Section 7.0.
5. Once an unexpected find has been identified and a UFP form filled in the Principal Contractor and CER should liaise with the client as to the appropriate means of managing the situation. This should include discussions around the handling, treatment and disposal of material, OH&S considerations and how the affected area will be validated and reopened for works.
6. Prior to closing out an unexpected find it will be important to ensure the appropriate documentation is obtained, such as: photographs, the UFP form, waste classification letter(s) and a validation report or letter.
7. A UFP form should be completed on each day of the remedial works as part of the daily site records. This will ensure that the process is being undertaken even if no unexpected finds are encountered. The form should include the name, company and the position of the person undertaking the field observations.

6. UNEXPECTED FINDS PROTOCOL FORM

To be completed by the Site Controller/Environmental Representative

SITE:

PERSONNEL ON-SITE:

DATE:

DAILY SUMMARY:

1.	Suspect material encountered during daily activities:	YES	☐	NO	☐
	(if YES, compete 2 to 5)				
2.	CER contacted:	YES	☐	NO	☐
3.	UFP Reference Number				
	(label occurrences sequentially 1, 2, 3, etc.).				

DESCRIPTION OF MATERIAL ENCOUNTERED:

4.	Asbestos or suspected ACM present:	YES	☐	NO	☐
5.	Brief written description of material:				
6.	Material isolated:	YES	☐	NO	☐
7.	Location of contaminated material (incl. field sketch/map if required):				
8.	Photographs taken:	YES	☐	NO	☐

NAME: **SIGNATURE:**

7. UNEXPECTED FINDS REGISTER

UNEXPECTED FINDS REGISTER

UFP No.	Date Found	Suspect Material	Description	Recorded on UFP Form					Action Taken	Status
				YES		NO				
				YES		NO				
				YES		NO				
				YES		NO				
				YES		NO				
				YES		NO				

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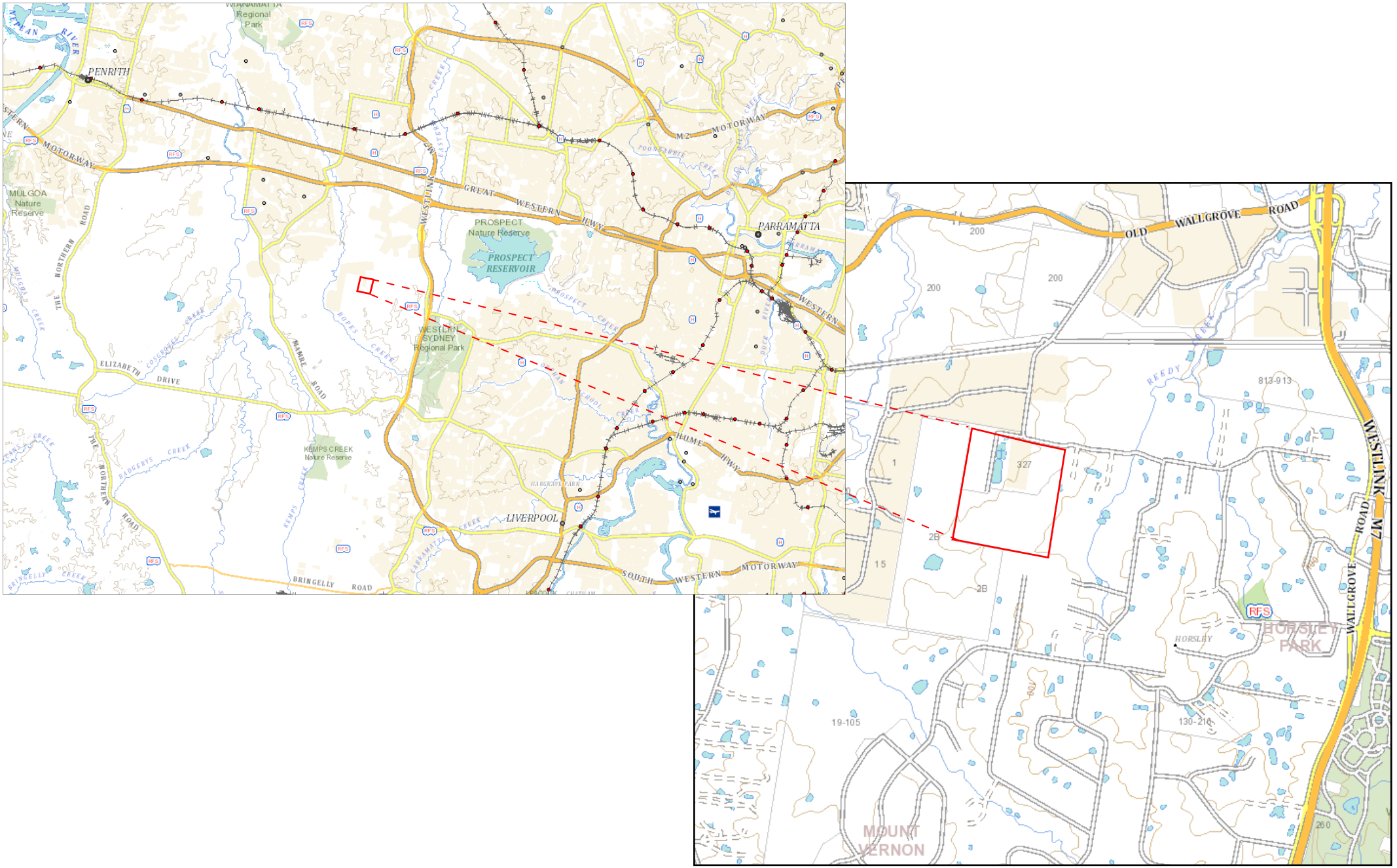
FIGURE 1 SITE LOCATION



Legend

Approximate Site Location

N
W E
S

Macquarie Park
Unit 11 Macquarie Link
277 Lane Cove Road
Macquarie Park NSW 2113

Newcastle
Level 4
45 Watt Street
Newcastle NSW 2300

Title: Site Location			
Site Address: CSR, Horsley Park	Project No.: 0449086	Figure No: 1	Date: 21/10/2019
Client: CSR	Scale: Not to Scale	Compiled: AD	Revision: Version 1.0

FIGURE 2 SITE LAYOUT

ROAD

21
D.P. 1173181

RESERVED ROAD

(A) BURLEY ROAD

101
5.03 ha

102
5.03 ha

302
1.81ha

301
1.81ha

303
1.51ha

304
1.51ha

305
2.01ha

202
5.04 ha

(5.88 ha)

201
13.35 ha

308
4.01ha

307
4.07 ha
(EX. HANDLE)

Pt 306
4.19 ha

203
4.02 ha

204
4.00 ha

Pt 306
11.51ha
ENVIRONMENTAL LAND

STAGE 1

STAGE 2

STAGE 3

PROPOSED ROAD No.1 20.0 m WIDE

PROPOSED ROAD No.1 20.0 m WIDE

7.0 m WIDE

R.O.C. 6.0m WIDE

A
D.P. 392643

70
D.P. 883089

71
D.P. 883089

6
D.P. 225031

A
D.P. 393203

B
D.P. 393203

141
D.P. 880131

131
D.P. 1066469

3
D.P. 627451

A
D.P. 366670

72
D.P. 1050228

81
D.P. 1023744

82

9
D.P.242752

71
D.P. 1050228

6
D.P. 242752

50
D.P. 1031826

GREENWAY PLACE

102
D.P. 1053670

101
D.P. 1053670

JACFIN DEVELOPMENT

'MA 893.4/2013'

[redacted]

THESE PLANS ARE TO BE READ IN CONJUNCTION WITH
THE DEVELOPMENT CONSENT DA No 893.1/2013 DATED
18 JUN 2018
COUNCIL'S REFERENCE NUMBER
MA 893.4/2013
NOTE: THIS IS NOT AN APPROVAL TO ERECT/DEMOLISH A
BUILDING UNDER SECTION 77 OF THE ENVIRONMENTAL
PLANNING AND ASSESSMENT ACT, 1979, AS AMENDED
SIGNED [redacted]

LEGEND	
(A)	OLD WALLGROVE ROAD

LOT SUMMARY
STAGE 1
101-102 = 2 INDUSTRIAL LOTS
STAGE 2
201-205 = 5 INDUSTRIAL LOTS
STAGE 3
301-308 = 8 INDUSTRIAL LOTS
(INCLUDING ENVIRONMENTAL LAND)

SECTION 96 - MASTERPLAN

ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	
FIRST ISSUE	PL	AC	PL		12/12/2013	
1	PL	AC	PL		02/04/2014	REVISION
2	PL	AC	PL		10/11/2017	SECTION 96
3	PL	AC	PL		20/11/2017	REVISION
4	PL	AC	PL		24/04/2018	REVISION
5	PL	PW	PL		13/06/2018	REVISION

CLIENT: CSR

AUTHORISED PERSON: BY: PETER LEE, Business Unit Manager - Planning SIGN: DATE: 13/06/2018

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PROJECT: 327-335 BURLEY ROAD, HORSLEY PARK

DRAWING TITLE: PROPOSED SUBDIVISION OF LOT 1 IN D.P. 106143 BEING PROPERTY AT 327-335 BURLEY ROAD, HORSLEY PARK

SCALE: 0 20 40 60 80 100 120 140 160
SCALE 1:2000 (A1) SCALE 1:4000 (A3)

PROJECT No. X13044.P_SEC 96_1 | DRAWING No. 1 OF 4 | STAGE | REVISION 5

FILE: H:\13xx\13044.P - CSR HORSLEY PARK\DRAWING\SP\FEASIBILITY\JUNE-2018\13044.P_SEC 96_1.DWG LAST SAVED BY PENG WU

ROAD

21 D.P. 1173181 RESERVED ROAD

(A) BURLEY ROAD

199.1 8.5

101
5.03 ha

245.4 239.4

205.2

STAGE 1

102
5.03 ha

245.2 245.2

205.2

PROPOSED ROAD NO.1 20.0 m WIDE

LOT 2
DP 1228114

70
D.P. 883089

71
D.P. 883089

6
D.P. 225031

A
D.P. 392643

A
D.P. 393203

B
D.P. 393203

FUTURE STAGE 2

RESIDUE
103
39.37ha

141
D.P. 880131

131
D.P. 1066469

3
D.P. 627451

A
D.P. 366670

72
D.P. 1050228

81
D.P. 1023744

82

9
D.P.242752

71
D.P. 1050228

6
D.P. 242752

GREENWAY PLACE

102
D.P. 1053670

101
D.P. 1053670

50
D.P. 1031826

JACFIN DEVELOPMENT

'MA 893.4/2018'

[redacted]

THESE PLANS ARE TO BE READ IN CONJUNCTION WITH THE DEVELOPMENT CONSENT DA No 893.1/2018 DATED 10 JUN 2018 COUNCIL'S REFERENCE NUMBER MA 893.4/2013

NOTE: THIS IS NOT AN APPROVAL TO ERECT/DEMOLISH A BUILDING UNDER SECTION 77 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979, AS AMENDED.

SIGNED [redacted]

LEGEND	
(A)	OLD WALLGROVE ROAD

LOT SUMMARY	
STAGE 1	
101-102 =	2 INDUSTRIAL LOTS
103 =	1 RESIDUE LOT

SECTION 96 - STAGE 1-SUBDIVISION PLAN

AMENDMENTS		DESIGN	DRAWN	CHECK	APPD	DATE	
FIRST ISSUE		PL	AC	PL		12/12/2013	
	1	PL	AC	PL		02/04/2014	REVISION
	2	PL	AC	PL		10/11/2017	SECTION 96
	3	PL	AC	PL		29/11/2017	REVISION
	4	PL	AC	PL		24/04/2018	REVISION
	5	PL	PW	PL		13/06/2018	REVISION

CLIENT: CSR

AUTHORISED FOR ISSUE
BY: PETER LEE
Business Unit Manager - Planning
SIGN:
DATE: 13/06/2018

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PROJECT: 327-335 BURLEY ROAD, HORSLEY PARK

DRAWING TITLE: PROPOSED SUBDIVISION OF LOT 1 IN D.P. 1228114 BEING PROPERTY AT 327-335 BURLEY ROAD, HORSLEY PARK

SCALE: 0 20 40 60 80 100 120 140 160
SCALE 1:2000 (A1) SCALE 1:4000 (A3)

PROJECT No.	DRAWING No.	STAGE	REVISION
X13044.P-SEC 96_2	2 OF 4		5

FILE: K:\13\13044.P - CSR HORSLEY PARK\DRAWINGS\FEASIBILITY\AHE_20180130\44.P_SEC 96_2.DWG LAST SAVED BY PENG WU

ROAD

21
D.P. 1173181

RESERVED ROAD

(A)

BURLEY ROAD

70
D.P. 883089

71
D.P. 883089

6
D.P. 225031

A
D.P. 393203

B
D.P. 393203

141
D.P. 880131

131
D.P. 1066469

3
D.P. 627451

A
D.P. 366670

9
D.P.242752

82
1 0 2 3 7 4 4

81
D.P.

72
D.P. 1050228

71
D.P. 1050228

6
D.P. 242752

50
D.P. 1031826

GREENWAY PLACE

102
D.P. 1053670

101
D.P. 1053670

101

EXISTING

STAGE 1

102

A
D.P. 392643

(5.88 ha)

201
13.35 ha

PROPOSED ROAD No.1 20.0 m WIDE

RESIDUE
205
33.45 ha

202
5.04 ha

STAGE

2

PROPOSED ROAD No.1 20.0 m WIDE

203
4.02 ha

204
4.00 ha

355.4
211.8
246.8
246.8
209.7
195.9
270.3
213.7
70
422.5
18.7
82.2
67
16.3
173
16.3
199
29

JACFIN DEVELOPMENT

'MA 893.4/2013'

APPROVED COPY

THESE PLANS ARE TO BE READ IN CONJUNCTION WITH THE DEVELOPMENT CONSENT DA No 893.1/2013 DATED 10 JUN 2019 COUNCILS REFERENCE NUMBER MA 893.4/2013

NOTE: THIS IS NOT AN APPROVAL TO ERECT/DEMOLISH A BUILDING UNDER SECTION 77 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979, AS AMENDED

SIGNED [redacted]

LEGEND	
(A)	OLD WALLGROVE ROAD

LOT SUMMARY
STAGE 2
201-205 = 5 INDUSTRIAL LOTS
206 = 1 RESIDUE LOT

SECTION 96 STAGE 2 - SUBDIVISION PLAN

	FIRST ISSUE	DESIGN	DRAWN	CHECK	APPD	DATE	
AMENDMENTS	1	PL	AC	PL		12/12/2013	
	2	PL	AC	PL		02/04/2014	REVISION
	3	PL	AC	PL		10/11/2017	SECTION 96
	4	PL	AC	PL		20/11/2017	REVISION
	5	PL	AC	PL		24/04/2018	REVISION
		PL	PW	PL		13/06/2018	REVISION

CLIENT: CSR

AUTHORISED FOR ISSUE
BY: PETER LEE
Business Unit Manager - Planning
SIGN:
DATE 13/06/2018

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PROJECT: 327-335 BURLEY ROAD, HORSLEY PARK

DRAWING TITLE: PROPOSED SUBDIVISION OF RESIDUE LOT 200 AND LOT 2 DP 1228114 IN PREVIOUS APPLICATION

SCALE: 0 20 40 60 80 100 120 140 160
SCALE 1:2000 (A1) SCALE 1:4000 (A3)

PROJECT No.	DRAWING No.	STAGE	REVISION
X13044.P_SEC 96_3	3 OF 4		5

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(A)

ROAD

21 D.P. 1173181

RESERVED ROAD

BURLEY ROAD

N

8.8 91.7 91.9 8.6

8.3 161.6 3.4 73.8 100

101

302 1.81ha

301 1.81ha

179.3 185.6 179.5

98 98

308 4.01ha

307 4.07 ha (EX. HANDLE)

245.1 236 178.9

70 D.P. 883089

71 D.P. 883089

EXISTING STAGE 1

STAGE 3

7.0 m WIDE

167.1 (107.6) 274.7

303 1.51ha

304 1.51ha

154.2 154.2 154.2

98 98

196

102

305 2.01ha

Pt 306 4.19 ha

303.8

6 D.P. 225031

PROPOSED ROAD No.1 20.0 m WIDE

PROPOSED ROAD No.1 20.0 m WIDE

R.O.C. 6.0m WIDE

A D.P. 392643

203

A D.P. 393203

202

B D.P. 393203

EXISTING STAGE 2

Pt 306 11.51ha ENVIRONMENTAL LAND

305.8

141 D.P. 880131

204

131 D.P. 1066469

3 D.P. 627451

117.2

201

113.4 100

A D.P. 366670

72 D.P. 1050228

81 D.P. 1023744

82

9 D.P.242752

71 D.P. 1050228

6 D.P. 242752

GREENWAY PLACE

102 D.P. 1053670

101 D.P. 1053670

50 D.P. 1031826

JACFIN DEVELOPMENT

('MA 898.4/2018')

WALGA COUNCIL

THESE PLANS ARE TO BE READ IN CONJUNCTION WITH THE DEVELOPMENT CONSENT DA No 898.1/2013 DATED 18 JUN 2018 COUNCIL'S REFERENCE NUMBER MA 898.4/2013

NOTE: THIS IS NOT AN APPROVAL TO ERECT/DEMOLISH A BUILDING UNDER SECTION 77 OF THE ENVIRONMENTAL PLANNING AND ASSESSMENT ACT, 1979, AS AMENDED.

SIGNED [redacted]

LEGEND	
(A)	OLD WALLGROVE ROAD

LOT SUMMARY
STAGE 3
301-308 = 8 INDUSTRIAL LOTS (INCLUDING ENVIRONMENTAL LAND)

SECTION 96 - STAGE 3 - SUBDIVISION PLAN

ISSUE	DESIGN	DRAWN	CHECK	APPD.	DATE	
FIRST ISSUE	PL	AC	PL		12/12/2013	
A 1	PL	AC	PL		02/04/2014	REVISION
2	PL	AC	PL		10/11/2017	SECTION 96
3	PL	AC	PL		20/11/2017	REVISION
4	PL	AC	PL		24/04/2018	REVISION
5	PL	PW	PL		13/06/2018	REVISION

CLIENT: CSR

AUTHORISED FOR ISSUE: BY: PETER LEE, Business Unit Manager - Planning SIGN: DATE: 13/06/2018

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PROJECT: 327-335 BURLEY ROAD, HORSLEY PARK

DRAWING TITLE: PROPOSED SUBDIVISION OF RESIDUE LOT 206 IN PREVIOUS APPLICATION

SCALE: 0 20 40 60 80 100 120 140 160 — SCALE 1:2000 (A1) SCALE 1:4000 (A3)

PROJECT No. X13044.P_SEC 96_4 | DRAWING No. 4 OF 4 | STAGE | REVISION 5

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FIGURE 3 UPDATED RAP AECS

ERM The business of sustainability

Compiled
TR

Legend

- Site Boundary
- Stage Boundaries
- Outside development area (E2 Conservation)
- Area applicable to revised RAP
- Camide Landfill subject to EMP
- Southern and Eastern Bund walls
- Data Gap areas
- Area covered by 2014 RAP

N

Approximate Scale

0m 60m 120m

Figure Title
Updated RAP AECs

Project Title
Horsley Park Remediation Action Plan

Client
CSR

Project No.	Date	Scale	Figure No.	Revision
0449086	12/12/2019	As Shown	3	Version 2

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ERM's Macquarie Park Office
Unit 11
277 Lane Cove Road
Macquarie Park NSW 2113

T: 02 8586 8750

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