Hornsby Shire Council

Hornsby Quarry Rehabilitation
UST Remedial Action Plan

October 2019

Executive Summary

Hornsby Shire Council (HSC) instructed GHD Pty Ltd (GHD) to prepare a remedial action plan (RAP) for the decommissioning of an underground storage tank (UST) and remediation of associated contaminated soil (if any) at the former workshop area within the Hornsby quarry site located at Quarry Road, Hornsby, NSW 2077.

GHD recently completed a targeted detailed site investigation (DSI) at the site (ref: 212645726, 28 August 2019). The investigation identified one UST and two fuel bowsers associated with machinery and equipment maintenance at the site, as well as two above ground storage tanks (ASTs). The investigation also identified low-level hydrocarbon contamination in soils surrounding the UST. GHD recommended in the report to remove the UST in accordance with industry guidelines; the ASTs and fuel bowser will remain at the site.

The purpose of this RAP is to provide a framework for the remediation and validation of soil from excavated areas following the removal of underground petroleum storage system (UPSS) infrastructure to evaluate the suitability of the site for its proposed use as a public park (public open space)

The actions required to carry out the RAP are summarised as follows:

- Develop a Site Management Plan (to be prepared by the nominated contractor).
- Prior to any excavation works, undertake a dial before you dig search and underground service identification.
- Remove concrete and excavate to expose UST.
- Remove all fuel from drainage points, pipework and UST. De-gas the UST prior to safe removal and transport for off-site destruction.
- Dispose of the UST off-site by a licensed waste contractor.
- Remove any associated infrastructure including underground pipework.
- Collect validation soil samples from the walls and base of the excavations for UST and fuel line excavations for laboratory analysis.
- Ensure that the validation samples show that no contamination exists within the excavation that is above the nominated screening criteria. If this is not the case, undertake further excavation of affected soils, until validation samples show that the remediation criteria has been achieved.
- Stockpile and separate any impacted soils that are considered unsuitable, which are to be classified and disposed off-site to an EPA approved waste facility.
- Backfill the resulting excavations with validated existing site soils from the tank excavation that are deemed suitable for re-use, approved excavated natural material (ENM) already on site from the North Connex project, or approved virgin excavated natural material (VENM) imported to site.
- Prepare a Validation Report

The validation report will be provided in accordance with the expected conditions of the development consent.

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Appendices

1. Introduction

Hornsby Shire Council (HSC) instructed GHD Pty Ltd (GHD) to prepare a remedial action plan (RAP) for the decommissioning of an underground storage tank (UST) and remediation of associated contaminated soil (if any) at the former workshop area within the Hornsby quarry site located at Quarry Road, Hornsby, NSW 2077 (hereinafter referred to as the site). The site location is shown in Figure 1, Appendix A.

GHD recently completed a targeted detailed site investigation (DSI) at the site (ref: 212645726, 28 August 2019). The investigation identified one UST and two fuel bowsers associated with machinery and equipment maintenance at the site, and above ground storage tanks (ASTs). GHD recommended in the report to remove the fuel infrastructure in accordance with industry guidelines; the ASTs and bowsers will remain at the site.

The purpose of this RAP is to describe the scope and controls for remediation and management during the removal of underground petroleum storage systems (UPSS), associated infrastructure and associated impacted soils.

1.1 Objectives

The objective of this RAP is to outline the approach and procedures in respect to:

- Removal of the UPSS;
- Management of potential contamination encountered during the removal; and
- Evaluate the suitability of the soils remaining in-situ for the intended land use (public open space).

1.2 Scope

Preparation of this RAP included:

- A desktop review of available contamination assessment reports for the site.
- Outlining procedures and activities that are required for the implementation of the remediation works.
- Identifying requirements for site management (including occupational health and safety) to be implemented during the remediation works.
- Developing requirements for a contingency plan and unexpected finds protocol for the remediation.

1.3 Technical framework for preparation of RAP

This RAP was prepared in general accordance with:

- Australian standard AS 1940:2017 The storage and handling of flammable and combustible liquids.
- Australian Standard AS 4482.1, 2005, Guide to the investigation and sampling of sites with potentially contaminated soil – Part 1: Non-volatile and semi-volatile compounds.
- Australian standard AS 4482.2, 1999, Guide to the sampling and investigation of potentially contaminated soil – Part 2: Volatile substances.
- Australian standard AS 4976:2008: The removal and disposal of underground storage tanks.
- *Contaminated Land Management Act 1997*, as amended 2019.
- Department of Environment, Climate Change and Water 2008, Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation.
- Department of Environment, Climate Change and Water, 2010, *UPSS Technical Note: Site Validation Reporting.*
- Friebel and Nadebaum 2011, CRC CARE Technical Report No. 10: *Health screening levels for petroleum hydrocarbons in soil and groundwater.*
- National Environment Protection Council, 2013. National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended in 2013 (NEPM, 1999).
- NSW Department of Environment and Conservation 2007, *Contaminated Sites: Guidelines for the Assessment and Management of Groundwater Contamination.*
- NSW Department of Urban Affairs and Planning 1998, *Managing Land Contamination: Planning Guidelines SEPP 55 Remediation of Land.*
- NSW Environment Protection Authority 1995, Contaminated Sites: *Sampling Design Guidelines.*
- NSW Environmental Protection Authority 2014, *Waste Classification Guidelines Part 1: Classifying Waste.*
- NSW Environmental Protection Authority 2015 *Guidelines on the Duty to Report Land Contamination under the Contaminated Land Management Act 1997.*
- NSW Environmental Protection Authority 2017, *Guidelines for the NSW Site Auditor Scheme (3rd edition).*
- NSW Environmental Protection Authority, 2014, Technical Note: Investigation of Service Station Sites.
- NSW Office of Environment and Heritage 2011, *Guidelines for Consultants Reporting on Contaminated Sites.*
- NSW *Work Health and Safety Act 2011.*
- Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 under the Protection of the Environment Operations Act 1997.
- WorkCover NSW 2005, Storage and Handling of Dangerous Goods Code of Practice.
- Work Health and Safety Regulation 2017.

1.4 Limitations

This report should be read in conjunction with, and is subject to, the limitations provided in Section 10.

2. Site setting

The following information has been obtained from the GHD (2019) targeted DSI report, and assumes the reader is fully cognisant with the findings.

2.1 Site details

The site details are summarised in Table 1. The site location is shown on Figure 1, Appendix A.

Table 1 Site location summary

Street Address	Hornsby Quarry, Quarry Road, Hornsby, NSW 2077
Title Identifiers	Portion of Lot E DP318676
Local Government Area	Hornsby Council
Current Land Use	Former quarry
Local Land Use Zoning	RE1 – Public Recreation

This RAP is focused on the former workshop area to the west of the main former quarry (Figure 2, Appendix A). This area currently comprises:

- Two bunded Above-Ground Storage Tanks (ASTs) (one empty, one containing diesel fuel) underneath an awning. The tanks appear to in good condition. Minor hydrocarbon staining was noted at the outlet taps of the ASTs, but was entirely contained within the concrete bunding.
- One petrol UST (containing 50 mm of hydrocarbon residue). No hydrocarbon staining was noted on the surface concrete pad covering the UST.
- Two fuel bowsers (and potentially related underground petroleum storage systems). Hydrocarbon staining was noted on the concrete base pad.
- One medium-sized (approximately 2.5 m x 2.5 m x 2.5 m) locked, inaccessible and corroded metal container.
- Patches of concrete hard-stand

2.2 Surrounding land use

General observations of the surrounding land use are shown in Table 2

Table 2 Surrounding land uses

Direction	Land Use
North	Bushland then residential
East	Residential and commercial
South	Bushland then residential
West	Bushland and Rosemead Trail (bushwalking trail).

2.3 Topography

The overall quarry site is situated between 53 and 148 m AHD (LotSearch, 2019). The site has very steep embankments from the perimeter of the site to the centre of quarry. The pre-existing site topography (prior to the quarry development) consisted of a moderately steep gully running from northeast downwards to the south-west of the site. Surrounding landforms to the north and east are generally steep, with topography sloping moderately away from the quarry towards the south and west. The former workshop area, where the UST is located is relatively flat.

2.4 Geology

The Sydney 1:100,000 *Geological Series Sheet 9130* (NSW Government Department of Resources and Geoscience, 1983) indicates the site is underlain by a Jurassic diatreme comprising volcanic breccia with various amounts of sedimentary breccia and basalt. The diatreme intruded the surrounding Triassic Hawkesbury Sandstone and Ashfield Shale of the Wianamatta Group, and produced a north-east to south-west elongated body which extends for approximately 1.5 kilometres and is less than 400 metres wide (Herbert, 1983, *in* Parsons Brinckerhoff (2004), *Hornsby Quarry and Environs Land Capability Study and Master Plan: Volume 1 – Technical Investigations, October 2004*).

The Hornsby Quarry diatreme forms part of the Hornsby – Thornleigh diatreme complex and was formed as a maar-diatreme volcano during the Early Jurassic, around 200 million years ago. The diatreme was created as a result of rising mafic magma intersecting the water table, producing a steam pressure driven explosion which forced pyroclastic ejecta upwards and which subsequently fell to create a small ring-like cavity, and associated volcanic breccia, sedimentary breccia and basalt.

The quarry was mined for its hard rock basalt which was crushed and used as road base material and gravels. The eastern face of the quarry has exposed a vertical cross-section through the diatreme, and is valued for its expression of this geological phenomenon. It provides exposure to geological information that is important to understanding the history of creation of the Sydney Basin, and Council intend to preserve this exposure as part of the redevelopment plans for the quarry.

During the Detailed Site Investigation undertaken by GHD in August 2019, four push tube / solid stem drilled augered boreholes (BH01 – BH04) and three shallow hand augered holes (BH05 – BH07) were completed at the former workshop area (refer to Figure 3, Appendix A).

Lithology encountered at all locations was fairly consistent, comprising the following:

- Coarse grained, dark grey, gravelly sand fill of variable thickness from surface to 0.5 metres below ground level (mbgl), Gravel fragments generally consisted of angular basalt.
- A layer of mottled creamy - orange clays and sandy clay with medium to high plasticity at variable depths from 0.5 to 4.0 mbgl.
- Possible natural sandy clays from 4.9 to 6.0 mbgl.

Additional observations of note during drilling included:

- Fragments of concrete were intersected at 1.0 mbgl in BH02, and at 0.5 in BH03, indicating the boreholes intersected the edges of the UST foundations.

Hydrocarbon staining and odour in gravelly to clayey sand fill material at BH02 from 0.4 – 0.6 mbgl, and BH03 from 4.0 – 4.1 mbgl, and 4.4 – 4.5 mbgl. Slightly elevated PID readings above background were recorded for these samples (see borehole logs, and varying in colour from orange and yellow to creamy brown.

2.5 Hydrology

Surface water is expected to follow the local topography on site. Along the northern margin of the quarry void, the diversion channel diverts storm water westwards from Old Mans Valley in the east and from Manor Road in the north.

A natural waterway runs through the site from northeast to southeast. This waterway flows into Jimmy Bancks Creek, 670 m south of the site. Waitara and Berowra Creeks are 680 and 980 m west of the site.

2.6 Hydrogeology

A search of the NSW Department of Primary Industries Office of Water Groundwater Bore Map revealed that there are six registered groundwater wells within two kilometres of the site. The closest registered bore to the site was a monitoring bore (GW111573) situated 1118 m to the northeast. This bore was drilled to a depth of 5.0 m below ground level and sits in silty clay, weathered shale and sandstone.

Standing water levels in all six bores was recorded between 0.63 m and 2.0 mbgl, however, depth to groundwater at the site itself is unknown, but expected to be relatively deep based on the water ponding at the base of the quarry. Salinity levels are not anticipated to be an issue at the site, and no dryland salinity is reported for the site in the National Assessment database (National Land and Water Resources audit, 2013), or the Dryland Salinity Potential of Western Sydney map (Department of Infrastructure, Planning and Natural Resources, March 2003).

Groundwater in the region surrounding the site is expected to flow from the northeast to the southwest.

During the Detailed Site Investigation undertaken by GHD in August 2019, groundwater was not encountered.

2.7 Acid sulphate soil risk

The *NSW Office of Environment and Heritage Acid Sulfate Soils Risk Map* (NSW Government, n.d.) indicates the site is within an area with no known occurrence of Acid Sulfate Soils.

The Atlas of Australian Acid Sulfate Soils indicates the site is Class B (low probability of occurrence. 6 to 70% chance of occurrence) and Class C (extremely low probability of occurrence. 1 to 5 % chance of occurrence with occurrences in small localised areas).

2.8 Site history

Hornsby Quarry is a former breccia hard rock quarry that was operated by private business from the early 1900s and ceased quarry operations in the early 2000s. The Safework NSW storage of hazardous chemicals search indicated that there has been a fuel UST located at the site since 1955.

3. Contamination status

3.1 Previous reports

A number of previous investigations have been undertaken on the site which include the following:

- PB, 2004: Land Capability Study.
- PB, 2004: Technical Investigations.
- GHD Pty Ltd, May 2019. Hornsby Quarry Rehabilitation EIS – Geophysical Investigation Report.
- GHD Pty Ltd, September 2019, Hornsby Quarry Rehabilitation, Targeted Detailed Site Investigation.

GHD present the following pertinent information related to the area of the workshop area.

3.1.1 PB, 2004: Technical Investigations

The Council engaged PB to undertake a Phase 1 Environmental Site Assessment of the site. This included the review of historical documentation, including a WorkCover NSW Dangerous Goods Licence information and records, NSW EPA notices, property records, land title information and aerial photographs.

A review of the title information and aerial photographs indicated that the site was used as market gardens and orchard cultivation from the 1820s to the 1960s. Parts of the site were leased to Hornsby Blue Metal Limited in 1924. Hornsby Blue Metal Limited acquired the majority of the site between 1960 and 1968. Site quarrying infrastructure was constructed by 1969. Extensive quarrying activities appeared to have ceased by late 1992.WorkCover NSW records confirmed a UST was located in the vicinity of the office and workshop area, and was used to store petrol. The initial UST had the capacity to hold 9,000 L. This tank was replaced in 1968 with a smaller capacity tank (4,500 L). The UST was reported to have been removed in 1997/98. PB is not aware of any reports relating to the removal of this UST. Two above ground storage tanks (ASTs) are located in the same area. These were used to store diesel and have the capacity to hold 30,000 L and 25,000 L. These remain on site in a bunded area.

Also in this area was a detonator magazine used to store up to 5,000 detonators. All detonators and explosives were utilised prior to the cessation of quarrying activities on site. GHD did not observe this magazine during their site visit.

A site investigation was undertaken by PB in 2004. The two diesel ASTs were observed in the workshop area, along with a waste oil AST with a capacity of 2,000 to 5,000 L. GHD note that the waste oil AST was not observed during their site visit. All ASTs were reported to be in covered, bunded areas.

PB identified a number of areas of environmental concern as a result of this Phase 1 Environmental Site Assessment. To address the potential contamination issues identified, PB recommended a *Phase 2 Detailed Site Investigation* be scoped and implemented as part of future management principles for the site (Parsons Brinckerhoff, 2004).

3.1.2 GHD Pty Ltd, May 2019. Hornsby Quarry Rehabilitation EIS – Geophysical Investigation Report

This report details the geophysical investigation of the UST at the former workshop area with the use of ground penetrating radar (GPR). The survey determined that the UST is slightly smaller than the overlying concrete slab, at approximately 8600 mm x 4500 mm. The GPR

reflection suggested that the depth to the top of the top underneath the slab is approximately 700 mm below surface. A measuring tape placed within the sump/downpipe hit the assumed base of the tank at 2500 mm depth. A dipstick removed from the tank indicated there was 50 mm of hydrocarbon residue at the base of the tank.

3.1.3 GHD Pty Ltd, September 2019, Hornsby Quarry Rehabilitation, Targeted Detailed Site Investigation

GHD was commissioned by the Hornsby Shire Council (the Council) to undertake a targeted detailed site contamination investigation (DSI) at the Hornsby Quarry in Hornsby, New South Wales (NSW). One aspect of this was an investigation of the former workshop area.

The objective of this DSI was to assess, to the extent practicable using available information, the potential for contamination to be present at the site as a result of historical or current use of the site, which may pose a risk to human health or the environment. For the workshop area, GHD completed a desktop study, site walkover and a limited soil sampling program.

A field investigation conducted on 6 August 2019 included: four push tube / solid stem augered boreholes and three shallow hand augered holes at the former workshop area. Sampling locations in workshop area are provided on Figure 3, Appendix A.

All analytical results were reported below the nominated human and ecological criteria, with the exception of nickel and zinc results in some soil samples. GHD consider these results to be related to the natural rock and soil properties of the sampled material, and are not considered to be indicative of contamination.

Visual and olfactory indicators of hydrocarbon contamination were noted in two boreholes adjacent to the southern and eastern sides of the underground storage tank (UST). These samples reported results below the selected site assessment criteria.

The extent of hydrocarbon contamination associated with the UST is currently unknown and requires further investigation, or removal, of the potentially contaminated soils during removal of the UST.

Based on the findings of this investigation, GHD consider the risk of exposure to contaminants of potential concern (COPC) for on-site and off-site receptors to be low, however, we acknowledge the potential for contamination to exist associated with the UST.

Based on the completed scope of work, and in consideration of the proposed future recreational land use for the site, GHD recommended the following:

- Removal of the UST in accordance with the Work Health and Safety *Regulation 2017.* This would include site validation following removal and preparation of a validation report prepared by a suitably qualified person, such as a contaminated land consultant, in addition to completion of any soil or groundwater remediation following decommissioning of the UST, if remediation is required.
- A remedial action plan (RAP) should be developed for the removal of the UST and associated impacted soils (if required).

3.2 Summary of sources of contamination

It is understood that the sources of contamination in the former workshop area consist of

- One UST.
- Two AST's.
- Two fuel bowsers.

- Fuel lines associated with UST and bowsers.

Soil analytical results indicated hydrocarbon impact in soils down gradient of the UST however the detected concentrations were less than one order of magnitude greater than the laboratory limit of reporting and did not exceed the adopted guideline concentrations.

3.3 Conceptual site model

The conceptual site model (CSM) is a qualitative analysis tool, which identifies the contamination sources, transport mechanisms, exposure pathways and receptors considered. A CSM has been developed based on GHD's understanding of the site setting, including geology, hydrogeology and surrounding land use in order to identify potentially significant source-pathway-receptor (SPR) linkages in respect of risks to human health and the environment.

An analysis of potential source pathway receptor (SPR) linkages for human and environmental receptors is summarised in Table 3.

Table 3 Revised conceptual site model

Potential Sources	Potential Pathway	Potential Receptors	SPR Linkage
Spill and leaks of fuels and oils from UST, ASTs, and historical workshop equipment and maintenance activities	**Human exposure** Direct contact with contaminated soils Ingestion and inhalation of soils, vapours and dust **Environmental exposure** Vertical migration through the unsaturated zone into groundwater and subsequent infiltration into river system	**Human** Current and future occupants, construction and maintenance workers (both on- and off-site); Recreational users of the site; Surrounding residential receptors **Environmental** Groundwater and ecological systems such as the tributaries to Waitara and/or Berowra Creek and natural vegetation	Unlikely - Analytical results were reported below the selected human health and ecological guideline criteria, or can be explained by the natural rock properties of the gravel fill. Groundwater is deep at the site and is unlikely to be impacted by vertical migration of contaminants through the unsaturated zone.

Based on Table 3 one SPR pathway is potentially complete. This pathway is the release of fuel or fuel residues from the UST impacting human health or the environment. As detailed in Table 3, this pathway is considered unlikely based on investigation works to date.

It is noted that during the UPSS removal works there is the potential for site workers to come into contact with hydrocarbon impacts in the excavations.

4. Remedial options evaluation

4.1 Objectives of remediation

The remediation goals are consistent with NSW SEPP 55 guidelines and include:

- Meeting the conditions of the planning consent and to render the remediation area suitable for the land use;
- Demonstrating that the proposed remediation strategy for the remediation area is environmentally justifiable, practical and technically feasible;
- Adopting clean-up criteria appropriate for the future use of the remediation area to mitigate possible impacts to human health and the environment;
- Consideration of the principles of ecologically sustainable development in line with Section 9 of the *Contaminated Land Management Act* 1997; and
- Minimising waste generation under the *Waste Avoidance and Resource Recovery Act* 2001.

Further, the remediation must be completed in consideration of the Hornsby Shire Council development consent requirements.

4.2 Options for remediation

4.2.1 General

With regard to site remediation, the NSW EPA guidelines indicate that the preferred options for site remediation and management are (in descending order):

- On-site treatment of contamination so that the contaminant(s) are either destroyed or the associated hazard is reduced to an acceptable level; then
- Off-site treatment of contamination so that the contaminant(s) are either destroyed or the associated hazard is reduced to an acceptable level, after which the formerly contaminated material is returned to the site.

If these options cannot be implemented, then the other options that should be considered include:

- Removal of contaminated material to an approved site or facility (such as a landfill), followed, where necessary by the reinstatement of formed excavations using clean fill; then.
- Consolidation and isolation of the contaminated material on-site by containing the contaminated material within a properly designed barrier.

If remediation is likely to cause a greater adverse effect than would occur should the site be left undisturbed, then remediation should not proceed.

4.2.2 Options discussion

To establish the optimal remedial strategy for the UST and contaminated soil (if identified on site), GHD has completed screening of various available remediation options, taking into consideration the hierarchy endorsed by NSW EPA (as discussed in Section 5.2.1 of this report**)**, the principles of ecologically sustainable development and the objectives in Section 1.2. This list is not exhaustive; however, provides a list of technologies appropriate for addressing contamination at the site. A summary of this screening is presented on Table 4.

Table 4 UST and soil remedial options assessment

Process Type	Remedial Option	Effectiveness	Ease of Implementation	Ongoing Liability	Health / Environmental Risk	Time frame	Compliance	Capital Cost	Retained or Eliminated
UST and impacted soil									
Do nothing	Do nothing	Ineffective, UST and hydrocarbon impacted soil remains in situ	Easy to implement	Liability remains	No current risk based on investigations to date however potential future issues.	No time required	Does not comply with *Work Health and Safety Regulation 2017*	Lowest cost option	Eliminated – does not meet Councils objectives. Ongoing liability associated with disused UST in ground, potential non compliance with *Work Health and Safety Regulation 2017.*
Abandon in-situ, no soil excavation	Pump out UST, foam fill and leave in situ	Relatively effective however impacted soil remains in situ and potential future issues with UST degradation	Moderately easy to implement	Liability of UST in the ground remains – potential future issues with UST degradation, and ground subsidence.	No current risk based on investigations to date however potential future issues.	1 day	Complies with *Work Health and Safety Regulation 2017*	Moderate cost	Eliminated - does not meet Councils objectives. Ongoing liability associated with disused UST in ground
Remove UST, and impacted soil	Excavation and disposal	Effective and reliable – will remove liability associated with UST and impacted soil	Moderately easy to implement	None - will remove liability associated with UST and impacted soil	No current risk based on investigations to date. No future risks with infrastructure and impacted material removed.	2 weeks	Complies with *Work Health and Safety Regulation 2017*	Highest cost	Retained – removes liability associated with UST in ground, Complies with *Work Health and Safety Regulation 2017* and is in line with industry best practice.

4.3 Nominated remedial option

Option three to remove the UST and associated impacted soil was selected as the nominated remedial option. Whilst this option is the most time consuming and the most expensive, it removes ongoing liability, is compliant with the relevant legislation and removes any potential future risk associated with the presence of the UST and associated infrastructure.

5. Basis of remedial works

5.1 Data quality objectives

The purpose of establishing Data quality objectives (DQO) is to ensure the assessment is undertaken in a way that enables the collection and reporting of reliable data on which to base the assessment.

DQOs have been established for this assessment to assist the design and implementation of data collection activities, to ensure the type, quantity and quality of data obtained are appropriate and address the project objectives. The DQO process described in Schedule B2 of the National Environmental Protection Council (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure (No.1)* (NEPM), was adopted for this project, and involves seven steps:

- Step 1: State the problem.
- Step 2: Identify the decisions.
- Step 3: Identify inputs to the decision.
- Step 4: Define the study boundaries.
- Step 5: Develop a decision rule.
- Step 6: Specify limits on decision errors.
- Step 7: Optimise the design for obtaining data.

A description of each DQO step developed for this project is provided in Table 5

Table 5 Data quality objectives

Step	Data quality objectives
Step 1 State the problem	The problem relates to the dis-used UPSS at the site, and that hydrocarbon contamination has been detected in soil adjacent to the UST. Potential source-pathway-receptor linkages of contaminants have been identified but not assessed and as such the contamination status of the site is unknown. The objectives of the remediation are to remove the UPSS and impacted soil surrounding the UPSS to the extent practicable. Validation of the UST pit and fuel line trenches can then be undertaken to demonstrate that all hydrocarbon impact has been removed to the extent practicable and that any remaining hydrocarbon impact does not pose a risk to receptors or affect the future use of the site. Investigation of the area to assess whether the potential contamination sources have actually caused site contamination and if these impacts may pose a risk to receptors or affect the proposed future use of the site.
Step 2 Identify the decision	The decisions for the assessment are the issues that need to be addressed arising from Step 1 and form the basis for risk characterisation: • Following UPSS removal and excavation of surrounding soils, is contamination present at the site and will the presence of any contamination affect the future use of the site or pose a risk to the identified receptors? • Is there a need for further assessment, remediation and/or management of contamination (if identified)?

Step 3 Inputs to the decision	The inputs to the decision represent the information and data that will be collected as part of the assessment include: • Sampling from the UST pit and fuel line trenches. Collection and laboratory analysis of soil samples; and • Comparison of the analytical data to applicable investigation levels to evaluate the potential for contamination to adversely impact upon human health and/or environmental receptors
Step 4 Boundaries of the study	The lateral boundaries of the study area are the boundaries of the remediation area, as depicted in Figure 2 Appendix A. The vertical boundary of the study area will be determined by the depth to the base of the tank and any potentially related soil contamination below the tank.
Step 5 Decision rules	The decision rules adopted in this investigation are as follows: • Spoil removed from the UST pit will be stockpiled separately and sampled for analysis of contaminants of potential concern (COPC) to assess the suitability for reuse or waste classification. • The concentrations of COPC are to be assessed against adopted site investigation levels, which are sourced from the NSW EPA, and NEPM endorsed guidelines with reference to site-specific exposure scenarios. • If concentrations of contaminants of potential concern are below the adopted investigation levels, then contamination at the site will be considered unlikely to pose an unacceptable risk to identified receptors. In such case, spoil will be returned to the UST pit as fill material. • Conversely, when concentration(s) of contaminants of potential concern exceed the adopted site investigation levels, spoil will be removed from site in accordance with the nominated remedial option as noted in Section 4.3.
Step 6 Tolerable limits on decision errors	Two types of decision errors are possible: • Sampling errors which occur when the sampling program does not adequately detect the variability of a contaminant from point to point across the site, i.e. the samples collected are not representative of the site conditions such that contamination is either missed or overstated. • Measurement errors which occur during sample collection, handling preparation, analysis and data reduction. To minimise the potential for decision errors, a number of data quality indicators (DQIs) will be evaluated, namely representativeness, completeness, comparability, precision, sensitivity and accuracy. The DQIs are based on those listed in Appendix C of the NEPM.
Step 7 Optimisation of the data collection process	For the assessment, the data collected will be optimised by: • Engagement of specialist GHD personnel with previous experience in the assessment and remediation of contaminated sites to cover all aspects of the assessment. • Laboratory analysis of selected soil samples for identified contaminants of potential concern. Samples will be selected on the basis of: • Visual and olfactory indications of potential contamination presence observed, as well as Photo Ionisation Detector (PID) screening results. • Assessment of data quality with reference to the specified DQIs, to evaluate the reliability and useability of the obtained data. • Assessment of laboratory analytical results against adopted criteria.

5.2 Validation criteria

The establishment of applicable remediation criteria is required to demonstrate that the site is suitable (with respect to contamination) for the proposed land use (i.e. public open space).

5.2.1 Soil – Human based investigation and screening levels

For assessing contamination levels in soil in urban settings during the UPSS removal, the NEPM (2013) presents health based investigation levels (HILs) and health screening levels (HSLs) for different land uses (e.g. industrial/commercial, residential, recreational etc).

The site is proposed to be developed into a public park containing playing fields etc. Contaminant concentrations, excluding TRH, BTEX and naphthalene, will be screened against the HILs applicable to public open space land use (HIL C) as per the current zoning (public recreation).

Similarly, TRH, BTEX and naphthalene concentrations will be assessed against the soil HSLs for vapour intrusion from the relevant depth and soil matrix applicable to public open space land use (HSL C) from the NEPM (2013).

For the intrusive maintenance workers, the recommended assessment criteria for vapour and direct contact pathways provided in the *Cooperative Research Council for Contamination Assessment and Remediation for the Environment* (CRC CARE) Technical Report no. 10 (Friebel and Nadebaum, 2011) will be adopted.

5.2.2 Soil – Ecological screening levels

To assess the risk posed by contaminants of concern to ecological receptors, the NEPM (2013) Ecological Investigation Levels (EILs) have been adopted. EILs have been developed for common metal contaminants in soil as well as several other compounds based on a species sensitivity distribution model. EILs consider the physiochemical properties of soil and contaminants and the capacity of the soil to accommodate increases in contaminant levels above natural background while maintaining ecosystem protection.

EILs apply principally to contaminants in the top two metres of soil at the finished surface/ ground level which corresponds to the root zone and habitation of many species. For the purposes of this assessment the urban, residential and public open space EIL is considered the most appropriate given the proposed land use of the site.

Additionally to assess the risk posed by hydrocarbon contamination to ecological receptors by petroleum hydrocarbons, NEPM Ecological Screening Levels (ESLs) have been adopted. ESLs have been developed for Total Petroleum Hydrocarbon fractions F1 – F4 as well as BTEX and benzo (a) pyrene in soil. For the purposes of this assessment, the urban, residential and public open space ESL is considered the most appropriate given the proposed land use of the site.

5.2.3 Soil – waste classification criteria

Material requiring off site disposal will be classified prior to transport and disposal. Soil analytical results will be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines – Part 1: Classifying Waste.

5.2.4 Water

Based on the conceptual site model, it is not anticipated that groundwater will be encountered during the UPSS removal works.

6. Remedial works plan

6.1 Roles and responsibilities

Currently, the responsible parties are as follows:

Client: Hornsby Shire Council.

Environmental Consultant: GHD.

Remediation Contractor: To be appointed.

6.2 Preliminaries and approvals

Prior to commencing remedial works, all relevant licences and approvals must be obtained by the site owner or by the Environmental Consultant and/or Remediation Contractor (on their behalf).

Prior to establishment at the site, the Remediation Contractor must show Council that they possess the relevant plans, programs, licences, certificates and other documents necessary for the commencement of the work.

These documents are anticipated to include, but not limited by the following:

- A copy of the RAP that was submitted as part of the current DA application to Council (DA/101/2019)
- A copy of the DA consent conditions, relating to the remediation works. As the planned remediation works for the UPSS replacement are considered to be classified as 'Category 1 remediation works: work needing a consent' based on the site being a scenic area and classified as significant biodiversity – Tree and Vegetation Preservation (SEPP 55). UPSS removal works will be assessed as part of the current Development Application (DA/101/2019) for the quarry earthworks
- Management plans including a project management plan, site management plan, health and safety plan, and a community consultation plan (if required); and
- WorkCover Authority notifications.

6.3 General

All excavation works should be undertaken by licensed contractors, experienced in the decommissioning and removal of fuel infrastructure and the remediation of contaminated soils.

An environmental scientist should be present during the excavation works, particularly to assess the contamination status of the soil excavated from around the tanks, and to determine whether further excavation of tank pit walls and floor is required to remove contaminated soil.

As a minimum, the relevant Codes of Practice and guidelines detailed in Section 1.3 should be adhered to.

6.4 Primary source removal for UPSS infrastructure

The UST and associated pipework and bowsers are located adjacent to two bunded AST's which will be remaining in situ. The UST and associated infrastructure is to be removed is shown in Figure 2, Appendix A. Based on a geophysical assessment, the UST is estimated to be approximately 7.8 m long with a diameter of approximately 2.2 m. There are two AST's present at the site, which are similar in size.

Initially the tank contents (if any) will be removed by a licensed liquid waste contractor and disposed at a licensed disposal / processing facility. After the tanks have been de-gassed and are certified gas free, an experienced contractor will remove the UST and pipework by appropriate methods and will then dispose of or recycle the tanks and pipes.

Work will be carried out in accordance with relevant codes of practice, Australian Standards and NSW WorkCover regulations. The contractor should make allowance for temporary shoring of excavations, if deemed necessary, particularly along the western boundary of the site to ensure that stability of the adjacent structure (AST's and shelter) is maintained.

Soils that are excavated to facilitate the removal of the underground infrastructure will be checked visually and screened using a photo-ionisation detector (PID) for the presence of petroleum hydrocarbon contamination. Excavated material with obvious visual evidence of hydrocarbon impact or elevated PID measurements will be segregated from cleaner or less impacted material and placed into separate stockpiles if practicable.

A suitably qualified and experienced Environmental Scientist will guide the excavation of potentially contaminated soils. The excavations will be extended to the extent practicable until visual, olfactory and field screening with a PID by on site personnel indicate that the contaminated soil above the site remediation criteria is likely to have been removed. Excavated soil will be temporarily stockpiled in a designated stockpile area.

Validation sampling will be carried out to confirm that contaminated soil has been removed. The excavation should be left open and fenced off to prevent access until validation results have been obtained. The contractor will need to maintain the excavation according to NSW WorkCover regulations.

6.5 Management of stockpiled material

Temporary stockpiles will be placed on hard standing or HDPE liner. Should the stockpiles be retained onsite for greater than 24 hours, they shall be covered to prevent dust, odour or run off.

The Environmental Consultant will collect samples of the stockpiled material created during the excavations, to assess its suitability for reuse or waste classification (as required).

6.6 Reinstatement of the excavations

Following the completion of excavation and validation works, remaining excavations will be backfilled with material that will comprise validated existing site soils that are deemed suitable for re-use on site, approved excavated natural material (ENM) already on site from North Connex, or approved virgin excavated natural material (VENM).

It is noted that excavated material that was imported to the site as ENM from the North Connex project is considered suitable for use at the site and therefore it would be acceptable to use this ENM material to backfill the excavation.

Any material that is imported to the former workshop area for backfilling, should be inspected and confirmed to be suitable for the intended use. This procedure would involve:

- Reviewing the history of the source of the material including any VENM or ENM certification.
- A visual inspection for foreign material, unusual staining and any odours.
- Sampling of the material for chemicals of potential concern (if required).

Where excavations are backfilled, the material will be compacted to a standard suitable for the proposed above ground usage.

6.7 Pollution Incidents

During the tank replacement works, all practicable measures will be implemented to prevent pollution incidents. This shall include: pumping out the UST and fuel lines etc prior to excavation; measures to prevent dust, soil or spills of impacted water or any other fluid entering the stormwater drains. In the event of a pollution event occurring, the following protocol will be implemented:

- Works will stop immediately. This area will be isolated to minimise potential disturbance or further pollution (unless clean up is underway).
- Immediate notification of sub-contractors on-site, the environmental consultant, Council and the NSW EPA. All parties should be notified within 24 hours.
- An appropriately experienced environmental consultant will assess of the nature and extent of the pollution, which may include sampling and laboratory analysis.
- The pollution will be cleaned up and measures put in place to prevent further pollution. Validation of the clean-up will be undertaken and documented as required.

7. Sampling and validation plan

To obtain agreement that the site has undergone appropriate and effective remediation works, and that it is suitable for the proposed site use, validation of the tank excavation will be undertaken.

This section summarises the scope of works for the on-site sampling and validation program. Sampling will be undertaken in accordance with the relevant guidelines listed in Section 1.4

7.1 Soil validation strategy

7.1.1 Validation of UST areas

Following completion of excavation works, the number and location of soil samples collected from the excavations will be in accordance with relevant guidelines and/or standards referenced in Section 1.4. Quality control samples will be collected as specified in Section 7.3.

The indicative extent of the excavation is shown on Figure 2, Appendix A.

The UST underlies a concrete slab with dimensions of 8.6 m x 4.5 m. This slab will be excavated to allow access to the soils and UST below. The minimum excavation area will be similar to the concrete slab (8.6 m x 4.5 m). Enlarging of the excavation to allow for benching or shoring may be required.

The minimum number of soil validation samples will be:

- Two from the base beneath the centre of the tank;
- Two soil samples from each of the longer north to south walls; and
- Two samples from each of the shorter east to west walls.

The wall samples are proposed to be collected at a mix of depths and will be collected when all material considered to impacted by hydrocarbons (based on visual observations and PID readings) has been removed.

The validation soil samples will be analysed for COPC including TRH, BTEXN, and lead.

7.1.2 Validation of fuel dispensing area and associated fuel lines

Following completion of the excavation works associated with the removal of fuel lines, soil validation samples will be collected at a rate of one sample per five lineal metres. Additional samples may be required if excavations extend beyond one metre depth.

The soil samples collected from this area will be analysed for TRH, BTEXN, and lead.

7.2 Stockpile sampling

For stockpiled material (including the bedding sands), sampling is proposed at a frequency of approximately one per 25 m^3 at each stockpile (not less than three per stockpile), or in accordance with NEPM (2013) guidance.

Excavated soils will be sampled for COPC and will be classified in accordance with guidelines for reuse on site (i.e. suitable for public open space) or disposed off-site to a licenced waste facility (as applicable). No material is to be disposed offsite without formal approval from Council.

The Environmental Consultant shall prepare appropriate reports for the stockpile sampling e.g. a waste classification report.

7.3 Quality control and quality assurance (QA/QC)

All fieldwork will be conducted in general accordance with industry standards. A summary of the QA/QC protocols to be followed is presented in Table 6

Table 6 QA/QC protocols

Task	Description
Decontamination procedures	The use of new disposable gloves for the collection of each sample, decontamination of all multiple use sampling equipment between each sampling location (using a phosphate free 'Decon' detergent) and the use of dedicated sampling containers provided by the laboratory.
Sample procedures	Samples will be collected and immediately transferred to sample containers of appropriate composition and preservation for the required laboratory analysis. All sample containers will be clearly labelled with a sample number, sample location, sample depth and sample date. The sample containers will then be transferred to an ice filled cooler for sample preservation prior to and during shipment under a chain of custody to the testing laboratory.
Duplicate samples	Duplicates will be collected and analysed at a rate not less than 10% for both inter and intra laboratory duplicates. A nominal acceptance criterion of 30% RPD for field duplicates and splits for inorganics and a nominal acceptance criterion of 50% RPD for field duplicates and splits for organics. It is noted that this may not always be achieved, or may be exceeded at low analyte concentrations.
Rinsate	One rinsate a day will be collected when non-dictated equipment or when equipment requires decontamination between sampling points is being used. Results should all be less than the laboratory's limit of detection.
Trip blanks	One trip blank per sample batch will be sent to the laboratory. Results should all be less than the laboratory's limit of detection.
Laboratory quality control	The primary and secondary project laboratories should adopt their internal procedures and NATA accredited methods in accordance with their quality assurance systems.

7.4 Reporting

At the completion of the site works, a UPSS validation report will be prepared in general accordance with the UPSS Regulation and NSW DECCW (2010) *UPSS Technical Note: Site Validation Reporting* and the relevant NSW EPA guidelines. The UPSS validation report will detail the methodologies and results of the validation works.

The UPSS Validation Report will need to include the following:

- Details of the remedial works completed, including sampling methodologies and quality control procedures.
- Calibration records.
- Laboratory chain of custody forms and certificates.
- Waste tracking documentation including characterisation sampling for off-site disposal, stockpile management, confirmation of off-site disposal and any imported fill (VENM) certificates.
- Photographs.
- Evaluation of results including statistical analysis and comparison with the relevant criteria.
- Graphical representation of the remedial works including identification of remedial areas and all validation sampling locations.

- Confirmation that the overall remedial goal has been achieved.

7.5 Unexpected finds

Should unexpected contamination be found on-site, works will stop immediately. This area will be isolated to minimise potential disturbance of affected soils.

Unexpected contamination could include:

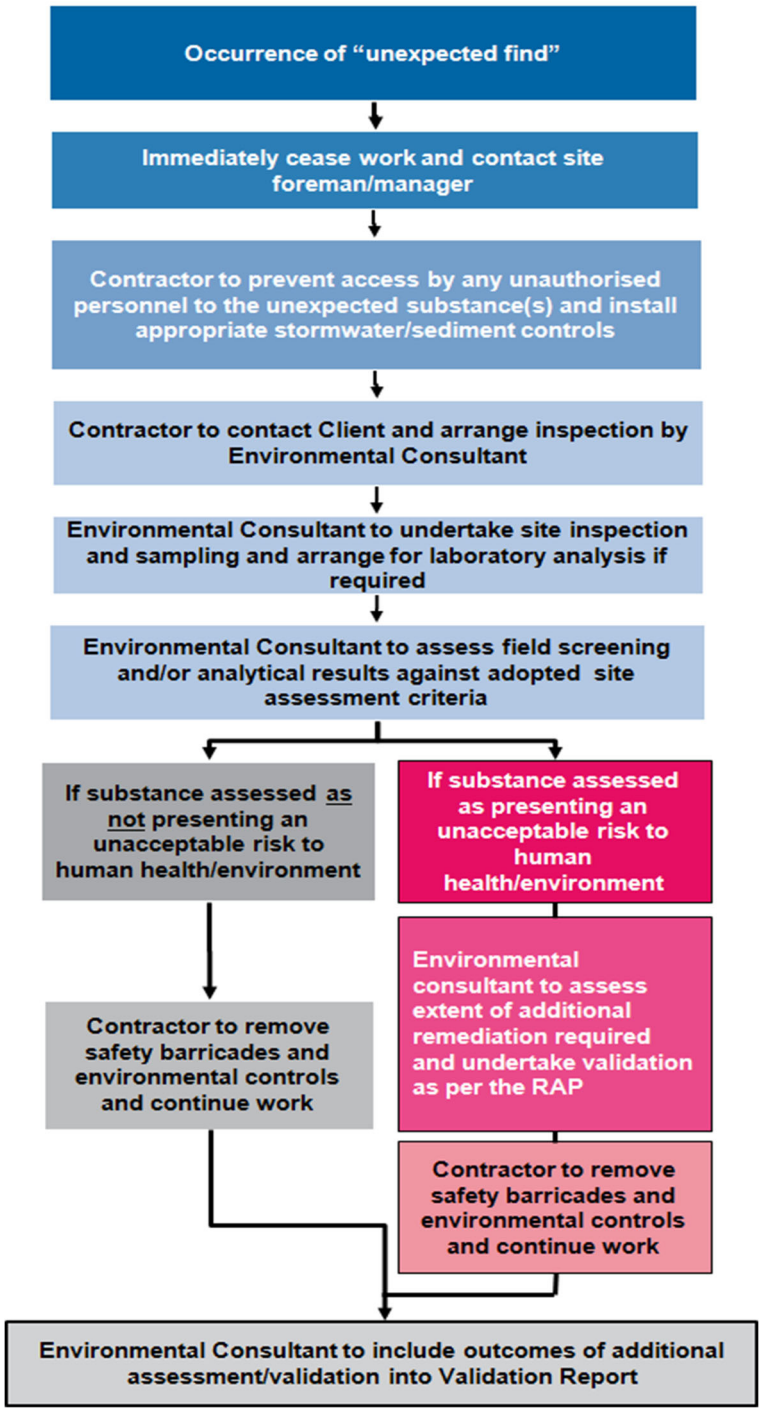
- Unexpected staining, presence of LNAPL or odours in soil.
- Additional subsurface infrastructure such as underground tanks and pipes that were not identified previously.
- Encountering contaminated shallow (perched) water.
- Asbestos fragments.
- Buried wastes.

The general approach for managing unexpected finds comprises:

- Immediate notification to Council and the Environmental Consultant of the unexpected find.
- An appropriately experienced Environmental Consultant will assess of the nature and extent of the unexpected contamination, which may include sampling, laboratory analysis and reporting.
- Additional remediation work (including an amendment to this RAP), and validation if required. If the RAP is amended, it will be submitted to council for approval before works are undertaken.

Procedures to be followed in the event of an unexpected find are shown in **Chart 1**.

Chart 1 – Unexpected finds flowchart



8. Site management

8.1 General

Given the proposed works will result in the disturbance and exposure of contaminated soils during remediation, an activity specific Site Health and Safety Plan (SHSP) and Safe Work Method Statement (SWMS) must be prepared by the contractor undertaking the works (with assistance from a suitably qualified health and safety or environmental consultant, where required). This is so the protection of the environment and the health and safety of workers can be adequately addressed.

The SHSP and SWMS shall include measures to manage the exposure of site workers and users to contamination to acceptable levels and detail the appropriate personal protective equipment (PPE) requirements during the work.

In addition, the SHSP and SWMS must have provisions for equipment and personnel decontamination to manage migration of contamination via equipment and personnel. All workers must be inducted into the SHSP and SWMS by an appropriate person prior to work commencing.

A Site Management Plan (SMP) must be prepared by the contractor and submitted to Council prior to starting the UPSS replacement works. It shall be the responsibility of the remediation contractor to provide, install and maintain all required environmental control measures and the project environmental consultant will undertake inspections of the environmental control measures. The contractor must implement all necessary environmental control measures in accordance with NSW OEH, Safe Work NSW and Council requirements.

The environmental control measures described in the following sections are those anticipated to be required and are not necessarily exhaustive. The contractor must identify any additional control measures considered required.

8.1.1 Occupational health and safety

The appointed contractor will ensure that a project specific occupational health and safety plan has been prepared. This RAP does not relieve the contractor of their responsibility for the health and safety of their employees, sub-contractors and visitors to the Site, nor their responsibility for preventing contamination of areas outside remediation work areas.

Specific safe work method details for the remediation and management of contamination on the site will be the responsibility of the appointed contractor and will depend upon the equipment used and the overall sequence of remediation.

The SMP must include details regarding safe loading and unloading of excavation machines, plant and equipment to ensure appropriate protection of existing landscaping, street trees and any public land.

8.1.2 Access control

The SMP must include details for safe access to and from the site (defined as the former workshop area) during works. Access to the site will be restricted to authorised staff and contractors who have been inducted and appropriately trained for the works being undertaken. It is anticipated that access to and from site will be via Quarry Road. Where required, traffic management will be employed for access to the site.

The SMP must also include provisions for site security. Fencing and/or hoarding will be maintained around the perimeter of the site during the works.

Signage, including contractor details and contact numbers, will be erected near the gate at the site. The signage will remain displayed on the site entrance throughout the duration of the remediation works. Any lighting requirements for the site, road and footpath should also be included in the SMP.

The contractor is responsible for keeping public roads on the routes of site vehicle traffic clean of any material sourced from the site. All equipment/ trucks are to be decontaminated if required prior to leaving the site to prevent the inadvertent transport of contaminated material off-site.

8.1.3 Inductions

The contractor will be responsible for conducting site safety inductions on all personnel required to be in the work area. Inductions will include, but may not be limited to, the following information:

- Safe work method statements.
- Personal protective equipment.
- Responsibilities of personnel.
- Emergency response procedures.
- Contact details of key personnel.

Documented evidence that site staff have completed the site induction must be recorded in the contractor's health and safety plan, which must be retained on-site at all times for inspection.

In addition to the general site induction, the site supervisor must conduct daily "toolbox" talks with site staff prior to commencing works each day. The toolbox talks must address the following as a minimum:

- Specific tasks to be conducted.
- Potential changes to the program.
- Issues and concerns.
- Site activities that may influence the works being carried out (e.g. other works onsite).
- Environmental factors that may influence the works, such as weather.

8.1.4 Incident Reporting Procedures and Timeframes

All incidents (including near miss incidents) occurring on the job must be immediately reported to the Site Manager. In the event of an emergency, all members of the project team shall assemble at the nominated assembly point and wait for further instruction from the Site Manager or delegate at the assembly area. The Site Manager will then assess the situation and, if required, inform other affected parties including Council, neighbours and site staff.

If there is an incident, which creates an immediate risk to the surrounding environment requiring an emergency response, the Site Manager will contact a suitably qualified hazardous materials contractor to contain the issue and mitigate the risk, as far as possible. Following the emergency response actions, the Site Manager should engage a suitably qualified environmental professional to assess the extent of impact to the environment and propose appropriate remedial actions to mitigate the risk to an acceptable level.

8.2 Soil and water management

The SMP must include details of soil and water management. The following measures outline generalised methods that should be implemented to manage soil and water (if any) related impacts. However, activity specific factors need to be considered and appropriate control

measures assessed for the specific activity. Management measures should include (but are not necessarily limited to):

- Installation and maintenance of secure fencing (with shade cloth) around the site boundaries to prevent public access.
- Implementation of sediment and erosion controls to divert surface water away from open excavations such as sand bags.
- Implementation of control measures to prevent surface run-off impacting local drainage networks.
- Covering of temporary stockpiles (if required) with high density polyethylene (HDPE) sheeting. Stockpiles should not be placed near the site boundary, drainage lines, easements, footpaths, roadways, gutters or stormwater pits.
- Significant quantities of groundwater are unlikely to be encountered during the excavation works. Where possible, accumulation of water in excavations will be minimised by back filling open excavations as soon as practicable. Any perched or groundwater ingress occurring during excavation works will be pumped into a mobile tanker, transported and disposed at an appropriately licenced facility. In the event that excessive volumes of water are encountered, further excavations will be terminated, and any open excavations backfilled until an appropriate way forward is established.
- Control of erosion or dust migration from stockpiles, which may involve:
  - Regular dampening of stockpiles with water mist to minimise dust generation. Note that the amount of water used for dust suppression needs to be minimal in order to prevent runoff.
  - Wetting down of exposed soils or delaying of excavation works, in the case that dust migration occurs due to high winds.

8.3 Stormwater run-off

The SMP must include details of methods to prevent pollutants entering the stormwater system and waterways. The following measures will be employed to minimise the risk imposed by stormwater run-off from impacted areas:

- Silt fences will be established across all areas where surface water could flow from the proposed excavation/stockpile areas using geofabric and absorbent booms.
- Covering of any stockpiles of contaminated soil in order to prevent leaching of chemicals and subsequent transport into site drainage.

No visibly dirty water shall migrate as surface water flow from the site.

8.4 Dust control

Generation of dust during remediation works may occur. Site activities will be managed to minimise the generation of dust and the movement of dust off the site.

The following strategies will be implemented to minimise dust generation and dust movement:

- Wetting down of dry soils during excavation and loading.
- Covering loads during transportation.
- Application of shade cloth or similar to perimeter fencing.
- Limiting excavation and loading activities during high winds.
- Wetting down stockpiles and/or covering with plastic/geofabric.

- Maintaining stockpile heights below the heights of perimeter fencing.

8.5 Odour control

Given the anticipated levels and type of contamination expected at the site, generation of odours to a level that requires action is not considered likely, however, odour controls should be adopted as appropriate to ensure that no offensive odours occur at or beyond the site boundary.

The following odour management procedures may be used:

- Undertaking the excavation works in a staged manner to limit the surface area and amount of potentially odorous materials being exposed.
- Application of odour suppressants (e.g. Biosolve® or Killsmell®).
- Covering of stockpiled material until disposal.
- Covering of transported soil, to suppress the release of the odours.

Should volatile hydrocarbon compounds be identified during remediation works, air monitoring will be carried out during the excavation works using a calibrated PID, to assess the potential for ionisable volatile organic compounds (VOC) to be present. Air quality within workers' breathing zones will be monitored during the remediation works using the PID. Workers will stop work and withdraw from the work area when PID readings are continuously greater than 10 ppm in the workers' breathing zone. Use of respirators, watering or covering of stockpiles, and suspension of site works will be implemented as appropriate.

8.6 Noise controls

Noise producing machinery and equipment will only be operated during approved working hours. Australian Standard AS2436-2010 (R2016) Guide to noise control on construction, maintenance and demolition sites outlines guidelines for the minimisation of noise on construction and demolition sites and these will be followed at all times.

Mechanical plant, equipment and the like used during remediation works/activities will use all 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.

Best practical means to minimise noise levels will be used to minimise noise levels throughout remediation works.

8.7 Hours of operation

All operations will be conducted within the working hours permitted by Council. The only works permitted outside these hours shall be emergency response procedures and subject to approval by Council.

Remediation work are proposed to be conducted between the following nominal hours:-

Monday – Friday	0700 hrs – 1800 hrs
Saturday	0800 hrs – 1300 hrs
Sunday & Public Holidays	No work is permitted

8.8 Communication & complaints

Communication and complaints received for the site must be reported to Council. All communications and complaints will be assessed and an appropriate response, corrective and/or preventative action implemented (as necessary).

A communication and complaints register will be operated on site to ensure that concerns of local residents and businesses are recorded and addressed.

8.9 Emergency preparedness and response

The appointed contractor will ensure that plans to respond to incidents and emergencies (e.g. fires, spills or other uncontrolled releases) have been prepared. The appointed contractor will ensure that all employees, sub-contractors and visitors to the site are made aware of the emergency protocols in place. A Contingency and Emergency Response Plan should be prepared by the contractor. The purpose of the contingency plan is to identify unexpected situations that could occur during the project, and to specify procedures that can be implemented to manage such situations and prevent adverse impacts to the environment and human health. The information that will be contained herein will include, but is not necessarily limited to:

- Assignment of responsibilities to nominated key personnel.
- Hazard assessment of potential off-site impacts.
- Contingency responses.
- Reporting to regulatory authorities.
- Unexpected situations.

9. Summary

The purpose of this RAP is to provide a framework for the remediation and validation of soil from excavated areas following the removal of UPSS infrastructure to evaluate the suitability of the site for its proposed use as a public park (public open space)

The actions required to carry out the RAP are summarised as follows:

- Develop a Site Management Plan (to be prepared by the nominated contractor).
- Prior to any excavation works, undertake a dial before you dig search and underground service identification.
- Remove concrete and excavate to expose UST.
- Remove all fuel from drainage points, pipework and UST. De-gas the UST prior to safe removal and transport for off-site destruction.
- Dispose of the UST off-site by a licensed waste contractor.
- Remove any associated infrastructure including underground pipework.
- Collect validation soil samples from the walls and base of the excavations for UST and fuel line excavations for laboratory analysis.
- Ensure that the validation samples show that no contamination exists within the excavation that is above the nominated screening criteria. If this is not the case, undertake further excavation of affected soils, until validation samples show that the remediation criteria has been achieved.
- Stockpile and separate any impacted soils that are considered unsuitable, which are to be classified and disposed off-site to an EPA approved waste facility.
- Backfill the resulting excavations with validated existing site soils from the tank excavation that are deemed suitable for re-use, approved excavated natural material (ENM) already on site from the North Connex project, or approved virgin excavated natural material (VENM) imported to site.
- Prepare a Validation Report.

The validation report will be provided to Council in accordance with the expected conditions of the development consent.

10. Limitations

This Hornsby Quarry UST – Remedial Action Plan ("RAP"):

1. *has been prepared by GHD Pty. Ltd. ("GHD") for Hornsby Shire Council (Council)*
2. *may only be used and relied on by Council;*
3. *must not be copied to, used by, or relied on by any person other than Council without the prior written consent of GHD and subject always to the next paragraph;*
4. *may only be used for the purpose of Remedial Works (and must not be used for any other purpose).*

GHD has prepared this RAP on the basis of information provided by Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked ("Unverified Information") beyond the agreed scope of work, as well as site investigations undertaken by GHD.

GHD expressly disclaims responsibility in connection with the Unverified Information, including (but not limited to) errors in, or omissions from, the RAP, which were caused or contributed to by errors in, or omissions from, the Unverified Information.

The opinions, conclusions and any recommendations in this RAP are based on information obtained from, and testing undertaken at or in connection with, specific sampling points and may not fully represent the conditions that may be encountered across the site at other than these locations. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this RAP are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this RAP.

GHD has considered and/or tested for only those chemicals specifically referred to in this RAP and makes no statement or representation as to the existence (or otherwise) of any other chemicals.

Site conditions (including any the presence of hazardous substances and/or site contamination) may change after the date of this RAP. GHD expressly disclaims responsibility:

- *arising from, or in connection with, any change to the site conditions; and*
- *to update this RAP if the site conditions change.*

Except as otherwise expressly stated in this RAP, GHD makes no warranty or representation as to the presence or otherwise of asbestos and/or asbestos containing materials ("ACM") encountered in the remediation excavations or found elsewhere on the site. If fill material has been imported on to the site at any time, or if any buildings constructed prior to 1970 have been demolished on the site or material from such buildings disposed of on the site, the site could possibly contain asbestos or ACM.

Subsurface conditions can vary across a particular site and cannot be exhaustively defined by the investigations carried out prior to this RAP. As a result, it is unlikely that the results and estimations expressed or used to compile this RAP will represent conditions at any location other than the specific points of sampling. A site that appears to be unaffected by contamination at the time of the reports attached to this RAP may later, due to natural causes or human intervention, become contaminated.

Except as otherwise expressly stated in this RAP, GHD makes no warranty, statement or representation of any kind concerning the suitability of the site for any purpose or the permissibility of any use, development or re-development of the site.

These disclaimers should be read in conjunction with the entire RAP. This RAP must be read in full and no excerpts are taken to be representative of the findings of this RAP.

Appendices

Appendix A - Figures

Legend

- Site boundary
- Remediation area
- Watercourses

Paper Size ISO A4

0 25 50 75 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Hornsby Shire Council
Hornsby Quarry
UST RAP

Project No. **2126457**
Revision No. **A**
Date **04/10/2019**

Site location

FIGURE 1

\\ghdnet\ghd\AU\Sydney\Projects\21\26457\GIS\Maps\Deliverables\Hornsby Quarry UST RAP\21_26457_Z001_SiteLocationNewTemplate.mxd
Print date: 04 Oct 2019 - 11:54

Data source: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: jwatson2

Legend

- Remediation area
- Excavation area
- UST - Proposed to be removed
- AST - Not proposed to be removed
- Existing bowser

Paper Size ISO A4

0 2.5 5 7.5 10

Metres

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

GHD

Hornsby Shire Council
Hornsby Quarry
UST RAP

Project No. **2126457**
Revision No. **A**
Date **04/10/2019**

Site layout and extent of excavation

FIGURE 2

\\ghdnet\ghd\AU\Sydney\Projects\21\26457\GIS\Maps\Deliverables\Hornsby Quarry UST RAP\21_26457_Z004_ExtentofExcavation.mxd
Print date: 04 Oct 2019 - 14:25 Imagery extracted from Nearmap on the 02/10/2019

Data source: . Created by: jwatson2

Legend

Borehole

Paper Size ISO A4

0 5 10 15 20

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

GHD

Hornsby Shire Council
Hornsby Quarry
UST RAP

Project No. **2126457**
Revision No. **A**
Date **03/10/2019**

Previous investigation locations

FIGURE 3

\\ghdnet\ghd\AU\Sydney\Projects\21\26457\GIS\Maps\Deliverables\Hornsby Quarry UST RAP\21_26457_Z002_PreviousInvestigationLocations.mxd
Print date: 03 Oct 2019 - 10:33 Imagery extracted from Nearmap on the 02/10/2019

Data source: . Created by: jwatson2

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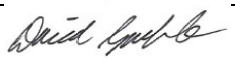
https://projects.ghd.com/oc/Sydney/hornsbyquarryrehabil/Delivery/Documents/2126457_Hornsby Quarry UST RAP.docx

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	J. Ewing	H. Milne		A.Roberts		
0	J.Ewing	D. Gamble		D.Gamble		16/10/19
1	J.Ewing	D. Gamble		D.Gamble		22/10/19

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