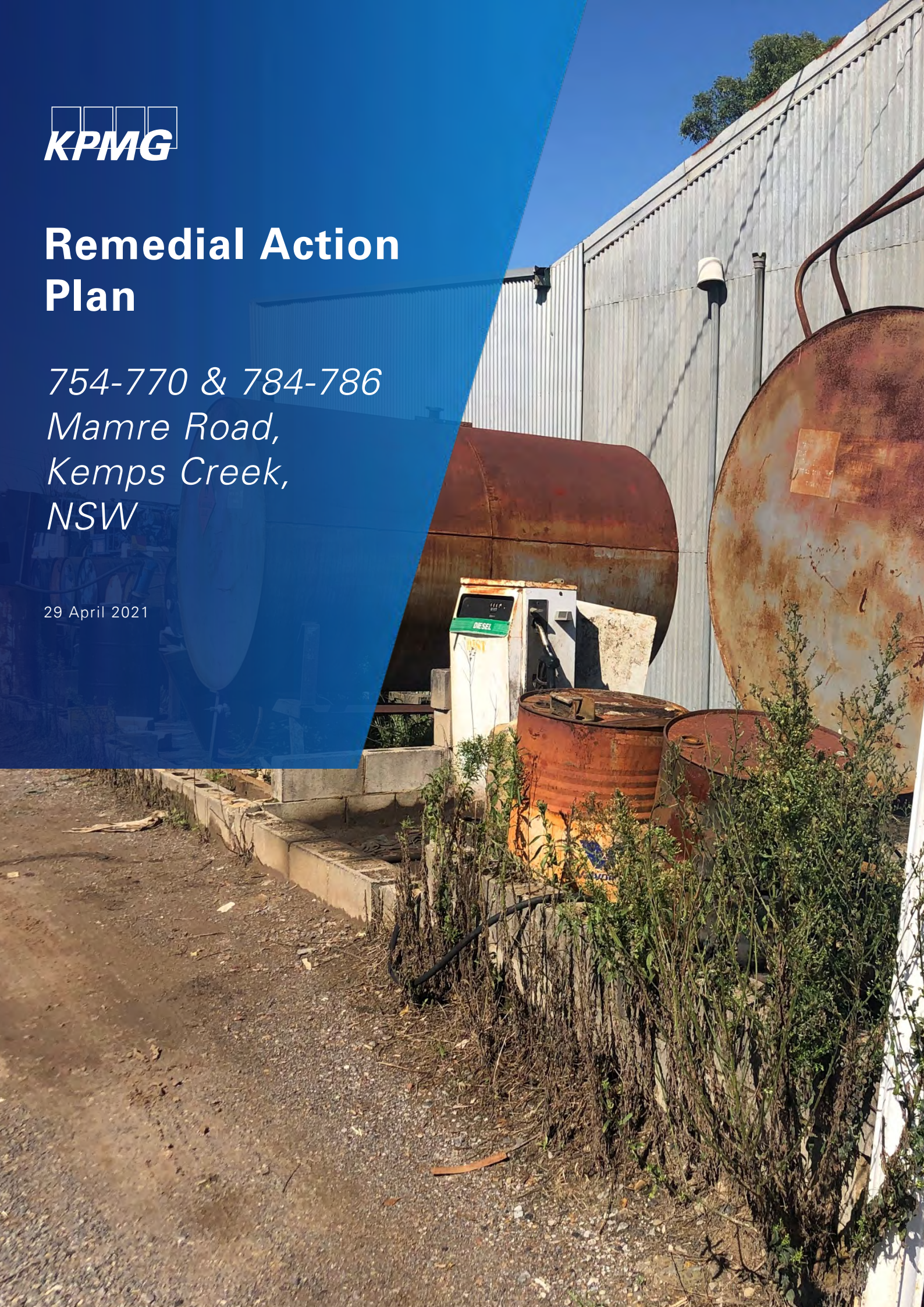




Remedial Action Plan

*754-770 & 784-786
Mamre Road,
Kemps Creek,
NSW*

29 April 2021



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Table 1 NSW EPA Consultants Reporting on Contaminated Land – Remedial Action Plan Checklist

Report Section	Required Information	Included	Section
Document Control	Date, version number, author and reviewer (including certification details) and who commissioned the report	✓	Page 2
Executive Summary	Background – include a summary of site contamination	✓	Section 1
	Objectives of the remediation	✓	
	Summary of selected scope of remediation works	✓	
Objectives	The objectives of the remediation	✓	Section 2.1
Scope of work	Summary of the scope of work	✓	Section 2.2
Site identification	Site identification and detail items from ASC NEPM Field Checklist 'Site information' sheet	✓	Section 3
Site history	Site history items from ASC NEPM Field Checklist 'Site information' sheet	✓	Section 5
Site condition and surrounding environment	Site condition and surrounding environment items from ASC NEPM Field Checklist 'Site information' sheet. A summary is enough if detail information was included in an available referenced previous report.	✓	Section 6
Remediation Criteria	Table listing all selected remediation criteria and references	✓	Section 7
	Rationale for the selection of criteria, including assumptions and limitations of the criteria and any deviations from the approved guidelines	✓	Section 7
	Rationale for any site-specific remediation criteria developed through a site-specific risk assessment. Refer to ASC NEPM Schedules B4, B5a, B5b, B5c, B6 and B7	✓	Section 7.5
	Refer to HEPA (2020) PFAS National Environmental Management Plan (NEMP) or guidance on environmental levels that indicate the need for action.		Not applicable
Results	A summary is enough if detailed information was included in an available referenced previous report	✓	Section 4 and 6.1

Report Section	Required Information	Included	Section
Results	Tabulated previous results relating to the remedial action plan that:	✓	Section 6.1 and Appendix A, Figures 3A to 3D and 4A to 4C
	<ul style="list-style-type: none"> show all essential details such as sample identification numbers and sampling depth 	✓	
	<ul style="list-style-type: none"> show remediation assessment criteria 	✓	
	<ul style="list-style-type: none"> highlight all results exceeding any remediation criteria 	✓	
	Sample descriptions for all media where applicable (e.g. soil, sediment, surface water, groundwater, biota)	✓	
	Site plan showing all sample locations	✓	
	Site plan(s) showing the extent of soil and groundwater contamination exceeding selected remediation criteria for each sampling depth, including sample identification numbers and sampling depths of all samples analysed	✓	Appendix A, Figure 5
	Site plan(s) showing the proposed extent of remediation	✓	
Site characterisation	A summary is enough if detailed information was included in an available referenced previous report	✓	Section 6.1
	Assessment of types of all environmental contamination	✓	Section 6.1
	Assessment of extent of all identified contamination, including off-site areas	✓	Section 6.1
Conceptual site model	See Table 2(a)	✓	Section 6.2
Remediation Options Assessment and Remediation Strategy	Remediation objectives (these should already be defined under the general objectives and then the criteria derived.)	✓	Section 9.1
	Assessment of possible remedial options and how risk can be reduced	✓	Section 9.2
	Rationale for the selection of recommended remedial option, in accordance with the preferred hierarchy of site remediation and/or management set out in Key Principles for Remediation and Management of Contaminated Sites of the ASC NEPM Toolbox	✓	Section 9.2

Report Section	Required Information	Included	Section
Remediation Options Assessment and Remediation Strategy	Description of the remediation works to be undertaken	✓	Section 10
	A validation plan which includes proposed testing to validate the site during/after remediation, including SAQP as per Table 2.2	✓	Section 11.1
	Confirmation that waste imported onto the site is lawful Note: materials transported onto site will either need to meet the definition of virgin excavated natural material, or a resource recovery order and resource recovery exemption. In addition, materials imported onto the site must be adequately assessed as being appropriate for the final use of the site, including QA/QC evaluation of any sampling and analysis for material brought to site	✓	Section 11.2.2
	Contingency plan if the selected remedial strategy fails	✓	Section 10.6
	Interim site management plan before remediation, including fencing, erection of warning signs, stormwater diversion, etc.	✓	Section 12
	Site management plan requirements (operational phase):	✓	Section 13
	• site stormwater management plan	✓	Section 13
	• soil management plan, including material tracking	✓	Section 13
	• noise control plan	✓	Section 13
	• dust control plan, including wheel wash (where applicable)	✓	Section 13
	• odour control plan	✓	Section 13
	• work health and safety plan	✓	Section 14
	• remediation schedule	✓	Section 14
	• hours of operation	✓	Section 13.2

Report Section	Required Information	Included	Section
Remediation Options Assessment and Remediation Strategy	<ul style="list-style-type: none"> contingency plans to respond to site incidents, to remove potential effects on surrounding environment and community 	✓	Section 14.6.3
	Description of regulatory compliance requirements such as licences and approvals or financial assurance	✓	Section 10.3
	Names and phone numbers of appropriate personnel to contact during remediation	✓	Section 14.6.4
	Community relations plans (where applicable)		Not applicable
	Staged progress reporting (where appropriate)	✓	Section 10.5.2
	Outline of environmental management plan for ongoing management of contamination at the site (if needed)		Not applicable
Waste management (if applicable)	Waste classification reporting requirements in accordance with EPA Waste Classification Guidelines (see Table 2(d))	✓	Section 7.6.2
	Description of material handling and tracking plan	✓	Section 13.9
	Statements regarding materials being disposed via appropriately licenced facility or re-used under an order or exemption	✓	Section 10.5.5
	Waste disposal dockets or other waste documentation for any disposed waste	✓	Section 10.5.5 and 13.9
	Refer to the Site Auditor Guidelines section 4.3.7 Waste management for waste management requirements		Not applicable
Remediation Technology Pilot Trail (if applicable)	Details and results from treatability trials and Proof of Performance testing, to demonstrate the remediation option chosen was suitable for the site (for major remediation projects). If trials have not been completed, include an indicative scope of the proposed trial.		Not applicable
Conclusions and recommendations	A list summarising the activities and physical changes proposed for the site	✓	Section 15
	Conclusions addressing the stated objectives	✓	Section 15

Report Section	Required Information	Included	Section
	Assumptions used in reaching the conclusions	✓	Section 15
	A clear statement as to why the consultant considers the site can be made suitable for the proposed use if the remedial action plan is implemented	✓	Section 15
	A summary of proposed limitations and constraints on the use of the site post remediation and proposed environmental management plan for long-term management of residual contamination at the site (where applicable)		Not applicable
	Recommendations for further work, if appropriate	✓	Section 15

Table 2 Glossary of General Terms

Glossary of General Terms	
AST	Above ground storage tank
BTEX	Benzene, toluene, ethylbenzene, xylenes
COCs	Chemicals of concern
CSM	Conceptual site model
DQO	Data quality objective
DGV	Derived Guideline Value
EILs	Ecological Investigation Levels
EPA	NSW Environment Protection Authority
ESI	Environmental Site Investigation
ESLs	Ecological Screening Levels
HHRA	Human Health Risk Assessment
HILs	Health Investigation Levels
HSLs	Health Screening Levels
LOR	Limit of laboratory reporting
m	Meters
mbgl	Meters below ground level
mbTOC	Meters below top of casing
mg/kg	Milligram per kilogram
NATA	National Association of Testing Authorities
NEPM ASC	National Environment Protection Council (1999) National Environment Protection (Assessment of Site Contamination) Measure (Amended 2013)
OCPs	Organochlorine pesticides
OPPs	Organophosphorous pesticides
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PID	Photoionisation detector
PSI	Preliminary Site Investigation
QA/QC	Quality Assurance / Quality Control
RAC	Remediation Acceptance Criteria
RAP	Remedial Action Plan
RPD	Relative percentage difference
TEI	Targeted Environmental Investigation
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
µg/L	Microgram per litre
UPSS	Underground petroleum storage system
UST	Underground storage tank
WHS	Work health and safety

1 Executive Summary

KPMG Property & Environmental Services Pty Limited (KPMG) were commissioned by GPT to undertake a Remedial Action Plan (RAP) at 754-770 & 784-786 Mamre Road, Kemps Creek, NSW (the site). The area known to require remediation is wholly located within 784-786 Mamre Road, which is legally described as Lot 59 on DP259135, however 754-770 Mamre Road has been included in this RAP as it forms part of the proposed development and is subject to protocols within this RAP. A map showing the location of the site is provided as Figure 1.

It is understood that a RAP is required to satisfy the Secretary's Environmental Assessment Requirements (SEARs) for a State Significant Development Application (SSDA). This RAP is based on information contained within previous site investigations carried out by KPMG and relates to the presence of chemicals of concern (COCs), namely heavy metals and hydrocarbons, that were identified in soil and groundwater within an area of the site containing above ground and underground fuel and chemical storage. KPMG understand that it is proposed to remediate the site to make it suitable for commercial/industrial land use as part of a general industrial development. This RAP incorporates information from these investigations along with additional information to support the SEARs for the SSDA.

The extent of remediation required at the site will be contingent on the results of an additional investigation detailed in section 8. The proposed additional investigation locations aim to assess soil and groundwater conditions and to delineate the extent of contamination particularly originating from the underground petroleum storage system (UPSS) and chemical storage. The advancement of the proposed investigation locations is contingent on the demolition and removal of site structures and underground services. An addendum to this RAP may be produced with the results of the additional investigation, the extent of COC impact identified, and any changes to the remediation strategy.

In consideration of the hierarchy for soil remediation options and the significant earthworks required to develop the site, the preferred option is to remove contaminated material from site, which is above the specified remediation acceptance criteria, to an appropriately NSW EPA licensed landfill. The primary method of remediation will involve the excavation of visually impacted soil by excavator. Impacted soil will be stockpiled on site under appropriate controls, sampled for validation / waste classification purposes and removed off-site if above the remediation acceptance criteria. The walls and base of remediation excavations will continue to be excavated until visually clean natural material is encountered. Validation samples will be collected at frequencies specified in section 11.

The objective of the remediation activities is to render the site suitable for the proposed industrial/commercial land use. An Unexpected Findings Protocol has been developed (Appendix C) which should be enacted if additional potential contamination is encountered during remediation activities or general site works.

2 Background, Objective and Scope of Works

KPMG Property & Environmental Services Pty Limited (KPMG) were commissioned by GPT to undertake a Remedial Action Plan (RAP) at 754-770 & 784-786 Mamre Road, Kemps Creek, NSW (the site). The area known to require remediation is wholly located within 784-786 Mamre Road, which is legally described as Lot 59 on DP259135, however 754-770 Mamre Road has been included in this RAP as it forms part of the proposed development and is subject to protocols within this RAP. A map showing the location of the site is provided as Figure 1.

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2.1 Objective

The primary objective of this RAP is to inform and guide site remediation and validation through the following:

- Define the remedial goals that will ensure that the remediated site will be suitable for commercial/industrial land use
- Document the remediation strategy and describe the remediation procedures to be implemented to reduce the contamination risk to an acceptable level for the land use, including requirements for validating the remedial works
- Establish the necessary environmental management procedures to be implemented during the proposed remedial works
- Identify and reference approvals or licenses required by the proposed works.

2.2 Scope

The following key scope items were included in the RAP:

- Identify the extent and type of contamination requiring remediation
- Definition of remediation goals and Remediation Acceptance Criteria (RAC)
- Evaluate the feasible remediation strategies and options
- Detail the preferred remedial option for the site
- Preparation of a validation plan to ensure that the RAC are achieved
- Outline preliminary work health and safety (WHS) requirements to minimise the risk of human exposure to COCs

- Outline preliminary environmental management requirements to minimise the impact of remediation works on the surrounding environment.

Following the execution of the remediation processes, a validation report will be required to be prepared. The objective of the validation report would be to describe the completed remedial works and determine whether the site has been remediated to a standard that is suitable for the proposed land-use.

3 Site Identification

The site is located at 754-770 & 784-786 Mamre Road, Kemps Creek, NSW (the site). The area known to require remediation is wholly located within 784-786 Mamre Road, which is legally described as Lot 59 on DP259135, however 754-770 Mamre Road has been included in this RAP as it forms part of the proposed development and is subject to protocols within this RAP.

Site and investigation areas details are summarised in Table 3.

Table 3 Site Details

Item	Details
Site Address	754-770 & 784-786 Mamre Road, Kemps Creek, NSW
Land Identifier	Lots 59 and 60 on DP259135
Site Area	Approximately 331,525m ²
Local Government Authority	Penrith City Council
Zoning	WSA - SEPP (Western Sydney Aerotropolis) 2020
Site Locality Map	Figure 1
Investigation Locations Map	Figure 2
Future Land Use	Commercial/Industrial

4 Previous Investigations

The following information has been reviewed as part of this RAP:

Table 4 Information Reviewed

Documents Reviewed	
<ul style="list-style-type: none"> Costin Roe Consulting – Preliminary Bulk Earthworks Plans, dated May 2019 (CRC 2019) KPMG SGA Property Consultancy Pty Ltd - Targeted Environmental Investigation, 754-786 Mamre Road, Kemps Creek, NSW, dated 21 November 2019 (KPMG SGA 2019) KPMG Property and Environmental Services Pty Ltd - Limited Asbestos Assessment, 754 & 784-786 Mamre Road, Kemps Creek, NSW, dated 27 August 2020 (KPMG 2020a) KPMG Property and Environmental Services Pty Ltd - Groundwater and Surface Water Sampling Event, 754 & 772-782 Mamre Road, Kemps Creek, NSW, dated 22 December 2020 (KPMG 2020c) KPMG Property and Environmental Services Pty Ltd - Environmental Assessment, 784-786 Mamre Road, Kemps Creek, NSW, dated 23 March 2021 (KPMG 2021a). KPMG Property and Environmental Services Pty Ltd – Preliminary Site Investigation, 754-770 & 784-786 Mamre Road, Kemps Creek, NSW, dated 23 March 2020 (KPMG 2021b). 	
Key Findings	
CRC 2019	<ul style="list-style-type: none"> The plans were based upon a proposed development comprising seven (7) warehouses which would necessitate cut and fill earthworks across the site to facilitate benching of construction pads. The plans calculated that, with the stripping of 200mm of topsoil from the site and significant cut and fill earthworks, there would be a net requirement for 21,500 m³ of material to be imported.
KPMG SGA 2019	<ul style="list-style-type: none"> KPMG SGA was engaged by GPT Pty Ltd to undertake a Targeted Environmental Investigation (TEI) at 754-770 and 784-786 Mamre Road, Kemps Creek, NSW. The objective of the TEI was to assess the presence and nature of COCs within site soils as part of due diligence considerations associated with potential acquisition of the site. KPMG SGA understood that GPT were considering acquiring the site to allow industrial redevelopment. Potential areas of environmental concern (AECs) which were considered to be sources of COC impact to soil/groundwater were: <ul style="list-style-type: none"> above ground and underground fuel storage – a refuelling area containing aboveground storage tanks (ASTs), chemical drums and two (2) underground storage tanks (USTs) was identified at 784-786 Mamre Road adjacent to a vehicle workshop. Anecdotal information received on site indicated that at least one of the USTs was in poor condition and was no longer in use. This area represented a source of petroleum hydrocarbons. other chemical storage – a chemical drum and equipment storage area was identified within a shed located in the south western section of the site (784-786 Mamre Road). This area was considered to represent sources of a wide variety of organic and inorganic COCs including, but not limited to, petroleum hydrocarbons, volatile organic compounds (VOCs), and heavy metals. vehicle workshops – two (2) vehicle workshop areas were identified at 754-770 & 784-786 Mamre Road and include the use and storage of liquid chemicals. These areas were considered to represent sources of a wide variety of organic and inorganic COCs including, but not limited to, petroleum hydrocarbons, VOCs, and heavy metals. washdown activities – vehicle/equipment washdown areas were identified at 754-770 & 784-786 Mamre Road. These areas were considered to represent a source of a wide

	<p>variety of organic and inorganic COCs including, but not limited, to petroleum hydrocarbons and heavy metals.</p> <ul style="list-style-type: none"> – former market gardens – the western section of 754-770 Mamre Road was historically used for horticultural (market garden) activities. This area was considered to represent a source of organochlorine/organophosphate pesticides (OCPs/OPPs), herbicides, and heavy metals. <ul style="list-style-type: none"> • The above mentioned AECs were subjected to intrusive investigation with fieldworks undertaken by KPMG on 19 and 20 September 2019 which involved: <ul style="list-style-type: none"> – advancing 20 soil borehole locations with a drill rig on a targeted basis to at least 0.5 m into natural soil or refusal is met – advancing two (2) soil borehole locations with a hand auger at in a dam wall in the eastern section of the site – advancing three (3) locations with a hand auger within stockpiled material in the north western section of the site. – no soil samples were collected from 772-782 Mamre Road as no significant sources of COCs were identified at that property. • In general, the concentrations of COCs within most soil samples analysed were below the laboratory limit of detection and the adopted guidelines for commercial/industrial use. • During the investigation, areas of hydrocarbon staining were observed to surface material around the vehicle workshop and refuelling area at 784-786 Mamre Road. A surface soil sample collected from this area contained concentrations of total recoverable hydrocarbons (TRH) above guidelines for the protection of ecological receptors and Management Limits. • The concentrations of heavy metals (chromium, copper, nickel and zinc) within soil samples collected from around the vehicle workshop and refuelling area at 784-786 Mamre Road and one sample from 754-770 Mamre Road were also identified as being variably above guidelines for the protection of ecological receptors. In addition, the concentration of benzo(a)pyrene (BaP) in a surface soil sample collected from a storage area at 754-770 Mamre Road was above the guideline for the protection of ecological receptors. • Elevated concentrations of TRH were also identified in locations adjacent to the ASTs and USTs, however they were below the adopted guideline levels. The subsurface lithology identified around the ASTs and UPSS at 754-770 Mamre Road comprised shallow fill (<0.5 m), overlying firm clays, overlying weathered shale to a maximum investigation depth of 5 mbgl. It was considered likely that this lithology had limited the migration of COCs, however it was expected that localised COC impact would be present within the material immediately surrounding the USTs (i.e. within the tank pits) and possibly on the western side of the USTs where investigation was not undertaken due to access constraints. • KPMG SGA considered that the site was generally suitable for commercial/industrial land use subject to the following works being undertaken: <ul style="list-style-type: none"> – production of a Remedial Action Plan (RAP) to document the below remediation works – remediation of TRH impacted surface soils be undertaken around the workshop area at 784-786 Mamre Road – the underground petroleum storage systems (UPSSs), believed to include two (2) underground fuel storage tanks (USTs) located adjacent to the workshop at 784-786 Mamre Road, be decommissioned by removal with the area remediated and a Validation Report provided in accordance with the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 – consideration of the need to remediate heavy metal and BaP impacted soils which exceeded the guidelines for the protection of ecological receptors; this may not be required if these soils are emplaced beneath hardstand areas rather than used as landscaping material.
KPMG 2020a	<ul style="list-style-type: none"> • KPMG was engaged by GPT to undertake a Limited Asbestos Assessment (LAA) at 754-770 and 784-786 Mamre Road, Kemps Creek, NSW. • KPMG inspected the site on 29 July 2020. • KPMG identified asbestos containing materials (ACMs) and/or potential asbestos containing materials (PACMs) in various building onsite. These occurrences of ACMs/PACMs comprised

	<p>fibre cement sheeting as either external walls, gables or eaves/soffits to buildings, and electrical backing boards, which were generally observed to be in a good condition and were considered to pose a low risk to current site users in their current condition.</p> <ul style="list-style-type: none"> In accordance with the Work Health and Safety Regulation 2017 and supporting Codes of Practice, KPMG recommended the following: <ul style="list-style-type: none"> If the site is planned to continue operating as a workplace, the PCBU should engage a suitably qualified consultant to provide an Asbestos Register and Management Plan (ARMP) for all buildings considered to be workplaces. A pre-demolition asbestos inspection, utilising destructive sampling techniques should be undertaken prior to any planned demolition or refurbishment works. Prior to demolition or refurbishment works, all ACM/PACMs should be removed in accordance with the Code of Practice – How to Safely Remove Asbestos (Reference 11). All asbestos removal works should be undertaken by appropriately licensed asbestos removal contractors, with asbestos clearance certificates provided by an independent licensed asbestos assessor.
KPMG 2020b	<ul style="list-style-type: none"> KPMG was engaged by GPT to undertake an Environmental Assessment (EA) at 754-770 Mamre Road, Kemps Creek, NSW. KPMG had previously undertaken a Targeted Environmental Investigation (KPMG SGA 2019) for GPT at 754-770 and 784-786 Mamre Road, Kemps Creek, NSW. The EA was designed to provide an update to the previous TEI report to assess whether any changes to 754-770 Mamre Road since the time of the TEI fieldwork (19 and 20 September 2019) had the potential to have impacted site soils or groundwater with COCs. KPMG inspected the site on 29 July 2020. No further sampling of soils was undertaken as part of the EA. The site appeared to have remained relatively unchanged since September 2019 to September 2020 with the following exceptions: <ul style="list-style-type: none"> soil/rock stockpiled material in the south western section of 754-770 Mamre Road had been altered with the large majority of the material expected to have removed. Two (2) small stockpiles of construction waste material located in this area appeared to have been imported an increased amount of hydrocarbon staining was noted on the ground surface immediately around an intermediate bulk container (IBC) used to store waste oil located external to the south-western corner of the vehicle maintenance building a groundwater monitoring well may have been installed adjacent to the access road to the south-central residential building the above changes were not considered to be of significance due to the small volumes of the stockpiles of construction waste material and that any hydrocarbon impacts to soil in the vicinity of the IBC were expected to be minimal due to the small volume of waste oils used and stored onsite. KPMG considered it unlikely that site activities undertaken since the time of the TEI fieldwork (19 and 20 September 2019) had the potential to have significantly impacted site soils or groundwater with COCs. Importation of two (2) small stockpiles of construction waste in the south western section of 754-770 Mamre Road and localised hydrocarbon impacts to the soil immediately around the IBC adjacent to the vehicle maintenance building may have occurred, however the cost of removing this material and validating post-removal was not expected to be significant (i.e. <\$20,000).
KPMG 2020c	<ul style="list-style-type: none"> KPMG was engaged by GPT to undertake a Groundwater and Surface Water Sampling Event (GWSWSE) at 754-770 & 772-782 Mamre Road, Kemps Creek, NSW. The sampling event was undertaken by KPMG on 29 July 2020. The scope of work included the collection of groundwater samples from two (2) existing permanent groundwater monitoring wells, one of which was located offsite at 772-782 Mamre Road, and surface water samples from an onsite dam, laboratory analysis of water samples for COCs, and provision of a letter style report outlining the results, findings and recommendations.

	<ul style="list-style-type: none"> • The GWSWSE did not identify any significant COC impacts to groundwater or surface water samples analysed which would prevent the planned demolition and redevelopment works at the site. The surface water within the dam subject to sampling was considered to be chemically suitable to be transferred to the dam on the western section of 754-770 Mamre Road, however there was potential for the concentrations of nutrients to lead to algal blooms in the receiving water. • KPMG recommended: <ul style="list-style-type: none"> – unless there was an explicit reason to decommission groundwater wells (GW01 and GW02), it was recommended that they be maintained until the fuel storage at 784-786 Mamre Road was decommissioned, investigated, and remediated (if required). Further sampling of the wells could be undertaken prior to and post-decommissioning of the fuel storage to assess for any changes in concentrations of COCs – if the wells are required to be decommissioned, GPT should follow the guidance provided in Minimum Construction Requirements for Water Bores in Australia, Third Edition – assessment of the receiving water (i.e. western dam) should be undertaken prior to any future transfer of water from that dam.
KPMG 2021a	<ul style="list-style-type: none"> • KPMG was engaged by GPT to undertake an Environmental Assessment (EA) at 784-786 Mamre Road, Kemps Creek, NSW. • KPMG had previously undertaken a Targeted Environmental Investigation (KPMG SGA 2019) for GPT at 754-770 and 784-786 Mamre Road, Kemps Creek, NSW. The EA was designed to provide an update to the previous TEI report to assess whether any changes to 784-786 Mamre Road, since the time of the TEI fieldwork (19 and 20 September 2019), had the potential to have impacted site soils or groundwater with COCs. • KPMG inspected the site on 26 February 2021. • No further sampling of soils was undertaken as part of the EA. • The site appeared to have remained relatively unchanged since September 2019 to February 2021 with the following exceptions: <ul style="list-style-type: none"> – an increased amount of hydrocarbon staining was noted on the ground surface around drums used to store waste oil and other chemicals located in the vicinity of the Workshop Building and Refuelling Area – vehicle maintenance activities appear to have continued in the Workshop Building – information received onsite indicated that refuelling activities associated with the civil plant depot had ceased. • The above changes were not considered to be of significance as the identified additional hydrocarbon impacts associated with vehicle maintenance activities and chemical storage were expected to be limited to the shallow surface soils. Furthermore, vehicle maintenance activities associated with the Workshop Building had occurred within an area of the site previously identified to require remediation and validation. • Based upon the EA, KPMG considered it unlikely that site activities undertaken since the time of the TEI fieldwork (19 and 20 September 2019) had the potential to have significantly increased previously identified COC impact to soils.
KPMG 2021b	<ul style="list-style-type: none"> • KPMG were commissioned by GPT to undertake a Preliminary Site Investigation (PSI) at 754-770 & 784-786 Mamre Road, Kemps Creek, NSW (the site). The PSI was required to satisfy the Secretary's Environmental Assessment Requirements (SEARs) for a State Significant Development Application (SSDA). • Previous investigations carried out at the site by KPMG included a TEI (KPMG SGA 2019), two EA's (KPMG 2020b & 2021a), and a GWSWSE (KPMG 2020c), which have been summarised above. The PSI incorporated information from these investigations along with additional information to comply with the SEARs for the SSDA. • KPMG considered that the site was generally suitable for commercial/industrial land use subject to the following works being undertaken: <ul style="list-style-type: none"> – production of a RAP to document remediation works including:

- the UPSSs, believed to include two (2) USTs located adjacent to the workshop at 784-786 Mamre Road, be decommissioned by removal with the area remediated and a Validation Report produced in accordance with the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019
- consideration of the need to remediate heavy metal and BaP impacted soils which exceeded the guidelines for the protection of ecological receptors; this may not be required if these soils are emplaced beneath hardstand areas rather than used as landscaping material
- implementation of remediation activities documented within the above-mentioned RAP.

5 Summary of Site History

The KPMG PSI (Reference 1) included the following pertinent information relating to the history of the site:

- The site was used for agricultural (grazing) and rural residential purposes from at least 1955 until circa 1980s when the north-western section of 784-786 Mamre Road was developed for use as a civil plant hire depot. 754-770 Mamre Road was developed for horticultural (market garden) purposes which continued until circa 2010.
- The depot at 784-786 Mamre Road comprised several industrial style buildings joined by unsealed surfaces. A refuelling area, containing several above ground storage tanks (ASTs) and underground storage tanks (USTs), was developed on the eastern side of the main "Vehicle Workshop Building" circa 1995.
- The following hazardous chemicals were registered at 784-786 Mamre Road and were confirmed during site inspections undertaken by KPMG on 19 September 2019 and 26 February 2021:
 - 4,000 L petrol UST
 - 20,000 L diesel UST
 - three (3) ASTs
 - several drums.

The ASTs and other chemical drums not listed above were stored within a bunded area but have been noted to be in poor condition. Liquid was noted within the bunded area and heavy staining was noted on the ground surface outside of the bunding. A fuel dispensing bowser was located adjacent to the ASTs and it is understood that refuelling activities had been carried out at 784-786 Mamre Road for many years.

Various quantities of chemicals such as oils, lubricants, degreasers, and solvents were also observed within and around the Vehicle Workshop Building. These chemicals were stored on unsealed areas without secondary containment and hydrocarbon staining was observed on the ground surface within these areas.

- The remaining western and eastern sections of 784-786 Mamre Road remained relatively undeveloped except for a small farm outbuilding located on the central western section and a residential building and dam located on the eastern section.
- Previous investigations (References 1, 2, 4, 5) undertaken between 2019 and 2021 identified that COC impacts to soils at the site were generally limited to the north-western section of 784-786 Mamre Road in the vicinity of the civil plant hire depot as illustrated in Figure 2.
- A vehicle workshop and vehicle/equipment washdown activities were also present/undertaken at 754-770 Mamre Road. Some minor COC (e.g. hydrocarbon) impacts to surface soils have been identified at 754-770 Mamre Road, however large areas of this property have been cleared for development, including the identified area of minor hydrocarbon impact. It is anticipated that any surficial hydrocarbon impacts would have been removed during these earthworks and this AEC is not considered to require remediation.

6 Environmental Setting

A summary of the environmental setting of the site and surrounding area is provided in Table 5.

Table 5 Environmental Setting

Element	Description
Topography	In general, the topography of the site currently rises from Mamre Road to the north-eastern corner of the site. The western half of the site is relatively flat and has an average elevation of approximately 54 metres Australian Height Datum (mAHD). The eastern half of the site rises from approximately 56 mAHD to 74 mAHD at an average slope of 3.6% to the eastern boundary.
Hydrology	The vast majority of the site is unsealed with a number of dams located onsite with the largest one, being approximately 10,500 m ² , located in the eastern section of the site. The nearest down gradient offsite surface water feature is a dam located 75 metres (m) south of the site on an adjacent property. It is anticipated that the majority of stormwater captured onsite would drain to ground through unsealed areas and/or be captured in the dams.
Soils	<p>The soil profile of the site and the surrounding region has been classed as Kurosols, which are defined by the CSIRO Atlas of Australian Soils as soils with a clear or abrupt textural B horizon and in which the major part of the upper 0.2 m of the B2 horizon is strongly acid.</p> <p>Based upon the Australian Soil Resource Information System (ASRIS) (Reference 16), the site lies within an area with an extremely low probability of acid sulfate soils.</p> <p>KPMG reported that “the subsurface lithology identified around the ASTs and UPSS at 784-786 Mamre Road comprised shallow fill (<0.5 m), overlying firm clays, overlying weathered shale to a maximum investigation depth of 5 mbgl (metres below ground level)” (Reference 2).</p>
Geology	<p>The geology underlying the site, as described in the Geological Survey NSW (1958) – Sydney 1:250,000 Geological Sheet S1 56-5 (Reference 7), comprised of Triassic aged Bringelly Shale which consist of shale with some sandstone beds.</p> <p>Previous investigations encountered the abovementioned geology (Reference 2).</p>
Hydrogeology	<p>The hydrogeology of the area has been based on a search of the Bureau of Meteorology – Australian Groundwater Explorer. No registered groundwater wells were located within a 1km radius of the site. The nearest registered groundwater bore was located approximately 1.25km north-west of the site and was installed to a depth of 0.75 mbgl for monitoring purposes.</p> <p>KPMG identified one (1) existing groundwater well offsite at 754-770 Mamre Road and one (1) existing groundwater well offsite at 772-782 Mamre Road. These wells were sampled during a groundwater sampling investigation and the depth to groundwater was reported to be approximately 3.5 to 4.5 mbgl (Reference 5).</p>
Summary	Based on the soil, geological and hydrogeological review, the site is expected to be underlain by clay and shale. Previous investigations (Reference 5) encountered groundwater at an approximate depth of 3.5 to 4.5 mbgl. The potential migration of COCs within this geological system is expected to be low to moderate.

6.1 Areas and Type of Contamination

Previous investigations undertaken by KPMG have identified that the area of the site requiring remediation is limited to the civil plant hire depot located in the north-western corner of 784-786 Mamre Road, as illustrated in Figure 2.

The COCs requiring remediation have been identified as total recoverable hydrocarbons (TRH) and, to a lesser extent, heavy metals. It is possible that additional COCs may be found during the proposed assessment of the data gaps. An illustration of previous investigation COC exceedances are illustrated in Figures 3A to 3D and Figures 4A to 4C. KPMG note that groundwater samples were collected from existing groundwater monitoring wells located off-site.

For the purpose of this RAP, KPMG has delineated the following areas of the site requiring remediation. These areas include data gap areas requiring assessment and, potentially, remediation:

- Remediation Area A: Includes the UPSS, ASTs and drums located adjacent to the workshop located in the north-western section of 784-786 Mamre Road. Total approximate area 100m².
- Remediation Area B: Includes the area beneath the footprint of the Vehicle Workshop Building at 784-786 Mamre Road located immediately west of the UPSS and ASTs. This area has been identified as a data gap due to access constraints at the time of undertaking previous investigations. Total approximate area 615m².
- Remediation Area C: Includes the area in the vicinity of the vehicle wash bay at 784-786 Mamre Road also used to store, and potentially clean, hydraulic hoses. Total approximate area 230m².
- Remediation Area D: Includes visually impacted surface soils in the vicinity of the civil plant depot at 784-786 Mamre Road. Total approximate area 5,740m²

KPMG understand that extensive excavations works are required to develop the site for the proposed commercial/industrial development. These activities include the stripping of 200mm of surface soils within an area of over 23 hectares and extensive cut and fill earthworks (CRC 2019). The above remediation areas have been designed in consideration of the required excavation work and focus on soil and potential groundwater impacts localised around the UPSS and Vehicle Workshop Building.

6.2 Conceptual Site Model

The conceptual site model (CSM) is presented in Appendix D. The CSM has been developed based on the findings of previous investigations and desktop study. This includes a detailed summary of the CSM as well as the source-pathway-receptor analysis and application of relevant investigation levels. The CSM will be updated with findings of the additional investigation detailed in section 8.

7 Basis for the Remediation Criteria

7.1 Statutory Guidelines

There are a number of statutory and approved guidelines which have been made or approved by the NSW Environment Protection Authority (EPA) which are relevant to the RAP, including:

Statutory Guidelines

- NSW EPA Consultants Reporting on Contaminated Land – Contaminated Land Guidelines 2020 (Reference 13)
- State Environmental Planning Policy 55 (SEPP 55) – Remediation of Land (Reference 9)

Approved Guidelines

- Australian and New Zealand Environment Governments (ANZG) – Guidelines for Fresh and Marine Water Quality 2018 (Reference 14).
- Australian and New Zealand Environment Conservation Council (ANZECC) Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC 2000) (Reference 15).
- National Environmental Protection Council (NEPC) National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended in 2013 (NEPM ASC) (Reference 8).
- Australian Government National Health and Medical Research Council (NHMRC) – Guidelines for Managing Risks in Recreational Water 2008 (Reference 16).

7.2 National Environmental Protection Measure (NEPM)

The National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM 1999) (Reference 8) is made under the National Environment Protection Council Act 1994 and was developed to establish a nationally consistent approach to the assessment of site contamination to ensure sound environmental management practices by the community which includes regulators, site assessors, environmental auditors, landowners, developers and industry. The NEPM 1999 was amended on 16 May 2013, with subsequent national implementation, and is referred to within this report as NEPM ASC.

The NEPM ASC Schedule B1 – Guideline on Investigation Levels for Soil and Groundwater provides a framework for the use of investigation and screening levels for soil, soil gas and groundwater. The framework is based on a matrix of human health, ecological and groundwater investigation and screening levels in conjunction with guidance for specific COCs. The investigation levels and screening levels presented in the NEPM ASC are the concentrations of a COC above which further appropriate investigation and evaluation would be required.

The NEPM ASC guidelines relevant to this assessment include:

- **Health Investigation Levels (HILs)** - for a broad range of metals and organic substances in soil. The HILs are applicable for assessing human health risk via all relevant pathways of exposure – applicable.
- **Health Screening Levels (HSLs)** - for selected petroleum compounds and fractions and are applicable to assessing human health risk via the inhalation pathway – applicable.
- **Ecological Investigation Levels (EILs)** - for selected metals and organic substances and are applicable for assessing risk to terrestrial ecosystems – applicable.

- **Ecological Screening Levels (ESLs)** - for selected petroleum hydrocarbon compounds and total recoverable hydrocarbon (TRH) fractions in soil and are applicable for assessing risk to terrestrial ecosystems – applicable.
- **Petroleum Hydrocarbon Management Limits (Management Limits)** - are applicable to petroleum hydrocarbon compounds in soil only. They are applicable as screening levels following evaluation of human health and ecological risks and risks to groundwater resources – applicable.

7.3 ANZG Guidelines for Fresh and Marine Water Quality Water

The Australian and New Zealand Government (ANZG) 2018 Guidelines for Fresh and Marine Water Quality contain default guideline values (DGVs) used for assessment of fresh and marine water ecosystems. The DGVs provide various levels of protection depending on the nature of the ecosystem i.e. high ecological value to highly disturbed and low ecological value ecosystems. The nearest significant water body is an unnamed water course that extends through the eastern section of the site via two dams. The water body is considered to be a freshwater ecosystem and is slightly to moderately disturbed; therefore the 95% level of freshwater species protection DGV has been adopted.

7.4 NHMRC Guidelines for Managing Risks in Recreational Water

NHMRC guidelines are non-mandatory and are used in order to assess the physical, aesthetic, microbiological and chemical risks to recreational water users. In regard to chemical risks, the guidelines reference the Australian Drinking Water Guidelines (ADWG) which are used for tier 1 risk assessment only. Recreational use of water sources are not considered applicable as the site is to be developed for commercial/industrial use.

7.5 Derivation of Assessment Criteria

The site is currently used for rural residential and commercial purposes. It is understood that the "GPT Industrial Estate" proposes to rezone and redevelop the site for industrial use, with the exception of a small tract of E2 Environmental Conservation zoned riparian corridor on the eastern section of the site. KPMG have adopted the commercial/industrial NEPM land use scenario D across the entire site.

Application of these investigation and screening levels form the basis of a Tier 1 risk assessment. If concentrations are found to exceed the applicable investigation levels, further investigations and a site-specific risk assessment may be necessary. In the absence of local (Australian) criteria availability for certain chemicals, international criteria is to be used.

7.5.1 Soil Criteria

Health Investigation Levels (HILs)

A single set of health investigation level (HIL) values is presented in the NEPM 1999 (2013 amendment). KPMG has adopted HIL-D values for commercial/industrial land use.

Health Screening Levels (HSLs)

With consideration to the proposed commercial/industrial future land use, HSL-D criteria have been adopted.

Ecological Screening Levels (ESLs)

With consideration to the proposed commercial/industrial future land use, commercial/industrial criteria have been adopted.

Ecological Investigation Levels (EILs)

With consideration to the proposed commercial/industrial future land use, commercial/industrial criteria have been adopted.

Petroleum Hydrocarbon Management Limits (Management Limits)

KPMG has adopted the Management Limits as additional screening levels for petroleum hydrocarbons in soil. Like HILs and HSLs, an exceedance of a Management Limit does not necessarily mean that there is a risk, rather further appropriate evaluation and/or investigation is required. With consideration to the proposed commercial/industrial future land use, commercial/industrial criteria have been adopted.

7.5.2 Groundwater Criteria

Application of these investigation and screening levels form the basis of a Tier 1 risk assessment. If concentrations are found to exceed the applicable investigation levels, further investigations and a site-specific risk assessment may be necessary. In the absence of local (Australian) criteria availability for certain chemicals, international criteria will be used.

Groundwater Investigation Levels

The ultimate point of discharge of the aquifer beneath the site is unknown. The vast majority of the site is unsealed with a number of dams located onsite with the largest one, being approximately 10,500 m², located in the eastern section of the site. The nearest down gradient offsite surface water feature is a dam located 75 metres south of the site on an adjacent property. A narrow unnamed riparian corridor runs through the eastern section of the site and connects the two (2) dams. Given the slightly to moderately disturbed nature of the receiving water ways, the ANZG 2018 guidelines for the protection of 95% of freshwater species were conservatively adopted.

Based on site measured electrical conductivity parameters, the groundwater is generally not considered suitable for drinking. Additionally, there are no registered abstraction bores located within a 500 m radius of the site, therefore the Australian Drinking Water Guidelines (ADWG) were not considered to be directly applicable for the purpose of assessing drinking water quality.

Recreational Water Quality and Aesthetics

Considering that the site is to be developed for commercial/industrial purposes and that no registered abstraction bores located within a 500 m radius of the site, recreational guidelines will not be considered.

Health Screening Levels

With consideration to the proposed commercial/industrial future land use, HSL D criteria have been conservatively adopted for groundwater at 2 to <8 mbgl in clay.

7.6 Remediation Criteria

7.6.1 Soil Remediation Criteria

In accordance with the above guidelines, the soil remediation criteria presented in Table 6 have been adopted. Further details of the guideline criteria are included in Appendix B.

Table 6: Soil Remediation Assessment Criteria

Analyte	Health Investigation/Screening Levels (HILs/HSLs) (mg/kg)		Ecological Investigation/Screening Levels (EILs/ESLs) (mg/kg)		Management Limits (mg/kg)	
	HIL-D / HSL-D	Reference	EIL / ESL Commercial/industrial	Reference	Commercial/industrial	Reference
Heavy Metals						
Arsenic	3,000	Table 1A - Reference 13	160*	Table 1B (5) - Reference 13	-	-
Cadmium	900	Table 1A - Reference 13	-	-	-	-
Chromium (VI)	-	-	-	-	-	-
Chromium (III)	3,600	Table 1A - Reference 13	310 or TBD	Table 1B (3) - Reference 13	-	-
Copper	240,000	Table 1A - Reference 13	140 or TBD	Table 1B (2) - Reference 13	-	-
Lead	1,500	Table 1A - Reference 13	1,800 *	Table 1B (5) - Reference 13	-	-
Mercury (inorganic)	730	Table 1A - Reference 13	-	-	-	-
Nickel	6,000	Table 1A - Reference 13	55 or TBD	Table 1B (3) - Reference 13	-	-
Zinc	400,000	Table 1A - Reference 13	360 or TBD	Table 1B (1) - Reference 13	-	-
BTEXN						
Benzene	4 (0 to <1mbgl) 6 (1 to <2 mbgl)	Table 1A - Reference 13	95**	Table 1B (6) - Reference 13	-	-

Analyte	Health Investigation/Screening Levels (HILs/HSLs) (mg/kg)		Ecological Investigation/Screening Levels (EILs/ESLs) (mg/kg)		Management Limits (mg/kg)	
	HIL-D / HSL-D	Reference	EIL / ESL Commercial/industrial	Reference	Commercial/industrial	Reference
	9 (2 to <4 mbgl) 20 (4 mbgl +)					
Toluene	NL	Table 1A - Reference 13	135**	Table 1B (6) - Reference 13	-	-
Ethylbenzene	NL	Table 1A - Reference 13	185**	Table 1B (6) - Reference 13	-	-
Xylenes	NL	Table 1A - Reference 13	95**	Table 1B (6) - Reference 13	-	-
Naphthalene	NL	Table 1A - Reference 13	370*	Table 1B (6) - Reference 13	-	-
Total Recoverable Hydrocarbons (TRH)						
F1 C6-C10	310 (0 to <1mbgl) 480 (1 to <2 mbgl) NL (2 to <4 mbgl) NL (4 mbgl +)	Table 1A - Reference 13	215	Table 1B (6) - Reference 13	800**	Table 1B (7) - Reference 13
F2 >C10-C16	NL	Table 1A - Reference 13	170	Table 1B (6) - Reference 13	1,000**	Table 1B (7) - Reference 13
F3 >C16-C34	NL	Table 1A - Reference 13	2,500**	Table 1B (6) - Reference 13	5,000**	Table 1B (7) - Reference 13
F4 >C34-C40	NL	Table 1A - Reference 13	6,600**	Table 1B (6) - Reference 13	10,000**	Table 1B (7) - Reference 13
Polycyclic Aromatic Hydrocarbons (PAHs)						

Analyte	Health Investigation/Screening Levels (HILs/HSLs) (mg/kg)		Ecological Investigation/Screening Levels (EILs/ESLs) (mg/kg)		Management Limits (mg/kg)	
	HIL-D / HSL-D	Reference	EIL / ESL Commercial/industrial	Reference	Commercial/industrial	Reference
Benzo(a)pyrene	NA	NA	1.4	Table 1B (6) - Reference 13	-	-
Benzo(a)pyrene TEQ	40	Table 1A - Reference 13	NA	NA	-	-
Total PAHs	4,000	Table 1A - Reference 13	NA	NA	-	-
Others						
Others	Various	Table 1A - Reference 13 or appropriate site-specific guideline	Various	Appropriate site specific guideline	-	-
Asbestos						
Asbestos – surface and buried	No visible asbestos for surface soil (to 100 mm depth)	Table 7 – Reference 13	NA	NA	-	-
Buried bonded asbestos	0.05%	Table 7 – Reference 13	NA	NA	-	-
Buried friable asbestos	0.001%	Table 7 – Reference 13	NA	NA	-	-

Note: TBD = to be determined once the CEC and pH concentrations have been calculated.

conservative EIL calculation assumption

**** fine soil texture**

***generic added contaminant limits**

NA = not applicable

7.6.2 Waste Classification Guidelines

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

- Waste Classification Guidelines (NSW EPA, 2014)
- Protection of the Environment Operations Act 1997 and associated regulations
- Protection of the Environment Operations (Waste) Regulation 2014
- 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 7. Any criterion not listed can be found in the relevant guidelines and reference documents.

Table 7 Selection of Applicable NSW EPA Waste Classification Guidelines

Analyte	General Solid Waste			
	CT1 ^a	CT2 ^b	TCLP1 ^c	SCC1 ^d
BTEX				
Benzene	10	40	0.5	18
Toluene	288	1152	14.4	518
Ethylenebenzene	600	2400	30	1080
Xylenes (total)	1000	4000	50	1800
TRH				
C6-C10	NA	NA	NA	650
>C10-C36	NA	NA	NA	10000
PAH				
PAH (total)	NA	NA	NA	200
B(a)P	0.8	3.2	0.04	10
Heavy Metals				
Arsenic	100	400	5	500
Cadmium	20	80	1	100
Chromium	100	400	5	1900
Copper	-	-	-	-
Lead	100	400	5	1500
Mercury	4	16	0.2	50
Nickel	40	160	2	1050
Zinc	-	-	-	-

Note:

CT – Contaminant Threshold

TCLP – Toxicity Characteristics Leaching Procedure

SCC – Specific Contaminant Concentration

a – Waste Classification Guidelines (NSW EPA, 2016), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 1: General Solid Waste

7.6.3 Groundwater remediation criteria

The groundwater remediation criteria presented in Table 8 have been adopted. Groundwater samples collected during additional investigation detailed in section 8 will be screened against these guidelines. Further details of the guideline criteria are included in Appendix B.

Table 8 Groundwater Remediation Assessment Criteria

Analyte	Health Screening Levels (HSLs) (mg/L)		Groundwater Investigation Levels (GILs) (ug/L)	
	HSL-D	Reference	Freshwater	Reference
Total Metals				
Arsenic	NA	-	24 as As (III) 12 as As(V)	Table 1C Reference 13
Cadmium	NA	NA	0.2	Table 1C Reference 13
Chromium (VI)	NA	NA	1	Table 1C Reference 13
Chromium (III)	NA	NA	-	Table 1C Reference 13
Copper	NA	NA	1.4	Table 1C Reference 13
Lead	NA	NA	3.4	Table 1C Reference 13
Mercury (total)	NA	NA	0.06	Table 1C Reference 13
Nickel	NA	NA	11	Table 1C Reference 13
Zinc	NA	NA	8	Table 1C Reference 13
BTEXN				
Benzene	30 (2 to <8mbgl) 35 (8 mbgl +)	Table 1A - Reference 13	960	Table 1C Reference 13
Toluene	NL	Table 1A - Reference 13	-	Table 1C Reference 13
Ethylbenzene	NL	Table 1A - Reference 13	-	Table 1C Reference 13
Xylenes	NL	Table 1A - Reference 13	350 (as o xylene) 200 (as p xylene)	Table 1C Reference 13
Naphthalene	NL	Table 1A - Reference 13	16	Table 1C Reference 13
Total Recoverable Hydrocarbons (TRH)				
F1 C6-C10	NL	Table 1A - Reference 13	NA	NA
F2 >C10-C16	NL	Table 1A - Reference 13	NA	NA
F3 >C16-C34	NL	Table 1A - Reference 13	NA	NA
F4 >C34-C40	NL	Table 1A - Reference 13	NA	NA

Analyte	Health Screening Levels (HSLs) (mg/L)		Groundwater Investigation Levels (GILs) (ug/L)	
	HSL-D	Reference	Freshwater	Reference
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	NA	NA	16	Table 1C Reference 13
Benzo(a)pyrene	NA	NA	-	Table 1C Reference 13
Others				
Others	Various	Table 1A - Reference 13 or appropriate site-specific guideline	Various	Table 1A - Reference 13 or appropriate site-specific guideline

Note:

clay lithology criteria have been adopted

investigation levels apply to a typical slightly moderately disturbed system

NA = not applicable

8 Additional Investigation

This section of the RAP recommends an additional investigation to address data gaps identified during the KPMG PSI (Reference 1).

8.1 Investigation Plan

The proposed additional soil and groundwater investigation aims to address data gaps in the area of the site in the vicinity of the Vehicle Workshop at 784-786 Mamre Road. At the time of previous investigation, the positioning of the Vehicle Workshop Building prevented the advancement of investigation boreholes to provide appropriate coverage of this area.

The proposed additional investigation locations are shown on Figure 6. The advancement of the proposed investigation locations is contingent on the demolition and removal of site structures and underground services.

The rationale for sampling locations is presented in Table 9. In general, the rationale for location selection is to identify the presence of subsurface COC impact, with consideration given to the conceptual site model.

Table 9 Rationale for additional investigation locations

Investigation Location	Sample type	Targeting Justification
Stage 1		
BH21 to BH30	Soil	To assess the concentrations of COCs in soil in areas west of the above ground and underground fuel storage and vehicle workshop activities.
BH31 to BH40	Soil	To assess the concentrations of COCs in soil in the remainder of the Civil Plant Hire Depot.
MW01	Soil / Groundwater	Converted soil bore to groundwater well to assess soil and groundwater conditions upgradient of the above ground and underground fuel storage and vehicle workshop activities.
MW02	Soil / Groundwater	Converted soil bore to groundwater well to assess soil and groundwater conditions downgradient of the above ground and underground fuel storage and vehicle workshop activities.
MW03	Soil / Groundwater	Converted soil bore to groundwater well to assess soil and groundwater conditions downgradient of the above ground and underground fuel storage and vehicle workshop activities.
GW02	Groundwater	Sample existing (offsite) groundwater well to delineate groundwater impact downgradient of the above ground and underground fuel storage and vehicle workshop activities.
Stage 2 (provisional scope if required)		
MW04	Soil / Groundwater	Converted soil bore to groundwater well to delineate soil and groundwater impact downgradient of the above ground and underground fuel storage and vehicle workshop activities.

Investigation Location	Sample type	Targeting Justification
MW05	Soil / Groundwater	Converted soil bore to groundwater well to delineate soil and groundwater impact downgradient of the above ground and underground fuel storage and vehicle workshop activities.
MW06	Soil / Groundwater	Converted soil bore to groundwater well to delineate soil and groundwater impact downgradient of the above ground and underground fuel storage and vehicle workshop activities.

8.2 Methodology

8.2.1 Soil Sampling Methodology

Soil sampling will be undertaken by a suitably qualified environmental consultant.

Subject to the demolition and clearance of site infrastructure, soil boreholes would be advanced immediately west of the aboveground and underground fuel storage area and within the footprint of the former Vehicle Workshop Building. Boreholes would be advanced to depths ranging between approximately 1 mbgl and 5 mbgl utilising a combination of hand auger, push tube and solid flight auger drilling methods. Stage 1 would involve the advancement of thirteen (13) boreholes, with three (3) of these soil boreholes converted to groundwater monitoring wells. If COC impact to soil and/or groundwater has not been delineated by Stage 1 works, Stage 2 may potentially involve the advancement of an additional three (3) soil bores converted to groundwater monitoring wells with the aim of delineating COC impact.

Soil sampling depths would be determined at the discretion of the environmental consultant onsite to target depths displaying indicators of COC impact and provide vertical coverage particularly around the western side of the UPSSs. Each soil sample should be collected with disposable nitrile gloves and placed into laboratory provided glass jars with Teflon lids and minimal headspace. Each sample container must be clearly labelled with the project number, sample location and date of sample collection using a waterproof marker. Upon collection, samples should be immediately placed into a chilled cooler for storage and later transport to the laboratory.

Soil samples should be screened using a photo ionisation detector (PID) which measures volatile organic compounds (VOCs) in parts per million (ppm).

8.2.2 Groundwater Sampling Methodology

Groundwater sampling should be undertaken by a suitably qualified environmental consultant.

Groundwater

Prior to sampling and purging, standing water levels (SWLs) within the groundwater monitoring wells should be measured using an electronic water interface probe. Wells are to be purged using a minimal drawdown technique, where the standing water levels were monitored, and the pumping rate altered, so the well screen is not dewatered. Dedicated tubing for each sampling location should be used to minimise the potential for cross contamination to occur between wells. Monitoring of chemical characteristics with a calibrated groundwater multi parameter water meter should be undertaken to confirm samples were representative of formation water. Groundwater wells should be sampled once the chemical characteristics stabilised as per below:

- $\pm 10\%$ for dissolved oxygen (DO)
- $\pm 10\%$ for turbidity (if tested)

- $\pm 3\%$ for electrical conductivity (EC)
- ± 0.05 pH units
- 10 mV oxidation reduction potential (ORP).

Samples should be placed in laboratory supplied acid washed vials/glass bottles for organic analysis and plastic Teflon sealed plastic bottles for inorganic analysis and should be sealed with no headspace. Field filtering using a 0.45 μ m membrane filter and acid preservation should be undertaken for metals analysis.

Upon collection, samples should be placed immediately into ice filled coolers for storage and transport to the laboratory.

8.3 Laboratory Analysis

A summary of the analytical schedule is summarised in Table 10

Table 10 Analytical schedule

Media	Sample ID	Maximum sample depth (mbgl)	No. of samples			COCs	Locations
			Primary samples per location	Total primary samples	Intralab duplicate samples		
Stage 1							
Soil	BH21 to BH30 MW01 to MW03	4.9-5.0	1 to 3	30	2	Heavy metals, TRH, BTEX, PAHs, phenols, PCBs, VOCs, OCPs/OPPs and asbestos %w/w	Refer to Figure 3
Soil	BH31 to BH40	1 mbgl	2	20	2	Heavy metals, TRH, BTEX, PAHs, phenols, PCBs, VOCs, OCPs/OPPs and asbestos %w/w	Refer to Figure 3
Water	MW01 MW02 MW03 GW02	~3 mbgl	n/a	3	1	Heavy metals, TRH, BTEX, PAHs, phenols, PCBs, VOCs and OCPs/OPPs	Refer to Figure 3
Stage 2 (provisional if required)							
Soil	MW04 to MW06	4.9-5.0	1 to 3	9	1	Heavy metals, TRH, BTEX, PAHs, phenols, PCBs, VOCs, OCP/OPP and asbestos %w/w	Refer to Figure 3

Water	MW04 to MW06	~3 mbgl	n/a	5	1	Heavy metals, TRH, BTEX, PAHs, phenols, PCBs, VOCs and OCP/OPP	Refer to Figure 3
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9 Remediation Strategy

This section defines the remedial goal, the extent of remediation required and discusses the remediation options to determine the preferred remedial option.

9.1 Remediation Goal

The goal of the remediation activities is to render the site suitable for the proposed industrial/commercial land use.

9.2 Remediation Options

The current policy of the Australian and New Zealand Environment Conservation Council (ANZECC) and National Health and Medical Research Council (NHMRC) is provided within the Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites (Reference 20) and is endorsed by the NSW EPA. The policy requires that soil remediation and management in NSW should be implemented in the following preferred order:

1. Onsite 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. Removal of contaminated soil to an approved site or facility.
4. Consolidation and isolation of the soil on-site by containment with a properly designed barrier.

Given the type and extent of contamination present at the site, remediation is not expected to cause a greater adverse effect compared to leaving the contamination undisturbed. Additionally, the proposed development requires extensive cut and fill excavations and the stripping of the top 200mm of site soils. There is a potential exposure pathway to future users of the site including construction workers engaged during the redevelopment works. It is important that the extent of COC impacts associated with the UPSS and vehicle workshop building is delineated, remediated and validated to prevent construction delays and to not preclude the future use of the site for commercial/industrial purposes. A summary of the soil remediation options and assessment of the suitability of each is provided in Table 11.

Table 11 Remediation Options

Remediation Option	Assessment	Conclusion
1. Onsite treatment of soil	<p>There is a range of treatment technologies available depending on the type of contaminant including in-situ and ex-situ remediation methods. Most commonly, the technologies adopted are ex-situ, requiring excavation of the impacted material. In-situ remediation technologies generally require a longer timeframe for completion than ex-situ technologies. Most of the treatment technologies that require excavation of the impacted material could be undertaken on or off-site, subject to obtaining licenses.</p> <p>Some possible treatment methods for heavy metals and hydrocarbons include biological remediation and thermal treatment.</p>	Suitable

Remediation Option	Assessment	Conclusion
	These treatment solutions may delay the development of the site, however may allow for treated soil to be reused on site.	
2. Offsite treatment of excavated soil	The cost of excavating, transporting, treating and returning contaminated material is not considered economical given the large volume of material already required to be imported during the site's development.	Least preferred option
3. Removal of impacted soil to an approved site or facility	<p>There are suitably licensed waste facilities in the Sydney Metropolitan region capable of accepting hydrocarbon impacted soil, although waste classification is required in accordance with NSW EPA (2014) Waste Classification Guidelines (Reference 21).</p> <p>It is anticipated that hydrocarbon impacts associated with the UPSS and vehicle workshop will be limited to localised areas. The quantity of soil requiring excavation is expected to be immaterial to the earthworks associated with the development of the site and can be undertaken during removal of the USTs. This option generates additional truck movements and associated fuel/emissions over other options, however the small expected volumes mitigates this issue.</p>	Preferred option
4. Consolidation and isolation of the soil on site	<p>Hydrocarbons are generally not considered suitable for consolidation and isolation within an onsite containment structure due to their volatility.</p> <p>Furthermore, the cap and contain option would require on-going management under an EMP and has potential exposure or liability to future construction or maintenance workers.</p>	Not suitable

9.3 Preferred Remediation Option

In consideration of the hierarchy for soil remediation options outlined above and the significant earthworks required to develop the site, the preferred option is to remove from site any contaminated material above the commercial/industrial land use criteria to an appropriately NSW EPA licensed landfill.

10 Remediation Methodology

This section outlines the scope of the remediation works and provides detail of the proposed methodology of each of the required remediation tasks.

10.1 Remediation Scope of Work

The scope of the remediation works required to be undertaken on the site under this RAP comprises the following:

1. Obtain necessary approval from development approval authority
2. Complete the additional investigations detailed in Section 8
3. Organise a surveyor to mark out the remediation areas
4. Organise an appropriate contractor to undertake the remediation work
5. Remove the UPSS in accordance with Work Health and Safety Regulation 2017 and UPSS Regulation 2019 requirements (References 23 and 25)
6. Controlled excavation and removal of contamination
7. Validation sampling and analysis
8. Waste classification sampling and analysis of unsuitable material requiring off-site disposal
9. Preparation of a validation report.
10. Submit validation report to Council within 60 days after the remediation is complete in accordance with References 23 and 25.

10.2 Assigning Roles and Responsibilities

For the purposes of the remediation work the roles and responsibilities are presented in Table 12.

Table 12 Roles and Responsibilities

Role	Party	Responsibilities
Principal/Owner	GPT	To engage the principal contractor and undertake all stakeholder management.
Contractor	To be decided	To carry out the civil works associated with the UPSS removal and remediation and ensure compliance with WHS and environmental management controls. Require contractors to maintain written records of activities undertaken each day and manage any unexpected findings.
Environmental Consultant	KPMG	<ul style="list-style-type: none"> • Carry out additional investigations • Carry out a validation assessment • Prepare a validation report

10.3 Regulatory Approval and Licensing

KPMG recommend that professional planning advice is provided in relation to the approval process in relation to the remediation works. The below is a summary of expected regulatory approval and licensing requirements.

The work should be undertaken with all due regard to the minimisation of environmental effects and to meet all statutory requirements, including provisions specified in:

- Environmental Planning and Assessment Act 1979.
- State Environmental Planning Policy 55 Remediation of Land.

The proposed remediation works at the site are expected to have approval of a Public Authority and should be considered under the Environment Planning and Assessment Act 1979 (EP&A Act), defined as:

- Part 5 of the EP&A Act applies where development consent is not required under a planning instrument but an approval from a public authority is required. Under Part 5, a determining authority, that is, the authority determining whether to grant an approval (in some cases the proponent may be the determining authority) must take full account of all matters likely to affect the environment.

KPMG expect that the remediation works will be considered by the Public Authority as part of the development consent for the overall industrial development. Should the works be excluded under Part 5 of the EP&A Act, the remediation works should be considered to comprise Category 2 works as defined in Clause 14 of SEPP55 based on the following:

- The work is ancillary to the proposed development of the site for commercial/industrial purposes.
- The work is not to be carried out on land declared a critical habitat.
- The work is not likely to have a significant effect on a critical habitat or threatened species, population or ecological community.
- The work proposed falls within the Part 3A planning framework and requires Part 3A planning approval.
- The work is not to be carried out in an area where any of the following classifications apply: coastal protection, conservation or heritage conservation, habitat area, habitat protection corridor, environment protection, escarpment, escarpment protection or escarpment preservation, floodway, littoral rainforest, nature reserve, scenic area or scenic protection, wetland.
- The work will be carried out in accordance with all applicable policies.

SEPP 55 requires the following for Category 2 remediation works:

- Notification of the proposed remediation works is to be provided to Council 30 days prior to the commencement of remediation.
- The notification must
 - be in writing
 - provide the name, address and telephone number of the person who has the duty of ensuring that the notice is given
 - briefly describe the remediation work
 - show why the person considers that the work is category 2 remediation work

- specify, by reference to its property description and street address, the land on which the works will be carried out
- provide a map of the location of the land
- provide estimates of the dates for the commencement and completion of the work.
- Remediation works to be carried out in accordance with the Contaminated Land Planning Guidelines (DUAP, 1998), with the guidelines published under section 105 of the Contaminated Land Management Act 1997, and with a plan prepared under the Contaminated Land Planning Guidelines (DUAP, 1998), i.e. this RAP.
- Notification of completion of remediation work is to be provided to the local Council within 30 days of Completion.

The proposed remediation works include removal of UPSSs. Such works are required to comply with the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019 (Reference 23) including provision of a Validation Report to the local council within 60 days of completion of remediation work.

Whilst no asbestos containing materials (ACMs) have been identified in site soils, should ACMs be identified removal should be performed by an appropriately licensed contractor, which includes:

- holding a Class B licence for non-friable asbestos removal; or
- holding a Class A licence for friable asbestos removal; and
- appropriately trained staff in asbestos removal and supervision.

Requirements of removal of asbestos should include:

- A notification of non-friable asbestos removal is to be submitted to SafeWork NSW by the licensed asbestos removal contractor.
- The asbestos removal contractor is to compile an asbestos removal control plan as per section 3.5 of the 'How to Safely Remove Asbestos Code of Practice' (Reference 11).
- Disposal of asbestos waste in accordance with asbestos removal control plan and Waste Classification Guidelines (Reference 20).

Removal of asbestos performed in accordance with the regulations and requirements of the NSW Work Health Safety Regulation 2017, the How to Safely Remove Asbestos Code of Practice (Reference 11), and Managing Asbestos in or on Soil, March 2014 (Reference 26).

10.4 Preparation of Documentation

Prior to commencing the remediation works, all documentation must be finalised in accordance with development consent conditions, regulatory requirements and principal's internal policies. The likely documentation required may include but not be necessarily limited to the following:

- all regulatory and landowner approvals and notifications
- up to date insurance certificates
- a WHS Plan including emergency response procedures, to manage the works
- a Construction Environment and Management Plan (CEMP).

10.5 Remediation Program

Subject to the appropriate regulatory approval, licensing and documentation (sections 10.3 and 10.4), the remediation of the site is expected to take place in the following stages:

10.5.1 Site preparation

- As asbestos has been identified within buildings within the remediation area, the following works should be undertaken in accordance with requirements detailed in section 10.3:
 - undertake a pre-demolition survey of the site structures and equipment
 - remove all occurrences of asbestos and provide asbestos clearance certificates for the site
 - provide a post demolition Asbestos Clearance Certificate of site surfaces.
- Prepare the site with fences, erosion controls, signage and environmental controls.
- Remove civil plant hire depot vehicles, equipment and above ground infrastructure (e.g. chemical drums, ASTs, LPG gas container, and vehicle workshop inventory).
- Demolish site structures (with development consent) and concrete slabs to allow for remedial works and additional investigations detailed in section 8.

10.5.2 Additional Investigation (data gap closure)

- Undertake the additional investigation specified in section 8. This investigation is proposed to target previously unassessed areas (e.g. within the Vehicle Workshop building footprint, remainder of Civil Plant Hire Depot).
- An addendum to this RAP may be produced with the results of the additional investigation, the extent of COC impact identified, and any changes to the remediation strategy.

10.5.3 Removal of UPSS infrastructure

- UPSS infrastructure is to be removed by a suitably experienced civil contractor under the supervision of the engaged environmental consultant.
- UPSS infrastructure is to be removed in accordance with Work Health and Safety Regulation 2017 and UPSS Regulation 2019 requirements (References 23 and 25).

10.5.4 Excavation of Impacted Soil

The civil/remediation contractor will be required to develop the methodology for the works, which should consider at a minimum the following:

- all necessary environmental controls are to be implemented prior to commencing the remediation works and appropriately maintained throughout the works period
- all excavation, loading and transport of soil must be undertaken in a manner to minimise the generation of dust and cross-contamination to uncontaminated areas of the site.

The approximate extent of known soil contamination identified at the site requiring excavation is presented in Figure 5. These areas will be clarified after undertaking additional investigations detailed in section 8.

10.5.5 Waste management

Waste Soil Classification

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

This section applies to excavated soil from the site that is to be disposed off-site to landfill.

To account for the expected heterogeneity of the fill, representative soil samples will be collected from excavated and stockpiled soil at a rate of at least one sample per 25m³ of excavated material, with a minimum of two samples per stockpile collected for analysis.

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
- homogeneity of the material
- 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 the following provisional set of COCs:

- heavy metals
- TRH
- BTEX
- PAHs
- asbestos

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.

Samples will also be submitted for TCLP (toxicity characteristics leaching procedure) for heavy metals and PAHs.

The results of the laboratory analysis will be compared against Tables 1 and 2 of the Waste Classification Guidelines (Reference 21).

All soils that require off-site disposal as part of the remediation works will be disposed to an appropriately licensed landfill facility. Copies of dockets pertaining to disposal of soils will be provided by the remediation contractor to confirm the source, type and quantities of materials. These should be included in the validation report.

Management of bonded asbestos

Asbestos waste is pre-classified as Special Waste Asbestos in accordance with Step 1 of the NSW EPA (2014) Waste Classification Guidelines. Therefore, fragments of bonded asbestos (if present) will be disposed to a landfill appropriately licensed for the receipt of Special Waste Asbestos.

Fragments of bonded asbestos will be handled, stored and transported in accordance with SafeWork NSW requirements 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
- 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. Copies of dockets pertaining to disposal of asbestos will be provided by the remediation contractor to confirm the quantity of materials. These should be included in the validation report.

10.6 Contingencies

The following contingencies presented in Table 13 should be considered for unexpected findings and issues.

Table 13 Remediation Contingencies

Anticipated Issues	Actions
Surplus material requiring off-site disposal.	Any materials to be disposed of off-site must be classified in accordance with the NSW EPA (2014) Waste Classification Guidelines Part 1: Classifying Waste, for off-site disposal to a waste management facility lawfully permitted to accept the materials.
Additional contamination outside of the identified areas or in between sampling locations.	Should any contamination not identified in previous investigations (Reference 2) or the additional investigation described in section 8 be uncovered, then an unexpected finds protocol should be enacted. An example unexpected finds protocol is contained in Appendix C.
COC impacted fill extends beyond the site boundaries.	Excavate to the extent practicable for construction works to be carried out. COC impacted fill should be appropriately covered at the interface of the construction boundary and the occupiers of the adjacent property notified as the material may require ongoing management.
COC impacted is discovered at greater depth, extent or cannot practically be removed.	Undertake further assessment to assess the extent of the contamination. Consider on-site management in consultation with relevant stakeholders.
Changes in future land use for the site	Should the proposed land use change, then the RAP should be revised to ensure that the adopted remediation option is suitable for the intended use.
Heavy rain or flooding	Construct sediment and surface water controls prior to commencing works as per the project environmental control requirements.
Complaints received relating to remediation works	Notify site manager and record details pre management procedures. Implement control measures to address the cause of the complaint.
Additional USTs	If additional USTs are identified at the site during excavations, then an unexpected finds protocol should be adopted by the contractor. An example unexpected finds protocol is contained in Appendix C. The identified USTs will need to be removed, excavations validated and a validation report provided to council.
Contaminated groundwater	<p>Review of groundwater conditions on site may warrant further groundwater investigations / remediation and longer-term management plans. Any dewatering may require approval under the Water Management Act 2000.</p> <p>Remedial measures may include source removal, natural attenuation, bioremediation, phase separated hydrocarbons (PSH) recovery using active pumping, groundwater permeability barrier, in-situ oxidation / stabilisation.</p> <p>If a groundwater contaminant plume is identified and migrating off-site or increasing in contaminant concentrations, the following is required:</p> <ul style="list-style-type: none"> • review contaminant increase and analytes • review remediation alternatives

Anticipated Issues	Actions
	<ul style="list-style-type: none"> • undertake downgradient monitoring • complete fate / transport modelling if required • assess the need for further action.

11 Validation Assessment

A validation assessment will be undertaken at the site to document that the remediation goal has been achieved. The purpose of the validation assessment is to verify that suitability of the remediation area for the proposed land use.

The following data quality objectives have been developed for the validation assessment.

11.1 Validation Plan

11.1.1 Data Quality Objectives

Development of data quality objectives (DQOs) for each project is a requirement of National Environment Protection Council (NEPC) (1999) – *National Environment Protection (Assessment of Site Contamination) Measure 1999 (Amended 2013)* (NEPM ASC) (Reference 8). This is based on a DQO process formulated by the United States Environmental Protection Agency (USEPA) for contaminated land assessment and remediation. The method provides sound guidance for a consistent approach in understanding site assessment and remediation.

The DQO process has seven steps. Each of these steps has been given due consideration in the undertaking of this project. In brief, these steps are:

Step 1: State the problem and establish the DQO team.

Step 2: Determine the possible and probable actions that will resolve the problems.

Step 3: Identify the informational inputs to assist in the problem resolution.

Step 4: Define the boundaries of the study (geographical, temporal, etc.).

Step 5: Develop and define decision rules.

Step 6: Specify tolerable limits to reduce probability of incorrect decisions.

Step 7: Ensure the quality of the information obtained.

Step 1 — State the Problem

The site is proposed to be redeveloped for commercial/industrial land use, however previous investigations have identified heavy metal and TRH impacts to soil above commercial/industrial guidelines. These impacts are associated with UPSS and vehicle workshop activities. The purpose of the validation assessment is to confirm that the soil at the site has been remediated and is suitable for the intended commercial/industrial land use.

Step 2 — Identify the Decision

The principal decisions to be made are:

- what are the nominated COCs to be validated?
- where are the areas of environmental concern which will be targeted by the validation activities?
- what are the remediation goals and remediation extent, required to make the site suitable for the proposed development (remediation objectives)?
- what validation procedures will suitably demonstrate that the remediation works have been undertaken to satisfy the remediation objectives?

Step 3 — Identify the Inputs to the Decision

The study inputs comprised existing information and information to be collected from additional investigations detailed in section 8. This includes:

- physical observations, including visual and olfactory results during site activities
- the results of previous investigations (section 4)
- the results of the additional investigation (section 8)
- soil analytical data for waste classification purposes for material requiring off-site disposal
- waste disposal documentation for excess material disposed of off-site
- soil analytical data from any imported fill.

Step 4 — Define the Study Boundaries

The lateral extent of the study boundary is defined by the remediation areas as shown in Figure 5. The vertical extent of the soil removal is until clean natural material is exposed. The horizontal extent will be determined by validation sample results. The need to undertake groundwater remediation will be contingent on the results of the additional investigation (section 8).

Step 5 — Develop and Define Decision Rules

Under the DQO process, it is important to nominate action levels for decision making.

In order to make a correct decision, the input laboratory data obtained needs to be confirmed to be suitable. It is recommended that at least 5 percent of samples (1 in 20) from a site should be collected in duplicate. For split samples, because of error associated with field splitting, a relative percentage difference (RPD) of between <50% and <150% (depending on the substance) will be allowed as the measurement data quality indicators (MDQI). Any value >50% RPD will be noted and discussed, as per Standards Australia requirements, with respect to its acceptability for inclusion in the data-set. These are summarised as the MDQIs presented in Table 14, which will be used to establish whether the DQOs have been met.

It should be noted that NEPM ASC references Standards Australia AS 4482.1 (Reference 8), which specifies MDQIs for precision should be $\leq 50\%$ RPD. However, they also acknowledge that low concentrations and organic compounds in particular can be acceptably outside this range. AS 4482.1 (Reference 12) suggests that $\leq 50\%$ RPD be used as a 'trigger' and values above this level of repeatability need to be noted and explained.

Table 14 Measurement Data Quality Indicators

Data Quality Indicators	Acceptance Criteria
Intralab duplicates	<p>The RPDs will be assessed as acceptable if less than or equal to 50% - 150%. Where the results shows greater than 50% difference a review of the cause will be conducted (NEPM, 2013). It is noted that RPDs that exceed this range may be considered acceptable where:</p> <ul style="list-style-type: none"> • results are less than 5 times the LOR (no limit) • results are <80-150% for low level (<10 x LOR) • results are <80-150% for medium to high level (>10 x LOR) • heterogeneous materials are encountered.
Laboratory duplicates	<p>RPDs less than:</p> <ul style="list-style-type: none"> • 20% for high level laboratory duplicates (i.e. >20 x LOR) • 50% for medium level laboratory duplicates (i.e. 10 to 20 x LOR)
Matrix spikes	Recoveries between 70-130% of the theoretical recovery or as nominated in the laboratory's QC report, based on their historical database.
Method blanks	Less than the laboratory LOR.
Laboratory control samples	Recoveries between laboratories specified range for each particular analyte / analytical suite.
Rinsate blanks	Less than LOR
Trip Spikes	70-130%
Trip Blanks	Less than LOR

Step 6 — Specify Tolerable Limits on Decision Errors

There are two types of decision errors. If one assumes that the site is impacted by COCs (the null hypothesis):

- deciding that the site is not impacted when it actually is (Type I error). The consequence of this error may be unacceptable ecological or health risk for users of the site
- deciding that the site is impacted when it is not (Type II error). The consequence of this error is that the client or a future potential owner may pay for further investigation / remediation that is not necessary.

Step 7 — Optimise the Design

During the DQO process the sampling design was optimised through several iterations. Optimisation of the design included evaluating Steps 1-6 of the DQO process. The following are the key steps taken to optimise the sample design:

- revision of sampling locations onsite taking into account access constraints, location of underground services, infrastructure and health and safety considerations
- revision of conceptual site model (CSM) at each stage of the investigation process.

The final field program and sampling pattern is considered optimal taking into account the purpose of the investigation, access constraints, budget and temporal limitations.

Validation data is required to be collected to verify:

- the effectiveness of the remediation works
- any contaminated soils retained onsite have been appropriately contained and managed
- any material imported to backfill excavations are suitable for the proposed site use
- document the condition of the site as being suitable for the proposed future use.

The proposed validation works are outlined in Section 11.2.

11.2 Validation Works

Requirements for the sampling and analytical plan, sampling methodology and quality control / quality assurance procedures to be adopted for the validation works are presented below.

The following section relates only to soil validation of Remediation Areas A to D, as illustrated in Figure 5. The extent or requirement for groundwater remediation is contingent to the outcome of the additional investigation detailed in section 8 and discussed in section 10.6.

11.2.1 Sampling and Analytical Plan

Remediation of the impacted areas will be considered validated following the achievement of the two (2) validation objectives:

- validation of Remediation Areas A to D will continue to the extent that the soil impacts and validation samples are within the remediation acceptance criteria
- in the event of backfilling, validation of stockpiled and or imported fill materials used is required to confirm the suitability for the intended land use.

11.2.2 Soil Validation Methodology

Remediation Area A

The 20,000 L diesel and 4,000 L petrol USTs should be removed in accordance with UPSS Regulation 2019 requirements (References 23 and 25). Due to the volatile nature of petroleum storage tanks, it is recommended that the USTs be excavated and disposed of by an experienced contractor and with an environmental representative present.

Following the removal of any USTs and associated visibly stained or odorous soils, samples should be collected from the walls and floor of the excavation and submitted to a NATA accredited laboratory for analysis. The minimum sampling protocols to be used for Remediation Area A include:

- 3 samples per backfill UST sands per UST pit
- 1 sample per tank line
- 1 sample per vent pipe area
- 1 sample per spill box (currently not present but may be found)
- 2 base samples and 8 wall (2 samples per wall face) of each tank pit.

Remediation Area B to D

COC impacted soils will be excavated to clean natural clay and validated as follows:

- remedial hotspot excavation (validation sampling) – 1 sample per 100m², with one sample per 10m along each wall (with a minimum of one sample per excavation wall).

Excavated materials

Stockpiles of excavated material should be validated for re-use onsite or for classification for offsite disposal using the following sampling frequency:

- stockpile sampling – small volumes (<200m³) – 1 sample every 25m³
- large volumes (>200m³) as per Table 3 of the Victoria Sampling Guidelines (Reference 24).

Stockpiles and imported fill material

Materials transported onto site will either need to meet the definition of virgin excavated natural material, or be the subject of a resource recovery order and resource recovery exemption. In addition, materials imported onto the site should be adequately validated as being appropriate for the final use of the site, including QA/QC evaluation of any sampling and analysis for material brought to site.

Sample Collection

Soil validation sampling will be undertaken by a suitably qualified environmental consultant.

Soil validation samples will be collected directly from exposed surface of the excavation, or directly from the excavator bucket. Each soil sample should be collected with disposable nitrile gloves and placed into laboratory provided glass jars with Teflon lids and minimal headspace. Each sample container must be clearly labelled with the project number, sample location and date of sample collection using a waterproof marker. Upon collection, samples should be immediately placed into a chilled cooler for storage and later transport to the laboratory.

Considering that samples will be collected by hand using a new set of disposable nitrile gloves, decontamination will not be necessary as no re-usable equipment will be used. Additionally, when sampling using a shovel, care will be taken to ensure that the soil sampled did not come into contact with the shovel. However, if a trowel is required to collect samples, in situations of hard or well compacted ground, then the trowel will be decontaminated by washing with a laboratory grade, biodegradable and phosphate free detergent followed by rinsing with potable water.

Soil samples will be screened using a photo ionisation detector (PID) which measures volatile organic compounds (VOCs) in parts per million (ppm).

Laboratory analysis

Validation samples should be submitted to a NATA accredited laboratory for analysis of the following primary COCs:

- heavy metals
- TRH
- BTEX
- PAHs

The following secondary COCs may be selectively chosen for analysis in selected samples:

- phenols
- PCBs
- VOCs
- OCPs/OPPs
- asbestos %w/w (asbestos samples are to be collected at the discretion of the environmental consultant as asbestos in soils has not previously been identified at the site).

Quality Assurance

The quality assurance and quality control (QA/QC) procedures should be undertaken according to procedures referenced in NEPM ASC (Reference 8). Field procedures should be designed to ensure the prevention/minimisation of cross-contamination, analyte loss and to ensure samples and results were representative of actual conditions.

Quality Control

Field quality QAQC sampling frequencies are as follows:

- Intra lab duplicates – 1 in 20
- Interlab duplicates – 1 in 20
- Rinsate – 1 per day per piece of reusable equipment (if any)
- Trip Spikes / Blanks – 1 per batch

11.2.3 Validation Report

Consistent with NSW EPA requirements, a validation report will be prepared at the conclusion of remediation works. The validation report, prepared in accordance with the requirements of EPA guidelines (References 13 and 25), will outline the results of the remediation works undertaken at the site and an assessment of the suitability of the site for the proposed use.

12 Interim Site Management Plan

Prior to commencement of remediation activities, the site will be under the control of GPT and their site management protocols and procedures will apply. The following points should be considered by GPT for interim site management (i.e. prior to remediation works commencing):

12.1 Services and utilities

All services will need to be identified by a suitably qualified utility clearance operator.

12.2 Site security, restricted access and signage

Access to site should be restricted including use of secure fencing and signage with consideration of security patrols.

12.3 Approvals

Approval for the remediation work will be required from the development consent authority. KPMG expect that the remediation works will be considered by the development consent authority as part of the development consent for the overall industrial development.

Should the remediation works be excluded from the overall development consent, KPMG consider that the remediation works are classed as Category 2 works under SEPP55 which requires notification to the local authority 30 days prior to commencing work. Details of the notification are described in section 10.3.

KPMG recommend that professional planning advice is provided in relation to the approval process in relation to the remediation works.

12.4 Community relations plan

A community relations plan is not considered necessary for the site prior to commencement of remediation activities.

13 Site Management Plan Guidance

Environmental controls relating to remediation works shall be in accordance with overall project environmental management documentation prepared by others. Remediation specific environmental controls may be developed by the remediation contractor prior to remediation works commencing.

A summary of the minimum environmental safeguards to be implemented during remediation works is provided below.

13.1 Hours of Operation

Remediation works are expected to be undertaken during the following hours:

- Monday to Friday: 7:00 am to 5:00 pm.
- Saturday: 8:00 am to 1:00pm.
- Public Holidays and Sunday: No work permitted.

Emergency work should be permitted to be completed outside of these hours.

13.2 Demolition (including asbestos management)

Demolition works are to be completed in accordance with NSW SafeWork Standards and Codes of Practice. Any asbestos identified within the building materials should be managed in accordance with the NSW SafeWork Codes of Practice and Australian Standards.

13.3 Traffic Management

The management of the material leaving the site will be under the monitoring of the principal's representative, who will record the details of these materials.

Vehicular movement is to be conducted in accordance with regulatory requirements. The contractor should install environmental controls (e.g. a vehicle wheel washing or shaking facility) and will manage all vehicles as indicated by the principal's representative to minimise tracking of any materials onto public roads. Loads leaving the site should be maintained moist and must be covered to prevent materials from the site being spilled or left on public or private roadways or adjacent areas.

13.4 Site Access

During remediation works, the works area will need to be secured by an appropriate exclusion zone which will restrict access to the area. Only authorised persons will be able to enter the work areas where remediation is being undertaken.

13.5 Noise and Vibration

The contractor should keep noise levels to a minimum and levels should not exceed limits indicated in AS 2436 1981. Noise levels must also comply with authority requirements. It is expected that the equipment to be used in the remediation works will not generate noise levels above these requirements.

13.6 Soil and Water Management

The contractor should put in place adequate stormwater runoff, run-on and sediment control measures for the remedial works. These requirements are outlined in Schedule B (9) of the NEPM (2013).

These include stockpiling excavated soil in a manner that will prevent contamination from being transported off-site by stormwater, and include the following measures:

- Divert stormwater runoff outside the site so that it does not flow through the site
- Control drainage on the site by intercepting and redirecting runoff in a controlled manner
- Stormwater collected at the site in trenches and sumps should be appropriately managed
- Silt stop fences should be erected at locations where stormwater may flow outside the site.

The presence of sediment in surface water or runoff must be minimised by the use of sediment controls such as diversion drains, hay bales and silt fencing.

Soils that require stockpiling must be managed in such a manner that these materials remain well contained and easily identifiable and that the effects of wind and rain have minimal impact on their integrity. Subsequently, if adverse weather conditions are anticipated, or if the stockpile is to remain on-site for an extended period, stockpiles must be protected and covered. Stockpile records must be maintained to track the reuse of soils at the site (if any).

Any plant or equipment that comes into contact with soils must be inspected prior to leaving the site and cleaned as necessary.

13.7 Groundwater Management

If groundwater is encountered during excavation works, the groundwater is to be directed to and collected in trenches and sumps. No discharge of groundwater should occur without approval of appropriate regulatory bodies.

13.8 Air Quality

Dust Control

Dust emissions should be confined within the site boundary. The following dust control procedures should be considered to comply with this requirement as necessary:

- covering of all stockpiles
- keeping excavation and stockpiles moist.

Odour Control

If significant odours are identified at the boundary of the site, then appropriate actions will be taken to reduce the odours, which may include: increasing the amount of covering of excavations/stockpiles; mist sprays; odour suppressants or maintenance of equipment.

13.9 Waste / Soil Management Plan

13.9.1 Importation of material

An Imported Fill Protocol (IFP) has been developed by JBS&G Australia Pty Ltd (Reference 7). The IFP should be adhered to for any fill material to be imported onto the site as part of the remediation works.

13.9.2 Stockpiles

Stockpiles should be managed to minimise the risk of dust generation, erosion and leaching. The measures required to achieve this should include:

- restrict the height of stockpiles to reduce dust generation
- construct erosion, sediment and runoff control measures
- cover stockpiles of contaminated soils to be left on site for more than 24 hours or if windy conditions are expected
- manage the potential for leaching.

13.9.3 Waste Tracking

All transport of waste and disposal of materials must be conducted in accordance with the requirements of the POEO Act. All licences and approvals required for disposal of the material will be obtained prior to removal of the materials from the site.

Removal of waste materials from the site shall only be carried out by a licensed contractor holding appropriate licence, consent and/ or approvals to dispose of the waste materials according to the assigned waste classification, and with the appropriate approvals obtained from the EPA, if required. Details of all soils removed from the site shall be documented by the Contractor with copies of weighbridge slips, tip tickets and consignment disposal confirmation (where appropriate) provided to the Environmental Consultant and the Principal.

A site log shall be maintained by the Contractor to track disposed loads against on-site origin. Transport of spoil shall be via a clearly delineated, pre-defined haul route. The proposed waste transport route will be notified to the local Council and truck dispatch shall be logged and recorded by the Contractor for each load leaving the site.

13.9.4 Waste Disposal

All off-site disposal of wastes, where appropriate, will be undertaken in accordance with the POEO Act. Any soil and rock to be removed from the site will be classified in accordance with either:

- the NSW EPA Waste Classification Guidelines 2014 or
- a General or Specific Exemption under the Protection of the Environment Operations (Waste) Regulation 2014.

No soils should leave the site without a formal waste classification.

All materials excavated and removed from the site shall be disposed in accordance with the POEO Act to a facility/site legally able to accept the material. Copies of all necessary approvals from the receiving site shall be given to the contractor prior to any contaminated material being removed from the site.

A record of the disposal of materials will be maintained. Copies of all consignment notes for the transport, receipt, landfill receipts and disposal of all materials will be maintained as part of the site

log and made available to the Environmental Consultant for inspection and reporting purposes upon request.

13.10 Community Engagement

Community engagement should be carried out in accordance with Schedule B (8) of NEPM (2013). Prior to the start of any remediation works at the site, every owner and occupier of any land located either wholly or partly within 100m of the boundary of the premises should be notified at least 30 days in advance.

14 Work Health and Safety Guidance

A Work Health and Safety (WHS) Plan should be developed for the overall development project. A specific WHS Plan should also be developed for the remediation activities by the appointed contractors to ensure that remediation works are conducted in a controlled and safe manner with regard for potential hazards and safe work practices. The following preliminary plan contains minimum WHS requirements at the site.

14.1 Personnel and responsibility

All personnel should read and understand the WHS Plan(s) prior to commencing work and have signed a statement to verify this understanding. Contractors are responsible for ensuring that their employees are aware of and comply with Project Safety Plans developed for each task and with all relevant statutes and regulations.

14.2 Identification of potential hazards

14.2.1 Contaminant hazards

Contaminates present at the site include, but are not limited to:

- hydrocarbons
- heavy metals
- asbestos (in buildings)

Potential risks to personnel associated with these compounds, if present at the site, include inhalation of dust, vapours or aerosols containing contaminants or direct contact.

14.2.2 Physical Hazards

The following potential hazards may exist at the site:

- mobile plant
- vehicles
- excavations
- heat exposure
- underground utilities
- noise
- dust
- electrical equipment.

14.3 Medical surveillance

It is expected that all personnel involved in remediation activities have undergone specific training for working on contaminated sites. The requirement for medical surveillance should rest with the individual contractors involved with the activities.

14.4 Site Work Practices

14.4.1 Personal hygiene

No smoking, eating or drinking will be permitted on site in areas where the possibility of contamination exists. In particular, smoking will be prohibited in areas where volatile hydrocarbons or other inflammable materials have accumulated. In these areas, a designated clean location should be allocated for smoking or the consumption of food or drink. These areas should be equipped with hand washing facilities which must be used prior to engaging in these activities. Personnel should be made aware of the location of these facilities.

14.4.2 Decontamination

Contaminated equipment should not be removed from the work area to avoid contaminating other areas of the site.

14.4.3 Restricted access

A perimeter fence should be constructed around the perimeter of the remediation work area and should remain during the remediation works. Signs should be erected to notify personnel of the presence of excavations on the site. Site visitors must report to the site office and remediation area controller prior to entering the remediation work area.

14.4.4 Personal protection

Personnel will take measures to avoid coming into direct contact with contaminated material. Workers are to ensure that soil, surface water or groundwater are not ingested or swallowed and that direct contact with skin is avoided. Personnel should wear the following minimum personal protective equipment (PPE):

- Steel capped boots meeting AS2210.3 requirements
- Fluorescent safety vest or other high visibility clothing conforming to AS/NZ 4602:1999
- Hard hat meeting AS1801-1981 requirements when working in close proximity to the excavator
- Safety glasses or goggles with side shields meeting AS1337.6-2007 requirements as necessary
- Disposable latex gloves for personnel handling soil or groundwater.

14.4.5 Emergency response plan

Table 15 Resources

Element	Details
Hospital	Nepean Hospital, Derby St, Kingswood NSW 2747 – 17 km from site. (02) 4734 2000
Police, fire, ambulance	000
Electrical	Energy Australia 13 13 18
Council	City of Liverpool

Element	Details
Water	Sydney Water 132 090
Gas	Jemena Gas 131 909
Utilities	Telstra 1800 653 935

The site supervisor will be responsible for ensuring that site personnel are aware of emergency services available. A site safety officer must be available during remedial works.

14.5 Operational Controls

14.5.1 Fire and explosion hazard

Explosive atmospheres may be present where any petroleum products or other potentially flammable or explosive substance is encountered / used, including machinery. Therefore, the contractor will put into place measures to prevent fires and explosions, which include:

- pumping and degassing of tanks prior to removal
- preventing access to the site by unauthorised persons
- forbidding smoking or using naked flame at the site
- cutting of concrete to be carried out under a blanket of water in proximity to any underground storage tanks
- approved fire extinguishers to be maintained in proximity to excavations
- ensuring that no free product or fuel used for refuelling equipment enters a confined space or drainage/sewer system; and
- using only certified flameproof equipment in proximity to locations where free petroleum fuel is present or is expected to be present.

14.5.2 Public complaints registry

Given the location of the remediation works and lack of proximity to the community, it is considered that a community relations plan is not required.

14.6 Duties of the Onsite Environmental Consultant

The duties of the on-site environmental consultant will include:

- ensure adherence to the Remedial Action Plan, the Work Health and Safety Plan and other plans applicable to the site
- monitor the excavation of contaminated material undertaken at the site
- ensure environmental compliance of contractors
- monitoring with a PID in areas adjacent to open excavated pits at least three times throughout the day, and at additional times if strong or unusual odours or if unusual substances are encountered during the excavations part of the remediation works

- inspection of the integrity of the sediment controls placed around the site
- inspection at approximately two hourly intervals of the roadway in the vicinity of the site used by the vehicles leaving the site to ensure that no significant amounts of materials have been tracked off-site by vehicles. Immediately report actual or potential non-compliances to the principal's representative
- note weather conditions, approximate temperature, direction and velocity of the wind, and rainfall at the commencement of work, at about midday and at the end of the day
- collect samples for validation or other purposes as required
- maintain a site diary which will record the following information:
 - date
 - weather conditions
 - presence of odours at the site and at the site boundaries
 - PID measurements
 - details of materials excavated during the remediation works, and details of actions taken if unexpected materials are encountered
 - details of accidents, near misses or incidents, which may have resulted in injury, and the actions taken to prevent their recurrence
 - details of environmental issues, which may result in environmental incidents and measures taken to correct them
 - details of visitors to the site or other matters relating to environmental or health issues.

14.6.1 Unexpected Occurrences

If during remediation works, significant odours and/or evidence of gross contamination not previously detected are encountered, or any other significant unexpected occurrence, site works should cease in that area, at least temporarily, and immediate action taken to abate the odours or prevent / manage cross-contamination occurring. An Unexpected Finds Protocol is provided as Appendix C.

14.6.2 Non-Compliances

If the on-site environmental consultant suspects that some works carried out at the site do not comply with the requirements of the RAP, the WHS or other plans applicable to the site, this should be reported immediately to the principal's representative. If the principal's representative cannot be contacted or if immediate action is required, the on-site environmental consultant has authority to stop the work or request appropriate action to be taken. This is particularly the case under the following circumstances:

- injury to person due to exposure to materials excavated from the site
- spillage of materials at the site or on areas adjacent to the site
- other events that the environmental consultant believes could give rise to unacceptable risk to human health or to adverse impact to the site or to areas adjacent to the site.

14.6.3 Contingency Management

Due to the unexpected nature of excavations, the following contingency management conditions have been considered.

Table 16 Contingency Management

Anticipated problem	Corrective action
Asbestos cement sheeting, lagging, pipping etc.	Stop excavations if there is the potential for people to inhale airborne asbestos fibres. Contact GPT immediately. Cover the area with plastic and suppress dust by wetting down if needed. Place a warning sign at the entrance to the site where asbestos removal or site remediation is taking place. Adhere to WHS regulations and follow the unexpected finds protocol outlined in Appendix C
Discovery of Additional USTs	Stop excavations, contact GPT immediately. Follow the unexpected finds protocol outlined in Appendix C.
Chemical spill / exposure	Stop work, refer to OHS Plan and immediately contact GPT.
Excessive rain	Maintain access roads, cover high-traffic areas with gravel; or cover working areas/stockpiles with plastic during off-shifts; or shut down operations until runoff is more manageable. Inspect & maintain sediment control pond & filter fences.
Unmanageable mud in excavation zone	Improve drainage collection system; add geotextile/gravel in problem areas; or strip off mud/slurry materials; or excavate from the top of the fill.
Excessive drainage	Minimise active/contaminated work area; or improve diversion clean run-on; or maintain sufficient on-site wastewater storage capacity; or mobilise additional storage and/or treatment systems as needed.
Excessive dust	Use water sprays or biodegradable dust sprays, or cease dust generating activity until better dust control can be achieved or apply interim capping systems.
Sediment pond water for discharge – analytical results exceed site response levels	Perform in-situ treatment, e.g. flocculants dosing, until response levels are met. Alternatively arrange off-site disposal by a licensed Contractor.
Excessively wet materials	Stockpile and dewater on-site or add absorbents.
Equipment failures	Maintain spare equipment or parts; or maintain alternate rental options; or shut down affected operations until repairs are made.
Release of fuel/oil from UST or AST or machinery	Remove source, use absorbent booms to remove oil and make any repairs as required.
Silt fence fails	Stop work and repair fence to specifications.
Excessive odours / vapours	<p>The contents of the USTs, ASTs and drums should be removed by a licenced waste contractor prior to removal.</p> <p>If excessive organic odours / vapours are generated, stop works and monitor for volatiles at the site boundaries using PID and upgrade PPE if necessary.</p> <p>Implement control measures including respirators for on-site workers, wetting down excavated material, use of odour and volatile suppressing agents to eliminate or reduce odours as required and/or cover odorous material if practicable.</p>

14.6.4 Contact Persons

Table 17 Contact Persons

Responsible Party	Details		
Environmental Consultant	<p>KPMG Property and Environmental Services Pty Ltd</p> <table border="1"> <tr> <td> James Lean Senior Environmental Consultant Property & Environmental Services Deals, Tax & Legal Tel +61 2 9455 9718 Mob +61 407 116 536 jlean1@kpmg.com.au </td><td> James Walker Director Property & Environmental Services Deals, Tax & Legal Tel +61 2 9346 6194 Mob +61 417 069 585 jcwalker@kpmg.com.au </td></tr> </table>	James Lean Senior Environmental Consultant Property & Environmental Services Deals, Tax & Legal Tel +61 2 9455 9718 Mob +61 407 116 536 jlean1@kpmg.com.au	James Walker Director Property & Environmental Services Deals, Tax & Legal Tel +61 2 9346 6194 Mob +61 417 069 585 jcwalker@kpmg.com.au
James Lean Senior Environmental Consultant Property & Environmental Services Deals, Tax & Legal Tel +61 2 9455 9718 Mob +61 407 116 536 jlean1@kpmg.com.au	James Walker Director Property & Environmental Services Deals, Tax & Legal Tel +61 2 9346 6194 Mob +61 417 069 585 jcwalker@kpmg.com.au		
Site Owner	<p>GPT</p> <p>Tom Falconer Assistant Development Manager The GPT Group Level 51, 19 Martin Place Phone: Mobile: Fax: Email: Tom.Falconer@gpt.com.au</p>		
Remediation contractor	To be decided		

15 Conclusions and Recommendations

Remediation of the site is expected to involve the following activities:

1. Obtain necessary approval from development approval authority
2. Complete the additional investigations as detailed in Section 8
3. Organise a surveyor to mark out the remediation areas
4. Organise an appropriate contractor to undertake the work
5. Remove the UPSS in accordance with the UPSS Regulation 2019 requirements (Reference 23)
6. Controlled excavation and removal of contamination
7. Validation sampling and analysis
8. Waste classification sampling and analysis of unsuitable material requiring off-site disposal
9. Preparation of a validation report
10. Submit validation report to Council within 60 days after the remediation is complete (Reference 23).

KPMG note that data gaps currently exist in the area of the site in the vicinity of the Civil Plant Hire Depot, and particularly the Vehicle Workshop, at 784-786 Mamre Road. The additional soil and groundwater investigation specified in section 8 has been designed to assess the data gaps. An addendum to this RAP may be produced with the results of the additional investigation, the extent of COC impact identified, and any changes to the remediation strategy.

It is considered that the site will be suitable for the proposed commercial/industrial development subject to the implementation of remediation and validation works in accordance with this RAP. An Unexpected Findings Protocol has been developed (Appendix C) which should be enacted if additional potential contamination is encountered during remediation activities or general site works.

16 Limitations

This report has been prepared by KPMG in response to and subject to the following limitations:

- The specific instructions received from GPT.
- The specific scope of works, Terms and Conditions and Scope Limitations set out in the Professional Services Agreement between GPT and KPMG dated 2 March 2021.
- The report has been prepared to a specific scope of works as set out in this report.
- May not be relied upon by any third party not named in this report for any purpose except with the prior written consent of KPMG (which consent may or may not be given at the discretion of KPMG).
- This report comprises the formal report, documentation sections, tables, figures and appendices as referred to in the index to this report and must not be released to any third party or copied in part without all the material included in this report for any reason.
- The report only relates to 754-770 & 784-786 Mamre Road, Kemps Creek, NSW (the site) as shown on Figure 2.
- The report relates to the site as at the date of the investigations as conditions may change thereafter due to natural processes and/or site activities.
- No warranty or guarantee is made in regard to any other use than as specified in the scope of works and only applies to the media, locations, samples and the depths tested as reported in this report.
- Other limitations as described under Scope Limitations.

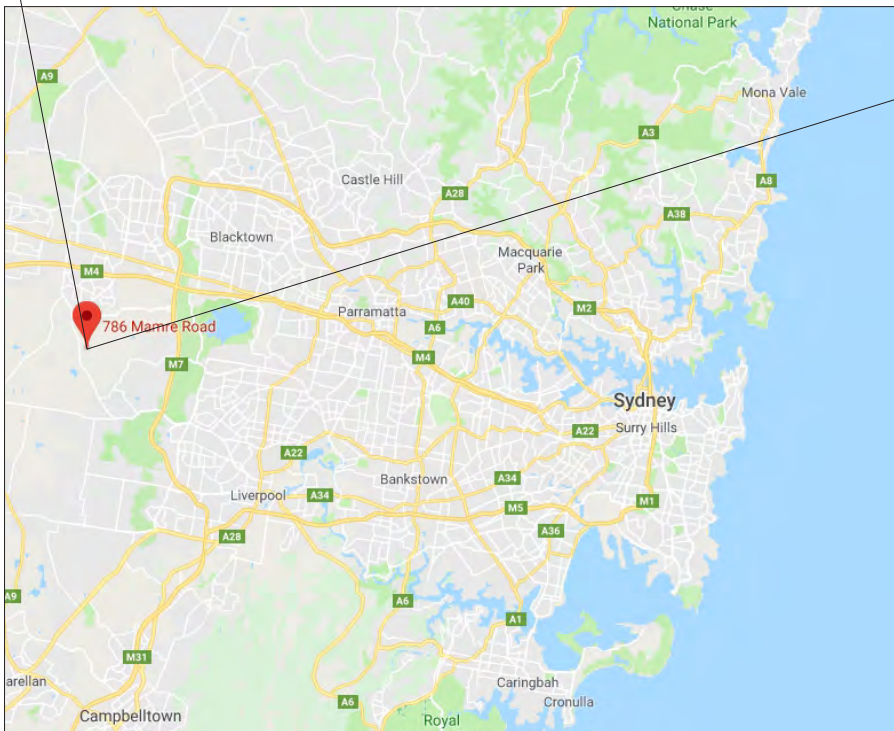
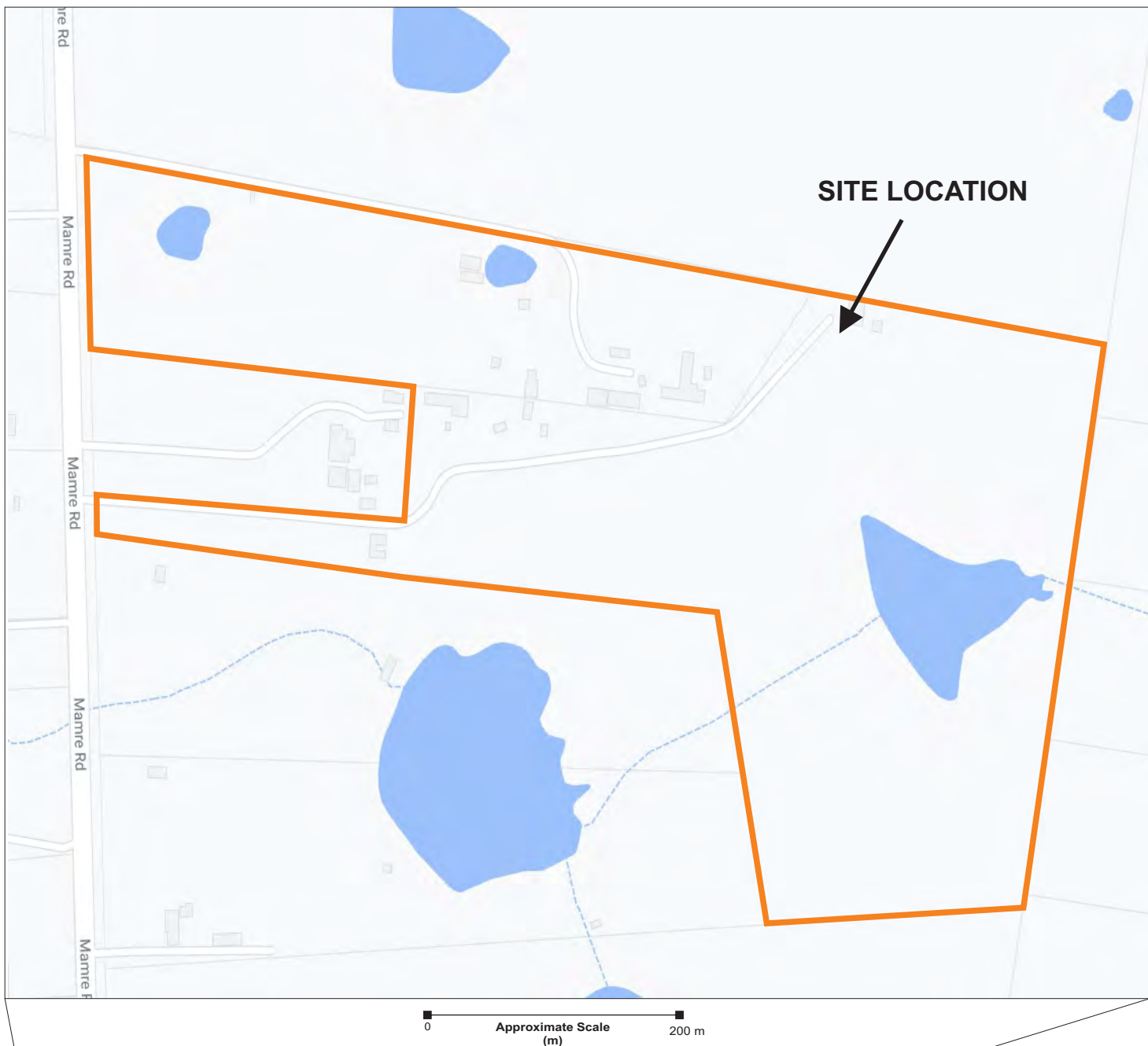
17 References

1. Preliminary Site Investigation, 784-786 Mamre Road, Kemps Creek, NSW, prepared by KPMG, dated 23 March 2021.
2. Targeted Environmental Investigation – 754-786 Mamre Road, Kemps Creek, NSW prepared by KPMG SGA dated 21 November 2019.
3. Limited Asbestos Assessment, 754 & 784-786 Mamre Road, Kemps Creek, NSW, prepared by KPMG, dated 27 August 2020
4. Environmental Assessment, 754 Mamre Road, Kemps Creek, NSW, prepared by KPMG, dated 29 September 2020.
5. Groundwater and Surface Water Sampling Event, 754 & 772-782 Mamre Road, Kemps Creek, NSW, prepared by KPMG, dated 22 December 2020.
6. Environmental Assessment, 784-786 Mamre Road, Kemps Creek, NSW, prepared by KPMG, dated 23 March 2021.
7. Imported Fill Protocol, 754-786 Mamre Road, Kemps Creek, NSW, prepared by JBS&G Australia Pty Ktd, dated 27 April 2021.
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10. Geological Survey NSW (1991) – Sydney 1:250,000 Geological Sheet S1 56-5.
11. Code of Practice - How to Safely Remove Asbestos - prepared by Safework NSW dated August 2019.
12. AS4482.1–2005 Guide to the investigation and sampling of sites with potentially contaminated soil, Part 1: non-volatile and semi-volatile compounds. Standards Australia.
13. NSW Environment Protection Authority (EPA) (2020) Contaminated Land Guidelines – Consultants Reporting on Contaminated Land Guidelines
14. Australian and New Zealand Environment Governments (ANZG)– Guidelines for Fresh and Marine Water Quality, 2018
15. Australian and New Zealand Environment Conservation Council (ANZECC) - Australian and New Zealand Guidelines for Fresh and Marine Water Quality, dated October 2000
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17. GHD Pty Ltd - Western Sydney Airport Environmental Impact Statement, Groundwater Assessment, dated October 2015.
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21. NSW EPA – Waste classification guidelines – part 1 classifying waste, dated November 2014.


- 22.NSW EPA – Technical Note: Investigation of Service Station Sites, dated April 2014.
- 23.NSW EPA – Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019.
- 24.Victoria EPA – Industrial Waste Resource Guidelines (IWRG702): Soil Sampling, dated June 2009.
- 25.NSW EPA – Guidelines for implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019, dated December 2020.
- 26.NSW Government – Managing asbestos in or on soil, dated March 2014.



APPENDIX A FIGURES



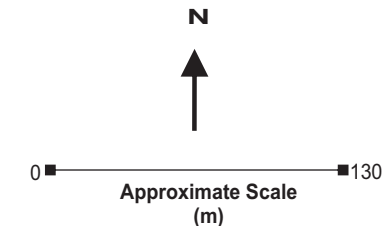
Source: Google Maps

CLIENT				
GPT				
PROJECT				
Remedial Action Plan 754-770 & 784-786 Mamre Road, Kemps Creek, NSW				
TITLE				
Figure 1 - Site Location				
SCALE		DATE	DRAWING No.	ISSUE
NTS		23/03/2021	390892_Figure 1	A
DRAWN	CHECKED	JOB No.		
J.L.	J.W.	390892		
<div><div></div><div><p>KPMG Property & Environmental Services Pty Ltd ABN 53 103 479 992 Tower 3 International Towers Sydney 300 Barangaroo Avenue Sydney NSW 2000 Phone: +61 2 9535 7000 Fax: +61 2 9535 7001 Web: www.kpmg.com.au <small>KPMG Property & Environmental Services Pty Limited is an affiliate of KPMG. KPMG, an Australian partnership and a member firm of the KPMG global organisation of independent member firms affiliated with KPMG International Limited, a private English company limited by guarantee. All rights reserved. The KPMG name and logo are trademarks used under license by the independent member firms of the KPMG global organisation</small></p></div></div>				



- Site Boundary
- Property Boundary
- Areas of Environmental Concern**
 - Civil Plant Hire Depot
 - Refueling Area:
 - 4,000 L petrol UST
 - 20,000 L diesel UST
 - three (3) ASTs
 - several drums
 - Other Chemical / Equipment Storage
 - Vehicle Washdown Area

- Previous Investigation Sampling Locations**
- KPMG 2019 Soil Sampling Location
 - KPMG 2020d Groundwater Sampling Location
 - KPMG 2020d Surface Water Sampling Location



Source: Nearmap

CLIENT
GPT

PROJECT
**Remedial Action Plan
754-770 & 784-786 Mamre Road, Kemps Creek, NSW**

TITLE
**Figure 2 – Areas of Environmental Concern
& Sampling Locations**

SCALE NTS	DATE 23/03/2021	DRAWING No. Figure 2 - 390892	ISSUE A
DRAWN J.L.	CHECKED J.W.	JOB No. 390892	

KPMG Property & Environmental Services
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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020d Groundwater Sampling Location

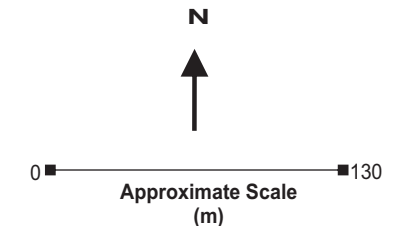
KPMG 2020d Surface Water Sampling Location

Guideline Criteria

310 mg/kg

NEPM 2013 Table 1B(5)
Generic EIL
Commercial / Industrial

Chromium Concentration
Above Guideline Criteria



Source: Nearmap

CLIENT
GPT

PROJECT
Remedial Action Plan
754-770 & 784-786 Mamre Road, Kemps Creek, NSW

TITLE
Figure 3A
Soil Exceedances - Chromium (III+VI)

SCALE
NTS

DATE
23/03/2021

DRAWING No.
Figure 3 - 390892

ISSUE
A

DRAWN
J.L.

CHECKED
J.W.

JOB No.
390892

KPMG

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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020c Groundwater Sampling Location

KPMG 2020c Surface Water Sampling Location

Guideline Criteria

140 mg/kg

NEPM 2013 Table 1B(5)
Generic EIL
Commercial / Industrial

Copper Concentration Above Guideline Criteria

Source: Nearmap

CLIENT
GPT

PROJECT
Remedial Action Plan
754-770 & 784-786 Mamre Road, Kemps Creek, NSW

TITLE
Figure 3B
Soil Exceedances - Copper

SCALE
NTS

DATE
23/03/2021

DRAWING No.
Figure 3 - 390892

ISSUE
A

DRAWN
J.L.

CHECKED
J.W.

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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020c Groundwater Sampling Location

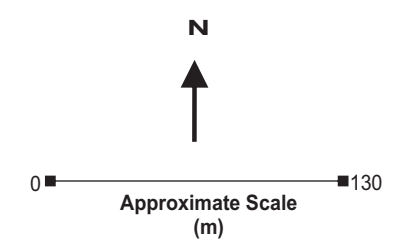
KPMG 2020c Surface Water Sampling Location

Guideline Criteria

55 mg/kg

NEPM 2013 Table 1B(5)
Generic EIL
Commercial / Industrial

Nickel Concentration
Above Guideline Criteria



Source: Nearmap

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Remedial Action Plan
754-770 & 784-786 Mamre Road, Kemps Creek, NSW

TITLE

Figure 3C
Soil Exceedances - Nickel

SCALE

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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020d Groundwater Sampling Location

KPMG 2020d Surface Water Sampling Location

Guideline Criteria

360 mg/kg

NEPM 2013 Table 1B(5)
Generic EIL
Commercial / Industrial

Zinc Concentration
Above Guideline Criteria

Source: Nearmap

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Figure 3D
Soil Exceedances - Zinc

SCALE
NTS

DATE
23/03/2021

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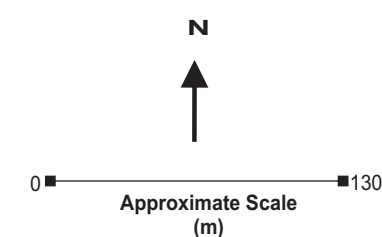
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- Site Boundary
- Property Boundary
- Previous Investigation Sampling Locations**
- KPMG 2019 Soil Sampling Location
- KPMG 2020d Groundwater Sampling Location
- KPMG 2020d Surface Water Sampling Location

- Guideline Criteria**
- NEPM 2013 Table 1B(7) Management Limits Commercial / Industrial (Coarse Soil)
- NEPM 2013 Table 1B(6) ESLs for Commercial / Industrial (Coarse Soil)
- TRH Concentration Above Guideline Criteria



Source: Nearmap

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TITLE
Figure 3E
Soil Exceedances - TRH

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NTS	23/03/2021	Figure 3 - 390892	A
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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020d Groundwater Sampling Location

KPMG 2020d Surface Water Sampling Location

Guideline Criteria

1.4 mg/kg

NEPM 2013 Table 1B(6)
ESLs for
Commercial / Industrial
(Coarse Soil)

Benzo(a)pyrene
Concentration Above
Guideline Criteria

Source: Nearmap

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TITLE

Figure 3F
Soil Exceedances - Benzo(a)pyrene

SCALE

NTS

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23/03/2021

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Figure 3 - 390892

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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020c Groundwater Sampling Location

KPMG 2020c Surface Water Sampling Location

Guideline Criteria

1.4 ug/L

ANZG (2018) Freshwater 95% Toxicant DGV / Adjusted For Hardness Factor

Copper (Filtered) Concentration Above Guideline Criteria

Note: GW01 is located offsite

Source: Nearmap

CLIENT
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Remedial Action Plan
754-770 & 784-786 Mamre Road, Kemps Creek, NSW

TITLE
Figure 4A
Water Exceedances - Copper

SCALE
NTS

DATE
23/03/2021

DRAWING No.
Figure 4 - 390892

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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020c Groundwater Sampling Location

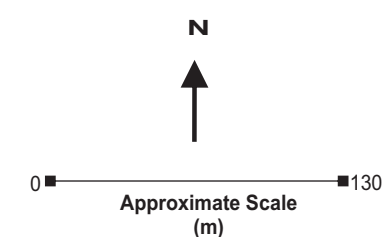
KPMG 2020c Surface Water Sampling Location

Guideline Criteria

ANZG (2018) Freshwater 95% Toxicant DGV / Adjusted For Hardness Factor

Nickel (Filtered) Concentration Above Guideline Criteria

Note: GW01 is located offsite



Source: Nearmap

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TITLE
**Figure 4B
Water Exceedances - Nickel**

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Site Boundary

Property Boundary

Previous Investigation Sampling Locations

KPMG 2019 Soil Sampling Location

KPMG 2020c Groundwater Sampling Location

KPMG 2020c Surface Water Sampling Location

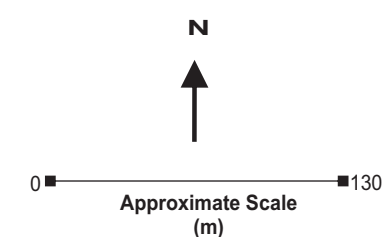
Guideline Criteria

ANZG (2018) Freshwater 95% Toxicant DGV / Adjusted For Hardness Factor

Zinc (Filtered) Concentration Above Guideline Criteria

8 / 31.2 ug/L

Note: GW01 is located offsite



Source: Nearmap

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**Remedial Action Plan
754-770 & 784-786 Mamre Road, Kemps Creek, NSW**






TITLE
**Figure 4C
Water Exceedances - Zinc**

SCALE	DATE	DRAWING No.	ISSUE
NTS	23/03/2021	Figure 4 - 390892	A

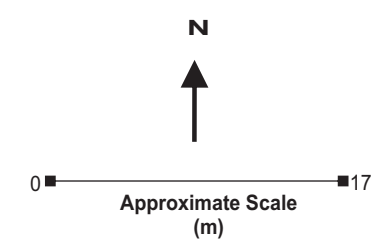
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-  Approximate Remediation Area Boundary
-  Property Boundary
-  Remediation Area A
-  Remediation Area B
-  Remediation Area C

Note: Remediation Area D is the remainder of area within Remediation Area Boundary not included in Remediation Areas A, B or C




Source: Nearmap			
CLIENT			
GPT			
PROJECT			
Remedial Action Plan			
754-770 & 784-786 Mamre Road, Kemps Creek, NSW			
TITLE			
Figure 5 - Remediation Areas			
SCALE	NTS	DATE	23/03/2021
DRAWN	J.L.	CHECKED	J.W.
DRAWING No.		ISSUE	
		A	
			
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 Approximate Remediation Area Boundary

 Property Boundary

 Refueling Area:
- 4,000 L petrol UST
- 20,000 L diesel UST
- three (3) ASTs
- several drums


Additional Investigation Sampling Locations - Stage 1

 Proposed Soil Sampling Location

 Proposed Soil Bore Converted To Groundwater Monitoring Well Location

Note: Further investigation may be required dependant on findings of Stage 1

 Anticipated Groundwater Flow Direction

N

0 17
Approximate Scale (m)


Source: Nearmap

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754-770 & 784-786 Mamre Road, Kemps Creek, NSW

TITLE
Figure 6 - Additional Invetigation

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Remedial Action Plan

754-770 & 784-786 Mamre Road, Kemps Creek NSW

Prepared for GPT

29 April 2021

APPENDIX B GUIDELINES

Table B1 Health Investigation Levels for Soil Contaminants

Chemical	Health-based Investigation Levels (mg/kg)			
	Residential A ¹	Residential B ¹	Recreational C ¹	Commercial Industrial D ¹ /
Metals and Inorganics				
Arsenic ₂	100	500	300	3 000
Beryllium	60	90	90	500
Boron	4500	40 000	20 000	300 000
Cadmium	20	150	90	900
Chromium (VI)	100	500	300	3600
Cobalt	100	600	300	4000
Copper	6000	30 000	17 000	240 000
Lead ₃	300	1200	600	1 500
Manganese	3800	14 000	19 000	60 000
Mercury (inorganic)⁵	40	120	80	730
Methyl mercury⁴	10	30	13	180
Nickel	400	1200	1200	6 000
Selenium	200	1400	700	10 000
Zinc	7400	60 000	30 000	400 000
Cyanide (free)	250	300	240	1 500
Polycyclic Aromatic Hydrocarbons (PAHs)				
Carcinogenic PAHs (as BaP TEQ)⁶	3	4	3	40
Total PAHs⁷	300	400	300	4000

- 1 - HIL A - Residential with garden/accessible soil (home grown produce <10% fruit and vegetable intake (no poultry), also includes childcare centres, preschools and primary schools.
- HIL B - Residential with minimal opportunities for soil access; includes dwellings with fully and permanently paved yard space such as high-rise buildings and apartments.
- HIL C - Public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and footpaths. This does not include undeveloped public open space where the potential for exposure is lower and where a site-specific assessment may be more appropriate.
- HIL D - Commercial/industrial, includes premises such as shops, offices, factories and industrial sites.
- 2 Arsenic: HIL assumes 70% oral bioavailability. Site-specific bioavailability may be important and should be considered where appropriate (refer Schedule B7).
- 3 Lead: HIL is based on blood lead models (IEUBK for HILs A, B and C and adult lead model for HIL D where 50% oral bioavailability has been considered. Site-specific bioavailability may be important and should be considered where appropriate.
- 4 Methyl mercury: assessment of methyl mercury should only occur where there is evidence of its potential source. It may be associated with inorganic mercury and anaerobic microorganism activity in aquatic environments. In addition the reliability and quality of sampling/analysis should be considered.

Table B2 Soil-specific added contaminant limits for aged zinc in soil

Zn added contaminant limits (ACL, mg added contaminant/kg)						
pH ⁴	CEC ⁵ (cmol/kg)					
Areas of ecological significance						
	5	10	20	30	40	60
4.0	15	20	20	20	20	20
4.5	20	25	25	25	25	25
5.0	30	40	40	40	40	40
5.5	40	60	60	60	60	60
6.0	50	90	90	90	90	90
6.5	50	90	130	130	130	130
7.0	50	90	150	190	190	190
7.5	50	90	150	210	260	280
Urban residential/public open space ¹						
	5	10	20	30	40	60
4.0	70	85	85	85	85	85
4.5	100	120	120	120	120	120
5.0	130	180	180	180	180	180
5.5	180	270	270	270	270	270
6.0	230	400	400	400	400	400
6.5	230	400	590	590	590	590
7.0	230	400	700	880	880	880
7.5	230	400	700	960	1200	1300
Commercial/industrial						
	5	10	20	30	40	60
4.0	110	130	130	130	130	130
4.5	150	190	190	190	190	190
5.0	210	290	290	290	290	290
5.5	280	420	420	420	420	420
6.0	360	620	620	620	620	620
6.5	360	620	920	920	920	920
7.0	360	620	1100	1400	1400	1400
7.5	360	620	1100	1500	1900	2000

- 1 Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table B1.
- 2 Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
- 3 The EIL is calculated from summing the ACL and the ABC.
- 4 pH measure using the CaCl₂ method (Raymond & Higginson 1992).
- 5 CEC measured using the silver thiourea method (Chabra et al. 1972).

Table B3 Soil-specific added contaminant limits for aged copper in soil

Cu added contaminant limits (ACL, mg added contaminant/kg)					
Areas of ecological significance					
<i>CEC⁵ (cmol/kg) based</i>					
5	10	20	30	40	60
30	65	70	70	75	80
<i>pH⁴ based</i>					
4.5	5.5	6.0	6.5	7.5	8.0
20	45	65	90	190	270
Urban residential/public open space ¹					
<i>CEC⁵ (cmol/kg) based</i>					
5	10	20	30	40	60
95	190	210	220	220	230
<i>pH⁴ based</i>					
4.5	5.5	6.0	6.5	7.5	8.0
60	130	190	280	560	800
Commercial/industrial					
<i>CEC⁵ (cmol/kg) based</i>					
5	10	20	30	40	60
140	280	300	320	330	340
<i>pH⁴ based</i>					
4.5	5.5	6.0	6.5	7.5	8.0
85	190	280	400	830	1200

- 1 Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table B1.
- 2 Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
- 3 The EIL is calculated from summing the ACL and the ABC.
- 4 pH measure using the CaCl₂ method (Raymond & Higginson 1992).
- 5 CEC measured using the silver thiourea method (Chabra et al. 1972).

Table B4 Soil-specific added contaminant limits for aged chromium III and nickel in soil

Chemical	Clay content (% clay)	Added contaminate limits (mg added contaminant/kg) for various land uses		
		Areas of ecological significance	Urban residential and public open space	Commercial and industrial
Chromium III	1	60	190	310
	2.5	80	250	420
	5	100	320	530
	≥10	130	400	660
Nickel	CEC^a (cmol/kg)	Areas of ecological significance	Urban residential and public open space¹	Commercial and industrial
	5	5	30	55
	10	30	170	290
	20	45	270	460
	30	60	350	600
	40	70	420	730
	60	95	560	960

- 1 Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table B1.
2 Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
3 The EIL is calculated from summing the ACL and the ABC.
a = CEC measured using the silver thiourea method (Chabra et al. 1972).

Table B5 Generic added contaminant limits for lead in soils irrespective of their physiochemical properties

	Pb added contaminant limits (mg added contaminant/kg) for various land uses		
CHEMICAL	Areas of ecological significance	Urban residential/public open space ¹	Commercial and industrial
Lead	470	1100	1800

- 1 Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table B1.
- 2 Aged values apply to contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
- 3 The EIL is calculated from summing the ACL and the ABC.

Table B6 Generic EIL's for aged As, fresh DDT and fresh naphthalene in soils irrespective of their physiochemical properties

CHEMICAL	Ecological Investigation Levels (mg total contaminant/kg)		
	Areas of ecological significance	Urban residential/public open space ¹	Commercial industrial and
Arsenic^{2 4}	40	100	160
DDT³	3	180	640
Naphthalene^{3 4}	10	170	370

- 1 Urban residential/public open space is broadly equivalent to the HIL A, HIL B and HIL C land use scenarios in Table B1.
- 2 Aged values are applicable to arsenic contamination present in soil for at least two years. For fresh contamination refer to Schedule B5c.
- 3 Insufficient data was available to calculate values for DDT and naphthalene, consequently the values for fresh contamination should be used.
- 4 Insufficient data was available to calculate ACL's for As, DDT and naphthalene. The EIL should be taken directly from Table B7

Table B7 Soil HSLs for vapour intrusion (mg/kg)

CHEMICAL	HSL B				HSL C				HSL D				Soil saturation concentration (Csat)
	0 m to <1 m	1 m to <2 m	2 m to <4m	4 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+	
SAND													
Toluene	160	220	310	540	NL	NL	NL	NL	NL	NL	NL	NL	560
Ethylbenzene	55	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	64
Xylenes	40	60	95	170	NL	NL	NL	NL	230	NL	NL	NL	300
Naphthalene	3	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	9
Benzene	0.5	0.5	0.5	0.5	NL	NL	NL	NL	3	3	3	3	360
F1 ⁹	45	70	110	200	NL	NL	NL	NL	260	370	630	NL	950
F2 ¹⁰	110	240	440	NL	NL	NL	NL	NL	NL	NL	NL	NL	560
SILT													
Toluene	390	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	640
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	69
Xylenes	95	210	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	330
Naphthalene	4	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	10
Benzene	0.6	0.7	1	2	NL	NL	NL	NL	4	4	6	10	440
F1 ⁹	40	65	100	190	NL	NL	NL	NL	250	360	590	NL	910
F2 ¹⁰	230	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	570
CLAY													
Toluene	480	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	630
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	68
Xylenes	110	310	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	330
Naphthalene	5	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	10
Benzene	0.7	1	2	3	NL	NL	NL	NL	4	6	9	20	430
F1 ⁹	50	90	150	290	NL	NL	NL	NL	310	480	NL	NL	850
F2 ¹⁰	280	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	NL	560

- Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used.
- The key limitations of the HSLs should be referred to prior to application and are presented in Friebel and Nadebaum (2011b and 2011d).
- Detailed assumptions in the derivation of the HSLs and information on how to apply the HSLs are presented in Friebel and Nadebaum (2011a and 2011b).
- Soil HSLs for vapour inhalation incorporate an adjustment factor of 10 applied to the vapour phase partitioning to reflect the differences observed between theoretical estimates of soil vapour partitioning and field measurements. Refer Friebel & Nadebaum (2011a) for further information.
- The soil saturation concentration (C_{sat}) is defined as the soil concentration at which the porewater phase cannot dissolve any more of an individual chemical. The soil vapour that is in equilibrium with the porewater will be at its maximum. If the derived soil HSL exceeds C_{sat}, 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'.

- 6 The HSLs for TPH C6-C10 in sandy soil are based on a finite source that depletes in less than seven years, and therefore consideration has been given to use of sub-chronic toxicity values. The >C8-C10 aliphatic toxicity has been adjusted to represent sub-chronic exposure, resulting in higher HSLs than if based on chronic toxicity. For further information refer to Section 8.2 and Appendix J in Friebe and Nadebaum (2011a).
- 7 The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation factor for vapour degradation, a number of conditions must be satisfied. Firstly the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.
- 8 For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit>50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.
- 9 To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.
- 10 To obtain F2 subtract naphthalene from the >C10-C16 fraction.

Table B8 **ESLs for TPH fractions F1-F4, BTEX and benzo(a)pyrene in soil**

CHEMICAL	Soil texture	ESLs (mg/kg dry soil)		
		Areas of ecological significance	Urban residential/public open space ¹	Commercial and industrial
F1 C ₆ – C ₁₀	<i>Coarse/Fine</i>	125*	180*	215*
F2 > C ₁₀ – C ₁₆		25*	120*	170*
F3 > C ₁₆ – C ₃₄	<i>Coarse</i>	-	300	1700
	<i>Fine</i>	-	1300	2500
F4 > C ₃₄ – C ₄₀	<i>Coarse</i>	-	2800	3300
	<i>Fine</i>	-	5600	6600
Benzene	<i>Coarse</i>	10	50	75
	<i>Fine</i>	10	65	95
Toluene	<i>Coarse</i>	10	85	135
	<i>Fine</i>	65	105	135
Ethylbenzene	<i>Coarse</i>	1.5	70	165
	<i>Fine</i>	40	125	185
Xylenes	<i>Coarse</i>	10	105	180
	<i>Fine</i>	1.6	45	95
Benzo(a)pyrene	<i>Coarse</i>	0.7	0.7	1.4
	<i>Fine</i>	0.7	0.7	1.4

- (1) ESLs are of low reliability except where indicated by * which indicates that the ESL is of moderate reliability.
- (2) “ – ” indicates that insufficient data was available to derive a value.
- (3) To obtain F1, subtract the sum of BTEX concentrations from C₆ – C₁₀ fraction and subtract naphthalene >C₁₀ – C₁₆ to obtain F2.

Table B9 Management Limits for TPH fractions F1-F4 in soil

TPH Fraction	Soil texture	Management Limits ¹ (mg/kg dry soil)	
		Residential, parkland and public open space	Commercial industrial and
F1² C₆ – C₁₀	<i>Coarse</i>	700	700
	<i>Fine</i>	800	800
F2² > C₁₀ – C₁₆	<i>Coarse</i>	1000	1000
	<i>Fine</i>	1000	1000
F3 > C₁₆ – C₃₄	<i>Coarse</i>	2500	3500
	<i>Fine</i>	3500	5000
F4 > C₃₄ – C₄₀	<i>Coarse</i>	10 000	10 000
	<i>Fine</i>	10 000	10 000

- 1 Management Limits are applied after consideration of relevant ESLs and HSLs.
- 2 Separate management limits for BTEX and naphthalene are not available hence these should not be subtracted from the relevant fractions to obtain F1 and F2.

Table B10 ANZG 95% Toxicant Default Guideline Values (DGVs)

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
Metals and Metalloids				
Aluminium pH>6.5	55	-	-	
Antimony	-	-	3	30
Arsenic	24 as As(III) 13 as As(V)	-	10	100
Barium	-	-	2000	20000
Beryllium	-	-	60	600
Boron	370 ³	-	4000	40000
Cadmium	0.2	5.5 ³	2	20
Chromium (III)	3.3	27	-	-
Chromium (VI)	1 ³	4.4	50	500
Cobalt	-	1	-	-
Copper	1.4	1.3	2000	20000
Iron (Total)	-	-	-	-
Lead	3.4	4.4	10	100
Manganese	1900 ³	-	500	5000
Mercury (Total)	0.6 ³	0.4 ³	1	10
Molybdenum	-	-	50	500
Nickel	11	70	20	200
Selenium (Total)	11	-	10	100
Silver	0.05	1.4	100	1000
Tributyl tin (as Sn)	-	0.006 ³	-	-
Tributyl tin oxide	-	-	1	10
Uranium	-	-	17	170
Vanadium	-	100	-	-
Zinc	8 ³	15 ³	-	-
Non-metallic Inorganics				
AmmoniaE (as NH3-N at pH 8)	900 ³	910	-	-
Bromate	-	-	20	200
Chlorine	3	-	-	-
Cyanide (as un-ionised Cn)	7	4	80	800
Fluoride	-	-	1500	15000
Hydrogen sulphide (un-ionised H2S measured as S)	1	-	-	-
Iodide	-	-	500	5000
Nitrate (as NO3)	refer to guideline	refer to guideline	50000	500000

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
Nitrite (as NO ₂)	refer to guideline	refer to guideline	3000	30000
Nitrogen	refer to guideline	refer to guideline	-	-
Phosphorus	refer to guideline	refer to guideline	-	-
Sulphate (as SO ₄)	-	-	500000	5000000
Organic alcohols/other organics				
Ethanol	1400	-	-	-
Ethylenediamine tetra-acetic acid (EDTA)	-	-	250	2500
Formaldehyde	-	-	500	5000
Nitrilotriacetic acid	-	-	200	2000
Anilines				
Aniline	8	-	-	-
2,4-Dichloroaniline	7	-	-	-
3,4-Dichloroaniline	3	150	-	-
Chlorinated Alkanes				
Dichloromethane	-	-	4	40
Trichloromethane (chloroform)	-	-	3	30
Trihalomethanes (total)	-	-	250	2500
Tetrachloromethane (carbon tetrachloride)	-	-	3	30
1,2-Dichloroethane	-	-	3	30
1,1,2-Trichloroethane	6500	1900	-	-
Hexachloroethane	360	-	-	-
Chlorinated Alkenes				
Chloroethene (vinyl chloride)	-	-	0.3	3
1,1-Dichloroethene (DCE)	-	-	30	300
1,2-Dichloroethene (DCE)	-	-	60	600
Tetrachloroethene (PCE) (Perchloroethene)	-	-	50	500
Chlorinated Benzenes				
Chlorobenzene	-	-	300	10
1,2- Dichlorobenzene	160	-	1500	20
1,3- Dichlorobenzene	260	-	-	-
1,4- Dichlorobenzene	60	-	40	0.3
1,2,3- Trichlorobenzene	10	-	30 for individual or total trichlorobenzenes	5
1,2,4- Trichlorobenzene	170 ³	80		

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
1,3,5-Trichlorobenzene	13	13		
Polychlorinated Biphenyls (PCBs)				
Aroclor 1242	0.6	-	-	-
Aroclor 1254	0.03	-	-	-
Other Chlorinated Compounds				
Epichlorohydrin	-	-	100	1000
Hexachlorobutadiene	-	-	0.7	7
Monochloramine	-	-	3000	30000
Monocyclic Aromatic Hydrocarbons				
Benzene	950	700 ³	1	10
Toluene	180	180	800	25
Ethylbenzene	80	80	300	3
Xylenes	350 (as o- xylene) 200 (as p- xylene) 75 (as m-xylene)	75 (as m-xylene)	600	20
Styrene (Vinyl benzene)	-	-	30	4
Polycyclic Aromatic Hydrocarbons (PAHs)				
Naphthalene	16	70 ³	-	-
Benzo[a]pyrene	0.2	0.2	0.01	0.1
Fluoranthene	1.4	1.4	-	-
Phenanthrene	2	2	-	-
Phenols				
Phenol	320	400	-	
2-Chlorophenol	490 ³	-	300	3000
4-Chlorophenol	220	-	-	-
2,4-Dichlorophenol	160	-	200	2000
2,4,6-Trichlorophenol	20	-	20	200
2,3,4,6-Tetrachlorophenol	20	-	-	-
Pentachlorophenol	10 ³	22	10	100
2,4-Dinitrophenol	45	-	-	-
Phthalates				
Dimethylphthalate	3700	-	-	-
Diethylphthalate	1000	-	-	-
Dibutylphthalate	26	-	-	-
Di(2-ethylhexyl) phthalate	-	-	10	100
Pesticides				
Acephate	-	-	8	80
Aldicarb	-	-	4	40

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
Aldrin plus Dieldrin	-	-	0.3	3
Ametryn	-	-	70	700
Amitraz	-	-	9	9
Amitrole	-	-	0.9	9
Asulam	-	-	70	700
Atrazine	13	-	20	200
Azinphos-methyl	0.02 ³	-	30	300
Benomyl	-	-	90	900
Bentazone	-	-	400	4000
Bioresmethrin	-	-	100	1000
Bromacil	-	-	400	4000
Bromoxynil	-	-	10	100
Captan	-	-	400	4000
Carbaryl	-	-	30	300
Carbendazim (Thiophanate-methyl)	-	-	90	900
Carbofuran	0.06	-	10	100
Carboxin	-	-	300	3000
Carfentrazone-ethyl	-	-	100	1000
Chlorantraniliprole	-	-	6000	6000
Chlordane	0.08	-	2	20
Chlorfenvinphos	-	-	2	20
Chlorothalonil	-	-	50	500
Chlorpyrifos	0.01 ⁴	0.009 ⁴	10	100
Chlorsulfuron	-	-	200	2000
Clopyralid	-	-	2000	20000
Cyfluthrin, Beta-cyfluthrin	-	-	50	500
Cypermethrin isomers	-	-	200	2000
Cyprodinil	-	-	90	900
1,3-Dichloropropene	-	-	100	1000
2,2-DPA	-	-	500	5000
2,4-D [2,4-dichlorophenoxy acetic acid]	280	-	30	300
DDT	0.01 ⁴	-	9	90
Deltramethrin	-	-	40	400
Diazinon	0.01	-	4	40
Dicamba	-	-	100	1000
Dichloroprop	-	-	100	1000

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
Dichlorvos	-	-	5	50
Dicofol	-	-	4	40
Diclofop-methyl	-	-	5	50
Dieldrin plus Aldrin	-	-	0.3	3
Diffubenzuron	-	-	70	700
Dimethoate	0.15	-	7	70
Diquat	1.4	-	7	70
Disulfoton	-	-	4	40
Diuron	-	-	20	200
Endosulfan	0.02 ³	0.01	20	200
Endothal	-	-	100	1000
Endrin	0.02	0.008	-	-
EPTC	-	-	300	3000
Esfenvalerate	-	-	30	300
Ethion	-	-	4	40
Ethoprophos	-	-	1	10
Etridiazole	-	-	100	1000
Fenamiphos	-	-	0.5	5
Fenarimol	-	-	40	400
Fenitrothion	0.2	-	7	70
Fenthion	-	-	7	70
Fenvalerate	-	-	60	600
Fipronil	-	-	0.7	7
Flamprop-methyl	-	-	4	40
Fluometuron	-	-	70	700
Fluproponate	-	-	9	90
Glyphosate	370	-	1000	10000
Haloxypop	-	-	1	10
Heptachlor	0.09	-	-	-
Heptachlor epoxide	-	-	0.3	3
Hexazinone	-	-	400	4000
Imazapyr	-	-	9000	90000
Iprodione	-	-	100	1000
Lindane (γ -HCH)	0.2	-	10	100
Malathion	0.05	-	70	700
Mancozeb (as ETU, ethylene thiourea)	-	-	9	90
MCPA	-	-	40	400

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
Metaldehyde	-	-	20	200
Metham (as methylisothiocyanate, MITC)	-	-	1	10
Methidathion	-	-	6	60
Methiocarb	-	-	7	70
Methomyl	3.5	-	20	200
Methyl bromide	-	-	1	10
Metiram (as ETU, ethylene thiourea)	-	-	9	90
Metolachlor/s-Metolachlor	-	-	300	3000
Metribuzin	-	-	70	700
Metsulfuron-methyl	-	-	40	400
Mevinphos	-	-	6	60
Molinate	3.4	-	4	40
Napropamide	-	-	400	4000
Nicarbazin	-	-	1000	10000
Norflurazon	-	-	50	500
Omethoate	-	-	1	10
Oryzalin	-	-	400	4000
Oxamyl	-	-	7	70
Paraquat	-	-	20	200
Parathion	0.004 ³	-	20	200
Parathion methyl	-	-	0.7	7
Pebulate	-	-	30	300
Pendimethalin	-	-	400	4000
Pentachlorophenol	-	-	10	100
Permethrin	-	-	200	2000
Picloram	-	-	300	3000
Piperonyl butoxide	-	-	600	6000
Pirimicarb	-	-	7	70
Pirimiphos methyl	-	-	90	900
Polihexanide	-	-	700	7000
Profenofos	-	-	0.3	03
Propachlor	-	-	70	700
Propanil	-	-	700	7000
Propargite	-	-	7	70
Propazine	-	-	50	500

Chemical	Fresh Waters ¹	Marine Waters ¹	Drinking Water ²	Non Potable Water
	µg/L			
Propiconazole	-	-	100	1000
Propyzamide	-	-	70	700
Pyrasulfatole	-	-	40	400
Pyrazophos	-	-	20	200
Pyroxsulam	-	-	4000	40000
Quintozene	-	-	30	300
Simazine	3.2	-	20	200
Spirotetramat	-	-	200	2000
Sulprofos	-	-	10	100
2,4,5-T	36	-	100	1000
Tebuthiuron	2.2	-	-	-
Temephos	-	0.05 ⁴	400	4000
Terbacil	-	-	200	2000
Terbufos	-	-	0.9	9
Terbuthylazine	-	-	10	100
Terbutryn	-	-	400	4000
Thiobencarb	2.8	-	40	400
Thiometon	-	-	4	40
Thiram	0.01	-	7	70
Toltrazuril	-	-	4	40
Toxaphene	0.2	-	-	-
Triadimefon	-	-	90	900
Trichlorfon	-	-	7	70
Triclopyr	-	-	20	200
Trifluralin	2.6 ⁴	-	90	900
Vernolate	-	-	40	400
Surfactants				
Linear alkylbenzene sulfonates (LAS)	280	-	-	
Alcohol ethoxylated sulfate (AES)	650	-	-	
Alcohol ethoxylated surfactants (AE)	140	-	-	

- 1 Investigation levels apply to typical slightly-moderately disturbed systems. See ANZG (2018) Guidelines for Fresh and Marine Water Quality, 2018 for guidance on applying these levels to different ecosystem conditions.
- 2 Investigation levels are taken from the health values of the Australian Drinking Water Guidelines (NHMRC 2011).
- 3 Figure may not protect key species from chronic toxicity, refer to ANZG (2018) for further guidance.
- 4 Chemical for which possible bioaccumulation and secondary poisoning effects should be considered, refer to ANZG (2018) for further guidance.



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- 5 For changes in DGV with pH refer to ANZG (2018) for further guidance
- 6 Values have been calculated using a hardness of 30 mg/L CaCO₃ refer to ANZG (2018) for further guidance on recalculating for site-specific hardness.

Table B11 Groundwater HSLs for vapour intrusion (mg/L)

CHEMICAL	2m to <4m	4m to <8m	8m+	2m to <4m	4m to <8m	8m+	2m to <4m	4m to <8m	8m+	Solubility Limit
	Low-High density residential			Recreational/open space			Commercial/industrial			
SAND										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	0.8	0.8	0.9	NL	NL	NL	5	5	5	59
F1 ⁹	1	1	1	NL	NL	NL	6	6	7	9.0
F2 ¹⁰	1	1	1	NL	NL	NL	NL	NL	NL	3.0
SILT										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	4	5	5	NL	NL	NL	30	30	30	59
F1 ⁹	6	6	6	NL	NL	NL	NL	NL	NL	9.0
F2 ¹⁰	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.0
CLAY										
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	NL	61
Ethylbenzene	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.9
Xylenes	NL	NL	NL	NL	NL	NL	NL	NL	NL	21
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	NL	0.17
Benzene	5	5	5	NL	NL	NL	30	30	35	59
F1 ⁹	NL	NL	NL	NL	NL	NL	NL	NL	NL	9.0
F2 ¹⁰	NL	NL	NL	NL	NL	NL	NL	NL	NL	3.0

(1) Land use settings are equivalent to those described in Table 1A(1) Footnote 1 and Schedule B7. HSLs for vapour intrusion for high density residential assume residential occupation of the ground floor. If communal car parks or commercial properties occupy the ground floor, HSL D should be used,

(2) The key limitations of the HSLs are presented in Friebe and Nadebaum (2011d) and should be referred to prior to application.

(3) Detailed assumptions in the derivation of the HSLs and information on the application of the HSLs are presented in Friebe and Nadebaum (2011a and 2011b).

(4) The solubility limit is defined as the groundwater concentration at which the water cannot dissolve any more of an individual chemical based on a petroleum mixture. The soil vapour that is in equilibrium with the groundwater will be at its maximum. 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'.

(5) The figures in the above table may be multiplied by a factor to account for biodegradation of vapour. A factor of 10 may apply for source depths from 2 m to <4 m or a factor of 100 for source depths of 4 m and deeper. To apply the attenuation

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factor for vapour degradation, a number of conditions must be satisfied. Firstly, the maximum length of the shorter side of the concrete slab and surrounding pavement cannot exceed 15 m, as this would prevent oxygen penetrating to the centre of the slab. Secondly, measurement of oxygen in the subsurface is required to determine the potential for biodegradation. Oxygen must be confirmed to be present at >5% to use these factors.

Federal Register of Legislative Instruments F2013L00768 Schedule B 1 - Guideline on Investigation Levels for Soil and Groundwater OPC50357 - B 57

(6) For soil texture classification undertaken in accord with AS 1726, the classifications of sand, silt and clay may be applied as coarse, fine with liquid limit <50% and fine with liquid limit >50% respectively, as the underlying properties to develop the HSLs may reasonably be selected to be similar. Where there is uncertainty, either a conservative approach may be adopted or laboratory analysis should be carried out.

(7) To obtain F1 subtract the sum of BTEX concentrations from the C6-C10 fraction.

(8) To obtain F2 subtract naphthalene from the >C10-C16 fraction



APPENDIX C

UNEXPECTED FINDS PROTOCOL

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1 Unexpected Finds Protocol

1.1 Introduction

The objective of this unexpected finds protocol (UFP) is to manage potential unexpected finds of contamination and mitigate associated human health and environmental risks.

The UFP is a precautionary measure to be implemented during all future site preparation and construction works at the site to ensure that unexpected finds of contamination, if any, are appropriately managed to allow the site to be suitable for the proposed land uses.

1.2 Unexpected Finds

Unexpected finds of potential contamination on site may be identified by visual (appearance or staining) and / or olfactory (odour) evidence. This UFP is applicable to the entire site, however particular care should be taken for site works undertaken in proximity to the Remediation Area illustrated in Figure 5.

Features described in Table 1 are typically encountered as unexpected finds.

Table 1 – Identification of Unexpected Finds

Unexpected Find	Details
Buried or surface asbestos containing materials (e.g. asbestos cement sheeting, lagging, pipping)	This may include cement bound asbestos or other forms of asbestos. Friable forms of asbestos including lagging and insulation may be seen as fibrous material which flakes and powders easily. Visibly identifying asbestos is difficult and often requires a sample of the material to be analysed by a NATA accredited laboratory.
Buried waste materials	This may include a variety of waste materials, inclusive of wood, plastic, metal fragments, building rubble (e.g. concrete, brick, asphalt, asbestos containing materials) and other general household/farm waste (e.g. tins and containers of chemicals and fuels). If waste materials are identified, this could indicate uncontrolled and poor-quality fill material. A definitive grouping of these materials buried underground will constitute an unexpected find.
Hydrocarbon impacts	May be identified by a hydrocarbon odour which may vary in strength and may be accompanied by specific areas of dark staining, evidence of oily sheen, or larger scale discolouration of strata from a previously identified natural colouration.
Septic tanks	May be identified by an organic odour (e.g. landfill/sewer/putrefied) of varying strength. Associated staining may be identifiable, colour and extent may vary dependant on the magnitude of spillage encountered.
Underground Storage Tank (UST)	These may be identified by encountering a buried cylindrical steel underground tank, deeper sand fill or relatively small concrete footings or steel pipelines, sometimes with observed hydrocarbon odours or staining.
Other unexpected finds	Other indications of contamination include various chemical odours or staining and discolouration of soils. It is possible that indications of contamination not specifically described by the UFP may be encountered. If in doubt about an unexpected find, a precautionary principal should be employed, and the unexpected finds procedure will be activated.

1.3 Unexpected Finds Procedure

1.3.1 Training and induction of personnel

All construction personnel working on the site are to be inducted on the identification of potential unexpected finds (Section 1.2). The induction into the UFP must be performed by a suitably qualified person as nominated by GPT.

A training register has not been provided in this UFP as the contractor is expected to have an overarching training register for construction works which should incorporate the UFP.

The personnel working on the site are required to have general competencies to identify unexpected finds of contamination in the field and that this competency will be used in good faith during site preparation, earthworks or construction activities.

If in doubt about an unexpected find, a precautionary principal should be employed, and the unexpected finds procedure activated (section 1.3.2).

1.3.2 Procedure in the event of an unexpected find

Should an unexpected find of potential contamination be encountered during the development works, the following procedure (steps 1 to 13) should be followed. In addition to the UFP all implementation procedures in accordance with other adopted site documentation should be followed (e.g. contractors Construction and Environmental Management Plans, Health and Safety Guidance, etc).

- 1) Stop work in the potentially contaminated areas as soon as practicably safe and move to a designated meeting point or safe area. Excavation will cease in the vicinity of the discovery.
- 2) Contact the Construction Foreman, Superintendent, environmental manager, or person in control of the workplace.
- 3) A suitable person must assess the potential risk to human health and the environment posed by the unexpected find and assess if evaluation or emergency services need to be contacted.
- 4) Delineate an exclusion / quarantine zone around the area using fencing and or appropriate barriers and signage.
- 5) If required, Construction Foreman to arrange inspection by environmental officer / external Environmental Consultant to assess the unexpected finds and provide advice as follows:
 - Preliminary assessment of the find and need for immediate management controls (if any)
 - What further assessment and/or remediation works are required and how such works are to be undertaken in accordance with regulations and guidelines
 - Preparation of a remedial action plan for large scale contamination or specification for smaller or minor volumes of material (if necessary)
 - Remediation works required (where applicable)
 - Validation works required following remediation works (if applicable).
- 6) Works are not to recommence in the impacted area until appropriate advice has been obtained from the environmental consultant or suitably qualified person and they have provided clearance. Works in the impacted area should not recommence until the extent of the contamination has been assessed and remediation strategy prepared (if necessary).
- 7) Air monitoring requirements are to be advised by an Environmental Consultant.

- 8) If it is deemed safe to do so, the Environmental Consultant will provide clearance for works to proceed in the impacted area. If it is not considered safe, works must remain on hold until appropriate assessment, remediation and or validation measures have been actioned.
- 9) Excavated material from remedial activities will be separated from other materials and stockpiled for assessment. Sampling of this material will be undertaken in accordance with the relevant guidelines and frequencies. Samples will be analysed for a range of analytes as required for beneficial reuse or offsite disposal.
- 10) Materials requiring offsite disposal will be analysed and assessed to determine the appropriate waste classification of the material in accordance with the NSW EPA Waste Classification Guidelines. Depending on the classification, materials will be transported to an appropriate waste facility.
- 11) All waste tracking system recording the volume of material, waste classification / beneficial reuse status, removal documentation and truck receiving landfill facility details must be recorded to ensure all waste is accounted for and disposed of appropriately in accordance with NSW EPA requirements.
- 12) Any unexpected finds must be documented, and records of volumes and types of materials identified and removed from site must be kept on file.
- 13) Keep a record of the unexpected find. The record must include the exact location / GPS coordinates of the find. Documentation on the removal of any contaminated materials from the site must be kept on file
 - a) Volume of the material removed
 - b) Type (classification) of material
 - c) Licensed facility that material was disposed to
 - d) Receipt of documentation from the licensed facility confirming volume received.

1.4 Final Statement

It is possible that indications of contamination not specifically covered in this UFP or any site inductions may be encountered. The precautionary principle should be applied, and the unexpected finds procedure activated in all such circumstances.



APPENDIX D

CONCEPTUAL SITE MODEL ANALYSIS



Proposed Commercial/Industrial Land Use Scenario							
Sources	COC	Media	Receptor	Exposure Route	Comments	Investigation Level	Pathway complete
ASTs, UPSS and Vehicle Workshop activities	Heavy metals, TRH, BTEX, PAHs, VOCs, OCP/OPP, and asbestos	Soil	Human	Direct contact, inhalation and ingestion of dust, ingestion	Concentrations of TRH were above the Management Limits for commercial/industrial land use in one sample in the vicinity of the vehicle workshop at 784-786 Mamre Road. UPSSs are present on site and are in poor condition. It is likely that petroleum hydrocarbon impacts are present within the fill sands and walls of the tank pit excavation.	HSLs / HILs Management Limits	Potentially
			Ecological species and soil microbial processes	Direct Contact and ingestion	Concentrations of heavy metals (chromium (III+VI), copper and nickel) and TRH C16-C34 and TRH C34-40 above ecological protection criteria were reported in shallow soil samples collected in the vicinity of the UPSS and ASTs located at 784-786 Mamre Road. The ecological criteria are not considered to be directly applicable to the site in its current condition considering that the identified AEC will be required to be remediated and that majority of the site will require significant earthworks as part of the proposed commercial/industrial development. Impacted soils in the vicinity of AECs may not be suitable for reuse on site for landscaping purposes.	ESLs / EILs	Potentially
		Groundwater	Human	Inhalation	Concentrations of COCs were below the laboratory LOR or below the adopted human health guidelines. Detectable concentrations of TRH in offsite well GW01 indicates that groundwater at the site has been somewhat impacted by the fuel storage located at 784-786 Mamre Road, which is located to the east of GW01. While the identified TRH impacts are minor, the concentrations of TRH may be higher closer to the fuel storage infrastructure at 784-786 Mamre Road.	HSLs / HILs	Unlikely
				Drinking	Presence of reticulated water supplied considered to preclude groundwater extraction for this purpose.	ADWGs (drinking water)	No

Proposed Commercial/Industrial Land Use Scenario							
Sources	COC	Media	Receptor	Exposure Route	Comments	Investigation Level	Pathway complete
Fill Material	Heavy metals PAHs	Soil	Human	Direct contact, inhalation and ingestion of dust, ingestion	Concentrations of COCs were below the laboratory LOR or below the adopted human health guidelines.	HSLs / HILs Management Limits	No
			Ecological species and soil microbial processes	Direct Contact and ingestion	Concentrations of selected heavy metals and benzo(a)pyrene (a PAH) above ecological protection criteria have been identified in samples collected in shallow fill material. The proposed development is expected to involve large scale earthworks. The above minor exceedances are not considered to preclude the future development of the site for commercial/industrial use. Impacted soils in the vicinity of AECs may not be suitable for reuse on site for landscaping purposes.	ESLs / EILs	Unlikely
	Asbestos		Human	Inhalation and ingestion of dust	No asbestos was identified in any of the soil samples analysed.	HIL	No
Buildings and structures containing ACM/PACM	Asbestos		Human	Inhalation and ingestion of dust	At the time of the investigations, no visual signs of asbestos impact were observed on the ground surface around the perimeter of the building/structures identified as containing ACM/PACM. Provided that all ACM/PACMs are appropriately removed before demolition, it is unlikely that surficial soils surrounding the buildings would be impacted with asbestos associated with current buildings and structures.	HIL	Unlikely
Pesticide use	OCPs/OPPs		Ecological species and soil microbial processes	Direct Contact and ingestion	Concentrations of OCPs/OPPs have not been detected within soil samples analysed.	EILs	No
			Human	Direct contact, inhalation and ingestion of dust		HIL	No



Remedial Action Plan

754-770 & 784-786 Mamre Road, Kemps Creek NSW

Prepared for GPT

29 April 2021

APPENDIX E

SAFework SEARCHES

Our Ref: D21/004125

19 January 2021

James Lean
KPMG Property and Environmental Services Pty Limited
Jlean1@kpmg.com.au

Dear James

RE SITE: 784-786 (Lot 59 on DP259135) Mamre Road, KEMPS CREEK NSW 2178

I refer to your site search request received by SafeWork NSW 24 December 2020 requesting information on Storage of Hazardous Chemicals for the above site.

Enclosed are copies of the documents that SafeWork NSW holds on record number 35/029818 relating to the storage of Hazardous Chemicals at the above-mentioned premises.

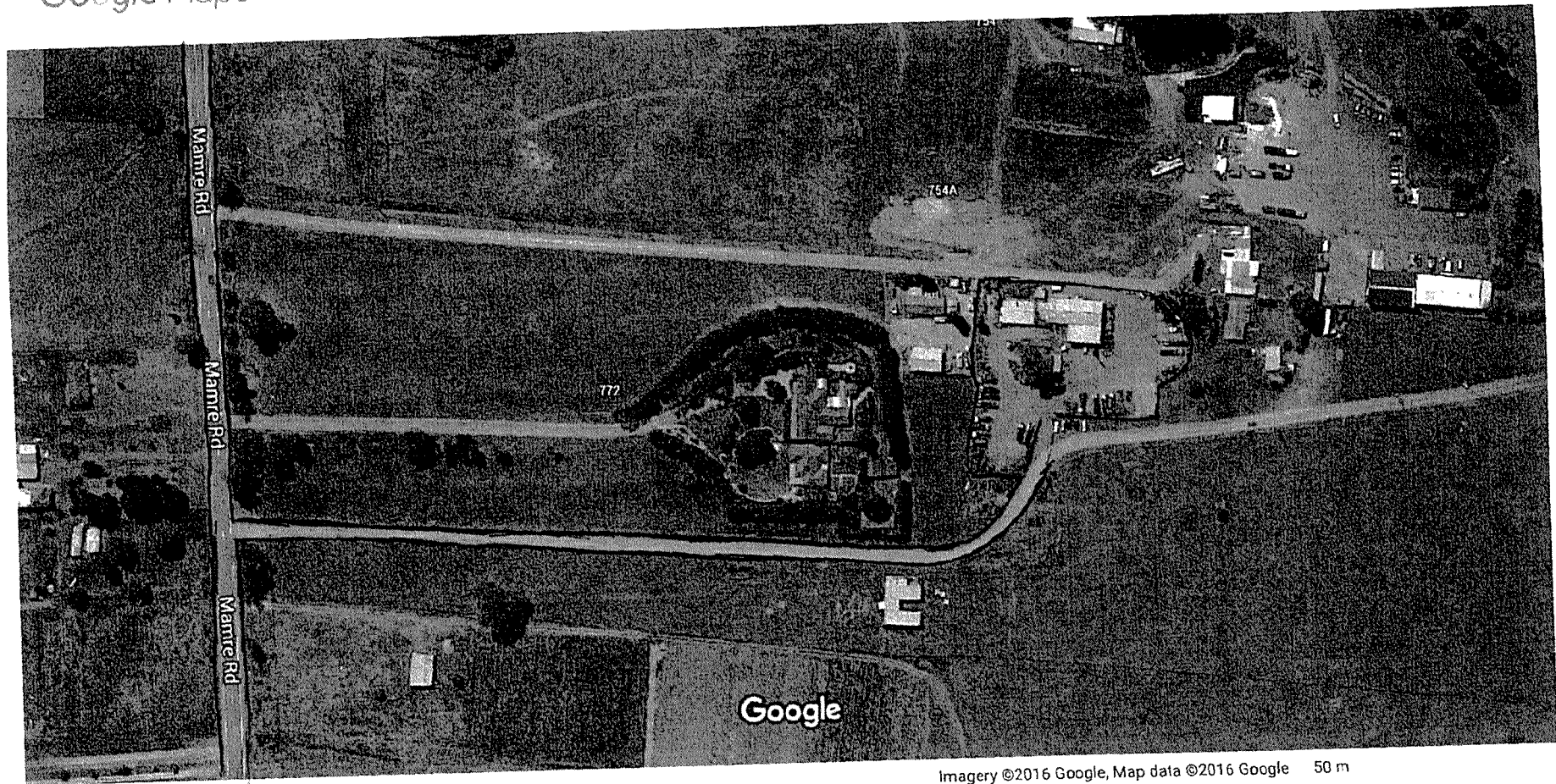
For further information or if you have any questions, please call us on 13 10 50 or email licensing@safework.nsw.gov.au

Yours sincerely



Customer Service Officer
Customer Experience - Operations
SafeWork NSW

Google Maps 784 Mamre Rd



Google Maps

MTF

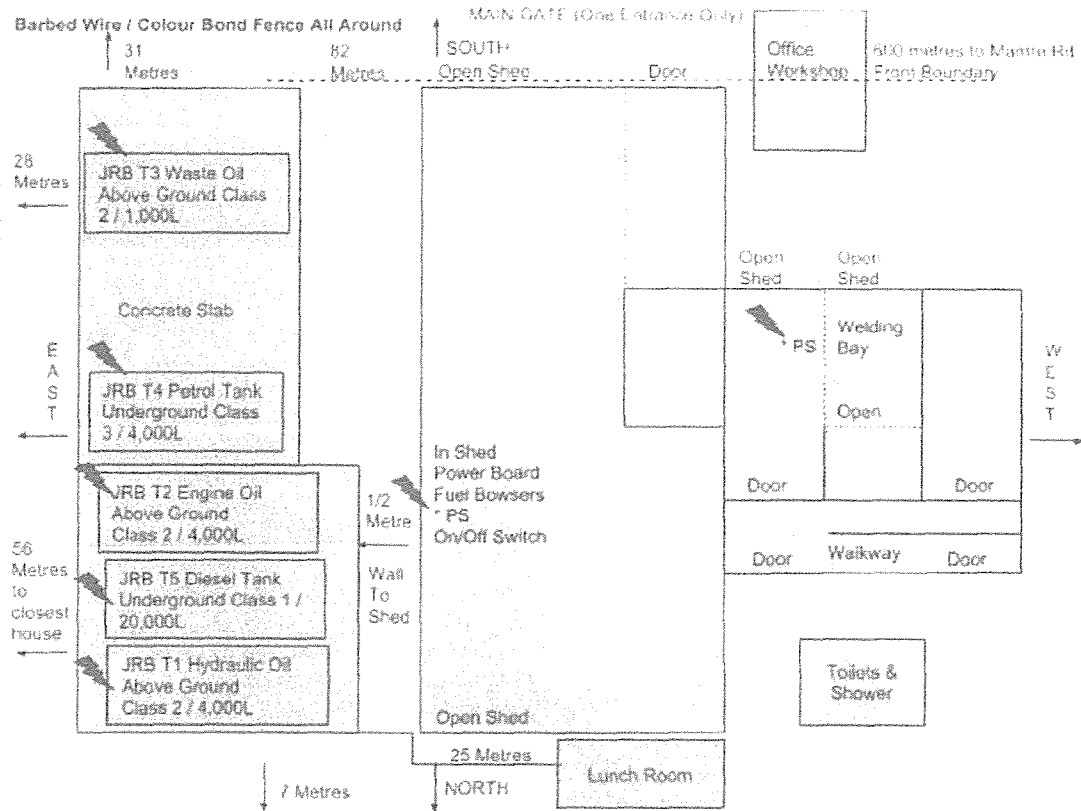
35/029818

John Robar Boring Contractors Pty Ltd Site Plan

NAME OF PREMISES: John Robar Boring Contractors Pty Ltd
ADDRESS: 784 Mamre Road, Kemps Creek, NSW 2178
DATE OF THIS PLAN DRAWING: 11th August 2016
DATE OF LAST REVISION: 31st July 2016

Legend
* PS = Power Supply (2 Main)

Vacant Land Surrounding The Depot (N-S-E-W)



Vacant Land Surrounding The Depot (N-S-E-W)

AM round

one Entrance only

31 metres

82 metres

Office
Work
Shop

600 metres to
main RD
Front Boundary

Centre
slab

Waste
oil
Class 2

1000 litre
above ground

Petrol tank
under ground
Class 3

4000 litres

Engine oil
above ground

4000 litres
Class 2

Diesel tank
Underground
Class 1

20,000 litres

in shed
Power
Board
Fuel Bousers
Weld to
shed

Hydraulic oil
above ground
Class 2

4000 litres

25 metres

open shed

Lunch
room

open shed

Welding
Bay
open

Door

open shed open shed Doors

Welding
Bay

West

fence
line

56 metres
to closest
house

28 metres

7 metres

STORAGE DETAILS (must be completed for both new notifications and further notifications)

If space is insufficient please provide details on a separate sheet of paper.

Storage facility identifier	Type of storage facility		
1	UNDERGROUND TANK		
Class or division	Maximum storage capacity	Unit (L or kg or number)	
3	4000		
UN number	Class or division	Typical quantity	Unit (L or kg or number) Packing group
1203			

Proper shipping name

UN1203 PETROL

Product or common name

UNLEADED PETROL

UN number	Class or division	Typical quantity	Unit (L or kg or number)	Packing group
0001	C1	20000		

Proper shipping name

UN0001 DIESEL

Product or common name

DIESEL

UN number	Class or division	Typical quantity	Unit (L or kg or number)	Packing group

Proper shipping name

Product or common name

UN number	Class or division	Typical quantity	Unit (L or kg or number)	Packing group

Proper shipping name

Product or common name

Barbed wire fence allround

Private drive way to Mamre RD

Water Tap

31 metres

Work shop office

Welding Bay

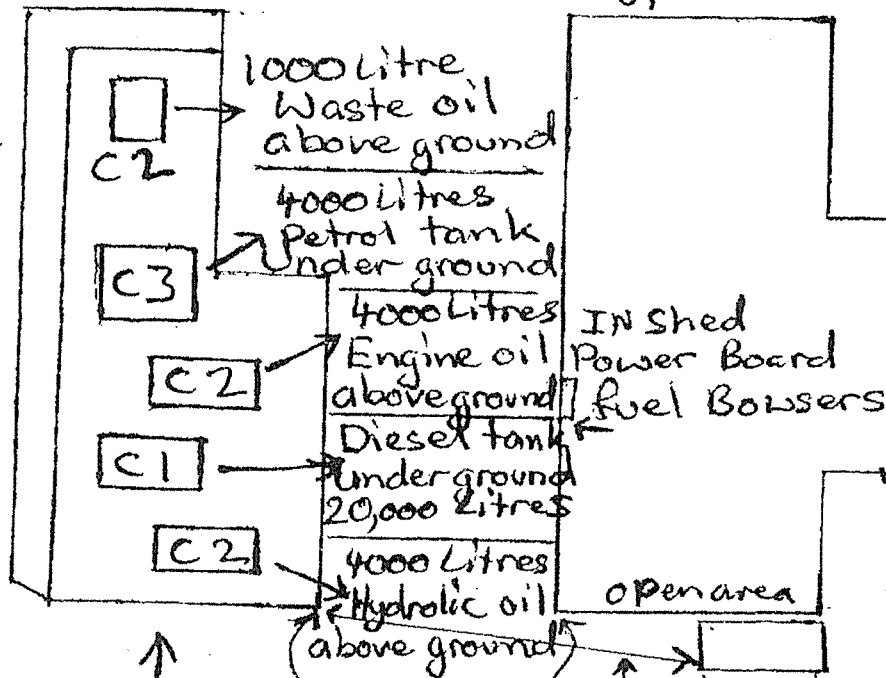
Front line

600 metres to Mamre RD front Boundary

28 metres

56 metres to closest house

West



7 metres

1 metre from Wall to shed
25 metres Water Tap

Licence No. 35/029818

APPLICATION FOR RENEWAL OF LICENCE TO KEEP DANGEROUS GOODS

ISSUED UNDER AND SUBJECT TO THE PROVISIONS OF THE DANGEROUS GOODS ACT, 1975 AND REGULATION
THEREUNDER

DECLARATION: Please renew licence number 35/029818 to 26/01/2004. I
confirm that all the licence details shown below are correct (amend if necessary).


(Signature)

JOHN ROBAR
(Please print name)

16/1/2003
(Date signed)

for: JOHN ROBAR BORING CONTRACTORS P/L

THIS SIGNED DECLARATION SHOULD BE RETURNED TO:

WorkCover New South Wales
Dangerous Goods Licensing Section
LOCKED BAG 2906
LISAROW NSW 2252

Enquiries:ph (02) 43215500
fax (02) 92875500

Details of licence on 14 January 2003

Licence Number 35/029818 Expiry Date 26/01/2003
Licensee JOHN ROBAR BORING CONTRACTORS P/L ACN 001 906 396
Postal Address: 784 MAMRE RD ST MARYS NSW 2760
Licensee Contact JOHN ROBAR Ph. 670 4674 Fax. 670 5091
Premises Licensed to Keep Dangerous Goods
JOHN ROBAR BORING CONTRACTORS P/L
784 MAMRE RD ST MARYS 2760

Nature of Site PLANT HIRING OR LEASING

Major Supplier of Dangerous Goods UNKNOWN OR OTHER

Emergency Contact for this Site JOHN ROBAR Ph. 670 4674

Site staffing 8 HRS 5 DAYS + HALF

Details of Depots

Depot No.	Depot Type	Goods Stored in Depot	Qty
1	EXEMPT - A/G TANK	Class C2	2000 L
	UN 00C2 COMBUSTIBLE LIQUID 2		2000 L
2	EXEMPT - A/G TANK	Class C2	1000 L
	UN 00C2 COMBUSTIBLE LIQUID 2		1000 L
3	EXEMPT - A/G TANK	Class C1	4000 L
	UN 00C1 DIESEL		4000 L
4	UNDERGROUND TANK	Class 3	20000 L
	UN 1203 PETROL		20000 L
5	EXEMPT - A/G TANK	Class C2	4000 L
	UN 00C2 COMBUSTIBLE LIQUID 2		4000 L
6	EXEMPT - U/G TANK	Class C1	4000 L
	UN 00C1 DIESEL		4000 L
7	EXEMPT - A/G TANK	Class C2	4000 L
	UN 00C2 COMBUSTIBLE LIQUID 2		4000 L

Dangerous goods that will be stored and/or processed on these premises (refer to Guide GDG01). Copy this page on additional sheets if there is insufficient space.

Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
Above ground tank roofless store	C2	1000 L

Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
Ultra max 46	2		Hydraulic oil	3Y		1000 L
Premium 40	2		Engine oil	3Y		

LPG.

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
1	Underground tank	3	4000 Litres

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
1203	Petrol	3	II	Premium Unleaded Petrol	3Y E	4000	Litres

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)
2	Underground tank	1	20,000 Litres

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg
0001	Diesel	1		Diesel	3Y	20,000	Litres

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg

Depot No	Type of storage location or process	Class	Maximum Storage Capacity (L, kg)

UN Number	Proper Shipping Name	Class	PG (I, II, III)	Product or Common Name	HazChem Code	Typical Qty	Unit eg L, kg

Barbed wire fence
all round

1 main gate
one Entrance on the

600 metres to
main RD
Front Boundary

31 metres

82 metres

open shed 1 doors

Office
Work
Shop

Welding
Bay

open shed open shed doors

Welding
Bay

open

door

West
fence
line

Boundary Tard Fence
18 metres

56 metres
to closest
house

Plastic
oil
Class 2

1000 litre
above ground

Centre
slab

Petrol tank
underground
Class 3

4000 litres

Engine oil
above ground
→ 4000 litres
- Class 2

Diesel tank
underground
Class 1
→ 20,000 litres
X-metre Fuel Bowusers

Hydraulic oil
above ground
Class 2
→ 4000 litres

in shed
Power
Boards
X-metre Fuel Bowusers
lead to
shed

open shed 1

25 metres
Lunch
room

Toilets
+
Shower

7 metres

Barbed wire fence all round

Mamre RD

31 metres

Work
shop
office

Welding
Bay

on fence
line

600 metres to
mamre RD front
Boundary

28 metres

56 metres
to closest
house

1000 Litre
Waste oil
above ground
C2
4000 Litres
Petrol tank
Under ground
C3
4000 Litres
Engine oil
above ground
C2
Diesel tank
underground
20,000 Litres
C1
4000 Litres
Hydraulic oil
above ground
C2

open area
IN Shed
Power Board
Fuel Bowzers

open open

Welding
Bay

West

Toilets

7 metres

1/2 metre
from wall
to shed
Lunch
room
2.5 metres

Lunch
room

35/029818

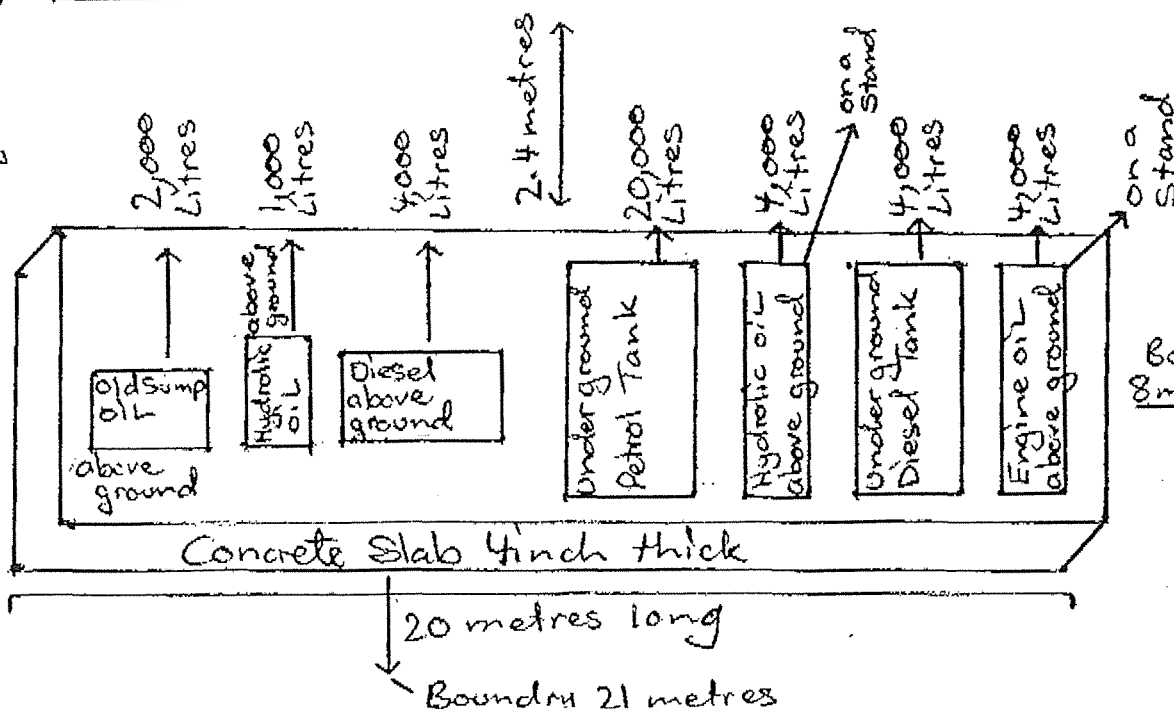
ndry
metres

parts
only

00/067010

82 metres

Concrete wall's
around tanks 1/2 metre high



Lunch room
Factory Workshop
Welding area

RECEIVED
13 APR 1995
SCIENTIFIC SERVICES
BRANCH

Welding area
Parts only

Toilet
Shower

Parts
only

Factory Workshop

17

2.4 metres

20,000
Litres

4,000
Litres

on a
Stand

4,000
Litres

4,000
Litres

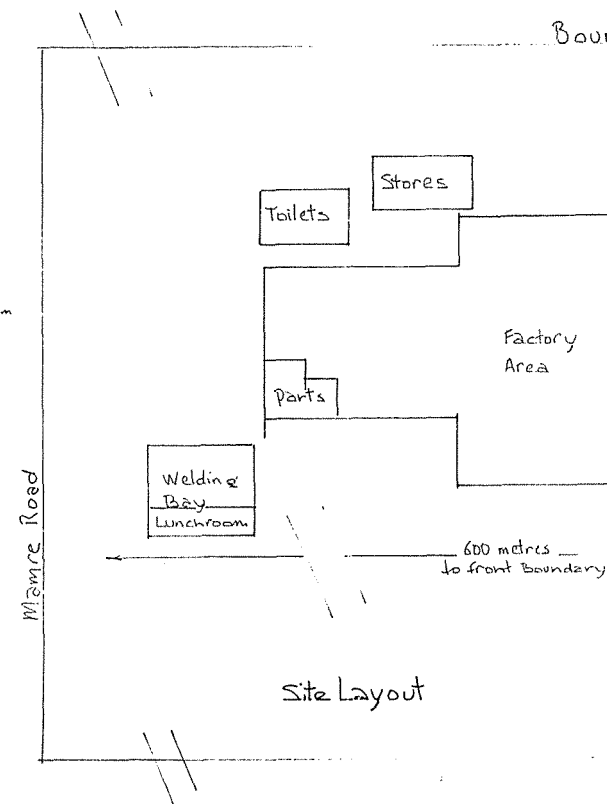
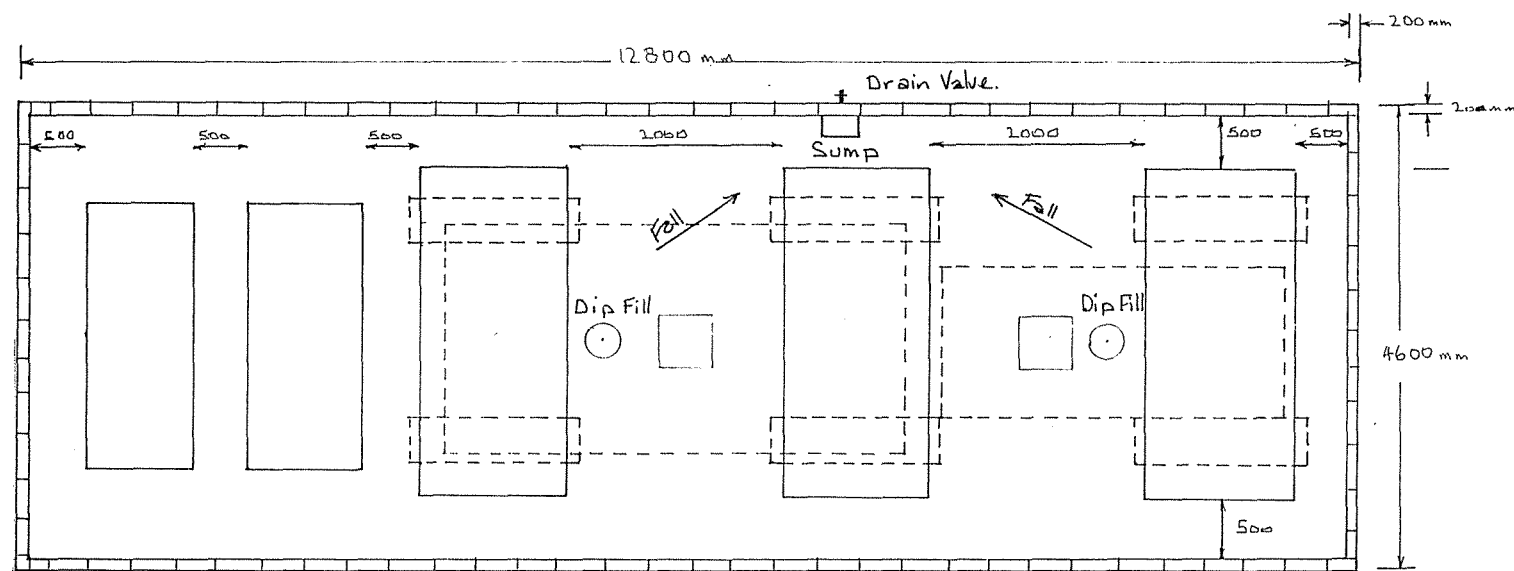
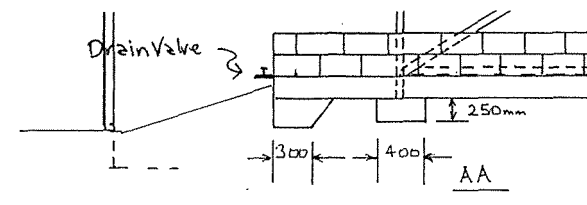
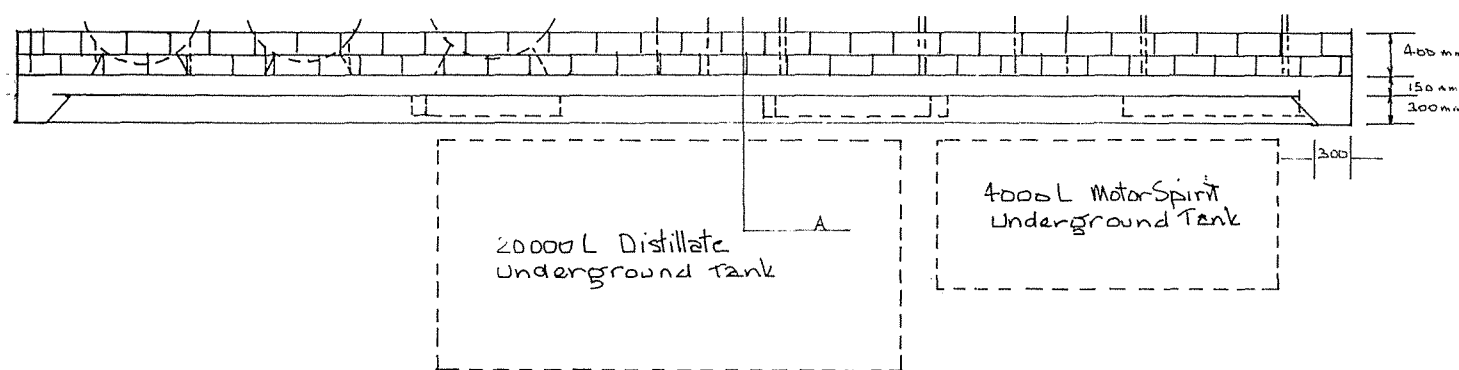
on a
Stand

Boundary
8 metres

Concrete Slab 4 inch thick

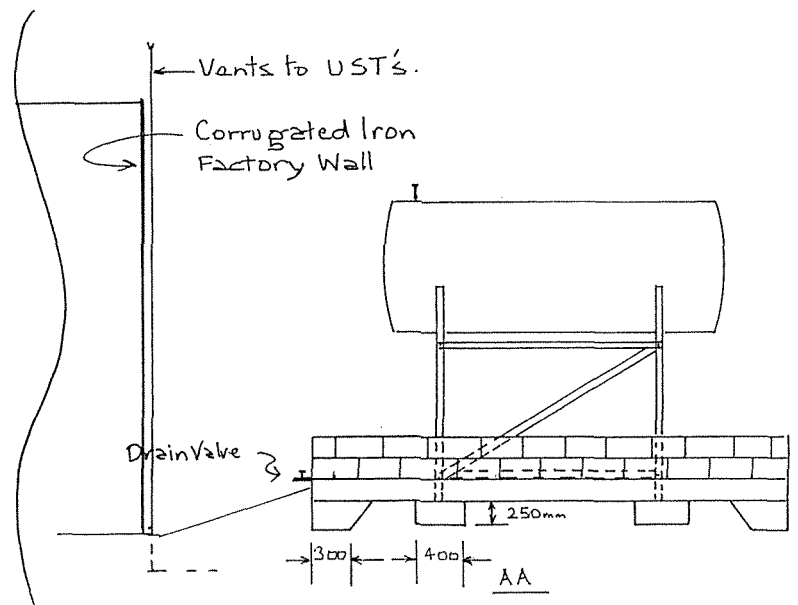
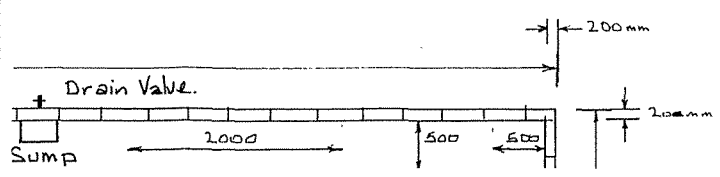
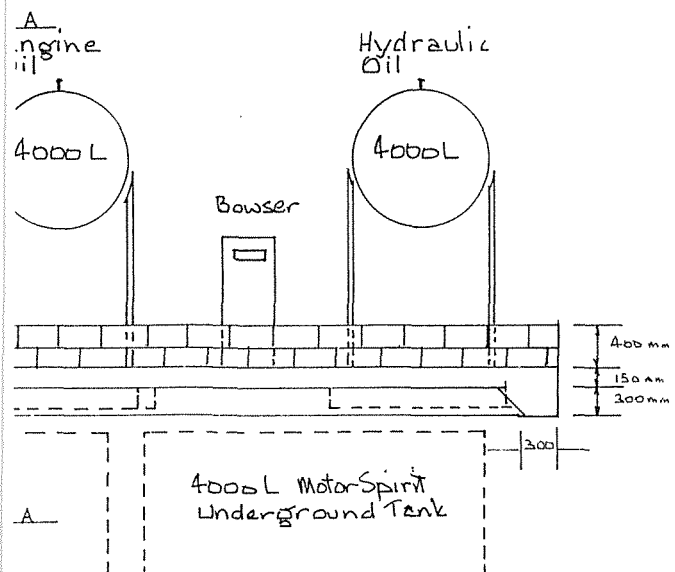
20 metres long

Boundary 21 metres

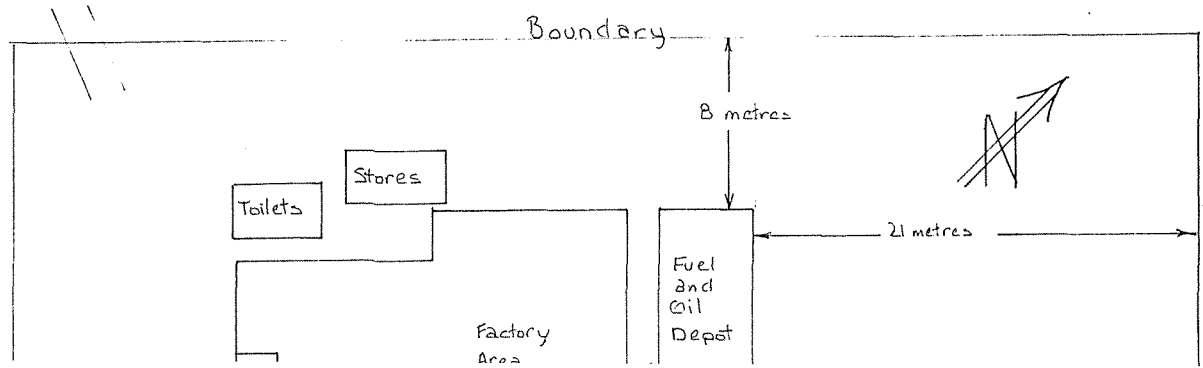


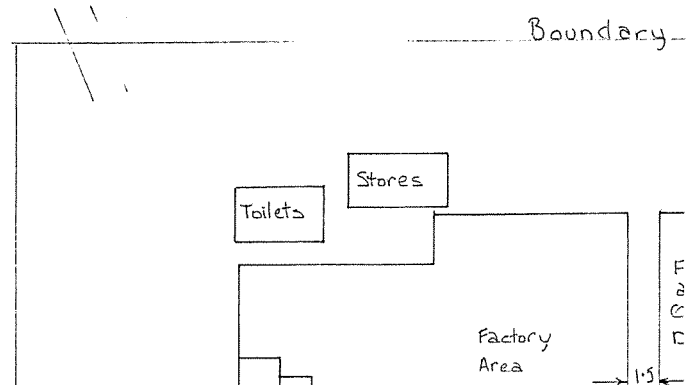
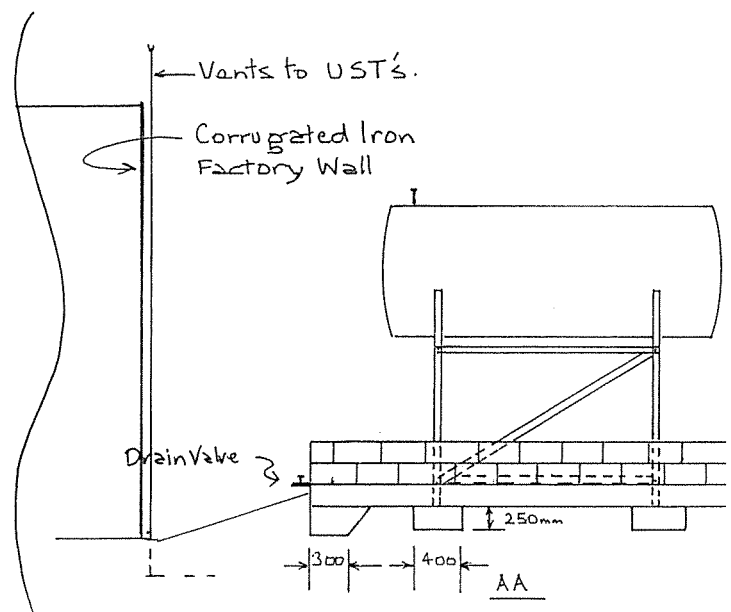
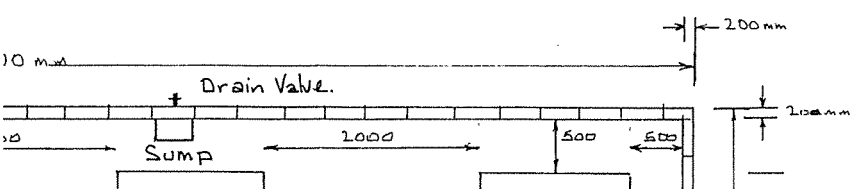
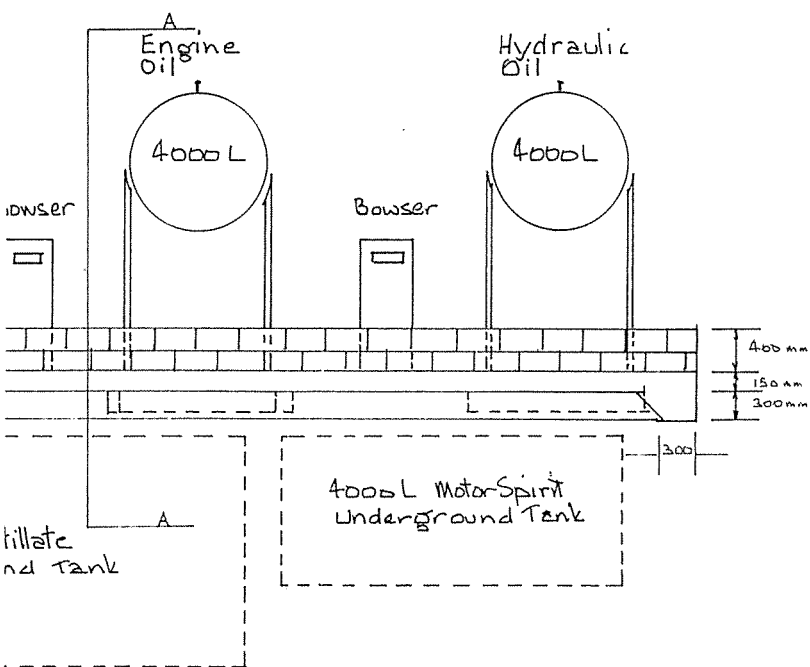
NOTE: Distance from Tank Shell to Bund Crest reduced to 500mm due to Viscosity of product being stored ie: oils.
AS 1940-93 5.9.3(g)

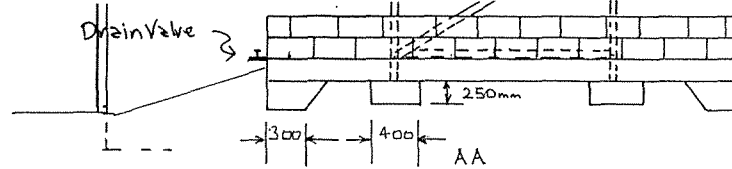
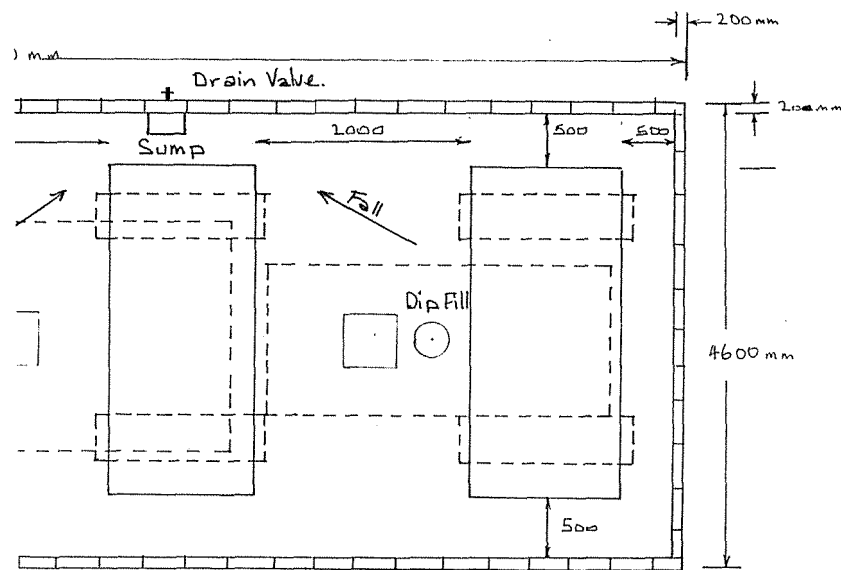
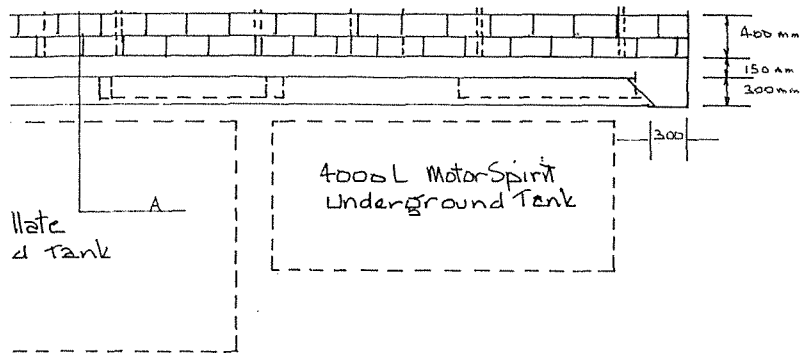
This plan conforms with the
Dangerous Goods Act N.S.W. 1975
and Aust. Standard AS 1940-93
Signed for Robert Boring
Date 20/3/95



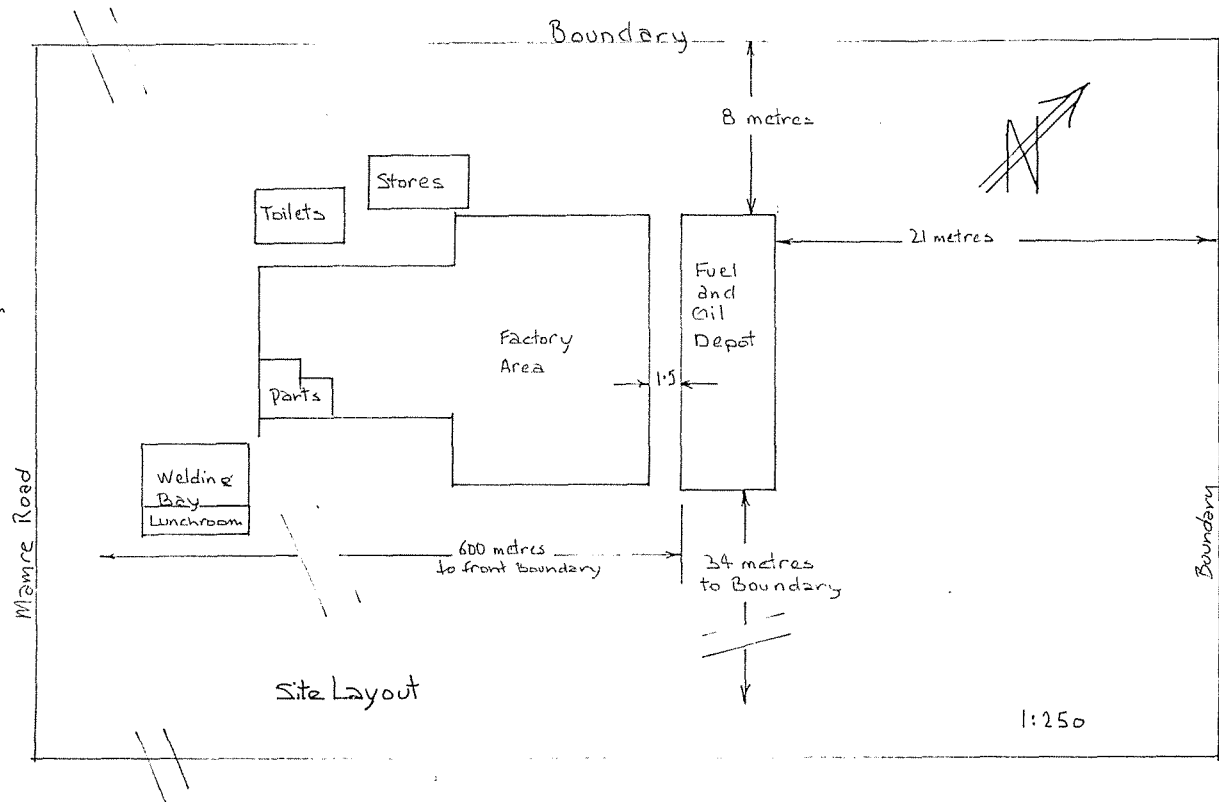
Filled Concrete Block Wall
Slab: 20 mpa - F82 Mesh







Filled Concrete Block Wall
Slab: 20 mpa - F82 Mesh



This plan conforms with the
Dangerous Goods Act N.S.W. 1975
and Aust. Standard As 1940-93

Signed for Robar Boring

[Signature] Date 20/3/95

PETROLINK Pty Ltd
Commercial Fuel Installations

Lot 44 Tilba Rd MULCORA Tel. 047 738521

Robar Boring 784 Mamre Rd St Marys
Fuel Storage Compound

DRAWN

CHECKED

SCALE

JOB

18/3/95

1:5 1:250

2745



Remedial Action Plan

754-770 & 784-786 Mamre Road, Kemps Creek NSW

Prepared for GPT

29 April 2021

APPENDIX F REPORT LIMITATIONS



Property and Environmental Services

Report Limitations

We advise that, unless specifically stated otherwise within the body of this document, the following Limitations apply to our Report;

- Sections within this Report may contain additional Limitations relevant to the reporting discipline concerned. These must be viewed as additional limitations that stand separately, and in addition to, the following Limitations.
- No reliance should be placed on draft reports, draft conclusions or draft advice issued by us as they may be subject to further work, revision and other factors which may mean that drafts are substantially different from any FINAL report or advice issued.
- Parts of the building built in, covered up or otherwise made inaccessible during construction, alteration or fitting out have not been inspected.
- This generally relates to ceiling voids, wall cavities and service risers. Therefore we are unable to comment as to whether such elements are free from defect or infestation.
- We have not undertaken any work of a specific engineering nature, such as engineering calculations, structural analysis, testing or measurements as the Report reflects our interpretation of the condition of the building as apparent from the inspection.
- Building services have been visually inspected where exposed to view only. No internal inspections have been undertaken of plant, equipment and machinery or where services are covered up or hidden by building structural elements or finishes. Building services have not been tested and no design calculations have been undertaken.
- The property has not been inspected specifically for termite infestation and we would only report on such if evidence of termite activity was apparent during our inspection.
- Where a variety of multiple units or tenanted areas are inspected, a random selection of each type of unit / area was inspected and used for the basis of this report.
- This Report is not a certification, a warranty or guarantee and has been scoped in accordance with the instructions given and the time allowed.
- The scope of the Report is described in the fee proposal accepted by the instructing client and disciplines not specifically mentioned are excluded from this report.
- This Report has been prepared for the benefit of the instructing client named on the cover of the document. This Report is not to be reproduced, in whole or in part, without the express written authorisation of KPMG Property & Environmental Services Pty Limited.
- The findings of this Report are valid for six calendar months from the date of issue of the Draft version of the document.
- Unless specifically stated otherwise, all cost estimates provided throughout the Report are subject to the following Limitations;
 - Estimates are indicative only and are provided as a guide to "order of magnitude" of the cost item. Items of work are not fully described or detailed reflecting the high level nature of the assessment, the amount of information available and the purpose for which they are prepared;
 - Preliminaries, builder's margins, overheads and contingencies are excluded;
 - Professional fees, project management fees, planning and building licence fees are excluded;
 - No allowance has been made for Tender Price Inflation throughout the budget terms considered;
 - In providing estimates we have assumed that replacements and renewals will be on a like for like basis. Unless specifically stated otherwise we have made no allowances for improvements over and above this standard.
- We have assume that WH&S /OH&S requirements will be similar to those encountered in the present and have made no allowances for any additional measures that may be required in the future.

KPMG Property & Environmental Services



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- Tax Depreciation
- Project & Contract Administration
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- Defect Reporting
- Asbestos & Hazardous Materials Assessments / Registers / Remediation
- Environmental Investigations / Remediation

- NABERS & BEEC
- WHS Risk Assessments
- Disability Access Audits
- Building Code Consultancy
- Statutory Compliance

Capitalising on a global skill base, all senior consultants are Chartered Building Surveyors, Engineers or Environmental Scientists, providing the company with a breadth of understanding across many specialist competencies, which is the key to our speed of assessment, service and delivery.

Contact us – pes@kpmg.com.au

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Brindabella Business Park
Canberra Airport ACT 2609
Australia
+61 2 6248 1111

Our reporting date corresponds with a period of significant volatility in global financial markets and widespread macro-economic uncertainty. In light of the emergence and spread of COVID-19, this volatility and uncertainty could persist for some time. The assumptions and cost estimates set out in our report will need to be reviewed and revised to reflect any changes which emerge as a result of COVID-19. As a result of the continued uncertainty in relation to the impact of COVID-19, our work may not have identified, or reliably quantified the impact of, all such uncertainties and implications. If the assumptions provided by Client/Target on which this report is based are subsequently shown to be incorrect or incomplete, this could have the effect of changing the findings set out in this report and these changes could be material. We are under no obligation to amend our report for any subsequent event or new information.

KPMG Property & Environmental Services

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October 2020. 57775576DTL