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AMPOL AUSTRALIA PETROLEUM PTY LTD

REMEDIATION ACTION PLAN FOR UPSS REPLACEMENT

AMPOL YASS SERVICE STATION (SITE ID: 22592), 228 COMUR STREET, YASS NSW

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Remediation Action Plan for UPSS Replacement
Ampol Yass service station (Site ID: 22592), 228 Comur Street, Yass NSW

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ABBREVIATIONS

BTEXN	Benzene, toluene, ethyl benzene, xylene, naphthalene
C_6–C_{10}	Light hydrocarbon chain groups (for example, petrol)
C_{10}–C_{16}	Medium hydrocarbon chain groups (for example, kerosene)
C_{16}–C_{34}	Heavy hydrocarbon chain groups (for example, diesel)
C_{34}–C_{40}	Heavy hydrocarbon chain groups (for example, lube oil)
CSM	Conceptual site model
EIL	Ecological investigation level
ESL	Ecological screening level
HIL	Health investigation level
HSL	Health screening level
IP	Interface probe
LOR	Limit of reporting
mAHD	Metres Australian Height Datum
mBTOC	Metres below top of casing
mBGL	Metres below ground level
NATA	National Association of Testing Authorities
NEPC	National Environment Protection Council
NEPM	National Environmental Protection Measure
PAH	Polycyclic aromatic hydrocarbons
PID	Photo-ionisation detector
PULP	Premium unleaded petrol
Data Quality	Quality assurance/quality control
RPD	Relative percentage difference
SWL	Standing water level
TRH	Total recoverable hydrocarbons
ULP	Unleaded petrol
UST	Underground storage tank
WQM	Water quality meter

1 INTRODUCTION

1.1 BACKGROUND AND PURPOSE

Ampol Australia Petroleum Pty Ltd (Ampol) commissioned WSP Australia Pty Ltd (WSP) to prepare a remediation action plan (RAP) for the planned underground petroleum storage system (UPSS) replacement works at the Ampol Yass service station (Site ID: 22592), located at 228 Comur Street, Yass NSW 2582 ('the site'). Ampol is planning to replace the UPSS at the site and a RAP is required to provide a framework for the remediation and/or management of potentially hydrocarbon impacted fill and soil/rock that may be encountered during the works program. This RAP will subsequently be provided by Ampol to Yass Valley Council (Council) to support and accompany a development application (DA) for the planned UPSS Replacement project.

1.2 OBJECTIVE

The objective of the RAP is to document the remediation actions required and provide a framework for the work practices and environmental management techniques to be implemented by both the Ampol appointed Principal Contractor ('PC') and the Contaminated Land Management consultant ('the consultant') while removal and replacement of the UPSS at the site is being undertaken ('the project'). The later sections of the RAP aim to document the process of validating (from a contamination perspective) the remnant soil/rock following the removal of the UPSS, such that there is are no unacceptable health risks to the relevant receptors.

1.3 SCOPE OF THE RAP

The RAP includes:

- A summary of the site conditions and surrounding environment;
- A summary of the known contamination status of the site and its surroundings;
- Identification of remediation goals, remedial options appraisal and strategy;
- An outline of the validation requirements for all remedial works, adopted validation criteria and data quality indicators;
- Material characterisation and handling methodology and contingency management;
- Work health and safety (WHS) issues and their management; and
- Summary of required site management documentation to be implemented to address environmental risk during remediation and worker health and safety.

1.4 TECHNICAL FRAMEWORK

The RAP was prepared in general accordance to, and with consideration of, the following regulations and industry guidelines:

- Contaminated Land Management Act 1997 (CLM Act);
- CRC Care (2011) *Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 1: Technical development document, Technical Report 10.*

- National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM; as amended 2013). NEPM Schedule B1 (Guideline on Investigation Levels for Soil and Groundwater).*
- National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM; as amended 2013). NEPM Schedule B7*
- NSW EPA 2014, *Waste Classification Guidelines. November 2014.*
- NSW EPA 2020, *Guidelines for Consultants Reporting on Contaminated Land: Contaminated Land Guidelines;*
- NSW EPA 2023, *Contamination Assessment of Service Station Sites: Minimum Sampling Requirements;*
- NSW Work Health and Safety Act 2011;
- Protection of the Environment Operations Act 1997 (POEO Act);
- Protection of the Environment (Underground Petroleum Storage Systems) Regulation 2019 (UPSS Regulation); and
- Standards Australia 2005, *Guide to the Sampling and Investigation of Potentially Contaminated Soil – Part 1: Non-volatile and Semi-volatile compounds, AS4482.1-2005.*

2 SITE BACKGROUND INFORMATION

2.1 SITE IDENTIFICATION

General site details are summarised in Table 2.1. The site layout is shown in the Ampol provided plan provided in Appendix A.

Table 2.1 Summary of general site information

Site name	Ampol Yass Service station
Site address	228 Comur Street, Yass NSW 2582
Ampol site identification	22592
Legal identification	Lot 1 and Lot 2, deposited plan (DP) 997849, Yass
Local government area	Yass Valley Council
Zoning	B2: Local Centre under the Yass Valley Local Environmental Plan 2013 (LEP)
Current land use	Retail petroleum distribution (service station)
Approximate land size	~2,560 m^2

2.2 CURRENT AND PROPOSED UPSS

There are six known USTs at the site. The location of the current fuel tanks is shown in the final concept plan presented in Appendix A, and a summary of the storage information is given below in Table 2.2, as well as the planned fate for the tanks as part of this UPSS Replacement program.

The information below is based on a review of 'UPSS Upgrade – Concept Site Plan' (Drawing No. 22592-SK-01, 18 April 2024) provided to WSP for review and consideration in preparing this RAP and the associated ESA report (see Appendix A for a copy of the plan). Also shown in the plan in Appendix A is the proposed location of the two, new, 60 kL compartmented USTs and the approximate excavation extent that will accommodate the new UST/s. Table 2.2 provides a summary the current and proposed USTs and ASTs and their fate.

Table 2.2 Summary of existing USTs and AST and their fate

Tank ID (T) number	Product	Capacity	Relative location on-site	Fate of the UST
UST T1	PULP V95	9,000 L	South-eastern forecourt	Removed from site
UST T2	PULP V98	14,300 L	South-eastern forecourt	Removed from site
UST T3	E10	57,000 L	West of the canopy	Decom. & abandon in-situ
AST T5	Diesel	27,000 L	North of sales building	Removed from site
1 x UST (no ID number)	Unknown	Unknown	South-eastern forecourt	Removed from site
2 x additional tanks without an ID number	Unknown, but indicated to be disused or abandoned	Unknown	Two tanks west of the canopy	Both to remain on-site, in-situ, due to structural and geotechnical considerations

2.3 SURROUNDING LAND USE

Surrounding land uses include:

- West: A stormwater culvert then commercial premise including Yass real estate, and further afield Commercial premises including restaurants, shops, government office, hotels.
- North: Vacant land and a carpark, and further afield TAFE education centre and low-density residential properties
- South: Comur Street, and further afield Commercial shops and offices with low density residential and vacant land beyond.
- East: Commercial premise (currently in construction), Commercial shops and carpark

2.4 PHYSICAL SETTING

2.4.1 GEOLOGY

The NSW Geological Survey indicates that the regional geology is characterised by Silurian aged sedimentary deposits, including sandstone and siltstone that have been metamorphosed to slate and quartzite, and volcanic rocks such as dacite and airfall tuffs.

The geology encountered by URS in 2009 (URS, 2011) during installation of the groundwater monitoring network comprised fill material to depths of approximately 0.6 to 1.6 mBGL, followed by clay with a low to medium plasticity to a depth of 4.5 to 6 mBGL. Sandstone bedrock was encountered at depths of 4.5 to 6.0 mBGL.

2.4.2 HYDROGEOLOGY AND SURFACE HYDROLOGY

The site has an elevation of approximately 263 metres Australian Height Datum (mAHD) (Google Earth, 2024) with regional topography generally sloping to the north and west towards the Yass River approximately 800 m from the site.

The nearest surface water body to the site is the Yass River, which is located approximately 800 m north of the site. Surface water is expected to follow the on-site topography and flow in a north-westerly direction.

During a groundwater monitoring event conducted by WSP in 2023, depth to groundwater was measured between 1.911 and 3.799 m below the top of casing (mBTOC). Groundwater flow direction was interpreted to be to the north-west (WSP, 2023).

The NSW Geological Survey indicates that the regional geology is characterised by Silurian aged sedimentary deposits, including sandstone and siltstone that have been metamorphosed to slate and quartzite, and volcanic rocks such as dacite and airfall tuffs.

The geology encountered by URS in 2009 (URS, 2011) during installation of the groundwater monitoring network comprised fill material to depths of approximately 0.6 to 1.6 mBGL, followed by clay with a low to medium plasticity to a depth of 4.5 to 6 mBGL. Sandstone bedrock was encountered at depths of 4.5 to 6.0 mBGL.

A review of the Department of Primary Industries licensed groundwater borehole registry (https://realtimedata.waternsw.com.au/water.stm) was conducted on 14 March 2024 and identified 14 registered groundwater bores within a 500 m radius of the site. Those were noted to be either monitoring, deep irrigation bores as well as some domestic bores, but those were all noted to be greater than 300 metres from the site.

3 SUMMARY OF CONTAMINATION AND POTENTIAL HEALTH RISKS

3.1 SUMMARY OF PREVIOUS SITE INVESTIGATIONS

Previously there has been several environmental investigations at the site commissioned by Ampol (formerly Caltex), including Groundwater well installation and sampling, groundwater monitoring events, Environmental site assessments, and an assessment following notification of contamination to the EPA under the CLM act 1997 section 1. The first investigation (URS, 2011) was a groundwater well installation and sampling program, and the most recent (WSP, 2023) was the second annual groundwater monitoring event (GME) by WSP. A list of previous investigations conducted at the site and summary of the findings is below:

- *URS 2011, Groundwater Monitoring Well Installation and Sampling, Caltex Yass Service Station (Site ID 22592), 228 Comur Street Yass, NSW.*

URS prepared a report in 2011 following the drilling and installation of three groundwater wells (MW1-MW3) drilled to depths between 5.5 and 6.0 mBGL in 2009. LNAPL at a thickness of 0.05 m was encountered in MW1, which was a combination of light fraction fuel and kerosine. Concentrations of TRH were detected above the laboratory limits of reporting (LORs) in MW2 and MW3. Benzene concentrations exceeded the nominated assessment criteria in all samples, and toluene, ethylbenzene and xylene concentrations exceeded the assessment criteria for MW1 and/or MW3.

- *ERM, 2012, PSH Evaluation and Groundwater Monitoring Event at Yass Caltex Service Station Site #225992.*

ERM conducted a GME involving the three groundwater wells at the site, installed by URS. LNAPL was detected in MW1 at a thickness of 0.427m. TRH and BTEXN compounds were detected above the adopted assessment criteria in all wells. The report concluded that the hydrocarbon impacts at the site are unlikely to migrate off-site and did not pose an unacceptable risk to off-site receptors. Testing concluded that transmissivity of LNAPL in MW1 was low (ERM, 2012).

- *GHD Group Pty Ltd (GHD) 2016a, 22592 - Caltex Yass Service Station, 228 Comur Street, Yass, NSW 2582, Environmental Site Assessment.*

GHD undertook an Environmental Site Assessment (ESA) in 2016 to accompany the sites' notification of contamination status under the NSW EPA (2015) *Guidelines on the Duty to Report Contamination* under section 60 of the *Contaminated Land Management Act 1997* (CLM Act). A soil vapour bore was drilled, installed and sampled and a GME was also conducted between install and sampling. All soil samples from the bore drilling showed detections of contaminants of concern below laboratory LORs. LNAPL was identified in MW1 at a thickness of 0.56 m. elevated concentrations of benzene were detected in groundwater sampled from MW2 and MW3, detections were below the adopted assessment criteria and were considered unlikely to pose an unacceptable risk to potential receptors. Soil vapour results indicated no vapour intrusion risks to off-site receptors.

- *GHD 2016b, Caltex Yass Service Station (ID: 22592), Contaminated Land Management Act (1997) – Section 12 Assessment.*

Following (GHD, 2016 – 1), GHD prepared a separate document stating that the contamination at the site was not significant enough to warrant regulation under Section 12 of the CLM Act.

- *WSP 2018, Caltex Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report.*

WSP was tasked in 2018 with completing a GME at the site monitoring network (MW01-MW03) to evaluate current groundwater quality and refine the conceptual site model (CSM). LNAPL was identified in MW1 at a thickness of 0.27 m. Concentrations of TRH and BTEX compounds were above the LOR but below the adopted assessment criteria in

MW3. The CSM determined that the risk to on- and off-site receptors was low, but did not rule out vapour intrusion risk to on-site workers or maintenance workers accessing utility pits on and adjacent to the site

- *WSP 2021, Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW Environmental Site Assessment, December 2021*

WSP conducted an Environmental Site Investigation (ESA) in late 2020 following the knowledge of a known failure of UST 4 at the site. The ESA aimed to understand whether the nature and extent of soil and groundwater contamination associated with known failure of the UST was within the acceptable range of criteria, and if there were potential vapour intrusion risks to on-site receptors at levels which would preclude the site from operating as a service station. Three new groundwater wells and two sub-slab vapour pins were installed. Analysis of groundwater from all wells except MW02 found dissolved phase hydrocarbons and concentrations of BTEXN compounds were in exceedance of drinking water and freshwater guidelines. LNAPL was identified in on-site well MW1 at a thickness of 0.05 m. Detections of volatile compounds well below assessment criteria were identified in soil vapour samples from all soil vapour sampling locations.

- *WSP 2022a, Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report-November 2021*

WSP conducted a GME in 2021, sampling and gauging all six wells of the monitoring network onsite. LNAPL was identified in well MW1 at thickness of 0.02 m. Elevated concentrations of hydrocarbons were identified in MW5. Both MW1 and MW5 exceeded groundwater criteria for vapour intrusion. Concentrations of various BTEX compounds in groundwater samples from MW1 and MW3 to MW6 exceeded drinking water, freshwater, and recreational water guidelines. Concentrations of TRH F1 and BTEXN had decreased since 2018, which potentially indicated that there was not an active or ongoing contamination issue at the site however it was also noted that water levels had increased by approximately 1 m during the same time period, potentially resulting in variations in contaminant concentrations.

- *WSP 2022b, Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report-November 2022*

WSP conducted another GME in 2022 involving the same scope as (WSP, 2022 – 1). LNAPL was identified in MW1 with an apparent thickness of 0.007 m, indicating a potential trend of decreasing LNAPL thickness, reduced LNAPL thickness was deemed likely due to the groundwater table fluctuation. Concentrations of dissolved phase hydrocarbons, including TRH F1 and F2 fractions were elevated in MW1, MW3, MW4 and MW5. MW6 had TRH F1 above the LOR. BTEXN compounds in groundwater samples from MW1, MW3, MW4, MW5 and MW6 exceeded drinking water, freshwater and recreational water guidelines, and the residential health screening level vapour intrusion criteria for benzene was exceeded in MW4 however no unacceptable risk to off-site sensitive receptors was identified. A vapour intrusion risk remained for on-site workers or maintenance workers accessing utility pits on and adjacent to the site.

- *WSP 2024a, Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report-November 2023*

WSP conducted another GME in 2023 involving the same scope as (WSP, 2022 – 2). Groundwater was encountered at depths of between 1.911 and 3.799 mBGL. LNAPL was identified in MW1 with a thickness of 0.016 m. Concentrations of various BTEXN compounds in groundwater samples from MW1, MW3, MW4, MW5 and MW6 exceeded drinking water, freshwater, and recreational water guidelines. Vapour intrusion criteria for TRH F1 was exceeded in MW1, MW4 and MW5 and it was noted that TRH F1 in wells MW1, MW4 and MW5 were recorded at the highest historical concentration (MW4 and MW5) or the highest since 2020 (MW1). Based on abnormally high contaminant concentrations, it was deemed there is a potential vapour intrusion risk to workers in the retail building and a possibility of migration of contamination off-site.

- *WSP 2024b, Pre-UPSS Replacement: Combined, Targeted Environmental Site Assessment and Geotechnical Investigation Report - Ampol Yass Service Station.*

WSP conducted a combined, targeted Environmental Site Assessment and Geotechnical Investigation in March 2024 (WSP, 2024b), a project related to this RAP. Eight boreholes were drilled to various target depths, many of which experienced refusal prior to the target depth due to ground penetration safety protocols.

The lithology encountered at each of the boreholes at the site was generally consistent. Immediately beneath the concrete pavements, which were typically 0.06 - 0.16 metres thick, the fill ranged from 0.2 m to 1 m thickness. Sandy and silty clays were encountered beyond approximately 1 metre to the extent of the deepest borehole – 5.3 metres below ground level (mBGL). The thickness of the fill observed in boreholes towards the north of the site decreased.

No significant visual or olfactory observations of potential hydrocarbon contamination were noted in any of the soil bores. No suspected asbestos containing materials (ACM) were observed in any drill cuttings observed nor in soils sampled during the intrusive investigation.

All chemical analyte and asbestos concentrations were below the nominated commercial/industrial human health screening levels (HSL-D) for vapour intrusion or the adopted commercial/industrial human health investigation level (HIL-D). These results suggests that, following the completion of the UPSS Replacement project, the site is likely be suitable for ongoing use as a retail service station in a commercial/industrial landuse setting. Concentrations of all analytes of interest collected in soil samples from near and around the UPSS met the 'General Solid Waste (non-putrescible)' criteria. Groundwater beneath the site was not assessed as part of this investigation.

3.2 SUMMARY OF KNOWN SITE CONTAMINATION

3.2.1 SOIL IMPACTS

Previous investigations have found little in the way of contaminated soils. Soil from one soil vapor bore installed by (GHD, 2016) returned concentrations of all COPC below the laboratory LORs. Sub-surface investigations by (WSP, 2021) found fill extended to a maximum depth of 1.9 mBGL at which sandy clay or clay was generally encountered. During this investigation maximum PID readings observed near the vadose zone were 343 ppm and strong hydrocarbon odours were noted in the saturated soil horizon. Several soil samples showed concentrations of TRH, BTEX and/or PAH above laboratory PQL but below adopted soil assessment criteria. Lead concentrations in all analysed soil samples were above the LOR but below the adopted HIL D soil assessment criteria. Soil was classified as Restricted Solid Waste and disposed of as appropriate during the investigation, it is deemed likely that soil in the immediate vicinity of UST 4 is still of this nature.

3.2.2 GROUNDWATER IMPACTS

All investigations that have taken place at the site previously have identified groundwater contamination by fuel products including TRH, BTEXN, metals and VOC's in varying degrees of severity. The most accurate and comprehensive summary of contamination was from (WSP, 2023) and this is thought to be representative of the current groundwater condition at the site, although it is worthwhile noting that there has been temporal variability in trends of contamination concentrations and LNAPL thickness due to factors such as infrastructure failure and variable groundwater levels.

In the most recent GME by (WSP, 2023) significant contamination of the groundwater, which occurs between 1.911-3.799 mBGL at the site, was identified at monitoring wells MW1, MW3, MW4 and MW5. TRH (F1) exceeded the HSL vapour intrusion criteria for sandy soils (6,000 µg/L) in MW1 (21,000), MW4 (8,900) and MW5 (17,000), while in MW2 no TRH was detected above the laboratory LOR. Benzene exceeded the drinking water GIL (1 µg/L) in all samples except MW02, while concentrations from MW1, MW3, MW4 and MW5 exceeded the recreational water investigation level (10 µg/L) and MW4 (3,700) exceeded the ANZG (2018) freshwater guidelines (950 µg/L). Ethylbenzene exceeded the ANZG (2018) Freshwater 95% guideline in MW4 and drinking water GIL (300 µg/L) in MW05 (570). Total xylenes exceeded drinking water GIL (600 µg/L) in MW4 (2,000). Naphthalene concentrations by volatile analysis in MW1, MW3, MW4 and MW5 exceeded the ANZG (2018) freshwater guideline (16 µg/L). MW3, MW4 and MW5 also exceeded freshwater guidelines for naphthalene by semi-volatile analysis. MW1 exceeded the ANZG (2018) freshwater guideline for PAH analytes anthracene, fluoranthene and naphthalene. This most recent investigation concluded that, considering the significant concentrations of dissolved phase contaminants and persistent LNAPL in groundwater, there is a potential vapour intrusion risk to workers in the retail building and a possibility of migration of contamination off-site.

3.2.3 SOIL VAPOUR IMPACTS

An earlier environmental assessment found all soil vapour samples showed detections of TRH F1, with both sub-slab vapour pins (SS1 and SS2) also showing detections of TRH F2 and toluene above laboratory PQL (WSP, 2020). The highest concentrations recorded were in sub-slab vapour pin SS2, located in front of the on-site retail building near the failed UST 4. Minor concentrations of helium, carbon monoxide, nitrogen, and tetrachloro-ethane were detected in the soil vapour samples however, detections of all analytes were well below the adopted assessment criteria.

4 CONCEPTUAL SITE MODEL

The conceptual site model (CSM) framework relates to the linkages between the contamination sources, pathways and receptors. The physical setting of this site, including topography, geology, hydrogeology, and surrounding land are detailed in Section 2, while historical contamination is discussed above in section 3. This information informs the site-specific conceptual site model, which is then evaluated according to potential real-world scenarios involving a completed linkage pathway before a level of risk is determined. The level of risk assigned to the linkage pathways of the CSM are then used to inform the remediation strategy in section 5.

4.1 CONTAMINANTS OF CONCERN AND SOURCES

Analytical results from previous site investigations were focused on various common contaminants of concern, mostly limited to heavy metals, total recoverable hydrocarbons (TRH) and volatile organic compounds (VOCs) which are generally associated with, and products of, the breakdown of hydrocarbon plumes stemming from faulty fuel infrastructure. All contaminants which exceeded soil or groundwater guideline levels during previous studies are of primary concern, these include:

- TRH (in particular, light fraction molecules) as indicators of petrol
- Benzene, toluene, ethylbenzene, xylene, naphthalene (BTEXN)
- Heavy metals (especially lead)

Analysis of polycyclic aromatic hydrocarbons (PAH), asbestos and other heavy metals (arsenic, cadmium, chromium, copper, mercury, nickel and zinc) may also be necessary for waste classification purposes and should be considered regardless due to the limited scope of intrusive investigation near the UPSS area at the site previously.

The only known sources of contamination to the site are:

- Unconsolidated fill material which was identified at all intrusive investigation locations to approximately 0.4-1.9 mBGL;
- Underground petroleum storage and transfer systems;
- And aboveground petroleum infrastructure, such as bowsers and pumps.

4.2 CONTAMINATED MEDIA

The media impacted by contamination potentially includes the following:

- Soil in the immediate vicinity of the wells and intrusive works locations previously showing hydrocarbon impacts, and soil below UPSS infrastructure onsite.
- Groundwater, found at shallow depths below ground level at this site.

4.3 SOURCE – PATHWAYS – RECEPTORS EVALUATION

4.3.1 SOURCE AND PATHWAYS

The primary source of known contamination is fuel loss resulting from failure of containment within USTs and potentially other UPSS infrastructure. Other potential sources of contamination include fuel loss via spills during refilling and other intrusive maintenance works at the site. The primary migration pathway is as liquid phase through solid media and soil, and likely vapour phase due to high concentrations of light fraction hydrocarbons and benzenes in shallow groundwater.

4.3.2 RECEPTORS

A summary of the ecological and human receptors considered in this CSM is presented in the following sections. A discussion of source-pathway-receptor linkages is presented in Table 4.1.

ECOLOGICAL RECEPTORS

The Yass River is located approximately 800m to the northwest of the site, and is the nearest surface water body/natural ecological feature, water is expected to flow down a gentle slope toward the river from site. Groundwater has been inferred to flow in a northwest direction, following the slope of the land, however given the low relief and distance between the site and the river, this cannot be substantiated and therefore the Yass River does not represent a likely receptor of contamination from the site.

HUMAN HEALTH RECEPTORS

Potential sensitive receptors of soil contamination impacts identified included on-site commercial workers, maintenance/underground workers and off-site users of commercial and residential properties. Potential sensitive receptors of groundwater contamination include those extracting groundwater from the regional aquifer for drinking water use or market garden watering, the only bore registered for domestic use within 500 m is GW414578, constructed in 1998, it is unknown what the current use is.

Prior to, and following the UPPS replacement works taking place, the site is to continue under the current land use to operate as a service station. In consideration of this site usage, the following table (Table 4.1) presents a summary of potential exposure pathways between sources of known contamination at the site and potential receptors. Is it WSP's expectation that the vapour risks relating to confined space entry and intrusive works that are likely to encounter contaminated groundwater are managed through occupational exposure controls in accordance with health and safety legislation, though the level of risk will still be evaluated below.

Table 4.1 Source, pathway, receptor evaluation

Potential Receptor	Potential Exposure Pathway	Risk from Exposure Through the Pathway (Is the Linkage Complete & is there a Risk?)
Ecological: Surface water bodies (Yass River)	Lateral migration of contaminants dissolved in groundwater or suspended atop surface water flows.	Likely an incomplete pathway, given the low relief of the surface around the site and the likelihood of natural attenuation in groundwater before reaching any of the identified surface water bodies. No greater than the risk associated with general fuel dispensing activities at the site. **Low Risk**

Potential Receptor	Potential Exposure Pathway	Risk from Exposure Through the Pathway (Is the Linkage Complete & is there a Risk?)
Users of groundwater bores registered for water supply	Abstraction of groundwater for beneficial purpose, dermal contact with groundwater.	There are several registered extraction wells for a beneficial purpose identified in the vicinity of the site, though the area is served by reticulated water supply. For downgradient wells, of which one exists (GW414578) a pathway cannot be ruled out though any hydrocarbon impact that may be migrating to the north of the site is likely to naturally attenuated before reaching any of the identified groundwater abstraction bores. Expansion of the monitoring well network would further substantiate the possibility of this potential linkage. **Low Risk**
Residents and occupiers of commercial buildings	Vapour intrusion	Hydrocarbon concentrations in groundwater samples collected at the site were generally far in exceedance of the screening levels in previous investigations. Regional groundwater (2-5 mBGL) is within the likely depth of any residential underground infrastructure. This pathway is considered potentially complete. **Moderate Risk**
Human receptors on open space land	Vapour inhalation	TRH concentrations in groundwater samples collected at the site were far in exceedance of the commercial/industrial HSLs for vapour intrusion, if the plume were to migrate offsite to adjacent properties open space guidelines may be exceeded. Accordingly, this pathway is deemed potentially complete. **Low Risk**
Sub-surface maintenance workers (intrusive trench workers)	Inhalation of vapour in shallow excavation trenches	Hydrocarbon concentrations in soil samples collected at the site previously have been below the screening levels but above the LOR. However given the significant contamination of groundwater which is found at shallow depths**, t**here is a potentially a **Significant Risk** to intrusive and sub-surface workers, however the risk during excavation works or maintenance works can be controlled through adoption of WHS procedures for intrusive works. This risk-receptor pathway is likely complete.
Sub-surface maintenance workers (intrusive trench workers)	Ingestion and direct contact with impacted soil	Hydrocarbon concentrations in soil samples collected at the site previously have not exceeded the assessment criteria. Any excavation works or maintenance works on site will be required to follow workplace health and safety (WHS) guidelines to mitigate risks. The risk-receptor pathway is likely incomplete though mitigation measures during construction should reduce the risk to **Low.**

5 REMEDIATION GOALS AND STRATEGIES

5.1 REMEDIATION OBJECTIVES

The primary objective of the UPSS replacement is to replace the UPSS (USTs, fuel lines, bowsers, fill-points, vent lines, and at the same time to remove former fuel infrastructure (except for UST T3 – as that is being decommissioned and abandoned in-situ) and to the extent practicable, any contaminated, stained or odorous fill, soil or rock found surrounding (above, beside or beneath) the current UPSS infrastructure.

Additionally, the remedial works are being undertaken to ensure that any potential contamination present in remnant fill, soil or rock (following UPSS and impacted material removal) identified will not preclude the site from its continued use as a retail service station in a commercial/industrial land-use setting.

5.2 REMEDIAL OPTIONS APPRAISAL

The review of historical reports at the site and subsequent construction of a CSM has found that there has previously been contamination to site soil and groundwater. Groundwater contamination remains the largest concern at the site, though the media surrounding the likely source of impact has not been assessed directly and likely contains concentrations of hydrocarbon products in excess of site assessment criteria. The groundwater contamination is inferred to have been a direct result of ageing underground petroleum infrastructure. The contamination at the site has the potential to impact human receptors on and off-site if left unmanaged during and following replacement works. The potential for impact to ecological receptors remains unlikely and there remains a need for further investigation regarding groundwater following works completion. The remediation options have been assessed based upon the likelihood of achieving the remediation objectives presented in Section 5.1 and their suitability against the remediation hierarchy presented in *National Environmental Protection (Assessment of Site Contamination) Measure 1999* (as amended 2013). This hierarchy includes the following:

- *On-site treatment of the contamination so that it is destroyed or the associated risk is reduced to an acceptable level;*

  and

- *Off-site treatment of excavated soil, so that the contamination is destroyed or the associated risk is reduced to an acceptable level, after which soil is returned to the site;*

  or,

- *If the above are not practicable,*
  - *Consolidation and isolation of the soil on site by containment with a properly designed barrier;*

    and

  - *Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material;*

  or,

- *Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.*

When deciding which option to choose, the sustainability (environmental, economic and social) of each option should be considered, in terms of achieving an appropriate balance between the benefits and effects of undertaking the option.

Table 5.1 presents an options assessment for management of identified contamination.

Table 5.1 Management of risk associated with the contamination sourced from underground fuel infrastructure

MANAGEMENT APPROACH	ADVANTAGES	DISADVANTAGES	OUTCOME
1.1 – Do nothing	– Low cost option.	– Does not address identified source contamination on the site – Does not mitigate the migration risk of identified groundwater contamination – Does not meet the requirements of the UPSS regulation (*Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation* 2019), which stipulates that if the UPSS has not been used for two years or more it is considered abandoned and should be decommissioned.	Not preferred
1.2 – Foam filling and in-situ decommission of UPSS	– Immediate risks associated with impacts are contained on site. – Foam filling is designed to provide long term decommission of UST	– Potential soil impacts have not been removed surrounding the tanks. – The tanks remain onsite as a likely continuing liability – Short term moderate financial cost involving filling the tank in-situ – Does not comply with NSW UPSS regulation which preferences off-site removal if there is insufficient justification for in-situ decommissioning – New UPPS system (upgraded) is unable to be installed, as per Ampol's desires.	Not preferred
1.3 – Excavate and dispose tanks and associated infrastructure, soils and liquid waste and re-instate excavations with 'clean' fill and new UPSS system, depending on space and location.	– Immediate risks associated with impacts are removed. – Fastest remediation option at the site – No further ongoing management or notification required on-site – Complies with UPSS regulation – Provides space for installation of new UPSS	– Short term moderate financial cost involving off-site disposal of old UPSS infrastructure/contaminated soils and importation of 'clean fill'.	**Preferred**

The UPSS will be excavated and the all current USTs, fuel lines, bowsers and associated fuel infrastructure, will be removed. After removal of the tanks, bowsers, fuel lines, and fill points, soils previously surrounding infrastructure are to be replaced, and soils remaining on the walls and floor of the tank pit will be sampled ex-situ and analysed for PCOCs. Once all soil is removed from the excavation validation sampling can take place as per the validation plan in section 7. Further assessment and remediation may be undertaken if residual soil impacts are assessed as posing a risk to future commercial site users or groundwater.

Concrete pavements being disturbed and areas excavated at the site during the works may result in the loss of some existing groundwater monitoring wells. Where it is expected that a well will be impacted, the well will be decommissioned by means of grout slurry filling (in accordance with ADIA, 2020).

Following completion of the UPSS replacement works, drilling and installation of new wells may be required to ensure the monitoring well network is adequate coverage to both:

- Effectively monitor groundwater conditions at the site; and,
- Ensure that the well network is compliant with the requirements of the UPSS Regulation (2019).

5.3 REMEDIAL ENDPOINTS

The UPSS replacement and soil remediation works will be considered to be completed when:

- The existing UPSS infrastructure has been removed and replaced;
- The areas of former UPSS have been sampled to the requirements set out in NSW EPA 2023 *Contamination Assessment of Service Station Sites: Minimum Sampling Requirements;*
- Concentrations of contaminants of potential concern in remnant fill, soil, rock and imported backfill material in the areas of removed UPSS is not considered to pose an unacceptable risk to the relevant receptors; and
- Concentrations of contaminants in groundwater in the groundwater monitoring event following the UPSS Replacement are not considered to pose an unacceptable risk to the relevant receptors;

6 REMEDIATION APPROACH – SOURCE REMOVAL METHODOLOGY

6.1 PLANNING AND PRELIMINARIES

6.1.1 DEVELOPMENT APPLICATION APPROVAL

Prior to commencement of remedial works at the site, the following activities would need to be completed:

- Provision of the RAP to the Yass Valley Council in conjunction with the development application for the site; and
- Receipt of all relevant regulatory approvals for the tank replacement works.

6.1.2 SAFETY TASKS

Safety consideration and documentation for the site will comprise, but is not limited to, the following:

- Project specific safety, health, environment and quality plans including:
  - Safety, health and environment (SHE) management plan;
  - Site induction documentation;
  - Safe work method statements (SWMSs) for high-risk work; and
  - A construction environmental management plan (CEMP).
- 'Before You Dig Australia' (BYDA) searches to assess for the presence of services, including gas, electricity, water, sewer, stormwater, and telecommunications. All services are assumed to be disconnected by the Principal Contractor.

6.2 GENERAL

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

As a minimum, the following Codes of Practice are applicable to the work and a copy of each should be obtained by the contractor. Standards should be the most recent version available unless otherwise specified:

- AS 4976:200, The removal of underground storage tanks; and
- AS 1940 Section 9, The storage and handling of flammable and combustible liquids.

A contaminated land consultant should be present during or shortly following the excavation works to assess the contamination status of the soil excavated from around the tanks and associated infrastructure, and to determine whether further excavation of tank pit walls and floor is required in the event of additional excavation for the purposes of remediation is required.

6.3 PRIMARY SOURCE REMOVAL

The concrete pavements comprising the forecourt will be broken (by the Principal Contractor) to allow access to the UPSS. USTs and ASTs must be cleaned prior to excavation by draining all product, vapour venting and de-gassing. Once tanks are cleaned, they will be gas-tested for vapours and then deemed safe by an appropriately qualified person. The

tank atmosphere and the excavation area shall be monitored with an Lower Explosive Limit (LEL) detector for presence of vapour until the tank is removed from the site. The USTs must be properly labelled prior to being transported and disposed of at an appropriately licensed waste disposal or scrap metal recycling facility. The tanks must not be reused or resold – they must be destroyed and a certificate/written record obtained and provided to WSP at the completion of this task.

All applicable permits must be prepared by an appropriately qualified party prior to the beginning of any work associated with UST removal. All liquid product and residue removed from the tank shall be handled in accordance with appropriate standards and local regulations associated with environmentally hazardous materials and dangerous goods.

The principal contractor shall submit the following, but not limited to, written procedures to Ampol to complete these work scopes, summarised below:

- Draining pipes, pumping out remnant products from tanks and degassing tanks;
- Removal of pipework, former bowsers and fill point/s;
- Removal of tank from ground;
- Excavation of further areas – both laterally and vertically to accommodate the new, replacement tank/s or other UPSS infrastructure;
- A plan regarding any dewatering of excavations in the case of either shallow groundwater inflows into the excavation, or the excavation is found to have accumulated shallow seepage water within it; and
- Labelling, transportation and destruction of the USTs tanks;

6.4 SOIL VALIDATION REPORTING

At the completion of the site works, a UPSS validation report will be prepared in general accordance and with consideration of the regulations and industry guidelines listed in Section 1.4. The UPSS validation report will detail the methodologies and results of the validation works program;

A checklist of the reporting requirement is provided in the NSW EPA (2019) *UPSS Regulation* and in the NSW EPA (2020) *Consultants Reporting of Contaminated Land*.

6.5 MANAGEMENT OF EXCAVATED SOILS

6.5.1 GENERAL REQUIREMENTS

All excavated soils shall be segregated into separate stockpiles based on field observations, such as soil type, field photoionisation detector (PID) readings, visual and olfactory evidence of contamination and depths where the soils are excavated.

The excavated soils will be temporarily stockpiled on-site while awaiting sampling of the soils by the consultant, receipt of laboratory analytical results and preparation of a Waste Classification (WCR) Report by the consultant. The WCR will enable the PC to arrange acceptance of the material to be disposed of at an appropriately licensed NSW EPA waste receival facility.

The soils are to be stockpiled on either plastic sheets or concrete pavements and the stockpile areas are to be securely bunded using silt fencing and silt socks and/or hay bales to prevent water or silt-laden runoff from entering or leaving the stockpiles or the site. Plastic sheeting may be required to be placed over the stockpile to minimise surface runoff, wind-blown dust and/or odours.

6.5.2 FROM EXISTING UST PIT

It is anticipated that approximately 300 m^3 (or 460 tonnes) of excavated (*ex-situ*) backfill spoil material will be generated from the area of the current and future main UST farm (in the south-eastern portion of the site), currently comprising UST T1, T2 and one earlier abandoned UST without an identification number.

WSP note that three existing USTs, including UST T3 – the UST currently dispending E10 product with a capacity of 57,000 L) and two additional USTs of unknown capacity that were earlier abandoned (see the final concept plan provided to WSP by Ampol in Appendix A) are planned to be decommissioned and abandoned in-situ due to their close proximity to the sales building.

6.5.3 FROM NEW UST PIT OVER-EXCAVATION

Arising from the over-excavation of the new UST pit (to accommodate the planned two, new 60 kL compartmented USTs it is anticipated that approximately 600 m^3 (or 1,000 tonnes) of excavated (*ex-situ)* clay and mixed fill spoil material will be generated.

6.5.4 FROM SHALLOW TRENCHING IN THE UNDER-CANOPY AREA AND FORECOURT

Arising from the expected shallow trenching in the under-canopy and general forecourt area, for the purpose of removal of existing UPSS and installation of new UPSS, it is anticipated that approximately 200 m^3 (or 340 tonnes) of excavated (*ex-situ*) clay, sand and mixed fill spoil material will be generated.

6.6 SOIL WASTE MATERIAL TRACKING

Fill, soil and rock materials excavated at the site and relocated on-site or disposed of off-site must be tracked in order to provide detailed and accurate information about the location and quantity of all materials from the time of their excavation until their disposal.

The waste disposal facilities will be determined and arranged by the PC. For any truck moving contaminated material on-site or off-site, the following information should be recorded:

- Origin of material;
- Material type (ie. Exact matrix type and proportions);
- Approximate volume and mass;
- Final waste receiving destination; and
- Truck registration number (for off-site disposal only).

This information, along with a copy of waste receiving facility docket for materials disposed at off-site facilities, will be provided in the consultant's soil validation report.

6.7 OTHER WASTE MATERIAL TRACKING

The other waste materials whose disposal volumes or masses require documentation to be provided to the consultant by the PC are as follows:

- General Waste (like general building and construction site waste – typically disposed off-site in skip bins;
- Metal recycling/scrap metal waste;
- Liquid waste (typically any groundwater or water accumulated in excavations and removed for dewatering purposes); and

- Concrete;

6.8 REINSTATEMENT OF EXCAVATIONS

Following excavation and validation of the tank pit and the subsequent soil excavations, the new USTs will be installed into the new UST excavation. The voids in the old tank pit and between the new tanks and the new pit will have to be reinstated. The fill used for reinstatement will be suitable for the intended use based on the following procedures.

6.8.1 REUSE OF EXCAVATED SOIL

Excavated soils with contaminant concentrations below the site assessment criteria may be, from a contamination perspective, reused on-site. The geotechnical suitability of such materials would need to be assessed separately. The material should be assessed for its potential to pose risk to the receptors relevant to the assessment and the site. The material would not be considered suitable for reuse if contaminant concentrations exceed assessment criteria, was malodorous or exhibited other aesthetic considerations such as discolouration or staining.

6.8.2 IMPORTED MATERIAL FOR BACKFILLING

Materials that can be imported to the site during the works program, for the purpose of backfilling around the new UPSS must meet the definition of either:

- Commercially quarried product: Commercial product not defined as a waste under the *Protection of the Environment Operations Act 1997*; or,
- Virgin Excavated Natural Material (VENM): Defined in the *Protection of the Environment Operations Act 1997*; and,

All backfill materials to be imported onto the site are required to be imported as per the procedures outlined in this RAP. The RAP breaks different types of importation materials into separate waste categories as defined below:

- Quarried Products – Materials which are commercially sourced, excavated from virgin ground and manufactured using crushing and screening techniques;
- Low Risk Materials - Virgin Excavated Natural Material (VENM)

According to characterisations above, the remediation works will preference the importation of commercially quarried products and then low risk materials (VENM) where practicable. Due to the persistent occurrence of asbestos fines and other low-level contamination concerns associated with the unknown source of recovered materials, these will not be considered an option as backfill for these works. The procedure for the validation of any imported backfill material is described below.

All materials will be validated as per the requirements of the imported materials validation protocol outlined in Section 7.3.3 of this RAP. In summary, all imported materials for backfilling that are imported to site are to be inspected and managed as per the following process:

1. *The material being imported to site will be visually verified by appropriately qualified or experienced on-site personnel to confirm:*
    - *The material imported to site is aesthetically consistent with the material presented in the relevant importation documentation; and*
    - *The material imported to site is free of visual evidence of contamination.*
2. *Periodic verification inspections will be conducted and a photographic records maintained of the imported material. These inspections will be carried out (as a minimum) for the initial load/s, and bi-weekly thereafter (for project duration or to volume limit of supplied material) and for the first load following a hiatus of import of greater than 4*

weeks. The records of the verification inspections are to be retained and provided to the validation consultant for incorporation into the soil validation report.

Note: where the imported material does not meet the requirements of point 1, this will trigger the need to either remove the material from site, further clarification from the supplier as to the source site, and/or inspection and sampling of the material by the consultant prior to determining the fate of the material.

6.9 UNEXPECTED FINDS

If soil is encountered during the remedial works which appears to be different from the soils otherwise identified in this RAP, or point sources of contamination such as buried drums or wastewater interceptors are encountered, the following procedures will apply:

- Any unexpected materials or soil which have been excavated should be stockpiled on bunded, strong, impermeable plastic sheeting, protected from erosion and all seepage retained (divided into domains or stockpiles representing similar material types);
- Excavation works at that part of the site where the unexpected material (soil, asbestos containing material or physical find) is encountered will cease until inspection is carried out by the environmental consultant or its representative;
- Based on visual inspection, the environmental consultant will provide interim advice on construction health and safety, soil storage and soil disposal to allow other remediation activities to proceed if possible; and
- Based on sampling and analysis of the material, the environmental consultant will provide advice based on comparison of the laboratory test results to appropriate criteria relating to human health, potential environmental impacts and waste disposal.

In the context of the above, unexpected material would include, but is not limited to the following: oily materials or materials with unusual odours, drums, metal or plastic chemical containers, buried building waste, putrescible waste, solid waste, ash, slag, coke or brightly coloured material, asbestos containing material and additional USTs.

7 REMEDIATION VALIDATION

7.1 DATA QUALITY PLANNING

7.1.1 DATA QUALITY OBJECTIVES

Systematic planning is critical to successful implementation of any assessment and is used to define the type, quantity and quality of data needed to inform decisions. The United States Environmental Protection Agency (US EPA) has defined a process for establishing data quality objectives (DQOs) (US EPA, 2000a and 2000b), which has been referenced in National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1) (NEPM) Schedule B2 – Guideline on Site Characterisation ((National Environmental Protection Council (NEPC), 2013).

DQOs ensure that:

- the study objectives are set;
- appropriate types of data are collected (based on contemporary land use and chemicals of potential concern); and
- the tolerance levels are set for potential decision making errors.

The DQO process is a seven-step iterative planning approach. The outputs of the DQO process are qualitative and quantitative statements which are developed in the first six steps. They define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose and specify the performance requirements for the quality of information to be obtained from the data. The output from the first six steps is then used in the seventh step to develop the data collection design that meets all performance criteria and other design requirements and constraints. The DQO process adopted for the UPSS replacement and soil remediation works is outlined in Table 7.1.

Table 7.1 Data quality objective process

Step	Description	Outcomes
1	State the problem	Ampol intends to replace the existing UPSS at the Ampol Yass service station and in the process remove hydrocarbon impacted soils in the vicinity of the UPSS to the extent practicable. The objective of the remedial works is to reduce the mass of contamination in the substrate at the site and hence reduce the potential for ongoing contamination of adjacent soils and groundwater. To ensure the works are undertaken in accordance with relevant regulations and assess the mass of hydrocarbon removed during the works, assessment of the excavated soils and measurement of contaminant concentrations in soil remaining onsite is required.
2	Identify the decisions	The decisions to be made are as follows: — What are the current soil contamination concentrations at the site? — What volume and mass of contaminated soil is to be removed from site? — What are the residual soil contamination concentrations at the site? — Does the contamination pose a risk to on and offsite receptors? — If there is a risk, what is the most appropriate remedial/management strategy to be employed at the site?
3	Identify the inputs to the decision	The inputs required to make the above decisions are: — The results of previous investigations. — Field and analytical data to be collected during the works. — National and NSW EPA made, endorsed or approved criteria for assessing the results.

Step	Description	Outcomes
4	Define the study boundaries/ constraints on data	The boundaries of the investigation have been identified as follows: — Spatial boundaries: the spatial boundary of the site is defined as the site boundary. The vertical extent of the study area is defined as either: i) the maximum depth of any excavation at the site; or, ii) the maximum depth of the deepest groundwater monitoring well, to impacted groundwater. The site boundary is shown on the plan in Appendix A; and, — Temporal boundaries: The temporal boundary for this assessment will be from the time of collection of the first sample to the time of collection of the last sample. Samples might be from any substrate including soil; groundwater and soil vapour.
5	Develop a decision rule	The purpose of this step is to define the parameters of interest, specify the action levels, and combine the outputs of the previous DQO steps into an 'if…then…' decision rule that defines the conditions that would cause the decision maker to choose alternative actions. The parameters of interest are concentrations of contaminants of concern and interest in soil, groundwater and soil vapour. An assessment of the concentrations of the contaminants of concern will be undertaken to ensure the site has been adequately investigated. Soil, groundwater and soil vapour results will be compared to a range of assessment criteria for different receptor endpoints from various exposure routes to determine whether there is a risk posed to the receptor. For the purposes of assessing this site (with a planned ongoing commercial/industrial land-use), both of the following questions need to be considered: — If soils have been found to contain contaminant concentrations above the adopted screening or investigation levels, then the site, soil and/or groundwater may be subject to further remedial action or management; and — If the site remedial strategy is proved to be insufficient in assessing the risk posed by remnant contamination at the site following the completion of the works program, then further investigative or remedial works may need to be implemented.
6	Specify limits on decision errors	The acceptable limits on decision errors to be applied in the investigation and the manner of addressing possible decision errors have been developed based on the data quality indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness and are presented in Table 7.2 and Table 7.3.
7	Optimise the design for obtaining data	The purpose of this step is to identify a resource-effective data collection design for generating data that satisfies the DQOs. This assessment has been designed considering the information and data from the previous assessments. The resource-effective data collection design that is expected to satisfy the DQOs is described in the sections below.

7.1.2 DATA QUALITY INDICATORS

DQIs for sampling techniques and laboratory analyses of collected representative soil and groundwater samples define the acceptable level of error required for this validation assessment. The adopted field methodologies and data obtained were assessed by reference to the following measures:

- Accuracy – a quantitative measure of the closeness of reported data to the true value;
- comparability – a qualitative parameter expressing the confidence with which one data set can be compared with another;
- completeness – a measure of the amount of useable data (expressed as a per cent) from a data collection activity;
- representativeness – the confidence (expressed qualitatively) that data are representative of each media present on the site; and
- precision – a quantitative measure of the variability (or reproducibility) of data.

A summary of the field and laboratory DQIs for the validation assessment are provided in Table 7.2 and Table 7.3

Table 7.2 DQIs for field techniques

DQI
Precision
Standard operating procedures (SOPs) appropriate and complied with.
Collection and laboratory analysis of intra-laboratory duplicates
Accuracy
WSP SOPs appropriate and complied with
Collection and laboratory analysis of inter-laboratory duplicates
Collection and laboratory analysis of rinsate blanks, trip blanks and spikes
Representativeness
Appropriate media sampled
Comparability
Same SOPs used on each occasion
Experienced sampler
Climatic conditions (temperature, rainfall, wind)
Same type of samples collected
Completeness
SOPs appropriate and complied with
All required samples collected

Table 7.3 DQIs for laboratory analysis

DQI	Acceptable Limits
Accuracy	
Laboratory prepared trip blanks (one per batch)	Non-detect for contaminants analysed
Rinsate blanks (one per day)	Non-detect for contaminants analysed
Method blanks	Non-detect for contaminants analysed
Matrix and surrogate spikes and laboratory control samples	Laboratory specific
Matrix spike duplicates	Laboratory specific
Reference materials	Laboratory specific
Reagent blanks	Non-detect for contaminants analysed
Comparability	
Sample analytical methods used (including clean-up)	As per NEPM (NEPC, 2013)
Same units (justify/quantify if different)	-
Same laboratories (justify/quantify if different)	-
Sample practical quantitation limit (PQLs)	< nominated criteria
Completeness	

DQI	Acceptable Limits
All critical samples analysed	-
All required analytes analysed	-
Appropriate methods and PQLs	As per NEPM (NEPC, 2013)
Sample documentation complete	As per NEPM (NEPC, 2013)
Sample holding times complied with	As per NEPM (NEPC, 2013)
Representativeness	
All required samples analysed	-
Precision	
Blind (intra-laboratory) duplicates and split (inter-laboratory) duplicates at rate of 1:20 primary samples for the same analysis of primary samples (not including asbestos, as no duplicates are required to be collected for asbestos analysis)	Variable (see Table 7.1)
Laboratory duplicates	Laboratory specific
Laboratory prepared trip spikes (one per batch for volatiles)	70–130%
National Association of Testing Authorities (NATA) certified laboratories used	-

→

7.1.3 FIELD DATA QUALITY PLANNING

An assessment of the duplicate sample results for both soils and groundwater is to be undertaken by calculating the relative percent difference (RPD) between measured concentrations. RPDs are calculated using the formula below.

$$RPD\% = \frac{|Ro - Rd|}{|(Ro + Rd)/2|} \times 100\%$$

where Ro is the primary sample and Rd is the duplicate.

RPDs will be calculated between primary samples and their corresponding duplicate pair samples in order to satisfy the 'precision' DQI as outlined in Section 7.1.2 above. A lower RPD value represents greater reproducibility of the analytical data measurements or 'precision' for the adopted field methodology. It is noted that using RPDs in evaluating the precision of sampling results becomes valuable only when one or both measured concentrations are within the same order of magnitude of the unacceptable risk criteria.

Duplicate sample pairs are planned to be collected at a minimum rate of 1:20. All duplicate samples submitted for the same analytical suite as the primary samples. All analytical testing laboratories to be accredited with the National Association of Testing Authorities (NATA) for all analyses performed.

SOIL RPD THRESHOLDS

There are no Australian reference guidelines for the acceptable RPDs for volatile compounds in soil; rather, acceptable RPD limits are dependent on measured concentrations relative to the detection limit for each analyte. However, for the purposes of this assessment a reference value of 100% is to be adopted. Australian Standard AS 4482.1 states acceptable calculated RPD values of 30–50% RPD (for non- and semi-volatiles). Where the measured concentration is more than one order of magnitude greater than the detection limit, RPDs within 100% are considered acceptable for the purposes of this investigation. RPDs were not calculated where concentrations in the either the primary or duplicate sample pair samples were below laboratory LOR.

GROUNDWATER RPD THRESHOLDS

There are no Australian reference guidelines for the acceptable RPDs for groundwater; rather, acceptable RPD limits are dependant on measured concentrations relative to the detection limit for each analyte. Where the measured concentration is more than one order of magnitude greater than the detection limit, RPDs within 100% are considered acceptable for the purposes of this investigation. RPDs were not calculated where concentrations in the primary or duplicate sample pair samples were below laboratory LOR.

It is noted that using RPDs in evaluating the precision of sampling results becomes valuable only when one or both measured concentrations are within the same order of magnitude of the unacceptable risk criteria. An additional factor affecting the usefulness of duplicate RPD assessments for groundwater is the presence of colloidal droplets of phase separated contaminant (i.e. light, non-aqueous phase liquids or LNAPL). The concentration as analysed may be dependent on the amount of mass in droplet form entrained into the duplicate sample pairs. In such cases RPDs may exceed 100% although both samples represent saturated or supersaturated concentrations and can thus be interpreted as representing a similar degree of groundwater impact.

A laboratory prepared trip blank and trip spike soil and groundwater sample will accompany each soil validation and groundwater sample batch in the chilled cooler, during sampling and transit of the samples to the testing laboratory. The trip blank and trip spike samples are to be analysed for the volatile BTEXN compounds at the primary testing laboratory.

7.2 LABORATORY DATA QUALITY PLANNING

The laboratories performed internal quality assurance and quality control (QA/QC) programs and used appropriate detection limits for the selected analyses. The following ranges, specified by the primary laboratory (SGS), were used as guidelines for acceptable results:

- Surrogates: 70–130% recovery.
- Matrix spikes: 60–130% recover (organics) and 70–130% (inorganics).
- Control samples: 60–140% recovery (organics) and 80–120% (inorganics).
- Matrix spike duplicate samples: RPD less than 30%
- Duplicate samples: RPD less than 15% (water).
- Method blanks: < PQL.

Assessment of laboratory QA/QC was undertaken internally by the individual laboratory; however, the results were also independently reviewed and assessed by WSP for the following items:

- confirmation that the objectives of the laboratory QA/QC were met;
- identification of any anomalous results;
- review of the detection limits of the analytical methods used;
- transcription errors; and identification of invalid data, where laboratory QA/QC reports indicate that sample integrity may be compromised; and,
- identification of invalid data, where laboratory QA/QC reports indicate that sample integrity may be compromised.

7.3 VALIDATION CRITERIA

7.3.1 ON-SITE SOIL VALIDATION CRITERIA

This RAP has been prepared for assessing the hydrocarbon impacts in soil at the site after the removal of the tanks. Therefore, the potential human receptors relevant to this investigation are the site operators and the excavation and maintenance workers at the service station. The exposure pathways identified were dermal contact and ingestion of soil or inflowing groundwater, and vapour inhalation during intrusive works. Based on the potential receptors identified and the exposure pathways, the applicable remediation criteria are the HSLs for vapour intrusion risk at commercial/industrial land use settings (HSL D) in sandy soils and health-based investigation levels (HILs) for commercial and industrial settings (HIL-D). The HSLs and HILs for commercial users are provided in the NEPM (2013). For the intrusive maintenance workers, the recommended assessment criteria for vapour and direct contact pathways provided in the Cooperative Research Council for Contamination Assessment and Remediation for the Environment (CRC CARE) Technical Report no. 10 (Friebel and Nadebaum, 2011) have been adopted.

Following the installation of the new tanks, the excavation will be reinstated with imported fill, and then paved with concrete. As such, direct contact with soils is unlikely for ongoing commercial workers at the site but possible for intrusive maintenance workers. The direct contact criteria presented in CRC CARE Technical Report no. 10 (Friebel and Nadebaum, 2011) will be adopted.

As the site will be used as a service station, and there are no ecologically sensitive areas within 500m of the site, the ecological screening levels (for the protection of plants and terrestrial organisms) for petroleum hydrocarbons have limited relevance and have not been included in the assessment.

The HSLs for the commercial site users and the intrusive maintenance workers are summarised in Table 7.4 and Table 7.5.

Table 7.4 Adopted soil HSLs and HILs for commercial/industrial land use

CHEMICAL	HSL D (mg/kg) IN SANDY SOILS[1]				HIL D[2] (mg/kg)
	0 m to <1 m	1 m to <2 m	2 m to <4 m	4 m+	
TRH C_6-C_{10} minus BTEX (F1)	260	370	630	NL	-
TRH >C_{10}-C_{16} minus naphthalene (F2)	NL[4]	NL	NL	NL	-
Benzene	3	3	3	3	-
Toluene	NL	NL	NL	NL	-
Ethylbenzene	NL	NL	NL	NL	-
Xylenes	230	NL	NL	NL	-
Naphthalene	NL	NL	NL	NL	-
Carcinogenic PAHs (as BaP TEQ)	-	-	-	-	40
Total PAHs	-	-	-	-	4000
Lead	-	-	-	-	1500

(1) Table 1A(3) Soil HSLs for vapour intrusion (NEPM, 2013)

(2) Table 1A(1) Health investigation levels for soil contaminants (NEPM, 2013)

NL - not limiting

- criteria are not available

BaP TEQ – Benzo(a)pyrene toxicity equivalency quotient

Table 7.5 Adopted soil HSLs for intrusive maintenance workers

CHEMICAL	HSL (mg/kg) IN SANDY SOILS[1]			HSL FOR DIRECT CONTACT (mg/kg)[2]
	0 m to <2 m	2 m to <4 m	4 m+	
TRH F1	NL	NL	NL	82,000
TRH F2	NL	NL	NL	62,000
TRH >C_{16}- C_{34}	-	-	-	85,000
TRH >C_{34}- C_{40}	-	-	-	120,000
Benzene	77	160		1,000
Toluene	NL	NL	NL	120,000
Ethylbenzene	NL	NL	NL	85,000
Xylenes	NL	NL	NL	130,000
Naphthalene	NL	NL	NL	29,000

(1) Table A3 Soil health screening levels for vapour intrusion (mg/kg) (CRC CARE Technical Report no. 10, Friebel and Nadebaum, 2011)

(2) Table B4 Soil health screening levels for direct contact (mg/kg) (CRC CARE Technical Report no. 10, Friebel and Nadebaum, 2011)

7.3.2 WASTE CLASSIFIATION CRITERIA

Prior to the transportation of excavated soils off-site for disposal, waste classification will be undertaken in accordance with the waste classification guidelines (NSW EPA, 2014), *Part 1: Classifying Waste*. The guidelines define four types of waste:

- Special waste (i.e. clinical and related waste, asbestos waste and waste tyres);
- Liquid waste;
- Pre-classified waste, including some hazardous wastes and general solid waste (putrescibles and non-putrescible); and
- Waste that possess hazardous characteristics.

For this latter category, the guidelines provide threshold levels for two different waste categories, namely ‘general solid waste’ and ‘restricted solid waste’. Waste that falls within the ‘restricted solid waste’ criteria should be classified as ‘hazardous waste’.

The guidelines provide contaminant threshold (CT) values for total concentrations, specific contaminant concentrations (SCC) and leachate concentrations for a list of approximately 50 contaminants. For a waste to be classified under a given category, both the SCC and TCLP concentrations should meet the respective investigation levels. The waste may be classified solely based on total concentrations (i.e. without undertaking TCLP testing) however, the applicable CT values when TCLP analysis is not undertaken are significantly lower (i.e. more stringent) than would apply when TCLP testing is undertaken.

A summary of the waste classification criteria is included in Table 7.6.

Table 7.6 Waste classification guidelines

CHEMICALS	CT (WITHOUT TCLP) (1)		SCC (WITH TCLP) (1)			
	MAXIMUM VALUE FOR CLASSIFICATION WITHOUT TCLP		MAXIMUM VALUES FOR LEACHABLE CONCENTRATION AND SPECIFIC CONTAMINANT CONCENTRATIONS WHEN USED TOGETHER			
	GENERAL SOLID (CT1)	RESTRICTED SOLID (CT2)	GENERAL SOLID		RESTRICTED SOLID	
			TCLP1	SCC1	TCLP2	SCC2
	(mg/kg)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)
TPH C_6-C_9	650	2,600	NA	650	NA	2,600
TPH C_{10}-C_{36}	10,000	40,000	NA	10,000	NA	40,000
Benzene	10	40	2	18	2	72
Toluene	288	1,152	57.6	518	57.6	2,073
Ethylbenzene	600	2,400	120	1080	120	4,320
Total xylene	1,000	4,000	200	1,800	200	7,200
Benzo(a)pyrene	0.8	3.2	0.04	10	0.16	23
Total PAH	200	800	NA	200	NA	800
Arsenic	100	400	5	500	20	2,000
Cadmium	20	80	1	100	4	400
Chromium (VI)	100	400	5	1,900	20	7,600
Lead	100	400	5	1,500	20	6,000
Mercury	4	16	0.2	50	0.8	200
Nickel	40	160	2	1,050	8	4,200

(1) Table 1 and Table 2 in Waste Classification Guidelines. Part 1: Classifying Waste (NSW EPA, 2014)

7.3.3 IMPORTED MATERIAL FOR BACKFILLING EXCAVATIONS

All material being imported to the site for backfilling of excavations is required to be derived from a source site free of acid sulfate soils and with no risk of impact from previous potentially contaminating activities. Only commercially quarried products, like gravels or sands or material meeting the definition of virgin excavated natural material (VENM) can be brought to the site to backfill the UPSS excavations and infrastructure. Samples of the imported backfill material will be collected by WSP and analysed for and assessed against the criteria presented in Table 7.7.

Table 7.7 Imported VENM Characterisation Criteria

CHEMICAL	TRIGGER VALUE (MG/KG)	SOURCE/JUSTIFICATION
Arsenic	20	Maximum Average Concentration – Table 4: NSW EPA (2014), *The Excavated Natural Material Order 2014*
Copper	60	NEPM Schedule B1 Minimum ACL for Urban Residential/Public Open Space Landuse
Chromium (Total)	75	Maximum Average Concentration – Table 4: NSW EPA (2014), *The Excavated Natural Material Order 2014*
Lead	50	Maximum Average Concentration – Table 4: NSW EPA (2014), *The Excavated Natural Material Order 2014*
Nickel	30	NEPM Schedule B1 Minimum ACL for Urban Residential/Public Open Space Landuse
Zinc	70	NEPM Schedule B1 Minimum ACL for Urban Residential/Public Open Space Landuse
Mercury	0.5	Maximum Average Concentration – Table 4: NSW EPA (2014), *The Excavated Natural Material Order 2014*
Total Recoverable Hydrocarbons	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Polycyclic Aromatic Hydrocarbons	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Organochlorine Pesticides	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Organophosphorus Pesticides	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Polychlorinated Biphenyls	<LOR	VENM definition NSW EPA (2014) Waste Classification Guidelines
Asbestos	Non detect	Special Waste Criteria NSW EPA (2014) Waste Classification Guidelines

Note that where results are below the <LOR criteria, the LOR should be confirmed as being below the relevant HIL or HSL for that specific contaminant (where applicable).

7.4 VALIDATION SAMPLING PROCESS

7.4.1 WALL AND BASE SAMPLING AND CHARACTERISATION

Following the removal of any UST, following cleaning out of the excavation of the backfill and any additional remediation by excavation or over-excavation to accommodate larger USTs, soil samples will be collected from the walls and floor of the excavation. All headspace of all soil samples will be screened in the field using a handheld photo-ionisation detector (PID) to determine indicative, relative concentrations of volatile organic compounds (VOCs). Samples will then be analysed for the contaminants of potential concern, i.e. TRH, BTEXN, PAHs and lead at the selected analytical laboratory. Due to the likely presence of contamination beneath USTs, if hydrocarbon impacted soils are observed (by olfactory senses and by PID screening), the lateral and/or vertical depth of excavation may be extended (to the extent practicable) to remove the additional contaminated material.

- The UST pit validation sampling will be undertaken in accordance with the NSW EPA 2023, *Contamination Assessment of Service Station Sites: Minimum Sampling Requirements*, which states that:

  Where a UST is removed, as a guide, sampling should be one sample from beneath the centre of the UST if tank length is less than 4 m and at least one sample from each of the four walls. If the tank is 4–10 m long, at least two samples from each of the four walls and under each end. If the tank is longer than 10 m, at least three samples from each of the four walls and under each end are taken. This applies to each tank in the same tank pit.

Quality assurance/quality control (QA/QC) samples will also have to be collected and analysed as described in Section 7.1.3 The excavations will be left open while waiting for laboratory results. If validation samples exceed the nominated assessment reference values, further excavation may be required.

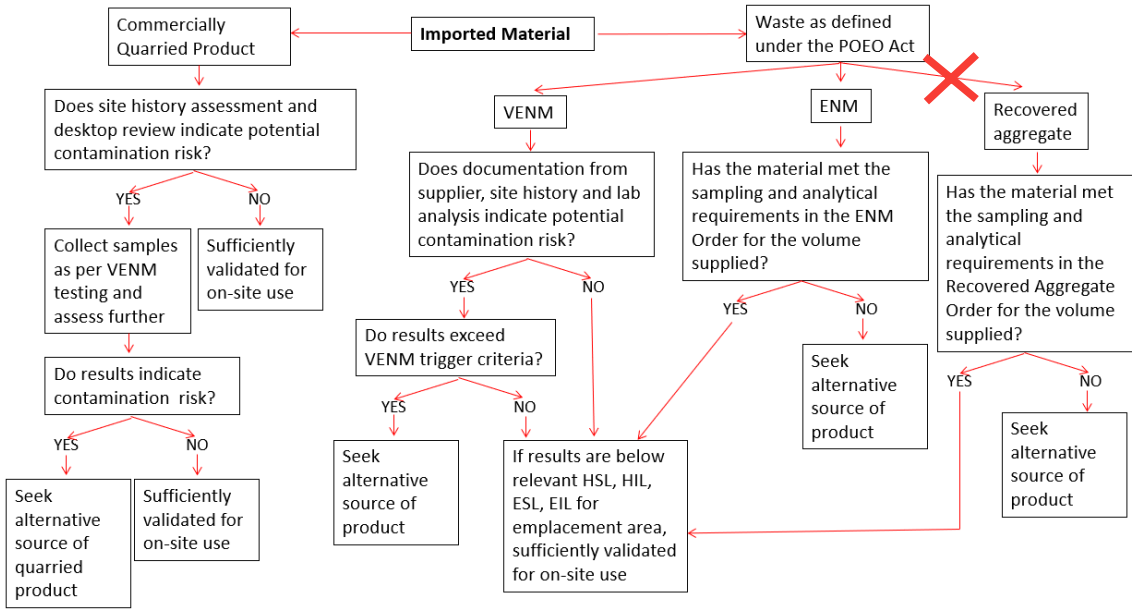
7.4.2 STOCKPILE CHARACTERISATION

The NEPM (2013) Schedule B2, Guideline on Site Characterisation, outlines the minimum number of samples for assessment of stockpiles. For stockpile volumes less than 250 m^3, the recommended sampling frequency is 1 per 25 m^3. For stockpiles greater than 250 m^3, lower sampling rates should be suitable for calculating the 95% upper confidence level (UCL). All the stockpile soil samples shall be analysed for TRH, BTEX, PAH, eight priority heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc) and asbestos as a minimum. Where results exceed the adopted disposal criteria further leachability testing or statistical calculations may be required to classify soils for off-site disposal. Samples will be collected either directly from the excavator bucket or using a decontaminated trowel to ensure soil samples are collected from a minimum depth of 300 mm below the stockpile surface. Alternatively hand tools like a trowel or shovel may be sufficient to sample smaller stockpiles of up to approximately 100 m^3.

Excavated soils may be suitable for re-use on site if contaminant concentrations are less than the site assessment criteria (presented in Tables 7.4 and 7.5) , however Ampol has stated that all new pits will be filled with a clean crushed basalt aggregate. Any soils intended to be retained and beneficially reused on site should not exhibit discolouration (staining), be malodourous or have abnormal consistency i.e. contain abundant fill, rubble or asbestos, and engineering/geotechnical suitability must also be considered. If contaminant concentrations or characteristics do not meet these criteria, disposal at an appropriately licensed (by NSW EPA) waste receiving may be undertaken. For off-site disposal, the soil analytical results will be compared to guideline values in the waste classification guidelines. Any soil disposed of from the site must be in accordance with the requirements of the NSW EPA waste classification guidelines (Table 7.6). Appropriately licensed contractors must be engaged for the removal, transport and disposal of all contaminated soils from the site. If the soils are disposed off-site, disposal dockets for tracking of waste must be obtained by the PC and provided to WSP for inclusion in the UPSS soil validation report.

7.4.3 SUITABILITY OF IMPORTED MATERIAL

The decision tree below presents how imported material is to be assessed for site suitability across the remediation site.



The following sections discuss the detailed sampling and validation requirements which need to be implemented during the remedial works for imported materials.

COMMERCIALLY QUARRIED PRODUCT

Because commercially quarried product constitutes a commercial product and does not meet the definition of a "waste" in the *Protection of the Environment Operations Act 1997*, the standard waste characterisation process that is applied to wastes does not apply. The validation requirements for commercially quarried product are as follows:

- Assessment of details of the source site including material specifications, source-site history and any available chemical assessment; and
- If the initial assessment indicates a potential for historic contamination, undertake sampling and analysis as per the requirements for Virgin Excavated Natural Material. Otherwise, no specific contamination testing would be required.

The validation consultant will require the details of the source-site assessment, any chemical analysis and results comparison and the verification inspection records to assess suitability of material and incorporate into the final validation report.

VIRGIN EXCAVATED NATURAL MATERIAL

The *Protection of the Environment Operations Act 1997*, defines VENM as natural material (such as clay, gravel, sand, soil or rock fines):

- That has been excavated or quarried from areas that are not contaminated with manufactured chemicals, or with process residues, as a result of industrial, commercial, mining or agricultural activities; and
- That does not include sulfidic ores or soils, or any other waste.

VENM sourced from off-site will be characterised for site suitability by applying the following validation procedure:

- Assessment of details of the source site including material specifications, source-site history and any available chemical assessment;

- Collection of confirmatory samples along with relevant QA/QC samples from each source site for analysis of the following parameters: TRH, BTEXN, PAHs, OCPs, OPPs, PCBs, eight priority heavy metals and asbestos.
- The sampling density for imported VENM will comprise (as a minimum) one sample per 200 m^3 for less than or equal to 1,000 m^3 of material being beneficially reused and one sample per additional 1,000 m^3 thereafter along with relevant QA/QC samples at the rate outlined in Section 8;
- Inclusion of the following information in the UPSS soil validation report:
  - The name and location of the source site;
  - Product description and extent (mass and on-site areas) of its use at the site;
  - Photographs of the material;
  - Tabulated analytical results compared against relevant criteria; and
  - Conclusion of suitability of material imported from source-site.

7.5 VALIDATION REPORTING

At the completion of the site works and upon provision of all required validation documentation, a soil validation report and likely an addendum groundwater monitoring event (GME) will be prepared in general accordance with NSW EPA 2020, *Guidelines for Consultants Reporting on Contaminated Land* (Contaminated Land Guidelines);

The validation report will detail the methodologies, observations made, analytical results and the outcome of the UPSS Replacement works and include the following sections as a minimum:

- Introduction including objectives of the works and legislative requirements;
- Site summary including location, identification, description, geological and hydrogeological details;
- Historical report summary including a summary of the site contamination status, data gap analysis and a pre-remediation site conceptual model;
- Data quality objectives;
- Remediation works summary including implementation, methodology of UPSS and waste removal, material importation, waste management and tracking information and the validation process;
- Site validation assessment criteria;
- A discussion of suitability of data based on comparison against the agreed data quality indicators;
- A discussion of the post-remediation site condition; and,
- Conclusions on the site's suitability and the need for any ongoing monitoring/management.

8 HEALTH & SAFETY PLANNING

The consultant will prepare a Health, Environment and Safety Plan (HESP), or equivalent, prior to performing on-site works associated with the role of the consultant and those are outlined in this RAP. The HESP will address the health and safety of the consultant's staff. As a minimum, it will consider (at a minimum):

- Site security;
- Driving and fatigue management;
- Manual handling;
- Potential exposure to contamination;
- Excavation safety;
- Vibration;
- Noise;
- Odour; and
- Dust.

Work associated with the remediation of the site will conform, at a minimum, to the requirements of the SafeWork NSW requirements and associated Regulations. Typically, the HESP will address the following issues:

- Regulatory requirements;
- Responsibilities;
- Hazard identification and control;
- Chemical hazard control;
- Sample and chemical handling procedures;
- Personal protective equipment;
- Work zones;
- Decontamination procedures;
- Emergency response plans;
- Contingency plans; and
- Incident reporting.

9 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

A construction environmental management plan (CEMP) should be developed as industry best practice for the site remediation works to ensure that the on-site and off-site environment is not adversely impacted during the remediation works. The CEMP should address and take into consideration the issues discussed in the following sections. The CEMP should be prepared by the PC.

9.1 VEHICLE TRAFFIC

The remediation works may slightly increase vehicle traffic in the vicinity of the site. Where necessary, details of traffic management will be incorporated into the CEMP to control traffic movement associated with the works and mitigate any disruption to local residents and road users.

9.2 ODOUR AND VAPOUR

The remediation works may result in significant vapours and odours being released into the atmosphere, particularly when excavation of potentially contaminated soil is carried out. At these times, consideration should be given to prevailing weather conditions and if distinct odours are detected then site works should stop until the odours can be reduced or controlled.

If the exposed soils at the site are strongly malodorous, the consultant may be required to monitor open excavations and stockpiled soils with a PID to ensure ambient air concentrations are within the acceptable work safe limits. Concentrations of PID monitoring shall be recorded by the consultant and submitted for review on a daily basis to ensure the daily average VOC concentration is below the time-weighted average (TWA) for benzene (i.e. 1 ppm) in accordance with the Safe Work Australia *Workplace Exposure Standards for Airborne Contaminants* (Safework NSW, 2018). There is no peak, ceiling or short term exposure limit (STEL) for benzene, however the *Guidance on the Interpretation of Exposure Standards for Airborne Contaminants* (Safework, 2013) indicates that ambient air concentrations of any airborne contaminant should not exceed three times the TWA exposure standard for more than 30 minutes per 8 hour work shift day and should not exceed five times the TWA exposure standard at any time during works (SafeWork, 2013). As a result, if ambient air concentrations of VOCs exceed 3 ppm for over 30 minutes, work will have to cease for the day or control measures implemented. If at any time during works, ambient levels exceed 5 ppm, works will stop immediately and not re-commence until appropriate control measures are implemented.

Alternative control measures could be implemented and include the following:

- Workers may be fitted with vapour masks or organic respirators for continuation of site works in the area; and
- Wetting down the excavated soil with the use of water sprays containing odour suppressant.

9.3 DUST

Dust will be visually monitored during the earthworks and areas generating excessive dust will be sprayed with water (by the PC) to reduce the dust levels. Soil that is to be stockpiled should be covered or wetted down to minimise potential dust generation. During excavation and transport of any soil off site, if the truck wheels can not be kept free of excessive dust, mud or similar, the wheels should be cleaned or driven through a constructed wash bay or similar control (e.g. rumble grid) to prevent potentially contaminated soil from being transported onto local roads.

9.4 PLANT AND MACHINERY

It is the responsibility of the PC to ensure that all plant and machinery used on the site is properly maintained and in good working condition. Any plant or machinery used should be appropriate for the task. Plant and machinery maintenance records should be available at the site for review. Staff operating any plant and machinery should be competent and appropriately licensed (where required).

9.5 NOISE

Increased noise levels may result from the use of plant and mechanical equipment during the course of the UPSS Replacement program. To mitigate the impact of excessive noise on surrounding receptors, all works should be carried out during normal working hours, in accordance with NSW regulations and in accordance with the Council Development Consent (DC).

Noise control measures to be implemented during the remediation works may include:

- Specified entry controls for construction vehicles entering and leaving the site;
- Suitable construction techniques and methodologies;
- Use of quieter equipment; and
- Restricted use of reversing alarms and all equipment should be fitted with alarm types that adjust output sound levels according to the prevailing ambient noise level.

9.6 WATER AND SEDIMENT MANAGEMENT

9.6.1 SURFACE WATER

Soil stockpiled during excavation works should be suitably contained to prevent run-off of any potentially contaminated water or soil to the surrounding environment, including the stormwater system. Control measures should be established to prevent surface water run-off entering and leaving excavation and stockpile areas. Control measures may include:

- Temporary bunding or diversion drains;
- Impermeable sheeting placed under and/or over stockpiles;
- Silt fences/silt socks to surround stockpiles; and
- Protection of existing drains with silt fencing/sand bags.

These mitigation measures should be regularly inspected to ensure that they are in good condition and if necessary upgraded where their performance is deteriorating.

9.6.2 SUBSURFACE SEEPAGE AND ACCUMULATED WATER IN EXCAVATIONS

Where possible, excavation openings are expected to be left open for short durations to minimise the potential of any surface water entering those excavations. If water does accumulate or is found to have accumulated when the excavation is opened up and inspected, then the water will be required to be removed prior to validation and reinstatement of the excavation. It is the responsibility of the contractor to arrange an appropriately licensed contractor equipped with appropriately licensed plant or a sucker truck to pump, transport and dispose of the water to an appropriately licensed waste receiving facility. Records of the volumes (or mass) of water pumped from any excavations, as well as the disposal dockets are required to be maintained and provided to the consultant for inclusion in the UPSS soil validation report.

9.6.3 SEDIMENT

Drains, gutters, roads and access ways shall be free of sediment in accordance with regulatory requirements and the DA. Where required, gutters and roadways shall be swept regularly to keep them free from sediment. As for surface water, control measures should be implemented. The erosion and sediment controls put in place during the civil works must be in accordance with the "*Blue Book" – Managing Urban Stormwater: Soils and Construction* (Landcom, 2004).

9.7 EQUIPMENT AND CLEANING OPERATIONS

During remediation, controls will be placed on the operation and movement of equipment. General procedures that will be implemented include the following:

- Excavation equipment will be washed in an environmentally sound manner prior to leaving the site;
- If necessary, effective truck wheel-washing facilities will be provided to ensure that contaminated soil is not tracked off-site; and
- No trucks or equipment carrying contaminated soils should be allowed to move across unsealed ground surfaces, with the exception of designated transport corridors.

All contaminated soil requiring off-site disposal will be transported to an appropriately licensed (by NSW EPA) waste receiving facility. All transport trucks loaded with any waste material for off-site disposal should be sealed and the load securely covered to prevent wind-blown emissions, loss of cargo or spillages. Covers should be in place until the final unloading. All truck tailgates should be securely fixed prior to loading and immediately after unloading and all vehicles are to be operated in a manner so as to prevent loss of soils during loading, transport and unloading activities.

As part of the CEMP, a preferred, safe and efficient transport route to the nominated facility is required to be identified. Overhead clearances of bridges or tunnels along the proposed route should be reviewed and check as suitable for the vehicles that will be transporting any waste materials.

9.8 SITE SECURITY

During construction works, the site perimeter will be barricaded or secured by a chain-wire fence, which will remain in place for the duration of the UPSS Replacement works as per the DC, in order to exclude and keep safe public visitors or passers-by. Appropriate safety and/or warning signs will be posted in accordance with the SafeWork NSW requirements and the DA.

If an excavation is to be left open while the environmental project manager and contractor are not on site for a substantial period of time (such as overnight), a temporary fence will be erected around the excavation. Should the excavation be deeper than 1.5 m, the edges of the excavation should be battered to a 45 degree slope or benched into 1 m steps based on industry best practices.

9.9 WORKING HOURS

Working hours should be undertaken in accordance with the conditions of development consent. Any works to be conducted outside the normal working hours needs to have prior agreement with Ampol and the Yass Valley Council.

9.10 CONTACT INFORMATION

Contact details of the appropriate PC representatives should be displayed in a prominent externally located position visible to the public, at a minimum at the main site entrance/s and the site office). Any incidents, near misses and

observations should be initially reported to the site foreman/manager, who will prepare a report for the Ampol representative as soon as practicable.

9.11 COMMUNITY CONSULTATION

Community notification will be carried out in accordance with the DC. Council will also publicly advertise and/or notify the adjoining landowners during the development application process in accordance with the Council's notification policies. The notice will include:

- Indication that UPSS replacement work is to be undertaken and the nature of these works;
- The time and date such work is to commence;
- The phone number of a person present on the premises whilst works are being undertaken; and
- The Ampol contact information and processes required for registering any complaints.

9.12 INCIDENT RESPONSE

Responses to incidents occurring during the works will be in accordance with the PC's emergency and evacuation procedures and incident reporting procedures. A health and safety plan and incident contact number/s are to be kept in an on-site register. All other relevant emergency contact numbers such as police, fire brigade and hospital will be listed in the HESP and posted on site for easy access. There will be a map or plan of where the nearest hospital is and the route to it.

Local contractors (including a plumber and electrician at a minimum) should be on call in case an incident is reported by the site workers, Ampol or any concerned members of the public.

9.13 CONTINGENCY MANAGEMENT

Contingency plans for anticipated environmental problems that may arise during the remediation works are summarised below in Table 9.1.

Table 9.1 Contingency management plans

ANTICIPATED PROBLEMS	CORRECTIVE ACTIONS
Unexpected contaminated soil finds	If soil is encountered during the remedial works which appears to be different from the soils otherwise identified in this RAP, or point sources of contamination such as buried drums or wastewater interceptors are encountered, the following procedures will apply: — Any unexpected materials or soil which have been excavated should be stockpiled on bunded, strong, impermeable plastic sheeting, protected from erosion and all seepage retained (divided into domains or stockpiles representing similar material types); — Excavation works at that part of the site where the unexpected material (soil, asbestos containing material or physical find) is encountered will cease until inspection is carried out by the environmental consultant or its representative; — Based on visual inspection, the environmental consultant will provide interim advice on construction health and safety, soil storage and soil disposal to allow other remediation activities to proceed if possible; AND — Based on sampling and analysis of the material, the environmental consultant will provide advice based on comparison of the laboratory test results to appropriate criteria relating to human health, potential environmental impacts and waste disposal. In the context of the above, unexpected material would include, but is not limited to the following, oily materials or materials with unusual odours, drums, metal or plastic chemical containers, buried solid waste, ash, slag, coke or brightly coloured material, asbestos containing material etc.
UPSS infrastructure is unable to be removed safely	Where applicable, undertake in-situ decommissioning as per NSW EPA (2020), *Guidelines for Implementing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2019.*
Chemical/fuel spill	Stop work, notify relevant emergency contacts and Ampol. Use accessible soil or appropriate absorbent material on site such as spill kits to absorb the spill (if practicable). Stockpile the impacted soil in a secure location, sample and determine the appropriate disposal/treatment option.
Excessive dust	Use water sprays to suppress the dust or stop the site activities generating the dust until it abates.
Excessive noise	Identify the source, isolate the source if possible, and modify the actions of the source. Ensure hearing protection is worn if the noise cannot be reduced.
Excessive odours/vapours	If excessive organic odours/vapours are being generated, stop works and monitor ambient air across the site for organic vapours with a PID and odours at site boundaries. Implement control measures including respirators for site workers, use of odour suppressants, and wetting down of excavated soil.
Excessive rainfall	Ensure sediment and surface water controls are operating correctly. If possible, divert surface water away from active work areas and/or excavations.
Water in excavations	Collect samples and assess against relevant assessment criteria to enable disposal options to be formulated.
Leaking machinery or equipment	If possible, stop the identified leak and clean up the spill with absorbent material. Stockpile the impacted soil in a secure location, sample and determine the appropriate disposal/treatment option.

ANTICIPATED PROBLEMS	CORRECTIVE ACTIONS
Failure of erosion or sedimentation control measures	Stop work and repair the failed control measure.
Unearthing unexpected fill or waste	Stop activities and contact the consultant, who can advise Ampol and prepare a management plan to address the issue if necessary.
Equipment failures	Ensure that spare equipment or equipment to attempt to repair it is on hand at the site or ensure that the failed equipment can either be repaired or serviced by on-site personnel or a local contractor.
Complaint management	Notify Ampol following the complaint and report the complaint in accordance with management procedures. If possible, implement control measures to address the reason/s for complaint.
Asbestos	If potential asbestos material is identified in the soil, stop work and notify the consultant representative who will advise Ampol. Asbestos management will be required regardless. However, depending on the scenario and the specific situation, the consultant will develop a management plan together with Ampol. Do not recommence work in that area, or on that stockpile prior to receiving the approval to proceed by the consultant.

10 REMEDIATION ACTION PLAN SUMMARY

The purpose of this RAP is to provide a framework to validate the removal of UPSS infrastructure and hydrocarbon impacted soils to levels which are suitable for continued petroleum service station use. The actions required to implement the RAP are summarised as follows:

- Complete all required site safety plans and documentations
- Engage an underground services locator to identify the position of any services prior to any excavation works and review all available dangerous good plans;
- Remove concrete and excavate to expose USTs;
- Drain pumps, bowsers, pipework, fill points;
- Remove the residual product in the USTs and degas the USTs to make safe for removal and transport off-site by a licensed waste contractor for destruction;
- Remove the associated infrastructure and dispose off-site to appropriately licensed waste receiving facilities;
- Excavate soil from the new UST footprints, to the required depth;
- Collect soil samples from the excavations for USTs and fuel lines for soil validation and laboratory analysis;
- Excavate and stockpile any backfill and impacted soils, which are to be classified in accordance with NSW EPA (2014) *Waste Classification Guidelines*, prior to off-site disposal at an appropriately licenced waste receiving facility;
- Backfill the resulting excavations and around new UPSS with either commercialy quarried material (virgin rock or sand) or material meeting the definition of *Protection of the Environment Operations Act 1997* definition of VENM;
- Assess groundwater at the site after the completion of the UPSS Replacement program; and
- Report on the work completed.

11 REFERENCES

- CRC Care 2011, *Health screening levels for petroleum hydrocarbons in soil and groundwater, Part 1: Technical development document, Technical Report 10.*
- *ERM, 2012, PSH Evaluation and Groundwater Monitoring Event at Yass Caltex Service Station Site #225992.*
- *GHD Group Pty Ltd (GHD) 2016a, 22592 - Caltex Yass Service Station, 228 Comur Street, Yass, NSW 2582, Environmental Site Assessment.*
- *GHD 2016b, Caltex Yass Service Station (ID: 22592), Contaminated Land Management Act (1997) – Section 12 Assessment.*
- National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM; as amended 2013). NEPM Schedule B1 (Guideline on Investigation Levels for Soil and Groundwater).*
- National Environment Protection Council (NEPC) *National Environment Protection (Assessment of Site Contamination) Measure 1999 (NEPM; as amended 2013). NEPM Schedule B7*
- NSW Environment Protection Authority (EPA) 2014, *Waste Classification Guidelines. November 2014.*
- NSW Work Health and Safety Act 2011;
- Protection of the Environment Operations Act 1997 (POEO Act);
- Protection of the Environment (Underground Petroleum Storage Systems) Regulation 2019 (UPSS Regulation); and
- Standards Australia 2005, *Guide to the Sampling and Investigation of Potentially Contaminated Soil – Part 1: Non-volatile and Semi-volatile compounds, AS4482.1-2005.*
- URS 2011, *Groundwater Monitoring Well Installation and Sampling, Caltex Yass Service Station.*
- WSP 2018, *Caltex Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report.*
- WSP 2021, *Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW Environmental Site Assessment, December 2021*
- WSP 2022a, *Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report-November 2021*
- WSP 2022b, *Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report-November 2022*
- WSP 2024a, *Ampol Yass Service Station (Site ID: 22592) 228 Comur Street, Yass NSW 2582, Groundwater Monitoring Event Report-November 2023*
- WSP 2024b, *Pre-UPSS Replacement: Combined, Targeted Environmental Site Assessment and Geotechnical Investigation Report - Ampol Yass Service Station.*

12 LIMITATIONS

1 This Report has been prepared by WSP Australia Pty Limited ("WSP") for the benefit of Ampol Limited ("Ampol"), the registered proprietor or tenant of the site requested to be investigated by WSP ("Site") under its agreement with Ampol dated 31 March 2018 ("Agreement").

2 The nature and extent of the environmental consulting and remediation works at the Site detailed in the Report reflects the scope of the Services set out in the Request for Proposal under the Agreement and the Scope of Works set out in Schedule 4 Templates, Item 1 – Scope of the Agreement.

3 A potential purchaser (but not including a purchaser's successor in title) of the Site may rely on the findings contained in the Report for the purpose of considering the possible (but not actual) level of contamination of or at that Site at the time of the contamination assessment of the Site was undertaken ("Permitted Purpose").

4 The registered proprietor of the land to which the report relates at the time of writing the report (but not including any proprietor's successor in title) may rely on the findings contained in the Report for the purpose of assessing the possible level of contamination of that Site ("Permitted Purpose") and subject to the limitations set out in Schedule 4 Templates, Item 1 – Scope of the Agreement.

5 The findings contained in the Report are subject to the qualifications, assumptions and limitations set out in the Report or otherwise communicated to, or by, Ampol. To the extent of any inconsistency between this Limitation Statement and the qualifications, assumptions and limitations in the Report, this Limitation Statement shall prevail.

6 The Report may contain information provided by others. Except as otherwise stated in the Report, WSP has not verified the accuracy or completeness of this information. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the Report ("Conclusions") are based in whole or in part on this information, those Conclusions are contingent upon the accuracy and completeness of that information. WSP accepts no responsibility for the reliability, accuracy, completeness or adequacy of information provided by others.

7 WSP has prepared the Report without regard to any special or particular interest of any person (including that of a potential purchaser), other than Ampol when undertaking the Services or setting out its findings in the Report.

8 The Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose and does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in relation to the Site ("Investment Decision").

9 Matters material to a potential purchaser, may have been omitted from the Report, or may not have been investigated because of the scope of the Services. It follows that a potential purchaser should be cognisant of the restrictions inherent in or otherwise set out in the Report and should commission the preparation of a contamination assessment of the Site that caters for its own interests and scope of services, and which will provide findings in relation to the level of contamination of or at the Site at the time the potential purchaser is making an Investment Decision.

10 The Report has not and will not be updated for events occurring after the date of the Report or any other matter which may have a material effect on its contents which come to light after the date of the Report. WSP will not be obliged to inform a potential purchaser of any matter arising or coming to its attention after the date of the Report, which may affect or qualify the Report.

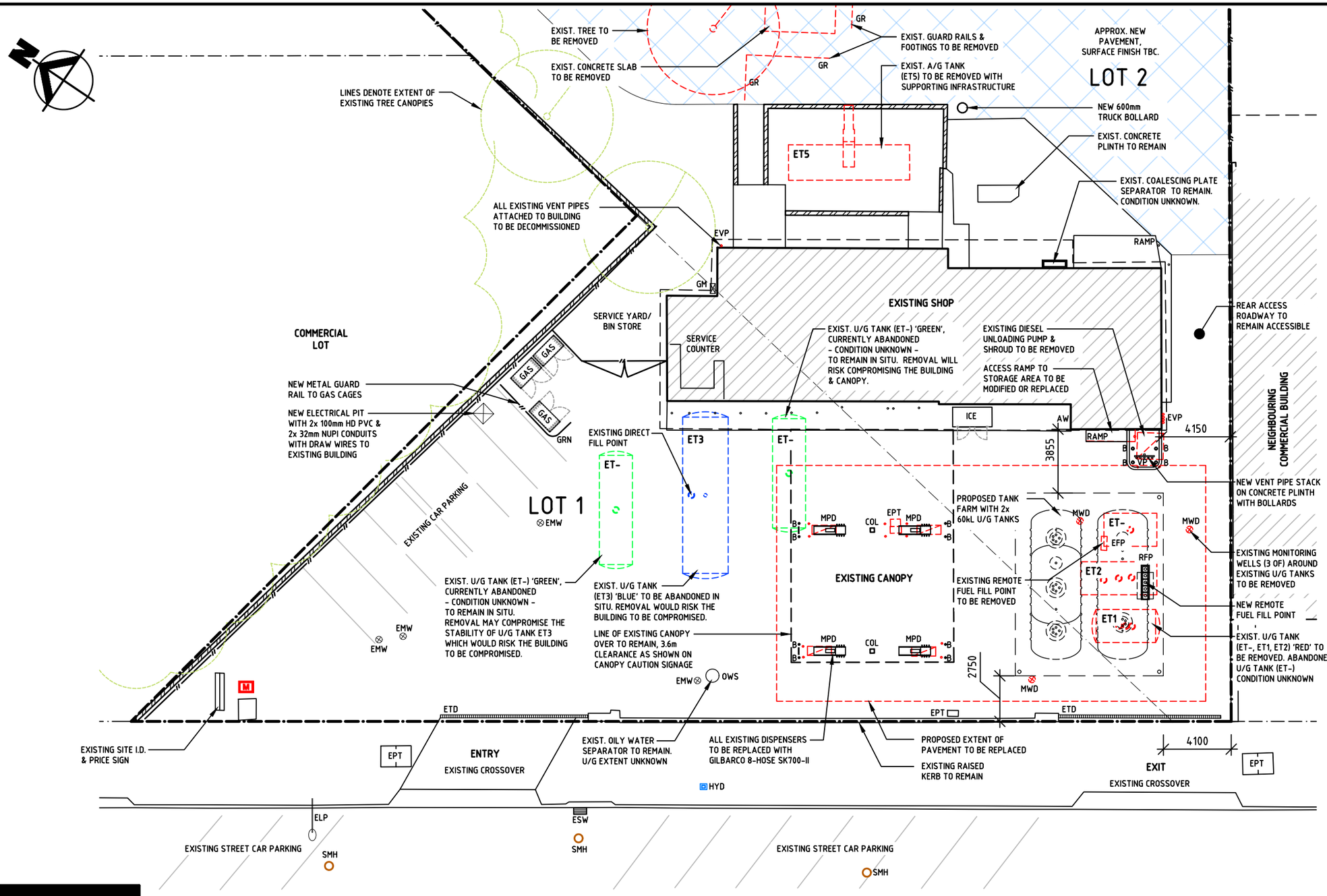
11 WSP is not liable to a potential purchaser in respect of errors or omissions in the Report which a potential purchaser knows of, or ought to be aware of, from:

- **a** its own actual knowledge and inquiries
- **b** inquiries made by its advisers; or
- **c** matters which a potential purchaser should have been aware of by making reasonable inquiry (including the inquiries recommended at Item 9 above).

12 To the fullest extent permitted at law, WSP, its related bodies corporate, its officers, employees and agents assume no liability and will not be liable to any potential purchaser for, or in relation to, any losses, damages or expenses (including any indirect, consequential or punitive losses or damages or any amounts for loss of income or profit, revenue or loss of opportunity to earn profit, loss of production, loss of contract, increased operational costs, loss of business opportunity, business interruption and pure economic loss) of any kind (and whether arising in contract, tort (including negligence), under statute, in equity or otherwise, suffered or incurred by a potential purchaser (or any other third party) arising out of or in connection with any matter outside the ambit of the Permitted Purpose in relation to the Report or findings expressed in the Report.

APPENDIX A

AMPOL PROVIDED DANGEROUS GOODS PLANS



REAL PROPERTY DESCRIPTION:

PROPERTY NAME:	AMPOL - YASS
PROPERTY ADDRESS:	228 COMUR STREET, YASS, NSW, 2582 LOT 1 & 2 ON DP997849
AREA:	4656.0m²
LGA:	YASS VALLEY COUNCIL

LEGEND - EXISTING

AW	EXISTING AIR & WATER POINT
COL	EXISTING CANOPY COLUMN
DFP	EXISTING DIRECT FUEL FILL POINT
ETD	EXISTING TRENCH DRAIN
ET#	DENOTE EXISTING TANK NUMBER
EFP	EXISTING REMOTE FUEL FILL POINT
ELP	EXISTING LIGHT POST
EMW	EXISTING MONITORING WELLS
EPT	EXISTING PIT
ESW	EXISTING STORMWATER GULLY PIT
EVP	EXISTING TANK VENT PIPES
GAS	EXISTING SWAP N GO GAS CAGE
GM	EXISTING GAS METER
GR	EXISTING METAL GUARD RAIL
GRN	NEW METAL GUARD RAIL
HYD	EXISTING HYDRANT
ICE	EXISTING ICE BOX
MWD	MONITORING WELL TO BE REMOVED
OWS	EXISTING HUMECEPTOR SEPARATOR
RFP	NEW REMOTE FUEL FILL POINT
SMH	EXISTING SEWER MANHOLE
M	EXISTING MANIFEST BOX

LEGEND - NEW

B	BOLLARD
MPD	MULTI-PRODUCT DISPENSER (8 HOSE)
RFP	REMOTE FUEL FILL POINT
VP	NEW TANK VENT PIPES

NOTES:

1. PRELIMINARY ONLY - NOT FOR TENDER OR CONSTRUCTION
2. SITE BOUNDARY & FEATURES ARE BASED ON PLAN OF DETAIL & LEVELS, REV 'A', BY SUMMIT GEOMATIC PTY LTD, DATED: 11.04.2024
3. ALL ABOVE GROUND & UNDER GROUND SITE FEATURES TO BE CONFIRMED BY CONTRACTOR ON SITE BEFORE COMMENCING WORKS.
4. DRAWING HAS NOT CONSIDERED TOWN PLANNING OR TRAFFIC ADVICE.

PROPOSED TANKS:

E10	20kL
P-95A	25kL
P-98A	15kL
CAR PREMIUM DIESEL	60kL
TOTAL CAPACITY	120kL

PRELIMINARY
ISSUE FOR DISCUSSION

TFA Project Group

PROJ. No.: 24210 | Appr.

AMPOL

REV.	BY	DATE	DESCRIPTION OF CHANGE
A	MAF	24.04.24	PRELIMINARY ISSUE
B	MAF	16.05.24	PRELIMINARY ISSUE - AMENEDED
C	MAF	27.05.24	PRELIMINARY ISSUE - AMENEDED FUEL TANKS, FILL POINT, PAVEMENT

REVISION

PROJECT
YASS - NSW
228 COMUR STREET

TITLE
UPSS UPGRADE - CONCEPT SITE PLAN

DRAWN	DATE	APPROVED	DATE
MAF	18.04.24		
SCALE	SIZE	DRAWING No.	REV.
1:250	A3	22592-SK01	C

0 2.5 5 7.5 10 12.5