UST VALIDATION REPORT

24 BOLONG ROAD
LOT 31 DP1222627
BOMADERRY, NSW, 2541

Prepared For:	**Shoalhaven Starches Pty Ltd (Manildra Group)**
Project Number:	**ENRS00536.25**
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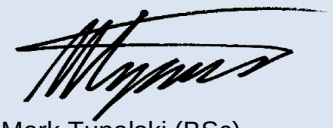 Mark Tupalski (BSc) *Environmental Scientist*	 Rohan Last (MSc, BSc) *Hydrogeologist & Environmental Scientist*

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EXECUTIVE SUMMARY

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as an independent environmental consultant in October 2020 by Shoalhaven Starches Pty Ltd (Manildra Group) to prepare a validation report to support the decommissioning of one (1) Underground Storage Tank (UST) at 24 Bolong Road, Bomaderry, NSW, 2451 (*herein referred to as the Site*). ENRS understands the UST was previously abandoned insitu and subsequently identified in the Preliminary Environmental Site Assessment prepared by Coffey in 2003. The UST was located within the footprint of a proposed building construction and was required to be further decommissioned by excavation and offsite disposal to comply with the *NSW Underground Petroleum Storage Systems Regulations* (EPA;2014).

This report documents the results of soil validation sampling and laboratory analysis in accordance with the Site Remediation Action Plan (ENRS;2020); the NSW Environment Protection Authority *Technical Note for Investigation of Service Station Sites* (EPA;2014); the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)*; and the *Guidelines for Consultants Reporting on Contaminated Land* (EPA;2020).

The aim of the project was to conduct intrusive ground investigations, including soil sampling, and compare analytical results against EPA endorsed Site Assessment Criteria (SAC) to evaluate ground conditions adjacent to the former Underground Petroleum Storage System (UPSS) and prepare a validation report to support decommissioning of the UST. This validation report provides an independent assessment, using objective and measurable criteria, if the UPSS site is free of unacceptable levels of contamination, all necessary remediation works have been successfully carried out, and the Site is suitable for an ongoing or future use.

The scope of work for the project comprised the following tasks:

- Decommission by excavation and offsite disposal of one (1) UST and associated infrastructure;
- Environmental sampling and NATA accredited laboratory analysis;
- Compare NATA soil analysis results against NSW EPA endorsed assessment criteria; and
- Document investigation results and prepare validation report with recommendations for ongoing site management, if required.

Based on the findings outlined during the scope of works the following conclusions and recommendations are provided:

- During the scope of works one (1) Underground Storage Tank (UST) was successfully decommissioned by excavation and offsite disposal in accordance with the requirements set by the regulator;
- Soil validation sample locations were selected with consideration of the NEPM Schedule B2 Section 6, guidelines on Sampling Design (NEPC 2013) and the NSW EPA (2014) *Technical Note for Investigation of Service Station Sites*. Soil samples were analysed by a NATA accredited laboratory and the QA/QC results indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory, and the quality of the data is acceptable for use in this assessment;

- NATA laboratory results for validation samples from the base and walls of the excavation pit report concentration of TRH, BTEX, and lead below the laboratory limit of reporting (LOR) or the Site Assessment Criteria. The results are satisfactory and indicate the primary source of potential contamination has been removed;
- Samples collected from stockpiled excavated material from the UST removal returned NATA laboratory results for TRH, BTEX, PAHs and Heavy Metals in soil which were all reported below the SAC. The soil was assessed to be suitable for re-use on site;
- Based on the NATA accredited laboratory results the UPSS area subject of this assessment has been validated in accordance with the revised NSW Underground Petroleum Storage Systems Regulations (EPA;2014), and the UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (DECCW;2010);
- The primary remediation objectives have been met and the UPSS area may be considered ***suitable for ongoing commercial & industrial landuse***;
- The Site owner shall notify the regulator of the UPSS decommissioning to remove the tanks from the database;
- Should any change in Site conditions or incident occur which causes a potential environmental impact, ENRS should be notified to further assess the site and consider requirements for any additional assessment; and
- This report must be read in conjunction with the attached Statement of Limitations.

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1.0 INTRODUCTION

Environment & Natural Resource Solutions (ENRS Pty Ltd) were commissioned as an independent environmental consultant in October 2020 by Shoalhaven Starches Pty Ltd (Manildra Group) to prepare a validation report to support the decommissioning of one (1) Underground Storage Tank (UST) at 24 Bolong Road, Bomaderry, NSW, 2451 (*herein referred to as the Site*). ENRS understands the UST was previously abandoned in situ and subsequently identified in the Preliminary Environmental Site Assessment prepared by Coffey in 2003. The UST was located within the footprint of a proposed building construction and was required to be further decommissioned by excavation and offsite disposal to comply with the *NSW Underground Petroleum Storage Systems Regulations* (EPA;2014).

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1.1 OBJECTIVES

The aim of the project was to conduct intrusive ground investigations, including soil sampling, and compare analytical results against EPA endorsed Site Assessment Criteria (SAC) to evaluate ground conditions adjacent to the former Underground Petroleum Storage System (UPSS) and prepare a validation report to support decommissioning of the UST. This validation report provides an independent assessment, using objective and measurable criteria, if the UPSS site is free of unacceptable levels of contamination, all necessary remediation works have been successfully carried out, and the Site is suitable for an ongoing or future use.

1.2 SCOPE OF WORK

The scope of work for the project comprised the following tasks:

- Decommission by excavation and offsite disposal of one (1) UST and associated infrastructure;
- Environmental sampling and NATA accredited laboratory analysis;
- Compare NATA soil analysis results against NSW EPA endorsed assessment criteria; and
- Document investigation results and prepare validation report with recommendations for ongoing site management, if required.

2.0 SITE DESCRIPTION

2.1 SITE IDENTIFICATION

The site is located at the western end of the Shoalhaven Starches Pty Ltd (Manildra Group) complex on the southern side of Bolong Road, Bomaderry, NSW as shown in **Figure 1**. The key features required to identify the Site are summarised in **Table 1** below.

Table 1 Site Identification

SITE	DESCRIPTION
Street Address	24 Bolong Road, Bomaderry, NSW, 2541
Lot / Deposited Plan	31 / 1222627
Local Government Area	Shoalhaven City Council

Figure 1 Site Location Map

Source: https://maps.six.nsw.gov.au/ (cited 27/10/2020)

2.2 SURROUNDING ENVIRONMENT

The Site is located within an industrial area operated by Shoalhaven Starches Pty Ltd (Manildra Group) Bomaderry Plant. The following adjacent land uses are noted:

North	Industrial/commercial properties and further to residential areas
East	Shoalhaven Starches Pty Ltd (Manildra Group) Bomaderry Plant, further to rural land
South	Shoalhaven Starches Pty Ltd (Manildra Group) Bomaderry Plant onto Shoalhaven River
West	Industrial/commercial properties and further to Bomaderry Creek

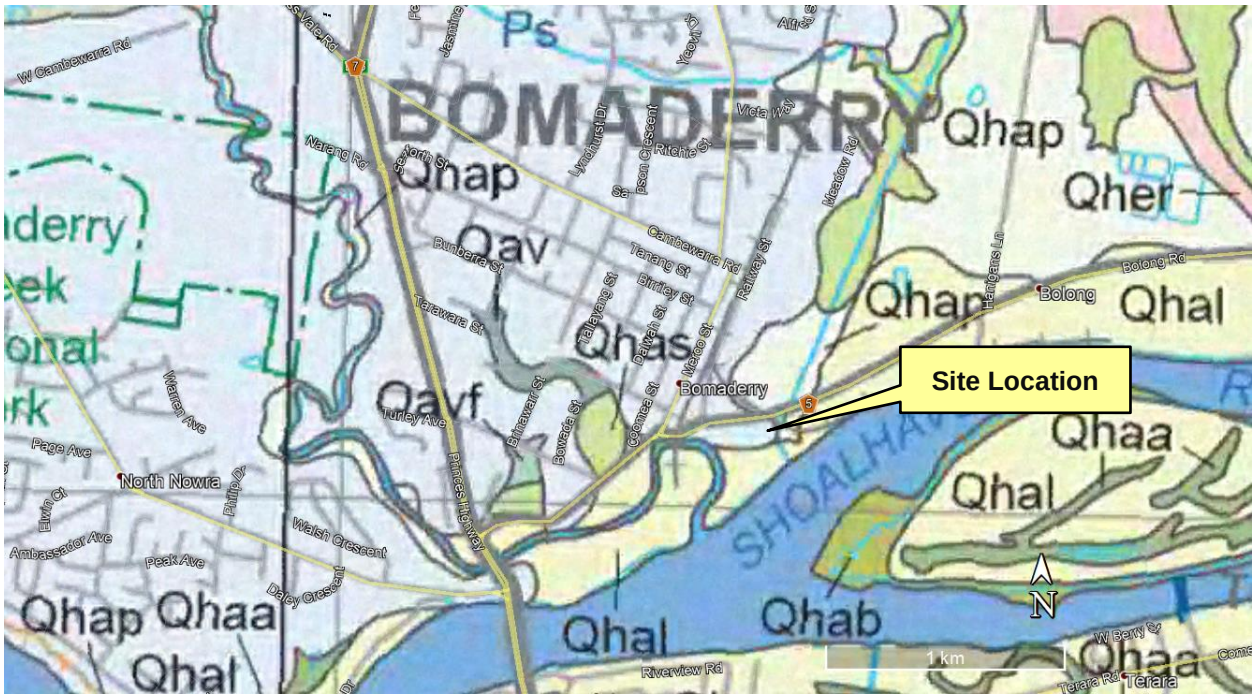
2.3 TOPOGRAPHY

A review of the Site topography was conducted with reference to the current series topographic map sheet (9028-3N Berry) supported by Site inspections. The Site is positioned on level hardstand within an area of low topographic relief. The regional gradient dips to the south towards Shoalhaven River approximately 200 m from the Site. A stormwater drain is present on the southern and eastern boundary of the Site which is expected to capture any surface runoff.

2.4 GEOLOGY

A review of the geological setting was conducted with reference to the Shoalhaven Quaternary 1:100,000 Geological series sheet. The mapped geology shows the Site is underlain by the Quaternary aged floodplain sediments (Qhap) characterised as silt, sand and clay. The mapped geology is consistent with the Site observations.

Figure 2 Site Geology



Source: https://search.geoscience.nsw.gov.au/product/205 (cited 27/10/2020)

2.5 HYDROGEOLOGY

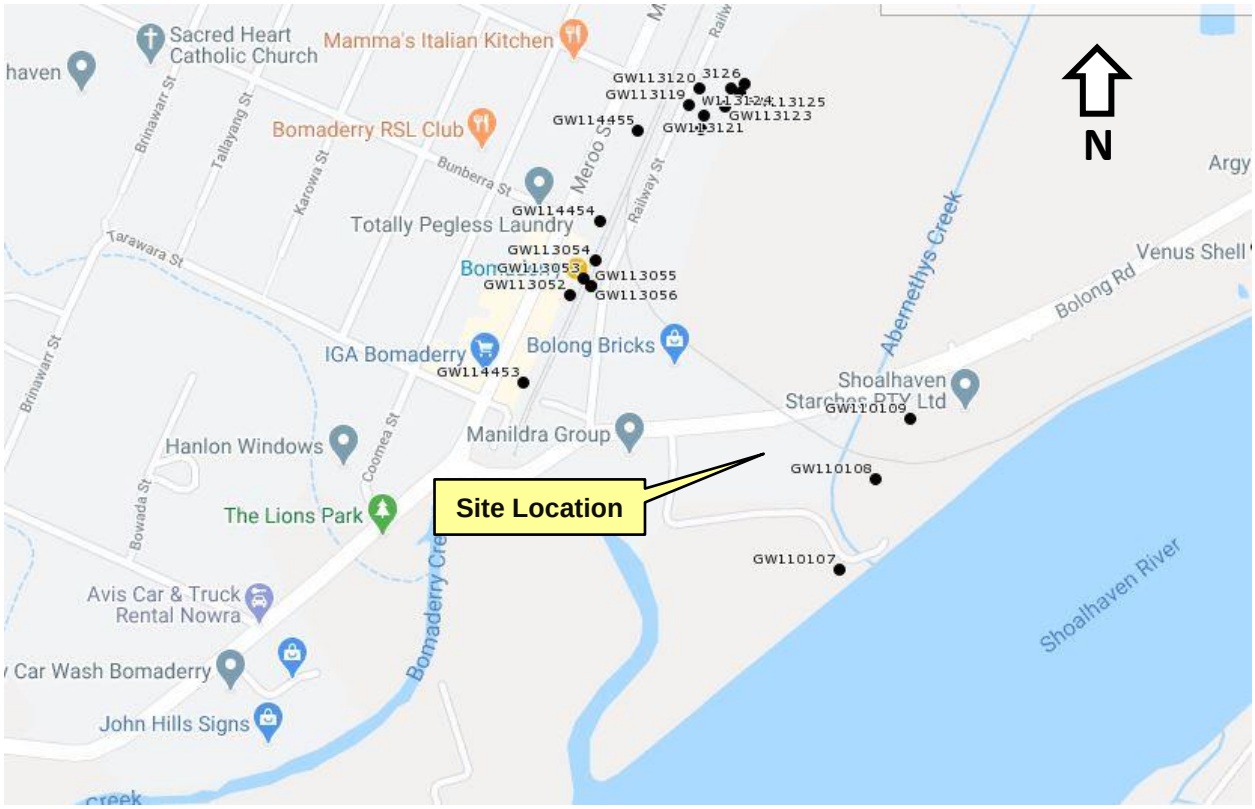
Based on the Site geology groundwater in the area is expected to be associated with the following aquifer systems;

- *Shallow unconfined* systems hosted in the unconsolidated sands and sediments.

Review of the NSW Office of Water (NOW) registered bore database identified multiple groundwater bores within a one (1) kilometre radius of the Site. The location of registered bores is provided in **Figure 3**.

Groundwater is expected to be located at depths greater than 5 m below ground level based on previous Site works which did not encounter groundwater at 4.5 mbgl. Natural groundwater flow is presumed in a South to South-Easterly direction towards Abernethys Creek and the Shoalhaven River.

Figure 3 Registered Bore Locations



Source: http://allwaterdata.water.nsw.gov.au/water.stm (cited 27/10/2020)

3.0 SITE HISTORY (SUMMARY)

ENRS understand the Site has been subject of previous environmental investigations, including one (1) Preliminary Site Investigation (PSI) completed by *Coffey Geosciences Pty Ltd* (2003).

A GPR survey of the UPSS areas was also conducted by ENRS to support the preparation of a RAP for decommissioning the UPSS. The following points summarise the key findings of the previous report and GPR Survey:

3.1 COFFEY GEOSCIENCES PTY LTD PSI (JULY 2003)

- Plans show installation of 300-gallon (~1,136 L) UST in the 1960's near the south-eastern corner of warehouse;
- Records indicate the UST was abandoned in-situ by filling with concrete approx. 30 years ago (early 1980's);
- No leakage from the UST was known by the owner;

- Area where UPSS identified was covered with hardstand. No surface evidence of UPSS visible. Black oil staining visible on adjacent wall of building where former bowser was reported to be located;
- Sampling investigation noted termination of CBH2 borehole at 0.65m on what was inferred to be the former abandoned UPSS;
- Borehole samples from CBH3 (~3m south of CBH2) recorded a faint hydrocarbon odour between 0.5m and 0.95m. No other odours were noted in soils during sampling. Samples tested with PID returned readings of 0 hydrocarbons present;
- Laboratory testing of soil sample collected from CBH3 returned results below NSW EPA (1998) Guidelines threshold values for Heavy Metals, Petroleum Hydrocarbons, BTEX, PAHs, Organochlorine Pesticides, and PCBs;
- It was noted that contamination of soils surrounding UPSS is common and though none was found in analysed samples it was likely that contamination of soils surrounding the UPSS existed. Removal of UPSS and testing/removal of any contaminated soil was recommended as part of any Site redevelopment and to remove future liabilities associated with UPSS; and
- Standing groundwater measured at a depth of 3m below ground surface several hours after drilling. Based on level of information collected at the site there was a low likelihood that there was significant groundwater contamination. Alluvial clays of medium to high plasticity underlie the site, these material tent to have a low vertical permeability and tend to inhibit movement of contamination deep into the soil profile.

3.2 GPR SURVEY (ENRS; JULY 2020)

A GPR survey of the UPSS area was conducted by Laneyrie Electrical in July 2020. The following points summarise the key observations:

- GPR survey identified area on southeast edge of Manildra Maintenance Building where an underground object was located. The area identified is consistence with the previous records of the UPSS location. The area was delineated on the ground with survey marker paint;
- The location of the Coffey (2003) concrete cores for drilling, were observed on the ground surface, consistent with the PSI report. A solid structure was found ~0.7 mBGL (metres below ground level) in the former BH2 which was re-gauged manually. Previous investigations by Coffey inferred the UST to be present below BH2;
- GPR located a possible second, small structure on the northern end of the identified (presumed UST) object. The second, smaller structure was likely piping or associated infrastructure connected to the UST;
- Unable to locate fill point/s or access to the UPSS;
- No hydrocarbon odour or staining identified during inspections, noting the areas if covered by concrete hardstand

4.0 REMEDIATION GOALS

ENRS understand the remediation goals for the project were to:

- Decommission the UPSS by excavation and offsite disposal;
- Conduct soil validation sampling and compare laboratory results against the adopted site assessment criteria (SAC) to ensure the site is suitable for the ongoing land use and will not present an unacceptable risk to human health or the environment; and
- Document the validation process for notification to the regulator.

4.1 EXTENT OF REMEDIATION

The remediation works were limited to the UPSS site as documented in **Figure 4** and do not comprise a detailed site investigation.

The excavation was approximately 2.3 m deep, 2.6 m wide (east-west), and 4.1 m long (north-south).

4.2 COMPLIANCE

ENRS understand the remediation works were carried out with consideration of the following guidelines:

- Guidelines for implementing the Underground Petroleum Storage System Regulation 2008 (NSW Department of Environment and Climate Change 2009);
- UPSS technical note: Site sensitivity assessment (Department of Environment, Climate Change and Water 2010a);
- UPSS technical note: Site validation reporting (Department of Environment, Climate Change and Water 2010b); and
- UPSS technical note: Decommissioning, abandonment and removal of UPSS (Department of Environment, Climate Change and Water 2010c).

These guidelines supplement the following industry standards and best practice:

- AS 1940-2004 - The storage and handling of flammable combustible liquids;
- AS 4897-2008: The design, installation and operation of underground petroleum storage systems;
- AS 4976 (2008) - The removal and disposal of underground petroleum storage tanks;
- Code of Practice - Excavation Work (SafeWork NSW); and
- Code of Practice - Storage and Handling of Dangerous Goods (SafeWork NSW).

5.0 UPSS DECOMMISSION METHODOLOGY

The following points outline the decommission methodology based on ENRS's understanding of the scope of works:

UST excavation and offsite disposal was the selected mode of remediation for the decommissioning of the **UPSS**. The following points outline the decommission methodology:

- ***OH&S documentation*** – SWMS, Work Plans etc. were prepared prior to commencing works;
- ***Dial Before You Dig*** – a dial before you dig search was conducted prior to mobilisation;
- ***Mobilisation*** – Contractor mobilised onto site;
- ***Pre-start Shoalhaven Starches Pty Ltd Induction*** – all personnel undertook an induction, including SWMS and site-specific training prior to commencement of works. Minimum PPE was inspected (long longs, lace up boots, hard hat and high visibility vest);
- ***Lower explosive limit (LEL) monitoring*** – LEL monitoring was conducted prior to, and whilst works were occurring to ensure that they were not conducted within an explosive atmosphere;
- ***Establish temporary*** – work, excavation and stockpile areas were established using temporary fencing;
- ***Liquid waste removal and disposal –*** liquid waste from within the UST were removed and disposed offsite at a suitably licensed facility;
- ***Establish environmental controls*** - 200 micron thick impermeable plastic was installed within the temporary fencing area where excavated soils were stockpiled to prevent the offsite migration of soil;
- ***Excavate UST's overburden*** – the UST's overburden was excavated and temporarily stockpiled onsite to expose the top of the UST, UST anchors and associated UST fittings/pipe works;
- ***Degas USTs (air purge)*** – the UST was air purged until monitors indicated LEL levels within the USTs at 5% or less;
- ***Onsite destruction of the USTs*** – the air purged USTs were rendered incapable of acting as a vessel to eliminate vapour recharge within the USTs;
- ***Excavate UST's concrete anchors and packing sands*** – the UST's concrete strip anchors were excavated and stockpiled onsite. The packing material adjacent to the UST was removed and stockpiled onsite so as to free the USTs for removal from the excavation;
- ***Removal of USTs from excavation*** – the USTs were lifted out of the excavation and loaded on to a truck for offsite transport and disposal;
- ***Offsite transport and disposal of the destroyed USTs*** – the USTs were transported and disposed offsite to a suitably licensed facility;
- ***Excavation of remaining soil material*** – additional soil from the walls and floor of the UST excavation was excavated and stockpiled;
- ***Environmental sampling and analysis*** – soil validation samples were collected for laboratory analysis from the walls and floor of the UST excavation. Classification samples were also collected from the stockpiled material removed from the material adjacent and below the USTs. Laboratory analysis was conducted to assess material suitability;
- ***Demobilisation and tidy up;*** the USTs excavation pits were backfilled for safety measures; and

- ***Validation Report –*** tabulate laboratory results against EPA endorsed criteria and prepare validation report to document UPSS decommission. Client to notify the regulator of removal of UST.

6.0 CONCEPTUAL SITE MODEL

The NSW EPA contaminated sites guidelines reference the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1). The NEPM (2013) recommends a tiered approach to risk assessment of ground contamination and the development of an appropriate Conceptual Site Model (CSM). The CSM describes the source(s) of contamination, the pathway(s) by which contaminants may migrate through the various environmental media, and the populations (human or ecological) that may potentially be exposed. The following sub-sections outline the key elements of the CSM for the UPSS Area subject of this assessment.

6.1 POTENTIAL CONTAMINANTS

The UPSS identified at the Site represents the primary source of potential contamination at the Site. The Areas of Environmental Concern (AECs) and Contaminants of Potential Concern (CoPC) and are listed below in **Table 2**.

Table 2: Potential Contaminants of Concern

AEC	Historical Activities	Dispersion Mechanism	Potential Contaminants
AEC01 (UPSS)	UPSS installation recorded circa 1960's. Abandonment & concrete filling of UPSS in-situ circa 1980's	Potential leaking of Petroleum Hydrocarbons and fuel associated contaminants from UPSS localised to soils surrounding UPSS	• Total Recoverable Hydrocarbons (TRH); • Benzene Toluene Ethylbenzene, Xylenes (BTEXN); • Polycyclic Aromatic Hydrocarbons (PAHs); and • Heavy Metals.

Source: based on Table J1, Appendix J, in AS4482.1 (2005).

6.2 PATHWAYS

6.2.1 UPSS Infrastructure

Given the relatively shallow construction of the UPSS, less than three (<3 mbgl) metres below ground level, and anticipated ground works during decommission and Site redevelopment, the primary contaminant migration and exposure pathways include:

- Dermal exposure to near surface (soil & groundwater) contaminants primarily during site works;
- Inhalation and or ingestion of dust or air bound contaminants primarily during site works;

- Soil vapour/ gas (volatile hydrocarbons) migration from the vadose zone, generally along preferential pathways such as service trenches, pits, slab joins/cracks;
- Surface run-off and potential entry into the stormwater drainage system;
- Vertical migration of contaminants leaching through the vadose zone;
- Lateral migration of contaminants in groundwater, generally in the direction of the local hydraulic gradient any preferential pathways; and
- Groundwater migration and discharge to sensitive receptors, if any.

6.3 RECEPTORS

The nearest receptors include:

- Site users;
- Civil/Enviro workers undertaking remediation works;
- Neighbouring properties;
- Waterways and natural drainage structures downgradient of the site (Abernethys Creek and Shoalhaven River);
- Human health – dermal / ingestion / inhalation - excavations, dust, fibres and soil gas/vapour); and
- Shallow soil, stormwater and groundwater – vertical and lateral migration of contaminants and connectivity with waterways.

7.0 SITE ASSESSMENT CRITERIA

ENRS have adopted the most appropriate Site Assessment Criteria (SAC) in accordance with current state and national guidelines. Where available, Australian and NSW EPA endorsed guidelines have been referenced in preference to international standards.

7.1 NATIONAL ENVIRONMENT PROTECTION MEASURE (NEPM)

The EPA has endorsed the use of the Health Investigation Levels (HILs) given in the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* 'Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater'. The NEPM provide a framework for risk-based assessment of soil and groundwater contamination. Health Screening Levels (HILs) are provided for four (4) land use categories:

Table 3: Summary of NEPM Land Use Categories

NEPM	Description of Land Use Categories
HIL A	Residential A with garden/accessible soil, including children's day care centres, preschools and primary schools.
HIL B	Residential B with minimal opportunities for soil access; includes buildings with fully & permanently paved yard space such as high-rise buildings & apartments.
HIL C	Recreational C includes public open space such as parks, playgrounds, playing fields (e.g. ovals), secondary schools and unpaved footpaths.

HIL D	Commercial/industrial D includes premises such as shops, offices, factories and industrial sites.

Given the current and proposed land use the relevant assessment criteria is **NEPM HIL 'D'** for commercial/industrial sites.

In addition to the HILs the amended NEPM (2013) provides the following site assessment criteria (SAC):

- ***Management Limits*** for petroleum hydrocarbon compounds (Table 1 B (7));
- ***Health Screening Levels*** (HSLs) potential vapour intrusion (Table 1A [4]) should be selected based on the; land use; medium (sand, silt, clay); and depth.
- ***Groundwater Investigation Levels*** (GILs) should be applied based on the receiving environment and groundwater resources. GILs are provided in NEPM Table 1C for; Fresh Waters; Marine Waters; and Drinking Water; and
- ***Ecological Investigation Levels*** (***EILs***) or common contaminants in the top two (2) metres of soil based on three (3) generic land use settings; areas of ecological significance; urban residential areas and public open space; and commercial and industrial land uses.

7.2 SOIL ASSESSMENT CRITERIA

The adopted soil assessment criteria (SAC) are summarised in **Table 4** with HSLs for vapour intrusion provided in **Table 5** adapted from NEPM (2013) Table 1A (3) which should be considered based on the depth and composition of soil.

Table 4: Soil Assessment Criteria for Land Use Suitability

Analyte		Units	NEPM D	HSL D Direct Contact	Maintenance Worker
Polycyclic Aromatic Hydrocarbons	Naphthalene	mg/Kg	370 [B]	11,000 [E]	29,000 [E]
	BaP TEQ	mg/Kg	40 [A]	-	-
	Total PAHs	mg/Kg	4,000 [A]	-	-
Metals & Metalloids	Arsenic	mg/Kg	3,000 [A]	-	-
	Cadmium	mg/Kg	900 [A]	-	-
	Chromium	mg/Kg	3,600 [A]	-	-
	Copper	mg/Kg	240,000 [A]	-	-
	Lead	mg/Kg	1,500 [A]	-	-
	Mercury	mg/Kg	730 [A]	-	-
	Nickel	mg/Kg	6,000 [A]	-	-
	Zinc	mg/Kg	35,000 [A]	-	-
Phenolics	T.Phenols	mg/Kg	240,000 [A]	-	-
BTEX	Benzene	mg/Kg	95 [D]	430 [E]	1,100 [E]
	Toluene	mg/Kg	135 [D]	99,000 [E]	120,000 [E]
	Ethyl benzene	mg/Kg	185 [D]	27,000 [E]	85,000 [E]
	m+p-Xylene	mg/Kg	95 [D]	81,000 [E]	130,000 [E]
	o-Xylene	mg/Kg	95 [D]	81,000 [E]	130,000 [E]
Total Recoverable Hydrocarbons	F1 TRH C6-C10	mg/Kg	700 [C]	26,000 [E]	82,000 [E]
	F2 TRH C10-C16	mg/Kg	1,000 [C]	20,000 [E]	62,000 [E]
	F3 TRH C16-C34	mg/Kg	3,500 [C]	27,000 [E]	85,000 [E]
	F4 TRH C34-C40	mg/Kg	10,000 [C]	38,000 [E]	120,000 [E]

[A] NEPM (2013) Health Investigation Levels for soil contaminants Table 1A (1).
[B] NEPM (2013) Soil EILs Table 1B (5).
[C] NEPM (2013) Management limits for TRH compounds in FINE soil Table 1 B(7).
[D] NEPM (2013) Ecological Screening Levels (ESL) for TRH, BTEX & BaP compounds in soil Table 1 B(6).
[E] CRC Care (2011) Technical Report No.10 (Table A4 Soil Health Screening Levels for Direct Contact)

Table 5: Soil Screening Criteria for Potenial Vapour Intrusion

NEPM D mg/Kg			Benzene	Toluene	Ethyl benzene	m+ p Xylene	o-Xylene	Naphthalene	F1 C6-C10	F2 >C10-C16	F3 >C16-C34	F4 >C34-C40
NEPM D HSL FOR VAPOUR INTRUSION SCREENING	SAND	0-1m	3	-	-	230	230	-	260	-	-	-
		1-2m	3	-	-	-	-	-	370	-	-	-
		2-4m	3	-	-	-	-	-	630	-	-	-
		>4m	3	-	-	-	-	-	-	-	-	-
	SILT	0-1m	4	-	-	-	-	-	250	-	-	-
		1-2m	4	-	-	-	-	-	360	-	-	-
		2-4m	6	-	-	-	-	-	590	-	-	-
		>4m	10	-	-	-	-	-	-	-	-	-
	CLAY	0-1m	4	-	-	-	-	-	310	-	-	-
		1-2m	6	-	-	-	-	-	480	-	-	-
		2-4m	9	-	-	-	-	-	-	-	-	-
		>4m	20	-	-	-	-	-	-	-	-	-

Source: adapted from NEPM (2013) Table 1A (3)

7.3 AESTHETIC CRITERIA

The NEPM (2013) *Schedule B (1) Guideline on the Investigation Levels for Soil and Groundwater* advises that there exist no numeric Aesthetic Guidelines, however site assessment requires balanced consideration of the quantity, type and distribution of foreign material or odours in relation to the specific land use and its sensitivity. General assessment considerations include:

- That chemically discoloured soils or large quantities of various types of inert refuse, particularly if unsightly, may cause ongoing concern to site users;
- The depth of the materials, including chemical residues, in relation to the final surface of the Site; and
- The need for, and practicality of, any long-term management of foreign material.

7.4 WASTE CLASSIFICATION CRITERIA

Liquid and non-liquid waste designated for disposal is assessed in accordance with the NSW EPA Waste Classification Guidelines (EPA;2014). Guidelines are defined for the specific contaminant concentration (SCC) and the toxicity characteristics leaching procedure (TCLP). To establish soil waste classification using both SCC and TCLP, the test values for each chemical contaminant must be compared with the threshold values set in Table 2 of the guidelines:

Table 6: Waste Classification Criteria

Classification	SCC value	TCLP value
General solid waste	≤ SCC1	≤ TCLP1
Restricted solid waste	≤ SCC2	≤ TCLP2
Hazardous waste	> SCC2	> TCLP2

8.0 SAMPLING METHODOLOGY

8.1 SOIL SAMPLING

8.1.1 Soil Sample Method

Samples were collected in accordance with the principals described in AS4482.1-2005: Guide to sampling and investigation of potentially contaminated soil (Part 1: Non-volatile and semi volatile compounds) and AS4482.2-1999: Guide to sampling and investigation of potentially contaminated soil (Part 2: Volatile compounds).

Soil logging procedures followed a systematic and standardised format providing for classification of the soil group based on particle size and structure. Field observations were conducted to detect potential soil contamination, if any and to distinguish between soil composition, condition, and structure.

8.1.2 Soil Sample Locations

Soil sample locations were selected with consideration of the NEPM Schedule B2 Section 6, guidelines on Sampling Design (NEPC 2013) and with consideration of the NSW EPA (2013) Guidelines for Assessing Service Station Sites. The sample location plan is summarised **Table 7**.

Table 7: Validation Sample Plan

Location	Number of Samples	Action	Analyte
UST Pit	1 per borehole adjacent each wall or every 5m length of tank	Grab samples from suitable depth to assess for potential migration from UST	TRH, BTEX, Lead (add Phenol for waste oil tanks/sumps)
Bowsers, pipelines	1 per item or every 5m	Sample from base of infrastructure.	TRH, BTEX, Lead
Stockpile Waste Classification	1 per $25m^3$	Representative discrete sampling.	TRH, BTEX, Heavy metals (8), & PAHs.
Contaminated Soil Areas	1 per $25m^2$	Grid sampling	TRH, BTEX, Heavy metals (8), & PAHs.

Source: Adapted from NSW EPA *Technical Note for Investigation of Service Station Sites* (EPA;2014) Table 1 minimum recommended soil sampling.

8.1.3 Soil Sampling Depths

Sample depths were selected with consideration to ground conditions observed during investigations. Samples were selected for analysis based on depth relative to the potential source/s of contamination and ground conditions observed during investigations. The maximum investigation depth was 2.3 metres which was considered to be at the level below the base of the UST.

8.1.4 Sample Preservation

All samples were collected in accordance with industry standard QA/QC procedures. Discrete soil samples were collected with disposable sterile gloves and placed directly in laboratory supplied 250 mL jars with Teflon lined lids and immediately stored on ice. Sample containers were individually labelled with sample identification clearly marked on the container and sealed lid.

8.2 VOLATILE LOSSES

Volatile compound losses were kept to a minimum by employing the following sampling techniques:

- Minimal disturbance of soil during sampling;
- Sample material placed in sampling jars as soon as possible;
- Sampling containers containing zero headspace;
- Samples placed directly on ice and transported to the laboratory as soon as possible; and

- Employing the most appropriate analytical method to minimise volatile losses at a NATA accredited laboratory.

8.2.1 Selection of Samples for Analysis

Samples were selected for analysis based on the stratigraphic conditions and any apparent contamination as to provide an understanding of soil conditions vertically and laterally. All other samples not selected for analysis were put on hold at the laboratory for subsequent analysis, if required.

9.0 QUALITY ASSURANCE & QUALITY CONTROL PROCEDURES

9.1 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQO) are required to define the quality and quantity of data needed to support management decisions. The process for establishing DQO's is documented by Australian Standard: AS 4482.1-2005 and referenced by the National Environment Protection (Assessment of Site Contamination) Measure (NEPC;2013). The DQO's for the investigation were to obtain sufficient representative data to allow a high-quality environmental assessment of:

- The location, nature, and degree of soil contamination at selected sampling locations (if any);
- The risks posed to human health and the environment, including potential future users of the Site; and
- The requirements for any further investigative works.

The assessment was conducted to a standard consistent with generally accepted and current professional consulting practice for such an investigation. The evaluation criteria (Decision Rules) adopted for the investigation are summarised in **Table 9**.

9.2 FIELD QUALITY ASSURANCE & QUALITY CONTROL

The Quality Assurance and Quality Control (QA/QC) protocols used during the fieldwork are shown in **Table 8**. Refer to **Appendix B** for sample Chain of Custody (COC) documentation.

Table 8: Field QA/QC

Protocol	Description
Sampling Team	Site personnel comprised only qualified environmental professionals and contractors trained in conducting environmental sampling.
Sample Equipment	All sample and investigation equipment decontaminated between sample sites. Disposable equipment including gloves changed between each sample.
Field Screening	Visual and olfactory inspection of sample materials for potential contamination.
Chain of Custody Forms	All samples were logged and transferred under appropriately completed Chain of Custody Forms.
Preservation	All samples were delivered to the laboratory in appropriately preserved containers, with preservation consisting of packing samples in eskies with ice.
Blind Field Duplicates	The frequency of duplicate testing corresponded to at least 10% of samples.

9.3 LABORATORY ANALYTICAL METHODS

Analysis of soil samples was conducted by Envirolab Services who are NATA accredited for the selected analysis. Laboratory QA/QC results are detailed in the Laboratory report contained in the appendices section of this report.

9.4 QUALITY ASSURANCE & QUALITY CONTROL DISCUSSION

A summary of the Data Quality performance is provided in **Table 9**.

Table 9: Data Quality Objectives and Criteria

DQO	Evaluation Criteria	Status
Documentation completeness	Completion of field records, chain of custody documentation, equipment calibration, NATA registered laboratory certificates of analysis.	✓
Data comparability	Use of appropriate sampling techniques, storage and transportation of samples. Use of NATA certified laboratory using NEPM procedures. Comparison with previous site information, if any.	✓
Representative Data	Sampling coverage of all areas of environmental concern at the Site, and selection of representative samples from each sampling location. Sampling coverage of all Areas of Environmental Concern (AEC), selection of representative samples.	✓
Sampling precision & accuracy	Use properly trained and qualified field personnel. Appropriate sampling and field techniques. Achieve laboratory QC criteria.	✓

The laboratory was NATA accredited and the Practical Quantitation Limits (PQL) were within the acceptable levels for the investigation criteria. Laboratory certificates of analysis provided in **Appendix A** indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory.

The QA/QC indicators either all complied with the required standards, or showed variations that would have no significant effect on the quality of the data or the conclusions of this assessment. It is therefore concluded that, for the purposes of this study, the QA/QC results are valid and the quality of the data is acceptable for use in this assessment.

10.0 UST VALIDATION RESULTS

The following sub sections present the results of the soil sampling program.

10.1 STRATIGRAPHIC CONDITIONS

Investigations encountered relatively uniform conditions in the UPSS area with silty sandy Clay encountered to a maximum investigation depth of 2.3 metres below ground level.

No visual or olfactory indicators were observed to indicate any significant contamination or trigger any further excavation beyond a 1 m radius of the former tank location.

10.2 GROUNDWATER CONDITIONS

No groundwater or significant ground contamination was encountered during the scope of works. Hence, no further assessment of groundwater was considered necessary during this scope of work.

10.3 ANALYTICAL RESULTS (SOIL)

Laboratory Certificates of Analysis (COA) are contained in **Appendix A** (Soil). Upon receipt results were tabulated and compared against the NEPM (2013) Management Levels for Hydrocarbons and adopted Site Assessment Criteria (SAC) to identify any exceedances. A summary of the results is provided in **Table 10**.

10.3.1 Benzene Toluene Ethylbenzene Xylene (BTEX)

BTEX compounds are volatile compounds commonly found in petroleum products and are typically found together at contaminated sites. Investigation results for BTEX in soil reported results below the laboratory Limit of Reporting (LOR) or the adopted Guidelines. Hence, the results are considered satisfactory.

10.3.2 Total Recoverable Hydrocarbons (TRH)

Laboratory testing was conducted for light fraction (C6-10) and heavy fraction (C10-40) Total Recoverable Hydrocarbons (TRH). Light fractions are generally associated with Mineral Spirits and Petrol whilst middle to heavy fractions are an indicator for Diesel or Kerosene. Investigation results for light fraction TRH C6-C10 and heavy fraction TRH C10-C40 reported levels either

below the adopted assessment criteria (NEPM D) or the laboratory LOR. Hence the results are considered satisfactory.

10.3.3 Heavy Metals and Metalloids (Lead)

Laboratory results for Lead in soil were reported at levels below the relevant SAC land use guidelines or LOR. Hence, the results are satisfactory.

10.3.4 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic Aromatic Hydrocarbons are formed by the incomplete combustion of coal, oil, petrol, wood, or other organic materials. Major sources of PAHs include asphalt roads, road tar, coal, coal tar, oil, fuels and fires of all types. Laboratory analysis was undertaken for Naphthalene as a key indicator for PAHs, with results reported below the LOR, and considered satisfactory.

11.0 SOIL CLASSIFICATION

Additional soil samples were collected from excavated stockpiled material and submitted for NATA accredited laboratory analysis. Upon receipt, the NATA accredited laboratory results were tabulated and compared against the following soil assessment criteria:

Tier 1: Compare results against relevant NEPM (2013) land use screening levels for the proposed site use to assess soil suitability to remain on site; and

Tier 2: Compare results against the NSW EPA Waste Classification Guidelines (EPA:2014) for offsite disposal. Where results are identified above the Contaminant Threshold (CT) some material/s may pre-classify as General Solid Waste (non-putrescible) such as asphalt waste and lead from paint, or further analysis should be conducted for leachate potential. TCLP results are then compared against the Specific Contaminant Concentration (SCC) criteria as defined by Table 1 and Table 2 of guidelines.

Stockpile Results: Two (2) samples were submitted for laboratory analysis.

- Stockpile 1 – backfill sands
- Stockpile 2 – Clay

The material from both stockpiles reported results below the NEPM D Site Assessment Criteria (SAC) and was considered suitable for re-use on Site.

12.0 ENVIRONMENTAL SITE ASSESSMENT

The soil conditions at the UPSS investigation area reported levels of potential contaminants of BTEX, hydrocarbons, and lead below the laboratory level of detection and/or the adopted NEPM D criteria for commercial land use. Based on the site observations and the laboratory results reviewed during this assessment it is considered unlikely that the UPSS area may pose a significant risk to the environment and to the health of future users of the Site.

12.1 SITE VALIDATION

The validation strategy included the decommissioning of one (1) Underground Storage Tank (UST) by excavation and offsite disposal. The investigation results have documented the UST decommission methodology as successful. The sample QA/QC assessment reports the results are valid for this investigation. The remediation works have successfully decommissioned the primary source of potential contamination being the one (1) UST. Based on the NATA accredited laboratory results the UPSS area has been validated in accordance with the requirements set by the regulator, and the UPSS area may be considered suitable for ongoing commercial and industrial land use.

13.0 CONCLUSIONS & RECOMMENDATIONS

Based on the findings outlined during the scope of works the following conclusions and recommendations are provided:

- During the scope of works one (1) Underground Storage Tank (UST) was successfully decommissioned by excavation and offsite disposal in accordance with the requirements set by the regulator;
- Soil validation sample locations were selected with consideration of the NEPM Schedule B2 Section 6, guidelines on Sampling Design (NEPC 2013) and the NSW EPA (2014) *Technical Note for Investigation of Service Station Sites*. Soil samples were analysed by a NATA accredited laboratory and the QA/QC results indicate that for the samples collected during the scope of works, sampling techniques, transport procedures and laboratory analysis were satisfactory, and the quality of the data is acceptable for use in this assessment;
- NATA laboratory results for validation samples from the base and walls of the excavation pit report concentration of TRH, BTEX, and lead below the laboratory limit of reporting (LOR) or the Site Assessment Criteria. The results are satisfactory and indicate the primary source of potential contamination has been removed;
- Samples collected from stockpiled excavated material from the UST removal returned NATA laboratory results for TRH, BTEX, PAHs and Heavy Metals in soil which were all reported below the SAC. The soil was assessed to be suitable for re-use on site;
- Based on the NATA accredited laboratory results the UPSS area subject of this assessment has been validated in accordance with the revised NSW Underground Petroleum Storage Systems Regulations (EPA;2014), and the UPSS Technical Note: Decommissioning, Abandonment and Removal of UPSS (DECCW;2010);
- The primary remediation objectives have been met and the UPSS area may be considered ***suitable for ongoing commercial & industrial landuse***;
- The Site owner shall notify the regulator of the UPSS decommissioning to remove the tanks from the database;

- Should any change in Site conditions or incident occur which causes a potential environmental impact, ENRS should be notified to further assess the site and consider requirements for any additional assessment; and
- This report must be read in conjunction with the attached Statement of Limitations.

14.0 REFERENCES

Australian Government (2011) National Health & Medical Research Council. National Resource Management Ministerial Council. National Water Quality Strategy. Australian Drinking Water Guidelines.

Australian Standard (1999) AS4482.2–1999: Guide to the investigation and sampling of sites with potentially contaminated soil – Volatile substances.

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Australian Standard (2008). AS 4976 (2008) - The removal and disposal of underground petroleum storage tanks.

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EPHC & NEPC (2003) Assessment of Underground Storage Systems: Proceedings of the Fifth National Workshop on the Assessment of Site Contamination, Environment Protection and Heritage Council & National Environment Protection Council, Adelaide

NEPC (2013). National Environment Protection (Assessment of Site Contamination) Measure.

NSW Department of Environment Climate Change and Water (2008). Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation.

NSW Department of Environment and Climate Change (2009a). Contaminated Sites: Guidelines on the Duty to Report Contamination under the Contaminated Land Management Act 1997

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NSW EPA (1995) Sampling Design Guidelines. ISBN 0-7310-3756-1.

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NSW EPA (2014). Waste Classification Guidelines.

NSW Office of Environment and Heritage (OEH) (2011) Guidelines for Consultants Reporting on Contaminated sites. ISBN 0 7310 3892 4.

NZME (2003) 'Checklist for the removal of petroleum underground storage tank' in Contaminated Land Management Guidelines No. 1: Reporting on contaminated sites in New Zealand, New Zealand Ministry for the Environment.

SafeWork NSW (2019). Demolition Work Code of Practice.

SafeWork NSW (2020). Excavation Work Code of Practice.

15.0 LIMITATIONS

This report and the associated services performed by ENRS are in accordance with the scope of services set out in the contract between ENRS and the Client. The scope of services was defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to Site.

ENRS derived the data in this report primarily from visual inspections, and, limited sample collection and analysis made on the dates indicated. In preparing this report, ENRS has relied upon, and presumed accurate, certain information provided by government authorities, the Client and others identified herein. The report has been prepared on the basis that while ENRS believes all the information in it is deemed reliable and accurate at the time of preparing the report, it does not warrant its accuracy or completeness and to the full extent allowed by law excludes liability in contract, tort or otherwise, for any loss or damage sustained by the Client arising from or in connection with the supply or use of the whole or any part of the information in the report through any cause whatsoever.

Limitations also apply to analytical methods used in the identification of substances (or parameters). These limitations may be due to non-homogenous material being sampled (i.e. the sample to be analysed may not be representative), low concentrations, the presence of 'masking' agents and the restrictions of the approved analytical technique. As such, non-statistically significant sampling results can only be interpreted as 'indicative' and not used for quantitative assessments.

The data, findings, observations, conclusions and recommendations in the report are based solely upon the state of Site at the time of the investigation. The passage of time, manifestation of latent conditions or impacts of future events (e.g. changes in legislation, scientific knowledge, land uses, etc) may render the report inaccurate. In those circumstances, ENRS shall not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance on, the contents of the report.

This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the provisions of the agreement between ENRS and the Client. ENRS accepts no liability or responsibility whatsoever and expressly disclaims any responsibility for or in respect of any use of or reliance upon this report by any third party or parties.

It is the responsibility of the Client to accept if the Client so chooses any recommendations contained within and implement them in an appropriate, suitable and timely manner.

TABLES

Table 10: Comparison of Soil Validation Results against Site Assessment Criteria (SAC)

ENRS
ENVIRONMENT & NATURAL RESOURCE SOLUTIONS

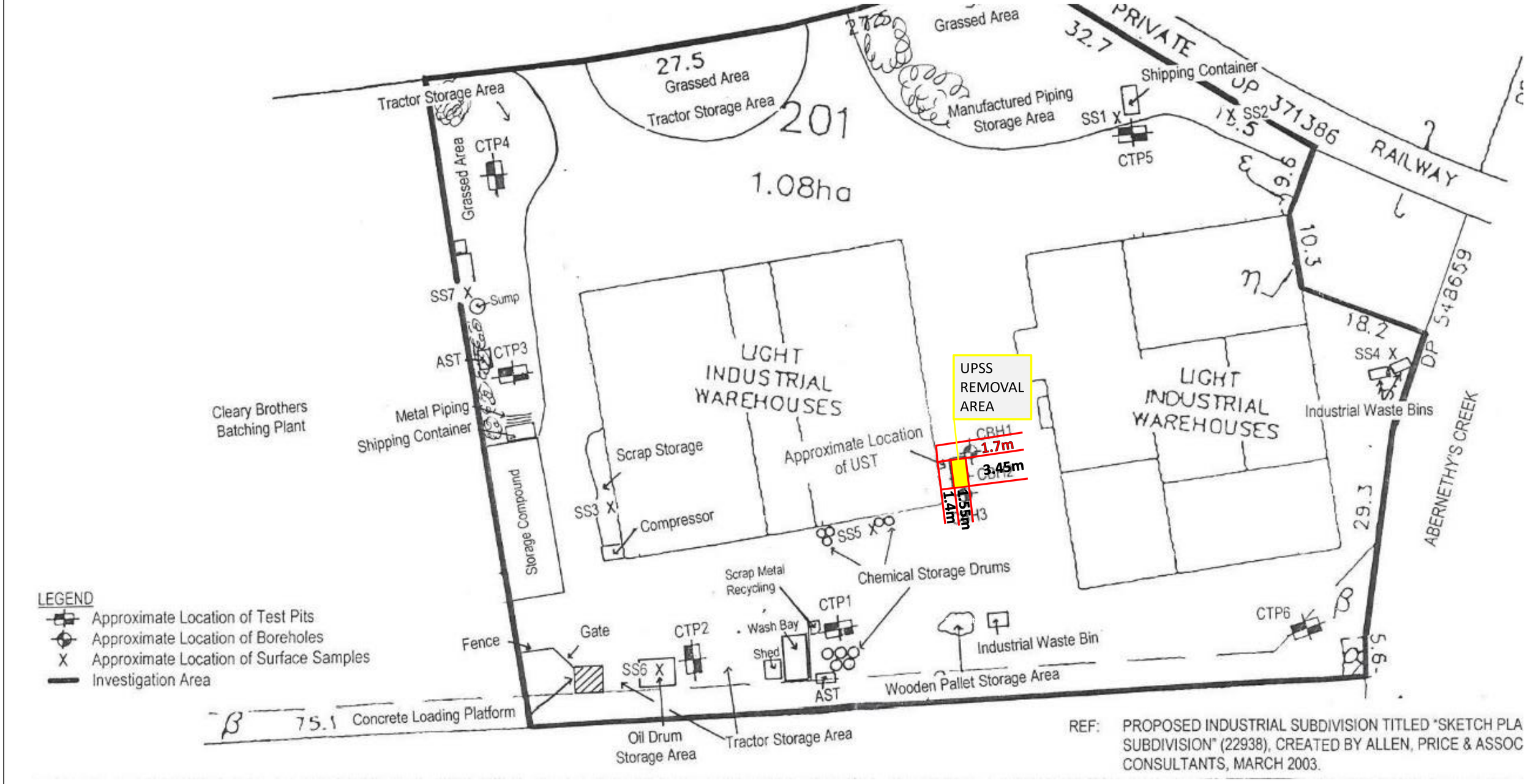
Table A: Total Concentration Results - Soil
Manildra Bomderry - UST Removal & Pit Validation Samples

Analyte			Organochlorine Pesticides (OCP)					Total PCB's	Organophosphate Pesticides (OPP)	Total Phenols	BTEX					Total Recoverable Hydrocarbons							Polycyclic Aromatic Hydrocarbons (PAHs)				Metals / Metalloids								< ASC NEPM Suitability for Re-Use On Site
			Aldrin	Dieldrin	Chlordane	DDT, DDD & DDE	Heptachlor				Benzene	Toluene	Ethyl benzene	m+p-Xylene	o-Xylene	TRH C6-C9	TRH C10-C36	F1 TRH C6-C10	F2 TRH C10-C16	F3 TRH C16-C34	F4 TRH C34-C40	Total TRH C10-C40	Naphthalene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Total Positive PAHs	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	
Site Assessment Criteria - NEPM (2013) Soil Investigation Levels (mg/Kg)																																			
HIL 'D' (Industrial / Commercial)			45	45	530	3600	50	7	-	240000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	40	4000	3000	900	3600	240000	1500	730	6000	35000	
HSL 'D'	CLAY	**0-1m**	-	-	-	-	-	-	-	-	4	NL	NL	NL	NL	-	-	310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		1-2m	-	-	-	-	-	-	-	-	6	NL	NL	NL	NL	-	-	480	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
		2-4m	-	-	-	-	-	-	-	-	9	NL	NL	NL	NL	-	-	NL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Management Limits (Industrial / Commercial)		**Coarse**	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	700	1000	3500	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	
		Fine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	800	1000	5000	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	
EIL/ESL (Industrial/ Commercial)		**Coarse**	-	-	-	640	-	-	-	-	75	135	165	180	180	-	-	215	215	1700	3300	-	370	3	-	-	160	-	-	1200(pH8)	1800	-	-	-	
		Fine	-	-	-	640	-	-	-	-	95	135	185	95	95	-	-	170	170	2500	6600	-	370	3	-	-	160	-	-	1200(pH8)	1800	-	-	-	
CRC Care (2011) HSL D (Direct Contact)			-	-	-	-	-	-	-	-	430	99000	27000	81000	81000	-	-	26000	20000	27000	38000	-	11000	-	-	-	-	-	-	-	-	-	-	-	
CRC Care (2011) Intrusive Work (Direct Conact)			-	-	-	-	-	-	-	-	1100	120000	85000	130000	130000	-	-	82000	62000	85000	120000	-	29000	-	-	-	-	-	-	-	-	-	-	-	
Total Concentrations - PQL			**0.05**	**0.05**	**0.05**	**0.05**	**0.05**	**0.1**	**0.05**	**0.5**	**0.2**	**0.5**	**0.5**	**0.5**	**0.5**	**10**	**50**	**10**	**50**	**100**	**100**	**50**	**0.5**	**0.5**	**0.05**	**0.05**	**5**	**1**	**2.0**	**5**	**5**	**0.1**	**2**	**5**	
Area	**ID / Depth (m)**	**Date**	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	
UST Pit Validation (Walls & Base)	VN/2.3 (north Wall)	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<1	----	----	----	----	----	----	----	**21**	----	----	----	<NEPM 'D'
	VE/2.3 (east Wall)	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<1	----	----	----	----	----	----	----	**22**	----	----	----	<NEPM 'D'
	VS/2.3 (south Wall)	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<1	----	----	----	----	----	----	----	**18**	----	----	----	<NEPM 'D'
	VW/2.3 (West Wall)	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<1	----	----	----	----	----	----	----	**18**	----	----	----	<NEPM 'D'
	VBASE/2.3	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<1	----	----	----	----	----	----	----	**23**	----	----	----	<NEPM 'D'
Stockpiles	SP1/1 Sand	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	<5	<1	**14**	**7**	**6**	<0.1	**2**	**39**	<NEPM 'D'
	SP2/1 Clay	15/10/2020	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05	<0.5	<0.2	<0.5	<0.5	<0.5	<0.5	<10	<50	<10	<50	<100	<100	<50	<0.5	<0.5	<0.5	<0.5	**17**	<1	**21**	**24**	**19**	<0.1	**16**	**54**	<NEPM 'D'
95% Upper Confidence Limit Calculations (mg/Kg)																																			
Number of samples			7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	2	2	2	2	2	2	2	7	2	2	2	
Maximum			0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.25	0.10	0.25	0.25	0.25	0.25	5.0	25	5.0	25	50	50	25	0.50	0.25	0.25	0.25	17.0	0.5	21.0	24	23.00	0.05	16.00	54.00	
Minimum			0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.25	0.10	0.25	0.25	0.25	0.25	5.0	25	5.0	25	50	50	25	0.25	0.25	0.25	0.25	2.50	0.50	14.0	7.0	6.0	0.05	2.0	39.0	
Standard deviation			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0	0	0.12	0.00	0.00	0.00	10.25	0.00	4.95	12.02	5.70	0.00	9.90	10.61	
Coefficient of Variation			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.28	0.00	0.00	0.00	1.05	0.00	0.28	0.78	0.31	0.00	1.10	0.23	<NEPM 'D' = suitable for re-use on Site
t statistic at a=0.05			1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.9	1.9	1.9	1.9	1.9	1.9	1.9	1.94	6.31	6.31	6.31	6.31	6.31	6.31	6.31	1.94	6.31	6.31	6.31	
Average			0.03	0.03	0.03	0.03	0.03	0.05	0.03	0.25	0.10	0.25	0.25	0.25	0.25	5	25	5	25	50	50	25	0.43	0.25	0.25	0.25	9.75	0.50	17.50	15.50	18.14	0.05	9.00	46.50	
95% UCL average			**0.025**	**0.025**	**0.025**	**0.025**	**0.025**	**0.05**	**0.03**	**0.25**	**0.10**	**0.25**	**0.25**	**0.25**	**0.25**	**5.0**	**25**	**5.0**	**25**	**50**	**50**	**25**	**0.52**	**0.25**	**0.25**	**0.25**	**55.5**	**0.5**	**39.6**	**69.2**	**22.3**	**0.1**	**53.2**	**93.9**	

Notes: Basis for NEPM (2013) ESL for B(a)P has been rescindered. Recommend application of HSL 'A' 3 mg/kg pending publication of updated ESL.

Figures

Figure 4 Site Plan



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Client:	Shoalhaven Starches (Manildra)	Drawn:	TF	Figure:	1
Project:	ENRS0536.19	Source:	googleearth	Date:	23/07/2019
Location:	Fire Pump Car Park	Scale:	NA	Title:	Site Plan
		Status:	Rev 1		

APPENDICES

Appendix A

Laboratory Certificates of Analysis (Soil)

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **EW2004681**	Page	: 1 of 7
Client	: **ENVIRONMENT & NATURAL RESOURCE SOLUTIONS**	Laboratory	: Environmental Division NSW South Coast
Contact	: LAB ENRS	Contact	: Aneta Prosaroski
Address	: 25 River Rd Shoalhaven Heads 2535	Address	: 1/19 Ralph Black Dr, North Wollongong 2500 4/13 Geary Pl, North Nowra 2541 Australia NSW Australia
Telephone	: 02 9037 4708	Telephone	: +61 2 4225 3125
Project	: ENRS0536 - UST Validation	Date Samples Received	: 16-Oct-2020 07:32
Order number	: ENRS0536	Date Analysis Commenced	: 16-Oct-2020
C-O-C number	: ----	Issue Date	: 19-Oct-2020 19:07
Sampler	: Rohan Last		
Site	: ----		
Quote number	: EN/222		
No. of samples received	: 7		
No. of samples analysed	: 7		

Accreditation No. 825
Accredited for compliance with
ISO/IEC 17025 - Testing

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results
- Surrogate Control Limits

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QA/QC Compliance Assessment to assist with Quality Review and Sample Receipt Notification.

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is carried out in compliance with procedures specified in 21 CFR Part 11.

Signatories	*Position*	*Accreditation Category*
Edwandy Fadjar	Organic Coordinator	Sydney Organics, Smithfield, NSW
Gaston Allende	R&D Chemist	Sydney Organics, Smithfield, NSW
Ivan Taylor	Analyst	Sydney Inorganics, Smithfield, NSW

General Comments

The analytical procedures used by ALS have been developed from established internationally recognised procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are fully validated and are often at the client request.

Where moisture determination has been performed, results are reported on a dry weight basis.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

When sampling time information is not provided by the client, sampling dates are shown without a time component. In these instances, the time component has been assumed by the laboratory for processing purposes.

Where a result is required to meet compliance limits the associated uncertainty must be considered. Refer to the ALS Contact for details.

Key : CAS Number = CAS registry number from database maintained by Chemical Abstracts Services. The Chemical Abstracts Service is a division of the American Chemical Society.
LOR = Limit of reporting
^ = This result is computed from individual analyte detections at or above the level of reporting
ø = ALS is not NATA accredited for these tests.
~ = Indicates an estimated value.

- **Analytical work for this work order will be conducted at ALS Sydney.**
- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) per the NEPM (2013) is the sum total of the concentration of the eight carcinogenic PAHs multiplied by their Toxicity Equivalence Factor (TEF) relative to Benzo(a)pyrene. TEF values are provided in brackets as follows: Benz(a)anthracene (0.1), Chrysene (0.01), Benzo(b+j) & Benzo(k)fluoranthene (0.1), Benzo(a)pyrene (1.0), Indeno(1.2.3.cd)pyrene (0.1), Dibenz(a.h)anthracene (1.0), Benzo(g.h.i)perylene (0.01). Less than LOR results for 'TEQ Zero' are treated as zero, for 'TEQ 1/2LOR' are treated as half the reported LOR, and for 'TEQ LOR' are treated as being equal to the reported LOR. Note: TEQ 1/2LOR and TEQ LOR will calculate as 0.6mg/Kg and 1.2mg/Kg respectively for samples with non-detects for all of the eight TEQ PAHs.
- EP080: Where reported, Total Xylenes is the sum of the reported concentrations of m&p-Xylene and o-Xylene at or above the LOR.
- EP075(SIM): Where reported, Total Cresol is the sum of the reported concentrations of 2-Methylphenol and 3- & 4-Methylphenol at or above the LOR.

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	VN/2.3	VE/2.3	VE/2.3	VW/2.3	VBASE/2.3
			Client sampling date / time	15-Oct-2020 00:00	15-Oct-2020 00:00	15-Oct-2020 00:00	15-Oct-2020 00:00	15-Oct-2020 00:00
Compound	CAS Number	LOR	Unit	EW2004681-001	EW2004681-002	EW2004681-003	EW2004681-004	EW2004681-005
				Result	Result	Result	Result	Result
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	21.3	26.3	23.2	24.8	24.3
EG005(ED093)T: Total Metals by ICP-AES								
Lead	7439-92-1	5	mg/kg	21	22	18	18	23
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	<10	<10	<10
C10 - C14 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
C15 - C28 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
C29 - C36 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ C10 - C36 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg	<10	<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg	<10	<10	<10	<10	<10
>C10 - C16 Fraction	----	50	mg/kg	<50	<50	<50	<50	<50
>C16 - C34 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
>C34 - C40 Fraction	----	100	mg/kg	<100	<100	<100	<100	<100
^ >C10 - C40 Fraction (sum)	----	50	mg/kg	<50	<50	<50	<50	<50
^ >C10 - C16 Fraction minus Naphthalene (F2)	----	50	mg/kg	<50	<50	<50	<50	<50
EP080: BTEXN								
Benzene	71-43-2	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	108-88-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	100-41-4	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
ortho-Xylene	95-47-6	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
^ Sum of BTEX	----	0.2	mg/kg	<0.2	<0.2	<0.2	<0.2	<0.2
^ Total Xylenes	----	0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5
Naphthalene	91-20-3	1	mg/kg	<1	<1	<1	<1	<1
EP080S: TPH(V)/BTEX Surrogates								
1.2-Dichloroethane-D4	17060-07-0	0.2	%	101	102	103	99.7	102
Toluene-D8	2037-26-5	0.2	%	93.8	92.1	99.3	90.7	97.1
4-Bromofluorobenzene	460-00-4	0.2	%	86.9	90.3	89.7	84.6	91.6

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)			Client sample ID	SP1/1 Sand	SP2/1 Clay	----	----	----
			Client sampling date / time	15-Oct-2020 00:00	15-Oct-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit	EW2004681-006	EW2004681-007	--------	--------	--------
				Result	Result	----	----	----
EA055: Moisture Content (Dried @ 105-110°C)								
Moisture Content	----	1.0	%	**4.0**	**27.0**	----	----	----
EG005(ED093)T: Total Metals by ICP-AES								
Arsenic	7440-38-2	5	mg/kg	<5	**17**	----	----	----
Cadmium	7440-43-9	1	mg/kg	<1	<1	----	----	----
Chromium	7440-47-3	2	mg/kg	**14**	**21**	----	----	----
Copper	7440-50-8	5	mg/kg	**7**	**24**	----	----	----
Lead	7439-92-1	5	mg/kg	**6**	**19**	----	----	----
Nickel	7440-02-0	2	mg/kg	**2**	**16**	----	----	----
Zinc	7440-66-6	5	mg/kg	**39**	**54**	----	----	----
EG035T: Total Recoverable Mercury by FIMS								
Mercury	7439-97-6	0.1	mg/kg	<0.1	<0.1	----	----	----
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons								
Naphthalene	91-20-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthylene	208-96-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Acenaphthene	83-32-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluorene	86-73-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Phenanthrene	85-01-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Anthracene	120-12-7	0.5	mg/kg	<0.5	<0.5	----	----	----
Fluoranthene	206-44-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Pyrene	129-00-0	0.5	mg/kg	<0.5	<0.5	----	----	----
Benz(a)anthracene	56-55-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Chrysene	218-01-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(b+j)fluoranthene	205-99-2 205-82-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(a)pyrene	50-32-8	0.5	mg/kg	<0.5	<0.5	----	----	----
Indeno(1.2.3.cd)pyrene	193-39-5	0.5	mg/kg	<0.5	<0.5	----	----	----
Dibenz(a.h)anthracene	53-70-3	0.5	mg/kg	<0.5	<0.5	----	----	----
Benzo(g.h.i)perylene	191-24-2	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg	<0.5	<0.5	----	----	----
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg	**0.6**	**0.6**	----	----	----
^ Benzo(a)pyrene TEQ (LOR)	----	0.5	mg/kg	**1.2**	**1.2**	----	----	----
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction	----	10	mg/kg	<10	<10	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SP1/1 Sand	SP2/1 Clay	----	----	----
				Client sampling date / time	15-Oct-2020 00:00	15-Oct-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EW2004681-006	EW2004681-007	--------	--------	--------
					Result	Result	----	----	----
EP080/071: Total Petroleum Hydrocarbons - Continued									
C10 - C14 Fraction	----	50	mg/kg		<50	<50	----	----	----
C15 - C28 Fraction	----	100	mg/kg		<100	<100	----	----	----
C29 - C36 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **C10 - C36 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions									
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	----	----	----
^ **C6 - C10 Fraction minus BTEX (F1)**	C6_C10-BTEX	10	mg/kg		<10	<10	----	----	----
>C10 - C16 Fraction	----	50	mg/kg		<50	<50	----	----	----
>C16 - C34 Fraction	----	100	mg/kg		<100	<100	----	----	----
>C34 - C40 Fraction	----	100	mg/kg		<100	<100	----	----	----
^ **>C10 - C40 Fraction (sum)**	----	50	mg/kg		<50	<50	----	----	----
^ **>C10 - C16 Fraction minus Naphthalene (F2)**	----	50	mg/kg		<50	<50	----	----	----
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	----	----	----
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	----	----	----
Ethylbenzene	100-41-4	0.5	mg/kg		<0.5	<0.5	----	----	----
meta- & para-Xylene	108-38-3 106-42-3	0.5	mg/kg		<0.5	<0.5	----	----	----
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	----	----	----
^ **Sum of BTEX**	----	0.2	mg/kg		<0.2	<0.2	----	----	----
^ **Total Xylenes**	----	0.5	mg/kg		<0.5	<0.5	----	----	----
Naphthalene	91-20-3	1	mg/kg		<1	<1	----	----	----
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		**103**	**98.3**	----	----	----
2-Chlorophenol-D4	93951-73-6	0.5	%		**100**	**98.2**	----	----	----
2.4.6-Tribromophenol	118-79-6	0.5	%		**52.0**	**48.2**	----	----	----
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		**97.6**	**99.8**	----	----	----
Anthracene-d10	1719-06-8	0.5	%		**106**	**106**	----	----	----
4-Terphenyl-d14	1718-51-0	0.5	%		**103**	**109**	----	----	----
EP080S: TPH(V)/BTEX Surrogates									
1.2-Dichloroethane-D4	17060-07-0	0.2	%		**108**	**99.7**	----	----	----
Toluene-D8	2037-26-5	0.2	%		**101**	**92.8**	----	----	----

Analytical Results

Sub-Matrix: SOIL (Matrix: SOIL)				Client sample ID	SP1/1 Sand	SP2/1 Clay	----	----	----
				Client sampling date / time	15-Oct-2020 00:00	15-Oct-2020 00:00	----	----	----
Compound	CAS Number	LOR	Unit		EW2004681-006	EW2004681-007	--------	--------	--------
					Result	Result	----	----	----
EP080S: TPH(V)/BTEX Surrogates - Continued									
4-Bromofluorobenzene	460-00-4	0.2	%		**94.1**	**91.4**	**----**	**----**	**----**

Surrogate Control Limits

Sub-Matrix: **SOIL**

Compound	CAS Number	Recovery Limits (%) Low	High
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	63	123
2-Chlorophenol-D4	93951-73-6	66	122
2.4.6-Tribromophenol	118-79-6	40	138
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	70	122
Anthracene-d10	1719-06-8	66	128
4-Terphenyl-d14	1718-51-0	65	129
EP080S: TPH(V)/BTEX Surrogates			
1.2-Dichloroethane-D4	17060-07-0	73	133
Toluene-D8	2037-26-5	74	132
4-Bromofluorobenzene	460-00-4	72	130

Appendix B

Sample Chain of Custody (CoC)

ENRS
Environment & Natural Resource Solutions

Chain of Custody

SYDNEY 277-289 Woodpark Road Smithfield NSW 2164
Ph: 02 8784 8555 E: samples.sydney@alsglobal.com

NOWRA 4/13 Geary Place North Nowra NSW 2541
Ph: 02 4423 2063 E: nowra@alsglobal.com

WOLLONGONG 99 Kenny Street Wollongong NSW 2500
Ph: 02 4225 3125 E: wollongong@alsglobal.com

CLIENT: ENRS Pty Ltd	TURNAROUND REQUIREMENTS : ☐ Standard TAT (List due date):	FOR LABORATORY USE ONLY (Circle)
OFFICE: 108 Jerry Bailey Rd Shoalhaven Heads	(Standard TAT may be longer for some tests e.g.. Ultra Trace Organics) ☒☐ Non Standard or urgent TAT (List due date): 19/10/2020	Custody Seal
PROJECT: ENRS0536 - UST Validation	ALS QUOTE NO.: WO/001/17	COC SEQUENCE NUMBER (Circle) — Free ice / froz receipt?
ORDER NUMBER: ENRS0536	COUNTRY OF ORIGIN:	COC: 1 2 3 4 5 6 7 — Random Sam
PROJECT MANAGER: Rohan Last	CONTACT PH: 0401 518 443	OF: 1 2 3 4 5 6 7 — Other comme
SAMPLER: RL	SAMPLER MOBILE: -	RELINQUISHED BY:
COC Emailed to ALS? (Yes / No)	EDD FORMAT (or default):	R.Last
Email Reports to lab@enrs.com.au		DATE/TIME:..... 15/10/2020
Email Invoice to accounts@enrs.com.au		

RECEIVED BY: [signature]
DATE/TIME: 15/10/20 1Pm

RELINQUISHED
DATE/TIME:

Environmental Division
Wollongong
Work Order Reference
EW2004681

Telephone : 02 4225 3125

COMMENTS/SPECIAL HANDLING/STORAGE OR DISPOSAL:

ALS USE ONLY	SAMPLE DETAILS MATRIX: Solid(S) Water(W)			CONTAINER INFORMATION		ANALYSIS REQUIRED including SUITES (NB. Suite Codes must be listed to the right) Where Metals are required, specify Total (unfiltered bottle required) or Dissolved (field filtered bottle required)								
LAB ID	SAMPLE ID	DATE / TIME	MATRIX	TYPE & PRESERVATIVE (refer to codes below)		S-6	S26							
	VN/2.3	15/10/2020	Soil	G		1								
	VE/2.3	15/10/2020	Soil	G		1								
	VE/2.3	15/10/2020	Soil	G		1								
	VW/2.3	15/10/2020	Soil	G		1								
	VBASE/2.3	15/10/2020	Soil	G		1								
	SP1/1 Sand	15/10/2020	Soil	G			1							
	SP2/1 Clay	15/10/2020	Soil	G			1							
				TOTAL		5	2	0	0					

Water Container Codes: P = Unpreserved Plastic; N = Nitric Preserved Plastic; ORC = Nitric Preserved ORC; SH = Sodium Hydroxide/Cd Preserved; S = Sodium Hydroxide Preserved Plastic; AG = Amber Glass Unpreserved; AP - Airfreight Unpreserved Plastic
V = VOA Vial HCl Preserved; VB = VOA Vial Sodium Bisulphate Preserved; VS = VOA Vial Sulfuric Preserved; AV = Airfreight Unpreserved Vial SG = Sulfuric Preserved Amber Glass; H = HCl preserved Plastic; HS = HCl preserved Speciation bottle; SP = Sulfuric Preserved Plastic; F = Formaldehyde Preserved Glass;
Z = Zinc Acetate Preserved Bottle; E = EDTA Preserved Bottles; ST = Sterile Bottle; ASS = Plastic Bag for Acid Sulphate Soils; B = Unpreserved Bag; LI = Lugols Iodine Preserved Bottles; STT = Sterile Sodium Thiosulfate Preserved Bottles.

Appendix C

Waste Disposal Documentation

(Append any Receipts or Dockets for Tank Disposal, Liquid, Solids or Concrete/Steel)

ANC Foster Pty. Ltd.
ABN: 48 079 145 529

Address: 64 Barry Avenue, Mortdale, NSW, 2223 Telephone: 02 9533 1011 Facsimile: 02 9533 2372 Email: info@ancfoster.com.au **www.ancfoster.com.au**

18th November 2020

ENSR Pty. Limited
108 Jerry Bailey Road
SYDNEY NSW 2000

A.N.C. FOSTER PTY. LTD., 64 BARRY AVE. MORTDALE 2223 ABN 48 079 145 529 (the company) acknowledges and agrees to **ENSR Pty. Ltd** that all risk and title in the **1 x 5,000 litre capacity underground fuel storage tank** removed from the Manildra Starches Pty. Limited 36 Bolong Road Bomaderry passes to (the company)

The tank were demolished on site due to the abandonment with fly ash and cement the tank shell transported by ANC Foster Pty. Ltd to Sell and Parker 42 Yalwal Road South Nowra for a safe and legal disposal.

The tank will not be sold for any Purpose.

A.N.C. FOSTER PTY. LTD
was hereunto affixed by
C.T.FOSTER
in the presence of
S.W. FOSTER
on the 18th November 2020