



Phase 1 Environmental Site Assessment

Proposed UTAS Pedestrian Bridge
Invermay

Prepared for
University of Tasmania (UTAS)

Client representative
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Date
21 May 2019

Rev 00



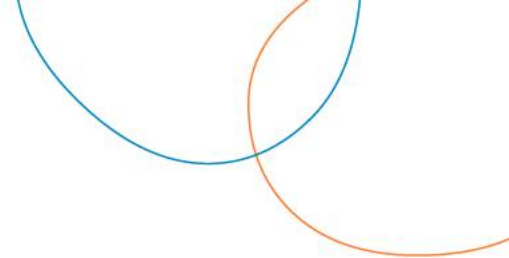


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Executive Summary

This report presents the findings of a Phase 1 Environmental Site Assessment (ESA) undertaken by pitt&sherry for the land impacted by a proposed pedestrian-cycle bridge at the UTAS Invermay Campus, Launceston. An ESA is required because over 1 m² of soil will be excavated during the bridge construction period. It is understood that the excavation of soils up to 1 m below the ground surface will be necessary, however the areas of excavation will be minimal. The current land use is public open space and the proposed works do not represent a change in site use.

The assessment consisted of a site history review, site inspection and limited shallow soil sampling and chemical analysis. Soil sampling was undertaken for preliminary waste classification purposes. The desk study included all available site and off-site environmentally relevant information to identify potentially contaminated areas and specific contaminants of concern.

Previous potentially contaminating activities were identified at the site and neighbouring properties (railyards, workshops, concrete works, underground petroleum storage sites (UPSS), gasworks and potential imported fill), which may have resulted in soil and groundwater contamination at the site (metals, hydrocarbons, polychlorinated biphenyls, pesticides and phenols).

The soil analytical results were compared against the EPA Tasmania Classification and Management of Contaminated Soil for Disposal Guidelines (Version 3 2018). With the exception of sample BH-E, all the analytical results were below the Low Level Contaminated Soil Level 2 criteria. Concentrations of benzo(a)pyrene and lead were detected in sample BH-E above the respective Maximum Total Level 2 waste criteria. Total Characteristic Leaching Procedure (TCLP) extraction was subsequently scheduled on sample BH-E to allow classification against the maximum TCLP benzo(a)pyrene and lead criteria, which take precedence over the maximum total concentration. Although the TCLP benzo(a)pyrene concentration was below the Level 2 criteria, the TCLP lead concentration exceeded, resulting in the sample classification remaining as Contaminated Soil - Level 3.

Due to the inherent variability of the soil and in-situ waste classification, excavated soils should be treated as potentially contaminated and appropriately stored on site until visual inspection of the material and sampling for waste classification purposes have been completed.

1. Introduction

1.1 Background

pitt&sherry were engaged by the University of Tasmania (UTAS) to prepare an Environmental Site Assessment (ESA) for the land impacted by a proposed pedestrian-cycle bridge development at the UTAS Invermay Campus.

The proposed bridge, herein referred to as the 'the site' will occupy small areas on the northern (approximately 150 m²) and southern side (approximately 190 m²) of the North Esk River located in Launceston Tasmania. The site occupies the river bank and nature strip on either side of the river and part of 21 Boland Street on the southern side and 6 Barnards Way Inveresk, Invermay on the northern side. The construction of the bridge will also involve the advancement of supporting piles at two locations in the river channel. The majority of the site is Department of Primary Industries, Water and Environment (DPIPWE) Crown Land and consists of a nature strip on either side of the North Esk River. The site also occupies part of title references 174633/2 on the north shore and title reference 144355/1 and 31568/2 on the southern shore. A Site Location Plan which indicates the land parcels, likely area of soil disturbance and sample locations is provided in Figure 1 (Appendix A).

The land adjacent to the site on the northern shore currently hosts multiple uses, with the UTAS campus consisting of open communal areas, campus buildings, pedestrian pathways and carparks (PID- 174633/2). On the southern side of the river, the land is mainly local government or Crown Land owned and represented by a nature strip and access road. There is also a parcel of land owned by UTAS, which is currently used as an Automobile Museum and carpark. The site is subject to a development application as UTAS intends to construct a pedestrian and bicycle bridge.

The potentially contaminated land code (E2.0) of the *Launceston Interim Planning Scheme 2015* will apply to the development application. Clauses E2.5.1 (use of land) and E2.6.2 (excavation of land) are relevant. Specifically, the performance criteria require that the land is suitable for the intended use, having regard to:

- an environmental site assessment that demonstrates there is no evidence that the land is contaminated
- an environmental site assessment that demonstrates that the level of contamination does not present a risk to human health or the environment
- a plan to manage contamination and associated risk to human health or the environment that includes:
 - o an environmental site assessment
 - o any specific remediation and protection measures required to be implemented before any use commences; and
 - o a statement that the land is suitable for the intended use.

This report presents the findings of a Phase 1 ESA and includes a review of all available site and off-site environmental information to identify potentially contaminated areas and specific contaminants of concern that may require further investigation.

1.2 Objectives

The objective of the Phase 1 ESA was to assess the likelihood of contamination at the site and determine:

- If the land is suitable for the proposed development
- If any site contamination is likely to present a risk to workers involved in redevelopment of the site, or future users of the site
- If any site contamination is likely to present an environmental risk from excavation conducted during redevelopment of the site: and
- If any specific remediation and/or protection measures are required to be implemented before use or excavation commences.

1.3 Scope of work

The ESA was carried out in accordance with the National Environment Protection (Assessment of Site Contamination) Measure 1999 ('NEPM' - amended 2013). The scope of work included the following.

- Review of all available sources of information to compile a site history
- Review available site plans, historical maps and aerial photographs
- A review of past users of the site, and nearby sites to determine historical activities relevant to potential contamination; and
- Review historical environmental records for the site to confirm any incidents or issues that may have given rise to localised soil or groundwater contamination.

2. Site Setting

2.1 Site identification

Most of the site occupies Crown Land, with small areas occupying part of several titles on the northern and southern river shore. Details of the site are summarised in Table 1 and the title reference for the surrounding parcels of land are indicated on the Site Location Plan in Appendix A.

Table 1: Site Details

	Site Details
Street addresses	6 Barnards Way, Inveresk, Invermay TAS 7250 21 Boland Street, Launceston TAS 7250 DPIPWE Crown Services Land Local Government Authority Land
Property IDs	3389971, 6675498, 1844555
Title references	174633/2, 144355/1, 31568/2, 144356/1
Site area	Bridge footbridge approximately 1000m ² (Final design/footprint TBC)
Owner	UTAS, DPIPWE, Local Government Authority, Crown Land Services
Local Government Area	Launceston City Council
Zoning	Particular Purpose (Inveresk Site), Open Space, Urban Mixed Use
Current land use	River foreshore nature strip, pedestrian walkway university campus, automobile museum and carpark

2.2 Current and proposed land use and zoning

No known activities are currently undertaken on the site and it is largely represented by undeveloped river foreshore. A concrete slab is located on the southern shore close to the proposed bridge. It is understood that the slab relates to a demolished building, which was used by Scotch/Oakburn Collage Rowing Club before they relocated to another building approximately 20 m to the east.

Under the Launceston Interim Planning Scheme 2015, the site is zoned Particular Purpose (Inveresk Site), Open Space and Urban Mixed Use.

UTAS is proposing to construct a pedestrian cycle bridge over the North Esk River. The proposed bridge will be constructed in a two-stage process. Stage one will entail construction from the north landing bank/platform spanning to the northern side of Boland Street. Stage one will also include pedestrian connections to the existing shared pathways. Stage two will complete the bridge link over Boland Street and connect to a mid-level floor on the proposed Willis Street Campus building.

It is expected that no excavation will occur on the northern side of the bridge. Minimal excavation will be required on the southern side at each landing. It is not expected that excavation will extend beyond 1 m in depth.

2.3 Surrounding land use

Referring to the Launceston Planning Scheme 2015, the land to the north of the site is zoned 'Particular Purpose'. The land to the south of the site is zoned 'Open Space with Commercial' and 'Inner Residential' beyond to the east, and 'Urban Mixed Use' beyond to the west. The North Esk River runs through the site and is zone 'Environmental Management'.

The site is surrounded by a mix of light commercial, residential and open parkland uses:

- East: North Esk River with the row club building, Boland Street and Becks Home Timber and Hardware and residential properties approximately 200 m beyond
- West: North Esk River with UTAS student accommodation, an open storage area, education building and carparking. Invermay Road, retail shops and residential properties are located approximately 250 m beyond
- North: Queen Victoria Museum with the University of Tasmania Inveresk Campus beyond; and
- South: Boland Street with open space, parking, with the National Automobile Museum of Tasmania, Crystal Cleaning approximately 100 m beyond.

2.4 Geology

As identified in The LIST¹, the Mineral Resources Tasmania (MRT)² Geological Polygons, 1:25,000 mapping, indicated the following geological units at the site:

- The northern shore and to the east of the site on the southern shore is defined as Quaternary estuarine deposits of clayey silty, sand and subordinate gravel, supra-estuarine swamps and laterally derived alluvial deposits, unmapped man-made deposits including silt dredgings; in environments inferred to lie above frequent tidal influence (Qhiv); and
- The southern shore is defined as undifferentiated Quaternary sediments (Q).

A concealed fault is indicated trending approximately the same alignment as the proposed footbridge in a north-west to south-east orientation. Anecdotal evidence suggests that material used to construct the levees was derived from a nearby quarry, however this could not be confirmed in the historical records.

2.5 Topography and hydrogeology

From a survey of the bridge construction area undertaken on 27 March 2018 (ref L17236) the site is at an elevation ranging from 0 to 4 m Australian Height Datum (AHD). The river banks sloped into the river channel on either side of the river. Groundwater onsite is located within the North Esk River catchment and taking into account the proximity of the river, groundwater is anticipated to flow to the south on the southern side and to the north on the northern side. The North Esk River discharges into the River Tamar approximately 1.4 km to the south-west of the site.

2.6 Surface water and site drainage

A small concrete slab is located on the southern shore and the river foreshore vegetated. Levees on either side of the river direct any surface runoff adjacent to the channel towards river. In the site's observed state, surface runoff is likely to be infrequent, however the North Esk River does experience regular flood events, which would inundate the site.

1 <https://maps.thelist.tas.gov.au/listmap/app/list/map>

2 <http://www.mrt.tas.gov.au/portal/digital-geological-atlas-1-25000-scale-series>

2.7 Groundwater

A search of the DPIPWE Groundwater Information Access Portal (accessed 23 November 2018) indicated no registered groundwater bores within a 2 km radius of the site. The nearest registered bores, 41750 and 41502 are located approximately 3.1 km and 3.3 km respectively to the south-west of the site. Bore 4175 is registered as abandoned as has a recorded depth of 30 m. Bore 41502 is also listed as abandoned and has a recorded depth of 100 m. Taking into account the surrounding topography and proximity to the river channel, groundwater is anticipated to be shallow (within 2 m below the ground surface).

2.8 Flora and fauna

According to TASVEG 3.0 mapping, the vegetation community on the northern river foreshore would be classified as 'agricultural, urban and exotic vegetation' (FWU), with a vegetation community description of 'weed infestation'. Vegetation beyond the river foreshore on the northern bank and the southern side of the river within the site is classified as 'agricultural, urban and exotic' species (FUR) with a vegetation community description of 'urban areas'. The site does not support and vegetation larger than low lying grasses and shrubs, consistent with earthworks which would have occurred during the construction of the levees.

A flora and fauna assessment³ was undertaken at the site of the proposed development. The flora and fauna assessment confirmed that vegetation along the banks of the North Esk River consists of highly disturbed riparian vegetation. The findings of the survey were as follows:

- No Threatened Ecological Communities identified under either the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *Tasmanian Nature Conservation Act 2002* (NC Act) was recorded in the Study Area
- No threatened flora as listed under either the Commonwealth EPBC Act or the Tasmanian Threatened Species Protection Act 1995 (TSP Act) were recorded within the Study Area. Assessment of available habitats using the results of the field survey indicates that due to historic disturbance associated with urban development in the Study Area, threatened flora species are considered unlikely to occur
- Three declared weeds, as listed under the *Weed Management Act 1999* (WM Act), were identified: crack willow, blackberry and Paterson's curse; and
- No threatened fauna was recorded within the Study Area, during the field survey. The proposed development will not impact any critical habitat elements for any threatened species identified with potential to occur including Tasmanian wedge-tailed eagle, grey goshawk, white-bellied sea-eagle, Australasian bittern or the fish species Australian grayling.

2.9 Acid sulfate soils

The Tasmanian Acid Sulfate Soils Information (TASSI) database accessed via the LIST, identified coastal acid sulfate soil ASS (0-20 m AHD zone) on the site. The northern river shore, and a strip on the southern shore close to the river, had a high probability of costal ASS occurrence. This equates to a >70% chance of occurrence with ASS generally within upper 1 m. No excavation will occur in these areas.

The remainder of the site on the southern side of the river had a low probability of costal ASS occurrence, which corresponds to a 6-70% chance of occurrence. Minimal soil excavation is proposed in these areas, therefore no specific management measures are considered necessary.

³ *University of Tasmania Proposed Footbridge Flora and Fauna Assessment Report (R01)*. Prepared by Umwelt (Australia) Pty Ltd on behalf of Pitt&Sherry, February 2019

3. Historical Review

Information on the history of the site and surrounding land was obtained from the following sources:

- Historical aerial photographs
- Property Information Request from the Contaminated Sites Unit of the Tasmanian EPA which included historical dangerous good registered with Workplace Standard Tasmania (WST); and
- Existing reports from previous assessments and remediation works carried out at the Invermay site.

3.1 Aerial photography

To determine past activities and land use at and near the site five historical aerial photographs and one current aerial photograph was examined (Table 2). The photographs dated from 1973 to the present day and copies of the photographs are provided in Appendix B.

Table 2: Review of historical photographs

Item	Date and scale	Observations
Photo 1	14/11/1973 1:15,500	The northern part of the site consists of the river bank, nature strip and the Launceston Railyard beyond. The southern part of the site consists of the river bank with a rectangular building to the east (where the rowing club is now located). <u>Surroundings:</u> The site adjacent to the south appears to be used as a rail storage area. The Launceston Gasworks is located to the south on Willis Street between Boland Street and Cimitiere Street. The Launceston Railyard to the north of the site occupies a large area, with residential housing beyond to the west.
Photo 2	22/11/1982 1:6,200	No significant changes are observed in the northern and southern portions of the site on either side immediately adjacent to the river bank. The rectangular building on the southern nature strip remains. <u>Surroundings:</u> Many of the rail carts and other items appear to have been removed from the storage yard to the south of the site. On the Gasworks site to the west, some of the storage tanks appear to have been demolished, however it is difficult to determine the extent of these changes due to the low resolution of the photograph.
Photo 3	26/02/1992 1:12,500	No significant changes are observed across northern and southern portions of the site immediately adjacent to the river bank. A second rectangular building on the southern nature strip appears to have been constructed to the west of the existing building. <u>Surroundings:</u> Many of the buildings in the Launceston Railyard to the north of the site appear to have been demolished. The site to the north of the railyard appears to now be used for recreational use. Infrastructure associated with the rail sidings to the south of the site appear to have been removed. Infrastructure and buildings on the Gasworks site to the west appear largely unchanged.
Photo 4	25/11/1997 1:12,500	The northern portion of the site appears to have been levelled following the demolition of the Railyards. The southern portion of the site appears to be largely unchanged. <u>Surroundings:</u> Buildings and infrastructure associated with the Launceston Railyard to the north of the site appear to have been removed and the land adjacent to the river nature strip is largely vacant. Vehicle parking and open space is present to the north beyond. The road following the southern river bank (now Boland Street) appears to have been sealed. A building appears to have been constructed to the south of the site and cars

Item	Date and scale	Observations
		appear to be parked in a triangular shaped parking area. Buildings and infrastructure at the Gasworks to the west appear to be largely unchanged.
Photo 5	08/03/2009 1:7,000	The northern portion of the site beyond the river nature strip remains vacant. The southern portion of the site appears to be largely unchanged. <u>Surroundings:</u> The land adjacent to the river nature strip remains vacant. Trees have been planted surrounding the parking areas and open space to the north beyond. Trees have also been planted on the adjacent site to the south on the southern side of the river. The tanks associated with the Gasworks now appear to have been demolished, although part of the structure on one tank in the south western corner appears to remain. A large building has been constructed on the northern site boundary which is now occupied by a Centrelink Service Centre.
Photo 6	Current State Aerial Photography	A shared walking and cycle path appears to have been constructed along the northern river bank adjacent to the nature strip. The rectangular building on the southern portion of the site appears to have been demolished and the concrete slab remains. <u>Surroundings:</u> The UTAS student accommodation block has been constructed on the formally vacant land to the north of the site. Trees to the north and south of the site have become established. The former Gasworks site to the south appears to be largely unchanged.

The review of historical aerial photographs indicated that the locations where excavation is proposed onsite has not undergone significant changes since 1973. However, significant changes primarily from heavy industrial to light industrial, high density residential and open space use is observed on nearby sites. Contamination associated with historical industrial activity on nearby sites has the potential to migrate offsite and is therefore required to be considered.

3.2 Planning and regulatory review

3.2.1 EPA Property Information Request

The review of historical aerial photographs indicated that the locations where excavation is proposed onsite has not undergone significant changes since 1973. However, significant changes primarily from heavy industrial to light industrial, high density residential and open space use is observed on nearby sites. Contamination associated with historical industrial activity on nearby sites has the potential to migrate offsite and is therefore required to be considered.

2 Invermay Road, Invermay (PID 3389971)

Number 2 Invermay Road is situated on the northern side of the river and was historically the location of the Launceston railyards and workshops, Pioneer Concrete works and sporting grounds. The EPA listed a number of reports and documents r included an Environmental Audit, several Contamination Assessment Reports and a Site Management Plan.

In addition to the above, several records were located by the EPA which related to neighbouring properties. The details of these records are summarised below:

- **129-139 Invermay Road** – Historical Work Safe Tasmania (WST) records indicate dangerous goods were stored in underground storage tanks at the property between 1949 and 1960. The EPA was notified of an incident in 1999 and approval to remove contaminated soil was given in 2000. Currently an operational United Petroleum Service station is located on the site, with underground petroleum storage tanks (UPSS) with a combined capacity of 85,000L
- **103 Invermay Road** – A Coles Express Service station was registered in 2010 with six UPSS. The EPA subsequently received advice that three tanks were removed, and one was decommissioned in situ in 2011 due to leaking. A remediation notice was issued in 2013 and was revoked in 2014
- **3-11 Dry Street** – A Caltex Petrol Station was registered in 2010 with three UPSS. Two UPSS were reported to have been removed in 2015
- **32-38 Invermay Road** – A Caltex Service Station with four UPSS and a combined capacity of 89,000 L are registered; and
- **1-9 Lindsay Street (Scottsdale Levee)** – A Management Notice (8655/1 relating to the burial of approximately 300 m3 of hydrocarbon contaminated soil is registered on the property. EPA are in possession of the following report entitled 'Summary Report - Burial of PAH Contaminated Soil Scottsdale Levee', dated October, prepared by pitt&sherry.

86 Cimitiere Street, Launceston and associated land (certificate of Title 144356/1, 144355/1 and 31568/2) on the southern shore

86 Cimitiere Street is situated on the southern shore and is in a former light industrial area adjacent to the former Launceston Gasworks site and service stations. The EPA received a number of reports in 2006 as part of a development application including a ground investigation, health risk assessment and site management plan. The EPA provided comment on the reports and advised that Site sign off would not be granted until a signed agreement between the Launceston City Council and the landowner was received. No further records for the Site were located.

The former Launceston Gasworks site was located to the west of 86 Cimitiere Street on Willis Street. EPA report that they have an extensive number of reports relating the coal gas production at the site which ceased in 1996 and the site was decommissioned and rehabilitated between 1999 and 2007. An Environmental Protection Notice (EPN) 696/1 was issued in 2003 to regulate the soil and groundwater environmental works. The contaminants of concern include polycyclic aromatic hydrocarbons (PAHs), benzene, toluene ethylbenzene and xylene (BTEXN), total petroleum hydrocarbons (TPH), phenols, ammonia and cyanide associated with tar and other liquid wastes. Following a request, the EPA agreed that groundwater monitoring could cease in 2007 and the EPN was withdrawn.

In addition, several records were located by the EPA which related to neighbouring properties. The details of these records are summarised below:

- **68-76 Cimitiere Street** – hosted a Shell City Park Service Station. This ceased trading and infrastructure was removed between 1996 to 1999. EPA was also in possession of a site validation report and a development application which was submitted to Launceston City Council
- **4-6 Boland Street** – EPA received a decommissioning form for the removal of an UPSS in 2018. No contamination concerns were raised; and
- **13 Tamar Street and 15-21 Tamar Street** – Historic WorkSafe Tasmania records indicate between 1947 and 1956 dangerous goods were stored in underground tanks.

In August 2018, EPA approved the disposal of nearly 5,000 T of low-level contaminated soil excavated during streetscape works in Cimitiere Street. Level 2 petroleum hydrocarbon and leachable PAH including benzo(a)pyrene.

3.2.2 Dangerous Goods Register

Historical records of dangerous goods for the surrounding sites was provided in the PIR issued by the EPA and summarised in Section 3.2.1. No records of dangerous good storage or other relevant information was indicated for the site.

3.3 Hobart City Council Records

Taking into account the detailed information on potentially contaminating activities and history of contaminated sites surrounding the investigation area, no records were directly requested from Hobart City Council. In addition, Council does not hold any records of environmental incidents that may have caused localised environmental nuisance or harm and impact on future use or users of the site.

4. Previous assessments

A number of environmental reports exist which document environmental assessment and site remediation works undertaken on the Invermay side of the development, prior to redevelopment of the Inveresk Railyards. All known existing reports have been listed in Section 10.

The description and outcomes of these investigations have been summarised below.

4.1 Inveresk Railyard

Information was mostly gained from the following two reports:

- *Inveresk Railyard, Status of Site Remediation*. Prepared by SEMF for Launceston City Council in November 1999; and
- *Contamination Site Assessment (Tier 1 – Screening Level) – UTAS Inveresk Residences, Invermay*. Prepared by Geoton Pty Ltd for Morrison & Breytenbach Architects on 11 August 2014.

The Inveresk railway workshops were established in 1868 to service steam locomotives. The site was used for the industrial production and maintenance of rolling stock over the period up to the 1990's. The diesel workshop was constructed during the 1950's, when the transition from steam to diesel powered locomotives occurred. The rail yards were also used for a short period for the production of munitions during the Second World War.

In the 1990's, the Inveresk Railyard site was redeveloped for the purposes of public facilities, including an annex of the Queen Victoria Museum, the Launceston Campus of UTAS and the Royal Launceston Show Society. As part of the site's redevelopment, a comprehensive site assessment and subsequent site clean-up and management programs were undertaken, due to the side-wide contamination of soil and groundwater with metals and hydrocarbons.

The following remediation and management measures were implemented at the site:

- Soil excavation: certain areas of the site were extensively contaminated with hydrocarbons. These soils were excavated and remediated by landfarming followed by site reuse or off-site disposal (Remount Road Landfill)
- Capping: areas of hydrocarbon and metal contamination were managed by installation of a barrier such as clean soil (minimum of 300 mm), car parks, paving and sealing. Any fill brought to site was from a known location to ensure it was not contaminated
- Groundwater monitoring and remediation: nine groundwater monitoring bores were installed in 1995, with monitoring undertaken on a six-monthly basis. Groundwater was found to be significantly contaminated with hydrocarbons, including free phase hydrocarbons. Groundwater was pumped from excavations to a sedimentation bay located on site and treated through an oil water separator prior to discharge of the treated water to sewer. Groundwater was not remediated over the entire site
- Prevention of off-site migration of contamination: the prevention of the off-site migration of both air and water borne contamination was achieved by a number of site specific measures such as paving of contaminated areas, control of stormwater on the site, dust generation control and removal of contaminated materials from the site; and
- Underground fuel tanks: two UST's were located at the northern end and south of the diesel workshops. The northern UST and approximately 50m³ of hydrocarbon contaminated soil were removed. The southern UST was decommissioned in situ, as no apparent contamination was present.

The southern area adjacent to the river was subsequently assessed in 2014 before construction of the UTAS student accommodation [Geoton report]. The assessment identified lead and polycyclic hydrocarbon contamination in soils, at concentrations higher than the assessment criteria for the protection of human health for residential use (and recreational use). Groundwater sampling and assessment was not undertaken as part of the contamination site assessment; however, groundwater seepage was encountered in several boreholes at depths of between 0.5 m and 0.6 m. Taking account the close proximity of the investigation area to the site groundwater is likely to be shallow (>1 mBGL).

pitt&sherry comment: the site remediation status report documents the excavation and onsite treatment (via landfarming) of soil impacted with TPH and metal. When the levels of TPH were at appropriate levels, the material is reported to have been reused in the amphitheatre area of the site, which is used for vehicle parking and open public space. The report does not indicate that any treated soil was placed near the river bank in the vicinity of the site. Significant hydrocarbon impacted water has historically been identified on the Inveresk Railyard site. Although groundwater remediation (by pumping and treatment prior to discharge to sewer) is stated, there is potential for offsite migration onto the site to have occurred and for impacted groundwater to be encountered.

5. Soil sampling and site inspection

5.1 Investigation methodology

A site inspection and shallow soil sampling with a hand auger were undertaken on 12 November 2018. Soil samples were collected from each of the five locations where soil excavation is likely to occur. A sample location plan is provided in Appendix A. One sample (BH-A) was located on the northern river bank, and the remaining four samples (BH-B, BH-C, BH-D and BH-E) were located on the southern river bank and flat grassed area adjacent to it.

5.2 Ground conditions

The sample details and description of the soil encountered is summarised in Table 3.

Table 3: Shallow soil sampling summary

Sample ID	Site Details	Sample depth (m)	Sample description
BH-A	12/11/2018	0.66	Stiff orange, black clay
BH-B	12/11/2018	0.5	Black silt. C and D waste on banks
BH-C	12/11/2018	0.15	Gravelly loam/topsoil with bitumen fragments
BH-D	12/11/2018	0.15	Gravelly topsoil with bitumen fragments
BH-E	12/11/2018	0.25	Dark brown loam/topsoil, no gravels

Photographs taken during the inspection are provided in Appendix D.

5.3 Site inspection observations

The following observations were made during the site inspection:

- Brick fragments were observed on the southern portion of the site on the lower part of the bank adjacent to the water. Although the source of the brick is unknown, it could be associated with demolition of the nearby building
- The top of the levee along the southern side of the river was covered in bitumen. Three small areas of excavation are anticipated on each side of the levee (soil assessed in samples BH-C, BH-D and BH-E; Appendix A)
- No visual indications of contamination were observed throughout the site, such as impacted vegetation, staining or observed potential asbestos containing materials; and
- Access for collection of samples BH-A and BH-B (refer to sample location plan in Appendix A) was difficult due to the infestation of tall weeds along the banks. Sampling was restricted to areas of hard ground. The areas close to the river were very silty and soft and could pose a potential safety hazard during site works.

5.4 Chemical analysis

Soil samples were collected and dispatched (in chilled containers) under a chain of custody documentation to Australian Laboratory Services (ALS) in Springvale, VIC. The laboratory met in-house compliance under their quality assurance programs and is accredited by the National Association of Testing Authorities (NATA) for all analysis undertaken (where required). In addition, the laboratory performed inhouse quality assurance/quality control (QA/QC) programs. All soil samples were analysed for a comprehensive suite of determinates, which included:

- Metals
- Total petroleum hydrocarbons (TPHs)
- Polycyclic aromatic hydrocarbons (PAH)
- Benzene, toluene ethylbenzene, xylene (BTEX)
- Polychlorinated biphenyls (PCBs)
- Organochlorine pesticides (Ops); and
- Phenols.

No field QA/QC intra-laboratory, inter-laboratory, rinsate, field blank or trip blank samples were collected. Taking into account that soil sampling was undertaken to provide a preliminary indication of contaminant concentrations in areas likely to be disturbed, field QA/QC sampling was not considered to be the necessary.

If additional sampling is required for assessment or waste classification purposes, QA/QC sampling should be undertaken in accordance with the National Environmental Protection (Assessment of Site Contamination) Measure 1999 (NEPM 1999) and/or Tasmania Waste Classification (Version 3 2018) guidelines. The results of the chemical analysis are summarised in Table 4 and analytical reports are included in Appendix D.

Table 4: Summary of analytical results (mg/kg)

Analyte	Minimum concentration	Maximum concentration	Maximum total concentration Level 2 ⁽¹⁾	Sample locations exceeding criteria
Metals				
Arsenic	LOR	12	200	None
Barium	20	120	3,000	None
Beryllium	LOR	LOR	40	None
Cadmium	LOR	LOR	40	None
Chromium (total)	20	97	500	None
Chromium (IV)	LOR	LOR	200	None
Cobalt	LOR	26	200	None
Copper	9	60	2,000	None
Lead		3,000	1,200	BHE – 3,000 mg/kg
Manganese	36	593	5,000	None
Mercury (total)		0.4	30	None
Nickel	8	119	600	None
Selenium			50	None
Zinc	37	200	14,000	None
PAHS				
Benzo(a)pyrene	LOR	2.88	2	BHE – 2.8 mg/kg
Total PAHS	LOR	19.3	40	None

Analyte	Minimum concentration	Maximum concentration	Maximum total concentration Level 2 ⁽¹⁾	Sample locations exceeding criteria
TRH/BTEXN				
TRH C-6-C9	LOR	LOR	650	None
TRH C-10-C36 Fraction (sum)	LOR	LOR	5,000	None
Benzene	LOR	LOR	5	None
Toluene	LOR	LOR	100	None
Ethylbenzene	LOR	LOR	100	None
Xylene	LOR	LOR	180	None
Other				
Cyanide	4	LOR	4	None
Fluoride	150	70	3,000	None
Total PCBs	LOR	LOR	20	None
Sum of aldrin + dieldrin	LOR	LOR	200	None
Phenols	LOR	LOR	500	None

1. EPA Information Bulletin Number 105 (2012) Low Level Contaminated Soil – Level 2
2. Only contaminants with applicable criteria have been included
3. Limit of reporting (LOR)

For the purpose of the preliminary waste classification assessment, the sample collection, documentation, handling, storage and transportation procedures utilised were of an acceptable standard and the analytical results provided by the laboratories are deemed reliable and complete.

5.5 Preliminary assessment of analytical results

The soil analytical results were compared against the EPA Tasmania Classification and Management of Contaminated Soil for Disposal Guidelines – Information Bulletin Number 105 (Version 3 2018). With the exception of sample BH-E, all the analytical results were below the Low Level Contained Soil – Level 2' criteria. Concentrations of benzo(a)pyrene (2.88 mg/kg) and lead (3,000 mg/kg) were detected in sample BH-E above the respective Maximum Total Level 2 criteria.

Total Characteristic Leaching Procedure (TCLP) extraction and benzo(a)pyrene and lead analysis was subsequently scheduled on sample BH-E to allow classification against the maximum TCLP concentration criteria, which take precedence over the maximum total concentration. The TCLP benzo(a)pyrene concentration was below the LOR and the Level 2 waste criteria, however the TCLP lead concentration was 2 mg/L, which exceeded the 0.5 mg/L Level 2 TCLP maximum. Based on the TCLP analysis sample BH-E classifications remains as Contaminated Soil - Level 3.

6. Summary of potential contamination

Based on the review of available records, with the exception of the construction of the levees, no potentially contaminating activities have been identified to have occurred on site. The source of the material used to construct the levees is unknown, however anecdotal information suggested that it may have been derived from a nearby quarry. Aerial photographs indicate a small building on the southern bank was demolished between 2009 and 2018. The building may have contained hazardous materials, such as asbestos or lead paint, which may have been distributed in the surrounding area during the demolition process.

Based on the surrounding commercial/industrial land use, and the levees which required material to be imported onto the site, it is possible that contaminated soil and or groundwater may be present onsite.

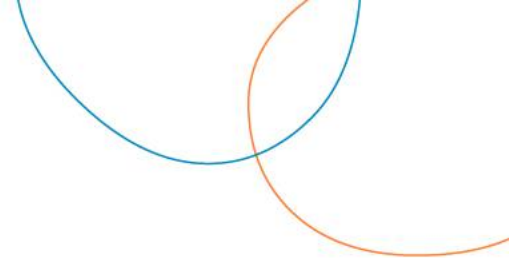
The potentially contaminating activities that have been identified at the site and on adjacent land have been summarised in Table 5 and Table 6 and a sample location plan is provided in Appendix A.

Table 5: Summary of potential sources of contamination at the site

Potentially contaminating activities	Potential contaminants	Media
Imported fill used to construct the levees and covering the site	Metals, hydrocarbons, PAHs, BTEX, PCBs, phenols	Soil
Demolition of small building	Asbestos, lead paint	Soil
Application of pesticides to control invasive weeds	Organochlorine Pesticides	Soil

Table 6: Summary of potential off-site historical sources of contamination

Address	Site activities	Potential contaminants of concern	Potentially affected media
2 Invermay Road	Launceston Railyards and workshops, concrete works, sporting grounds	TPH, BTEX, metals, PAHs, asbestos, OP, PCBs	Soils and groundwater
129-139 Invermay, 3-11 Dry Street Road, 32-38 Invermay Road	Petroleum Service Station	TPH, BTEXN, lead, PAHS	Soils and groundwater
1-9 Lindsay Street	Burial of hydrocarbon contaminated soil in levee	PAH, BTEXN	Soils
86 Cimitiere Street	Former light industrial area	Asbestos contaminants from adjacent sites	Soils and groundwater



7. Risk Assessment

7.1 Preliminary conceptual site model

A preliminary Conceptual Site Model (CSM) has been developed based on pitt&sherry's understanding of the site setting, in order to identify potentially significant source-pathway-receptor linkages with regard to human health and the environment (Figure 1).

Potential sources of on-site and off-site contamination and associated contaminants of concern have been identified in Table 5 and

Table 6. Contamination which may potentially be present at the site are as follows:

- Contaminants in soils and subsoils from imported material to construct the levees, from unreported site activities or uncontrolled imported fill (hydrocarbons, BTEXN, metals, PAHs, asbestos); and
- Contaminants in groundwater from previous past industrial activities Launceston Gasworks, UPSS, burial of contaminated soils, Launceston Railyards and workshops, concrete works (hydrocarbons, BTEXN, metals, PAHs, polychlorinated biphenyls (PCBs)).

Taking into account water ingress observed on nearby sites, groundwater depth is likely to be less than 2 m bgl with a flow direction towards the river channel.

The TASSI database indicated that the site has a high (>70%) chance of coastal ASS occurrence on the northern shore and a low to high (6% to 70%) chance on the southern shore. The human health and environmental risks associated with ASS disturbance are therefore required to be considered, in addition to contaminants.

Human receptors identified for the site are:

- Current recreational site users (members of the public)
- Future site users: (members of the public); and
- Workers during the construction of the bridge or during development works.

Off-site identified ecological receptors are:

- Aquatic ecological receptors (flora and fauna) in North Esk River (which dissects the site); and
- Derwent Estuary (1 km).

No site terrestrial ecological receptors (flora and fauna) have been identified due to the absence of identified protected species and limited current or future vegetation.

The identified potential pathways by which human receptors may be exposed to contaminants are:

- Direct contact (dermal contact/ingestion) with contaminants in surface soils and/or sub-surface soils (construction workers)
- Inhalation (dust inhalation or hydrocarbon vapours) with contaminants in surface soils and/or sub-surface soils (construction workers); and
- Inhalation of hydrocarbons from contaminated groundwater (all users).

The identified potential pathways by which ecological receptors may be exposed to contaminants are:

- Migration of contaminated groundwater.

7.2 Preliminary risk evaluation

The Preliminary Conceptual Site Model graphically displayed in Attachment 1 seeks to identify possible pollutant linkages which may eventuate due to the disturbance, excavation and removal of soil during the proposed bridge construction works. The likely risks are assessed on a qualitative basis according to a 'source-pathway-receptor approach'. Risks are classified as 'low and acceptable' or 'potential risks'. The adopted risk categories are defined as follows:

- **Low acceptable Risks** – it is considered unlikely that the identified pathway represents a significant risk; and
- **Potential Risks** – there is a possibility that the identified pathway represents an unacceptable risk requiring further investigation and/or the implementation of mitigation control measures.

Based on the desktop information gathered, the limited shallow soil sampling and the Preliminary Conceptual Site Model, the risk to the each of the identified receptors has been assessed as follows:

- **Risk to construction workers:** workers engaged in construction activities may potentially be exposed to contaminants in surface soils and sub-soils during excavation. Workers carrying out excavation work may also potentially be exposed to hydrocarbon vapours from contaminated soil and/or groundwater (if present). The risk to construction workers from contaminated soil is considered low based on the limited soil sampling undertaken and implementation of a Construction Environmental Management plan (CEMP) which should be prepared prior to any soil disturbance or soil excavation. The CEMP should include protection measures for workers and management measures for potentially contaminated soil.
- **Risk to current and future site users:** the risk to site users by direct contact with contaminated soil is considered to be low based on the understanding that excavated soil will be removed offsite and any freshly exposed soil after the development will be revegetated. However, the desktop study and preliminary sampling indicated the potential for soil and/or groundwater contamination to be present onsite, excavated soil should be treated as potentially contaminated and appropriately stored until visually inspected and tested by a competent person to verify the absence of significant contamination. If soil is encountered which is not consistent with the material sampled, or there are visual or olfactory signs of contamination such as staining, discolouration or hydrocarbon odours, appropriate control should be implemented to prevent the potential spread of contamination.
- **Risk to ecological receptors:** Based on the absence of threatened or significant terrestrial flora or fauna on the site, the risk to these ecological receptors from contamination emanating from the site is considered to be low. Because the North Esk River passes through the site and piles will be advanced in the river channel, there is considered to be a potential risk to aquatic ecological receptors associated with potentially contaminated soil and/or groundwater. In addition, parts of the site have a high probability of encountering coastal ASS within the upper 1 m. The northern river shore, and a strip on the southern shore close to the river, have a >70% chance of occurrence. However, no excavation will occur in these areas. The remainder of the site on the southern side of the river have a low probability of coastal ASS occurrence, which corresponds to a 6-70% chance of occurrence. Minimal soil excavation is proposed in these areas and no ASS management plan is considered necessary. However regular visual monitoring of the works area to identify signs of ASS oxidation should be included in the CEMP.

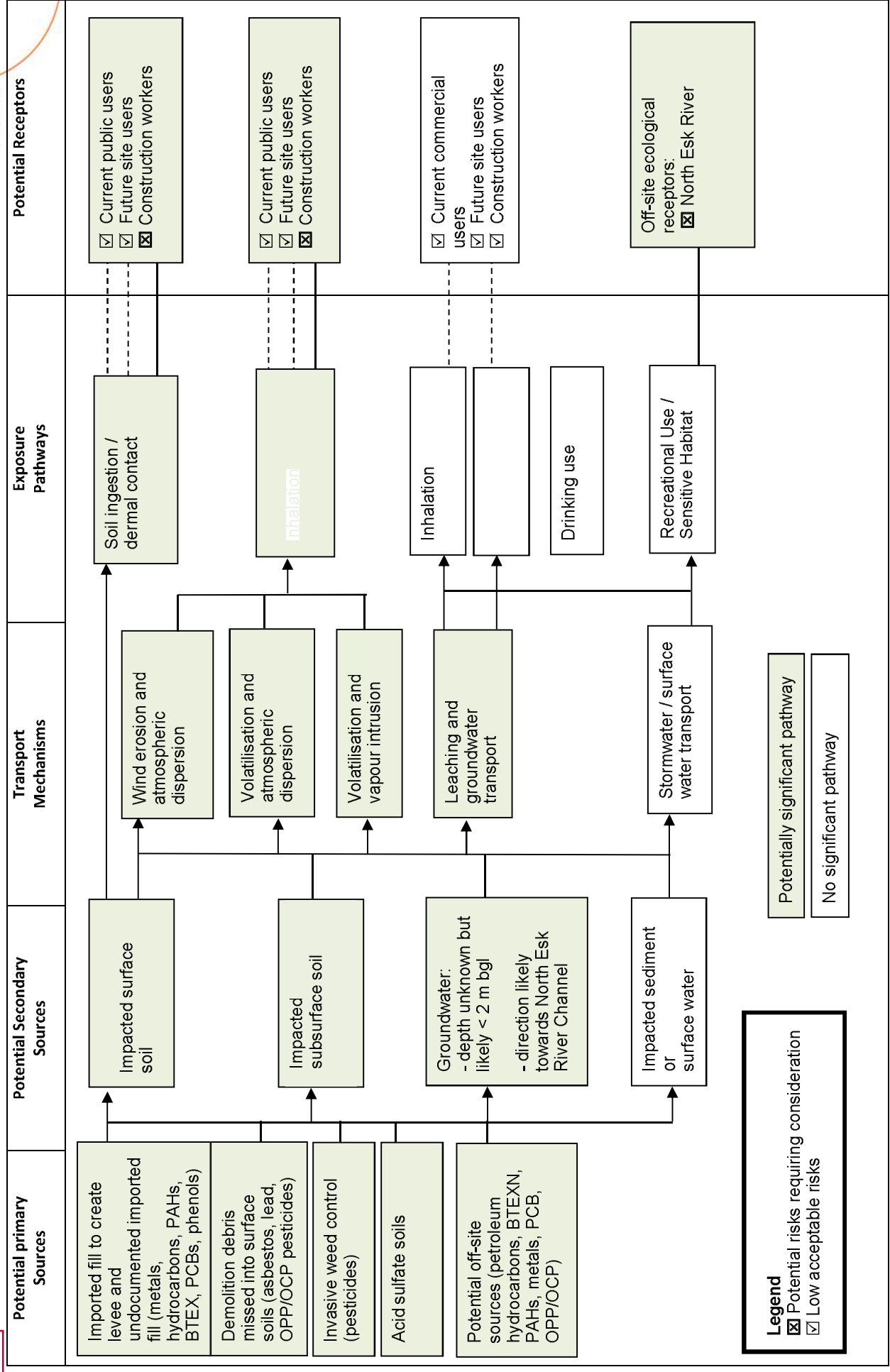


Figure 1: Preliminary conceptual site model

8. Uncertainties and data gaps

In addition to the above potential contamination linkages, some uncertainties currently exist relating to the following:

- The thickness and composition of fill associated with the levees
- The aquifer properties, the depth to groundwater and direction of groundwater flow
- The presence or absence of contaminated groundwater, which may have migrated onto the site from offsite sources; and
- The potential lateral and vertical extent of acid sulfate soils.

9. Conclusions and recommendations

This report presents the findings of a Phase 1 Environmental Site Assessment undertaken by pitt&sherry to support the construction of a proposed pedestrian-cycle bridge at the Invermay Campus, Launceston.

The assessment consisted of a site history review, site inspection and limited soil sampling and chemical analysis to identify potentially contaminated areas and specific contaminants of concern.

A summary of the information gained through this assessment is as follows:

- The site historical review indicated no contaminating activities directly associated with the site, however contaminated soil may have been transported onto the site during the construction of the flood levees
- There are no records documenting the demolition of the small building on the southern side of the river, therefore hazardous materials which may have been in the building may have been distributed in surface soils onsite
- The review of historical records indicated the presence of contamination in nearby sites and activities commonly associated with contamination. These activities included the Inveresk Railyard and workshops, concrete works, UPSS, Launceston Gasworks and the burial of hydrocarbon contaminated soil; and
- The following potential contamination was identified at the site:
 - o Metals, PAH, TPHs, BTEX, PCBs, OPs and phenols.

A preliminary conceptual site model was developed based on the information gained to date and it was determined that there was a potentially significant risk to the following receptors without with implementation of appropriate controls of further investigation:

- Construction workers, due to the potential for contaminants to reside in soils and groundwater onsite; and
- Ecological aquatic receptors, due to the potential for contaminants to reside in soils and groundwater onsite.

Notwithstanding this, the identified risks are considered to be acceptable, given that:

- The limited soil sampling undertaken does not indicate significant lateral migration of offsite sources of historical contamination in shallow soils. In addition, remediation works which are reported to have been undertaken on many of the adjacent sites following the cessation of heavy industrial activities further reduces the risk of offsite migration; and
- No records of potentially contaminating activities were identified on the in the EPA PIRs.

Based on the reviewed historical information, the site inspection and limited soil sampling the implementation of the following protection measures are considered necessary to ensure that any contamination present at the site will not present an unacceptable risk to human health or the environment in relation to the proposed development:

- A Construction Environmental Management plan (CEMP) should be prepared prior to any soil disturbance or soil excavation. The CEMP should include and unexpended finds protocol and protection measures for workers in relation to encountering potentially contaminated soil and groundwater. The CEMP should also include regular visual monitoring of the works area to identify signs of acid sulfate soil oxidation.
- Due to the potential for soil and/or groundwater contamination to be present onsite, disturbed soil should be visually inspected by a competent person to verify the absence of significant contamination.
- An Unexpected Finds Protocol should be prepared and implemented where suspected contaminated or hazardous materials are encountered during excavation works.
- A Surface Water and Sediment Management Plan should be implemented prior to soil disturbance or excavation to prevent surface water or sediments from entering the North Esk River.
- Due to the variability of in-situ soil waste classification, excavated soils should be treated as potentially contaminated and appropriately stored on site until a visual inspection of the material and sampling for waste classification purposes in accordance with EPA Tasmania Classification and Management of Contaminated Soil for Disposal Guidelines have been completed.

Based on the review of historical information and ESA, and with the implementation of the above protection measures, site contamination is not considered likely to present a risk to workers or the environment.

10. Important information

10.1 Scope of services

This report (“the Report”) has been prepared in accordance with the scope of services set out in the contract, or as otherwise agreed, between the client and pitt&sherry (“the scope of services”). In some circumstances the scope of services may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints. The Report may only be used and relied on by the client for the purpose set out in the contract or as otherwise agreed between the client and pitt&sherry. Any use which a third party makes of this document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties.

10.2 Reliance on data

In preparing the Report, pitt&sherry has relied upon data, surveys, analyses, designs, plans and other information provided by the client and other individuals and organisations, most of which are referred to in the Report (“the data”). Except as otherwise stated in the Report, pitt&sherry has not verified the accuracy or completeness of the data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the Report (“conclusions”) are based in whole or part on the data, those conclusions are contingent upon the accuracy and completeness of the data. pitt&sherry does not warrant the accuracy will not be liable in relation to conclusions should any of the data, be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to pitt&sherry.

10.3 Conclusions and recommendation

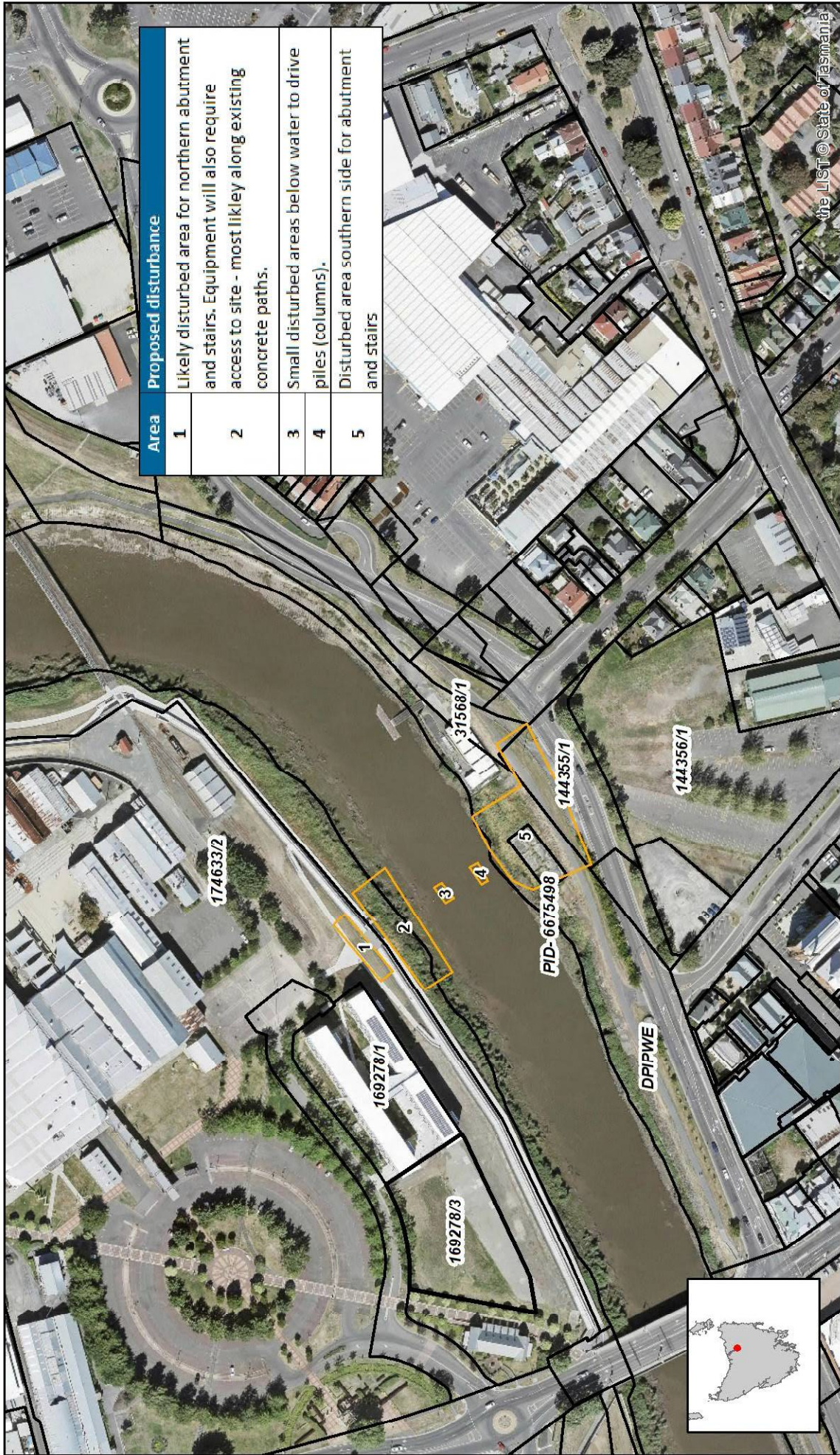
The conclusions in this Report are based on conditions encountered and information reviewed at the date of preparation of the Report. pitt&sherry has no responsibility or obligation to update this Report to account for events or changes occurring subsequent to the date that the Report was prepared.

11. References

- (2018), Environment Protection Authority Tasmania.
- Contamination Site Assessment (Tier 1 Screening Level) (2014), GeoTon Pty Ltd Geotechnical Consultants.
- Geotechnical Foundation Investigation UTAS Inveresk Residence, Invermay (2014), GeoTon Pty Ltd Geotechnical Consultants.
- Inveresk Railway Workshops Soil Stockpile Remediation Advice, (1995) Stephenson EMF Consultants Engineers and Managers.
- Inveresk Railway Workshops Development, Groundwater Monitoring Program, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.11 September, October, November, December, January, February, March, Report No. 95MREP/11, (1998) SEMF Holdings Pty Ltd.
- Inveresk Railway Workshops Development, Monthly Report No.9 August, September, October, November, December, Report No. 95MREP/09, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.7 January, February, March, Report No. 95MREP/07, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.6 December, Report No. 95MREP/06, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.5 November, Report No. 95MREP/05, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.4 October, Report No. 95MREP/04, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.3 September, Report No. 95MREP/03, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.2 August, Report No. 95MREP/02, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Monthly Report No.1 July, Report No. 95MREP/01, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Development, Management of Site Remediation Report No. 95/01, (1995) Stephenson EMF Consultants Engineers and Managers
- Inveresk Railway Workshops Site Redevelopment Groundwater and Soil Remediation Environmental Performance Review, (1994) Stephenson EMF Consultants Engineers and Managers
- Launceston City Council, Inveresk Railyard Status of Site Remediation, (1999), SEMF Holdings Pty Ltd; and
- National Environment Protection (Assessment of Site Contamination) Measure 1999 ('NEPM' - amended 2013).

Figures

Appendix A



Area	Proposed disturbance
1	Likely disturbed area for northern abutment and stairs. Equipment will also require access to site - most likely along existing concrete paths.
2	Small disturbed areas below water to drive piles (columns).
3	Disturbed area southern side for abutment and stairs
4	
5	

the LIST © State of Tasmania

UTAS

Site Location Plan



Legend

- Proposed bridge design disturbance
- Land Parcels (title reference)

N
 0 15 30 60 Meters
 Coordinate System: GDA 1994 MGA Zone 55
 1:2,636 When Printed at A4

MAP REF	LN18249R3	DATA	Base map from The LIST
REVISION	B	SOURCES	Base data from The LIST
AUTHOR	Klawrence		Tasmanian Government
DATE	26/06/2019		



UTAS

Inveresk Pedestrian Cycle Bridge
Sampling Locations

pitt&sherry



Coordinate System: GDA1994 MGA Zone 55
1:843 When Printed at A4

MAP REF	LN18249 R2	DATA	Base map from The LIST
REVISION	B	SOURCES	Base data from The LIST
AUTHOR	Klawrence		Tasmanian Government
DATE	25/06/2019		

Legend

- Proposed bridge design disturbance
- ▲ Borehole/soil samples

Historical Aerial Photographs

Appendix B

Aerial Photographs

14/11/1973 Scale 1:15,500



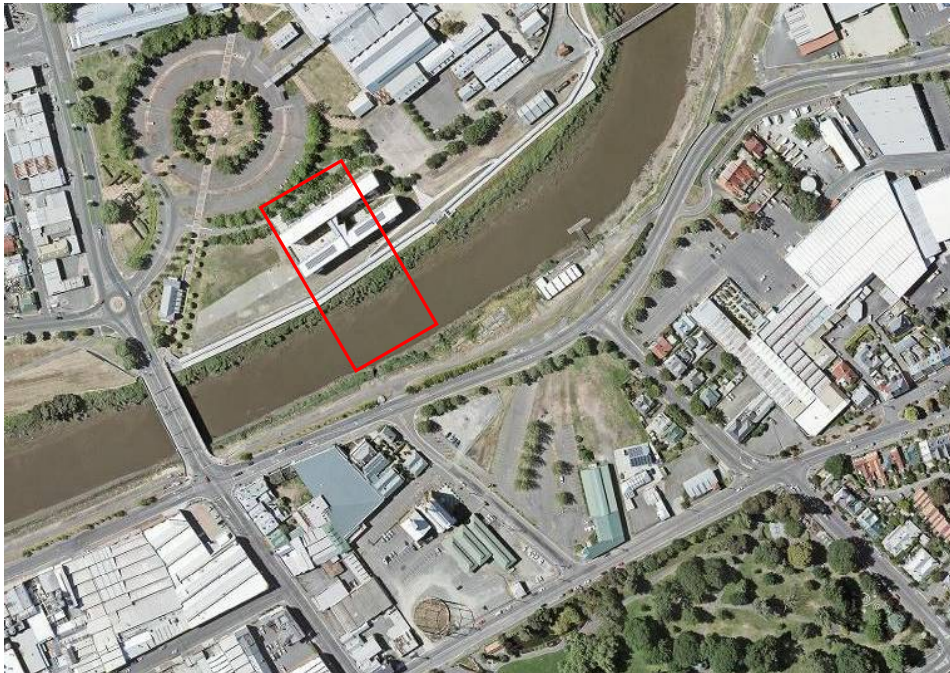
26/02/1992 Scale 1:12,500



08/03/2009 Scale 1:7,000



2018 – The List State Aerial Photograph



Property Title Information

Appendix C

Level 7, 134 Macquarie Street, Hobart TAS
GPO Box 1550, Hobart, TAS 7001 Australia



Enquiries: Contaminated Sites Unit
Phone: (03) 6165 4599
Email: contaminatedsites@epa.tas.gov.au
Web: www.epa.tas.gov.au
Our Ref: (EN-EM-AV-100706_38: H966289) sma
Your Ref: PLNH00047

5 November 2018

Ms Katie Lawrence
Pitt and Sherry
Level 1 Surrey House
199 Macquarie Street
HOBART TAS 7000

Dear Ms Lawrence

**PROPERTY INFORMATION REQUEST
2 Invermay Road, Invermay
PID 3389971**

On 13 September 2018, the Contaminated Sites Unit received your Property Information Request relating to the land referred to above ('the Site'). A search of relevant databases and records has been undertaken.

The Site historically hosted the Launceston railyards and workshops, Pioneer Concrete works and sporting grounds. It now hosts the Launceston Showgrounds, Queen Victoria Museum and the University of Tasmania Inveresk Campus.

EPA Tasmanian has numerous volumes of documents regarding the redevelopment and repurposing of the Site during the 1990s. These include, but are not limited to:

- *Environmental Audit - Inveresk Railway Workshops Redevelopment project Launceston Tasmania for Launceston City Council Volume 1: Site History*, dated February 1992, prepared by Dames and Moore
- *Queen Victoria Museum and Art Gallery - Inveresk Railyard Redevelopment - Contamination Assessment Report - Land*, dated June 1999, prepared by SEMF
- *Queen Victoria Museum and Art Gallery - Inveresk Railyard Redevelopment - Contamination Assessment Report - Buildings*, dated June 1999, prepared by SEMF
- *Launceston City Council August 1999 York Park Environmental Site assessment*, prepared by SKM
- *Department of State Development - Inveresk Railyard Redevelopment Project - Site Management Plan*, dated August 2000, prepared by SEMF

There are also records relating to neighbouring properties:

129-139 Invermay Road

- Historic WorkSafe Tasmania (WST) records indicate that dangerous goods were stored in underground storage tanks (USTs) at the property between 1949 and 1960. The record refers to WST file number N27.
- EPA Tasmania received notification in September 1999 of an incident at the Mobil Service Station having the potential to cause harm. Approval to remove the contaminated soil to Remount Road was given in 2000.

Currently the property hosts a United Petroleum Service Station with four active UPSS with a total volume of 85,000L.

103 Invermay Road

- Six UPSS were registered at the Coles Express Service station in September 2010. EPA Tasmania received advice that three Underground Storage Tanks were removed and another decommissioned in situ at the property in November 2011 due to leaking.
- Remediation Notice 8655/1 (RN) was issued in July 2013 to require further works to address petroleum hydrocarbon contamination in groundwater and vapour risk concerns. The RN was revoked in November 2014.
- EPA Tasmania hold several documents regarding this property. The most recent is:

Environmental Site Assessment - Coles Express Invermay Service Station - 103 Invermay Road Invermay, dated 31 March 2014, prepared by ERM

3-11 Dry Street

- Three UPSS were registered at the Caltas Petrol Station in June 2010.
- A decommissioning form stated that two UPSS were removed in December 2015

32-38 Invermay Road

- Four UPSS with a total volume of 89,000L are registered at the Caltas service station.

1-19 Lindsay Street (Scottsdale Levee)

- Site Management Notice 8655/1, relating to the burial of approximately 300 m³ of hydrocarbon contaminated Soil, is registered on the property.
- EPA Tasmania holds the following report regarding the contaminated soil:

Summary Report - Burial of PAH Contaminated Soil Scottsdale Levee, dated October 2011, prepared by Pitt and Sherry

No other records relating to contamination or potentially contaminating activities at the Site or adjacent properties were found.

The search of records is restricted to those held by EPA Tasmania and includes records relating to: The *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2010*; Industrial Sites (which are or have been regulated by EPA Tasmania); historical landfills; and contamination issues reported to the Contaminated Sites Unit. In addition, the Incidents and Complaints database and records relating to the historical storage of dangerous goods (as detailed below) are searched.

WorkSafe Tasmania (1300 366 322 or wstinfo@justice.tas.gov.au) may have issued dangerous goods licences and/or may hold relevant records for the Site and adjoining properties. As the storage of dangerous goods/fuels is an environmentally relevant activity, you may wish to contact them for further information.

Please note that the dangerous goods licensing records referred to by EPA Tasmania are for sites with underground storage tanks that ceased holding Dangerous Goods Licences prior to 1993. WorkSafe Tasmania hold the records for these Licences after 1993.

EPA Tasmania does not hold records on all sites that are or may be contaminated. You should consider obtaining a site history to determine the likelihood of contamination. If contamination on the Site or an adjacent property is considered likely, further assessment by a competent environmental assessment practitioner is recommended. Site assessments should be conducted in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council (or as varied). <http://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/contaminated-site-assessment>

Please note since 1 July 2015, the Director has required all environmental site assessments and reports submitted to the Contaminated Sites Unit for consideration to be prepared by a person certified as a specialist contaminated sites consultant under a scheme approved by the Director. Effective 30 June 2018, the endorsed scheme is operated by Certified Environmental Practitioners (CEnvP): Consultants certified under this scheme are approved to use the seal **CEnvP Site Contamination**. <https://www.cenvp.org>.

Further details are available at: <http://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/engaging-a-contaminated-site-assessment-consultant>.

As local councils are able to issue Environment Protection Notices, Environmental Infringement Notices and record complaints, you may wish to contact them for additional information that may be relevant to the site. Further, if the Site has historically been subject to a permit under the *Land Use Planning and Approvals Act 1993*, the Council would have issued the permit.

Under the *Right to Information Act 2009* (RTI Act), you are entitled to apply for any records mentioned within this letter such as reports, letters, or other relevant documents. For further information on how the RTI process works and how to request information under the RTI Act please visit the Department of Primary Industries, Parks, Water and Environment website.

If you are purchasing a property, you should consider Part 5A of the *Environmental Management and Pollution Control Act 1994* (EMPCA) which defines and specifies requirements for managing contaminated sites. If there is reason to believe the site is, or is likely to be, contaminated there are certain requirements that you must meet (e.g. notification of a likely contaminated site to the Director, EPA as outlined in section 74B of the EMPCA).

Although all due care has been taken in the preparation of this letter, the Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided. The Crown and its servants or agents accept no responsibility for any loss or damage arising from reliance upon this letter, and any person relying on the letter does so at their own risk absolutely.

As you are aware, property searches incur a charge of \$237.00. An invoice is enclosed.

If you have any queries in relation to the matters above, please contact the Contaminated Sites Unit using the details at the head of this correspondence or refer to the EPA website at www.epa.tas.gov.au and click on 'Regulation' to locate information on Underground Fuel Tanks and Contaminated Sites.

Yours sincerely



Bruce Napier
ENVIRONMENTAL OFFICER - CONTAMINATED SITES

Email: sleroux@pittsh.com.au
klawrence@pittsh.com.au

Attachment: Invoice



PLANNING EXHIBITED DOCUMENTS
 Ref No: DA 0312/2019
 Date advertised: 21/09/2019
 Planning Administration: *DMES*

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Level 7, 134 Macquarie Street, Hobart TAS
 GPO Box 1550, Hobart, TAS 7001 Australia



Enquiries: Contaminated Sites Unit
 Phone: (03) 6165 4599
 Email: contaminatedsites@epa.tas.gov.au
 Web: www.epa.tas.gov.au
 Our Ref: (EN-EM-AV-100706_38: H966323) sma

5 November 2018

Ms Katie Lawrence
 Pitt and Sherry
 Level 1, Surrey House
 199 Macquarie Street
 HOBART TAS 7000

Dear Ms Lawrence

PROPERTY INFORMATION REQUEST
86 Cimitiere Street, Launceston and associated land
Certificate of Title: 144356/1, 144355/1 and 31568/2

On 13 September 2018, the Contaminated Sites Unit received your Property Information Request relating to the land referred to above (the Site). A search of relevant databases and records has been undertaken.

The Site is in a former light industrial area of Launceston and is adjacent to the former Launceston Gasworks site and service stations.

EPA Tasmania received a number of environmental assessment reports on the Site prepared by SEMF as part of a development application seeking site sign off from the Director of Environmental Management (the Director); including:

- *Woolworths Development, Willis Street, Launceston - Groundwater Investigation Report, dated November 2006, by SEMF Pty Ltd (SEMF) ('the groundwater report');*
- *Woolworths Development, Willis Street, Launceston - Health Risk Assessment, dated December 2006, by SEMF ('the HRA');* and
- *Woolworths Development, Willis Street, Launceston - Site Management Plan, dated December 2006, by SEMF ('the SMP').*

In a letter dated 21 December 2006 the Director provided comments regarding the submitted reports (See Attachment 1) and advised that Site sign off would not be granted until a signed agreement between the Launceston City Council and the landowner was received.

No further records or requests for sign-off for the Site were found, however records regarding neighbouring properties were located.

To the west of the Site is the former Launceston Gasworks site, which was located on Willis Street, between Boland Street and Cimitiere Street. EPA Tasmania has nine volumes of reports relating to coal gas production at the site, which ceased in 1996, and the subsequent decommissioning and rehabilitation of the site (1999-2007).

¹ Australian and New Zealand Environment and Conservation Council 2000

Environmental Protection Notice (EPN) 696/1 was issued in September 2003 to regulate the environmental works relating to soil contamination and groundwater monitoring. The chemicals of concern were PAH's, BETX, TPH, phenols, ammonia and cyanide arising from tar and other liquid wastes. Please note that EPN 696/1 included **12 Boland Street** (CT 123976/2) which adjoins the Site.

The report; "*Former Launceston Gasworks – Groundwater Monitoring Investigations, September 2006*" prepared by Earth Tech Engineering Pty Ltd and dated November 2006 was received on 28 November 2006 and included a request to cease groundwater monitoring.

The Director concurred with the request in a letter dated 11 Jan 2007 (see Attachment 2) and the EPN was withdrawn.

68-76 Cimitiere Street hosted the *Shell City Park Service Station* that ceased trading in January 1996. All infrastructure was removed and environmental site assessments were conducted between 1996 to 1999.

EPA Tasmania holds several reports relating to this site including:

Former Shell Launceston City Park Service Station Site Validation Report. 68-76 Cimitiere Street Launceston Tasmania dated September 1999, prepared by IT Environmental Aust. Pty Ltd

In a letter, dated 17 Jan 2000, to Launceston City Council regarding Development Application DA 566/99 the Acting Director advised the following:

"The future use of the site is as a vehicle tinting service and carpark. As notification of environmental harm (under Section 33 of the Environmental Management and Pollution Control Act 1994 [EMPCA] has not been received for this site and it is not being redeveloped for a more sensitive use"

"On review of these reports I am satisfied that there is no evidence of environmental harm (as defined in EMPCA1994) occurring on or off the site."

EPA Tasmania received a decommissioning form for the removal of an underground petroleum storage system at **4-6 Boland Street** in March 2018. No ongoing contamination concerns were raised

Historic WorkSafe Tasmania (WST) record indicates that between 1947 and 1956 dangerous goods were stored in underground storage tanks (UST) at neighbouring properties **13 Tamar Street** and **15-21 Tamar Street**. The record refers to file number L163.

In August 2018, EPA Tasmania approved a request for the City of Launceston to dispose of 4,972 tonnes of low-level contaminated soil excavated during streetscape works in Cimitiere Street. Level 2 total petroleum hydrocarbons and leachable PAH including Benzo(a)pyrene.

No further records relating to contamination or potentially contaminating activities at the Site or adjacent properties were found.

The search of records is restricted to those held by EPA Tasmania and includes records relating to: The *Environmental Management and Pollution Control (Underground Petroleum Storage Systems) Regulations 2010*, industrial Sites (which are or have been regulated by EPA Tasmania), historical landfills and contamination issues reported to the Contaminated Sites Unit. In addition, the Incidents and Complaints database and records relating to the historical storage of dangerous goods (as detailed below) are searched.



WorkSafe Tasmania (1300 366 322 or wstinfo@justice.tas.gov.au) may have issued dangerous goods licences and/or may hold relevant records for the Site and adjoining properties. As the storage of dangerous goods/fuels is an environmentally relevant activity, you may wish to contact them for further information.

Please note that the dangerous goods licensing records referred to by EPA Tasmania are for sites with underground storage tanks that ceased holding Dangerous Goods Licences prior to 1993. WorkSafe Tasmania hold the records for these Licences after 1993.

EPA Tasmania does not hold records on all sites that are or may be contaminated. You should consider obtaining a site history to determine the likelihood of contamination. If contamination on the Site or an adjacent property is considered likely, further assessment by a competent environmental assessment practitioner is recommended. Site assessments should be conducted in accordance with the *National Environment Protection (Assessment of Site Contamination) Measure 1999*, National Environment Protection Council (or as varied). <http://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/contaminated-site-assessment>

Please note since 1 July 2015, the Director has required all environmental site assessments and reports submitted to the Contaminated Sites Unit for consideration to be prepared by a person certified as a specialist contaminated sites consultant under a scheme approved by the Director. Effective 30 June 2018, the endorsed scheme is operated by Certified Environmental Practitioners (CEnvP): Consultants certified under this scheme are approved to use the seal **CEnvP Site Contamination**. <https://www.cenvp.org>.

Further details are available at: <http://epa.tas.gov.au/regulation/contaminated-sites/identification-and-assessment-of-contaminated-land/engaging-a-contaminated-site-assessment-consultant>.

As local councils are able to issue Environment Protection Notices, Environmental Infringement Notices and record complaints, you may wish to contact them for additional information that may be relevant to the site. Further, if the Site has historically been subject to a permit under the *Land Use Planning and Approvals Act 1993*, the Council would have issued the permit.

Under the *Right to Information Act 2009* (RTI Act), you are entitled to apply for any records mentioned within this letter such as reports, letters, or other relevant documents. For further information on how the RTI process works and how to request information under the RTI Act please visit the Department of Primary Industries, Parks, Water and Environment website.

If you are purchasing a property, you should consider Part 5A of the *Environmental Management and Pollution Control Act 1994* (EMPCA) which defines and specifies requirements for managing contaminated sites. If there is reason to believe the site is, or is likely to be, contaminated there are certain requirements that you must meet (e.g. notification of a likely contaminated site to the Director, EPA as outlined in section 74B of the EMPCA).

Although all due care has been taken in the preparation of this letter, the Crown gives no warranty, express or implied, as to the accuracy or completeness of the information provided. The Crown and its servants or agents accept no responsibility for any loss or damage arising from reliance upon this letter, and any person relying on the letter does so at their own risk absolutely.

As you are aware, property searches incur a charge of \$237.00. An invoice is enclosed.



If you have any queries in relation to the matters above, please contact the Contaminated Sites Unit using the details at the head of this correspondence or refer to the EPA website at www.epa.tas.gov.au and click on 'Regulation' to locate information on Underground Fuel Tanks and Contaminated Sites.

Yours sincerely



Bruce Napier
ENVIRONMENTAL OFFICER - CONTAMINATED SITES

Email: sleroux@pittsh.com.au
klawrence@pittsh.com.au

Attachment: Invoice
Attachment 1
Attachment 2



DEPARTMENT of
TOURISM, ARTS *and the* ENVIRONMENT

ENVIRONMENT DIVISION

Enquiries: Jeff Miller
Phone: 6233 2782
Email: jeffrey.miller@environment.tas.gov.au
Our Ref: 109299:(EWM\Contam\willis street_launceston09_let) tm

9 December
21 November 2006

Mr Jeff Reynolds
Tasmania Manager
MCD Australia Pty Ltd
Level 3, 85 Macquarie Street
HOBART TAS 7000

FAXED

Facsimile: (03) 6234 9799

Dear Mr Reynolds

Woolworths Development, Willis Street, Launceston, Tasmania

The Environment Division received the following documents in reference to the proposed Woolworths Development located along Willis Street, Launceston, Tasmania ('the site'):

- *Woolworths Development, Willis Street, Launceston - Groundwater Investigation Report*, dated November 2006, by SEMF Pty Ltd (SEMF) ('the groundwater report');
- *Woolworths Development, Willis Street, Launceston - Health Risk Assessment*, dated December 2006, by SEMF ('the HRA');
- *Woolworths Development, Willis Street, Launceston - Site Management Plan*, dated December 2006, by SEMF ('the SMP');
- A draft 'Part 5 Agreement' under the Land Use Planning and Approvals Act 1993 dated 15 December 2006, by Mallesons Stephen Jaques ('the draft Agreement').

It is understood that the above documents have been submitted to this Division for site sign-off for the redevelopment of the site. These documents have been reviewed and comments are provided below.

The groundwater report details an additional groundwater investigation conducted in the southern and south eastern areas of the site. This additional investigation was needed to ensure that contaminated groundwater has not migrated on to the site from off-site locations. It is noted that, as with the initial investigation, groundwater at the site contains manganese concentrations and pH values outside Australian Drinking Water Quality Guidelines, as well as concentrations of ammonia and iron above the ANZECC 2000¹ Water Quality Guidelines for recreational purposes. Based on the results above, it was recommended that groundwater use on the site is to be controlled to ensure that no groundwater is extracted or used for any purpose.

¹ Australian and New Zealand Environment and Conservation Council 2000

The HRA details the results of a site-specific health risk assessment performed on the site. The report was prepared to ensure that any risks to site occupiers were adequately identified and controlled. The SMP presents a summary of environmental risk management practices to be implemented during and after the construction at the site to address risks presented by the contamination identified at the site.

It is noted that the HRA was completed in accordance with Australian Standard 4360 (AS4360), and not Schedule B (4) of the NEPM² as requested in correspondence from this Division dated 2 November 2006. While the risk assessment model outlined in AS4360 is not generally accepted by the Contaminated Sites Unit for use in assessing risk at contaminated sites, this Division concurs that the level of risk identified in the HRA is able to be satisfactorily controlled through the implementation of the environmental risk management measures outlined in the SMP.

It is understood that an Agreement, to be entered into between Sandhurst Trustees Limited (the owner) and Launceston City Council (Council) under the Tasmanian Land Use Planning and Approvals Act 1993, will formalise the recommendations outlined in the SMP. I have reviewed the draft Agreement and I am satisfied the specific environmental management sections (specifically Recital C, and Clauses 3 and 4) adequately describe the environmental risk management measures necessary for the proposed future use of the site.

Please note that this letter does not constitute a sign-off for the site. Sign-off will only be granted when this Division receives confirmation that the Agreement has been finalised and signed by both the owner and Council. Further, sign-off will only be granted on the basis that site management will not vary from that specifically described within the final SMP dated 13 December 2006 and the proposed land use as shown in Appendix B of the report *Woolworths Development, Willis Street, Launceston, Site History*, dated 21 September 2006 by SEMF.

I look forward to receiving confirmation that the Agreement has been finalised. Once this has occurred, the Environment Division will be in a position to provide you with a site sign-off letter.

As you are aware there is a charge for report review. The review of the above documents involved eight hours of officer time at an hourly rate of \$99.82 (excluding GST). An invoice will be sent to you separately.

If you require any further information regarding this matter, please contact Jeff Miller on (03) 6233 2782.

Yours sincerely



Mr Floyd Browne
DIRECTOR OF ENVIRONMENTAL MANAGEMENT

- cc: Ms Carly Harington, Environmental and Safety Scientist, SEMF Pty Ltd, 45 Murray Street, HOBART TAS 7000
- cc: Planning Officer, Launceston City Council, PO Box 396, LAUNCESTON TAS 7250



² National Environment Protection Measure for the Assessment of Site Contamination 1999

DEPARTMENT of
TOURISM, ARTS and the ENVIRONMENT

ENVIRONMENT DIVISION

Enquiries: Jeff Miller
Phone: (03) 6233 2782
Email: Jeffrey.Miller@environment.tas.gov.au
Our Ref: 030662: (M:\ENV\EE0\EWM\Sh\CONTAM\gascorp48_let) tm

11 January 2007

Ms Ada Cinaglia
Asset Management Services
Origin Energy
1 Wood Street
THOMASTOWN VIC 3074

FAXED
11 Jan 07
of invoice to Carol

Facsimile: (03) 9463 8219

Dear Ms Cinaglia

Former Launceston Gasworks Remediation Project: Application to Cease Groundwater Monitoring

The Environment Division received a report by Earth Tech Engineering Pty Ltd entitled *Former Launceston Gasworks – Groundwater Monitoring Investigation, September 2006*, dated November 2006 ('the report'). The report details the results of the latest groundwater monitoring investigation (GMI) as required by Environment Protection Notice (EPN) 696/1 and contains a request that the requirement for ongoing groundwater monitoring be lifted.

In the report, results from the current GMI are compared to previous groundwater monitoring events undertaken both before and after the completion of site remedial works in March 2005. Additionally, analytical results for geochemical parameters are presented to identify the potential for natural attenuation of the remaining dissolved phase groundwater contamination at the site.


The results of this most recent GMI show a continuing trend of generally decreasing concentrations for a majority of target contaminants in selected monitoring wells at the site. Additionally, historically clean wells have remained so since the completion of remedial works. Finally, the results from the geochemical analysis are indicative of the conditions required for natural attenuation.

Given the above, I am pleased to inform you that the Environment Division accepts your application to cease further groundwater monitoring and is now satisfied that all conditions of EPN 696/1 have been complied with in full. Please find attached an Environmental Protection Notice Compliance Certificate for your records. Also, please note that a Certificate of Cancellation for the EPN will be sent to the Tasmanian Land Titles Office which will result in the subsequent removal of the EPN from the Land Title.

As you are aware there is a charge for report review. The review of the above report involved three hours of officer time at an hourly rate of \$90.75 (excluding GST). An invoice will be sent to you separately.

The Environment Division thanks you and your consultant for your professional and diligent management of this site. If you require any further information regarding this matter, please contact Jeff Miller on (03) 6233 2782.

Yours sincerely



Floyd Browne
DIRECTOR OF ENVIRONMENTAL MANAGEMENT

- cc: Adele Gliddon, Senior Environmental Health Officer, Launceston City Council, PO Box 396, LAUNCESTON TAS 7250
- cc: Paul Carstairs, Project Manager, Earth Tech Engineering Pty Ltd, 71 Queens Road, MELBOURNE VIC 3004



Attachment 1

Environment Protection Notice Compliance Certificate



Tasmania

Department of Tourism, Arts and the Environment

ENVIRONMENT PROTECTION NOTICE COMPLIANCE CERTIFICATE

Issued under the Environmental Management and Pollution Control Act 1994

Environment Protection
Notice Number:

696/1

Date of Issue:

16 September 2003

Issued to:

Origin Energy Tasmania Ltd ACN 009 539 753 situated at
Level 6, 1 King William Street, Adelaide SA 5000

Activity:

Removal of tar and remediation of soil and groundwater
contamination at the former Launceston Gas Works, 8-10
Boland Street, Launceston, Tasmania 7250 (Land Title
Volume 250467 Folio 3, Volume 250467 Folio 1, Volume
236232 Folio 1, Volume 123976 Folio 2).

I, Floyd Browne, Director of Environmental Management, am satisfied, on the evidence available to me, that the person to whom the above Environment Protection Notice was issued has complied with the requirements thereof.

The Crown does not indemnify the person to whom this certificate is issued for any damages that may be suffered by any person or the environment, arising from the activity in relation to which the Environment Protection Notice was issued.

Director of Environmental Management:

Date of Issue:

Site Inspection Photographs

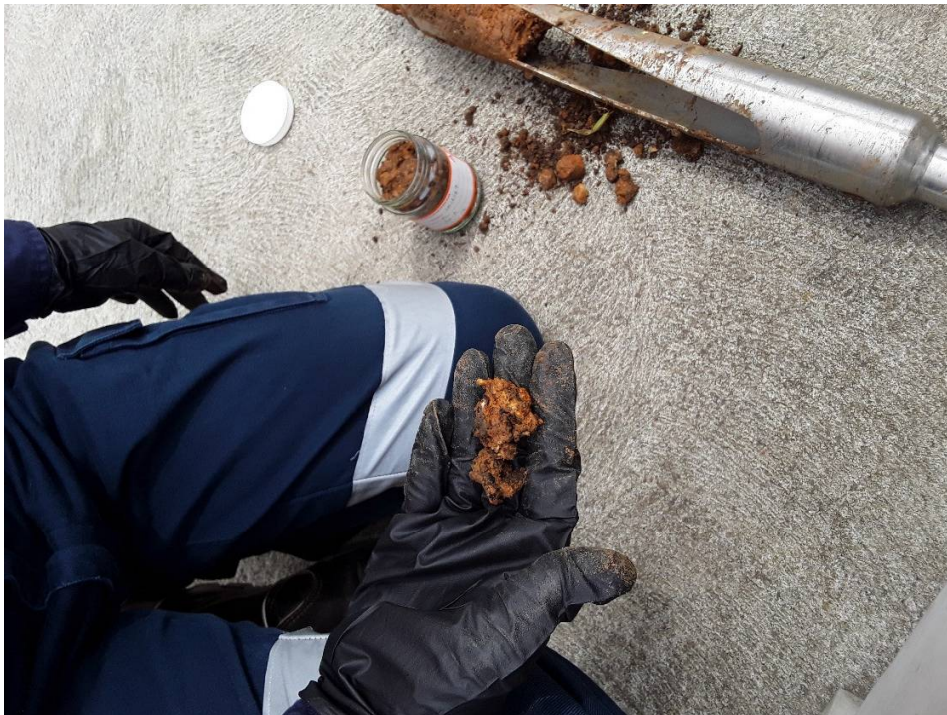
Appendix D

Site Photographs

Photo showing the extent of vegetation on the river bank inside the floodwall



Soil composition of BH_A



Soil composition inside flood wall (BH_B)



Soil composition adjacent to walkway (BH_C)



Laboratory Certificate of Analysis

Appendix E



Environmental

CERTIFICATE OF ANALYSIS

Work Order :
 Client : **Pitt & Sherry (Operations) Pty Ltd**
 Contact : SOPHIE LE ROUX
 Address : PO BOX 94 199 MACQUARIE ST
 HOBART TAS, AUSTRALIA 7001
 Telephone :
 Project :
 Order number :
 C-O-C number :
 Sampler :
 Site :
 Quote number : EN/222
 No. of samples received :
 No. of samples analysed :

Page : 1 of 7
 Laboratory :
 Contact :
 Address :
 Telephone :
 Date Samples Received :
 Date Analysis Commenced :
 Issue Date :



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
Dilani Fernando	Senior Inorganic Chemist	Melbourne Inorganics, Springvale, VIC
Xing Lin	Senior Organic Chemist	



Page : 2 of
Work Order : EM1818185
Client :
Project :

General Comments

The analytical procedures used by the Environmental Division have been developed from established internationally recognized procedures such as those published by the USEPA, APHA, AS and NEPM. In house developed procedures are employed in the absence of documented standards or by 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.

- Benzo(a)pyrene Toxicity Equivalent Quotient (TEQ) 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)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.





Page : 3 of 3
 Work Order : EM1818185
 Client : Pitt & Sherry (Operations) Pty Ltd
 Project :

Analytical Results

Compound	CAS Number	LOR	Unit	Client sample ID					BH - E
				Client sampling date / time	BH - B	BH - C	BH - D	BH - E	
EA055: Moisture Content (Dried @ 105-110°C)		1.0	%	17.3	36.2	3.8	2.6	10.3	
EG005T: Total Metals by ICP-AES									
Arsenic	7440-38-2	5	mg/kg	12	12	<5	<5	10	
Barium	7440-39-3	10	mg/kg	20	90	20	40	120	
Beryllium	7440-41-7	1	mg/kg	<1	<1	<1	<1	<1	
Cadmium	7440-43-9	1	mg/kg	<1	<1	<1	<1	<1	
Chromium	7440-47-3	2	mg/kg	97	34	20	24	44	
Cobalt	7440-48-4	2	mg/kg	<2	12	26	16	15	
Copper	7440-50-8	5	mg/kg	9	39	38	21	60	
Lead	7439-92-1	5	mg/kg	28	200	<5	7	3000	
Manganese	7439-96-5	5	mg/kg	36	454	537	437	593	
Molybdenum	7439-98-7	2	mg/kg	<2	<2	<2	<2	4	
Nickel	7440-02-0	2	mg/kg	8	19	119	62	35	
Selenium	7782-49-2	5	mg/kg	<5	<5	<5	<5	<5	
Silver	7440-22-4	2	mg/kg	<2	<2	<2	<2	<2	
Tin	7440-31-5	5	mg/kg	<5	11	<5	<5	25	
Zinc		5	mg/kg	37	200	48	38	156	
EG035T: Total Recoverable Mercury by FIMS									
Mercury		0.1	mg/kg	<0.1	0.2	<0.1	<0.1	0.4	
EG048: Hexavalent Chromium (Alkaline Digest)									
Hexavalent Chromium		0.5	mg/kg	<0.5	<0.5	<0.5	<0.5	<0.5	
EK026SF: Total CN by Segmented Flow Analyser									
Total Cyanide		1	mg/kg	<1	<1	<1	<1	4	
EK040T: Fluoride Total									
Fluoride		40	mg/kg	100	150	150	70	100	
EP066: Polychlorinated Biphenyls (PCB)									
EP068A: Organochlorine Pesticides (OC)									
alpha-BHC	319-84-6	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Hexachlorobenzene (HCB)	118-74-1	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
beta-BHC	319-85-7	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
gamma-BHC	58-89-9	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
delta-BHC	319-86-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	
Heptachlor	76-44-8	0.05	mg/kg	<0.05	<0.05	<0.05	<0.05	<0.05	



Page : 4 of 4
 Work Order : EM1818185
 Client : Pitt & Sherry (Operations) Pty Ltd
 Project :

Analytical Results

Sub-Matrix: SOIL Matrix: SOIL)		Client sample ID				BH - B	BH - C	BH - D	BH - E
Compound	CAS Number	LOR	Unit	Client sampling date / time	Result	Result	Result	Result	
EP068A: Organochlorine Pesticides (OC) - Continued									
Aldrin	309-00-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
Heptachlor epoxide	1024-57-3	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
^ Total Chlordane (sum)	---	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
trans-Chlordane	5103-74-2	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
alpha-Endosulfan	959-98-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
cis-Chlordane	5103-71-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
Dieldrin	60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
4,4'-DDE	72-55-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
Endrin	72-20-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
beta-Endosulfan	33213-65-9	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
^ Endosulfan (sum)	115-29-7	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
4,4'-DDD	72-54-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
Endrin aldehyde	7421-93-4	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
Endosulfan sulfate	1031-07-8	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
4,4'-DDT	50-29-3	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	
Endrin ketone	53494-70-5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
Methoxychlor	72-43-5	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	
^ Sum of Aldrin + Dieldrin	309-00-2/60-57-1	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
^ Sum of DDD + DDE + DDT	72-54-8/72-55-9/5	0.05	mg/kg		<0.05	<0.05	<0.05	<0.05	
EP075(SIM)A: Phenolic Compounds									
Phenol	108-95-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2-Chlorophenol	95-57-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2-Methylphenol	95-48-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
3- & 4-Methylphenol	1319-77-3	1	mg/kg		<1	<1	<1	<1	
2-Nitrophenol	88-75-5	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2,4-Dimethylphenol	105-67-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2,4-Dichlorophenol	120-83-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2,6-Dichlorophenol	87-65-0	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
4-Chloro-3-methylphenol	59-50-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2,4,6-Trichlorophenol	88-06-2	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
2,4,5-Trichlorophenol	95-95-4	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
Pentachlorophenol	87-86-5	2	mg/kg		<2	<2	<2	<2	
^	---	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons									



Page : 5 of
 Work Order : EM1818185
 Client : Pitt & Sherry (Operations) Pty Ltd
 Project :

Analytical Results

Sub-Matrix: SOIL Matrix: SOIL)		Client sample ID				BH - E		
Compound	CAS Number	LOR	Unit	Client sampling date / time	BH - B	BH - C	BH - D	BH - E
					Result	Result	Result	Result
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons - Continued								
Naphthalene	91-20-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Acenaphthylene	208-96-8	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Acenaphthene	83-32-9	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Fluorene	86-73-7	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Phenanthrene	85-01-8	0.5	mg/kg		<0.5	<0.5	<0.5	1.7
Anthracene	120-12-7	0.5	mg/kg		<0.5	<0.5	<0.5	0.5
Fluoranthene	206-44-0	0.5	mg/kg		<0.5	<0.5	<0.5	3.0
Pyrene	129-00-0	0.5	mg/kg		<0.5	<0.5	<0.5	3.2
Benz(a)anthracene	56-55-3	0.5	mg/kg		<0.5	<0.5	<0.5	1.8
Chrysene	218-01-9	0.5	mg/kg		<0.5	<0.5	<0.5	1.6
Benzo(b)fluoranthene	205-99-2	0.5	mg/kg		<0.5	<0.5	<0.5	2.6
Benzo(k)fluoranthene	207-08-9	0.5	mg/kg		<0.5	<0.5	<0.5	0.8
Indeno(1,2,3-cd)pyrene	193-39-5	0.5	mg/kg		<0.5	<0.5	<0.5	1.0
Dibenz(a,h)anthracene	53-70-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5
Benzo(g,h,i)perylene	191-24-2	0.5	mg/kg		<0.5	<0.5	<0.5	1.1
^ Sum of polycyclic aromatic hydrocarbons	----	0.5	mg/kg		<0.5	<0.5	<0.5	19.3
^ Benzo(a)pyrene TEQ (zero)	----	0.5	mg/kg		<0.5	<0.5	<0.5	2.6
^ Benzo(a)pyrene TEQ (half LOR)	----	0.5	mg/kg		0.6	0.6	0.6	2.9
^	----	0.5	mg/kg		1.2	1.2	1.2	3.1
EP075B: Polynuclear Aromatic Hydrocarbons								
Benzo(a)pyrene		0.05	mg/kg		<0.05	<0.05	<0.05	2.88
EP080/071: Total Petroleum Hydrocarbons								
C6 - C9 Fraction		10	mg/kg		<10	<10	<10	<10
C10 - C14 Fraction		50	mg/kg		<50	<50	<50	<50
C15 - C28 Fraction		100	mg/kg		<100	<100	<100	110
C29 - C36 Fraction		100	mg/kg		<100	<100	<100	150
^		50	mg/kg		<50	<50	<50	260
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions								
C6 - C10 Fraction	C6_C10	10	mg/kg		<10	<10	<10	<10
^ C6 - C10 Fraction minus BTEX (F1)	C6_C10-BTEX	10	mg/kg		<10	<10	<10	<10
>C10 - C16 Fraction		50	mg/kg		<50	<50	<50	<50
>C16 - C34 Fraction		100	mg/kg		<100	<100	<100	220
>C34 - C40 Fraction		100	mg/kg		<100	<100	<100	<100



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Analytical Results

Sub-Matrix: SOIL Matrix: SOIL)		Client sample ID				BH - B	BH - C	BH - D	BH - E
Compound	CAS Number	LOR	Unit	Client sampling date / time	EM1818185-002	EM1818185-003	EM1818185-004	EM1818185-005	
					Result	Result	Result	Result	
EP080/071: Total Recoverable Hydrocarbons - NEPM 2013 Fractions - Continued									
^ >C10 - C40 Fraction (sum)	----	50	mg/kg		<50	<50	<50	220	
^ >C10 - C16 Fraction minus Naphthalene	----	50	mg/kg		<50	<50	<50	<50	
EP080: BTEXN									
Benzene	71-43-2	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	
Toluene	108-88-3	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
Ethylbenzene	100-41-4	0.5	mg/kg		<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	
ortho-Xylene	95-47-6	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
^ Sum of BTEX	----	0.2	mg/kg		<0.2	<0.2	<0.2	<0.2	
^ Total Xylenes	----	0.5	mg/kg		<0.5	<0.5	<0.5	<0.5	
Naphthalene		1	mg/kg		<1	<1	<1	<1	
EP066S: PCB Surrogate									
Decachlorobiphenyl		0.1	%		81.9	80.0	84.9	96.1	
EP068S: Organochlorine Pesticide Surrogate									
Dibromo-DDE		0.05	%		91.0	102	111	115	
EP068T: Organophosphorus Pesticide Surrogate									
DEF		0.05	%		92.2	102	105	111	
EP075(SIM)S: Phenolic Compound Surrogates									
Phenol-d6	13127-88-3	0.5	%		93.8	95.6	96.6	93.5	
2-Chlorophenol-D4	93951-73-6	0.5	%		97.2	96.5	97.6	94.2	
2,4,6-Tribromophenol		0.5	%		79.3	88.5	84.5	88.3	
EP075(SIM)T: PAH Surrogates									
2-Fluorobiphenyl	321-60-8	0.5	%		107	107	110	109	
Anthracene-d10	1719-06-8	0.5	%		100	101	103	99.0	
4-Terphenyl-d14		0.5	%		101	99.9	101	96.1	
EP075T: Base/Neutral Extractable Surrogates									
2-Fluorobiphenyl	321-60-8	0.025	%		108	116	116	114	
Anthracene-d10	1719-06-8	0.025	%		104	110	97.8	107	
4-Terphenyl-d14		0.025	%		104	106	95.9	104	
EP080S: TPH(V)/BTEX Surrogates									
1,2-Dichloroethane-D4	17060-07-0	0.2	%		75.3	88.6	79.2	93.1	
Toluene-D8	2037-26-5	0.2	%		66.0	71.9	70.3	86.7	
4-Bromofluorobenzene	460-00-4	0.2	%		78.8	90.7	85.0	96.9	



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Ref. No: DA 0312/2019
 Date submitted: 21/09/2019
 Planning Administration: *D. Dwyer*
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Surrogate Control Limits

Sub-Matrix:		Recovery Limits (%)	
Compound	CAS Number	Low	High
EP066S: PCB Surrogate			
Decachlorobiphenyl	2051-24-3	36	
EP068S: Organochlorine Pesticide Surrogate			
Dibromo-DDE	21655-73-2	38	
EP068 T: Organophosphorus Pesticide Surrogate			
DEF	78-48-8	33	
EP075(SIM)S: Phenolic Compound Surrogates			
Phenol-d6	13127-88-3	54	125
2-Chlorophenol-D4	93951-73-6	65	123
2,4,6-Tribromophenol	118-79-6	34	
EP075(SIM)T: PAH Surrogates			
2-Fluorobiphenyl	321-60-8	61	125
Anthracene-d10	1719-06-8	62	130
4-Terphenyl-d14	1718-51-0	67	
EP075 T: Base/Neutral Extractable Surrogates			
2-Fluorobiphenyl	321-60-8	35	126
Anthracene-d10	1719-06-8	40	135
4-Terphenyl-d14	1718-51-0	42	
EP080S: TPH(V)/BTEX Surrogates			
1,2-Dichloroethane-D4	17060-07-0	51	125
Toluene-D8	2037-26-5	55	125
4-Bromofluorobenzene	460-00-4	56	124



ALS Environmental

Automated Guideline Comparison Report

EPA Tasmania Information Bulletin No. 105 - Table 2: Soil Hazard Categorisation

Work Order :
 Client :
 Contact :
 Address : PO BOX 94 199 MACQUARIE ST
 HOBART TAS, AUSTRALIA 7001
 E-mail : sleroux@pittsh.com.au
 Telephone : +61 03 6223 1800
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 Project :
 Order number :
 C-O-C number :
 No. of samples received :
 No. of samples analysed :

Page : 1 of
 Laboratory : Environmental Division Melbourne
 Address :
 E-mail :
 Telephone :
 Facsimile :
 Date Received :
 Date Analysed :
 Date Issued : 16-Nov-2018 16:03
 Quote number :

General Comments

This guideline comparison report **only** provides evaluation of total concentration data against upper limit thresholds for the 'Fill Material', 'Low Level Contaminated Soil', and 'Contaminated Soil' categories in Table 2 of EPA Tasmania Information Bulletin No. 105.

This guideline comparison report is **NOT** a soil classification report. Classification of soils requires consideration of a number of other factors including preliminary site investigation, sampling density and statistical calculations.

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

This guideline comparison report only provides evaluation data where chemical parameters specifically listed within Table 2 of EPA Tasmania Information Bulletin No. 105 are analysed by ALS using the **P-20/1 package in full**. P-20/1 package does not include Tributyltin.

Red shading is applied where the result is equal to or greater than the guideline upper limit and/or equal to or lower than the guideline lower limit. Red shading is not applied to the 'Summary of Thresholds Reached or Exceeded'.

For the 'Summary of Thresholds Reached or Exceeded' to accurately function, all samples must be analysed and included in the 'Analytical Results' section of the following report. Please verify that all required IDs are listed and analysed.

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.



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Summary of Thresholds Reached or Exceeded

TAS EPA Bulletin No. 105 (2012)

Table 2: Maximum Total Concentration: Contaminated Soil - Level 3

Client Sample ID	ALS Sample ID	Compound	Method	LOR	Limits	Result
BH - E	EM1818185-005	Lead	EG005T	5	< 3,000 mg/kg	3000 mg/kg

TAS EPA Bulletin No. 105 (2012)

Table 2: Maximum Total Concentration: Fill Material - Level 1

Client Sample ID	ALS Sample ID	Compound	Method	LOR	Limits	Result
BH - A	EM1818185-001	Chromium	EG005T	2	< 50 mg/kg	97 mg/kg
BH - B	EM1818185-002	Zinc	EG005T	5	< 200 mg/kg	200 mg/kg
BH - B	EM1818185-002	Benzo(a)pyrene	EP075-TAS	0.05	< 0.08 mg/kg	0.28 mg/kg
BH - C	EM1818185-003	Manganese	EG005T	5	< 500 mg/kg	537 mg/kg
BH - C	EM1818185-003	Nickel	EG005T	2	< 60 mg/kg	119 mg/kg
BH - D	EM1818185-004	Nickel	EG005T	2	< 60 mg/kg	62 mg/kg
BH - E	EM1818185-005	Lead	EG005T	5	< 300 mg/kg	3000 mg/kg
BH - E	EM1818185-005	Manganese	EG005T	5	< 500 mg/kg	593 mg/kg
BH - E	EM1818185-005	Benzo(a)pyrene	EP075-TAS	0.05	< 0.08 mg/kg	2.88 mg/kg

TAS EPA Bulletin No. 105 (2012)

Table 2: Maximum Total Concentration: Low Level Contaminated Soil - Level 2

Client Sample ID	ALS Sample ID	Compound	Method	LOR	Limits	Result
BH - E	EM1818185-005	Lead	EG005T	5	< 1,200 mg/kg	3000 mg/kg
BH - E	EM1818185-005	Benzo(a)pyrene	EP075-TAS	0.05	< 2 mg/kg	2.88 mg/kg



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Analytical Results

Classification and Management of Contaminated Soil for Disposal

Table 2 Maximum total conc. - Contaminated Soil: Table 2: Maximum Total Concentration: Contaminated Soil - Level 3

Compound	Method	LOR	Unit	Guideline		Upper Limit	BH - A	BH - B	BH - C	BH - D	BH - E
				Client sample ID			12-Nov-2018	12-Nov-2018	12-Nov-2018	12-Nov-2018	12-Nov-2018
				Lower Limit	Upper Limit		11:40	12:30	12:45	13:00	13:15
EG005T: Total Metals by ICP-AES											
Arsenic	EG005T	5	mg/kg	----	750	12	12	<5	<5	<5	10
Barium	EG005T	10	mg/kg	----	30000	20	90	20	40	40	120
Beryllium	EG005T	1	mg/kg	----	400	<1	<1	<1	<1	<1	<1
Cadmium	EG005T	1	mg/kg	----	400	<1	<1	<1	<1	<1	<1
Chromium	EG005T	2	mg/kg	----	5000	97	34	20	24	24	44
Cobalt	EG005T	2	mg/kg	----	1000	<2	12	26	16	16	15
Copper	EG005T	5	mg/kg	----	7500	9	39	38	21	21	60
Lead	EG005T	5	mg/kg	----	3000	28	200	<5	7	7	3000
Manganese	EG005T	5	mg/kg	----	25000	36	454	537	437	437	593
Molybdenum	EG005T	2	mg/kg	----	4000	<2	<2	<2	<2	<2	4
Nickel	EG005T	2	mg/kg	----	3000	8	19	119	62	62	35
Selenium	EG005T	5	mg/kg	----	200	<5	<5	<5	<5	<5	<5
Silver	EG005T	2	mg/kg	----	720	<2	<2	<2	<2	<2	<2
Tin	EG005T	5	mg/kg	----	900	<5	11	<5	<5	<5	25
Zinc	EG005T	5	mg/kg	----	50000	37	200	48	38	38	156
EG035T: Total Recoverable Mercury by FIMS											
Mercury	EG035T	0.1	mg/kg	----	110	<0.1	0.2	<0.1	<0.1	<0.1	0.4
EG048: Hexavalent Chromium (Alkaline Digest)											
Hexavalent Chromium	EG048G	0.5	mg/kg	----	2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
EK026SF: Total CN by Segmented Flow Analyser											
Total Cyanide	EK026SF	1	mg/kg	----	2500	<1	<1	<1	<1	<1	4
EK040T: Fluoride Total											
Fluoride	EK040T	40	mg/kg	----	10000	100	150	150	70	70	100
EP066: Polychlorinated Biphenyls (PCB)											
Total Polychlorinated biphenyls	EP066	0.1	mg/kg	----	50	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)											
Sum of Aldrin + Dieldrin	EP068	0.05	mg/kg	----	50	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of DDD + DDE + DDT	EP068	0.05	mg/kg	----	1000	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds											
Sum of Phenols	EP075(SIM)	0.5	mg/kg	----	2000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons											
Sum of polycyclic aromatic hydrocarbons	EP075(SIM)	0.5	mg/kg	----	200	<0.5	<0.5	<0.5	<0.5	<0.5	19.3



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Classification and Management of Contaminated Soil for Disposal

Table 2 Maximum total conc. - Contaminated Soil: Table 2: Maximum Total Concentration: Contaminated Soil - Level 3

Compound	Method	LOR	Unit	Client sample ID		Guideline Lower Limit	Guideline Upper Limit	BH - A 12-Nov-2018 11:40 EM1818185-001	BH - B 12-Nov-2018 12:30 EM1818185-002	BH - C 12-Nov-2018 12:45 EM1818185-003	BH - D 12-Nov-2018 13:00 EM1818185-004	BH - E 12-Nov-2018 13:15 EM1818185-005
				Sampling date/time								
				Method	Unit							
EP075B: Polynuclear Aromatic Hydrocarbons												
Benzo(a)pyrene	EP075-TAS	0.05	mg/kg	----	20	----	20	<0.05	0.28	<0.05	<0.05	2.88
EP080/071: Total Petroleum Hydrocarbons												
C6 - C9 Fraction	EP080	10	mg/kg	----	1000	----	1000	<10	<10	<10	<10	<10
C10 - C36 Fraction (sum)	EP071	50	mg/kg	----	10000	----	10000	<50	<50	<50	<50	260
EP080: BTEXN												
Benzene	EP080	0.2	mg/kg	----	50	----	50	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	EP080	0.5	mg/kg	----	1000	----	1000	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	EP080	0.5	mg/kg	----	1080	----	1080	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	EP080	0.5	mg/kg	----	1800	----	1800	<0.5	<0.5	<0.5	<0.5	<0.5



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Classification and Management of Contaminated Soil for Disposal

Table 2 Maximum total conc. - Fill Material: Table 2: Maximum Total Concentration: Fill Material - Level 1

Compound	Method	LOR	Unit	Client sample ID					Guideline Lower Limit	Guideline Upper Limit	BH - A 12-Nov-2018 11:40 EM1818185-001	BH - B 12-Nov-2018 12:30 EM1818185-002	BH - C 12-Nov-2018 12:45 EM1818185-003	BH - D 12-Nov-2018 13:00 EM1818185-004	BH - E 12-Nov-2018 13:15 EM1818185-005
				Sampling date/time											
				5	10	1	1	2							
EG005T: Total Metals by ICP-AES															
Arsenic	EG005T	5	ng/kg	---	20	12	12	<5	<5	<5	<5	<5	<5	10	
Barium	EG005T	10	ng/kg	---	300	90	90	<1	<1	<1	<1	<1	<1	120	
Beryllium	EG005T	1	ng/kg	---	2	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Cadmium	EG005T	1	ng/kg	---	3	<1	<1	<1	<1	<1	<1	<1	<1	<1	
Chromium	EG005T	2	ng/kg	---	50	97	34	20	20	24	24	24	24	44	
Cobalt	EG005T	2	ng/kg	---	100	<2	12	26	26	16	16	16	16	15	
Copper	EG005T	5	ng/kg	---	100	9	39	38	38	21	21	21	21	60	
Lead	EG005T	5	ng/kg	---	300	28	200	<5	<5	7	7	7	7	3000	
Manganese	EG005T	5	ng/kg	---	500	36	454	537	537	437	437	437	437	593	
Molybdenum	EG005T	2	ng/kg	---	10	<2	<2	<2	<2	<2	<2	<2	<2	4	
Nickel	EG005T	2	ng/kg	---	60	8	19	119	119	62	62	62	62	35	
Selenium	EG005T	5	ng/kg	---	10	<5	<5	<5	<5	<5	<5	<5	<5	<5	
Silver	EG005T	2	ng/kg	---	10	<2	<2	<2	<2	<2	<2	<2	<2	<2	
Tin	EG005T	5	ng/kg	---	50	<5	11	<5	<5	<5	<5	<5	<5	25	
Zinc	EG005T	5	ng/kg	---	200	37	200	48	48	38	38	38	38	156	
EG035T: Total Recoverable Mercury by FIMS															
Mercury	EG035T	0.1	ng/kg	---	1	<0.1	0.2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.4	
EG048: Hexavalent Chromium (Alkaline Digest)															
Hexavalent Chromium	EG048G	0.5	ng/kg	---	1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
EK026SF: Total CN by Segmented Flow Analyser															
Total Cyanide	EK026SF	1	ng/kg	---	32	<1	<1	<1	<1	<1	<1	<1	<1	4	
EK040T: Fluoride Total															
Fluoride	EK040T	40	ng/kg	---	300	100	150	150	150	70	70	70	70	100	
EP066: Polychlorinated Biphenyls (PCB)															
Total Polychlorinated biphenyls	EP066	0.1	ng/kg	---	2	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	
EP068A: Organochlorine Pesticides (OC)															
Sum of Aldrin + Dieldrin	EP068	0.05	ng/kg	---	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Sum of DDD + DDE + DDT	EP068	0.05	ng/kg	---	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
EP075(SIM)A: Phenolic Compounds															
Sum of Phenols	EP075(SIM)	0.5	ng/kg	---	25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons															
Sum of polycyclic aromatic hydrocarbons	EP075(SIM)	0.5	ng/kg	---	20	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	19.3	
EP075B: Polynuclear Aromatic Hydrocarbons															



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Classification and Management of Contaminated Soil for Disposal

Table 2 Maximum total conc. - Fill Material: Table 2: Maximum Total Concentration: Fill Material - Level 1

Compound	Method	LOR	Unit	Guideline		Client sample ID				
				Lower Limit	Upper Limit	Sampling date/time				
						BH - A	BH - B	BH - C	BH - D	BH - E
EP075B: Polynuclear Aromatic Hydrocarbons - Continued										
Benzo(a)pyrene	EP075-TAS	0.05	mg/kg	----	0.08	<0.05	0.28	<0.05	<0.05	2.88
EP080/071: Total Petroleum Hydrocarbons										
C6 - C9 Fraction	EP080	10	mg/kg	----	65	<10	<10	<10	<10	<10
C10 - C36 Fraction (sum)	EP071	50	mg/kg	----	1000	<50	<50	<50	<50	260
EP080: BTEXN										
Benzene	EP080	0.2	mg/kg	----	1	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	EP080	0.5	mg/kg	----	1	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	EP080	0.5	mg/kg	----	3	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	EP080	0.5	mg/kg	----	14	<0.5	<0.5	<0.5	<0.5	<0.5



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Classification and Management of Contaminated Soil for Disposal

Table 2: Maximum total conc. - Low Level Contaminated Soil: Table 2: Maximum Total Concentration: Low Level Contaminated Soil - Level 2

Compound	Method	LOR	Unit	Client sample ID						
				Guideline		BH - A	BH - B	BH - C	BH - D	BH - E
				Lower Limit	Upper Limit	12-Nov-2018 11:40 EM1818185-001	12-Nov-2018 12:30 EM1818185-002	12-Nov-2018 12:45 EM1818185-003	12-Nov-2018 13:00 EM1818185-004	12-Nov-2018 13:15 EM1818185-005
Sampling date/time	Guideline	Guideline	Guideline	Guideline	Guideline	Guideline	Guideline			
EG005T: Total Metals by ICP-AES										
Arsenic	EG005T	5	ng/kg	---	200	12	12	<5	<5	10
Barium	EG005T	10	ng/kg	---	3000	20	90	40	40	120
Beryllium	EG005T	1	ng/kg	---	40	<1	<1	<1	<1	<1
Cadmium	EG005T	1	ng/kg	---	40	<1	<1	<1	<1	<1
Chromium	EG005T	2	ng/kg	---	500	97	34	20	24	44
Cobalt	EG005T	2	ng/kg	---	200	<2	12	26	16	15
Copper	EG005T	5	ng/kg	---	2000	9	39	38	21	60
Lead	EG005T	5	ng/kg	---	1200	28	200	<5	7	3000
Manganese	EG005T	5	ng/kg	---	5000	36	454	537	437	593
Molybdenum	EG005T	2	ng/kg	---	1000	<2	<2	<2	<2	4
Nickel	EG005T	2	ng/kg	---	600	8	19	119	62	35
Selenium	EG005T	5	ng/kg	---	50	<5	<5	<5	<5	<5
Silver	EG005T	2	ng/kg	---	180	<2	<2	<2	<2	<2
Tin	EG005T	5	ng/kg	---	500	<5	11	<5	<5	25
Zinc	EG005T	5	ng/kg	---	14000	37	200	48	38	156
EG035T: Total Recoverable Mercury by FIMS										
Mercury	EG035T	0.1	ng/kg	---	30	<0.1	0.2	<0.1	<0.1	0.4
EG048: Hexavalent Chromium (Alkaline Digest)										
Hexavalent Chromium	EG048G	0.5	ng/kg	---	200	<0.5	<0.5	<0.5	<0.5	<0.5
EK026SF: Total CN by Segmented Flow Analyser										
Total Cyanide	EK026SF	1	ng/kg	---	1000	<1	<1	<1	<1	4
EK040T: Fluoride Total										
Fluoride	EK040T	40	ng/kg	---	3000	100	150	150	70	100
EP066: Polychlorinated Biphenyls (PCB)										
Total Polychlorinated biphenyls	EP066	0.1	ng/kg	---	20	<0.1	<0.1	<0.1	<0.1	<0.1
EP068A: Organochlorine Pesticides (OC)										
Sum of Aldrin + Dieldrin	EP068	0.05	ng/kg	---	20	<0.05	<0.05	<0.05	<0.05	<0.05
Sum of DDD + DDE + DDT	EP068	0.05	ng/kg	---	200	<0.05	<0.05	<0.05	<0.05	<0.05
EP075(SIM)A: Phenolic Compounds										
Sum of Phenols	EP075(SIM)	0.5	ng/kg	---	500	<0.5	<0.5	<0.5	<0.5	<0.5
EP075(SIM)B: Polynuclear Aromatic Hydrocarbons										
Sum of polycyclic aromatic hydrocarbons	EP075(SIM)	0.5	ng/kg	---	40	<0.5	<0.5	<0.5	<0.5	19.3
EP075B: Polynuclear Aromatic Hydrocarbons										



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 Work Order : EM1818185
 Client : Pitt & Sherry (Operations) Pty Ltd
 Project :

Classification and Management of Contaminated Soil for Disposal

Table 2: Maximum total conc. - Low Level Contaminated Soil - Level 2

Compound	Method	LOR	Unit	Client sample ID		Guideline	Guideline	BH - A	BH - B	BH - C	BH - D	BH - E
				Sampling date/time	Sampling date/time							
Sub-Matrix: SOIL												
EP075B: Polynuclear Aromatic Hydrocarbons - Continued												
Benzo(a)pyrene	EP075-TAS	0.05	mg/kg	----	----	2	<0.05	0.28	<0.05	<0.05	<0.05	2.88
EP080/071: Total Petroleum Hydrocarbons												
C6 - C9 Fraction	EP080	10	mg/kg	----	----	650	<10	<10	<10	<10	<10	<10
C10 - C36 Fraction (sum)	EP071	50	mg/kg	----	----	5000	<50	<50	<50	<50	<50	260
EP080: BTEXN												
Benzene	EP080	0.2	mg/kg	----	----	5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Toluene	EP080	0.5	mg/kg	----	----	100	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	EP080	0.5	mg/kg	----	----	100	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Xylenes	EP080	0.5	mg/kg	----	----	---	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

PLANNING EXHIBITED DOCUMENTS
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Phase 1 Environmental Site Assessment

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