Contamination | Remediation | Geotechnical

URBAN PROPERTY GROUP

Remediation Action Plan

614-632 High Street, Penrith NSW

E24300.E06_Rev0
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Executive Summary

Urban Property Group engaged EI Australia (EI) to prepare a Remediation Action Plan (RAP) for 614-632 High Street, Penrith NSW (herein referred to as 'the site').

This site is located within the Local Government Area of Penrith City Council. It comprises Lot 10 in Deposited Plan (DP) 1162271, covering a total area of 4730m^2, and at the time of drafting this plan was a semi-sealed asphalt parking area with a partially completed display suite in its eastern portion.

Based on previous investigations, the site had been used for commercial purposes (including automotive sales and mechanical repairs) and two underground storage tanks (USTs; each 3000 gallons) were installed in 1958, although both were removed in 1996. As contamination of significance was not present on the land, the focus of this RAP is to provide contingency measures that will deal with unexpected finds, should they be encountered during the proposed redevelopment.

The sequence, or stages, of the recommended environmental works will be:

- Site establishment;
- Demolition of structures (hardstands), followed by site walkover inspection;
- Additional assessment (including GPR, test pitting and further groundwater monitoring);
- Waste management; and
- Reporting.

Management procedures are provided to characterise (waste) soil for offsite disposal (if / where required).

In summary, EI considers that the site will remain suitable for the proposed mixed (high density) residential / commercial land use, assuming the provisions outlined in this plan are adhered to.

1. Introduction

Urban Property Group (the 'client') engaged EI Australia (EI) to prepare a Remediation Action Plan (RAP) for 614-632 High Street, Penrith NSW (the 'site').

This site is located within the Local Government Area of Penrith City Council (**Appendix A**, **Figure 1**). It comprises Lot 10 in Deposited Plan (DP) 1162271, covering a total area of 4730m^2, and at the time of drafting this plan was a semi-sealed asphalt parking area with a partially completed display suite in its eastern portion (**Appendix A**, **Figure 2**).

Based on previous investigations, the site had been used for commercial purposes (including automotive sales and mechanical repairs) and two underground storage tanks (USTs; each 3000 gallons) were installed in 1958, although both were removed in 1996. As contamination of significance was not present on the land, the focus of this RAP is to provide contingency measures that will deal with unexpected finds, should they be encountered during the proposed redevelopment.

1.1 Proposed Development

Based on the supplied plans attached in **Appendix B**, the proposed redevelopment involves construction of two, mixed use, residential / commercial towers. The ground level will be comprised of retail units and vehicle parking facilities. Above a mezzanine floor will be three more levels of car parking, followed by residential apartments. Podiums with communal open space are to be included on Levels 4-6.

Concrete slabs shall cover the entire ground surface and no basement is to be included in the development. Landscaping shall be limited to boxed planters.

1.2 Objective

Formal remediation is not deemed necessary for this site. The main objective of this plan, therefore, is to provide contingency measures that will deal with unexpected finds, should they be encountered during the redevelopment. The procedures will ensure building construction occurs in a safe and acceptable manner, complying with relevant guidelines and preventing adverse effects on human and environmental receptors.

1.3 Scope of the RAP

The above objective will be achieved by:

- Outlining the legislative framework relevant to the works;
- Providing a summary of the previous investigations of the site, including the site setting and contamination status;
- Definition of environmental protection goals and acceptance criteria;
- Description of contingency procedures that are compliant with relevant environmental legislation;
- Guidance on approvals and licences required for environmental works;
- Provision of information to assist the contractor in their preparation of a Work, Health and Safety Plan (WHSP) and other site management/planning documents; and
- Identification of the key stakeholders and their responsibilities.

1.4 Regulatory Framework

The following legislation and guidelines were considered during the preparation of this RAP:

Legislation

- *Contaminated Land Management Act 1997* (CLM Act);
- *Water Management Act* 2000 (Water Act);
- *Protection of the Environment Operations Act 1997* (POEO Act) and associated regulations, including the *Waste Regulation 2014*;
- *State Environment Protection Policy 55 – Remediation of Land* (SEPP 55);
- *Penrith Local Environmental Plan 2010*; and
- *Work Health and Safety Act 2011* (WHS Act) and associated regulations and codes of practice.

Guidelines

- ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Qualit*y;
- EPA (1995) *Sampling Design Guidelines*;
- EPA (2017) *Guidelines for the NSW Site Auditor Scheme;*
- NEPC (2013) *National Environment Protection (Assessment of Site Contamination) Amendment Measure*;
- OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*; and
- WADOH (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*.

1.5 Deviations from this RAP

Any deviation from the methodology specified in this RAP is to be properly documented and approved, as required under the OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites*.

Performing investigation and/or remedial works without the supervision of a qualified environmental engineer/scientist may lead to project delays and extra costs, as well as additional requirements imposed by an independent consultant, or appointed Site Auditor, to confirm the environmental status of the site.

In worst case scenarios, waste materials removed from the site without proper characterisation and/or tracking, may lead to regulatory action and potential penalties, as described under the *Waste Regulation 2014* and the *Contaminated Land Management Act 1997*.

2. Site Description

2.1 Property Identification, Location and Physical Setting

Pertinent information regarding the site setting is presented in **Table 2-1**. Refer also to **Appendix A**, **Figures 1** and **2**).

Table 2-1 Site Identification, Location and Zoning

Attribute	Description
Street Address	614-632 High Street, Penrith NSW
Location	Approximately 50km west of the Sydney central business district (CBD). A trapezoidal shaped block bound by High Street (north), Union Lane (south) and commercial/industrial buildings (all other directions).
Coordinates	North east corner of site (GDA94-MGA56): Easting: 286032.904 Northing: 6262960.939 (Source: http://maps.six.nsw.gov.au)
Area	4730m^2
Lot and Deposited Plan (DP)	Lot 10 in DP 1162271
Owner	Urban Property Group
State Survey Marks	Two State Survey and three Permanent Marks (SSM / PM) are situated in close proximity (<150m) to the site: ▪ SS18074D, on the corner of High Street and John Tipping Grove; ▪ SS18075, on John Tipping Grove; ▪ PM12650, on the corner of High and Worth Streets; ▪ PM12651, on the corner of High Street and John Tipping Grove; and ▪ PM12652, on the corner of Union Road and John Tipping Grove. (Source: http://maps.six.nsw.gov.au)
Site Features	At the time of drafting this RAP the site was comprised of a semi-sealed asphalt parking area with a partially completed display suite in its eastern portion.
Local Government Authority	Penrith City Council
Parish	Castlereagh
County	Cumberland
Current Zoning	B4 – Mixed Use (Penrith Local Environmental Plan 2010)

2.2 Regional Setting

Local topography, geology, soil landscape and hydrogeological information are summarised in **Table 2-2**.

Table 2-2 Regional Setting Information

Attribute	Description
Topography	Relatively flat / level, with a slight decline (<5%) toward the west.
Site Drainage	Consistent with the general slope of the site; stormwater is assumed to flow to the west, towards Peach Tree Creek and the Nepean River, via drainage systems discharging to various easements and the municipal stormwater system.
Regional Geology	With reference to the *Penrith 1:100 000 Geological Series Sheet 9030* (DMR, 1983), the site is underlain by Quaternary Age soils of the Cranebrook Formation, comprising of gravel, sand, silt and clay.
Soil Landscape	The Soil Conservation Service of NSW *Soil Landscapes of the Penrith 1:100,000 Sheet* (Bannerman and Hazelton, 1990) indicates that the site overlies a Richmond (*ri*) alluvial landscape, which typically includes poorly structured, orange to red, clay loams, clays and sands.
Acid Sulfate Soil (ASS) Risk	The *Penrith Local Environmental Plan 2014 - Acid Sulfate Soils Risk Class Map* (Sheet ASS_004) has the site within an area of *Non-Standard Values.* The area was not mapped by the NSW Department of Land and Water Conservation in relation to risk of ASS presence. EI concluded that the likelihood of ASS occurring on the site was low.
Depth of Filling	0.2-1.2m thickness
Typical Soil Profile	FILL, silty sand with gravels and plant rootlets (0.2-1.2m thickness); overlying NATURAL FLUVIAL SOILS of fine to coarse grained silty sand / sandy silt / sandy gravel (13.4-16.93m thickness); overlying (WEATHERED) SHALE.
Depth to Groundwater	5.5-8m below ground level (BGL)
Nearest Surface Water Feature	Peach Tree Creek, located 0.5km west of the site. Peach Tree Creek is a tributary of the Nepean River (0.8km west of the site).
Inferred Groundwater Flow Direction	Inferred to be westerly, towards Peach Tree Creek / Nepean River.
Local Groundwater Usage	Low

3. Site Characterisation

3.1 Previous Investigations

The following reports were available for the development of this RAP:

- Benviron Group (2019) *Detailed Site Investigation (DSI); 614-632 High Street, Penrith NSW* (Benviron Reference E638, dated 16 December 2019);
- EI Australia (2019) *Geotechnical Investigation (GI); 614-632 High Street, Penrith NSW* (EI Report E24300.G03, dated 9 August 2019); and
- EI Australia (2020) *Additional Groundwater Investigation; 614-632 High Street, Penrith NSW* (EI Report E24300.E03_Rev0, dated 30 January 2020).

A summary of the findings from these reports is presented in **Table 3-1**.

Table 3-1 Summary of Previous Investigations

Project Task	Findings
DSI (Benviron, 2019)	
Objective	To "consider the potential for suspected historical activities to have caused contamination at the site and determine suitability for the proposed land use", assumed at the time as being high density residential with minimal access to soil.
Scope of Work	▪ Benviron completed the following tasks as part of their investigation: ▪ Review of property history; ▪ Review of previous environmental reports relating to the site; ▪ A walkover inspection, with a survey for existing underground services; ▪ Development of Conceptual Site Model (CSM); ▪ The drilling of two boreholes for targeted soil profiling and sampling purposes (BH101 and BH102), expanding the previous intrusive investigations of Geotechnique Pty Ltd (2007) and Benviron Group (2015), which involved three (BH1, BH2 and BH5) and eight (BH1-BH8) sampling locations, respectively (see **Figure 2**, **Appendix A**); ▪ Laboratory analysis of soil samples for the contaminants of potential concern (COPC); ▪ Integration of a field and laboratory quality assurance / quality control (QA/QC) program; and ▪ Data interpretation and reporting.
Principal Findings	The review of historical information indicated that the site had been used for commercial purposes since 1943 (at least), including automotive sales and mechanical repairs (1956 to early 2000s). Two underground storage tanks (USTs; each 3000 gallons) were installed in 1958, although both "were removed from the site (Mitsubishi Motors)" in 1996 by Knight's Syndicate Pty Ltd, being disposed "at their quarry in Rouse Hill". The NSW Environment Protection Authority (EPA) had no regulatory involvement in relation to the area of investigation, including statutory notices and environmental protection licensing. The property was not included on the *List of NSW Contaminated Sites Notified to the EPA*. No electricity substation was present on the land. ***Previous Reports*** The Benviron (2019) DSI report provided summaries of two previous environmental assessments relating to the site, those being: ▪ Geotechnique Pty Ltd (2007) *Contamination Assessment; 616 High Street, Penrith NSW* (Geotechnique Report 11437/1-AA, dated 16 July 2007); and ▪ Benviron Group (2015) *Preliminary Site Investigation; 614-652 High Street & 87-91 Union Road, Penrith NSW* (Benviron Reference E638, dated 9 September 2015).

Project Task	Findings
	The Geotechnique (2007) assessment established that: ▪ the property "was vacant and previously used as a car display centre"; ▪ two underground storage tanks (USTs) had been installed; however, these were removed (in 1996); ▪ the property "was underlain by some shallow fill material overlying alluvial soils, river gravels, residual clay then shale bedrock"; ▪ groundwater was measured at 7.8m below ground level (BGL) in the installed monitoring well MW1; ▪ based on the analysis of representative samples, the soils "did not appear to have been significantly impacted by past or present activities and/or the presence of imported fill"; ▪ no groundwater contamination issues were revealed, although the tested groundwater sample GW1 (from MW1) had elevated levels of dissolved nickel and zinc ("reflective of background conditions"), as well as traces of toluene, ethylbenzene, xylenes and the C_6-C_9 / C_{10}-C_{14} / C_{15}-C_{28} TRH fractions; ▪ no issues concerning migration of contamination were identified; and ▪ the property "did not present a significant risk of harm to human health or the environment" and was "considered to be environmentally suitable for the development". The Benviron (2015) preliminary investigation concluded that the risks to human health and the environment associated with soil contamination "were medium to high in context of the proposed use" (i.e. high density residential buildings with a triple basement), recommending that more detailed assessment be undertaken. Note, however, this investigation applied to a larger block of land than the current site. ***CSM*** The Benviron (2019) CSM identified the following "areas of potential concern": ▪ Historical commercial uses (car sales and repairs); ▪ Imported filling of unknown origin and quality; ▪ Former UST area; ▪ Driveways and parking areas; ▪ Impacts from the weathering of building fabrics with hazardous substances; and ▪ The migration of impacted groundwater from up-gradient sources. The COPC were considered to be heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), volatile organic compounds (VOC; including chlorinated volatile organic compounds (CVOC) and the monocyclic aromatic hydrocarbons benzene, toluene, ethylbenzene and xylenes (BTEX)), total recoverable hydrocarbons (TRH), semi-volatile organic compounds (SVOC; including polycyclic aromatic hydrocarbons (PAH), organochlorine pesticides (OCP), organophosphate pesticides (OPP), polychlorinated biphenyls (PCB) and phenol) and asbestos. ***Results from Combined Geotechnique and Benviron Sampling Works*** Based on the combined borehole logs, the stratigraphy consisted of shallow (≤1.2m thickness), gravelly sand fill, overlying natural soils of silty sand / clayey silt / gravel / silty clay, overlying weathered shale. Asbestos-containing materials (ACM) were not observed in any of the drill spoils or samples collected. Concentrations of all COPC in the tested soil samples were below the adopted acceptance criteria applicable for residential land use with minimal access to soil (and thus commercial / industrial land use, by default). Some exceedances of the adopted ecological investigation / screening levels (EILs / ESLs) were identified in localised fill materials - specifically copper (Benviron BH5 (0.5m)), nickel (Benviron BH5 (0.5m)), zinc (Benviron BH5 (0.5m)) benzo(α)pyrene (Geotechnique BH1 (0.3-0.5m)) and C_{16}-C_{34} (F3) TRHs (Benviron BH101 (0.1-0.2m)).
Conclusion and Recommendations	Based on the results of their investigation, Benviron concluded that the site required remediation in order to render the site suitable for the proposed (high density residential) development. In addition to additional (fill) soil sampling and testing for asbestos, it was recommended that "an up to date assessment of groundwater be completed, including the analysis of TRH phenols, VOC and the installation of at least three monitoring wells to determine an inferred flow direction".

Project Task	Findings
GI (EI, 2019)	
Principal Findings	Based on borehole logs and standard penetration testing (STP) at six separate locations, the subsurface conditions to 18.2-19.6m BGL were summarised as: ▪ FILL, silty sand with gravels and plant rootlets (0.2-1.2m thickness); overlying ▪ FLUVIAL SILTY SAND / SANDY SILT, fine to medium grained (1.9-3m thickness); overlying ▪ FLUVIAL SANDY GRAVEL, medium to coarse grained, some silt (9.4-10.7m thickness); overlying ▪ SHALE, low to medium strength, weathered (2.1-3.2m thickness); overlying ▪ SHALE, high strength, fresh. Groundwater was encountered at depths of 8.0m BGL and 7.5m BGL in monitoring wells BH1M and BH3M, respectively (each well being installed to a depth of 12.6m BGL; see **Figure 2**, **Appendix A**).
AGI (EI, 2020)	
Objective	To investigate the local groundwater conditions, via sampling from the existing (GI) monitoring wells and laboratory analysis for the COPC, in support of the current redevelopment.
Scope of Work	EI completed the following tasks as part of their investigation: ▪ Review of topographical, geological, hydrogeological and soil landscape maps; ▪ Review of the previous investigations; ▪ Review of existing underground services on the property; ▪ A walkover inspection; ▪ One round of groundwater sampling from the EI (2019) monitoring wells BH1M and BH3M; ▪ Laboratory analysis of the groundwater samples for the COPC; and ▪ Data interpretation and reporting.
Principal Findings	The EI (2020) CSM identified the following sources of potential contamination for local groundwater: ▪ Residual impacts from the former USTs (understood to have been removed in 1996); and ▪ The migration of impacted groundwater from up-gradient (off-site) sources. The COPC were considered to be dissolved heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), VOC (including CVOC and BTEX), TRH and PAH. Per- and poly-fluoroalkyl substances (PFAS) were eliminated as being contaminants of interest. Groundwater was encountered at depths of 5.78m BGL (BH1M) and 5.5m BGL (BH3M), with the inferred hydraulic gradient being westerly. Field measurements of pH (5.54 and 5.47, respectively) and electrical conductivity (EC; 3201 µS/cm and 2200 µS/cm, respectively) indicated that it was acidic and brackish. Turbidity was low and "no odours or sheen" were observed. Concentrations of all COPC in the tested groundwater samples were below the adopted GILs, except for marginal exceedances of: ▪ Dissolved copper and nickel (BH1M); ▪ Dissolved zinc (BH1M and BH3M); and ▪ >C_{16}-C_{34} (F3) TRHs (BH1M). The metal concentrations were considered to be "consistent with background conditions for urban (Sydney metropolitan) areas, including Penrith", while the "TRH concentrations will likely attenuate prior to encountering any sensitive environmental receptors".
Conclusion	EI concluded that the local groundwater "presents a low human health and environmental risk and is suitable for the proposed mixed residential and commercial towers with above ground car parking".

3.2 Updated Conceptual Site Model

In accordance with NEPC (2013*) Schedule B2 - Guideline on Site Characterisation* and to aid the assessment of data collected for the site, Benviron (2019) and EI (2020) developed conceptual site models as part of their investigation. Each CSM assessed plausible linkages between potential contamination sources, migration pathways and receptors.

EI hereby provides an updated CSM, consolidating the available information.

3.3 Potential Contamination Sources

On the basis of the previous findings (described in **Section 3.1**), the potential contamination sources were considered to be as follows:

- Contamination of soil and groundwater from historical commercial industrial activities (car sales and repairs);
- Importation of uncontrolled fill to the site;
- Residual impacts from the former USTs (understood to have been removed in 1996);
- Driveways and parking areas;
- Weathering of building fabrics with hazardous substances, such as painted / metal surfaces and ACM;
- Migration of impacted groundwater from off-site (up-gradient commercial) sources.

3.4 Contaminants of Potential Concern

The COPC for this site were considered to be:

- heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
- volatile organic compounds (VOC); including
- chlorinated volatile organic compounds (CVOC); and the
- monocyclic aromatic hydrocarbons benzene, toluene, ethylbenzene and xylenes (BTEX);
- total recoverable hydrocarbons (TRH);
- polycyclic aromatic hydrocarbons (PAH);
- organochlorine pesticides (OCP);
- organophosphate pesticides (OPP);
- polychlorinated biphenyls (PCB); and
- asbestos.

Note: PFAS were eliminated as being contaminants of interest under the EI (2020) *Additional Groundwater Investigation* (EI Report E24300.E03_Rev0, dated 30 January 2020).

3.5 Exposure Pathways and Receptors

The previous investigations indicated that contamination of significance was not present on the land. Only minor breaches of EILs/ESLs were identified for soils and groundwater displayed concentrations of heavy metals that were “consistent with background conditions for urban (Sydney metropolitan) areas, including Penrith”, and residual petroleum hydrocarbons that “will likely attenuate prior to encountering any sensitive environmental receptors”.

The site is to be redeveloped for mixed use, the high density residential component commencing after five levels of commercial (retail and vehicle parking) facilities, with the entire ground surface to be paved. Given this scenario, exposure pathways for possible human and environmental receptors are:

- **Site Workers**: low risk of exposure through dermal contact, inhalation and/or ingestion of (fill) soil;
- **General Public and Future Residents**: very low risk of exposure through dermal contact, inhalation and/or ingestion of (fill) soil; and
- **Receiving Ground and Surface Waters**: low to moderate risk of impact, as attenuation likely, accelerated by mixing.

3.6 Data Gaps

EI considers that the following data gaps exist in the updated CSM:

- The location(s) of the former USTs (2 x 3000 gallons); and
- Validation of the (former) UST pit soils, post tank removal.

On-going monitoring of local groundwater conditions is recommended, to establish whether a downward trend is apparent for TRH and VOC (including BTEX).

Closure of these data gaps would be integrated into the site works program, as part of the Additional Assessment stage.

4. Goals and Planning

Formal remediation is not deemed necessary for this site. Nevertheless, the site investigation phase revealed that two USTs (each 3000 gallons) were installed on the site in 1958, although both were removed in 1996 by Knight's Syndicate Pty Ltd (**Section 3.1**).

None of the previous reports identified the actual location(s) of these tanks on the property, while validation of the UST pit soils in accordance with EPA (2014a) *Technical Note: Investigation of Service Station Sites* and Australian Standard AS4976 (2008) *The Removal and Disposal of Underground Petroleum Storage Tank*, does not seem to have been recorded post tank removal. Closure of these data gaps will therefore be integrated into the recommended environmental works program for the site.

The focus of this works program will be contingency measures to deal with unexpected finds, should they be encountered during the redevelopment. The proposed measures will be consistent with the SEPP 55 guidelines (DUAP/EPA, 1998) and Council's contaminated land policy, and shall meet the following goals:

- Meeting the conditions of the planning consent and to render the site suitable for the proposed land use(s);
- Consideration of the principles of ecologically sustainable development, in line with Section 9 of the *Contaminated Land Management Act 1997*;
- Minimising waste, as per the *Waste Avoidance and Resource Recovery Act 2001*;
- To remediate any "discovered" contamination, encountered during redevelopment of the property, so there are no unacceptable risks to on-site and off-site receptors; and
- Demonstrating that the plans for site management consider work health and safety, environmental management and the identified contingencies.

In addition, all works will be in accordance with any consent conditions issued by Penrith City Council for the corresponding Development Application (DA), as well as the *Penrith Development Control Plan (DCP) 2010*.

The appointed building contractor must prepare a site-specific Work Health and Safety Plan (WHSP) and Construction Environmental Management Plan (CEMP) for the project, covering human / environmental health and safety issues, as well as all measures required under Penrith City Council's DA approval and DCP. Where asbestos removal is required, an asbestos management plan (AMP) should be drafted and the appointed contractor must be appropriately licensed to perform such works.

Refer to **Tables 6-2**, **6-3** and **6-4** for measures / issues that are to be addressed in the CEMP / AMP and should be implemented during the environmental works at the site.

5. Recommended Environmental Works

5.1 Predicted Works Sequence

The sequence of environmental works for the initial phase of the site redevelopment, with estimated timeline, is proposed in **Table 5-1**. Further details are provided in the subsections that follow.

Table 5-1 Works Sequence and Timeline

Task	Description of Work
Site Establishment (Weeks 1-8)	Development of pre-work plans (e.g. work health and safety plan, construction environmental management plan and AMP). Collate approvals and permits to commence work. Install site pollution monitoring and control measures to be maintained for the duration of the works, as outlined in the management plans.
Demolition of Structures (Week 9)	Demolish existing structures, including hardstands. Identify, disconnect, remove and/or manage existing services as required. Conduct site walkover inspection. *Efforts to be made to preserve all existing wells during hardstand demolition.*
Additional Assessment (Weeks 10-13)	Conduct ground penetrating radar (GPR) survey and test pitting, to check for any (abandoned) underground petroleum storage system (UPSS) still remaining, as well as the former UST area. Ensure any identified tanks / sumps / pits are empty and engage liquid waste management should any such material remain. Conduct soil sampling if / where residual contamination is suspected. Conduct one round of groundwater monitoring, utilising the existing wells (BH1M, BH3M and MW1, if still present).
Waste Management (Weeks 14-16)	Initiate waste classification of soils designated for off-site disposal (if required). Ensure waste documentation is collated for reporting purposes, including all tipping dockets.
Reporting (Weeks 17-20)	Complete reports, as required, detailing any further investigative / remedial works and provide conclusions on site suitability.

5.2 Site Establishment

Notice will be given to Council at least 30 days prior to the commencement of environmental / demolition works. A list of all required work permits will be obtained from Council and arrangements are to be made to obtain the necessary approvals from the relevant regulatory authorities.

The site itself will be prepared in accordance with the requirements of the Site Management Plan outlined in **Section 6**. The site developer will also need to prepare and implement a WHSP, CEMP and AMP prior to any works. Establishment of environmental controls, site access, security, fencing and warning signage is required prior to works commencement. A project plan should also be developed to outline engineering design for excavation support (if required), water treatment requirements and design, staging of excavation works, stockpiling, waste stabilisation, waste material loading, traffic management and waste tracking.

As part of the site preparation phase and preliminary tasks, a workshop should be conducted with the appointed contractor(s), to further develop any (excavation) plans and environmental management requirements. The site contractor is to complete a project plan that outlines the basic stages of the works. The staging plan should include, but not necessarily be limited to:

- Staging of the decommissioning and removal of tanks (if any) and associated equipment;
- Staging of areas to be excavated;
- Areas designated for waste segregation, screening and storage (stockpiling), amenities, soil and groundwater treatment (if required);
- Truck movements to allow loading to mitigate impacts to surrounding land users and council infrastructure; and
- Proposed environmental mitigation measures.

Should unexpected finds be discovered during the course of the works program, then the procedures described under the Contingency Management (**Section 5.7**) and Unexpected Finds Protocol (**Appendix C**) are to be implemented until the RAP goals have been achieved and the site is deemed suitable for the intended land use.

5.3 Demolition and Site Walkover

Removal of onsite structures (hardstands) is required to access the underlying soils and allow test pitting. Building demolition should be in accordance with Australian Standard AS2601 (2001) *The Demolition of Structures* and wherever possible, waste should be segregated into metal, wood, brick / concrete and plastic.

Following the removal of hardstand pavements, a site walkover is to be conducted by a qualified and experienced environmental engineer/scientist, to inspect for any visual signs of contamination (including fragments of fibre cement sheeting) and buried building waste (potentially containing ACM) that may have been beneath the existing pavements.

5.4 Additional Assessment

5.4.1 Soil

The site walkover will coincide with a GPR survey, conducted by a certified and experienced service locator, to confirm the presence of any (abandoned) UPSS and subsurface infrastructure. Test pitting using a bucket excavator will also be performed, to assist the inspection / survey stage and investigate the former UST area.

If contamination of potential risk is suspected in any of the test pits, soil sampling will be undertaken, including in-field screening of soil head space samples for VOC using a portable photoionisation detector (PID).

5.4.2 Groundwater

Rationale

Further monitoring of local groundwater conditions is recommended, to establish whether a downward trend is apparent for TRH and VOC.

Methodology

The assessment methodology will comply with referenced guidance documents, including:

- NEPC (2013) *Schedule B2 Guideline on Site Characterisation* and *Schedule B6 Framework for Risk-Based Assessment of Groundwater Contamination*;
- DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*; and
- Vic EPA (2000) *Groundwater Sampling Guidelines.*

Effort should be made to preserve all existing groundwater monitoring wells during site demolition. Any additional (new) groundwater wells, if required, must be installed according to NUDLC (2012) *Minimum Construction Requirements for Water Bores in Australia*.

The screens of any new wells will be at least 1m above the watertable, to assess the potential presence of light non-aqueous phase liquid (LNAPL) and vapour within the vadose zone. Existing and/or newly installed groundwater monitoring wells will be adequately developed to remove sediment from the well, then left for at least seven days prior to sampling.

One groundwater monitoring event (GME) is proposed at this stage. Sampling will be completed using micropurge techniques, with representative samples to be analysed for dissolved heavy metals, VOC (including CVOC and BTEX) and TRH. Field measurements of pH, reduction-oxidation potential (Redox), electrical conductivity (EC), dissolved oxygen (DO) and temperature will also be taken.

Should contamination of potential risk be identified in groundwater, further remedial works may be required and will be addressed via an addendum to this RAP.

Further details of the groundwater SAQP are provided in **Table 5-2** and **Table 7-2**.

Table 5-2 SAQP for the Groundwater Assessment

Activity/Item	Details
Well Construction (if required)	Well construction to be in accordance with the standards described in NUDLC (2012) and involve the following: ▪ 50mm, Class 18 unplasticised polyvinyl chloride (uPVC), threaded, machine-slotted screen and casing, with slotted intervals set to screen to at least 1m above the standing water level to allow sampling of phase-separated hydrocarbon product, if present. ▪ The base and top of each well to be sealed with a uPVC cap. ▪ Annular, graded sand filter to be applied to approximately 500mm above the top of the screen interval. ▪ Bentonite to be applied above the annular filter to seal the screened interval. ▪ Drill cuttings to be used to backfill the bore annulus to just below ground level. ▪ Surface completion to comprise 50mm uPVC casing.
Well Development	Well development to be conducted directly following installation. This will involve agitation within the full length of the water column using a dedicated, high density polyethylene (HDPE), disposable bailer, followed by removal of water and accumulated sediment using a HDPE submersible bore pump. Pumping to continue until no further reduction in suspended sediment is observed.
Well Gauging	Wells will be gauged for standing water level (SWL) using an interface probe, prior to purging at the commencement of the GME (which shall be performed after a re-equilibration time of at least seven days, post well installation / development). A transparent (PFAS-free) HDPE bailer will be used for visual assessment of the presence of phase-separated hydrocarbons (PSH), prior to the commencement of well purging.
Well Purging, Field Testing and Sampling	For each well, groundwater will be purged and sampled by a low-flow / minimal draw-down sampling method (e.g. *MicroPurge* kit (MP15) with portable pump). The *MicroPurge* system incorporates a low density polyethylene (LDPE) pump bladder and Teflon-lined, LDPE tubbing. It employs pressurised carbon dioxide gas to regulate groundwater flow. Pump pressure and pumping cycles will be adjusted accordingly, to regulate extraction flow rate and avoid excessive drawdown of water level during sampling. During the purging process, water will be continuously measured for pH, Redox, EC, DO and temperature using a suitable (calibrated) multi-meter, positioned within an open flow-through cell. Readings will be recorded onto field data sheets. Once water quality parameters are stabilised in accordance with NEPC (2013) guidelines (i.e. within ± 0.2 for pH, ± 20mV for redox, ± 3% for EC, ± 10% for DO and ± 0.2° for temperature), groundwater sampling will be undertaken. Detection of any suspicious odours and visual signs of contamination (including colour, turbidity and oil filming) during the purging / sampling will be noted. Samples for heavy metal analysis will be field-filtered (0.45µm pore membranes).

Activity/Item	Details
Decontamination Procedure	Between uses/wells, the micro-purge pump (or equivalent) will be decontaminated in a solution of potable water and PFAS-free detergent, then rinsed with potable water. Note, the *MicroPurge* kit (MP15) employs disposable bladders and tubing, to minimise potential (cross) contamination. Between measurements, the water level and multi-meter probes will be washed in a potable water / PFAS-free detergent solution, then rinsed with potable water.
Sample Containers and Preservation	Only laboratory-supplied containers will used to collect samples, as follows: ▪ One, amber glass, acid-washed and solvent-rinsed bottle; ▪ Two, 40mL amber glass vials (with 1mL hydrochloric acid), Teflon-sealed; and ▪ One, 250mL HDPE bottle (with 1mL nitric acid). Each container will be opened only once, immediately prior to use, and filled to the brim with sample. It will then be capped and stored in an insulated chest holding ice-bricks, until completion of the fieldwork and during transit to the corresponding analytical laboratory.
Sample Transport	Refrigerated sample chests will be transported to the contracted analytical laboratories using strict chain of custody (COC) procedures. Sample Receipt Advice (SRA) is to be provided by each laboratory, to document sample condition.
Laboratory Analyses	All groundwater samples will undergo analysis for heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), VOC (including CVOC and BTEX) and TRH.
Field QA/QC	Field QA/QC measures will include: ▪ The development of site safety plans prior to works commencement; ▪ Standard operating procedures to be followed, to prevent cross contamination; ▪ Blind and split field duplicate field samples to be collected and analysed; ▪ The analysis of one laboratory-prepared trip blank, one laboratory-prepared trip spike and one low flow sampling equipment rinsate blank; ▪ Samples to be stored under secure, temperature controlled conditions; and ▪ Completion of COC documentation, to track the handling, transport and delivery of samples to the contracted environmental laboratories.
Laboratory QA/QC	In-house laboratory QA/QC measures will include: ▪ Analysis of reagent blanks, matrix and surrogate spikes, duplicates and calibration / control standards; and ▪ Data quality review, as part of their (final) analytical report.

5.5 Waste Management

Prior to any soil being removed from the site, formal waste classification certificates shall be completed, in accordance with the EPA (2014b) *Waste Classification Guidelines*.

Soil samples designated for waste classification will be collected at a rate of one sample per 25m^3 (minimum of three) up to 250m^3. For spoil exceeding 250m^3 but less than 2,500m^3, a minimum of 10 samples is required and 95% UCL statistical calculations of contaminant concentrations will be compared to the criteria. Samples to be analysed for heavy metals, TRH, BTEX, PAH, OCP, OPP, PCBs and asbestos. Note, the previous Geotechnique (2007) and Benviron (2015 / 2019) investigation data, as well as any collated as part of the **Additional Assessment** (**Section 5.4**), can be utilised for this purpose.

Results of analyses will be compared with the criteria set out in the EPA (2014b) *Waste Classification Guidelines*.

Ensuring that the waste fill/soil streams are kept separate, material will be loaded, transported and disposed off-site to landfill facilities that are appropriately licensed to receive the materials corresponding to the documented waste classification(s).

In accordance with the *Waste Regulation 2014*, waste movements will be tracked and disposal receipts (dockets) will be maintained by the site manager, so that copies can be provided for final reporting purposes.

5.6 Reporting

All fieldwork, chemical analyses, discussions, conclusions and recommendations must be documented in a formal report. Any validation report will be prepared in accordance with requirements of the OEH (2011) *Guidelines for Consultants Reporting on Contaminated Sites* and EPA (2017) *Guidelines for the NSW Site Auditor Scheme* and will confirm that the site is suitable for the proposed development.

5.7 Contingencies

Remedial contingencies may be required should the scenarios detailed in **Table 5-3** arise.

Table 5-3 Contingency Actions

Scenario	Contingencies/Actions Required
Highly contaminated soils / sludges not identified during previous investigations are encountered, particularly at site boundaries	Work to be suspended until the Environmental Engineer / Scientist can assess impacted materials and associated risks. The leachability of contaminants to be assessed, before disposal options are considered. Follow the unexpected finds protocol in **Appendix C**.
Underground tanks (i.e. USTs that have not been previously identified) are encountered at the site	Should unexpected USTs be identified at the site, a GPR survey and visual inspection may be conducted by a certified and experienced service locator, to confirm the presence / absence of any further UPSS and any unknown subsurface infrastructure. Systems to be removed and the excavations appropriately validated and backfilled by an experienced contractor. Tank removal works to be reported by an appropriate environmental engineer / scientist, in accordance with EPA (2014a) *Technical Note: Investigation of Service Station Sites* and Australian Standard AS4976 (2008) *The Removal and Disposal of Underground Petroleum Storage Tanks*. Follow the unexpected finds protocol in **Appendix C**.
Unexpected asbestos wastes are encountered	Work to be suspended and asbestos removed by a suitably qualified contactor, in accordance with SafeWork NSW regulations. Follow the unexpected finds protocol in **Appendix C**.
Residual soil impacts remain on-site	Assess potential vapour hazard and delineate plume. Should significant soil vapour contamination be identified, consider soil vapour monitoring program and the implementation of a vapour membrane barrier system within the final development design.
Contaminated groundwater (including LNAPL or DNAPL) encountered	Review groundwater conditions on site (if required) and determine need for further investigation/remediation and/or longer-term management plan. Any dewatering may require approval under the *Water Management Act 2000*. Remedial options may include natural attenuation, extraction, bioremediation, PSH recovery using active pumping (including hydraulic control), installation of a groundwater permeability barrier, in situ oxidation or stabilisation.
Contaminated groundwater plume is identified and is migrating off-site, or there are increases in concentration due to increased infiltration	Review contaminant increase and analytes. Review active remediation alternatives (if necessary). Ensure down-gradient monitoring is undertaken. Carry out fate and transport modelling and assess the need for further action.

Scenario	Contingencies/Actions Required
Contamination is identified near heritage items or significant trees (if identified)	Stop work. Review contaminant concentrations and risks to heritage items / flora. Assess human health and environmental risks if contamination remains in place. Review natural attenuation options.
Changes in proposed excavation depth	Review remediation works for the site.
Changes in proposed land use(s) at the site	Review remediation works for the site.

Decommissioning of UPSS (if any)

Remediation of any (abandoned) UPSS will follow the following procedure (EPA, 2014a):

- A licensed liquid waste transporter will be required to remove any liquid contents from the UST and associated infrastructure, with the disposal of any waste to a suitably licensed liquid waste facility.
- The contractor must provide appropriate documentation for the waste disposal.
- Tanks should then be excavated, rendered safe and transported off-site by a licensed contractor for destruction/disposal. The contractor must provide formalised certification of the tank destruction and disposal.
- Above ground storage tank (AGST) or infrastructure including mechanical hoists, oil water separators, bowsers, fuel lines and vent lines will be removed followed by excavation of the waste oil pits. Once the AGST is dismantled, it will be rendered safe for transport by a licensed contractor for off-site destruction/disposal. The contractor must provide formalised certification of the tank destruction and disposal.
- Any soil showing signs of contamination will be screened using a photoionisation device (PID) and all soil producing readings greater than 30 parts per million (ppm) will be excavated, segregated and stockpiled awaiting further classification. Any impacted soil will be ‘chased’ and removed until no further signs of contamination are present and PID readings are <30 ppm.
- Excavated soil is to remain segregated from clean soil, to enable waste classification. Once classified, material will be transported to an off-site waste disposal facility to minimise dust and odour issues.
- All excavation works should be undertaken by licensed contractors experienced in the decommissioning and removal of fuel infrastructure, demolition of buildings and the remediation of hydrocarbon contaminated soils.
- Validation of excavations will be required as described in **Section 7** of this report.

6. Site Management

6.1 Roles and Responsibilities

Roles and responsibilities of key personnel required to complete the environmental / redevelopment works are provided in **Table 6-1**. The details of people responsible should be kept up to date throughout the remedial works.

Table 6-1 Management Team

Team Member	Organisation	Responsibilities
Property Owner	Urban Property Group	▪ Overall responsibility of site and key liaison for council. ▪ Appoint site contractors.
Project Manager - Site Operations	Urban Property Group	▪ Overall site management and day to day decision maker. ▪ Key communicator between site and stakeholders. ▪ Ensure relevant control plans are developed and implemented and appoints required staff to the roles required.
Building Contractor	To be announced (TBA)	▪ Preparation of a site-specific WHSP, CEMP and AMP (as per **Section 5.2**). ▪ Site establishment, including the implementation of environmental controls required by the site management plans and relevant legislation. ▪ Completion of tasks in accordance with the methods of the RAP and relevant legislation. ▪ Ensure environmental engineer / scientist is informed of schedules and is employed for key components, such as additional assessment and waste classification. ▪ Effectiveness of mitigating measures required for environmental activities. ▪ Ensure appropriate handling of all material and correct offsite disposal of waste under appropriate documentation. Copies of all waste documents are required by the environmental engineer / scientist for inclusion in site (validation) report. ▪ Reporting any environmental issues, complaints or unexpected finds to the project manager and environmental engineer / scientist.
Environmental Engineer / Scientist	TBA	▪ Support all workers in understanding the requirements of the RAP and the potential risks posed should measures not be implemented. ▪ Supervision of key environmental components, collection of all samples and provide guidance to ensure the work is understood and effective. ▪ Development of any remediation objectives and strategy. ▪ Detail all works in a (validation) report, concluding on site suitability.
Local Authority	Penrith City Council	▪ Responsible for the granting of all consents and ensuring the recommendations of environmental reports are implemented. ▪ Regulator of consent conditions.

6.2 Materials Handling

Table 6-2 summarises the measures that should be implemented in respect of materials handling during any (bulk) excavation works at site. These measures will form part of the site-specific CEMP and AMP, to be prepared by the appointed building contractor(s).

Table 6-2 Materials Handling Requirements

Item	Description/ Requirements
Excavation Contractors	Excavation should be completed by a suitably qualified contractor to ensure all staff are aware of the site's environmental and health and safety requirements, and that all adverse effects are mitigated, isolated, or reduced.
Soil Management	Appropriate measures shall be taken during soil excavations to reduce nuisance dust and odours. Soils will be disposed in accordance with the NSW *Protection of the Environment Operations (Waste) Regulation 2014*.
Stockpiling of Materials	All stockpiles will be maintained as follows: ▪ Present on sealed surfaces such as concrete, asphalt, or high-density polyethylene. If placed on bare soil, the land will be over-excavated to ensure adequate removal of all impacted material and located in areas of the site which do not pose environmental risk (e.g. sheltered areas). ▪ No greater than 2m in height, be appropriately battered and sediment measures surrounding each base to manage stormwater runoff. Material will either be covered or kept moist to prevent dust blow. ▪ Stockpiles will be in approved locations of the site, selected to mitigate environmental impacts while facilitating material handling requirements. Any contaminated material will only be stockpiled in non-remediated areas of the site or at locations that do not pose any risk (e.g. sheltered areas).
Transport of Material (off-site)	Material shall be transported via a clearly distinguished haul route defined within construction management plans. All haulage routes for trucks transporting soil, materials, equipment, and machinery shall comply with all road traffic rules. Implementation of sediment measures to reduce the movement of soil onto public roadways or vehicle wheels is required, such as wheel washing/cleaning facilities placed at each site entry/exit. Any residue from the cleaning facility will be collected and deemed contaminated unless proven otherwise. Spoil material will require offsite disposal. Trucks transporting soils from the site are to be covered with tarpaulins (or equivalent). All deliveries of soil, materials, equipment, or machinery should be completed during the approved hours of work and exit the site in a forward direction. Removal of waste materials from the site shall only be carried out by a recognised contractor holding the appropriate EPA NSW licenses, consents, and approvals.
Material Tracking	Materials excavated from the site should be tracked from the time of their excavation until their disposal ("cradle to grave"). Tracking of the excavated materials should be completed by recording the following: ▪ Origin of material; ▪ Material type; ▪ Approximate volume; and ▪ Truck registration number. Disposal locations will be determined by the building contractor and the receiving facility, weighbridge dockets and waste certification information should be provided to the environmental engineer / scientist for reporting.
Importation of Material	Landscaping soil, or material imported as fill for planter boxes, is to be certified as either *virgin excavated natural material* (VENM) or *excavated natural material* (ENM) criteria by the supplying contractor. Copies of certification are to be provided to site management and the environmental engineer / scientist. Any material outside of these classifications is to be sampled for characterisation, which can be achieved by: ▪ Collecting one soil sample per $100m^3$ of imported soil in deposited areas. ▪ Analysis of samples for the heavy metals, TRH, BTEX, PAH, OCP / OPP, PCBs, PFAS and asbestos (at least).

Item	Description/ Requirements
	▪ Acceptance will be achieved once all contaminant concentrations are reported to be below the site criteria. ▪ Analysis results should be presented to the environmental engineer / scientist for inclusion in the site (validation) report. Visual inspection of the imported material to confirm consistency is recommended. Should imported / excavated materials be identified as potentially contaminated or unsuitable for (re)use, the following procedure should be undertaken: ▪ Visually assess if the contaminated material can be isolated from other material, and stockpile separately if possible. ▪ Stockpile in contaminated material area and sample in accordance with waste classification procedures detailed in **Section 5.5**. ▪ Subject to classification, 'clean' materials may then be reused as filling material on-site or disposed of at an appropriate receiving facility.

6.3 Environmental Management

All building work must be undertaken with due regard to the minimisation of environmental effects and meet all statutory environmental and safety requirements. The WHSP, CEMP and AMP must therefore address the issues identified in **Table 6-3**.

Table 6-3 Environmental Management Requirements

Category	Measure
Demolition (including Asbestos Management)	Appropriate measures shall be taken to ensure that demolition works are completed in accordance with SafeWork NSW standards and codes of practice. Any asbestos identified should be managed in accordance with SafeWork NSW codes of practice and Australian Standards.
Site Stormwater Management and Control	Appropriate measures shall be taken to ensure that potentially contaminated water does not leave the site. Such measures will include: ▪ diversion and isolation of any stormwater from any contaminated areas; ▪ provision of sediment traps including geotextiles or hay bales; and ▪ discharge of any water to drains and water bodies must meet the appropriate effluent discharge consent condition under the *Protection of the Environmental Operations Act 1997*.
Dust and Odour	Control of dust and odour during the course of the works shall be maintained by the contractor to ensure no nuisance dust or odours are received at the site boundary according to requirements of the *Penrith DCP 2010*. Action levels and specific control measures would be described in the site CEMP and may include, but will not necessarily be limited to, the following: ▪ site wide water spraying, as/when appropriate, to eliminate wind-blown dust; ▪ use of mist sprays, and/or sprinklers on stockpiles, fill screening areas and loaded fill to lightly condition the material; ▪ use of tarpaulin or tack-coat emulsion or sprays to prevent dust blow from stockpiles or from vehicle loads; ▪ covering of stockpiles or loads with polythene or geotextile membranes; ▪ restriction of stockpile heights to ≤2m above surrounding site level; ▪ ceasing works during periods of inclement weather such as high winds or heavy rain; ▪ regular checking of the fugitive dust and odour issues to ensure compliance with the CEMP requirements; and ▪ undertaking immediate remedial measures to rectify any cases of excessive dust or odour (e.g. use of misting sprays or odour masking agent). EI notes the Council Contaminated Land Policy requires that no odours shall be detected at any boundary of the site during the works by an authorised Council

Category	Measure
	Officer relying solely on sense of smell. Should significant odours be detected, during site works, additional control measures for odour control may be required under the Council contaminated land policy, being: ▪ staging of works; ▪ monitoring of ambient air across the site and at site boundaries with a PID; ▪ the use of appropriate covering techniques, such as plastic sheeting to cover excavation faces; ▪ use of fine mist sprays / hydrocarbon mitigation (suppressing) agent on the impacted areas/materials (examples of mitigation agents include BioSolve® Pinkwater®, or Anotech, however a similar product may be selected by the contractor); ▪ adequate maintenance of equipment and machinery to minimize exhaust emissions; and ▪ provision of respirators for on-site workers. Records of volatile emissions and odours shall be logged, kept on-site and made available to Council Officers on request.
Noise and Vibration	Noise and vibration will be restricted to reasonable levels. All plant and machinery used on site will be noise muffled to ensure that noise emissions do not breach statutory levels as defined within the *Penrith DCP 2010*.
Hours of Operation	Working hours will be restricted to those specified by Council, which are normally defined as being 7am to 5pm weekdays and 8am to 1pm Saturdays; no Sunday or public holiday works permitted. These hours may differ from DA conditions, which if specified for the site, must be adhered to.
Community Engagement	Community engagement should be carried out in accordance with Schedule B(8) of NEPC (2013). Prior to the commencement of any works at the site, every owner and occupier of any land located either wholly or partly within 100m of the boundary of the premises should be notified at least 30 days in advance. The notice should include: ▪ advice of demolition and excavation work to be carried out on the premises; ▪ state the time and date such work is to commence; ▪ indicate that the works are being conducted to minimise any risk of site contamination impacting on off-site receptors; ▪ provide appropriate site signage at an easily readable location on the site fencing, including site contact name and phone number to be contacted should any matter arise; and ▪ provide contact information and procedure for registering any complaints.

6.4 Contingency Plan for Environmental Incidents

A contingency plan to deal with incidents that could arise during the proposed building works must form part of the site-specific WHSP, CEMP and AMP. Refer to **Table 6-4** for a selection of potential problems. This plan should be cross-referenced with the provisions presented in **Section 5.7** / **Table 5-3** and **Section 6.3** / **Table 6-3**. The Unexpected Finds Protocol (**Appendix C**) should also be followed should an incident occur.

Table 6-4 Contingency Management

Problem	Corrective Actions
Chemical / Fuel Spill	Stop work, notify above site project manager. Use accessible soil or appropriate absorbent material on site to absorb the spill (if practicable). Stockpile the impacted material in a secure location, sample and determine the appropriate disposal/treatment option.

Problem	Corrective Actions
Leaking Machinery / Equipment	Stop work, repair or replace equipment, as required. Clean up spill with absorbent material.
Failure of Erosion / Sediment Control Measures	Stop activities, contact the site manager / building contractor. Follow the unexpected finds protocol (**Appendix C**). Prepare a management plan if required, to address the issue.
Excessive Rainfall / Water in Excavations	Collect samples and assess against relevant criteria from the EPA (2014b) *Waste Classification Guidelines*, to enable disposal options to be formulated. Stop the identified leak (if from service). Clean up with absorbent material.
Equipment Failures	Ensure that spare equipment is on hand at site, or that the failed equipment can be serviced by site personnel or a local contractor.
Identification of Cultural or Building Heritage Item	Stop work and notify site manager and owner. Follow the unexpected finds protocol as detailed in **Appendix C**. Prepare action or conservation plan as required.
Unearthing Unexpected Materials, Fill or Waste	Stop activities, contact the site manager. Follow the unexpected finds protocol as detailed in **Appendix C**. Prepare a management plan if required, to address the issue.
Incident Management and Community Relations	Ensure that a suitable response is carried out quickly. A response plan to any incident that may occur on site should be prepared and various responsibilities assigned. The site WHSP, CEMP and AMP should specify how to document these procedures and responsibilities, and incident contact numbers should be maintained in an on-site register. All other relevant emergency contact numbers such as Police, Fire Brigade, and Hospital should be listed in the WHSP / CEMP / AMP and posted on-site for easy access.
Complaint Management	Notify the site manager, owner and environmental engineer / scientist (if required) following complaint. Report complaint as per management procedures. Implement control measures to address reason of complaint (if possible). Notify complainant of results of remedial actions.

7. Sampling, Analytical and Quality Plan

The sampling, analytical and quality plan (SAQP) will ensure that any data collected during environmental works are representative and provide a robust basis for site decisions.

7.1 Sampling Methodology

The recommended frequency of sample collection is presented in **Table 7-1.**

Table 7-1 Sampling Design

Remediation Area	Sampling Density	Potential Contaminants
Stockpiled Materials	Any soil material stockpiled on-site for off-site disposal (not pre-classified), will be sampled for waste classification purposes at a rate of one per 25m^3 (with a minimum of 3 samples for stockpiles <25m^3)	HM, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos
Imported Fill Materials	If material is required to be sourced from off-site to reinstate excavations, it will be certified suitable for the intended use by sampling at a rate of one per 100m^3	HM, TRH, BTEX, PAH, OCP, OPP, PCB, PFAS and asbestos
UST Pit and Associated Infrastructure (if encountered)	Wall – 1 sampling location per wall or per 5m length of excavation wall Base – 1 sample per 25m^2 Fuel lines – 1 sample per 10m	Lead, TRH, BTEX and PAH

The collection and handling of samples will be as described in **Table 7-2**.

Table 7-2 Sample Collection and Handling Procedures

Action	Description of Required Works
Sample Collection	Soil sampling will be directly from the exposed surface of excavation, or from the material brought to the surface by the backhoe/excavator bucket. Bulk soil samples for asbestos analysis are to be prepared in the field using the following protocol: ▪ Approximately 10 litres (L) of soil from indicated excavation depths collected into a bulk bag. Soil characteristics recorded (constituents, grain size, etc.). ▪ Sample bags sent to the laboratory (requesting ACM identification (presence / absence) method with 0.01% detection limit and, if identified, 0.001% detection limit for FA/AF analysis). Groundwater sampling will be completed using micropurge techniques within the top 0.5m of the water column. Water level gauging, well purging and field testing of water quality parameters will be collected and data shall be recorded to comply with routine chain of custody requirements.
Sampling, Handling, Transport and Tracking	The use of stainless-steel or disposable (single use) sampling equipment. All sampling equipment (including hand tools or excavator parts) to be washed in a 3% solution of phosphate- / PFAS- free detergent, followed by a rinse with potable water prior to each sample being collected. Direct transfer of the sample into new glass jars, bottles, vials or plastic bags is preferred, with each plastic bag individually sealed to eliminate cross contamination during transportation to the laboratory. Label sample containers with individual and unique identification including

Action	Description of Required Works
	Project No., Sample No., depth, date and time of sampling. Place sample containers into a chilled, enclosed and secure chest for transport to the laboratory. Provide chain of custody documentation to ensure that sample tracking and custody can be cross-checked at any point in the transfer of samples from the field to the laboratory.
Sample Containers and Holding Times	▪ Metals - 250g glass jar / refrigeration 4^{o}C / 6 months (maximum holding period). ▪ TRH/BTEX - 250g glass jar / refrigeration 4^{o}C / 14 days (maximum holding period). ▪ PAH/OCP/OPP - 250g glass jar / refrigeration 4^{o}C / 14 days (maximum holding period). ▪ PFAS - 50g HDPE jar (Teflon-free) / refrigeration 4^{o}C / 14 days (maximum holding period). ▪ Asbestos - up to a 10 Litre resealable plastic (polyethylene) bag / no refrigeration / indefinite holding time.
Field QA/QC	Quality assurance (QA) and quality control (QC) procedures will be adopted throughout any field sampling program to ensure sampling precision and accuracy, which will be assessed through the analysis of 10% field duplicate/replicate samples. Appropriate sampling procedures will be undertaken to prevent cross contamination, in accordance with EI's Standard Operating Procedures Manual. This will ensure: ▪ Standard operating procedures are followed; ▪ Site safety plans are developed prior to works commencement; ▪ Split duplicate field samples are collected and analysed; ▪ Samples are stored under secure, temperature-controlled conditions; ▪ Chain of custody documentation is employed for the handling, transport and delivery of samples to the contracted environmental laboratory; and ▪ Contaminated soil or groundwater originating from the site area is disposed in accordance with relevant regulatory guidelines. In total, field QA/QC will include one in 10 samples to be tested as intra-laboratory, blind field duplicates, one in 20 samples to be tested as inter-laboratory, split field duplicates, as well as one VOC trip blank, one VOC spike sample and one equipment wash blank sample per sample batch.
Laboratory Quality Assurance and Quality Control	The contract laboratory will conduct in-house QA/QC procedures involving the routine analysis of: ▪ Reagent blanks; ▪ Spike and surrogate recoveries; ▪ Laboratory duplicates; ▪ Calibration standards and blanks; and ▪ Control standards; will ▪ Statistical analysis of each QC measure.
Achievement of Data Quality Objectives (DQOs)	DQOs are to be achieved and an assessment of the overall data quality should be presented in the final validation report, in accordance with the EPA (2017) *Guidelines for the NSW Site Auditor Scheme*.

7.2 Validation Issues

Should remediation of the site (or part thereof) be necessary, such work will be deemed acceptable based on the achievement of the following validation objectives:

- ***Remedial Excavations and Stockpiles*** – Validation of any remedial excavation areas and stockpiles will involve sampling and analysis to ensure that contaminant concentrations are below the proposed soil acceptance criteria (**Section 7.3**). The sampling frequency will be in accordance with the NEPC (2013) NEPM and EPA (1995) *Sampling Design Guidelines*. All tests shall be performed by NATA-accredited environmental analytical laboratories.

- ***Backfill Materials*** – Should backfilling be required, validation of imported fill materials used for the backfilling of remediated areas would be required to verify their suitability for the proposed land use.

Where the importation of 'clean' soil is required to backfill remedial voids and bring the site to the intended finished levels, all such materials must be previously classified as *virgin excavated natural material* (VENM) or *excavated natural material* (ENM), or deemed suitable under another EPA resource recovery exemption/order. In the absence of suitable validation information (as confirmed by the appointed environmental engineer / scientist), imported materials must be sampled and analysed as suitable for on-site use, in accordance with the methodology outlined in **Table 6-2** and **Section 7.1**.

7.3 Acceptance Criteria

The adoption of 'clean-up' criteria that are appropriate for the future use of the site will help mitigate possible impacts to human health and the environment, which may arise in the event that contamination is identified during the proposed building works.

Soil

The soil criteria proposed for this project are outlined in **Table 7-**. These were selected from available published guidelines that are endorsed by national or state regulatory authorities, with due consideration of the exposure scenario that is expected for various parts of the site, the likely exposure pathways and the identified potential receptors.

Table 7-3 Proposed Criteria for Soil

Adopted Guidelines	Rationale
NEPC (2013) Soil HILs and HSLs	**Soil Health-based Investigation (HILs)** All soil samples will be assessed against the NEPC (2013) *HIL-D* thresholds for commercial / industrial sites. **Soil Health-based Screening Levels (HSLs)** The NEPC (2013) Soil *HSL-D* thresholds for vapour intrusion in multistorey buildings, where non-residential uses exist in the basement or at the ground floor, will be applied to assess potential human health impacts from residual petroleum hydrocarbon, BTEX and naphthalene vapours. Since asbestos represents a contaminant of concern for this site, soil asbestos results will be assessed against the NEPC (2013) *HSL* thresholds for "all forms of asbestos", which are derived from the WADOH (2009) criteria.

Note:
For a given analytical method, the laboratory's limit of reporting (LOR) should comply (i.e. be lower) than the adopted remediation criterion.

Prior to being removed from the site, excavated soils must be classified in accordance with the EPA (2014b) *Waste Classification Guidelines*. Under these guidelines, fill/soils may be classified into the following groups: *General Solid Waste*, *Restricted Solid Waste,* or *Hazardous Waste*, subject to chemical assessment using NATA-registered laboratory methods for total and leachable (toxicity characteristics leaching procedure (TCLP)) contaminant levels. Any soils containing asbestos would also be classified as *Special Waste - Asbestos Waste*. In accordance with the *NSW Waste Regulation 2014*, waste soils must only be disposed to a waste facility that is appropriately licenced to receive the incoming waste. It is therefore recommended that confirmation is obtained from the waste facility prior the materials being removed from the site.

Groundwater

The groundwater investigation levels proposed for this project will be derived from:

- ANZG (2018) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*, specifically the *95% Trigger Values* for the protection of fresh / marine water ecosystems;
- ANZECC/ARMCANZ (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality*; and
- NEPC (2013) *National Environmental Protection (Assessment of Site Contamination) Amendment Measure*, specifically *Schedule B1 Guideline on Investigation Levels for Soil and Groundwater*, including the groundwater HSLs for vapour intrusion.

Relevant default criteria will be applied where the above guidelines do not provide values, in compliance with the *Protection of the Environment Operations Act 1997* and the DEC (2007) *Guidelines for the Assessment and Management of Groundwater Contamination*.

7.4 Data Quality Indicators

To ensure that any validation data (including any additional assessment data) are of an acceptable quality, the results will be evaluated against the DQIs outlined in Error! Reference source not found., which will apply to both field and laboratory-based procedures (where applicable).

Table 7-4 Data Quality Indicators

Data Quality Objective	Data Quality Indicator	Acceptable Range
Accuracy	Field – Trip blank (laboratory prepared) Field – Trip spike (laboratory prepared) Field – Split (inter-laboratory) duplicate Laboratory – control and matrix spikes	< laboratory limit of reporting (LOR) 80-120% recovery <30% relative percentage difference (RPD) Prescribed by the laboratory
Precision	Field – Blind (intra-laboratory) duplicate Laboratory – Duplicate and matrix spikes	<30% RPD Prescribed by the laboratory
Representativeness	Field – Rinsate and trip blanks Laboratory – Method blank	< laboratory LOR Prescribed by the laboratory
Completeness	Completion (%)	All RAP tasks completed as prescribed

8. Conclusions

This RAP has been prepared to inform (assist) the building works at 614-632 High Street, Penrith NSW.

Formal remediation is not deemed necessary; however, the site investigation phase revealed that two USTs (each 3000 gallons) were installed on the site in 1958, both being removed in 1996 by Knight's Syndicate Pty Ltd. The actual location(s) of these tanks was unclear, while validation of the pit soils does not seem to have been recorded post tank removal. Closure of these data gaps will therefore be integrated into the recommended environmental works program for the site.

The focus of this works program is contingency measures to deal with unexpected finds, should they be encountered during the initial phase of the redevelopment. The sequence, or stages, of the recommended environmental works will be:

- Site establishment;
- Demolition of structures (hardstands), followed by site walkover inspection;
- Additional assessment (including GPR, test pitting and further groundwater monitoring);
- Waste management; and
- Reporting.

Management procedures are provided to characterise (waste) soil for offsite disposal (if / where required).

In summary, EI considers that the site will remain suitable for the proposed mixed (high density) residential / commercial land use, assuming the provisions outlined in this plan are adhered to.

9. Limitations

This report has been prepared for the exclusive use of Urban Property Group (the client), being the only intended beneficiary of our work. The scope of the RAP is limited to that agreed with our client.

No other party should rely on the document without the prior written consent of EI, and EI undertakes no duty, or accepts any responsibility or liability, to any third party who purports to rely upon this document without EI's approval.

In drafting this RAP, EI has used a degree of care and skill ordinarily exercised by reputable members of the environmental industry in Australia, as at the date of this document. No other warranty, expressed or implied, is made or intended. Each section of this plan must be read in conjunction with the whole of this report, including its appendices.

The methods and conclusions presented in this plan are based on a limited investigation of conditions, with specific sampling locations chosen to be as representative as possible under the given circumstances.

EI's professional opinions are reasonable and based on its professional judgment, experience, training and results from analytical data. EI may also have relied upon information provided by the client and other third parties to prepare this document, some of which may not have been verified by EI.

EI's professional opinions contained in this document are subject to modification if additional information is obtained through further investigation, observations, or validation testing and analysis during remedial activities. In some cases, further testing and analysis may be required, which may result in a further report with different conclusions.

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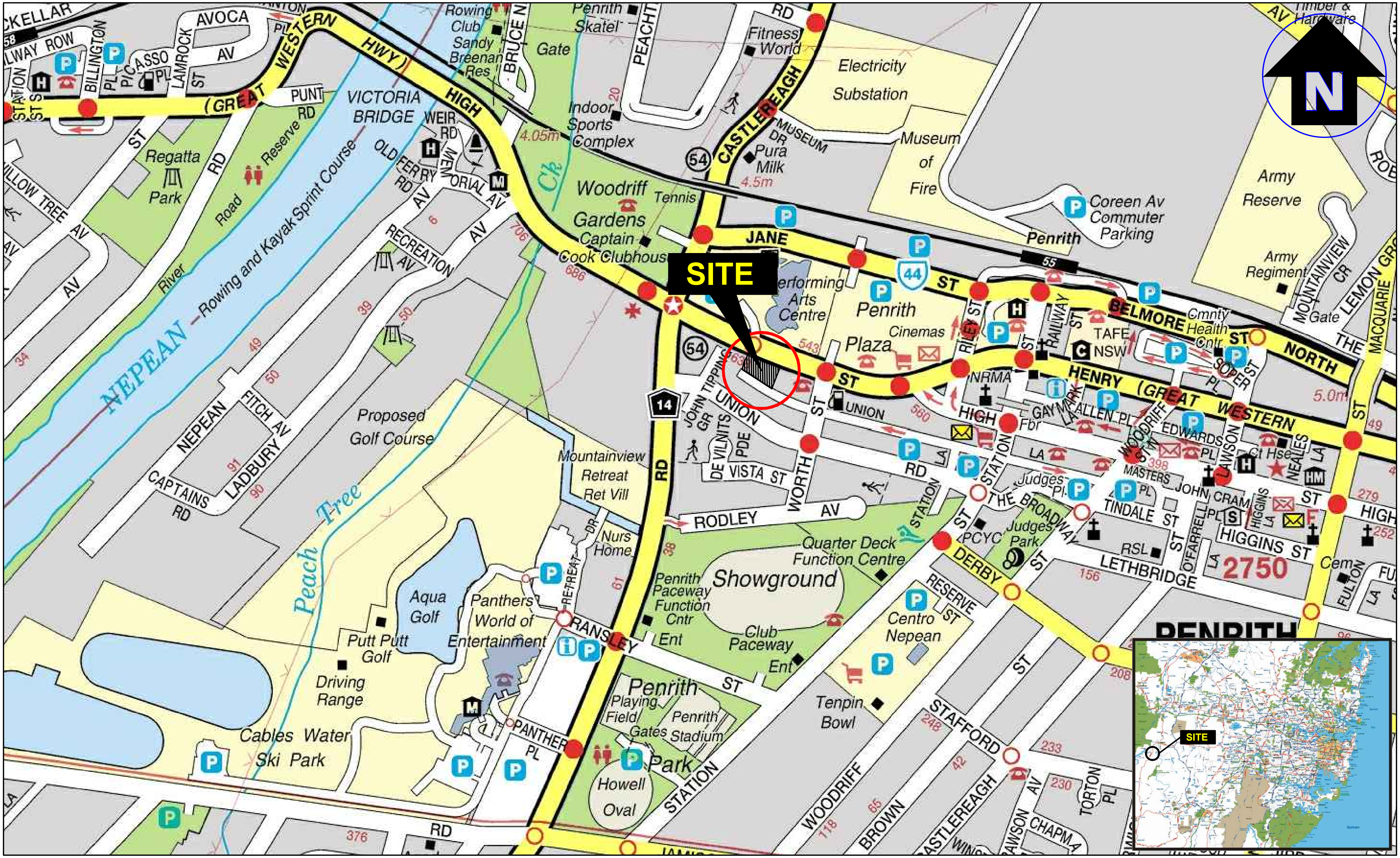
Abbreviations

ACM	Asbestos-Containing Materials
AGST	Above-Ground Storage Tank
ASS	Acid Sulfate Soils
ANZG	Australian and New Zealand and Australian State and Territory Governments
B(α)P	Benzo(α)Pyrene (a PAH compound)
BEL	Bulk Excavation Level
BGL	Below Ground Level
BH	Borehole
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CBD	Central Business District
CEMP	Construction Environmental Management Plan
CSM	Conceptual Site Model
CLM	Contaminated Land Management
COC	Chain of Custody
COPC	Contaminants of Potential Concern
CVOC	Chlorinated Volatile Organic Compounds (a sub-set of the VOC analysis suite)
DA	Development Application
DCP	Development Control Plan
DNAPL	Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
DP	Deposited Plan
DQI	Data Quality Indicator
DQO	Data Quality Objective
EC	Electrical Conductivity
EPA	NSW Environment Protection Authority
F1	C_6-C_{10} TRH Fraction (less sum of BTEX concentrations)
F2	>C_{10}-C_{16} TRH Fraction (less naphthalene)
F3	>C_{16}-C_{34} TRH Fraction
F4	>C_{34}-C_{40} TRH Fraction
GPR	Ground Penetrating Radar
HDPE	High Density Polyethylene
HIL	Health-based Investigation Level
HMS	Hazardous Material Survey
HSL	Health-based Screening Level
LDPE	Low Density Polyethylene
LNAPL	Light Non-Aqueous Phase Liquid (also referred to as PSH)
LOR	Limit of Reporting (of laboratory analytical method)
DNAPL	Dense Non-Aqueous Phase Liquid
m	Metres
mAHD	Metres Australian Height Datum
mBGL	Metres Below Ground Level
NATA	National Association of Testing Authorities, Australia
NEPC	National Environmental Protection Council
NEPM	National Environmental Protection Measure
OCP	Organochlorine Pesticides
OPP	Organophosphate Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Poly-Chlorinated Biphenyls
PFAS	Per or Poly-Fluoroalkyl Substances
PID	Photo-ionisation Detector

POEO	Protection of the Environment Operations Act
pH	Potential Hydrogen (measure of the acidity or basicity of an aqueous solution)
PSH	Phase-Separated Hydrocarbons (also referred to as LNAPL / DNAPL)
QA/QC	Quality Assurance / Quality Control
RAP	Remediation Action Plan
Redox	Reduction-Oxidation Potential
RPD	Relative Percentage Difference
SAQP	Sample and Analytical Quality Plan
SEPP	State Environment Protection Policy
SRA	Sample Receipt Advice
STP	Standard Penetration Testing
TBA	To Be Announced
TCLP	Toxicity Characteristics Leaching Procedure
TRH	Total Recoverable Hydrocarbons (non-specific petroleum hydrocarbon fractions)
UCL	Upper Confidence Limit of the Mean
UPSS	Underground Petroleum Storage System
UPVC	Unplasticised Polyvinyl Chloride
US EPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compounds
WHS	Work Health and Safety
WHSP	Work Health and Safety Plan

Appendix A - Figures



Drawn:	L.C.
Approved:	-
Date:	05-02-20
Scale:	Not To Scale

Urban Property Group

Remediation Action Plan

614-632 High Street, Penrith NSW

Site Locality Plan

Figure: 1

Project: E24300.E06

eiaustralia
Contamination | Remediation | Geotechnical
Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

LEGEND

- Approximate site boundary
- Approximate monitoring well location
- Approximate previous geotechnique borehole location (Benviron Group, May 2007)
- Approximate previous monitoring well location (Benviron Group, May 2007)
- Approximate previous borehole location (Benviron Group, Nov 2015)
- Approximate previous borehole location (Benviron Group, Nov 2017)

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Suite 6.01, 55 Miller Street, PYRMONT 2009
Ph (02) 9516 0722 Fax (02) 9518 5088

Drawn:	L.C.
Approved:	-
Date:	05/02/20

High 618 Pty Ltd
Remediation Action Plan
614-632 High Street, Penrith NSW
Sampling Location Plan

Figure: 2

Project: E24300.E06

Appendix B – Proposed Development Plans

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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www.DKO.com.au
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NSW: Nominated Architects
Koos de Keijzer 5767
David Randerson 8542

Project Name	High Street Penrith
Project Address	614-632 High Street, Penrith, NSW 2750
Client	Urban Apartments
Project Number	00012012
Drawing Name	Ground Floor Plan
Scale	1:200@A1
Date Commenced	March 2019
Drawing Number	DA200
Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith
Project Address	614-632 High Street, Penrith, NSW 2750
Client	Urban Apartments
Project Number	00012012
Drawing Name	Mezzanine Floor Plan
Scale	1:200@A1
Date Commenced	March 2019
Drawing Number	DA201
Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith
Project Address	614-632 High Street, Penrith, NSW 2750
Client	Urban Apartments
Project Number	00012012
Drawing Name	Level 1 Carpark
Scale	1:200@A1
Date Commenced	March 2019
Drawing Number	DA202
Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith
Project Address	614-632 High Street, Penrith, NSW 2750
Client	Urban Apartments
Project Number	00012012
Drawing Name	Level 2 Carpark
Scale	1:200@A1
Date Commenced	March 2019
Drawing Number	DA203
Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith	Project Number	00012012
Project Address	614-632 High Street, Penrith, NSW 2750	Drawing Name	Level 3 Carpark
		Scale	1:200@A1
		Date Commenced	March 2019
Client	Urban Apartments	Drawing Number	DA204
		Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith	Project Number	00012012
Project Address	614-632 High Street, Penrith, NSW 2750	Drawing Name	Level 4 Podium Communal Openspace Plan
		Scale	1:200@A1
		Date Commenced	March 2019
Client	Urban Apartments	Drawing Number	DA205
		Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith	Project Number	00012012
Project Address	614-632 High Street, Penrith, NSW 2750	Drawing Name	Level 5 Podium Communal Openspace Plan
		Scale	1:200@A1
		Date Commenced	March 2019
Client	Urban Apartments	Drawing Number	DA206
		Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith
Project Address	614-632 High Street, Penrith, NSW 2750
Client	Urban Apartments
Project Number	00012012
Drawing Name	Level 6 Podium Communal Openspace Plan
Scale	1:200@A1
Date Commenced	March 2019
Drawing Number	DA207
Revision	P1

Document Set ID: 9091260
Version: 1, Version Date: 07/04/2020

[redacted]

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith	Project Number	00012012
Project Address	614-632 High Street, Penrith, NSW 2750	Drawing Name	Level 7 Plan
		Scale	1:200@A1
		Date Commenced	March 2019
Client	Urban Apartments	Drawing Number	DA208
		Revision	P1

[redacted]

Rev.	Date	By	Ckd	Description
P1	5/07/2019	SZ	PP	Issue for Review

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Project Name	High Street Penrith
Project Address	614-632 High Street, Penrith, NSW 2750
Client	Urban Apartments
Project Number	00012012
Drawing Name	Level 8 Typical Tower Plan
Scale	1:200@A1
Date Commenced	March 2019
Drawing Number	DA209
Revision	P1

Appendix C – Unexpected Finds Protocol

Unexpected Finds Protocol

In the event of an unexpected find, immediately cease work and contact the site foreman.

Site foreman to construct temporary high visibility barricading to prevent worker access to the area. Foreman to apply appropriate stormwater/sediment control measures.

Site foreman to take arrange an inspection by the Environmental Consultant

Environmental Consultant to undertake a detailed site inspection and collect representative samples for analysis as per documented sampling procedures outlined in this RAP.

Environmental Consultant to assess field screening and/or laboratory analytical results against documented site Clean-Up criteria outlined in this RAP

If substance is assessed as not presenting a risk to human health, then:

Site foreman to remove safety barricades and environmental controls and continue works

If substance is assessed as presenting a risk to human health, then:

Environmental Consultant to supervise remediation & undertake validation sampling as required. An addendum to this RAP may be required.

Site foreman to remove safety barricades and environmental controls and continue works

Environmental Consultant to submit an assessment/validation/clearance to site foreman for distribution to Client and appropriate regulatory authorities.