Remediation Action Plan

Block 1151 and Block 864, Weston Creek

PBS Building (ACT) Pty Ltd

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Author	Aisling O'Grady
Reviewer	Chris Gunton
Approver	Chris Gunton
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1 Introduction

PBS Building (ACT) Pty Ltd (PBS) engaged Lanterra Consulting Pty Ltd (Lanterra) to prepare this remediation action plan (RAP) as part of the environmental consulting requirements for the remediation of Block 1151 and Block 864 Weston Creek (herein referred to as the site). The site is located at 106 Cotter Road, Weston Creek and has a total area of approximately 58,864 square metres (m^2). According to the ACT Territory Plan, the site is DES: Designated and under the custodianship of the National Capital Authority (NCA).

The location and layout of the site is illustrated on **Figure 1, Appendix A**.

1.1 Background

It is understood the site is to be redeveloped for residential aged care purposes with multi storey buildings containing apartments and landscaped areas.

KPMG Property and Environmental Services Pty Ltd (KPMG) completed a Technical Due Diligence assessment of the site in October 2020, which included a Limited Environmental Hazardous Materials Assessment. The results of the assessment are presented in the report titled 'Environmental Site Investigation, 106 Cotter Road, Weston Creek, ACT' (reference *385509 – ESI – 106 Cotter Rd, Weston Creek ACT – KPMG DRAFT 23-10-20*) which is summarised in Section 4 below. The purpose of the environmental investigation was to assess the site for contaminants of concern within the soil across the site.

The results of the investigation indicated that an estimated 35,000 cubic metres (m^3) of fill is present on the site. Asbestos was also identified on the surface of the site, in several stockpiles and within the fill material in the central northern section and would require remediation/management to enable the site to be made suitable for the future aged care residential use.

Based on a review of aerial photographs, a former pit was located in the central section of Block 864 which crosses the western boundary of the site. The pit is estimated to be approximately 3.5 m deep and was used for the disposal of house hold rubbish. Fragments of asbestos containing material and traces of fibrous asbestos (FA) and asbestos fines (AF) were also identified within the pit.

Prior to the sale of the site, a RAP must be prepared that presents a viable remedial plan to make the site suitable for residential use.

1.2 Objectives

The objective of the RAP is to provide a detailed plan of activities, procedures, contingency measures and objectives to ensure the effective and controlled remediation of the site for future residential use.

The objectives of the RAP are to:

- Summarise the site characteristics;
- Define the extent of remediation required;
- Assess appropriate remediation options and select a preferred option;
- Document the remediation methodology, including the associated safety and environmental management controls;
- Establish the requirements for the derivation and/or selection of validation criteria relevant to the future land-use and detail the validation program (including reporting);
- Identify the regulatory requirements relevant to the proposed remedial works; and

- Outline any potential ongoing monitoring or management requirements to ensure the continued protection of human health and the environment.

2 Site Conditions and Surrounding Environment

2.1 Site Location

The site location and a detailed site plan are presented as **Figure 1** and **Figure 2**, **Appendix A**.

Table 1: *Summary of Site Details*

Site Characteristics	Detail
Approximate Easting and Northing MGA GDA 94 (centre of site)	Easting: 688266.26419 Northing: 6090218.95972
Approximate Elevation (m AHD)	555-567 m
Block, Section, Division	Block 1151 and Block 864, Weston Creek
Land Zoning	DES: Designated
Current Land Use	Vacant land with historic buildings still present
Proposed Use	Residential aged care
Area of Site	54,864 m^2

2.2 Site Description

Access to the site is via a portion of sealed road which adjoins Cotter Road in the south of the site. Unused buildings assumed to be the former motel building and several sheds located through the central portion of the Block 864 and are associated with the former equestrian and motel businesses.

A former residential dwelling is located in the south western corner of Block 1151.

In the northern portion of the site, a dirt track leads to a cleared area which appears to be a raised pad of filled material.

2.3 Surrounding Land Uses

A summary of the land uses that surround the site are as follows:

- **North:** Vacant rural property.
- **South:** Cotter Road with residential buildings within Curtin beyond.
- **East:** Equestrian Park Business
- **West:** Vacant rural blocks

2.4 Sensitive Environments

Sensitive environments in the vicinity of the site are summarised below:

- Yarralumla Creek is located approximately 500 m to the east of the site.
- Molonglo River is located approximately 220 m to the north west of the site.

2.5 Proposed Land Use

It is understood that all site structures are to be demolished and the site redeveloped for residential aged care purposes with proposed development to consist of several three to five storey buildings containing approximately 360 aged care apartments and landscaped areas (KPMG, 2020).

2.6 Topography

The digital topographic map presented in ACTMAPi (available at http://www.actmapi.act.gov.au/) indicates the site has an elevation of approximately 555 - 567 m above Australian Height Datum (m AHD).

The general topography of the site and surrounding area tends to slope gently towards the north with the surrounding area generally sloping in a north west direction towards Molonglo River.

2.7 Geology and Hydrogeology

The 1:100,000 Geological Series, Canberra, New South Wales and Australian Capital Territory, Sheet 8727 (Bureau of Mineral Resources, 1992) indicates the site is comprised of Silurian aged Mount Painter Porphyry Volcanics which consists of dark, massive porphyry with xenoliths.

KPMG (2020) completed a search of the Bureau of Meteorology Australian Groundwater Explorer which indicated that the nearest registered groundwater bore was located approximately 400 m to the east of the site and its use listed as 'water supply'.

A review of the Bureau of Mineral Resources (1984) Hydrogeology of the Australian Capital Territory and Environs indicates that groundwater is hosted in fractured, higher yielding zones associated with the upper and lower portions of the individual ash flow tuffs and interbedded sediments. Groundwater quality tends to be poor.

The general total dissolved solids (TDS) is anticipated to be less than 500 milligrams per litre (mg/l) with yield being less than 0.5 litres per second (l/sec).

3 Data Quality Objectives

The Data Quality Objectives (DQO) derived for the RAP have been developed in accordance with the NEPM, (2013), Sampling Design Guidelines (NSW EPA, 1995), and the Guidelines for Consultants Reporting on Contaminated Sites (OEH, 2011). Using the following seven step DQO process, which has been established by the United States Environmental Protection Agency (US EPA) and is endorsed in AS4482.1-2005, will ensure that appropriate DQOs are established for the Site.

The DQO process is planning tool that relies on scientific methods for establishing criteria for data quality and for designing data collection programs. The DQO defines the experimental process required to test a hypothesis. The DQO process aims to ensure that efforts relating to data collection are cost effective, by eliminating unnecessary, duplicative or overly precise data whilst at the same time, ensuring the data collected is of sufficient quality and quantity to support defensible decision making.

The DQO process consists of seven steps, which are designed to clarify the study objectives, define the appropriate type of data and specify tolerable levels of potential decision errors. The seven-step DQO process adopted for this DSI is as follows:

Step 1: State the Problem – concisely describe the problem to be studied. Review prior studies and existing information to gain a sufficient understanding to define the problem;

Step 2: Identify the Decision – identify what questions the study will attempt to resolve, and what actions may result;

Step 3: Identify the Inputs to the Decision – identify the information that needs to be obtained and the measurements that need to be taken to resolve the decision statement;

Step 4: Define the Study Boundaries – specify the time periods and spatial area to which decisions will apply. Determine when and where data should be collected;

Step 5: Develop a Decision Rule – define the statistical parameter of interest, specify the action level, and integrate the previous DQO outputs into a single statement that describes the logical basis for choosing among alternative actions;

Step 6: Specify Tolerable Limits on Decision Errors – define the decision maker's tolerable decision error rates based on a consideration of the consequences of making an incorrect decision; and

Step 7: Optimise the Design –evaluate information from the previous steps and generate alternative data collection designs. Choose the most resource-effective design that meets all DQOs.

The DQOs derived for the investigation are presented in **Table 2**.

Table 2: *Data Quality Objectives*

Step	Details
Step 1: State the Problem	The site has been used to import uncontrolled fill material since 2016 and due diligence investigations have identified ACM on the ground surface, in sub surface soil and soil stockpiles with intermixed building demolition waste and ACM and FA/AF containing soil. The site is proposed to be redeveloped for residential aged care use and the investigation found the site to be currently unsuitable for the proposed use without remediation and validation. Prior to the sale of the site, a RAP must be prepared that presents a viable remedial plan to make the site suitable for residential use.

Step	Details
Step 2: Identify the Decision	To make the site suitable for the proposed residential aged care use, asbestos impacted soil is to be removed and disposed of offsite or encapsulated and managed onsite. Validation sampling of the remediated area must be completed and concentrations of contaminants of potential concern measured below the adopted assessment criteria.
Step 3: Identify the Inputs into the Decision	The inputs to the decisions are: • Surface inspection and clearance by a licensed asbestos assessor • Observation and photographic log of excavated material encapsulated in the containment cell. • Validation of the remedial works by showing that sufficient material and lateral extent of the excavation has been established in accordance with the relevant soil guidelines and the Validation Plan. • Soil analytical data from impacted soil during validation and soil/waste classification prior to offsite disposal being conducted should it be necessary. • Soil analytical data collected from imported fill, if required. • Survey data for excavation area and capping layer • Existing environmental data. • Relevant ACT EPA endorsed guidelines.
Step 4: Define the Site Boundaries	The remediation area is situated in the central section of the site as illustrated on **Figure 3**, Appendix A. Where asbestos is present in sub-surface soil, the depth of the impacted material extends to approximately 3.5 m below ground level.
Step 5: Develop a Decision Rule	1. Have all occurrences of ground surface ACM been removed? A licensed asbestos assessor will complete a clearance inspection once all surface ACM has been removed and prior to the remediation excavation. A surface clearance report will be issued to confirm the absence of residual surface ACM. 2. Is there any residual soil contamination following the removal of contaminated soil? Soil validation sampling of the walls and base of the remedial excavation will be completed. Following the removal of the impacted material, soil samples will be collected at the boundaries of the extent of excavation and in accordance with validation procedures to be detailed in later sections of the RAP. Soil samples shall be analysed at a National Association of Testing Authorities (NATA) accredited laboratory. Soil analytical data will be compared to ACT EPA endorsed criteria. Statistical analyses (see below) of the data in accordance with relevant guidance documents will be performed, if appropriate, to facilitate the decisions. The following criteria will be adopted with respect to soils: • The reported concentrations are all below the site criteria. • For non-point source contamination and the classification of a stockpile the average site concentration (determined as the 95% UCL) for each analyte must be below the adopted site criterion:

Step	Details
	– No single analyte concentration exceeds 250% of the adopted site criterion. The standard deviation of the results must be less than 50% of the site criteria. 3. Have residual asbestos impacted soils been successfully encapsulated with appropriate marker layer in excavation areas prior to placement of imported materials in accordance with RAP requirements? The environmental consultant shall supervise the installation of marker layers above the asbestos waste impacted layer in the containment cell. Details of the cell are shown on **Figure 4**. The remediation consultant shall confirm that the marker layer installation is satisfactory prior to the placement of overlying imported materials. 4. Was imported fill suitable for use at the site? Fill material must be accompanied by a letter from ACT EPA stating that the soil is classified as Virgin Excavated Natural Material (VENM). 5. Is a Long Term Environmental Management Plan required? A Long Term Environmental Management Plan (LTEMP) is required at the site due to the remaining asbestos hazards within inaccessible soils. The LTEMP will detail the management strategies required to ensure the residual asbestos contamination at the site does not pose a health risk to future site occupants and users, and outlines the control measures required to manage the residual asbestos hazards for the site ongoing use. 6. Is the site suitable for the proposed residential aged care use? The site will be considered suitable for the proposed use if the following conditions are met: • Remediation and encapsulation works have been completed in accordance with this RAP • Ground surface asbestos clearance works are completed and a clearance report is issued by the asbestos assessor • An LTEMP will be implemented at the site.
Step 6: Specify Tolerable Limits	Capping Design and Implementation Errors Relevant suitably qualified personnel are to ensure that: • A suitably constructed containment cell is installed with an allowable capacity of 10,000 m^3 of contaminated material with a 1 m capping layer, to industry standard, placed over the material; The tolerable limits for field QA/QC data are as follows: • RPD criteria of 50% or less, for concentrations > or = 10 times practical quantitation limits (PQL); • RPD criteria of 75% or less, for concentrations between 5 and 10 times the EQL; and • RPD criteria of 100% or less, for concentrations < 5 times PQL. Replicate data for field duplicates for inorganics, including metals is expected to be as follows: • RPD criteria of 30% or less, for concentrations > or = 10 times PQL; • RPD criteria of 75% or less, for concentrations between 5 and 10 times the PQL; and

Step	Details
	• RPD criteria of 100% or less, for concentrations < 5 times PQL.
Step 7: Optimise the Design	The purpose of this step is to identify a resource-effective sampling design that generates data to satisfy the site manager's decision performance criteria, as specified in the preceding steps of the DQO Process. The output of this step is the sampling design that will guide development of the sampling and analysis plan (validate soils). This step provides a general description of the activities necessary to generate and select data collection designs that satisfy decision performance criteria. The Quality Assurance and Quality Control (QA/QC) procedures, as detailed in later sections, will be performed to detect and correct problems and to ensure defensible results. Validation of onsite soils will be completed in accordance with the validation plan outlined in Section 7.7. The rationale for the selection of soil sampling locations is detailed in subsequent sections of this RAP.

4 Previous Environmental Investigations

The following investigation was made available to Lanterra for review:

- KPMG Property & Environmental Services Pty Limited (KPMG) (2020) '*Environmental Site Investigation, 106 Cotter Road, Weston Creek, ACT*' (reference *385509 – ESI – 106 Cotter Rd, Weston Creek ACT – KPMG DRAFT 23-10-20*)

A brief summary of the report is presented in the section below.

4.1 KPMG (2020)

KPMG were commissioned by LDK Corporate Pty Ltd (LDK) to undertake an Environmental Site Investigation (ESI) at Blocks 864 and Block 1151 in Weston Creek. The purpose of the ESI was to assess the presence and nature of COCs within soil across the site. The ESI involved a desktop review and two stages of intrusive environmental investigations:

- 72 sample locations were selected across the site. This was completed in two (2) stages – Stage 1 where 15 sample locations were advanced; Stage 2 where 45 additional sample locations were selected to delineate the extent of asbestos impacted soil.
- Chemical contaminants of potential concern selected included total recoverable hydrocarbons (TRH), benzene, toluene, ethylbenzene, xylenes (BTEX), polycyclic aromatic hydrocarbons (PAH), heavy metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), organochlorine and organophosphate pesticides (OCP/OPP), polychlorinated biphenyls (PCB). All concentrations of these contaminants were below the adopted assessment criteria for the protection of human health and the environment.
- Asbestos impact was identified as fragments of asbestos containing material (ACM) on the ground surface, ACM in sub-surface soil to a depth of up to 3.3 m bgl and stockpiles of soil with intermixed building demolition waste and soil which contained ACM.
- Based on the results of the investigation, it was estimated that up to approximately 35,000 cubic metres (m^3) of fill material is present on the site which may be impacted with asbestos.
- The asbestos impacted soil would require remediation/management to enable the site to be redeveloped for future residential use. Two (2) strategies were proposed for development:
    - Excavation of the impacted soil and disposal to a landfill facility licensed to accept asbestos waste;
    - Excavation and encapsulation of the asbestos impacted material on the site.
- In the short term, it was recommended by KPMG that approximately 100 m^3 of soil contained within three (3) stockpiles that contains building demolition waste and asbestos is covered to prevent the generation of dust.

4.2 Lanterra (November 2020)

Lanterra were commissioned by PBS to complete a further intrusive investigation on the site:

- A total of 16 test pits were advanced to a depth of 3.1 m bgl. Test pits targeted the former pit which was used for the disposal of waste and where sub-surface occurrences of asbestos were encountered by KPMG.
- ACM was observed at 2 locations within the footprint of the rubbish pit and at depths of 1.4 m bgl and 2.7 m bgl.
- AF and FA was detected at 2 locations, also in the historic dump, and at depths of 1.0-1.1 m bgl and 2.5-2.6 m bgl respectively.

- Fill material was present from 0.3 m bgl to the maximum investigation depth of 3.1 m bgl. Anthropogenic waste was present which consisted of glass, metal, ceramic, household waste, copper and PVC pipe.
- Natural material was encountered from 0.3 m bgl and was described as a silty clayey sand, pale brown to a sandy clay, yellow brown weather volcanic rock.

5 Conceptual Site Model

Based on the results of the intrusive investigations, the following conceptual site model (CSM) has been prepared to reflect the information obtained to date.

5.1 Contaminant Source

The following summaries the potential sources of contamination that pose an unacceptable risk to human health under the proposed residential aged care use:

- Fill material located in the footprint of a historical dump placed on site with asbestos and rubbish uncovered during investigation works
- Asbestos uncovered on the site has comprised of ACM found on the ground surface which consisted of fibre cement sheeting and moulded product fragments. ACM was also found within the soil as asbestos fines (AF) and bonded asbestos in sporadic fragments of fibre cement sheeting mixed with other anthropogenic inclusions such as building rubble.
- Three stockpiles containing building construction rubble was also confirmed to contain ACM.

5.2 Exposure Pathways

Transport mechanisms are the manner in which the impacts move away from the source area, based on the proposed development design.

Due to the placement of asbestos in soil during historical filling and residual ACM, the primary contaminant migration and exposure pathway include:

- Direct contact with soil that is impacted with asbestos. Asbestos fines and fibrous asbestos may be mobile in high wind conditions where dust is generated which poses an inhalation or ingestion risk if soil is managed poorly.
- Mixing of contaminated soils with non-contaminated material during excavation works.

5.3 Potential Receptors

The following receptors have been identified during demolition, construction and future occupation of the site:

- Workers conducting the remedial excavation works and those working on the greater site during the remedial works who may be exposed to asbestos through dermal contact and/or inhalation of fibres, particularly when fibres could be released during soil disturbance.
- Neighbouring properties or those downwind of the site.
- Future construction workers who may be exposed to unexpected occurrences of unexpected finds of asbestos impacted soil through ingestion or inhalation.
- Future residents and office workers on the site who could be exposed to unexpected finds of asbestos impacted soil through ingestion or inhalation. Provided that the objectives of this RAP are accomplished, the potential risk of this receptor being exposed to contamination is low.

6 Remediation Plan

6.1 Remediation Objectives

The objective of the RAP is to provide a detailed plan of activities, procedures, contingency measures and objectives to ensure the effective and controlled remediation of the site for the proposed re-development. It describes the procedures and standards to be followed throughout the project to facilitate successful remediation / management of the site for the protection of human health and the environment. The remediation objectives are outlined as follows:

- Remediate the site to a level that is suitable for the proposed residential aged care use.
- Prevent or minimise to the extent practicable further migration of contaminants from source
- Validate the soil remedial works by demonstrating unacceptable concentrations of COPCs have been removed in accordance with the relevant industrially accepted guidelines and the validation plan outlined in Section 7 of this RAP is completed.
- Validate the remedial works in accordance with the relevant ACT EPA guidelines.
- Document the validation/assessment process.

6.2 Extent of Remediation Required

Investigations by KPMG and Lanterra identified asbestos containing material (ACM) on the soil surface at locations primarily in the central and north eastern sections of the site. A detailed surface inspection is proposed across the site to remove all ACM by a licensed asbestos removalist followed by clearance by a licensed asbestos assessor.

Fibrous asbestos and asbestos fines in soil samples above were identified within the rubbish tip identified on historic aerial photographs in 1961. This area is estimated to be approximately 4,400 m^2 with fill material encountered at depths from surface to 3.5 m below ground level (bgl).

The vertical extent of remediation is proposed to a depth of 3.5 m bgl or to the depth of natural materials or bedrock, whichever is shallower.

6.3 Possible Remediation Options

The Contaminated Sites Guidelines for the NSW Auditor Scheme 3rd Edition (NSW EPA 2017) states that a site auditor must be satisfied than any proposed or completed remediation is technically feasible, environmentally justifiable and consistent with relevant laws, policies and guidelines including:

- National and ACT EPA endorsed remediation policies.
- The Environment Protection Act 197 and Regulations.
- Relevant technical guidance documents issued by the ACT EPA. In addition, they state the preferred hierarchy of options for site remediation and/or management is set out in s.6(16) Assessment of Site Contamination Policy Framework of Schedules A and B of the NEPM, which is followed in the ACT. This means that soil remediation and management is implemented in the following preferred order:
    - On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level.
    - Off-site treatment of excavated soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level, after which the soil is returned to the site.

    - Removal of contaminated soil to an approved site or facility, followed, where necessary, by replacement with clean fill.
    - Consolidation and isolation of the soil on-site by containment within a properly designed barrier.
- WA DoH (2009) *Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia* which notes the following considerations when assessing the acceptability of asbestos remediation:
    - Minimisation of public risk;
    - Minimisation of contaminated soil disturbance; and
    - Minimisation of contaminated material/soil moved to landfill.

In accordance with the above hierarchy, an evaluation of the potential remedial options is summarised in Table 3 below.

Table 3: *Remediation Options*

Remedial Option	Method of Remediation	Viability
On-site treatment and reuse of soil	Excavation and destruction of contaminants in soil	FA/AF are generally dispersed heterogeneously through the soil, are not visible to the eye and as such there is no option to remove asbestos fibres from impacted soils.
Off-site treatment of soil	This comprises of the excavation and removal of soil from the site where it is treated for the destruction of the contaminant, after which the soil is returned and reused on the site.	The offsite treatment of FA/AF and non-friable ACM impacted soils is not a viable option as the contamination can not be destroyed or removed from the soil.
Removal of Contaminated Soil and Replacement with Clean Soil	Excavation of impacted soil and disposal to a landfill facility licensed to accept the material.	Offsite disposal of FA/AF impacted soils generates the highest quantity of waste as the material is disposed to landfill as opposed to being treated, reused or retained on site. This option also has the highest cost including generating of additional truck movements and waste disposal costs.
Consolidation and isolation of the soil on-site by containment within a properly designed barrier	Excavation and reinstatement of impacted material within a pre approved containment area on the site with a 1 m capping layer. A geotextile fabric would be placed on top of the impacted material as a marker layer between the impacted material and the clean capping layer. The topsoil and clean fill material found above the waste layer can be used in the cell capping layer.	In addition to the implementation of an environment management plan (EMP) with protocols for the ongoing containment cell management, **this is the preferred option for remediation of FA/AF impacted soil.** See below for a review of these remediation options.

Excavation and Containment of Impacted Soil

Viability of this option is as follows:

Pros:

- The exposure pathway between the impacted soil and human and ecological receptors is made incomplete. The contaminated material is contained in a controlled environment to minimise future impact.
- As the material is retained onsite, the potential for an accidental and uncontrolled release of contaminated material is eliminated.
- The cost of remediation is minimised as disposal costs are not incurred.

Cons:

- As contaminated material is retained on the site, a long term environment management plan to provide the custodian of the road with information that identifies the location of the contaminated material and the ongoing management requirements of the impacted material.

6.4 Preferred Remediation Option

With consideration to ACT EPA's endorsed guideline hierarchies for soil remediation options and clean-up objectives and the site-specific contaminants, proposed development and environmental setting, the preferred remediation strategy is outlined as follows:

- Removal of visible ACM from the surface of the site followed by a surface clearance by a licenced asbestos assessor.
- Excavation, consolidation and encapsulation of soil from the rubbish pit that is impacted with household rubbish and asbestos into a containment cell onsite. The cell is to be located on the eastern boundary of the site, refer to **Figure 4** for location of cell.
- Preparation of a long term environmental management plan to assist the custodian of the site with the ongoing management of the contaminated material.

6.5 Remediation Method

A summary of the remedial method for soil is provided as follows:

6.5.1 Surface ACM removal

The following is the requirements for the removal and clearance of surface ACM:

- Detailed inspection of all ground surfaces by a licensed asbestos removalist and visual clearance by Licenced Asbestos Assessor after the asbestos has been removed.
- Hand removal of any visible ACM or potential ACM and placement of asbestos waste into 200 µm thick plastic bags to be sealed at the neck with duct tape.
- Any quantities of ACM that are unable to be removed by hand will be removed as part of the site remediation works and buried within the containment cell.
- ACM collected by hand from the surface will be disposed of to a licensed waste facility in accordance with ACT EPA (2016) 'Information Sheet 5'. Waste dockets will be required to be provided to the licensed asbestos assessor.
- Following removal and disposal of asbestos waste, the licensed asbestos assessor will complete a clearance inspection and issue a clearance certificate.

6.5.2 Excavation of Impacted Material

- Markers will be placed on the boundaries of the impacted area to delineate the excavation area and temporary fencing installed surrounding the asbestos removal zone.
- Asbestos air monitoring will be implemented prior to the excavation works and maintained until such time that monitoring results demonstrates that works do not present an unacceptable risk to site users. Air monitoring sampling and analysis will be conducted by a licensed asbestos assessor and in accordance with NOHSC:3003(2005)" Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition."
- A suitably qualified environmental consultant (SQEC) will be present for the removal of impacted material and will confirm when natural material has been encountered.
- Removal and stockpiling of topsoil and clean fill material to be reused in the capping layer above the asbestos waste material in the containment cell. Appropriate stockpile controls are detailed in Section 6.10 below.
- Removal of impacted material to a depth of 3.5 m bgl or to the depth of natural material or bedrock, whichever is shallower and encapsulated in the containment cell. Material from areas impacted by FA and AF is to be excavated first to allow for deepest placement in the bottom of the containment cell.
- Soil imported for either the reinstatement of the remedial excavation or used for the construction of the capping layer of the containment cell will be accompanied by either a report confirming that the material is virgin excavated natural material (VENM) and is endorsed in writing by the ACT. Any soil that does not comply with either of these conditions is not permitted on the site.
- A suitably qualified environmental consultant will monitor remediation, complete validation works, and prepare the necessary report(s) required to document the site remediation.

6.6 Encapsulation Procedure

6.6.1 Assessment of the Suitability of Landfill Cap Material

The suitability of material to be used for capping of the landfill material must be determined prior to reuse of soil on site or material being transported onto the site:

- Investigations by Lanterra (2020) and KPMG (2020) have identified that the top layer of topsoil and fill material above the layer of rubbish within the investigation area may be suitable for reuse in the capping layer as analytical results were below the adopted site assessment criteria for residential use. No anthropogenic material is to be present in the landfill cap material.
- Any soil imported for use in the capping layer will be classified as VENM and assessed as suitable for use as a capping layer by a suitably qualified Geotechnical Engineer

6.6.2 Capping of Landfill Waste

Lanterra has referred to the WA DoH (2009) guideline for determining the capping layer thickness as asbestos is the primary contaminant of concern. A 1 m capping layer will be constructed due to the presence of FA and AF in soil. The proposed specification of the capping layer has to be designed to meet the recommended requirements of the WA guideline and will be sufficient for the ongoing use of the site as a landscaped area.

6.6.3 Capping Layer Construction

The proposed capping layer construction is as follows:

- A geotextile fabric should be placed on top of the waste and asbestos impacted material as a marker layer between the waste material and the clean capping layer. The geotextile fabric should be placed on the base and sides of the cell with 0.5 m overlap joints
- A 0.7 m clay layer is to be placed on top of the geotextile fabric and compacted in accordance with geotechnical requirements. The clay layer would be placed in two (2) layers of 250 mm compacted thickness which will be confirmed by the geotechnical consultant.
- The capping layer is to be shaped in such a way as to divert surface water away from the cell to prevent water accumulation on the capping layer
- The final cap layer should be surveyed by a licensed surveyor to ensure the thickness of the capping layer is at least 0.7 m.
- Once the thickness of the clay cap has been verified as at least 0.7 m, a 0.3 m thick topsoil and mulch layer is to be placed on top of the clay cap for establishment of vegetation. The mulch layer will help to stabilise the topsoil and reduce erosion.

6.7 Validation Sampling

Collection of validation samples from the walls and base of the excavations based on the recommended frequencies outlined in '*Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia*' (WA DoH, 2009)

- At least one sample per every 10 m along the excavation wall at 1m and then 2m depth.
- The excavation floor will be visually inspected, and samples collected in an evenly spaced grid pattern with an estimated 14 base samples collected. For the estimated investigation area size of 4,400 m^2, a total number of 24 validation samples will be collected.
- Per every sample location, 10 litres (L) of material will be spread out on a contrasting coloured material (e.g tarpaulin), or sieved through a 7 mm sieve with any ACM placed in a labelled zip lock bag for laboratory analysis.
- One 500 ml wetted sample will be collected per sample location and submitted for laboratory analysis of AF and FA.

Imported soil for use as backfill of the remedial excavation will be classified as VENM approved by ACT EPA.

6.8 Define the Boundary Contamination

The boundaries of the contaminated area shall be determined by:

- The soil located in the footprint of the historic landfill as defined in **Figure 3.**
- The estimated depth of the remedial excavation will be approximately 3.5 m below ground level.

6.9 Soil and Stockpile Management

Stockpiling of impacted soils should be kept to a minimum with the excavated soil placed in the containment cell as soon as possible. However, should the impacted material require stockpiling prior to encapsulation, then the following management controls are required. These controls also apply to imported material:

- Excavated soil should be placed within the contaminated zone on a plastic layer to prevent the spread of contaminated material. Sampling of stockpile footprints once the stockpile has been removed will be required to ascertain that no residual contamination is present.

- Covering of all excavated and stockpiled material from the contaminated zone to prevent the migration of contaminants, particularly in conditions of heavy rain or high winds.
- Construction of sediment retention features, such as silt fencing, around stockpiled materials.
- Prior to the importation of soil for use on the site, sediment and erosion controls around the designated stockpile areas have been established.
- Soil that requires removal from the site will be assessed in accordance with the ACT EPA '*Information Sheet 4: Requirements for the Reuse and Disposal of Contaminated Soil in the ACT*'.

6.10 Backfilling of Excavations

Upon confirmation of the walls and base of the excavation being validated as suitable for the proposed residential land use, the excavation will be reinstated to the desired level using soil classified as VENM or material that has been approved for reuse on the site in writing by the ACT EPA. The excavations will be finished to the desired level in accordance with the landform specification.

7 Validation Plan

7.1 Soil Sampling Methodology

Soil samples shall be collected by suitably qualified environmental scientist. Samples will be collected in a methodology which reduces cross contamination and enhances the integrity of the process. The proposed method for the collection of soil samples is as follows:

- Soil samples are to be collected from the walls and base of the excavation and placed in glass jars fitted with Teflon sealed lids for chemical analysis. Any hand-held equipment used to collect samples is to be decontaminated between each sample.
- A minimum of 500 ml samples will be placed in zip locked bags for asbestos analysis.
- Separate soil from each sample location would be placed in a zip lock plastic bag and field screened for volatile organic compounds with a photoionisation detector (PID).
- Sample preservation should be undertaken in accordance with ASC NEPM (2013) with samples immediately placed and stored in an ice filled Esky to keep them chilled, prior to being couriered to the laboratory with the signed chain of custody form filled out with the required analysis.
- Each soil sample should be described in general accordance with the Unified Soil Classification System (USCS) and details of any discolouration, staining, odours or other indicators of contamination were also noted.

7.2 Laboratory Analyses

Primary soil samples are to be sent to a NATA accredited laboratory for the required analyses. Any method that is not NATA accredited will require justification.

Based on the results of the previous investigations, asbestos is the primary contaminant of concern. Therefore the analytical plan presented in Table 4 is proposed.

Table 4*: Soil Validation Sampling*

Location	Number of Samples to be Analysed	Analytical Plan
Validation Sampling of Remedial Excavation Base	14	ACM, AF, FA
Validation Sampling of Remedial Excavation Walls	10	ACM, AF, FA
Soil Requiring off-site disposal	To be completed in accordance with Information Sheet 4	TRH, BTEX, PAH, 8 Metals, Asbestos ID
Imported Soil for backfilling of remedial excavation of construction of road	NA	To be classified as VENM or been assessed and approved for reuse on the site by the EPA before being imported onto the site.

7.3 Quality Assurance/Quality Control

The QA/QC program for the site should comprise the following elements:

- Field Duplicate Samples: one field duplicate sample to be collected for every 20 primary samples collected (or part thereof). Duplicate samples are to be sent to the primary analytical laboratory to check the accuracy of the analytical results. No duplicates are required for the 10L samples.
- Field Triplicate Samples: one field triplicate sample to be collected for every 20 primary samples collected (or part thereof). Triplicate samples are sent to be sent to a secondary analytical laboratory to check the accuracy of the analytical results.
- Equipment Rinsate Samples: one equipment rinsate sample would be prepared each day of sampling by passing deionised water over reusable equipment to assess the decontamination procedures of the equipment.

7.4 Sampling Rationale

The sampling and analytical regime presented in Section 7.2 is based on the following rationale:

- The minimum number of sampling points, as per the NSW EPA (1995) '*Sampling Design Guidelines*' for an area 4,400 m^2 is 12. Due to the COC being asbestos, the number of sampling points will be doubled, and 24 sampling points will be selected (WA DoH, 2009). This is considered to be an appropriate number of validation sampling points as the sampling regime will meet the requirements outlined in WA Doh, 2009.
- Asbestos was the only COC as per previous soil investigations (KPMG, 2020).
- Imported material will require a VENM letter.

7.5 Soil Validation Criteria

The NEPM (2013) Health Based Investigation Levels for Standard Residential sites with garden accessible soil (HIL A) has been adopted based on the proposed residential aged care development. Previous soil investigations (KPMG, 2020) on the site have indicated asbestos to be the only contaminant of concern (COC) as other concentrations of potential COCs were below either the laboratory limit of reporting and/or the adopted HIL/HSL A criteria.

The adopted criteria is summarised in Table 5 below.

Table 5*: Asbestos Soil Validation Criteria*

Form of Asbestos	Health Screening Level (w/w)
Bonded ACM	0.04% (residential, minimal soil access)
FA and AF (friable asbestos)	0.001%
All forms of asbestos	No visible asbestos for surface soil

7.6 Criteria for Imported Soil

The importation of material may be necessary during the proposed remediation works. In accordance with current ACT EPA policy, only material that does not represent an environmental or health risk at the receiving site may be considered. In accordance with this requirement, only VENM or any other suitable material approved for reuse on the site in writing by ACT EPA may be imported to reinstate the excavations.

7.7 Validation Reporting

At the completion of the remedial works a Validation Report will be prepared in general accordance with the NSW EPA '*Consultants reporting on contaminated land – Contaminated Land Guidelines*', documenting the works as completed. This report will contain information including:

- Details of the remediation works conducted.
- Information demonstrating that the objectives of the RAP have been achieved, in particular the sample results of any waste classification, imported material, along with assessment of the data against both the pre-defined data quality objectives and the remediation acceptance criteria.
- Information demonstrating compliance with appropriate regulations and guidelines.
- Any variations to the strategy undertaken during the implementation of the remedial works.
- Details of any environmental incidents occurring during the course of the remedial works and the actions undertaken in response to these incidents.
- Other information as appropriate, including requirements (if any) for ongoing monitoring / management.

The report will serve to document the remediation works for future reference and will need to be provided to the Site Auditor for review and endorsement.

The following records will be maintained by the civil contractor during remediation work and will be made available for inclusion into the Validation Report:

- Any complaints made towards the remedial works, the date and time that the complaint was made, and corrective actions taken.
- Records of approvals to remove or dispose soil from the site.
- Suspicious soil material encountered in the materials brought onto site.
- Source of material being brought onto site for the sub-grade layer or for backfilling.
- Dockets for the quantities of material being brought onto site as well as the EPA approvals.
- Any amendments to works which deviate from this RAP, ACT EPA / Auditor comments to these amendments, as well as any comments and/or endorsements. Site visits and activities performed.
- Photographic records of the stockpiled materials as well as stockpile management, and site establishment.

8 Contingency Plan

A review of remediation works has been undertaken to identify potential risks to meeting the specified site validation criteria. A number of potential risks have been identified. These are listed following with contingencies that will be implemented to ensure that validation criteria are met.

8.1 Unexpected Finds

The possibility exists for undiscovered hazards to be present at the site. Environmental sampling is based on chemical analytes identified as a potential concern during a documented process of reviewing historical site activities. However, ground conditions between sampling points may vary, and further hazards may arise from unexpected sources and/or in unexpected locations. The nature of any undiscovered hazards which may be present at the site are generally detectable through visual or olfactory means, for example:

- Petroleum contaminated soils (staining / discolouration visible);
- Volatile Organic Compound contaminated soils (odorous).
- Fragments of asbestos-containing materials (visible);
- Significant ash and/or slag contaminated soils / fill materials (visible);

As a precautionary measure to ensure the protection of the workforce and surrounding community, should any unexpected potentially hazardous substance be encountered the works should cease immediately before being assessed by a suitably qualified and experienced environmental consultant. In the event of asbestos hotspots, large quantities of ACM found, or the unearthing of trace material found to be of a friable nature, work will cease until the licensed asbestos assessor will inspect the area and provide site specific instructions to manage the asbestos.

The sampling strategy for each "unexpected find" shall be designed by a suitably qualified and experienced environmental professional. The strategy will, however, be aimed at determining the nature of the substance – that is, is it hazardous and, if so, at concentrations which pose an unacceptable risk to human health or the environment.

The sampling frequency of the identified substance / materials shall meet the minimum requirements the *NSW EPA Sampling Design Guidelines* (1995) or '*Information Sheet 4 – Requirements for the Reuse and Disposal of Contaminated Soil in the ACT*'.

8.2 Excessive Odours from Works

While no volatile compounds have been identified during the previous investigations, should odorous material be encountered, then the following will be undertaken:

- Impacted soil would be stored away from the boundary of the site;
- Covering of impacted soils;
- Where odours are still a nuisance, an odour suppressant may be used.

9 Site Management Plan

The following section contains appropriate details to eliminate / manage potential environmental emissions which may be generated by or during the site remediation works.

9.1 Hours of Operation

Remediation works shall only be permitted during the following hours based on the hours of operation outlined for work in industrial, city and town areas in EPA (2011) '*Environment Protection Guidelines for Construction and Land Development in the ACT*' for the control of noise:

- Monday to Saturday: 6:00 am to 8:00 pm
- Sundays and Public Holidays: 6:00 am to 8:00 pm

Emergency work is permitted to be completed outside of these hours. Any constraints to the hours of operation specified in a contract for the works take precedence over the hours of operation stated above.

9.2 Soil and Water Management

All works shall be conducted in strict accordance with the soil and water management measures outlined in this section.

To prevent the migration of impacted soil/sediment off site, silt fences shall be constructed at the down-gradient work area boundaries, as per the specifications contained in Environment Protection Guidelines for Construction and Land Development in the ACT (ACT EPA, 2011) and a Sediment Control Plan. Any material collected behind the sediment controls is to be treated as potentially contaminated and suitably managed.

In a storm event, the sediment controls located on-site will need to be monitored and replaced or altered if necessary. Collected material will need to be suitably managed in accordance with remediation works.

If underlying ACM impacted fill material is identified and is to be accessed during intrusive earthworks or excavation works, the following activities should be carried out and implemented by the party responsible for the disturbance to soil in the affected areas:

- Notification to the Principal Contractor to discuss the scope of works to be undertaken, the likelihood of generating dust, excess spoil or waste and the management of this material.
- Ensure contractors / workers are aware of the potential for asbestos contaminated materials to be encountered.
- Setup of work area, and exclusion zone including appropriate signage and barriers.
- Assess proposed scope of works to minimise the requirement to expose and / or excavate asbestos contaminated materials.
- Ensure contractors/workers are supervised by an appropriately qualified person as required by the relevant legislation (i.e. Class-A or Class-B licensed asbestos removalist) while carrying out any works suspected or known to contain asbestos contaminated materials.
- Preparation of a specific occupational health and safety plan that caters for the proposed activities / works including the provision of PPE.
- Consideration and/or preparation of a Dust Management Plan to mitigate/minimise dust generation. Consideration of the equipment used to minimise potential soil exposure and dust

generation. Preparation of a specific environmental protection plan including soil, water and air management protocols.

- Preparation of a methodology for managing excavated soil.
- Contingency planning to include encountering other suspected asbestos impacted material other than that expected.

Additional information pertaining to the transportation of ACM should also be consulted.

9.3 Site Access

During remediation works, perimeter fencing will be maintained to restrict access to the works area, including any remediation area. Only authorised persons will be able to enter the works area. Vehicle access to the site shall be stabilised to prevent the tracking of soil around the site and the adjoining driveway/access point to the road will be swept or cleaned on an as-needed basis. Any collected materials shall be treated as potentially contaminated and will be suitably managed.

9.4 Stockpiles

The following procedures will be implemented:

- No stockpiles or other materials shall be placed on footpaths or roadways and will be away from all stormwater infrastructure (including drainage lines, stormwater pits, gutters, etc) where possible. Where this is not possible, sediment controls will be placed over stormwater grates to prevent ingress of sediment to stormwater drainage lines.
- Stockpiles shall be formed with sediment control structures placed immediately down slope to protect other lands and waters from sediment pollution.
- Placement of material on a sealed or plastic lined surface.
- Covering of all excavated/stockpiled material.

9.5 Removal of Water in Excavation

Any water that is removed from remedial excavations shall be removed by a suitably licences liquid waste contractor and disposed in accordance with the waste classification requirements of the Environment ACT '*ACT's Environmental Standards: Assessment and Classification of Liquid and Non-liquid Wastes*'.

All disposal dockets for liquid waste must be provided to the environmental consultant for inclusion of the validation report.

9.6 Noise

The remediation works are to comply with the ACT EPA (2011) '*Environment Protection Guidelines for Construction and Land Development in the ACT*' for the control of noise from construction sites. All machinery and equipment used on site is to be in good working order while work is to be conducted within the hours of operation specified in Section 9.1.

9.7 Vibration

The use of plant and machinery should not cause vibrations which are felt or are capable of being measured at neighbouring premises.

9.8 Air Quality

Health and air monitoring must be undertaken when a worker is at risk of exposure due to work that is not licensed asbestos removal work. The need for health and air monitoring of these workers should be determined on the basis of the potential for exposure, frequency of potential exposure and duration of the work being undertaken.

Workers must be informed of any health and air monitoring requirements before the worker carries out work that may expose them to asbestos.

9.8.1 Asbestos Air Monitoring

Air monitoring for asbestos exposure may be required as result of the assessment and should be conducted by a competent person in accordance with Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition [NOHSC:3003(2005)].

Air monitoring will be undertaken daily during the period of remedial excavation works and will maintained until such a time that monitoring results demonstrates that works do not present an unacceptable risk to site users. Air monitoring sampling and analysis will be conducted by a licensed asbestos assessor and in accordance with NOHSC:3003(2005)" Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres 2nd Edition." Calibrated air monitoring pumps will be installed at boundary fences of the exclusion zone for the asbestos works area, downwind of proposed work locations, stockpiled asbestos contaminated materials and within the closed cabin of plant equipment.

Filter samples will be submitted to a NATA accredited laboratory for analysis and results will be required to be below 0.01 fibres per mL.

If asbestos respirable fibres are confirmed and are present between 0.01 and 0.02 mL, the remediation contractor must:

- review site control measures.
- Notify the asbestos assessor to advise on improved site controls.

If asbestos respirable fibres are confirmed and are present above 0.02 mL, the remediation contractor must:

- Stop work
- Notify Worksafe ACT
- Investigate the cause of the elevated concentrations
- Update site protocols for approval by the asbestos assessor

A daily air monitoring report will be prepared documenting the previous days asbestos fibre air monitoring results. This report will be made available to all stakeholders and site workers.

9.9 Dust Control

During the remediation, dust levels will be monitored and minimised by using mist sprays as necessary. A wetting or bonding agent may be used to further bind the soil to minimise asbestos fibre release. All asbestos impacted soils must be wetted prior to and during excavation of the soils.

Weather conditions will be monitored and by the remediation consultant and contractor. Remedial works will be stopped or modified during adverse weather conditions (eg strong winds).

Dust shall also be controlled by ensuring vehicles leave via the designated (stabilised) site access point and only traverse on wetted roads.

9.10 Odour

Given the nature of the soils being removed from the site, odour may not be an issue. Where complaints occur, the contingency measures associated with odour control outlined in Section 8.2 will be implemented. Additional odour suppression actions will be taken to reduce the odours as necessary, which may include: increasing the amount of covering of excavations / stockpiles; mist sprays; odour suppressants; or maintenance of equipment.

9.11 Material Transport

Trucks will be loaded in a designated area away from the contaminated material excavations. The transporting contractor shall ensure that there is no material tracked out onto the street and that the load is securely covered. In addition, all site vehicles must leave the site in a forward direction.

All appropriate road rules shall be observed and state roads will be selected as far as practicable over local roads when deciding on the transport route to the off-site material disposal location.

Where material is to be imported, controls are to be implemented to maintain separation between contaminated and non-contaminated materials.

9.12 Hazardous Materials

All hazardous and/or intractable wastes (if any) shall be removed and disposed of in accordance with the relevant regulatory requirements. In particular, any hazardous wastes will be transported by an transporter licensed to carry the waste.

9.13 Disposal of Contaminated Soil

Excavated material with the same preliminary soil/waste classification should be stockpiled together, where appropriate, to prevent cross contamination.

If the material is to be transported off site, a soil classification of the material should be conducted in accordance with the following guidance documents:

- ACT EPA (2020) '*Information Sheet 4: Requirements for the Reuse and Disposal of Contaminated Soil in the ACT*'.
- Environment ACT (2000) 'ACT's Environmental Standards: Assessment & Classification of Liquid & Non-liquid Wastes'.
- National Environment Protection Council 'National Environment Protection (Assessment of Site Contamination) Measure 1999' (amended 2013).

Soil classification of the stockpiles will be conducted by a suitably qualified environmental consultant.

All excavated soil material to be removed from site will need to be classified by a suitability qualified environmental consultant and approved by the ACT EPA prior to transport off-site.

If during any earthworks asbestos, evidence of gross contamination or other unknown type of material not previously detected is observed (Unexpected Finds), site works are to cease until the Site Manager has been notified and appropriate instructions have been provided to field personnel. Further works in such a location should be conducted under the supervision of a suitably qualified environmental consultant. All additional work would be documented and detailed in a validation report prepared by a suitably qualified environmental consultant.

Other waste, excluding soil and water generated during the remedial works may include:

- Domestic waste generated by site workers.
- Liquid waste.
- Inert building materials.

Each truck should be logged as clean prior to dispatch along with information pertaining to the volumes of loads and number of trucks leaving the site. In addition, copies of all waste classifications certificates, waste tracking certificates, weigh bridge dockets, and any council approvals should be maintained onsite for inspection.

9.14 Imported Fill

If any materials are required to be imported on site to re-establish existing or designed levels, then only material meeting the requirements outlined in Section 7.6 will be accepted onto the site.

9.15 Site Signage and Contact Numbers

Throughout the duration of the works appropriate signage shall be erected around the remediation area with the contact details of the remediation contractor and project manager.

9.16 Complaint Reporting and Resolution

Complaints from adjoining site occupants or workers on site will be directed initially to the civil contractor on site. Following that, discussion between the environmental consultant and the complainant will be used to investigate the issue and remedy the issue appropriately.

10 Health and Safety

The principal remedial contractor should prepare a separate construction and environmental management Plan (CEMP) prior to the remediation works beginning. The information presented below is not exhaustive and is to be included along with additional relevant information in the CEMP. The objectives of the health and safety plan are:

- To apply standard procedures that reduce risks resulting from the above works;
- To ensure all employees are provided with appropriate training, equipment and support to consistently perform their duties in a safe manner; and
- To have procedures to protect other site workers and the general public. These objectives will be achieved by:
    - Assignment of responsibilities;
    - An evaluation of hazards;
    - Establishment of personal protection standards and mandatory safety practices and procedures; and
    - Provision for contingencies that may arise while operations are being conducted at the site.

This health and safety section does not provide safety information specific to construction and other demolition or excavation activities carried out by contractors, such as the safe operation, maintenance and inspection of plant, etc. Contractors will be required to prepare their own Safe Work Method Statements for their work activities. All parties working on the site shall comply with all applicable Health and Safety legislation, regulations, codes and guidelines.

10.1 Responsibilities

Superintendent – PBS

The client supervisor/manager is responsible for:

- Advice on obtaining development approval;
- Helping to ensure all works are compliant with the development approval; and
- Assisting with community consultation.

The client supervisor/manager contact details will be provided prior to the works.

Remediation Contractor – D-Group

The remediation contractor is responsible for:

- Ensuring all works are undertaken as per the RAP;
- Ensuring all works are undertaken in accordance appropriate regulations and standards;
- Ensuring all works are undertaken as per the health and safety plan;
- Ensuring a copy of the health and safety plan is available at the site during the remediation/validation activities;
- Confirming individuals are competent in performing allotted tasks;
- Liaison with the client supervisor/manager and contractor representatives, as appropriate, regarding safety matters; and
- Investigation and reporting of incidents and accidents.

Environmental Consultant – Lanterra Consulting

The environmental consultant is responsible for:

- Undertake remediation and validation sampling as per the RAP;
- Ensuring consultant works are undertaken as per the health and safety plan;
- Liaison with the contractor representatives, as appropriate, regarding safety matters; and
- Undertake validation and reporting as per the RAP.

Table 6: *Site Contacts*

	Details
Supervisor/Manager	
Name	
Company	
Address	
Contact Phone	
Environmental Consultant	
Name	
Company	
Address	
Contact Phone	

10.2 Other Members of the Workforce

Every individual worker is responsible for conducting their allocated tasks in a safe manner and in accordance with their training and experience. They must give due consideration to the safety of all others in their proximity and cooperate in matters of health and safety. All workers must leave their work areas in such a condition that the location will not be hazardous to others at any time.

10.3 Hazards

The known or potential hazards associated with the work activities are listed below:

- Chemical hazards associated with the presence of contaminated soil;
- Physical hazards, including:
- Work in or near excavations;
- Operating machinery;
- Heat stress and UV exposure;
- Underground or overhead services;

- Manual handling; and
- Noise.

In the event of the discovery of any condition that would suggest the existence of a situation more hazardous than anticipated, or of any new hazard that could potentially cause serious harm to personnel or the environment, work will be suspended until the Site Manager has been notified and appropriate instructions have been provided to field personnel.

Planning of the earthworks involving exposure and / or disturbance of impacted soils, and implementation of appropriate health and safety measures, will minimise the potential for contact with contaminated materials through the above listed pathways.

Areas that have been excavated and are suspected of containing contaminated material must be isolated and barricaded to prevent unauthorized access. If required, appropriate signage indicating the presence of contamination should be placed on the barricade (e.g. a 'Danger - Asbestos' sign should be used if possible ACM or nonbonded asbestos is identified).

10.3.1 Airborne Hazards

The main chemical hazards associated with the remediation/validation works is asbestos. Workers involved in disturbing the known impacted soil, and surrounding stakeholders, could be exposed by ingestion / inhalation of asbestos impacted soil and dust.

When working with contaminated materials in general, care must be taken to ensure that the contamination is not introduced to the worker via ingestion, inhalation or absorption. Personal Protective Equipment (PPE) and decontamination requirements related to the remedial works are summarised below.

10.3.2 Physical Hazards

Operating Machinery

Heavy plant and equipment operating in the vicinity of field personnel presents a risk of physical injury. Personnel should be cognisant of their position in relation to operating machinery at all times. Personnel must wear high visibility clothing when onsite.

Never walk behind or to the side of any operating equipment without the operator's knowledge. Do not assume that the operator knows your position. Personnel should stay at least 1 m from the operational area of heavy equipment and should not stand directly below any load or piece of equipment (e.g. backhoes, excavators, vehicles).

Work In or Near Excavations

No site personnel are to stand closer than 0.5m to the edge of an excavation. No site personnel are to enter excavation greater than 1 m deep. Additionally, at the end of each day excavations are to be barricaded to prevent access.

Cuts and Abrasions

The manual work associated with the remediation works gives rise to the risk of cuts and abrasions to personnel working in the area. As well as the direct consequences of any cut or abrasion, such injuries can lead to the possibility of exposure to contaminants through the wound as well as diseases such as tetanus. To minimise the risk of direct or indirect injury, personnel will wear the personal protective equipment described.

Heat Stress and UV Exposure

Site personnel may experience heat stress due to a combination of elevated ambient temperatures and the concurrent use of personal protection equipment; this depends in part on the type of work and the time of year. In addition to heat stress, overexposure to UV radiation in sunlight can result in sunburn to exposed skin. The use of a high protection sunscreen (SPF15 or greater) on all exposed skin is recommended. Hats (including hard hats in specified areas) will also provide additional sun protection during the peak (i.e. 10:00 am to 3:00 pm) sun period. Sunglasses should be worn (where appropriate) to protect eyes from effects of UV exposure.

Underground Services

There is the potential for underground services (electricity, natural gas lines, water, telephone, sewer, and stormwater) to be present beneath the work area. The remediation contractor shall ensure that appropriate procedures will be taken to minimise the risk associated with excavation near services.

Aboveground Electrical Hazards

All electrical plant and equipment must comply with the requirements of Australian Standard AS 3000. Hand held portable tools shall comply with AS/NZS 3160 "handheld Portable electric tools" and shall be double insulated. Cord connected Portable hand lamps shall comply with AS/NZS 3118. A Residual Current Device (RCD) shall protect plug-in Portable equipment, which is connected to a supply above Extra Low Voltage - 12-24volts (including equipment supplied from a generator or welding set). RCD protection shall be provided during maintenance of Portable electrical equipment at all times while the equipment is connected to a power supply above Extra Low Voltage, irrespective of whether power is switched ON or OFF. RCD's shall comply with AS 3190 and shall be type II units, rated to trip at or below 30 milliamps within 40 milliseconds.

Manual Handling

When lifting or handling heavy objects, use correct lifting techniques, bending the knees not the back. If the item to be lifted is too heavy or awkward for one person to lift, seek assistance from other company employees or use mechanical help.

Noise

Long-term exposure to high levels of noise is unlikely. However, operating machinery may cause significant noise exposures for short periods. Earplugs or earmuffs should be worn in any situation where noise levels make normal conversation difficult.

10.4 Personal Protective Equipment

All workers who may come into direct contact with asbestos impacted soil will wear the following personal protective equipment:

- Disposable hazmat suit
- P2 disposable dust mask
- heavy duty outer gloves (e.g. leather) where there is a risk of cuts or abrasions,
- otherwise PVC outer gloves if in direct contact with contaminated soil.
- steel capped boots.
- safety glasses.
- high visibility vest or jacket.
- hard hat.

Plant operators undertaking intrusive works must close cabin doors and windows and have air conditioning set to re circulate when inside asbestos zones.

It is further noted that additional PPE may be required as part of the WorkCover permitting process. If this occurs, then the above PPE requirements will be upgraded to reflect WorkCover's requirements.

Action Levels for Asbestos Fibres Respirator Use

The control level for airborne fibre concentrations recorded during air monitoring will be 0.01 fibres/mL, as required by National Occupational Health and Safety Commission (NOHSC): 2002 (2005) 'Safe Removal of Asbestos, 2nd Edition' and as per Worksafe Australia's recommended Exposure Standard for all forms of asbestos of 0.1 fibres/mL.

If concentrations above the control levels were recorded, works would be halted until a review of the asbestos management procedures had been performed, and appropriate mitigation measures implemented.

In the event that workers will be exposed to highly odorous soil conditions during remediation works, the following additional PPE should be adopted:

- Impermeable disposable overalls; and
- Half or full face respirator with organic vapour cartridge (as per action levels identified in Table 10).

A PID shall be used to monitor the concentrations of VOCs within the workspace, with the following action levels at which the additional PPE mentioned above is required.

Table 7: *PID Breathing Space Screening Criteria*

Instrument	Airborne levels	Level of Protection
PID	<1 ppm	No additional protection
PID and/or Dräger or Kitagawa tubes	> 1 ppm	Half or full faced respirator*
PID and/or Dräger or Kitagawa tubes	> 10 ppm** or > 1 ppm on the site boundary	Stop work, cover excavation to minimise production of volatiles

*If action levels exceed the action level following 5 minutes, the use of a respirator is required. Organic respirator cartridge to be changed daily.

** 10 times the benzene exposure limit as recommended by 3M Respirator Selection Guide.

All persons engaged in intrusive works within the vicinity of the affected area should wear respiratory protective equipment conforming to the requirements of AS/NZS1716-2003 Respiratory Protective Devices.

10.5 Decontamination Procedures

The decontamination procedures specified below will be followed whenever personnel, plant or equipment leave the site.

Personnel

The following steps should be taken to ensure personnel do not leave the site with potentially contaminated clothing:

- wash boots in clean water.
- remove outer gloves and store for reuse.
- remove overalls (if used) and store for reuse.
- remove respirator and goggles (if used) and store clean for reuse or decontamination, as appropriate.
- thoroughly wash hands and face.

If any part of a worker's body comes into direct contact with any potentially contaminated material, the affected part(s) should be immediately washed with clean water.

Vehicle, Plant and Equipment

All equipment, including personal protective equipment, will be washed or otherwise cleaned to ensure that contaminated soil, water or dust is removed before it leaves the Site. All plant and equipment will have their outer bodies thoroughly cleaned of soil and sediment before moving off the site.

10.6 Contamination Control Zone

A contamination control zone will be set-up onsite for remedial works. All personnel entering the contamination control zone must wear the appropriate PPE as discussed above and monitoring procedures must be in place. The lunch shed and office will be located outside of the contamination control zone and will be designated clean zones. Any personal and plant leaving the contamination zone must undergo appropriate decontamination procedures, in a designated area (decontamination zone) as discussed above, prior to entering the site clean zones. The service station will not be operational during remedial works and therefore not accessible to the public.

11 Regulatory Guidelines and Legislation

All works on the site must be undertaken with all due regard to the environment and to statutory requirements. Work on site is to comply with the requirements of the following ACT legislation and endorsed guidelines.

The investigation and preparation of this report was undertaken with reference to (but not limited to) the following regulatory guidance documents and standards:

- *ACT Government (2019) Information Sheet 4 - Requirements for the Reuse and Disposal of Contaminated Soil in the ACT;*
- *ACT Government (2020) Information Sheet 11 - EPA Report Submission Requirements;*
- Environment ACT (2000) *Environmental Standards: Assessment and Classification of Liquid and Non- Liquid Wastes;*
- *ACT EPA (2007) General Environment Protection Policy;*
- *NSW EPA (2017) Guidelines for the NSW Site Auditor Scheme (3rd Ed.) (2017);*
- *NSW EPA (1995) Sampling Design Guidelines (1995);*
- *NSW EPA (2014) Waste Classification Guidelines: Part 1 Classifying Waste;*
- *NSW EPA (2016) Addendum to Waste Classification Guidelines: Part 1 Classifying Waste;*
- *NSW EPA (2020) Consultants Reporting on Contaminated Land – Contaminated Land Guidelines;*
- *Standards Australia (2005). Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds AS4482.1 (2005) and Part 2: Volatile substances, AS4482.2 (2005).*
- *WA Department of Health (2009) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, May 2009*

11.1 Environment Protection Act 1997

Under Section 48 of the Act, Schedule 1; Clause 48, the transporting of waste which includes hazardous waste, restricted solid waste, liquid waste, clinical and related waste or friable asbestos waste (or any combination of them) a license is required if it involves the transport of more than 200 kilograms in any load. If more than 200 kilograms of restricted solid waste is required to be transported from the site, the transporter of the waste will require a license.

11.2 Environment ACT (2000) Environmental Standards: Assessment and Classification of Liquid and Non- Liquid Wastes

The ACT EPA provided guidance to waste generators to classify the wastes they produce and ensure the environmental and human health risks associated with it are managed appropriately.

11.3 ACT EPA (2017) Contaminated Sites Environment Protection Policy

Works conducted at the site in relation to contaminated soils, groundwater or vapours should be conducted in accordance with this EPP. The EPP provides a framework for relevant ACT EPA adopted guideline documents and also provides the mechanism and guidelines as to when a contaminated site should be notified to the EPA.

11.4 National Environmental Protection Council (NEPC) (2013). National Environment Protection (Assessment of Site Contamination) Measure 1999 (as amended May 2013)

Provides a national framework for which contaminated site assessments can be conducted. The ACT EPA endorse the health and ecological investigation levels provided within the ASC NEPM (2013)

12 Conclusions

It is considered that the objectives of the onsite remediation will be achieved subject to the successful implementation of the actions contained in this RAP, which will enable the site to be made suitable for the proposed residential aged care use. Additional documents/plans may be required by an Auditor or the ACT EPA to be prepared prior to remediation commencing, in order to inform the remediation strategy and validation of remediation objectives.

13 References

ACT EPA (2017) Contaminated Sites Environment Protection Policy;

ACT EPA (2007) General Environment Protection Policy;

ACT EPA (2009) 'Contaminated Sites Environment Protection Policy'

ACT EPA (2011) '*Environment Protection Guidelines for Construction and Land Development in the ACT*'

ACT EPA (2020) 'Information Sheet 4 - Requirements for the Reuse and Disposal of Contaminated Soil in the ACT'

ACT EPA (2016) 'Information Sheet 5 – Requirements for the Transport and Disposal of Asbestos Contaminated Wastes'

Bureau of Mineral Resources, Geology and Geophysics (1984) '1:100,000 Hydrogeology of the Austrailan Capital Territory and Environs'

Bureau of Mineral Resources, Geology and Geophysics (1992) '1:100,000 Geological Series, Canberra, New South Wales and Australian Capital Territory, Sheet 8727'

Environment ACT (2000) Environmental Standards: Assessment and Classification of Liquid and Non-Liquid Wastes;

KPMG (2020) Environmental Site Investigation, 106 Cotter Road, Weston Creek, ACT (reference *385509 – ESI – 106 Cotter Rd, Weston Creek ACT – KPMG DRAFT 23-10-20*)

National Environmental Protection Council (NEPC) (2013) '*National Environment Protection (Assessment of Site Contamination) Measure 1999'* (as amended May 2013);

NSW EPA (2017) 'Guidelines for the NSW Site Auditor Scheme (3rd Ed.)';

NSW EPA (1995) 'Sampling Design Guidelines (1995)';

NSW EPA (2014) 'Waste Classification Guidelines: Part 1 Classifying Waste';

NSW EPA (2016) 'Addendum to Waste Classification Guidelines: Part 1 Classifying Waste';

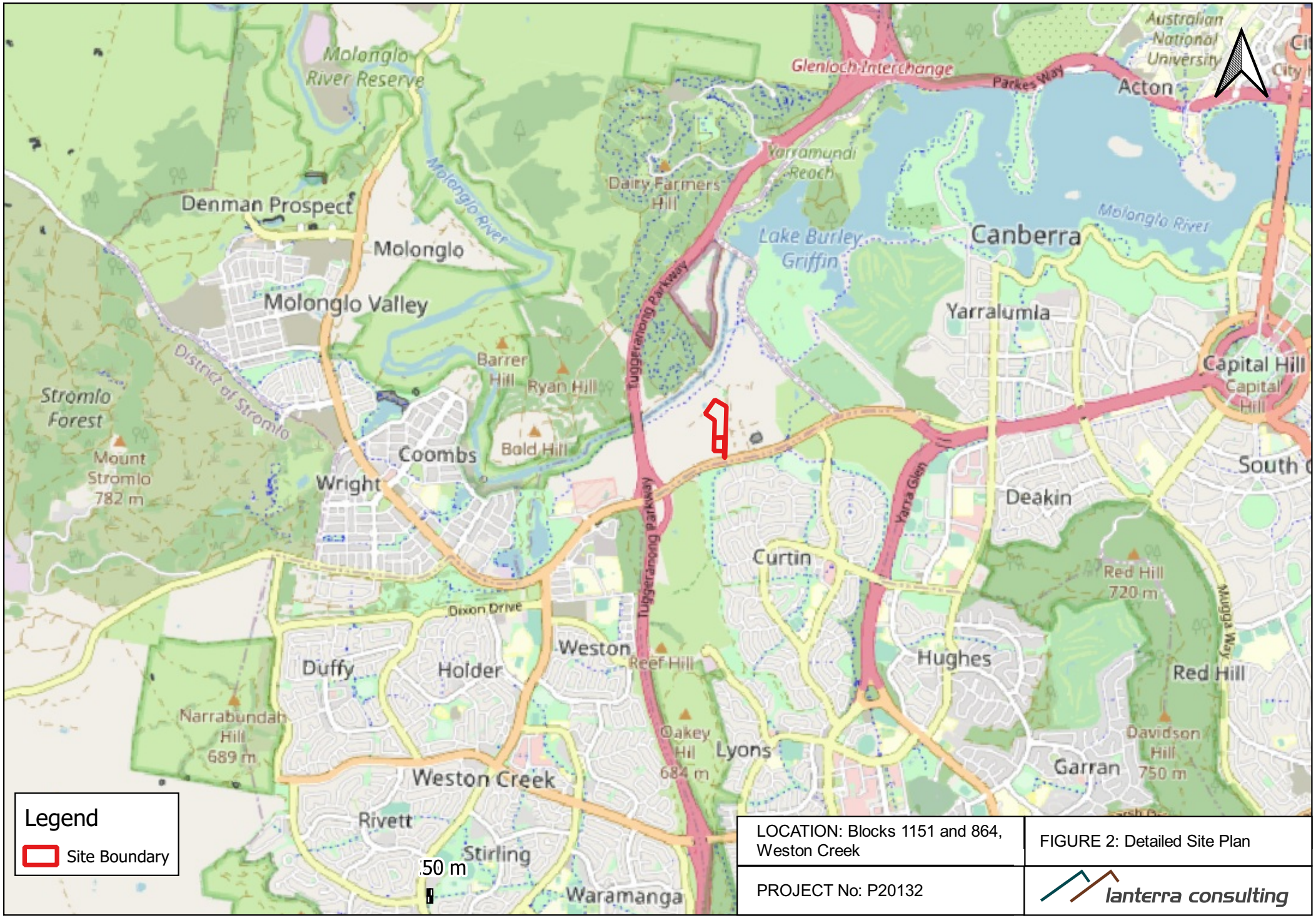
NSW EPA (2020) 'Consultants Reporting on Contaminated Land – Contaminated Land Guidelines';

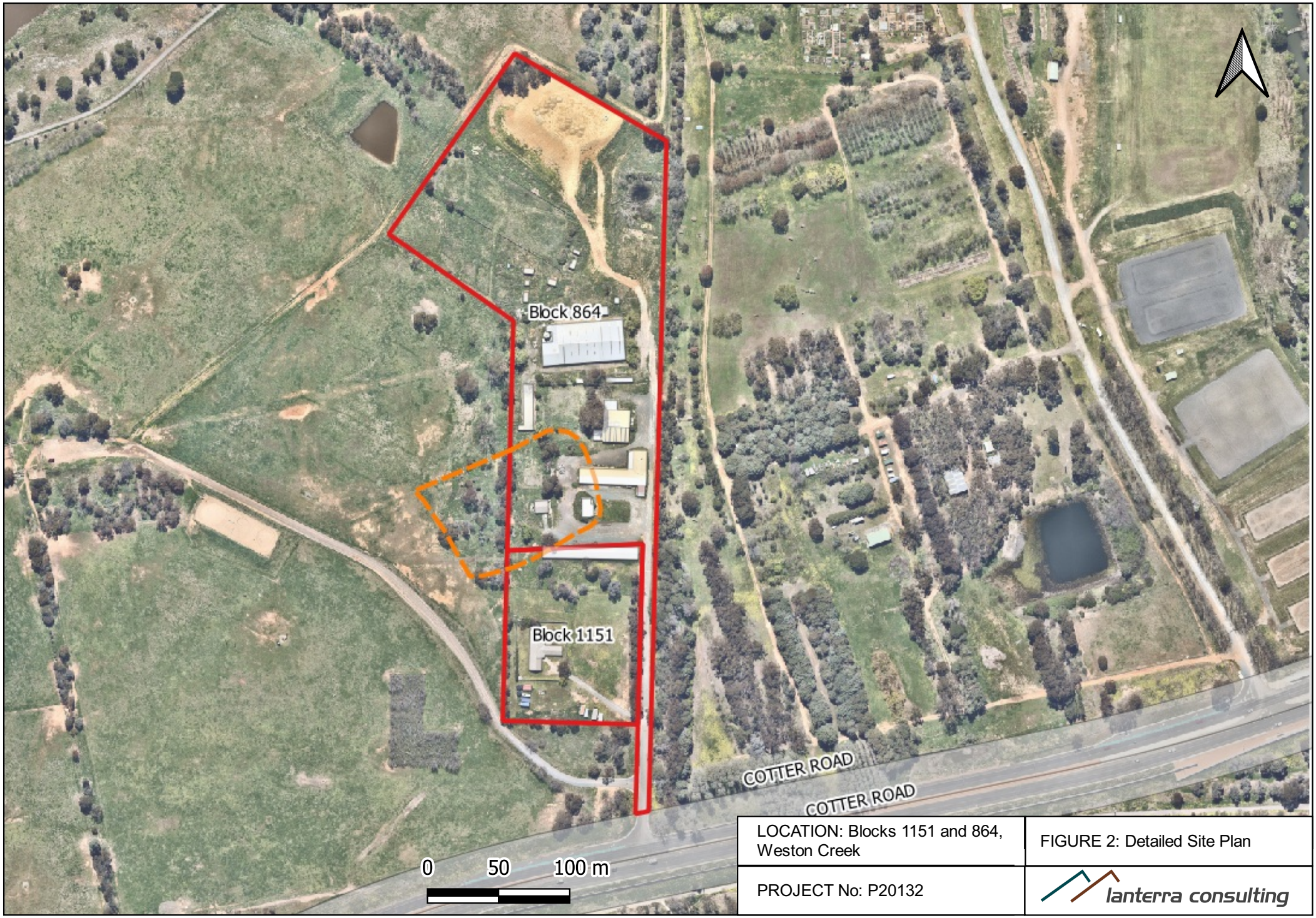
Standards Australia (2005) 'Guide to the investigation and sampling of sites with potentially contaminated soil. Part 1: Non-volatile and semi-volatile compounds AS4482.1 (2005) and Part 2: Volatile substances, AS4482.2 (2005).

WA Department of Health (2009) Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia, May 2009

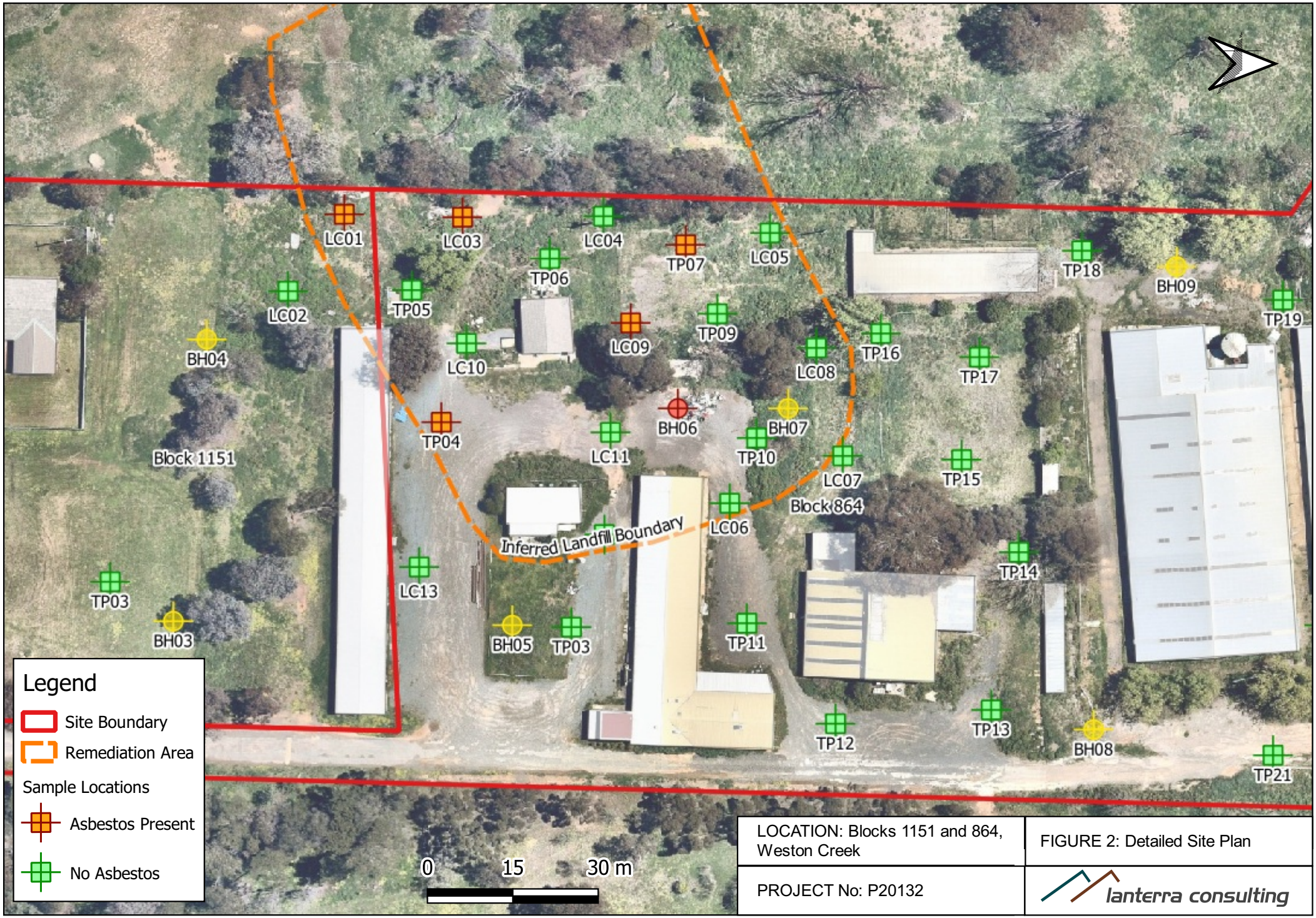
Appendix A

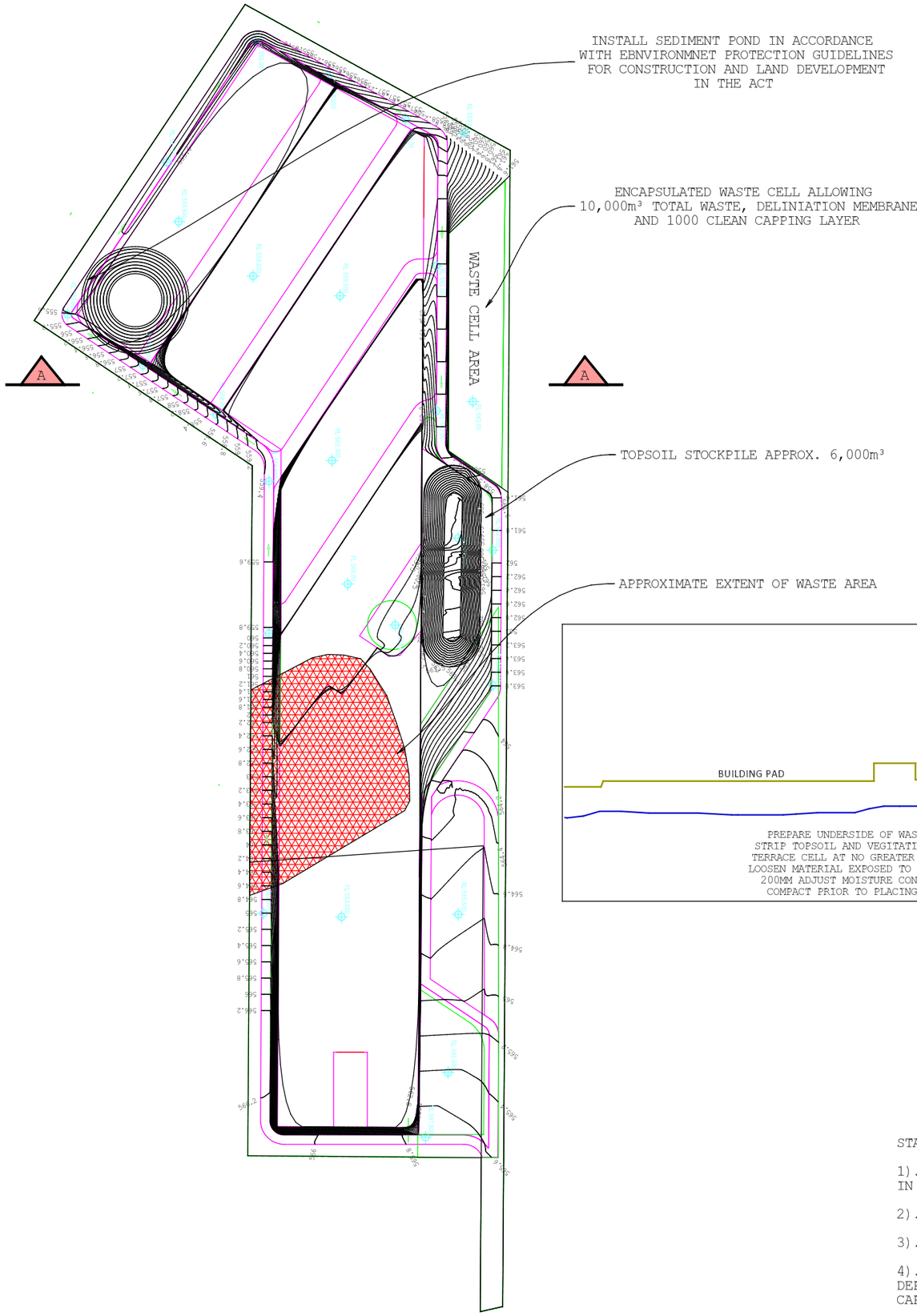
Figures

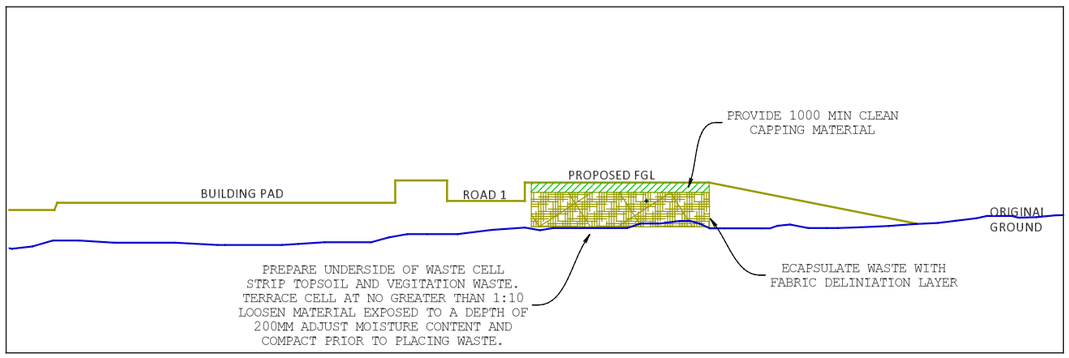

Molonglo River Reserve
Glenloch Interchange
Parkes Way
Australian National University
Acton
Yarramundi Reach
Dairy Farmers Hill
Molonglo River
Denman Prospect
Molonglo
Molonglo Valley
Lake Burley Griffin
Canberra
Molonglo River
Tuggeranong Parkway
Yarralumla
Capital Hill
Barrer Hill
Ryan Hill
District of Stromlo
Stromlo Forest
Mount Stromlo 782 m
Coombs
Bold Hill
Wright
Deakin
South
Yarra Glen
Curtin
Red Hill 720 m
Dixon Drive
Weston
Reef Hill
Duffy
Holder
Hughes
Red Hill
Narrabundah Hill 689 m
Oakey Hill 684 m
Lyons
Davidson Hill 750 m
Garran
Weston Creek
Rivett
Stirling
Waramanga
Legend
Site Boundary
50 m
LOCATION: Blocks 1151 and 864, Weston Creek
FIGURE 2: Detailed Site Plan
PROJECT No: P20132
lanterra consulting



LOCATION: Blocks 1151 and 864, Weston Creek	FIGURE 2: Detailed Site Plan
PROJECT No: P20132	lanterra consulting


LC01
LC03
LC04
TP07
LC05
TP18
BH09
TP19
TP06
LC02
TP05
LC09
TP09
TP16
BH04
LC10
LC08
TP17
BH06
BH07
TP04
LC11
TP10
LC07
TP15
Block 1151
Block 864
LC06
Inferred Landfill Boundary
TP14
LC13
TP03
BH03
BH05
TP03
TP11
TP12
TP13
BH08
TP21
Legend
Site Boundary
Remediation Area
Sample Locations
Asbestos Present
No Asbestos
0
15
30 m
LOCATION: Blocks 1151 and 864, Weston Creek
FIGURE 2: Detailed Site Plan
PROJECT No: P20132
lanterra consulting





SECTION A

STAGE 1:

1). INSTALL ENVIRONMENTAL PROTECTION MEASURES IN ACCORDANCE WITH ACT EPA GUIDELINES

2). CLEARING AND GRUBBING AND DISPOSE SURPLUS GREEN WASTE

3). STRIP TOPSOIL TO STOCKPILE AND STABILISE

4). PREPARE WASTE CELL TO REQUIRED LEVELS TO ALLOW SUFFICIENT DEPTH FROM FINISHED SURFACE LEVEL TO ACCOMODATE 1000 THICK CLEAN CAPPING FILL LAYER.

REV	ANT	REASON FOR REVISION	DATE	SIGN

SITE MAP

Forrest Park

D GROUP SINCE 1994

PROJECT NUMBER	DRAWN BY	CHECKED BY
T2133	KR	CH
DATE	**APPROVED BY**	
16-DEC-20	LC	

SHEET DESCRIPTION

SITE REMEDIATION PLAN STAGE 1

COORD SYSTEM

Australia/AGD
ACT Standard Grid Co-ordinates

SCALE	SHEET NUMBER	REV
1 : 2000	Plan: 1 of 1	1