



# Remedial Action Plan

Woorong Park  
Stony Creek Road  
Marsden Park NSW 2765

J. Wyndham Prince

DL3492\_S006370

March 2017

<b>PROJECT NAME</b>	Woorong Park Remediation Action Plan
<b>PROJECT ID</b>	DL3492
<b>DOCUMENT CONTROL NUMBER</b>	S006370
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DOCUMENT CONTROL				
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## ABBREVIATIONS

A list of the common abbreviations used throughout environmental reports is provided below:

<b>ACM</b>	Asbestos Containing Material
<b>AEC</b>	Area of Environmental Concern
<b>AF</b>	Asbestos Fines
<b>AHD</b>	Australian Height Datum
<b>BGL</b>	Below Ground Level
<b>BTEX</b>	Benzene, Toluene, Ethyl Benzene, Xylene
<b>COPC</b>	Contaminant of Potential Concern
<b>CSM</b>	Conceptual Site Model
<b>CT</b>	Contaminant Threshold
<b>DLA</b>	DLA Environmental Services
<b>DSI</b>	Detailed Site Investigation
<b>ENM</b>	Excavated Natural Material
<b>EPA</b>	Environment Protection Authority (NSW)
<b>ESL</b>	Ecological Screening Level
<b>FA</b>	Fibrous Asbestos
<b>HIL</b>	Health-Based Investigation Level
<b>HSL</b>	Health Screening Level
<b>HSP</b>	Health and Safety Plan
<b>NA</b>	Not Applicable
<b>NEPC</b>	National Environment Protection Council
<b>NEPM</b>	National Environment Protection Measure
<b>NSW</b>	New South Wales
<b>OCP</b>	Organochlorine Pesticides
<b>OEH</b>	Office of Environmental and Heritage
<b>OPP</b>	Organophosphorus Pesticides
<b>PAH</b>	Polycyclic Aromatic Hydrocarbons
<b>PCB</b>	Polychlorinated Biphenyls
<b>PPE</b>	Personal Protective Equipment
<b>QA/QC</b>	Quality Assurance and Quality Control
<b>RAP</b>	Remedial Action Plan
<b>SCC</b>	Specific Contaminant Concentration
<b>SEMP</b>	Site Environmental Management Plan
<b>SEPP</b>	State Environmental Planning Policy
<b>SWMS</b>	Safe Work Method Statement
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>TEQ</b>	Toxicity Equivalence Quotient
<b>TRH</b>	Total Recoverable Hydrocarbons
<b>VENM</b>	Virgin Excavated Natural Material
<b>WHS</b>	Work Health Safety

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## 1.0 INTRODUCTION

### 1.1 General

DLA Environmental Services (DLA) was engaged by J. Wyndham Prince (the Client) to prepare a Remediation Action Plan (RAP) of the following area:

**Woorong Park**  
Stony Creek Road, Marsden Park NSW 2765  
(the site)

This RAP provides information on the works which are proposed to manage and remediate contamination identified at the site. The report has been prepared utilising information obtained from previous assessment reports and from experience, knowledge, and current industry practice in the remediation of similar sites.

### 1.2 Development Controls

This RAP has been prepared in accordance with the requirements of the City of Blacktown *Development Control Plan 2015, Part 1 – Contaminated Land Guidelines*.

### 1.3 Objectives

The project objectives of this RAP are to detail all necessary actions to be undertaken at the site in order to render it suitable for the proposed use, thereby posing no unacceptable risk to human health or to the environment.

In particular, this RAP sets remediation goals and documents management procedures and environmental safeguards for future land use consistent with *Residential A* as described in the *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013* (No.1) ('NEPM', NEPC, 2013).

### 1.4 Scope of Works

The scope of the RAP has been defined on the basis of the findings of previous investigations, site observations and the nature of the proposed development.



In this regard, the scope of the RAP is to:

- Provide a summary of the history and environmental setting of the site, including previous environmental investigations;
- Establish an appropriate remedial strategy so as to render the site suitable, from a contamination perspective, for the proposed development;
- Outline clean-up criteria to be adopted for the remediation of the site and design a validation plan to confirm the successful implementation of the remediation strategy; and
- Establish appropriate safeguards to perform the remediation works in an environmentally acceptable manner, having regard to best-practice work, health and safety procedures.

## 2.0 SITE DESCRIPTION

### 2.1 Site Identification

The site identification details are summarised in **Table 1**.

**Table 1: Site Identification Summary**

ITEMS	DETAILS
<b>Site Name</b>	Woorong Park
<b>Address</b>	Stony Creek Road, Marsden Park NSW 2765
<b>Local Government Authority</b>	City of Blacktown
<b>Lot and Deposited Plan</b>	Lots 4, 5, 7, 8 and 9 in Deposited Plan 1078717 Lot 10 in Deposited Plan 1178982
<b>Site Zoning</b>	R2 – Low Density Residential R3 – Medium Density Residential RU6 – Transition RE1 – Public Recreation: Open Space E2 – Environmental Conservation E3 – Environmental Management SP2 – Infrastructure: Local Drainage under the State Environmental Planning Policy (Sydney Region Growth Centres) 2006
<b>Current Use</b>	Rural open space
<b>Proposed Use</b>	Low density residential subdivision
<b>Remediation Area (approx.)</b>	472 hectares (ha)
<b>Locality Map</b>	Refer to <b>Figure 1</b> – Site Location
<b>Site Layout</b>	Refer to <b>Figure 2</b> – Site Layout and Paddock Boundaries

### 2.2 Proposed Development

It is understood that the site is to be subdivided and developed for low density residential purposes, with some areas retained as riparian land or for use as open space / parkland.

This development scenario is consistent with the definition of ‘Residential with gardens and accessible soil’ as described in Schedule B7 of the NEPM (NEPC, 2013).

## 2.3 Site History

A desktop review of the site history was undertaken as part of previous investigations (DLA, May 2015, ref: DL3492\_S002906, revision 01.01).

The desktop review indicated that the site had been used for agricultural purposes from the early 1900s, while the main homestead area located in the western portion may have been used as a commercial laundry between 1948 and 1971.

No other significant development was noted to have previously occurred within the site.

## 2.4 Boundaries and Surrounding Land Use

The boundary and surrounding landscape features of the site are summarised in **Table 2**.

**Table 2: Boundaries and Surrounding Land Use**

DIRECTION	DETAILS
North	Former chicken farm
East	Grassed paddocks, current construction of a residential subdivision, driving range and golf course, and a former pig farm
South	Former Air-services Australia site and Cumberland Wood Plain
West	Stony Creek Road, South Creek, market gardens and rural residential housing

## 2.5 Environmental Setting

The landscape and environmental setting of the site is summarised in **Table 3**.

**Table 3: Environmental Setting**

DIRECTION	DETAILS
<b>Topography</b>	The site lies at elevations between 12 metre Australian Height Datum (AHD) in the north-west to 31m AHD in the west, and exhibits undulating gradual slopes and rises of up to 30m. Overall the site slopes down towards South Creek and Stony Creek Road to the west of the site.
<b>Geology</b>	The 1:100,000 Sydney Geological Series (Sheet 9130) indicates that the site is underlain by Londonderry Clay which comprises clay with patches of ferruginized sand.
<b>Soils</b>	The 1:100,000 Sydney Soil Landscape Map (9130) indicates that the site lies within the South Creek Soil Landscape Group. The natural soils encountered during the previous investigations predominantly comprised silty sand and sandy / silty clay with localised areas of fill at the creek crossing and in adjacent low-lying areas.
<b>Acid Sulfate Soils</b>	A search of the NSW Natural Resources Atlas indicated that there are no known occurrences of acid sulfate soils in the vicinity of the site.
<b>Salinity</b>	The Salinity Potential in Western Sydney map indicates that the site and the Marsden Park area generally is within a region of moderate salinity potential.
<b>Hydrology</b>	An unnamed tributary of South Creek runs through the centre of the site, flowing in a broadly northerly direction. South Creek lies immediately north of the site, and ultimately discharges to the Nepean River, located approximately 9 kilometres to the north-west of the site.
<b>Hydrogeology</b>	A search of the NSW Office of Water groundwater works database did not identify any registered groundwater bores within a 500m radius of the site. Previous investigations undertaken on-site indicate that groundwater is expected to lie at depths between 6m and 8m below ground level (bgl) and is expected to flow in a north-westerly direction towards South Creek.

## 3.0 SUMMARY OF PREVIOUS INVESTIGATIONS

### 3.1 Land Capability, Salinity and Contamination Assessment Report (Geotechnique, 2012)

Geotechnique Pty Ltd (Geotechnique) undertook a preliminary contamination assessment which incorporated the site as part of the wider Marsden Park Precinct. Aerial photographs indicated that the site had historically undergone extensive clearing of vegetation, and had been predominantly used for grazing purposes. Laboratory analysis of soil samples collected from 30 test pits reported chemical concentrations below the adopted assessment criteria, however asbestos containing material (ACM) was identified in fill material in test pit TP10 excavated at the main creek crossing. Groundwater monitoring wells installed on-site reported contaminant concentrations below the adopted assessment criteria. Saline soil conditions were identified in at depths greater than 1m bgl.

Refer to **Figure 3** – Geotechnique (2012) Sampling Locations.

### 3.2 Detailed Site Investigation (DLA, 2015)

DLA carried out a Detailed Site Investigation (DSI) to assess the potential for historical activities to have caused contamination at the site, and to demonstrate the suitability of the land for future low-density residential land use.

A total of 300 test pits were excavated in a grid over the site area, while one targeted borehole and three groundwater monitoring wells were also installed. Laboratory analysis of soil samples collected from the site reported chemical concentrations below the adopted assessment criteria, with the exception of benzo(a)pyrene TEQ (toxicity equivalence quotient) in sample TP252-0.7 (0.7m bgl) which exceeded health-based investigation levels, and fragments of bonded ACM in three locations – TP120A (at the surface), TP206-0.1 (0.1m bgl) and TP250-0.1 (0.1m bgl).

Asbestos fragments were also identified within the building footprint of the disused cottage within the main homestead area in the western portion of the site.

Groundwater reported heavy metals including zinc and nickel at concentrations exceeding the adopted investigation criteria, however these concentrations were considered to be representative of natural occurring levels associated with the local geology.

The DSI concluded that the site was suitable for low density residential land use, with the exception of the identified benzo(a)pyrene TEQ and asbestos impacted soils. It was indicated that these areas

could be made suitable for the proposed land use through the removal of the fill materials and a subsequent asbestos clearance / validation report.

Refer to **Figures 4a to 4f** – DLA (2015) Sampling Locations.

## 4.0 EXTENT OF CONTAMINATION

Based on the available data, DLA has identified the Areas of Environmental Concern (AECs) presented in **Table 4**. The AECs define the extent of remediation which is understood to be required to make the site suitable for its proposed future land use.

**Table 4 – Extent of Contamination: AECs**

AEC ID	LOCATION	CONTAMINANT OF CONCERN	DEPTH (bgl)
<b>AEC1</b>	TP120A (Paddock 23)	Bonded ACM	Surface
<b>AEC2</b>	TP206-0.1 (Paddock 14)	Bonded ACM	Surface
<b>AEC3</b>	TP250-0.1 (creek crossing)	Bonded ACM	Surface
<b>AEC4</b>	Main homestead area	Bonded ACM	Surface
<b>AEC5</b>	TP252-0.7 (Paddock 8)	Benzo(a)pyrene TEQ	0.7m

Refer to **Figure 5** – Remediation Areas.

Considering the nature of historical activities at the site, there is a risk that previously unidentified chemical contamination or asbestos fragments may be present. Should additional contamination be identified during remediation works, the Unexpected Finds Protocol presented as **Appendix A** will be implemented.

## 5.0 CONCEPTUAL SITE MODEL

A Conceptual Site Model (CSM) is a representation of an environmental system and the processes that determine the transport of contaminants from sources through environmental media to environmental receptors. The development of a CSM comprises an iterative process of characterising site contamination on the basis of historical, anecdotal, previous and current environmental data.

An exposure pathway is a means by which an ecosystem, human population or individual (receptor) may be exposed to site-derived contaminants. If a source, transport mechanism (pathway), an exposure point and a sensitive receptor are all present then a complete exposure pathway exists.

### 5.1 Potential Contaminants

Site-specific AECs and associated contaminants of potential concern (COPC) are summarised in **Section 4** of this RAP.

### 5.2 Release and Transport Mechanisms

Contaminants generally migrate from a site via a combination of windblown dusts, infiltration, groundwater migration and surface water runoff. The potential for contaminants to migrate is a combination of:

- The nature of the contaminants (solid/liquid and mobility characteristics);
- The extent of the contaminants (isolated or widespread);
- The location of the contaminants (surface soils or at depth); and,
- The site topography, geology, hydrology and hydrogeology.

#### Windblown Dust Migration

Given that most of the site area comprises unsealed surface, there is the potential for windblown dust migration of contamination from the site.

Once bonded asbestos is exposed and asbestos fibres are released, they may be transported by wind as part of the dust load. Given the isolated nature of the identified asbestos material, the risk of exposing asbestos is considered to be low based. However, excavation and disturbance of fill material has the potential to uncover further asbestos-impacted soils which would inevitably increase the risk of release.



### **Surface water migration**

The migration of chemical contaminants is considered to be low considering the absence of widespread contamination within the site.

Asbestos is an inert, non-leachable mineral and is unable to be transported by groundwater but may possibly be transported by surface water or exposed by erosion.

### **Soil and Groundwater Migration**

The potential for migration of contamination through the soil profile is considered to be low given the isolated nature of the identified contamination and the generally impermeable nature of the residual clay soils underlying the site.

The depth to groundwater is further considered to preclude the likelihood of subsurface migration of contamination.

### **Vapour Generation**

The potential for vapour generation requires a source of vapour. No sources have been identified on-site, therefore vapour migration is not considered to present a risk to human health.

## **5.3 Potential Exposure Pathways**

Based on the identified COPCs and future potential site development activities, the exposure pathways for the site's use include:

- Inhalation of asbestos fibres;
- Potential dermal and oral contact with impacted soils;
- Potential contaminant uptake by vegetation established in the landscaped areas of the site;
- Potential contaminant uptake by site occupants as a result of ingestion via consuming vegetation grown in areas of the site; and/or
- Direct ingestion of soil, particularly by young children playing on the ground surface in unsealed areas of the site.

## **5.4 Sensitive Receptors**

The potential sensitive receptors at the site include:

- Present and future site users;
- Construction and maintenance workers;

- 
- Visitors to the site;
  - Flora and fauna species established at the site; and
  - The drainage (creek) network running through the site.

## 6.0 SELECTION OF PREFERRED REMEDIAL STRATEGY

### 6.1 Remediation Options

The *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme* (NSW EPA, 2<sup>nd</sup> ed., 2006) outlines the hierarchical management of wastes as preferred by the NSW EPA. According to this document, the order of preference for soil remediation and management is:

1. On-site treatment of the soil so that the contaminant is either destroyed or the associated hazard is reduced to an acceptable level;
2. 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;
3. Removal of contaminated soil to an approved site or facility, followed where necessary by replacement with clean fill; and
4. Consolidation and isolation of the soil on-site by containment within a properly designed barrier.

A review of the available remediation methods and technologies indicates that the following strategies may be applicable to the remediation of the site.

### 6.2 On-site Treatment of Contaminated Media

Treatment of soil contamination is often the preferred strategy where large volumes of heavily contaminated soils require remediation.

On-site treatment of contaminated media may include in-situ methods such as stabilisation and oxidation, and ex-situ methods such as thermal desorption and bioremediation. Ex-situ on-site treatment requires sufficient land area to facilitate the process for the life of the remediation program.

Both in-situ and ex-situ remediation methods often take an extended period of time to complete and have significant costs associated with mobilisation and monitoring. In addition, treatment technologies often target only one type of contaminant (i.e. volatile organics, or heavy metals) and therefore are not typically suitable for sites with different types of contamination.

The benefits of on-site treatment of contamination is that off-site disposal of contaminated media is not typically necessary, and importation of soils to reinstate excavations is not required.

*This option is not considered suitable for implementation at the Site given the type of contamination that requires remediation.*

### **6.3 Off-site Treatment of Contaminated Media**

Off-site treatment of contaminated media includes the same methods as on-site treatment however remediation is undertaken in an alternate location. This method is typically adopted when the remediation site has an insufficient land area to accommodate the remediation technology.

Unlike on-site treatment, off-site treatment requires excavation of contaminated soils, or extraction of contaminated groundwater, and transportation of the media to the treatment site. Reinstatement of on-site excavations is also required following treatment.

*This option is not considered suitable for implementation at the Site given the type of contamination that requires remediation.*

### **6.4 Excavate and Off-Site Disposal**

Landfill disposal is the simplest of all remediation methods, and involves the excavation of the contaminated materials, and disposal off-site to a NSW EPA approved landfill disposal site with appropriate environmental safeguards. The formed excavation is then backfilled using clean, validated fill materials, if required.

The selection of an appropriate landfill will normally depend largely upon the results of classification of the wastes. It is sometimes necessary for heavily contaminated soils to be pre-treated prior to disposal, to reduce the concentrations or minimise the mobility of the contaminants. Special criteria are sometimes applicable to certain categories of waste. Contaminants covered by Chemical Control Orders have restrictions placed on their handling and disposal.

*This option is considered suitable for implementation at the site given type of contamination that requires remediation, and the nature of the proposed future land use.*

### **6.5 On-Site Capping and Containment**

On-site capping and containment involves the installation of a physical barrier around the contaminated area to prevent potential migration pathways of contaminants. A site management plan must be implemented for capping to ensure that future excavation work is minimised and where

necessary, carried out in strict accordance with appropriate occupational health and safety procedures.

*This option is not considered suitable for implementation at the site given the nature of the proposed future development.*

## 6.6 Preferred Strategy

The preferred remediation strategy is:

**EXCAVATE, CLASSIFY AND DISPOSE OFF-SITE**

Based on the above, excavation and off-site disposal of contaminated material is considered the most suitable remediation strategy as it is time efficient and offer no constraints on future land use. The strategy ensures removal of all contaminated materials and ongoing exposure risks, and can be carried out as part of the proposed development works.

## 7.0 IMPLEMENTATION OF REMEDIATION STRATEGY

### 7.1 General

The proposed remediation strategy incorporates the following elements:

1. Stakeholder consultation;
2. Implementation of an accepted Site Environmental Management Plan (SEMP) during remediation works;
3. Site establishment and pre-remedial works;
4. Remediation works; and
5. Validation.

### 7.2 Stakeholder Consultation

On approval of the strategy, the Stakeholders including on-site residents and relevant regulatory bodies will be informed of the intention to conduct remediation work, and the progress at all stages of the remediation works.

### 7.3 Implementation of Site Environmental Management Plan

A SEMP covering the remedial works has been prepared for the site. Before work commences it is imperative that all issues relating to potential impacts have been reviewed. The SEMP, and associated health and safety controls, are presented in **Sections 10** and **11** of this RAP.

### 7.4 Site Establishment and Pre-Remedial Works

Initial activities at the site shall involve the establishment of all plant and equipment necessary for the remediation works. Prior to the commencement of any earthmoving activities, it will be necessary to install environmental protection safeguards, as well as site security measures. These measures are included as part of the SEMP presented in **Section 10**.

## 7.5 Remediation Works

### 7.5.1 Remediation of Identified Asbestos Fragments (AEC1 to AEC4)

The locations of the fragments of asbestos identified at the surface of test pits TP120A (AEC1), TP206 (AEC2) and TP250 (AEC3) are shown on **Figure 5**. The homestead area (AEC4) where fragments of bonded ACM were observed on the surface is also shown on **Figure 5**.

Remediation of asbestos fragments within soil will be carried out in general accordance with WorkCover NSW (2014) *Managing asbestos in or on soil*.

The activities to be undertaken during the remediation of these soils will include:

1. Tiling or raking of the top 10cm of soil to expose residual asbestos fragments;
2. 'Hen-picking' of fragments of asbestos until such time no fragments are visible. Given that the quantity of bonded asbestos to be removed from the site is expected to be less than 10m<sup>2</sup>, hen-picking may be carried out by a suitably qualified and experienced environmental consultant or civil contractor, rather than a licensed asbestos removalist;
3. Off-site disposal of asbestos containing material in accordance with **Section 8.2** of this RAP; and
4. Validation by a suitably qualified and experienced environment consultant in accordance with the validation strategy presented in **Section 9.2.1** of this RAP.

It is recommended that asbestos remediation (hen-picking) in the vicinity of the homestead be carried out following demolition of the existing on-site structures to enable unrestricted access to the surface of the site, and to enable removal of asbestos fragments that may be present within near surface soils as a result of demolition works.

### 7.5.2 Remediation of Identified Benzo(a)pyrene TEQ Hotspot (AEC 5)

The location of the benzo(a)pyrene TEQ identified within test pit TP252 (AEC 5) is shown on **Figure 5**.

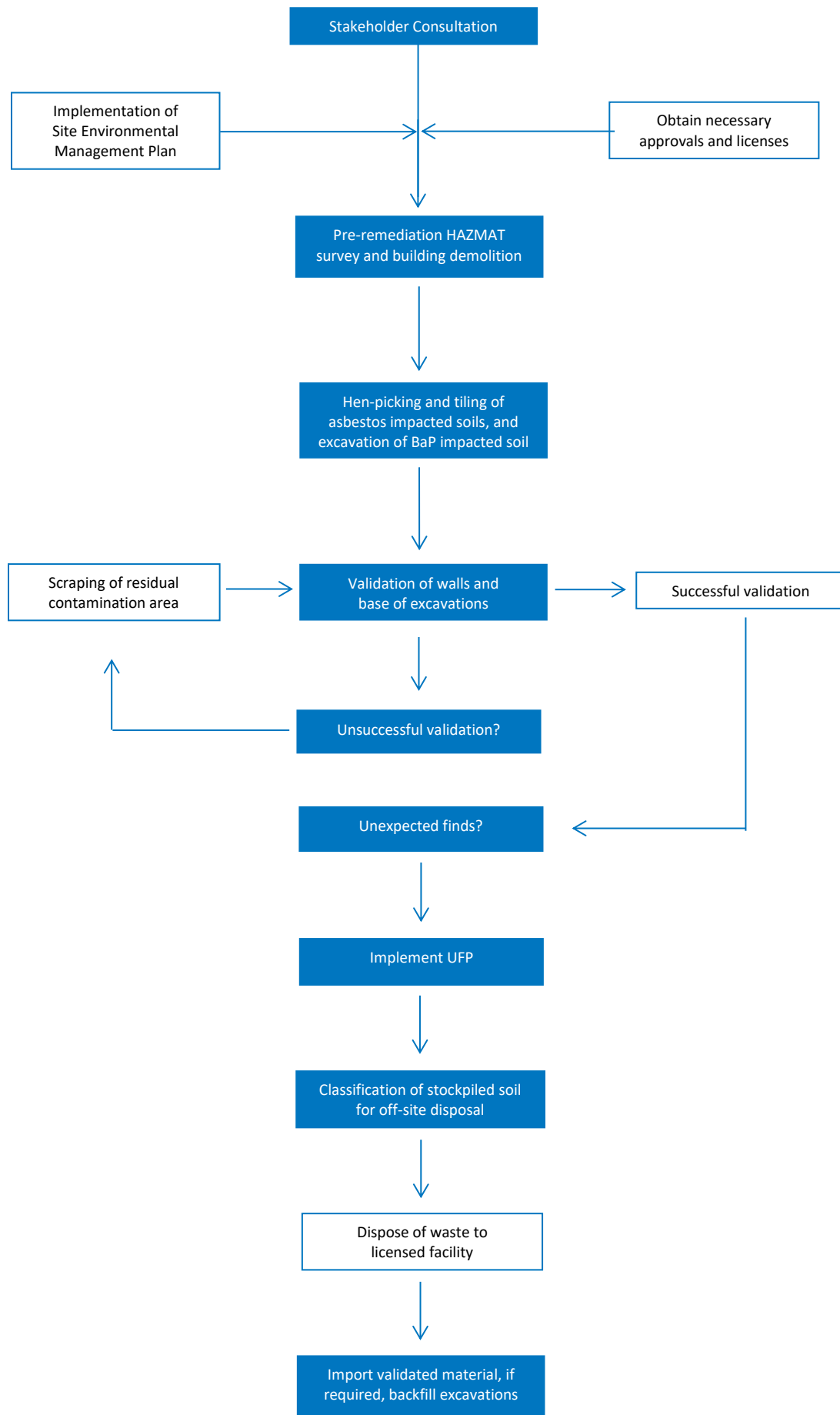
The activities to be undertaken during the remediation of these soils will include:

1. Delineation of the hotspot by marking a 5m x 5m grid centred around test pit TP252;
2. Excavation of soil within the gridded area to a depth of approximately 0.8m bgl, which is equivalent to the vertical extent of fill material, or based on evidence of contamination such as staining, odours or elevated field screening readings;

3. Stockpiling of excavated materials within a designated area for classification purposes to facilitate appropriate off-site disposal in accordance with **Section 8.1** of this RAP;
4. Validation of the excavation by a suitably qualified and experienced environment consultant in accordance with the validation strategy presented in **Section 9.2.2** of this RAP; and
5. Backfilling of the excavation, if required, following validation using 'clean' imported soil (refer to **Section 8.3** of this RAP).

A schematic of the **Remediation Process** is shown below:





## 8.0 WASTE MANAGEMENT

All waste disposal activities should be undertaken in accordance with *the Waste Classification Guidelines* (NSW EPA, 2014), the *Waste Avoidance and Resource Recovery Act 2001*, the *Protection of the Environment Operations Act 1997* and other relevant legislation.

### 8.1 Waste Soil Classification

This section applies to excavated soil from the site that is to be disposed off-site to landfill.

To account for the expected heterogeneity of the fill, representative soil samples will be collected from excavated and stockpiled soil at a rate of at least one sample per 25m<sup>3</sup> of excavated material, with a minimum of two samples per stockpile collected for analysis.

The sampling frequency and analytical schedule may need to be adjusted on a “case by case” basis, depending on factors such as:

- The volume of the material;
- The homogeneity of the material; and
- The visual assessment of the material.

Where possible, to assist in efficient classification and off-site disposal, less impacted soils will be segregated from those which have visual or olfactory indicators of contamination, or are suspected to contain asbestos.

Soil samples collected for waste classification purposes will be analysed for the following potential contaminants:

- Heavy metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn);
- Total Recoverable Hydrocarbons (TRH);
- Benzene, Toluene, Ethylbenzene, Xylene (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAH);
- Organochlorine Pesticides (OCP);
- Organophosphorous Pesticides (OPP);
- Polychlorinated Biphenyls (PCB); and
- Asbestos.

The analytical suite may be reduced where existing data is available, however this would be at the discretion of a suitably qualified and experienced environmental consultant.

Samples will also be submitted for TCLP (toxicity characteristics leaching procedure) for heavy metals and PAH.

The results of the laboratory analysis will be compared against Tables 1 and 2 of the *Waste Classification Guidelines* (NSW EPA, 2014).

All soils that require off-site disposal as part of the remediation works will be disposed to an appropriately licensed landfill facility. Copies of dockets pertaining to disposal of soils will be provided by the remediation contractor to confirm the source, type and quantities of materials. These will be included in the validation report.

## **8.2 Management of Bonded Asbestos**

Asbestos waste is pre-classified as Special Waste Asbestos in accordance with Step 1 of the NSW EPA (2014) *Waste Classification Guidelines*. Therefore, fragments of bonded asbestos will be disposed to a landfill appropriately licensed for the receipt of Special Waste Asbestos.

Fragments of bonded asbestos will be handled, stored and transported in accordance with WorkCover NSW (2014) and the *Protection of the Environment Operations (Waste) Regulation 2005*, as follows:

- Waste will be stored on-site in an environmentally safe manner;
- Non-friable (bonded) asbestos will be securely packaged at all times;
- Asbestos waste will be transported in a covered, leak-proof vehicle; and
- Asbestos waste will be disposed to a landfill that can lawfully receive this waste. The landfill will be contacted prior to disposal to advise of the intention to dispose of asbestos waste.

Copies of dockets pertaining to disposal of asbestos will be provided by the remediation contractor to confirm the quantity of materials. These will be included in the validation report.

## **8.3 Importation of Soil**

### **8.3.1 Off-site Sources**

Fill imported to the site for the purpose of reinstating excavations must be either:

- Virgin Excavated Natural Material (VENM); or
- Excavated Natural Material (ENM).

In accordance with the *Protection of the Environment Operations Act 1997*, VENM must be 'natural material (such as clay, gravel, sand, soil or rock fines) that:

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

The VENM must be accompanied by a validation certificate from the supplier which adequately certifies that the material is VENM, or otherwise be subject to validation sampling prior to importation to the site.

Where validation of VENM is required, based on the importation of approximately 12m<sup>3</sup> of material to the site, if required for backfilling purposes, representative soil samples will be collected at a rate of at least one sample per 25m<sup>3</sup> of VENM with a minimum of two samples collected for analysis.

Soils will be analysed for the following contaminants of concern as a minimum: heavy metals, TRH, BTEX, PAH, OCP, OPP, PCB and asbestos.

In accordance with the *Protection of the Environment Operations (Waste) Regulation 2014*, ENM is naturally occurring rock and soil (including but not limited to materials such as sandstone, shale, clay and soil) that has:

- a) been excavated from the ground;
- b) contains at least 98% (by weight) natural material; and,
- c) does not meet the definition of VENM in the Act.

ENM does not include:

- a) material located in a contamination hotspot;
- b) material that has been processed; or
- c) material that contains asbestos, acid sulfate soil, potential acid sulfate soils, or sulfidic ores.

Assuming the material meets the above criteria, confirmation of the ENM classification is carried out by the comparison of contaminant concentrations against the thresholds presented in Table 4 of NSW EPA *The excavated natural material order 2014*.

Imported soil will be observed by a suitably qualified and experienced environmental consultant as it is delivered to site to confirm:

- that it appears consistent with the source; and
- that there is no visual or olfactory evidence of contamination such as staining, anthropogenic materials or odours.

In the case that discrepancies exist, the imported material will be refused entry to the site and not considered suitable for use until appropriately validated.

Copies of dockets pertaining to imported fill soils will be provided by the remediation contractor to confirm the source, type and quantities of materials. These will be included in the validation report.

### 8.3.2 On-site Sources

Where fill is sourced from within the site (i.e. as excess cut material from surface grading earthworks), the material must be assessed for its suitability for beneficial on-site reuse from a contamination perspective.

Representative soil samples will be collected at a rate of at least one sample per 25m<sup>3</sup> of material, with a minimum of two samples collected for analysis.

Soils will be analysed for the following contaminants of concern as a minimum: heavy metals, TRH, BTEX, PAH, OC, OPP, PCB and asbestos.

The results of the laboratory analysis will be compared against the health screening and investigation levels for *Residential A* land use as described in the NEPM (NEPC, 2013).

Where the concentrations are below the guidelines, the material is considered suitable for use as backfill. Where the concentrations exceed the guidelines, the material will be considered unsuitable to remain on-site and will require waste classification and appropriate off-site disposal.

## 9.0 VALIDATION SAMPLING AND ANALYSIS QUALITY PLAN

### 9.1 Extent of Validation

Validation activities will be required for the following areas:

- Asbestos clearance areas (AEC1 to AEC4);
- Benzo(a)pyrene remediated area (AEC5); and
- Areas of unexpected finds.

### 9.2 Validation Procedure

#### 9.2.1 Asbestos Clearance Areas (AEC1 to AEC4)

At the completion of 'hen picking' within the tilled/raked area, a clearance inspection of the surface of the site will be carried out to assess whether visible fragments of bonded asbestos remain.

In the case that fragments are observed during the clearance inspection, further hen picking will be carried out, followed by another clearance inspection.

The clearance inspection will be carried out by a suitably qualified and experienced environmental consultant.

#### 9.2.2 Benzo(a)pyrene TEQ Remediated Area (AEC5)

Validation of the excavation created by the removal of benzo(a)pyrene impacted soils will be performed by way of visual inspection and soil sampling. Visual inspection will observe for any obvious signs of contamination/environmental concern (e.g. odours, staining). This may require the collection of additional samples to those required by the testing frequencies given below. A systematic sampling methodology will be utilised to validate the residual soils in accordance with *Australian Standards 4482.1 and 4482.2* and the *Contaminated Sites: Sampling Design Guidelines* (NSW EPA, 1995).

Sampling numbers will conform to the following as a minimum:

- **Excavation Base:** one sample per 25m<sup>2</sup>, or part thereof. Where high local variation is expected, a minimum of 3 samples will be collected; and

- **Excavation Walls:** one sample per 10m length of wall, or part thereof. Additional samples will be collected at depths of concern where there is more than one depth of concern, with a minimum of 1 sample per 1.5m depth.

Validation samples collected from AEC5 will be analysed for PAHs including benzo(a)pyrene TEQ.

### 9.2.3 Unexpected Finds

Validation of any unexpected find will be dependent on contaminant type and the individual circumstances of each contamination event. Sample numbers and analysis will be dependent on the area of impact and a review of initial assessment data, and will conform to AS 4482.1, AS 4482.2 and NSW EPA (1995).

In the case that previously unidentified contamination hotspots are identified following demolition of existing buildings and structures, the impacted material will be excavated as follows:

1. Delineation of excavation area/s by marking a grid around the identified impact;
2. Excavation of identified gridded areas to the required depths (based on the depth of the identified impact);
3. Stockpiling, waste classification and removal of associated soils in accordance with the *Waste Classification Guidelines* (NSW EPA, 2014);
4. Validation of the resultant excavation in accordance with **Section 9.2** of this RAP; and
5. Backfilling of excavation with material assessed as suitable for the future land use if required.

Refer to **Appendix A** - Unexpected Finds Protocol for details regarding the typical characteristics of an unexpected find.

## 9.3 Quality Assurance / Quality Control

The quality assurance/quality control (QA/QC) program for the site will ensure the representativeness and integrity of samples and accuracy and reliability of the analysis results. This includes cleaning of tools before and between sampling, and delivery of samples to the laboratory within holding times and in good condition.

The QC program for the site will monitor and measure the effectiveness of the QA procedures. This will involve the collection and analysis of:

- intra-laboratory field duplicate samples at a rate of 10% of the total number of primary samples collected;
- inter-laboratory field duplicate samples at a rate of 5% of the total number of primary samples collected; and
- laboratory-prepared trip spikes at a rate of one per day of validation fieldwork.

#### 9.4 Validation Acceptance Criteria

Criteria and methods for assessing acceptable concentrations of contaminants at the site were derived from the following publication:

- *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)* (NEPC, 2013).

Validation criteria have been referenced for the following land use:

- **Residential A – Residential with gardens and accessible soil.**

##### 9.4.1 Soil Criteria

The NEPM (NEPC, 2013) provides Health Investigation Levels (HILs) for benzo(a)pyrene TEQ which are generic and apply across Australia to all soil types. The NEPM (NEPC, 2013) also provides Ecological Screening Levels (ESLs) for benzo(a)pyrene to address potential ecological impacts. The material type of 'clay' (or 'fine') has been used as it offers the most sensitive criteria and corresponds to the condition of soils at the site.

In the case that asbestos is identified, soils will then be assessed against the health screening levels (HSLs) for asbestos contamination in soil presented in the amended NEPM (NEPC, 2013) applicable to *Residential A* land use.

The HIL and ESL for benzo(a)pyrene, and the HSL for asbestos, are summarised in **Table 5**.



**Table 5 – Validation Acceptance Criteria**

ANALYTES	HIL / HSL Residential A	ESL (Fine) Urban Residential and Public Open Space
<b>Benzo(a)pyrene TEQ</b>	3mg/kg	0.7mg/kg
<b>Bonded ACM</b>	0.01%	-
<b>FA and AF</b>	0.001%	-
<b>All forms of asbestos</b>	No visible asbestos	-

FA: fibrous asbestos

AF: asbestos fines

HILs obtained from NEPM (NEPC, 2013) Table 1A(1)

HSL obtained from NEPM (NEPC, 2013) Table 7

ESLs obtained from NEPM (NEPC, 2013) Table 1B(6)

#### 9.4.2 Waste Classification Assessment Criteria

The characterisation of materials for off-site disposal during the remediation program of the Site will be performed in accordance with:

- *Waste Classification Guidelines* (NSW EPA, 2014);
- *Excavated Natural Material Order* (NSW EPA, 2014) and *Excavated Natural Material Exemption* (NSW EPA, 2014);
- *Protection of the Environment Operations Act 1997* (NSW) and associated regulations; and
- All other relevant resource recovery orders, resource recovery exemptions and approvals issued by the NSW EPA.

A selection of criteria from the aforementioned sources are summarised in **Table 6**. Any criterion not listed can be found in the relevant guidelines and reference documents.

**Table 6 – Waste Classification Criteria (mg/kg)**

ANALYTE	GENERAL SOLID WASTE				ENM	
	CT1 <sup>a</sup>	CT2 <sup>b</sup>	TCLP1 <sup>c</sup>	SCC1 <sup>d</sup>	Ave. Conc. <sup>e</sup>	Max. Conc. <sup>f</sup>
<b>BTEX</b>						
Benzene	10	40	0.5	18	--	0.5
Toluene	288	1,152	14.4	518	--	65
Ethylbenzene	600	2,400	30	1,080	--	25
Xylenes (total)	1,000	4,000	50	1,800	--	15
<b>TRH</b>						
C <sub>6</sub> – C <sub>10</sub>	NA	NA	NA	650	--	--
>C <sub>10</sub> – C <sub>36</sub> <sup>6</sup>	NA	NA	NA	10,000	250	500
<b>PAH</b>						
PAH (total)	NA	NA	NA	200	20	40
B(a)P	0.8	3.2	0.04	10	0.5	1
<b>Heavy Metals</b>						
Arsenic	100	400	5.0	500	20	40
Cadmium	20	80	1.0	100	0.5	1
Chromium	100	400	5	1,900	75	150
Copper	--	--	--	--	100	200
Lead	100	400	5	1,500	50	100
Mercury	4	16	0.2	50	0.5	1
Nickel	40	160	2	1,050	30	60
Zinc	--	--	--	--	150	300
<b>Other</b>						
pH (pH units)	--	--	--	--	5 to 9	4.5 to 10
Foreign Materials	--	--	--	--	0.05%	0.10%
Electrical Conductivity (dS/m)	--	--	--	--	1.5	3.0

**CT** – Contaminant Threshold.

**TCLP** – Toxicity Characteristics Leaching Procedure.

**SCC** – Specific Contaminant Concentration

**a** – *Waste Classification Guidelines* (NSW EPA, 2016), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 1: General Solid Waste.

**b** – *Waste Classification Guidelines* (NSW EPA, 2016), Table 1: CT1 & CT2 values for classifying waste by chemical assessment without the TCLP test, Column 2: Restricted Solid Waste.

**c** – *Waste Classification Guidelines* (NSW EPA, 2016), Table 2: TCLP and SCC values for classifying waste by chemical assessment, Column 1: Leachable concentration.

**d** – *Waste Classification Guidelines* (NSW EPA, 2016), Table 2: TCLP and SCC values for classifying waste by chemical assessment, Column 1: Specific Contaminant Concentration.

**e** – *Excavated Natural Material Order* (NSW EPA, 2014), Table 4, Column 2 – Maximum Average Concentration for Characterisation.

**f** – *Excavated Natural Material Order* (NSW EPA, 2014), Table 4, Column 3 – Maximum Average Concentration for Characterisation.

**NA** – No applicable as these contaminants are only assessed using Specific Contaminant Concentrations

### 9.4.3 Application of Criteria

Validation for chemically tested soils will be determined when concentrations are reported below the criteria, thereby not posing an unacceptable risk to human health or the environment. For chemical analysis, the individual contaminant concentration must not exceed the validation guidelines by more than 250%.

## 9.5 Validation Report

At the completion of the remediation activities, a Validation Report will be prepared by the environmental consultant engaged to validate the remedial works with reference to the NSW OEH (2000) *Contaminated Sites: Guidelines for Consultants Reporting on Contaminated Sites*.

The validation report will include:

- Executive summary;
- Scope of work;
- Site identification details;
- Summary of the site history;
- Summary of the site condition and surrounding environment;
- Summary of the site geology and hydrogeology;
- Remediation activities undertaken (including extent and observations of excavation/s, waste documentation materials tracking and imported fill documentation);
- Validation sampling and analysis plan (including methodology);
- QA/QC protocols for field works and laboratory analysis;
- Basis for validation criteria and validation sampling records; and
- Conclusions and recommendations.

## 10.0 SITE ENVIRONMENTAL MANAGEMENT PLAN

A major component of the remedial works shall involve the implementation of a SEMP. The SEMP will provide details of the environmental protection and pollution control measures to be implemented during the operational phase of the remedial works. This SEMP applies to the maintenance of the site prior to and during the remediation program.

The following sections outline various pollution control measures that will be implemented during most elements of the remedial works. It is appropriate for the Contractor to develop control measures for their component of the works based on the broad guidelines of the RAP.

### 10.1 Hours of Operation

Working hours for any on-site remedial works would be set in consultation with the Council, but it is envisaged the likely hours would be as follows:

<b>Mondays to Fridays</b>	7:00 am to 5:00 pm
<b>Saturdays</b>	7:00 am to 3:00 pm
<b>Sundays and Public Holidays</b>	No Work Permitted

### 10.2 Erosion and Sedimentation Control Plan

Generally, no surface run-off and/or water from remediation excavations will be permitted to discharge to the surrounding environment without regulatory authority approval.

**Table 7 – Erosion Sedimentation Controls**

#	CONTROLS
1	Diversion drains and berms to prevent runoff entering or leaving excavation areas.
2	Use of silt fencing, hay bales and/or oil absorbing booms, as required.
3	Activities that involve soil disturbance will be avoided during rain periods or when heavy rain is forecast.
4	Restoration of disturbed areas is to be undertaken as soon as practicable.
5	Excavation areas will be isolated from the surrounding site through the use of temporary barricades and fencing.

### 10.3 Stockpile management

Stockpiles will be designated and handled to ensure that the soil materials are properly tracked and classified.

**Table 8 – Stockpile Management**

#	CONTROLS
1	Stockpiles will be placed on hardstand areas where practical. If hardstand areas are not available, a plastic liner will be placed on the ground where soils are to be stockpiled.
2	Stockpiles will be bunded with sediment control barriers to mitigate runoff from the stockpile to surrounding areas.
3	Stockpiles will not be placed within or immediately adjacent to drainage lines, easements, footpaths, roadways or existing stormwater drains.
4	Stockpiles will be positioned and formed to minimise potential for stockpile erosion where possible.

### 10.4 Noise Control Plan

It will be necessary to minimise noise in accordance with the NSW EPA (2013) *Noise Guide for Local Government* for the control of noise from construction sites.

**Table 9 – Noise Controls**

#	CONTROLS
1	Site work will be restricted to the hours specified above.
2	The use of construction vehicles on-site will be kept to a minimum.
3	All equipment in operation in open areas on-site shall comply with the requirements of AS2436-1981 <i>Guide to Noise Control on Construction, Maintenance and Demolition Sites</i> .
4	Noise monitoring may be conducted during the site remediation program, if considered necessary.

### 10.5 Dust Control Plan

Dust mitigation procedures will be undertaken to ensure that dust generated from the site is controlled within acceptable levels.

**Table 10 – Dust Controls**

#	CONTROLS
1	All vehicles leaving the site will be cleaned on-site to remove any potentially contaminated dust.
2	Water sprays will be made available to wet down excavation faces and stockpiles in the case that dust generation becomes significant.
3	Plastic sheeting shall be available to cover excavation faces and stockpiles.
4	Dust monitoring if required.

#### 10.6 Odour Control Plan

Odour control measures shall be undertaken to ensure that possible odours generated on-site are controlled within acceptable levels.

**Table 11 – Odour Controls**

#	CONTROLS
1	The prevailing weather conditions shall be considered in the manner in which work is undertaken.
2	Plastic sheeting will be made available at all times on-site to allow for any excavated or disturbed contaminated soils to be covered, if necessary to reduce odour.
3	Odour masking agents (such as Biosolve) will be available for use on-site to suppress any nuisance odours not controlled by the above actions, so that ambient air quality at the site boundary is not adversely impacted.

## 11.0 HEALTH AND SAFETY AND COMMUNITY RELATIONS PLAN

### 11.1 Workplace Health and Safety

A Workplace Health and Safety (WHS) plan is an essential part of all remediation projects, to ensure the health and safety of all personnel working on or visiting the site. All remediation work would be undertaken in accordance with the provisions set out by the *Work Health and Safety Act 2011* (NSW) and associated *Work Health and Safety Regulation 2011* (NSW), and any other regulations or directions set out by regulatory authorities.

Typically, the WHS plan would consider a broad range of issues including (but not limited to) the following:

**Table 12 – WHS Plan Components**

#	COMPONENTS
1	Evaluation of the site hazards and the risks associated with these hazards.
2	Definition of the risk control measures.
3	Definition of the Personal Protection Equipment (PPE) required.
4	Details on work practices and restrictions, assessment of anticipated protection levels, controls on access to the site and decontamination.
5	Supervision of work practices at the site.
6	The notification of accidents and other matters.
7	Environmental monitoring protocols.
8	Risk assessment methods.

Workplace health and safety involves the development and implementation of systems and procedures into a Health and Safety Plan (HSP) included in a Safe Work Method Statement (SWMS). The objectives of these documents are to ensure the health and safety of those undertaking specific tasks on site and the wider community if necessary. A HSP would typically include the following:

- A clear health and safety policy;
- Requirements for worker health assessments and inductions;
- Identified health and safety training requirements;
- Requirements for occupational health protection and monitoring;
- Site/location specific emergency plan;
- Site/location specific emergency contact details;

- Permit to work/clearance procedures, and
- Task specific SWMSs.

## 11.2 Site Induction

All workers and visitors will be required to attend a site-specific health and safety induction before entry to the site is allowed. It is recommended that as a minimum, the following items be presented in the site induction:

**Table 13 – Site Induction Components**

#	COMPONENTS
1	General overview of the work to be conducted.
2	Overview of the contamination issues at the site.
3	Contamination concerns and associated exposure risks.
4	Hazard identification and prevention.
5	Personal Protective Equipment (PPE).
6	The notification of accidents and other matters.
7	Environmental monitoring protocols.
8	Risk assessment methods.

All workers and visitors to the site will be required to sign an induction log which signifies that they have been inducted, understand the issues and agree to follow the safe work method procedures.

## 11.3 Personal Protective Equipment

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

- Overalls or long sleeved collared shirt;
- 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; and,
- Hard hat.



## 11.4 Personal Hygiene and Decontamination

Appropriate hygiene and decontamination assists with minimising worker exposure and the transportation of potentially contaminated materials from the site to more sensitive home environments.

The following activities are prohibited while working in the hazardous materials area:

- Eating
- Chewing gum
- Drinking
- Smoking

Practices that involve contact between the hands and the mouth increase the risk of chemical ingestion. Hands should be thoroughly washed with soap and water after completing work activities and before meal breaks. Personal decontamination is required to minimise workers' exposure to, and indirect transportation of potential chemicals of concern.

Decontamination involves physically removing material from personnel and equipment. Protective equipment, tools and other equipment are decontaminated by cleaning with detergent water using a soft-bristle brush followed by rinsing with a sufficient quantity of water. Decontamination should be conducted before meal breaks, and at the end of a day's work

## 11.5 Community Relations Plan

### 11.5.1 Communications Plan

Meetings with stakeholders have kept information on the Project flowing to involved groups. It is envisaged that the remediation program will be developed in consultation with the stakeholders prior to implementation. It is likely that the plan would intend to:

**Table 14 – Communications Plan Components**

#	CONTROLS
1	Provide the stakeholders with information about the remedial works project.
2	Enable the stakeholders to raise questions/concerns and other suggestions regarding the remedial works project.
3	Co-ordinate matters of concern in relation to the remedial works project with Council and Regulatory Authorities with a stake in the project.

### 11.5.2 Complaint Response Measures

A complaint response system has been developed for dealing with any complaints received. The system includes:

**Table 15 – Complaint Response Measures**

#	CONTROLS
1	Identification of the individuals (e.g. Project Manager, etc.) with overall responsibility of ensuring all complaints are dealt with in an appropriate manner.
2	A clearly documented procedure for receiving, logging and passing on details of any complaints to the appropriate personnel.
3	Clearly defined roles for personnel working on the project in relation to complaint reporting and response.
4	A complaint register, which will record details of complaints, the party making the complaint, the parties, notified of the complaint, and actions arising from the complaint.
5	Mechanisms for advising Council and Regulatory Authorities of complaints in their jurisdiction.
6	Mechanisms for disseminating information (as appropriate) to the local community and/or committee regarding complaints and the response to the complaints.
7	Procedure for following up on the satisfactory resolution of any complaints.

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## 12.0 REGULATORY APPROVALS AND LICENSES

### 12.1 Regulatory and Licence Requirements

The remedial works will be undertaken in accordance with, but not limited to, all relevant sections of:

- *Contaminated Land Management Act 1997* and associated Regulations; and
- *Protection of the Environment Operations Act 1997* and associated Regulations.

### 12.2 Planning Consent

The remediation work constitutes Category 2 work in accordance with State Environmental Planning Policy (SEPP) No. 55 – Remediation of Land, and may be carried out without development consent.

SEPP 55 requires that the local Council be notified 30 days before Category 2 remediation works commence to allow council sufficient time to verify that the work is not Category 1.

## 13.0 ROLES AND RESPONSIBILITIES

### 13.1 Principal Contractor

The Principal Contractor will retain overall responsibility for ensuring that the RAP is appropriately implemented. The actual implementation of the RAP will be carried out by the Remediation Contractor on behalf of the Principal Contractor. The Principal Contractor will also be responsible for acquiring or organising the acquisition of all necessary approvals and licenses for the proposed remediation works proposed.

### 13.2 Remediation Contractor

The Remediation Contractor is responsible for day-to-day environmental performance of the remediation works, including the implementation and maintenance of acceptable environmental controls and plans during all remediation works. The Remediation Contractor will nominate a Site Manager who will be responsible for initial response to any unexpected finds encountered during remediation works.

### 13.3 Environmental Consultant/Occupational Hygienist

The Environmental Consultant will be primarily responsible for providing guidance on the implementation of this RAP to achieve site validation. In achieving this end, the Environment Consultant will be responsible for:

- Supervising, overseeing and directing remediation works;
- Undertake all validation assessment work in accordance with the RAP;
- Provide advice and recommendations based on inspections and validation results;
- Undertaking assessments for the characterisation, classification and disposal of wastes;
- Providing advice on issues under the *Protection of the Environment Operations Act 1997*; and
- Undertaking all necessary monitoring activities and preparation of management plans.

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## 14.0 CONCLUSION

The site can be made suitable for the intended land-use subject to appropriate remediation in accordance with this RAP and SEPP 55.

In conclusion, this RAP has:

- Summarised the history and environmental setting of the site and defined the extent of remediation required;
- Selected a preferred remediation strategy based on site-specific issues and currently available technologies;
- Presented appropriate validation acceptance criteria to confirm the successful implementation of the remediation strategy and outlined the means of validation for the completed works; and,
- Prepared a SEMP and associated health and safety and remediation management plans to ensure human health and the environment are appropriately protected during the proposed works.

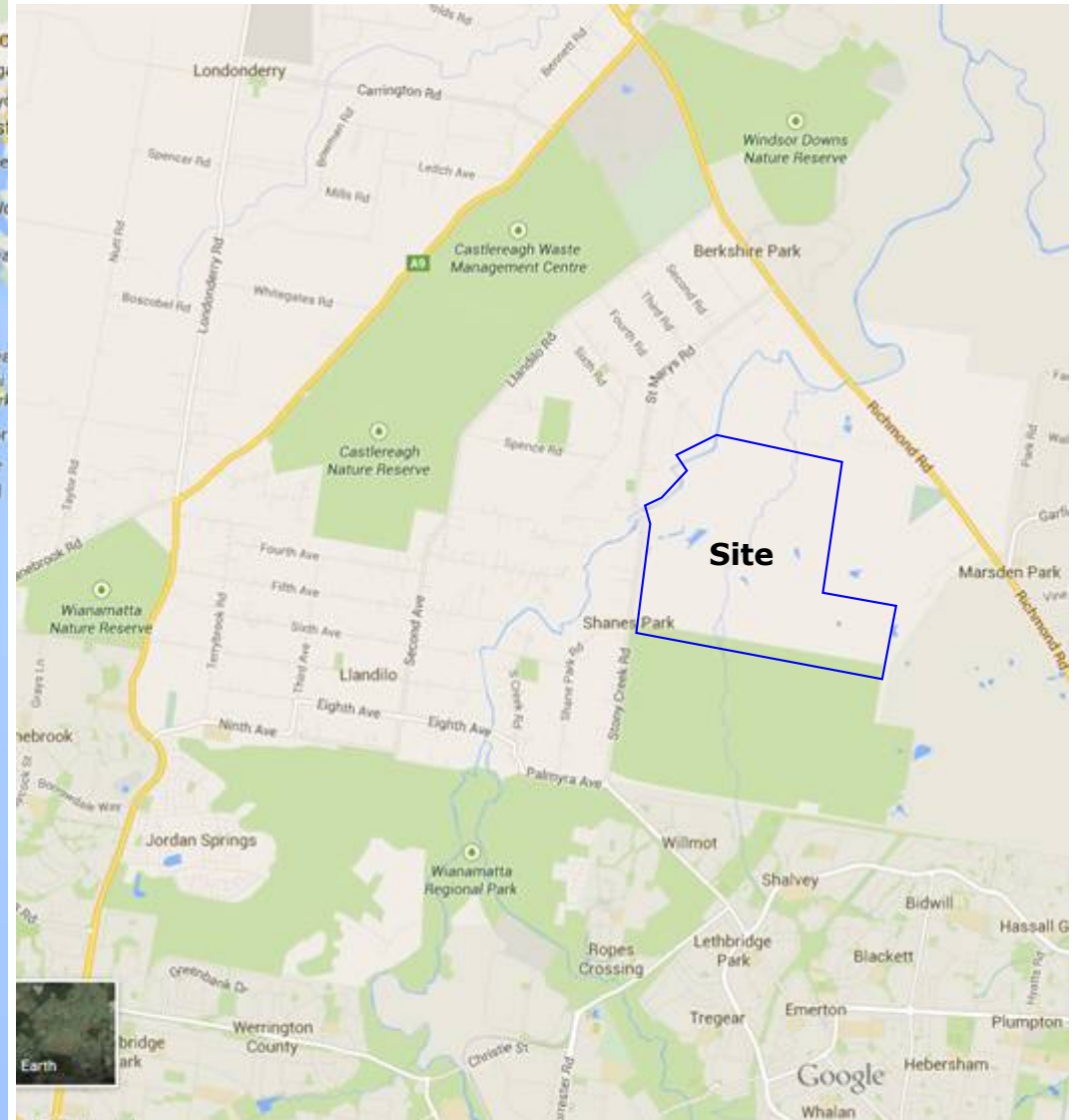
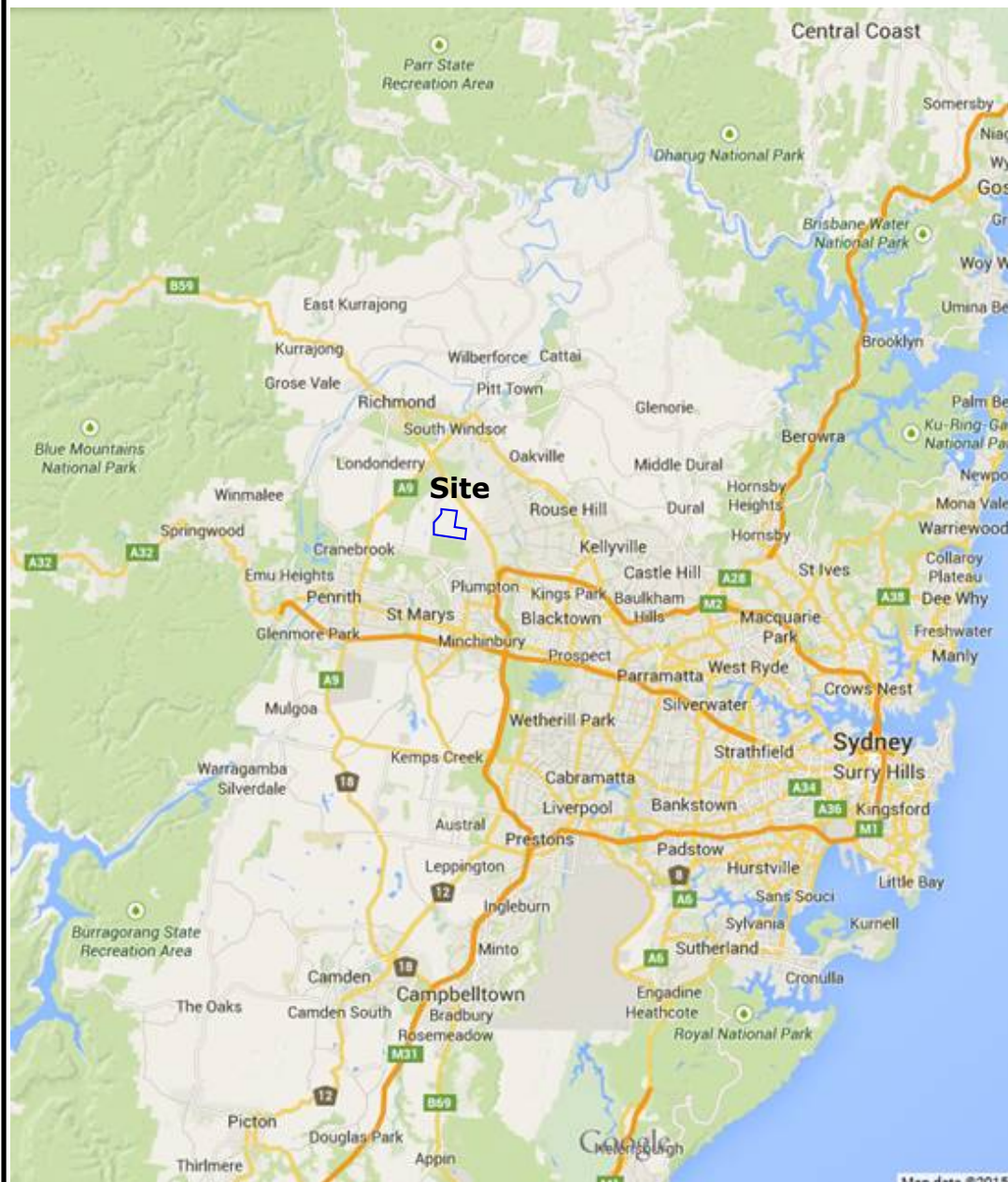
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---

**FIGURE 1 – SITE LOCATION**





#### Legend

  Approximate Site Boundary



\*Not to Scale



Sydney Office  
Phone (02) 9476 1765  
Fax (02) 9476 1557

Maitland Office  
Phone (02) 4933 0001

Title  
**Site Location**

Client  
**J. Wyndham Prince**

Project Title  
**RAP for 'Woorong Park'**

Project No.  
**DL3492**

Scale  
**As Shown**

Figure No  
**1**

Compiled  
**SK**

Date  
**6/3/2017**

Revision  
**R01**



---

**FIGURE 2 – SITE LAYOUT AND LOT BOUNDARIES**





Approximate Scale



Sydney Office  
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Fax (02) 9476 1557

Maitland Office  
Phone (02) 4933 0001

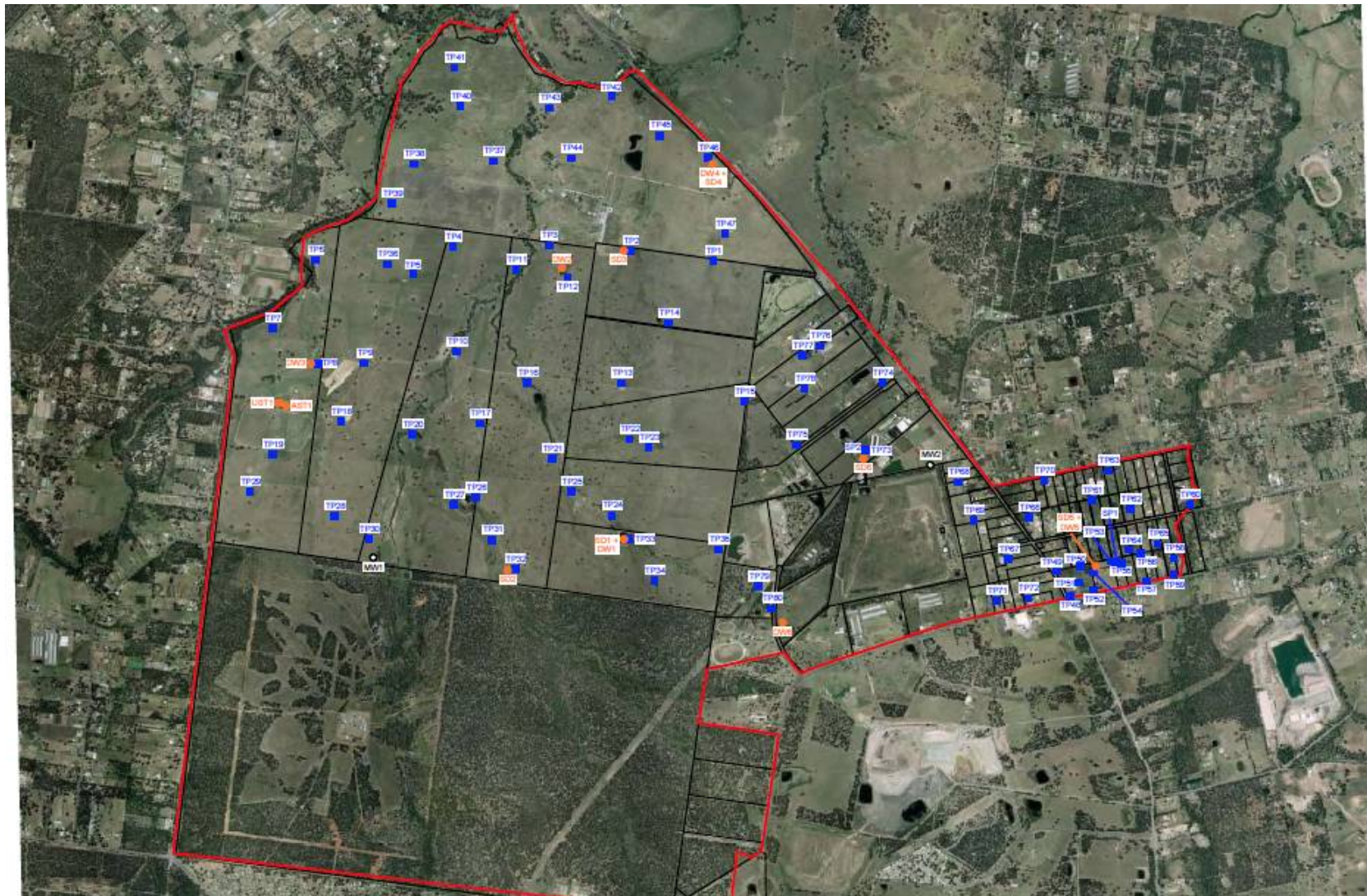
Title  
**Site Layout & Paddock Boundaries**

Client <b>J. Wyndham Prince</b>	Project No. <b>DL3492</b>	Figure No <b>2</b>	Date <b>3/6/2017</b>
Project Title <b>RAP for 'Woorong Park'</b>	Scale <b>As Shown</b>	Compiled <b>SK</b>	Revision <b>R01</b>

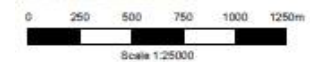


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**FIGURE 3 – GEOTECHNIQUE (2012) SAMPLING LOCATIONS**



Source: Geotechnique, 2015



### Legend

- Test Pit
- Sample
- Monitoring Well



Figure Title

Geotechnique (2012) Sampling Locations

Project Title

RAP for 'Woorong Park'

Client

J. Wyndham Prince

Project No.

DL3492

Date

6/3/2017

Scale

As Shown

Figure No.

3

Revision

Version 1.0

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**FIGURE 4 – DLA (2015) SAMPLING LOCATIONS**





Not to Scale

Figure Title  
DLA (2015) Sampling Locations

Project Title  
RAP for "Woorong Park"

Client  
J. Wyndham Prince

Project No.  
DL3492

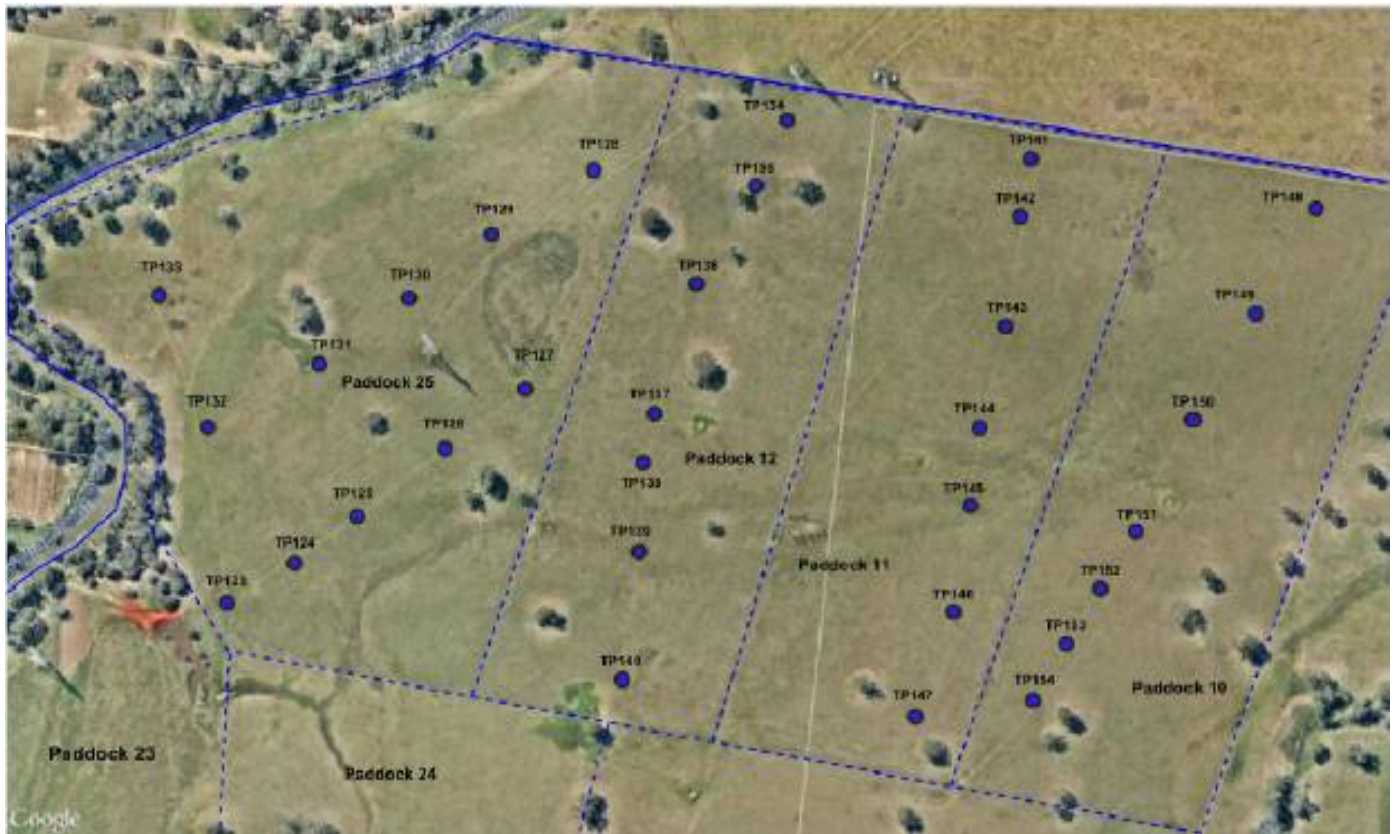
Date  
6/3/2017

Scale  
As Shown

Figure No.  
4a

Revision  
Version 1.0





  
 Not to Scale

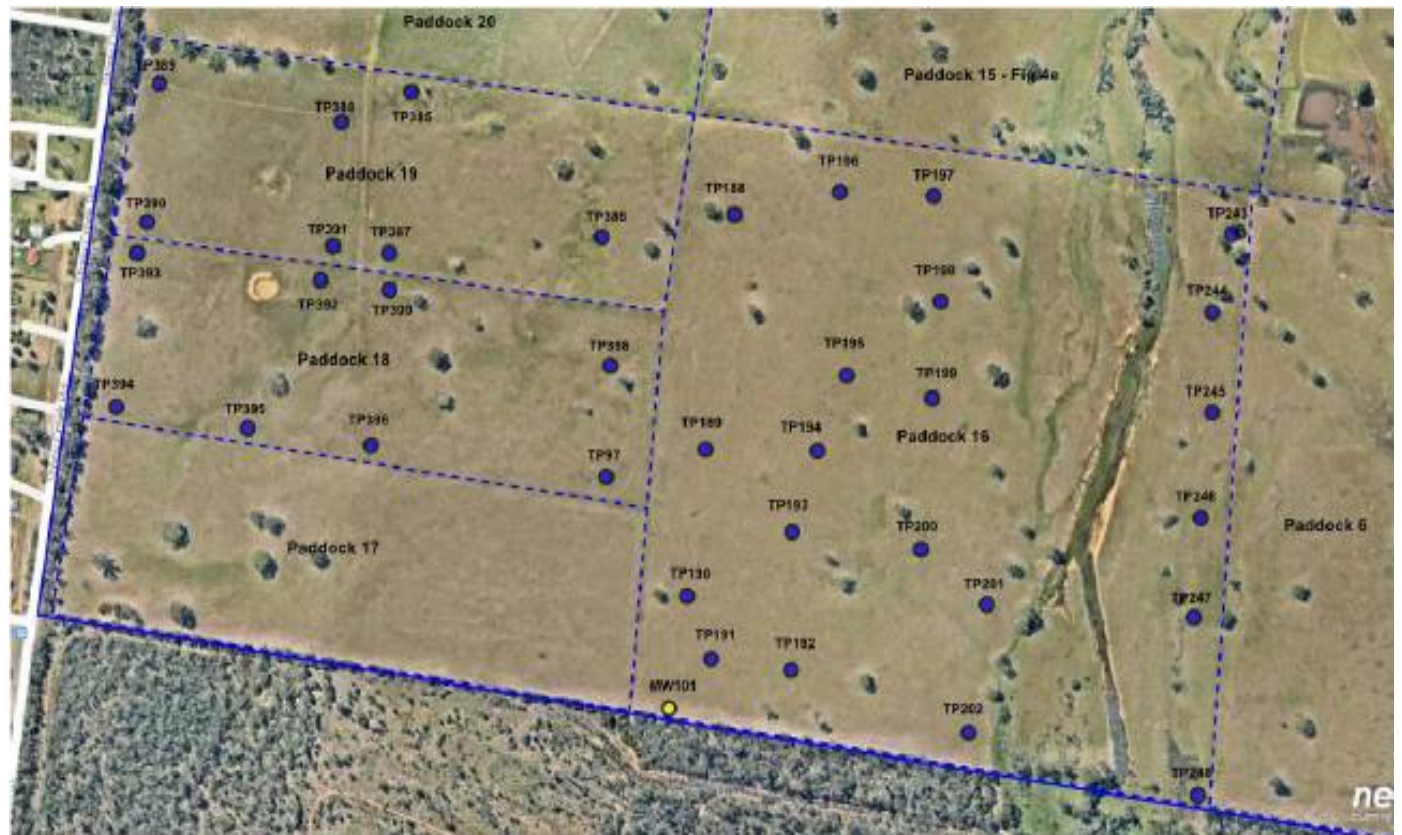
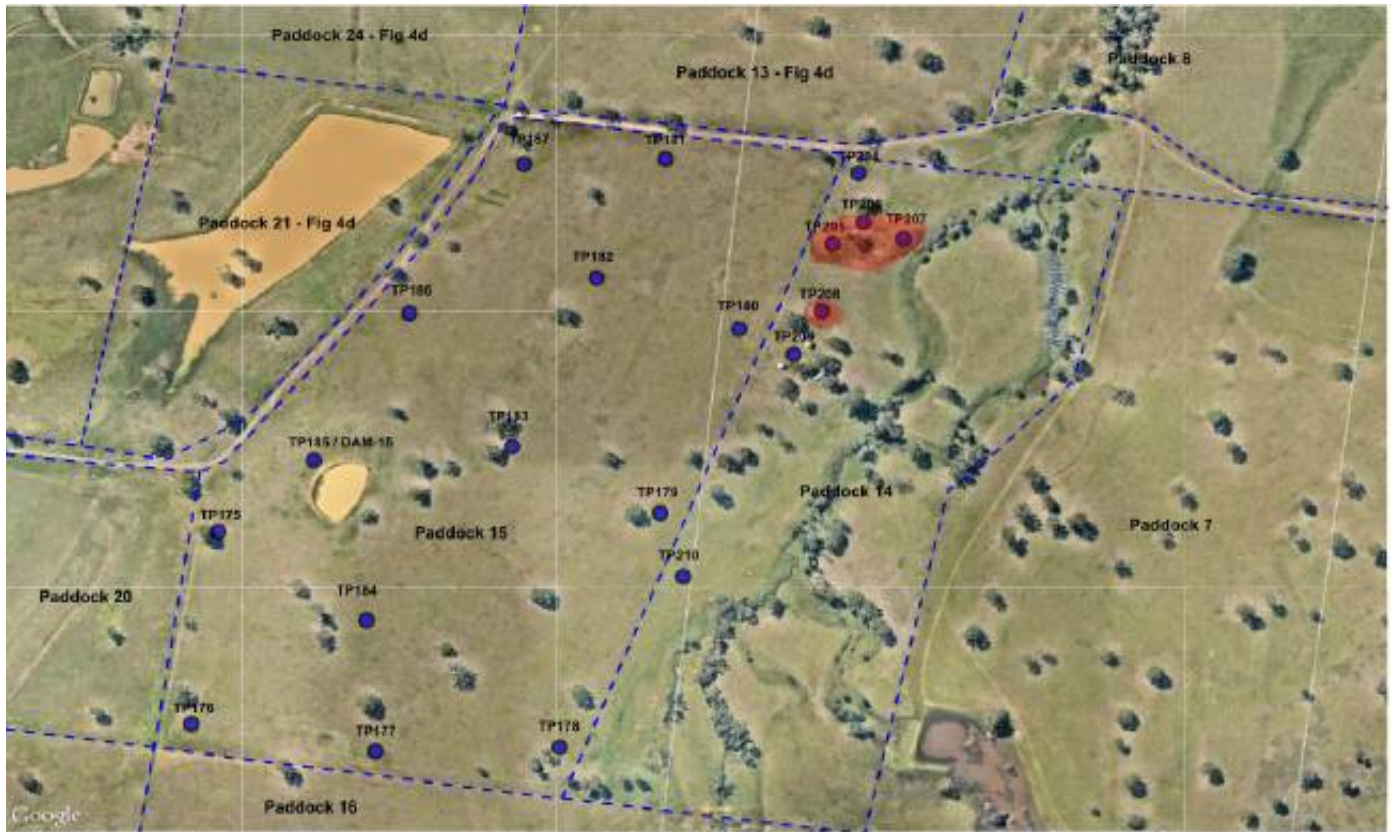
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DLA (2015) Sampling Locations

Project Title  
RAP for "Woorong Park"

Client  
J. Wyndham Prince

Project No.	Date	Scale	Figure No.	Revision
DL3492	6/3/2017	As Shown	4b	Version 1.0





Not to Scale

Figure Title

DLA (2015) Sampling Locations

Project Title

RAP for "Woorong Park"

Client

J. Wyndham Prince

Project No.

DL3492

Date

6/3/2017

Scale

As Shown

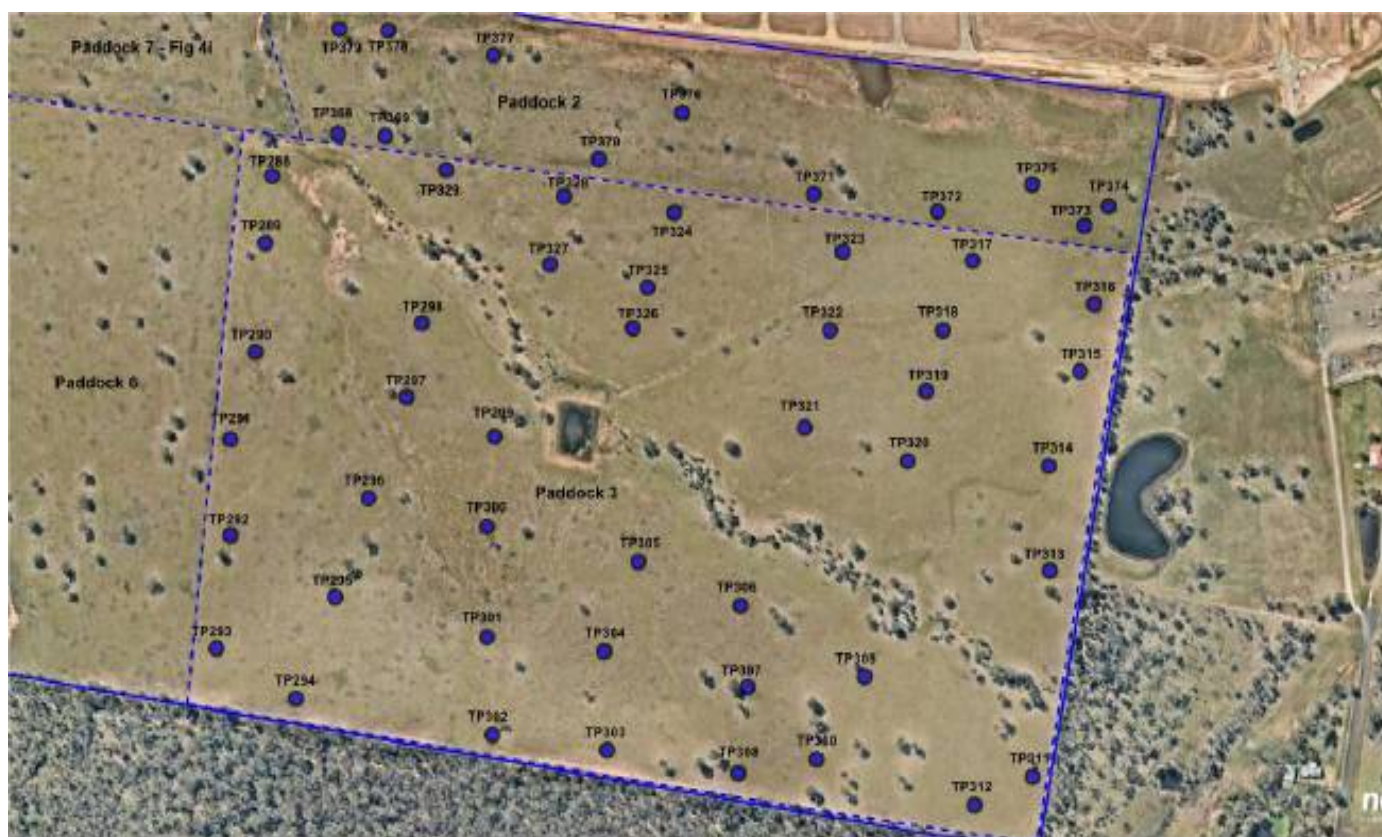
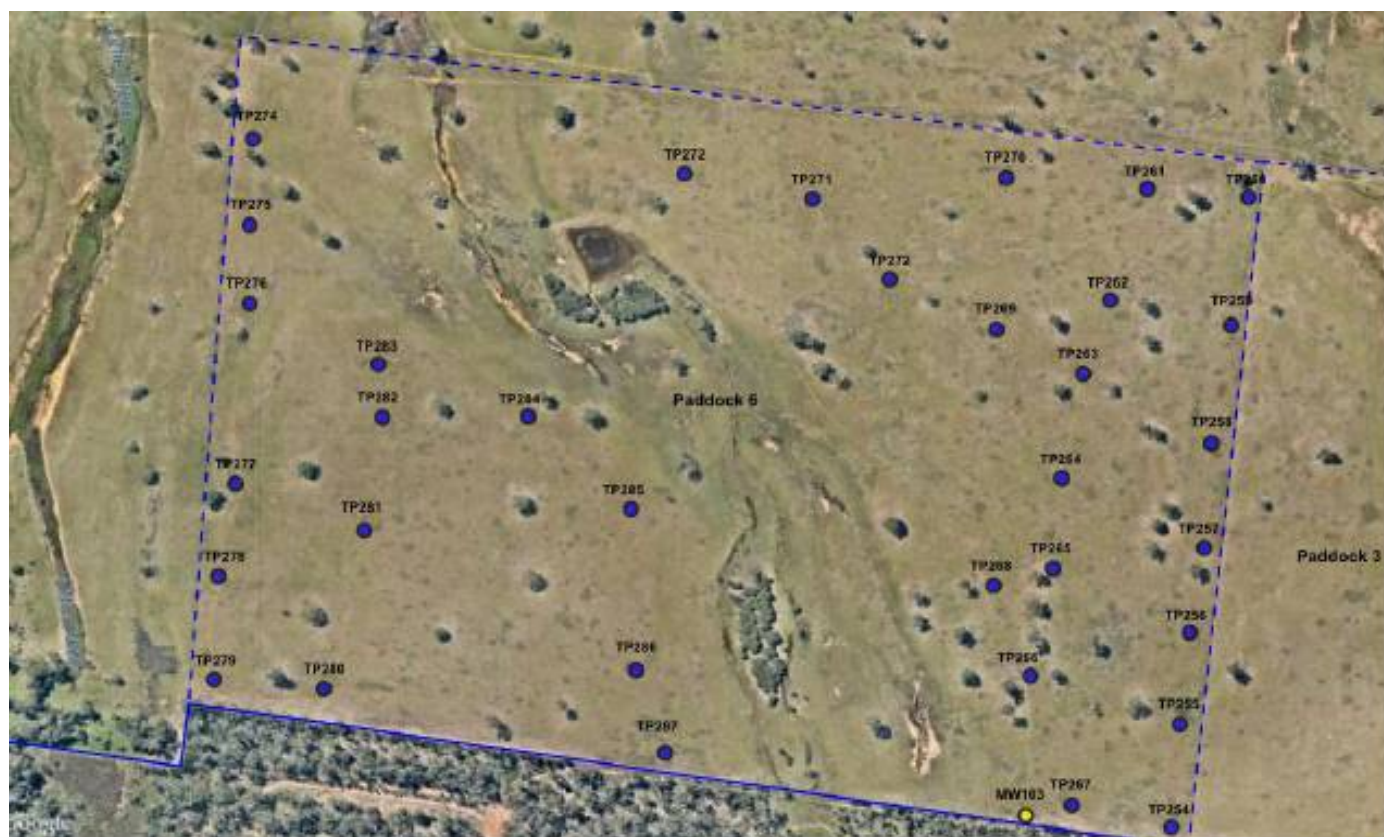
Figure No.

4c

Revision

Version 1.0





Not to Scale

DLA (2015) Sampling Locations

Project Title

RAP for "Woorong Park"

Client  
**J. Wyndham Prince**

Project No.	Date	Scale	Figure No.	Revision
DL3492	6/3/2017	As Shown	4d	Version 1.0



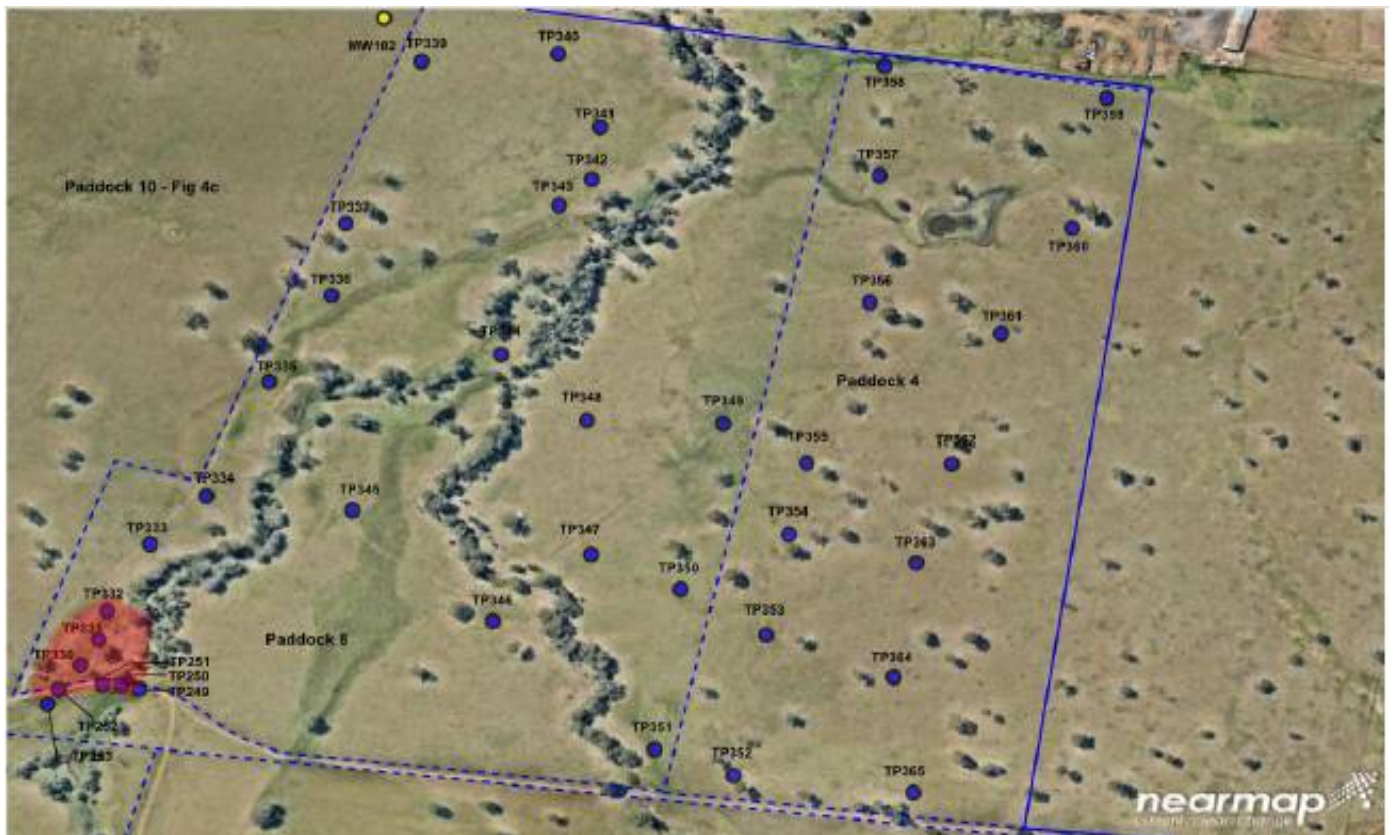


Figure Title  
DLA (2015) Sampling Locations

Project Title  
RAP for "Woorong Park"

Client  
J. Wyndham Prince

Project No.	Date	Scale	Figure No.	Revision
DL3492	6/3/2017	As Shown	4e	Version 1.0



Not to Scale

Figure Title

DLA (2015) Sampling Locations

Project Title

RAP for "Woorong Park"

Client

J. Wyndham Prince

Project No.

DL3492

Date

6/3/2017

Scale

As Shown

Figure No.

4f

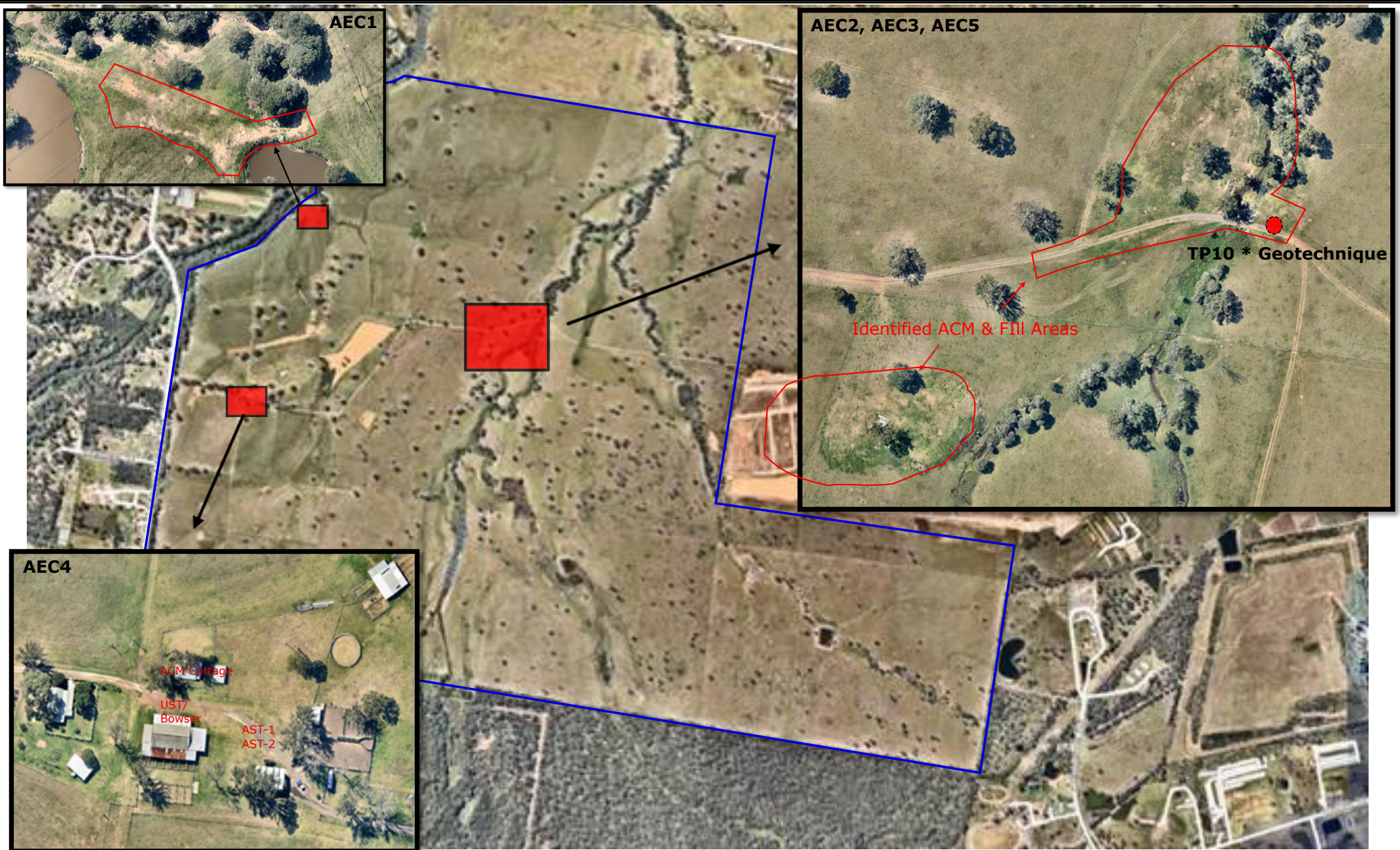
Revision

Version 1.0



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**FIGURE 5 – REMEDIATION AREAS**



#### Legend

  Approximate Site Boundary



#### Approximate Scale



Sydney Office  
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Maitland Office  
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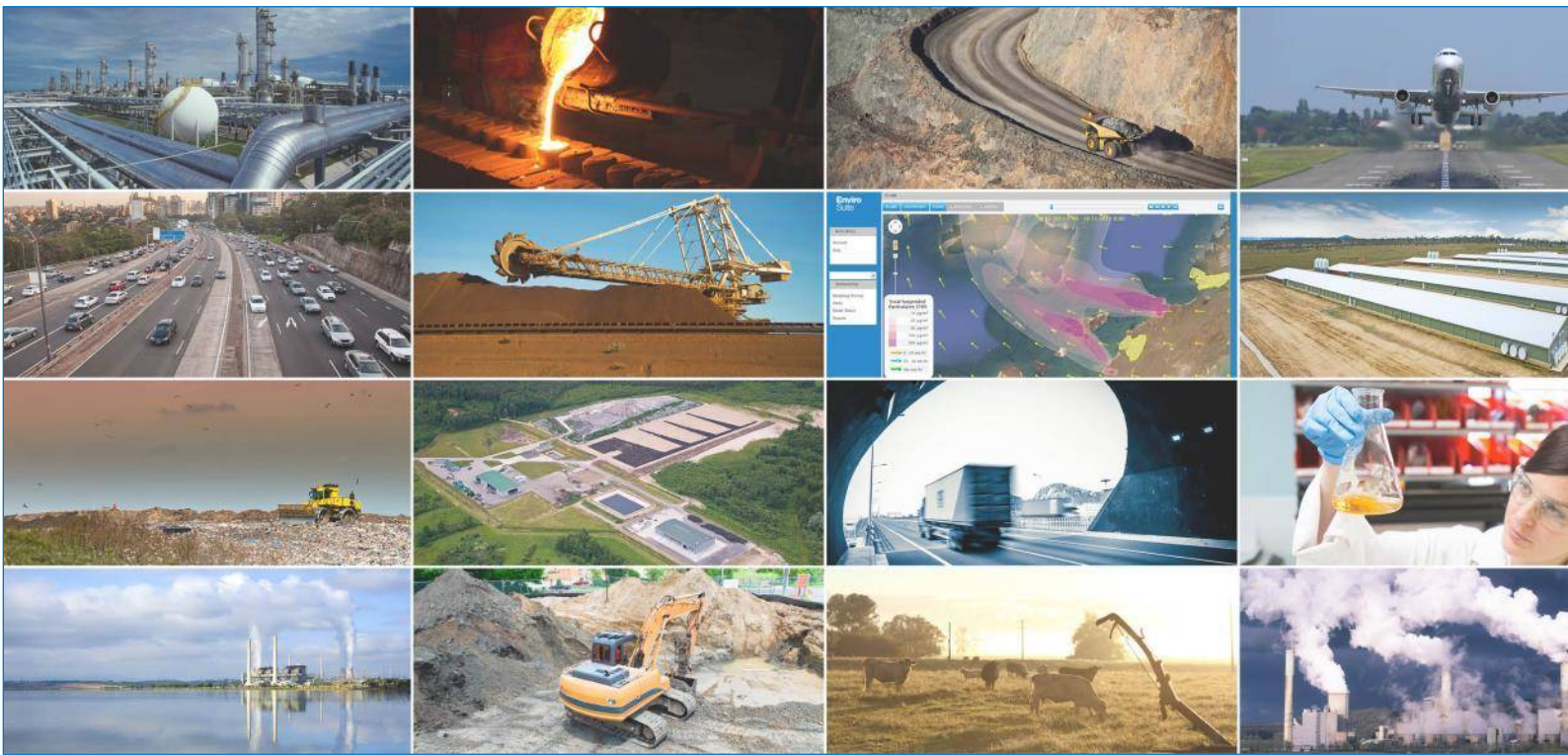
#### Title Remediation Areas

Client	Project No.	Figure No	Date
J Wyndham Prince	DL3492	5	6/3/2017
Client	Scale	Compiled	Revision
RAP for 'Woorong Park'	As Shown	SK	R01

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## APPENDIX A – UNEXPECTED FINDS PROTOCOL





# Unexpected Finds Protocol

Woorong Park  
1 Stony Creek Road  
Marsden Park NSW 2765

J. Wyndham Prince

DL3492\_S006373

March 2017

<b>PROJECT NAME</b>	Woorong Park, Marsden Park NSW
<b>PROJECT ID</b>	DL3492
<b>DOCUMENT CONTROL NUMBER</b>	S006373
<b>PREPARED FOR</b>	J. Wyndham Prince
<b>APPROVED FOR RELEASE BY</b>	Simon Spyrdz
<b>DISCLAIMER AND COPYRIGHT</b>	This report is subject to the copyright statement located at <a href="http://www.pacific-environment.com">www.pacific-environment.com</a> © Pacific Environment Operations Pty Ltd ABN 86 127 101 642

DOCUMENT CONTROL				
VERSION	DATE	COMMENT	PREPARED BY	REVIEWED BY
Version 1.0	6/3/2017		Sally King	Abanesh Nepal

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## 1.0 INTRODUCTION

DLA Environmental Services (DLA) was commissioned by Group Development Services Pty Ltd to prepare an Unexpected Finds Protocol (UFP) for the property identified as:

Woorong Park  
1 Stony Creek Road, Marsden Park NSW 2765 (the site).

This UFP has been developed as part of the construction planning for implementation during Site works primarily associated with excavation and civil activities. It has been prepared to ensure appropriate management of natural soils / fill which may contain undefined levels of chemical and asbestos contamination should they be encountered during Site works.

Due to the history of the Site (both past and present) and discoveries of chemical and asbestos contamination during previous environmental investigations, there is previously unidentified impacted soils to be present on-site. These materials may require additional assessment or management. It is imperative that the potential for such material to impact site workers and the remainder of the site is minimised during remedial and construction works.

## 2.0 TYPICAL FEATURES OF 'UNEXPECTED FINDS'

The main features to look for are:

- Material containing anthropogenic artefacts such as rubble, plastics, metal etc.;
- Material with an obvious unnatural odour, i.e. fuel, solvent, burnt odour;
- Material that is noticeably stained in colour;
- Asbestos or suspected asbestos containing material;
- Material with fibres visible; and,
- Any material that has evidently been dumped at the site.

## 3.0 IMPLEMENTATION OF THE PROTOCOL

### 3.1 General

Prior to the commencement of any excavation or construction works on-site, an occupational health and safety induction should be attended by all site staff. The aim and importance of the UFP and how it is to be implemented should be discussed at this time. Responsibility for its implementation will be assigned to the Principal Contractor.

Monitoring of environmental issues will be undertaken on a daily basis. If an unexpected find is revealed during site works, the following protocol is to be followed.

### 3.2 Implementation Process

1. Cease disturbance of the affected portion of the site and evacuate the immediate area.
2. Contact the Principal Contractor and the Contractors Environmental Representative (CER).
3. Principal Contractor and CER to conduct an assessment of the location and extent of the unexpected find.
4. High risk areas should be isolated and secured against unintended access.
5. Temporary encapsulation (sealing) of the high risk area to ensure no airborne spread of contamination occurs may be appropriate. This may involve clean soil, plastic sheeting, etc.
6. Dust should be prevented by wetting the soil and drainage controls should be arranged where there is a potential for runoff to occur (runoff should be minimised).
7. Warning signs should be placed in the vicinity.
8. If the Principal Contractor and CER considers that the material warrants further investigation, the area is to be barricaded to provide an exclusion zone.
9. If necessary, environmental controls should be established to minimise the potential for migration of contaminants from the impacted area.

10. Principal Contractor to complete UFP form (refer to **Section 4.0**) and issue to all relevant stakeholders.
11. Further visual assessment and sample collection and analysis undertaken by a qualified environmental consultant. If necessary, samples will be sent to a NATA registered laboratory.
12. Evaluation of analytical data with respect to specific health screening levels to be undertaken. Contaminated soil incident report amended with final classification of soils, including whether the soils are suitable for the proposed land use, need to be remediated or disposed of offsite to a suitably licensed facility. If soils are suitable to remain on-site and/or the area is found to be clean, a work instruction will be provided by the CER to this effect. A waste classification letter must be provided prior to any offsite disposal.
13. If the material is subsequently found to contain asbestos, an appropriately licensed contractor will be employed to remove it.
14. Affected areas will be reopened for earthworks following a clearance of the location and issuance of a report by CER.

### 3.3 Notes

1. Any suspected asbestos containing should be left in place and not disturbed. The CER will organise appropriate environmental professionals for further investigation purposes.
2. It is essential that material of differing compositions not be mixed.
3. All sampling for validation, waste classification or characterisation purposes will be carried out in accordance with the following documents:
  - *Contaminated Sites: Sampling Design Guidelines* (NSW EPA, 1995);
  - *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No.1)* (NEPC, 2013);
  - *Contaminated Sites: Guidelines for Assessing Service Station Sites* (NSW EPA, 1994);
  - *Waste Classification Guidelines* (NSW EPA, 2014).
4. Any unexpected finds encountered should be listed on a UFP register, which should include the action taken and the status of the unexpected find. A suitable register is included in **Section 5.0**.

5. Once an unexpected find has been identified and a UFP form filled in the Principal Contractor and CER should liaise with the client as to the appropriate means of managing the situation. This should include discussions around the handling, treatment and disposal of material, OH&S considerations and how the affected area will be validated and reopened for works.
6. Prior to closing out an unexpected find it will be important to ensure the appropriate documentation is obtained, such as: photographs, the UFP form, waste classification letter(s) and a validation report or letter.
7. A UFP form should be completed on each day of the remedial works as part of the daily site records. This will ensure that the process is being undertaken even if no unexpected finds are encountered. The form should include the name, company and the position of the person undertaking the field observations.

## 4.0 UNEXPECTED FINDS PROTOCOL FORM

*To be completed by the Site Controller/Environmental Representative*

**SITE:** \_\_\_\_\_

**PERSONNEL ON-SITE:** \_\_\_\_\_

**DATE:** \_\_\_\_\_

### DAILY SUMMARY:

1. Suspect material encountered during daily activities: YES ☐ NO ☐  
(if YES, complete 2 to 5)

2. CER contacted: YES ☐ NO ☐

3. UFP Reference Number \_\_\_\_\_  
(label occurrences sequentially 1, 2, 3, etc.).

### DESCRIPTION OF MATERIAL ENCOUNTERED:

4. Asbestos or suspected ACM present: YES ☐ NO ☐

5. Brief written description of material:

6. Material isolated: YES ☐ NO ☐

7. Location of contaminated material (incl. field sketch/map if required):

8. Photographs taken: YES ☐ NO ☐

**NAME:** \_\_\_\_\_ **SIGNATURE:** \_\_\_\_\_

## 5.0 UNEXPECTED FINDS REGISTER

UNEXPECTED FINDS REGISTER						
UFP No.	Date Found	Suspect Material	Description	Recorded on UFP Form	Action Taken	Status
				YES <input type="checkbox"/> NO <input type="checkbox"/>		
				YES <input type="checkbox"/> NO <input type="checkbox"/>		
				YES <input type="checkbox"/> NO <input type="checkbox"/>		
				YES <input type="checkbox"/> NO <input type="checkbox"/>		
				YES <input type="checkbox"/> NO <input type="checkbox"/>		
				YES <input type="checkbox"/> NO <input type="checkbox"/>		