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REMEDIAL ACTION PLAN

Corner of Horsley Drive and Cowpasture Road, Wetherill Park NSW

6/06/2012 Revised: 6/06/2012

Quality Management

Issue/revision	Issue 1	Revision 1	Revision 2	Revision 3
Remarks	Draft for Comment	Final		
Date	1 June 2012	6 June 2012		
Prepared by	Josie Milner			
Signature				
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Authorised by	Peter Moore	Peter Moore		
Signature				
Project number	00030337.01	00030337.01		
Report number				
File reference	00030337 RAP Draft v1	00030337 Report Final		

REMEDIAL ACTION PLAN

Corner of Horsley Drive and Cowpasture Road, Wetherill Park NSW

6/06/2012

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List of Abbreviations

ANZECC	Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000)
ASS	Acid Sulfate Soils
bgl	Below ground level
BaP	Benzo a pyrene
BTEX	Benzene, toluene, ethyl benzene and xylene
COC	Chain of custody
COPC	Contaminants of potential concern
DO	Dissolved oxygen
DQI	Data quality indicators
DQO	Data quality objectives
DSI	Stage 2 Detailed Site Investigation as defined in NSW OEH (2011)
EC	Electrical conductivity
HIL	Health-based investigation levels for varying land uses as defined in Appendix II of NSW DEC (2006). Including HIL A (residential with access to gardens), HIL D (residential with minimal soil access), HIL E (parks, playing fields, open space) and HIL F (commercial / industrial)
LoP	Limit of protection as defined under ANZECC (2000)
M8	Eight heavy metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc
NAPL	Non aqueous phase liquid
NSW EPA	Over the past few years the environmental regulatory body has undergone a number of name changes, including: Department of Environment and Conservation (DEC); Department of Environment and Climate Change (DECC); Department of Environment, Climate Change and Water (DECCW); and, Office of Environment and Heritage (OEH). For the purpose of currency, the organisation is referred to as NSW EPA in this report. EPA guidelines are referenced by the name of the organisation at the time of publication.
OCP	Organo chlorine pesticides
OPP	Organo phosphate pesticides
ORP	Oxygen reducing potential
PAH	Polycyclic aromatic hydrocarbons
PCB	Poly chlorinated biphenyls
pH	Unit of measurement for acidity and alkalinity
PID	Photo ionisation detector
PIL	Phytotoxicity-based investigation levels as defined in Appendix II of NSW DEC (2006)
PSI	Stage 1 Preliminary Site Investigation as defined in NSW OEH (2011)
PSH	Phase Separated Hydrocarbons
PVC	Poly vinyl chloride
QA/QC	Quality assurance / quality control
RAP	Remedial Action Plan as defined in NSW OEH (2011)
RPD	Relative percentage difference
SAP	Sampling and Analysis Plan
SAQP	Sampling Analysis and Quality Plan
SVOC	Semi volatile organic compounds
TCLP	Toxicity criteria leaching potential (laboratory extraction technique)
TPH	Total petroleum hydrocarbons (C10 to C36)
UCL	Upper confidence limit
USCS	Unified soil classification system
VOC	Volatile organic compounds
vTPH	Volatile total petroleum hydrocarbons (C6 to C9)
WSP	WSP Environmental Pty Limited trading as WSP Environment & Energy

Executive Summary

WSP Environment & Energy was engaged by Tim Colless, as project manager on behalf of the Western Sydney Parklands Trust (WSPT) to prepare a Remedial Action Plan (RAP) for a 21 hectare parcel of land located within the Smithfield/Wetherill Park precinct of the Western Sydney Parklands, NSW (the site) (See Figure 1, **Appendix A**). The site is located on the corner of Horsley Drive and Cowpasture Road.

A number of studies were conducted across the site between 2006 and 2012. These investigations identified shallow and deep soil impacted with TPH on Lot 10 DP879209 and PSH groundwater impact on Lot 10 DP879209 and Lot 100 DP879680.

On the basis of the investigation findings, WSP recommended the following works for the residual contamination on these two allotments at the site:

- Excavate residual shallow soils impacted with TPH and remediate the soils on site by landfarming;
- Install additional groundwater wells to determine the extent of the PSH plume; and,
- Undertake a risk assessment to assess the risks of leaving the PSH in situ.

The key objectives of the RAP are to address the findings of the previous investigations in order to:

- Reduce potential risk to future site occupiers and the surrounding natural environment from impacted soils; and
- Render the site suitable for commercial/industrial land use.

The remedial approach adopted as part of this RAP includes:

- As the extent of the PSH groundwater plume has not been established, the first stage of remedial works will be to undertake a groundwater investigation.
- Excavation and removal of TPH impacted surface soils across the site including the former drum platform storage area and shallow soils on the eastern end of the former tank pit. At this stage, soils impacted at depth will remain in situ;
- Landfarming of the TPH in a designated area on site to reduce the TPH to criteria suitable for commercial/industrial land use;
- Validation sampling in accordance with the EPA “Sampling Design Guidelines” (1995) to be carried out to ensure that the area has been remediated: and,
- For groundwater there are no EPA endorsed criteria for TPH. The final remediation decision will be based on the results of the additional groundwater investigation, but is likely to be a risk based approach.

1 Introduction

WSP Environment & Energy was engaged by Tim Colless, as project manager on behalf of the Western Sydney Parklands Trust (WSPT) to prepare a Remedial Action Plan (RAP) for a 21 hectare parcel of land located within the Smithfield/Wetherill Park precinct of the Western Sydney Parklands, NSW (the site) (See Figure 1, **Appendix A**). The site is located on the corner of Horsley Drive and Cowpasture Road.

A number of studies were conducted across the site between 2006 and 2012. These investigations identified shallow and deep soil impacted with TPH on Lot 10 DP879209 and PSH groundwater impact on Lot 10 DP879209 and Lot 100 DP879680.

This RAP will document the proposed methodologies for works required to make the site suitable for unrestricted commercial/industrial land use as a business park which is proposed for the allotment. The report outlines the remediation strategy, methodology and proposed validation works.

1.1 Objective of the RAP

The proposed remediation strategy aims to ensure that the site is rendered suitable for unrestricted commercial/industrial land use, and that potential contamination risks to future site occupiers and the surrounding natural environment are minimised.

The RAP is proposed to be implemented such that the site complies, where practicable, with relevant guidelines, including:

- NEPM HIL- F (1999) Soil Investigation Levels for Commercial/Industrial land use;
- NSW EPA (1994) Guidelines for Assessing Service Station Sites;
- NSW DEC (2006) Guidelines for the NSW Site Auditor Scheme; and
- State Environmental Planning Policy No. 55 (1998) – Remediation of Land (SEPP 55).

1.2 RAP Structure

The RAP is structured as follows:

- Section 2 – Describes the site location, surrounding landuse, sensitive environments, soils, geology and hydrogeology;
- Section 3 – Presents a summary of previous environmental assessments;
- Section 4 – Details the Data Quality Objectives (DQO) for the remedial strategy;
- Section 5 – Outlines the remediation goals and available remediation options for the impacted areas;
- Section 6 – Outlines the preferred remedial strategy and contingency;
- Section 7 – Validation Sampling Plan;
- Section 8 – Presents the Environmental Management Plan (EMP) for the proposed works;
- Section 9 – Regulatory Approvals / Licensing requirements;
- Section 10 – Concludes the RAP;
- Section 11 – Report limitations; and
- Section 12 – References.

The RAP figures that accompany this report and are included in **Appendix A**.

2 Site Characteristics

2.1 Site Location and Description

The location of the site is shown on Figure 1 in **Appendix A,** approximately 30km west of Sydney CBD. The site covers an area of approximately 21ha and is predominantly overgrown paddocks (formerly market gardens) with the exception of two residential properties (Lot 10 DP 879209 and Lot 30B DP 13961). The site layout is provided in Figure 2, **Appendix A**.

Table 1 Site Identification Details

Street Address:	Corner of Horsley Drive and Cowpasture Road, Wetherill Park NSW
Property Description:	Lots 24, 25, 28B, 30, 30A, 30B, 32, and 32A in DP 13961 Lot C in DP 103755 Lot 10 in DP 879209 Lot 100 in DP 879680 Lot 1 in DP 1036933 Lots 1, 2, 3, 4 and 5 in DP 1098128
Current Site Ownership	Western Sydney Parklands Trust
Geographical Coordinates (to approximate centre of site)	33°50'45.19"S 150°52'32.61"E
Property Size:	Approximately 21 hectares
Local Government Area:	Fairfield City Council
Subdivision:	The property is planned to be subdivided into 11 industrial/commercial lots
Zoning – Existing:	State Environmental Planning Policy (SEPP) Western Sydney Parklands 2009

2.2 Surrounding Landuse

Based on current aerial photographs and observations made during the site visit conducted by WSP on 11 April 2012, the surrounding land use can be summarised as follows:

Table 2 Surrounding Land Use

North	Transmission lines running east-west beyond which is vacant rural land.
East	Cowpasture Road beyond which is an industrial/commercial precinct.
South	Horsley Drive beyond which is one residential property with market gardens surrounded by vacant land.
West	Paved bicycle path beyond which is Sydney Water Supply Canal and then rural land.

2.3 Sensitive Environments

The nearest sensitive environments area include:

- Residential properties approximately 700m north of the site boundary and adjacent to Horsley Drive to the south.
- The Sydney Water Canal is approximately 35m west of the site boundary. The canal flows in a northerly direction into Prospect Reservoir.
- The nearest environmental receptor for the southern portion of the site is an unnamed drainage channel located approximately 0.4km to the south at the intersection of Cowpasture Road and The Horsley Drive. The channel flows in a north easterly direction through Wetherill Park and into Prospect Creek. For the northern portion, a drainage channel intersects the site and runs in a north easterly direction.

2.4 Soils, Geology and Hydrogeology

The site has an elevation ranging between 60 to 80m above the Australian Height Datum (AHD) (referenced from Google Earth's elevation tool accessed on 04/04/12). The highest point coincides with the approximate centre of the site with surrounding land sloping down in all directions.

According to the 1:100,000 Penrith Soil Landscape Series Sheet 9030 (Third Edition), the site is situated in the Luddenham Erosional Landscape, which is characterised by undulating to rolling low hills on Wianamatta Group Shales often associated with Minchinbury Sandstone. The shallow (<100cm) soils consist of dark Podzolic Soils on crests, moderately deep (70-150cm) soil consist of red podzolic soils on upper slopes.

The Penrith 1:100,000 Geological Series Sheet 9030 indicates that the site is underlain by Bringelly Shale of the Wianamatta Group. This geology typically consists of shale, carbonaceous claystone, claystone, laminate, fine-medium grainded lithic sandstone, rare coal and tuff.

Potential fill material is present across the site. A dam in north western corner of the site was backfilled between 1994 and 2005. Possible fill mounds covered with thick grass are located in the south west corner of site. Fill material may also be present on the surrounds of two existing dams in north west of site

Fill material was encountered on Lot 10 DP 879209. The fill generally extended to a depth of 0.1 – 2.0m with the exception of the western portion of the property where fill extended beyond 2.0m bgl. Fill origin is unknown but has been assessed as suitable for commercial/industrial land use.

3 Previous Investigations

Previous environmental works completed for the site are:

- [1] Tank Removal Status Report prepared by RES (June 2006) – *Pertains to Lot 10 DP 879209 only;*
- [2] Landfarm Soil Testing prepared by WSP (December 2006) – *Pertains to Lot 10 DP 879209 only;*
- [3] Tank Removal Works prepared by WSP (June 2009) – *Pertains to Lot 10 DP 879209 only;*
- [4] Phase 2 Draft Environmental Site Assessment and Additional Investigation prepared by WSP (February 2010) – *Pertains to Lot 10 DP 879209 only;*
- [5] Preliminary Environmental Site Assessment prepared by Environmental Investigation Services (EIS) (December 2011) – *Pertains to the whole site area with the exception of Lot 10 DP 879209*; and
- [6] Preliminary Geotechnical Investigation prepared by Jeffrey and Katauskas (December 2011) – *Pertains to the whole site area.*

A summary of these report findings is as follows. Relevant extracts from previous reports have been included in **Appendix B**

Lot 10 DP 879209

Between November 2005 and February 2006, one above ground storage tank, eight USTs, fuel pumps and associated line work were removed from Lot 10 DP 879209.

Contaminated soil excavated from the former tankpits and infrastructure locations was formed into a landfarm near the main tank pit on Lot 10 DP 879209. Soil results from the landfarm indicated that TPH(C_{10}-C_{36}) exceeded the site criteria on 9 May 2006.

The remaining soil surrounding the AST and main tankpit, was validated by RES to the NSW EPA (1994) and NEMP (1999) guidelines for open space landuse.

Soil in the vicinity of the linework and tankpits 2 and 3 had concentrations of TPH(C_{10}-C_{36}) which exceeded the NSW EPA (1994) guidelines for Sensitive / Open Space landuse and was left in situ at depth.

Soil in the landfarm was regularly tilled over a period of approximately six months to allow for the degradation of organic compounds. In December 2006, it was concluded that TPH soil results from the landfarm area were below the NSW EPA (1994) guidelines and hence the soil was suitable to remain onsite.

In 2009, three more USTs along with associated linework and dispensers were removed from Lot 10 DP879209. The excavation, stockpiled excavated material and additional ENM were validated as being suitable for commercial/industrial landuse. The excavation was backfilled with the excavated material and the additional ENM.

An intrusive environmental site investigation was conducted in 2009 and 2010. The works involved both soil and groundwater assessment. Works concluded the following:

- Shallow TPH soil impact was identified in the main shed area (BH23 and BH24). TPH impacted soils were also identified in MW03 and MW06 to depths of 4.0m bgl. These impacts were not delineated;
- Groundwater across the site was determined to flow in a south easterly direction and was measured between 6.27 and 17.52m bgl. Groundwater was very saline and of low yield;
- Concentrations of heavy metals arsenic, nickel, cadmium, copper and zinc exceeded the ANZECC 2000 guidelines in the majority of wells. These concentrations were considered to be representative of background concentrations; and
- PSH were identified at the southern boundary of the site and in the adjoining property Lot 100 DP 879680 (MW01 and MW07). The extent of the PSH plume was estimated, however was not delineated.

The Site (excluding Lot 10 DP 879209)

A preliminary site assessment was undertaken across the entirety of the site (with the exception of Lot 10 DP 879209) in 2011 by EIS. Soil sampling was conducted at twelve locations with no analytes detected above the NEPM HIL F and EPA 1999 Service Station guidelines.

A Preliminary Geotechnical Investigation was undertaken utilising the EIS soil bores. Soil bores were advanced to a maximum depth of 6m bgl. Groundwater was not encountered during drilling works. The soil stratum was identified as silty clay topsoil to 0.5m bgl underlain by high plasticity residual silty clays. Weathered shale bedrock was identified in all locations with the exception of BH5 which was underlain by sandstone. The bedrock improved in quality with depth.

Comments were made regarding excavation conditions, site preparation, temporary and permanent batters, permanent retention, footings, on-grade floor slabs, external pavements and drainage. A detailed geotechnical investigation was recommended upon finalisation of design details for the site.

4 Data Quality Objectives (DQOs)

The DQO process is a systematic planning tool based on the scientific method for establishing criteria for data quality and for developing data collection designs. The DQO defines the experimental process required to test a hypothesis.

The DQO process has been developed 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.

It is recognised that the most efficient way to accomplish these goals is to establish criteria for defensible decision making before data collection begins and develop a data collection design based on these criteria. By using the DQO process to plan the investigation effort, the relevant parties can improve the effectiveness, efficiency and defensibility of a decision in a resource and cost effective manner.

4.1 Guidance Documents

DQO have been developed to detail the type of data that is needed to meet the overall objectives of this project (refer to Section 1.3). The DQO have been developed in general accordance with procedures stated in the guidelines presented in Section 12 of this report.

4.2 Process for DQO Development

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 that is to be adopted for the works is as follows:

- Step 1 – Defining the Problem;
- Step 2 – Identify the Decision;
- Step 3 – Identify Inputs to the Decision;
- Step 4 – Define the Study Boundaries;
- Step 5 – Develop a Decision Rule;
- Step 6 – Specify Limits on Decision Errors; and
- Step 7 – Optimise the Design for obtaining the Data.

4.3 Step 1 – Defining the Problem

The sources of contamination require remediation to render the site suitable for the proposed commercial/industrial land use.

4.4 Step 2 – Identify the Decision

The principle decision is ‘what is the most appropriate way to render the site suitable for its intended purpose’. Requirements of the adopted remediation works must include:

- No unacceptable on or off-site impacts during and after remedial works;
- Provisions to verify that the remedial actions are adequate; and
- Provisions to verify that the site is suitable for the proposed commercial/industrial landuse.

4.5 Step 3 – Identification of Inputs into the Decision

The inputs comprise the assessment data gathered during previous investigations.

Firstly, the contaminants of concern must be identified. Based on the previous analysis, contaminants that did not meet the adopted site criteria were TPH in soil and PSH present in groundwater.

An assessment of the remedial action preferences (inputs) shall also be conducted to identify the most appropriate remedial action.

4.6 Step 4 – Defining the Study Boundaries

The extent of the RAP is limited to the boundaries of the site and targeted to Lot 10 DP879209 and Lot 100 DP879680 shown in Figure 2, **Appendix A**.

TPH and PSH impacts are confined to Lot 10 DP879209 and Lot 100 DP879680 as a result of operations at the former fuel depot. Delineation of the groundwater contamination is proposed to be undertaken as part of stage 1 implementation of this RAP.

4.7 Step 5 – Developing Decision Rules

Based on the available site assessment information, elements of the decision rule can be established as follows:

- Can the remedial works be conducted such that further contamination issues in the form of on- or off-site impacts do not occur during remediation?
- Will the remedial works or onsite management adequately reduce the overall risk of the site?
- Will the site be rendered suitable for the proposed commercial/industrial landuse?

Validation sampling is required to demonstrate that the impacted areas have either been remediated as suitable for commercial/industrial landuse or is located at depths which pose minimal risk.

For soil remaining on site the **National Environment Protection Measure (1999) HIL – F Commercial/Industrial criteria** and **NSW EPA (1994) Contaminated Sites – Service Station Guidelines** have been adopted. It is intended that following remediation, the soil in the areas of concern be assessed against the adopted site criteria such that:

- The remedial works adequately reduce the overall risk of the site; and
- The site is rendered suitable for the proposed use and to obtain Auditor sign off, if required.

For material that may require offsite disposal as part of the adopted remedial approach, waste classification will be undertaken in accordance with DECCW (2009) Waste Classification Guidelines, Part 1: Classifying Waste.

In the event that soil needs to be imported to the site to facilitate future development (e.g. backfill excavations), it will be obtained from reputable suppliers and will comprise Virgin Excavated Natural Material (VENM) or Excavated Natural Material (ENM) where appropriate characterisation of the source material has occurred in accordance with the published NSW DECCW General Waste Exemption for ENM.

The decision rules adopted to answer the decisions outlined in Section 4.4 are summarised in the following table.

- No unacceptable on or off-site impacts during and after remedial works;
- Provisions to verify that the remedial actions are adequate; and
- Provisions to verify that the site is suitable for the proposed commercial landuse.

For groundwater there are no EPA endorsed criteria for TPH. The final remediation decision will be based on the results of the groundwater investigation, but is likely to be a risk based approach.

Table 3 Summary of Decision Rules

No.	Decision to be Made	Decision Rule
1	Are there any unacceptable on- or off-site impacts both during and after remedial works?	Were contaminants present at concentrations above the adopted guidelines AND were the same contaminants detected in leachate or groundwater analysis. If there were, then the decision was yes. Otherwise, the decision was no.
2	Are the remedial actions are adequate?	Are contaminants present at concentrations above the adopted guidelines post-remediation? If yes, are these contaminants likely to pose a significant risk? If significant rick is likely then the decision is yes. Otherwise the decision is no.
3	Is the site is suitable for the proposed commercial land use?	No unacceptable risks to human health or the environment for the proposed land use.

4.8 Step 6 – Specify Limits on Decision Errors

NSW EPA (1995) states that *"Unless a site investigator can demonstrate otherwise, the EPA maintains that all statistical interpretation should be carried out at a confidence level of no lower than 95%"*. To ensure compliance with this guideline, an overall acceptable error rate of <= 5% was adopted for this project.

The pre-determined data quality indicators (DQIs) established for the project are discussed below in relation to precision, accuracy, representativeness, comparability and completeness (PARCC parameters) as required by Step 6 of the DQO process.

Table 4 Data Quality Objectives and Indicators

Data Quality Objective	Frequency conducted	Data Quality Indicator[2]
Precision		
Intra-laboratory field duplicates	1/20 samples	<5xLOR : <100% RPD[1] 5-10xLOR : <75% RPD or >5xLOR: M8 <30% RPD >5xLOR: Other <50% RPD
Inter-laboratory field duplicates	1/20 samples	
Laboratory duplicates (Envirolab and ALS)	1/20 samples	<5xLOR : no limit[1] 5-10xLOR : <70% RPD or >5xLOR: M8 <30% RPD >5xLOR: Other <50% RPD
Laboratory method blanks	1/20 samples	< LOR[1]
Accuracy		
Matrix spikes refer to lab report	1/20 samples	60 to 140%
Laboratory control samples	1/20 samples	70 to 130% (inorganic) As specified by lab (organic)
Representativeness		
Sampling handling storage and transport appropriate for media and analytes	-	Yes

Data Quality Objective	Frequency conducted	Data Quality Indicator[2]
Rinsate blanks	1 per day per equipment	<LOR
Laboratory blanks	1 per sampling event	<LOR
Trip Spike	1 per media	70 to 130% (inorganic) As specified by lab (organic)
Samples extracted and analysed within holding times.	-	Hold Times: 14 days – organics 6 months – inorganics
Comparability		
Standard operating procedures used for sample collection and handling (including decontamination)	All Samples	Yes
Standard analytical methods used for all analyses	All Samples	Yes
Consistent field conditions, sampling staff and laboratory analysis	All Samples	Yes
Limits of reporting appropriate and consistent	All Samples	Yes
Completeness		
Soil description and COCs completed and appropriate	All Samples	Yes
Appropriate documentation for testing	All Samples	Yes
Data set to be 95% complete after validation	All Samples	Yes

[1] **- If the RPD between duplicates is greater than the pre-determined data quality indicator, a judgment will be made as to whether the excess is critical in relation to the validation of the data set or unacceptable sampling error is occurring in the field.**

4.9 Step 7 – Optimise Design

The purpose of this step is to identify a resource-effective data collection design for generating validation data to meet the project objectives. This will be achieved by the proposed Sampling and Analysis program for the validation sampling (Refer to Section 7). This chapter detail the number of sample locations, media to be sampled, number of samples retained for analysis, analytical suite and method of sample collection.

5 Remediation and Validation Criteria

5.1 Soil Quality

The following presents a summary of the remediation criteria for soil that will remain on-site, for soil disposed off-site and for any soil that may be imported to the site from off-site sources.

1.4.1 Soil Remaining On-Site

The site is to be remediated for future commercial land use. The applicable soil remediation criteria comprise the NSW EPA (1994) Contaminated Sites – Service Station Guidelines.

The soil quality guidelines are summarised in Table 5.1.

Table 5.1 Soil Criteria

Contaminant	EPA 1999 (mg/kg)
TPH	
TPH C_6-C_9	65
TPH C_{10}-C_{36}	1000

1.4.2 Material for Off-Site Disposal

If soil is to be taken for off-site disposal, it will be sampled and classified in accordance with the NSW DECCW (2009) Waste Classification Guidelines. Waste classification will include total concentrations for COPC identified as well as leachable concentrations by conducting the Toxicity Characteristics Leaching Procedure (TCLP), where necessary. Analytical data will be assessed against Tables 1 and 2 of the guideline.

1.4.3 Imported Fill Material

Any soil imported to the site will be obtained from reputable suppliers and should comprise Virgin Excavated Natural Material (VENM). To validate imported fill, one sample per 100m^3 should be collected and analysed for metals, TPH, BTEX, OCPs and PCBs as contained in the NSW EPA (1994) guidelines.

5.2 Groundwater Quality

As there are no endorsed criteria for TPH by the NSW EPA, groundwater impacts will be evaluated on a risk assessment basis. There should be no unacceptable risks to human health or the environment. To delineate the PSH plume identified in previous investigations, additional wells will be installed down gradient of the known contaminant locations.

6 Remedial Strategy

6.1 Remediation Objectives

The main objectives of the remediation program are to:

- Reduce potential risk to future site occupiers and the surrounding natural environment from impacted soils and groundwater;
- Render the site suitable for commercial land use; and
- Comply with the recommendations of previous reports.

6.2 Extent of Remediation

Impacted soils above the adopted site criteria are located on Lot 10 DP 879209.

See Figure 3 **Appendix A** for the extent of soil contamination.

Groundwater with PSH is located on Lot 10 DP 879209 and Lot 100 DP879680. As part of stage 1 of implementation of the RAP, the extent of this plume will need to be determined.

See Figure 4 **Appendix A** for the current known extent of the groundwater contamination.

6.3 Remediation Options

Possible remediation options were considered against the current NSW EPA waste management hierarchy set out in the Waste Minimisation and Management Act 1995 and the DEC (2006) Guidelines for the NSW Auditor Guidelines.

A preliminary feasibility evaluation of soil and groundwater remediation options for contamination impacts associated with the area defined in Figure 3, **Appendix A** is presented in Table 6.3.

Table 6.3: Remediation Options & Feasibility Summary for the site located at the corner of Cowpasture Road & Horsley Drive, Wetherill Park NSW

Remedial Option	Benefits	Limitations	Acceptability	Time Effectiveness	Cost	Ongoing Liability
Impacted Soil						
Do nothing	Nil cost	Does not render the site suitable for unrestricted commercial landuse	Does not meet EPA requirements and does not meet the remedial objectives for the property	No time required	Nil cost outlay	Yes
Excavation and offsite disposal	Removes contamination	Requires waste classification of excavated fill material prior to disposal and validation works post remediation Difficult for deep contamination due to the large amount of material being removed	Acceptable approach for shallow soils and meets EPA requirements for soil remediation	Up to 1 month	Medium – for shallow soils High – for deeper soils	No
Bioremediation via excavation and landfarming	Removes contamination	Time constraints Require suitable landfarming area	Given that it is non-volatile, accepted form of remediation	3-6 months	Low	No
Capping and containment	Eliminates requirement for offsite disposal	Not appropriate for shallow soil contamination Ongoing liability and EMP required which must be accepted and enforced by Council	Acceptable approach for deep soil contamination. Meets EPA requirements for remediation	Up to 6 months due to necessary approvals	Low to Medium – due to on-going requirements associated with EMP	Yes
Impacted Groundwater						
Do nothing	Nil cost	Does not render the site suitable for commercial landuse	Does not meet EPA requirements and does not meet the remedial objectives for the property	No time required	Nil cost outlay	Yes
Delineate PSH groundwater plume and potential migration pathway	Identifies extent of groundwater PSH contamination	NA	Required to determine remediation strategy	1 month	Low	NA
Remediate PSH via mechanical methods eg Multi Phase Vacuum Extraction	Removes contamination	High Cost. Effectiveness limited due to low yield groundwater system	Impractical given the low yield of the groundwater system. Meets EPA requirements for groundwater remediation	Years	High	No
In-situ oxidation	Removes contamination	Ongoing remediation program requiring access during and post development. Low permeability aquifer.	Ongoing remediation program would require development design to incorporate MW's so as not to disturb system.	Years	High	No
Natural attenuation with risk assessment and ongoing monitoring	Low cost Minimal disturbance to future development	Slow process PSH not removed in the short term.	Acceptable approach for deep non-potable groundwater contamination with no beneficial use.	Ongoing	Low - Medium	Yes

6.4 Preferred Remediation Option

Based on the current dataset, WSP considers that the final preferred remediation approach should include the following:

- As the extent of the PSH groundwater plume has not been established, the first stage of remedial works will be to undertake a groundwater investigation. Six groundwater wells are proposed to be installed both within and on the perimeter of the currently known plume;
- Excavation and removal of TPH impacted surface soils across the site including the former drum platform storage area and shallow soils on the eastern end of the former tank pit. Soils at MW06 will not be excavated as TPH C10-36 results (1,020 mg/kg) are only marginally above the site criteria of 1,000mg/kg. Soils impacted at depth (>4m bgl) will remain in situ;
- Landfarming of the TPH in a designated area on site to reduce the TPH to criteria suitable for commercial/industrial land use;
- Validation sampling in accordance with the EPA "Sampling Design Guidelines" (1995) to be carried out to ensure that the area has been remediated and landfarm material also meets adopted criteria; and,
- For groundwater there are no EPA endorsed criteria for TPH. The final remediation decision will be based on the results of the groundwater investigation, but is likely to be a risk based approach.

6.5 Contingency

As there are plans to undertake extensive excavations of soils at the site, the situation may arise where soils that will remain in situ at depth as part of this proposed remediation strategy will become exposed due to the cut and fill excavations. Should this situation arise, these soils will need to be excavated and remediated in accordance with the requirements of Section 7.

Should contaminated groundwater be encountered, the water will need to be disposed of in accordance with the requirements of Section 8.

7 Validation Sampling Programme

The soils on site will be sampled and validated in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (1999) Schedule B(1) (NEPM, 1999) Health-based Investigation Level F – Commercial/Industrial," and NSW EPA (1995) Sampling Design Guidelines.

For groundwater contamination, WSP propose to undertake a risk assessment which will be undertaken in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (1999) Schedule B(6) (NEPM, 1999) Guideline on Risk Based Assessment of Groundwater Contamination and NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination.

7.1 Sampling Plan for Validation of Soil Hotspot Excavations

Soil samples will be taken from the base and the walls of the hotspot excavations using an excavator bucket. Linear sampling will occur every 8m. Samples will be collected by hand using nitrile gloves. For sample integrity gloves will be replaced for each sampling event. Samples will be placed in a laboratory prepared glass sample jar with the details of the sample, including the sample name, the job number, the date of sample and the sample depth. For preservation in accordance with NEPC (1999), samples will then be stored in an ice filled esky to keep the samples below 4°C. The samples will then be couriered to the laboratory with the signed chain of custody form filled out with the required analysis.

7.2 Field Screening of Samples

Soil Samples will be collected from each excavation. All samples will be screened using a photo- ionisation detector (PID) and note made of the soil type, appearance and odour of the sample.

7.3 Number of Validation Samples for Analysis

All validation samples will be submitted for analysis.

The following sampling frequency will be undertaken:

- A wall and base sample at each hotspot excavation. Validation samples will be collected every 8.5 lineal metres;
- 1 sample for every 25 cubic metres, or greater, of soil material requiring classification for off-site disposal or reuse if required; and
- 1 sample for every 100 cubic metres of any imported fill material if brought onto site, if required (a minimum of three samples are required for characterisation).
- The validation sampling points are dependent on the final extent of each excavation.

7.4 Sample handling

After collection of the samples, the jars will be secured in insulated containers and chilled with ice. This will be under the control of the environmental scientist.

Samples will be labelled, using waterproof ink on the jar and the lid, with the following:

- Job Number;
- Sample Number (located on the site drawing);

- Samplers initials; and
- Sampling date.

Chain of Custody (COC) documentation will be used. The COC will be completed immediately after the sample has been labelled and stored, as described.

Sampling equipment will be cleaned before collection of each sample, as follows:

- Brush off any adhering soil using a nylon brush in potable water;
- Rinse in a stream of potable tap water;
- Wash in a solution of phosphate free detergent (e.g. Decon 90) and distilled water; and
- Rinse with demineralised water.

7.5 Laboratory and Sample Analysis

The primary laboratory to be used will be NATA accredited. Quality assurance will comprise the collection of field duplicates (1:20). Laboratory quality assurance will comprise analysis of control spikes, lab blanks, lab duplicates and surrogates, as well as detailed reporting of recoveries.

A secondary laboratory, also NATA certified, will be used for quality assurance. Samples to the secondary laboratory will be submitted at a frequency of 1 in 20 samples.

Samples analysis will comprise the following:

- Validation samples for material remaining onsite will be analysed for TPH;
- For imported fill material, samples will be analysed for 8 priority heavy metals, organochlorine (including PCBs) and organophosphate pesticides (OC/OPPs), TPH, BTEX, and PAHs;
- Material requiring classification for off-site disposal will be analysed for the site constituents of concern which is TPH.

7.6 Validation Reporting

During the course of soil remediation works, communication between the Client and the consultant regarding progress of works will occur.

At the completion of remedial activities, a soil validation report will be prepared in accordance with the NSW OEH (2011) Guidelines for Consultants Reporting on Contaminated Sites.

7.7 Groundwater

Once the extent of groundwater impact has been established, a risk assessment will be undertaken and reported in accordance with the National Environment Protection (Assessment of Site Contamination) Measure (1999) Schedule B(6) (NEPM, 1999) Guideline on Risk Based Assessment of Groundwater Contamination and NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination.

To confirm the validity of the risk assessment, groundwater monitoring should be undertaken quarterly for a period of twelve months to verify that the groundwater plume is not migrating further. Where PSH is not encountered, groundwater should be sampled and analysed for TPH.

8 Environmental Management Plan

The remedial program will be undertaken with due regard to legislative requirements and any relevant environment planning instruments that apply to the site, including the following:

- Protection of the Environment Operations Act (1997);
- Contaminated Land Management Act (1997);
- NSW State Environmental Planning Policy 55; and the
- Fairfield City Council Development Control Plan.

In particular, in addition to any statutory compliance required by the above mentioned Acts and planning instruments, the contractor will be responsible to carry out the site works with all due care, to ensure that the following conditions are complied with:

- No wind-borne dust is to leave the confines of the site;
- No water containing any suspended matter or contaminants is to be allowed to leave the confines of the site in such a manner that it could pollute any nearby waterway;
- Material from exposed, un-validated surfaces is not to be tracked onto other areas of the site by personnel or equipment; and
- Noise levels at the site boundary are to comply with the Council requirements.

The contractor will ensure that the site manager/foreman is conversant with the contents of the RAP and that each employee or sub-contractor employed by the contractor is familiarised with the requirements of the RAP by the site manager/foreman.

8.1 Dust

Dust may be generated during excavation works. All contractors working on site will be briefed on the need to keep dust generation to a minimum. Careful and minimal handling of the excavated material and stockpiling material in a manner which does not generate excessive dust, can achieve this.

Where a visual inspection of the dust levels indicates that unacceptable levels are being generated, work will cease until measures have been undertaken to reduce the dust, or until weather conditions are more suitable. The former may involve an alteration of the work plan or dust suppression using water sprays. Such decisions will be made by the contractor's site supervisor/s.

Dust controls will be implemented to minimise potential emissions, reduce sediment load into stormwater and protect local amenity and air quality. Specific control measures to be used include:

- Containing operations within the site and maintaining concrete, gravel or asphalt access ways on site;
- Having regard for weather conditions e.g. wind, heat;
- Wherever possible using "low dust" generating methods of excavating and loading;
- Supervision of loading, including policing of load covers;
- Constant management of stockpiles;
- Controlled water spraying at source/s of dust generation e.g. concrete cutting and pulverising;

- Use of shade cloth and other suitable dust barriers; and
- Regular consultation with Council and neighbours.

8.2 Noise

Any noise impact associated with excavation works is acknowledged as an important environmental issue. Some noise may be generated during such activities. These activities will be limited to normal (or designated by Fairfield City Council) working hours. Contractors are bound to comply with the statutory regulations regarding noise limitations in residential areas and the works on site will be restricted to approved working hours as indicated in section 8.7.

8.3 Water Management – Erosion and Sediment Control

To minimise erosion and sediment it will be necessary to:

- Manage surface water flows that will occur during the various Stages i.e. excavation, remediation and validation, to ensure they are fit to be disposed of into the Council storm water system;
- Provide erosion and sediment control measures to prevent generation of sediment loaded runoff;
- Prevent excavation materials or imported materials entering Council's storm water system; and
- Ensure the works are generally in accordance with the "Managing Urban Storm water" documents issued by NSW DEC for the State Storm water Coordinating Committee and the DLWC document entitled "Preparing an Erosion and Sedimentation Plan".

To control surface, seepage and storm water on the site, the excavation contractor will implement the following practices and site controls:

- Redirection of any storm water away from work areas, excavations and stockpiles to on-site sump/s;
- Bunding of any stockpiles with appropriate silt control traps and/or hay bales installed at the down gradient side of stockpiles to prevent runoff of sediment and any potential contaminants;
- Establishing heavy equipment and vehicle routes for day-to-day operations to minimise site disturbance and the transportation of sediment on/off and across the site; and
- Daily inspections by site supervisor and excavation contractors for potential surface water runoff or movement of sediment from stockpiles.

8.4 Discharge of Pumped Water from Excavations

Prior to pumping of water from any phases of the project, samples will be collected from the excavations and analysed in the laboratory for the contaminants of concern. The results of the testing will be compared to the DECCW (2009) Waste Classification Guidelines. Based on the results of these samples, the water will be removed from the excavation by a licensed waste removal contractor and disposed at a facility licensed to accept that classification of waste.

8.5 Groundwater Discharges

Contaminated groundwater will have to be either stored and treated on site and then removed to an appropriate facility or disposed to sewer under a Trade Waste Agreement, or removed from site and disposed of at a facility licensed to receive the liquid waste.

8.6 Traffic Movements and Management

1.4.4 Movements

No major traffic disruptions are expected to result from the onsite remediation works.

Trucks removing materials from site for disposal will generate traffic. Heavy equipment movement will be conducted in accordance with Council's/Road & Traffic Authority approved times. Any heavy equipment or machinery will be transported to the site in accordance with the standard regulatory requirements.

An operating area for storage of bins and equipment, stockpiles, sorting of materials and on-site truck waiting spaces will be established on the site, close to the work area and on sealed ground.

1.4.5 Truck Route/s

Site management will:

- Inspect roads daily;
- Ensure that the site supervisor checks, truck movements and external road condition throughout the day; and
- Instruct drivers and employees on site access and the need for safe operation and clean roads.

1.4.6 Traffic Control

Relevant signage will be in place during the traffic control operation to protect pedestrians and other traffic in the vicinity.

1.4.7 Waiting Areas

As necessary, truck drivers will be directed to nominated "waiting areas" to avoid any local traffic or parking problems on local roads. These areas will also be used to avoid early morning annoyance to residents.

1.4.8 Loading

Trucks will only be loaded within the site boundaries. Heavy equipment will be unloaded / reloaded within the site.

1.4.9 Specific Truck Related Measures

A clearly designated, correctly bunded and drained, truck cleaning area with a sediment sump will be located inside the site. Wheels and bodies will be checked, and cleaned as necessary, with minimum use of water.

Vehicles inspected and found to have unacceptable dust, mud or demolition materials on tyres, underside or body, will be cleaned down in the designated area before being allowed to leave site.

Wherever possible, materials will be cleaned up, using "dry" methods, e.g. shovel, bobcat, broom. Hose down facilities will be available cleaning for truck bodies and wheels, in a designated area, only where absolutely necessary.

Sediment barriers will be placed across the driveway entry and adjacent to the nearest street drainage pits.

Although it is not anticipated that there will be any significant spillage of materials from trucks onto roads, the contingency measures include:

- Arrangements will be in place to ensure that, in the event that any materials are tracked onto the roads, they will be cleaned up and removed, as soon as possible;
- Materials will be cleaned up using “dry” methods, e.g. shovel, bobcat, broom; and
- Should it be deemed necessary, arrangements will be made for street sweeping around the roads external to the site.

8.6 Underground Services

Where available, underground services diagrams for the site will be obtained prior to excavation work commencing.

If encountered during excavation works, underground services will be adequately supported, re-routed or disconnected as is practicable and necessary, with all work being carried out by approved contractors.

8.7 Working and Operational Hours

Working hours for on site remedial works will be as set by Fairfield City Council in the Consent Conditions, but expected to be as follows:

- Monday to Friday 7.00am to 5.00pm
- Saturday 7.00am to 1.00pm
- Sunday and Public Holidays No Work Permitted

8.8 Restricted Access and Site Security

The site will be secured with a perimeter fence and locked gate/s. The site is a construction area and as such access restricted solely to authorised staff and contractors who have appropriate levels of personal protective equipment.

The contractor’s site supervisor shall control site access and security, and shall authorise visitors onto the site on an “as needs’ basis. The site supervisor is responsible for locking access gates at the end of each day.

Access to the construction site may vary depending on the progress of excavation works. Environmental Scientists will only access, or work on, the construction site when necessary for field sampling and observation of excavation progress.

8.9 Emergency Contact Numbers

During remediation works, representatives and on-site supervisors from the contractor will be available to be contacted at all times. Additionally, the Site Health & Safety plan will detail contact numbers for emergency services and utility authorities.

Diary

During the remedial works, the environmental scientist will maintain a site diary in which will be recorded the following:

- Date;
- Weather conditions;
- Details of any unusual materials or odours encountered during excavation works and details of actions taken;
- Details of calibration of the PID;
- Results and times of air monitoring with the PID;
- Details of any accidents, near misses or incidents which may have resulted in injury;
- Details of any environmental issues which may result in environmental concern and measures taken to correct them;
- Details of any visitors to the site relating to environmental or health issues; and
- Records of soil sampling activities and sampling and excavation locations will be illustrated on a site plan.

8.10 Waste Management

1.4.10 Waste Generation – non-contaminated materials

Any building materials will be source separated and stockpiled for recycling. This process will provide a beneficial use and minimise the actual quantity of materials designated as waste that will have to go to landfill.

Processes will include:

- Source separation of the various types of demolition materials into, individual, uncontaminated stockpiles, as work proceeds e.g. concrete, steel, masonry, timber etc.
- On-site reduction of waste volume; and
- Disposal of non - recyclable material.

1.4.11 Waste Generation – contaminated materials

The final quantities will not be defined until the remediation works have been completed and the remaining soils are considered suitable for the proposed landuse. Any contaminated soils will be remediated onsite or disposed offsite to a licensed waste receiving facility, in accordance with the NSW DECCW (2009) Waste Classification Guidelines.

9 Regulatory Approvals / Licensing

The remedial program will be undertaken with due regard to legislative requirements and any relevant environment planning instruments that apply to the site.

9.1 State Environmental Planning Policy No 55 (SEPP 55)

The SEPP 55 provides the planning framework for the remediation of contaminated land within NSW. A review of the SEPP 55 indicates that the proposed remediation works may fall under Category 1or Category 2 of the SEPP 55 Planning Policy. Clause 9 of SEPP 55 defines Category 1 remediation works as works that require development consent. Under this scenario, a DA for the remedial works will need to be submitted to Council. Works classified as Category 2 Remediation Works (i.e. not requiring consent) will require Council to be notified 30 days before remediation works commence and within 30 days following the completion of the works.

9.2 Protection of the Environment Operations 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 licence is required if it involves the transport of more than 200 kilograms in any load. If more than 200 kilograms of restricted solid is required to be transported from the site, the transporter of waste will require a licence.

9.3 Protection of the Environment Operations (Waste) Regulation 2005

The regulations define a “non-paying landfill” as any premise that is carried on for business or other commercial purposes, and involves the generating or storage of waste, and is not licensed under the Act, or landfill sites that receive virgin excavated natural material only (and not any other type of waste).

Part 6 of the waste regulations apply to non-paying landfill sites and transporting. These require:

- Certain reporting requirements for non-licensed landfill sites (Reg 47);
- The waste must be stored in an environmentally safe manner (Reg 48);
- Certain transport requirements relating to the transportation of waste (Reg 49);
- If the waste is transported from the premises, the waste generator must ensure that the waste is transported:
  - to a waste facility that is licensed under the Act; or
  - to a person carrying on mobile waste processing that is licensed under the Act; or
  - to a place that can otherwise lawfully be used as a waste facility for that waste.
- Under the POEO (Waste) regulation 2005, Reg 32 (Record keeping requirements relating to occupiers of waste facilities): An occupier of a waste facility (which includes the storage, treatment, processing or sorting of waste) who is not a consignor of the waste must retain the following records for at least 4 years: (a) copies of each waste transport certificate given to the occupier of a waste facility by the consignor of the waste, (b) copies of each agreement evidencing the appointment of an authorised agent as referred to in clause 27 (2) (b). An authorised agent under the regulations, means a person appointed as an authorised agent for the transportation of the waste.

As part of the validation report, waste disposal and tipping dockets must be provided to confirm compliance with POEO Regulations.

9.4 Waste Classification Guidelines Part 1: Classifying Waste (DECC 2009)

The NSW 2009 Waste Guidelines (DECCW 2009) provides guidance to waste generators to classify the wastes they produce and ensure the environmental and human health risks associated with it are managed appropriately and in accordance with the POEO Act 1997. The following important notes are provided:

- Under “Step 5” of the guidelines, hazardous waste cannot be disposed of and must be treated;
- If the waste is not chemically assessed, the waste must be managed as if it were hazardous waste; and
- If any of the SCC or toxicity characteristics leaching procedure (TCLP) threshold values specified in Table 1 or 2 are exceeded for Restricted Solid Waste, the waste must be classified as Hazardous Waste.

9.5 Transportation of Material and Equipment

All haulage routes for trucks transporting soil, materials, equipment or machinery to and from the site must:

- Comply with all road and traffic rules;
- Aim to minimise noise, vibration and odour to adjacent premises; and
- Utilise State roads and minimise the use of local roads.

10 Conclusions

WSP has prepared a RAP for a site located on the corner of Horsley Drive and Cowpasture Road. (the site). The RAP is required to document the proposed methodologies for works required to make the site suitable for commercial/industrial land use

A number of environmental studies were conducted across the site between 2006 and 2012. These investigations identified shallow and deep soil impacted with TPH on Lot 10 DP879209 and PSH groundwater impact on Lot 10 DP879209 and Lot 100 DP879680.

Based on the current dataset, WSP considers that the final preferred remediation approach should include the following:

- As the extent of the PSH groundwater plume has not been established, the first stage of remedial works will be to undertake a groundwater investigation. Six groundwater wells are proposed to be installed both within and on the perimeter of the currently known plume.
- Excavation and removal of TPH C10-36 impacted surface soils across the site including the former drum platform storage area and shallow soils on the eastern end of the former tank pit. At this stage, soils impacted at depth and at MW06 will remain in situ;
- Landfarming of the TPH in a designated area on site to reduce the TPH to criteria suitable for commercial/industrial land use;
- Validation sampling in accordance with the EPA “Sampling Design Guidelines” (1995) to be carried out to ensure that the area has been remediated and landfarn validated; and,
- For groundwater there are no EPA endorsed criteria for TPH. The final remediation decision will be based on the results of the groundwater investigation, but is likely to be a risk based approach.

11 Limitations

The findings of this report are based on the scope of work outlined in Section 6. WSP performed the services in a manner consistent with the normal level of care and expertise exercised by members of the environmental assessment profession. No warranties, express or implied, are made.

Subject to the scope of work, WSP's assessment was limited strictly to identifying typical environmental conditions associated with the subject property area and does not include evaluation of any other issues. This report does not comment on any regulatory obligations based on the findings. This report relates only to the objectives stated and does not relate to any other work undertaken for the Client. It is a report based on the conditions and concentrations observed in soil, water and air at the time of the sample collection. These conditions may change with time and space.

The absence of any identified hazardous or toxic materials on the subject property should not be interpreted as a guarantee that such materials do not exist on the site.

All conclusions regarding the property area are the professional opinions of the WSP personnel involved with the project, subject to the qualifications made above. While normal assessments of data reliability have been made, WSP assumes no responsibility or liability for errors in any data obtained from regulatory agencies, statements from sources outside of WSP, or developments resulting from situations outside the scope of this project.

WSP is not engaged in environmental assessment and reporting for the purpose of advertising sales promoting, or endorsement of any Client interests, including raising investment capital, recommending investment decisions, or other publicity purposes.

The Client acknowledges that this report is for their exclusive use. Other parties may only gain reliance on this report following receipt of written approval from WSP.

12 References

NSW Environment Protection Authority (1994) Guidelines for Assessing Service Station Sites.

NSW Environment Protection Authority (1995) Sampling Design Guidelines.

National Environment Protection Council (1999) National Environment Protection Measure (NEPM) 1999 Assessment of Site Contamination, Schedule B (1) and B (2).

NEPM (1999) National Environmental Protection (Assessment of Soil Contamination) Measure, NEPC Guidelines.

National Environment Protection (Assessment of Site Contamination) Measure (1999) Schedule B(6) (NEPM, 1999) Guideline on Risk Based Assessment of Groundwater Contamination.

NSW DEC (2007) Guidelines for the Assessment and Management of Groundwater Contamination.

NSW Department of Environment and Conservation (2009) Waste Classification Guidelines Part 1: Classifying Waste.

NSW Department of Environment and Conservation (2006) Guidelines for the Site Auditor Scheme, Second Edition.

State Environmental Planning Policy No. 55 (1998) – Remediation of Land.

Tank Removal Status Report prepared by RES (June 2006)

Landfarm Soil Testing prepared by WSP (December 2006)

Tank Removal Works prepared by WSP (June 2009)

Phase 2 Draft Environmental Site Assessment and Additional Investigation prepared by WSP (February 2010)

Preliminary Environmental Site Assessment prepared by Environmental Investigation Services (EIS) (December 2011)

Preliminary Geotechnical Investigation prepared by Jeffrey and Katauskas (December 2011)

Stage 2 Environmental Site and Geotechnical Assessment prepared by WSP (June 2012)

Appendix A - Figures

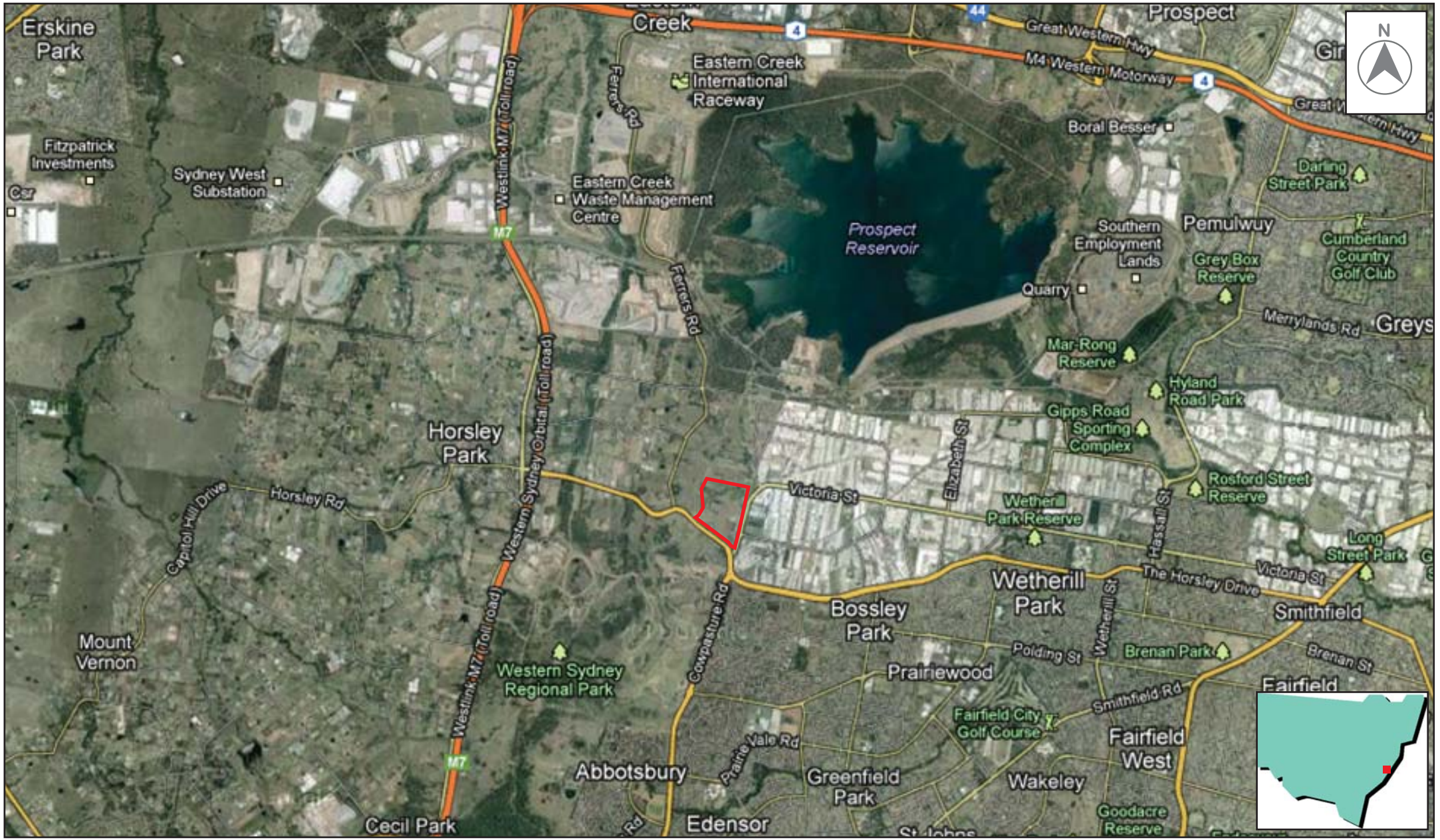

Image Courtesy of Google Maps (2012)

Site Boundary

Approximate Scale

0 2

Kilometres

Site Location

Stage 2 Investigation, Cnr Horsley Drive and Cowpasture Road, Wetherill Park NSW

00030337

FIGURE 1

UNITED BY OUR DIFFERENCE WSP

Image Courtesy of NearMap (Aerial Photograph 5 February 2012)

Site Boundary

Inaccessible During Initial Investigations

Former Building Location

Abandoned Shed

Site Features

Stage 2 Investigation, Cnr Horsley Drive and Cowpasture Road, Wetherill Park NSW

00030337

FIGURE 2

UNITED BY OUR DIFFERENCE WSP

KEY

- Site Boundary
- MW04 Monitoring Well Location
- BH29 New Borehole Location (Nov 09)
- Assumed Shallow Contamination
- Assumed Deep Contamination

0 10
Approximate Scale Metres

Areas of Soil Contamination TPH C_{10}-C_{36} Above Criteria

30337 - Phase 2 - 27 Cowpasture Road, Horsley Park

FIGURE 3

WSP

KEY

- Site Boundary
- MW04 Monitoring Well Location
- BH29 New Borehole Location (Nov 09)
- Estimated Extent of PSH Plume
- Areas of Uncertainty
- Proposed Well Location

0 10
Approximate Scale Metres

Estimated Groundwater Plume

30337 - Phase 2 - 27 Cowpasture Road, Horsley Park

FIGURE 4

WSP

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