CONSULTING EARTH SCIENTISTS

BASELINE ENVIRONMENTAL SITE ASSESSMENT, REMEDIATION AND VALIDATION:

65 - 115 REDMAYNE ROAD, HORSLEY PARK, NSW

PREPARED FOR NSW DEPARTMENT OF PLANNING

REPORT ID: CES090515-DP-01-F

Revision No: 1.0

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EXECUTIVE SUMMARY

CES was commissioned by the NSW Department of Planning (DoP) to carry out a baseline ESA, remediation supervision and validations works, at the site located at 65 – 115 Redmayne Road, Horsley Park, NSW. The purpose of the works was to provide some assurance that there would be no significant health-risk to future users of the site. CES understands that Western Sydney Parklands Trust, the owners of the site, intend to lease the site for recreational use, specifically a children's dirt-bike riding track and associated facilities.

The baseline ESA comprised the collection of fourteen near surface soil samples across the site. Nine of the fourteen samples targeted areas of greater potential for contamination while the remaining five samples provided general coverage across the remainder of the site. The results of the baseline ESA identified a localised area of hydrocarbon impacted soil, fragments of Asbestos Containing Materials (ACM) in and immediately surrounding a number of asbestos clad sheds on the site, and elevated Polycyclic Aromatic Hydrocarbons (PAHs) within a small stockpile of imported sandy soil.

The hydrocarbon impacted soil was excavated and disposed off-site as general solid waste (non-putrescible) as determined by waste classification sampling and site observations conducted in accordance with DECC NSW (2008) *Waste Classification Guidelines Part 1: Classifying Waste.* The soil remaining in the excavation was validated by CES as being suitable for the intended recreational land use. Additionally, soil used to backfill the excavation, which was sourced from site, was also validated as being suitable for the intended land-use.

The fragments of ACM within and immediately surrounding the sheds on the site were collected and appropriately disposed off-site by More Contracting Pty Ltd (More Contracting) who are licensed to carry out the removal of friable asbestos. Following removal of the visible ACM fragments, Hibbs and Associates Pty Ltd (Hibbs and Associates) conducted an asbestos visual clearance inspection in and immediately surrounding the sheds and found no visible ACM.

At the request of DoP, More Contracting also demolished three derelict general storage sheds which were predominately clad in asbestos fibre cement sheeting. The near surface soil beneath the footprint of the sheds was validated through sampling and analysis by CES as being suitable for the intended recreational land use.

The elevated PAHs found within the small stockpile of imported sandy soil are likely to be attributed to fragments of asphalt observed within the stockpile and not considered to be a significant risk (with respect to contamination) to future users of the site.

LIST OF ABBREVIATIONS

ACM	Asbestos Containing Materials
ALS	Australian Laboratory Services
BTEX	Benzene, Toluene, Ethylbenzene and Total Xylenes
CES	Consulting Earth Scientists Pty Ltd
COC	Chain-of-Custody
CoPC	Contaminants of Potential Concern
DAC	Data Acceptance Criteria
DECC	Department of Environment and Climate Change
DQO	Data Quality Objectives
ESA	Environmental Site Assessment
LCS	Laboratory Control Sample
LOR	Limit of Reporting
NATA	National Association of Testing Authorities
nd	not detectable
NSW	New South Wales
OCP	Organochlorine Pesticides
OPP	Organophosphorous Pesticides
PAH	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PID	Photoionisation Detector
PSP	Project Safety Plan
QA/QC	Quality Assurance and Quality Control
RPD	Relative Percentage Difference
SAQP	Sampling, Analysis and Quality Plan
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank

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1 INTRODUCTION

Consulting Earth Scientists Pty Ltd (CES) was commissioned by Karen Kaufman of the NSW Department of Planning (DoP) to undertake a baseline Environmental Site Assessment (ESA) at the property located at 65 - 115 Redmayne Road, Horsley Park NSW (referred to herein as the site). CES was also commissioned to supervise remediation works and undertake validation of the site with respect to a localised hotspot of hydrocarbon contamination and fragments of Asbestos Containing Materials (ACM) observed at the surface around some disused sheds. The sheds were clad in ACM and are believed to be the source of the ACM fragments within and surrounding these structures.

A site location plan is presented as Figure 1.

The objective of the ESA was to assess whether soil quality on the site is likely to have been impacted by historical land use that would impact upon its suitability for the proposed recreational land use. The remediation and subsequent validation works, was required by Western Sydney Parklands Trust, the owner of the site, to provide some assurance that there would be no significant health-risk (with respect to contamination)) to the future users of the site (considering the proposed recreational use).

1.1 BACKGROUND INFORMATION

The site has been the subject of two previous environmental investigations which were conducted by JBS Environmental Pty Ltd (JBS, 2005) and subsequently Douglas Partners Pty Ltd (DP, 2007).

The JBS (2005) investigation comprised two rounds of soil sampling and analysis which identified one localised hotspot of hydrocarbon contamination and potential fragments of Asbestos Containing Materials (ACM) around disused chicken sheds. The DP (2007) investigation comprised a review of the site's history to determine potential areas of environmental concern and its likely suitability for commercial and/or industrial land use. The investigation report provided a sampling program to address the areas of potential concern. No actual soil sampling or analysis was carried out by DP.

The main areas of potential environmental concern outlined in the DP (2007) investigation were:

- Unknown fill or burial /incorporation of wastes and contaminants;
- Potential chemicals / spills;
- Use of pesticides; and
- Use of ACM; and
- Potential biohazard from a septic tank.

There was no mention in the DP (2007) report of a localised hotspot of hydrocarbon contamination as identified in the JBS (2005) report. It is not known if the hotspot of hydrocarbon impacted soil was removed prior to the DP (2007) investigation or simply not identified.

2 OBJECTIVES AND SCOPE OF WORKS

The objective of the baseline ESA, remediation supervision and validation works, was to provide some assurance that there would be no significant health-risk to future users of the site.

To satisfy the above objective, CES completed the following scope of work as agreed by the DoP:

- Provision of a detailed review of the JBS (2005) and DP (2007) reports;
- Where possible, update of the site history information since the DP (2007) report;
- Completion of a detailed site inspection;
- Implementation of a limited soil sampling and analysis programme, including sampling of the localised hydrocarbon stained area;
- Waste classification of the hydrocarbon stained soil;
- Excavation and off-site disposal of the hydrocarbon stained soil to an appropriately licensed landfill facility;
- Validation of the excavation following removal of the hydrocarbon impacted soil;
- Demolition of three disused and derelict sheds;
- Validation of the near surface soils beneath the demolished sheds;
- Emu-pick of ACM identified during the site inspection and following demolition of the sheds. This included an asbestos visual clearance inspection in the vicinity of the sheds (i.e. shed building material believed to be the source of the ACM); and
- Provision of a report detailing the results of the ESA, remediation and validation.

3 DATA QUALITY OBJECTIVES

Step 1 - State the Problem

The problem is the potential for the site to be impacted by contamination associated with historical land use. Additionally, past investigations have identified fragments of ACM at the surface surrounding disused sheds on Lot 113 and a localised hotspot of hydrocarbon impacted soil, also on Lot 113.

Step 2 - Identify the Decision Statement

What are the baseline soil conditions (with respect to contamination) at the site prior to the commencement of a lease of the site for recreational land use , specifically a children's dirt-bike riding club and has remediation of the hotspot of hydrocarbon impacted soil and the ACM removed contamination from the site to a level suitable for the recreational land use?

Step 3 - Identify inputs to the decision

The findings from the baseline ESA and validation undertaken at the site are the inputs required to resolve the decision statement.

Step 4 - Define the Boundaries of the Study

The site is located at 65 - 115 Redmayne Road, Horsley Park, NSW and includes the following legal allotments:

- Lots 6 in Deposited Plan (DP) 1021711
- Lot 112 and 113 in DP 13905

The site layout showing the site boundaries and individual allotments is shown on Figure 2.

The lateral extent of the baseline ESA was the three allotments described above. The remediation and validation works were limited to the hotspot of hydrocarbon impacted soil and the areas immediately surrounding and beneath the sheds located on Lot 113 impacted by fragments of ACM. The vertical extent of the baseline ESA was the near surface soils extending to approximately 0.3 m below ground level.

Step 5 - Develop a Decision Rule

The purpose of this step is to define the parameter of interest, specify the action level and combine the outputs of the previous DQO steps into an "if…then…" decision rule that defines the conditions that would cause the decision maker to choose alternative actions.

The parameters of interest (or contaminants of concern) have been derived from a review of previous investigations and a broad group of common contaminant compounds known to occur on sites with similar past land use.

The action level or Site Assessment Criteria (SAC) will be used to decide if the parameter represents an unacceptable risk for the proposed recreational land use and/or the receiving environment. If the measured concentration of a parameter or compound exceeds the action levels (SAC) in soils, then this may be deemed to present an unacceptable risk depending on the potential for exposure or available environmental receptors.

Step 6 - Optimising the Design for Obtaining Data

The purpose of this step is to identify a resource-effective data collection design for generating data that are expected to satisfy the DQO's.

The resource effective data collection design that is expected to satisfy the DQOs is described in detail in Section 11 of the report. To ensure the design satisfies the DQOs a comprehensive Quality Assurance and Quality Control Plan will be implemented as described in Section 11.

4 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

The site was the subject of two previous environmental investigations as listed below:

- JBS Environmental Pty Ltd, 2005: *Detailed Site Investigation, 85-101 Redmayne Road, Horsley Park NSW*. Prepared for DIPNR. June 2005 (Report 30245-10467); and

- Douglas Partners Pty Ltd, 2007: *Report on Preliminary Contamination Assessment, Proposed Employment Lands*, *Site 6, Horsley Park.* Prepared for NSW Department of Planning. Project 40904-4 Dated September 2007.

A summary of each report is provided earlier in Section 1.1, while relevant information about the site, including site history is provided in Section 5.

5 SITE INFORMATION

The site information presented below is based on observations made by CES and information contained in the previous environmental reports.

5.1 SITE IDENTIFICATION

The site address is 65 - 115 Redmayne Road, Horsley Road, NSW and includes the following allotments:

- Lots 6 in Deposited Plan (DP) 1021711; and
- Lot 112 and 113 in DP 13905.

The Australian Map Grid (AMG) co-ordinates of the centre of the site are 301820 mE, 6253900 mN. The site location is shown in Figure 1.

5.2 SITE DESCRIPTION

The site is approximately rectangular in shape and covers an area of approximately 9 hectares. Vehicle access to the site is via two driveways off Redmayne Road. A gravel driveway enters the site through the central allotment (Lot 113), while a grassed driveway enters the site through the eastern allotment (Lot 112).

On the central allotment there is a dam (approximately 200 m^2), a residential dwelling with attached carport, two chicken sheds, three other sheds used for general storage, and a dog kennel. Much of the sheds, the dog kennel and the residential dwelling were partially clad with fibre-cement sheeting, some of which was damaged resulting in fragments of the sheeting observed on the surrounding ground. Analysis of a number of these fragments identified the presence of asbestos in the fibre-cement sheeting.

The only other structure situated on the site is a steel and timber shed located on the eastern allotment (Lot 112).

The majority of the site is open, over-grown grassland.

A site plan showing the layout of the site including the location of structures is provided as Figure 2.

5.2.1 Tanks and Associated Services

An inspection of the site undertaken by CES in August 2009 as part of this investigation revealed no evidence of underground storage tanks (USTs). The only above ground storage tanks visible on the site were steel grain stores attached to the two chicken sheds.

5.2.2 Fill

Based on the general site topography compared to the surrounding topography, CES does not anticipate that any significant filling has occurred across the site.

5.2.3 Odours and Staining

A small area of soil adjacent to the general storage sheds was stained black. Based on the odour, the staining was assumed to have been caused by hydrocarbons, specifically diesel and/or petrol (Figure 3). It was estimated that the extent of staining and hydrocarbon odour at the surface was less than 1 m^2.

5.2.4 Chemical and Wastes

No chemicals were observed to be stored on site. All sheds were vacant.

5.3 SURROUNDING LAND-USE

At the time of undertaking the fieldwork, the site was surrounded by the following:

- North – Rural / residential property;
- East – Rural / residential property;
- South – Redmayne Road and rural / residential property; and
- West – The M7 Motorway and bicycle track.

5.4 SITE ZONING AND LANDUSE

According to the Fairfield City Council Local Environment Plan (LEP) zoning map dated February 2009, the site is currently unzoned. A copy of the zoning map is provided in Appendix A.

The site is currently vacant. There was a single storey residential building located on the central allotment (Lot 113) and several sheds, some of which were formerly used to house chickens. The majority of the site is open rural land which was partly used as a market garden.

5.5 PROPOSED SITE USE

CES understand that DoP intend to lease the site for recreational use, specifically a dirt-bike riding club for children.

5.6 TOPOGRAPHY

A review of the Prospect 1:25,000 Topographic Map 9030-II-N (Department of Lands, 1979) indicated that the site elevation is approximately 70 metres Australian Height Datum (AHD).

The site generally slopes approximately 5 degrees from north to south in the direction of the dam located on the central allotment (Lot 113).

5.7 GEOLOGY AND SOILS

5.7.1 Geology

Review of the Penrith 1:100 000 Geological Series Sheet 9030 (NSW Department of Minerals, 1991) indicated that the site is underlain by a quaternary alluvium deposit comprising fine grains sand, silt and clay. From a review of the area surrounding the alluvial deposit, it can be expected that the alluvium is underlain by residual soil and bedrock associated with the Bringelly Shale Formation of the Wianamatta Group. The Bringelly Shale Formation typically consists of 'shale, carbonaceous claystone, claystone, laminite, fine to medium grained lithic sandstone, rare coal and tuff'.

5.7.2 Soils

Review of the Penrith 1:100 000 Soil Landscape Series map 9030 (Soil Conservation Service of NSW, 1989) indicated that that the site is underlain by a quaternary alluvium deposit identified as the South Creek formation.

As described by the soil map, the landscape in which soils of the South Creek soil landscape group are found comprise floodplains, valley flats and drainage depressions of the channels of the Cumberland Plain. Soils are described as often very deep layered sediments over bedrock or relict soils. The limitations of this soil landscape group are noted as erosion hazard and frequent flooding.

5.8 HYDROGEOLOGY

Groundwater associated with the Wianamatta Shale is characterised by high salinity (Wooley, 1980; Krumins *et al*., 1998) and elevated ammonia concentrations (>10 mg L^{-1}, Old, 1942). Naturally occurring high levels of these parameters reflect the deposition of organic-rich sediment in low energy coastal environments. Rates of groundwater movement are likely to be low as a result of low relief, low altitude and low permeability of the Wianamatta Shale (Herbert, 1980).

A search of groundwater bores registered with the Department of Natural Resources (DNR), indicated that there were four registered bores within a 1 km radius of the site, all of which are environmental monitoring bores located to the north of the site adjacent to a landfill. Information obtained from one of the four bores, suggests that a water bearing zone was identified at approximately 6 m depth within shale bedrock. No water quality information was available from the bore information reviewed.

The exact direction of permanent groundwater flow could not be determined from the available information and was not assessed in this investigation. However, it is likely that any groundwater would follow the general topography of the area and flow south and south-east towards Eastern Creek.

6 SITE HISTORY

The following site history summary was determined based on a review of the previous environmental investigations.

The earliest aerial photograph of the site taken in 1930 indicates that the site was used for grazing purposes, which was predominately for sheep.

The dam located within the central allotment is understood to have been constructed in 1957, followed by construction of the two chicken sheds in 1966 and 1970, respectively. The residential dwelling was constructed in 1978. Chicken farming ceased in 1999 with the chickens disposed off-site.

At the time of this investigation, the site was vacant with no sheep or other livestock present.

7 CONTAMINANTS OF POTENTIAL CONCERN

The Contaminants of Potential Concern (CoPC) were derived from information obtained from the previous environmental investigations undertaken on the site and from a broad group of common contaminant compounds known to occur within the similar rural areas.

CoPC investigated as part of the baseline ESA included:

- Petroleum Hydrocarbons (analysed as TPH);
- Benzene, Toluene, Ethyl Benzene and Xylenes (BTEX);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Organochlorine Pesticides (OCP);
- Organophosphorous Pesticides (OPP);
- Polychlorinated Biphenyls (PCB);
- Heavy Metals; and
- Asbestos.

7.1 CHARACTERISTICS OF CHEMICALS OF POTENTIAL CONCERN

7.1.1 Heavy Metals

The metals typically analysed as contaminants in urban environments are arsenic, cadmium, chromium, copper, lead, nickel, zinc and mercury. They all generally tend to bind strongly to soil particles and will dissolve in water. Both mercury and zinc accumulate in animal tissue while the others will not. The mobility of all metals increases with increasing acidity.

7.1.2 Petroleum Hydrocarbons (TPH) and BTEX Compounds

Petroleum hydrocarbons and BTEX compounds are mostly associated with petroleum products. Petroleum hydrocarbons are analysed as TPH which are divided into C6-C9, C10-C14, C15-C28 and C29-C36 fractions based upon the number of carbon atoms within the compound. The C6-C9 fraction is considered to be the volatile fraction, with volatility decreasing and density increasing with the increasing number of carbon atoms. As a result, the C6-C9 fraction and BTEX are generally the most mobile and can volatilise, whereas the C29-C36 fraction is the least mobile. TPH and BTEX compounds are less dense than water and are typically found at the top of aquifers.

7.1.3 Polycyclic Aromatic Hydrocarbons (PAH)

PAHs are essentially a by-product of incomplete combustion, either by natural or anthropogenic sources. Common sources are coal, soot, charcoal and bitumen. There are hundreds of PAHs in existence, but the common PAH analytical suite consists of the 16 USEPA priority PAHs which are listed in order of decreasing volatility, with naphthalene being the most volatile.

PAHs are very stable and persistent in the environment as well as being carcinogenic. Most PAHs adsorb strongly to soil particles, although some are capable of migrating into groundwater. They do not dissolve easily in water and are most likely to be associated with particulate matter.

7.1.4 Organochlorine (OC) and Organophosphorous (OP) Pesticides

Pesticides which are now generally banned from use in most parts of the world due to their environmental impact and bioaccumulative potential within fatty tissue. They are generally rapidly broken down by sunlight within about two days and adsorb strongly to soil. Only minor concentrations of OCPs andOPPs would be expected to be detected in groundwater as they do not dissolve easily.

7.1.5 Polychlorinated Biphenyls (PCB)

PCBs are chlorine-based, man-made compounds which are chemically stable, unreactive and have high electrical resistivity. They are commonly used in capacitors and transformers, hydraulic fluids, adhesives, plasticizers, heat transfer fluids, wax extenders, lubricants, cutting oils and flame retardants.

PCBs are fat soluble and bio-accumulate in the fatty tissue of aquatic and terrestrial organisms and are biomagnified through the food chain. PCBs are transported through water and soil and occasionally through the air when waste materials containing PCBs are burned.

7.1.6 Asbestos

Asbestos is the commercial name for a family of minerals that separate into dust-like fibres when crushed. They are present naturally in rock formations worldwide. Of the six common types, chrysotile is the most common. Asbestos is a very good insulator against heat, cold, electricity and noise. It is also resistant to fire and many corrosive metals. It has been used for fireproofing (sprayed onto steel beams and overhead surfaces in commercial buildings, apartments and houses), as heat insulation (pipes, furnace boilers, heating and ventilation ducts), and as noise insulation (ceilings and walls). Some of its current uses include insulation in brake linings, clutch facings and automatic transmissions in automobiles.

Asbestos materials tend to be inert until they are installed, removed or otherwise disturbed. It is non-biodegradable and environmentally cumulative. Asbestos does not evaporate, dissolve, burn or undergo significant reactions with other chemicals. It does not evaporate into the air or dissolve in water. Small fibres may be transported long distances in the air or water. Asbestos fibres do not generally build up in plants or animals.

Asbestos exposure is primarily through inhalation, while ingestion and dermal absorption are minor exposure routes. The size and shape of asbestos fibres affect the ability of the lungs to effectively remove them.

Diseases associated with high occupational exposure (through inhalation) are asbestosis (fibrosis of the lung), mesothelioma (cancer of the pleural sac lining the lung or the peritoneal sac lining the abdomen), and cancer of the lung. Asbestos related diseases generally develop 10 to 30 years after exposure. Extensive studies have revealed that ingested asbestos causes little or no risk of non-carcinogenic injury. Dermal exposure has been associated with the formulation of small warts or corns, mostly on the hands.

8 FIELDWORK OPERATIONS

As mentioned in Section 2, fieldwork operations conducted as part of this investigation, either directly by CES, or under the supervision of CES, included:

- A limited soil sampling and analysis programme across the site (Baseline ESA);
- Demolition of the three disused general storage sheds;
- Validation sampling of the near surface soils beneath the demolished sheds;
- Excavation, waste classification and off-site disposal of the hydrocarbon impacted soil adjacent to the general storage sheds;
- Validation sampling of the hydrocarbon impacted soil excavation;
- Validation sampling of soil used to backfill the hydrocarbon excavation; and
- Emu-pick of ACM identified during the site inspection and following demolition of the sheds. This included an asbestos visual clearance inspection in the vicinity of the sheds (i.e. source of the ACM).

The above fieldwork operations were conducted in five stages with the first stage comprising the limited soil sampling and analysis programme undertaken across the entire site (i.e. baseline ESA). The baseline ESA was undertaken on 2 July 2009 to assess whether soil quality on the site is likely to have been impacted by historical land use that would impact upon its suitability for the proposed recreational use. As part of the baseline ESA several fragments of Asbestos Containing Material (ACM) were identified on the ground immediately surrounding the chicken sheds and general storage sheds. Additionally, a localised hydrocarbon impacted soil hotspot was identified.

The second stage of fieldwork was completed on 24 July 2009 and comprised a preliminary emu-pick of ACM fragments in and around the sheds, followed by an asbestos visual inspection clearance. The emu-pick was conducted by More Contracting Pty Ltd (More Contracting), while the asbestos visual clearance inspection was undertaken on the same day by Hibbs and Associates Pty Ltd (Hibbs and Associates).

The third stage of works was completed between 13 and 20 August 2009 and comprised the:

- demolition of the three general storage sheds as requested by DoP;
- clearance of vegetation up to 1.5 m around the chicken sheds and demolished sheds to facilitate removal of ACM fragments;
- validation sampling of the near surface soils beneath the demolished sheds;

- excavation, waste classification and off-site disposal of the hydrocarbon impacted soil adjacent to the general storage sheds; and
- validation sampling of the hydrocarbon impacted soil excavation.

The fourth stage was completed on 21 August 2009 and comprised a final emu-pick of ACM fragments in and around the sheds, followed by an asbestos visual inspection clearance. The emu-pick was again conducted by More Contracting, while the asbestos visual clearance inspection was undertaken on the same day by Hibbs and Associates.

The fifth and final stage of fieldwork was undertaken by CES on 31 August 2009 and comprised the supervision of the backfilling of the hydrocarbon impacted soil excavation pit and validation sampling of the backfill soil material.

More detailed information of each stage of works including sampling methods is provided in the following sections.

8.1 STAGE 1 - BASELINE ESA

8.1.1 Sampling pattern, number and location

Baseline ESA sampling comprised a judgemental (i.e. targeted) and systematic (i.e. random) sampling pattern to target areas of potential gross contamination and to provide general site coverage. Targeted samples were collected from areas of greater potential for contamination, such as from within the sheds, the hydrocarbon impacted soil adjacent to the general storage sheds (Figure 3), and a small stockpile of imported sand which contained fragments of black gravel, potentially asphalt). Two samples of fibre cement sheeting found on the ground adjacent to the general storage sheds, were also sampled to confirm the presence or absence of asbestos. Elsewhere across the site, samples were collected from the open grassed area of Lot 112, Lot 113 and Lot 6.

A total of fourteen soil samples and two samples of fibre cement sheeting fragments were collected for laboratory analysis. Quality Control (QC) samples, including one blind replicate sample, one trip blank and one trip spike sample were also collected during the fieldwork QC sample results are detailed Section 11.

A summary of the samples collected as part of the baseline ESA (including QC samples) is provided in Table 1, while their locations are shown on Figure 2.

8.2 STAGE 2 - PRELIMINARY EMU-PICK AND ASBESTOS CLEARANCE INSPECTION

The preliminary emu-pick of ACM fragments was undertaken by More Contracting in and around the, chicken sheds, general storage sheds and residential dwelling. The work was supervised by Hibbs and Associates whom also conducted asbestos fibre air monitoring during the works. Air monitoring results were considered acceptable and reports from Hibbs and Associates are provided in Appendix C.

The clearance inspection report issued by Hibbs and Associates is provided in Appendix B. Unfortunately thick, overgrown grass immediately surrounding the sheds prevented a thorough inspection around the source of the ACM fragments. However, the vegetation was removed up to 1.5 m around each shed during Stage 3 of the fieldwork operations. This was followed with a final emu-pick and asbestos clearance inspection (refer to Section 8.4).

8.3 STAGE 3 – DEMOLITION, REMEDEATION OF HYDROCARBON IMPACTED SOIL, VALIDATION AND WASTE CLASSIFICATION SAMPLING

8.3.1 Demolition and Clearance Works

DoP contracted More Contracting directly to demolish, and remove from site, the three general storage sheds located to the south of the two chicken sheds (Figure 3). Demolition of the sheds took place between 13 and 19 August 2009. Following removal of the sheds, gravel which was present at the base of each shed was also excavated and removed from the site. During removal of the gravel, buried ACM fragments were noted and excavation continued until there was no visible ACM present. It was estimated that up to 100 mm depth of ACM impacted soil in some areas was removed during this part of the works.

During demolition works, asbestos fibre air monitoring was conducted by Hibbs and Associates. Air monitoring results were considered acceptable and reports from Hibbs and Associates are provided in Appendix C.

During the same period, More Contracting also cleared vegetation up to 1.5 m around each of the chicken sheds and demolished the general storage sheds. The purpose of this was to facilitate a final emu-pick of ACM followed by asbestos clearance inspection by Hibbs and Associates (refer to Section 8.4).

Landfill tip dockets supplied by More Contracting for the demolition and clearance waste are provided in Appendix D along with a copy of More Contracting's licence to undertake the removal of friable asbestos (Licence 206650AS1).

Following demolition, CES collected validation samples from the near surface soils at the base of each former shed. The collection of these validation samples is discussed in more detail in Section 8.3.3.

8.3.2 Remediation of Hydrocarbon Impacted Soil

More Contracting, under the supervision of CES, excavated the hydrocarbon impacted soil adjacent to the three general storage sheds. The excavated material was placed directly into a skip bin for disposal, following waste classification of the impacted soil within the bin. The excavation was supervised by Stephen McCormack of CES, an experienced environmental engineer who routinely assessed the walls and base for evidence of hydrocarbon impact. The final size of the excavation was approximately 2.5 m x 2.5 m x 1.5 m deep. During excavation itwas apparent that the hydrocarbon had migrated more vertically than laterally. At the base of the final excavation a slight hydrocarbon odour was noted however, the depth was considered by DoP to be sufficient to have achieved the objective of removing any significant risk to future users of the site.

During excavation, samples of impacted soil which was placed into the skip bin were sampled for waste classification purposes in accordance with DECC (2008) *Waste Classification Guidelines*. Following excavation of the impacted soil, CES collected validation samples from the four walls and base of the final excavation pit. The waste classification and validation samples collected are discussed further in Section 8.3.3.

8.3.3 Waste Classification and Validation Sampling

8.3.3.1 Number of Samples and Location

As mentioned above, CES collected validation samples from the near surface soils beneath each of the demolished sheds (200809-01, 200809-03-SM and 200809-04) and from the four walls and base of the final hydrocarbon excavation pit (200809-10-SM, 200809-11-SM, 200809-13-SM, 200809-14-SM and 200809-15-SM). This equated to a total of eight samples.

A total of six waste classification samples were collected (200809-05-SM, 200809-06-SM, 200809-07-SM, 200809-08-SM, 200809-09-SM and 200809-12-SM), although sample ‘09’ was not analysed.

A summary of the waste classification and validation samples collected (including QC samples), including location, is provided in Table 3, while their locations are shown on Figure 3.

8.4 STAGE 4 – FINAL EMU-PICK AND ASBESTOS CLEARANCE INSPECTION

The final emu-pick of ACM fragments and asbestos clearance inspection was again undertaken by More Contracting and Hibbs and Associates on 21 August 2009.

The emu-pick and clearance inspection was limited to the footprint of the chicken sheds and former general storage sheds (i.e. the source of the ACM) and a 1.5m strip of cleared land surrounding the sheds.

The clearance inspection report issued by Hibbs and Associates is provided in Appendix E.

8.5 STAGE 5 – BACKFILLING OF HYDROCARBON EXCAVATION PIT

At the request of DoP, CES backfilled the hydrocarbon impacted soil excavation on 31 August 2009 with soil from a nearby stockpile. The soil in the stockpile comprised brown silty sand and sandy silt with grass rootlets throughout. The source of the stockpile was not known, however, considering it was situated adjacent to the dam, it is likely to have been former topsoil stripped from the location of the dam.

A single representative sample of the soil, used to backfill the excavation, was collected and analysed for validation purposes.

9 SAMPLING METHODOLOGY

All sampling was undertaken by CES Environmental Scientists/Engineers in accordance with documented sampling procedures.

9.1.1 Method of Sampling Collection and Depth

Care was taken to ensure that representative samples were obtained from the depth required and that sample integrity was maintained, particularly when dealing with potentially volatile and semi-volatile components.

Soil samples from the different stages of works were collected as follows:

- Soil samples for the baseline ESA were collected by hand from the near surface soils following excavation with a shovel. All samples were collected between 0.0 m and 0.3 m depth. Care was taken to ensure that the soil sampled had not come into contact with the shovel and the soil was transferred to the sample jar using new latex gloves; and

- Soil samples for validation were collected by hand from the near surface soils following excavation with a shovel. All samples were collected between 0.0 m and 0.1 m depth and care was taken to ensure that the soil sampled had not come into contact with the shovel. The soil sample was transferred to the sample jar using new latex gloves.

When collecting duplicates, samples to be analysed for volatiles were not mixed, rather they were placed directly into sample jars.

A summary of the sample depths is provided in Table 1.

9.1.2 Sampling Methodology

Sample collection, handling and preservation were undertaken in accordance with documented CES procedures by appropriately trained personnel. When collecting duplicate samples, samples were not homogenised, rather they were placed directly into sample jars to maintain the concentration of volatile compounds.

Sampling procedures for soil are summarised below:

1. Labelled sample containers with a unique sample identification, project details, date and initials of sampling personnel;
2. Collected samples in pre-washed glass jars with Teflon™ lined screw lids in accordance with USEPA methods SW846. All samples were collected by hand with new disposable gloves;
3. Ensured minimal head space within the sample jar and sealed jar with lid;

4. Completed Chain-of-Custody (COC) form;
5. Placed samples in coolers containing ice;
6. Sealed coolers with custody seal at the conclusion of sampling; and
7. Transported samples to the analytical laboratory under CES COC.

9.1.3 Sample Containers, Method of Sample Storage and Handling

The soil sample jars were glass with Teflon ™ lined lids and were supplied by the primary laboratory Australian Laboratory Services (ALS). The jars were completely filled with soil, labelled with unique sample identification, project details, date and initials of sampling personnel.

The soil jars, once filled with sample and sealed, were immediately placed in an esky / cool box in which ice had been added. At the end of the day the samples were transported, in the cool box, to the CES office where they were kept on ice until delivered to the laboratory in a cool box to which ice had been added.

Sample holding times, container and preservation requirements in accordance with NEPC (1999) are shown in Table 2.

9.1.4 VOC Screening

Where there was sufficient sample volume, part of the sample was placed in a re-sealable polyethylene bag for measurement of volatile soil gases using the closed headspace Photoionisation Detector (PID) method. The PID is a non-specific detector and the instrument provides a measure of concentrations of total ionisable compounds reported as equivalents of a calibration span gas. Therefore, the data are used to compare Volatile Organic Compounds (VOC) concentrations between samples without an understanding of the specific compounds present.

VOC concentrations detected by PIDs are dependent on a number of factors including:

- The concentration and type of VOCs present in soil samples;
- Soil texture and compaction largely influence the potential for VOCs to be released from samples;
- Time since sample collection; and
- Temperature strongly affects the level of volatilisation of VOCs from soil and fill samples. In fact, temperature changes may result in differences of up to one order of magnitude in levels of VOCs detected using PIDs. Consequently, field screening for

VOCs should be undertaken at the same time for all samples in order to produce representative results.

The procedure for soil screening using a PID is summarised as follows:

1. A corresponding sample to that selected for possible laboratory analysis was placed into a “snap-lock” or re-sealable plastic bag until half filled, then sealed. As recommended, samples were stored on ice and returned to base.
2. Upon returning to base, samples were left to equilibrate to ambient room temperature with occasional agitation to maximise the release of Volatile Organic Compounds (VOC) into the headspace. All samples were screened at the same time.
3. The PID instrument was calibrated to ambient air and a span gas comprising 97.5 ppm ± 10 Isobutylene.
4. Background VOC concentrations in ambient air were measured prior to each reading in order to account for sensor drift. Concentrations were recorded on field data sheets along with date, location details, depth and method (HS for headspace method).
5. The point of the PID or a knife was used to punch a small hole in the top of the plastic bag. The tip of the PID was pushed into the hole in the bag, the readout monitored and the maximum and minimum concentrations during the measurement period were noted.
6. The concentrations were noted in field data sheets.
7. The process outlined above was repeated for each sample (i.e., background reading followed by sample reading).
8. Instrument calibration was checked against span gas at the conclusion of monitoring. Calibration checks and recalibrations were recorded on field data sheets (Appendix H).
9. Samples with high concentrations of VOCs in headspace gases were included for TPH testing at the laboratory.

A summary of the PID readings are provided in Table 1.

9.1.5 Decontamination Procedures

As described above, soil samples were collected from a shovel excavation by hand using a new pair of disposable latex gloves. Care was taken to ensure that the material collected for analysis had not come in contact with the shovel. Therefore, decontamination of the excavator bucket was not required and no rinsate blank was collected for analysis.

9.1.6 Documentation

All samples were classified in the field based on soil/fill characteristics, which along with obvious signs of contamination such as discolouration and/or odour, were noted on a log.

All samples, including QA samples, were transported to the primary and check laboratories under Chain-of Custody procedures and maintained in an ice-filled cool box. The COC detailed the following information:

- Site identification;
- The sampler;
- Nature of the sample;
- Collection time and date;
- Analyses to be performed;
- Sample preservation method;
- Departure time from office; and
- Time of receipt at the laboratory.

9.1.7 Sample Logging

A qualified environmental scientist logged the sampled soil prior to placing into the laboratory supplied sample jar. A description of each soil sample is provided in Table 1.

10 ANALYTICAL PROGRAMME

10.1.1 Laboratory Analysis

10.1.1.1 Baseline ESA Samples

Soil samples were selected for analysis based on the PID screening, visual observations and odour. Selected soil samples were analysed for heavy metals, TPH, BTEX, PAHs, OCP, OPP, PCB and asbestos. A summary of the soil analytical programme is provided in Table 1.

10.1.2 Waste Classification Samples

Waste classification samples were analysed for elevated chemicals identified by the baseline ESA sampling, specifically, metals (both total and leachable concentrations), TPH, BTEX and PAHs (both total and leachable concentrations where applicable). A summary of the soil analytical programme is provided in Table 3.

10.1.3 Validation Samples

The validation samples collected from the base of the demolished sheds were analysed for heavy metals, TPH, BTEX, PAHs and asbestos. Samples collected from the hydrocarbon impacted soil excavation were analysed for heavy metals, TPH, BTEX, PAHs. The validation sample collected from the material used to backfill the hydrocarbon excavation was analysed for heavy metals, TPH and BTEX as directed by DoP.

10.1.4 Analytical Parameters and Methods

CES commissioned ALS as the primary laboratory which is National Association of Testing Authorities (NATA) registered for the testing undertaken. No secondary (or check) laboratory was used during this investigation.

Soil samples were analysed in accordance with NEPC (1999) using accredited methods based on US EPA and APHA approved analytical methods as described in Table 4. The corresponding laboratory Limits of Reporting (LORs) are also summarised in Table 4.

11 QA/QC DATA EVALUATION

All soil samples were collected by experienced CES environmental scientists and engineers, under established CES protocols. CES personnel have been trained in sample collection and handling techniques.

For the purpose of assessing the quality of data presented in this report, CES collected and analysed various Quality Control (QC) samples (field QC samples), while the laboratory completed their own QC. The current section of this report is focused on the presentation of results of these QC samples, adherence to QA systems and discussion of deviations, if any, from the Data Acceptance Criteria (DAC). A description of the types of QC samples and their purpose is provided Appendix F.

Additionally, in accordance with the NSW DEC (2006) *Contaminated Sites: Guidelines for the NSW Site Auditor Scheme (2nd Edition)*, Data Quality Indicators (Completeness, Comparability, Representativeness, Precision and Accuracy) have also been considered, where appropriate.

11.1 FIELD QC

11.1.1 Blind Replicates

One blind replicate sample 020709-13-ME (blind replicate of environmental sample 020709-10-ME) was analysed to assess the quality control during the field sampling program. The frequency of blind replicate samples compared to primary samples analysed does not meet NSW EPA (1994) and the DAC requirement of 5%, however, the investigation was limited and not intended to provide a comprehensive assessment of potential contamination across the site.

All the RPDs calculated for the blind replicate pair conformed to CES standard DAC.

11.1.2 Trip Blanks

Two laboratory prepared trip blanks (Trip Blank - 2 July 2009 and Trip Blank – 20 Aug 2009) were submitted with the two largest batches of samples collected during the investigation.

The concentrations of BTEX compounds in the trip blank were below the respective laboratory LORs and therefore conformed to the DAC.

11.1.3 Trip Spikes

Two laboratory prepared trip Spike samples (Trip Spike – 2 July 2009 and Trip spike – 20 Aug 2009) was submitted with the two largest batches of samples collected during the investigation.

With the exception of the recovery for meta- and para-xylenes (68%), the recoveries for the remaining BTEX compounds in the trip spike conformed to the DAC. From discussions with the analytical laboratory, a recovery of 68% for meta- and para-xylenes meets the laboratory and NATA QC range of 60 to 140%. Considering that the recovery meets the laboratory and NATA QC, the exceedance does not affect the quality of the data.

11.2 LABORATORY QA

All analysis was undertaken by a NATA accredited laboratory (ALS) using NATA accredited analytical methods.

11.3 LABORATORY QA/QC

Laboratory QA/QC data is presented in full in the laboratory certificates in Appendix F.

11.3.1 Laboratory Duplicates

The laboratory duplicate samples conformed to the DAC.

11.3.2 Laboratory Control Samples

The results of laboratory control samples conformed to the DAC.

11.3.3 Surrogates

The results of laboratory surrogate samples conformed to the DAC.

11.3.4 Matrix Spikes

All matrix spike recoveries were within the acceptable range as outlined in the DAC.

11.3.5 Method Blanks

Concentrations of all parameters in method blanks were below the laboratory's LOR and therefore conformed to the DAC.

11.3.6 Sample Holding Times

All samples were extracted and analysed within the specified holding times.

11.3.7 Sample Condition

All samples were received by the analytical laboratories in correctly preserved and chilled containers with no reported breakages. Sample receipt advice sheets are presented with the laboratory reports in Appendix G.

11.4 DATA QUALITY INDICATORS (DQI)

11.4.1 Precision

Where applicable, the RPD's of the field and laboratory duplicates generally conformed to the DAC, which indicated the sampling, laboratory and analytical precision was within acceptable limits and therefore provided confidence of limited variability and high reproducibility of the data set.

11.4.2 Accuracy

Considering the results of the field QA/QC and the use of a NATA accredited laboratory, it is considered likely that the laboratory is accurate and useable.

11.4.3 Representativeness

CES consider the samples collected from the site to be representative of the materials being targeted as part of this investigation.

11.4.4 Completeness

All samples were collected and analysed in accordance with the documented CES procedures. All other required QA/QC data, including both field and laboratory data (where applicable) is also provided and complete.

11.4.5 Comparability

Soil samples were collected by experienced CES environmental scientists/engineers in accordance with appropriate CES protocols and analysed in accordance with NATA accredited laboratory methods. The comparability of the data should be consistent as sampling protocols were employed throughout the duration of the fieldwork and analysis was undertaken by NATA registered laboratories using accredited analytical methods.

11.5 ASSESSMENT

It is concluded that laboratory data are of acceptable quality and are considered useable in making conclusions and recommendations regarding the site.

12 SITE ASSESSMENT CRITERIA

To determine the significance of any contaminants detected in the baseline ESA samples and the validation samples, appropriate Site Assessment Criteria (SAC) were defined with reference to the proposed land use (i.e. Recreational and open space). In accordance with NSW DEC (2006), acceptability for recreational and open space land use, aesthetics (contaminant odours in particular) and potential phytotoxicity, must be addressed by the SAC.

12.1 AESTHETICS

On recreational sites aesthetics relate to appearance (e.g. visual discolouration) as well as the generation of odours from the soil as a result of contamination (NSW DEC, 2006). Soil odour was continually assessed in the field while undertaking the investigations.

12.2 SOIL - HEALTH BASED INVESTIGATION LEVELS

To address potential health impacts at the site given the proposed recreational land use, CES has compared the analytical results against the NEPC (1999b) Health Investigation Levels (HIL) recommended for exposure setting 'E' which includes parks, recreational open space, playing fields and secondary schools. HIL 'E' is considered appropriate as it is set at a level that provides confidence that contaminant concentrations below the HIL will not adversely affect human health.

As the site is proposed to be used for recreational land use, CES has adopted the following HIL criteria:

- NEPC (1999) Health Based Investigation Levels (HIL) recommended for exposure setting 'E'; and
- With respect to hydrocarbons (TPH and BTEX), no NEPC assessment criteria are available for which the NSW EPA (1994) Threshold Concentrations for Sensitive Land-use have been adopted.

With respect to asbestos in soil, the current EPA policy is that sites should not contain any Asbestos Containing Material (ACM) or asbestos fibres at the surface. For this project, CES have adopted the policy that there must be no visible ACM and each soil sample collected must not contain any respirable asbestos fibres above the lower detection limit of the NATA certified analytical method used by ASET (i.e. 0.1 grams per kilogram).

A summary of the SAC is provided in Table 5.

12.3 WASTE CLASSIFICATION CRITERIA

Waste assessment criteria have been adopted from the NSW DECC (2008) *Waste Classification Guidelines Part 1: Classifying Waste*. Under the NSW DECC (2008) guidelines, non-liquid waste may be classified in the following groups:

(i) General Solid Waste (Putrescible);

(ii) General Solid Waste (Non-putrescible);

(iii) Restricted Solid waste;

(iv) Hazardous Waste; and

(v) Special Waste.

The guidelines contain a classification process for liquid and non-liquid waste. The process includes the comparison of total or Specific Contaminant Concentrations (SCC) with Contaminant Threshold (CT) values. The CT values are highly conservative and are based on the assumption that all the contaminants present in a sample are leachable and would leach completely. CT values are used largely in the early stages of waste-classification activities.

The waste characterisation process can also involve the determination of leachable contaminant concentrations using the TCLP. In this stage of the process, both SCC and leachable concentrations are used to classify waste. The waste classification can be determined jointly by SCC and leachable concentrations. It should be noted that in the instance that **either** SCC or leachable concentration criteria for **one** contaminant are exceeded, then the higher waste category must be adopted. SCC values for waste classification refer to total contaminant concentrations measured as part of the investigation.

Waste criteria for contaminants measured in this investigation are presented in Table 6.

13 RESULTS

Results of the investigation are presented below.

13.1 BASELINE SAMPLING

13.1.1 Aesthetics

Minor quantities of bitumen or asphalt were noted in a small stockpile of imported fill located adjacent to the northern-most chicken shed (Sample SS07 – Figure 4). Discolouration and hydrocarbon odour was identified adjacent to the general storage sheds (Samples SS61/SS62 – Figure 2). This localised area of hydrocarbon impacted soil was remediated as described in Section 8.3.2).

13.2 SOIL PID FIELD SCREENING RESULTS

Results of the PID field screening indicated Volatile Organic Compounds (VOC) at concentrations between 1.1 ppm in sample 020709-12-ME (SS12) to 149.1 ppm in sample 020709-61-ME (SS61) indicating that the screened soil samples contained low concentrations of VOC. The slightly elevated PID reading for sample 020709-61-SM corresponded to the localised hydrocarbon impacted soil.

PID field data sheets are presented in Appendix H.

13.3 ANALYTICAL RESULTS

Soil analytical results for the samples collected as part of the baseline ESA are presented below. Laboratory certificates of analysis are presented in Appendix G.

13.3.1 Heavy Metals

A total of fourteen near surface soil samples were submitted to the laboratory for analysis of eight metals including arsenic, cadmium, chromium, copper, nickel, lead, mercury and zinc. The concentrations of heavy metals in all samples analysed are presented in Table 7.

With the exception of lead in sample 020709-62-ME (SS62) located within the localised area of hydrocarbon impacted soil at 0.2 – 0.3 m depth, the concentrations of metals were below the SAC.

13.3.2 TPH and BTEX

A total of eleven near surface soil samples were submitted to the laboratory for analysis of TPH and BTEX. The concentrations of TPH and BTEX in all samples analysed are presented in Table 8.

With the exception of two samples collected from the localised area of hydrocarbon impacted soil (020709-61-ME and 020709-62-ME), the concentrations of TPH and BTEX were below the SAC for all samples analysed.

13.3.3 PAHs

A total of eleven near surface soil samples were submitted to the laboratory for analysis of PAHs. PAH concentrations in the soil samples are presented in Table 9.

With the exception of benzo(a)pyrene in sample 020709-07-ME (SS7) the concentrations of PAH were below the SAC for all samples analysed. It is noted that SS7 was collected from a small stockpile of imported sandy soil located adjacent to the northern-most chicken shed. The stockpile contained some asphalt particles which are likely to have caused the elevated PAH concentrations.

13.3.4 OCPs

A total of nine soil samples were submitted to the laboratory for analysis of OCPs. OCP concentrations in the soil samples are presented in Table 10.

OCP concentrations were below the laboratory detection limit and below the SAC for all samples analysed.

13.3.5 OPPs

A total of nine soil samples were submitted to the laboratory for analysis of OPPs. OPP concentrations in the soil samples are presented in Table 11.

OCP concentrations were below the laboratory detection limit for all samples analysed.

13.3.6 PCBs

A total of nine soil samples were submitted to the laboratory for analysis of PCBs. PCBs concentrations in the soil samples are presented in Table 12.

PCB concentrations were below the laboratory detection limit and below the SAC for all samples analysed.

13.3.7 Asbestos

Results for soil samples submitted for asbestos analysis are presented in Table 13. Asbestos was not detected in any of the soil samples analysed, however was detected in the samples of fibre cement sheeting found at the base of the former general storage sheds.

13.4 WASTE CLASSIFICATION SAMPLES

Soil analytical results for the samples collected for waste classification purposes are presented below. Laboratory certificates of analysis are presented in Appendix G.

13.4.1 Heavy Metals

The total and leachable concentrations of heavy metals in the soil samples are presented in Table 14.

The concentrations of metals in waste classification samples were below the threshold levels for General Solid Waste.

13.4.2 TPH and BTEX

The concentrations of TPH and BTEX in the waste soil samples are presented in Table 15.

The concentrations of TPH and BTEX in waste classification samples were below the threshold levels for General Solid Waste.

13.4.3 PAHs

The total and leachable concentrations of PAHs in the waste soil samples are presented in Table 16.

The concentrations of PAH in waste classification samples were below the threshold levels for General Solid Waste.

13.4.4 Final Waste Classification

On the basis of the CES reported analytical results, and in accordance with DECC NSW (2008) *Waste Classification Guidelines Part 1: Classifying Waste*, the hydrocarbon impacted soil which was excavated and disposed off-site is classified as General Solid Waste (Non-Putrescible). This soil was disposed of accordingly at SITA Australia Pty Ltd's Elizabeth Drive Landfill, Kemps Creek NSW.

A copy of the landfill delivery docket is provided in Appendix I.

13.5 VALIDATION SAMPLES

Analytical results for the validation soil samples collected at the site are presented below. Laboratory certificates of analysis are presented in Appendix G.

13.5.1 Metals

The concentrations of metals in the soil validation samples are presented in Table 17. The concentrations of all metals analysed in each sample were below the SAC.

13.5.2 TPH and BTEX

The concentrations of TPH and BTEX in the soil validation samples are presented in Table 18.

TPH and BTEX concentrations were below the SAC for each of these samples.

13.5.3 PAHs

PAH concentrations in the validation soil samples are presented in Table 19.

The concentrations of PAH were below the SAC and laboratory detection limit for all samples analysed.

13.5.4 Asbestos

Results for validation soil samples submitted for asbestos analysis are presented in Table 20. Asbestos was not detected in any of the soil samples analysed.

14 CONCLUSIONS

CES has undertaken a baseline ESA and limited remediation and validation works, at the site located at 65 – 115 Redmayne Road, Horsley Park, NSW. The purpose of the works was to provide some assurance that there will be no significant health-risk to future users of the site. CES understands that Western Sydney Parklands, the owners of the site, intend to lease the site for recreational use, specifically a children's dirt-bike riding track and associated facilities.

The baseline ESA identified a localised area of hydrocarbon impacted soil, fragments of ACM in and immediately surrounding a number of sheds on the site, and elevated PAHs within a small stockpile of imported sandy soil.

The hydrocarbon impacted soil was excavated and disposed off-site as general solid waste, as determined by waste classification sampling conducted in accordance with DECC NSW (2008) *Waste Classification Guidelines Part 1: Classifying Waste.* The soil remaining in the excavation was validated by CES as being suitable for the intended recreational land-use. Additionally, soil used to backfill the excavation, which was sourced from site, was also validated as being suitable for the intended land-use.

The fragments of ACM within and immediately surrounding the sheds on the site (which is also the source of the ACM) were collected and appropriately disposed off-site by More Contracting, which is licensed to carry out the removal of friable asbestos. Following removal of the visible ACM fragments, Hibbs and Associates conducted an asbestos visual clearance inspection in and immediately surrounding the sheds and found no visible ACM.

At the request of DoP, More Contracting also demolished three derelict general storage sheds which were predominately clad in asbestos fibre cement sheeting. The near surface soil beneath the footprint of the sheds was validated by CES as being suitable for the intended recreational land-use.

The elevated PAHs found within the small stockpile of imported sandy soil are likely to be attributed to fragments of asphalt observed within the stockpile and not considered to be a significant risk (with respect to contamination) to future users of the site.

15 LIMITATIONS OF THIS REPORT

This report has been prepared for use by the client who commissioned the works in accordance with the project brief and based on information provided by the client. The advice contained in this report relates only to the current project and all results, conclusions and recommendations should be reviewed by a competent person with experience in environmental investigations before being used for any other purpose. Consulting Earth Scientists Pty Ltd (CES) accepts no liability for use of interpretation by any person or body other than the client. This report must not be reproduced except in full and must not be amended in any way without prior approval by the client and CES.

The extent of sampling and analysis of soils has been undertaken to provide site coverage with sampling, where possible. The positioning of sample locations has been limited by site features and floor coverings.

Furthermore, soil, rock and aquifer conditions are variable, resulting in potential for the heterogeneous distribution of contaminants across the site. The accuracy with which subsurface conditions have been characterised depends on the frequency of sampling, field and laboratory methods, the uniformity of the substrate and is therefore limited by the scope of works undertaken.

This report is based on sampling from borehole locations placed to provide site coverage and limited by site features and floor coverings. This report does not provide a complete assessment of the environmental status of the site and is limited to the scope defined therein. Should information become available regarding conditions at the site including previously unknown sources of contamination, CES reserves the right to review the report in the context of the additional information.

16 REFERENCES

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Figures

Tables

Appendix A
Fairfield Council Zoning Map

Appendix B
Asbestos Visual Inspection Clearance Report – 24 July 2009

Appendix C
Asbestos Fibre Air Monitoring Results

Appendix D
Demolition Waste Landfill Delivery Dockets

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Appendix F
Quality Assurance / Quality Control

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Appendix I
Landfill Delivery Docket – Hydrocarbon Impacted Soil