

## 6.0 Site Suitability Status

Based on the information available from the assessments completed to date:

- Soil and groundwater investigations have not identified any unacceptable risk to current or future occupants of the Site.
- Remedial works carried out (associated with the UPSS) have reported successful removal of UPSS and associated impacted soils.
- Hazardous material investigations did not identify materials that could not be managed through conventional WHS, Asbestos Register, or Construction Environmental Management Plan procedures.

Furthermore, in relation to development on the site:

- Any future development proposal would be subject to development assessment under the *Planning and Development ACT 2007*, at which time consideration would be given, by the relevant entities, to the merits of the proposal and the appropriateness of the site to the support development of that type.

For these reasons, AECOM considers that the site could be capable of supporting a CFZ land use with potential for a child care.

## 7.0 References

- 1) AECOM Australia Pty Ltd (2014a) *Remedial Action Plan, Former West Belconnen Fire Station*, issued 03 March 2014 (attached).
- 2) AECOM Australia Pty Ltd (2014b) *JACSD Charnwood, Stage 1 Environmental Assessment*, issued 18 November 2014 (attached).
- 3) AECOM Australia Pty Ltd (2014c) *UPSS Validation Report, Former West Belconnen Fire Station, Belconnen ACT*, issued 03 October 2014 (attached).
- 4) AECOM Australia Pty Ltd (2015a) *Former Charnwood Fire Station, Stage 2 Environmental Site Assessment Report*, issued 13 March 2015 (attached).
- 5) AECOM Australia Pty Ltd (2015b) *Excavated Soils, Block 6 Section 97, Former West Belconnen Fire Station, Charnwood, ACT, Validation Letter*, issued 30 April 2015 (attached).
- 6) Coffey Environments Pty Ltd (2013) *Hazardous Materials Register and Management Plan, Charnwood Fire Station, 35 Lhotsky Street, Charnwood*, issued
- 7) National Environmental Protection Council (1999) *National Environment (Assessment of Site Contamination) Protection Measure*, as amended May 2013. Health Screening Levels A – low density land use including childcare centres and risk-based assessment of groundwaters.

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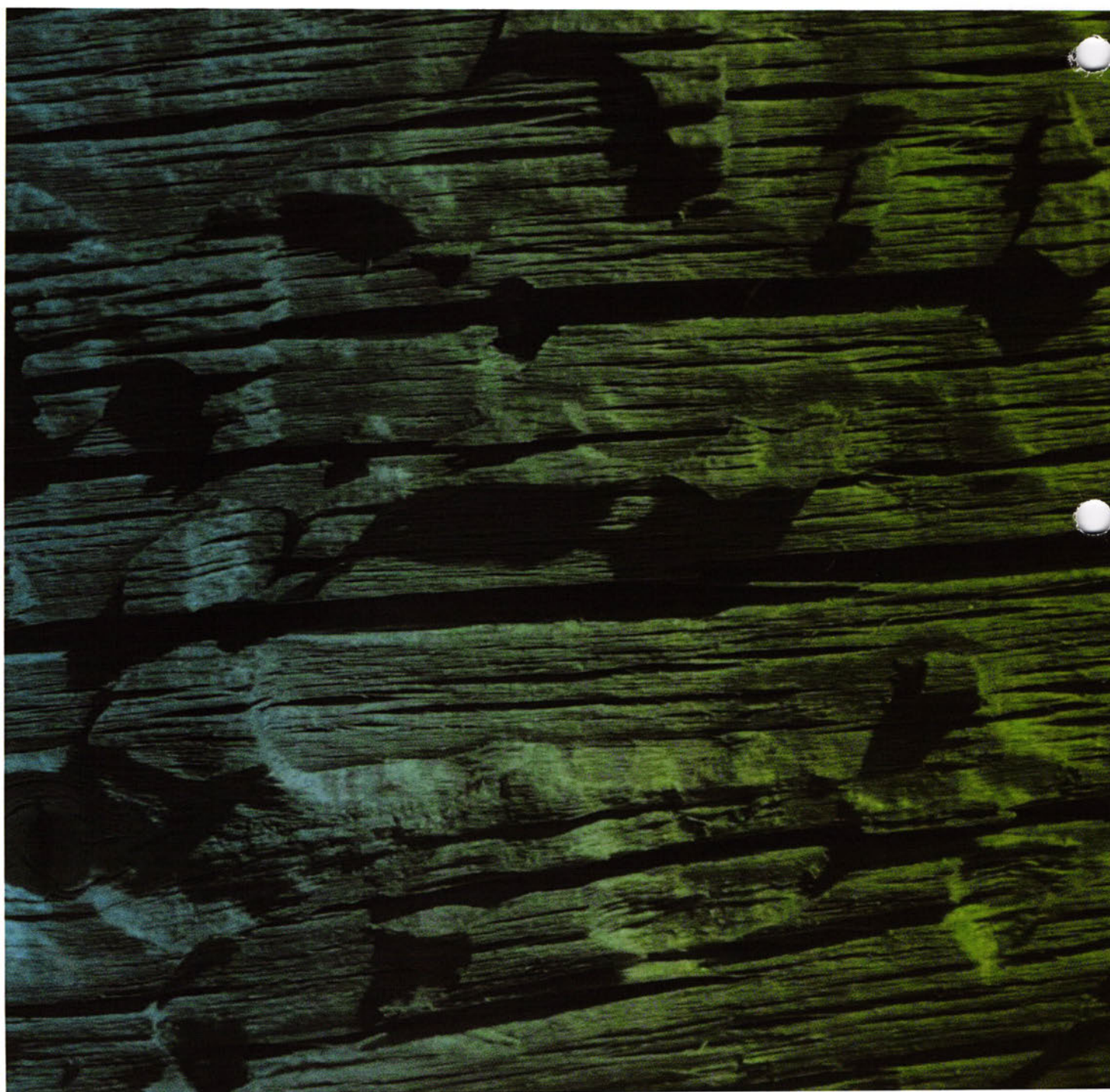
AECOM Australia Pty Ltd (2014a) *Remedial Action Plan, Former West Belconnen Fire Station*, issued 03 March 2014.



West Belconnen RAP  
Justice and Community Services  
Directorate  
03-Mar-2014  
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# Remedial Action Plan

Former West Belconnen Fire Station



AECOM

West Belconnen RAP  
Remedial Action Plan

## Remedial Action Plan

Former West Belconnen Fire Station

Client: Justice and Community Services Directorate

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## Glossary of Terms

General Terms				
ACT EPA	Australian Capital Territory Environment Protection Authority			
ACM	Asbestos containing material(s)			
AEC	Areas of Environmental Concern			
ANZECC	Australian and New Zealand Environment and Conservation Council			
AHD	Australian Height Datum			
AST	Above Ground Storage Tank			
BMRGG	Bureau of Mineral Resources, Geology and Geophysics			
BoM	Bureau of Meteorology			
BTEX	Benzene, toluene, ethylbenzene and xylenes			
COPC	Contaminants of potential concern			
EMP	Environmental Management Plan			
EPA	Environment Protection Authority			
ESA	Environmental Site Assessment			
Heavy metals	Generally arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc			
JACSD	The Justice & Community Safety Directorate			
NEPC	National Environment Protect Council			
NEPM	National Environmental Protection Measure			
NSW EPA	New South Wales Environment Protection Authority			
OCP	Organochlorine pesticides			
OPP	Organophosphorus pesticides			
PAH	Polycyclic Aromatic Hydrocarbons			
PCB	Polychlorinated biphenyls			
RAC	Remediation Acceptance Criteria			
SMP	Soil or Site Management Plan			
SWL	Standing water level			
TPH	Total petroleum hydrocarbons			
UST	Underground Storage Tank			
VENM	Virgin Excavated Natural Material			
Units				
ha	hectare		mg/L	milligrams/litre
km	kilometre		µg/kg	micrograms/kilogram
L	litre		µg/L	micrograms/litre
L/s	litres/second		ppb	parts per billion
m	metre		ppm	parts per million
mg/kg	milligrams/kilogram		t	Tonne

## 1.0 Introduction

### 1.1 Preamble

AECOM Australia Pty Ltd (AECOM) was engaged by Justice and Community Safety Directorate (JACSD) to prepare this Remedial Action Plan (RAP) for the removal of Underground Storage Tanks (USTs) located at the former West Belconnen Fire Station.

The former Fire Station site is identified as Block 6, Section 97, Charnwood, ACT (the Property). The Property location is shown on **Figure 1** and the current Property and Site layout is shown on **Figure 2** in **Appendix A**.

Remediation activities are to be undertaken at the Site to ensure that removal of onsite Fuel Storage and Dispensing Infrastructure is undertaken in accordance with ACT Environment Protection Authority (EPA) requirements and its suitability for proposed future land consistent with commercial/industrial land use, as defined under the National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 2013) (herein referred to as the ASC NEPM [NEPC, 1999 as amended]).

It should be noted that these works do not provide an overall assessment of the Suitability of the site and only relate to the onsite fuel storage and dispensing area.

### 1.2 Objective

The objectives of this RAP are to:

- Present a plan of the anticipated remediation works for the removal of existing onsite USTs and related fuel dispensing infrastructure.

The scope of remediation works and methodology presented herein is based on AECOM's current understanding of the nature and extent of existing fuel storage and dispensing infrastructure and potential contamination identified within the Site.

AECOM notes that the RAP is required to be approved by the ACT EPA.

This RAP has been developed with reference to the following guideline documents:

- ANZECC/ARMCANZ, 2000. *Australian and New Zealand Environment Guidelines for Fresh and Marine Water Quality* (Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand)
- ACT EPA, 2011. *Environmental Guidelines for Service Station Site and Hydrocarbon Storage*
- ACT EPA, 2009. *Contaminated Sites Environmental Protection Policy*
- ACT EPA, 2008. *Practice Note 3 – Contaminated Soils*
- ACT EPA, 2008. *Practice Note 4 – Contaminated Sites*
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 2013) NSW Environment Protection Authority (EPA), 1997. *Guidelines for Consultants Reporting on Contaminated Sites*
- NSW Department of Environment and Conservation (DEC), 2006. *Guidelines for the NSW Site Auditor Scheme* (2<sup>nd</sup> edition)
- Western Australian (WA) Department of Health (DOH), 2009. *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia*. May 2009.



### 1.3 Background

The site is identified as the former West Belconnen Fire Station located on the corner of Lhotsky Street and Florey Drive, Charnwood, ACT (the Site).

The Site is currently non-operational and is planned to be redeveloped for future commercial/industrial purposes.

Information provided to AECOM indicates the presence of USTs, Fuel Dispensing Infrastructure and associated connective pipe works to be located within the eastern portion of the Site associated with the historical use of the Site.

A review of site plans provided to AECOM indicates that the storage and dispensing infrastructure is comprised of the following:

- 3 Underground storage tanks up to 4500 L in size. The tanks were identified to contain a range of diesel and petroleum products
- 2 fuel dispensers located on concrete hardstand
- 3 vent pipes
- Buried connective pipework.

**Figure 1** (below) illustrates the layout of the Site.

**Figure 1** Former West Belconnen Fire Station Site Layout



Following removal of the identified contamination sources within the Site (USTs, Fuel Dispensers etc.), validation and classification samples are to be collected and analysed to assess the suitability for the proposed ongoing commercial/industrial land use.

## 2.0 Summary of Background Information

### 2.1 Property Identification

The Property identification details are provided in **Table 1** below.

**Table 1** Property Details

Item	Description
Property Identification	Former West Belconnen Fire Station
Property Address <sup>(1)</sup>	Corner of Lhotsky Street and Florey Drive, Charnwood ACT
Title Identification Details <sup>(2)</sup>	Block 6, Section 97 Charnwood
Property Area <sup>(2)</sup>	The total site area is approximately 3638 m <sup>2</sup>
Current Zoning <sup>(1)</sup>	TSZ2 - Services
Site Owner	Owned by ACT Government, managed by Justice and Community Safety Directorate
Property Location	<b>Figure 1</b>
Property & Site Layout	<b>Figure 2</b>

Notes: <sup>(1)</sup> Data sourced from Douglas Partners 2012a

<sup>(2)</sup> Data sourced from AECOM 2012

### 2.2 Topography and Drainage

The site and surrounding area is generally flat with a slight slope to the south. During an inspection of the Site no visible surface water was present within the Site boundary; however it is expected that surface water when present during periods of rainfall would generally flow to the site boundaries and captured by onsite and adjacent stormwater infrastructure.

### 2.3 Regional Meteorology

Climatic data was obtained from the Bureau of Meteorology (BoM) website (<http://www.bom.gov.au>). The closest BoM weather station (070014), located at Canberra Airport indicates the following:

- Average annual rainfall of 616 mm, with October and November typically the wetter months (>60 mm per month)
- Average maximum temperature of 19.7°C, ranging from 11.3°C in July to 28.0°C in January
- Average minimum temperature of 6.5°C, ranging from 0.1°C in July to 13.2°C in January.

### 2.4 Geology

Review of available mapping indicates that the site is underlain by material of middle-late Silurian age (Bureau of Mineral Resources, Geology and Geophysics 1984). This material consists of rhyodacitic ignimbrite and minor volcanoclastic and argillaceous sediments.

### 2.5 Hydrogeology

Review of available mapping indicates that the site is underlain by two water bearing zones of middle-late Silurian age (Bureau of Mineral Resources, Geology and Geophysics 1984).

Both of the hydrogeological units are noted to be fractured with higher yielding zones associated the upper and lower portions of the individual ash-flow tuffs and interbedded sediments. The water quality is variable to poor with yields expected to be 0.5 – 1.0 L/s with total dissolved solids of 500 – 1000 mg/L.

## 3.0 Remediation Feasibility Study

### 3.1 Remedial Objective

The remedial objective is to remove existing USTs, fuel dispensing infrastructure, associated tank fill materials and contaminated soils at the Site to the specified Remediation Acceptance Criteria (RAC) (Refer to **Section 5.0**).

### 3.2 Soil

#### 3.2.1 Summary of Remediation Required at the Site

AECOM notes that:

- The remedial areas relate to the area immediately surrounding USTs and dispensing infrastructure only, not the remainder of the Property
- The ACT EPA preference for decommissioning of USTs is by removal, with in-situ decommissioning to be considered only where all other options have been exhausted.

Based on information provided to AECOM by JACs the following table summarises the remediation areas to be addressed. The remediation areas are shown on **Figure 2 (Appendix A)**:

**Table 2 Remediation Areas**

Area(s)	Location	Remediation Extent
1	3 x Underground Storage Tanks located within the eastern portion of the Site adjacent to the site access driveway.	Vertically to approximately 0.5 m beneath the current base of the USTs and laterally as far as necessary and practicable to remove hydrocarbon impacted soils.
2	Vent pipes, Connective pipework and dispensing infrastructure.	Removal of fuel lines, dispensing infrastructure and vent lines and excavation of soil beneath the line to approximately 0.5 m beneath lines.
3	Contaminated soils.	Contaminated soils surrounding the UST tank pits are to be excavated to the extent practicable to ensure risk to human health and the environment is acceptable from potential contamination arising from onsite Underground Petroleum Storage Systems (UPSS) infrastructure.

### 3.2.2 Evaluation of Soil Remediation Options

Following removal of USTs and associated dispensing infrastructure the potential exists for contaminated fill and soil material to be present within the Site.

An evaluation of the remediation options for the impacted soils at the Site is summarised in **Table 4** below.

**Table 3 Soil Remediation Options**

Soil Remediation Options	Comments	Feasibility Assessment
<b>1. Do Nothing/Ongoing Management</b>	This option is suitable where contamination presents a low or minimal risk to human health and the environment.	<b>Poor</b> – Strategy does not match with Site objective of remediating to meet EPA requirements for UST removal.
<b>2. Excavation and Offsite Treatment/Landfarming</b>	This option involves onsite landfarming of soils containing CoPCs above the RAC. This strategy is a well proven and relatively time-and cost-effective option for remediation of petroleum hydrocarbon impacted soils where there is substantial space available for stockpiling of soils. This strategy is in line with the preferred options detailed in the ACT EPA (2009).	<b>Possible</b> – Space for land farming is available within the sealed bitumen area at the rear of the Site, however due to the small volume of material to be excavated, it is the opinion of AECOM that land farming and turning of soils on site is not cost effective.
<b>3. Excavate and Offsite Disposal to Licensed Landfill Facility</b>	This option involves the excavation and offsite disposal of soils containing CoPC concentrations above the RAC. This strategy is less environmentally-sustainable than onsite landfarming and reuse.	<b>Feasible</b> – This can be an uncomplicated and time-effective strategy, however, additional costs would be incurred for transport and disposal of soils. AECOM notes that due to the small volume of soil material this is likely to be the most cost effective option.
<b>4. Consolidation and Isolation of Contaminated Soils</b>	This option involves the excavation and placement of soil exceeding the RAC in a properly engineered barrier or containment cell. Typically requires a long-term management plan and long-term design integrity monitoring program.	<b>Poor</b> - This strategy would require approval from the consenting authority and does not match well with Site objective of remediating to the RAC. Could affect future site use and development.

### 3.2.3 Preferred Soil Remediation Strategy

Based on the available options, the proposed future land use and the feasibility study presented above, AECOM considers that Soil Remediation Option # 3 (comprising excavation with offsite disposal to landfill where/as required) is the most practical approach to address impacted soils present at the Site.

It should be noted that wherever possible, the volume of soils to be disposed to landfill shall be minimised.

## 3.3 Groundwater

At the time of preparing this RAP, it is the understanding of AECOM that no investigation into the quality of groundwater underlying the Site has been undertaken.

Upon completion of UST excavation and soil disposal works, where the potential is identified for contamination to have impacted underlying groundwater aquifers consideration to be given to the installation and monitoring of groundwater monitoring wells.

The potential for impact on groundwater and where necessary additional investigation recommendations should also be addressed within the Site Validation Report.

## 4.0 Remediation Acceptance Criteria

The proposed Remediation Acceptance Criteria (RAC) for the Site is based on the following guidance documents:

- ACT EPA (2009). Contaminated Sites, Environment Protection Policy
- ACT EPA (2000). Environmental Standards: Assessment and Classification of Liquid and Non-Liquid Wastes
- ACT EPA (2001). Practice Note No. 3: Requirements for the Disposal of Contaminated Soil
- Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand. (ANZECC and ARMCANZ), 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality – Aquatic Ecosystems 95% Protection of Species Trigger Values for Fresh Water
- National Environment Protection Council (NEPC), 1999. National Environment Protection (Assessment of Site Contamination) Measure
- NSW DEC, 2006. Guidelines for the NSW Site Auditor Scheme (2<sup>nd</sup> Edition)
- NSW EPA, 1994. Guidelines for Assessing Service Station Sites
- Western Australian Department of Health (2009): Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia.

It is noted that all soil movement in ACT requires approval from ACT EPA.

While it is the opinion of AECOM that less than 200m<sup>3</sup> of material will require excavation, if more than 1000 m<sup>3</sup> of material is to be landfarmed, an Environmental Authorisation (EA) will be required from the ACT EPA in accordance with the Environment Protection Act 1997.

### 4.1 Remediation Acceptance Criteria

Given the proposed required soil analytical program for the Site and the proposed future land use (commercial/industrial), a range of investigation criteria sourced from the guidance documents listed above are required to be applied.

Application of these guidelines to the soil samples to be collected and analysed from the Site is described below.

The current assessment criteria endorsed by ACT EPA to evaluate soil analytical results are based on the following guidelines:

- ACT EPA 2011: Environmental guidelines for service station sites and hydrocarbon storage
- NSW EPA, 1994. *Guidelines for Assessing Service Station Sites*
- NSW DEC, 2006. *Guidelines for the NSW Site Auditor Scheme (2<sup>nd</sup> Edition)*
- National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (NEPC, 2013).

The guidelines to which soil analytical results are compared within ACT present a range of Health-Based Soil Investigation Levels (SILs), provisional Phytotoxicity-Based Investigation Levels (PBILs), Ecological Investigation Levels (EILs), sensitive land use thresholds and expected background concentration ranges for urban redevelopment Sites in ACT. Application of these guidelines is briefly described below.

## SILs

The SILs described in the NSW DEC (2006) and 2013 ASC NEPC (1999) are based on the National Environmental Health Forum (NEHF) levels devised by Imray and Langley (1996).

A series of statistically based guideline levels are provided for various substances for the protection of human health based on four specific land use and exposure scenarios, as summarised below.

**Table 4 SILs and Relevant Land-Use**

SIL	Land-Use
SIL <sub>1</sub>	Residential with gardens and accessible soil (home-grown produce contributing less than 10% fruit and vegetable intake; no poultry), including children's day care centres, preschools and primary schools, or town houses or villas. SIL <sub>1</sub> is the same as <b>NEPC HIL A</b> .
SIL <sub>2</sub>	Residential with minimal access to soil access, includes dwellings with fully and permanently paved yard space such as high-rise apartments and flats. SIL <sub>2</sub> is the same as <b>NEPC HIL B</b> .
SIL <sub>3</sub>	Parks, recreational open space, playing fields including secondary schools. SIL <sub>3</sub> is the same as <b>NEPC HIL C</b> .
SIL <sub>4</sub>	Commercial or industrial. SIL <sub>4</sub> is the same as <b>NEPC HIL D</b> .

For the assessment of petroleum hydrocarbon contamination, NSW DEC (2006) refer to the use of the *Guidelines for Assessing Service Station Sites*, which contain threshold concentrations for petroleum contaminants in soil and provide for the protection of human and environmental health assuming a sensitive (i.e. residential) land use.

Identified hydrocarbon concentrations will also be assessed against the CRC Care (2011) screening criteria. The criteria are based on potential risk via dermal contact and vapour risk in a range of soil types and depths.

The NSW DEC (2006) assessment process also stipulates that the impact of contaminants on ground and surface water, potential degradation of building structures and effects of chemical mixtures need to be considered and that SILs may not be appropriate for the protection of groundwater, surface water or all potential environmental concerns, such as the protection of wildlife.

### 4.1.1 Asbestos

Potential asbestos contamination will be assessed against the ACT EPA adopted Western Australian Department of Health (2009): *Guidelines for the Assessment Remediation and Management of Asbestos-Contaminated Sites in Western Australia*.

### 4.1.2 Aesthetic Conditions

Due to the potential offsite disposal and beneficial re-use of excavated materials originating from the Site, the aesthetic condition of soil material must be considered.

In the decision-making process for assessing urban sites, presented in NSW DEC (2006) and endorsed by the ACT EPA, the assessment of sites that are to be used for purposes other than commercial/industrial requires the consideration of aesthetic issues in the assessment of contamination.

Aesthetic issues include the presence of potential asbestos contaminated materials, the presence of anthropogenic waste materials, the generation of odours and any discolouration of and/or presence of inclusions in the soil as a result of contamination.

In accordance with the ACT EPA endorsed NSW DEC (2006) guidelines, consideration will be given to aesthetic issues such as potential asbestos, odour and discolouration during the investigation of soil across the Site.

Table 5 Soil Remediation Acceptance Criteria

Contaminant of Potential Concern (COPC)	Commercial / Industrial HIL D (mg/kg)	CRC Care Direct Contact HSL D (mg/kg)	CRC Care Vapour Intrusion (sand) 2-<4 m (mg/kg)	Adopted SAC (mg/kg)	Reference
<b>MAHs</b>					
Benzene	350	430	3	3	CRC Care Vapour Intrusion HSL-D
Toluene		99,000		99,000	CRC Care Direct Contact HSL-D
Ethylbenzene		27,000		27,000	CRC Care Direct Contact HSL-D
Xylene (Total)		81,000		81,000	CRC Care Direct Contact HSL-D
<b>TRH</b>					
C6-C10		26,000		26,000	CRC Care Direct Contact HSL-D
>C10-C16		20,000		20,000	CRC Care Direct Contact HSL-D
>C16-C34		27,000		27,000	CRC Care Direct Contact HSL-D
>C34-C40		38,000		38,000	CRC Care Direct Contact HSL-D
<b>PAH/Phenols</b>					
Naphthalene		11,000		11,000	CRC Care Direct Contact HSL-D
Total PAHs	4,000			4,000	NEPC 2013 HIL D
Phenols	240,000			240,000	NEPC 2013 HIL D
Pentachlorophenol	660				NEPC 2013 HIL D
<b>Heavy metals</b>					
Arsenic	3,000			3,000	NEPC 2013 HIL D
Cadmium	900			900	NEPC 2013 HIL D
Chromium					NEPC 2013 HIL D
Copper	240,000			240,000	NEPC 2013 HIL D

Contaminant of Potential Concern (COPC)	Commercial / Industrial HIL D (mg/kg)	CRC Care Direct Contact HSL D (mg/kg)	CRC Care Vapour Intrusion (sand) 2-<4 m (mg/kg)	Adopted SAC (mg/kg)	Reference
Lead	1,500	1,500		1500	NEPC 2013 HIL D
Mercury	730			730	NEPC 2013 HIL D
Nickel	6,000			6,000	NEPC 2013 HIL D
Zinc	400,000			400,000	NEPC 2013 HIL D
<b>Asbestos</b>					
Asbestos	Non Detect				NEPC 2013 HIL D

#### 4.1.3 Waste Criteria

The current criteria used in the ACT to characterise waste materials for off-site disposal are provided in ACT EPA (2000), *Waste Classification Guidelines*.

The guidelines set different maximum total concentrations and leachable concentrations, for specific contaminants in order for waste to be classified as '*Inert, Solid or Industrial*'. This classification then affects the way in which the waste is handled and where the waste is able to be disposed.

For the purpose of characterising soil conditions at the Site for potential off-site disposal, soil analytical results, will be compared to in ACT EPA (2000) *Waste Classification Guidelines*.

It should be noted that approval from the ACT EPA will be obtained prior to any off-site disposal of waste.



## 5.0 Proposed Remediation Methodology

The proposed remedial and further investigation works at the Site will comprise the following tasks, which will be conducted in a staged approach.

### 5.1 Stage 1: Engagement of an Environmental Officer

A suitably qualified and experienced Environmental Officer (EO) is to be engaged to advise on and undertake all requirements specified within this RAP. The EO is to undertake at least the following:

- All remediation requirements specified within this RAP
- Make observations of the materials encountered and undertake sampling and analysis of soil/groundwater and soil vapour as deemed necessary
- Make an evaluation of potential risks to human health and the environment posed by the materials and ensure the risk to health and the environment are acceptable
- Provide guidance to assist with the appropriate re-use and/or disposal of material.

### 5.2 Stage 2: Environmental Controls

Prior to the commencement of works, the principal contractor is to develop an environmental management plan to manage all environmental issues associated with the proposed works.

The environmental controls to be implemented prior to commencement of remedial works should include, but are not limited to, the following:

- Sediment/erosion management
- Excavation water (groundwater and storm water runoff) management
- Stockpile management
- Material tracking and disposal
- Site access
- Noise, odour, dust, and vibration controls.

### 5.3 Stage 3: Service Location across the Site

A Telstra-accredited services locator will be required to locate underground services across the Site.

It is the recommendation of AECOM that relevant service providers attend the Site to determine the specific location of service lines and make recommendations regarding the suitability of the proposed excavation works.

### 5.4 Stage 4: Excavation and Removal of Underground Storage Tanks

Following service location, an excavator will be required to excavate around and then remove the 3 known USTs on the Site.

If the principal contractor deems the location of USTs too close to buildings for safe removal and building stability prior to or during excavations, the tanks may need to be decommissioned in-situ in accordance with Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation (2008).

The excavator will also be required to remove UST associated underground infrastructure including fuel lines and any aboveground infrastructure including fuel bowsers and fuel vents.

USTs are required to be removed and disposed of in accordance with the ACT EPA (2011) Guidelines for the assessment of service station facilities and the POEO (UPSS) Regulations (2008).

Any waste water/liquid products removed from Site should be disposed of to a licenced ACT waste facility and disposal docket provided with a Validation Report for the Site.

The excavator will be required to excavate soils beneath the USTs to approximately 0.5 - 1 m vertically below the base of the tank pit and laterally to approximately 0.5 m, or to below/adjacent to the observable potential

contamination, which would be noted by the EO for visual indicators, olfactory indicators or photoionization detector (PID) measurements.

The excavator will be required to excavate soils beneath the fuel lines to approximately 0.5 m vertically and laterally below the base of the fuel lines or to below the observable potential contamination.

### 5.5 Stage 5: Excavation of Impacted Soils and Validation of Tank Pits

Following excavation works to remove the USTs and associated infrastructure, validation of the excavation boundary of each UST pit should be undertaken.

Validation samples should be collected from the base and walls of each excavation to ensure all residual impact has been appropriately removed.

Excavation sampling should be conducted in accordance with ACT EPA endorsed NSW EPA (1994) guidelines. In general samples should be collected at a rate of 1/10 m of linear tank pit wall and 1/5 m<sup>2</sup> of tank pit floor. Duplicate and triplicate samples should be collected as per regulatory guideline criteria requirements.

### 5.6 Stage 6: Sampling of Stockpiles

Samples should be collected from fill material or natural excavated soils proposed to be reused or disposed off-site, to validate suitability for use and/or disposal. Samples should be collected and analysed at rate of one per 25 m<sup>3</sup> and analysed for TPH, BTEX, PAH, phenols, metals, VOC and asbestos. Where additional potential contamination is identified during excavation works consideration should be given to additional analysis.

If offsite disposal of excavated materials is required, this will be undertaken in accordance with the *Environmental Standards: Assessment & Classification of Liquid and Non-liquid Wastes* Guidelines (ACT EPA, 2000).

The materials will be assessed based on total concentrations of contaminants and toxicity characteristic leaching procedure (TCLP) results (as required).

The EO should prepare a Waste Classification Letter for any soils requiring offsite disposal. Prior to disposal to landfill, a letter addressed to the selected licensed landfill facility would be required, indicating the waste classification and volumes of the relevant excavated materials.

Disposal dockets from the landfill facility should be obtained and provided in a Validation Report as evidence of appropriate disposal.

### 5.7 Stage 7: Imported Fill Sampling

If imported fill is required at the Site for reinstatement of excavations, only certified Virgin Excavated Natural Material (VENM) should be imported onto the Site. The EO should also observe materials as they are imported and placed onsite.

If a VENM certificate is unavailable, samples of the imported fill should be collected at an approximate rate of one per 100 m<sup>3</sup> and submitted for laboratory analysis for the following potential contaminants at a minimum:

- Heavy metals (Cu, Cr, As, Pb, Ni, Zn, Hg and Cd)
- TPH
- BTEX
- PAH
- Pesticides (OCPs/OPPs)
- Polychlorinated Bi-Phenyls
- Asbestos.

Further analysis may be required as determined by a qualified EO and approved by the EPA based on the current and historical uses of the VENM source site.

## 6.0 Environmental Management

The objective of environmental management is to ensure that all personnel involved in the project are aware of the potential environmental issues and activities associated with the works and that they have the necessary information to manage and minimise any resulting impacts.

The consultant should conduct its operations in an environmentally efficient and responsible manner, ensuring that all staff including sub-contractors are aware of their environmental responsibilities, minimise harm and handle all waste products in an environmentally responsible manner.

It should be noted that a detailed Environmental Management Plan is to be prepared for use during all site works.

The following sections outline required environmental controls during site remediation works only and does not constitute a site Environmental Management Plan.

### 6.1 Potential Environmental Impacts

Environmental controls should be implemented at the Site to address the following potential impacts (hazards) associated with the project:

- Noise and vibration
- Flora and fauna
- Water quality
- Contamination
- Waste
- Air quality, including odour and dust
- Surface water and off-site waters protection
- Public road maintenance
- Security
- Traffic impacts and management, both on and off-site around the Site entry and exit points.

The EO should ensure that environmental controls are in place to alleviate potential environmental impacts. The environmental controls and management should be documented in an Environment Management Plan (EMP).

AECOM recommends that daily inspections of environmental control measures occur by the EO at the commencement of each day and at the end of the work day to ensure that systems and structures are in place.

### 6.2 Management of Unexpected Finds

In the event that other in-ground features are identified and are considered to represent potential contamination sources (e.g. USTs, drums, asbestos, unusual wastes etc.), the following protocol should be adopted:

- All excavation works will cease, the nominated Site manager/principal contractor and/or the EO should be contacted and the area of concern should be appropriately barricaded
- If required, appropriate sampling and analysis should be undertaken by the EO
- The requirement for additional remediation works should be assessed by the EO and undertaken as required
- The above works should be documented in a validation report.

Occupational Health & Safety (OH&S) and environmental protection requirements may need to be reviewed, depending on the type of unexpected finds encountered.

### 6.3 Landfill Disposal

The requirements of the ACT's *Assessment & Classification of Liquid & Non-liquid Wastes* (ACT EPA, 2000) would apply. After appropriate characterisation sampling and analysis, the process steps would involve:

- The EO gaining approval from the ACT EPA. This would require a written application to the Landfill facility, including an assessment of the ACT EPA (2000) waste classification and an estimate of the anticipated volume of material proposed for disposal
- Once Landfill approval is gained, excavated materials can be transported to the nominated facility. In the event that the material is classified as Hazardous Waste or Restricted Solid Waste (RSW), a licensed transporter would be required, and a NSW landfill would be used to dispose the waste, as the ACT currently has no landfills licensed to accept Hazardous or RSW.

Tracking and record keeping of materials disposed to landfill must be 'cradle-to-grave'. The contractor must dispose of the material to the nominated landfill and must retain all weighbridge dockets to validate that materials were disposed appropriately.

## **6.4 Excavation Backfilling**

### **6.4.1 Excavation Backfilling with Site Derived Stockpiled Materials**

Where analysis results indicate that stockpiled materials are suitable for re-use on site, the materials can be used for excavation backfilling purposes.

All material should be placed and compacted in accordance with relevant standards.

### **6.4.2 Excavation Backfilling with Imported Fill Material**

Where there is insufficient site material, fill materials may be required to replace the volume of the removed USTs and fuel lines. The following strategy should be adopted:

- The excavations should only be backfilled with certified VENM material (refer to **Section 5.7**)
- An inspection of the VENM source would be required. Sampling and analysis of the VENM at the source and the destination (Site) would be required
- The VENM should be sampled at an approximate rate of one sample per 100 m<sup>3</sup> and analytes assessed as per **Section 5.7**. Additional analysis may be required depending on the historical/current use of the VENM source site
- All material imported to the site must be approved by the ACT EPA.

## 6.5 Remediation Contingency Plan

As variable sub-surface conditions impose a degree of uncertainty for the project, a set of anticipated conditions has been assumed in developing this RAP.

However, because field conditions may vary, flexibility has been built into the programme to adapt to differing conditions or in the event of unforeseen circumstances

### 6.5.1 Environmental Control Contingencies

Examples of environmental control contingencies are provided in **Table 6** below.

**Table 6** Environmental Control Contingency Examples

Potential Problem	Corrective Action By Contractor
Chemical spill / exposure	Stop work, refer to Environment Management Plan (EMP) and Occupational Health & Safety (OH&S) Plan and immediately contact the Site Manager.
Excessive rain	Cover working areas/stockpiles not located under cover with plastic during off-shifts. Inspect and maintain sediment controls and filter fences.
Excessive noise	Identify source and review noise attenuation equipment and as necessary provide silencers on noisy equipment.
Excessive drainage	Minimise active/contaminated work area; or improve diversion of clean run-on; or maintain sufficient onsite wastewater storage capacity; or mobilise additional storage and/or treatment systems as needed.
Excessive dust	Use water sprays or biodegradable dust sprays, or cease dust-generating activity until better dust control can be achieved, or apply interim capping systems. If necessary, install dust deposition gauges prior to and during works to monitor the effectiveness of dust controls implemented on site.
Excessively wet materials	Stockpile and dewater onsite or add absorbents.
Equipment failures	Maintain spare equipment or parts; or maintain alternate rental options; or shut down affected operations until repairs are made.
Release of fuel/oil from machinery	Remove source, use absorbent booms to remove fuel/oil and make any repairs as required. Any spillages to be tested by the environmental consultant, who will recommend any remediation requirements.
Silt fence fails	Stop work and repair fence to specifications.

In the event that unexpected finds of contamination (including the depth is greater than envisaged) or items such as drums, additional USTs, asbestos pipes or waste, stained or odorous soils, etc. are encountered, the following protocol would be adopted:

- 1 All excavation works would cease and the AECOM Project Manager should be contacted
- 2 The area of concern should be appropriately barricaded
- 3 The nature of the contamination should be visually characterised and, if required, appropriate sampling and analysis completed by the environmental scientist
- 4 The requirement for any additional remediation works should be assessed
- 5 The above works should be documented in a Validation Report.

OH&S and environmental protection requirements may need to be reviewed, depending on the type of the unexpected finds encountered. Potential supplementary measures may include, but are not limited to:

- Upgrade of PPE, for workers within the active work zone, in accordance with the OH&S Plan
- Segregation and bunding of discovered material
- Use of odour suppressants (where appropriate)
- Cover the discovered material with plastic sheeting
- Appropriate sampling and analysis to assess potential contaminants

- Appropriate treatment and/or disposal of the materials following receipt of analytical results and any associated regulatory approvals required.

### 6.5.2 Remediation Contingencies

Should an increase in observed hydrocarbon concentrations or offsite migration of contamination within observed groundwater conditions indicate that an unacceptable risk exists to offsite receptors then the following must be undertaken:

- Notify the ACT EPA and EPA accredited contaminated land site auditor of the anticipated risk
- Provide written review of groundwater monitoring results and assessment of implications of elevated groundwater concentrations to the EPA
- Provide a proposal, to the EPA, outlining the actions to be undertaken as part of the contingency plan, which is prepared by an environmental consultant, in consultation with the site owner and the EPA accredited contaminated land site auditor
- Undertake contingency plan actions, as agreed with the EPA.

The groundwater contingency actions may include the following:

- Additional quantitative assessment of the risks posed by any potential trigger-level exceedances; or
- Review of practicable groundwater control / remediation measures.

## 7.0 Validation Plan

This section provides a description of the validation methodology to be adopted by the EO during remediation works. The information presented herein is of a summary nature only.

### 7.1 Project Team

The Project team must be from a suitably qualified environmental consultant with experience working on contaminated sites and trained in the requirements of this RAP.

Decisions related to validation shall be made in accordance with relevant guidelines endorsed by the ACT EPA.

### 7.2 Quality Assurance / Quality Control

The EO will adopt the Data Quality Objectives (DQO) process, which has been developed, based on the iterative DQO process developed by the USEPA (2000) Guidance for the Data Quality Objectives Process – EPA QA/G-4 and stated in the Australian Guidelines AS 4482.1 (2005).

The guidelines incorporate field quality control and laboratory analysis, methods and information on laboratory quality control data and shall be used to validate the field and analytical data for the validation works. Assessment of the achievement of the DQOs shall be undertaken through reference to the Data Quality Indicators (DQIs) of completeness, comparability, representativeness, precision and accuracy.

Components of the DQO process are briefly presented in the following sections.

#### 7.2.1 Sampling Methodology

Field procedures shall be undertaken with reference to:

- 2013 ASC NEPC (1999) - National Environment Protection Measure (NEPM) for the Assessment of Site Contamination, Guideline 2, "*Data Collection, Sample Design and Reporting*", December 1999
- ANZECC (2000) - Australian and New Zealand Environment and Conservation Council and National Health and Medical Research Council (ANZECC/NHMRC), "*Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*", October 2000.

The general soil sampling strategy would be as follows:

- All soil samples shall be collected into laboratory prepared and supplied glass jars with Teflon lined lids. The sampling locations shall be accurately recorded. Sample depths shall be recorded by tape measure

- Screening of the vapour headspace of soil samples for volatile organic compounds (VOCs) shall be undertaken in the field using a photoionisation detector (PID). Observations of odours, staining and other unusual conditions shall be made. Sample collection shall be biased towards detecting contamination
- All samples shall be collected using decontaminated equipment and a new pair of nitrile gloves
- Samples for analysis for organic compounds shall be placed on ice
- All samples shall be forwarded to an analytical laboratory for analysis under chain-of-custody protocols.

### 7.2.2 Field and Laboratory QA/QC

Collection of field quality control samples shall include:

- Blind duplicate soil samples (intra-laboratory) shall be analysed at a rate of 1 per 10 primary samples;
- Split duplicate samples (inter-laboratory) shall be analysed at a rate of 1 per 20 primary samples; and
- Where required, rinsate or equipment blank samples shall be collected and analysed at a rate of 1 sample per day of sampling activities.
- The PID shall be calibrated prior to the start of field activities and daily during field activities. Calibration records will be provided in the Validation Report.

Laboratory QA/QC procedures shall comprise the following at a minimum:

- Laboratory Duplicate Samples: at least one per batch (where the batch exceeds five samples);
- Matrix Spiked Samples: at a rate of approximately 5% of all analyses. At least one per batch shall be reported;
- Laboratory Blanks: at least one per batch and one per analyte;
- Laboratory Control Samples: analysed at a rate of at least one per process batch, and typically at a rate of 5% of analyses; and
- Surrogates: at least one per sample.

### 7.2.3 Laboratory Analyses

All laboratory analyses shall be conducted by laboratories using methods accredited by the National Association of Testing Authorities, that adhere to the international standard methods referred in the ANZECC (1996) guidelines and NEPM (1999) Schedule B(3).

### 7.2.4 Decision Rules

To evaluate the sample analysis data, the following decision rules shall be applied:

- Sampling locations are to be recorded by survey or measurement to known, fixed reference points;
- Comparison of the soil sample analysis results to the RAC;
- Qualitative assessment of potential risk associated with 'elevated' result(s);
- If required, assessment of data through checking that each individual sample concentration does not exceed the RAC by more than 250%;
- Calculation of the Upper Confidence Limit (UCL) on the average concentrations (of the relevant contaminant(s)) at a confidence level of 95 % (95 % UCL<sub>average</sub>). This would include excavation and stockpile samples. If required, calculation of the standard deviation of the data. The standard deviation should be less than 50% of the RAC;
- Assessment of the sampling results for soil/waste to be disposed off-site in accordance with the ACT's *Assessment & Classification of Liquid & Non-liquid Wastes* (ACT EPA, 2000); and
- Assessment of the reliability of both the field and laboratory programs by reference to DQIs.

Where data indicates that unacceptable concentrations of chemical contaminants remain, the excavation and stockpiling process shall be required at the relevant location(s).

### 7.3 Sampling & Analysis Rates

Validation samples should be collected at the rates specified within Section 5.0

### 7.4 Validation Reporting

A Validation Report shall be prepared by the EO on completion of remediation works. The report shall contain an overview of the remediation activities conducted and details of the following:

- Volumes of excavated material and location of excavations/stockpiles;
- Tracking of materials disposed off-site or relocated to other parts of the Site;
- Volumes of soil reinstated into excavations;
- Validation field methods;
- Plan of sampling locations;
- Site photographs;
- Analytical results of validation and characterisation soil samples and QA/QC;
- Analytical results of collected groundwater samples; and QA/QC; and
- A conclusion regarding the completeness of remediation and the suitability of the Site for the proposed land use.

Supporting factual evidence shall be included in the report. This shall include NATA 'stamped' laboratory analysis certificates, landfill disposal certificates, VENM certificates (if required), interpretative summary tables and an overview of the works carried out during the remediation process. The report shall include an assessment of all results and evaluation of the suitability of the Site for the proposed land use.

The Validation Report shall be prepared in accordance with the relevant ACT EPA endorsed guideline documents, and submitted to the ACT EPA and Site Auditor as soon as practicable after completion of the works.

## 8.0 Conclusions

This RAP was compiled to provide the remedial strategy detailing the excavation, soil stockpiling, transport, validation and occupational health and safety and environmental management strategies associated with the remediation works for the partial validation area of the West Belconnen Fire Station.

AECOM considers that if the remediation and management works proposed within this RAP are successfully undertaken in accordance with this RAP, the onsite fuel storage and dispensing infrastructure and potentially contaminated soils will be removed and validated in accordance with ACT EPA requirements.

It should be noted that these works do not provide an overall assessment of the Suitability of the site and only relate to the onsite fuel storage and dispensing area.



## 9.0 References

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Appendix A

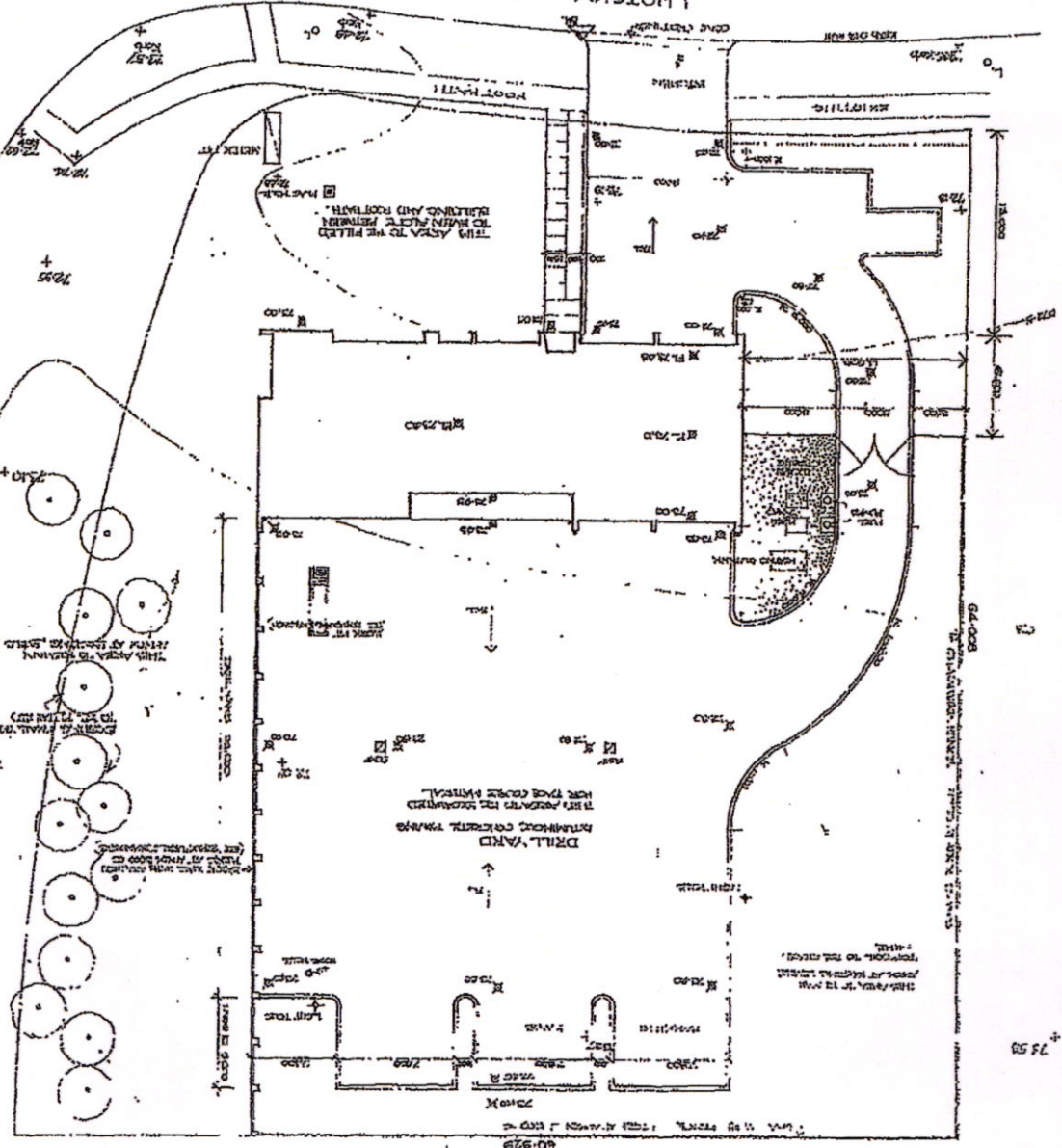
# Figures



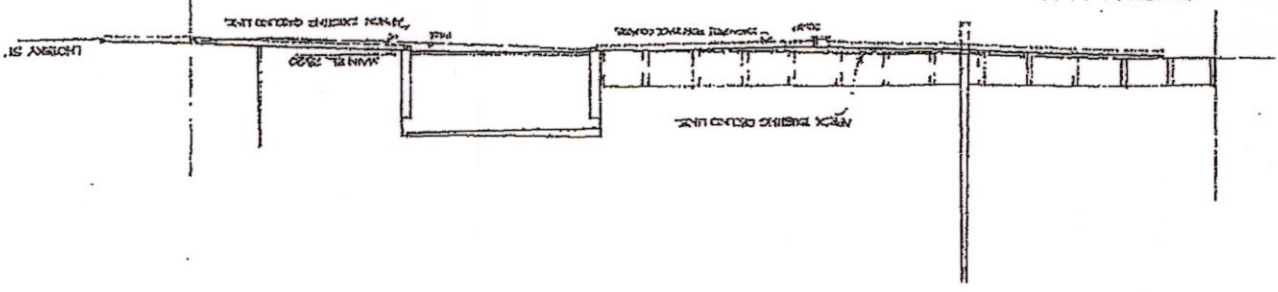
# SITE PLAN

LIHITSKY STREET

FLOREY DRIVE



## SECTION X-X





AECOM Australia Pty Ltd (2014b) *JACSD Charnwood, Stage 1 Environmental Assessment*, issued 18 November 2014.



Stage 1 Environmental Assessment -  
JACSD Charnwood  
Justice & Community Safety Directorate  
18-Nov-2014  
Doc No. 60316172\_JACSD PSI\_20140821

# JACSD Charnwood

Stage 1 Environmental Assessment



AECOM

Stage 1 Environmental Assessment - JACSD Charnwood  
JACSD Charnwood

## JACSD Charnwood

### Stage 1 Environmental Assessment

Client: Justice &amp; Community Safety Directorate

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## Glossary of Terms

General Terms				
ACT EPA	Australian Capital Territory Environment Protection Authority			
ACM	Asbestos containing material(s)			
AEC	Areas of Environmental Concern			
AFFF	Aqueous Film-Forming Foam			
ANZECC	Australian and New Zealand Environment and Conservation Council			
AHD	Australian Height Datum			
AST	Above ground Storage Tank			
BMRGG	Bureau of Mineral Resources, Geology and Geophysics			
BTEX	Benzene, toluene, ethylbenzene and xylenes			
COPC	Contaminants of potential concern			
EMP	Environmental Management Plan			
ESA	Environmental Site Assessment			
ESDD	Environment and Sustainable Development Directorate			
Heavy metals	Generally arsenic, cadmium, chromium, copper, mercury, nickel, lead and zinc			
JACS	The Justice & Community Safety Directorate			
NEHF	National Environmental Health Forum			
NEPC	National Environment Protect Council			
NEPM	National Environmental Protection Measure			
NSW EPA	New South Wales Environment Protection Authority			
OCP	Organochlorine pesticides			
OPP	Organophosphorus pesticides			
PAH	Polycyclic Aromatic Hydrocarbons			
PCB	Polychlorinated biphenyls			
PFOS	Perfluorooctane Sulfonate			
POP	Persistent Organic Pollutant			
SMP	Soil or Site Management Plan			
SWL	Standing Water level			
TPH	Total petroleum hydrocarbons			
UST	Underground Storage Tank			
Units				
ha	hectare		µg/kg	micrograms/kilogram
km	kilometre		µg/L	micrograms/litre
m	metre		ppb	parts per billion
mg/kg	milligrams/kilogram		ppm	parts per million
mg/L	milligrams/litre		t	Tonne

## Executive Summary

AECOM Australia Pty Ltd (AECOM) was commissioned by the Justice and Community Safety Directorate (JACSD) to undertake a Phase 1 Environmental Site Assessment (Phase 1 ESA) of the property identified as the former West Belconnen Fire Station, located on Block 6 Section 97 otherwise known as 35 Lhotsky Street Charnwood (the Site).

The Phase I ESA was undertaken to assess for potential contamination issues that may require further investigation and/or management to ensure the site is suitable for proposed future land uses and was completed in general accordance with ACT and NSW EPA guideline documents and included a review of background and historical data, consultation with key stakeholders and followed by a Site inspection and this summary report.

AECOM completed the following scope of work to meet the project objective:

- Reviewed background information relating to the Site, including:
  - Contaminated Land Search
  - Historical aerial photographs
  - Groundwater bore information
  - Published soil, geology, and topographic maps
- A Site inspection to 'ground-truth' the background information.
- Consultation with personnel familiar with the historical use of the site to gain additional anecdotal information.
- Data evaluation and reporting.

Areas and activities identified within this investigation that are considered to present a moderate risk of contamination include:

- Underground storage tanks, fuel dispensers and associated fuel lines
- Vehicle maintenance
- Use and storage of AFFF
- Onsite septic tanks and/or septic lines
- Possible presence of imported fill materials of unknown origin and quality at the Site

To further evaluate the potential contamination risks, completion of a Phase II ESA is recommended (i.e. intrusive investigation, sampling and analysis). The Phase II ESA should be undertaken on a targeted and systematic basis and include assessment of soil as follows:

- Targeted soil sampling around the building footprint and a grid sampling approach for the remainder of the site vicinity of the areas of environmental concern outlined above.
- Groundwater monitoring should be considered in the event of contaminants of concern being identified in the soil samples.

## 1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by the Justice & Community Safety Directorate (JACSD) to undertake a Phase 1 Environmental Site Assessment (Phase 1 ESA) of the property identified as the former West Belconnen Fire Station, located on Block 6 Section 97 otherwise known as 35 Lhotsky Street Charnwood. (the Site).

The Site location is shown on **Figure 1** and the current Site layout is shown on **Figure 2** in **Appendix A**. The Site is currently occupied by the former West Belconnen Fire Station.

The Phase I ESA was undertaken to assess for potential contamination issues that may require further investigation and/or management to ensure the site is suitable for current and/or proposed future land uses.

### 1.1 Objective

The objective of the Phase I ESA was to assess for potential soil and/or groundwater contamination issues that may require further investigation and/or management prior to potential Territory Plan Variation to a more sensitive landuse.

### 1.2 Scope of Work

AECOM completed the following scope of work to meet the project objective:

- Reviewed background information relating to the Site, including:
  - Contaminated Land Search
  - Historical aerial photographs
  - Groundwater bore information
  - Published soil, geology, and topographic maps
  - Undertook a Site inspection.
- A Site inspection to 'ground-truth' the background information;
- Data evaluation and reporting.

Investigative work was conducted with reference to relevant parts of the following guidelines:

- Environmental Protection Authority (EPA), 2009. Contaminated Sites Environmental Protection Policy
- National Environment Protection Council (NEPC), 1999. National Environment Protection (Assessment of Site Contamination) Measure (NEPM)
- Office of Environment and heritage (2011). Guidelines for Consultants Reporting on Contaminated Sites
- NSW Department of Environment and Conservation (DEC) 2006. *Guidelines for the NSW Site Auditor Scheme* (2<sup>nd</sup> edition)
- NSW DEC 2007. Guidelines for the Assessment and Management of Groundwater Contamination.

## 2.0 Site Identification

The Site identification information is presented in Table 1 below.

**Table 1 Site Identification**

Item	Description
Site Owner	Justice & Community Safety Directorate (JACSD)
Site Occupier	Formerly ESA/ACT Fire and Rescue
Site Address & Legal Description	35 Lhotsky Street Block 6, Section 97 Charnwood
Zoning	TSZ2- Services
Geographical Coordinates (AMG)	35°12'15.4"S 149°01'42.2"E
Site Elevation (m AHD)	572.7
Site Area (approximate)	3638 m <sup>2</sup>
Site Location	<b>Figure 1 (Appendix A)</b>
Site Layout	<b>Figure 2 (Appendix A)</b>

**Notes:**

AMG - Australian Map Grid

m AHD – m Australian Height Datum

## 3.0 Site Background Review

The following sections summarise the information obtained during the Site background and history review.

### 3.1 Site Location

The Site is located on the eastern corner of Lhotsky St and Florey Drive in Charnwood ACT.

The Site location is shown on **Figure 1** in **Appendix A**.

### 3.2 Zoning

The Site is zoned under the ACT Planning and Land Authority document: *Transport and Services Zone Development Code* as a TSZ2 Services zone. The TSZ2 designation refers to an area primarily used as a services zone.

### 3.3 Site Features and Current Land Use

The site is the former West Belconnen Fire Station, operated by ACT Emergency Services Agency - ACT Fire and Rescue.

At the time of site inspection the site was noted to be comprised of the following key features:

- Main building and garage is centrally located with a drive leading to Lhotsky Street.
- Large bitumen covered space is located directly to the south of the main building and extends to the southern boundary.
- Gates (located by the eastern boundary of the site) leads into the rear courtyard of the station.
- The site is 90% covered by bitumen with small garden areas.
- Two fuel dispensers located directly to the east of the main building.
- Three USTs<sup>1</sup> (approximately 4500 L) are located beneath the grassy verge located to the east of the main building.
- Three vent pipes located directly along the eastern wall of the main building.

### 3.4 Surrounding Land Use

The land uses surrounding the Site at the time of investigation were:

- North: Open space
- East: St Thomas Aquinas Primary School, Early Learning Centre and Catholic Church
- South: Ginninderra Christian Church
- West: Charnwood District Playing Fields

### 3.5 Topography

The elevation of the Site is approximately 572.7 m AHD. Regional Topography is relatively flat with low undulating hills to the North West.

### 3.6 Regional Meteorology

Review of the Bureau of Meteorology website ([www.bom.gov.au](http://www.bom.gov.au)) weather station (070014) located at Canberra Airport indicates the following:

- Average approximate annual rainfall of 615 mm, with October and November typically the wetter months (>60 mm per month),

---

<sup>1</sup> At the time of assessment, these USTs were in the process of being removed, are undergoing a separate validation process.

- average maximum temperature of 19.7°C, ranging from 28.0°C in January to 11.4°C in July,
- average minimum temperature of 6.5°C, ranging from 13.2°C in January to -0.1°C in July.

### **3.7 Surface Water and Drainage**

The Site comprises approximately 90% hard standing (vehicle parking and building footprint) and 10% soft standing (gardens and landscaped planted areas).

During rainfall periods, surface waters within the Site are expected to flow towards the north (front) of the site into the street drains.

### **3.8 Geology and Soils**

The former NSW Department of Environment, Climate Change and Water 2010 soil landscape series – sheet 8727, indicates the site is underlain by the Williamsdale soil formation comprised of undulating rises, fans, valley flats and depressions on Silurian Volcanics of the Canberra Lowlands.

The soils are characteristically moderately deep, moderately well-drained Yellow Chromosols on Red and Brown Kandosols on upper rises and fan elements. Moderately to very deep, poorly to imperfectly drained Sodosols are reported on lower rises and fan elements.

A small area to the west of the Site is characterised as Burra soil formation. This is characterised by undulating to rolling low hills and alluvial fans on Silurian volcanics.

### 3.9 Hydrogeology

A search of the ACT department of the Environment and Sustainable Development (ESDD) groundwater database indicated that no registered groundwater bores were identified within a 1 km radius of the Site.

### 3.10 Aerial Photography

Aerial photographs (Appendix F) were reviewed as part of the assessment of the site history. The following information was obtained:

Table 2 Review of Aerial Photographs

#	Photograph Details	Description
1	Mar- 1959 Run 5, Canberra Series, Black and White	<b>Site:</b> The site is comprised of cleared agricultural land.
		<b>Surrounds:</b> The surrounding areas are primarily agricultural land
2	Mar- 1967 Run 5L, Canberra Series, Black and White	<b>Site:</b> The site remains cleared agricultural land
		<b>Surrounds:</b> Surrounding lands are primarily cleared farmland with the addition of some roadways.
3	Apr- 1976 Run 4, Canberra Series, Black and White	<b>Site:</b> Cleared land
		<b>Surrounds:</b> Development of St Thomas Aquinas Primary School to the east. Residential areas developed to the North and South West.
4	Feb- 1985 Run 4, Canberra Series, Black and White	<b>Site:</b> Fire station constructed- one structure and a large paved area for vehicles.
		<b>Surrounds:</b> Further development of St Thomas Aquinas school and church to the East. Significant development of the suburbs of Latham and MacGregor to the South of the Site.
5	Oct- 1992 Run 6, Canberra Series, Colour	<b>Site:</b> Fire station remains unchanged. Vegetation growth noted.
		<b>Surrounds:</b> Further development of surrounding suburbs in all directions.
6	Jan- 2005 Run 6, Canberra Series, Colour	<b>Site:</b> Fire station remains unchanged.
		<b>Surrounds:</b> Suburbs surrounding, Charnwood district playing fields to the west and north west

### 3.11 Historical Title Search

Based on the aerial photograph review, a search of the ACT Historical Titles on-line database was not conducted as it was considered unlikely that the search for land titles would provide any further details on potential sources of contamination.

### 3.12 Contaminated Land Search

A search of the ACT Government Environment and Planning Department (EPD) Contaminated Land Search database indicated the following:

The block is recorded on the EPA's contaminated sites management database and geographic information system.

Records indicate the site was formerly occupied by a fire station which included refuelling facilities. These records also indicate that three underground fuel storage tanks were located at the site.

The EPA received a report by Maunsell Pty Ltd in November 2002 which identified soil contamination in the immediate vicinity of the underground tanks.

The EPA has not issued any environmental protection orders over the site and as a result, the site is not recorded on the register of contaminated sites.

### 3.13 Anecdotal Evidence

During the course of this investigation AECOM conducted an interview with [REDACTED].  
[REDACTED] Using standard protocols derived from the 2013 revised National Environment Protection Measure for the Assessment of Contaminated Sites (2013 ASC NEPM), [REDACTED] was interviewed in relation to his experience at the Charnwood Site. [REDACTED] advised that, while he was not stationed at the Charnwood facility, he had a detailed knowledge of its operations since its construction in the mid 1980's.

In relation to potential environmentally significant information, [REDACTED] noted:

- 1) The presence of three (3) underground fuel storage tanks in the eastern portion of the Site.
- 2) Car wrecks were stored in the southern car park section of the rear yard, adjacent to the green metal garage. [REDACTED] suggested that there may have been (very) small amounts of residual car fluids leaked onto the bitumen pavement over the years, including oil, brake fluid, hydraulic oil, anti-freeze and other motor vehicle-related products.
- 3) A small quantity of 20L drums of AFFF foam (only a few drums at any one time) were stored in the internal store room (off the engine bay) for topping up the foam tank on the fire engine. [REDACTED] considered that whilst very small quantities of foam may have been spilled over the years of operation, it is unlikely they would have leached into the concrete floor and was more likely cleaned up promptly by the Station-proud staff.
- 4) As for cleaning chemicals used, there was regular vehicle washing conducted immediately to the rear (outside) of the engine bay. [REDACTED] suggested that only small amounts were involved (amounting to only approximately 50-100ml of truck wash concentrate mixed in a 20L bucket of water, then the residual suds would have been diluted significantly further as the truck was hosed off.
- 5) Some uncontrolled fill may be present in the back of the Site, near the back fence line.

This information assists in informing detailed design of any subsequent environmental sampling and analysis (e.g. Phase 2 environmental site assessment studies).



## 4.0 Site Inspection

The site inspection was undertaken by [REDACTED], a suitably qualified and experienced AECOM Environmental Scientist, while he was supervising the removal of the three USTs beneath the grassy verge located to the east of the main building (and associated infrastructure) as part of a separate project.

Site features observed during field activities are summarised below and shown on Photographs in **Appendix E** and on **Figures F1 and F2 – Appendix A**.

The Site covers an approximate area of 0.7 ha and is comprised of the former West Belconnen Fire Station and is located on 35 Lhotsky Street. The following observations were made during the site visit on 26 August 2014:

- The site mostly covered by bitumen that was seen to be in good condition. No staining on the bitumen was observed.
- Vegetation, located primarily around the perimeter of the site, appeared to be healthy and free from obvious signs of stress.
- The main building is in good condition, and has been generally well maintained.

As a result of the UST removal works, the following observations were also made regarding the site:

- The former location of the USTs, exhibits clay walls and base, with excavations (approximately 2.5 m deep) subsequently encountering natural material.
- Stockpiles of spoil material removed from the excavations were banded with hay bales and erosion and sediment control measures, thus preventing any migration of spoil across the site.

Further details surrounding the removal of the USTs and associated infrastructure are contained in a separate validation report which has been provided to the EPA for information. The conclusions of the validation report indicated that the UST removal was completed to a standard acceptable for a proposed future land use of Community Facility Zone, subject to required Territory Plan Variation and any other relevant statutory processes.

## 5.0 Preliminary Conceptual Site Model

A Conceptual Site Model (CSM) was developed based on the findings of the Phase 1 ESA as shown in **Table 3** below.

**Table 3** Conceptual Site Model

Consideration	Details
Potential On-site Sources of Contamination	<ul style="list-style-type: none"> <li>- Heavy metals from fill material of unknown origin (e.g. from former industrial properties), and deterioration of stored metal products, general workshop activities (e.g. welding, vehicle/equipment maintenance and servicing).</li> <li>- Aliphatic hydrocarbons from fuel leaks from underground fuel storage tanks may have occurred and fuels, solvents, oils, etc. may occur in fill material of unknown origin.</li> <li>- Aromatic hydrocarbons i.e. BTEX from fuel leaks from underground fuel storage tanks may have occurred and fuels, solvents, oils, etc. may occur in fill material of unknown origin.</li> <li>- Polycyclic aromatic hydrocarbons (PAHs) related to some petroleum hydrocarbons, such as waste and lubricating oils and diesel fuel, bitumen/asphalt.</li> <li>- PFOA and PFOS may have historically been used to make aqueous film forming foam (AFFF), a component of fire-fighting foams</li> <li>- Volatile halogenated compounds (VHC) related to solvent use, such as degreasers and 'thinners'.</li> </ul>
Potential Transport Mechanisms and Exposure Pathways for Contaminants	<p>The potential transport mechanisms include:</p> <ul style="list-style-type: none"> <li>- Transport of contamination through surface water flows to stormwater drains.</li> <li>- Transport of contamination to underlying groundwater aquifers</li> <li>- Inhalation and ingestion of airborne contaminated dust and potentially asbestos fibres</li> <li>- Dermal contact with contaminated soils</li> <li>- Transport of contaminants through mechanical transport</li> </ul>
Potential Receptors of Contamination	<p>The potential receptors identified include:</p> <ul style="list-style-type: none"> <li>- Workers and visitors and construction/maintenance workers through direct dermal contact or ingestion of contaminants in soil</li> <li>- Environmental receptors associated with on and off site water bodies</li> <li>- Workers carrying out installation or maintenance within the Site</li> <li>- Residents in adjacent properties</li> <li>- Potential future residence if the site developed into residential dwellings.</li> </ul>

## 6.0 Summary of Findings

At the time of this investigation, the site was the former West Belconnen Fire Station. Information provided to AECOM during this assessment indicates that since February 1985 the Site has been used as a fire station.

Following a review of desktop information and undertaking a site inspection the primary potentially contaminating sources within the Site include the following:

- The presence of fuel dispensers and USTs and associated infrastructure (now removed and the subject of a separate validation reporting process).
- Potential contamination associated with the use and storage of aqueous film-forming foam (AFFF).
- Potential contamination associated with the maintenance of fire engines (heavy metals and hydrocarbons)
- Fill material of unknown origin potentially present:
  - Underneath building structures
  - Access driveways
  - Within the USTs and fuel lines
- Potential asbestos associated with building structures

### 6.1 Contaminants of Potential Concern

Based on the Site history and background data reviewed and AECOM professional knowledge, the Contaminants of Potential Concern (CoPC) within the Site are considered to include the following:

**Table 4 Identified Contaminants of Potential Concern**

CoPC	Rationale / Comments
Heavy Metals (HM)	<ul style="list-style-type: none"> <li>- May occur in fill material of unknown origin (e.g. from former industrial properties), and can be associated with deterioration of stored metal products, general workshop activities (e.g. welding, vehicle/equipment maintenance and servicing).</li> <li>- Common metal contaminants include arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc</li> </ul>
Petroleum hydrocarbons (TPH)	<ul style="list-style-type: none"> <li>- Petroleum hydrocarbons are generally quantified by analytical laboratories as total petroleum hydrocarbons (TPH).</li> <li>- Fuel leaks from underground fuel storage tanks have occurred as documented in the contaminated sites search.</li> <li>- Occurs in fuels, solvents and oil - may occur in fill material of unknown origin.</li> </ul>
Benzene, toluene, ethylbenzene, xylenes (BTEX)	<ul style="list-style-type: none"> <li>- Found in petrol and to a lesser extent, diesel.</li> <li>- Can be present in solvents.</li> <li>- May have been introduced into the soil and groundwater in the immediate vicinity of the underground fuel storage tanks.</li> <li>- May occur in fill material of unknown origin.</li> </ul>
Polycyclic aromatic hydrocarbons (PAH)	<ul style="list-style-type: none"> <li>- Related to some petroleum hydrocarbons, such as waste and lubricating oils and diesel fuel, bitumen/asphalt. Can be present in coal and incompletely combusted materials, such as ash. PAH are also potentially present in fill of unknown origin.</li> </ul>
Perfluorooctanoic acid (PFOA)	<ul style="list-style-type: none"> <li>- PFOA and PFOS have historically been used to make aqueous film forming foam (AFFF), a component of fire-fighting foams</li> </ul>
Perfluorooctanesulfonic acid (PFOS)	
Polychlorinated biphenyls (PCB)	<ul style="list-style-type: none"> <li>- Historically present in electrical equipment such as transformers. Can be present in fill of unknown origin.</li> </ul>
Volatile Halogenated	<ul style="list-style-type: none"> <li>- Related to solvent use, such as degreasers and 'thinners'.</li> </ul>

CoPC	Rationale / Comments
Compounds (VHC)	
Asbestos	- Can be related to the use and subsequent weathering and damage of asbestos cement materials (sheets, gutters, down-pipes etc) in former Site buildings and can be present in fill materials containing demolition wastes. Can be present as conduits for underground services.
Biological contamination (including pathogens)	- Typically associated with degrading biological material such as degrading faecal matter within onsite septic tanks

## 7.0 Conclusions and Recommendations

AECOM completed a Phase I ESA to assess the potential for significant soil and/or groundwater contamination to be present, which may materially affect the Site and identified potential receptors.

The Phase I ESA was completed in general accordance with relevant ACT Government made or endorsed guideline documents and included a review of site background and history data, followed by a Site inspection.

At the time of this investigation, the site was occupied by the former West Belconnen Fire Station.

Based on the data obtained to date, the potential for contamination to be present at the Site is considered to be moderate. A more precise determination will be made once the soil validation sampling associated with the UST removals are analysed.

Areas and activities identified within this investigation that are considered to present a moderate risk of contamination include:

- Underground storage tanks, fuel dispensers and associated fuel lines
- Vehicle maintenance
- Use and storage of AFFF
- Onsite septic tanks and/or septic lines
- Possible presence of imported fill materials of unknown origin and quality at the Site

To further evaluate the potential contamination risks, completion of a Phase II ESA is recommended (i.e. intrusive investigation, sampling and analysis). The Phase II ESA should be undertaken on a targeted and systematic basis and include assessment of soil as follows:

- Targeted soil sampling around the building footprint and a grid sampling approach for the remainder of the site vicinity of the areas of environmental concern outlined above including:
  - The presence of three (3) underground fuel storage tanks (now decommissioned) in the eastern portion of the Site.
  - Car wrecks were stored in the southern car park section of the rear yard, adjacent to the green metal garage.
  - A small quantity of 20L drums of AFFF foam (only a few drums at any one time) were stored in the internal store room (off the engine bay) for topping up the foam tank on the fire engine.
  - Some uncontrolled fill may be present in the back of the Site, near the back fence line.
- Groundwater monitoring should be considered in the event of contaminants of concern being identified in the soil samples.

## 8.0 References

- 1) ACT Environmental Protection Act (1997).
- 2) ACT EPA (2009). *Contaminated Sites, Environment Protection Policy*.
- 3) ACT EPA (2000). *Environmental Standards: Assessment and Classification of Liquid and Non-Liquid Wastes*.
- 4) ACT EPA (2001). *Practice Note No. 3: Requirements for the Disposal of Contaminated Soil*.
- 5) ACT ESDD (28/02/2013). Contaminated Land Search Record.  
<http://www.canberraconnect.act.gov.au/Services/c/contaminated-land-search>
- 6) Australian and New Zealand Environment Conservation Council, National Health and Medical Research Council, 1992. *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*.
- 7) Bureau of Mineral Resources, Geology and Geophysics (1978) Groundwater Investigation at the Hume Industrial Estate, ACT. Jacobson, G. and Hohnen, P. D. Record 1980/56.
- 8) Bureau of Mineral Resources, Geology and Geophysics (1980) *Geology of Canberra, Queanbeyan and Environs*. 1:50,000 Sheet.
- 9) Bureau of Mineral Resources, Geology and Geophysics (1984) *Hydrogeology of Australian Capital Territory and Environs*. 1:100,000 Sheet. In Coffey Environments (2008).
- 10) National Environment Protection Council, 1999 (2013 ASC). *National Environmental Protection (Assessment of Site Contamination) Measure (as amended)*.
- 11) NSW Department of Land and Water Conservation, 2000. *Canberra Soil Landscape Series Sheet 8727 1:100,000*.
- 12) NSW Department of Conservation (DEC) (2006). *Guidelines for the NSW Site Auditor Scheme (2<sup>nd</sup> edition)*.
- 13) Office of Environment and Heritage (2011). *Guidelines for Consultants Reporting on Contaminated Sites*.
- 14) NSW EPA, 1994. *Guidelines for Assessing Service Station sites*, December 1994.
- 15) NSW EPA, 1995. *Sampling Design Guidelines*, September 1995.

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Appendix A

# Figures



G:\Projects\60316172 West Belconnen Fire Station\FIGURES\60316172 FI Site Location 13.06.2014 TO



**SITE LOCATION**  
Former West Belconnen Fire Station  
Block 6, Section 97  
Charnwood, ACT

FIGURE 1





**SITE LAYOUT**  
 Former West Belconnen Fire Station  
 Block 6, Section 97  
 Charnwood, ACT

FIGURE 2

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Appendix B

# ACT ESDD Groundwater Bore Search



**ACT**  
Government

Environment and Planning

[REDACTED]

AECOM

Email: [REDACTED]

Dear [REDACTED]

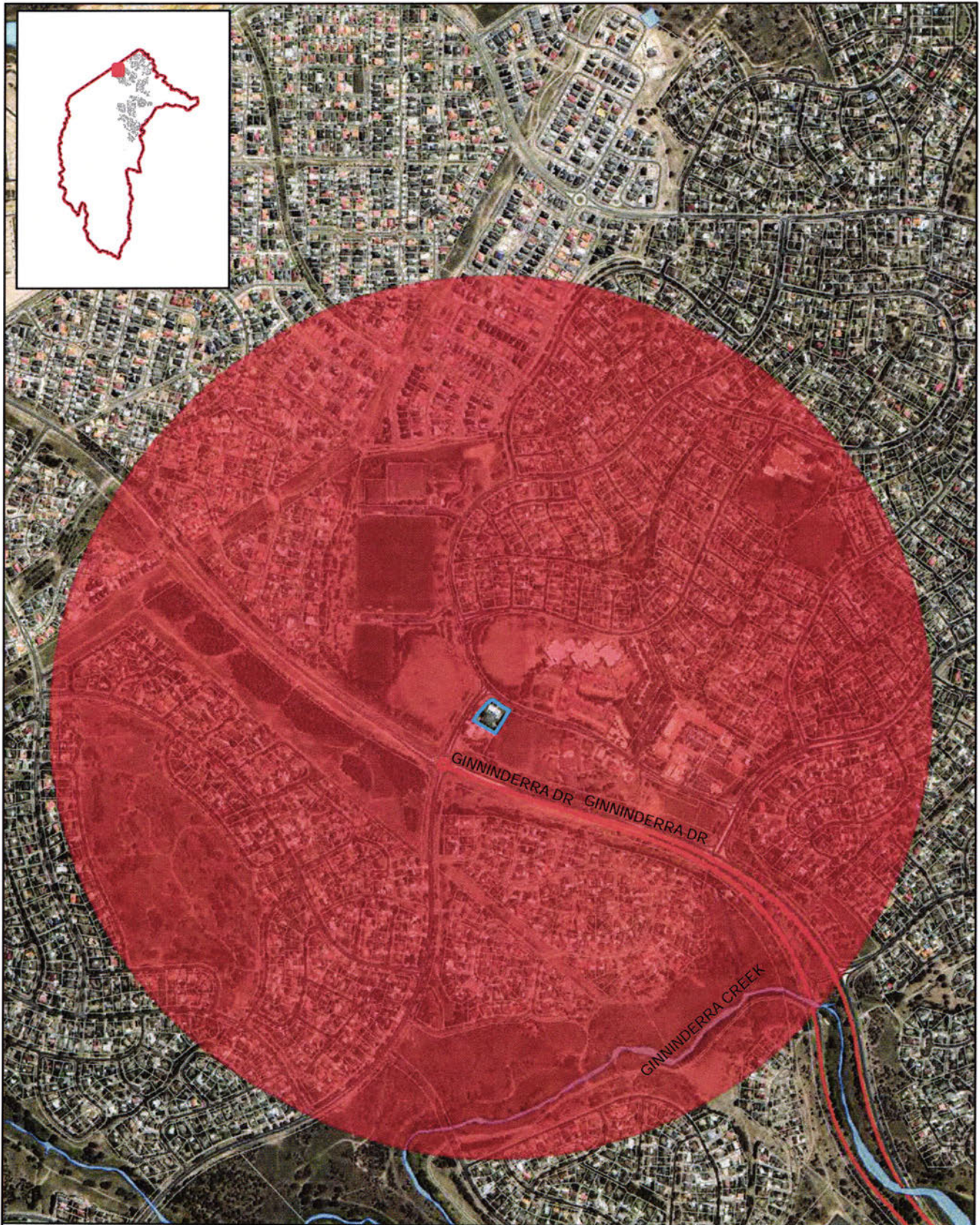
I refer to your application for a groundwater bore search. There are no privately managed groundwater abstraction bores registered under the *Water Resources Act 2007* within a 1km radial search area of block 6, section 97 Charnwood.

Please note that this search does not include investigation and/or monitoring bores associated with possible contaminated sites in the search area. If you require more information please contact Contaminated Sites (Environment Protection Authority) on 132281.

If you have any questions please contact me on (02) 6207 5606 or email [jillian.harrap@act.gov.au](mailto:jillian.harrap@act.gov.au).

Yours sincerely

Jillian Harrap  
Environment Protection Officer  
Water Regulation  
19/08/2014



**Groundwater bore search**  
**Site: block 6, section 97 Charnwood**

Date: 19 August 2014  
 Produced by: Water Regulation  
 Source: Environment and Sustainable Development Directorate (ESDD)

Coordinate system: MGA Zone 55  
 Datum: GDA 1994

Contact: Contact Water Regulation via Canberra Connect (132281)



**Legend**

- 1km buffer of site
- Groundwater abstraction bores
- ▲ Water table monitoring bores
- Major roads



*Disclaimer: ESDD does not warrant that the data is free from errors.*

AECOM

Stage 1 Environmental Assessment - JACSD Chamwood  
JACSD Chamwood

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Appendix C

# ACT ESDD Contaminated Land Search

**ACT**

Government

Environment and Planning

File Ref: 02/2664

██████████  
AECOM Australia  
Level 2, 60 Marcus Clarke Street  
Canberra City ACT 2600

**RE: CONTAMINATED LAND SEARCH**

Dear ██████████

Thank you for your search form request of 18/08/2014 enquiring about:

**Block 6 Section 97 Charnwood Belconnen**

Records held by the Environment Protection Authority (EPA) for the above block(s) indicate the following:

The block is recorded on the EPA's contaminated sites management database and geographic information system.

Records indicate the site was formerly occupied by a fire station which included refuelling facilities. These records also indicate that 3 underground fuel storage tanks are or were located at the site. There is no record of the current status of these facilities.

The EPA received a report titled "Emergency Services Bureau - Truck Wash Bays and Fuel Tanks Removal Feasibility Study - Phase 1 Fuel Tank Investigation Report Charnwood Fire Station Tanks A, B and C" by Maunsell Pty Ltd dated November 2002. The report identified soil contamination in the immediate vicinity of the underground tanks.

The ANZECC 1992 Guidelines for the Assessment and Management of Contaminated Sites and the ACT Contaminated Sites Environment Protection Policy, November 2009 list fuel storage facilities as activities associated in the past with land contamination which may present a risk to human health or the environment.

You or your client should also contact WorkSafe ACT, who license fuel storage facilities and other dangerous substance storage, on (02) 6205 0200 regarding records of any facilities or incidents at the site.

Under the precautionary principal all blocks which contain or have contained fuel storage facilities are identified and persons making enquiries are made aware of potential for impacts from adjacent sites due to the ability of hydrocarbons and other contaminants to migrate through the environment.

The EPA has not issued any environment protection orders under sections 91C (1), 91D (1) or 125 (4) of the *Environment Protection Act 1997* (the Act) over the site and as a result the site is not recorded on the Register of contaminated sites under section 21(A) of the Act.

The information detailed above only relates to records held by the EPA and may not represent the actual condition of the site.

At present the EPA has no information on contamination of the above block(s) other than as detailed above. However, this does not absolutely rule out the possibility of contamination and should not be interpreted as a warranty that there is no contamination.

I appreciate that this does not absolutely rule out the existence of contamination of the soils. If you or your clients wish to be completely sure you, or they, should arrange to conduct independent tests.

Yours sincerely



Mark Heckenberg  
Project Officer  
Environment Protection and Water Regulation

19/08/2014




## TAX INVOICE

Date: 18/08/2014

Receipt Number: 1403447138

To:

  
 AECOM Australia  
 Level 2, 60 Marcus Clarke Street  
 Canberra City ACT 2600

Quantity	Description of Supply	Price	Total
	Contaminated Land Search		
1	Block 6, Section 97, Charnwood, Belconnen	\$41.50	\$41.50
<b>TOTAL AMOUNT PAID</b>			<b>\$41.50</b>

THE TOTAL PRICE INCLUDES GST



AECOM


Stage 1 Environmental Assessment - JACSD Chamwood  
JACSD Chamwood

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Appendix D

# Site Photographs

**PHOTOGRAPHIC LOG**

<b>Site Name: Former West Belconnen Fire Station</b>		<b>Site Location: Belconnen, ACT</b>	<b>Project No: 60316172</b>
<b>Plate No.</b> <b>1</b>	<b>Date:</b> <b>26 August 14</b>		
<b>Direction Photo Taken:</b> <b>North</b>			
<b>Description:</b> <b>Exposed tank pits</b>			

<b>Plate No.</b> <b>2</b>	<b>Date:</b> <b>26 August 14</b>	
<b>Direction Photo Taken:</b> <b>South west</b>		
<b>Description:</b> <b>Stockpile location and skip bin in courtyard</b>		


Plate No. <b>3</b>	Date: <b>27 August 14</b>	
Direction Photo Taken: <b>North</b>		
Description: <b>From rear car park looking toward the front of the Site</b>		

Plate No. <b>4</b>	Date: <b>27 August 14</b>	
Direction Photo Taken: <b>North</b>		
Description: <b>Excavator assisting with taking validation samples</b>		

<b>Plate No.</b> <b>5</b>	<b>Date:</b> 27 August 14	
<b>Direction Photo Taken:</b> South west		
<b>Description:</b> Stockpiles		


<b>Plate No.</b> <b>6</b>	<b>Date:</b> 27 August 14	
<b>Direction Photo Taken:</b> North		
<b>Description:</b> Fire Station Building.		

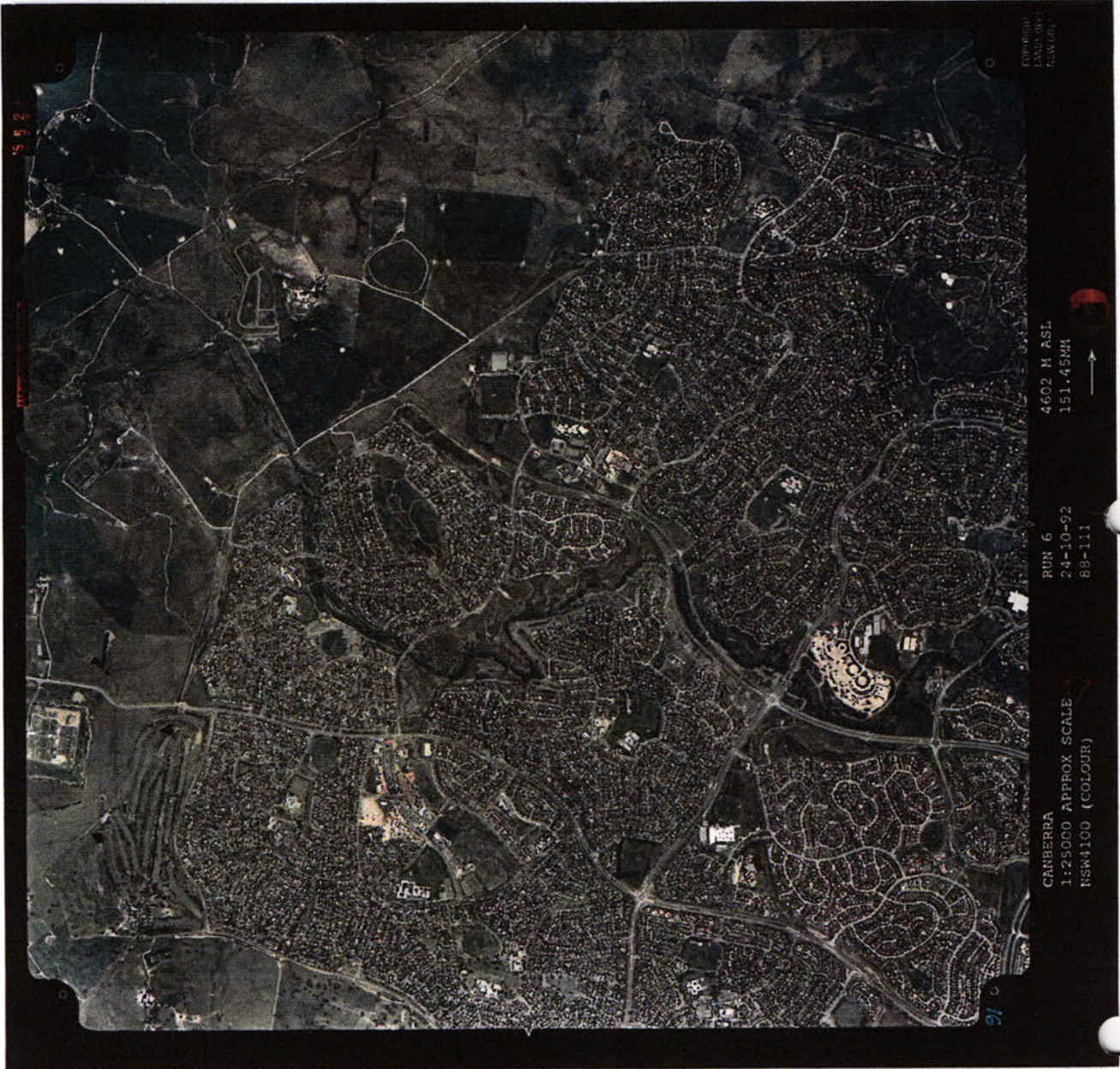
Plate No. <b>7</b>	Date: 25 September 14	
Direction Photo Taken:  South		
Description:  Backfill material imported to site.		

Plate No. <b>8</b>	Date: 25 September 14	
Direction Photo Taken:  North		
Description:  Compaction roller. Material compacted in 300 mm layers		

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Appendix E

# Historical Aerial Photographs



Copyright  
Aerial Photo  
NSW4100

4602 M ASL  
151.45MH

RUN 6  
24-10-92  
88-111

CANBERRA  
1:25000 APPROX SCALE  
NSW4100 (COLOUR)

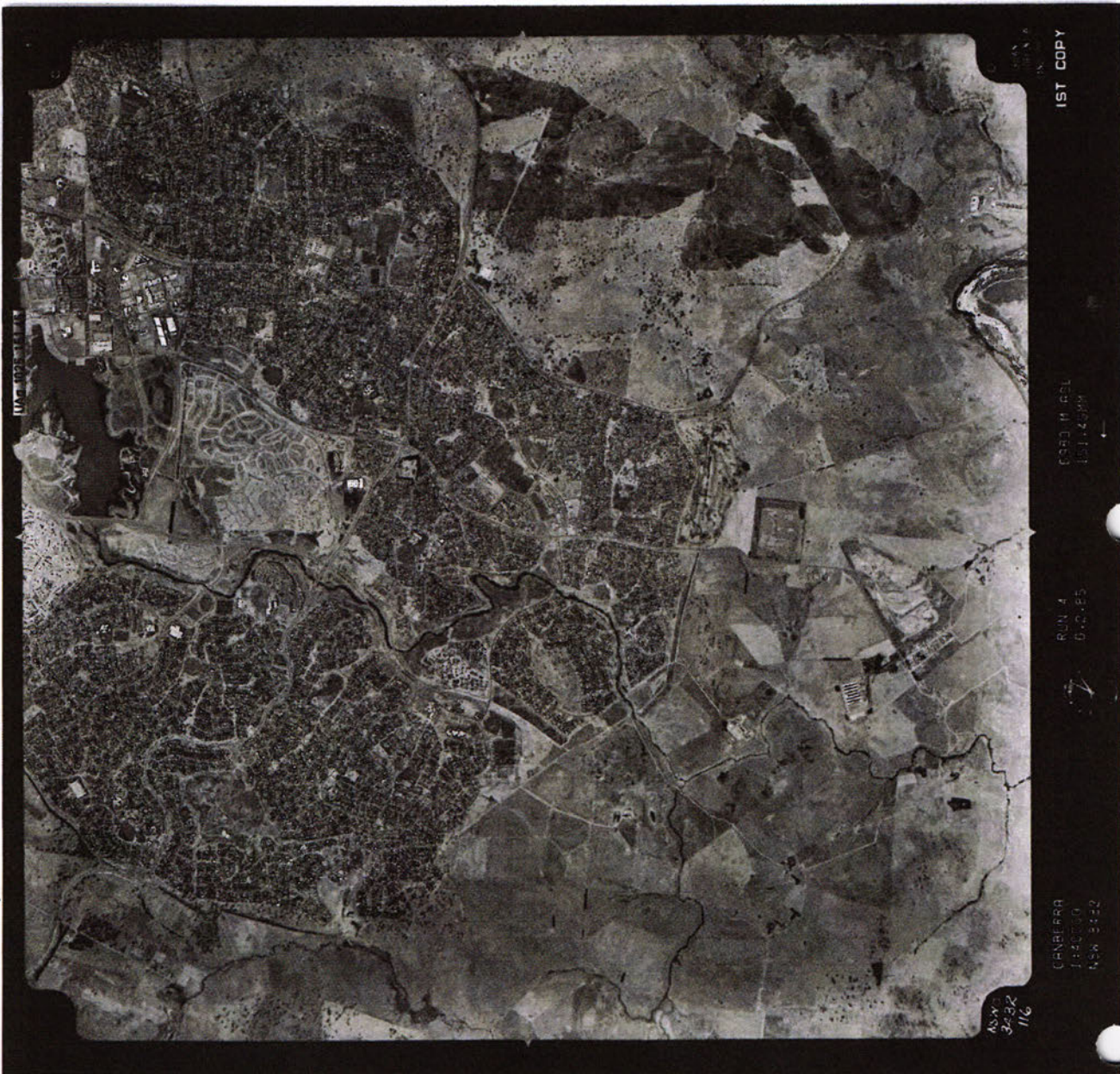


5.2.2.1

21







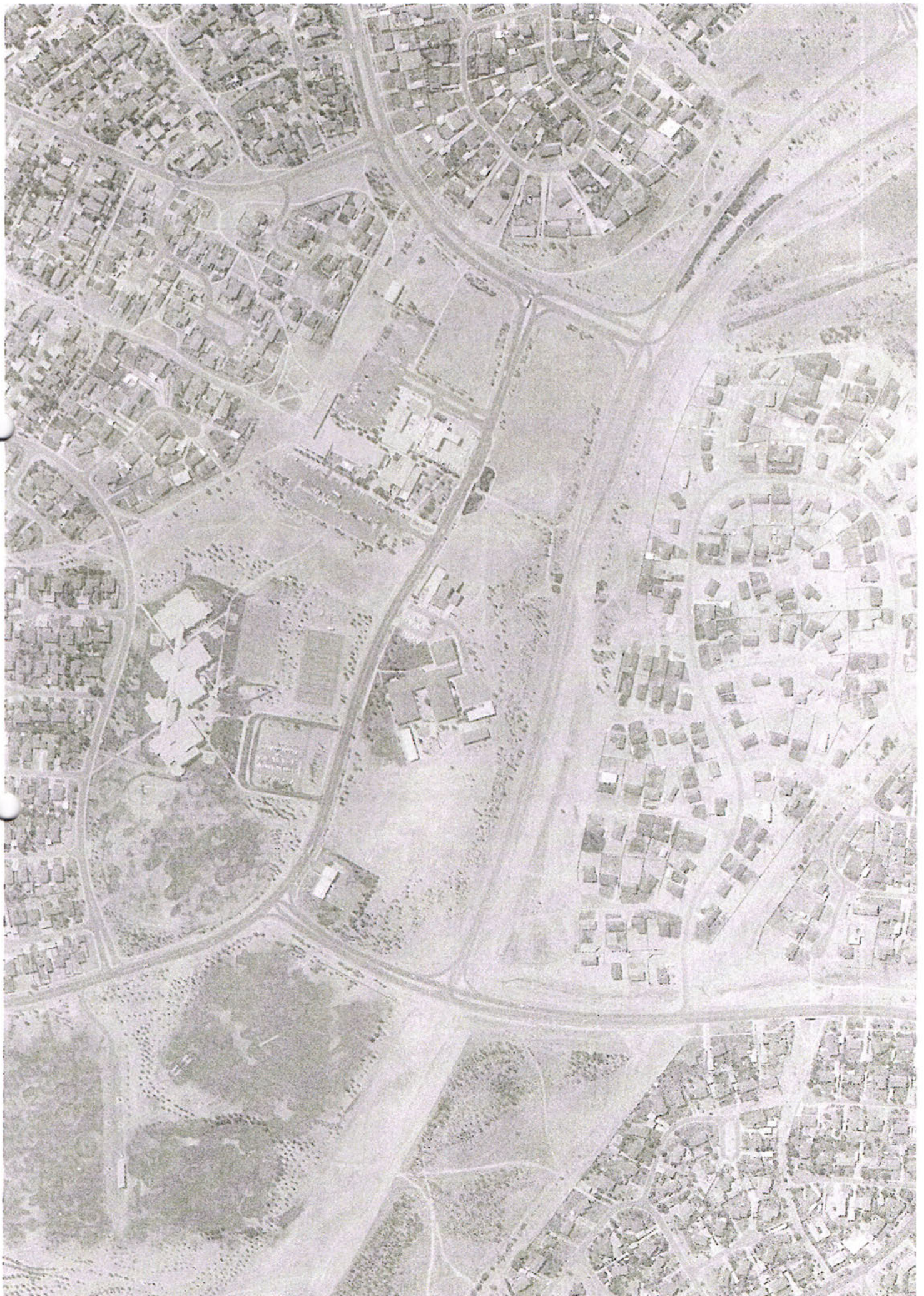
1ST COPY

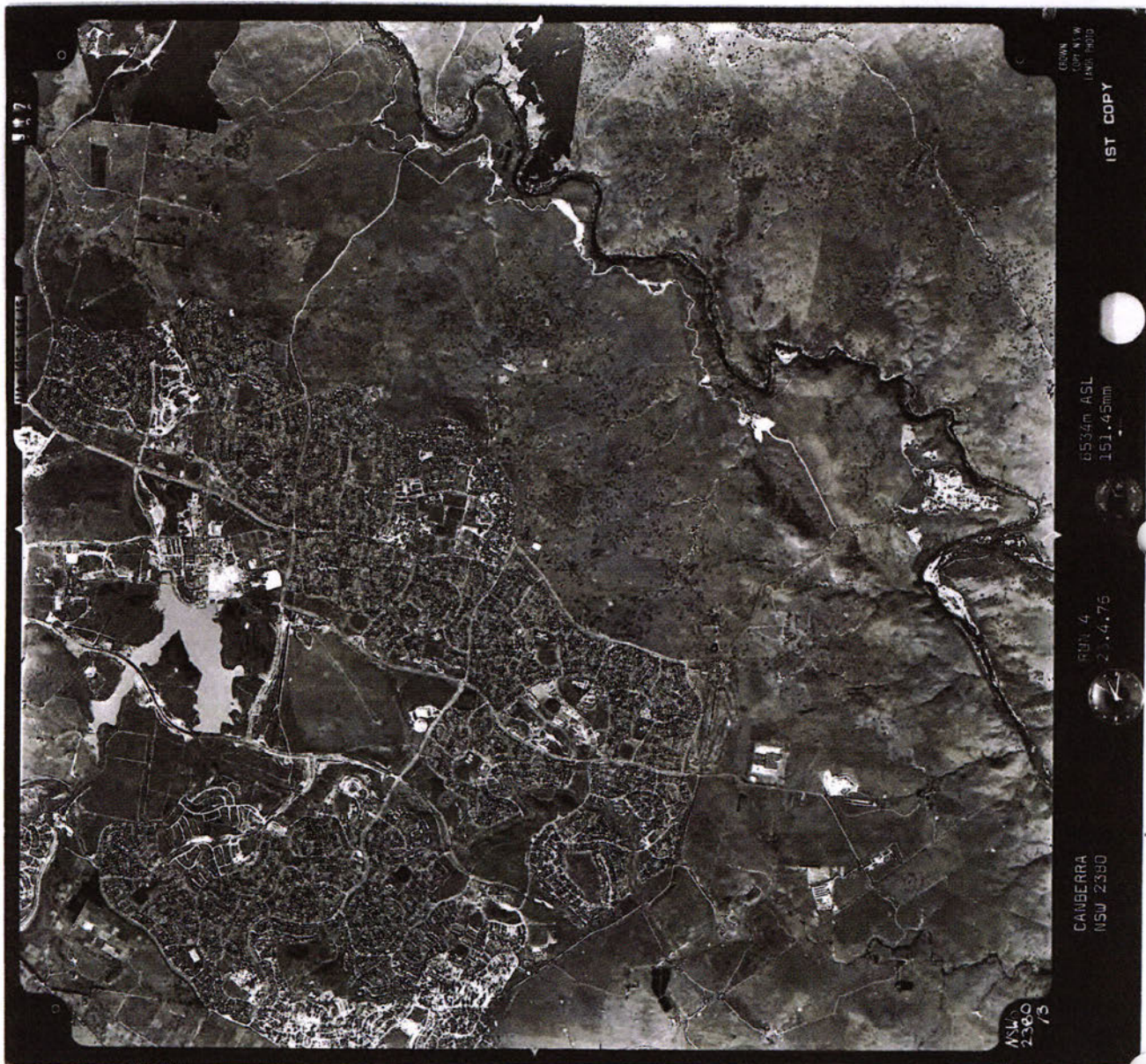
CSRD M. 65L  
15114599

RUN 4  
6.0.65

CHAMPLAIN  
1:20,000

ASW 3232  
116





6534m ASL  
151.45mm

IST COPY

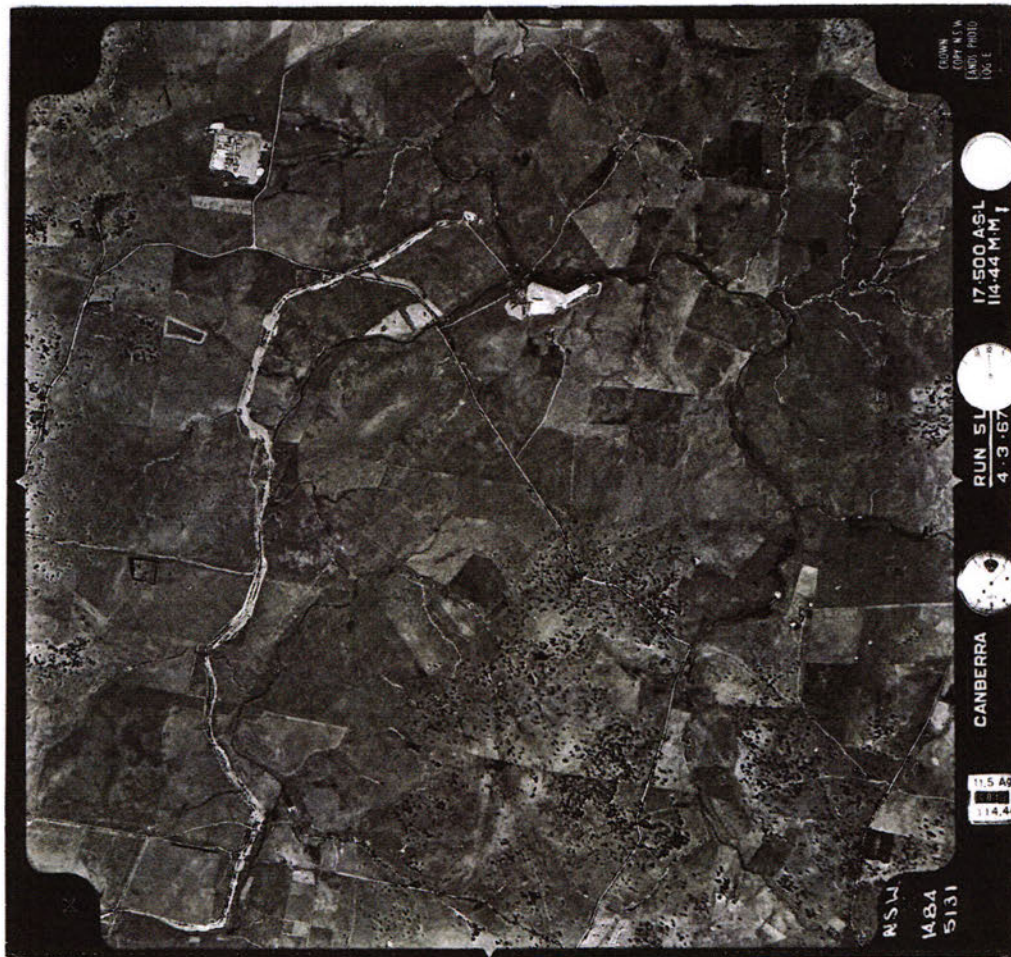
6534m ASL  
151.45mm

RUN 4  
2.4.76

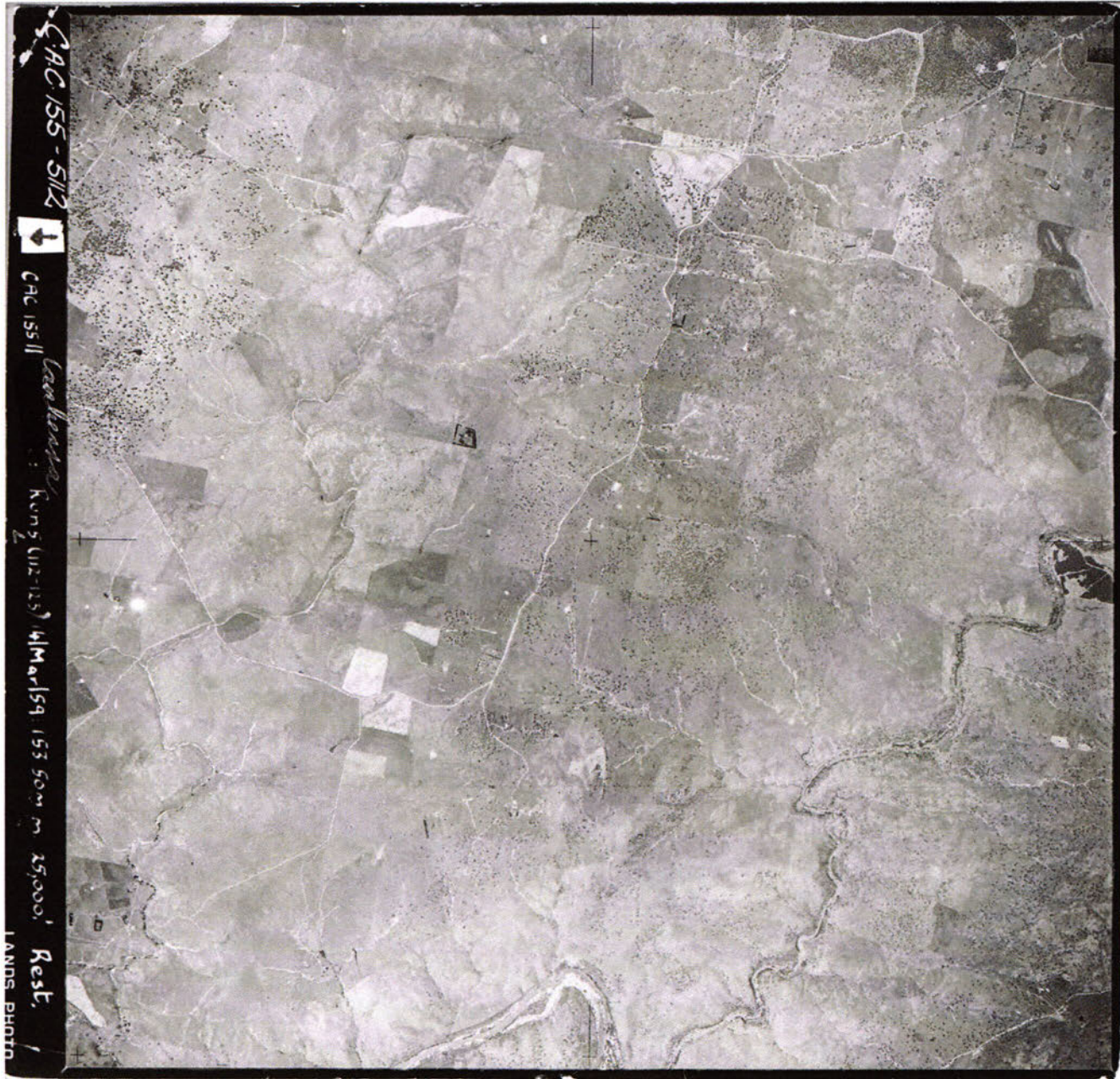
CANBERRA  
NSW 2380

NSW  
2380  
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CAC 155-5112  
↑  
CAC 15511  
Crest  
Kungs (112-125)  
14 Mar 59  
153 50m m 25,000  
Rest.  
LANDS PHOTO

