

From: [REDACTED]
To: [AC EPD Customer Services](#)
Subject: Caltex Holt - Application for an ESO
Date: Wednesday, 2 June 2021 5:40:42 PM
Attachments: [image001.jpg](#)

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Hi EPD customer service,
Please find via the following link the ESO application for Caltex Holt.
This package contains:

- Letter of authorisation for Block 1 Section 53 Holt.
- Completed Form 1M.
- Application for an ESO supporting documentation.

<https://wsp.hostedftp.com/CJ6iMg9kCRtgtJx02Poql7Tlw>

If you need anything else please let me know.

Cheers,



[REDACTED]
Environmental Scientist

T: +61 2 6201 9695

[REDACTED]
WSP Australia Pty Limited
Level 2, 121 Marcus Clarke Street
Canberra, ACT
2601 Australia

wsp.com/au

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From: [EPD Impact](#)
To: [AC, EPD Customer Services](#)
Subject: ESO202100029 completeness check pass
Date: Wednesday, 9 June 2021 1:43:00 PM
Attachments: [ESO-202100029-CALTEX HOLT REMEDIATION WORKS.obr](#)

OFFICIAL

Hi Customer Services,

I have reviewed the ESO application ESO202100029 for remediation works of the caltex holt petrol station at block 1 section 53 Holt. It has now passed a completeness check.

Can you please send out the fee advice of \$642.00 to the applicant and notify the impact assessment team when the fee is paid.

Kind regards,

Ben

Benjamin Huttner-Koros | Development Assessment Officer

Direct Phone: 02 6207 9397 | Direct Email: benjamin.huttner-koros@act.gov.au

Impact Assessment | Statutory Planning Division

Environment, Planning and Sustainable Development Directorate | ACT Government

Level 1, 480 Northbourne Avenue, Dickson ACT 2602 | GPO Box 158, Canberra, ACT 2601 | www.planning.act.gov.au

From: [AC, EPD Customer Services](#)
To: [REDACTED]
Subject: FEE ADVICE-SCOPING DOCUMENT-202100029-1/53 HOLT-CALTEX HOLT REMEDIATION WORKS
Date: Friday, 11 June 2021 12:10:00 PM
Attachments: [image001.png](#)

OFFICIAL

Dear Applicant,

Following an initial check of your Request for **Scoping Document**, the submission is now ready to proceed to the next stage.

Please visit the payment web site below or fees can also be paid cheque or credit card by coming into the counter at 8 Darling Street, Mitchell.

Proposal Number:	202100029
Sites:	1/53 HOLT
Applicant Name:	WSP AUSTRALIA – [REDACTED]
Scoping Fee:	\$642.00
Payment Site:	https://form.act.gov.au/smartforms/landing.htm?formCode=1215

If you have any enquiries, please call the Customer Service Centre on (02) 6207 1923 or by email: epdcustomerservices@act.gov.au.

Kind Regards

Your name

Phone 6207 1923

EPDCustomerServices@act.gov.au

www.act.gov.au/accesscbr

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8 Darling Street, Mitchell | GPO Box 158 Canberra ACT 2601



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From: [AC, EPD Customer Services](#)
To: [EPD Impact](#)
Subject: PAYMENT RECEIVED-SCOPING DOCUMENT-202100029-1/53 HOLT-CALTEX HOLT REMEDIATION WORKS
Date: Tuesday, 15 June 2021 10:51:00 AM
Attachments: [image002.png](#)
[ESO-202100029-CALTEX HOLT REMEDIATION WORKS.obr](#)

OFFICIAL

Customer Services has received payment for the ESO: 202100029

DESCRIPTION: CALTEX HOLT REMEDIATION WORKS
LODGEMENT DATE: 11/06/2021

Kind Regards

Katherine
Phone 6207 1923

EPDCustomerServices@act.gov.au
www.act.gov.au/accesscbr

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Access Canberra is an ACT Government service that brings together customer and regulatory services, including the former Environment and Planning Directorates Customer Services Team. Access Canberra has been set up to make it easier for business, community organisations and individuals to work with ACT Government and deliver a more seamless experience.

From: [EPD Impact](#)
To: [REDACTED]
Cc: [Maxwell, Brad](#); [Riches, Dominic](#)
Subject: ESO202100029 Caltex Holt Remediation Works
Date: Monday, 26 July 2021 5:12:00 PM
Attachments: [ESO given Authority opinion - ESO202100029 - Signed.pdf](#)

OFFICIAL

Good afternoon [REDACTED]

The environmental significance opinion for the Caltex Holt remediation works (ESO application ESO202100029) has been granted by the ACT Planning and Land Authority. I have attached the ESO to this email.

The ESO will be publicly notified on the legislation register shortly.

Please contact me if you have any questions.

Regards

Ben

Benjamin Huttner-Koros | Development Assessment Officer

Direct Phone: 02 6207 9397 | Direct Email: benjamin.huttner-koros@act.gov.au

Impact Assessment | Statutory Planning Division

Environment, Planning and Sustainable Development Directorate | ACT Government

Level 1, 480 Northbourne Avenue, Dickson ACT 2602 | GPO Box 158, Canberra, ACT 2601 | www.planning.act.gov.au

From: [REDACTED]
To: [EPD Impact](#)
Cc: [Maxwell, Brad](#); [Riches, Dominic](#)
Subject: RE: ESO202100029 Caltex Holt Remediation Works
Date: Tuesday, 27 July 2021 8:44:27 AM
Attachments: [image001.png](#)

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Hi Ben,
Many thanks for sending through the ESO.
Please be aware that the future works at the site will occur as two separate packages and will be submitted as two development applications for consideration. WSP will apply for development approval for the remediation works while Ampol (formerly known as Caltex) has engaged a separate consultant to undertake tank replacement.
We have provided a copy of the ESO to Ampol to ensure that both components of the works will be undertaken in accordance with the conditions previously attached.
If the Impact team would like advanced notice of these DA's prior to lodgement please let me know.
Cheers,



[REDACTED]
Environmental Scientist

T: +61 2 6201 9695



WSP Australia Pty Limited
Ngunnawal Country
Level 2, 121 Marcus Clarke Street
Canberra, ACT, 2601
Australia

wsp.com/au

WSP acknowledges that every project we work on takes place on First Peoples lands. We recognise Aboriginal and Torres Strait Islander Peoples as the first scientists and engineers and pay our respects to Elders past and present.

From: EPD Impact [mailto:EPDImpact@act.gov.au]
Sent: 26 July, 2021 5:13 PM
To: [REDACTED]
Cc: Maxwell, Brad <Brad.Maxwell@act.gov.au>; Riches, Dominic <Dominic.Riches@act.gov.au>
Subject: ESO202100029 Caltex Holt Remediation Works

OFFICIAL

Good afternoon [REDACTED]
The environmental significance opinion for the Caltex Holt remediation works (ESO application ESO202100029) has been granted by the ACT Planning and Land Authority. I have attached the ESO to this email.
The ESO will be publicly notified on the legislation register shortly.
Please contact me if you have any questions.
Regards
Ben

Benjamin Huttner-Koros | Development Assessment Officer
Direct Phone: 02 6207 9397 | Direct Email: benjamin.huttner-koros@act.gov.au
Impact Assessment | Statutory Planning Division
Environment, Planning and Sustainable Development Directorate | ACT Government
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From: [Sargent, Narelle](#)
To: [EPD Impact](#)
Cc: [Huttner-Koros, Benjamin](#); [EPAPlanningLiaison](#)
Subject: Environmental significance opinion referral-202100029-Caltex Holt remediation-B1/S53 Holt
Date: Thursday, 17 June 2021 10:39:32 AM
Attachments: [image001.png](#)

Dear Impact Assessment Team

Thank you for the opportunity to review and provide advice on the application for an Environmental Significance Opinion (ESO) for development works to replace a failed underground fuel tank and develop a temporary facility to extract and treat groundwater. The Environment Protection Authority (EPA) supports an exemption from the requirement for an ESO provided the EPA's conditions of approval will be managed through the Merit Track Development Application process.

The following conditions are required to be included in the approval. Further commentary including further recommended conditions of approval will be provided following review of the detailed documentation to be provided with the Development Application.

Demolition/Tank Removal:

- all tanks (and related infrastructure) subject to removal must be removed in accordance with WorkSafe ACT requirements
- the area subject to works under the development application must be assessed and remediated in accordance with the EPA Contaminated Sites Environment Protection Policy 2017 (CSEPP) and the National Environment Protection (Assessment of Site Contamination) Measure 1999 as amended 2013 by a suitably qualified environmental consultant
- all assessment and remedial works must be independently audited in accordance with the CSEPP by an EPA approved environmental auditor
- the Remedial Action Plan (RAP) for the proposed works must be reviewed and endorsed by the auditor with a copy of the endorsement of the RAP provided to the EPA.

Completion of works:

- a copy of the Auditor's draft site audit report, draft site audit statement and any proposed draft site management plan must be submitted to the EPA for review and comment in accordance with the CSEPP and EPA Information Sheet 11 - Environment Protection Authority Report Submission Requirements prior to finalisation of these documents
- a copy of the Auditor's final audit documents into the appropriateness of all investigation and remedial works and confirming the site's continued suitability for its permitted uses under its Crown lease must be submitted to the EPA for review and endorsement in accordance with EPA Information Sheet 11 - Environment Protection Authority Report Submission Requirements.

General conditions:

- sediment and leachate control measures must be incorporated for any stockpiled material to prevent contaminants entering the stormwater system
- dust and odour suppression measures must be incorporated as required during the works to minimise impacts on surrounding blocks
- all spoil identified at the site must be managed in accordance with EPA Information Sheet - Spoil Management in the ACT
- all soil subject to disposal from the site must be assessed in accordance with EPA Information Sheet 4 - Requirements for the reuse and disposal of contaminated soil in the ACT
- no soil is to be disposed from site without EPA approval.

Yours sincerely

Narelle Sargent

Environment Protection Authority

Narelle Sargent

*Environment Protection Authority (including Water Resources)
Clinical Waste Controller*

Delegate for Lakes

Access Canberra | Chief Minister, Treasury and Economic Development Directorate | ACT Government

Phone: 02 6207 5782 | Mobile 0466 510 033 | Email: narelle.sargent@act.gov.au

480 Northbourne Avenue, Dickson | GPO Box 158 Canberra City ACT 2601 | www.act.gov.au/accessCBR



From: EPD Impact <EPDImpact@act.gov.au>

Sent: Tuesday, 15 June 2021 4:25 PM

To: SupportHPS <ED-HPS-support@act.gov.au>; EmergencyManagement <EmergencyManagement@act.gov.au>; EPAPanningLiaison <EPAPanningLiaison@act.gov.au>; Sargent, Narelle <Narelle.Sargent@act.gov.au>; DangerousSubstances <DangerousSubstances@worksafe.act.gov.au>; Agius, Jacqueline <Jacqueline.Agius@worksafe.act.gov.au>

Cc: Morgan, Cody <Cody.Morgan@worksafe.act.gov.au>; Riches, Dominic <Dominic.Riches@act.gov.au>

Subject: Environmental significance opinion referral-202100029-Caltex Holt remediation-B1/S53 Holt

OFFICIAL

Good afternoon,

Email 1 of 2

Request for comments – Environmental Significance Opinion Application

The ACT planning and land authority has received an application for an Environmental Significance Opinion (ESO) for the project detailed below. The site is on the *Environment Protection Act 1997* register of contaminated sites.

Schedule 4 of the *Planning and Development Act 2007* requires an environmental significance opinion (ESO) or environmental impact statement (EIS) for all development on a site on the register of contaminated sites.

Please note in accordance with the *Planning and Development Act 2007* the authority is required to consult with the following entities on this proposal:

- a. the work safety commissioner
- b. the environment protection authority
- c. the emergency services commissioner and
- d. the director-general of the administrative unit responsible for the Health Act 1993

ESO APPLICATION NUMBER: 202100029
--

PROJECT: Caltex Holt Remediation Works

LOCATION: Block 1 Section 53 Holt
--

The development is to replace a failed underground fuel tank and develop a temporary facility to extract and treat groundwater.

Please find attached the ESO application documents for your consideration and provide any comments by **COB 6 July 2021 (15 working days)** to EPDImpact@act.gov.au. I have attached an objective link to the documents and the documents as pdf files. A second email will be sent with the remaining files that could not fit into this email.

Please contact me if you have any questions.

Kind regards,

Ben

Benjamin Huttner-Koros | Development Assessment Officer

Direct Phone: 02 6207 9397 | Direct Email: benjamin.huttner-koros@act.gov.au

Impact Assessment | Statutory Planning Division

Environment, Planning and Sustainable Development Directorate | ACT Government

Level 1, 480 Northbourne Avenue, Dickson ACT 2602 | GPO Box 158, Canberra, ACT 2601 | www.planning.act.gov.au

From: [Peters, Mel](#) on behalf of [EmergencyManagement](#)
To: [EPD Impact](#)
Cc: [ACTF&R Risk & Planning](#); [Potts, Greg](#); [Ambulance Events](#); [Rose, David](#)
Subject: ACTF&R comments for ESO202100029 - Caltex - 1/553 HOLT
Date: Monday, 28 June 2021 10:21:15 AM
Attachments: [image001.jpg](#)
[image002.png](#)
[image003.png](#)
[image004.png](#)
[image005.jpg](#)

OFFICIAL

Good Morning,
Please see comments below from ACTF&R for the above ESO.
Kind regards
Mel Peters

P: (02) 620 52770 M: [REDACTED]

Email: Mel.Peters@act.gov.au

Address: 9 Amberley Avenue, Fairbairn, ACT 2601



Hi Emergency Management,
ACTF&R has no comments or concerns for ESO202100029 - Caltex - 1/553 HOLT.
All appropriate atmospheric monitoring protocols and procedures are to be followed as per the site safety plan



Neil Willis

Bushfire and Development Assessment Officer
ESA Headquarters
T. 02 6207 8472
E. actf&risk&planning@act.gov.au
Address: 9 Amberley Ave, Fairbairn
www.esa.act.gov.au

From: [SupportHPS](#)
To: [EPD Impact](#)
Cc: [SupportHPS](#)
Subject: Quality Check ESO 202100029 Caltex Holt Remediation
Date: Friday, 16 July 2021 11:22:15 AM
Attachments: [Signed Attachment A Letter - ESO202100029 Caltex Holt \(003\).pdf](#)
[image001.jpg](#)

OFFICIAL

Good morning,

Please see attached input from Health Protection Service signed on behalf of EBM HPS.

Thank you

Victor Hugo Martin (he/him) | Executive Branch Manager, Health Protection Service

Ph: 5124 9262 | Email: ED-HPS-support@act.gov.au

Health Protection Service, Public Health, Protection & Regulation | ACT Health Directorate

25 Mulley St, Holder, ACT 2611

health.act.gov.au

ACTH Email signature Values



From: [Morgan, Cody](#) on behalf of [DangerousSubstances](#)
To: [EPD Impact](#)
Subject: Environmental significance opinion referral-202100029-Caltex Holt remediation-B1/S53 Holt
Date: Monday, 28 June 2021 3:58:05 PM
Attachments: [image001.png](#)
[image003.png](#)
[image004.png](#)

OFFICIAL

Good afternoon Ben

Further to our telephone conversation earlier today, I confirm that the Work Health and Safety Commissioner does not have any comments to make in relation to the following environmental significance opinion referral under the Planning and Development Act 2007:

ESO APPLICATION NUMBER: 202100029
PROJECT: Caltex Holt Remediation Works
LOCATION: Block 1 Section 53 Holt

We understand that the development is to replace a failed underground fuel tank and develop a temporary facility to extract and treat groundwater.

Please be advised that in providing this response, WorkSafe ACT has not approved or endorsed the proposed work arrangements for the development activities, including any proposed risk control measures. Nothing in this response affects the safety duties of persons involved in the work under the [Work Health and Safety Act 2011](#).

If you have any questions regarding this matter, please feel free to contact me on (02) 6205 2406 or by e-mail at DangerousSubstances@worksafe.act.gov.au.

Regards

Cody Morgan

Cody Morgan | Licensing Officer

P: 6205 2406 | E: cody.morgan@worksafe.act.gov.au

Office of the Work Health and Safety Commissioner

GPO Box 158 Canberra ACT 2601



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APPENDIX A

LNAPL MANAGEMENT PLAN



AMPOL AUSTRALIA PETROLEUM PTY
LTD

JUNE 2021

LNAPL MANAGEMENT PLAN (LMP)

CALTEX HOLT SERVICE
STATION (SITE ID: 22546), 1
HARDWICK CRESCENT HOLT
ACT

wsp



LNAPL Management Plan (LMP)

Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT

Ampol Australia Petroleum Pty Ltd

WSP

Level 27, 680 George Street

Sydney NSW 2000

GPO Box 5394

Sydney NSW 2001

Tel: +61 2 9272 5100

Fax: +61 2 9272 5101

wsp.com

REV	DATE	DETAILS
A	22 March 2021	Initial draft report for review
B	6 April 2021	Draft – Incorporation of Auditor comments
C	5 May 2021	Draft – Incorporation of Auditor comments
D	18 May 2021	Final – Incorporation of Auditor comments
E	26 May 2021	Revised Final – Incorporation of ACT EPA comments
F	2 June 2021	Revised Final – Incorporation of ACT EPA comments

	NAME	DATE	SIGNATURE
Prepared by:		2 June 2021	
Reviewed by:		2 June 2021	
Approved by:		2 June 2021	

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ABBREVIATIONS

ACT	Australian Capital Territory
BTEX	Benzene, toluene, ethyl benzene, xylene
°C	Degrees Celsius
C6–C10	Light hydrocarbon chain groups (for example, petrol)
C10–C16	Medium hydrocarbon chain groups (for example, kerosene)
C16–C34	Heavy hydrocarbon chain groups (for example, diesel)
C34–C40	Heavy hydrocarbon chain groups (for example, lube oil)
CSM	Conceptual site model
EA	Environmental authorisation
EPA	Environment Protection Authority
ESA	Environmental Site Assessment
GAC	Granulated activated carbon
GME	Groundwater monitoring event
Hr	Hour
IBC	Intermediate bulk container
HSL	Health screening level
ISCO	In Situ Chemical Oxidation
K	Hydraulic Conductivity
kg	Kilogram
kg/hr	Kilograms per hour
kPa	Kilopascal
L	Litre
LCSM	LNAPL conceptual site model
LNAPL	Light non-aqueous phase liquid
LOR	Limit of reporting
LPG	Liquid Petroleum Gas
L/s	Litres per Second
L/min	Litres per minute
mAHD	Metres Australian Height Datum
mBGL	Metres below ground level
mBTOC	Metres below top of casing
mg/L	Milligrams per Litre
min	Minute
m	Metres
mm	Millimetre
mV	Millivolt
m ³ /h	Metres cubed per hour
mg/m ³	Milligrams per metres cubed

Na ₂ S ₂ O ₈	Sodium persulfate
NATA	National Association of Testing Authorities
NSW	New South Wales
Pa	Pascal
PAH	Polycyclic aromatic hydrocarbon
pH	Potential of hydrogen
PID	Photo-ionisation detector
ppm	Parts per million
ppm _v	Parts per million by volume
PULP	Premium unleaded petrol
PVC	Polyvinyl chloride
ROI	Radius of influence
SAC	Site Assessment Criteria
SOP	Standard operating procedure
SWL	Standing water level
SVE	Soil Vapour Extraction
TDS	Total Dissolved Solids
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
µg/L	Micrograms per litre
µS/cm	Millisiemens per centimetre
UPSS	Underground petroleum storage system
UST	Underground storage tank
VOC	Volatile organic compounds
WSP	WSP Australia Pty Limited

1 INTRODUCTION

Ampol Australia Petroleum Pty Ltd (Ampol) (formally Caltex Australia Petroleum Pty Ltd (Caltex)) engaged WSP Australia Pty Limited (WSP) to prepare a Light Non-Aqueous Phase Liquid (LNAPL) Management Plan (LMP) for the Caltex Holt service station, 1 Hardwick Crescent, Holt, Australian Capital Territory (ACT) (Site ID: 22546). The site regional location setting plan and site layout plan is presented in Figures 1 and 2 respectively (Appendix A).

1.1 BACKGROUND

During February 2020, in response to a suspected loss of fuel at the site, Ampol engaged WSP to assist in the spill response investigations and works to mitigate the loss of product at the service station.

The works conducted by WSP since the commencement of the fuel loss response in February 2020 have included:

- Assessment and delineation of the groundwater impacts;
- A vapour intrusion risk assessment for the on-site service station buildings;
- Active recovery (pumping) of LNAPL impacts;
- Soil vapour assessment and associated human health risk assessment for the off-site areas;
- Preliminary options assessment for the clean up of the LNAPL impacts noted off-site, and the dissolved phase hydrocarbon impacts (at or above saturation levels) on site;
- Remediation pilot trials;
- Preparation of a Remediation Action Plan (RAP) for the long term clean up and management of the LNAPL impacts in groundwater.

The outcomes of the works above identified on- and off-site LNAPL impacts, with the LNAPL thicknesses declining in the monitoring well network in the second half of 2020. The declining thicknesses of LNAPL are at least partially due to the on-going LNAPL recovery measures that have been undertaken since February 2020, but also likely due to the rise in groundwater levels across the well network.

The investigations delineated the hydrocarbons impacts and demonstrated that there is no current (and likely no future) impact to surface receiving waters. Stormwater pipework in the area of drilling is above the aquifer level and is therefore not impacted by contaminated groundwater. The local stormwater pipework drains to piped ‘trunk’ mains which eventually discharge to Ginninderra Creek, 650 m north-northwest of the service station.

The vapour assessments conducted confirmed that there was no unacceptable risk from vapour intrusion to occupants of buildings at the service station, or to occupants of nearby residential and commercial properties.

1.2 STATUTORY REGULATION OF THE SITE

Following the formal notification of the fuel loss to the ACT Environment Protection Authority (EPA), on 3 March 2020 the EPA issued Environmental Protection Order (EPO) No: 50048. Amongst other actions relating to the management and mitigation of the suspected fuel loss, the order required Caltex to “*undertake an assessment of the risk to human health of the occupants and visitors of the site to demonstrate that the site is suitable to continue operating*”. This assessment was conducted during mid to late March 2020 and a report was produced by WSP and was submitted to the EPA (Ref: PS118985-CLM-AVIR-8115 Rev2, dated 31 March 2020) (WSP March 2020a).

In addition to the EPO, the EPA issued a notification requiring Caltex to commission an environmental audit of contaminated land for the site (letter file ref: 10/3998, dated 13 March 2020). A NSW EPA and ACT EPA approved

contaminated land site auditor [REDACTED] was engaged by Ampol for the purpose of the audit. The audit was to address the following key requirements:

1. Determine the nature and extent of contamination both on and off-site from the identified release of petroleum product at the site;
2. Determine the appropriateness of all investigations and remedial actions undertaken to date and the appropriateness of any proposed assessment and management strategies for the site;
3. Provide commentary on the consultant's findings, past current and future, with respect to the level of risk the contamination posed to both on and off-site receptors;
4. Provide a conclusion as to the suitability of all impacted areas (both on and off-site) for their current permitted uses under the ACT Territory Plan from a contamination perspective; and
5. Be undertaken and submitted in accordance with the requirements of the Authority's Contaminated Sites Environment Protection Policy 2017 and the Authority's endorsed guidance.

The site auditor [REDACTED] from GHD) issued the final Site Audit Report and Site Audit Statement (*Caltex Holt Service Station – 1 Hardwick Crescent, Holt ACT – Site Audit Report, Report Number – 12529519, GHD, June 2021*) to ACT EPA on 2 June 2021.

While the assessment works concluded that there was no unacceptable health risks to on- and off-site receptors, and there is no current or likely future impact to surface receiving waters, due to residual LNAPL remaining at the site¹, it was determined that this LMP needed to be prepared in accordance with the requirements of the ACT EPA, *Environment Protection, Contaminated Sites – Information Sheet 9: Management of groundwater impacted by light non-aqueous phase liquids (LNAPL)*, dated April 2019.

1.3 REMEDIATION ACTION PLAN

As part of the Audit, a RAP was developed (WSP, March 2020) with the following objectives:

- Review and assess the suitability of clean up options to manage and mitigate the identified hydrocarbon impacts at the site;
- Ensure the effectiveness of the remedial options is clear and based on all available data;
- Provide Ampol with remedial options that offer value and assist in moving the site (and affected sites) towards end point classification in a timely fashion; and
- Provide Ampol with recommended additional measures which will assist with refining the final clean up strategy.

The RAP outlined the proposed technology for the clean up of LNAPL impacts (soil vapour extraction (SVE) and pumping), and the monitoring and validation plan during and following the active clean up works. A copy of the RAP is attached in Appendix B.

¹ The ACT EPA in their published guidance: *Information Sheet 9 – Management of light non-aqueous phase liquids (LNAPL)* (Information Sheet 9) defines LNAPL as hydrocarbons that exist as a separate, immiscible phase when in contact with water, that has a density less than that of water. For the purpose of practicality and application to site assessments, the ACT EPA broadens the definition to be: “a liquid with low solubility in water that is in sufficient quantity to form a discrete layer or separate phase”. A discrete layer in this context is defined by Information Sheet 9 as being “a thickness of NAPL of 3mm or greater as measured by an interface probe”

1.4 OBJECTIVES

While the 2020 assessment works characterised the extent of contamination at the site, and there were no unacceptable risks to receptors, there is LNAPL (and associated contaminated groundwater) present that needs to be managed and monitored. Therefore the objectives of this LMP is to identify and provide a framework for the clean up and management of on- and off-site residual hydrocarbon impacts in groundwater (including LNAPL) in accordance with the requirements of the ACT EPA, Environment Protection, *Contaminated Sites – Information Sheet 9: Management of groundwater impacted by light non-aqueous phase liquids (LNAPL)*, dated April 2019.

This LMP also incorporates the requirements and considerations of the CRC CARE 2015, *Technical Report 34: A practitioner’s guide for the analysis, management and remediation of LNAPL*.

1.5 IMPLEMENTATION OF THE LMP

This LMP is to be implemented and managed by the Site Owner (Ampol), and a copy of the LMP provided to the Site Auditor for review and endorsement as well as ACT EPA for review and approval prior to implementation.

The site’s Environmental Authorisation (EA number 0749, dated 3 May 2016) will be amended to include a new condition that requires the implementation of this LMP.

The LMP, in its current form, is to remain in force at the site until the on-going management requirements under the LMP are deemed no longer required by the Auditor and supported in writing by the EPA.

1.6 TECHNICAL FRAMEWORK

The environmental and contaminated land management works at the site are to be conducted in general accordance with the relevant statutory legislations, guidelines and standards as detailed in the following documents:

- ACT EPA 2000, Environmental Standards: Assessment and Classification of Liquid and Non-Liquids Wastes.
- ACT EPA 2017, Contaminated Sites Environment Protection Policy.
- ACT EPA 2011, Environment Protection Guidelines for Construction and Land Development in the ACT.
- ACT EPA 2013, Environmental Guidelines for Preparation of Environmental Management Plan.
- ACT EPA 2019, Environmental Guidelines for Service Station Sites and Hydrocarbon Storage.
- ACT EPA 2016, Information Sheet 1 – Decommissioning, assessment and audit of sites containing above ground or underground fuel storage tanks.
- ACT EPA 2016, Information Sheet 2 – Requirements for the assessment and validation of former service station sites.
- ACT EPA 2016, Information Sheet 3 – Requirements for the assessment and validation of sites containing above ground or underground fuel storage tanks.
- ACT EPA 2015, Policy on Institutional Controls and Enforcement of Site Management Plans required for Contaminated Sites.
- ACT EPA 2017, Contaminated Sites Environment Protection Policy
- ACT EPA 2019, Information Sheet 9 – Management of groundwater impacted by light non-aqueous phase liquids (LNAPL).
- ACT EPA 2020, Information Sheet 11 – Environment Protection Authority Report Submission Requirements

- Australian and New Zealand Environmental Conservation Council (ANZECC) 1992, Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites.
- CRC CARE 2015, Technical Report 34: A practitioner’s guide for the analysis, management and remediation of LNAPL.
- CRC CARE 2010, Technical Report 10: Selecting and assessing strategies for remediating LNAPL in soils and aquifers.
- CRC CARE 2013, Technical Report 23: Petroleum hydrocarbon intrusion assessment: Australian guidance.
- CRC CARE 2010: Technical Report 15: A technical guide for demonstrating monitored natural attenuation of petroleum hydrocarbons in water.
- Environment Protection Act 1997
- Environment Protection Regulation 2005
- National Environment Protection (Assessment of Site Contamination) Measures 1999 (NEPM; as amended 2013).
- National Occupational Health and Safety Commission (NOHSC) 1995, Exposure Standards for Atmospheric Contaminants in the Occupational Environment
- NSW EPA 2020, Guidelines for Consultants Reporting on Contaminated Land: Contaminated Land Guidelines; and
- Protection of the Environment (Underground Petroleum Storage Systems) Regulation 2019 (UPSS Regulation).
- Work Health and Safety Act (2011).

2 SITE INFORMATION

2.1 SITE IDENTIFICATION

The site is located within a mixed commercial and residential area in Holt, ACT. Figure 1 (Appendix A) shows the regional site location and setting. General site details are summarised below in Table 2.1. The site layout is shown in Figure 2 (Appendix A).

Table 2.1 Summary of general information

SITE NAME	CALTEX KIPPAX HOLT SERVICE STATION
Site address	1 Hardwick Crescent, Holt ACT 2615
Ampol site identification	22546
Legal identification	Block 1, Section 53, Holt, Belconnen
Latitude & Longitude	35°13'27.22"S 149° 1'15.49"E
Geographic Coordinates	683925.187 E 6100219.083 N (Zone 55)
Current Site Owners / Occupiers	Ampol Australia Petroleum Pty Ltd
Site Area	~2083 m ³
Local government area	ACT Government
Zoning	CZ2: Business Zone
Current land use	Service station with on-site retail shop and mechanic workshop

2.2 FUEL STORAGE INFRASTRUCTURE

There are five known underground storage tanks (USTs) and one decommissioned aboveground former liquefied petroleum gas (LPG) storage tank at the site. The location of the USTs is shown in Figure 2 (Appendix A). The storage information is given below in Table 2.2, based on the information provided from Ampol. There are no records for other storage tanks outside of the current tank farm other than an above ground waste oil tank behind (to the south-west) the mechanical workshop building.

Table 2.2 Petroleum storage information

TANK NUMBER	PRODUCT	SIZE (L)
T1 UST	Vortex 95 premium unleaded petrol (PULP)	27,400
T2 UST	Diesel	27,400
T3 UST	Unleaded petrol with 10% ethanol (E10)	27,400
T4 UST	Former Vortex 98 PULP (out of service from 14 February 2020 and temporarily abandoned from 1 April 2020 – tank currently empty)	20,000
T5 UST	Unleaded petrol with 10% ethanol (E10)	59,400
T6 AST	Decommissioned (formerly LPG)	7,500

2.3 SURROUNDING LAND USE

Surrounding land uses include:

- **North:** Hardwick Crescent with residential properties (Zara Gardens) to the north-east (approximately 22 m from the site boundary) and commercial properties (Scott Chambers Building) north (approximately 29 m from the site boundary);
- **East:** Flack Street with the Raiders Belconnen and open-air recreation sports field beyond to the north-east (approximately 20 m from the site boundary);
- **South:** Hardwick Crescent with residential properties (Canberra Masonic Homes) beyond to the south-west (approximately 21 m from the site boundary); and
- **West:** open-air bitumen carpark (immediately adjacent to the site boundary).

Utility facilities including maintenance pits, drains and inspection covers relating to electrical, communications, water, sewer and stormwater infrastructure are located in all cardinal directions surrounding the site. The up to date locations of these services can be shown in Dial Before You Dig plans for the area, and the location of the utility pits surrounding the site are shown in Figures 19a to 19d in the recent ESA report (WSP, 2020d).

2.4 SITE HISTORY, GEOLOGY, HYDROGEOLOGY, EXTENT OF IMPACTS

Relevant and detailed information in relation to site features, history, geology, hydrogeology, previous investigations, the extent of impacts, and a summary of the potential risks to receptors are all contained within the RAP (WSP, 2021), which is attached in Appendix B.

3 CONCEPTUAL SITE MODEL

Environmental assessment works at the site are continuing and the conceptual site model (CSM) is being developed as more data is gathered. The sections below present is an update to the CSM (previously presented in the Stage 1 ESA (WSP, August 2020c) based on relevant findings from the recent Stage 2 ESA works (WSP, December 2020d), the Stage 2 Addendum (WSP, December 2020g), the Draft Groundwater Monitoring Event (WSP, May 2021a), and the Draft Summertime Vapour Sampling (WSP, May 2021b).

The CSM relates to source, pathways and receptors. Figures 4a to 4g of the RAP (Appendix B) shows the cross-section location plans, and Figures 5a through 5e of the RAP (Appendix B) inclusive present five selected cross sections through the site and provides a graphical depiction of the site CSM. The alignments for the five cross sections were chosen as they were considered to provide the best overview of the study area in terms of the interaction of the source area with the various receptors in the surrounding areas.

3.1 PHYSICAL SETTING

The physical setting of the site, including topography, geology, hydrogeology, and surrounding land use is summarised in Section 2, with further detail provided in the RAP (see Appendix B).

3.2 CONTAMINANTS OF CONCERN

The analytical results from the groundwater monitoring have provided clear evidence that the contaminants in groundwater are sourced from petrol. Additionally, samples for fingerprinting of the LNAPL encountered in some wells were also collected. The fingerprinting report identified the LNAPL as premium unleaded petrol having been in the environment for between one and a half to two and a half years, however the fuel loss was identified in February 2020; approximately seven months prior to LNAPL sampling. The results of the fingerprinting analysis identified the source of the LNAPL to be slightly degraded Vortex 98 unleaded petrol, which is the same type of fuel that was released from UST 4 in the fuel loss incident.

The contaminants of concern are therefore the compounds comprising premium unleaded petrol, largely characterised by:

- BTEXN; and
- petroleum hydrocarbon fractions C₆-C₁₀ and >C₁₀-C₁₆ as indicators of petrol.

Lead and ethanol are not considered contaminants of concern at the site resulting from the fuel loss, they are however required to be analysed (in certain circumstances) as stipulated in the site's Environmental Authorisation (EA number 0749, dated 3 May 2016).

3.3 CONTAMINATED MEDIA

The media impacted by contamination includes the following:

- Vadose zone in the immediate vicinity of the original fuel loss incident;
- Saturated soil within the water bearing zone of the Tuff formation;
- Groundwater on and off site. Although the potentiometric levels show there is a clear northly gradient in the groundwater, the hydrocarbon impacted groundwater has migrated in a radial pattern away from the site along preferential pathways formed by fractures in the Tuff bedrock, within the saturated zone, and along zones of softer rock due to greater weathering; and

- Vapours within the pores of soil in equilibrium with soil and groundwater within the area of impact on site as referred to in the previous bullet point.

3.4 CONTAMINANT MIGRATION MECHANISMS

Fuel known to have leaked from the base of the tank is likely to have entered the weathered Tuff and be distributed (predominantly) vertically, with some radial distribution due the head pressure of the fuel and / or fracturing within the Tuff. The fuel is likely to have intercepted groundwater at a depth of approximately 9 mBGL.

As previously identified, there are two dominant mechanisms controlling the migration of groundwater at the site. The predominant flow is controlled by the gradient resulting in a northerly flow, and the secondary groundwater migration is influenced by preferential pathways caused as a result of a network of discontinuities within the Tuff geology. The dominance of the natural groundwater flow gradient is observed by the pattern of hydrocarbon impact showing much of the impacted wells to the north of the site. The occurrence of impacts in other cardinal directions can be explained by taking into account the influence of preferential pathways.

Exposure to volatile hydrocarbons through the inhalation of vapours is the risk driving pathways to human receptors. Groundwater contaminated with volatile hydrocarbons can diffuse through vadose zone from the impacted groundwater. In terms of mass flux of vapour, the major source is the groundwater smear zone which contains the ‘smear’d hydrocarbon mass in the profile above the saturated zone.

Off-site, away from the source of fuel loss, the contaminated medium is the saturated ground horizon in which the contamination is migrating in a dissolved and phase separated form. The groundwater smear zone intercepting unsaturated soil may be considered a distinct medium within the lithology. While groundwater migration is the mechanism for the lateral transport of the contamination, the smear zone above the transient level of the saturated zone (i.e. the potentiometric level), is the source of the diffusive vapour pathway. Thus, the physical nature, thickness and porosity of the smear zone is a major controlling factor in the generation of vapours.

The structure and features of the vadose zone, above the smear zone, including air filled porosity, will influence the flux rates, more so than concentration of vapours in the profile. Existence of vertical preferential migration pathways may have a significant bearing on the vapour flux rates towards the ground surface.

Weather influences, particularly rainfall and temperature can have strong influence on the vertical migration pathway for soil vapours. Diffusive flux rates of contaminant vapours are greatly influenced by water filled porosity within the vadose zone – as affected by rainfall, and soil profile temperature affects vapour pressures of VOCs and hence the resulting diffusive flux rates.

3.5 SOURCE – PATHWAYS – RECEPTORS EVALUATION

3.5.1 SOURCE AND PATHWAYS

The primary source of the contaminants was fuel loss of unleaded petrol (Vortex 98 PULP) from an underground storage tank (Depot 4) and the primary migration pathway is as liquid transport in groundwater flows, as dissolved phase and phase separated hydrocarbons.

A secondary subsequent source of contaminants is hydrocarbon vapour diffusion from the dissolved and phase separated hydrocarbons in the groundwater upwards through the vadose zone. The ultimate pathway leading to vapour intrusion into buildings as diffusive and advective flows into buildings.

3.5.2 RECEPTORS

ECOLOGICAL RECEPTORS

The nearest surface water feature is an unnamed channel, a stormwater outlet, that flows only during rain events, located approximately 580 m north-west of the site. The unnamed channel is unlikely to be used for recreational purposes but could potentially support a down-stream freshwater ecosystem, however groundwater analytical results for the perimeter wells to the north and north-west, S2-P7, S2-C3, S2-C4, S2-C5 and S2-C6, approximately 80 – 100 m from the site, indicated no hydrocarbon impacts. Furthermore, the depth at which groundwater was intersected within the investigation area ranged from 6 mBGL to 17 mBGL, and it is likely that the groundwater depth at the stormwater drain is too deep to discharge into the drain. The more substantial surface body, Ginninderra Creek, is more distant from the service station, at 870 m and is thus out of reach of the hydrocarbon plume. On this basis, the ecological receptor risk pathway is considered incomplete.

HUMAN HEALTH RECEPTORS

The local area is served with reticulated town water and a review of the ACTMapi (www.actmapi.act.gov.au) groundwater database conducted on 29 October 2020 indicated that there are no registered groundwater boreholes within a 500 m radius of the site, and generally at depths of greater than 6m. Thus, the probability of humans (both residents and/or workers) having exposure to abstracted groundwater via dermal contact or ingestion is low.

On 4 June 2020, WSP conducted a desktop survey and walkover of areas surrounding the site for evidence of unregistered bores and the use of those bores. The survey did not identify any unregistered bores. However, this doesn't rule out the potential for unregistered bores to exist nearby.

Groundwater is not abstracted at the service station site or surrounding properties for any other purpose than clean up/recovery and monitoring, and the depth to groundwater (approximately 6 metres deep at its shallowest in the study area) indicates that the probability of incidental intersection of the impacted groundwater during routine intrusive maintenance works is considered minimal. Where workers are potentially in contact with the water or are performing the clean up and groundwater monitoring activities, those workers follow the appropriate WHS guidelines to mitigate their exposure risks.

The risk of exposure to hydrocarbons in groundwater by on-site and off-site workers, including intrusive (trench) maintenance workers by means of vapour inhalation, dermal contact and ingestion is unlikely. Firstly, vapour intrusion into the sales building and workshop was assessed and deemed acceptable (WSP, March 2020). Secondly, utility pits surrounding the site have been routinely monitored with a photo-ionisation detector (PID) since the project commenced and vapour concentrations have always been below 1 ppm_v. Soil vapour testing in the previous works showed that concentrations were less than health screening level criteria (CRC Care Technical Report No 10) for maintenance workers' vapour exposure in shallow trenches. This risk-receptor pathway of vapour intrusion is therefore considered incomplete.

A further possible exposure pathway is the intrusion of vapours arising from hydrocarbon impacted groundwater and the smear zone created by fluctuations in levels of impacted groundwater. The receptors are the occupants of the buildings on three nominated properties (Zara Gardens, Scott Chambers Building and Raiders Belconnen) determined from earlier screening level assessments of soil vapour, to be potentially exposed to VOC vapours from the migration pathways. The receptors include any person occupying a building for any length of time. The Vapour Risk Assessment (off-site) (WSP October 2020) and subsequent Summertime Vapour Sampling (WSP, May 2021) concluded that the pathway of vapour intrusion into buildings off site has an acceptable risk levels for building occupants. Therefore, the risk-receptor pathway is considered incomplete.

A summary of potential risk pathways and receptors is presented in Table 3.1.

Table 3.1 Risk level assessment for relevant source-pathway-receptor linkages

Potential Receptor	Potential Exposure Pathway	Risk from Exposure Through the Pathway (Is the Linkage Complete & is there a Risk?)
Ecological: Surface water bodies	Discharge of groundwater into surface water bodies – stormwater channel or Ginninderra Creek to the north-west	Considered to be an incomplete pathway as groundwater impacts were not identified in the perimeter wells of the current investigation area approximately 120 m from the source location; therefore, no unacceptable risk.
Users of groundwater bores registered for water supply	Abstraction of groundwater for beneficial purpose	There are currently no known users of groundwater within 500 m of the service station. Possible exposure pathways if water is accessed and used are: ingestion; dermal contact; contamination of soil if groundwater is used for irrigation. There are currently no known groundwater extraction bores, with irrigation of the playing fields in Block 47 Section 53 and the Raiders Club utilising mains water. Thus, the risk pathways are believed to be currently incomplete.
Residents and occupiers of commercial buildings	Vapour intrusion	The pathway of vapour intrusion into buildings on and off the site has assessed to result in acceptable risk levels for building occupants. Accordingly, this pathway can be considered incomplete.
Human receptors on open space land	Vapour inhalation	Due to considerable atmospheric dispersion above unconfined open space (the car parking area to the west of the site, and open fields to the north east and east), the level of risk has been shown to be acceptable. The pathway can thus be considered incomplete.
Sub-surface maintenance workers (intrusive trench workers)	Inhalation of vapour in shallow excavation trenches	Soil vapour testing in the earlier environmental site assessment works showed that concentrations were less than screening level criteria (CRC Care Technical Report No 10) for workers' vapour exposure in shallow trenches. This risk-receptor pathway is therefore considered incomplete.
Sub-surface maintenance workers (intrusive trench workers)	Ingestion and direct contact with impacted groundwater or soil	Considered an incomplete pathway. The groundwater is too deep for excavation workers to come into contact with and potential soil contamination is believed to be confined to the service station.

3.6 LNAPL CONCEPTUAL SITE MODEL

In response to the requirements of ACT EPA (2019) *Information Sheet 9* and considering the presence of LNAPL detected at a thickness greater than 3 mm at the site (and also off-site), an LNAPL CSM (LCSM) is required to be developed and presented as part of the site assessment process.

3.6.1 LNAPL CHEMICAL PROPERTIES

LNAPL was found to have a chromatographic profile typical of a slightly degraded Vortex 98 unleaded petrol product. Based on the absence of groundwater impacts in September 2019, and the understanding that the leak possibly

commenced in late 2019 (detected in early February 2020), it is estimated that the age of the LNAPL is approximately 15-18 months at the time of writing.

A compositional analysis of the BTEXN component of the LNAPL was also undertaken. The BTEXN component of the LNAPL was identified to make up 18.2% to 34.2 % of the total product across the analysed samples; with the latter more typical of petrol composition. The percentage of benzene was consistent across all samples, which was close to 1%, which meets the Australian regulation of benzene content of petrol of 1%.

3.6.2 LNAPL MOBILITY AND BODY STABILITY

The groundwater monitoring event of 22-24 February 2021 identified LNAPL in wells MW15 and MW16 with measured thicknesses of 0.065 m and 0.071 m respectively. Since the commencement of the works program at the site, regular gauging of the groundwater monitoring well network have been undertaken. Over the course of the 2020-2021 works, the measured LNAPL thickness measured in wells appear to be generally declining across the monitoring well network. The declining thicknesses of LNAPL on-site are at least partially due to the ongoing product recovery measures and / or the rise in groundwater levels across the general area encompassing the well network.

An assessment of LNAPL transmissivity was performed by means of a bail down test on the 21 May 2020. The off-site and downgradient well MW15 was selected for the assessment due to its proximity to sensitive receptors (Zara Gardens residents). Initial gauging of well MW15 prior to undertaking the bail down test showed an apparent LNAPL thickness of 0.663 m. LNAPL transmissivity was estimated at 0.076 m²/day and indicates that the LNAPL may be recoverable (i.e. is greater than LNAPL transmissivity range of 0.009–0.07 m²/day (ITRC, 2009)). However, recent attempts during the September 2020 pilot trials to conduct LNAPL transmissivity testing were not possible due to the reduced LNAPL thicknesses.

As the contamination to groundwater is a recent occurrence, not enough time has passed for biodegradation of natural attenuation parameters to occur and therefore produce a meaningful result, and there is only limited data collected to date. However, geochemical indicators of microbial activity, and thereby potential natural attenuation processes, were noted by the reduction of pH and DO when comparing the results between the GMEs undertaken in Stage 1 and Stage 2 ESA works.

3.6.3 LNAPL SOURCE – PATHWAYS – RECEPTORS

A summary of the potential receptors of the LNAPL impact detected on and off-site, the potential exposure pathways and an assessment of the likelihood of risk from exposure to the LNAPL through the potential pathway is presented in Table 3.2.

Table 3.2 Source-pathway-receptor linkages related to LNAPL

Potential Receptor	Potential Exposure Pathway	Risk from Exposure Through the Pathway (is the linkage complete & is there a risk?)
Ecological: Surface water bodies	Discharge of LNAPL into surface water bodies – stormwater channel or Ginninderra Creek to the north-west	Considered to be an incomplete pathway as LNAPL was not identified in the perimeter wells of the investigation area approximately 120 m from the source location; therefore, no unacceptable risk.

Potential Receptor	Potential Exposure Pathway	Risk from Exposure Through the Pathway (is the linkage complete & is there a risk?)
Users of groundwater bores registered for water supply	Abstraction of groundwater impacted with LNAPL for beneficial purpose	<p>There are currently no known registered users of groundwater within 500 m of the service station. Possible exposure pathways if water is accessed and used are: ingestion; dermal contact; contamination of soil if groundwater is used for irrigation.</p> <p>There are currently no known groundwater extraction bores, with irrigation of the playing fields in Block 47 Section 53 and the Raiders Club utilising mains water. Thus, the exposure pathway associated with groundwater abstraction is incomplete.</p>
Residents and occupiers of commercial buildings	Vapour arising from the LNAPL intrudes and accumulates in buildings	The pathway of vapour intrusion into buildings on and off the site was assessed to result in acceptable risk levels for building occupants. Accordingly, this pathway can be considered incomplete.
Human receptors on open space land	Vapour arising from the LNAPL is inhaled	Due to considerable atmospheric dispersion above unconfined open space (the car parking area to the west of the site, and open fields to the north east and east), the level of risk has been shown to be acceptable. The pathway can thus be considered incomplete.
Sub-surface maintenance workers (intrusive trench workers)	Vapour arising from the LNAPL enters shallow excavation trenches and is then inhaled	Soil vapour testing in the earlier environmental site assessment works showed that concentrations were less than health screening level criteria (CRC Care Technical Report No 10) for workers' vapour exposure in shallow trenches. This risk-receptor pathway is therefore considered incomplete.
Sub-surface maintenance workers (intrusive trench workers)	Ingestion and direct contact with LNAPL impacted groundwater or soil	The groundwater is too deep (>4m) for excavation workers to come into contact with and potential soil contamination is believed to be confined to the service station. This risk-receptor pathway is therefore considered incomplete.

4 CLEAN UP GOALS

The assessment works conducted to date have determined that there are no unacceptable vapour inhalation risks to existing receptors, specifically the on-site commercial workers, and the commercial and residential receptors located adjacent to the site (i.e. residents in Zara Gardens and the commercial occupants of the Raiders Sports Club and the Scott Chambers Building). In addition to the vapour risks being low and acceptable to on- and off-site receptors, the plume has been delineated in all directions, and is not impacting any surface water receptor or the users of a groundwater bore.

While the risks to receptors are low and acceptable, LNAPL at a thickness of more than 3mm has been identified at site and in the immediate off site areas during all gauging events since February 2020, and thus in accordance with ACT *Contaminated Sites Information Sheet 9: Management of groundwater impacted by light non-aqueous phase liquids (LNAPL)* (dated April 2019) (Information Sheet 9) ongoing management of the LNAPL and the associated dissolved phase plume is required. Information Sheet 9 states that:

“Where LNAPL has been identified at 3mm or greater at a site a follow-up gauging event must be performed within three (3) months of its original detection. Where LNAPL is again detected at 3mm or greater active remediation or ongoing management of the LNAPL is required.”

Information Sheet 9 also states:

“Any remedial action must demonstrate that there are no unacceptable risks to human health, the environment and the beneficial uses of the groundwater.

The results of the risk assessment will guide the level of LNAPL clean-up that is required. LNAPL needs to be cleaned up to such an extent that further removal or treatment of LNAPL no longer reduces the level of risk. In any case, LNAPL clean-up should continue if the LNAPL is still spreading. The need for LNAPL clean-up would also be indicated by a dissolved phase plume that continues to spread.”

Therefore, given the absence of unacceptable risks to receptors, and taking the regulatory guidance from Information Sheet 9 into consideration, the clean up goals for the site are to:

- Remove all observable LNAPL contamination² from the groundwater on and off the site such that the LNAPL thicknesses are <3mm for at least three consecutive months; and
- Reduce the dissolved phase hydrocarbons to the maximum extent practicable, ensuring that there remains no unacceptable risk to human health and the environment and the beneficial uses of the groundwater; and
- Ensure that the LNAPL and dissolved phase plumes are not spreading.

The overall clean up end-points for operation of the chosen clean up strategy correspond to these clean up goals. However, it is acknowledged that to remove the residual hydrocarbon impacts from soil and groundwater (such that the LNAPL thickness in all wells remain less than 3mm for three consecutive months) may require active clean up for many years.

Given that the LNAPL removal may not be achieved via active clean up within a reasonable timeframe, a review of the clean up outcomes at an appropriate point in time may be required. This will enable an assessment of practicability of ongoing clean up.

While Information Sheet 9 acknowledges that the level of clean up will be guided by risks, and the nature of the LNAPL and / or dissolved phase plumes (e.g. expanding, stable or contracting), there is no guidance on when clean up has been conducted to the “*extent practicable*” (or similar). In lieu of such guidance in the ACT, it is proposed that the Environment Protection Authority Victoria (EPA Victoria) Publication 840.2 “*The Clean Up and Management of Polluted Groundwaters*” (April 2016) (Publication 840.2) is used as the basis for determining the practicable limit of

² As per the LNAPL definition in Information Sheet 9

groundwater clean up (Publication 840.2 is included as Appendix H in the attached RAP (Appendix B). This document recognises the impracticability in some cases of full clean up, to the point where groundwater contamination no longer compromises any potential beneficial uses. In this case, the option is available for clean up to be carried out (to the extent practicable), and for this to be demonstrated to EPA Victoria in a formal submission (which in this case would be ACT EPA via the Site Auditor).

Only where the Site Auditor and ACT EPA agrees that clean up has been conducted to the extent practicable, will it be acceptable for further clean up efforts to be ceased. Cessation of clean up works under a '*clean up to the extent practicable*' (CUTEPA) scenario would then be subject to ongoing groundwater management (via a long term management plan), including any measures required to ensure the risks remain low and acceptable, monitoring (i.e. a Monitored Natural Attenuation (MNA) Strategy, as per Information Sheet 9), and contingency measures should conditions worsen. It is also subject to periodic EPA review that may determine that clean up efforts need to be revisited.

In the event LNAPL removal (such that the LNAPL thickness in all wells remain less than 3mm for three consecutive months) cannot be achieved, and WSP considers clean up has been conducted to the 'extent practicable', a review of the practicability of further clean up using the current clean up approach or additional clean up measures will be undertaken in consultation with the Auditor. Where further clean up works are considered impracticable, with agreement from the Auditor and ACT EPA, the residual impacts would be assessed, and management measures implemented where required. A cessation of clean up submission would then be prepared for determination from EPA (See Section 6 for further details on the clean up validation protocols / end points).

5 CLEAN UP AND MONITORING WORKS

In order to satisfy the requirements of Information Sheet 9 (i.e. the clean up of LNAPL), the following management strategy has been proposed for the site:

- Initial spill response efforts (commencing on 15 February 2020) has consisted of active LNAPL / groundwater recovery using down hole pneumatic pumps. These LNAPL recovery works were ongoing at the time of reporting.
- A permanent on-site soil vapour extraction (SVE) and pumping system, that is proposed to be installed and operated in the future.
- Mobile multi-phase vacuum extraction (MPVE) events, that are proposed to be conducted in the off-site areas.
- The proposed replacement of the underground petroleum storage system (UPSS) at the site in the future.

The following sections are a summary of the clean up / management measures outlined in detail in the attached RAP (Appendix B).

5.1 INTERIM ACTIVE CLEAN UP / RECOVERY

Initial / interim active clean up / recovery of the LNAPL has been undertaken at the site since the fuel loss was identified. The initial spill response efforts commenced on 15 February 2020, with contractors (InSite) mobilising to site remove LNAPL from on-site groundwater monitoring wells using (mobile) pneumatically-driven, down hole pumps. The recovery was initially conducted from EW1 on 15 February 2020, with the pumping works were progressively expanded to include EW02, MW01 and MW02 in the following days.

A (semi-) permanent system was also progressively installed at the site. A storage tank (supplementing the on-site IBCs) was installed at the site in the week commencing 17 February 2020, and permanent air and liquids recovery lines initially run to EW01, EW02, MW01 and MW02 through a combination of trenches in unpaved areas and heavy duty, rubber speed humps (with cable channels) in paved areas.

Initial pumping efforts on 15 February 2020 were conducted during the day. However, pumping was quickly extended to include extraction throughout the night from 16 February 2020 and continuous pumping (24 hours/day) was conducted up until 2 March 2020, at which point pumping reverted to day time pumping.

On 10 April 2020 the system commenced operation in auto mode (unmanned), and thus this system was able to be operated 24 hours / day (whenever the site air compressor is on). Due to the operations of the on-site mechanics workshop, the site air compressor is only operational during normal working hours, and thus the system is accordingly only operational during these hours too.

The system (and / or mobile pumping) has been progressively expanded to include recovery from wells EW01, EW02, MW01, MW02, MW05, MW06, MW07, MW08, MW10, MW12, MW15 at various stages of operation. At the time of writing (May 2021), the system was pumping from wells EW02, MW05, MW06 and MW10.

To date, over 20,000 L of LNAPL has been recovered, with 60% of the LNAPL recovered to date recovered in the first two weeks of extraction (15 – 28 February 2020), as LNAPL recovery rates have progressively reduced over time.

The LNAPL thicknesses at the site have been declining since February 2020, and while the pumps have been moved / adjusted to maximise LNAPL recovery since installation, the declining LNAPL thicknesses have corresponded with declining LNAPL recovery rates by the system. It is considered that the declining LNAPL thicknesses and LNAPL recovery at the site is due to the ongoing product recovery measures and / or the rise in groundwater levels across the general area, which have risen approximately 1.0m across the site

Further details of the initial spill response efforts at the site are included in the RAP (Appendix B).

5.2 FUTURE LNAPL / GROUNDWATER CLEAN UP

Based on the nature and extent of impacts, the geology / hydrogeology, site setting, and the ability for the remediation technologies to remove / reduce / transform contaminant mass, costs and treatment time of implementation, the initial remediation screening process prepared for the site showed that the clean up technologies that are retained for further consideration are:

- SVE (with / without pumping);
- MPVE;
- ISCO; and
- (Continued) pumping.

Based on the outcomes of the pilot trials, the extent of impacts, the logistics of installation, SVE + Pumping (in-situ system) was selected as the most appropriate clean up method to address the bulk LNAPL/hydrocarbon contamination in the on site areas, and a series of MPVE events was selected as the most appropriate clean up method to address the bulk LNAPL/hydrocarbon contamination in the off site areas.

The details of the clean up approach, the associated monitoring requirements, site management / controls during works, validation plan / end points, and contingencies are contained within the attached RAP (Appendix B).

5.3 CLEAN UP MONITORING PLAN

All the details of the regular monitoring (and maintenance) that is to be conducted prior to and during the LNAPL clean up is outlined in the attached RAP (See Appendix B), and the proposed monitoring requirements are summarised in Table 5.1 below:

Table 5.1 Monitoring Plan

MONITORING EVENT	PRE-LNAPL CLEAN UP (ASSUME 6-12 MONTHS)	DURING LNAPL CLEAN UP (ASSUME 1-2 YEARS)
Gauging – Selected Wells	Monthly	Monthly
Operations and Maintenance	Fortnightly to Monthly (Existing pumping system)	Fortnightly to Monthly (Proposed SVE +pumping system)
GMEs – Selected Wells ^{1,2}	Not required	Quarterly
GMEs – All Wells ³	6 Monthly	6 Monthly
Soil Vapour – Selected Locations ^{4,5}	Not required	6 Monthly

1 – Selected wells include MW01, MW02, MW04 – MW07, MW10, MW15 – MW17, MW24, PMW1, PMW3, IW01, EW01, S2-P2.

2 – Includes analysis for TRH, BTEXN.

3 – Includes analysis for TRH, and BTEXN, and MNA Parameters on selected wells (nitrite, nitrate, sulphate, ferrous iron, dissolved methane & alkalinity as bicarbonate).

4 – Selected soil vapour monitoring locations include SV01S, SV02S, SV02D, SV03S, SV03D, SV04S, SV04D, SV05S, SV05D, SV06S, SS1, SS2, SS3, SVB1Z, SVB2Z, SS2SC

5 – Samples are to be analysed for a broad range of volatile petroleum hydrocarbons from C₅ to C₁₅ (including BTEXN and NEPM fractions F1 and F2).

5.3.1 POST-CLEAN UP MANAGEMENT PLAN

Following acceptance of the clean up cessation with the Auditor and EPA (See Section 6 below), a post-clean up Management Plan will be implemented (if required) to monitor and manage residual contamination (if any) in accordance with the Auditor and ACT EPA.

It is envisaged that the cessation of clean up and the commencement of the implementation of the Management Plan (if required) will occur at some point in 2022 or 2023. The details of the post-clean up groundwater monitoring / management will be defined following the cessation of clean up, taking into account the residual groundwater impact and the lessons learned from the clean up activities. It is expected that the monitoring / management plan would stipulate following minimum requirements:

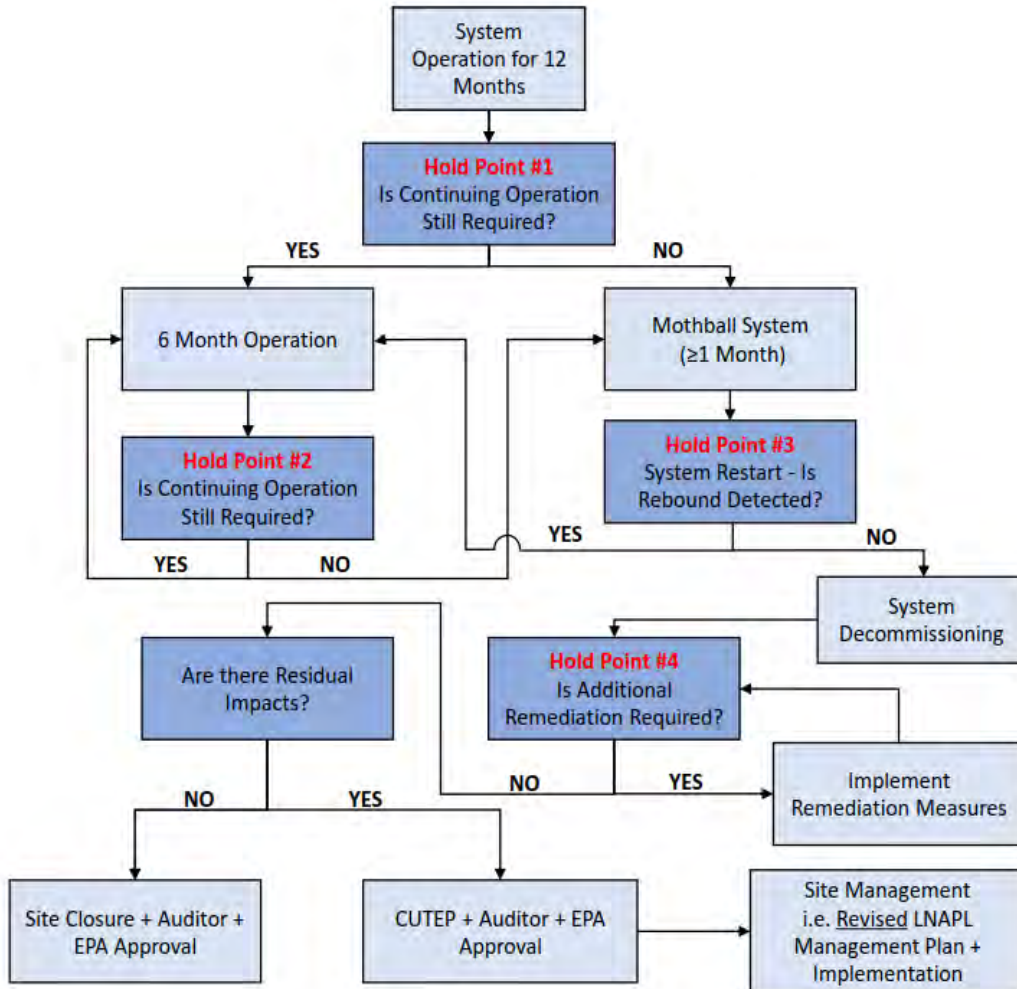
- The plan is to be implemented by a qualified and experience environmental practitioner.
- Six monthly gauging and sampling of selected (key) groundwater monitoring wells.
- Annual gauging and sampling of all other wells.
- Field parameters are to be collected at the time of sampling and shall include pH, temperature, electrical conductivity, dissolved oxygen and redox potential;
- The parameters to be analysed are TPH and BTEXN in all wells sampled.
- Natural attenuation parameters to be analysed in selected key wells sampled.
- Groundwater sampling is to be continued until the Auditor and ACT EPA determines that monitoring can cease.

It is possible that the post clean up management plan will stipulate what further works will be required with regard to data gaps and community liaison, so that the residual contamination is managed appropriately.

6 VALIDATION PLAN / END POINTS

Following conduct of the clean up works, it will be necessary to validate that the clean up has achieved the clean up goals (as outlined in the RAP (Appendix B) and summarised in Section 4). In this context, site validation is defined as the methodology by which the remedial goals are proven to have been achieved.

Experience in clean up of LNAPL indicates that the complete removal of LNAPL is sometimes not practicably achievable where there widespread LNAPL in complex hydrogeological settings. In these circumstances a strategy that assesses the practicability of ongoing clean up is often adopted. A summary of the proposed validation process is shown below (with further detail provided in the RAP (Appendix B)).



Flow Chart 1: Pathway to Closure

- i. The gauging / sampling of all wells proves that the effective LNAPL³ residual mass has been removed; OR
- ii. In the event that validation protocol (i) is not achieved after 12 months of system operation, a review of the clean up to assess the effectiveness of the clean up and status of the LNAPL impacts will be conducted as part of the biannual (6-monthly report) that this to be reviewed by the Site Auditor (**Hold Point #1**).

³ LNAPL as defined in Information Sheet 9

Where it is determined that the operation of the clean up system should continue, the clean up system shall operate for a further six months, after which this review process will be repeated. Six monthly reviews (**Hold Point #2**) of the system operation will be conducted in consultation with the Auditor until such time as it is determined that that is no overall net benefit to the community for continued operation of the system.

- iii. In the event that the validation protocol (ii) determines that clean up should cease, the system will be mothballed for at least one month. Following a period of at least one month, groundwater gauging and sampling would be conducted and then the system restarted and operated for a further period of at least one month, and the hydrocarbon recovery rates, and groundwater conditions reviewed (**Hold Point #3**). In the event that LNAPL or hydrocarbon recovery rates rebound, the system will again continue operate, and another review (as per validation protocol (ii)) will be conducted after up to six months operation.
- iv. In the event that the mothballing (validation protocol (iii)) does not detect any rebound, the clean up system will be decommissioned, and a review of alternative clean up technologies (e.g. oxidant injection) would be undertaken to assess their potential to achieve (practicably) the complete removal of LNAPL (**Hold Point #4**). If additional clean up is determined to be necessary (in consultation with the Auditor), the clean up measures will be implemented, followed by further reviews (as per validation protocol (ii)) to determine the requirement for further clean up (in consultation with the Site Auditor). The cycle of implementation of clean up measures followed by review will continue until clean up has been extended to the maximum extent practicable.
- v. If it is considered (by validation protocols (ii) to (iv)) that clean up has been extended to the maximum extent practicable, a Site Validation / Clean up Cessation report will be issued to the Auditor and EPA for review, verification and approval. .

If residual impacts are present following clean up (e.g. LNAPL is present (as per the definition in Information Sheet 9)), this LNAPL management plan will be updated and implemented to monitor and manage residual contamination following the completion of the clean up works. The LNAPL management plan (if required) will be updated in accordance with ACT EPA Information Sheet 9 and ACT EPA “*Environmental guidelines for preparation of an Environment Management Plan*” and will be issued to the Site Auditor and ACT EPA for review and approval.

Additionally, groundwater restrictions may need to be imposed on the site and surrounds by the ACT EPA in accordance with Part 9, Section 71 of the *Water Resources Act 2007*. Implementation of the following additional measures is proposed to prevent polluted groundwater being extracted for any other use other than clean up or monitoring:

- Formal communication of the groundwater impacts to the affected off-site properties. This has been conducted previously, with a number of letters and direct communications with the neighbouring stakeholders conducted in months from July to October 2020 notifying them of the groundwater impacts; and
- Inclusion of the affected area within the Dial Before You Dig registry service so that Ampol is notified whenever a person requests plans for works conducted within the affected area. Ampol can then determine if these subsurface works include any potential for groundwater extraction.

While the current risk to receptors has been determined to be low and acceptable, this is based on the current land use, and thus would need to be reassessed if the affected blocks were to be redeveloped to include basements. We note that some of the blocks in the vicinity of the site are included in the “Kippax Group Centre Master Plan” that has been prepared by the ACT Government to set out “*a vision, planning principles, spatial framework and planning strategies to guide growth and development in the centre over time*”.

The following Blocks and Sections, that are earmarked in the Kippax Master Plan for potential redevelopment, may potentially have been impacted by the fuel release at Caltex Holt:

- Blocks 2 and 5, Section 53 – Vacant land and carpark to the north west of the site
- Block 26, Section 51 – Scott Chambers Building
- Blocks 34, 35 and 47, Section 51 – Open space parkland north of Scott Chambers and Zara Gardens

The locations of these blocks are also shown in Figure 8 of the RAP (Appendix B).

While the Kippax Masterplan indicates that the only development in the southern area of the open space / parkland on Blocks 34, 35 and 47, Section 51 (nearer to the groundwater plume) is the construction of a skate park to the north of Zara Gardens (i.e. no basements), Blocks 2 and 5, Section 53 and Block 26, Section 51 are earmarked for mixed use, and are likely to include basement carpark. Such redevelopment of these areas will require a variation to the Territory Plan, and we would expect will likely trigger a contaminated land assessment by the ACT EPA. In the event that a potential vapour risk is identified at both or either sites by a future contaminated land assessment (based on the proposed future development), vapour barriers would likely need to be implemented as part of the development to mitigate the potential health risks.

7 OTHER MANAGEMENT / CONTROL MEASURES

Relevant and detailed information in relation to contingency measures, safety management, stakeholder engagement, environmental site management (during works), and timing are all contained within the RAP (WSP, 2021), which is attached in Appendix B.

8 CONCLUSIONS

This LMP has been prepared to provide the Auditor and the ACT EPA with an understanding of the strategy to address the contamination on and off site to date and in the future. This LMP includes the clean up strategy and information on how clean up is being implemented at the site, criteria for assessing the success of clean up and the general procedures for the management and monitoring of potential impacts during the clean up works.

9 REFERENCES

- ACT EPA 2017, *Contaminated Sites Environment Protection Policy*.
- ACT EPA 2017, *Environmental authorisation no. 0749*.
- ACT EPA 2019, *Environmental Guidelines for Petroleum Storage in the ACT*.
- ACT EPA 2019, Information Sheet 8 – *Requirements for the Classification and Reuse of Drilling Mud Waste in the ACT*.
- ACT EPA 2019, Information Sheet 9 – *Management of groundwater impacted by light non-aqueous phase liquids (LNAPL)*.
- ACT EPA 2020, Information Sheet 11 – *Environment Protection Authority Report Submission Requirements*.
- AECOM 2011, *Groundwater Monitoring Well Report, Caltex Holt (22546), Corner Hardwick Crescent and Flack Street, Holt, ACT*.
- Caltex Australia 2013, *Environmental management plan Caltex Holt (22546)*.
- Clements L, Palaia T, & Davis J 2009, *Characterisation of sites impacted by petroleum hydrocarbons: National guideline document*, CRC CARE Technical Report no. 34, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.
- CRC CARE 2015, *A practitioner's guide for the analysis, management and remediation of LNAPL*, CRC CARE Technical Report no. 11, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.
- Environment ACT 2000, *ACT's Environmental Standards: Assessment & Classification of Liquid & Non-liquid Wastes*.
- *Environmental Protection Act 1997*.
- *Environmental Protection Regulation 2005*.
- Friebel, E & Nadebaum, P 2011, *Health screening levels for petroleum hydrocarbons in soil and groundwater*, CRC CARE Technical Report no. 10, CRC for Contamination Assessment and Remediation of the Environment, Adelaide, Australia.
- GHD 2010, *Report for Holt Caltex Service Station, 1 Hardwick Crescent, Phase 2 Environmental site assessment*.
- GHD 2017, *22546 – Caltex Kippax Service Station, 1 Hardwick Crescent, Holt, ACT, 2615 Groundwater monitoring event – September 2016*.
- *National Environment Protection (Assessment of Site Contamination) Measure 1999* (NEPM; as amended 2013).
- NSW EPA 2014, *Technical Note: Investigation of Service Station Sites*.
- NSW EPA 2020, *Assessment and Management of Hazardous Ground Gases: Contaminated Land Guidelines*.
- NSW EPA 2020, *Guidelines for Consultants reporting on contaminated Land: Contaminated land guidelines*.
- URS Australia 2015, *Final Groundwater Data Memo – Kippax service station (22546)*.
- *Work Health and Safety Act 2011* (NSW).
- WSP (formerly Parsons Brinckerhoff) 2013, *2013 Round 1 – ACT Groundwater monitoring event*.
- WSP 2014, *2013 Round 4 – ACT Groundwater monitoring event*.

- WSP 2015, *Classification of stockpiled material at Caltex Holt Service Station (22546) Corner Hardwick Crescent and Flack Street, Holt, ACT.*
- WSP 2017, *Caltex Kippax Holt service station (Site ID: 22546), 1 Hardwick Crescent, Holt ACT 2615: Groundwater monitoring event.*
- WSP 2018, *Caltex Kippax Holt service station (Site ID: 22546), 1 Hardwick Crescent, Holt ACT 2615: Groundwater monitoring event.*
- WSP 2019, *Caltex Kippax Holt service station (Site ID: 22546), 1 Hardwick Crescent, Holt ACT 2615: Groundwater monitoring event.*
- WSP March 2020a, *Caltex Kippax Holt service station (Site ID: 22546), 1 Hardwick Crescent, Holt ACT 2615: Assessment of Vapour Risks;*
- WSP May 2020b, *Tier 1 Risk Assessment (Off-site), Caltex Holt Service Station, 1 Hardwick Crescent Holt, ACT, Site ID: 22546 (Rev0 – Draft);*
- WSP August 2020c, *Environmental Site Assessment Report, Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP December 2020d, *Environmental Site Assessment Report, Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP December 2020e, *Vapour Risk Assessment (Off-Site), Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP December 2020f, *Remediation Pilot Trial Report, Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP December 2020g, *Environmental Site Assessment Report - Stage 2 Addendum, Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP May 2021a, *Draft Groundwater Monitoring Event, Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP May 2021b, *Draft Summertime Vapour Sampling, Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*
- WSP December 2021c, *Remediation Action Plan, Caltex Holt service station (Site ID: 22546), 1 Hardwick Crescent Holt ACT.*

LIMITATIONS

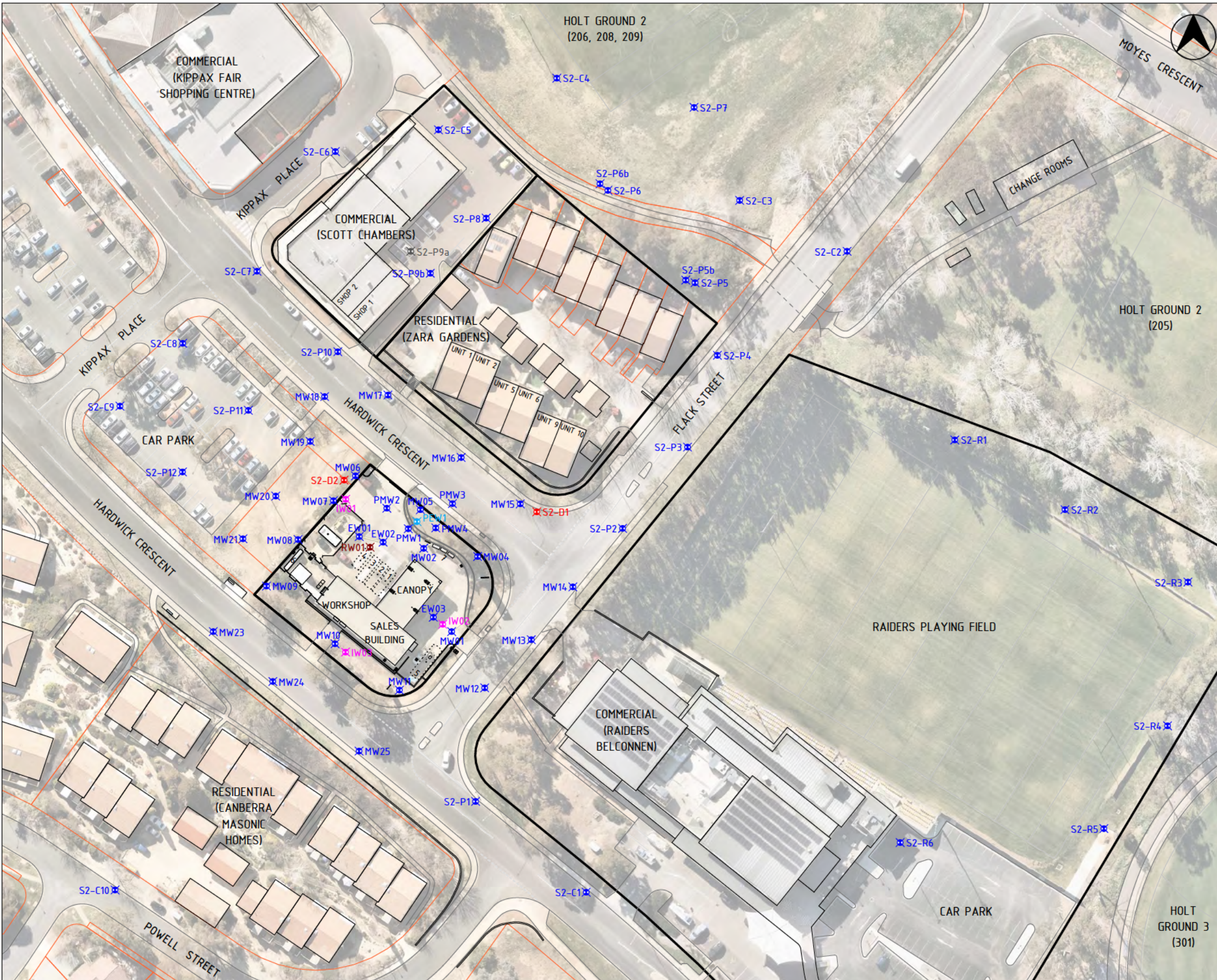
1. This Report has been prepared by WSP Pty Limited (“WSP”) for the benefit of Caltex Australia Petroleum Pty Ltd (“Caltex”), the registered proprietor or tenant of the site requested to be investigated by WSP (“Site”) under its agreement with Caltex dated 21 March 2018 (“Agreement”).
2. The nature and extent of the environmental consulting and remediation works at the Site detailed in the Report reflects the scope of the Services set out in the Request for Proposal under the Agreement and the Scope of Works set out in Schedule 1 of the Agreement (“Scope of Works”).
3. A potential purchaser (but not including a purchaser’s successor in title) of the Site may rely on the findings contained in the Report for the purpose of considering the possible (but not actual) level of contamination of or at that Site at the time of the contamination assessment of the Site was undertaken (“Permitted Purpose”).
4. The registered proprietor of the land to which the report relates at the time of writing the report (but not including any proprietor’s successor in title) may rely on the findings contained in the Report for the purpose of assessing the possible level of contamination of that Site (“Permitted Purpose”) and subject to the limitations set out in the Scope of Works.
5. The findings contained in the Report are subject to the qualifications, assumptions and limitations set out in the Report or otherwise communicated to, or by, Caltex. To the extent of any inconsistency between this Limitation Statement and the qualifications, assumptions and limitations in the Report, this Limitation Statement shall prevail.
6. The Report may contain information provided by others. Except as otherwise stated in the Report, WSP has not verified the accuracy or completeness of this information. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in the Report (“Conclusions”) are based in whole or in part on this information, those Conclusions are contingent upon the accuracy and completeness of that information. WSP accepts no responsibility for the reliability, accuracy, completeness or adequacy of information provided by others.
7. WSP has prepared the Report without regard to any special or particular interest of any person (including that of a potential purchaser), other than Caltex when undertaking the Services or setting out its findings in the Report.
8. The Report can only be relied upon for the Permitted Purpose and may not be relied upon for any other purpose and does not purport to recommend or induce a decision to make (or not make) any purchase, disposal, investment, divestment, financial commitment or otherwise in relation to the Site (“Investment Decision”).
9. Matters material to a potential purchaser, may have been omitted from the Report, or may not have been investigated because of the scope of the Services. It follows that a potential purchaser should be cognisant of the restrictions inherent in or otherwise set out in the Report and should commission the preparation of a contamination assessment of the Site that caters for its own interests and scope of services, and which will provide findings in relation to the level of contamination of or at the Site at the time the potential purchaser is making an Investment Decision.
10. The Report has not and will not be updated for events occurring after the date of the Report or any other matter which may have a material effect on its contents which come to light after the date of the Report. WSP will not be obliged to inform a potential purchaser of any matter arising or coming to its attention after the date of the Report, which may affect or qualify the Report.
11. WSP is not liable to a potential purchaser in respect of errors or omissions in the Report which a potential purchaser knows of, or ought to be aware of, from:
 - a its own actual knowledge and inquiries
 - b inquiries made by its advisers; or
 - c matters which a potential purchaser should have been aware of by making reasonable inquiry (including the inquiries recommended at Item 9 above).
12. To the fullest extent permitted at law, WSP, its related bodies corporate, its officers, employees and agents assume no liability and will not be liable to any potential purchaser for, or in relation to, any losses, damages or expenses (including any indirect, consequential or punitive losses or damages or any amounts for loss of income or profit, revenue or loss of opportunity to earn profit, loss of production, loss of contract, increased operational costs, loss of business opportunity, business interruption and pure economic loss) of any kind (and whether arising in contract, tort (including negligence), under statute, in equity or otherwise, suffered or incurred by a potential purchaser (or any other third party) arising out of or in connection with any matter outside the ambit of the Permitted Purpose in relation to the Report or findings expressed in the Report.

APPENDIX A

FIGURES



aerial image nearmap august 2020
 block & section data from http://www.actmap.act.gov.au
 drawn by laurie white at www.reumad.com.au
 Tue, 4 May 2021 12:18:37 PM
 Tue, 4 May 2021 12:18:37 PM
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LEGEND

- PROPERTY BOUNDARY
- BLOCK / SECTION BOUNDARY
- #### GROUNDWATER MONITORING WELL
- PEW## EXTRACTION WELL
- IW## INJECTION WELL
- RW## RECOVERY WELL
- S2-D# CORED BOREHOLE
- #### BACKFILLED OR DESTROYED WELL

0 25m

1:050 AT A3 APPROXIMATE

REFERENCE: CALTEX 'DANGEROUS GOODS PLAN' DRAWING NO. 22546-DG
 REV. B DATED 25/11/2011 AND VERIS SURVEY 217267.01 DATED
 02/10/2020 SUPPLIED BY CLIENT.



CALTEX HOLT SERVICE STATION
 1 HARDWICK CRESCENT
 HOLT ACT

FIGURE 2
SITE LAYOUT & GROUNDWATER
MONITORING LOCATION NETWORK



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CALTEX HOLT SERVICE STATION
 1 HARDWICK CRESCENT
 HOLT ACT

FIGURE 1
 SITE LOCATION

APPENDIX B

REMEDIATION ACTION PLAN (WSP, 2021)

