Australian Capital Territory

Planning and Development (EIS Exemption Application – Kaleen Caltex Service Station Redevelopment) Public Consultation Notice 2017

Notifiable Instrument NI2017– 179

made under the

Planning and Development Act 2007, s 211C (EIS exemption application – public consultation) and s 147AB (Public notification of concurrent documents)

1 Name of instrument

This instrument is the *Planning and Development (EIS Exemption Application – Kaleen Caltex Service Station Redevelopment) Public Consultation Notice 2017*.

2 Commencement

This instrument commences on the day after its notification day.

3 Dictionary

EIS means environmental impact statement, see section 208 of the *Planning and Development Act 2007* (the Act).

EIS exemption see section 211 of the Act.

EIS exemption application see section 211B of the Act.

concurrent consultation period see section 147AA of the Act

concurrent development application see section 147AA of the Act.

concurrent document see section 147AA of the Act.

4 EIS exemption application

(1) TFA Group is the proponent (proponent) of the proposed Caltex service station redevelopment located within block 26, section 120 Kaleen (proposal).

(2) The proponent has applied for an EIS exemption for the proposal under section 211B of the Act. The EIS exemption application is in the schedule.

(3) The EIS exemption application is a concurrent document for a concurrent development application.

(4) The EIS exemption application is also available at the planning and land authority website:

http://www.planning.act.gov.au/topics/design_build/da_assessment/environmental_assessment/exemption_from_requiring_and_eis_s211

5 Concurrent development application

(1) The proponent has lodged a concurrent development application, DA201731062, for the proposal.

(2) The concurrent development application is available at: http://www.planning.act.gov.au/development_applications/pubnote

(3) The concurrent development application cannot be finalised until the concurrent process is complete (see s 147AB(3)(a)(ii) of the Act).

(4) If the EIS exemption application is refused, rejected or withdrawn, the concurrent development application is taken to have been refused (see s 147AB(3)(c) of the Act).

6 Public consultation

(1) The concurrent public consultation period (concurrent consultation period) on the EIS exemption application and the concurrent development application starts on commencement of this instrument and ends 35 working days later.

(2) Anyone may give a written representation to the Chief Planning Executive (delegate) about the EIS exemption application or the concurrent development application.

(3) Representations may only be given during the concurrent consultation period.

7 Making of representations

(1) Representations should be addressed to the Chief Planning Executive and sent by:

a. email to: EPDCustomerServices@act.gov.au;
b. mail to:
Environment, Planning and Sustainable Development
Directorate Customer Service
GPO Box 158
Canberra ACT 2601; or
c. hand to:
Environment, Planning and Sustainable Development
Directorate's Customer Service Centre
16 Challis Street, Dickson.

(2) Representations should include the application reference number DA201731062 and the name and contact details of the person making the representation.

Note 1 Printed copies of the EIS exemption application and background documents are available for inspection and purchase at the Environment, Planning and Sustainable Development Directorate Customer Service Centre, 16 Challis Street, Dickson. The Customer Service Centre is open Monday to Friday (except public holidays) between 8:30am and 4:30pm. Please call 6207 1923 to arrange a copy for purchase.

Note 2 As required by section 211F and section 147AC of the Act copies of representations will be made publicly available on the planning and land authority website (see Note 1) until the concurrent consultation period ends or the representation is withdrawn. Also, copies of representations will be provided to the proponent. Published representations will include the name and contact details of the person making the representation as well as the other content of the representation. A request for exclusion of information from publication can be made under sections 411 or 412 of the Act. A request for exclusion under these sections must be made in writing, clearly identifying what exclusions are sought and how the request satisfies the exclusion criteria in sections 411and 412 of the Act.

Dorte Ekelund
Chief Planning Executive
(delegate of the Minister)
11 April 2017

Schedule
(see section 4(2))

ACT Government
Environment, Planning and Sustainable Development

Planning and Development Act 2007, s425

APPLICATION FOR:

SCOPING DOCUMENT

ENVIRONMENTAL SIGNIFICANCE OPINION S211 EXEMPTION FROM EIS

Form 1M

1. Type of Application

☐ **Request for Scoping Document OR**

☑ **Request for Exemption to Provide Environmental Impact Statement** *Section 211 Planning and Development Act 2007* ***OR***

☐ **Application for Environmental Significance Opinion** *Section 138AA Planning and Development Act 2007* ***OR***

☐ **Additional Information as requested by the planning and land authority for any application for Scoping, EIS, or ESO**

If you attended a pre-application meeting or written pre-application advice in relation to the proposal that is the subject of this application please provide proposal number **Proposal Number 20** 1630422

Project Name CALTEX SERVICE STATION - KALEEN

Project Description REDEVELOPMENT OF EXISTING SERVICE STATION

2. Lease/Site Details *Please Print*

Provide the following details for each lease/site:

Site 1

Block: 26 **Section:** 120 **Suburb:** KALEEN

Street Address (if applicable) 275 MARIBYRNONG AVE

Land Use Zone/s applicable to this site C2/4 - LOCAL CENTRE

Site 2

Block: **Section:** **Suburb:**

Street Address (if applicable)

Land Use Zone/s applicable to this site

Site 3

Block: **Section:** **Suburb:**

Street Address (if applicable)

Land Use Zone/s applicable to this site

Approved form AF2017-37 approved by Dorte Ekelund *Chief Planning Executive* Planning and Land Authority on 19 January 2017 under section 425 of the *Planning and Development Act 2007* and revokes approved form AF2014-88.
Authorised by the ACT Parliamentary Counsel—also accessible at www.legislation.act.gov.au

If more than three sites please provide details on separate page

3. Applicant Details *Please Print*

Surname	WALLS	**First Name**	GREG
Name of Company/Department/ Government Agency	CALTEX AUSTRALIA PETROLEUM c/- TFA PROJECT GROUP		
Position held in Company/Department/Government Agency	SENIOR TOWN PLANNER		
Australian Company/Business Number (ACN/ABN)	34 612 132 233		
Postal Address	315/33 LEXINGTON DR		
Suburb	BELLA VISTA	**State** NSW	**Postcode** 2153
Phone Number Business Hours	(02) 8814 5219	**Mobile**	0472 803 229
EMAIL ADDRESS	greg.walls@tfa.com.au		

4. Lessee (Property Owners) or Government Land Custodian Details *Please Print*

SITE 1

1st Lessee or Land Custodian Details		2nd Lessee or Land Custodian Details	
Full Name:	JOHN EVANGELISTA	**Full Name:**	
Company Name:	EVANGELISTA PTY LTD	**Company Name:**	
Position Held in Company:	DIRECTOR	**Position Held In Company:**	
ACN Number:	008 516 292	**ACN Number:**	
Postal Address:	PO BOX 301 WEST BURLEIGH QLD 4219	**Postal Address:**	
Telephone BH:	07 5575 6875	**Telephone BH:**	
Mobile:	0419 177 646	**Mobile:**	
Email Address:	john@evangelista.com.au	**Email Address:**	

SITE 2

1st Lessee or Land Custodian Details		2nd Lessee or Land Custodian Details	
Full Name:		Full Name:	
Company Name:		Company Name:	
Position Held in Company:		Position Held In Company:	
ACN Number:		ACN Number:	
Postal Address:		Postal Address:	
Telephone BH:		Telephone BH:	
Mobile:		Mobile:	
Email Address:		Email Address:	

SITE 3

1st Lessee or Land Custodian Details		2nd Lessee or Land Custodian Details	
Full Name:		Full Name:	
Company Name:		Company Name:	
Position Held in Company:		Position Held In Company:	
ACN Number:		ACN Number:	
Postal Address:		Postal Address:	
Telephone BH:		Telephone BH:	
Mobile:		Mobile:	
Email Address:		Email Address:	

*All lessees **must** sign authorising the lodgement of this application. In doing so the lessee gives authority to the applicant to negotiate any dealings in relation to the application through to its determination. If there are more than two lessees please ensure that the details and authorisation are attached to the application.*

*If a lessee signature **can not be obtained** and either a land acquisition or lease withdrawal is underway to facilitate the project to which the EIS Scope relates then the applicant **must** submit documentary evidence that such land acquisition or lease withdrawal is occurring and that the lessee is aware of the project to which the EIS Scope relates.*

5. EIS Requirements – complete this part for Application for Scoping Document ONLY

Please identify why your proposal requires an Environmental Impact Statement and include applicable references to the *Planning and Development Act 2007 (P&D Act).*

☐ The proposal is a type listed under schedule 4 of the P&D Act. **Please list item numbers:** _____ _____ _____ _____ _____

☐ The proposal is not an EXEMPT, CODE, or MERIT track development where the development is allowed under an existing lease

☐ The proposal is permissible under the National Capital Plan but listed as prohibited in the relevant development table

☐ The proposal has been declared under section 124 and section 125 of the P&D Act

☐ The proposal is not listed anywhere in the relevant development table (in-nominate use)

6. Complete this part for Application for Environmental Significance Opinion ONLY
S138AA Planning and Development Act 2007

Are you seeking an Environmental Significance Opinion? ☐ **YES** ☐ **NO**

IF YES - identify the item(s) for opinion under Schedule 4 of the *Planning and Development Act 2007*

☐ **Section 4.2 Item 3 (c)** ☐ **Section 4.2 Item 3 (d)** ☐ **Section 4.3 Item 1**
☐ **Section 4.3 Item 2 (a)** ☐ **Section 4.3 Item 2 (b)** ☐ **Section 4.3 Item 3**
☐ **Section 4.3 Item 6**

Note: Applications for Environmental Significance Opinion from the ACT Heritage Council must be accompanied by a Statement of Heritage Effects prepared by a suitably qualified heritage professional regarding the potential impacts of the proposal.

7. Complete this part for Request for Exemption to Provide Environmental Impact Statement ONLY
S.211 Planning & Development Act 2007

The Minister may exempt a development proposal from a requirement to include an EIS if satisfied that the expected environmental impact of the development proposal has already been sufficiently addressed by another study, whether or not the study relates to the particular development proposal.

If the proposal is a type listed under Schedule 4 of the P&D Act, **please list the item numbers:** PART 4.3 ITEM 7

Please supply supporting documentation to justify s211 consideration and a statement as to how the supporting documentation satisfies the requirement of s.211 and s50A of the P&D Regulation. ☑ **Documentation Attached**

8. Environment Protection and Biodiversity Conservation Act 1999

Does the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC) affect your proposal? ☑ **NO** ☐ **YES**

If YES - attach copies of the Commonwealth Department of the Environment "Notification of Referral Decision" and "Decision on Assessment Approach"

NOTE: Copies of these documents must be attached to this application form before it can be accepted for processing by the planning and land authority.

IF NO - Have you had meetings/discussions with the Department of the Environment? ☑ **NO** ☐ **YES**

If YES - Please provide the contact details of the Department of the Environment officer

Name: _____ **Contact No.** _____

9. Your Proposal – Required for ALL application types

Please attach to this application form a document that provides sufficient detail to enable prescribed entities to obtain an understanding of the full extent of your proposal and any associated works, including:

1. a statement outlining the objectives of the project and why it is needed;
2. a description of the nature/type of project proposed by providing location map(s) of the project site(s), preliminary design drawings and satellite/aerial photographs;
3. a preliminary risk assessment (PRA) based on the guidance document attached to this form (not required for an ESO application);
4. a description of the natural conservation values of the site based on the considerations listed in the "Preparation of an application for scoping and preparation of an ESO" guideline available from the EPD website;
5. a description of measures within the proposal that seek to avoid and minimise (and as a last resort offset) impact on identified conservation values (for ESO and Section 211 applications only);
6. any decision made under the EPBC Act in relation to this proposal.
7. **For s211 applications only**, the following additional information is required:
    - details of qualifications, expertise and experience of the person(s) who conducted previous studies supporting the application;
    - details of public consultation undertaken, as part of statutory requirement, for projects or previous studies included as supporting documentation undertaken. Details of public consultation not required for a statutory process should also be included;
    - verification from a qualified person that the information in the previous studies supporting the application is still current.

10. Prescribed Entities

Have you had any meetings/discussions with relevant prescribed entities?

☐ NO
☑ YES

IF YOU ANSWERED YES TO THE QUESTION – please complete the following table and provide meeting minutes:

ENTITY (please tick)	DATE/s OF MEETING/s	ENTITY CONTACT
☐ ACTEW Corporation Ltd		
☐ ACTEWAGL Distribution		
☐ Conservator Flora & Fauna		
☐ Emergency Services		
☐ Environment Protection		
☐ Heritage Council		
☐ Health Policy		
☑ Territories & Municipal Services	PHONE /EMAIL DISCUSSIONS	JEFF BELL
☐ Custodian of the Land		
☐ Other: _____ Please specify		

11. Conflict of Interest Declaration

Does the applicant or lessee have any association with EPD staff?

☑ NO
☐ YES

If **YES** please provide details:

_____

_____

NOTE: *There are penalties for deliberately giving false and misleading information. The planning and land authority or Minister may revoke an approval if satisfied that the approval was obtained by fraud or misrepresentation.*

12. Other Application Requirements

DOCUMENTATION AND PLANS

All required documentation must be provided in an electronic format on compact disc/DVD or via email and meet the following requirements (Form can be submitted in hardcopy if lodged over the counter)

- Each document must be saved as a PDF and named in accordance with the naming convention as detailed on the EPD website.
- All plans must be to scale.
- All plans must be rotated to the correct orientation i.e. they are the right way up when opened
- All plans are to be clear and concise and generally consistent with Australian Standard 1100.301 - 1985 and Australian Standard 1100.301 supplementary - as updated from time to time.
- The documentation provided on CD/DVD either over the counter or via an electronic lodgment process (email or internet) will be considered to be the relevant documentation associated with this application.

HARDCOPY DOCUMENTATION REQUIREMENTS FOR ALL APPLCATION TYPES

In addition to the documentation being provided on CD/DVD **one bound and one unbound hard copy must also be provided.**

13. Applicant and Lessee Declaration

I/we the undersigned, declare that this application is accompanied by all of the required information and or documents and understand that the documentation provided on CD/DVD or via electronic lodgement process (email or internet) will be considered to be the relevant documentation associated with this application; and understand that the information submitted with this application form will undergo a documentation check. I/we understand that this application will be considered lodged once the relevant application fees have been paid;

I/we hereby authorise ACT Government officers to access the subject property(s) for the purpose of evaluating the proposal;

I/we the undersigned (lessee) appoint the applicant whose name and signature appear below to act on my/our behalf in relation to this application. This authorises the applicant to pay for all application fees, bonds, and securities, liaise with the planning and land authority when required, alter amend or provide further information as necessary and receive any communications relating to this application;

I/we declare that all the information given on this form and its attachments is true and complete;

If signing on behalf of a company, organisation or Government agency: -
I/we the undersigned, declare I/we have the appropriate delegation or authority to sign on behalf of the company, organisation or Government agency.

Applicant Signature (s)		**Date**	20/03/2017
SITE 1			
1st Lessee Signature		**Date**	20/03/2017
2nd Lessee Signature		**Date**	
Govt Land Custodian Signature (unleased land only)		**Date**	
Delegate of the planning and land authority (unleased land only)		**Date**	

SITE 2

1st Lessee Signature		Date	
2nd Lessee Signature		Date	
Govt Land Custodian Signature (unleased land only)		Date	
Delegate of the planning and land authority (unleased land only)		Date	

SITE 3

1st Lessee Signature		Date	
2nd Lessee Signature		Date	
Govt Land Custodian Signature (unleased land only)		Date	
Delegate of the planning and land authority (unleased land only)		Date	

Does the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC) affect your proposal?
The EPBC came into operation on 16 July 2000. It establishes an environmental assessment and approval system that is separate and distinct from the ACT system. It does not affect the validity of ACT development assessment and approval processes, but may affect the assessment track. The ACT cannot provide preliminary advice on whether a proposal falls within the definition of a controlled action, or requires referral to the Commonwealth. You should consult with the Commonwealth to determine if your proposal is a controlled action before seeking any approvals under the *Planning and Development Act 2007*. For information about the EPBC, including the referral process and when a referral should be made, contact the Commonwealth Department of the Environment www.environment.gov.au

Privacy Notice
The personal information on this form is being collected to enable processing of your application. Collection of personal information is authorised by Chapters 7, 8 and 9 of the *Planning and Development Act 2007*. The information that you provide may be disclosed to the ACT Revenue Office, the Australian Valuation Office and the Registrar-General's Office. The information may be accessed by other government agencies, ACTEWAGL, ACTEW Corporation and other commercial organisations interested in development and building information.

Contact Details:
Environment, Planning and Sustainable Development Directorate
Customer Service Centre
GPO Box 158, Canberra City 2601
16 Challis Street, Dickson ACT 2602
Business Hours: 8.30am to 4.30pm weekdays (excluding Public Holidays)
Phone: (02) 6207 1923
Email: epdcustomerservices@act.gov.au **Website:** www.planning.act.gov.au

Caltex Australia Petroleum Pty Ltd

Preliminary Risk Assessment

275 Maribyrnong Avenue, Kaleen

(Block 26 in Section 120)

TFA Reference: 16155
TFA PROJECT GROUP SYDNEY
Revision B (20 March 2017)

New South Wales
Suite 315, 33 Lexington Drive
Bella Vista NSW 2153
Ph: 02 8814 5219
Mob: 0472 803 229

Head Office
4/100 Brookes Street (PO Box 2339)
Fortitude Valley QLD 4006
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Website: www.tfa.com.au

Victoria
Suite 13, 150 Albert Road
South Melbourne VIC 3205
Australia Wide:1300 794 300
ABN 34 612 132 233

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EXECUTIVE SUMMARY

Applicant

Applicant Details	Caltex Petroleum Australia Pty Ltd
Contact Details	C/- Greg Walls TfA Project Group Suite 315, 33 Lexington Drive BELLA VISTA NSW 2153

Site

Site Address	275 Maribyrnong Ave, Kaleen, ACT
Site Details	Block 26 Section 120
Site Area	2160m^2

Proposal

Proposal Description	Redevelopment of an existing service station
Application Type	Merit Track Development

Local Government

Assessing Authority	ACT Environment and Planning Directorate
Local Planning Instrument	Territory Plan
Territory Plan Land Use Zone	CZ4- Local Centre

1.0 INTRODUCTION

This report is to the ACT Minister for Planning and Land Management on the assessment of the request for exemption from requiring a completed EIS for the redevelopment of an existing service station at Kaleen. The request for exemption is made under section 211 of the Act (the s211 Request).

Section 211 of the Planning and Development Act 2007 allows an applicant to seek exemption from the requirement to complete an EIS. The Minister has discretion under this section to grant an exemption if satisfied that previous studies have adequately identified the potential environmental impacts of the proposal. The Minister must consider information provided to satisfy any criteria established by Regulation 50A of the Planning and Development Regulation 2008.

This Preliminary Risk Assessment, identifies possible impacts (without mitigation) and considers the likely activities that will be involved in the project.

2.0 THE SITE

2.1 Site Description

The site comprises block 26 in section 120, which is approximately 2160m^2 in area. The site has a frontage on Maribyrnong Avenue as well as a secondary frontage along Gwydir Square.

The site currently supports an existing service station with vehicular access and egress via Maribyrnong Avenue. There is also an unused access point on Gwydir Square.

The current development on site includes both a service station retail building and a service centre building. There is also refuelling infrastructure including six dispensers under an existing canopy and seven underground fuel tanks. The site is generally paved and includes nine car parking spaces. An aerial view of the site is shown in Figure 1 below.

Figure 1: Aerial View with Subject Site bound in red (source: NSW Land & Property Information)

2.3 Surrounding Land Uses

The site is located in the Kaleen Precinct of the Territory Plan within the Belconnen District. The subject site is approximately 3km east of the Belconnen Town Centre. The site is adjoined by residential development to the north, east, and south (zoned RZ2: Suburban Core) and by a car park (Gwydir Square) and commercial development to the west (zoned CZ4: Local Centre),

Refer to Figure 2 below for an aerial view of the site and surrounding area.

Figure 2: Aerial View of the surrounding area (source: NSW Land & Property Information)

2.3 Natural Conservation Value of the Site

The below table considers the existing natural conservation value of the site in accordance with the considerations listed in the "Preparation of an Application for Scoping and Preparation of an ESO".

Matter for Consideration	Site Value
Is the location important in maintaining existing processes or natural systems of the ACT?	The site is an existing service station that does not contribute to the natural systems or processes of the ACT.
Is the location important in exhibiting unusual richness of diversity of flora, fauna or landscapes?	The site is an existing service station generally devoid of flora, fauna or landscapes.

Is the location important in its possession of uncommon, rare or endangered flora, fauna, communities, natural landscapes or phenomena?	The site is an existing service station generally devoid of flora, fauna or landscapes.
Is the location important in demonstrating the principal characteristics of the range of landscapes, environments or ecosystems, the attributes of which identify them as being characteristic of their class?	The site is an existing service station and has no importance in demonstrating the range of landscapes, environments or ecosystems in the ACT.
Is the location important for information contributing to a wider understanding of the ACT's natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site?	The site is an existing service station and is not important for information contributing to a wider understanding of the ACT's natural history, by virtue of its use as a research site, teaching site, type locality, reference or benchmark site.

3.0 PROPOSED DEVELOPMENT

The proposed development that is the subject of this development application is for the redevelopment of the existing service station. The redevelopment will allow for more vehicles to be serviced at any given time.

Generally, the construction works will include:

- the demolition of the existing retail building, service centre, canopy, underground petroleum storage system (UPSS), fuel dispensers, paving, and other related plant and infrastructure;
- the remediation of the land where required undertaken in accordance with an independently verified Remediation Action Plan;
- the construction of a new retail building with adjacent parking and an enclosed service / plant yard;
- the installation of a new UPSS;
- the installation of 4 new fuel dispensers with the capacity to service up to 8 vehicles at any one time;
- the construction of a new canopy over the fuel dispensing area;
- new pylon and promotional signage;
- the relocation and reactivation of the access driveway to Gwydir Square;
- alterations to the landscaping on site with an overall net increase in landscaped area; and
- new / relocated plant and infrastructure including the fuel tanker fill point, the LPG tank enclosure, the air / water unit, stormwater infrastructure, fencing, and lighting.

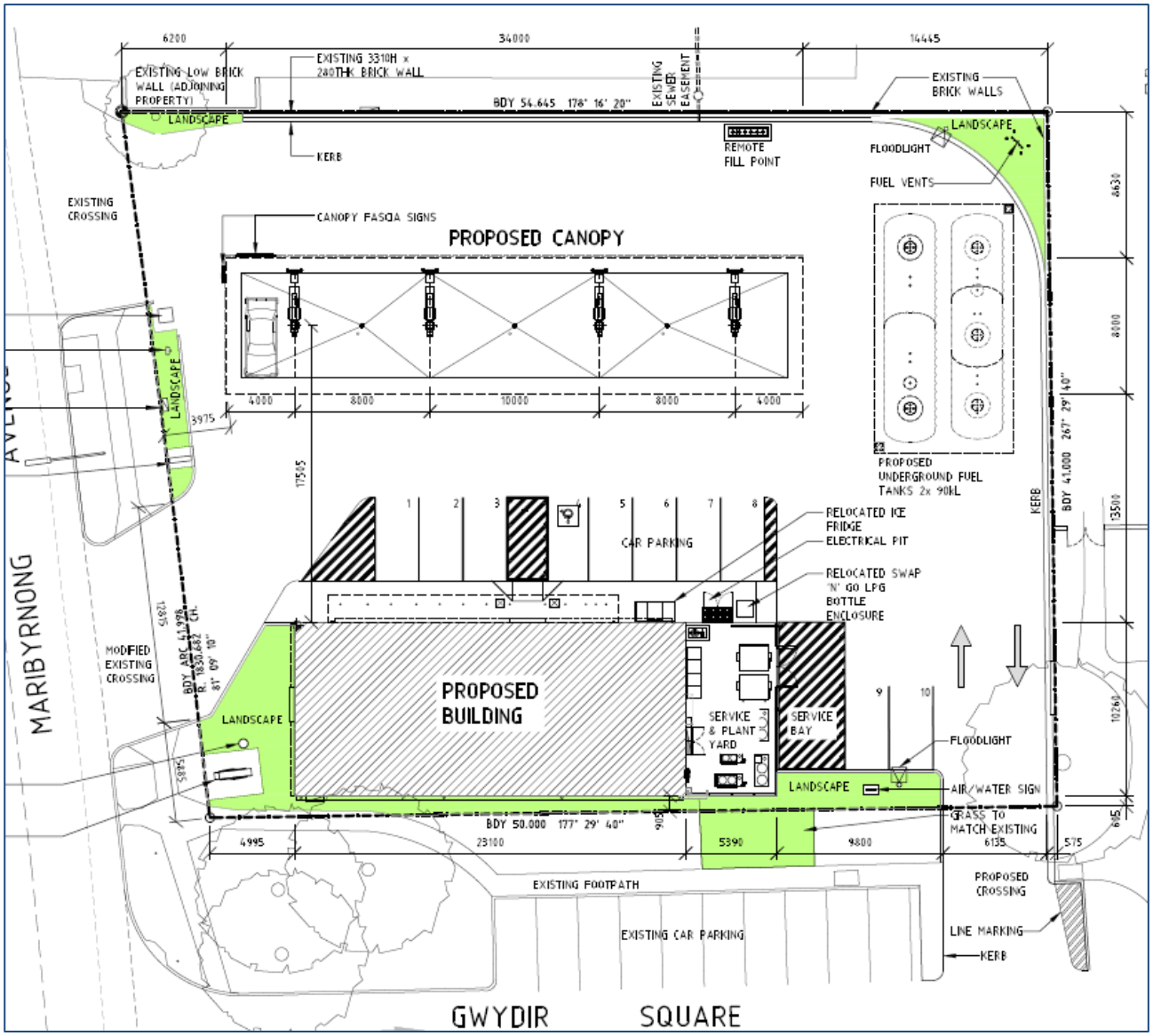

Figure 1 - Extract of Proposed Site Plan (source: TFA)

4.0 EVALUATING LIKELIHOOD AND CONSEQUENCE

4.1 Evaluating likelihood

The likelihood of an impact occurring is best described in terms of probability. Overlaying this is the need to recognise the uncertainty that may be associated with potential impacts, particularly during the preliminary risk assessment process. Best practice dictates that where there is scientific uncertainty, a cautious approach is warranted which will in turn identify a higher level of risk.

Each identifiable potential impact can be assigned a likelihood between 'remote' and 'almost certain'. In simplifying the possible impacts for the purposes of a risk assessment an element of subjectivity is introduced.

Table 1 is an example of the criteria that could be used to determine the likelihood of an impact. The criteria used for each column of information must be included in the preliminary risk assessment and must be appropriate to the project for which the preliminary risk assessment is being prepared.

Table 1:

Likelihood	Description	Probability	Community attitude
Remote	May occur in exceptional circumstances	<1%	Few people interested
Unlikely	Not expected to occur in most circumstances	1-20%	Some people affected
Possible	May occur	21-49%	Many people affected
Likely	Probably will occur	50-85%	Most people affected
Almost Certain	Expected to occur	>85%	Almost everyone affected

4.2 Evaluating consequence

The consequences of an impact require a degree of subjective assessment as the likely consequences of an impact may consist of several elements. For the purpose of a preliminary risk assessment the elements that could be considered are illustrated in Table 2 below. Several of the elements are interrelated and a consequence is considered to be major if any one of the elements has a predicted major impact. A subjective decision is needed for each possible impact as to the level of consequence taking a balanced view of the impact against each of the elements.

The consequence of an impact used in the risk assessment needs to be the reasonably foreseeable consequence. If there is a large amount of uncertainty then the consequence may be worse. The criteria for each element (both general and project specific) are a matter for the proponent and must be provided with the preliminary risk assessment.

Table 2:

Magnitude	**Spatial**	The area over which the impact will occur, from square metres to square kilometres.
	Intensity	The level of impact within the spatial area, from minor disruption to total destruction. A low intensity impact over a large area could be worse than a high intensity impact in a small area, depending on upon other elements.
Temporal	**Duration**	The length of time of the impact, from a single event to a permanent change.
	Timing	Short term events may create significant impacts if they occur often. They may also coincide with particularly sensitive times in the receiving environment such as breeding cycles.
Ecological	**Values**	The quality of the receiving environment, generally identified through the declaration of conservation areas, identification of protected species and other features of natural conservation value.
	Sensitivity	The capacity of the receiving environment to regenerate or adapt to the impact (resilience). The sensitivity of an environment to a potential impact will require informed judgement.
Social	**Number of people**	The number of people directly or indirectly affected through lost opportunities for enjoyment or other values such as equity or existence values.
	Heritage	The impact on known or possible items of heritage or cultural value.
	Political	The measure of the likely political implications or level of community interest.
Economic		The financial cost of the impact through lost productivity or the cost of remediation.

Table 3 illustrates the risk rating process as a matrix. Increased consequence from left to right and increased likelihood from top to bottom. The resulting juncture of consequence and likelihood produces the risk rating on a scale of negligible to significant.

Table 3:

Consequence	Minimal	Minor	Moderate	Major	Catastrophic
Likelihood					
Remote	Negligible	Negligible	Very low	Low	Medium
Unlikely	Negligible	Very low	Low	Medium	High
Possible	Very low	Low	Medium	High	Very high
Likely	Low	Medium	High	Very high	Significant
Almost certain	Medium	High	Very high	Significant	Significant

5.0 PRELIMINARY RISK ASSESSMENT

The construction phase of the below risk assessment includes both the demolition of the existing service station and the construction of the new one.

Phase of Development	Risk	Potential Effects (without mitigation)	Category	Likelihood	Consequence	Risk Rating
Construction	Hydrocarbon impacted soil	Vapour migration and inhalation	Health	Possible	Moderate	**Medium**
		Dermal contact	Health	Possible	Moderate	**Medium**
		Ingestion	Health	Unlikely	Major	**Medium**
Construction	Hydrocarbon impacted groundwater	Dermal contact	Health	Possible	Moderate	**Medium**
		Ingestion	Health	Unlikely	Major	**Medium**
		Vapour migration into onsite buildings	Health	Unlikely	Moderate	**Low**
		Vapour migration into offsite buildings	Health	Unlikely	Moderate	**Low**
		Offsite migration of impacted groundwater and discharge into surface water bodies	Ecological	Unlikely	Major	**Medium**
Construction	Acid sulfate soil	Exposure of acid sulfate soils	Health / Ecological	Unlikely	Moderate	**Low**
Operation	Hydrocarbon vapours	Vapour migration into onsite buildings	Health	Possible	Moderate	**Medium**
		Vapour migration into offsite buildings	Health	Possible	Moderate	**Medium**
Operation	Fuel product	Spills on forecourt during refuelling	Ecological	Possible	Moderate	**Medium**
		Spills during resupply of fuel tanks	Ecological	Possible	Major	**High**
		Tank leaks	Ecological	Possible	Major	**High**

6.0 RESIDUAL RISK RATING

The table below provides a residual risk rating for the risks identified above as being Medium or above following the implementation of mitigation measures identified in studies submitted with this application and further summarised below. The relevant qualifications of those responsible for the preparation of the reports is at Appendix A to this Report.

Phase of Development	Risk	Potential Effects (without mitigation)	Preliminary Risk Rating	Mitigation Measures Summary	Residual Risk Rating
Construction	Hydrocarbon impacted soil	Vapour migration and inhalation	Medium	Preparation and implementation of detailed WH&S Plan, control of site access, ambient air monitoring, cessation of works in certain air quality scenarios, controls will be placed on the operation and movement of equipment, stockpile management and registers	**Low**
		Dermal contact	Medium		**Very Low**
		Ingestion	Medium		**Very Low**
Construction	Hydrocarbon impacted groundwater	Dermal contact	Medium	Preparation and implementation of detailed WH&S Plan, control of site access, ambient air monitoring, cessation of works in certain air quality scenarios, controls will be placed on the operation and movement of equipment, stockpile management and registers, sediment and leachate control measures	**Very Low**
		Ingestion	Medium		**Very Low**
		Offsite migration of impacted groundwater and discharge into surface water bodies	Medium		**Very Low**
Operation	Hydrocarbon vapours	Vapour migration into onsite buildings	Medium	Stage 1 vapour recovery systems in-built to UPSS (AS 4897-2008).	**Very Low**
		Vapour migration into offsite buildings	Medium		**Very Low**
Operation	Fuel product	Spills on forecourt during refuelling	Medium	Safe work methods, provision of oily water separator, bunding of refuelling area, separation of stormwater / potential oily water, limitation of tanker compartment sizes, impervious materials, fill point spill containment	**Very Low**
		Spills during resupply of fuel tanks	High		**Low**
		Tank leaks	High	Equipment Level 1 in compliance with AS 4897-2008, leak protection, leak detection systems, secondary tank containment, groundwater monitoring wells, standards not less than AS 1692 "Tanks for the storage of Flammable and Combustible Liquids"	**Low**

7.0 CONCLUSION

The majority of risk associated with the proposed development is in regards to contamination on site and exposure of contaminated materials. This site has been managed in consultation with the ACT EPA on an ongoing basis. A Remediation Action Plan (RAP) has been prepared for the works at the site. This document addresses the expected environmental impact of the development proposal and is submitted as the relevant document in order to obtain an EIS exemption under Section 211 of the Act.

Risk related to potential spills as a result of the operation of the redeveloped facility is addressed in the planning report for the proposal. The underground petroleum storage system (UPSS) proposed for the service station has been designed and infrastructure will be installed to Equipment Level 1 in compliance with *AS 4897-2008 - The design, installation and operation of underground petroleum storage systems*. Further mitigation measures including leak detection and spill treatment are summarised in the planning report.

The residual rating as the result of the implementation of relevant mitigation measures as identified in the related documentation is either Low or Very Low for risks that would otherwise be Medium and above without the implementation of such measures. The relevant qualifications of those responsible for the preparation of the reports is at Appendix A to this Report.

It is considered that the preparation of an EIS for this project is unlikely to result in any additional understanding of the potential impacts of the proposed development following the continued environmental regulation of the site and studies undertaken (as summarised in the RAP). It is recommended that a Section 211 exemption be granted for this project based on the level of understanding of environmental impacts, and the proposed mitigation proposed in the RAP.

APPENDIX A – RELEVANT QUALIFICATIONS

MATTHEW MIKLOS

ENVIRONMENTAL SCIENTIST

YEARS WITH THE FIRM

4

YEARS EXPERIENCE

3

AREAS OF EXPERTISE

Program management

Site investigations and contamination assessments

Mining

Compliance monitoring

LANGUAGES

English

PROFILE

Matthew has developed strong technical, practical, organisational and interpersonal skills required to be a valuable member of an environmental sciences consultancy team. Matthew's refined field, information synthesis, data presentation and reporting skills are complemented by honed research, statistical capabilities and an understanding of drafting and geographical information systems.

Matthew has worked both as a supervising field scientist on numerous Phase 1 & 2 investigation projects involving subcontractor supervision, soil, vapour and gas sampling, groundwater well installation and sampling, community liaison and site health & safety management. Furthermore, Matthew has been involved in several large and long term compliance monitoring and remediation projects in a project manager capacity, often with numerous junior staff under his direct responsibility and supervision.

Matthew has worked at a range of mining, petrochemical, industrial and commercial facilities across NSW, QLD, and the ACT. He has a thorough understanding of the legal requirements surrounding the assessment, interpretation and ongoing management of contaminated land and compliance monitoring sites. Matthew's professional, client-focused and friendly manner gives him the ability to successfully and effectively consult relevant stakeholders to ensure the best outcome can be achieved.

EDUCATION

Bachelor of Land and Water Science (Honours Class I),
University of Sydney

PROFESSIONAL EXPERIENCE

Program management

Caltex service station UPSS/KDR project in NSW and ACT

- **Project management and client liaison of the NSW and ACT Caltex service station UPSS and KDR redevelopment project.**

  Matt has been able to secure the project as a sole-sourced contract for 2015, 2016 and 2017. The program has seen the redevelopment and completion of over 25 sites service station sites over two and a half years. Sites are a combination of Sydney and Canberra metro area, as well as regional sites. Matt is actively responsible for the efficient, safe and quality delivery of outcomes to Caltex by providing support and timely professional advice to the engaged principal contractor responsible for the KDR or UPSS replacement works. Matt provides a key communication link between site progress and work, to the Caltex project managers and environmental specialists.

Site investigations and contamination assessments

- Supervision of remediation and validation of a highly contaminated and NSW EPA audited former service station site in Newcastle, NSW.
- Project management of a detailed site investigation of operational pharmaceuticals manufacturing facility for due diligence purposes.

MATTHEW MIKLOS

- Project management of detailed site investigation and hazardous materials survey at a commercial property for due diligence purposes.
- Supervision of demolition and remediation of a large fuel terminal in Townsville, Queensland.
- Detailed site investigation (DSI) of site, soil and groundwater at a long operating commercial laundry and dry cleaning facility, with known redundant petroleum storage systems onsite.
- Detailed site investigation of a former farming and processing facility.
- Soil and groundwater investigation, drilling and groundwater monitoring well installation at a redeveloped industrial property.
- Composite sampling and site assessment for asbestos validation at a site redevelopment.
- Tank pit validation sampling for former UST at a car dealership.
- Soil and groundwater investigation, drilling and monitoring well installation at a heavily contaminated industrial site.
- Project management of a preliminary site investigation of a vacant industrial lot for due diligence purposes.
- Shallow depth soil and groundwater investigation, hand augering and monitoring well installation at a heavily contaminated industrial site.
- Deep soil and groundwater investigation, with monitoring well installation using subcontracted drilling at an industrial site.
- Soil and soil vapour investigation at EPU ACT audited former service station site.
- Supervision of site excavation at former service station site including waste classification and validation of impacted material.
- Detailed site investigation and salinity assessment of semi-rural land at Sydney's fringe for DA redevelopment to residential zoning.
- Acid Sulfate Soil (ASS) investigation for Council DA process.
- Project management of test pitting, excavation, remediation and validation reporting at a large former quarry site undergoing redevelopment.
- Research and recommendation of appropriate microbial water quality guidelines for treated waters utilised for surface and underground mining operations.
- Project management of a heavily impacted former gasworks remediation project. Including management of contractor processes, financial controls and reporting.
- Validation sampling of bioremediation stockpiles and former gasholder and tar pit excavations.

Mining projects

- Project management of an extensive scope of monthly groundwater and surface water sampling. Investigation area is in a water catchment area in Sydney, with data outputs are subject to high levels of data quality and data management.

MATTHEW MIKLOS

- Project management of monthly monitoring of surface water, water storage and treatment systems located at a surface facilities site for an underground coal mine operations site.
- Project management of ongoing well development, monitoring and reporting of numerous deep groundwater nested piezometer installations in a water supply catchment area.
- Project management of a technically challenging deep groundwater drilling, supervision, development and sampling program, including nuclear isotopic analysis for hydrogeochemical fingerprinting of groundwaters and formation waters.
- Installation of shallow groundwater monitoring wells in a large remote water catchment area subject to land subsidence due to underground longwall coal mining.
- Development and implementation of site-specific microbial water quality guidelines for reuse of treated coal mining process waters at an underground operation.
- Copper Project, Indonesia - Involvement in the development and drafting of an Environment and Safety Management System (ESMS) for a Copper Leach mining project in remote Indonesia. Specific involvement included development of surface and groundwater management plans.

Compliance monitoring projects

- Monitoring of groundwater wells associated with a UPSS at a car dealership.
- Long term monitoring of surface water and groundwater to aid in assessing impacts of leachate from former landfill sites.
- Quarterly monitoring of impact of local landfill groundwater, surface water and gas on surrounding environment.
- Quarterly monitoring of impact of former gasworks site on local environment.
- Quarterly groundwater monitoring and reporting on the progress and status of enhanced remediation strategies at a heavily creosote contaminated site.
- Biannual monitoring of surface water on site, maintenance and monitoring of a contaminated sediment detention system.
- Extensive and detailed indoor air quality assessment at >30 commercial/industrial complexes surrounding a former landfill site.
- Project management of ongoing monitoring of gas, vapour and groundwater from an extensive well network across a former landfill site.
- Groundwater monitoring of a large and highly concentrated Arsenic (As) plume at a redevelopment site.

PROFESSIONAL HISTORY

WSP | Parsons Brinckerhoff	2013 – Present
Environmental Earth Sciences International Pty Ltd	2010 – 2013

MATTHEW MIKLOS

AWARD

1st place winner of the Australian Contaminated Land Consultant's Association (ACLCA) Young Achiever's Award	2011
Current membership and contribution to the Australian Society of Soil Science (ASSSI)	

LOUISE WALKDEN

PRINCIPAL ENVIRONMENTAL SCIENTIST

YEARS WITH THE FIRM

12

YEARS EXPERIENCE

12

AREAS OF EXPERTISE

Contaminated land assessment

Soil and groundwater remediation

Human health risk assessment

LANGUAGES

English

PROFILE

Louise is a principal environmental scientist with 13 years' experience in contaminated land and groundwater investigation, human health risk assessment and remediation. She has project managed numerous environmental management projects including Phase 1 and 2 environmental site assessments, soil and groundwater remediation strategies and human health and environmental risk assessments. The majority of Louise's current role involves technical advisor and review for the team. Her experience includes assessment and remediation of fuel storage sites, service stations, defence sites, commercial and industrial facilities and residential sites in Australia and the UK.

Louise has a BSc in Environmental Science and an MSc in Geoenvironmental Engineering, where she specialised in human health risk assessment and groundwater modelling.

EDUCATION

BSc in Environmental Science, University of Manchester, UK	2000
MSc in Geoenvironmental Engineering, Cardiff University, UK	2002

PROFESSIONAL ASSOCIATIONS

Member, Australasian Land and Groundwater Association	ALGA
Member, Australian Contaminated Land Consultants Association	ACLCA

PROFESSIONAL EXPERIENCE

Site assessment and remediation

→ **Technical reviewer for soil assessment and remediation works on a program of sensitive sites for a major utility company (2016).**

The program included remediation and validation of several sites in the Sydney metro area that were contaminated by fill material containing asbestos, PAH and heavy metals. RAP preparation, supervision of remediation and validation of sites was undertaken to render the sites suitable for residential land use and achieve NSW EPA Auditor sign off. The program involved management of sensitive community issues.

→ **Project manager and technical advisor for several soil and groundwater remediation programs on active service stations, 7 Eleven, NSW (2015-present).**

Remediation methodologies employed include multiphase vacuum extraction, air-sparge and soil vapour extraction and insitu chemical injection. The programs involve community and stakeholder management and ensuring regulatory compliance with Voluntary Management Plans in place with the NSW EPA.

LOUISE WALKDEN

- **Technical reviewer for soil assessment and soil remediation during the construction phase of the Green Square Stormwater Drain program completed as part of the Green Square Stormwater Alliance (2016).**

  Services provided by WSP | Parsons Brinckerhoff included waste classification, validation sampling, asbestos monitoring, preparation of remediation action plans and acid sulfate soil management plans.

- **Project Director and technical reviewer, community health centre development, Health Infrastructure, NSW (2015).**

  Provided direction for the investigation and validation of a former commercial site (including a former service station) for development as a health centre. Services included preparation of a remediation action plan, environmental management plan and ongoing advice on contaminated land issues.

- **Technical review of investigation strategy, remediation and environmental management plans, Commonwealth Government (Defence), NSW (2013).**

  Technical reviewer for the contaminated land investigation design and reporting for a 220 hectare site proposed for commercial industrial land use. Deliverables, as part of a multidisciplinary team, included development of a sampling, analysis and quality plan, a Phase 2 intrusive investigation, and data management. The project also involved the development of a remediation action plan, various environmental management plans and preparation of detailed program cost estimates. All deliverables met the requirements of a NSW accredited Auditor and were completed in short turnaround times to meet the requirements of client.

- **Remediation and validation of a former service station, Hurlstone Park, Caltex (2013).**

  Technical reviewer for the remediation and validation of the site for residential land use and completed a human health risk assessment to allow divestment of the site on time and budget.

- **Project Manager, groundwater investigation and remediation, former fuel depot, Caltex Australia (2010-2014).**

  Designed a program of groundwater remediation and site validation to enable site divestment for commercial site use. The works included on and off-site health risk assessment.

- **Program Manager, Environmental site assessments and site remediation, Mobil Oil Australia (2005-2012).**

  Louise was the program manager for a large program of contaminated land assessments at numerous service stations and fuel depots throughout NSW including assessment of soil and groundwater impacts, health risk assessments and remediation design. Responsible for assessment strategy, coordination of staff and contractors, liaison with client project managers, regulatory authorities and third party organisations and delivery often to tight time schedules and budgets. Project manager and site supervisor experience including coordination of contractors, supervision of drilling works and tank excavation assessments and validation sampling.

LOUISE WALKDEN

- **Project Manager, Soil and groundwater remediation at former fuel depot, Yass, Mobil Oil Australia (2009-2011).**

  Principal contractor for soil remediation works and groundwater remediation through injection of chemical oxidant. Project managed the remediation, site validation and site close out.

- **Site Supervisor, Environmental Site Assessment at HMAS Platypus (2006-2007), Kirribilli, NSW, Australia, Sydney Harbour Foreshore Authority.**

  An investigation was undertaken to define the extent of contamination within the large harbour-side site which was formerly a gasworks and a submarine base and torpedo maintenance facility. Work included management of four drill rigs under a tight deadline, monitoring well installation, drilling of boreholes including incline boreholes beneath existing historical buildings and tar pits, soil sampling, core logging, groundwater monitoring, seepage sampling and sea and rock wall sampling.

- **Project Manager, Environmental Site Assessments at various Electrical Sub-Stations and Depots (2006-2010), Various Locations, NSW, Australia, Integral Energy.**

  Work included detailed site inspections, soil sampling, core logging, validations assessments, monitoring well installation, groundwater monitoring, qualitative risk assessment and interpretive report reproduction.

- **RAF St Athan, South Wales, UK, Welsh Development Agency (2003-2005).**

  Involved in a series of interrelated geo environmental studies undertaken in support of the redevelopment of a large, active defence site, including an extensive intrusive ground investigation involving the drilling of over 90 No. boreholes to delineate contamination of near surface soils and groundwater by hydrocarbons and chlorinated solvents.

Human health risk assessment

- **Human Health Risk Assessment former fuel depot, Caltex (2012).**

  Production of a detailed quantitative risk assessment for residential receptors impacted by a hydrocarbon plume in groundwater. Included analysis of multi-pathway exposures.

- **Quantitative Risk Assessment, former solvent re-processing site, Seven Hills, SITA (2010-2013).**

  Completed vapour inhalation risk assessments at a site impacted by chlorinated solvents and heavy end hydrocarbons. Part of the investigations involved a detailed characterisation of source areas using multiple pathway analysis, groundwater data, soil data, and passive vapour sampling.

- **Human Health Risk Assessment, Sydney Site, RailCorp (2010).**

  Undertook a qualitative risk assessment and developed a site management plan for a proposed recreational area with heavy metal contamination.

LOUISE WALKDEN

- **Former service station, Caltex (2008-2012) - Completed a risk assessment of off-site impact from hydrocarbon contamination in groundwater.**

  Results from the risk assessment assisted with the implementation of management strategies for the site. Further works at the site included removal of impacted soils at the site and validation for sale of the property.

PROFESSIONAL HISTORY

WSP | Parsons Brinckerhoff	2005 – Present
Parsons Brinckerhoff, Cardiff, UK	2002 – 2005
Royal Geographical Society Hydrological Research Placement, Danum Valley, Sabah	2000 – 2001

ALEX MOODY

ENVIRONMENTAL SCIENTIST

YEARS WITH THE FIRM

1.5

YEARS EXPERIENCE

4

AREAS OF EXPERTISE

Contaminated Land, Geology

LANGUAGES

English

PROFILE

Contaminated Land Consultant in Canberra, experienced in remediation and assessment of; hydrocarbon contamination, LNAPL's, asbestos, and heavy metals, experience with, field assessment and remediation, project management, and client liaison. Background in geology and geochemistry.

EDUCATION

Bachelor of Science (Hons), Geology, Australian National University	2013

PROFESSIONAL ASSOCIATIONS

Australasian Land and Groundwater Association	ALGA

PROFESSIONAL EXPERIENCE

Contaminated Land Assessment and Remediation

- **Environmental assessments at current and former service stations (2015-present).**

  Across NSW and the ACT, with United Petroleum, 7-Eleven, and independent clients. Project Manager and Field staff. Including, soil and groundwater sampling, waste classification, supervision of groundwater well installation.

- **Remediation of LNAPL via MPVE, Canberra, ACT, Australia (2016): Field technician.**

  Sampling of contaminated soil, groundwater, remediation of LNAPL and contaminated soil.

- **Bioremediation of Hydrocarbon Contamination, Canberra, ACT, Australia (2016): Field Supervisor.**

  Bulk excavation, management, and sampling of contaminated soil, and groundwater, bioremediation of LNAPL and contaminated soil.

- **Sub Slab Soil Vapour Assessment, National Archives, Canberra, ACT, Australia (2016): Field Technician.**

  Installation and sampling of soil vapour pins using evacuated canisters.

- **Detailed Environmental Site Assessment, Canberra, ACT, Australia (2014): Field Technician.**

  Installation of 12 soil bores and groundwater monitoring wells across a historic industrial site, to confirm suitability for high density residential, sampling of soil, and groundwater using micro purge.

- **Detailed Environmental Site Assessment, Canberra, ACT, Australia (2014): Field Technician.**

  Installation of 10 soil bores and groundwater monitoring wells across a historic industrial site, to confirm suitability for high density residential, sampling of soil, and groundwater using micro purge.

ALEX MOODY

→ **Detailed Environmental Site Assessment and remediation of Historic Canberra Brickworks landfill, Canberra, ACT, Australia (2014): Field Manager.**

Test pit assessment of historic landfill and installation of large scale landfill cap.

PROFESSIONAL HISTORY

WSP | Parsons Brinckerhoff	2015 – Present
Robson Environmental	2013 – 2015

GREG WALLS

SENIOR TOWN PLANNER

SPECIALTIES

- Town planning applications, environmental assessments, and approvals.
- Oil and gas industry (retail, bulk liquids, pipelines)
- Port, and industrial development (warehousing, freight terminals)
- Infrastructure
- State Government approvals
- Government and community liaison
- Compliance management

EXPERIENCE

Greg looks after town planning matters at TFA with particular knowledge and experience in NSW. In his ten years in the profession, Greg has worked heavily in the port, infrastructure, mining, and oil and gas space and has successfully obtained approvals through both local and state government planning pathways. Greg has experience in managing sub-consultants that may be required in the planning process.

SENIOR TOWN PLANNER – TFA PROJECT GROUP **APR 2016 – PRESENT**

Greg has worked on applications and obtained approvals for a wide collection of projects ranging from warehouses, to service stations to fuel depots. Greg works closely with clients and handles all aspects of consent authority interactions and liaison. Greg has experience working with local councils, State Government organisations, private developers, and providers.

CASE MANAGER – DEPARTMENT OF PREMIER AND CABINET **MAY 2015 – APR 2016**

Working mainly with the mining and energy assessment teams of the NSW Department of Planning, Greg helped facilitate the efficient progress of major projects through the planning assessment system liaising closely with government agencies and project proponents.

PLANNING & DEVELOPMENT COORDINATOR – NSW PORTS **DEC 2009 – MAY 2015**

Greg was responsible for the preparation and / or management of environmental assessments and development applications for NSW Ports as well as strategic review of tenant port development plans with particular experience in the landowner consent process.

GRADUATE – DEPARTMENT OF INFRASTRUCTURE, TRANSPORT, REGIONAL DEVELOPMENT, AND LOCAL GOVERNMENT **JAN 2009 – DEC 2009**

Greg spent a year in the Federal Department of Infrastructure which included working within the Infrastructure Investment Division as well as in Parliament for the responsible Minister at the time.

STUDENT PLANNER – SYDNEY PORTS CORPORATION **JUL 2006 – DEC 2008**

Greg was responsible for the preparation and / or management of port related environmental assessments and development applications.

EDUCATION AND ACCREDITATION

BACHELOR OF PLANNING – UNIVERSITY OF NEW SOUTH WALES

DIPLOMA OF GOVERNMENT, MANAGEMENT IN GOVERNMENT – AUSTRALIAN PUBLIC SERVICE COMMISSION

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South Melbourne Vic 3205
Website: www.tfa.com.au

CRAIG DUFFIELD
DIRECTOR - NSW

SPECIALTIES

- Master planning, Program rollouts, design and brief preparation
- Service Stations and Truck Stops – engineering, design & project management
- Thorough understanding of a project lifecycle from concept through to commissioning – Design, Approvals, Council/Gov't Requirements, Design, Tendering, Construction, Commissioning, Reporting.
- Dangerous Goods Legislation and Standards
- AS 1940, AS 4897 – Site Auditing and Reporting

EXPERIENCE

ASSOCIATE PROJECT MANAGER – TFA PROJECT GROUP — 2010 – PRESENT
PROJECT ENGINEER – TFA PROJECT GROUP — 2005 – 2010

- **SERVICE STATIONS & TRUCK STOPS**
  - BP: Upper Coomera, Slacks Creek – Design, project management, project support, engineering inspections
  - Caltex: Emerald, Hamilton, North Lakes, Richlands, Wishart – Site Planning, Design
  - Choice Petroleum: Banana, Calliope (Truck Stop), Guthalungra, Sun Valley (Gladstone) – project engineering, site auditing, compliance advice, project management, council approval, detailed design, approvals, construction support
  - Shell: 5 service station sites through Victoria – Site Audit and Measure, Re-image Design, Signage approvals through local council
  - Woolworths Petrol: Atherton, Bundaberg, Bargara, Bowen Hills, Childers, Edens Landing, Eli Waters, Enoggera, Emerald, Goonellebah (NSW), Gracemere, Gympie, Idalia (Fairfield Waters), Ingham, Innisfail, Kirkwood (Gladstone), Mission Beach, Ooralea (Mackay), Roma, Runaway Bay, Thuringowa, Tweed Heads South (NSW) – project management, co-ordination of town planning, traffic reporting, acoustic reporting, architectural, civil, structural, mechanical and electrical design.

- **FUEL DEPOTS & INDUSTRIAL**
  - BMA Peak Downs – MIBC Tank Farm – Compliance Audit and Report
  - ACTION Buses: Canberra – Audit of two depots, Compliance advice, detail design, construction support.

- **COMMERCIAL & RETAIL**
  - Shell: Pinkenba – Design of conveyor system and new high-speed labeling machine to the oil bottling plant
  - Baileys Marine: White Island (Sydney) – Project construction support and inspections of fuel installation (Fuel Design by TFA)
  - Bunnings: Stafford – Roof and Storm water Design, Car park Layout and Pavement Design
  - Road Designs – Small sub-division road designs in Caloundra, Gympie, Narre Warren (VIC)

EDUCATION AND ACCREDITATION

Bachelor of Engineering Technology – Civil
TMIE(Aust)

JUAN AVELLA

DIRECTOR CIVIL/STRUCTURAL ENGINEERING

SPECIALTIES

- Structural design of steel, concrete, timber and masonry buildings
- Bulk storage tanks foundations
- Support structures for machinery and pipes
- Site stormwater management design / oily water systems
- Roads and pavement design
- Design & procurement management

EXPERIENCE

Juan heads up the civil and structural section at TFA and has extensive experience in both disciplines. In his fifteen years in the profession, Juan has led and mentored engineering teams, undertaken conceptual and detailed design of numerous structures and facilities. He has also worked in the contractor side managing the design process of mid/high rise buildings projects and associated civil infrastructure.

CIVIL/STRUCTURAL ENGINEER – TFA PROJECT GROUP

- Fuel Terminals, Depots & Industrial
- Truck Stops & Service Stations
  - Caltex Holbrook, Puma Citiswich, BP Lytton & Puma Calliope Travel Centres – Full civil and structural design
  - Numerous Woolworths, Caltex, BP, 7-Eleven & Puma Petrol Service Stations
  - Slacks Creek - Murray's Rd Shopping Centre Redevelopment – Complete civil & structural design for updated building façade, new BP service station facilities & multi tenancies fit out requirements.
- Residential & Commercial
- Aviation Facilities
  - New Jet A1 fuel facilities at Brisbane, Townsville, Broome, Archerfield & Moorabbin Airports
  - Shell Tank 7 at Brisbane JUHI
  - Various hydrant pits expansion and relocations at Brisbane & Sydney Airports

STRUCTURAL ENGINEER – NJA CONSULTING PTY LTD JAN 2008 – AUG 2011

- Industrial & Institutional
  - Multiple Blockwork & Tilt-Up Shed Development at Lot 9402 Ghan Rd, Alice Springs NT
  - Tilt-Up Warehouse at 13 Marble Dr, Kingston QLD
  - Concrete and Steel Framed Mezzanines for DermcareVet Springwood and Slacks Creek
  - 40m Span Portal Frames Basketball Stadium at Traeger Park, Alice Springs NT
- Forensic
  - Collingwood Park Mine Subsidence Investigation (Over 400 dwellings)
  - Detailed Investigation and Rectification Works of Numerous Distressed Dwellings (QBC/BSA)
- Residential & Commercial
  - Numerous Detached Masonry, Timber and Steel Framed Houses in QLD, SA & the NT
  - Steel Framed Mezzanine for Super A-Mart, Logan Central
  - Alterations to Gillen Club, Alice Springs NT
- Energy & Defence
  - 3x Photovoltaic & Wind Farms at Ti-Tree, Kalkarindji and Alpurrurulam, NT
  - 18m Wide x 7m High Roller Door at Oakey RAAF Base

EDUCATION AND ACCREDITATION

BACHELOR OF ENGINEERING (CIVIL)
MASTER OF BUSINESS ADMINISTRATION – MBA (MAJOR IN FINANCE) / PROJECT MANAGEMENT DIPLOMA COURSE
MEMBER OF ENGINEERS AUSTRALIA – CHARTERED PROFESSIONAL ENGINEER – MIEAUST CPENG (CIVIL & STRUCTURAL)
REGISTERED ENGINEER NATIONAL ENGINEERING REGISTER – NER (CIVIL & STRUCTURAL)
REGISTERED PROFESSIONAL ENGINEER OF QUEENSLAND – RPEQ: 11899 (CIVIL & STRUCTURAL)
NORTHERN TERRITORY BUILDING PRACTITIONERS BOARD – CERTIFYING ENGINEER: 173355ES
VICTORIA BUILDING AUTHORITY - REGISTERED BUILDING PRACTITIONER: EC45074

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KARL PEREIRA

PROJECT MANAGER, NSW

SPECIALTIES

- Project Management including scheduling, financial management, document control
- Project Scoping and Cost Estimation; Tendering, estimating and procurement
- Contract management, construction administration & management, site supervision
- WHS&R, OHS Management, confined space

EXPERIENCE

TfA Project Group – Project Manager

- Management of various retail service stations from minor refits to full knock down rebuilds;
- Thorough understanding of the retail project delivery stream (concept to commissioning);
- Experience in initial project scoping and initial cost estimation – including co-ordination of detailed engineering inspections (by other TFA parties) of Structures, Electrical, Mechanical Refridgeration and Fuel Systems;
- Knowledge of local area oily-water and VR requirements (depending on location);
- Experienced in co-ordination of all other statutory approval processes and procedures prior to / concurrent to tendering and project construction delivery.

RCR Infrastructure / O'Donnell Griffin – Project Engineer/ Project Manager / Site Supervisor

- Lead Project Engineer / Manager on 4 x Sydney Water Sewer Pump Station (SPS) sites & 1 x Tertiary Water Filter Projects
- Responsible for: design delivery; client interface & co-ordination; technical evaluation of equipment supply; procurement of materials; On Site Construction Management and commissioning support; document control; inspections and testing, QA, WHS Management, Project Close Out
- Sub-contract initiation and administration, checks, verification and certification of contractor's periodical invoices for progress payments of constructed/ installed/ erected works.

ICD Asia Pacific – Project Engineer / Project Manager

- Effectively managed groups of 10-15 people for design package delivery; including: process, mechanical, E&I, civil, structural, & environmental disciplines.
- Co-ordination of Design Packages – time and budget control
- Successfully managed and delivered $4M fuel handling terminal on a FMG greenfield site, and a $4M fuel handling terminal on a Rio Tinto brownfield site.
- Identified and addressed critical and systemic processing problems. Tackled bottlenecks and delivered improvements of between 20% to 50% across the design, assessment and delivery stages.

Chatoyer Water - Project Engineer

- Successfully managed and delivered $2M PNG LNG WWPT Project (Exxon Mobile/ Kentz/ Clough).
- Successfully co-ordinated the design, then tendered and delivered a $3.5M safety equipment project (Sino Iron/MCC Mining/ CP Mining)

EDUCATION AND ACCREDITATION

BE Engineering (Mechatronics) (2nd Class Honours) – 2004

CALTEX AUSTRALIA PETROLEUM PTY LIMITED

Remediation Action Plan - Caltex Service Station Kaleen, ACT (Site ID: 22763)

275 MARIBYRNONG AVENUE, KALEEN, ACT, 2612

JANUARY 2017

WSP | PARSONS BRINCKERHOFF

Remediation Action Plan - Caltex Service Station Kaleen, ACT (Site ID: 22763)

275 MARIBYRNONG AVENUE, KALEEN, ACT, 2612

Caltex Australia Petroleum Pty Limited

Project no: 2201680AF-CLM-REP-001 RevD.docx
Date: January 2017

REV	DATE	DETAILS
A	21/10/2016	Draft for Caltex comment
B	26/10/2016	Draft for Caltex comment
C	31/10/2016	Draft for auditor comment
D	10/01/2017	Final

AUTHOR, REVIEWER AND APPROVER DETAILS

Prepared by:	Matthew Miklos	Date: 09/01/2017	Signature: 
Reviewed by:	Louise Walkden	Date: 10/01/2017	Signature: 
Approved by:	Matthew Miklos	Date: 10/01/2017	Signature: 

WSP | Parsons Brinckerhoff

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ABBREVIATIONS

ASS	Acid Sulfate Soils
AST	Above ground storage tank
ANZECC	Australian & New Zealand Environment & Conservation Council
BTEX	Benzene, Toluene, Ethyl Benzene, Xylene
DECCEW	Department of Climate Change, Energy and Water
LNAPL	Light non-aqueous phase liquids: liquid petroleum products usually detected on the groundwater table. Also known as Free Product or Separate Phase (also see apparent thickness)
LOR	Limit of Reporting
LPG	Liquefied petroleum gas
mBGL	Metres below ground level
mg/kg	Milligram per kilogram (or part per million)
mg/L	Milligram per litre (or part per million)
ND (nd)	Not detected above the LOQ or PQL
PAH	Polycyclic Aromatic Hydrocarbon
RAP	Remediation Action Plan
%RPD	Relative per cent difference
PID	Photoionisation detector
ppm	Part per million
PQL	Practical Quantitation Limit (of chemical concentration)
TDS	Total dissolved solids, a measure of salinity
TPH	Total Petroleum Hydrocarbons
TRH	Total Recoverable Hydrocarbons
µg/L	Microgram per litre (or part per billion)
µS/cm	MicroSiemens per centimetre, a measure of conductivity and salinity
UCL	Upper confidence limit of data set
UPSS	Underground petroleum storage system
UST	Underground Storage Tank
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

Caltex Australia Petroleum Pty Ltd (Caltex) commissioned Parsons Brinckerhoff Australia Pty Ltd trading as WSP | Parsons Brinckerhoff to prepare a remediation action plan (RAP) for the removal and replacement of the underground petroleum storage system (UPSS) and redevelopment of the Kaleen Service Station located at 275 Maribyrnong Avenue, Kaleen, ACT 2612 (the site; Caltex Site ID 22763). The service station at the site is no longer operating, in preparation for the redevelopment.

The objectives of the RAP will be to:

- Document the assessment, remediation and validation actions and methodologies required to confirm the site is suitable for ongoing commercial/industrial use.
- Provide a framework for the safe work practices and environmental management techniques to be implemented whilst undertaking fuel infrastructure replacement works.

The actions required to carry out the RAP are summarised as follows:

- Perform an underground services check to locate the position of any services prior to any excavation works.
- Decommission groundwater monitoring wells that will be damaged during the excavation works
- Remove concrete and excavate to expose USTs.
- Drain pumps and pipework.
- Degas the USTs to make safe for removal and transport off-site for destruction.
- Remove the residual product in the USTs and disposal off-site by a licensed waste contractor.
- Remove the UPSS and associated infrastructure.
- Provide tank destruction certificates.
- Collect soil samples from the excavations for USTs and fuel lines for analyses.
- Assess soil beneath other infrastructure where potentially contaminating activities have occurred.
- Remove any impacted soils which are to be classified and disposed off-site to an EPA approved landfill.
- Provide waste disposal certificates.
- Backfill the resulting excavations with approved clean imported VENM and/or excavated soil sourced from site found to be suitable for reuse.
- Reinstall groundwater monitoring wells to establish a groundwater monitoring well network that allows for adequate assessment of the extent of the LNAPL and dissolved phase contaminant plume and complete a groundwater monitoring event.
- Report on work completed.

Following the fieldwork, a validation report will be prepared. The report will be reviewed by the appointed Site Auditor and the ACT EPA and ACT Planning. The purpose of the validation report will be to document the procedures and results of the UPSS removal and the validation activities in accordance with relevant guidelines and Acts. The validation report will also provide an evaluation of the suitability of the site for continued use as a service station.

1 INTRODUCTION

1.1 Background and purpose

Caltex Australia Petroleum Pty Ltd (Caltex) commissioned Parsons Brinckerhoff Australia Pty Ltd trading as WSP | Parsons Brinckerhoff to prepare a remediation action plan (RAP) for the removal and replacement of the underground petroleum storage system (UPSS) and redevelopment of the Kaleen Service Station located at 275 Maribyrnong Avenue, Kaleen, ACT 2612 (the site; Caltex Site ID 22763). The service station at the site is no longer operating, in preparation for the redevelopment. Hydrocarbon contamination of soil and groundwater beneath the site has occurred as a result of historical leaks from the UPSS.

The purpose of the works is to replace all UPSS infrastructure at the site and to reduce the mass of hydrocarbon contamination in soil in the vicinity of the UPSS through excavation and offsite disposal. It is understood that some existing aboveground infrastructure will also be removed as part of the redevelopment, which will include the following:

- Removal of all existing fuel infrastructure, including underground storage tanks (USTs), fuel lines and bowsers.
- Removal of the existing retail building and the canopy.
- Removal of hydrocarbon impacted soils in the vicinity of the UPSS
- Installation of two new USTs and associated fuel lines, remote fill points and bowsers.
- Construction of a new retail building.
- Refurbishment of the existing carpark.

A plan of the existing site layout, showing the approximate locations of existing USTs and monitoring wells is provided as Figure 1. The proposed future site layout is provided as Figure 3.

This RAP has been prepared to document the proposed remediation works associated with UPSS replacement and site redevelopment and to provide a framework for the remediation and/or management of any hydrocarbon impacted soil encountered in the vicinity of the fuel infrastructure. It also outlines the validation methodology and criteria to be applied to assess that the site is suitable for ongoing commercial site use. The RAP has been endorsed by a Site Auditor and will be provided to ACT Planning in conjunction with the development application (DA) for the works.

1.2 Objectives

The objectives of the RAP will be to:

- Document the assessment, remediation and validation actions and methodologies required to confirm the site is suitable for ongoing commercial/industrial use.
- Provide a framework for the safe work practices and environmental management techniques to be implemented whilst undertaking fuel infrastructure replacement works.

This RAP will be provided to the appointed Site Auditor for comment prior to finalisation.

1.3 Scope of RAP

The RAP has been prepared in accordance to the requirements of the *Information sheet 3 – Requirements for the assessment and validation of sites containing above ground or underground fuel storage tanks* (ACT EPA, 2014). The RAP includes the following sections:

- Executive summary.
- Introduction – purpose, objectives and scope of the RAP.
- Site setting – site description, site history, existing UPSS infrastructure, zoning, surrounding land uses, geology/hydrogeology, groundwater database search, and summary of previous investigations.
- Summary of impacts – contaminants of concern, site impacts summary, site conceptual model.
- Remedial goals and strategies – remediation objectives, proposed remediation works, remediation and waste disposal criteria.
- Remediation approach – preliminaries, primary source removal, soil characterisation, reinstatement.
- Health, environment and safety plan.
- Construction environmental management plan.
- Remedial action plan summary.
- Appendices – site plans, historical results.

1.4 Technical framework

The RAP was prepared in accordance with the following guidelines:

- *Environmental Protection Act* 1997
- Environmental Protection Regulation 2005
- Australian and New Zealand Environmental Conservation Council (ANZECC) 1992, *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Sites*.
- ACT EPA 2000, *Environmental Standards: Assessment and Classification of Liquid and Non-liquids Wastes*.
- ACT EPA 2009, *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 2014, *Environmental Guidelines for Service Station Sites and Hydrocarbon Storage*.
- National Occupational Health and Safety Commission (NOHSC) 1995, *Exposure Standards for Atmospheric Contaminants in the Occupational Environment*
- *National Environment Protection (Assessment of Site Contamination) Measures 1999 (NEPM; as amended 2013).*
- *Protection of the Environment (Underground Petroleum Storage Systems) Regulation 2014* (UPSS Regulation).
- *Work Health and Safety Act* (2011).

The ACT Local Government has prepared a number of information sheets which outline the requirements for assessing sites which contain UPSS and those which are changing site use. These include:

- ACT EPA 2014, *Information Sheet 1 – Decommissioning, assessment and audit of sites containing above ground or underground fuel storage tanks*.
- ACT EPA 2014, *Information Sheet 2 – Requirements for the assessment and validation of former service station sites*.
- ACT EPA 2014, *Information Sheet 3 – Requirements for the assessment and validation of sites containing above ground or underground fuel storage tanks*.
- ACT EPA 2014, *Information Sheet 4 - Requirements for the reuse and disposal of contaminated soil in the ACT*.

2 SITE BACKGROUND INFORMATION

2.1 Site identification and description

The site identification details are provided in Table 2.1.

Table 2.1 Site identification details

SITE NAME AND ID	Caltex Kaleen service station (22763)
ADDRESS	275 Maribyrnong Avenue, Kaleen, ACT 2617
TITLE IDENTIFICATION	Block 26, Section 120, DP 6392
SITE AREA	2,160 m^2
ZONING	CZ4 – Local Centre
CURRENT SITE USE	Service station
PROPOSED SITE USE	Continued petroleum use (service station)

2.2 Site Features

Site features are shown on Figure 1. The site is generally covered by concrete hardstand. A limited area of landscaping is present predominantly along the northern boundary. A sales building currently occupies the eastern portion of the site with a canopy that extends to the west. A series of fuel bowsers are located beneath this canopy. Seven USTs and an associated remote filling point are located in the central portion of the site, one AST is located in the north-east corner of the site.

Other infrastructure includes an auto electrician and mechanics workshop in the southern portion of the site, with a waste oil tank located immediately north (central southern portion of the site).

Information regarding the UPSS to be removed from the site is summarised in Table 2.2. The approximate location of the existing fuel infrastructure is shown in Figure 1.

Table 2.2 Existing fuel storage details

TANK ID	TYPE	PRODUCT	CAPACITY (L)	STATUS
Depot 1	UST	Unleaded petrol (ULP)	45,000	Operational
Depot 2	UST	ULP	45,000	Operational
Depot 3	UST	ULP	45,000	Operational
Depot 4	UST	ULP	45,000	Operational
Depot 5	UST	ULP	45,000	Operational
Depot 6	UST	ULP	45,000	Operational
Depot 7	UST	Diesel	45,000	Operational
-	UST	Waste oil	1,500	Operational
Depot 8	AST	Liquefied petroleum gas (LPG)	5,000	Operational

2.3 Surrounding land use

The land uses surrounding the site are as follows:

- North – Maribyrnong Avenue, followed by residential properties.
- East – Residential properties, followed by Kaleen South Oval (recreational space).
- South – residential properties with Maribyrnong Primary School located approximately 50 m south of the site.
- West – shopping centre car park with residential premises beyond. A child care centre is located approximately 130 m west of the site.

2.4 Historical site use

A review of historical documentation did not provide any information on the historical uses of the site prior to occupation by Caltex. A certificate of title provided by Caltex indicates that the site was crown leased to a Karl Schreiner and then in 1952 the lease was transferred to Caltex where the site was used as a service station. Prior to this the title transfer documents indicate private occupation; however land use at that time is unknown.

2.5 Site zoning

The site is zoned as Local Centre (CZ4) in the ACT Land Use plan. The objectives of this zone are to:

- Provide for convenience retailing and other accessible, convenient shopping and community and business services to meet the daily needs of local residents.
- Provide opportunities for business investment and local employment.
- Ensure the mix of uses is appropriate to this level of the commercial hierarchy and enable centres to adapt to changing social and economic circumstances.
- Maintain and enhance local residential and environmental amenity through appropriate and sustainable urban design.
- Promote the establishment of a cultural and community identity that is representative of, and appropriate to, the place.

2.6 Physical Setting

2.6.1 Topography, geology and hydrogeology

The site is situated approximately 595 metres above Australian height datum (m AHD). The regional topography slopes gently towards the north-east; however the site's surface is generally flat.

A review of the Canberra 1:100,000 Geological Series (Sheet 8727) published by the Bureau of Mineral Resources 1st edition (1992) shows that the site is situated between two formations; the Early Silurian Canberra Formation and Middle-Late Ordovician Pittman Formation. These formations consist of mudstone, siltstone, minor sandstone, limestone, hornfels, dacitic ignimbrite and volcaniclastic sediments and interbedded sandstone, siltstone, shale and minor black shale, chert and impure calcareous sandstone (distal quartz turbidites). Previous environmental investigations at the site encountered stiff sandy clay to depths of approximately 6.5 metres below ground level (m BGL), underlain by siltstone. Groundwater strike was reported at depths of between approximately 6.0 and 9.0 m BGL, in the siltstone.

Groundwater at the site has been previously identified in onsite monitoring wells with a standing water level (SWL) of between 4.5 and 6 mBGL and a gradient of 0.012 (AECOM, 2012) to the north. Groundwater conditions in the vicinity of the site indicate that groundwater was not potable.

The nearest surface water feature is Yomani Pond located 2.5 km to the south-east of the site. Lake Ginninderra and Yomani Lagoon are located approximately 2.6 km to the west and south-east of the site respectively.

A search of ACT registered groundwater bores (www.actmapi.act.gov.au) completed on 6th October 2016 did not identify any registered groundwater bores within a 1 km radius of the site.

2.6.2 Acid sulfate soil risk

Based on a review of the CSIRO Australian Soil Resource Information System completed on 6th October 2016 (ASRIS, http://www.asris.csiro.au/index_ie.html), the site lies in an area where there is a 'low probability' of the occurrence of acid sulfate soils.

3 PREVIOUS ENVIRONMENTAL INVESTIGATIONS

WSP | Parsons Brinckerhoff is aware of the following previous environmental investigations and/or information sources for the site:

- AECOM, November 2011, *Groundwater Monitoring Report, Caltex Kaleen (22763), 275 Maribyrnong Avenue, Kaleen, ACT*.
- AECOM, May 2012, *Caltex Kaleen (22763) Groundwater Gauging Summary Report.*
- Coffey, November 2012, *Environmental Site Assessment, Corner Maribyrnong Avenue & Gwydir Square, Kaleen, ACT*.
- Parsons Brinckerhoff, *February 2012, Extraction Well Drilling Works Report, Caltex service station, 275 Maribyrnong Avenue, Kaleen, ACT (Site ID 22763).*
- Coffey, February 2013, *Soil Vapour Assessment, Caltex Kaleen Service Station (Site ID: 22763), 275 Maribyrnong Avenue Kaleen ACT*.
- Parsons Brinckerhoff, June 2013, *Multi-Phase Vacuum Extraction Event, Caltex service station, 275 Maribyrnong Avenue, Kaleen, ACT (Site ID 22763)..*
- Parsons Brinckerhoff, April/May 2013, *Groundwater Assessment, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763)*.
- Parsons Brinckerhoff, December 2013, *Multi-Phase Vacuum Extraction Event, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763)*.
- Parsons Brinckerhoff, December 2013, *Multi-Phase Vacuum Extraction Event, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763).*
- Parsons Brinckerhoff, May 2014, *Multi-Phase Vacuum Extraction Event, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763).*
- Parsons Brinckerhoff, August 2014, *Groundwater delineation and vapour assessment, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763).*
- Parsons Brinckerhoff, January 2015, *Groundwater Monitoring Event, Caltex Kaleen Service Station (Site ID 22763), 275 Maribyrnong Avenue, Kaleen, ACT*.
- AECOM, 2015, *Monitoring and Management Plan, Caltex Kaleen Service Station (Site ID 22763), 275 Maribyrnong Avenue, Kaleen, ACT*.
- AECOM, 2016, *Environmental Site Assessment with Plume Stability Assessment, Caltex Kaleen Service Station (Site ID 22763), 275 Maribyrnong Avenue, Kaleen, ACT*.
- AECOM, 2016, *Memorandum – Assessment of historical MPVE events, Caltex Kaleen Service Station*
- WSP | Parsons Brinckerhoff, August 2016, *Geotechnical Investigation and Environmental Site Assessment for Proposed Caltex Service Station Upgrade, Kaleen, ACT*.

A summary of the findings of these reports is provided in Table 3.1.

Table 3.1 Summary of previous environmental investigations

Report details	Objectives and scope	Key findings
Groundwater Monitoring Well Report AECOM Australia Pty Ltd 17 Nov 2011	To assess the condition of groundwater at the site with respect to potential petroleum hydrocarbon impacts from the operational underground petroleum storage system (UPSS) infrastructure. Drilling of three on-site boreholes and installation of three monitoring wells (MW1-MW3). Analysis of groundwater and selected soil samples for total recoverable hydrocarbons (TRH), BTEX compounds and lead.	Geology comprised fill material overlying sandy clay and silty clayey sand (with minor gravels) to 11.5 m BGL (maximum extent of the investigation). Groundwater was encountered between 6.01 and 6.33 m BGL with inferred flow to the north-east. All soil results were at concentrations below the assessment criteria with the exception of BH03 with which exceeded the adopted assessment criteria for benzene and total xylene at 0.5–0.6 m BGL. Dissolved phase hydrocarbon impacts comprising TRH and BTEX compounds were detected in MW2 located down gradient of the tank farm. TRH C_6-C_9 in MW2 was reported at 650,000 µg/L. Concentrations of TRH and BTEX were less than the groundwater assessment criteria in groundwater analysed from MW1 and less than the laboratory practical quantitation limits (PQLs) in the sample analysed from MW3.
Groundwater Gauging Summary Report AECOM Australia Pty Ltd 10 May 2012	Assess the conditions of groundwater at the site following detection of LNAPL in groundwater monitoring wells MW1, MW2 and MW3 during gauging by Parsons Brinckerhoff (March 2012). Gauging and sampling of monitoring wells MW1-MW3 and collection and analysis of samples for chromatographic product identification.	LNAPL was reported in all three monitoring wells with thicknesses reported as follows: 5 April 2012: MW1 (0.125 m), MW2 (4.447 m) and MW3 (4.5 m). 19 April 2012: MW1 (0.009 m), MW2 (3.787 m) and MW3 (0.966 m). LNAPL samples were collected and the laboratory product identification indicated the same chromatographic profile, consistent with a mixture of diesel and petrol in each well. AECOM recommended notifying ACT EPA, undertaking tank and line testing and rectification works, investigating the extent of soil and groundwater contamination and management/ remediation of the identified LNAPL.
Environmental Site Assessment Coffey 5 Nov 2012	The ESA was undertaken to delineate previously identified contamination both on and off-site, and provide a preliminary health risk assessment (HRA) for continued use as a service station. Drilling of six on-site (MW4-MW9) and four off-site (MW10-MW13) soil bores and subsequent conversion to groundwater monitoring wells. Installation of two on-site soil vapour bores (SV1 and SV2). Analysis of selected soil samples for TRH, BTEX compounds, PAH and lead. Gauging, purging and sampling of monitoring wells MW1 to MW13 and analysis of groundwater for TRH, BTEX compounds, PAH and dissolved heavy metals.	Depth to groundwater ranged from 590.31 (MW8) and 591.25 (MW3) m AHD and was inferred to flow to the north. LNAPL was identified in groundwater monitoring wells MW2 (3.46 m thickness) and MW3 (0.75 m thickness). Fingerprint analysis indicated that the LNAPL comprised petrol or a similar hydrocarbon product. An average seepage velocity of less than 1 m/year was calculated, although it was considered that the local influence of the tank farm on groundwater levels may result in a locally higher hydraulic gradient, and consequently a locally higher seepage velocity in the northern area of the site. Hydrocarbon impacts comprising TRH C_6-C_{14} and BTEX compounds were reported in soil collected from within the tank pit and to the south and north-west of the tank farm. The nature and depth of the identified impacts were considered to be consistent with releases of petrol from the USTs. Dissolved phase hydrocarbon impacts in groundwater were considered likely to extend beneath Maribyrnong Avenue but were not detected on the northern side of the road. It was considered that groundwater contamination

Report details	Objectives and scope	Key findings
		from the tank pit was unlikely to extend beneath the buildings on the southern end of the site. It was considered unknown whether groundwater impacts had potentially migrated off-site to the east or west. Coffey recommended that further investigation be undertaken in the southern and eastern areas of the site and off-site to the west to delineate the impacts.
Extraction Well Drilling Works Report Parsons Brinckerhoff 8 Feb 2013	Extraction well works were commissioned to enable future removal of LNAPLs and dissolved phase groundwater contamination. Installation of 4 x 100 mm diameter extraction wells (EX01-EX04) on-site to a depth of 10 m BGL, sampling and analysis of selected soil samples for waste characterisation and logging of soils samples.	Site geology was consistent with previous investigations and comprised fill material overlying sandy clay to approximately 6.0 m BGL, underlain by weathered sandstone to a maximum investigation depth of 10.0 m BGL. Photoionisation detector (PID) readings ranged between 0 and 2,530 ppm. High PID readings were consistent with visual and olfactory evidence of hydrocarbon contamination and were generally highest within the moist to wet horizons of the soil profile. Groundwater depth in the new wells ranged from 587.784 to 591.224 m AHD and inferred flow was to the north-east. LNAPL was not detected in any of the newly installed wells during the gauging immediately following drilling works.
Soil Vapour Assessment Coffey 7 Feb 2013	Provide a preliminary assessment of potential human health risks associated with soil vapour impacts. Purging and sampling of two previously installed on-site soil vapour points (SV1 and SV2) and laboratory analysis of aliphatic TRH >C_5-C_{12}, Aromatic TRH >C_5-C_{12}, volatile organic compounds (VOCs) and general gases (oxygen, carbon dioxide, methane and helium).	Two soil vapour points (SV1 and SV2), located to the west of the sales building were sampled to assess potential human health risks associated with vapour inhalation. Laboratory analytical results indicated that concentrations of benzene, ethylbenzene and xylene were below laboratory PQLs in both samples, while toluene concentrations were above PQLs but below the adopted reference criteria. Although detectable concentrations of TRH and VOCs were reported, no reference concentrations were available. Coffey concluded that contaminant concentrations reported within the soil vapour on-site were unlikely to pose an unacceptable human health risk through inhalation of volatile compounds for on-site workers (based on the current commercial/industrial use and configuration of the site) and/or maintenance workers within shallow trenches.
Multi-Phase Vacuum Extraction (MPVE) event Parsons Brinckerhoff 8 Feb 2013	Reduce the mass of hydrocarbons in the subsurface and trial the effectiveness of the MPVE method for removal LNAPL. Supervision of a three-day MPVE event at the site. The MPVE event was undertaken in December 2012.	Groundwater and soil vapour was extracted from monitoring wells EX01, EX02, EX03, MW1, MW2 and MW3. An estimated 19.34 kg of liquid equivalent hydrocarbon vapour was removed over 23 hours of extraction (over a three day period). Prior to extraction, LNAPL was detected in two monitoring wells; MW2 at a thickness of 3.466 m and MW3 at a thickness of 0.638 m. LNAPL was also detected in MW6 whist extraction was undertaken on EX01 and EX02 but was not present prior to or after extraction. At the completion of the event LNAPL was not detected in any on-site wells. The vapour flow rates achieved in the extraction wells and the mass removed were considered to indicate that MPVE

Report details	Objectives and scope	Key findings
		is a relatively efficient method for reducing the hydrocarbon mass at the site.
MPVE event Parsons Brinckerhoff 7 Jun 2013	Further reduce the mass of hydrocarbon contamination in the subsurface at the site. Remove LNAPL identified beneath the site during previous GMEs. Supervision of a two-day MPVE event at the site. The MPVE event was undertaken in April 2013.	Groundwater and soil vapour was extracted from groundwater extraction wells EX01 to EX04, and groundwater monitoring wells MW1, MW3 and MW6. An estimated 20.88 L of liquid equivalent hydrocarbon as vapour was extracted over a two day period (of 15.08 hours). Prior to extraction, LNAPL was detected in two monitoring wells (MW1 and MW6) and two extraction wells (EX03 and EX04). LNAPL was intermittently reported in MW1 and EX04 during the event. At the completion of the event LNAPL was not detected in any on-site wells. The vapour flow rates achieved in the extraction wells and the mass removed were considered to indicate that MVPE is a relatively efficient method for reducing the hydrocarbons mass at the site
Groundwater assessment Parsons Brinckerhoff April/May 2013	To delineate the lateral extent of the hydrocarbon contamination plume in groundwater previously identified. Involved the drilling of four off-site boreholes (MW14-MW16 and MW19) and two on-site boreholes (MW17-MW18) using a track mounted drill rig to depths ranging between 8.0 and 11.2 metres below ground level (m BGL) and conversion to groundwater monitoring wells Drilling of two off-site boreholes (SV3 and SV4) using a track mounted drill rig to a maximum depth of 2.0 m BGL and conversion to soil vapour bores Gauging and collection of groundwater samples from 19 monitoring wells analysed for TRH, BTEX and PAHs.	Groundwater was present at a depth of 5.0 to 6.5 m BGL in the sandy clay with inferred flow to the north-east, with radial flow patterns to the north and east with approximate hydraulic gradients of 0.0064, 0.0065 and 0.0142, respectively. The highest concentrations of hydrocarbons were reported in groundwater collected from on-site wells MW2 and MW6 (north of the tank farm), and MW3, MW7, MW8, MW17 and MW18 (in the south and south-east of the site). Concentrations were above the adopted groundwater assessment criteria (GAC). Elevated concentrations of TRH C_6-C_{10} and BTEX were also detected above the adopted GAC off-site adjacent to the northern site boundary (MW10) and to the west of the site (MW19) where dissolved phase hydrocarbons were detected at similar concentrations to groundwater collected from onsite wells within the southern area. Impacts in MW19 were considered to be attributable to a relatively flat gradient to the north and north-east (6 m for every 1000 m) and to preferential flow channels in the interface between the residual soil and bedrock. The off-site monitoring wells located to the east and north-east of the site and on the northern side of Maribyrnong Avenue showed low concentrations of TRH and BTEX compounds. Concentrations of F1 (TRH C_6-C_{10} fraction minus BTEX) exceeded the assessment criteria for adopted groundwater health screening (HSLs) levels for vapour intrusion in nine on-site monitoring wells (MW1 to MW3, MW5 to MW8, MW17 and MW18) and two off-site monitoring wells (MW10 and MW19). Parsons Brinckerhoff concluded that a hydrocarbon plume is present in groundwater beneath the site that extends beyond the northern site boundary and to the west of the site, advancing primarily north-east with radial flow to the north and west. The hydrocarbon plume was not delineated to the south, south-east or west. Further delineation of groundwater impacts off-site to the south- east (in the southern area of the residential car park) and west of the site in Gwydir Square was recommended. Parsons Brinckerhoff also recommended

Report details	Objectives and scope	Key findings
		further soil vapour investigations to assess any potential risks arising from vapour intrusion into the residential properties located to the east and south of the site.
MPVE event Parsons Brinckerhoff 20 Dec 2013	Further reduce the mass of hydrocarbon contamination in the subsurface at the site. Remove LNAPL identified beneath the site during previous GMEs. The MPVE event was undertaken in August 2013.	A total estimated mass of 61.33 kg (or 85.2 L) of hydrocarbons was removed during the event comprising 60.9 kg in extracted vapour and 0.43 kg in extracted liquid (over a three day period) and LNAPL was not detected in on-site wells at the completion of the event with the exception of EX04 (recovered to a thickness of 0.01 m). Vacuum radii of influence of 2 Pa and 6 Pa were recorded at monitoring wells MW04 and MW08 on the first day respectively, confirming the previous conclusions of a tight formation at the site, although it was observed that vacuum radius of influences at the site may increase with continued MPVE events. The results of this MPVE were comparable to those from the previous events undertaken, confirming those findings.
MPVE event Parsons Brinckerhoff 20 Dec 2013	An MPVE event was undertaken at the site to reduce the mass of hydrocarbons in the subsurface. Individual wells were targeted to obtain individual well data and to identify more effective wells for hydrocarbon mass removal. A three day MPVE event was conducted at the site on 22, 23 and 24 October 2013.	The MPVE event removed an estimated volume of 14.66 L in the vapour phase and an estimated 103.13 L of hydrocarbons in the liquid phase over 22.41 hours of extraction. LNAPL was detected prior to extraction in wells EX03 and EX04. LNAPL was not detected at the completion of the event. LNAPL appears to be rebounding in localised areas of the site following MPVE events; however the thicknesses of LNAPL are decreasing. The results of the MPVE were comparable to those from the previous events undertaken in December 2012, April 2013 and October 2013 confirming that the geology at the site is a tight formation. The MPVE identified EX03, EX04 and MW2 are primary locations for vapour recovery, having exhibited maximum recovery rates of 0.84, 1.8 and 0.81 L/h respectively. Secondary extraction locations such as MW3 and MW18 were also conducive to recovery, but to a lesser extent. The effectiveness of future MPVEs was anticipated to be maximised should these wells be targeted. However, with prolonged extraction the observed recovery rate decreased. This was attributed to the tight geological formation having no vacuum radius of influence and standing water levels (SWL) rising back to equilibrium post removal. It is considered that consecutive MPVE events have been effective in reducing hydrocarbons in the subsurface. As in the previous event, the vapour flow rates achieved in the extraction wells and the mass removed indicated that MPVE was a relatively efficient method for reducing the hydrocarbon mass. In terms of designing an effective vapour recovery system for the site, data suggested that recovery of vapour is limited over prolonged extraction times. Should a permanent vapour recovery system be installed, high initial recovery was anticipated to be achieved but performance would ultimately decrease over time. A system of this type

Report details	Objectives and scope	Key findings
		was therefore not recommended as a suitable remedial approach. Additionally, an assessment of residual risk to on-site and off-site receptors posed by dissolved phase hydrocarbons was recommended in the form of a soil vapour study on- and off-site to assess whether any vapour intrusion risk exists on- and off-site.
MPVE event Parsons Brinckerhoff 6 May 2014	Further reduce the mass of hydrocarbon contamination in the subsurface. Remove LNAPL identified beneath the site during previous GMEs. Supervision of a one-day MPVE event at the site. The MPVE event was undertaken 20 February 2014	During the one day MPVE event, groundwater and soil vapour was extracted from groundwater extraction wells EX01, EX03 and EX04, and groundwater monitoring wells MW02, MW03, MW08 and MW18. An estimated volume of 12.365 L of hydrocarbons were removed over 7.82 hours of extraction. Prior to extraction, LNAPL was detected in wells EX01 and EX03 and was not detected at completion. LNAPL appeared to be rebounding in localised areas of the site following MPVE events; however the quantity of LNAPL is decreasing. Extraction was observed to be most effective within on-site well EX03 and EX04 which should continue to be targeted during future MPVE events. The extraction rates decreased with time attributed to the tight geological formation having no vacuum radius of influence and SWL rising back to equilibrium post removal. It was considered that consecutive MPVE events were effective in reducing hydrocarbons in the subsurface. As in the previous events, vapour flow rates achieved in the extraction wells and the mass removed indicate that MPVE was a relatively efficient method for reducing the hydrocarbon mass at the site. Periodic MPVE was considered a viable remediation methodology at the site and further mobile MPVE events were recommended. An assessment of residual risk to on-site and off-site receptors posed by soil and groundwater impacted by hydrocarbons was recommended to assess potential for vapour intrusion risk.
Groundwater delineation and vapour assessment *August 2014*	Delineate lateral extent for the hydrocarbon plume in groundwater to the south, south east and west of the site and evaluate the potential vapour risk to offsite residential receptors from impacts at the site.	Contaminants of concern were detected above the adopted groundwater assessment criteria (GAC) to the south of the tank farm (wells MW3, MW7, MW8, MW17 and MW18) and to the north of the tank farm (wells MW1, MW2, MW5, and MW6) inferring that the plume is present beneath the tank farm area. Offsite impacts were limited to elevated naphthalene and xylene in groundwater collected from wells MW10 (immediately north of the site) and MW19 (to the west of the site). The groundwater plume was delineated in all directions. Based on May 2014 data, the plume does not extend offsite to the east or south and is delineated between 5 m and 18 m from the site boundary to the north (by wells MW10 and MW13 respectively) and between 18 m and 43m to the west (by wells MW19 and MW21 respectively). The groundwater seepage velocity has been calculated to be between 0.00002 and 7.3 m/year.

Report details	Objectives and scope	Key findings
		Based on the groundwater results, the vapour intrusion risk to offsite receptors was considered to be acceptable.
GME *Parsons Brinckerhoff* *29 January 2015*	Gather additional data on groundwater quality and aquifer properties to assess contaminant fate and transport and undertake a qualitative evaluation of onsite and offsite risks to human health and environmental receptors; Evaluate the best approach for ongoing management of LNAPL and/or dissolved phase hydrocarbon contamination (if required).	Groundwater was present at a depth of 3.9 to 6.6 m BTOC in the sandy clay with inferred flow to the north-east The highest concentrations of hydrocarbons were reported in groundwater collected from on-site wells Mw1, MW2, MW5 and MW6 (north of the tank farm), and MW3, MW7, MW8, MW17 and MW18 (in the south and south-east of the site). Concentrations were above the adopted groundwater assessment criteria (GAC).
Environmental Site Assessment URS *November 2015*	Assess the potential risk to receptors from groundwater contamination and soil vapours. The assessment involved the gauging and sampling of four on-site and seven off-site groundwater wells. Hydraulic conductivity testing was conducted on three wells, as well as sampling of two existing soil vapour wells. Additionally, one sub-slab soil vapour sampling location was installed and sampled.	Groundwater was gauged at depths between 3.3 and 7.2 m BGL with groundwater flow direction determined to be to the northeast. It was concluded that dissolved phase hydrocarbon impacts in groundwater had decreased since peak concentrations in 2012 and the plume was delineated down gradient of the site. Soil vapour concentrations detected in onsite vapour well SV1 exceeded HSL for commercial site use. Soil vapour results from the sub slab pin near the sales building onsite did not exceed commercial HSLs. The risk to on and offsite receptors from groundwater impacts at the site was determined to be low.
Monitoring and Management Plan *AECOM* *November 2015*	The purpose of the MMP is to detail the ongoing monitoring schedule to ensure the potential risks to identified receptors remain low and acceptable and ensure compliance with the EA for the site.	The MMP includes the requirement for annual groundwater monitoring events, utility pit vapour monitoring and soil vapour monitoring bi-annually in 2016. The MMP also outlines reporting requirements and Action Trigger Levels.
Geotechnical Investigation and Environmental Site Assessment WSP | Parsons Brinckerhoff *19 August 2016*	To assess the geotechnical subsurface conditions across the footprint of the proposed development area. The limited environmental site assessment focused on asbestos in fill and acid sulfate soils. A brief review of available historical reports was undertaken, targeting previous boreholes and sampling locations of relevance.	Asbestos and acid sulfate soils were not detected during the investigation. Groundwater was not encountered during the investigation.
Memorandum – Assessment of historical MPVE events, Caltex Kaleen Service Station AECOM *26 August 2016*	Conduct an assessment on the historical Multiphase Vacuum Extraction (MPVE) events undertaken at the Caltex Kaleen Service Station from April 2013 to August 2014.	MPVE data from five events ranging from April 2013 to August 2014 was assessed and generally, vapour and liquid extraction rates were low, resulting in a low mass of hydrocarbon during each event. Future use of MPVE at the site is not recommended. LNAPL is recommended to be removed manually, via periodic bailing out events, from wells where LNAPL thickness is greater than 5mm. Alternatively, passive skimmers can be installed inside LNAPL impacted wells and emptied during periodic site visits.

Report details	Objectives and scope	Key findings
Environmental Site Assessment and Plume Stability Assessment AECOM *September 2016*	Meet ACT operational compliance under the Environmental Authorisation of the site. Assess the nature and extent of the hydrocarbon plume.	LNAPL was detected in six monitoring wells onsite during gauging events between May and July 2016. LNAPL was delineated onsite and estimated to be due to a recent release (last 2-3 years). A LNAPL recovery event was undertaken on 1st July 2016 by pumping out of 15 onsite wells. Dissolved phase hydrocarbon impacts were delineated offsite. Soil vapour sampling indicated a low risk to onsite receptors from vapour intrusion pathways. The plume stability assessment indicated that the plume was stable and that the aquifer has sufficient capacity to biodegrade hydrocarbons to concentrations below HSLs within a short distance of the site boundary. The risk to on and offsite receptors was considered to be low due to the lack of complete exposure pathways.

4 CONCEPTUAL SITE MODEL

4.1 Contaminants of concern

Based on the historical use of the site as a service station and the potential for contaminated fill to be present on the site, the following contaminants of potential concern have been identified:

- TRH (service station and fill origins).
- BTEX (service station and fill origins).
- Lead (service station and fill origins).
- Polycyclic aromatic hydrocarbons (PAHs) (service station and fill origins).
- Asbestos (fill origins).

4.2 Extent of identified hydrocarbon contamination

Previous historical environmental investigations have identified hydrocarbon impacts in soil and groundwater at the site. Groundwater is present at depths of between approximately 4.0 and 6.5 m BGL in the sandy clay and siltstone. Following well installation in 2011, LNAPL was encountered on groundwater in three wells (MW01-MW03) in 2012, with 4.4 m thickness of product detected in well MW02. Chromatogram fingerprinting identified the product as weathered petrol that had been in the environment between nine and twenty-one years (15+/- 6 years). The source of the product was considered likely to be from leaks from the petrol USTS (Tanks 2, 4 and 6) which failed integrity testing in 2012. Delineation and remediation of the LNAPL was undertaken with six multiphase vacuum extraction (MPVE) events undertaken between 2012 and 2014 (Parsons Brinckerhoff 2012-2014).

During recent groundwater monitoring events in May and June 2016, AECOM (2016), identified LNAPL in onsite wells MW04, MW06, MW08, MW18, EX01, EX03 and EX04. The LNAPL was considered to be related to a recent release of fuel that occurred between March and May 2016.Anecdotal evidence suggested the source was underground tank Depot 5. The dispensers for this UST were subsequently shut down and an LNAPL recovery event was undertaken by pumping from onsite groundwater wells in July 2016.

Based on the most recent groundwater data provided from June 2016 (AECOM, 2016), LNAPL is present in wells in the southern, northern and eastern portions of the site and is delineated onsite. Dissolved phase hydrocarbon impacts are present in groundwater across the site at concentrations above various environmental assessment criteria. Dissolved phase groundwater impacts are delineated onsite to the south and east, and to just beyond the sites northern (down gradient) and western site boundaries.

An assessment of the contaminant plume stability was undertaken by AECOM (2016) and concluded that the contaminant plume does not appear to be expanding in one direction but instead concentrations of contaminants appear to fluctuate within the same general extent. The relatively flat groundwater gradient at the site means that dispersion in all directions has occurred. It is considered likely that lateral (e.g. cross hydraulic gradient) preferential flow pathways along fractures and more permeable sandy layers have an increased effect on contaminant migration in some directions and may have contributed to the observed lobes forming to the west and to the southeast of the main plume body (AECOM, 2016). Despite fluctuations in concentrations over time the centre of the plume was considered to have remained relatively stable indicating it is unlikely to migrate, even with the LNAPL detected in 2016.

Based on the results of previous investigations and recent observations at the site, it is expected that soil impacts will be greatest surrounding the underground tanks and associated fuel infrastructure including bowsers, lines, sumps and drains. Coffey (2012) identified hydrocarbon impacts comprising TRH C_6-C_{14} and

BTEX compounds in soil collected from within the UST tank pit and to the south and north-west of the tank farm. It is noted that there is limited soil data available, both historically and spatially, however LNAPL has been detected in wells across the site and hence impacted soils in the saturated zone are likely to be present across much of the site.

4.3 Potential receptors and exposure pathways

The potential receptors and exposure pathways to the hydrocarbon impacts identified at the siteare summarised in Table 4.1 below.

Table 4.1 Potential exposure pathways and receptors

SOURCE	POTENTIAL EXPOSURE PATHWAY	RECEPTORS	POTENTIALLY COMPLETE EXPOSURE LINKAGES
Hydrocarbon impacted soil	Vapour migration and inhalation Dermal contact Ingestion	Commercial site user Construction, maintenance and utility workers	Commercial site users through inhalation of vapours that migrate into onsite buildings Maintenance and utility workers through inhalation of vapours that accumulate in service trenches and excavations on and immediately adjacent to the site. Maintenance and utility workers through dermal contact with impacted soils at shallow depths.
Hydrocarbon impacted groundwater	Dermal contact and ingestion of impacted groundwater extracted onsite and offsite for beneficial use Vapour migration into onsite buildings Vapour migration into offsite buildings Offsite migration of impacted groundwater and discharge into surface water bodies	Commercial site users Construction, maintenance and utility workers Users of groundwater on and offsite Offsite commercial and residential site users Surface water bodies	Commercial site users through inhalation of vapours that migrate from groundwater into onsite buildings Construction, maintenance and utility workers through inhalation of vapours that accumulate in service trenches and excavations on and immediately adjacent to the site. Offsite commercial and residential receptors through migration of vapour into offsite buildings.

Soil vapour assessments undertaken at the site (Coffey, 2013, URS, 2015 and AECOM, 2016) identified low concentrations of hydrocarbons in soil vapour and it was concluded that the risk to human health from vapour inhalation pathways was low for on-site commercial workers (based on the current site use) and maintenance workers within shallow trenches. The vapour inhalation risk to offsite commercial site receptors located hydraulically down gradient of the site was also considered to be low. It is noted however, that soil vapour investigation locations were based on the current site layout. As the new site layout includes repositioning of the sales building to the western portion of the site, overlying the new LNAPL plume, additional assessment of the soil vapour risk is required. It is understood that further assessment of the soil vapour risk at the site is being undertaken in November 2016 to allow any mitigation or additional remediation measures that may be required to be incorporated into the redevelopment program.

Groundwater is not being extracted for beneficial use on the site or on the downgradient commercial site. Given the access to reticulated water in the area and the low yield of the clay aquifer, there is deemed to be a low risk of exposure to contaminated groundwater through extraction of groundwater in the immediate vicinity of the site. Given the distance to the nearest surface water receptor (2.5 km) and the current

delineation of the contaminant plume, there is deemed to be a low risk to fresh water receptors hydraulically down gradient of the site.

During site redevelopment works, health and safety protocols will be employed to mitigate risks to construction workers from contaminated soil. These are discussed in Section 8 and Section 9.

Based on current data, there is a lack of complete exposure pathways to current and future receptors from contamination at the site. Following redevelopment, potential exposure pathways will be limited to the potential migration of hydrocarbon vapours into onsite and offsite buildings. Site validation during and following completion of the redevelopment works will be undertaken to confirm that the risks to receptors from residual contamination in soil and groundwater at the site continue to be acceptable.

5 REMEDIATION GOALS AND STRATEGIES

5.1 Remediation objectives

The objective of the UPSS removal works is to install new tanks and lines, and at the same time to remove former fuel infrastructure and any significantly contaminated soil around the infrastructure, so that the site is suitable for continued use as a service station.

5.2 Proposed remediation and assessment works

The UPSS will be excavated and the USTs, fuel lines, bowsers and associated fuel infrastructure, will be removed. After removal of the tanks and lines, soils from the walls and floors of the excavation will be sampled to characterise the remaining soils. Exposed soils resulting from the removal of above ground infrastructure will also be sampled and analysed for the contaminants of concern. Further assessment and remediation may be undertaken if residual soil impacts are assessed as posing a risk to future commercial site users or groundwater.

The site layout is to be reconfigured during the works which will result in the loss of some existing groundwater monitoring wells. Replacement and repositioning of wells will be required to ensure the monitoring well network is adequate to monitor groundwater conditions at the site. New wells will be installed to target areas of known LNAPL contamination and will be constructed to the same specifications as the original wells.

5.3 Remedial endpoints

The UPSS replacement and soil remediation works will be considered to be completed when:

- the UPSS infrastructure has been removed and replaced
- Concentrations of contaminants in soil around and beneath the UPSS, and beneath site buildings to be removed, are assessed as not posing a risk to future site users or offsite receptors.
- Soil vapour assessment (undertaken by AECOM in December 2016 with results pending) indicates an acceptable risk to future commercial site occupiers from potential vapour intrusion into onsite buildings.

5.4 Data Quality Objectives

Systematic planning is critical to successful implementation of any assessment and is used to define the type, quantity and quality of data needed to inform decisions. The United States Environmental Protection Agency (US EPA) has defined a process for establishing data quality objectives (DQOs) (US EPA, 2000a and 2000b), which has been referenced in *National Environment Protection (Assessment of Site Contamination) Amendment Measure 2013 (No. 1)* (NEPM) Schedule B2 – Guideline on Site Characterisation ((National Environmental Protection Council (NEPC), 2013).

DQOs ensure that:

- → the study objectives are set
- → appropriate types of data are collected (based on contemporary land use and chemicals of potential concern)
- → the tolerance levels are set for potential decision making errors.

The DQO process is a seven-step iterative planning approach. The outputs of the DQO process are qualitative and quantitative statements which are developed in the first six steps. They define the purpose of the data collection effort, clarify what the data should represent to satisfy this purpose and specify the performance requirements for the quality of information to be obtained from the data. The output from the first six steps is then used in the seventh step to develop the data collection design that meets all performance criteria and other design requirements and constraints. The DQO process adopted for the UPSS replacement and soil remediation works is outlined in Table 5.1.

Table 5.1 Data quality objective process

STEP	DESCRIPTION	OUTCOMES
1	State the problem	Caltex intends to upgrade the current UPSS at the Kaleen service station and in the process remove hydrocarbon impacted soils in the vicinity of the UPSS. The objective of the remedial works is to reduce the mass of contamination in the substrate at the site and hence reduce the potential for ongoing contamination of groundwater. To ensure the works are undertaken in accordance with relevant regulations and assess the mass of hydrocarbon removed during the works, assessment of the excavated soils is required and measurement of contaminant concentrations in soil remaining onsite.
2	Identify the decisions	The decisions to be made are as follows: → What are the residual soil, soil vapour and groundwater contamination concentrations at the site → Does the contamination pose a risk to on and offsite receptors? → If there is a risk, what is the most appropriate remedial/management strategy to be employed at the site?
3	Identify the inputs to the decision	The inputs required to make the above decisions are: → the results of previous investigations → field and analytical data to be collected during the works → national and NSW EPA made, endorsed or approved criteria for assessing the results.
4	Define the study boundaries/ constraints on data	The boundaries of the investigation have been identified as follows: → Spatial boundaries: the spatial boundary of the site is defined as the site boundary and the extent of offsite groundwater plume. The vertical extent of the study area is defined as the depth to impacted groundwater. The site boundary is shown on Figure 2. → Temporal boundaries: As the data and information obtained from the previous investigations has been relied upon, the temporal boundary will be from the date of the oldest available assessment data to the date of acquisition of the final laboratory results
5	Develop a decision rule	The purpose of this step is to define the parameters of interest, specify the action levels and combine the outputs of the previous DQO steps into an 'if…then…' decision rule that defines the conditions that would cause the decision maker to choose alternative actions. The parameters of interest are concentrations of contaminants of concern and interest in soil, groundwater and soil vapour. An assessment of the concentrations of the contaminants of concern will be undertaken to ensure the site has been adequately investigated. Soil, groundwater and soil vapour results will be compared to a range of assessment criteria for different receptor endpoints from various exposure routes to determine whether there is a risk posed to the receptor. For the purposes of assessing this site (with commercial/industrial end point), the following questions need to be satisfied with the following if/then outcomes: → if the site assessment/validation report doesn't follow the 2011 EPA publication Guidelines for Consultants Reporting on Contaminated Sites, then the report will be rewritten in accordance with this guideline.

STEP	DESCRIPTION	OUTCOMES
		→ if any contaminant odours emanating from site soils are identified, then a sample of soil will be collected and further assessment undertaken through analytical testing of contaminant concentrations in the soil. Results will be compared to the assessment criteria detailed in Section 6.5. → if soils, groundwater or vapour have been found to contain contaminant concentrations above the investigation levels, then soil and/or groundwater will be subject to further remedial action or management. → if the site remedial strategy is proved to be insufficient in assessing the site, then further investigative or remedial works will be implemented.
6	Specify limits on decision errors	The acceptable limits on decision errors to be applied in the investigation and the manner of addressing possible decision errors have been developed based on the data quality indicators (DQIs) of precision, accuracy, representativeness, comparability and completeness and are presented in Tables 5.2 and 5.3.
7	Optimise the design for obtaining data	The purpose of this step is to identify a resource-effective data collection design for generating data that satisfies the DQOs. This assessment has been designed considering the information and data from the previous assessments. The resource-effective data collection design that is expected to satisfy the DQOs is described in Sections below.

DQIs for sampling techniques and laboratory analyses of collected representative soil and groundwater samples define the acceptable level of error required for this validation assessment. The adopted field methodologies and data obtained were assessed by reference to the following measures:

- → Accuracy – a quantitative measure of the closeness of reported data to the true value
- → comparability – a qualitative parameter expressing the confidence with which one data set can be compared with another
- → completeness – a measure of the amount of useable data (expressed as a per cent) from a data collection activity
- → representativeness – the confidence (expressed qualitatively) that data are representative of each media present on the site
- → precision – a quantitative measure of the variability (or reproducibility) of data.

A summary of the field and laboratory DQIs for the validation assessment are provided in Tables 5.2 and 5.3.

Table 5.2 DQIs for field techniques

DQI
Precision
Standard operating procedures (SOPs) appropriate and complied with.
Collection of intra-laboratory duplicates
Accuracy
WSP | Parsons Brinckerhoff SOPs appropriate and complied with
Collection and analysis of inter-laboratory duplicates
Collection of rinsate blanks, trip blanks and spikes
Representativeness

DQI
Appropriate media sampled according to the SAQP
Comparability
Same SOPs used on each occasion
Experienced sampler
Climatic conditions (temperature, rainfall, wind)
Same type of samples collected
Completeness
SOPs appropriate and complied with
All required samples collected

Table 5.3 DQIs for laboratory analysis

DQI	ACCEPTABLE LIMITS
Accuracy	
Laboratory prepared trip blanks (one per batch)	Non-detect for contaminants analysed
Rinsate blanks (one per day)	Non-detect for contaminants analysed
Method blanks	Non-detect for contaminants analysed
Matrix and surrogate spikes and laboratory control samples	Laboratory specific
Matrix spike duplicates	Laboratory specific
Reference materials	Laboratory specific
Reagent blanks	Non-detect for contaminants analysed
Comparability	
Sample analytical methods used (including clean-up)	As per NEPM (NEPC, 2013)
Same units (justify/quantify if different)	-
Same laboratories (justify/quantify if different)	-
Sample practical quantitation limit (PQLs)	< nominated criteria
Completeness	
All critical samples analysed	-
All required analytes analysed	-
Appropriate methods and PQLs	As per NEPM (NEPC, 2013)
Sample documentation complete	As per NEPM (NEPC, 2013)
Sample holding times complied with	As per NEPM (NEPC, 2013)

DQI	ACCEPTABLE LIMITS
Representativeness	
All required samples analysed	-
Precision	
Blind (intra-laboratory) duplicates and split (inter-laboratory) duplicates at rate of 1:20 primary samples for the same analysis of primary samples (not including asbestos, pH, cation exchange capacity (CEC), organic or clay content)	Variable (see Table 7.1)
Laboratory duplicates	Laboratory specific
Laboratory prepared trip spikes (one per batch for volatiles)	70–130%
National Association of Testing Authorities (NATA) certified laboratories used	-

5.5 Soil validation criteria

This RAP is prepared for assessing the potential contaminants of interest in soil at the site after the removal of the UPSS and other potentially contaminating infrastructure and sources. Therefore, the potential human receptors relevant to this investigation are the demolition and site construction workers, and future commercial site occupants. The exposure pathways identified were vapour intrusion into buildings and shallow trenches, dermal contact and ingestion. Based on the potential receptors identified and the exposure pathways, the applicable remediation criteria are the soil health screening levels (HSLs) for vapour intrusion risks and soil health based investigation levels (HILs) for direct contact and ingestion risks. The HSLs and HILs for commercial users are provided in the NEPM (2013). For the intrusive maintenance workers, the recommended assessment criteria for vapour and direct contact pathways provided in the Cooperative Research Council for Contamination Assessment and Remediation for the Environment (CRC CARE) Technical Report no. 10 (Friebel and Nadebaum, 2011) have been adopted.

In the absence of clay content data, the HSLs for ‘Sand’ and ‘Clay’ have been initially adopted as a conservative approach. Once intrusive works have been commenced and clay content analysis undertaken, this can be refined to reflect actual site conditions and to ensure that remedial works are not undertaken unnecessarily.

At the completion of remedial works, excavated areas will be backfilled and covered by either paving or buildings with limited soil access. As the site will be used as a service station, the ecological screening levels (for the protection of plants and terrestrial organisms) for petroleum hydrocarbons have very limited relevance and have not been included in this assessment.

Asbestos criteria for surface soils (top 10 cm) for both bonded and friable asbestos in subsurface soil are presented in the NEPM (2013). Bonded asbestos criteria are given for land use categories as well and as such the commercial/industrial criterion (HIL D) has been considered. Furthermore, there is to be no visible asbestos in surface soils.

The HSLs and HILs for the commercial site users and the intrusive maintenance workers are summarised in Table 5.1 and Table 5.2 below.

Table 5.4 Soil health screening levels for vapour intrusion into buildings and health investigation levels for human contact with soil – commercial land use

CHEMICAL	HSLS[1] (mg/kg)								HILS[1] (mg/kg) – COMMERCIAL/ INDUSTRIAL (HIL-D)
	Commercial/industrial land use (HSL-D) in sand				Commercial/industrial land use (HSL-D) in clay				
	0 to <1 m	1 m to <2 m	2 m to <4 m	≥4 m	0 to <1 m	1 m to <2 m	2 m to <4 m	≥4 m	
F1[2]	260	370	630	NL	310	480	NL	NL	–
F2[2]	NL	NL	NL	NL	NL	NL	NL	NL	–
Benzene	3	3	3	3	4	6	9	20	–
Toluene	NL	NL	NL	NL	NL	NL	NL	NL	–
Ethyl benzene	NL	NL	NL	NL	NL	NL	NL	NL	–
Xylene	230	NL	NL	NL	NL	NL	NL	NL	–
Naphthalene	NL	NL	NL	NL	NL	NL	NL	NL	–
Carcinogenic PAHs (BaP TEQ)[4]	–	–	–	–	–	–	–	–	40
Total PAHs	–	–	–	–	–	–	–	–	4,000
Arsenic	–	–	–	–	–	–	–	–	3,000
Cadmium	–	–	–	–	–	–	–	–	900
Chromium	–	–	–	–	–	–	–	–	3,600
Copper	–	–	–	–	–	–	–	–	240,000
Lead	–	–	–	–	–	–	–	–	1,500
Mercury	–	–	–	–	–	–	–	–	730
Nickel	–	–	–	–	–	–	–	–	6,000
Zinc	–	–	–	–	–	–	–	–	400,000
Bonded ACM	–	–	–	–	–	–	–	–	0.05%

CHEMICAL	HSLS[1] (mg/kg)								HILS[1] (mg/kg) – COMMERCIAL/ INDUSTRIAL (HIL-D)
	Commercial/industrial land use (HSL-D) in sand				Commercial/industrial land use (HSL-D) in clay				
	0 to <1 m	1 m to <2 m	2 m to <4 m	≥4 m	0 to <1 m	1 m to <2 m	2 m to <4 m	≥4 m	
Fibrous asbestos (FA) and asbestos fine (AF)	–	–	–	–	–	–	–	–	0.001%
DDT+DDE+DDD	–	–	–	–	–	–	–	–	3,600
Aldrin and dieldrin	–	–	–	–	–	–	–	–	45
Chlordane	–	–	–	–	–	–	–	–	530
Endosulfan	–	–	–	–	–	–	–	–	2,000
Endrin	–	–	–	–	–	–	–	–	100
Heptachlor	–	–	–	–	–	–	–	–	50
Methoxychlor	–	–	–	–	–	–	–	–	2,500

(1) Schedule B1 Investigation levels for soil and groundwater (NEPM, 2013)

(2) F1 = TRH C_6-C_{10} less BTEX, F2 = TRH >C_{10}-C_{16} less naphthalene.

(3) NL: not limiting; '-': criteria are not available.

(4) Benzo(a)pyrene toxic equivalency quotient, a weighted sum of carcinogenic PAHs. Further detail provided in the NEPM Schedule B1.

Table 5.5 Soil health screening levels for vapour intrusion into trenches and direct contact – intrusive maintenance workers

Chemical	HSL (mg/kg) for Intrusive maintenance worker (shallow trench)(1)				Commercial/ Industrial (2)
	Vapour intrusion			Direct contact	Direct contact
	0 to <1 m	1 m to <2 m	≥4 m		
F1 (C_6–C_{10} less BTEX)	NL	NL	NL	82,000	26,000
TRH >C_{10}–C_{16}	NL	NL	NL	62,000	20,000
TRH >C_{16}–C_{34}	–	–	–	85,000	27,000
TRH >C_{34}–C_{40}	–	–	–	120,000	38,000
Benzene	77	160	NL	1,100	430
Toluene	NL	NL	NL	120,000	99,000
Ethyl benzene	NL	NL	NL	85,000	27,000
Xylene	NL	NL	NL	130,000	81,000
Naphthalene	NL	NL	NL	29,000	11,000

(1) CRC CARE Technical Report no. 10 (Friebel and Nadebaum, 2011)

NL not limiting; '-': criteria are not available.

(2) Direct contact – commercial industrial

5.6 Waste disposal criteria

Prior to the transportation of soils off-site for disposal, the excavated soils shall be tested then classified. The classification of excavated soils will be classified in accordance with ACT EPA 2000, *ACT's Environmental Standards: Assessment and Classification of Liquid and Non-liquid Wastes*. A summary of the waste acceptance criteria is included in Table 5.3 below.

Table 5.5.6 Waste classification guidelines

CHEMICALS	CT (WITHOUT TCLP)(1)			SCC (WITH TCLP)(2)					
	Maximum value for classification without TCLP			Maximum values for leachable concentration and specific contaminant concentrations when used together					
	Inert Waste (CT1)	Solid Waste (CT2)	Industrial Waste (CT3)	Inert Waste		Solid Waste		Industrial Waste	
				TCLP1	SCC1	TCLP2	SCC2	TCLP3	SCC3
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)
TPH C_6–C_9	na	na	na	na	650	na	650	na	2,600
TPH C_{10}–C_{36}	na	na	na	na	5,000	na	10,000	na	40,000
Benzene	1	10	40	0.05	18	0.5	18	2	72
Toluene	28.8	288	1,152	1.44	518	14.4	518	57.6	2,073

CHEMICALS	CT (WITHOUT TCLP)(1)			SCC (WITH TCLP)(2)					
	Maximum value for classification without TCLP			Maximum values for leachable concentration and specific contaminant concentrations when used together					
	Inert Waste (CT1)	Solid Waste (CT2)	Industrial Waste (CT3)	Inert Waste		Solid Waste		Industrial Waste	
				TCLP1	SCC1	TCLP2	SCC2	TCLP3	SCC3
	(mg/kg)	(mg/kg)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)	(mg/L)	(mg/kg)
Ethyl benzene	60	600	2,400	3	1,080	30	1,080	120	4,320
Total xylene	100	1,000	4,000	5	1,800	50	1,800	200	7,200
Benzo(a)pyrene	0.08	0.8	3.2	0.004	10	0.04	10	0.16	23
Total PAHs	20	200	800	na	200	na	200	na	800
Arsenic	10	100	400	0.5	500	5	500	20	2,000
Cadmium	2	20	80	0.1	100	1	100	4	400
Chromium (VI)	10	100	400	0.5	1,900	5	1,900	20	7,600
Lead	10	100	400	0.5	1,500	5	1,500	20	6,000
Mercury	0.4	4	16	0.02	50	0.2	50	0.8	200
Nickel	4	40	160	0.2	1,050	2	1,050	8	4,200

(3) Extracted from Table A3 in *ACT's Environmental Standards: Assessment and Classification of Liquid and Non-liquid Wastes*, Environment ACT, June 2000

(4) Extracted from Table A4 in *ACT's Environmental Standards: Assessment and Classification of Liquid and Non-liquid Wastes*, Environment ACT, June 2000

5.7 Groundwater and soil vapour monitoring

AECOM (2016) and URS (2015) have assessed the risks to on and offsite receptors from hydrocarbon impacts at the site to be low. A Monitoring and Management Plan (MMP) for groundwater and soil vapour at the site was prepared by AECOM in November 2015 (AECOM, 2015 *Monitoring and management plan, Kaleen Service Station 22763, 275 Maribyrnong Road, Kaleen ACT*). The purpose of the MMP was to detail an ongoing monitoring schedule to ensure that potential risks to identified receptors remained low and acceptable and to be in compliance with the annual monitoring requirements for the site stipulated in the 2011 EA.

The MMP outlines the monitoring schedule and analysis suite for groundwater and soil vapour based on the current network of groundwater and soil vapour wells and has been endorsed by the Site Auditor. Following the completion of the UPSS replacement works and reconfiguration of the service station, new groundwater monitoring wells will be installed to replace lost wells and the MMP should be updated with the details of the new monitoring network. Groundwater wells will be positioned to target the area of the contaminant plume targeted by the original wells and allow for assessment of the extent of the LNAPL and dissolved phase hydrocarbon plume. Wells should be constructed as close as possible to the specifications of the original wells. The analytical suite and sampling methodology for groundwater monitoring will be in accordance with the MMP.

The MMP should also be updated to include details of the soil vapour locations completed in December 2016 by AECOM.

6 UPSS REMOVAL, SITE ASSESSMENT, REMEDIATION AND VALIDATION METHODOLOGY

6.1 Preliminaries

Prior to commencement of remedial works at the site, the following activities would need to be completed:

- The Dangerous Substances and Workers Compensation unit of the Office of Regulatory Services (ORS) WorkSafe should be contacted to notify them of the decommissioning of UPSS.
- The RAP and any Health & Safety Plans are to be reviewed and endorsed by an independent auditor with a copy of the RAP endorsement provided to the ACT EPA and ACT Planning stating that the installation of new facilities will not impact on the ongoing assessment and remediation of the site.
- Provision of the RAP to ACT EPA and ACT Planning.
- Receipt of all relevant regulatory approvals (development application) for demolition, tank removal and site development.
- Preparation of a health, environmental and safety plan (HESP) or equivalent (i.e. safe work method statement or SWMS) prior to commencement of site works.
- Induction of all site personnel to ensure they are aware of the health, safety and environmental management requirements relating to the excavation of potentially contaminated soils.
- Ensure that the contractor conducting the tank pit excavation has adequate safety equipment (for example, adequate fencing, barrier boards, barricades and warning signage) to secure the work area and minimise the danger to contractor personnel and the public for the duration of the excavation works.

6.2 General

All excavation works should be undertaken by experienced licensed contractors, experienced in the decommissioning and removal of fuel infrastructure and the remediation of contaminated soils.

An environmental scientist should be present during the excavation works, particularly to assess the contamination status of the soil excavated from around the tanks, and to determine whether further excavation of tank pit walls and floor is required to remove contaminated soil.

As a minimum, the following Codes of Practice are applicable to the work and a copy of each should be obtained by the contractor. Standards should be the most recent version available unless otherwise specified:

- AS 4976:200, The removal of underground storage tanks.
- AS 1940 Section 9, The storage and handling of flammable and combustible liquids.
- Contaminated Sites Environment Protection Policy.
- ACT EPA 2014, *Information Sheet 2 – Requirements for the assessment and validation of former service station sites.*
- ACT EPA 2014, *Information sheet 3 – Requirements for the assessment and validation of sites containing above ground or underground fuel storage tanks*.

- ACT EPA 2014, *Information sheet 4 – Requirements for the reuse and disposal of contaminated soil in the ACT.*

6.3 Existing groundwater well decommissioning

Existing wells in areas of the site where excavations will occur are at risk of being destroyed or compromised. These wells will be decommissioned prior to commencement of earthworks at the site. The wells are to be decommissioned in accordance to the requirements of the National Uniform Drillers Licensing Committee (2011) *Minimum Construction Requirements for Water Bores in Australia* document.

6.4 Primary source removal

The hardstand will be broken to allow access to the tanks and fuel lines. Tanks must be cleared prior to excavation by draining all products, vapour venting and de-gassing. Once tanks are 'cleared' they will be gas tested for vapours and then deemed safe by an appropriately qualified person. The tank atmosphere and the excavation area shall be checked regularly for presence of vapour until the tank is removed from the site. Following removal, tanks must be properly labelled and disposed of.

All applicable permits must be obtained prior to the beginning of any work associated with tank clearance. All product liquid and residue removed from the tank shall be handled in accordance with appropriate standards and local regulations associated with environmentally hazardous materials and dangerous goods. The contractor shall submit written procedures to complete the following activities outlined below.

- Draining pipes and pumping out tanks.
- Removal of pipework.
- Removal of tank from ground.
- Labelling of tanks.
- Transporting of tanks.
- Tank destruction.

6.5 Soil validation

Following the tank removal and excavation of the backfill sands, soil samples will be collected from the walls and floor of the excavation. All soil samples will be screened in the field using a handheld photo ionisation detector (PID) to measure indicative concentrations of volatile organic compounds (VOC). Samples will be analysed for the contaminants of potential concern for the site and former fuel infrastructure, i.e. TRH, BTEX, PAHs and lead, as well as asbestos.

The tank pit characterisation and characterisation of soils beneath fuel lines, dispensers and fill points will be undertaken in accordance with the NSW EPA 2014, *Technical Note: Investigation of Service Station Sites*.

Quality assurance/quality control (QA/QC) samples will be collected and analysed as described in Section 7. The excavations will be left open while waiting for laboratory results. If validation samples exceed the nominated assessment reference values, further excavation may be undertaken.

6.6 Management of excavated soils

The excavated soils, generated during the UPSS removal works will be segregated into separate stockpiles based on field observations, such as soil type, field PID readings, olfactory evidence of contamination and depths (i.e. above or below the tanks) where the soils are excavated. The NEPM (2013) Schedule B2, Guideline on Site Characterisation, outlines the minimum number of samples for assessment of stockpiles. For stockpile volume less than 200 m^3, the recommended sampling frequency is 1 per 25 m^3. For stockpiles

greater than 200 m^3, lower sampling rates should be suitable for calculating the 95% upper confidence level (UCL). All the stockpile soil samples shall be analysed for TRH, BTEX, PAH and lead as a minimum. Samples will be collected directly from the excavator bucket or using a decontaminated trowel to ensure soil samples are collected from a minimum depth of 300 mm below the stockpile surface.

Excavated soils may be suitable for re-use on-site if contaminant concentrations are less than the site assessment criteria (see Section 5.4), and the site has sufficient area to accommodate the material. In addition, any soils intended to be retained and beneficially reused on site should not exhibit discolouration (staining), be malodourous or have abnormal consistency ie. contain abundant fill, rubble or asbestos, and engineering suitability must also be considered. If contaminant concentrations or characteristics do not meet these criteria, the following steps can be considered (all of the options presented below must be accompanied by written prior approval from the site auditor and ACT EPA):

- a beneficial reuse application for the material to be reused at either a third-party facility, or at another Caltex site in ACT, potentially Fyshwick depot, 11 Barrier Street, Fyshwick, ACT may be prepared, pending auditor and ACT EPA approval
- disposal at an appropriately licensed ACT landfill facility, such as Mugga Lane. For disposal, the soil analytical results will be compared guideline values in the waste classification guidelines (ACT EPA, 2000; see Section 5.6). Any soil disposed of from the site must be in accordance with the requirements of the EPU as set out in ACT EPA Information Sheet 4. Appropriately licensed ACT contractors must be engaged for the removal, transport and disposal of all contaminated soils from the site. If the soils are disposed off-site, disposal dockets for tracking of waste will be maintained by the contractor for inclusion in the UPSS validation report.

6.7 Reinstatement of excavations

Following excavation and validation of the tank pit, the voids between the tanks and the pit will be reinstated by using certified imported fill. The fill used for reinstatement should be certified suitable for the intended use using the following procedures.

6.7.1 Reuse of excavated soil

Excavated soils with contaminant concentrations below the site assessment criteria may be reused on-site. The material should be assessed for its potential to pose risk to human and ecological receptors. The material will not be considered suitable for reuse if contaminant concentrations exceed assessment criteria or potential risks are identified. Refer to Section 6.6 for qualifications to the reuse of material at the site.

6.7.2 Virgin excavated natural material (VENM)

Where VENM is required for backfilling, it should be from a certified source and suitable for the intended use. The verification procedure would involve:

- reviewing the history of the source of the material
- a visual inspection for foreign material, unusual staining and any odours
- sampling of the material for contaminants of potential concern, if required.

Relevant duty of care documents will be provided in the validation report.

6.8 Post remediation groundwater well installation and sampling

Decommissioned groundwater wells will require replacement following the earthworks program. As detailed in Section 5.7, new wells will be installed to target areas of residual LNAPL and ensure a monitoring well network that is sufficient to assess the extent of the LNAPL and dissolved phase contaminant plume. Wells will be constructed to the specifications of the original wells and be placed in similar proximity to the original

wells where the site configuration allows. The exact number and location of wells in the monitoring network will be determined following the UPSS replacement and soil excavation works, in consultation with the Site Auditor.

On and offsite monitoring wells will be gauged and sampled following the source removal and soil remediation works to provide a baseline data set for the new groundwater monitoring network. Groundwater monitoring wells will be gauged and sampled in accordance with the MMP (AECOM, 2015). All the bottles will be laboratory supplied and labelled with the project number, well ID, date obtained and name of sampler. All non-disposable sampling equipment will be washed with Decon 90 and rinsed with clean water before and after each sample is collected. Disposable nitrile gloves worn during sampling will be changed between samples to minimise the potential for cross contamination. Quality assurance/quality control (QA/QC) samples will be collected and analysed as described in Section 7.

6.9 Reporting

At the completion of the site works, a site validation report will be prepared in general accordance with the Information Sheet 1 and 2 ACT Government Contaminated sites and NEPM 2013 (Assessment of site contamination). The UPSS validation report will detail the methodologies and results of the validation works and will include:

- excavation survey plans that show the extent of all excavation works
- copies of all degassing and tank destruction certificates
- waste classification documentation
- waste disposal and importation tracking documentation
- borehole decommissioning records
- Borelogs and well construction details
- DQO and QA/QC evaluation

A copy of the validation report must be reviewed and endorsed by an accredited Site Auditor and then forwarded to the ACT EPA for review and endorsement within 15 working days of the completion of the report.

6.10 Remedial contingencies

At this stage it is anticipated that the above proposed approach should be effective in managing the identified contamination, however contingency strategies may be required in the event of certain scenarios. Possible unexpected findings are listed in Table 6.1

Table 6.1 Remedial contingencies

POTENTIAL ISSUES	PROPOSED CORRECTIVE ACTIONS	RESPONSIBLE PERSON	COMMUNICATION AND ADDITIONAL SAMPLING/ MONITORING
Unexpected contaminated soil finds	If soil is encountered during the remedial works which appears to be different from the soils otherwise identified in this RAP, or point sources of contamination such as buried drums or wastewater interceptors are encountered, the following procedures will apply: → Any unexpected materials or soil which have been excavated should be stockpiled on bunded, strong, impermeable plastic sheeting, protected from erosion and all seepage retained (divided into domains or stockpiles representing similar material types). → Excavation works at that part of the site where the unexpected material (soil, asbestos containing material or physical find) is encountered will cease until inspection is carried out by the environmental consultant or its representative. → Based on visual inspection, the environmental consultant will provide interim advice on construction health and safety, soil storage and soil disposal to allow other remediation activities to proceed if possible. → Based on sampling and analysis of the material, the environmental consultant will provide advice based on comparison of the laboratory test results to appropriate criteria relating to human health, potential environmental impacts and waste disposal. In the context of the above, unexpected material would include, but is not limited to the following, oily materials or materials with unusual odours, drums, metal or plastic chemical containers, buried solid waste, ash, slag, coke or brightly coloured material, asbestos containing material etc.	Contractor	The findings are to be recorded in the daily site log and provided to Caltex and the environmental consultant immediately (initial notification) and detailed report to Caltex within 24 hours of the finding.
Impacted soil hotspot areas are larger in size than estimated	All soil containing contaminants above the relevant health assessment criteria will require management, even soils outside the areas defined. Should additional soils be identified beyond the areas highlighted, these soils will still need to be excavated for off-site disposal.	Contractor	Unexpected finds are to be recorded in the daily site log and provided to Caltex and the environmental consultant within 24 hours of breach occurring. All excavations need to be validated as per the validation sampling and monitoring.

POTENTIAL ISSUES	PROPOSED CORRECTIVE ACTIONS	RESPONSIBLE PERSON	COMMUNICATION AND ADDITIONAL SAMPLING/ MONITORING
Excavation limitations	A number of limitations have been identified that potentially would render chasing out of impacted soils no longer feasible or logistically possible. These include: → beyond the proposed excavation limits set out in the document → horizontally beyond the site boundary → vertically below the groundwater table → excavation will not be undertaken if they may affect building stability.	Contractor	Should impacted materials be found to extend beyond these spatial limits, excavation is to stop and the Caltex project manager notified. It may be more appropriate to risk assess or manage the contamination
Soil vapour monitoring indicates a potential health risk to commercial receptors	Undertake additional assessment of potential risk such as sub slab vapour pin within the sales building or flux measurements through the sales building floor. Consider installation of a vapour barrier or venting system during construction of new onsite buildings.	Consultant to advise Caltex	Additional assessment of vapour risk to be undertaken and/or engineering controls (vapour barrier or venting) to be incorporated into construction of buildings onsite.
Excessive stormwater collecting in excavations	Minimise active contaminated work area; improve stormwater diversion. Check control measures are adequate to prevent surface water runoff entering and leaving excavation and stockpile areas. Temporary bunding or diversion drain, silt fences/hay bales surrounding stockpiles and protection of existing drains to be regularly inspected to ensure that they are in good condition and if necessary upgraded where their performance is deteriorating. Excavations should be pumped out to remove excess water where necessary.	Contractor	Breaches are to be recorded in the daily site log and provided to Caltex and the environmental consultant within 24 hours of breach occurring. Water to be disposed of offsite is to be sampled and analysed for TPH/BTEX
Excessive dust	Use water sprays; stop dust-generating activity until better dust control can be achieved or apply interim capping systems on stockpiles or exposed material. Stop work in high wind conditions.	Contractor	Breaches are to be recorded in the daily site log and provided to Caltex and the environmental consultant within 24 hours of breach occurring. No additional monitoring/sampling required.
Excessively wet materials	Stockpile and dewater on-site or add absorbents and bunds. There is the potential for water to accumulate in excavation areas. If water does accumulate, it will require removal (remediation contractor to provide method statement to Caltex and its environmental consultant) prior to controls being implemented.	Contractor to consult environmental consultant	Water accumulated in excavations to be sampled by environmental consultant for contaminants of concern. Management/disposal options to be formulated based on analytical results.

POTENTIAL ISSUES	PROPOSED CORRECTIVE ACTIONS	RESPONSIBLE PERSON	COMMUNICATION AND ADDITIONAL SAMPLING/ MONITORING
Heavy rain	Ensure sediment and surface water controls are operating correctly. If possible divert surface water away from active work areas or excavations. Cover and bund all stockpiles with plastic or other suitable impermeable sheeting. Consider requirement for water holding tanks on site and relevant pumping equipment.	Contractor	None.
Equipment failures	Maintain spare equipment or parts close to site; keep rental options available, shut down affected operations until repairs are made. Develop and implement routine operation and maintenance checks on equipment, service checks etc. Clean up any equipment or plant spills (i.e. hydraulic or fuel releases) with absorbent material. Stockpile the impacted material in a secure location.	Contractor	Breaches are to be recorded in the daily site log and provided to Caltex and the environmental consultant within 24 hours of breach occurring. Sample any impacted stockpiled materials that have resulted from equipment failures (TRHs, BTEX compounds and PAHs) and determine appropriate disposal/treatment option based on an assessment of analytical results.
Complaints are received relating to the works undertaken	Stop works and implement control measures to address complaint (if possible). Advise and consult with Caltex.	Contractor	Notify relevant Project Managers following complaint. Report complaint as per Caltex's management procedures.

7 QUALITY ASSURANCE & QUALITY CONTROL (QA/QC)

A summary of the QA/QC protocols to be followed during the remediation and validation works is presented in Table 7.1.

Table 7.1 Data quality indicators

TASK	DESCRIPTION
General	Work will be undertaken in accordance with Parsons Brinckerhoff's standard operating procedures, which are based on industry accepted standard practice.
Soil screening with PID	The PID will be serviced and calibrated as per the manufacturer requirements and the PID would be calibrated at the beginning and end of each day of fieldwork and records sheet maintained for inclusion in the validation report.
Equipment decontamination	Soil and groundwater sampling equipment will be decontaminated after the collection of each soil sample by washing with phosphate-free detergent (such as Decon 90) and potable water, followed by a final distilled water rinse. One rinsate blank will be collected per day and analysed for the contaminants of concern. All results should be non-detect.
Transport	Samples will be stored in an ice brick-cooled esky and transported to the laboratory. To ensure the integrity of the samples from collection to receipt by the analytical laboratory, soil samples will be sent by courier to the laboratories under 'chain of custody', describing sample preservation, and transport duration, for receipt at the laboratory within 24 hours of sampling or at minimum within holding times.. One trip blank per sample batch will be sent to the laboratory. Results for trip blanks should all be non-detected.
QA samples	Field and laboratory QA samples will be analysed as follows: ■ intra-laboratory duplicate samples at a rate of 1 in 20 primary samples ■ inter-laboratory duplicate samples at a rate of 1 in 20 primary samples.
Soil and groundwater QA sample relative per cent differences (RPDs)	The precision of the data is assessed by calculating the RPD of duplicate samples. As per the data acceptance criteria detailed in the NEPM 2013, RPD values of 30% will be adopted as acceptance criteria for analytes in soil. In the absence of published criteria, RPD values of 100% will be adopted as acceptance criteria for analytes in groundwater. If a cause cannot be determined the data may require qualification.
Laboratory analysis	The laboratories selected will meet Parsons Brinckerhoff in-house compliance requirements under the respective ISO 9001 QA programs. They will perform their own internal QA/QC programs, and will use appropriate detection limits for the analyses to be undertaken. Laboratories will be NATA accredited for the analysis performed.
Holding Times	Holding times are the maximum permissible elapsed time in days from the collection of the sample to its extraction and/or analysis. All extraction and analyses will be completed within standard guidelines.
Rinsate blanks	While the number of equipment blanks varies between projects, a rate of one rinsate blank for each sampling day will be adopted and analysed for TPH, BTEXN and lead.

Field/trip blanks	For soil sampling programs, the field/trip blanks will consist of laboratory-supplied sand blank containing acid-washed quartz sand or deionised water. One field/trip blank will be analysed per sample batch for volatile TPH and BTEX compounds. These samples will be analysed for the purpose of monitoring for contamination that might be introduced during sampling or transit.
Trip spikes	Laboratory-prepared trip or VOC spikes consisting of distilled, de-ionised water or sand spiked with known concentrations of BTEX will be included at a rate of one per sample batch. These samples are to be submitted for BTEX analysis with results compared with the known additions. The purpose of these samples is to monitor VOC losses during transit.
Laboratory Duplicates	Laboratory duplicates are field samples that are split in the laboratory and subsequently analysed a number of times in the same batch. These sub-samples are selected by the laboratory to assess the accuracy and precision of the analytical method. The selected laboratories should undertake QA/QC procedures such as calibration standards, laboratory control samples, surrogates, reference materials, sample duplicates and matrix spikes. Intra-laboratory duplicates should be performed at a frequency of 1 per 10 samples.
Laboratory Control Standard	A laboratory control standard is a standard reference material used in preparing primary standards. The concentration should be equivalent to a mid-range standard to confirm the primary calibration. Laboratory control samples should be performed on a frequency of 1 per 20 samples or at least one per analytical run.
Matrix Spikes / Matrix Spike Duplicates (MS/MSD)	MS/MSDs are field samples to which a predetermined stock solution of known concentration has been added. The samples are then analysed for recovery of the known addition. Recoveries should be within the stated laboratory control limits of 70 to 130% and duplicates should have RPDs of less than 50%.
Surrogate Spikes	Surrogate spikes provide a means of checking, for every analysis that no gross errors have occurred at any stage of the procedure leading to significant analyte loss. Recoveries should be within the stated laboratory control limits of 70 to 130%.
QA/QC Conclusion	The QA/QC indicators should either all comply with the required standards or show no variations that would have a significant effect on the quality of the data.
Decontamination procedure	All non-disposable sampling equipment will be washed with Decon 90 and rinsed with clean water before and after each sample is collected. Disposable nitrile gloves were worn during sampling and were changed between samples to minimise the potential for cross contamination.
Sample handling	All soil and groundwater samples will be stored in chilled eskies after collection and during transport by courier to the laboratory. Prior to delivery to the laboratory, a chain of custody form (COC) will be completed. The COC will be signed and accompany the samples. Upon receipt by the laboratory, COC and/or samples receipt notices will be returned to confirm the receipt, condition of samples and specified analysis

8 SITE SAFETY PLAN

8.1 Preliminaries

Appropriate Work Health and Safety (WH&S) measures would be established by the contractor for the personnel involved in remedial works at the site. This will involve the finalisation of a detailed WH&S Plan by the contractor prior to mobilisation to the site. The WH&S plan will be prepared prior to performing on-site works associated with this RAP. The plan will address the health and safety of residents and workers in the surrounding area. As a minimum, it will consider:

- site security
- potential exposure to contamination
- excavation safety
- vibration
- noise
- odour
- dust.

Work associated with the remediation of the site will conform, at a minimum, to WorkCover requirements and associated Regulations. Typically the WH&S plan will address the following issues:

- regulatory requirements
- responsibilities
- hazard identification and control
- chemical hazard control
- sample and chemical handling procedures
- personal protective equipment
- work zones
- decontamination procedures
- emergency response plans
- contingency plans
- incident reporting.

Site safety and environmental management plans will be prepared to ensure that potential hazards related to the work are identified and control measures are implemented. Job safety analyses or safe work method statements will be prepared for all tasks required to be undertaken by any of the key stakeholders and their contractors.

Service plans will be requested from the Dial Before You Dig service and from Caltex as necessary to identify the location of underground services at the site.

8.2 Working hours

Working hours should be undertaken in accordance with the conditions of development application (DA) consent. Any works to be conducted outside the normal working hours, needs to have prior agreement with Caltex and have the Council's consent.

8.3 Site preparation

Table 8.1 summarises the measures that will be implemented prior to remediation works at the site.

Table 8.1 Site preparation measures

ITEM	DESCRIPTION
Control of site	Site control will ultimately be the responsibility of the Principal Contractor.
Access	Access to the site will be controlled by the principal contractor performing the works and the site will be off limits to all non-essential personnel. Public will not have access to this area of the site.
Signage	Signage on the site will be installed, with direction to key areas (including to the site offices, decontamination units, wash down areas, exits etc.) and traffic restrictions. Signage at the main access points will include after-hours contact details.
Fencing/hoarding	Perimeter security fencing will be maintained around the site where physical barriers (such as walls and buildings) are not already in place. Shade cloth will be installed on fences and hoardings. Additional fencing will be erected where required to secure work areas and exclusion zones. Regular maintenance and repair of all retained fences and hoardings within and surrounding the site will be undertaken during the period of the remediation work.
Haul roads/parking areas and traffic management	The remediation works may slightly increase vehicle traffic in the vicinity of the site. Where necessary, details of traffic management will be incorporated into all management plans to control traffic movement associated with the works and mitigate any disruption to local residents and road users. The contractor may need to transport impacted soils off-site and clean fill material on-site. Transport to and from site will need to consider traffic management options which take into account any access restrictions to the site. At the site, parking for private, pick-up and delivery and site vehicles is already in place. Additional designated areas may need to be marked as appropriate.
Supply of utilities	The installation and commissioning of all temporary site services (e.g. electricity, water, sewerage and telecommunications) required for the duration of the works will be installed to the requirements of the appropriate regulatory authorities will be undertaken. All approvals in respect to the installation, operation and eventual removal of temporary services will be obtained.
Contractor's facilities	All site accommodation and facilities required for the remediation works will be established in conformance with relevant regulations and authority's requirements. Existing site infrastructure may be utilised for this purpose. Licensed persons in accordance with statutory requirements for the specialist activity in question will carry out all connections. The following facilities may need to be established at the site: → site office → stores → work sheds (including decontamination facilities) and changing areas for the use of the remediation contractor, all subcontractors and consultants → temporary site sheds → bins for rubbish generated by personnel.

8.4 Incident response

Response to an incident occurring on-site will be in accordance with Caltex's emergency and evacuation procedures and incident reporting procedures. A WH&S plan and incident contact numbers are to be

maintained in an on-site register. All other relevant emergency contact numbers such as police, fire brigade and hospital will be listed in the WH&S plan and posted on site for easy access.

Local contractors (including a plumber and electrician) should be on call should an incident be reported by the site workers or local residents.

9 CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN SUMMARY

A construction environmental management plan (CEMP) should be developed as industry best practice for the site remediation works to ensure that the on-site and off-site environment is not adversely impacted during the remediation works. The CEMP should address and take into consideration the issues discussed in the following sections. The CEMP should be prepared by the principal contractor or delegate.

9.1 Odour and vapour

The remediation works may result in significant vapours and odours being released into the atmosphere, particularly when excavation of potentially heavily contaminated soil is carried out. At these times, consideration should be given to prevailing weather conditions and if distinct odours are detected, site works should cease work until the odours can be reduced or controlled.

The site supervisor shall monitor all open excavations and remediated soils with a PID to ensure ambient air concentrations are within the acceptable work safe limits. Concentrations of PID monitoring shall be recorded by field staff and submitted for review on a daily basis. If ambient air concentrations of VOCs exceed 15 ppm for over 30 minutes based on short term exposure limit of 15 ppm for benzene (NOHSC, 1995), work should cease until levels drop.

Additional or complimentary control measures could be implemented, including the following:

- Workers may be fitted with vapour masks or respirators for continuation of site works in the area.
- Site boundary odour misting suppression system
- Wetting down the excavated soil with the use of water sprays containing odour suppressant such as 'Biosolve'® or 'Anotek'®.
- Boundary air monitoring with ambient air sampling methodologies such as 'Radiello'® passive samplers sorption tube samplers.

9.2 Dust

During the earthworks, dust will be visually monitored. If excessive dust is being generated, areas of earthworks will be sprayed with water to reduce dust levels. Soil to be stockpiled should be covered or wetted down to minimise dust generation.

During excavation and transport of any soil off-site, truck wheels should be cleaned or driven through a constructed wash bay or similar control (e.g. rumble grid) to prevent potentially contaminated soil from being transported onto local roads.

9.3 Plant and machinery

It is the responsibility of the remediation contractor to ensure that all plant and machinery used on the site is properly maintained and in good working condition.

9.4 Noise

Increased noise levels may result from the use of on-site and off-site mechanical equipment during the course of the remediation works. To mitigate any noise which may arise as a result of site works, all works should be carried out during normal working hours and in accordance with ACT regulations on this matter.

Noise control measures to be implemented during the remediation works may include:

- Specified entry controls for construction vehicles entering and leaving the site.
- Suitable construction techniques and methodologies.
- Use of quieter equipment.
- Restricted use of reversing alarms and all equipment should be fitted with alarm types that adjust output sound levels according to the prevailing ambient noise level.

All practical measures will be taken to minimise generation of noise, and contact information for enquires or complaints will be posted on the site entrance gate.

9.5 Stockpile management

A stockpile register is to be utilised on-site. The register will contain information pertaining to the stockpile including but not limited to the origin of the soil, contaminants, volume, soil analysis and soil type. A map (plan) of stockpile locations will be provided to ensure all stockpiles are recorded. Any stockpile movements on-site will be recorded. All off-site soil load out will be recorded including time of load out, truck registration and destination. A period of fine weather will be chosen for load out of material.

Suitable stockpile areas will be identified on-site. Locations will be selected based on the area being flat, away from runoff receptors and reasonably sheltered from wind. All material to be handled will require being at optimum soil moisture content as to prevent spread of the material through the air as dust.

9.6 Water and sediment management

9.6.1 Surface water

Sediment and leachate control measures must be incorporated for any stockpiled material to prevent contaminants entering the stormwater system or from migrating off-site. Control measures should be established to prevent surface water run-off entering and leaving excavation and stockpile areas. Control measures may include:

- Temporary bunding or diversion drains.
- Impermeable sheeting placed under and/or over stockpiles.
- Silt fences/silt socks to surround stockpiles.
- Protection of existing drains with silt fencing/sand bags.

These mitigation measures should be regularly inspected to ensure that they are in good condition and if necessary upgraded where their performance is deteriorating.

9.6.2 Subsurface seepage and accumulated excavation water

Excavations surfaces are expected to be left open for short durations only, where possible, to minimise the potential of any surface water entering work areas. If water does accumulate (e.g. rainfall or groundwater ingress), then it will require removal prior to validation and reinstatement. Any water accumulated in

excavations will be sampled and analysed for TRH and BTEXN compounds. Upon receipt of the analytical results, management and/or disposal options will be formulated.

All excavations remaining open on-site will be fenced and with clear signage advising of the excavation. No one is to enter excavations. Excavations are to be backfilled immediately after validation sampling of the excavation is complete.

9.6.3 Sediment

Drains, gutters, roads and access ways shall be maintained free of sediment in accordance with regulatory requirements. Where required, gutters and roadways shall be swept regularly to keep them free from sediment. As for surface water, control measures should be implemented.

The erosion and sediment control put in place during the civil works must be undertaken in accordance with:

- POEO Act.
- The “Blue Book” – Managing Urban Stormwater: Soils and Construction (Landcom, 2004).

9.6.4 Equipment and cleaning operations

Throughout the site remediation project, controls will be placed on the operation and movement of equipment. General procedures that will be implemented include:

- Excavation equipment will be washed in an environmentally sound manner prior to leaving the site.
- Effective truck wheel-washing facilities will be provided, if necessary, to ensure that contaminated soil is not tracked off-site.
- No trucks or equipment carrying contaminated soils should be allowed to move across unsealed ground surfaces, except across designated transport corridors.

All contaminated soil requiring off-site disposal will be transported to an appropriate landfill facility. All transport trucks loaded with contaminated soil for off-site disposal should be sealed and the load completely/securely covered to prevent wind-blown emissions or spillages and covers should be maintained until unloading. All truck tailgates should be securely fixed prior to loading and immediately after unloading soils and all vehicles are to be operated in a manner so as to prevent loss of soils during loading, transport and unloading activities.

As part of the CEMP, a preferred transport route to the nominated facility is required to be identified.

10 SUMMARY

The purpose of this RAP is to provide a framework to validate the removal of UPSS infrastructure and potentially impacted soils to levels suitable for commercial /industrial land use. The actions required to carry out the RAP are summarised as follows:

- Perform an underground services check to locate the position of any services prior to any excavation works.
- Decommission groundwater monitoring wells that will be damaged during the excavation works
- Remove concrete and excavate to expose USTs.
- Drain pumps and pipework.
- Degas the USTs to make safe for removal and transport off-site for destruction.
- Remove the residual product in the USTs and disposal off-site by a licensed waste contractor.
- Remove the UPSS and associated infrastructure.
- Provide tank destruction certificates.
- Collect soil samples from the excavations for USTs and fuel lines for analyses.
- Assess soil beneath other infrastructure where potentially contaminating activities have occurred.
- Remove any impacted soils which are to be classified and disposed off-site to an EPA approved landfill.
- Provide waste disposal certificates.
- Backfill the resulting excavations with approved clean imported VENM and/or excavated soil sourced from site found to be suitable for reuse.
- Reinstall groundwater monitoring wells to establish a groundwater monitoring well network that allows for adequate assessment of the extent of the LNAPL and dissolved phase contaminant plume and complete a groundwater monitoring event.
- Report on work completed.

11 REFERENCES

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Parsons Brinckerhoff *2013, Multi-Phase Vacuum Extraction Event, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763).*

Parsons Brinckerhoff *2013, Multi-Phase Vacuum Extraction Event, Caltex Kaleen Service Station, 275 Maribyrnong Avenue, Kaleen, ACT (Caltex Site ID 22763).*

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12 LIMITATIONS

1. This Report has been prepared by Parsons Brinckerhoff Australia Pty Limited ("*WSP | Parsons Brinckerhoff*") for the benefit of Caltex Australia Petroleum Pty Ltd ("*Caltex*"), the registered proprietor or tenant of the site requested to be investigated by WSP | Parsons Brinckerhoff ("Site") under its agreement with Caltex dated 22 September 2015 ("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 section 1.2 of 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 | Parsons Brinckerhoff 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 | Parsons Brinckerhoff accepts no responsibility for the reliability, accuracy, completeness or adequacy of information provided by others.
7. WSP | Parsons Brinckerhoff 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 | Parsons Brinckerhoff 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 | Parsons Brinckerhoff 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:

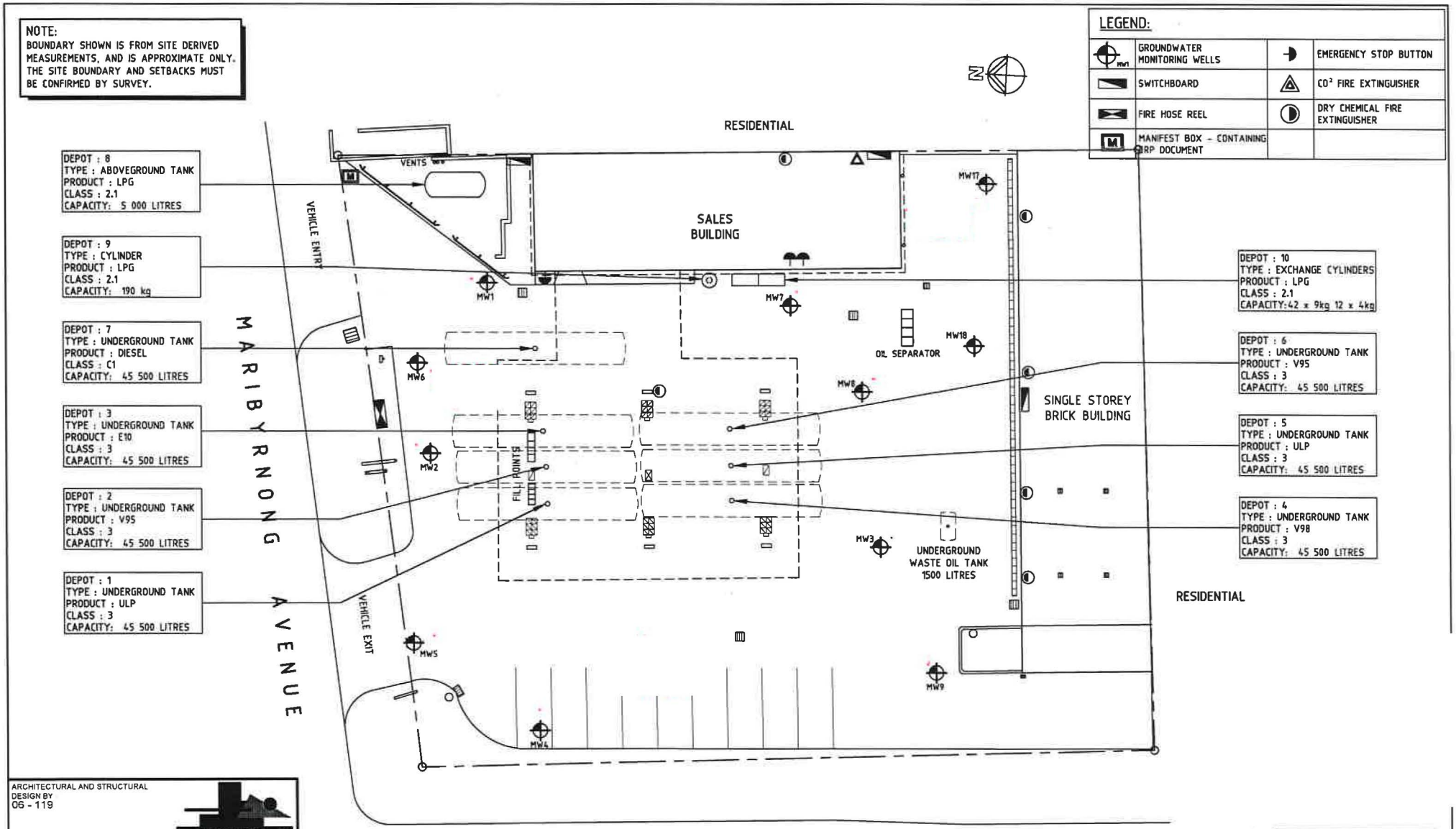
- **a)** its own actual knowledge and inquiries
- **b)** inquiries made by its advisers; or
- **c)** matters which a potential purchaser should have been aware of by making reasonable inquiry (including the inquiries recommended at Item 9 above).

12. To the fullest extent permitted at law, WSP | Parsons Brinckerhoff, 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

FIGURE 1. EXISTING SITE LAYOUT PLAN



ARCHITECTURAL AND STRUCTURAL DESIGN BY
06 - 119

R.J. SINCLAIR Pty Ltd
Building Design

CALTEX
Caltex Australia Petroleum Pty Ltd

REV.	BY	DATE	DESCRIPTION OF CHANGE
C	JB	05.07.12	MONITORING WELLS LOCATION UPDATE
D	JB	21.06.13.	MONITORING WELLS LOCATION UPDATE
E	AB	04.06.14	UPDATED PRODUCTS

REVISION

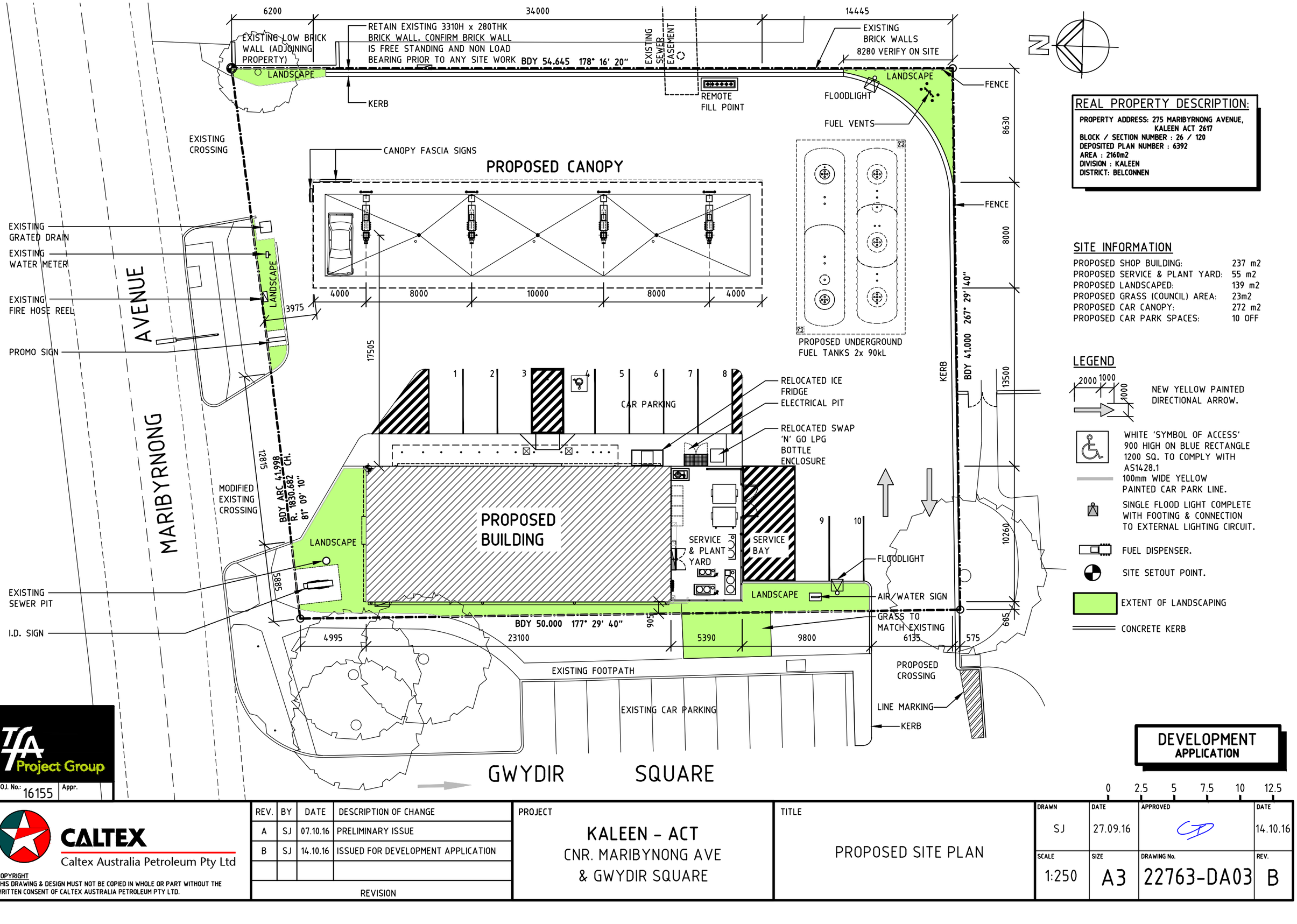
PROJECT
KALEEN ACT
Cnr MARIBYRNONG AVE
& GWYDIR SQUARE

TITLE
DANGEROUS GOODS PLAN

DRAWN	DATE	APPROVED	DATE
VTP	22.02.07		
SCALE	SIZE	DRAWING No.	REV.
1:250	A3	22763 DG	E

Figure 2. Groundwater well location plan

Figure 3. Proposed site layout



REAL PROPERTY DESCRIPTION:

PROPERTY ADDRESS: 275 MARIBYRNONG AVENUE, KALEEN ACT 2617
BLOCK / SECTION NUMBER : 26 / 120
DEPOSITED PLAN NUMBER : 6392
AREA : 2160m2
DIVISION : KALEEN
DISTRICT: BELCONNEN

SITE INFORMATION

PROPOSED SHOP BUILDING:	237 m2
PROPOSED SERVICE & PLANT YARD:	55 m2
PROPOSED LANDSCAPED:	139 m2
PROPOSED GRASS (COUNCIL) AREA:	23m2
PROPOSED CAR CANOPY:	272 m2
PROPOSED CAR PARK SPACES:	10 OFF

LEGEND

2000 1000 1000 — NEW YELLOW PAINTED DIRECTIONAL ARROW.

WHITE 'SYMBOL OF ACCESS' 900 HIGH ON BLUE RECTANGLE 1200 SQ. TO COMPLY WITH AS1428.1

100mm WIDE YELLOW PAINTED CAR PARK LINE.

SINGLE FLOOD LIGHT COMPLETE WITH FOOTING & CONNECTION TO EXTERNAL LIGHTING CIRCUIT.

FUEL DISPENSER.

SITE SETOUT POINT.

EXTENT OF LANDSCAPING

CONCRETE KERB

DEVELOPMENT APPLICATION

0 2.5 5 7.5 10 12.5

TFA Project Group

PROJ. No.: 16155 | Appr.

CALTEX
Caltex Australia Petroleum Pty Ltd

REV.	BY	DATE	DESCRIPTION OF CHANGE
A	SJ	07.10.16	PRELIMINARY ISSUE
B	SJ	14.10.16	ISSUED FOR DEVELOPMENT APPLICATION

REVISION

PROJECT
KALEEN - ACT
CNR. MARIBYNONG AVE & GWYDIR SQUARE

TITLE
PROPOSED SITE PLAN

DRAWN	DATE	APPROVED	DATE
SJ	27.09.16		14.10.16
SCALE	SIZE	DRAWING No.	REV.
1:250	A3	22763-DA03	B