



REPORT

Resource Consent Application and Assessment of Effects on the Environment - Discharge of Contaminants

Former Mobil Dunedin Terminal - 199 Fryatt Street, Dunedin

Submitted to:

Mobil Oil New Zealand Limited

Law Department, PO Box 1709, Auckland

Submitted by:

Golder Associates (NZ) Limited

Level 2, Nielsen Centre 129 Hurstmere Road Takapuna, Auckland

New Zealand

+64 9 486 8068

20449679-001-R-Rev0

February 2022

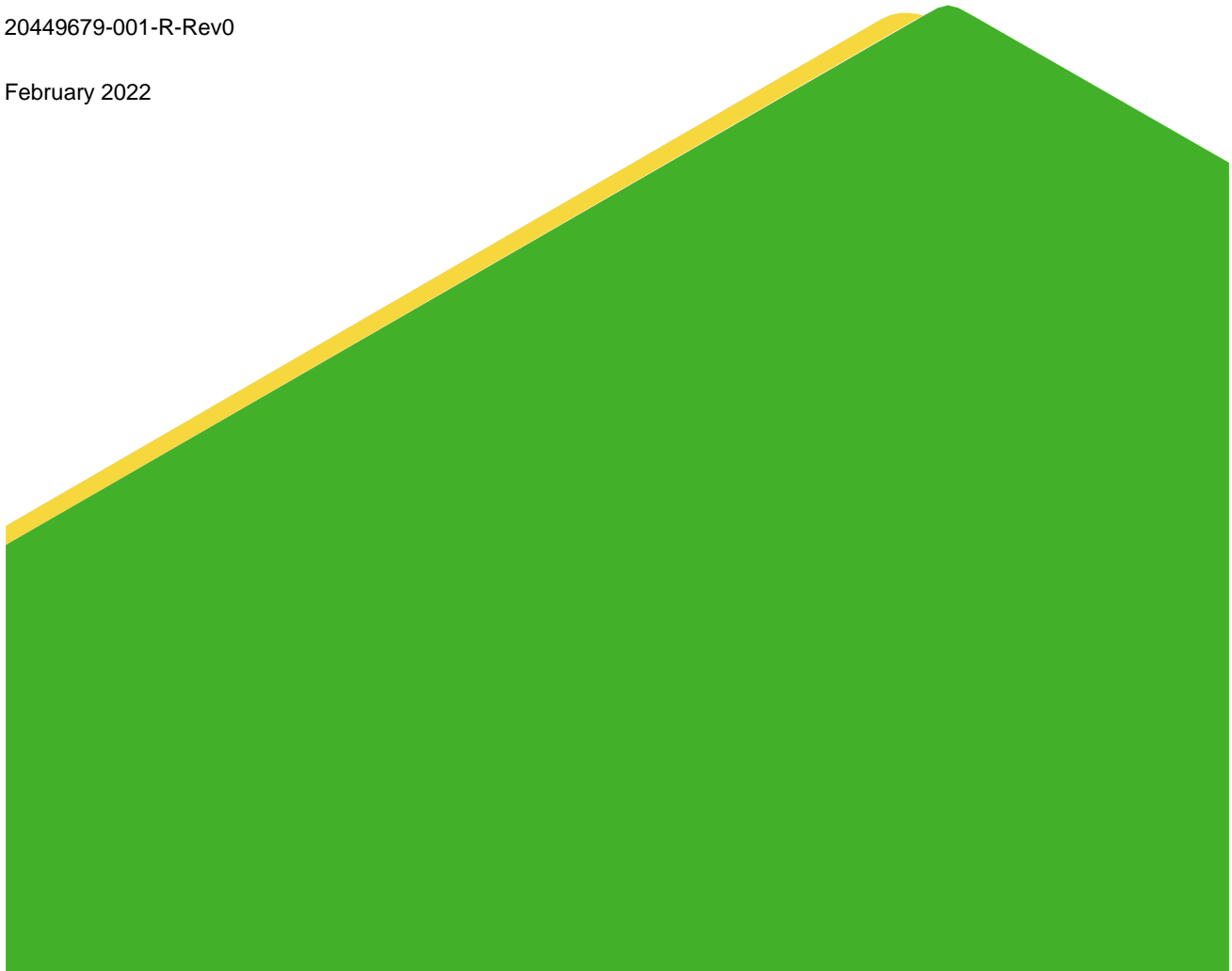


Table of Contents

| | |
|---|-----------|
| 1.0 INTRODUCTION | 1 |
| 1.1 Purpose | 1 |
| 1.2 Background | 1 |
| 1.2.1 Site background | 1 |
| 1.2.2 Previous engagement with ORC | 2 |
| 2.0 ENVIRONMENTAL SETTING | 3 |
| 2.1 Site Location and Description | 3 |
| 2.2 Adjacent Land Uses | 6 |
| 2.3 Groundwater Sensitivity | 6 |
| 2.4 Surface Water | 7 |
| 2.5 Underground Services | 7 |
| 2.5.1 On site | 7 |
| 2.5.2 Off site | 7 |
| 3.0 CONCEPTUAL SITE MODEL | 9 |
| 3.1 Overview | 9 |
| 3.2 Geology | 9 |
| 3.3 Hydrogeology | 9 |
| 3.4 Potential Contaminant Sources | 10 |
| 3.5 Contaminant Conditions | 13 |
| 4.0 ASSESSMENT OF EFFECTS ON THE ENVIRONMENT | 19 |
| 4.1 Overview | 19 |
| 4.2 Source-Pathway-Receptor Linkage | 19 |
| 4.3 Potential Risk from Contaminant Exposure | 19 |
| 4.4 Current and Potential Future Risks | 23 |
| 4.5 Mitigation Measures – Management Plans | 23 |
| 4.6 Potentially Affected Parties | 24 |
| 4.7 Summary | 24 |
| 5.0 STATUTORY ASSESSMENT | 26 |
| 5.1 Introduction | 26 |

| | | |
|------------|--|-----------|
| 5.2 | Resource Management Act 1991 | 26 |
| 5.2.1 | Part 2 considerations | 26 |
| 5.2.2 | Notification considerations – sections 95 to 95F | 27 |
| 5.2.3 | Section 104 considerations | 28 |
| 5.2.4 | Section 1040B, 105 and 107 considerations | 29 |
| 5.3 | Assessment of Relevant Objectives and Policies | 30 |
| 5.3.1 | Otago Regional Policy Statement 1988 | 30 |
| 5.3.2 | Partially Operative Otago Regional Policy Statement 2019 | 31 |
| 5.3.3 | Regional Plan: Waste for Otago | 32 |
| 5.3.4 | Regional Plan: Water for Otago | 33 |
| 5.4 | Resource Consent Requirements | 34 |
| 5.4.1 | Introduction | 34 |
| 5.4.2 | Regional Plan: Waste for Otago | 34 |
| 5.4.3 | Regional Plan: Water for Otago | 35 |
| 5.5 | Statutory Summary | 35 |
| 6.0 | SUMMARY | 37 |
| 7.0 | LIMITATIONS | 38 |
| 8.0 | REFERENCES | 38 |

TABLES

| | |
|---|----|
| Table 1: Site details. | 3 |
| Table 2: Surrounding land use. | 6 |
| Table 3: Groundwater sensitivity assessment. | 6 |
| Table 4: Summary of site hydrogeology. | 9 |
| Table 5: Relevant exposure pathways. | 19 |
| Table 6: Source-pathway-receptor linkages. | 22 |

FIGURES

| | |
|---|----|
| Figure 1: Site location. | 4 |
| Figure 2: Site layout. | 5 |
| Figure 3: Site layout pre-decommissioning. | 12 |

Figure 4: Inferred LNAPL extent – April 2017. 14

Figure 5: Vapour transport-related processes (Garg et al. 2017). 15

Figure 6: Groundwater quality – April 2017. 17

APPENDICES

APPENDIX A

Certificate of Title

APPENDIX B

Environmental Management Plans

APPENDIX C

Report Limitations

PART A – RESOURCE CONSENT APPLICATION FORM

**APPLICATION FOR RESOURCE CONSENT UNDER SECTION 88 OF THE
RESOURCE MANAGEMENT ACT 1991**

To: Otago Regional Council
Private Bag 1954
Dunedin 9054

1) We, Mobil Oil New Zealand Limited ('Mobil') (Law Department, PO Box 1709, Auckland 1140) apply for the following type of resource consents:

- A discharge permit for the discharge of hazardous waste onto or into land in circumstances that may result in that hazardous waste entering water, pursuant to Rule 5.6.1(3) (**discretionary activity**) of the Regional Plan: Waste for Otago (Waste Plan).
- A discharge permit for the discharge of any hazardous substance to water or onto or into land in circumstances which may result in that substance entering water, pursuant to Rule 12.B.4.2 (**discretionary activity**) of the Regional Plan: Water for Otago (Water Plan).
- Any other resource consents which may have been inadvertently omitted from this application.

A consent term of 10 years is sought.

2) The activity to which the application relates (the proposed activity) is as follows:

Mobil Oil New Zealand Limited (Mobil) is seeking a discharge permit from Otago Regional Council (ORC) for the passive discharge of petroleum hydrocarbons onto or into land from the site in circumstances that may enter water, to address the present regulatory requirements for this ongoing activity. This application is made subsequent to the findings of environmental site assessments, which have documented the presence of residual petroleum hydrocarbon impacts related to historical fuel storage at the site.

3) The site at which the proposed activity is to occur is as follows:

The application relates to the passive discharge of hydrocarbon contaminants to land and groundwater from the property at 199 Fryatt Street, Dunedin (Figure 1 in Part B (Supporting Information)) and legally described as Lot 2 DP 482844 (refer Appendix A in Part B).

The total site area is 1.12 hectares.

4) The full name and address of each owner or occupier (other than the applicant) of the site to which the application relates are as follows:

The property is currently owned by Chalmers Properties Limited with the registered address of:

15 Beach Street
Port Chalmers
Dunedin 9023

- 5) **There are no other activities that are part of the proposal to which this application relates.**
- 6) **No additional resource consents are needed for the proposal to which this application relates.**
- 7) **We attach an assessment of the proposed activity's effect on the environment that—**
- a) includes the information required by clause 6 of Schedule 4 of the Resource Management Act 1991; and
 - b) addresses the matters specified in clause 7 of Schedule 4 of the Resource Management Act 1991; and
 - c) includes such detail as corresponds with the scale and significance of the effects that the activity may have on the environment.
- 8) **We attach an assessment of the proposed activity against the matters set out in Part 2 of the Resource Management Act 1991.**
- 9) **We attach an assessment of the proposed activity against any relevant provisions of a document referred to in section 104(1)(b) of the Resource Management Act 1991, including the information required by clause 2(2) of Schedule 4 of that Act.**
- 10) **We attach the following further information required to be included in this application by the regional plan, the Resource Management Act 1991, or any regulations made under that Act:**

This application includes an assessment of the Resource Management Act 1991 (RMA), the Regional Policy Statement for Otago 1988 (RPS), the Partially Operative Otago Regional Policy Statement 2019 (PRPS), the Regional Plan: Waste for Otago (Waste Plan), and the Regional Plan: Water for Otago (Water Plan).

Dated this 21st day of February 2022.



Signature:

Signature of the applicant (or person authorised to sign on behalf of the applicant)

Address for service of applicant:

C/- Andrew Hart
WSP New Zealand Limited
PO Box 33-849
Takapuna 0740
Auckland

Mobile: 029 707 0981
Telephone: 09 486 8068
Fax: 09 486 8072
Email: andrew.hart@wsp.com

Address for fees/charges for the application:

Mobil Oil New Zealand Limited
Law Department
PO Box 1709
Auckland 1140

Form 1 – Application for Resource Consent



This application is made under Section 88 of the Resource Management Act 1991 (RMA).

The purpose of this Form 1 and the relevant activity form(s) is to provide applications with guidance on information that is required under the Resource Management Act 1991. Please note that these forms are to act as a guide only, and Otago Regional Council reserves the right to request additional information or to reject the application as incomplete under Section 88 of the RMA if the provisions of the fourth schedule of the RMA are not provided (refer to page 6 of this form, which details these requirements).

PLEASE NOTE: You must have Adobe Acrobat Reader installed onto your computer to use this editable version, which you can download for free from the Adobe website. This form cannot be filled in on your internet browser. REMEMBER to save the form to your computer after completing then attach and send via email along with the other relevant application forms/information to consents.applications@orc.govt.nz. The form can also be printed and completed manually.

1(a). Applicant's details:

- The full names or Company name or Trust (including full names of all Trustees) of the consent holder who will be responsible for the consent and any associated costs.
- A resource consent can only be held by a legal organisation or fully named individual(s). A legal organisation includes a registered limited company, incorporated group or registered trust. If the application is for a Trust, the full names of all Trustees are required. If the application is not for a limited company, incorporated group or rust, then you must use fully named individual(s).
- All invoices will be made out to and sent to the applicant.

Full name(s): _____

OR

Registered company: Mobil Oil New Zealand Limited

OR

Trust (include all Trustees full names)

Postal address: PO Box 1709, Auckland

Post code: 1140

and

Physical address: Building B, Level 2, 8 Nugent Street
(not a PO Box number) Grafton, Auckland

Post code: 1023

Phone number: Business: 09 302 4700 Private: _____
Mobile: +61 414 590 762

Email address: chris.belej@exxonmobil.com

Please provide a valid and clear email address. Otago Regional Council has adopted a paperless consenting process – therefore any correspondence including decision documents and consent (if granted) will be sent via email, unless you request a paper copy.

Please tick if you do not prefer contact by electronic means

1(b). Key contact for applicant details (if applicable):

Only complete if the applicant consists of multiple parties (e.g. multiple consent holders, Trust etc). Please outline who the key contact for the consent will be, if granted:

Full name: Chris Belej

Phone number: Business: _____ Private: _____
Mobile: +61 414 590 762

Email address: chris.belej@exxonmobil.com

2. Consultant details (if applicable):

Contact person: Andrew Hart

Company: Golder Associates (NZ) Limited

Phone number: Mobile: 029 707 0981 Business: _____

Email address: ahart@golder.co.nz

3. Consents required in relation to this proposal:

Water

Take surface water Divert
 Take groundwater Dam

Discharge onto or into:

Land Water Air

Land use:

Bore construction Activities in or on beds of lakes or rivers or floodbanks
 Bore alteration Disturbance of contaminated land

Coastal

Activities in the coastal marine area (i.e. below mean high water spring tide)

Where you have indicated the type of consent that is required, you must complete the appropriate application form before your application can be processed. Application forms can be found on the Council's website: www.orc.govt.nz/consents/ready-to-apply-for-a-consent

4. For what purpose is/are the consent(s) required (e.g. gravel extraction, water for irrigation etc):

Passive discharge of petroleum hydrocarbons from historical bulk fuel storage at the Former Mobil Dunedin Terminal. The terminal was decommissioned and demolished between 1995 and 2007.

5. Location of proposed activity:

Address: 199 Fryatt Street, Dunedin
Legal description(s): Sections 27-34 and 52-59, DP 3536
Map reference(s) (NZTM 2000): E 1407362 N 4916984

Please include location details on separate documentation if there are multiple sites or activities.

Note: Certificate(s) of Title less than three months old for the site to which this application relates are required.

6. Are there any current or expired Resource Consents relating to this proposal:

Yes No

If yes, give consent number(s), description and expiry date(s):

(a) Do you agree to your current consent automatically being surrendered should a replacement consent be issued?

Yes No

(b) Has there been a previous application for this activity that was returned as incomplete?

Yes No

(c) Have you lodged a pre-application with Council for this activity?

Yes No

(d) Have you spoken to a Council staff member about this application prior to lodging this application?

Yes No

If yes, please state name of staff member: Rachel Brennan and Simon Beardmore (9/10/20)

7. What is the term of consent you are seeking and reason for this term:

10 years - the site is no longer operational and ESA works have documented that natural attenuation processes are acting to reduce hydrocarbon mass and there is no unacceptable risk.

8. Territorial Local Authority in which activity is situated:

Dunedin City Council Queenstown Lakes District Council
 Clutha District Council Waitaki District Council
 Central Otago District Council

9. Do you require any other resource consent from any local authority for this activity:

Yes No

If yes, please give the date applied for or issued:

10. For the land on which the activity occurs, is the applicant (tick one):

If the applicant does not own the land to which this application relates, unconditional written approval from the land owner/affected party will be required.

- The owner
 The lease holder
 The occupier
 Prospective purchaser

If the applicant is not the land owner, who is the owner of the land on which the activity occurs/is to occur:

Name of land owner: Chalmers Propety Limited (Kevin Winders)
Phone number: Mobile: +64 27 4321 530 Business: +64 3 4729894
Email address: kwinders@portotago.co.nz

11. Site visit from the Consents Team:

Consents staff are able to meet with you, visit your site and see what you are proposing to do. We find that this is beneficial to everyone involved. The cost of the visit will be included in the total cost of processing your consent. However, we find that applications that have an on-site visit are processed with less congestion and at a similar or lesser overall cost. Please let us know below if you would like us to come and see your site.

I would like a member of the Consents Team to visit my site:

- Yes No

12. Processing Officer:

Due to high workloads or the complex nature of your application, it could be assigned to a consultant processing officer. Having your application assigned to an external officer should not greatly affect the processing costs. However, if you would like your application to be assigned to an internal officer then please advise. This may mean that your application enters a waiting line to be allocated and may not be processed straight away. If this is the case we will ask for a timeframe extension to cover the waiting time. There may be situations where we cannot accommodate this request but will let you know why this is.

I would like my application to only be processed by an internal staff member:

- Yes No

13. How to pay:

A deposit **must** accompany this application (see **page 8** for amounts and ways to pay). The applicant will be invoiced for all costs incurred in processing this application that exceed the deposit.

If the required deposit does not accompany your application, staff will contact you on the email address provided on this form to request payment, and after 5 working days your application will be returned as incomplete if no payment is made for the required deposit.

When paying online, please use the word '**Consent**' followed by the name of the applicant as a reference.

Method of payment:

- | | |
|---|------------------------------------|
| <input type="checkbox"/> Online bank transfer | <input type="checkbox"/> Cheque |
| <input type="checkbox"/> Credit card | <input type="checkbox"/> In person |

Date of payment: _____

Amount paid: _____

Payment reference: _____

Please note: Your deposit may not cover the entire cost of processing your application. At the end of the application process you will be invoiced for any costs that exceed the deposit. Interim invoices may be sent out for applications, where appropriate.

Information regarding the average costs in processing various types of single non-notified consent applications can be found via the following link, scrolling down to "Costs to process the application": www.orc.govt.nz/consents/ready-to-apply-for-a-consent/fees-and-charges

6

Application To Discharge Contaminants to Land



(For Office Use Only)

Consent No.: _____

Show the location of the discharge and adjoining properties on your map on Form 1.

Part A: General

1. What is the source of the contaminant (e.g., sewage, treatment, industry, water treatment, rural activity, solid waste, etc)?

Petroleum hydrocarbons associated with historical bulk storage at the former Mobil Dunedin Terminal that ceased operation in 1995.

2. Describe the contaminant, including, where appropriate, the physical and chemical content and their toxicity to the receiving environment.

Petroleum hydrocarbon impacts to soil and groundwater as outlined in Section 3.0 of Part B of the Application.

3. Is the contaminant treated in any way before being discharged? Yes No

If yes, describe treatment Natural attenuation processes have and are acting to degrade the residual petroleum hydrocarbon impacts.

3. What is the location of the discharge, including map reference in NZTM 2000? Discharge from the former Mobil Dunedin terminal located at 199 Fryatt Street, Dunedin

NZTM 2000: E 1407362 N 4916984

5. For liquid contaminants, what method of discharge will be used (e.g., spray irrigation, soakage, etc)

Passive discharge of petroleum hydrocarbon compounds attributable to historic releases during operation of the terminal prior to 1995.

6. Describe the soils, topography and vegetation cover of the land onto which the discharge will be made:

Site and surrounding land is flat and located in area of reclaimed land (sand and silt). Site is currently vacant and grassed.

7. What is the total area of land onto which the discharge is to be made? NA hectares

What is the area of land over which the discharge is made each day? NA hectares

Part A: General (continued)

8. Discharge Rate Information:

Maximum flow rate: NA litres per second
 Maximum discharge rate: NA cubic metres per day
 or _____ cubic metres per week

Is the discharge: continuous or intermittent

What will be the maximum discharging period?
NA hours per day
 _____ days per week
 _____ weeks per month
 _____ months per year

9. For animal manure, what is the source of the manure?

Cows Pigs Poultry Other, specify, _____

How many animals in your herd: _____

What maximum herd size are you planning? _____

What is the volume of waste produced daily: _____

If you have treatment ponds, how many do you have: _____

What are their dimensions?
 _____ metres long, _____ metres wide _____ metres deep

10. For septic tanks, what is the source of waste?

Multiple dwelling Motel/Restaurant Park/Recreation facility

Other, specify _____

Is the waste: Toilet and hand washing Toilet, bathroom and kitchen waste?

Other, specify _____

What is the estimated number of people using the facility per day? _____

Please provide details of your design, design calculations, soils, percolation tests and site plan which justify your choice of septic tank size, type and layout.

| | | Yes | No |
|-----|---------------------------------|-------------------------------------|-------------------------------------|
| 11. | Does the discharge also involve | | |
| | Outlet structure? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| | Diversion? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| | Discharge to air? | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| | Discharge to water? | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

If you have answered "Yes" to any of 11. above, another schedule to this consent application may be required.

Part B: Assessment of Effects on the Environment

1. Comment on the possible effects the discharge may have on the drainage capacity, fertility, ground or surface water of or near the site:

The passive discharge is not considered to result in adverse effects on the environment and human health as outlined in Section 4.0 of Application.

- | | Yes | No | Not Known |
|--|-------------------------------------|-------------------------------------|--------------------------|
| 2. Within the vicinity of the discharge are there any: | | | |
| (a) Waterbodies, groundwater or groundwater bore(s)? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (b) Water abstractions? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (c) Obvious signs of fish, eels, insect life, aquatic plants, etc? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (d) Wetlands (e.g., swamp areas)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (e) Recreational activities carried out (eg., swimming, fishing, canoeing)? | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| (f) Areas of particular aesthetic or scientific value (eg., scenic waterfall, rapids, archaeological sites)? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| (g) Areas or aspects of significance to Iwi? | <input type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |

If you have answered “Yes” to any of the above, describe what effects your operation may have and the steps you propose to take to mitigate these.

A comprehensive programme of ESA works (refer Section 3.0 of Part B of Application) has demonstrated that there are no unacceptable risks to human health and the environment associated with the on-going discharge of petroleum hydrocarbon compounds. Based on the Conceptual Site Model, as outlined in the Closure Report (Golder 2019b), further monitoring is not warranted and potential risks can be addressed through a management approach.

(Continue on a separate page if necessary)

3. What alternative methods of disposal or discharge locations have you considered?

The discharge relates to historical releases during operation of the terminal which ceased in 1995. The application is for the passive discharge of residual petroleum hydrocarbon impacts from the site and as such there are no alternative methods of disposal or discharge location.

4. Why did you choose the proposed method of disposal and location point?

The discharge relates to historical releases from the operation of the former bulk fuel terminal that ceased operation in 1995.

7

Application To Discharge Water or Contaminants to Water



(For Office Use Only)

Consent No.: _____

This application form should be used for all discharges to water, e.g. to rivers, lakes, ocean, harbours, etc.

Show the location of the discharge on your map on Form 1. Include design plans and details with this application.

Part A: General

1. What is the discharge: Water or contaminant

(A contaminant is any substance or water which is likely to change the natural state of the water into which it is discharged in any way.)

2. What is the source of the water or contaminant (eg. Sewage treatment, industry, sewage pumping station, water treatment, rural activity)?

Passive discharge of petroleum hydrocarbon compounds from historical bulk storage at former Mobil Dunedin Terminal

3. Describe the contaminant: Passive discharge of petroleum hydrocarbon compounds associated with historic operations at the site.

including, where appropriate:

Temperature: _____ °C pH: _____ Suspended solids: _____ g/m³

BOD₅: _____ g/m³ Faecal coliforms: _____ cfu/100mls

The chemical content, including heavy metals or toxic substances, nitrates, ammonia and dissolved reactive phosphorous and their toxicity to the receiving water / environment.

4. Is the contaminant treated in any way before being discharged? Yes No

If yes, describe treatment _____

5. What is the name of the water body into which the discharge is made (e.g. name of river, lake, bay, harbour, ocean, etc) and what is the map reference in NZTM 2000 at the discharge point?

Otago Harbour

NZTM 2000: E_1407426 _____ N_4916900 _____

Part B: Assessment of Effects on the Environment (Contd.)

If you have answered yes to any of 2. above, describe what effects your discharge may have and the steps you propose to take to mitigate these.

A comprehensive programme of ESA works (refer Section 3.0 of Part B of Application) has demonstrated that there are no unacceptable risks to human health and the environment associated with the on-going discharge of petroleum hydrocarbon compounds. Based on the Conceptual Site Model, as outlined in the Closure Report (Golder 2019b), further monitoring is not warranted and potential risks can be addressed through a management approach.

(Continue on a separate page if necessary)

3. What alternative methods of disposal or discharge locations have you considered?

The discharge relates to historical releases during operation of the terminal which ceased in 1995. The application is for the passive discharge of residual petroleum hydrocarbon impacts from the site and as such there are no alternative methods of disposal or discharge location.

4. Why did you choose the proposed method of disposal and location point?

The discharge relates to historical releases from the operation of the former bulk fuel terminal that ceased operation in 1995. The application is for the passive discharge of residual petroleum hydrocarbon impacts from the site and as such there are no alternative methods of disposal or discharge location.

5. How will the equipment controlling the discharge be operated and maintained to prevent equipment failure, and what measures will be implemented to ensure that the effects of any malfunction are remedied?

NA

6. What, if any, monitoring do you propose to carry out to ensure that the discharge does not have any adverse effect?

A comprehensive programme of ESA works (refer Section 3.0 of Part B of Application) has demonstrated that there are no unacceptable risks to human health and the environment associated with the on-going discharge of petroleum hydrocarbon compounds. Based on the Conceptual Site Model, as outlined in the Closure Report (Golder 2019b), further monitoring is not warranted and potential risks can be addressed through a management approach.

PART B – SUPPORTING INFORMATION

1.0 INTRODUCTION

1.1 Purpose

Mobil Oil New Zealand Limited (Mobil) formerly operated a bulk storage terminal (the Dunedin Terminal) at 199 Fryatt Street, Dunedin ('the site') as shown in Figure 1. Mobil ceased operations at the terminal in 1995 and decommissioned the facility between 1995 and 2007. Mobil has progressively undertaken environmental site assessment (ESA) works at the terminal, both on site and off site, commencing in 1992. The ESA works have documented the presence of residual petroleum hydrocarbon impacts at the site.

Based on the findings of the ESA works, and an assessment of the risks, Mobil is seeking a resource consent from Otago Regional Council (ORC) for the ongoing discharge of residual petroleum hydrocarbon impacts onto or into land from the site.

This application document, which includes an Assessment of Effects on the Environment (AEE) has been prepared by Golder Associates (NZ) Limited (Golder¹) on behalf of Mobil to accompany the application forms contained in Part A (Resource Consent Application Forms) of this document. It provides a description of the site and the petroleum hydrocarbon impacts, the methods and controls to be implemented, and a statutory assessment with respect to the relevant regulatory framework, and an assessment of effects in accordance with the requirements of the Fourth Schedule of the Resource Management Act 1991 (RMA).

The planning documents relevant to this application, in terms of identifying the need to seek resource consent are the Regional Plan: Waste for Otago (Waste Plan) and the Regional Plan: Water for Otago (Water Plan).

In accordance with the requirements of the Waste Plan and Water Plan, the following resource consents are being sought from ORC:

- A discharge permit for the discharge of hazardous waste onto or into land in circumstances that may result in that hazardous waste entering water, pursuant to Rule 5.6.1(3) (**discretionary activity**) of the Waste Plan.
- A discharge permit for the discharge of any hazardous substance to water or onto or into land in circumstances which may result in that substance entering water, pursuant to Rule 12.B.4.2 (**discretionary activity**) of the Water Plan.

Overall, resource consent is required as a discretionary activity from ORC. A statutory assessment of these documents, and other relevant statutory and planning documents, is contained in Section 4.0 of this application. A duration of 10 years is sought for the resource consent. The application form for the above resource consent is contained in Part A of this document.

1.2 Background

1.2.1 Site background

The Mobil Dunedin Terminal site operated from the mid to late 1920s to 1995. It was progressively decommissioned between 1995 and 2007 and has remained vacant since decommissioning. Mobil has progressively undertaken ESA works at the terminal, both on site and off site, commencing in 1992.

The ESA works have been undertaken in a step wise and sequential manner to assess the nature and extent of impacts associated with the historical bulk storage of petroleum hydrocarbons at the site. The initial investigations focused on establishing the nature of on-site impacts to soil and groundwater. Recent

¹ Golder Associates (NZ) Limited was amalgamated into WSP New Zealand Limited as at 1 January 2022.

investigations have focused on assessing the extent of residual light non-aqueous phase liquid (LNAPL) and characterising the presence, stability and attenuation of dissolved phase hydrocarbons both on and off site.

The ESA works undertaken to date form the basis for development of a robust Conceptual Site Model (CSM) and provide a detailed understanding of the extent of residual impacts to soil, groundwater and soil vapour and the associated risks to human health and the environment (Golder 2019a). The time-series of the ESA data also provides for a detailed understanding of the stability and attenuation of residual LNAPL and dissolved phase hydrocarbons.

The CSM, based on the ESA works, supports the adoption of natural attenuation over more direct remediation methods as the most effective strategy to degrade residual hydrocarbon impacts such that there is not considered to be unacceptable risks to the environment. Further the CSM developed for the site supports a position that risks to human health associated with residual petroleum hydrocarbon impacts are able to be appropriately managed on the basis of continued commercial/industrial use of the site (Golder 2019a).

1.2.2 Previous engagement with ORC

In support of its exit from the property, Mobil commissioned the preparation of a Closure Report (Golder 2019b). The Closure Report was prepared for the purpose of establishing that no further action was required in respect of the residual discharge at the site and that risks to human health can be managed through regulatory controls and that ongoing monitoring is not necessary. The nature and extent of site-related discharge impacts are fully described in the ESA report (Golder 2019a) and Closure Report (Golder 2019b) which have been provided to and discussed with ORC.

The ESA report and Closure Report² were submitted to ORC in August 2019 and discussed with ORC's Contaminated Land Officer (Simon Beardmore) on 4 September 2019. Based on review comments from ORC, a revised Closure Report³ was submitted to ORC and discussed at a meeting on 16 December 2019.

Following submission of the Closure Report to ORC and subsequent discussions, Mobil applied to ORC seeking written notice that the discharge meets the requirements of section 87BB of the RMA, and based on an analysis of the relevant regulations, it can be considered a deemed permitted activity (Golder 2020a). While it is acknowledged that this request was declined, Mobil requests that ORC consider the overall intent of the Resource Legislation Amendment Act 2017 (RLAA17) which incorporated section 87BB into the RMA, and after receiving this application for a resource consent for the discharge activity (section 87BB(2)(a)), consider using its discretion provided in accordance with section 87BB(1)(d) of the RMA. The intent of that legislation is to provide consenting authorities and applicants with a more proportional approach to situations where the scale and significance of the effects do not justify the time, effort and cost associated with a full consenting process.

As part of the engagement with ORC in relation to the site and the application of section 87BB, it is understood that ORC is in agreement with the CSM developed for the site and the key outcomes that future monitoring is not warranted and that, based on continued commercial/industrial use, potential risks to future users both on- and off-site can be effectively managed via the implementation of Environmental Management Plans (EMPs).

² Golder reference 1792933-003-R-Rev0 dated May 2019.

³ Golder reference 1792933-003-R-Rev1 dated November 2019.

2.0 ENVIRONMENTAL SETTING

2.1 Site Location and Description

The site is located at 199 Fryatt Street within an industrial area approximately 1.5 km from central Dunedin (Figure 1). The site covers an area of 1.12 ha and is bounded by Halsey Street to the south-west, Jutland Street to the north-west, Akaroa Street to the north-east and Fryatt Street to the south-east. The site is located approximately 60 m from the Otago Harbour. A summary of relevant site information is provided in Table 1.

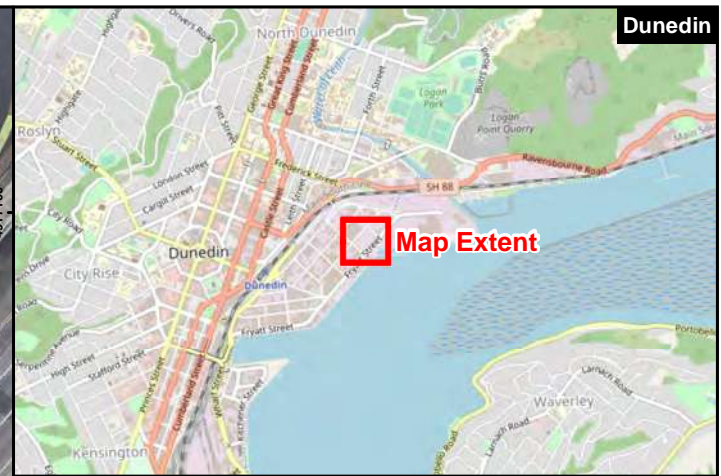
Table 1: Site details.

| | |
|-------------------------------|---|
| Site address | 199 Fryatt Street, Dunedin |
| Legal description | Lot 2 DP 482844 (refer Appendix A) |
| Site area | 1.12 ha |
| Co-ordinates (NZTM) | 1407362 E, 4916984 N. |
| Regulatory authorities | Dunedin City Council (DCC) Otago Regional Council (ORC) |
| Zoning | 'Port 2' under Dunedin City District Plan (2006) and 'Industrial Port' under Dunedin City Proposed Second Generation Plan (2018). |
| Land owner | Chalmers Properties Limited (on behalf of Port of Otago Limited (POL)). |
| Current status | Vacant. |
| Proposed future use | Continued commercial/industrial use. |

Currently, the site comprises a predominantly grassed vacant block of land, with concrete building foundations present in the southern corner of the site. Elements associated with former Mobil operations remaining on site include (Figure 2):

- Tank pads of the five former above ground storage tanks (ASTs).
- An earth bund, approximately 1.5 m in height, which formed the perimeter to the main bulk tank compound.
- Four fire hydrants and water lines associated with the former fire suppression system.
- Two separators formerly referred to as Separator 1 and Separator 3. Separator 1, a four-chamber separator, is in the eastern corner of the site and was connected to the stormwater system that collected water from the tank compound. Separator 3, a three-chamber separator, is located mid-way along the Halsey Street (south-west) boundary. The source of water received by Separator 3 is not known. Separator 2, formerly located in the southern corner of the site, was not observed during site works and is assumed to have been removed.
- A set of decommissioned fuel lines are visible next to Separator 3 on the Halsey Street boundary. These pipelines historically connected the site to a tanker wagon fill station located on the property south across Halsey Street. These lines are reportedly concrete slurry filled (Pattle Delamore Partners Limited (PDP) 2007).

Historically a railway line ran along the south-eastern boundary (parallel to Fryatt Street), with a former rail siding servicing the terminal entering the south-eastern margin of the site. It is unknown when Mobil ceased using the rail siding. The railway lines were still present in a 1977 historical aerial photograph, however, appear to have been removed by 1985. The rail siding was used for distribution of product from the site to smaller regional depots via rail.

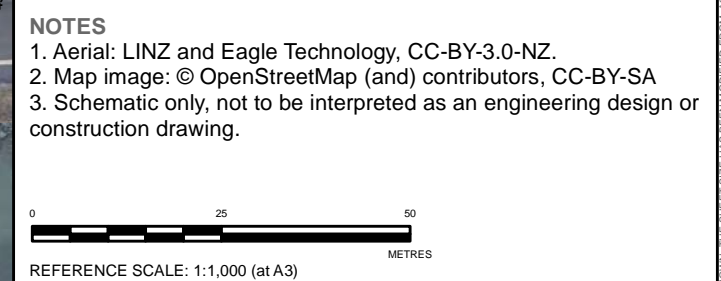


LEGEND

Site boundary

NOTES

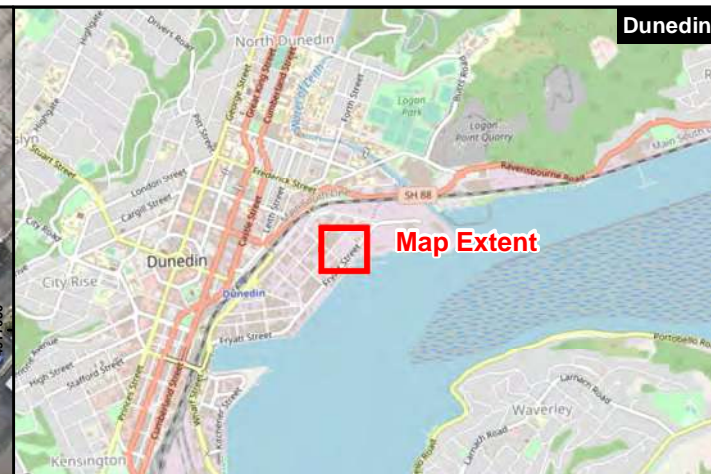
1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.



| | | | |
|---------------|------------|-------------------------------|--------|
| CLIENT | | MOBIL OIL NEW ZEALAND LIMITED | |
| PROJECT | | FORMER MOBIL DUNEDIN TERMINAL | |
| TITLE | | | |
| SITE LOCATION | | | |
| CONSULTANT | YYYY-MM-DD | 2021-03-04 | |
| | PREPARED | AE | |
| | REVIEW | CV | |
| | APPROVED | AH | |
| PROJECT NO. | REPORT | REV. | FIGURE |
| 20449679 | 001 | 0 | 01 |

File: \\naacc\dev\1\aukland\GIS\Projects\Dynamic\2020\MOBIL_Bundle_2020\20449679_DunedinTerminalMap\Documents\20449679-01-RevA-F001_A3_GIS.mxd
 2020/03/04 09:27:29

25mm
 THIS INSTRUMENT DOES NOT TAKE EFFECT UNTIL SHOWN TO BE VALID BY THE SIGNATURE OF THE SIGNATORY OFFICER



LEGEND

- Site boundary
- SS—S Sanitary sewer
- SW—S Stormwater
- Interceptor
- E—E Electrical (de-energised)
- H—H Hydrant line (de-energised)
- ?—? Unknown
- SW—S Stormwater on site
- Sump (1m diameter)
- Historic fuel lines
- Existing bund
- Concrete pad / surface structure

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.



REFERENCE SCALE: 1:700 (at A3)
 PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
CURRENT SITE LAYOUT

| | | |
|------------|------------|------------|
| CONSULTANT | YYYY-MM-DD | 2021-03-04 |
| | PREPARED | AE |
| | REVIEW | CV |
| | APPROVED | AH |

File: \\sazacc\client\Auckland\GIS\Projects\2021\Terminal\Map\Documents\2021\486750101_RevA_E002_A3R_GIS.mxd
 2021/03/04 10:46:29.236 Bundles: 2021/03/04 10:46:29.236

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN COPIED FROM A3

2.2 Adjacent Land Uses

The site is in an industrial area of Dunedin and surrounded by commercial/industrial land uses. A summary of land uses surrounding the site are indicated on Figure 1 and summarised in Table 2.

Table 2: Surrounding land use.

| Direction | Land use |
|------------------------------------|--|
| North-east (across Akaroa Street) | Bulk fuel storage terminal operated by Z Energy Limited (Z Energy). |
| South-east (across Fryatt Street) | Fulton Hogan Limited bitumen plant and HarbourCold cold store facility. |
| South-west (across Halsey Street) | Northern Southland Transport Holding Limited. |
| North-west (across Jutland Street) | Commercial properties (Tulloch Transport Company, Reillys Towage & Salvage). |

2.3 Groundwater Sensitivity

The Ministry for the Environment (MfE 2011) provides criteria for assessing groundwater sensitivity at petroleum hydrocarbon impacted sites (Table 3). An aquifer is defined as sensitive when either all the first three criteria are met, or the fourth criterion is met.

Table 3: Groundwater sensitivity assessment.

| Criteria | Assessment |
|---|--|
| The aquifer is not artesian or confined; and | Yes The site stratigraphy comprises sand and silt deposits that form an unconfined aquifer. |
| The aquifer is expected to be less than 10 m below the potential suspected source of contamination; and | Yes Groundwater has been measured in the unconfined aquifer at depths between 1.3 and 3.0 m below ground level (bgl) in groundwater monitoring wells on the site. |
| The aquifer is of quality, appropriate for use, can yield water at a useful rate and is in an area where extraction and use of groundwater may be reasonably foreseen; or | No The site is located in an area of Dunedin consisting of reclaimed land with a long history (>100 years) of commercial/industrial use. This history combined with the close proximity to the harbour means it is extremely unlikely that shallow groundwater will be extracted for beneficial use. |
| The source of contamination is less than 100 m from a sensitive surface water body | Yes The Otago Harbour is located approximately 60 m from the site. |

Although the site is located within 60 m of Otago Harbour, the shallow aquifer would be classified as **not sensitive** with respect to abstractive use and with respect to environmental discharges for the following reasons:

- No registered groundwater abstractions for potable, irrigation or stockwater use purposes are located within 1.5 km of the site with registered wells mainly used for monitoring or geological investigation purposes (PDP 2013).
- Unregistered potable abstractions are considered unlikely given the proximity of Otago Harbour (low groundwater quality) and the presence of a reticulated supply in the vicinity of the site.

- Otago Harbour is a large water body and would facilitate significant dilution. MfE (2011) guidance notes that where “*the receiving water body facilitates significant dilution of groundwater discharged into it (large river systems, coastal water), sites within 100 metres of a surface water are unlikely to affect the surface water quality significantly, unless free phase hydrocarbons [LNAPL] is present and migrating off-site. Frequently, dilution rates in the order of 1000:1 following discharge of groundwater to surface water, resulting in contaminant concentrations less than criteria for the protection of aquatic ecosystems in the surface water after dilution, even when high dissolved phase concentrations are present. Under these conditions, some minor impact on the aquatic ecosystem within the dilution or mixing zone may occur.*”
- Previous ESA works have not documented the presence of LNAPL in monitoring wells installed immediately adjacent to Otago Harbour (PDP 2011, 2013; Golder 2019a).

2.4 Surface Water

The nearest surface water body is Otago Harbour which is located approximately 60 m to the south-east of the site across Fryatt Street. The site is located adjacent to the upper harbour basin which comprises a highly modified environment as a result of reclamation, road works and dredging activities (URS-Opus 2011). The upper Otago Harbour basin receives stormwater discharges from the greater Dunedin urban area which includes a range of mixed recreational and commercial land use activities. URS New Zealand Limited (URS)-Opus International Consultants Limited (Opus) (URS-Opus 2011) notes that tidal range in Otago Harbour is approximately 2.2 m with estimates of harbour flushing times ranging from four to 15 days.

2.5 Underground Services

2.5.1 On site

With the exception of underground services mentioned in Section 2.1 and indicated on Figure 2, there are no other known underground services present on the site.

2.5.2 Off site

A network of underground services is present in the streets adjacent to the site (Figure 2) and includes:

- Shallow telecommunication and water services likely to be installed above the shallow groundwater table.
- Two stormwater lines beneath Halsey Street along the south-west of the site. DCC’s Geographic Information System⁴ (GIS) shows the stormwater lines to be 1,950 mm and 1,300 mm in diameter with invert levels of 99.893 m relative level (RL) (2.36 m bgl) at Jutland Street and 99.829 m RL (2.94 m bgl) at Fryatt Street. The stormwater lines form part of the stormwater system that receives stormwater from the wider Dunedin City and discharge to Otago Harbour beneath the HarbourCold facility.
- A stormwater line beneath Akaroa Street and Fryatt Street to the north-east of the site. DCC’s GIS shows the stormwater pipe is 225 mm in diameter with an invert level of 101.954 m RL (1.0 m bgl) adjacent to the Z Energy bulk fuel terminal in Akaroa Street. The pipe increases to 300 mm in diameter with an invert level of 101.204 m RL (1.67 m bgl) beneath Fryatt Street. Available plans (URS 2012) indicate that this line receives stormwater from the bulk fuel storage terminal located to the north-east of the site and discharges to Otago Harbour between the Fulton Hogan bitumen plant and the HarbourCold facility.

⁴ <https://www.dunedin.govt.nz/do-it-online/maps-and-photos/water-services-map-and-wws-work-in-progress>

- A sewer line beneath Akaroa Street and Jutland Street. The pipe is 225 mm in diameter with invert levels of 101.091 m RL (1.70 m bgl) at the intersection of Akaroa Street and Fryatt Street, 100.588 m RL (2.63 m bgl) at the intersection of Akaroa Street and Jutland Street and 99.924 m RL (2.95 m bgl) at the intersection of Halsey Street and Jutland Street. The sewer pipe pumps sewage along Halsey Street away from Otago Harbour and connects to a main trunk sewer approximately 400 m north-west of the site.
- Two sewer lines are present beneath Halsey Street to the south of the site. The first, a 300 mm diameter pipe runs from Fryatt Street with an invert level of 100.341 m RL (2.49 m bgl) and connects to the 225 mm diameter pipe from Jutland Street. The second is a 300 mm pipe with invert levels of 100.658 m RL (1.93 m bgl) at the intersection of Fryatt Street and Halsey Street and 100.286 m RL (2.59 m bgl) at the intersection of Halsey Street and Jutland Street.

3.0 CONCEPTUAL SITE MODEL

3.1 Overview

This section summarises the Conceptual Site Model (CSM) based on the ESA works and as presented in the Closure Report (Golder 2019b). The purpose of the CSM is to identify and document the source-pathway-receptor relationships for the site and to communicate the potential risk to human health and the environment associated with residual impacts from the former hydrocarbon terminal activities on the site.

Specifically, this section outlines the geological and hydrogeological setting and provides an overview of the contaminant sources and contaminant conditions present at the site. A detailed assessment of the contaminant conditions is presented in the ESA Report (Golder 2019a) and Closure Report (Golder 2019b).

The relevant exposure pathways and assessment of current and potential future risks to the identified receptors are discussed in Section 4.0 of this document.

3.2 Geology

The site has been shown to be underlain by the following geological sequence:

- Fill comprising:
 - Gravel (sandy fine gravel) across the whole site predominately from surface to 0.7 m bgl, however the fill extends to depths up to 2 to 3 m bgl beneath and between former Tank 1 and Tank 8, and the southern corner of the site.
 - Sand (fine to medium coarse, often with shells and varying amounts of silt) with discontinuous layers of silt or gravels at varying thicknesses underlies the gravel fill unit. This sand unit extends to between 4.5 and 5 m bgl.
- Marine sediments – Clayey silt and silty clay between 4.5 m and about 8.0 m bgl. Competent material (possibly bedrock) was encountered below about 8 m bgl.

3.3 Hydrogeology

Key hydrogeological findings from the supplementary ESA works undertaken at the site (Golder 2019a) are summarised in Table 4.

Table 4: Summary of site hydrogeology.

| Aspect | Description |
|------------------------|--|
| Depth to groundwater | A shallow unconfined aquifer system is present within the fill material, with groundwater present at depths between approximately 0.45 m and 3.0 m bgl based on data collected between November 2015 and April 2017 (Golder 2019a). Average depth to groundwater has ranged between 1.61 m below top of casing (btoc) (June 2016) and 1.75 m btoc (November 2015) over this period. Groundwater levels are typically lower (up to 0.5 m) in monitoring wells located closer to Otago Harbour than those located in the centre or north-west of the site. |
| Groundwater elevations | Measured groundwater elevations have ranged between: <ul style="list-style-type: none"> ■ 100.115 m RL (BHA) and 101.875 m RL (BH26) in November 2015. ■ 100.475 m RL (BH29) and 102.654 m RL (BH23) (June 2016). ■ 100.801 m RL (BH46) and 102.852 m RL (BH56) in April 2017. |

| Aspect | Description |
|-------------------------------------|---|
| Inferred flow direction | Groundwater flow in the unconfined aquifer is typically in a south-easterly direction toward Otago Harbour (Golder 2019a). |
| Tidal response | The shallow groundwater system in the area of Fryatt Street and in close proximity to the harbour shows evidence of tidal influence (up to 0.23 m), while little or no tidal influence was noted within the confines of the site (maximum ~ 0.002 m). |
| Salinity | Electrical conductivity has ranged from 400 $\mu\text{S}/\text{cm}$ to 2,009 $\mu\text{S}/\text{cm}$ (Golder 2019a). |
| Redox Conditions | Groundwater reported slightly to moderately negative redox conditions and low dissolved oxygen (Golder 2019a). |
| Hydraulic conductivity (K) | Previous hydraulic testing of the shallow strata indicated hydraulic conductivity values in the range 0.4 m/d to 2.2 m/d (PDP 2012). |
| Effective porosity (θ_e) | Estimated to range from 5 % to 10 % based on values reported from over 100 tracer tests in unconsolidated sand and gravel aquifers (Suthersan et al. 2016). |
| Hydraulic gradient (i) | The groundwater gradient across the site is in the order of 0.004 to 0.006 metres per metre (m/m). |
| Estimated groundwater flow velocity | ~ 90 m/year (assuming upper value of $K \sim 2 \text{ m/d}$, $i = 0.006$, $\theta_e \sim 5 \%$). |

3.4 Potential Contaminant Sources

Mobil has previously commissioned preliminary site investigations (PSIs) to document an assessment of historical land use activities undertaken as part of its operations at its former Dunedin Terminal (PDP 2007, 2009). Mobil's terminal operations were split between two adjoining properties:

- The subject site which was principally used as a bulk fuel tank compound and associated operations.
- A neighboring property (located west of Halsey Street at 197 Fryatt Street) used for offices, warehousing, tanker wagon filling, bulk storage of lubricants, drum filling/reconditioning and drum storage.

The site operated from the mid to late 1920s to 1995. It was progressively decommissioned between 1995 and 2007 and based on the condition of the site at the time of these ESA works has remained vacant since decommissioning.

Fuels were delivered in bulk to the site either by ship via two above ground wharf lines (running from the Oil Wharf located 70 m to the south-east of the site) that entered the south corner of the site (with a small length of the wharf lines running underground by the Fryatt Street boundary), or via a rail car loading/unloading facility located along the south site boundary. A diesel bunker line was also located with the wharf lines which supplied diesel to the Oil Wharf. Fuels and lubricants were hard piped from the site to the neighbouring Halsey Street facility via fuel lines that passed under Halsey Street (PDP 2007).

A large bunded tank compound occupied the central and eastern parts of the site and some of the western site area (Figure 3). This compound contained up to seven large bulk storage tanks (ranging between 436,000 L and 4,695,000 L) storing petrol, diesel, kerosene and slops. This tank compound occupied at least 80 % of the site area. The tank compound also contained several smaller vertical and horizontal tanks (located in the western area of the tank compound) which stored kerosene, slops, white spirit (Stoddard Solvent), turpentine, and fuel additive (PDP 2007).

The western part of the site appears to have principally comprised various pump manifolds that serviced both properties/facilities. A small tanker wagon fill station was in the south-east area of the site before being relocated on the Halsey Street site sometime in the 1940s and 1950s. Drum storage occurred in the north-west corner of the site and drum filling is believed to have occurred close to the midway point of the site's western boundary (PDP 2007).

Based on a review of the site history the key sources of hydrocarbon and/or solvent contamination comprise:

- Bulk storage tank compound – bulk tanks and oil-water separator.
- Rail siding along Fryatt Street boundary.
- Drum filling plant approximately half way along the Halsey Street boundary.
- Drum storage in the western corner of the site.
- Tanker wagon fill station in the southern corner of the site.

As outlined in the Phase 1 ESA (PDP 2007), the primary contaminants of interest were identified to be petroleum hydrocarbons and metals (primarily lead). Based on the identified sources of contamination, the ESA works included analysis of media including:

- Soil – total petroleum hydrocarbons (**TPH**), benzene, toluene, ethylbenzene and xylenes (**BTEX**), polycyclic aromatic hydrocarbons (**PAH**), and a suite of metals including arsenic, cadmium, chromium, copper, lead, nickel and zinc. Historical testing also included analysis for organic lead in areas where “*weathered sludge from the weathering slab had been buried*” (PDP 1994).
- Groundwater – dissolved TPH, dissolved BTEX, dissolved PAH, dissolved metals and a suite of geochemical parameters including nitrate-nitrogen, sulphate, dissolved iron and dissolved manganese.
- Soil vapour – volatile organic compounds, aromatic and aliphatic hydrocarbons, oxygen, carbon dioxide and methane.
- LNAPL – fingerprinting using gas chromatogram along with in situ characterisation using laser induced fluorescence (**LIF**).

The sampling and analysis undertaken during the ESA works undertaken at the site is consistent with the historical land use activities at the site and the identified contaminants of interest at the time of the ESA works.

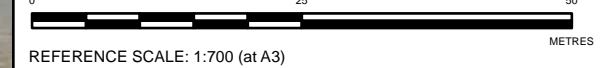


LEGEND

- Site boundary
- Tanks**
- AST, removed
- Above Ground Services**
- ⦿ Fire Hydrant
- ⦿ Power Substation
- Overhead Power
- Fuel Pipeline
- Underground Services**
- Dewatering Line
- Product Pipeline (slurry filled)
- Vacuum Recovery Pipeline
- Vapour Conservation Pipeline
- Chevron Pipeline
- Historical Offsite Fuel Transfer Pipelines to Tanker Wagon Fill Stand
- Power
- Sewer
- Stormwater
- Water
- Telephone
- Fibre Optic
- Gas
- Drainage**
- ⦿ Manhole
- ⦿ Water Draw Off Sump
- Sump
- Boundaries**
- Corrugated Steel Fence
- Wire Mesh Fence
- Boundary of Lease Area
- Earth Bund Wall, existing
- Earth Bund Wall, historical

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.
4. Base plan and legend from Figure 2B in PDP (2013).



REFERENCE SCALE: 1:700 (at A3)
 PROJECTION: NZGD 2000 New Zealand Transverse Mercator

| | | | |
|-------------|------------|---------------------------------|--------|
| CLIENT | | MOBIL OIL NEW ZEALAND LIMITED | |
| PROJECT | | FORMER MOBIL DUNEDIN TERMINAL | |
| TITLE | | SITE LAYOUT PRE-DECOMMISSIONING | |
| CONSULTANT | YYYY-MM-DD | 2021-03-04 | |
| | PREPARED | AE | |
| | REVIEW | AS | |
| | APPROVED | AH | |
| PROJECT NO. | REPORT | REV. | FIGURE |
| 20449679 | 001 | 0 | 03 |

Path: K:\GIS\Projects\Dynamic\2017\4051762033_MobilNZL_Dunedin_AerialMap\Documents\1762033-002_Rev0-F03_A3L_GIS.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SITE SIZE HAS BEEN MODIFIED FROM A3

3.5 Contaminant Conditions

Historical losses at the site have impacted the underlying soils and groundwater across the site. A detailed assessment of the contaminant conditions at the site is provided in the ESA report (Golder 2019a) and Closure Report (Golder 2019b) which incorporate the results of previous ESA work commissioned by Mobil (PDP 1992, 1994, 2007, 2011, 2012, 2013; Golder 2014, 2015).

ESA works undertaken between 2011 and 2013 primarily focused on assessing soil and groundwater quality on site (PDP 2011, 2012, 2013). Supplementary ESA works between 2014 and 2017 further refined the CSM and focused on assessing the extent and distribution of LNAPL, assessing the extent of off-site dissolved phase impacts including risks to Otago Harbour, and assessing on- and off-site risks associated soil vapour impacts (Golder 2019a). The ESA investigation locations are shown on Figure 4 and Figure 5 in the Closure Report (Golder 2019b).

The environmental condition of the site, as outlined in the Closure Report (Golder 2019b) can be summarised as follows:

LNAPL

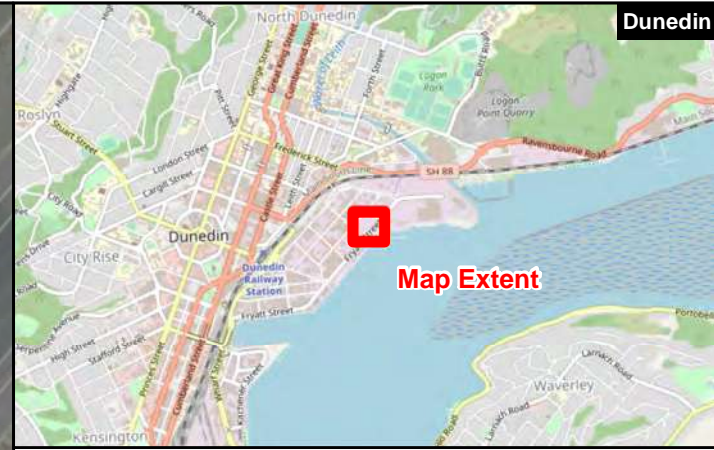
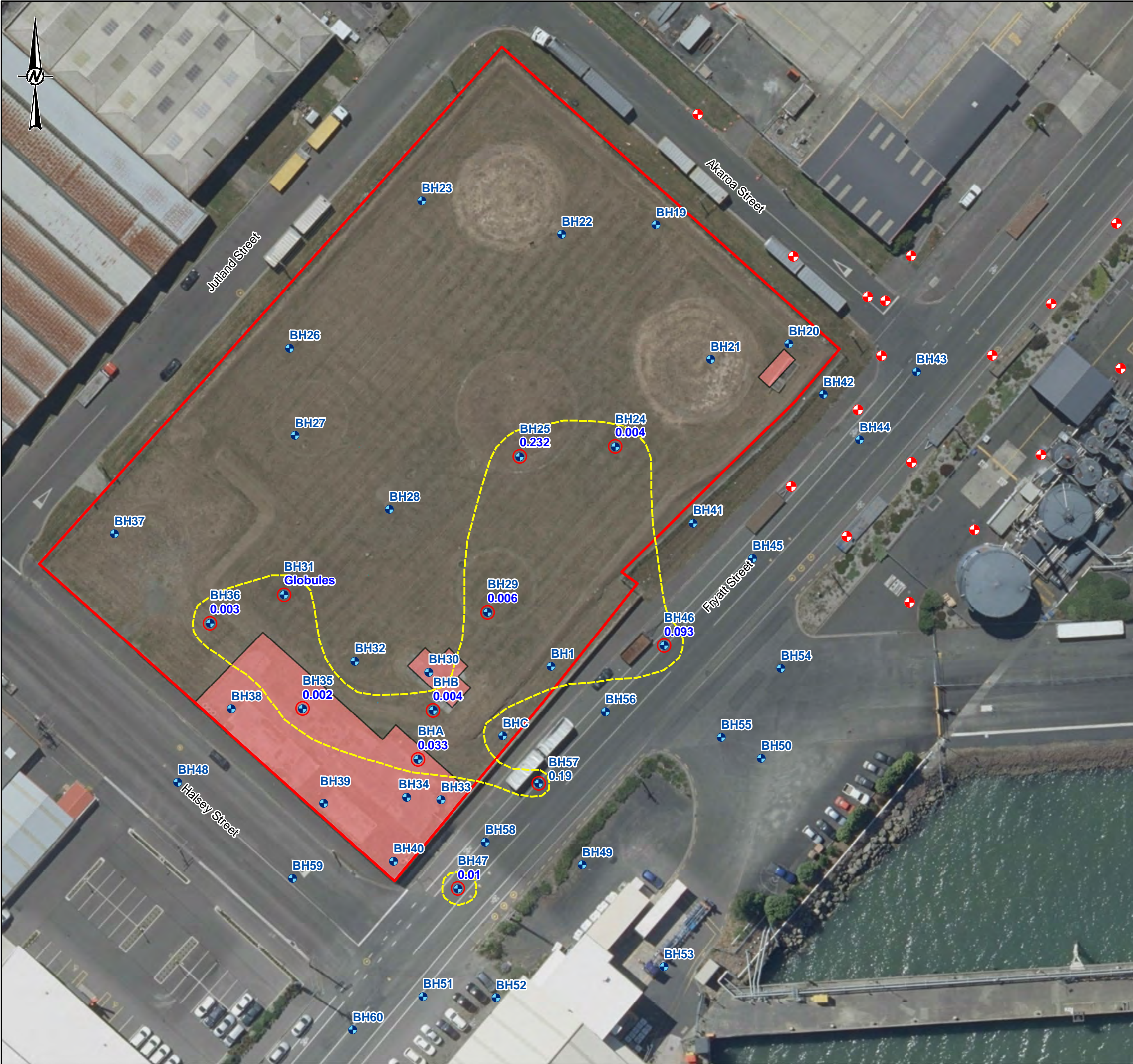
LNAPL, consisting predominately of diesel with some petrol, is evident in a small number of monitoring wells located across the southern half of the site, specifically the southern part of the former tank compound, drum filling site and tanker wagon fill station (Figure 4). Given the heterogeneous nature of the fill, the LNAPL does not comprise one single continuous layer and is present as a series of smaller discontinuous LNAPL pockets with varying LNAPL saturations.

Seasonal fluctuations in groundwater elevation have created a vertical LNAPL smear zone ranging between 1.5 and 2.5 m bgl, extending to 3 m bgl across the south-eastern area of the site. The LNAPL smear zone extends up to 1.5 m below the water table during winter/high groundwater table conditions.

LNAPL is present off site to the western side of Fryatt Street. The LNAPL off site is likely to consist predominately of diesel with a minor petrol content. The LIF investigation (Golder 2019a) was not undertaken along Fryatt Street, however an LNAPL smear zone similar to that on site may be present off site.

The LNAPL is inferred to have low mobility based on the results of a bail-down test in one well, limited elevation difference between LNAPL head and nearby groundwater in surrounding monitoring wells, and minimal LNAPL thickness in other monitoring wells.

Overall, the lateral extent of LNAPL appears to be contracting over time (refer Figure 15 and Figure 16 in Closure Report (Golder 2019b)). This is supported by the apparent reduction in LNAPL thickness at many locations over the past decade. LNAPL bail down testing at the site indicates low LNAPL transmissivity, low recoverability and low mobility. The LNAPL is not considered to be mobile and does not pose a risk of migration towards or discharge into Otago Harbour.



- LEGEND**
- Groundwater monitoring wells
 - ⊕ Monitoring wells April 2017 (LNAPL observed; thickness; m)
 - ⊕ Monitoring wells - not Mobil
 - Inferred LNAPL extent
 - Site boundary
 - Concrete pad / surface structure

0 20 40
 REFERENCE SCALE: 1:700 (at A3) METRES
 PROJECTION: NZGD 2000 New Zealand Transverse Mercator

NOTE(S)
 1. AERIAL: LINZ AND EAGLE TECHNOLOGY, CC-BY-3.0-NZ.
 2. MAP IMAGE: © OPENSTREETMAP (AND) CONTRIBUTORS, CC-BY-SA
 3. SCHEMATIC ONLY, NOT TO BE INTERPRETED AS AN ENGINEERING DESIGN OR CONSTRUCTION DRAWING.

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
MONITORING WELLS CONTAINING LNAPL APRIL 2017

| | | |
|--------------------------------|------------|------------|
| CONSULTANT | YYYY-MM-DD | 2021-03-04 |
| GOLDER MEMBER OF WSP | PREPARED | AE |
| | REVIEWED | AH |
| | APPROVED | AH |

| | | | |
|-------------------------|----------------|-----------|--------------|
| PROJECT NO. 20449679 | CONTROL 001 | REV. 0 | FIGURE 04 |
|-------------------------|----------------|-----------|--------------|

PATH: \\nasaschm1\avek\GIS\Projects\Dunedin\MapDocuments\20449679\001_RevA\F014_A31_GIS.mxd PRINTED ON: 2021-03-25 AT 5:50:10 PM

25mm IF THIS REPRESENTATION DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN COPIED FROM ISO 7

Shallow soil vapour sampling at the site has documented the presence of methane and elevated carbon dioxide in conjunction with depletion of oxygen consistent with the Natural Source Zone Depletion (NSZD) conceptual model of the key vadose zone vapour processes (Figure 5). The trends in LNAPL distribution and thickness over time as well as the presence of these gases indicate that NSZD is occurring at this site and hence ongoing degradation of the LNAPL can be expected overtime.

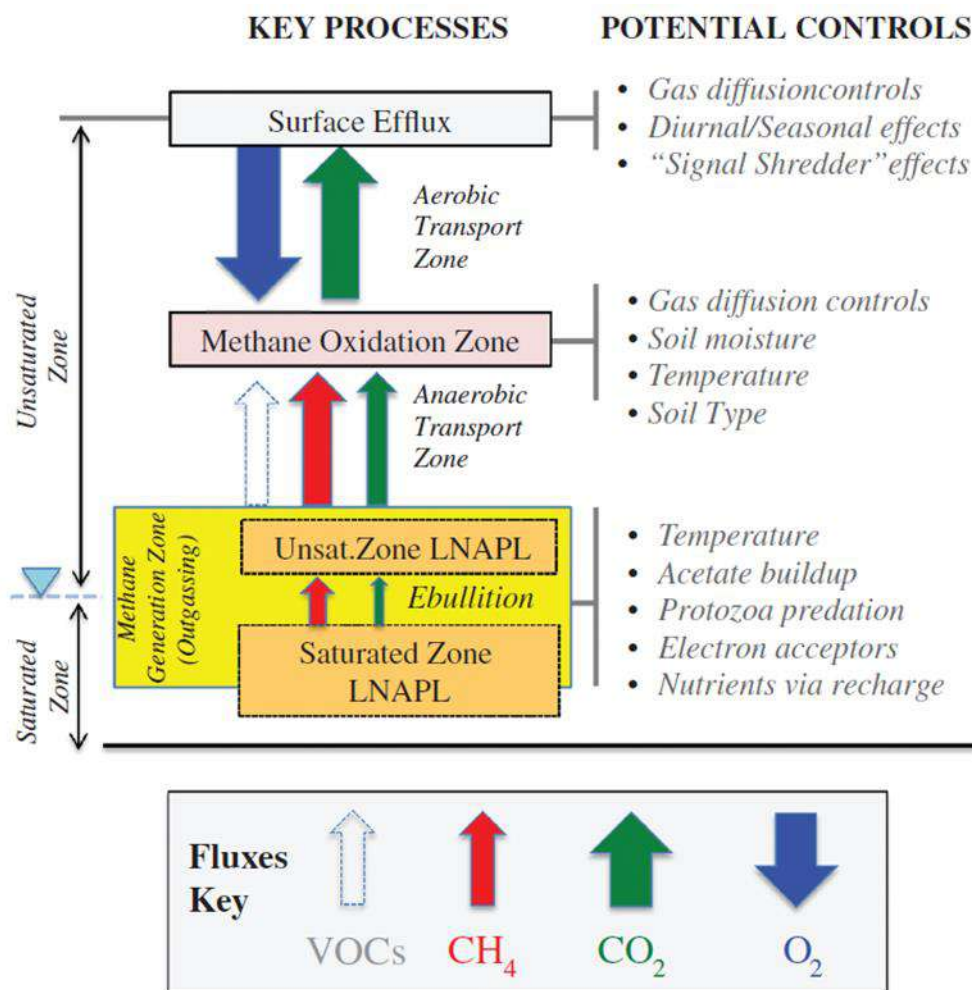


Figure 5: Vapour transport-related processes (Garg et al. 2017).

Soil

Hydrocarbon soil contamination is present primarily toward the south-west of the site. The highest concentrations are present in soils adjacent to the former drum rack, former 45,400 L kerosene AST, former drum fill and pumps in the south-west of the site, to the south of the tank farm bund wall along the Fryatt Street boundary, in the footprint of former Tank 5 tank pad and adjacent to former Tank 8. Hydrocarbon impacts to soil are generally characterised by C₇-C₉ TPH, C₁₀-C₁₄ TPH and total xylenes with the highest concentrations present between 1.0 and 4.0 m bgl coinciding with the smear zone. The spatial and vertical distribution of soil impacts is consistent with the findings of the LIF investigation (Golder 2019a).

Petroleum hydrocarbon concentrations in soil collected between 2011 (PDP 2011) and 2017 (Golder 2019b), were compared to MfE (2011) Tier 1 acceptance criteria for a commercial/industrial land use and the outcomes are summarised as follows:

- **Excavation Workers Inhalation Pathway** – Twenty-three out of 103 samples collected from shallow soils (< 1 m bgl) exceeded the MfE (2011) Tier 1 ‘All Pathways’ acceptance criteria. Primarily these exceedances were identified for C₇-C₉ TPH, C₁₀-C₁₄ TPH and (total) xylenes and for the protection of excavation workers based on the inhalation pathway. For soils below 1.0 m bgl, the bulk of the overall exceedances (~80%) were identified for the excavation pathway in soils between 1.0 m and 4.0 m including in soils located below the groundwater table. The exceedances are primarily located in the former tank farm area to south-west of former Tank 5 and toward the southern corner of the site.
- **Commercial/Industrial Workers / Other Pathways** – There were no exceedances of criteria applicable to dermal contact with soils, soil ingestion and outdoor inhalation pathways.

Metals/Metalloids are present in shallow soils across the site. The impacts are primarily characterised by the presence of lead. Concentrations of metals/metalloids were below adopted applicable standards⁵ for a commercial/industrial land use.

Groundwater

Dissolved TPH, benzene, toluene, ethylbenzene, xylene and naphthalene (BTEXn) and polycyclic aromatic hydrocarbons (PAHs) are present in groundwater beneath the site and off site to the south beneath Fryatt Street and to a lesser extent Halsey Street. The detected concentrations are below MfE (2011) Tier 1 acceptance criteria based on the indoor air inhalation pathway. Naphthalene, ethylbenzene and m&p-xylene have been identified above the ANZECC⁶ (2000) trigger values for the protection of marine ecosystems (Figure 6).

An assessment of the stability of the dissolved phase hydrocarbon impacts was undertaken using trend analysis, estimates of the plume velocity, attenuation rates and predicted plume lengths (Golder 2019b). The stability of dissolved phase hydrocarbon impacts can be summarised as follows:

- Concentrations of ethylbenzene, C₁₀-C₁₄ TPH and naphthalene, which are considered to be the key indicators of the dissolved phase petroleum hydrocarbon contamination, indicate that overall there has been a decreasing trend over the past decade.
- Assessment of the ethylbenzene and naphthalene attenuation rates indicate that the dissolved phase contamination does not extend further than 40 m downgradient of the leading edge of the LNAPL.
- Given the decreasing trend, the relatively short extent for these dissolved phase contaminants, and that concentrations attenuate below ANZECC (2000) trigger values prior to discharging to Otago Harbour, they are unlikely to migrate beyond their present locations and are not considered to pose a future risk to Otago Harbour.

⁵ As per regulation 7(2), 7(3) and 7(4) of the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011

⁶ Australian and New Zealand Environment and Conservation Council (ANZECC)



| | MfE (2011) | | ANZECC (2000) | |
|--------------------------------------|-------------------|--------------------|--------------------|-----------------|
| | Indoor Inhalation | Outdoor Inhalation | 95% Marine Species | Low Reliability |
| C ₇ -C ₉ TPH | S | S | ne | ne |
| C ₁₀ -C ₁₄ TPH | S | S | ne | ne |
| C ₁₅ -C ₃₆ TPH | S | S | ne | ne |
| Benzene | 5.2 | (340) | 0.7 | |
| Toluene | (460) | S | ID | 0.18 |
| Ethylbenzene | (110) | S | ID | 0.005 |
| m&p-Xylene | | | ID | 0.075 |
| o-Xylene | | | ID | 0.35 |
| Total Xylene | S | S | | |
| Naphthalene | S | S | 0.07 | |

ne - not established
ID - insufficient data
S - exceeds solubility



LEGEND

- Groundwater monitoring wells
- Inferred LNAPL extent
- ▭ Site boundary
- ▭ Concrete pad / surface structure

0 20 40 METRES
REFERENCE SCALE: 1:700 (at A3)
PROJECTION: NZGD 2000 New Zealand Transverse Mercator

- NOTES**
1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
 2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
 3. Schematic only, not to be interpreted as an engineering design or construction drawing.
 4. Shading represents exceedance of Tier 1 acceptance criteria.
 5. Concentrations expressed in mg/L.

| | | | |
|----------------------------------|------------|------|--------|
| CLIENT | | | |
| MOBIL OIL NEW ZEALAND LIMITED | | | |
| PROJECT | | | |
| FORMER MOBIL DUNEDIN TERMINAL | | | |
| TITLE | | | |
| GROUNDWATER QUALITY - APRIL 2017 | | | |
| CONSULTANT | | | |
| YYYY-MM-DD | 2021-03-30 | | |
| PREPARED | AE | | |
| REVIEW | AE | | |
| APPROVED | AH | | |
| PROJECT NO. | REPORT | REV. | FIGURE |
| 20449679 | 001 | 0 | 06 |

| | |
|--------------|-----------|
| BH42 | 4/10/2017 |
| Ethylbenzene | 0.0143 |

| | |
|--------------|-----------|
| BH41 | 4/10/2017 |
| Ethylbenzene | 1.77 |

| | |
|--------------|-----------|
| BH56 | 4/10/2017 |
| Ethylbenzene | 0.076 |
| m&p-Xylene | 0.27 |
| Naphthalene | 0.26 |

| | |
|--------------|-----------|
| BH49 | 4/10/2017 |
| Ethylbenzene | 0.1 |
| Naphthalene | 0.4 |

| | |
|--------------|-----------|
| BH51 | 4/10/2017 |
| Ethylbenzene | 0.023 |
| Naphthalene | 0.26 |

| | |
|--------------|-----------|
| BH52 | 4/10/2017 |
| Ethylbenzene | 0.008 |

Path: K:\GIS\Projects\Dunedin\2017\4081782033_MobilOilNZLtd_Dunedin_terminaMapDocuments\003_R1782033\003_RevG-FM_A3L_GIS.mxd

25mm IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN ON THE SCREEN THE SCREEN SIZE HAS BEEN MODIFIED FROM A3

Soil Vapour

Petroleum hydrocarbon residues in soil vapour are present on site with the highest concentrations detected in the south-east of the site adjacent to former Tanks 10, 11 and 12. The presence of elevated soil vapour concentrations correspond to the area of LNAPL impacts. With the exception of 1,2,4-trimethylbenzene, the detected concentrations of hydrocarbons in soil vapour are below MfE (2011) target soil gas concentrations and vapour intrusion screening levels (USEPA 2019).

Further assessment was not undertaken specifically in relation to the exceedance of the screening criteria for 1,2,4-trimethylbenzene. Rather, as part of the Tier 2 assessment, it was considered that as this exceedance was located in an area of residual LNAPL, the potential risk could be managed through appropriate consideration in building design such as ventilation or use of a vapour barrier depending on the building use and location.

Concentrations of primary contaminants of interest (COIs) (BTEXn) in soil gas collected on the HarbourCold property (off site) were below the laboratory limits of reporting (LORs) (which are below MfE (2011) target soil gas concentrations and vapour intrusion screening levels).

The residual hydrocarbon impacts, including the presence of LNAPL, is not generating soil vapour that represents an unacceptable risk both on site and off site based on the following:

- Soil vapour monitoring undertaken to date shows concentrations of the primary COIs (BTEXn) in soil vapour on site are below MfE (2011) target soil gas concentrations for the protection of indoor quality. The on-site soil vapour samples identified the presence of a range of petroleum hydrocarbon-related compounds in addition to BTEX and naphthalene. The reported concentrations of these compounds, with the exception of 1,2,4-trimethylbenzene at soil vapour bore SV3 were below vapour intrusion screening criteria.
- The presence of LNAPL in the south-west of the site is a source of soil vapour which may represent a risk to indoor air of newly constructed buildings where the LNAPL occurs. However, the risk to indoor air can be managed through appropriate consideration in building design such as ventilation or use of a vapour barrier, depending on the building use and location with respect to the groundwater impacts.
- Monitoring of the shallow soil vapour bore located adjacent to the off-site HarbourCold facility identified the presence of BTEXn at concentrations below MfE (2011) target soil gas concentration for the protection of indoor air quality. This indicates a low probability of a vapour intrusion risk to off-site properties associated with the presence of off-site petroleum hydrocarbon impacts.

4.0 ASSESSMENT OF EFFECTS ON THE ENVIRONMENT

4.1 Overview

This section provides an assessment of effects on the environment associated with the passive discharge of residual petroleum hydrocarbons at the site. This section provides an assessment of the risks associated with the discharge with respect to the potential pathways for exposure and the natural attenuation of the residual hydrocarbon impacts.

4.2 Source-Pathway-Receptor Linkage

An exposure pathway describes the course a chemical or physical agent takes from the site source to the exposed receptor and generally includes the following elements:

- A source and mechanism of chemical release.
- A retention or transport medium (or media where chemicals are transferred between media).
- A point of potential human or ecological contact with the contaminated medium.
- An exposure route (e.g., ingestion, inhalation) at the point of exposure.

Golder (2019a) presents a CSM which include an assessment of Source-Pathway-Receptor linkages and identified the following potentially complete exposure pathways, for site derived contamination.

4.3 Potential Risk from Contaminant Exposure

For a risk to a receptor to occur, a complete pathway must exist between the source of contamination and the receptor. Where the contaminant pathway is incomplete, there is no exposure and hence no risk via that pathway. Based on the current understanding of the extent of contamination and the potential contaminant sources, an assessment of the completeness of the exposure pathway and associated mechanism has been undertaken to evaluate potential risks to human health and the environment.

The relevant exposure pathways considered in the risk evaluation are summarised in Table 5.

Table 5: Relevant exposure pathways.

| Land use | Pathway | Reasoning (if pathway is not included) |
|---|---|--|
| Current/Future Site Use | | |
| <input type="checkbox"/> Petroleum use <input checked="" type="checkbox"/> Commercial/Industrial <input type="checkbox"/> Residential <input type="checkbox"/> Recreational <input type="checkbox"/> Agricultural | <input checked="" type="checkbox"/> Soil ingestion <input checked="" type="checkbox"/> Dermal absorption <input checked="" type="checkbox"/> Maintenance/Excavation <input checked="" type="checkbox"/> Inhalation (soil) <input checked="" type="checkbox"/> Inhalation (water) <input type="checkbox"/> Groundwater use <input type="checkbox"/> Produce ingestion <input type="checkbox"/> Discharge to Ecosystem | <p>Groundwater Use: Groundwater not abstracted on site.</p> <p>Produce Ingestion: Not valid pathway for commercial/industrial use, no produce grown on site.</p> <p>Discharge to Ecosystem: Not valid pathway, nearest surface water is 60 m away from site boundary.</p> |
| Off-Site Use | | |
| <input type="checkbox"/> Petroleum use <input checked="" type="checkbox"/> Commercial/Industrial <input type="checkbox"/> Residential <input type="checkbox"/> Recreational <input type="checkbox"/> Agricultural | <input type="checkbox"/> Soil ingestion <input type="checkbox"/> Dermal absorption <input checked="" type="checkbox"/> Maintenance/Excavation <input checked="" type="checkbox"/> Inhalation (soil) <input checked="" type="checkbox"/> Inhalation (water) | <p>Soil Ingestion and Dermal Absorption: Not valid pathway as surrounding off-site land is paved.</p> |

| Land use | Pathway | Reasoning (if pathway is not included) |
|----------|---|--|
| | <input checked="" type="checkbox"/> Groundwater use <input type="checkbox"/> Produce ingestion <input checked="" type="checkbox"/> Discharge to Ecosystem | Produce Ingestion: Not valid pathway, surrounding property use is commercial/ industrial with no produce grown on site. |

Based on the conceptual model for the site, the following exposure pathways were assessed:

■ **Soil – on-site source:**

- **Direct contact with soils on site:** As noted above, the ESA works identified soil petroleum hydrocarbon concentrations exceeding MfE (2011) Tier 1 All Pathways acceptance criteria. Exceedances were indicated in shallow soils less than 1 m bgl primarily for the protection of excavation workers (via vapour inhalation). No exceedances of the dermal, soil ingestion and outdoor inhalation pathways were identified. As such, the site data does not indicate that there is an unacceptable risk associated with direct contact with shallow soils above the groundwater table. Therefore, this pathway is considered to be **incomplete**.

In the context of the CSM, typical maintenance workers such as gardeners or utility maintenance are unlikely to contact hydrocarbon soils. However, there is the potential for unexpected discovery and there is a need to inform workers of the hazards associated with the possibility of encountering hydrocarbon impacts in these soils. These hazards can be addressed through adoption of a precautionary approach with implementation of an EMP.

- **Direct contact with soils off site:** The adjacent sites surrounding the property are covered by asphalt and concrete or are active roadways. The pathway for soil ingestion and dermal adsorption exposure of off-site workers at those properties is considered to be **incomplete**.
- **Excavation Workers:** The majority of the soil petroleum hydrocarbons exceedances were identified below 1 m bgl, below the groundwater table, and for the protection of excavation workers (via vapour inhalation). The exposure route for the majority of exceedances relates to volatilisation and the inhalation of petroleum hydrocarbon vapours.

Workers conducting deeper excavation below the water table need to prepare an appropriate work plan incorporating procedures to mitigate risks to health, safety and the environment and considering the data available of the locations to be excavated based on the ESA or through collection of additional data. Given the majority of exceedances were detected in soils below 1.0 m, direct exposure to these concentrations via excavation work would likely trigger confined space entry requirements and specific occupational health and safety requirements under the Health and Safety at Work Act 2015 including the requirement to undertake appropriate air monitoring. Therefore, this pathway is considered to be **partially complete**.

■ **Groundwater – on-site and off-site source:**

- **Discharge to aquatic ecosystems:** The nearest surface waterbody is the Otago Harbour approximately 60 m to the south-east of the site boundary. Monitoring has documented a decrease in the extent and thickness of LNAPL which indicates it is not mobile and does not pose a risk of migration towards or discharge into Otago Harbour. Dissolved phase hydrocarbons have also decreased and are below ANZECC (2000) trigger values within 40 m of the site boundary nearest Otago Harbour. Dissolved phase hydrocarbons in monitoring wells closest to Otago Harbour below

laboratory LORs. This pathway is considered to be potentially complete however the ESA works indicate there to be a low risk of dissolved hydrocarbons discharging to Otago Harbour.

- **Extractive groundwater use:** Shallow groundwater is not abstracted for use on site and there are no registered groundwater abstractions within 1 km of the site. Given the absence of registered abstraction bores and the location of the site within commercial/industrial zoned reclaimed land) the shallow groundwater system would not be considered sensitive with respect to potable abstraction. Therefore, the pathway is not complete.
- **Vapour exposure from groundwater and soil:** This exposure pathway is considered to be **potentially complete** for vapour generated from on- and off-site soil and groundwater impacts:
 - **On-site vapour.** The presence of LNAPL in the south-west of the site is a source of soil vapour which may represent a risk to indoor air of newly constructed buildings over areas where the LNAPL is present. However, consistent with the risk-based approach, the risk to indoor air can be managed through appropriate building design, such as ventilation or use of a vapour barrier, depending on the building use and location with respect to the groundwater impacts.
 - **Off-site vapour.** Soil vapour bore located adjacent to the off-site HarbourCold facility identified petroleum hydrocarbon concentrations below MfE (2011) target soil gas concentration for the protection of indoor air quality. This indicates a low probability of a vapour intrusion risk to off-site properties associated with the presence of off-site petroleum hydrocarbon impacts.

Based on the current understanding of the extent of contamination and the potential contaminant sources, and in consideration of the pathways and receptors present at the site and surrounding land, the potential CSM linkages are presented in Table 6.

In summary, development of the CSM has identified the following potentially complete exposure pathways:

Human Health




- On-site inhalation of petroleum hydrocarbon vapours during excavation works in shallow soils and/or close to the groundwater table undertaken in central and southern areas of the site, likely to be associated with LNAPL and soil impacts.
- Off-site inhalation of petroleum hydrocarbon vapours during deep excavation works, particularly those that intersect the groundwater along Fryatt Street adjacent to the site.
- Occupiers of poorly ventilated workspaces located across the southern half of the site via the vapour intrusion pathway due to the presence LNAPL.

Environment

- Migration of impacted groundwater from the site towards Otago Harbour and associated marine ecosystems.

No other potentially complete source-pathway-receptor linkages are considered to exist.

Table 6: Source-pathway-receptor linkages.

| Source | Media | Exposure Mode | On-Site | | Off-Site | | |
|---|-------------|---|---------------------------------|--|---------------------------------|----------------------------------|------------------|
| | | | Commercial / Maintenance Worker | Construction / Excavation Worker | Commercial / Maintenance Worker | Construction / Excavation Worker | Marine Ecosystem |
| Historical discharges from bulk fuel storage at the terminal | Soil | Inhalation | | | | | |
| | | Ingestion | | | | | |
| | | Dermal Contact | | | | | |
| | Groundwater | Abstraction | | | | | |
| | | Discharge to Aquatic Ecosystem | | | | | |
| | Soil Vapour | Indoor Air Inhalation | | | | | |
| | | Outdoor Air Inhalation | | | | | |
|  Pathway not complete or not applicable and no further assessment required | |  Pathway potentially complete but risk assessed to be acceptable | |  Pathway complete | | | |

4.4 Current and Potential Future Risks

The site is located in a commercial/industrial area of Dunedin. Based on the current understanding of soil and groundwater conditions at the site, the potential risks associated with the future commercial/industrial use of the site are anticipated to be:

- Workers undertaking sub-surface excavation works or working within underground voids both on site and off site in the area of Fryatt Street have a potential exposure risk to petroleum hydrocarbon vapours and dermal contact/ingestion. Appropriate health and safety control should be in place to manage risk to workers associated with sub surface excavations.
- Occupiers of poorly ventilated workspaces located within the southern half of the site have a potential exposure risk due to the presence of identified sub-surface petroleum hydrocarbon vapours.

The use of soil and groundwater management best practices at the site should enable the site to be used for continued commercial/industrial land use (consistent with the underlying zoning) with minimal limitations to normal operation of the site. Future buildings may need to consider the use of a vapour barrier to limit the potential for vapour migration from sub-surface soils and groundwater into indoor air.

Naphthalene exceeds the ANZECC (2000) trigger value for the protection of marine ecosystems in groundwater on and off site. However, these off-site locations are limited to only a portion of land extending from the southern end of the site. Naphthalene concentrations decrease by a factor of three within 25 m of the site boundary to a maximum concentration of 0.4 mg/L in well BH49, only slightly above the ecosystem protection criterion of 0.07 mg/L. Naphthalene was not detected above the laboratory LOR (0.0005 mg/L) in monitoring well BH53 located between well BH49 and Otago Harbour.

On this basis and the marginal exceedance of the criterion in BH49, the naphthalene concentrations observed in the off-site groundwater are not likely to present a risk to the marine ecosystems in Otago Harbour. Continued attenuation of the residual hydrocarbon impacts will act to reduce potential future risks associated with discharges to Otago Harbour.

4.5 Mitigation Measures – Management Plans

Environmental Management Plans (EMPs) have been prepared to document controls to mitigate the potential risks to future users (refer Section 4.4) of the site (Golder 2020b) and the off-site road reserve of Fryatt and Halsey Streets adjacent to the site (Golder 2020c). The objective of these EMPs is to set out procedures for the protection of human health and the environment in relation to the identified hazards and risks from petroleum hydrocarbon residues. The EMPs are provide in Appendix B.

The EMPs document a framework for the control of hazards associated with petroleum hydrocarbon impacts to soil, soil vapour and groundwater including:

- Workers undertaking sub-surface excavation works or working within underground voids have a potential exposure risk to petroleum hydrocarbon vapours and dermal contact/ingestion.
- Occupiers of poorly ventilated workspaces located within the southern half of the site have a potential exposure risk due to the presence of identified sub-surface petroleum hydrocarbon vapours.
- Future buildings may need to consider the use of vapour protection measures to minimise the potential for vapour migration from sub-surface soils and groundwater into indoor air.
- Environmental receptors may be impacted as a result of improper soil and or groundwater disposal during ground-disturbing works.

The EMPs are intended to assist the owner, occupier(s) and other affected parties in complying with their legal obligations with respect to health, safety and the environment. The plans are not intended to relieve any party of their legal responsibilities in relation to the management of residual petroleum hydrocarbon impacts on and adjacent to the site.

The off-site EMP (Golder 2020c) does not cover the entirety of Fryatt Street adjacent to the former Mobil terminal. Z Energy Limited (Z Energy) is responsible for a separate Management Area covering the road reserve at the intersection of Fryatt Street and Akaroa Street. The Z Energy Management Area was established under discharge permit RM12.312 issued by ORC. The off-site EMP (Golder 2020c) is intended to complement the Z Energy Long Term Monitoring and Management Plan (URS 2013) prepared under discharge permit RM12.312.

4.6 Potentially Affected Parties

Potentially affected parties for this application are considered to be limited to the landowner (Chalmers Property Limited on behalf of Port of Otago Limited) and DCC.

As part of its ongoing approach to manage potential risks at and adjacent to the site, Mobil has engaged with DCC. Mobil met with DCC in November 2019 to discuss the findings of the ESA works undertaken at the site and adjacent off-site land and the associated risks with respect to the road reserve around the site.

Subsequent to the meeting DCC was provided a copy of the off-site environment management plan (EMP) (Golder 2020c).

An outcome of this engagement was that DCC integrated a management layer in its GIS system with respect to the residual petroleum hydrocarbon impacts in the road reserve around the site. This triggers a notification to the party proposing to undertake disturbance works as part of the approval to work process and provides a link to the EMP.

The residual hydrocarbon impacts relate to a period during which Mobil was the leasehold for the site. While Mobil has exited the lease of the property, it continues to engage with landowner Chalmers Property Limited (on behalf of the Port of Otago Limited) in relation to the site.

4.7 Summary

In summary, it is considered that the effects on the environment associated with the residual discharge of hydrocarbons from the site into and onto land and groundwater are less than minor. The site was decommissioned by 2007 and hence there is no further source of potential contamination. The residual impacts are related to historical activities and the ESA works undertaken have documented that residual hydrocarbon impacts have, and are continuing to attenuate.

The site is located within a commercial/industrial setting with a bulk fuel storage facility located to the north-east, Fulton Hogan Limited bitumen plant and HarbourCold cold store facility to the south-east, Northern Southland Transport Holdings Limited to the south-west, and commercial properties to the north-west.

Monitoring data collected to date documents that while petroleum hydrocarbon impacts to soil and groundwater are present on site, natural processes are acting to attenuate the residual impacts. This is evident in the decrease in concentrations in the monitoring wells over time and the reduction in extent and thickness of LNAPL. Monitoring has also documented decreasing trends in hydrocarbon concentrations with concentrations attenuating below ANZECC (2000) trigger values within 40 m of the leading edge of the LNAPL. Dissolved phase hydrocarbons have not been detected in monitoring wells located closest to Otago Harbour. Dissolved

phased hydrocarbon concentrations indicate that contamination is unlikely to pose a future risk to Otago Harbour.

The site is not located in an area considered sensitive for groundwater abstraction. The absence of registered abstraction bores within this industrial area surrounding the site suggests that the groundwater system would not be considered sensitive with respect to potable abstraction. Therefore, the petroleum hydrocarbon concentrations are not considered to represent an unacceptable risk with respect to potable abstraction.

The Closure Report (Golder 2019b), which has been reviewed and accepted by ORC, concluded future monitoring is not warranted on the basis that:

- The LNAPL mass is not considered to be mobile and poses no further risk of migration.
- The overall trend in the apparent reduction of the lateral extent and thickness of LNAPL.
- The dissolved phase contamination has and is continuing to attenuate. Concentrations adjacent to Otago Harbour are below the ANZECC (2000) trigger values.
- A clear trend of decreasing dissolved phase hydrocarbon concentrations which indicates that contamination is unlikely to pose a future risk to Otago Harbour.
- Soil vapour monitoring indicates no unacceptable risk to off-site commercial-industrial land-use.

In addition, potential risks to future users, based on continued commercial/industrial use, can be effectively managed via the EMPs (including hazardous and health and safety control procedures) in place both on and off site to control hazards associated with petroleum hydrocarbon impacts to soil, soil vapour and groundwater (Golder 2020b, 2020c); and by identification of the affected areas requiring a process for risk management through layers now included within DCC's GIS. On this basis, any adverse environmental effects are being appropriately addressed and no further mitigation is required with respect to the site's discharges.

Based on the current understanding of soil and groundwater conditions at the site, potential risks associated with the future use of the site and potential risks to off-site receptors, are acceptably low and addressed through the EMPs adopted to manage residual contamination. Overall, any adverse effects of the discharge on any persons and on the environment are considered to be less than minor and no persons are considered to be adversely affected.

5.0 STATUTORY ASSESSMENT

5.1 Introduction

This section of the document assesses the relevant statutory matters that arise from the RMA and the relevant planning documents in relation to the discharge of contaminants into land in a manner that may enter groundwater.

5.2 Resource Management Act 1991

5.2.1 Part 2 considerations

In assessing an application for resource consent, a consent authority is required to determine whether the proposal is consistent with the purpose and principles of the Act (Part 2), having regard to the matters set out in section 104, the Fourth Schedule, and any other statutory considerations. Part 2, as set out under sections 5 to 8 of the Resource Management Act 1991 (RMA), outlines the purpose and principles of the Act.

As determined by the Court of Appeal in the recent Davidson⁷ case, the Court held that the Supreme Court's decision in *Environmental Defence Society Incorporated v King Salmon Company Limited* [2014] NZSC 41 was a contextual rejection of the "overall judgment" approach (whereby reference was made to Part 2 after consideration of relevant planning instruments). The Supreme Court's decision did not prohibit consideration of Part 2 in the context of resource consent applications. The Court of Appeal in Davidson held that decision makers should usually consider Part 2 when making decisions on resource consents and must do so where the relevant planning instruments have not been prepared in a way which reflects Part 2. But consideration of a consent application under Part 2 may be unnecessary where the relevant planning instruments have clearly been prepared in a way which gives effect to Part 2.

In this case, the relevant objectives and policies of the Regional Policy Statement for Otago 1988 (RPS) and the Partially Operative Otago Regional Policy Statement 2019 (PRPS) as discussed below, provide certainty and are complete regarding the matters relating to this application. There are no known invalidities, uncertainties or incompleteness with respect to this application. However, for completeness, consideration has been given to Part 2, as well as the objectives and policies of the relevant planning instruments as outlined in Section 5.3. It is assessed that consent can be granted under both Part 2 and the relevant provisions of the applicable planning documents, and that the proposal is consistent with the policy framework of the RPS and the PRPS. A brief summary of the key sections of Part 2 of the RMA is provided below.

Part 2 of the RMA sets out the purpose and principles of the Act. Section 5 states the purpose of the Act as sustainable management. In relation to the effects on the environment and human health of the residual impacts, the assessment undertaken in Section 4.0 of this report concludes that the effects on the environment associated with the discharge of hydrocarbon compounds into and onto land and groundwater are less than minor. Potential risks to human health and the environment associated with the presence of the residual dissolved phase hydrocarbons are considered to be of a level that is acceptable and can be appropriately addressed through management approaches in line with the EMPs in place. It is considered that the implementation of the EMPs, supported by observed natural attenuation processes acting to reduce the mass of residual impacts, will safeguard the life-supporting capacity of the water and soil, thereby achieving the purpose of the Act.

⁷ Davidson Family Trust v Marlborough District Council [2018] NZCA 316.

Section 6 of the RMA identifies matters of national importance which shall be 'recognised and provided for', while section 7 identifies other matters which 'shall have particular regard to' under the RMA. There are no section 6 matters of relevance to this proposal.

The following section 7 matters are also considered to be relevant:

7(b) the efficient use and development of natural and physical resources:

7(f) maintenance and enhancement of the quality of the environment."

Mobil ceased operations at the terminal in 1995 and decommissioned the facility between 1995 and 2007. ESA works at the terminal, both on site and off site, have been undertaken progressively commencing in 1992. The ESA works have identified the presence of hydrocarbons in soil and groundwater beneath the site, and extending off site, due to the historic bulk storage of petroleum and diesel products. The CSM, based on the ESA works, supports the adoption of natural attenuation over more direct remediation methods as the most effective strategy to degrade residual hydrocarbon impacts such that there is not considered to be unacceptable risks to the environment.

Natural attenuation processes have reduced the overall contaminant extent and mass. The ESA works have documented a decrease in the extent and thickness of LNAPL, and decreasing trends of dissolved phase hydrocarbons. Monitoring has documented dissolved phase concentrations attenuating below ANZECC (2000) trigger values within 40 m of the leading edge of residual LNAPL and prior to the point of discharge of shallow groundwater to Otago Harbour.

Therefore, it is considered that the quality of the environment will be maintained and that the residual impacts will continue to decrease through natural attenuation processes. Further, EMPs have been prepared to document controls to mitigate the potential risks to future users, thereby enabling the efficient use and development of the land resource for future commercial/industrial purposes. On this basis, it is considered the proposal is consistent with the relevant section 7 matters in the RMA.

Section 8 of the RMA requires specific regard to be had to the principles of the Treaty of Waitangi (Te Tiriti o Waitangi). It is considered that for this proposal there are no specific Treaty of Waitangi matters requiring consideration in accordance with section 8 of the RMA.

It is considered that the application is consistent with Part 2 of the RMA and accords with the relevant matters set out under the RMA sections 5 to 8.

5.2.2 Notification considerations – sections 95 to 95F

Sections 95 to 95F of the RMA set out requirements in relation to the public and limited notification of resource consent applications. Sections 95A, 95B, 95D and 95E have particular relevance to this application.

The steps in Section 95A relate to whether public notification should be given. The application is assessed below with regards to its requirements:

- Step 1: The applicant does not request public notification, section 95C is not relevant as this relates to requests for further information; and the application is not made jointly with one to exchange recreation reserve land. Therefore, public notification is not mandatory under section 95A(2)(a).
- Step 2: The application is not subject to a rule or national environmental standard that precludes public notification; and the application is not for a controlled activity or a boundary activity. Therefore, public notification is not precluded under section 95A(4)(a).
- Step 3: The application is not subject to a rule or national environmental standard that requires public notification; and as demonstrated in Section 4.0 of this report, the application will not or is not likely to

have adverse effects on the environment that are more than minor in relation to section 95D. Therefore, the application need not be publicly notified under section 95A(7)(a).

- Step 4: No special circumstances are considered to exist in relation to the application that would warrant the application being publicly notified, therefore public notification is not required under section 95A(9)(a). Therefore, in applying the tests set out under section 95A of the RMA, it is considered that the application should not be publicly notified.

The steps in section 95B relate to whether limited notification should be given. With regards to its requirements:

- Step 1: There are no affected protected customary rights groups or customary marine title groups; and the proposed activity is not identified as being on, adjacent to, or affecting land that is the subject of a statutory acknowledgement. Therefore, there are no specific people or groups that are affected, to whom limited notification should be given under section 95B(4).
- Step 2: The application is not subject to a rule or national environmental standard that precludes limited notification; and the application is not for a controlled activity. Therefore, limited notification is not precluded under section 95B(5)(a).
- Step 3: The application is not for a boundary activity or a prescribed activity, but the consent authority must notify any other person they determine to be affected under section 95E. Under section 95E and as concluded in the assessment of effects on the environment in Section 4.0, there are no persons that have been identified as being affected to an extent that is minor or more than minor. Therefore, limited notification is not required under section 95B(9).
- Step 4: No special circumstances are considered to exist in relation to the application that would warrant limited notification, therefore limited notification is not required under section 95B(10)(a).

Therefore, in applying the tests set out under section 95B of the RMA, it is considered that the application does not warrant limited notification.

5.2.3 Section 104 considerations

For any resource consent application, section 104 of the RMA requires the consent authority, in making a decision on a resource consent application, to have regard to:

- The actual and potential effects on the environment of allowing the activity (section 104(1)(a)).
- Any measure proposed or agreed to by the applicant for the purpose of ensuring positive effects on the environment to offset or compensate for any adverse effects on the environment that will or may result from allowing the activity (section 104(1)(ab)).
- The relevant provisions of any national environmental standard, other regulation, national policy statement, coastal policy statement, regional policy statement or proposed regional policy statement, plan or proposed plan (section 104(1)(b)).
- Any other matters considered relevant or necessary to consider (section 104(1)(c)).

The actual effects on the environment associated with the discharge in question have been assessed in Section 4.0 of this document and are concluded as being less than minor (section 104(1)(a)).

The statutory documents of relevance to this application to discharge contaminants are the RPS, the PRPS, the Waste Plan and the Water Plan, which are assessed in accordance with section 104(1)(b) in Section 5.3 and Section 5.4 of this report.

Having regard to section 104(1)(b), it is noted the National Policy Statement for Freshwater Management 2020 (NPSFW) came into effect on 3 September 2020, replacing the National Policy Statement for Freshwater Management 2014, which was later amended in 2017 (NPSFW 2014). In terms of the policy framework generally, much of what has changed from the previous NPSFW 2014, relates to obligations for local authorities and tangata whenua. The NPSFW sets out the objectives and policies for freshwater management under the RMA, however it is considered an assessment against its provisions would not result in any barriers to the outcomes of this application process and is therefore not considered to be relevant to the proposal to which this application relates. Therefore, no further consideration has been given to the NPSFW in this document.

5.2.4 Section 104B, 105 and 107 considerations

Under section 104B, a consent authority may grant or refuse the application for a discretionary activity and if it grants such an application, may impose conditions under section 108.

Section 105 of the RMA provides for matters that consent authorities must have regard to when considering applications to discharge. Effectively, section 105 requires:

- An assessment of the discharge and the sensitivity of the environment to adverse effects (section 105(1)(a)).
- The reason for the proposed choice in relation to the discharge (section 105(1)(b)).
- An outline of the alternative discharge methods and locations (section 105(1)(c)).

The nature of the discharges and sensitivity of the receiving environment for the discharge of contaminants is described in Sections 2.0 and 3.0. As outlined in these sections, the site is located within an industrial area and the primary source of the residual impacts (former terminal infrastructure i.e., tank farm, drum storage and filling station) has been removed from the site. The residual impacts are inherently linked to the historical petroleum handling activities. In addition, the movement of residual hydrocarbon impacts has been observed to be decreasing in extent to being largely localised on site. The residual LNAPL has decreased in extent and thickness through natural attenuation and has been assessed as being less than minor, and recent ESA works (Golder 2019a) show that while residual petroleum hydrocarbon impacts are present the impacts do not pose, or are not likely to pose an immediate or long term hazard to human health or the environment. EMPs have been prepared to outline management controls to ensure potential risks associated with the future commercial/industrial use of the site are acceptably managed.

It is not possible to change the discharge or its location. Natural attenuation of the residual hydrocarbon impacts is occurring with groundwater monitoring documenting a reduction in the mass and extent of dissolved phase concentrations over time through natural attenuation processes. Further, the ESA works have documented that the site conditions do not pose an unacceptable risk to human health and the environment. On this basis, active remedial work at the site is not considered to be required and the potential risks can be appropriately managed through the implementation of the EMPs for any future works undertaken both on and off site. The proposal, as reflected within this application, is considered to be the best practicable option available.

Section 107 of the RMA is also of relevance to the discharge of contaminants into land in circumstances where it may enter groundwater. Under this section of the RMA, a consent authority may not grant a discharge permit if the discharge, after reasonable mixing, gives rise to a range of specific effects listed in section 107(1)(c) to (g). The discharge will not result in any of these specific effects occurring, and therefore there is no barrier to granting the discharge permit being sought under the provisions of section 107 of the RMA.

5.3 Assessment of Relevant Objectives and Policies

5.3.1 Otago Regional Policy Statement 1988

The RPS was made operative on 14 September 1998 and sets the direction for future management of Otago's natural and physical resources. It provides the foundation for the development of regional plans and district plans. The RPS contains issues, objectives, policies and methods to address the region's resource management issues with a goal to achieve integrated management of the region's natural and physical resources.

The RPS is under review and as such, some provisions within the RPS have been revoked and do not have any legal force. The document is therefore partially operative and works in conjunction with the Partially Operative Regional Policy Statement for Otago 2019 (PRPS), which is assessed in Section 5.3.2 below. It is noted that those provisions assessed below have not been revoked and therefore remain operative under the RPS. Chapter 5 (Land), Chapter 6 (Water) and Chapter 8 (Coast) of the RPS contain objectives and policies which are relevant to this application and are assessed below.

Chapter 5 considers the effects of the use, development and protection of Otago's regional land assets and particularly, seeks to promote the sustainable management of Otago's land resources (Objective 5.4.1) while avoiding, remedying or mitigating degradation of the region's natural and physical resources resulting from activities utilising the land resource in accordance with Objective 5.4.2.

Associated Policy 5.5.3 seeks to ensure Otago's land resources are not adversely affected by land activities including contaminated soils, in order to maintain and enhance land resources through avoiding, remedying or mitigating potential adverse effects. The historical use of the site for the storage of petroleum product prior to 1995 has resulted in hydrocarbon impacts to soil and groundwater at the site. Based on the findings of the ESA works (Golder 2019a), continued use of the site for commercial/industrial purposes, supported by EMPs to outline a framework for managing residual contamination risks, the impacted soils are unlikely to pose a risk to human health. While there are potential exposure risks should excavation works be undertaken, the EMPs (Golder 2020b, 2020c) document controls to mitigate the potential risks to future users of the site and the off-site road reserve off Fryatt and Halsey Streets adjacent to the site.

Policy 5.5.5 seeks to minimise the adverse effects of landuse activities on the quality and quantity of Otago's water resource by avoiding, remedying or mitigating the degradation of groundwater and surface water caused by the introduction of contaminants. ESA works undertaken at the site document that hydrocarbon concentrations in groundwater have decreased over the past decade and similarly, the extent and thickness of residual LNAPL has decreased through natural attenuation processes. Given the decreasing trends observed, and that the extent of dissolved phase hydrocarbons has been delineated prior to the point of discharge to Otago Harbour, the residual impacts are unlikely to pose a future risk to or discharge into the Otago Harbour, owing to its proximity from the site.

Chapter 6 seeks to maintain and enhance the quality of Otago's water resources (Objective 6.4.2) and to safeguard the life-supporting capacity of Otago's water resources through protecting the quantity and quality of those water resources (Objective 6.4.3), by promoting a reduction in adverse effects of contaminant discharges into Otago's water bodies through promoting discharges to land where practicable and where there are no significant adverse effects on groundwater or surface water resources or soil, while considering financial and technical constraints, pursuant to Policy 6.5.5. As mentioned above, the ESA works have documented a decrease in the extent and mass of residual petroleum hydrocarbon impacts through natural attenuation occurring over the past decade. These processes will continue to degrade the residual impacts and therefore reduce the nature and extent of residual impacts. The effects of the residual discharge on the Otago Harbour are considered to be less than minor, owing to monitoring trends, the size of the water body and its distance from the site. As such, the proposal is not considered to have any significant adverse effects on ground water or surface water, consistent with Policy 6.5.5.

The policy direction of Chapter 8 is to put in place national priorities and direction to guide the use, development and protection of New Zealand's coastal environment. Policy 8.5.6 recognises the need to reduce the adverse effects of contaminant discharges into Otago's coastal waters through promoting discharges to land where practicable and where there are no significant adverse effects on groundwater or surface water resources or soil, while considering financial and technical constraints. This policy is directly consistent with the intent of Policy 6.5.5 discussed above, with which the proposal is considered to be consistent.

It is therefore considered that the proposed discharge from the site is consistent with the relevant objectives and policies in the RPS.

5.3.2 Partially Operative Otago Regional Policy Statement 2019

The PRPS became effective on 14 January 2019 and provides an update to certain policies of the RPS.

Otago's RPS is under review while ORC prepares and notifies a proposed new Otago Regional Policy Statement (ORPS), scheduled to become operative by 1 April 2022. Appeals are now resolved on several provisions in the proposed ORPS. On 12 December 2018, Council approved these provisions to become operative from 14 January 2019, thereby creating the PRPS. Some provisions in the ORPS are still subject to legal proceedings. However, many are either not under appeal, or have been resolved through negotiation and approved by the court. ORC has made the resolved provisions, and those not appealed, operative from 14 January 2019 under the PRPS, intended to provide more certainty for other planning and consenting processes going on around Otago. Objectives and policies are contained under Part B of the PRPS. The provisions relevant to the proposal are contained under Chapter 4 in Part B of the PRPS and are assessed below.

The policy direction of Chapter 4 is that 'Communities in Otago are resilient, safe and healthy' and specifically, Objective 4.6 seeks that hazardous substances, contaminated land and waste materials do not harm human health or the quality of the environment in Otago. Associated Policy 4.6.5 relates to the management of contaminated land and seeks to ensure contaminated or potentially contaminated land does not pose an unacceptable risk to people or the environment by:

- a) Assessing and, if required, monitoring contaminant levels and environmental risks.
- b) Protecting human health in accordance with regulatory requirements.
- c) Minimising adverse effects of the contaminants on the environment.

Extensive ESA works have been undertaken on the site (Golder 2019a) to identify the potential risk to human health and the environment, following the decommissioning of the historical terminal infrastructure at the site, being the source of the residual discharges. Based on the assessment of effects in Section 4.0, together with the mitigation and management measures in place for future use of the land on and off site and that the site is located within an industrial area, any adverse effects of the proposal on human health and the environment are considered to be less than minor, and the associated risks acceptable. On this basis, it is not considered necessary for ongoing monitoring or further remedial work to be required, as the ESA works have documented that the residual hydrocarbon impacts do not represent an unacceptable risk to human health and the environment (Golder 2019a, 2019b) and that:

- The LNAPL mass is not considered to be mobile and poses no further risk of migration.
- There is an overall trend of a reduction of the lateral extent and thickness of LNAPL.
- The dissolved phase contamination has and is continuing to attenuate. Concentrations adjacent to Otago Harbour are below the ANZECC (2000) trigger values.
- There is a clear trend of decreasing dissolved phase hydrocarbon concentrations which indicates that contamination is unlikely to pose a future risk to Otago Harbour.
- Soil vapour monitoring indicates no unacceptable risk to off-site commercial/industrial land-use.
- EMP's are in place to manage residual contamination for both potential on-site (Golder 2020b) and off-site (Golder 2020c) receptors.

The proposal is therefore consistent with Policy 4.6.5.

The discharge is considered to be consistent with the policy direction of the PRPS.

5.3.3 Regional Plan: Waste for Otago

The Waste Plan was made operative on 11 April 1997 and assists ORC in managing Otago's waste issues. Its purpose is to provide an integrated approach to waste issues with the aim of reducing the adverse effects associated with Otago's waste stream. To achieve this, the Waste Plan has policies methods and rules to address the waste issues facing Otago. The provisions relevant to the proposal are contained in Section 5 'Contaminated Sites' and are assessed below.

Objective 5.3.1 aims to avoid, remedy or mitigate any adverse effects of contaminated site, while Objective 5.3.2 seeks to avoid further site contamination. Sections 2.0 and 3.0 document a comprehensive understanding of the historic site activities and associated sources of contamination, and the nature and extent of residual hydrocarbon impacts including that natural attenuation processes are acting to degrade the residual hydrocarbons.

The assessment in Section 4.0 concludes that the residual hydrocarbon impacts do not represent an unacceptable risk to human health and the environment and will be managed in such a way that any adverse effects on the surrounding environment are less than minor. Given the source of the discharge has been removed from the site, no further contamination will occur.

Policy 5.4.3 requires that contaminated sites are contained and rehabilitated to a practicable extent having regard to the use to which the land is to be put. Policy 5.4.4 outlines the requirement to apply the ANZECC (1992) guidelines to identify the most appropriate course of action for a particular contaminated site.

Adoption of the ANZECC (1992) guidelines supports the implementation of a risk-based decision-making process for the management of contaminated land. The ANZECC (1992) guideline notes that a fundamental goal is to "render a site acceptable and safe for continuation of its existing use". Further it considers that

where there is no threat to human health and the environment is not at risk, a management approach is acceptable particularly where further investment in site investigation and remediation will not result in a net benefit with respect to understanding and managing risks associated with residual contamination.

ESA works have been undertaken at the site in an iterative manner since 1992 and have resulted in a comprehensive understanding of the nature and extent of hydrocarbon impacts associated with historical bulk fuel storage. The ESA works have documented that while petroleum hydrocarbon impacts are present at the site, these do not represent an unacceptable level of risk to human health based on continued commercial/industrial use (Golder 2019a, 2019b). This is considered to adequately align with the intent of Policy 5.4.4, owing to the use of the site and surrounding land for industrial activities and future use of the site for industrial/commercial purposes.

Further, given that the majority of residual impacts are present below the groundwater table and that the ESA works have documented that natural attenuation processes have and are continuing to reduce the mass and extent of residual hydrocarbon impacts, active remediation is not considered warranted with respect to the risks posed. Rather, implementation of a management approach where the residual hazards are identified, and control measures outlined is most appropriate course of action for this site. The use of soil and groundwater management best practices at the site should enable the site to operate as a continued commercial/industrial land use zone with minimal limitations to normal operation of the site. Future buildings may need to consider the use of a vapour barrier to limit the potential for vapour migration from sub-surface soils and groundwater into indoor air. This is considered to adequately align with the intent of Policy 5.4.3

Overall, the proposal is consistent with the relevant objectives and policies of the Waste Plan.

5.3.4 Regional Plan: Water for Otago

The Water Plan was made operative on 1 January 2004 and was most recently updated in May 2020 and is the primary document that manages water within the Otago region. Its purpose is to promote the sustainable management of Otago's water resources and to achieve this, the plan has policies, methods and rules to address issues of development and protection of Otago's water resources. The relevant objectives and policies are contained within Sections 7 'Water Quality' and 9 'Groundwater' and are assessed below.

The key Objective 7.A.2 in Section 7 aims to enable the discharge of water or contaminants to water or land in a way that maintains water quality and supports natural and human use values, including Kai Tahu values. Policy 7.B.4 states that when considering any discharge of water or contaminants to land, have regard to the ability of the land to assimilate the water or contamination, any potential soil contamination, and any potential adverse effects on water quality. Policy 7.C.2 specifically seeks to have regard to the nature or the discharge and sensitivity of the receiving environment to adverse effects, when considering applications to which this proposal relates.

The assessment of effects in Section 4.0, based on the comprehensive ESA works (Golder 2019a) shows that the ongoing discharge poses a low risk to Otago Harbour owing to an ongoing decrease in the mass and extent of dissolved phase petroleum hydrocarbons in groundwater with attenuation below relevant ANZECC (2000) criteria prior to the point of discharge to Otago Harbour. Therefore, it is considered the quality of groundwater and of the Otago Harbour will be effectively maintained and no significant adverse effects are anticipated as a result of the proposal.

Additionally, and in line with Policy 7.C.2, the proposed discharge is passive in nature where the source of contamination has been removed from the site, located within an industrial area and proposed for future industrial/commercial land use. Accordingly, EMPs are in place for works undertaken both on and off site to ensure appropriate management of the residual impacts of the discharge.

Policy 7.C.4 addresses the duration of any new resource consent for an existing discharge of contaminants and the need to take account of the anticipated adverse effects of the discharge on any natural and human use values supported by an affected water body. As shown though the ESA works (Golder 2019a), the discharge is considered to meet the relevant water quality standards for the receiving environment and there is not considered to be any adverse effects on the water body.

Objective 9.3.3 seeks to ensure that the existing groundwater quality of Otago's aquifers is maintained to provide for the existing and potential uses of water. Related Policy 9.4.1 states that in managing any activity involving the discharge of contaminants, to ensure that the suitability of aquifers to support the recognised uses of groundwater identified in Schedule 3 is maintained. The site and associated discharge are not located within any groundwater protection zone identified in the Water Plan or within the vicinity of aquifers specified under Schedule 3 as under Policy 9.4.1.

As discussed above, given the continued use of the land for commercial/industrial purposes, and that natural attenuation of hydrocarbons has and is continuing to occur, and with implementation of the EMPs, the proposal ensures that significant adverse impacts on the environment will not occur and the existing groundwater resource is maintained. No registered groundwater abstractions for potable, irrigation or stockwater use purposes are located within 1.5 km of the site with, registered wells mainly used for monitoring or geological investigation purposes (PDP 2013). Additionally, any unregistered potable abstractions are considered unlikely given the proximity of Otago Harbour (low groundwater quality) and the presence of a reticulated supply in the vicinity of the site. As such, the impacted groundwater resource is not considered to be sensitive or adversely impacted, supported by the occurrence of natural attenuation of the contamination as has been observed.

Overall, the proposal is considered to be consistent with the relevant objectives and policies of Water Plan.

5.4 Resource Consent Requirements

5.4.1 Introduction

The Waste Plan and Water Plan contain the relevant rules which trigger the need to seek resource consents. The relevant provisions of each document are set out in the following sections of this application.

5.4.2 Regional Plan: Waste for Otago

The provisions within section 5 'Contaminated Sites' of the Waste Plan are relevant to this application as they relate to the discharge of contaminants. Section 5.6 contains rules for contaminated sites and is assessed below.

Rule 5.6.1 provides for hazardous wastes at contaminated sites as a discretionary activity, where this involves:

1. *"The disturbance of land; or*
2. *The discharge of hazardous waste into water; or*
3. *The discharge of hazardous waste onto or into land in circumstances that may result in that hazardous waste (or any other hazardous waste emanating as a result of natural processes from that hazardous waste) entering water; or*
4. *The deposit of any hazardous waste, in, on or under land; or*
5. *The discharge of hazardous waste into air at or from a contaminated site"*

The application relates to the discharge of petroleum hydrocarbon compounds associated with historical bulk storage activities. The residual petroleum hydrocarbons would not be considered hazardous waste based on the definition in the Waste Plan. However, the residual petroleum hydrocarbons would be considered a contaminant as defined in the RMA (and adopted in the Waste Plan). As such it is considered that the discharge would be incorporated by the overall intent of Rule 5.6.1(3) above.

Therefore, resource consent is required for the passive discharge of contaminants into land which may enter water, as a discretionary activity pursuant to Rule 5.6.1(3) of the Waste Plan.

5.4.3 Regional Plan: Water for Otago

The provisions within section 12 of the Water Plan are relevant to this application as they relate to 'Water Take, Use and Management'. Specifically, the rules contained within section 12.B provide for the discharge of hazardous substances, hazardous wastes, specified contaminants, and stormwater; and discharges from industrial or trade premises and consented dams, and are therefore relevant to the proposal and assessed below.

Rule 12.B.4.2 requires that the:

“The discharge of any hazardous substance to water or onto or into land in circumstances which may result in that substance entering water is a discretionary activity, unless it is:

- (a) Permitted by a rule in 12.B.1; or*
- (b) Provided for by a rule in 12.B.2 or 12.B.3.”*

The application is not for the discharge of herbicides or pesticides that is provided for under Rule 12.B.1 and is not for the discharge of tracer dye (Rule 12.B.2) or stormwater (Rule 12.B.3). Therefore, it is considered that the application is covered by Rule 12.B.4.2 above. The application relates to the discharge of petroleum hydrocarbon compounds associated with historical bulk storage activities. The residual petroleum hydrocarbons would be considered a contaminant as defined in the RMA. As such it is considered that the discharge would be regulated by Rule 12.B.4.2.

Therefore, resource consent is required for the passive discharge of contaminants into land which may enter water, as a discretionary activity pursuant to Rule 12.B.4.2 of the Water Plan.

5.5 Statutory Summary

Given the above assessment of resource consent requirements, the discharge of contaminants into land and water from the site at 199 Fryatt Street, Dunedin requires the following resource consents:

- A discharge permit for the discharge of hazardous waste onto or into land in circumstances that may result in that hazardous waste entering water, pursuant to Rule 5.6.1(3) (**discretionary activity**) of the Waste Plan.
- A discharge permit for the discharge of any hazardous substance to water or onto or into land in circumstances which may result in that substance entering water, pursuant to Rule 12.B.4.2 (**discretionary activity**) of the Water Plan.

Overall, the proposal requires resource consent as a **discretionary activity**.

The application is consistent with the policy direction of the relevant planning documents, including the RPS, PRPS, the Waste Plan and Water Plan as assessed in Section 5.3. It is considered that the effects on the environment associated with the passive discharge of hydrocarbon contaminants into land and groundwater will be less than minor as concluded in Section 4.7.

Overall, the potential risks associated with the residual hydrocarbon impacts are considered to be mitigated and effectively managed, supported by appropriate EMPs in place for any future works conducted on site or off site; and will ensure the future use of the industrial/commercial property enables people to provide for their economic, and in turn, social well-being, while avoiding and mitigating any adverse effects.

Therefore, the proposed discharge of contaminants is consistent with Part 2 of the RMA. It is therefore considered that this application for resource consent can be granted on a non-notified basis, subject to appropriate conditions of consent.

6.0 SUMMARY

Mobil is seeking a discharge permit from ORC, for the discharge of petroleum hydrocarbon contaminants onto or into land in a manner that may enter groundwater from the site at 199 Fryatt Street, Dunedin. The former Mobil Dunedin Terminal site is owned by a third party and is presently vacant, following its historical use associated with petroleum handling activities comprising terminal infrastructure, including drum storage, a tank farm and filling station, which have now been removed from the site.

Mobil ceased operations at the terminal in 1995 and decommissioned the facility between 1995 and 2007. Mobil has progressively undertaken ESA works at the terminal, both on site and off site, commencing in 1992. The ESA works have documented the presence of residual petroleum hydrocarbon impacts in soil and groundwater at the site. Residual petroleum hydrocarbon impacts primarily comprise:

- LNAPL, consisting predominately of diesel with some petrol, in a small number of monitoring wells located across the southern half of the site. Given the heterogeneous nature of the fill, the LNAPL does not comprise one single continuous layer and is present as a series of smaller discontinuous LNAPL pockets with varying LNAPL saturations.
- Hydrocarbon soil contamination is present primarily toward the south-west of the site. Hydrocarbon impacts to soil are generally characterised by C₁₀-C₁₄ total petroleum hydrocarbons (TPH) and total xylenes with the highest concentrations present between 1.0 and 4.0 m bgl coinciding with the smear zone.
- Dissolved hydrocarbons, characterised by C₁₀-C₁₄ TPH, naphthalene and ethylbenzene are present in groundwater beneath the site and off site to the south beneath Fryatt Street and to a lesser extent Halsey Street, detectable concentrations were below the MfE (2011) Tier 1 acceptance criteria. Naphthalene, ethylbenzene and m&p-xylene have been identified above the ANZECC (2000) trigger values for the protection of marine ecosystems.

The CSM, based on the ESA works, supports the adoption of natural attenuation over more direct remediation methods as the most effective strategy to degrade residual hydrocarbon impacts such that there is not considered to be unacceptable risks to the environment. Further the CSM supports a position that future monitoring is not warranted and potential risks to future users, based on continued commercial/industrial use, can be effectively managed via the EMPs (including hazardous and health and safety control procedures) in place both on and off site to control hazards associated with petroleum hydrocarbon impacts to soil, soil vapour and groundwater (Golder 2020b, 2020c); and by identification of the affected areas requiring a process for risk management through layers now included within DCC's GIS.

On this basis, any adverse environmental effects are being appropriately addressed and no further mitigation is required with respect to the site's discharges. Overall, any adverse effects of the discharge on any persons and on the environment are considered to be less than minor and no persons are considered to be adversely affected.

It is considered that the proposal represents sustainable management and is consistent with Part 2 of the RMA, and the policy framework of relevant statutory plans and other documents.

7.0 LIMITATIONS

Your attention is drawn to the document, “Report Limitations”, as attached (Appendix C). The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

8.0 REFERENCES

- ANZECC 1992. Guidelines for the Assessment and Management of Contaminated Sites. Australian and New Zealand Environment and Conservation Council National Health and Medical Research Council, January 1992.
- ANZECC 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Management Strategy Paper No. 4, Vol. 1 (2nd revision). Australian and New Zealand Environment and Conservation Council, Canberra.
- Garg S, Newell CJ, Kulkarni PR, King CD, Adamson DT, Irianni Renno M, Sale T 2017. *Overview of Natural Source Zone Depletion: Processes, Controlling Factors, and Composition Change*. Groundwater Monitoring & Remediation Vol 37, No. 3 pp 62–81.
- Golder 2019a. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Supplementary Environmental Site Assessment. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, May 2019.
- Golder 2019b. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Closure Report. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, November 2019.
- Golder 2020a. Former Mobil Dunedin Terminal – Request for s87BB Notice of Deemed Permitted Activity. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, 30 September 2020.
- Golder 2020b. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Environmental Management Plan. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, March 2020.
- Golder 2020c. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Environmental Management Plan – Fryatt Street Adjacent to Former Terminal. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, March 2020.
- MfE 2011. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Ministry for the Environment, Wellington.
- PDP 2007. Phase 1 Environmental Site Assessment for the Mobil Dunedin Terminal (410-350). Report prepared by Pattle Delamore Partners Limited for Mobil Oil New Zealand Limited, December 2007.

- PDP 2009. Phase 1 Environmental Site Assessment for Mobil Dunedin Terminal – Historical Site Office Compound, Dunedin (410-350). Report prepared by Pattle Delamore Partners Limited for Mobil Oil New Zealand Limited, November 2009.
- PDP 2011. Preliminary Site Investigation Works at the Former Dunedin Terminal, Fryatt Street, Dunedin (410-350). Report prepared by Pattle Delamore Partners Limited for Mobil Oil New Zealand Limited, September 2011.
- PDP 2012. 2012 Groundwater Monitoring and Sampling Round & Extras – Former Dunedin Terminal, Fryatt Street, Dunedin (410-350). Report prepared by Pattle Delamore Partners Limited for Mobil Oil New Zealand Limited, July 2012.
- PDP 2013. Additional Site Investigations at Former Mobil Dunedin Terminal, Fryatt Street, Dunedin (410-350). Report prepared by Pattle Delamore Partners Limited for Mobil Oil New Zealand Limited, October 2013.
- Suthersan SS, Potter ST, Schnobrich M, Wahlberg J, Quinnan J, Welty N, Fewless T 2016. Rethinking Conceptual Site Models in Groundwater Remediation. Groundwater Monitoring and Remediation 36(4) pp. 22-30.
- URS 2012. Chevron Dunedin Terminal - Resource Consent Application and Assessment of Environmental Effects. Report prepared by URS New Zealand Limited for Chevron New Zealand, 31 August 2012.
- URS-Opus 2011. Halsey Street Integrated Catchment Management Plan 2010-2060 - Contract No. 3206 Dunedin 3 Waters Strategy. Report prepared by URS New Zealand Limited and Opus International Consultants Limited for Dunedin City Council, 18 October 2011.
- USEPA 2019. Vapour Intrusion Screening Level (VISL) calculator. US Environmental Protection Agency, March 2019.

Signature Page

Golder Associates (NZ) Limited



Deanne Barretto
Senior Planner



Andrew Hart
Principal Environmental Scientist

Golder and the G logo are trademarks of Golder Associates Corporation.

[https://golderassociates.sharepoint.com/sites/139835/project files/6 deliverables/001-r/20449679-001-r-rev0.docx](https://golderassociates.sharepoint.com/sites/139835/project%20files/6%20deliverables/001-r/20449679-001-r-rev0.docx)

APPENDIX A

Certificate of Title



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R. W. Muir
Registrar-General
of Land

Identifier 679896
Land Registration District Otago
Date Issued 01 July 2016

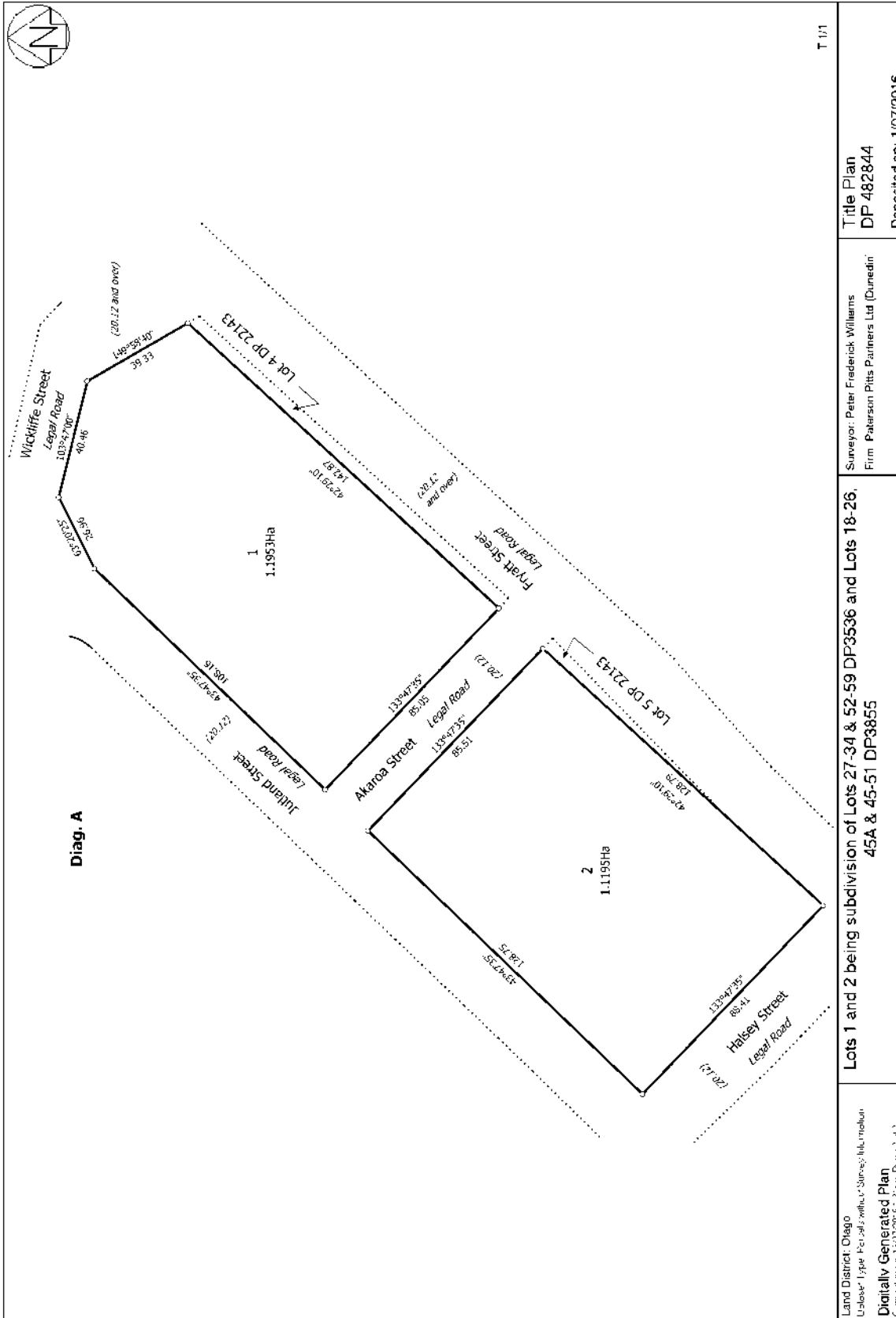
Prior References
OT295/183

Estate Fee Simple
Area 1.1195 hectares more or less
Legal Description Lot 2 Deposited Plan 482844

Registered Owners
Chalmers Properties Limited

Interests

789125 Lease in renewal of Lease 334897 to Mobil Oil New Zealand Limited Term 21 years computed from 1.7.1989 (renewal clause) - 27.9.1991 at 10:55 am



T 1/1

Title Plan
DP 482844

Surveyor: Peter Frederick Williams
Firm: Paterson Pitts Partners Ltd (Dunedin)

Lots 1 and 2 being subdivision of Lots 27-34 & 52-59 DP3536 and Lots 18-26, 45A & 45-51 DP3855

Land District: Otago
Unless stated otherwise, bearings, distances, and areas are as shown on the original plan.
Digitally Generated Plan
Generated on 11/07/2016 at 3:03:03 PM

Deposited on: 1/07/2016

APPENDIX B

**Environmental Management
Plans**



REPORT

**Former Mobil Dunedin Terminal - 199 Fryatt Street,
Dunedin**

Environmental Management Plan

Submitted to:

Mobil Oil New Zealand Limited

Law Department, PO Box 1709, Auckland 1104

Submitted by:

Golder Associates (NZ) Limited

Level 2 Nielsen Centre, 129 Hurstmere Road, Takapuna 0622, Auckland

+64 9 486 8068

19129937-001-R-Rev0

March 2020



Table of Contents

| | | |
|------------|---|-----------|
| 1.0 | INTRODUCTION | 1 |
| 1.1 | Purpose | 1 |
| 1.2 | Document Structure | 1 |
| 1.3 | Relevant Parties..... | 3 |
| 1.4 | General Site Details | 3 |
| 2.0 | SUMMARY OF CONTAMINATION RISKS | 4 |
| 2.1 | Overview..... | 4 |
| 2.2 | Soil | 4 |
| 2.3 | Soil Vapour | 4 |
| 2.4 | Groundwater | 5 |
| 3.0 | MANAGEMENT REQUIREMENTS..... | 5 |
| 4.0 | SITE USE | 7 |
| 4.1 | Present Condition..... | 7 |
| 4.2 | Future Uses and Site Redevelopment | 7 |
| 5.0 | EXCAVATION PROCEDURES..... | 8 |
| 5.1 | General..... | 8 |
| 5.2 | Site Control..... | 8 |
| 5.3 | Hazard Control Procedures | 8 |
| 5.3.1 | Overview..... | 8 |
| 5.3.2 | Personal protective equipment (PPE)..... | 8 |
| 5.3.3 | Personal hygiene | 9 |
| 5.3.4 | Gas and vapour monitoring | 9 |
| 5.4 | Control of Excavation | 10 |
| 5.5 | Disposal of Surplus Soil | 11 |
| 5.6 | Management of Groundwater..... | 11 |
| 5.7 | Contingency Measures..... | 12 |
| 6.0 | LIMITATIONS..... | 12 |
| 7.0 | REFERENCES | 12 |

TABLES

Table 1: Relevant parties3
Table 2: Site details3

FIGURES

Figure 1: Site location and layout2
Figure 2: On-site management area6

APPENDICES

APPENDIX A
Report Limitations

1.0 INTRODUCTION

1.1 Purpose

Mobil Oil New Zealand Limited (Mobil) ceased operation of its former Dunedin Terminal at 199 Fryatt Street in Dunedin (the site) in 1995 and decommissioned the facility between 1995 and 2007 (Figure 1).

Environmental site assessment (ESA) works have been undertaken by Mobil since 1992.

Based on an assessment of soil and groundwater conditions at the site (Golder Associates (NZ) Limited (Golder) 2019a, 2019b), the site is considered suitable for commercial/industrial use. The implementation of soil and groundwater management controls under this Environmental Management Plan (EMP) is intended to address the potential risks to future users.

The potential risks associated with the future commercial/industrial use of the site are anticipated to be:

- Workers undertaking subsurface excavation works or working within underground voids have a potential exposure risk to petroleum hydrocarbon vapours and dermal contact/ingestion.
- Occupiers of poorly ventilated workspaces located within the southern half of the site have a potential exposure risk due to the presence of identified subsurface petroleum hydrocarbon vapours.
- Future buildings may need to consider the use of vapour protection measures to minimise the potential for vapour migration from subsurface soils and groundwater into indoor air.
- Environmental receptors may be impacted as a result of improper soil and or groundwater disposal during ground-disturbing works.

This EMP has been prepared by Golder on behalf of Mobil for the former terminal land. The objective of this EMP is to set out procedures for the protection of human health and the environment in relation to identified hazards and risks from petroleum hydrocarbon residues remaining beneath the site.

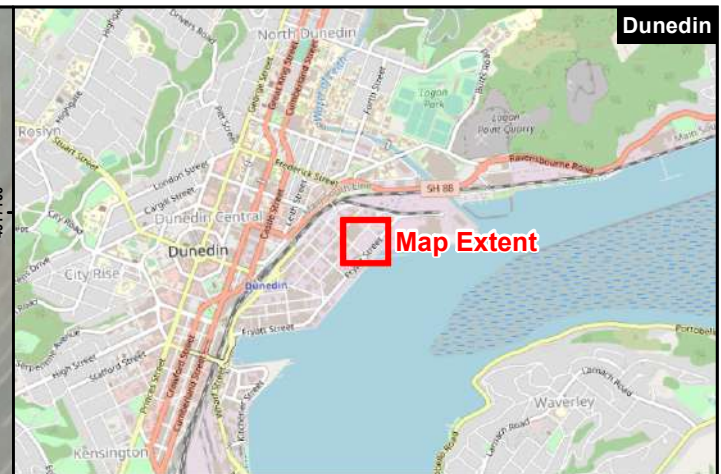
The ESA works and associated risk assessments undertaken to date have been based on continued commercial/industrial land use at the site. If the site is to be used for a more sensitive land use in the future, then professional advice should be sought from a suitably qualified and experienced practitioner in contaminated land management to reassess potential risks.

This EMP is a “live” document to be reviewed and amended, as necessary, prior to any future redevelopment works to ensure any changes to the environmental conditions are recognised and that human health and environmental risks are managed appropriately.

1.2 Document Structure

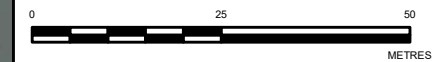
The EMP is structured as follows:

- Section 1.0 – Information on the site and relevant parties.
- Section 2.0 – Summarises the potential risks to human health, and the environment associated with the documented contaminant conditions.
- Section 3.0 – Documents the site management approach and generic controls to be implemented.



- LEGEND**
- Site boundary
 - Former tank locations
 - Existing bund
 - Concrete pad / surface structure

- NOTES**
1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
 2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA Sourced from the LINZ Data Service and licensed for re-use under the Creative Commons Attribution 4.0 New Zealand licence
 3. Schematic only, not to be interpreted as an engineering design or construction drawing.



REFERENCE SCALE: 1:1,000 (at A3)
 PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
 MOBIL OIL NEW ZEALAND LIMITED

PROJECT
 FORMER MOBIL DUNEDIN TERMINAL

TITLE
 SITE LOCATION AND LAYOUT

| | | |
|------------|------------|------------|
| CONSULTANT | YYYY-MM-DD | 2019-11-19 |
| | PREPARED | AE |
| | REVIEW | DD |
| | APPROVED | AH |

PROJECT NO. 19129937 REPORT 001 REV. 0 FIGURE 01

- Section 4.0 – Provides an assessment of the use of the site with respect to current and future uses including site redevelopment.
- Section 5.0 – Documents procedures to be implemented when undertaken excavation works on the site.

1.3 Relevant Parties

A copy of the EMP will be held by the following parties as detailed in Table 1.

Table 1: Relevant parties.

| Owner/Occupier/Authority | Relevant party ⁽¹⁾ | Contact |
|-----------------------------|--|---|
| Lessee | Mobil Oil New Zealand Limited | Phone: 0800 880 361 |
| Landowner | Chalmers Properties Limited (on behalf of Port of Otago Limited (POL)) | Phone: 03 472 9787 |
| Regulatory Authority | Otago Regional Council (ORC) | 70 Stafford Street Dunedin 9054 Phone: 0800 474 082 |
| Territorial Local Authority | Dunedin City Council (DCC) | 50 The Octagon Dunedin 9016 Phone: 03 477 4000 |

Note: ⁽¹⁾ Relevant parties at the time of preparing this EMP.

1.4 General Site Details

A summary of general site information is given in Table 2.

Table 2: Site details.

| | |
|---------------------|---|
| Site address | 199 Fryatt Street, Dunedin |
| Legal description | Sections 27-34 and 52-59, DP 3536. |
| Site area | 1.12 hectare (ha) |
| Co-ordinates (NZTM) | 1407362 E, 4916984 N. |
| Regulatory agency | Dunedin City Council Otago Regional Council |
| Zoning | 'Port 2' under Dunedin City District Plan (2006) and 'Industrial Port' under Dunedin City Proposed Second Generation Plan (2018). |
| Landowner | Chalmers Properties Limited (on behalf of POL). |
| Proposed future use | Continued commercial/industrial use associated with POL operations. |

2.0 SUMMARY OF CONTAMINATION RISKS

2.1 Overview

Based on the ESA works and groundwater sampling undertaken up until April 2017 (Golder 2019a, 2019b), the following summarises potential risks to human health and the environment.

Contaminants have been documented to be present at the site and its immediate surrounds in the following phases:

- Residual soil contamination where contamination is adsorbed onto the soil. Soil contamination typically comprises total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, total xylenes and naphthalene (BTEXn).
- As light non-aqueous phase liquid (LNAPL) which tends to occur at the top of the groundwater table.
- Dissolved phase contamination, where contaminants are dissolved within groundwater. Dissolved phase contaminants primarily comprise TPH and BTEXn.
- As a vapour, due to volatile compounds present in LNAPL, dissolved phase and/or residual soil contamination volatilising into the vapour phase.

2.2 Soil

Previous investigations have documented the nature and extent of on-site soil impacts associated with historical bulk fuel storage activities at the site (Golder 2019a, 2019b). The investigations have documented the presence of petroleum hydrocarbons compounds including TPH and BTEXn.

Petroleum hydrocarbon concentrations in soil exceeded Ministry for the Environment (MfE) (2011) Tier 1 acceptance criteria for a commercial/industrial land use. These exceedances have primarily been identified for C₇-C₉ TPH, C₁₀-C₁₄ TPH and total xylenes and for specific criteria for the protection of excavation workers based on the inhalation pathway.

Evaluation of the soil quality data identifies that the bulk of the criteria exceedances for the protection of excavation workers are present in soils between 1.0 metres (m) and 4.0 m below ground level (bgl) including in soils located below the groundwater table. The exceedances are primarily located in the former tank farm area to south-west of former Tank 5 and toward the southern corner of the site (Figure 1).

A limited number of exceedances of the indoor inhalation pathway, primarily for total xylenes were also identified. Exceedances of the indoor inhalation pathway were primarily located in samples collected at and below the groundwater table. As volatilisation is controlled by solubility, soil samples collected below the groundwater table cannot be used to assess vapour inhalation risk.

2.3 Soil Vapour

Soil vapour monitoring undertaken across the southern and western areas of the site shows concentrations of the primary chemicals of interest (COIs), namely BTEXn, in soil vapour on site are below MfE (2011) target soil gas concentrations for the protection of human health (via vapour intrusion) (Golder 2019a, 2019b).

In addition to BTEXn, on-site soil vapour samples also identified the presence of a range of other petroleum hydrocarbon-related compounds. The reported concentrations of these compounds, except for 1,2,4-trimethylbenzene were below vapour intrusion screening criteria.

The presence of LNAPL in the south-west of the site is a source of soil vapour which may represent a risk to indoor air of newly constructed buildings where the LNAPL occurs. However, the risk to indoor air can be managed through appropriate building design, such as ventilation or use of a vapour barrier, depending on the building use and location with respect to the groundwater impacts.

2.4 Groundwater

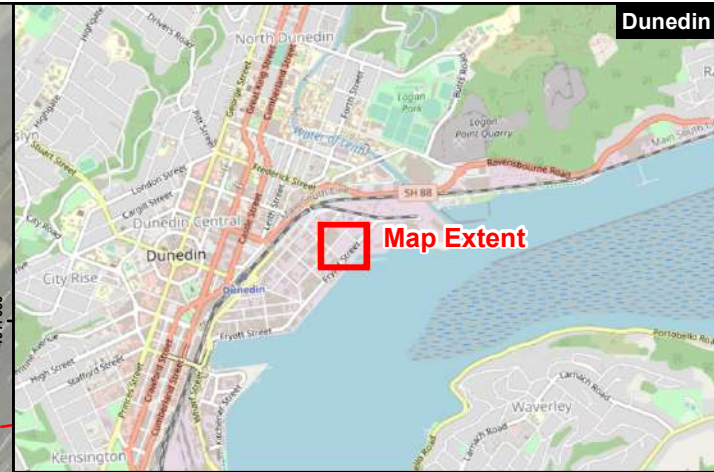
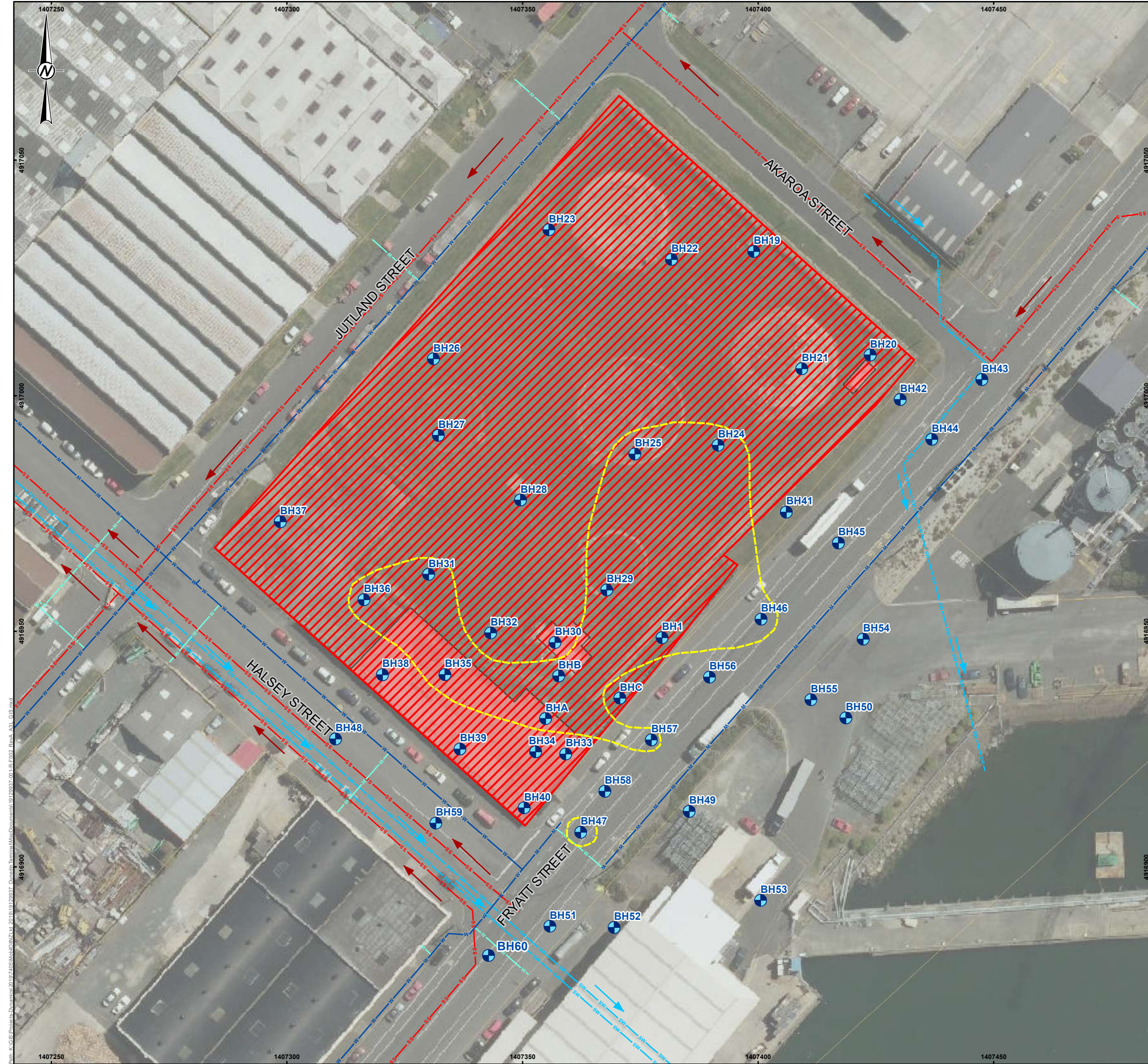
Groundwater monitoring has identified the presence of LNAPL in a number of monitoring wells across the central and southern area of the site and in monitoring wells along the western side of Fryatt Street (Figure 2). Measurable LNAPL was detected in seven on-site wells (BH24, BH25, BH29, BH35, BH36, BHA and BHB) with globules observed in a further well (BH31). A maximum in-well LNAPL thickness of 0.232 m (BH25) was measured in April 2017 (Golder 2019a).

Dissolved TPH and BTEX and polycyclic aromatic hydrocarbon (PAH) compounds in samples collected from the groundwater monitoring wells were below MfE (2011) Tier 1 route specific groundwater acceptance criteria via the indoor and outdoor inhalation pathways.

3.0 MANAGEMENT REQUIREMENTS

This section sets out general management requirements under this EMP. The key requirements comprise the following:

- 1) It is recommended that this EMP is implemented during any future site redevelopment and/or any future subsurface maintenance works.
- 2) This plan applies to 199 Fryatt Street, Dunedin, which is legally described as Sections 27-34 and 52-59, DP 3536.
- 3) All site occupiers and personnel carrying out or controlling redevelopment and/or subsurface maintenance on the site should be familiar with this EMP and are responsible for ensuring that the requirements of this EMP have been followed.
- 4) A copy of this EMP should be available on site at all times so that reference can be made to the EMP when undertaking any excavation works within the site.
- 5) The EMP is intended to assist the owner(s) or site supervisor(s) in mitigating risks related to potentially contaminated soils and/or groundwater with respect to health, safety and the environment. It is not intended to cover the general site safety procedures required for typical excavation, demolition and construction activities at the site.



LEGEND

- On-site Management Area
- Groundwater monitoring wells
- Inferred LNAPL extent - April 2017
- Water pipe
- Water service pipe
- Stormwater pipe
- Sewer pipe
- Concrete pad / surface structure
- Parcel boundaries

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.



REFERENCE SCALE: 1:800 (at A3)
 PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
ON-SITE MANAGEMENT AREA

| | | |
|------------|------------|------------|
| CONSULTANT | YYYY-MM-DD | 2020-02-10 |
| | PREPARED | AE |
| | REVIEW | DD |
| | APPROVED | AH |

PROJECT NO. 19129937 REPORT 001 REV. 0 FIGURE 02

Path: K:\GIS\Projects\Dunedin\19129937_001\19129937_001_1B_E002_Rev04_A31_GIS.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN REPRODUCED FROM A31

- 6) Excavation, demolition and construction activities at the site may be subject to other controls/rules/policies under the relevant district and regional plans, including but not limited to, the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 and ORC's Regional Plan – Waste for Otago. Any conditions imposed by the regulatory authorities should be adhered to. However, it is expected that this EMP will be incorporated into any consent/permit involving excavation work at the site to ensure the risks associated with remaining petroleum hydrocarbon residues are managed appropriately.
- 7) Overall responsibility for the implementation of this EMP will be held by the Landowner. However, the specific requirements and provisions of the EMP will be under the control of the site supervisor. This EMP should be considered a “live” document and updated to reflect any changes in contaminant sources or site usage.

4.0 SITE USE

4.1 Present Condition

Based on previous ESAs, the current use of the site is not expected to present unacceptable human health or environmental risks during ground disturbance works associated with petroleum hydrocarbon residues in soil, soil vapour and groundwater beneath the site. This EMP is intended to provide guidance to future site users or developers that may encounter residual hydrocarbons during redevelopment or future use of the site.

4.2 Future Uses and Site Redevelopment

With respect to the currently identified environmental risks and hazards, there is not expected to be unacceptable human health or environmental risks for any future redevelopment, provided the following conditions are adhered to:

- The land use remains commercial/industrial.
- Prior to the construction/alteration of any buildings a soil vapour assessment should be undertaken by a suitably qualified professional to assess any possible vapour migration risk for the proposed building. If the soil vapour intrusion risk is unacceptable, mitigation measures may need to be incorporated into the design of the building to ensure the risk to occupants (via the inhalation pathway) is effectively managed (e.g., installation of a vapour barrier).
- All excavation activities should be undertaken in accordance with the procedures outlined in Section 5.0 below.
- No groundwater bores should be installed at the site for abstractive purposes unless further investigations are undertaken.

The provisions of this EMP should be adhered to during any future redevelopment or subsurface maintenance activities.

5.0 EXCAVATION PROCEDURES

5.1 General

This section discusses safety in relation to potential human and environmental hazards associated with exposure to petroleum hydrocarbon contaminated soil or groundwater. It is not intended to cover the general site safety procedures required at any site where such work is carried out. In addition to standard health and safety measures the following procedures should be adhered to by all workers during excavation work at the site.

5.2 Site Control

Excavation works undertaken on site should be placed under the control of a responsible person who should ensure that the requirements for excavation work contained within this plan are adhered to. This person should be aware of the groundwater, soil and soil vapour conditions (as summarised in Section 2.0) likely to be encountered.

Given ground disturbance works are likely to encounter petroleum hydrocarbon impacts, the landowner or principal contractor should engage a suitably qualified and experienced contaminated land professional¹ to provide advice in relation to handling contaminated soils and groundwater.

5.3 Hazard Control Procedures

5.3.1 Overview

The main hazards associated with excavating into contaminated soils and groundwater at the site are the inhalation of dust and vapours by workers and the release of contaminants into the environment.

Any work in confined spaces should be carried out in accordance with Australian/New Zealand Standard AS/NZ2865:2001 'Safe Working in a Confined Space' which outlines requirements for risk assessment, securing a safe atmosphere, respirators, work permits, standby persons, rescue, retrieval, equipment, communications, and training.

No flames, smoking or sparking equipment are to be permitted within 11.0 m of excavations or subsurface work. Any hot work activities or work that involves an ignition source within 11.0 m of an excavation can only be carried out in conjunction with appropriate atmosphere testing (see Section 5.3.4).

5.3.2 Personal Protective Equipment (PPE)

The nature of the chemicals present in soil and groundwater indicates that there is a potential hazard from exposure to these chemicals via inhalation, ingestion and skin absorption. Where the work methods cannot be modified to mitigate the risk of skin contact, workers should wear appropriate PPE to minimise contact with impacted soils. Minimum PPE requirements should include:

- Wrist-to-neck-to-ankle cover (long sleeve shirt and pants or equivalent).
- Impermeable gloves, for example nitrile, however, the resistance of the gloves to the contaminants encountered on site should be confirmed prior to use.

¹ In the absence of a definition for a SQEP in the NES_{soil}, guidance on the minimum requirements for a SQEP are provided in the MfE (2012) Users' Guide - National Environmental Standard for Assessing Contaminants in Soil to Protect Human Health'.

- Eye protection.
- Gumboots or similar footwear.

Where the risk of exposure to dust or vapours cannot be mitigated, workers should consider the use of appropriate respiratory equipment (i.e., respirators fitted with volatile organic compound (VOC) filter cartridges).

5.3.3 Personal hygiene

Site personnel undertaking subsurface works should be made aware of the importance of personal hygiene. Direct skin contact with petroleum hydrocarbon impacted soils, dust and groundwater should be avoided but if contact does occur, the area should be washed immediately. The following measures should be implemented:

- The designation of separate areas for eating, located away from the area of works, should be clearly delineated.
- Eating or drinking should not be allowed on the site outside of the designated eating areas.
- Protective gloves should be removed prior to eating, drinking or smoking.
- Hands and other exposed parts of the body should be washed prior to entering the eating area and on leaving the site.

5.3.4 Gas and vapour monitoring

If contaminated soil or groundwater is encountered during excavation or subsurface work, the advice of a suitably qualified health and safety advisor should be sought to assess whether any extra precautions are necessary. A suitable monitor such as a photo-ionisation detector (PID) should be used to detect petroleum vapours – soil should not be sniffed.

The site supervisor will be responsible for monitoring of ambient air within the works area during excavation works to assess air quality. Where available, information on the potential levels of vapours along the excavation should be reviewed in advance and the need for third party monitoring evaluated.

Ambient air quality within the works area will be monitored using a calibrated gas meter able to measure VOCs, lower explosive limit (LEL), oxygen (O₂), methane (CH₄), carbon monoxide (CO) and hydrogen sulfide (H₂S) during ground breaking and prior to entry of the excavation. Monitoring instruments should be bump tested prior to commencement of works each day using a suitable standard of known concentration.

It is noted that where the work area will include a deep excavation this would effectively be a confined space. Any works carried out in a subsurface confined space should be done in accordance with the “Occupational Safety and Health booklet – Safe Working in a Confined Space”.

Atmosphere testing with a LEL meter is required for the duration of works. If LEL concentrations are identified above 1 % LEL, then the source of this concentration is to be either isolated or controlled and re-tested prior to commencing works. At 5 % LEL, work should be stopped and the site supervisor informed.

The LEL meter may also measure concentrations of O₂, H₂S and CO, which can cause potential hazards in confined spaces and H₂S and CO can result in asphyxiation. Ambient air is oxygen-deficient when the O₂ concentration is less than 19.5 % by volume, which should be used as an action level for O₂.

For H₂S, respiratory tract irritation and eye inflammation occurs at around 200 parts per million (ppm). National occupational exposure limits for H₂S are 15 ppm for short term exposure (15-minute average) and 10 ppm for long term exposure (8-hour average). However, H₂S, which can be smelt (rotten eggs) between 0.01 ppm and 1.5 ppm, can cause acute health problems between 2 ppm and 5 ppm; therefore, H₂S greater

than 2 ppm should be used as the Action Level for stopping work and re-assessing conditions. Respirators are available to prevent exposure to H₂S.

CO is an asphyxiant and is combustible, with a national occupational exposure limit of 30 ppm for long term exposure (8-hour average). An action level of 20 ppm for CO should be used.

In summary the action levels are:

- LEL:
 - 1 % triggers isolation and re-assessment of work environment and controls; and
 - 5 % triggers stop work.
- VOCs, as a measure of total hydrocarbons, greater than 100 ppm trigger stop work and re-assessment of work environment and controls.
- O₂ less than 19.5 % trigger stop work and re-assessment of work environment and controls.
- H₂S greater than 2 ppm triggers stop work and re-assessment of work environment and controls.
- CO greater than 20 ppm triggers stop work and re-assessment of work environment and controls.

Work should only recommence when conditions are below the limits defined above and suitable mitigation measures have been implemented.

Personnel should not enter excavations or subsurface confined space where petroleum hydrocarbons odours are present without approval/permission by a person qualified to issue permits, and:

- Designated assessment parameters fall within the appropriate safety ranges; or
- Ventilation of the area maintains these parameters; or
- Suitable PPE including breathing apparatus provides the level of protection required.

Any groundwater pumping used to control groundwater at the site should be managed so that petroleum hydrocarbon residues in the ground drawn towards the pumping position do not present an explosion hazard.

Changes in procedures or the use of additional controls may be considered but should be addressed in revised work procedures.

5.4 Control of Excavation

The following general and physical controls of site works are considered necessary when dealing with any potentially contaminated soils and/or groundwater that may be encountered.

- a) Where excavation work is being conducted, public access should be prevented using warning signs with secure fencing (whilst still allowing for vehicle access).
- b) All excavation work undertaken at the site should be carried out in such a way that the generation of dust is kept to a minimum. This will be achieved by:
 - dampening down of soils, including stockpiled soils, on a regular basis, particularly during hot/dry and windy periods;
 - limit vehicle access and speed (<15 kilometres per hour (km/hr)) and control traffic movements to minimise dust generation and transport of affected soil on vehicle tyres;

- advise all site workers of the need to minimise dust by the responsible operation of machinery;
 - suspend dust generating activities when dust control measures become ineffective due to increased wind speed. The objective of these measures is to prevent visible dust emissions beyond the site boundary; and
 - daily tidying-up of the site area and excavations to minimise the potential for any leaching or erosion of excavated material by wind or water.
- c) Maintain a water supply on site (e.g., hose and garden sprinkler) to keep soils, including any stockpiled soils, damp during dry conditions.
- d) Erosion and sediment control measures should be established to minimise stormwater entry into the excavations and control surface water and sediment run-off from excavations and stockpiles.
- e) Excavated soil that is obviously impacted with petroleum hydrocarbon residues should be covered to prevent transport of the soil off-site by wind or rain.
- f) Run-off from an open excavation or uncovered stockpile (resulting from events such as rainfall, dust suppression or stockpiling of wet excavated ground) should be restricted to within the site boundary.
- g) It is important to prevent the spread of soil from the site unto site access roads. Controls, including haul roads and wheel wash facilities, should be established given the unpaved condition of the site. Controls should be inspected daily and if vehicles are found to be tracking affected soil beyond the site boundary then remedial measures should be implemented. Any tracked soil observed beyond the site boundary should be removed and returned to the site.
- h) Any conditions imposed by the regulatory authorities associated with the excavation works (e.g., as part of a resource consent) should be adhered to.

5.5 Disposal of Surplus Soil

Given the likelihood of encountering impacted soils during future redevelopment works or by maintenance/excavation workers carrying out subsurface works, a suitably qualified and experienced environmental consultant should be contacted to identify the appropriate environmental requirements (e.g., soil sampling). As a general principle, potentially contaminated soil should not be removed from the site. Site excavation activities should be carried out in such a way as to minimise the generation of surplus soil.

Material to be removed off-site should be tested by a suitably qualified and experienced environmental consultant to identify the best disposal option. Materials being disposed off-site should only be taken to a facility holding the appropriate licence to accept that material.

The site supervisor for the redevelopment site works should ensure that records are kept of all excavation works associated with contaminated soils. These should include the location and dimensions of the excavation, the ground conditions (e.g., presence of petroleum hydrocarbon impact, i.e., staining and odour). Copies of the completed waste manifest documentation should be forwarded to the environmental consultant, ORC and DCC for their records.

5.6 Management of Groundwater

If an excavation intercepts groundwater, and the excavation requires dewatering, groundwater pumped from the excavation should not be disposed off to stormwater or sanitary sewer receptors without the approval of DCC and ORC.

5.7 Contingency Measures

If potentially contaminated materials are encountered outside of documented areas of residual petroleum hydrocarbons during ground-breaking activities, the following should be undertaken:

- Cease earthwork activities, isolate, secure and stockpile soil as necessary. Temporary stockpiled materials should be managed in accordance with industry best practice guidelines.
- Contact the landowner or principal contractor who should in turn engage a suitably qualified and experienced contaminated land professional.
- The suitably qualified and experienced contaminated land professional should be engaged to undertake a visual assessment, collect soil samples (if required) and provide guidance as to appropriate mitigation or contingency measures.
- DCC and ORC should be notified by the landowner or principal contractor within one week of the identification of any contamination identified during the earthworks.

6.0 LIMITATIONS

Your attention is drawn to the document 'Report Limitations' as attached (Appendix A). The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

7.0 REFERENCES

Golder 2019a. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Supplementary Environmental Site Assessment. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, May 2019.

Golder 2019b. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Closure Report. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, May 2019.

MfE 2011. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated sites in New Zealand. Ministry for the Environment, Wellington.

MfE 2012. Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington.

APPENDIX A

Report Limitations

This report has been provided by Golder Associates (NZ) Limited (“Golder”) subject to the following limitations:

- i) The purpose for which the works were performed is set out in Section 1.1 of the report.
- ii) The scope of the works to be performed and described is in accordance with Purchase Order 4410826021. A description of the work done is set out in the report. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.
- iii) This report is prepared based on information reviewed at the time of preparation of the report.
- iv) Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the report. If a service is not expressly indicated, do not assume it has been provided. Conclusions from field work are an expression of opinion based on samples or locations at the site. The report accordingly is not operating as a guarantee that the condition of the site could not be different at points between sampling locations or at different parts of the site. Thus, due to the inherent variability in natural soils and [subsurface] conditions it is therefore unlikely that the results, assumptions and conclusions set out in this report will represent the extremes of conditions at any location removed from the specific points of sampling.
- v) Where this report indicates that information has been provided to Golder by Mobil Oil New Zealand Limited or by third parties, Golder has made no independent verification of this information except as expressly stated in the report.
- vi) The analysis and conclusions presented in this report are applicable as at the date of this report. Golder does not make any representation or warranty that the conclusions in the report can be extrapolated for future use as there may be changes in the conditions of the site, applicable legislation or other factors that would affect the conclusions contained in this report.
- vii) All relevant legislation in the jurisdiction in which the site is located and relating to the works has been complied with by Golder as at the date of this report.
- viii) The report should be read in full and no excerpts are to be taken as representative of the conclusions. The report should not be used or relied upon for any purpose except as defined in Section 1.1 of the report and subject to the limitations set out in this section.
- ix) This report has been prepared on the instruction of Mobil Oil New Zealand Limited and may be used and relied on by Mobil Oil New Zealand Limited and its Affiliates, and other entities contemplated in the agreement between Golder and Mobil Oil New Zealand Limited, such as purchasers of the site, lenders to purchasers, property owners, purchasers from property owners, lessees from property owners and assignees of lease from lessees of property owners.
- x) Golder accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.
- xi) Affiliates means (a) Exxon Mobil Corporation or any parent of Exxon Mobil Corporation, (b) any company or partnership in which Exxon Mobil Corporation or any parent of Exxon Mobil Corporation now or hereafter(1) owns or (2) controls, directly or indirectly, more than fifty percent (50%) of the ownership interest having the right to vote or appoint its directors or functional equivalents (“Affiliated Company”), (c) any joint venture in which Exxon Mobil Corporation, any parent of Exxon Mobil Corporation, or an Affiliated Company is the operator, and (d) any successor in interest to (a) and (c) above.



golder.com



REPORT

**Former Mobil Dunedin Terminal - 199 Fryatt Street,
Dunedin**

Environmental Management Plan - Fryatt Street Adjacent to Former Terminal

Submitted to:

Mobil Oil New Zealand Limited

Law Department, PO Box 1709, Auckland 1104

Submitted by:

Golder Associates (NZ) Limited

Level 2 Nielsen Centre, 129 Hurstmere Road, Takapuna 0622, Auckland

+64 9 486 8068

19129937-002-R-Rev0

March 2020



Table of Contents

| | |
|---|-----------|
| 1.0 INTRODUCTION | 1 |
| 1.1 Purpose | 1 |
| 1.2 Document Structure | 3 |
| 1.3 Relevant Parties..... | 3 |
| 1.4 General Management Area Details..... | 3 |
| 2.0 SUMMARY OF CONTAMINATION RISKS | 4 |
| 2.1 Overview..... | 4 |
| 2.2 Soil | 4 |
| 2.3 Groundwater | 4 |
| 2.4 Soil Vapour | 5 |
| 3.0 MANAGEMENT REQUIREMENTS..... | 5 |
| 4.0 MANAGEMENT AREA USE..... | 6 |
| 5.0 EXCAVATION PROCEDURES..... | 6 |
| 5.1 General..... | 6 |
| 5.2 Site Control..... | 7 |
| 5.3 Hazard Control Procedures | 7 |
| 5.3.1 Overview..... | 7 |
| 5.3.2 Personal Protective Equipment (PPE) | 7 |
| 5.3.3 Personal hygiene | 7 |
| 5.3.4 Gas and vapour monitoring | 8 |
| 5.4 Control of Excavation | 9 |
| 5.5 Disposal of Surplus Soil | 10 |
| 5.6 Management of Groundwater..... | 10 |
| 5.7 Contingency Measures..... | 10 |
| 6.0 LIMITATIONS..... | 11 |
| 7.0 REFERENCES | 11 |

TABLES

Table 1: Relevant parties3
Table 2: Management Area details3

FIGURES

Figure 1: Off-site Management Areas2

APPENDICES

APPENDIX A
Report Limitations

1.0 INTRODUCTION

1.1 Purpose

Mobil Oil New Zealand Limited (Mobil) ceased operation of its former Dunedin Terminal (the site) in 1995 and decommissioned the facility between 1995 and 2007 (Figure 1). Environmental site assessment (ESA) works have been undertaken by Mobil since 1992.

The ESA works have documented the presence of petroleum hydrocarbon impacts extending beneath Halsey Street and Fryatt Street primarily to the south and south-east of the former Mobil terminal. Based on the ESA works, the petroleum hydrocarbon impacts are not considered to represent an unacceptable risk to human health and the environment. The implementation of soil and groundwater management controls under this Environmental Management Plan (EMP) is intended to address the potential risks to future users.

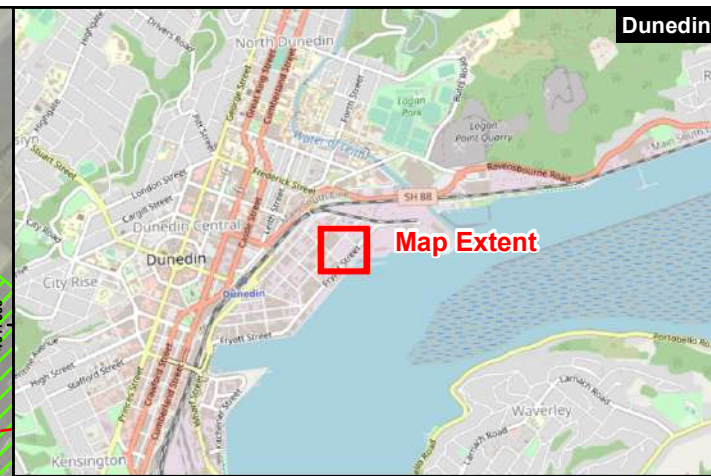
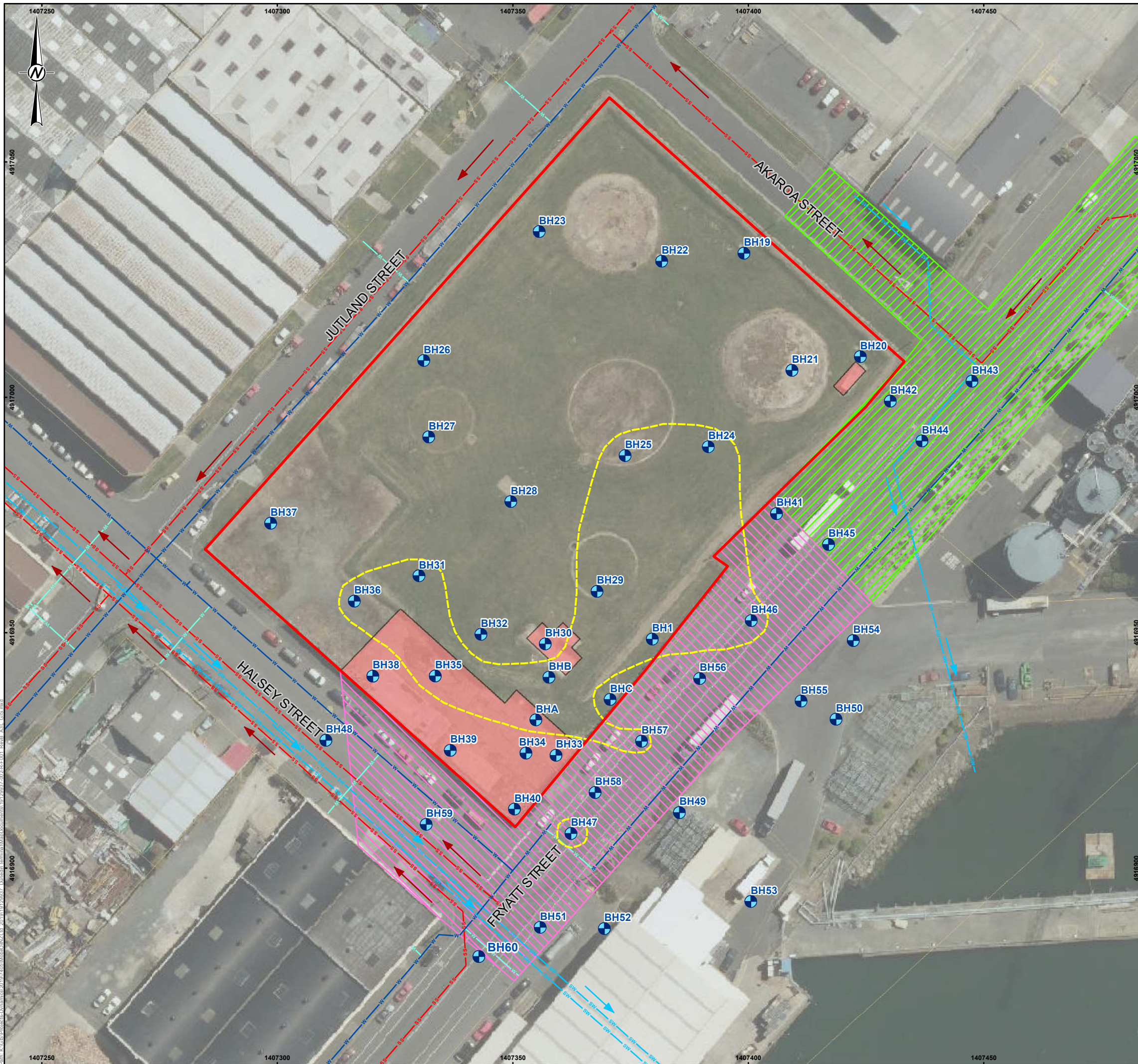
Based on an assessment of soil and groundwater conditions (Golder Associates (NZ) Limited (Golder) 2019a, 2019b), potential risks associated with identified hydrocarbons are anticipated to be:

- Workers undertaking subsurface excavation works or working within underground voids in the area of Fryatt Street have a potential exposure risk to petroleum hydrocarbon vapours and dermal contact/ingestion. Appropriate health and safety controls should be in place to manage risks to workers associated with subsurface excavations.
- Inadequate controls during ground disturbance works that result in the discharge of contaminants to the environment.

This EMP has been prepared by Golder on behalf of Mobil. The objective of this EMP is to set out procedures for the protection of human health and the environment in relation to the identified hazards and risks from petroleum hydrocarbon residues. This EMP is applicable to the 'Management Area' which comprises the road reserve of Fryatt and Halsey Streets adjacent to the site (Figure 1).

This EMP does not cover the entirety of Fryatt Street adjacent to the former Mobil terminal. Z Energy is responsible for a separate Management Area for the road reserve at the intersection of Fryatt Street and Akaroa Street (established under discharge permit RM12.312 issued by Otago Regional Council (ORC)). This EMP is intended to complement the Z Energy Long Term Monitoring and Management Plan (URS New Zealand Limited (URS) 2013) prepared under RM12.312.

This EMP is a "live" document to be reviewed and amended, as necessary, prior to any future redevelopment works to ensure any changes to the environmental conditions are recognised and that human health and environmental risks are managed appropriately. If there is a change to a more sensitive land use activity, professional advice should be sought from a suitably qualified and experienced practitioner to reassess the potential risks.



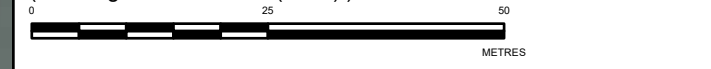
LEGEND

- Site boundary
- Groundwater monitoring wells
- Inferred LNAPL extent - April 2017
- W—W Water pipe
- W—W Water service pipe
- SW—S Stormwater pipe
- SS—S Sewer pipe
- Z Energy Management Area*
- Mobil Management Area
- Concrete pad / surface structure
- Parcel boundaries

NOTES

1. Aerial: LINZ and Eagle Technology, CC-BY-3.0-NZ.
2. Map image: © OpenStreetMap (and) contributors, CC-BY-SA
3. Schematic only, not to be interpreted as an engineering design or construction drawing.

* Z Energy Management Area defined by ORC Permit RM12, 312 (refer Figure 5-2 of URS (2013)).



REFERENCE SCALE: 1:800 (at A3)
 PROJECTION: NZGD 2000 New Zealand Transverse Mercator

CLIENT
MOBIL OIL NEW ZEALAND LIMITED

PROJECT
FORMER MOBIL DUNEDIN TERMINAL

TITLE
OFF-SITE MANAGEMENT AREA

| | | |
|---------------|------------|------------|
| CONSULTANT | YYYY-MM-DD | 2020-02-10 |
| GOLDER | PREPARED | AE |
| | REVIEW | DD |
| | APPROVED | AH |

PROJECT NO. 19129937 REPORT 002 REV. 0 FIGURE 01

Path: K:\GIS\Projects\Dunedin\19129937_002\MapDocs\19129937_002_01_Rpt_A31_GIS.mxd
 1407250 1407300 1407350 1407400 1407450
 4917050 4917000 4916950 4916900

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3

1.2 Document Structure

The EMP is structured as follows:

- Section 1.0 – Information on the Management Area and relevant parties.
- Section 2.0 – Summarises the potential risks to human health, the environment and infrastructure associated with the documented contaminant conditions.
- Section 3.0 – Documents the site management approach and generic controls to be implemented.
- Section 4.0 – Summarises the current and future site usage for which this EMP is intended to apply.
- Section 5.0 – Documents generic procedures intended to mitigate the potential human health and environmental risks associated with ground disturbance works in the Management Area.

1.3 Relevant Parties

A copy of the EMP will be held by the following parties as detailed in Table 1.

Table 1: Relevant parties.

| Owner/Occupier/Authority | Relevant party ⁽¹⁾ | Contact |
|-----------------------------|-------------------------------|---|
| Management Area Landowner | Dunedin City Council (DCC) | 50 The Octagon Dunedin 9016 Phone: 03 477 4000 |
| Regulatory Authority | Otago Regional Council (ORC) | 70 Stafford Street Dunedin 9054 Phone: 0800 474 082 |
| Territorial Local Authority | Dunedin City Council | 50 The Octagon Dunedin 9016 Phone: 03 477 4000 |

Note: ⁽¹⁾ Relevant parties at the time of preparing this EMP.

1.4 General Management Area Details

A summary of general Management Area information is given in Table 2.

Table 2: Management Area details.

| | |
|-------------------------|---|
| Site Address | 199 Fryatt Street, Dunedin |
| Management Area address | Road reserve of Fryatt Street and Halsey Street adjacent to 199 Fryatt Street, Dunedin (Figure 1). |
| Co-ordinates (NZTM) | 1407388 E, 4916930 N. |
| Regulatory agency | Dunedin City Council Otago Regional Council |
| Zoning | 'Port 2' under Dunedin City District Plan (2006) and 'Industrial Port' under Dunedin City Proposed Second Generation Plan (2018). |

| | |
|--------------------------------|--|
| Site Address | 199 Fryatt Street, Dunedin |
| Management Area address | Road reserve of Fryatt Street and Halsey Street adjacent to 199 Fryatt Street, Dunedin (Figure 1). |
| Proposed future use | Continued usage as a road reserve. |

2.0 SUMMARY OF CONTAMINATION RISKS

2.1 Overview

Based on the ESA works and groundwater sampling undertaken up until April 2017 (Golder 2019a, 2019b), the following summarises potential risks to human health and the environment.

Petroleum hydrocarbon compounds have been documented to be present within the Management Area in the following phases:

- Residual soil contamination where contamination is adsorbed onto the soil. Soil contamination typically comprises total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, total xylenes and naphthalene (BTEXn).
- As light non-aqueous phase liquid (LNAPL) which tends to occur at the top of the groundwater table.
- Dissolved phase contamination, where contaminants are dissolved within groundwater. Dissolved phase contaminants primarily comprise TPH and BTEXn.
- As a vapour, due to volatile compounds present in LNAPL, dissolved phase and/or residual soil contamination volatilising into the vapour phase.

2.2 Soil

Previous investigations have documented the nature and extent of soil impacts associated with historical bulk fuel storage activities at the former Mobil terminal (PDP 2011, Golder 2019a). The investigations have documented the presence of petroleum hydrocarbons compounds including TPH, BTEX and naphthalene.

Soil quality data from locations along Fryatt Street documents the presence of low level concentrations of petroleum hydrocarbons in soils between 0.5 metres (m) and 1.0 m below ground level (bgl). Petroleum hydrocarbon concentrations within the upper 1 m of the soil profile were below Ministry for the Environment (MfE 2011) Tier 1 acceptance criteria for commercial/industrial land use.

Higher concentrations exceeding MfE (2011) Tier 1 acceptance criteria for commercial/industrial land use were identified in soil samples collected below 1.5 m bgl (PDP 2011). These exceedances have primarily been identified for C₇-C₉ TPH and for specific criteria for the protection of excavation workers based on the inhalation pathway.

2.3 Groundwater

Groundwater monitoring has identified the presence of LNAPL in a select number of monitoring wells installed within Fryatt Street (Figure 1). Monitoring over time has documented a reduction in the extent and measured

in-well thickness of LNAPL beneath Fryatt Street and based on April 2017 monitoring data is generally only millimetres thick.

Dissolved phase hydrocarbons, primarily comprising C₇-C₉ TPH, ethylbenzene, xylenes and naphthalene are present across the Management Area. Monitoring data from April 2017 documented concentrations of ethylbenzene, xylenes and naphthalene exceeding Australasian and New Zealand Environment and Conservation Council (ANZECC) (2000) trigger values in monitoring wells along the eastern side of Fryatt Street. Concentrations in monitoring wells located adjacent to Otago Harbour did not exceed ANZECC (2000) trigger values.

Dissolved phase hydrocarbon concentrations are below MfE (2011b) Tier 1 route specific groundwater acceptance criteria via the indoor and outdoor inhalation pathways.

2.4 Soil Vapour

Soil vapour monitoring has been undertaken across the southern and western areas of the former Mobil terminal and adjacent to the HarbourCold cold storage facility located at 142 Fryatt Street (between Fryatt Street and Otago Harbour).

Concentrations of primary contaminants of interest (COIs) (BTEXn) within the shallow soil vapour sample collected on the HarbourCold property were below the laboratory limits of reporting (LORs) (PDP 2013; Golder 2014, 2019a). The laboratory LORs for the compounds included in the analytical suite are below the Tier 1 acceptance criteria and vapour intrusion screening criteria (where derived).

The presence of LNAPL in the Management Area is a source of soil vapour which may represent a risk to workers during ground disturbance works. Potential risks can be managed through the implementation of controls and gas/vapour monitoring (refer Section 5.0).

3.0 MANAGEMENT REQUIREMENTS

This section sets out general management requirements under this EMP. The key requirements comprise the following:

- 1) It is recommended that this EMP is implemented during any future ground-disturbance works in the Management Area.
- 2) This plan applies to Management Area which comprises the areas of Fryatt Street and Halsey Street adjacent to 199 Fryatt Street, Dunedin, as presented on Figure 1.
- 3) All personnel carrying out or controlling redevelopment and/or subsurface maintenance in the Management Area should be familiar with this EMP and responsible for ensuring that the requirements of this EMP have been followed.
- 4) A copy of this EMP should be available at all times so that reference can be made to the EMP when undertaking any excavation works within the Management Area.
- 5) The EMP is intended to assist the owner(s) or site supervisor(s) in mitigating risks related to potentially contaminated soils and/or groundwater with respect to health, safety and the environment. It is not

intended to cover the general site safety procedures required for a typical excavation, demolition and construction activities at the site.

- 6) Ground disturbance works in the Management Area may be subject to other controls/rules/policies under the relevant district and regional plans, including but not limited to, the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 and ORC's Regional Plan – Waste for Otago. Any conditions imposed by the regulatory authorities should be adhered to. However, it is expected that this EMP will be incorporated into any consent/permit involving excavation work to ensure the risks associated with remaining petroleum hydrocarbon residues are managed appropriately.
- 7) Overall responsibility for the implementation of this EMP will be held by the landowner. However, the specific requirements and provisions of the EMP will be under the control of the site supervisor. This EMP should be considered a "live" document and updated to reflect any changes in contaminant sources or site usage.

4.0 MANAGEMENT AREA USE

The current use of the area as a road reserve is not expected to present significant human health or environmental risks associated with petroleum hydrocarbon residues in soil, soil vapour and groundwater provided following conditions are adhered to:

- The usage of the Management Area remains as a road reserve.
- The procedures within this EMP are adhered to.
- All excavation activities are undertaken in accordance with the procedures outlined in Section 5.0 below.
- No groundwater monitoring wells are disturbed/removed without the prior approval of the landowner.
- No groundwater bores are installed at the site for abstractive purposes unless further investigations are undertaken.

The provisions of this plan should be adhered to during any future redevelopment or subsurface maintenance activities.

5.0 EXCAVATION PROCEDURES

5.1 General

This section discusses safety in relation to potential human and environmental hazards associated with exposure to petroleum hydrocarbon contaminated soil or groundwater. It is not intended to cover the general site safety procedures required at any site where such work is carried out. In addition to standard health and safety measures the following procedures should be strictly adhered to by all workers during excavation work at the Management Area.

5.2 Site Control

Excavation works undertaken in the Management Area should be placed under the control of a responsible person who should ensure that the requirements for excavation work contained within this plan are adhered to. This person should be aware of the groundwater, soil and soil vapour conditions (as summarised in Section 2.0) likely to be encountered.

Given ground disturbance works are likely to encounter petroleum hydrocarbon impacts, the landowner or principal contractor should engage a suitably qualified and experienced contaminated land professional¹ to provide advice in relation to handling contaminated soils and groundwater.

5.3 Hazard Control Procedures

5.3.1 Overview

The main hazards associated with excavating into contaminated soils and groundwater in the Management Area are the inhalation of dust and vapours by workers and the release of contaminants into the environment.

Any work in confined spaces should be carried out in accordance with Australian/New Zealand Standard AS/NZ2865:2001 'Safe Working in a Confined Space' which outlines requirements for risk assessment, securing a safe atmosphere, respirators, work permits, standby persons, rescue, retrieval, equipment, communications, and training.

No flames, smoking or sparking equipment are to be permitted within 11.0 m of excavations. Any hot work activities or work that involves an ignition source within 11.0 m of an excavation can only be carried out in conjunction with appropriate atmosphere testing (see Section 5.3.4).

5.3.2 Personal Protective Equipment (PPE)

The nature of the chemicals present in soil and groundwater indicates that there is a potential hazard from exposure to these chemicals via inhalation, ingestion and skin absorption. Where the work methods cannot be modified to mitigate the risk of skin contact, workers should wear appropriate PPE to minimise contact with impacted soils. Minimum PPE requirements should include:

- Wrist-to-neck-to-ankle cover (long sleeve shirt and pants or equivalent).
- Impermeable gloves, for example nitrile, however, the resistance of the gloves to the contaminants encountered on site should be confirmed prior to use.
- Eye protection.
- Gumboots or similar footwear.

Where the risk of exposure to dust or vapours cannot be mitigated, workers should consider the use of appropriate respiratory equipment (i.e., respirators fitted with volatile organic compound (VOC) filter cartridges).

5.3.3 Personal hygiene

Personnel undertaking any subsurface works should be made aware of the importance of personal hygiene. Direct skin contact with petroleum hydrocarbon impacted soils, dust and groundwater should be avoided but if

¹ In the absence of a definition for a SQEP in the NES_{soil}, guidance on the minimum requirements for a SQEP are provided in the MFE (2012) Users' Guide - National Environmental Standard for Assessing Contaminants in Soil to Protect Human Health'.

contact does occur, the area should be washed immediately. The following measures should be implemented:

- The designation of separate areas for eating, located away from the area of works, should be clearly delineated; and
- Eating or drinking should not be allowed on the work site outside of the designated eating areas; and
- Protective gloves should be removed prior to eating, drinking or smoking; and
- Hands and other exposed parts of the body should be washed prior to entering the eating area and on leaving the work site.

5.3.4 Gas and vapour monitoring

If contaminated soil or groundwater is encountered during excavation or subsurface work, the advice of a suitably qualified health and safety advisor should be sought to assess whether any extra precautions are necessary. A suitable monitor such as a photo-ionisation detector (PID) should be used to detect petroleum vapours – soil should not be sniffed.

The site supervisor will be responsible for monitoring of ambient air within the works area during excavation works to assess air quality. Where available, information on the potential levels of vapours along the excavation should be reviewed in advance and the need for third party monitoring evaluated.

Ambient air quality within the works area should be monitored using a PID and calibrated gas meter able to measure VOCs, lower explosive limit (LEL), oxygen (O₂), methane (CH₄), carbon monoxide (CO) and hydrogen sulfide (H₂S) during ground breaking and prior to entry of the excavation. Monitoring instruments should be calibrated prior to commencement of works each day using a suitable standard of known concentration.

It is noted that where the work area will include a deep excavation this would effectively be a confined space. Any works carried out in a subsurface confined space should be done in accordance with the “Occupational Safety and Health booklet – Safe Working in a Confined Space”.

Atmosphere testing with a LEL meter should be undertaken for the duration of works. If LEL concentrations are identified above 1 % LEL, then the source of this concentration is to be either isolated or controlled and re-tested prior to commencing works. At 5 % LEL, work should be stopped and the site supervisor informed.

The LEL meter may also measure concentrations of O₂, H₂S and CO, which can cause potential hazards in confined spaces and H₂S and CO can result in asphyxiation. Ambient air is considered to be oxygen-deficient when the O₂ concentration is less than 19.5 % by volume, which should be used as an action level for O₂.

For H₂S, respiratory tract irritation and eye inflammation occurs at around 200 parts per million (ppm). National occupational exposure limits for H₂S are 15 ppm for short term exposure (15-minute average) and 10 ppm for long term exposure (8-hour average). However, H₂S, which can be smelt (rotten eggs) between 0.01 ppm and 1.5 ppm, can cause acute health problems between 2 ppm and 5 ppm; therefore, H₂S greater than 2 ppm should be used as the action level for stopping work and re-assessing conditions. Respirators are available to prevent exposure to H₂S.

CO is an asphyxiant and is combustible, with a national occupational exposure limit of 30 ppm for long term exposure (8-hour average). An action level of 20 ppm for CO should be used.

In summary the action levels are:

- LEL:
 - 1 % triggers isolation and re-assessment of work environment and controls; and

- 5 % triggers stop work.
- VOCs, as a measure of total hydrocarbons, greater than 100 ppm trigger stop work and re-assessment of work environment and controls.
- O₂ less than 19.5 % trigger stop work and re-assessment of work environment and controls.
- H₂S greater than 2 ppm triggers stop work and re-assessment of work environment and controls.
- CO greater than 20 ppm triggers stop work and re-assessment of work environment and controls.

Work should only recommence when conditions are below the limits defined above and suitable mitigation measures have been implemented.

Personnel should not enter excavations or subsurface confined space where petroleum hydrocarbons odours are present without approval/permission by a person qualified to issue permits, and:

- Designated assessment parameters fall within the appropriate safety ranges; or
- Ventilation of the area maintains these parameters; or
- Suitable PPE including breathing apparatus provides the level of protection required.

Any groundwater pumping used to control groundwater at the site should be managed so that petroleum hydrocarbon residues in the ground drawn towards the pumping position do not present an explosion hazard.

Changes in procedures or the use of additional controls may be considered but should be addressed in revised work procedures.

5.4 Control of Excavation

The following general and physical controls of site works are considered necessary when dealing with any potentially contaminated soils and/or groundwater that may be encountered.

- a) Where excavation work is being conducted, public access should be prevented using barricades (commensurate with the scale of the works whilst still allowing for vehicle access) and warning signs.
- b) All excavation work undertaken at the site should be carried out in such a way that the generation of dust is kept to a minimum. This will be achieved by:
 - dampening down of soils, including stockpiled soils, on a regular basis, particularly during hot/dry and windy periods;
 - limit vehicle access and speed (<15 kilometres per hour (km/hr)) and control traffic movements to minimise dust generation and transport of affected soil on vehicle tyres;
 - advise all site workers of the need to minimise dust by the responsible operation of machinery;
 - suspend dust generating activities when dust control measures become ineffective due to increased wind speed. The objective of these measures is to prevent visible dust emissions beyond the site boundary; and
 - daily tidying-up of the site area and excavations to minimise the potential for any leaching or erosion of excavated material by wind or water.
- c) Maintain a water supply on site (e.g., hose and garden sprinkler) to keep soils, including any stockpiled soils, damp during dry conditions.

- d) Erosion and sediment control measures should be established to minimise stormwater entry into the excavations and control surface water and sediment run-off from excavations and stockpiles.
- e) Excavated soil that is obviously impacted with petroleum hydrocarbon residues should be covered to prevent transport of the soil off site by wind or rain.
- f) Run-off from an open excavation or uncovered stockpile (resulting from events such as rainfall, dust suppression or stockpiling of wet excavated ground) should be restricted to within the site boundary.
- g) It is important to prevent the spread of any soil across the roads. This should be inspected daily and if vehicles are found to be tracking affected soil beyond the work area then other dust removal arrangement will be required. Any tracked soil observed beyond the work area should be removed and disposed of to an appropriately licensed disposal facility.
- h) Any conditions imposed by the regulatory authorities associated with the excavation works (e.g., as part of a resource consent) should be adhered to.

5.5 Disposal of Surplus Soil

Given the likelihood of encountering impacted soils during maintenance/excavation works, a suitably qualified and experienced environmental consultant should be contacted to identify the appropriate environmental requirements (e.g., soil sampling). As a general principle, excavation activities should be carried out in such a way as to minimise the generation of surplus soil.

Material to be removed off site should be tested by a suitably qualified and experienced environmental consultant to identify the best disposal option. Materials being disposed off site should only be taken to a facility holding the appropriate licence to accept that material.

The site supervisor for the redevelopment site works should ensure that records are kept of all excavation works associated with contaminated soils. These should include the location and dimensions of the excavation, the ground conditions (e.g., the presence of petroleum hydrocarbon impact, i.e., staining and odour). Copies of the completed waste manifest documentation should be forwarded to the environmental consultant, ORC and DCC for their records.

5.6 Management of Groundwater

If an excavation intercepts groundwater, groundwater pumped from the excavation should not be disposed off to stormwater or sanitary sewer receptors, without the approval of DCC and ORC.

5.7 Contingency Measures

If potentially contaminated materials are encountered outside of documented areas of residual petroleum hydrocarbons during ground-breaking activities, the following should be undertaken:

- Cease earthwork activities, isolate, secure and stockpile soil as necessary. Temporary stockpiled materials should be managed in accordance with industry best practice guidelines.
- Contact the landowner or principal contractor who should in turn engage a suitably qualified and experienced contaminated land professional.

- The suitably qualified and experienced contaminated land professional should be engaged to undertake a visual assessment, collect soil samples (if required) and provide guidance as to appropriate mitigation or contingency measures.
- ORC and DCC should be notified by the landowner or principal contractor within one week of the identification of any contamination identified during the earthworks.

6.0 LIMITATIONS

Your attention is drawn to the document 'Report Limitations' as attached (Appendix A). The statements presented in that document are intended to advise you of what your realistic expectations of this report should be, and to present you with recommendations on how to minimise the risks to which this report relates which are associated with this project. The document is not intended to exclude or otherwise limit the obligations necessarily imposed by law on Golder Associates (NZ) Limited, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in so doing.

7.0 REFERENCES

ANZECC 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. National Water Quality Management Strategy Paper No. 4, Vol. 1 (2nd revision). ANZECC, Canberra.

Golder 2014. Former Mobil Dunedin Terminal – Groundwater Monitoring Event. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, August 2014.

Golder 2019a. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Supplementary Environmental Site Assessment. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, May 2019.

Golder 2019b. Former Mobil Dunedin Terminal – 199 Fryatt Street, Dunedin: Closure Report. Report prepared by Golder Associates (NZ) Limited for Mobil Oil New Zealand Limited, May 2019.

MfE 2011. Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated sites in New Zealand. Ministry for the Environment, Wellington.

MfE 2012. Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment, Wellington.

PDP 2011. Preliminary Site Investigations at the Former Mobil Dunedin Terminal, Fryatt Street, Dunedin (410-350). Prepared by Pattle Delamore Partners (PDP) for Mobil Oil New Zealand Limited. Ref: AJ24704R001.

PDP 2013. Additional Site Investigations at Former Mobil Dunedin Terminal, Fryatt Street, Dunedin (410-350). Prepared by PDP for Mobil Oil New Zealand Limited. Ref: AJ24710R001.

URS 2013. Long Term Monitoring and Management Plan – Chevron Dunedin Terminal. Report prepared by URS New Zealand Limited for Chevron New Zealand, June 2013.

Appendix A

Report Limitations

This report has been provided by Golder Associates (NZ) Limited (“Golder”) subject to the following limitations:

- i) The purpose for which the works were performed is set out in Section 1.1 of the report.
- ii) The scope of the works to be performed and described is in accordance with Purchase Order 4410826021. A description of the work done is set out in the report. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.
- iii) This report is prepared based on information reviewed at the time of preparation of the report.
- iv) Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the report. If a service is not expressly indicated, do not assume it has been provided. Conclusions from field work are an expression of opinion based on samples or locations at the site. The report accordingly is not operating as a guarantee that the condition of the site could not be different at points between sampling locations or at different parts of the site. Thus, due to the inherent variability in natural soils and [subsurface] conditions it is therefore unlikely that the results, assumptions and conclusions set out in this report will represent the extremes of conditions at any location removed from the specific points of sampling.
- v) Where this report indicates that information has been provided to Golder by Mobil Oil New Zealand Limited or by third parties, Golder has made no independent verification of this information except as expressly stated in the report.
- vi) The analysis and conclusions presented in this report are applicable as at the date of this report. Golder does not make any representation or warranty that the conclusions in the report can be extrapolated for future use as there may be changes in the conditions of the site, applicable legislation or other factors that would affect the conclusions contained in this report.
- vii) All relevant legislation in the jurisdiction in which the site is located and relating to the works has been complied with by Golder as at the date of this report.
- viii) The report should be read in full and no excerpts are to be taken as representative of the conclusions. The report should not be used or relied upon for any purpose except as defined in Section 1.1 of the report and subject to the limitations set out in this section.
- ix) This report has been prepared on the instruction of Mobil Oil New Zealand Limited and may be used and relied on by Mobil Oil New Zealand Limited and its Affiliates, and other entities contemplated in the agreement between Golder and Mobil Oil New Zealand Limited, such as purchasers of the site, lenders to purchasers, property owners, purchasers from property owners, lessees from property owners and assignees of lease from lessees of property owners.
- x) Golder accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.
- xi) Affiliates means (a) Exxon Mobil Corporation or any parent of Exxon Mobil Corporation, (b) any company or partnership in which Exxon Mobil Corporation or any parent of Exxon Mobil Corporation now or hereafter(1) owns or (2) controls, directly or indirectly, more than fifty percent (50%) of the ownership interest having the right to vote or appoint its directors or functional equivalents (“Affiliated Company”), (c) any joint venture in which Exxon Mobil Corporation, any parent of Exxon Mobil Corporation, or an Affiliated Company is the operator, and (d) any successor in interest to (a) and (c) above.



golder.com

APPENDIX C

Report Limitations

Report Limitations

This report has been provided by Golder Associates (NZ) Limited (“Golder”) subject to the following limitations:

- i) The purpose for which the works were performed is set out in the report.
- ii) The scope of the works to be performed and described is in accordance with Purchase Order No. 4410887578. A description of the work done is set out in the report. If a matter is not addressed, do not assume that any determination has been made by Golder in regards to it.
- iii) This report is prepared based on the information reviewed at the time of preparation of the report.
- iv) Golder did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the report. If a service is not expressly indicated, do not assume it has been provided. Conclusions from field work are an expression of opinion based on samples or locations at the site. The report accordingly is not operating as a guarantee that the condition of the site could not be different at points between sampling locations or at different parts of the site. Thus, due to the inherent variability in natural soils and subsurface conditions it is therefore unlikely that the results, assumptions and conclusions set out in this report will represent the extremes of conditions at any location removed from the specific points of sampling.
- v) Where this report indicates that information has been provided to Golder by Mobil Oil New Zealand Limited or by third parties, Golder has made no independent verification of this information except as expressly stated in the report.
- vi) The analysis and conclusions presented in this report are applicable as at the date of this report. Golder does not make any representation or warranty that the conclusions in the report can be extrapolated for future use as there may be changes in the conditions of the site, applicable legislation or other factors that would affect the conclusions contained in this report.
- vii) All relevant legislation in the jurisdiction in which the site is located and relating to the works has been complied with by Golder as at the date of this report.
- viii) The report should be read in full and no excerpts are to be taken as representative of the conclusions. The report should not be used or relied upon for any purpose except as defined in the report and subject to the limitations set out in this section.
- ix) This report has been prepared on the instruction of Mobil Oil New Zealand Limited and may be used and relied on by Mobil Oil New Zealand Limited and its Affiliates, and other entities contemplated in the agreement between Golder and Mobil Oil New Zealand Limited, such as purchasers of the site, lenders to purchasers, property owners, purchasers from property owners, lessees from property owners and assignees of lease from lessees of property owners.
- x) Golder accepts no responsibility for damages, if any, suffered by any other third party as a result of decisions made or actions based on this report.
- xi) Affiliates means (a) Exxon Mobil Corporation or any parent of Exxon Mobil Corporation, (b) any company or partnership in which Exxon Mobil Corporation or any parent of Exxon Mobil Corporation now or hereafter(1) owns or (2) controls, directly or indirectly, more than fifty percent (50%) of the ownership interest having the right to vote or appoint its directors or functional equivalents (“Affiliated Company”), (c) any joint venture in which Exxon Mobil Corporation, any parent of Exxon Mobil Corporation, or an Affiliated Company is the operator, and (d) any successor in interest to (a) and (c) above.



golder.com