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RE: RM22.099 - Mobil Dunedin Terminal - Technical Review

1 Introduction

Mobil Oil New Zealand Limited (Mobil) is applying for consent under the Regional Plan: Waste and Regional Plan: Water to passively discharge hazardous substances onto or into land in circumstances that may result in those substances entering water, at the former Mobil bulk oil terminal, 199 Fryatt Street, Dunedin.

Overall, this activity is discretionary and an application, including assessment of environmental effects (AEE), has been prepared by Golder Associates (NZ) Limited (Golder Associates - now WSP New Zealand Limited) dated 21 February 2022. Supporting documents, also prepared by Golder Associates, include:

- A Closure Report dated November 2019
- Two separate Environmental Management Plans (EMPs) dated March 2020, covering on-site and off-site areas.

e3Scientific Limited (e3s) have been commissioned by Otago Regional Council (ORC) to provide a technical review of the consent application. A list of specific questions from the ORC are addressed in section 7.

1.1 Scope of Work

The scope of this technical assessment includes:

- Providing a technical assessment of the adequacy of Closure Report and EMPs.

- Providing a technical review of the assessment of effects associated with discharge of contaminants at the site.

This assessment is based on the information provided in the application, Closure Report, EMPs and information held by the Otago Regional Council associated with Hazardous Activities and Industries List (HAIL) Register HAIL.00496.01.

2 Proposal

Mobil operated the bulk storage terminal from 1927 until 1995. During operation, the site stored a variety of hydrocarbon products, including leaded and unleaded petrol, diesel, turpentine, kerosene, white spirits, and lube oils. The bulk fuel storage facility was decommissioned from 1995 and aboveground infrastructure on site was progressively removed from site until 2007.

Environmental site assessment (ESA) works at the terminal and surrounding area were completed between 1992 and 2017. These investigations have documented the presence of residual petroleum hydrocarbon impacts at the site. Light Non-Aqueous Phase Liquid (LNAPL), comprised primarily of diesel and diesel/petrol mixture, is present in the ground beneath the site and extending to the southeast into Fryatt and Halsey Streets. Dissolved phase contaminants are present in groundwater up to 40 m to the south of the site. While the original discharges of petroleum hydrocarbons to land from the operational use of the terminal occurred more than 27 years ago, contaminants continue to partition from contaminated soil and LNAPL source areas into groundwater, which emanates from 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.

Based on their understanding of the risks at the site, Mobil is not proposing to actively remediate the existing soil and groundwater contamination. Instead, existing risks will be mitigated through the implementation of soil and groundwater management controls under the Environmental Management Plans (EMPs) submitted with the application. A consent duration of 10 years has been sought.

3 HAIL Register Summary

The former Mobil terminal is recorded on the Otago Regional Council HAIL Register as a 'Verified HAIL' site. The reference number for the site is HAIL.00496.01. The property is listed due to current and past land uses that include the following:

- A13: Petroleum or petrochemical industries including a petroleum depot, terminal, blending plant or refinery, or facilities for recovery, reprocessing or recycling petroleum-based materials, or bulk storage of petroleum or petrochemicals above or below ground.

The contamination status of the site is recorded as 'New Information Received' as the recently submitted closure report and consent application have not yet been formally assessed.

4 Closure Report

The intent of the Closure Report is to describe the site history and environmental setting, summarise results of previous investigations, and demonstrate that risks to human health and the environment are acceptably low, requiring no further investigation or remediation.

The Closure Report summarises the findings of previous environmental investigations at the site, with emphasis on the investigative works that have taken place since 2012. These investigations are comprehensive and adequately characterise contaminant conditions in soil, groundwater, and vapour. The closure report uses multiple lines of evidence to assess the stability of the LNAPL and the associated dissolved phase contaminant plume, and to assess the risk to human health and the environment, both on-site and off-site.

The diesel/petrol LNAPL identified in the southern part of the site is not mobile and has been shown to be contracting and reducing in thickness over time. There is qualitative evidence that natural source zone depletion is occurring, and we can confidently expect this trend to continue.

The extent of the dissolved phase plume (where ethylbenzene and naphthalene concentrations exceed the ANZECC 2000 95% species protection values) has been delineated, and this has also been shown to reduce in area over time. In the most recent monitoring rounds, the extent of plume does not reach the

harbour, with natural attenuation processes working to degrade contaminants within 15-40 m of the LNAPL.

These findings are consistent with current understanding of hydrocarbon fate and behaviour.

Based on the conceptual site model established, potential risks are correctly identified as:

- Intrusion of vapour to indoor air in any future buildings constructed over areas of residual LNAPL.
- Risks to workers undertaking sub-surface excavation works on site and within Fyratt Street, immediately south of the site.
- Environmental risks associated with soil and groundwater disturbance in these areas.

These are all risks that can be adequately addressed using an appropriate Environmental Management Plan.

5 Environmental Management Plans

The draft Environmental Management Plans provided with the application and include controls and procedures on ground disturbing activities to mitigate adverse effects from contaminants in soil. The on-site management plan also outlines restrictions on the future use of the site.

Controls on dust management, soil handling, stockpiling, off-site soil disposal, imported material, accidental discovery, worker H&S, and management responsibilities are included within the plans.

The contents of the EMPs generally cover the topics for a Long-term Site Management Plan outlined in Contaminated Land Management Guideline No 1. Reporting on Contaminated Sites in New Zealand (Ministry for the Environment, 2021). The controls outlined in the CSMP are comprehensive and appropriate for the site.

6 Other matters

6.1 Potentially affected parties

The application notes that Mobil engaged with the Dunedin City Council as the local authority responsible for the Fryatt Street road reserve. 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. This is a useful feature which adds an additional layer of assurance that the EMP will be implemented. However, without written approval from the DCC, it would be appropriate to consider them an affected party.

The application also notes that 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. To effectively manage residual risk via the EMP, the landowner must also agree. As such, we would consider it also important for Chalmers Properties Limited to be considered an affect party. As noted previously, discussions between Mobil and the landowner regarding their lease obligations are a civil matter, and ORC's position should be clear that any determination by ORC should not be construed as providing comment on the condition of the land, or suitability of the site for future uses.

6.2 Other contaminants

It is important to note that the scope of the Closure Report is limited to specific contaminants of concern – petroleum hydrocarbons and also heavy metals.

Per and Polyfluorinated Alkyl Substances (PFAS) are associated with firefighting foams which may have been used or stored on site. This contaminant class has not been assessed on site as part of previous environmental assessments. My understanding, informally, is that firefighting infrastructure was shared between oil company terminals, and the bulk foam storage and testing took place on the adjacent Chevron / Z Energy terminal. Notwithstanding, this should be clarified with the applicant.

6.3 Section 87BB

The applicant encourages ORC to use its discretion under section 87BB(1)(d) of the Resource Management Act 1991 to notify the activity as 'deemed permitted.' However, there is no relevant permitted activity for a discharge of this type in any of the regional plans. Therefore, the discharge cannot meet the requirements of 87BB(1)(a), and this option is not available to council.

7 Specific Questions

Responses to specific questions regarding the application are summarised the tables 1 below:

Table 1: General Questions

Q:	Is the technical information provided in support of the application robust, including being clear about uncertainties and any assumptions? Yes, or no. If not, what are the flaws?
R:	Yes, the technical information provided in support of the application is robust, and limitations associated with the Closure Report and application are clearly expressed in appendix A.
Q:	Are there any other matters that appear relevant to you that have not been included? Or is additional information needed? Please specify what additional info you require and why.
R:	As described in section 6.2, the Closure Report and application have not expressly addressed PFAS as a potential contaminant of concern at the site. It would be appropriate to a) request additional information regarding the use of these chemicals on the site, and their potential for soil and groundwater contamination, and b) clarify that currently, this class of contaminants is not within the scope of the discharge permit.
Q:	If granted, are there any specific conditions that you recommend should be included in the consent?
R:	The most critical consent condition would be to prepare and submit finalised copies of the EMPs to the consent authority, Dunedin City Council and Chalmers Properties Limited.

Table 2: Understanding of the application and discharges – proposal and site

Q	Does the application adequately characterise the proposal and site a. General b. Sensitivity of the environment, identifies all potential receptors and the current state of the environment (water quality) c. Specialist reporting – adequate in terms of who has provided and congruence with 2011 Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand and current editions of CLMG #1 and #5.
R	Yes, the application adequately characterises the proposal and site, including the sensitivity of the receiving environment. The application has been prepared by suitably qualified and experienced practitioners and is in general congruence with the relevant contaminated land management guidelines in New Zealand.
Q	Have all of the contaminants of concern been identified and accurately described – are all of the potential contaminants identified OR are there more that are a risk but haven't been investigated?
R	As described in section 6.2, the Closure Report and application have not expressly addressed PFAS as a potential contaminant of concern at the site. It would be appropriate to a) request additional information regarding the use of these chemicals on the site, and their potential for soil and groundwater contamination, and b) clarify that currently, this class of contaminants is not within the scope of the discharge permit.
Q	Has the applicant provided the information Council was requesting from a technical point of view/complete suite of discharges that would typically be expected for a site like this?
R	Yes, the applicant has provided a comprehensive set of information for a discharge of this type.

Table 3: Adverse environmental effects/risk grading

Q:	Do you agree with the Applicant's assessment of effects (and SQP) – graded as less than minor on certain affected persons? Level of confidence in characterisation of adverse effects on the wider public? Level of confidence in characterisation of adverse effects on certain affected persons including localised effects, adjoining landowners etc.?
R:	The applicant considers that there are no persons that have been identified as being affected to an extent that is minor or more than minor.

	<p>In my opinion, the effects on the Dunedin City Council and Chalmers Properties Limited are not less than minor. For the potential risks associated with the discharge to be appropriately mitigated, the Dunedin City Council and Chalmers Properties Limited must implement the EMPs prepared by Mobil. Although the controls are reasonable, this arrangement imposes on them an on-going responsibility which indicates a level of effect that could be considered minor.</p> <p>The characteristics of the hydrocarbon discharge have been adequately characterised and there is high degree of confidence that the adverse effects on the wider public are less than minor.</p>
<p>Q</p>	<p>In your opinion is any further investigation required in order to characterise adverse effects? Plume to southwest of site over Halsey Street hasn't been identified on site plans, but is mentioned as a location of contamination. Stormwater system, including black "unnamed" pipe on Figure 02. PFAS analysis as indicated in the Simon Beardmore 2019 report.</p>
<p>R:</p>	<p>No, in my opinion no further investigation is required to characterise adverse effects.</p> <p>Exceedances of the 95% species protection values for ethylbenzene and naphthalene have been identified on Halsey Street as shown in Figures 21 to 24 of the Closure Report. This is the lateral edge of the same plume that extends south to Fryatt Street.</p> <p>The majority of the former stormwater system on site is isolated from the Dunedin City Council network, as shown in Figure 5 of the Closure Report. A small section of this line, as well as the unknown pipe, may remain connected to the wider reticulated system at Akaroa Street. The depth of the council stormwater line at this location is between 1.0 and 1.67 m below ground level, and the on-site stormwater lines are necessarily higher than this. Measured groundwater levels are typically below 1.5 m, indicating that it is unlikely these remaining pipes are acting as preferential pathways for contaminant migration.</p> <p>The discharge application only relates to hydrocarbon compounds. As discussed in section 6.2, PFAS use is associated with bulk fuel storage compounds. The applicant should confirm whether fire-fighting foams containing PFAS compounds have been used, stored, or tested on site.</p>

Q:	In your opinion, is practical mitigation required onsite to intercept leachate discharges before they leave the site as is typical for consenting Petroleum Hydrocarbon Contaminated Sites in New Zealand? I.e. mechanical remediation. If so, why not? What are the detailed reasons for this not being required in order to confirm compliance with MfE tech guidelines 2011/CLMGS/local plans and policies.
R:	<p>No, in my opinion, intercepting groundwater (i.e., pump and treat) or other forms of active remediation are not required. Investigation confirms that risks associated with migration of contaminants is low, and no further risk reduction in this respect is required.</p> <p>Furthermore, a LNAPL recovery pumping trial was completed by PDP in 1995. Between 689 and 1,325 m³ of water was pumped from the recovery well over a period of approximately 2 months. During this period, a few hundred litres of LNAPL was recovered. This a very low rate of recovery, and the transmissivity of the LNAPL would have decreased further since that time. LNAPL bail-down testing by PDP in 2012 reconfirmed this finding.</p>
Q:	Have the cumulative effects of the discharge activity been appropriately assessed? Do you concur with the assessment? Yes/No
R:	Yes. Based on the demonstrated attenuation of contaminant concentrations, it is unlikely that measurable concentrations of contaminants are entering the receiving water and the contribution to cumulative effects within the harbour would be negligible.
Q:	Natural attenuation is a proposed passive 'remediation strategy'. What is the proposed timeline for the attenuation curve for discharges to soil, ground water and air (soil vapour)?
R	<p>Although the applicant has estimated an attenuation rate for dissolved phase ethylbenzene and naphthalene, they have not provided an estimate of degradation within the source area.</p> <p>The time required for natural attenuation of the plume largely depends on which end-point or clean up criteria is selected. It is likely that partitioning from soil and LNAPL to groundwater will continue for a considerable period of time; however, risks to off-site receptors are already considered low.</p>
Q	There is no further monitoring or Long Term Management and Monitoring Plan? Is that required? The application says "It is not possible to change the

	discharge or its location." Mechanical remediation is not proposed ie considering impacts on adjoining land 'owner' Dunedin City Council, would this be appropriate given the site is still discharging 27 years after it was de-commissioned/intergenerational equity principle of clean up sites in a generation (mentioned in Simon Beardmore 2019 ORC report as per below)
R	<p>No, based on the established conceptual site model, I do not consider that there is a need to undertake regular routine groundwater monitoring. There may be instances where a monitoring round may be warranted; for example, towards the end of the consent term, monitoring could be completed to determine whether a consent was still necessary. A monitoring round may also be appropriate in advance of any major soil disturbance or redevelopment works occurring on the site.</p> <p>As discussed above, an EMP to manage risks associated with soil disturbance and future development of the site will likely be required for a considerable period of time. However, environmental risks associated with the discharge are low, and remediation to this end-point is complete.</p>
Q	Does the applicant appropriately assess any surface water users as affected ie Otago Harbour? Cultural and recreational users?
R	Yes. Based on the demonstrated attenuation of contaminant concentrations, it is unlikely that measurable concentrations of contaminants are entering the receiving water.

Table 4: Final considerations of the proposal – technical viewpoint

Q	What is the applications general congruence with current best practice for discharges of this type/ considering preclusions on grant of resource consent s107 RMA?
R	<p>It is unlikely that any of the preclusion listed in s107 would apply.</p> <p>Natural attenuation is an accepted practice for remediation under the appropriate circumstances.</p>
Q	Is there any reason the consent term should be shorter than applied for?
R	No, the conceptual site model is well established, and there is a high degree of certainty the extent of the LNAPL and dissolved phase plumes will continue to reduce. If anything, a slightly longer consent term would be more efficient,

	as, in the absence of a permitted activity rule for such discharges, I expect a consent renewal would be required after 10 years.
Q	Is the ANZECC benchmarking appropriate for aquatic environmental, or Canadian or Landcare benchmarking more appropriate?
R	Yes, the ANZECC (2000) 95% species protection values are an appropriate benchmark. These guidelines have been superseded by the ANZG 2018 freshwater and marine guidelines; however, the trigger values for the contaminants of concern have not been changed.
Q	Please review the Simon Beardmore report provided as an amendment to the application. I have made specific comments in relation to comments made about the Site Closure report provided to Council at the time.
R	I have reviewed the memo and provided responses to the comments. A copy of the memo with comments is included as Attachment A.

8 Summary and Conclusions

Overall, the consent application and Closure Report provide a thorough summary of the environmental conditions at the site. Past investigations at the site have been comprehensive and hydrocarbon contamination at the site is well understood.

Adverse effects on environmental receptors are less than minor; dissolved phase contaminants degrade rapidly within a short distance of the source area. The application correctly identifies that the potential risks associated with the discharge are related to future development of the site, and any potential soil disturbance in areas of contamination. These risks are adequately managed through the implementation of the draft EMPs.

I disagree, however, that effects on the Dunedin City Council and Chalmers Properties Limited are less than minor. As the entities responsible for implementing the EMPs, they should be considered affected persons, and imposing the obligations under the EMP could be considered a minor effect.

It is important to note that the scope of the Closure Report is limited to specific contaminants of concern – petroleum hydrocarbons and heavy metals. Per and Polyfluorinated Alkyl Substances (PFAS) are associated with firefighting foams which may have been used or stored on site. This contaminant class has not been assessed on site as part of previous environmental assessments. My

understanding, informally, is that firefighting infrastructure was shared between oil company terminals, and the bulk foam storage and testing took place on the adjacent Chevron / Z Energy terminal. Notwithstanding, this should be clarified with the applicant.

If you have any questions regarding the information provided in this letter, please contact Simon Beardmore on 03 409 8664 or via email at simon.beardmore@e3scientific.co.nz

Yours sincerely,



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Attachment A: 2019 memo w comments

