

NORTHLAND REGIONAL COUNCIL

Decision of the council, under delegated authority, on a limited notified application

Applicant: New Zealand Refining Company trading as Refining NZ

Application Numbers: AUT.008319.01-02, 04-06, 11, 13 and 16-19

(Note: In this decision, the term, “resource consent” means single and/or multiple activities as applicable).

1. SUMMARY DESCRIPTION OF THE PROPOSED ACTIVITY AND SITE

1.1 Background

1. The application was lodged on 17 July 2020 by Chancery Green acting as the legal counsel and agent for the Applicants, The New Zealand Refining Company Limited, trading as “Refining NZ”.
2. An Assessment of Environmental Effects (AEE) to support the application was prepared by Enspire and included a number of supporting technical reports as listed below:
 - Marsden Point Refinery Re-Consenting Project, Landscape Assessment -Brown NZ Ltd, 2020.
 - Air Quality Assessment, Tonkin and Taylor, 2020.
 - Refining New Zealand Ltd. Marsden Point Refinery Re-Consenting: Marine Mammal Assessment of Effects, Report No. 3391, Cawthron, 2020.
 - Marsden Refinery Whangarei Harbour Dredging: Archaeological Assessment, Clough and Associated Ltd, 2017.
 - The Value of consent renewal – Economic assessment of reconsenting discharges and structures at the Marsden Point Refinery, New Zealand Institute of Economic Research, 2020.
 - Assessment of Effects on Marine Ecological Values – Reconsenting of discharges and structures in the CMA Prepared for refining New Zealand, Boffa Miskell, 2020.
 - Refining NZ, Re-consenting Application, Coastal Bird Assessment, Biosearches, 2020.
 - Refining NZ Crude Shipping Project, Recreation and Tourism Effects Assessment, Prepared for ChanceryGreen on behalf of Refining NZ, Rob Greenaway and Associates, 2017.
 - Marsden Point Refinery, Hydrogeological Conceptual Site Model, Tonkin and Taylor, 2020.

- AEE Environmental Health Effects Assessment, Application by Refining NZ to re-consent discharges and structures at Marsden Point, Environmental Medicine Limited, 2020.
 - Crude Shipping Project, Proposed Deepening and Realigning of the Whangarei harbour Entrance and Approaches, Ryder, 2017.
 - Assessment of Ecological Effects for Air Discharges from the Marsden Point Oil Refinery, Wildlands, 2020.
 - Water quality assessment at Marsden Point oil refinery to inform resource consent renewal applications, Streamlined Environmental, 2020.
 - Refinery NZ: Re-consenting Project, Alternatives Assessment, Jane Thomson, Refining NZ, 2020.
3. Through the consenting process additional information was supplied in support of the application including:
- Response to Comments on Hydrogeological Conceptual Site Model Report, Tonkin and Taylor, 10 September 2020.
 - Northland Regional Council Peer Review of Air Quality Assessment, Tonkin and Taylor, 27 August 2020.
 - Monitoring plan for lichens, vegetation, and soils to assess the effects of air discharge from the Marsden Oil Refinery, Wildlands, October 2020.
 - Scientific advice to assist with setting new consent conditions for Refining NZ SWB discharge consent: Metals, PAHs and phenols, Streamlined Environmental, 19 November 2020.

1.2 The Proposal

4. The applicant seeks to renew the necessary regional resource consents to enable the continued existence, operation and maintenance of the coastal marine structures, abstraction of groundwater, and discharges to land air and water from Refinery activities, including the future potential operation of the site as a terminal.
5. A summary of the proposal is set out below and Section 3.0 of the applicants AEE describes the proposal in full detail. The key activities and structures that form part of the proposal are:
- Three jetty structures and associated mooring dolphins and breasting moorings;
 - Discharges to air;
 - Discharges to land;
 - Discharges to the coastal marine area; and
 - Abstraction of groundwater
6. The applicant has noted in the application that activities associated with shutdown and maintenance work outside the scope of this proposal will be determined if they can be carried out within permitted activities criteria or require a resource consent. If resource consent is required, it will be sought for on a 'project by project' basis, at the time in which the shut down or maintenance activity is to be scheduled / planned. The applicant has made one exception and that is for wet and dry abrasive blasting to be undertaken on land to remove existing coatings, to enable repair and/or maintenance.

1.2.1 Jetties and Associated Structures

7. The three jetty structures and associated mooring dolphin and breasting moorings form a crucial part of infrastructure for the on-going operation of the Refinery, as shown in Figure 1. As noted in the application, approximately 40% of refined product leaves the site via coastal tankers to other domestic centres. With up to 210 tankers visiting the refinery in previous years, the jetty structures enable these vessels to safely berth and either unload crude oil or load refined products.
8. Jetty 1 and 2 were constructed in 1960s and have been regularly maintained, (AUT.008319.06.01). Jetty 3 was built in 2009 to provide loading facilities for a ship bunkering vessel (AUT.008319.12.02).



Figure 1: Location of the Jetties, (Sourced: Application)

9. Jetty 1, referred to as 'the Crude Jetty' is utilised by the tankers bringing crude oil to the Refinery, where they berth to unload. Jetty 2 'the Product Jetty' is predominantly used to load tankers with refined product destined for other centres or markets. When required Jetty 2 can also be used to unload vessels. The wastewater diffuser outfall structure is also located on Jetty 2.
10. Jetty 3 includes a purpose-built berth, for fuel barges, consented in 2008, extending approximately 128m to the west.
11. The main jetty structure, provides access to the three jetties, houses a number of structures that facilitate the operation of the loading and unloading of the vessels. The facilities consist of toilets and sewerage holding tanks, fire pump diesel tanks, slops tanks, various pipes and loading gantries.
12. The breasting moorings and mooring dolphins are required for the mooring of vessels visiting the refinery. There are eleven breasting dolphins which occupy an area of approximately 25m² each and are attached to the jetty structures. The four mooring dolphins occupy approximately 20m² each.

13. The applicant also holds resource consent (AUT.038275.01.01-AUT.038275.01.07) for capital and maintenance dredging of the seabed around the eastern dolphin moorings, including the associated dredging activities which expire on 31 May 2022. The applicant is not seeking to renew these consents, due to the recently granted 'Crude Shipping Project' resource consents AUT.037197.01.01 – AUT.037197.13.01, which encompasses the area and therefore will supersede them, expiring on 17 July 2053.
14. Therefore, this application covers the continued occupation and use of the three existing jetty structures and associated breasting and dolphin moorings, including the auxiliary structures and the wastewater diffuser outfall structure located on Jetty 2 and the stormwater basin overflow spillway structure within the coastal marine area.

1.2.2 Discharges to Air

15. As outlined in the application, there are five key types of discharges to air from the site:
 - Emissions of contaminants to air, from the furnaces that are used to heat the crude oil and intermediate products;
 - Fugitive emissions from various sources, relief valves, pump seals, compressor seals, valves, sample points and storage tanks that are located throughout the site;
 - Flaring of gases from the flare stacks due to upsets and emergencies;
 - Smoke from firefighting exercise during training; and
 - Sand/particle blasting activities undertaken as recurrent maintenance activities on site.
16. The applicant has a number of management strategies to minimise the effects of the discharges to air, which are outlined in the application under section 3.4.2 of the AEE and encapsulated in the proposed conditions.

1.2.3 Discharges to Land

17. The three main points of discharge to land are from the Accidentally Oil Contaminated System (AOC), Continuously Oil Contaminated System (COC) drainage networks and via leakages from the storage tanks. Historic activities are also involved in contributing to contaminates to land, that are still working their way through the soil horizon.
18. The drainage networks of the AOC are not completely lined and are therefore permeable in some parts. It is expected that stormwater percolates from some of these drains, containing dissolved hydrocarbons and metals, making their way into the underlying groundwater resources. The applicant also acknowledges that some parts of the COC are permeable and expects some discharges to ground to occur as a result.
19. The refinery has three storage areas, the Crude Storage Area, and two product storage areas. Leakage from these areas does occur, with the contaminates leaching into the groundwater table.

1.2.4 Discharges to Coastal Marine Area

20. The applicant identifies four broad types of discharges associated with its wastewater, stormwater, firefighting system, and ground water abstraction.

1.2.5 Wastewater

21. Site wastewater is derived from three main sources, process water, ship de-ballast water and ship tank washing. It is noted in the application that due to the modern tanker designs de-ballast water discharge is rarely required.
22. The three sources of wastewater are treated onsite using a 'Biotreater' plant, which forms part of a Water Treatment Unit. The wastewater from the unit, is then discharged into a Retention Basin for further treatment and flows into the Stormwater Basin (SWB) which discharges into the Whangarei Harbour via a submarine diffuser that is attached to Jetty 2 or via the SWB spillway in extreme weather events.
23. The Biotreater plant, illustrated in Figure 2, includes a 'de-oiling' system, a flocculation/flotation unit, an activated sludge unit, a clarifier, and a Retention Basin System. This unit is designed to handle a flow of up to 3,300 m³/d.

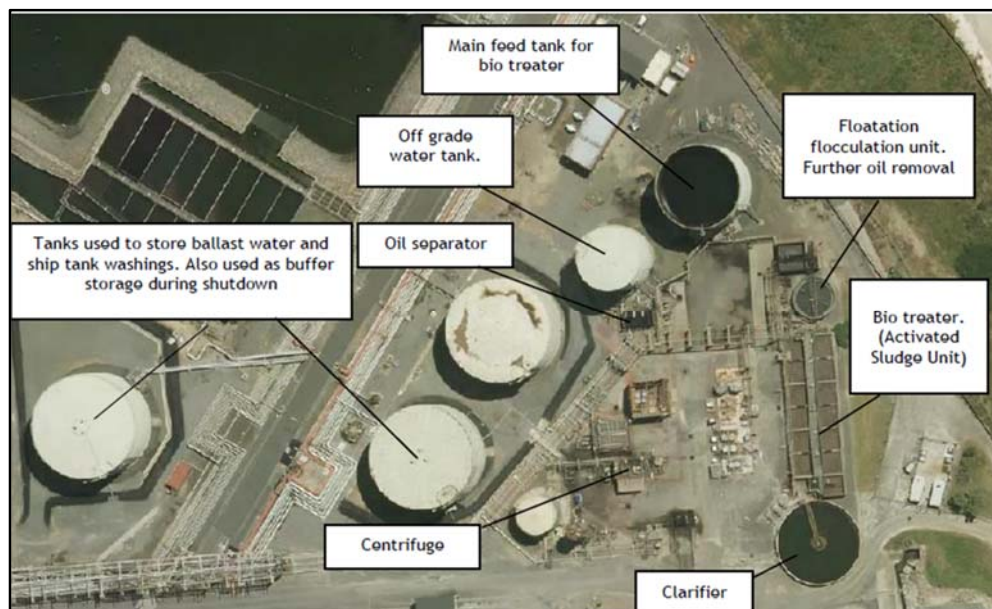


Figure 2: Layout of the Biotreater Plant (Source: Application)

24. The COC system intercepts process water, stormwater and tank drainage water that is likely to be contaminated with hydrocarbons and/or compounds from several processing and treatment activities on the Site. The COC system consist of five sewer networks and oil interceptors, oil sumps and pumps. The oil that is collected in the main oil interceptors is directed to the Site's slops processing unit which recycles the captured hydrocarbons back from reprocessing. The separated water is pumped to the Water Effluent Treatment Unit for further treatment, as it may include oil, suspended solids, soluble components and chemicals.
25. When the rainfall intensity exceeds 6mm/hr the treated water from the oil interceptors is discharged into the AOC. The AOC is regarded as the stormwater system for the site. It typically collects water that is unlikely to be contaminated by process activities or chemicals but may have come in to contact with oil. The Firefighting training ground wastewater is also collected and treated by the AOC, as it contains residues of the foams used during training. The water from the AOC is directed to the SWB via oil traps and is discussed in more detail below.

1.2.6 Stormwater

26. As mentioned above the stormwater within the site is collected by the AOC and discharged into the SWB, and ultimately discharged into the Harbour via the diffusers attached to Jetty 2 or the SWB spillway. The AOC consist of a Western and Eastern branch as shown in Figure 3. Stormwater entering the East AOC flows through an oil trap, is combined with treated wastewater from the biotreater plant, and then discharges in to the SWB via a retention basin. The Western AOC water flows through an oil trap and into the SWB, which then discharges to the Harbour via the wastewater diffuser outfall structure or SWB spillway.



Figure 3: Location of the AOC System (Source: Application)

1.2.7 Firefighting Discharges

27. Seawater is continuously extracted for the purposes of firefighting, to ensure that the firewater main is kept in a constant state of readiness. The suction lines and pumps associated with this take are capable of abstracting 11,000m³/hour from the Harbour.

28. The uncontaminated seawater that is used for firefighting purposes, is discharged at three locations. A service pump that is used to maintain pressure in the fire main discharges approximately 28 L/s to the Harbour, located near the abstraction point on the Jetty. Secondly a small volume of water is diverted to cool the diesel pumps used to abstract the firefighting seawater, when the system is activated. The cooling water is discharged at a rate of approximately 50 m³/hr to the harbour below the jetty, near the abstraction point also. The third point of discharge is from overpressure valves located on the jetty, which discharge up to 11,000 m³/hr directly into the harbour to prevent the fire main from being over pressurised.
29. These three discharges of seawater have not been contaminated by the Refinery operations and are essential for the safe operation of the Refinery. No consent is required for this take and discharge under both the oRCP and pRP.

1.2.8 Ground Water Abstraction

30. In the mid-1980s the applicant commenced a site-wide groundwater pumping programme to contain the impacts of its past and present activities. The applicant abstracts up to 2,700 m³/d of groundwater, under two separate resource consents, which is discharged into the AOC, and ultimately to the Harbour.
31. The abstraction serves two key purposes, to ensure hydrocarbons in the ground are contained thus minimising the risk of hydrocarbons migrating into the Harbour with the ground water; and protecting the Control Room from the risk of hydrocarbons or explosive vapour entering it via the concrete floor.
32. The applicant is seeking a resource consent to continue abstracting up to 2,700 m³/d generally over the site, allowing the volume and location for the takes to be transferable within the site, provided the maximum of 2,700 m³/d is not exceeded. This would reduce the need for the existing number of wells on site, with the decommissioning of several wells over time, and the establishing new wells in the future if required.
33. During processing of this consent the applicant withdrew the element of the application seeking to use the abstracted water in the Refinery processes. On this basis the abstraction is considered to be “non-consumptive”, as defined in the pRP, as the groundwater is taken just prior to it entering the coastal marine area and then discharged back into the coastal marine area in close proximity to the take points within a very short timeframe.

1.3 Zoning, Resource Areas and Other Notations

34. The site is subject to the following location classifications:
 - oRCP – Marine 5 (Port Facilities) Management Area (MM5A)
 - oRWSP – Riparian Management Zone
 - oRAQP – Marsden Point Air Shed – for SO₂ and PM₁₀
 - pRP – Marsden Point Port Zone
 - pRP – Significant Marine Mammal and Seabird Areas
 - pRP – Enclosed Waters Areas
35. The site subject to this application is recognised as being within the coastal marine area classified as:

- Regional Coastal Plan for Northland (RCP), refer to Figure 4:
 - Marine 5 (Port Facilities) Management Area (MM5A) and:



Figure 4: Operative Regional Coastal Plan Zone Map (Source: NRC GIS)

- Proposed Regional Plan for Northland (PRP), refer to Figure 5:
 - Marsden Point Port Zone (under appeal),
 - Significant Marine Mammal and Seabird Areas (under appeal), and
 - Enclosed Waters Areas.

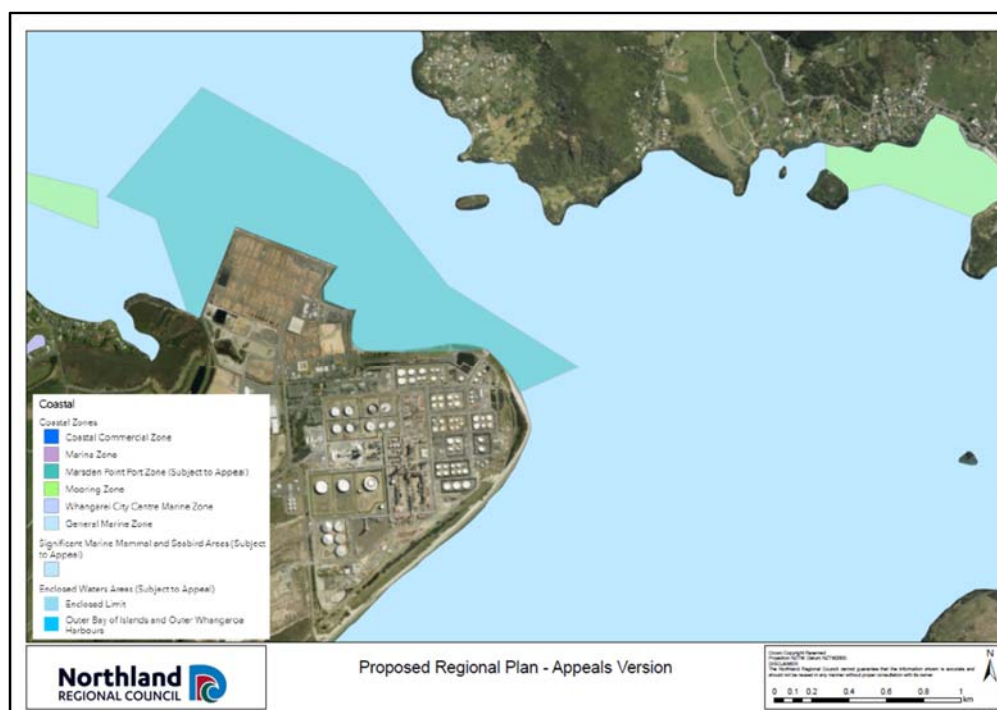


Figure 5: Proposed Coastal Plan Zone Map (Source: NRC GIS)

36. In regard to the RAQP mapping, the site is situated within the Marsden Point Airshed, refer Figure 6.

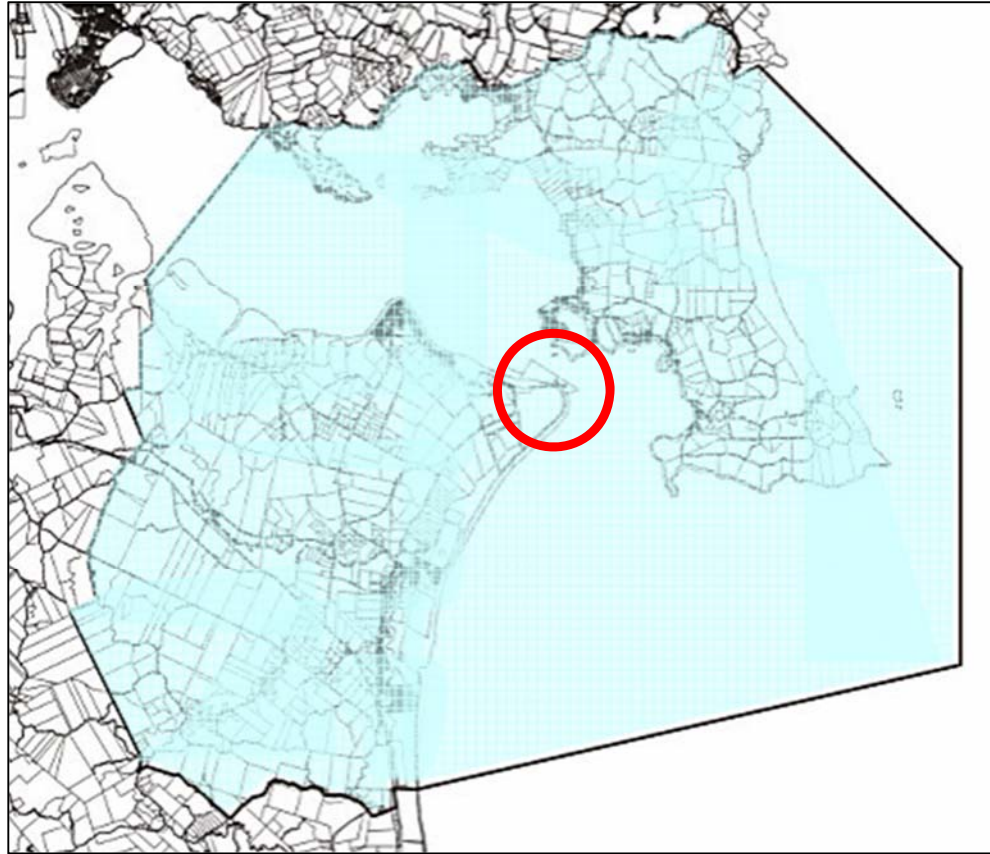


Figure 6: Airshed for Marsden Point

37. The land use components of the proposal are located within:
- Regional Soil and Water Plan (RSWP):
 - Riparian Management Zone (RMZ)

1.4 Site Description

38. The Refinery site is described in detail in Section 1.3 of the AEE. For the purposes of this report, the following description provides a summary of the main areas of interest, namely the crude and product jetties and coastal marine discharge points, the water effluent treatment units, flares and the firefighting training area.
39. The crude and product jetties extend from the refinery sites northern boundary into the natural deep-water port, at Marsden Point. The main jetty structure provides access to the three jetties. The diffuser from which treated process wastewater is discharged is located along Jetty 2, (refer to Figure 7).



Figure 7: Location of the Jetties and the three outfall points. (Source: Annexure 3m Water)

40. There are seven air discharge locations on site, grouped by process block and discharged via a number of stacks and flares (refer to Figure 8). The three main discharge locations that can be viewed from the sounding area are the red and white striped multiple flue stack, Block B and Block C utilities, located near the centre of the site, Block A's stack just to the north and the unpainted flare structures are located to the south of the site, which discharges at height of 110m above ground.

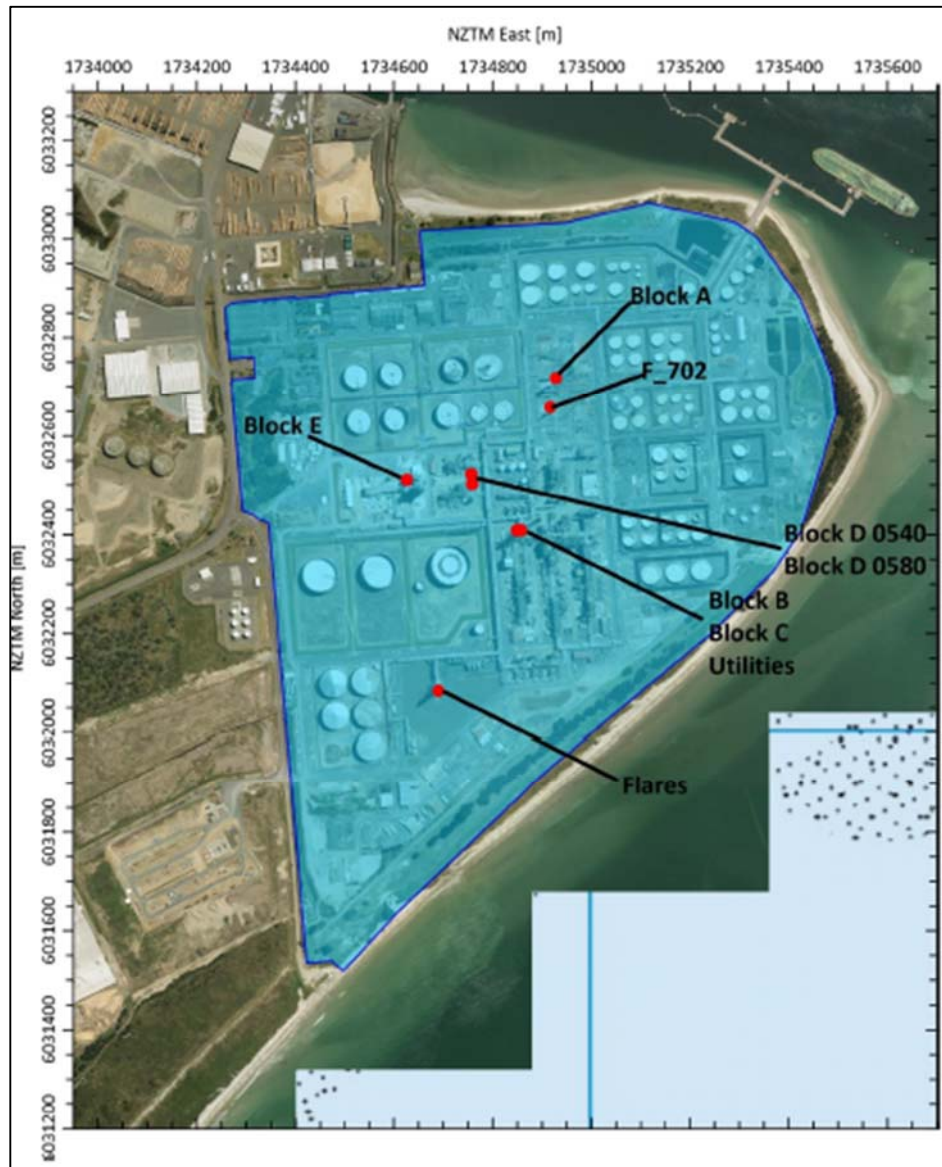


Figure 8: Location of discharge stacks and flares (Source: Tonkin and Taylor, Air Quality Assessment).

41. There are two ACO units one located near the centre of the site and referred to as the “West ACO” the other lies to the east, hence it is referred to as the “East ACO”. A lattice of drains run throughout the site, the COC, forms part of this lattice, consisting of five sewer networks and oil interceptors, oil sumps and pumps located throughout the site, connecting the ACO, retention basin, SWB, and Biotreater unit.
42. The SWB, Retention Basin and Biotreater Unit are located on the northern / eastern boundary of the site. The firefighting training area is located on the eastern boundary of the site, as illustrated on Figure 9.



Figure 9: Location of fire training ground, retention basin and stormwater basin at the Refinery. (Source: Annexure 3m Water)

43. In regard to the groundwater and wells on site, there are currently 140 monitoring wells on the site, as well as four active recovery wells and one used recovery well (refer to Figure 10).

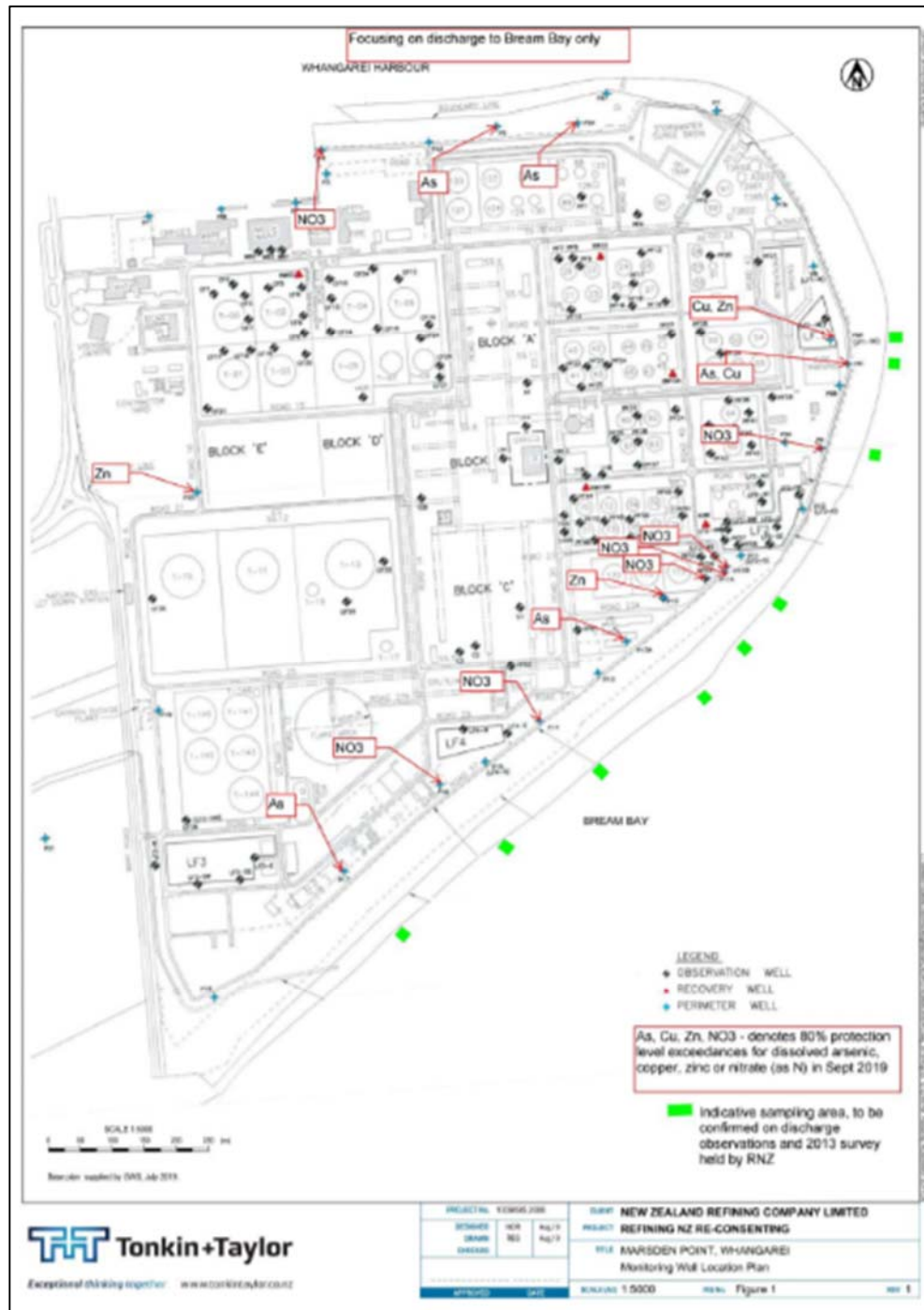


Figure 10: Location of the Monitoring Wells on site (Source: Application)

2. REGIONAL PLAN RULES AFFECTED

44. The following activities are sought as a bundled Discretionary activity and trigger rules under both the operative and proposed Regional Plans as follows and as detailed in Section 1.5 of the applicants AEE:

- Operative Regional Air Quality Plan for Northland (oRAQP)
- Operative Regional Coastal Plan for Northland (oRCP)
- Operative Regional Water and Soil Plan for Northland (oRWSP)
- Proposed Regional Plan for Northland (pRP)

Table 1: Activities and Reasons for Consent

| Consent Type | For | Detail | Classification |
|-------------------|------------------|---|--|
| Coastal Discharge | Industrial | <ul style="list-style-type: none"> ▪ To discharge treated process wastewater from the refining of petroleum hydrocarbons; stormwater; groundwater; and ballast water to Whangarei Harbour, via a diffuser at or about location co-ordinates 1735261E 6033230N. | <ul style="list-style-type: none"> ▪ Discretionary activity (Rule 31.7.6(f) oRCP) ▪ Controlled activity (Rule C.6.6.4 pRP) |
| Air Discharge | Industrial | <ul style="list-style-type: none"> ▪ To discharge contaminants into the air from all Site activities associated with the refining, storage and/or transport of petroleum hydrocarbons at the Refinery Section 10, Blk VIII Ruakaka SD, identifier NA70A371. | <ul style="list-style-type: none"> ▪ Discretionary activity (Rule 9.3.2 AQP) ▪ Discretionary activity (Rule 31.7.6(u) oRPC) ▪ Restricted Discretionary Activity (Rule C.7.1.8 pRP) burning fuels ▪ Discretionary activity (Rule C.7.1.9 pRP) Fire fighting ▪ Discretionary Activity (Rule C.7.1.9 pRP) Fugitive emissions |
| Land Discharge | Industrial | <ul style="list-style-type: none"> ▪ To discharge water and contaminants to ground as a result of activities associated refining, storage and/or transport of petroleum hydrocarbons and from wet and dry abrasive blasting, on Section 10 Blk VIII Ruakaka SD, identifier NA3D/1472, in the catchment of Whangarei harbour and Bream Bay (including associated passive discharges). | <ul style="list-style-type: none"> ▪ Discretionary Activity (Rule 20.3.1 oRWSP) ▪ Discretionary Activity (Rule C.6.4.4 pRP) |
| Water Take | Groundwater take | <ul style="list-style-type: none"> ▪ To take groundwater from bores in the catchment of Whangarei Harbour and Bream Bay, on Section 10 Blk VIII Ruakaka SD, identifier NA70A371, for water table depression purposes. | <ul style="list-style-type: none"> ▪ Discretionary Activity (Rule 25.3.1 oRWSP) ▪ Discretionary activity (Rule C.5.1.12 pRP) |
| Coastal Permit | Structure | <ul style="list-style-type: none"> ▪ To occupy (on an exclusive basis) and use the coastal marine area with the Refinery Wharf and Jetty extension and associated structures, including toilets and sewage holding tanks, fire pump diesel tanks, slops tanks, mooring dolphins and breasting moorings, a diffuser structure and diffuser bypass structure on Section 10 Block VIII | <ul style="list-style-type: none"> ▪ Controlled activity (Rule 31.7.4 (d) oRCP) ▪ Controlled activity (Rule 31.7.4 (b) oRCP) ▪ Permitted activity |

| Consent Type | For | Detail | Classification |
|-------------------|-------------|---|--|
| | | Ruakaka Survey, and Lot 1 DP 52379 Blk VIII Ruakaka SD, Whangarei Harbour, identifier NA3D/1472. | (Rule C.1.1.1 (13 and 14) pRP) |
| Air Discharge | Industrial | <ul style="list-style-type: none"> To discharge contaminants into the air from dry abrasive blasting and spray-painting operations conducted at Marsden Point on Section 10 Block VIII Ruakaka Survey, and Lot 1 DP 52379 Blk VIII Ruakaka SD, identifier NA3D/1472 (excluding the coastal marine area). | <ul style="list-style-type: none"> Discretionary activity (Rule 9.3.2 AQP) Controlled Activity (Rule C.7.2.9 pRP) |
| Coastal Discharge | Industrial. | <ul style="list-style-type: none"> To discharge treated process wastewater; stormwater; groundwater; and ballast water into Whangarei Harbour via the stormwater basin diffuser bypass at or about location co-ordinates 1735261E 6033230N | <ul style="list-style-type: none"> Discretionary Activity (Rule 31.7.6(f) oRCP) Controlled activity (Rule C.6.6.4 pRP) |
| Coastal Discharge | Industrial | <ul style="list-style-type: none"> To discharge treated process wastewater; stormwater; groundwater; and ballast water into Whangarei Harbour via the stormwater basin diffuser bypass at or about location co-ordinates 1735261E 6033230N | <ul style="list-style-type: none"> Discretionary Activity (Rule 31.7.6(f) oRCP) Controlled activity (Rule C.6.6.4 pRP) |
| Coastal Permit | Structure | <ul style="list-style-type: none"> To use and occupy the coastal marine area with part of a stormwater basin overflow spillway structure. | <ul style="list-style-type: none"> Controlled activity (Rule 31.7.4(d) oRCP) Permitted activity (Rule C.1.1.1 (13) pRP) |
| Coastal Permit | Disturb CMA | <ul style="list-style-type: none"> To disturb, and deposit sand on, the coastal marine area during maintenance and repair of a stormwater basin overflow spillway structure. | <ul style="list-style-type: none"> Discretionary activity No Rule – Section 87B(1(a)) of the Act. Restricted Discretionary (Rule C.1.5.11 pRP) |
| Water permit | Divert | <ul style="list-style-type: none"> Dam and divert stormwater in the Accidentally Oil Contaminated System, Continuously Contaminated System. | <ul style="list-style-type: none"> Discretionary activity (Rule 21.3.1 of oRWSP) Controlled activity (Rule C.6.4.4 of pRP) |

3. NOTIFICATION AND SUBMISSIONS RECEIVED

45. The notification assessment under Section 95 of the RMA concluded that the potential adverse effects of the proposal were minor or less than minor. Consequentially the following parties were identified as potentially affected:
 - Properties in the bays across the harbour to the northeast of the Refinery due to potential minor adverse odour effects from the discharge to air from stacks at the site;
 - The Patuharakeke Trust Board, Ngati Wai Trust Board and Te Parawhau ki Tai due to impacts on cultural values as a result of the applicant's operations in general.
46. Accordingly, the application proceeded on a limited notified basis on 26 August 2020. The submission period closed on the 23 September 2020.
47. A total of 10 submissions were received by the closing date for submissions. Four of these submitters requested to be heard – two opposed and two in support. No late submissions were received.

48. A summary table of submissions is attached to this report as Attachment 1.

3.1 Submissions in Support

49. Of the five submissions in support of the application, two submitters indicated that they wished to be heard. The key issues to those in support of the proposal were:
- Marsden Point Refinery is of national security importance.
 - A major regional employer, with high skill sets.
 - Benefits to the community and country outweigh the occasional minor odour effects.

3.2 Neutral Submissions

50. No submission where received that where neutral.

3.3 Submissions in opposition

51. A total of five submission were in opposition to the application, with Patuharakeke Trust Board and Te Parawhau ki Tai indicating their wish to be heard. The main issues of concern to those opposed to the proposal were:
- Effects are considered more than minor, with Whangarei Terenga Paraoa in a state of degrade.
 - Cost of the remediation of the site;
 - Potential effects on the cultural landscapes and seascapes and customary access.
 - Ongoing engagement with iwi/hapū to resolve and implement recommendations through resource consent conditions, a relationship agreement or both.
 - Māori rights and interests that are yet to be confirmed via the customary marine title and protected customary activity process under the Marine and Coastal Area (Takutai Moana) Act 2011 (MACA Act), a 35 year term may have an impact.

4. DELEGATION OF DECISION

52. The two opposing submitters wishing to be heard, Patuharakeke Trust Board and Te Parawhai ki Tai have withdrawn their wish to be heard based on the conditions of consent.
53. Due to the resolution of issues raised by Patuharakeke Trust Board and Te Parawhai ki Tai, the two submitters in support who wished to be heard, Robert Mountjoy and Janice Boyes, have also withdrawn their wish to be heard. Ms Boyes's submission sought the ongoing consultation with the Whangarei Heads Citizens Association, which is an entity listed in the condition requiring the applicant to resource and consult with the Marsden Point Liaison Committee.
54. Accordingly, since there are no submitters wishing to be heard, the decision on the proposal is delegated to council staff.

5. PRINCIPAL ISSUES

55. The principal issues that were in contention were:

- (a) Demonstration of the best practicable option for discharges and associated discharge thresholds in the conditions;
- (b) The adequacy of Cultural mitigation and monitoring conditions to mitigate adverse cultural effects;
- (c) The process for stakeholder groups and Mana Whenua to be involved in reviews of the Management and Monitoring Plans and conditions, and the frequency of these reviews;
- (d) Ensuring the future introduction of new process chemicals do not result in effects beyond the scope of the consent;
- (e) The need for a Site Remediation Plan to ensure site discharges are adequately managed or ceased in the event that Refining, Import and Distribution activities cease on the site during the term of consent;
- (f) The impact of the groundwater taken on overall aquifer allocation and the approach to Light Non-Aqueous Phase Liquid (LNAPL) contaminant reductions in the groundwater resource;
- (g) The appropriate thresholds for contaminant discharges to the mixing zone;
- (h) Simplifying the approach to monitoring discharges in the mixing zone, while retaining reliability and enabling replicability of results;
- (i) An approach to the build-up of sludge in the Stormwater Basin to minimise the discharge of sludge in quantities that may exceed the discharge contaminant standards in the conditions;
- (j) The adequacy of Terrestrial Ecology monitoring;
- (k) Maintain or increase the stringency of air discharge controls and apply a measurable monitoring approach to smoke opacity of site discharges to air from the stacks; and
- (l) Balance operational and health and safety requirements for exclusive coastal occupation with enabling public access beneath the jetty structures.

6. MAIN FINDINGS OF FACT

- 56. The following are the main facts relating to this application:
- 57. The applicant has undertaken a robust assessment of alternatives to demonstrate it has selected the best practicable option as follows:
 - In regard to the air emissions, the installation of sulphur dioxide scrubber to treat furnace flue gas has been investigated. It was considered prohibitively expensive and has a lead time of around 3 years. This would result in a significant increase in operational costs and/or significant refining margin destruction, as a means of reducing sulphur dioxide emissions. The minor level of environmental effects associated with this discharge do not warrant this level of investment.
 - Land Irrigation had been considered as an alternative to discharge to water for effluent disposal. The new infrastructure required to construct land irrigation on or off site and the requirements under the Resource Management Act, have placed this alternative as not the best practicable option due to the negative environmental impacts on site groundwater and it is capital intensive. The technical reports have determined that the projected actual and potential adverse effects of the proposed discharge to water are minor or less and does not warrant the investment in the alternative discharge location.

- Refurbishing of the entire site's drain system to improve the onsite drain and tankage system that works in conjunction with the operation of the hydrocarbon recovery wells has been determined to be unsafe and impractical in regard to completely eliminating leaks from the system. Due to the actual and potential effect of the discharges, which are expected to be negligible, it is considered unnecessary to make further investment above what is already proposed.
 - The current groundwater extraction system has been determined to be the best practicable option for application on site at Refinery NZ, following investigation and based on existing performance data. The inclusion of additional treatment facilities as add-ons to the existing system cost, outweigh the environmental benefit, when considering that there is a net environmental benefit from the existing abstraction.
 - The operation of the refinery is neither realistic nor practicable without the existing jetty facilities. They enable the refinery to operate at a sustainable viability, to unload and load products.
58. The proposed conditions are sufficient to mitigate significant adverse cultural effects and satisfy key policy provisions on the basis of the general environmental controls in the proposed conditions and the specific conditions requiring the establishment and funding of a Mana Whenua Roopu, Cultural monitoring and reporting, involvement in reviews of the Management and Monitoring plans, capacity building, the requirement for a Site Remediation plan, and the ability to influence a formal review of the consent conditions via s128 of the RMA across the duration of the consents being exercised. This conclusion is supported by the withdrawal of the wish to be heard by Te Patuharakeke Trust Board and Te Parawhau ki Tai.
59. A condition of consent has been added to ensure the addition of new process chemicals at the site will not result in an exceedance of these water quality standards or an effect beyond what was considered in this application and assessment.
60. In regard to the groundwater approach and whether it represented reasonable and efficient use of the resource, there are no known close sources of potable water abstractions and the site is at the end of the groundwater gradient for the aquifer on a spit edging the coastal marine area. The applicant modified the proposal to ensure the abstraction is for non-consumptive use and as water is contaminated and unsuitable for consumptive use, the policy position of Council is the abstraction is neutral in terms of the aquifer allocation limit.
61. As detailed in the applicant's technical report by Ms Schiess and Mr Simpson, the groundwater abstraction has been operating without impacting the operation of bores beyond the site. However, some locations within the site are subject to saline intrusion, particularly during low flow conditions. Saline intrusion in regard to this proposal, is considered to result in positive environmental outcomes by neutralising the PNAPL contaminants present in the site groundwater. Alternatives to extraction PNAPL have been explored but are prohibitively costly and may not be as efficient.
62. The applicant's AEE provides a detailed description of the site infrastructure that is dedicated to managing the quality of discharges. This includes the Accidentally Oil Contaminated System, Continuously Contaminated System and the Stormwater Basin, the groundwater abstraction program, maintenance programme, including the onsite treatment and natural biological processes. These all contribute to the technical assessment conclusion that the adverse effects on water quality of the site operation over the previous term of consents is less than minor on the receiving environment.

63. The stormwater management and treatment, including trade waste, has evolved over the years, with improvements in its operations and assets to provide the best practical options, minimising the contaminants discharged to ground and to the Harbour. The Refinery has exhibited, and is proposing to continue to take, a pragmatic approach to the continuing improvement of management and treatment to the operating discharges covered by this proposal. An example of this approach is agreement to a condition requiring the preparation of a stormwater detention basin sludge management plan which will detail the methodology for managing sludge build so as to minimise the potential for significant quantities of sludge being discharged into the coastal marine environment. Monitoring of the discharge of contaminants to groundwater and the coastal marine area will continue in accordance with the monitoring plan that is attached to the conditions of consent.
64. The applicant provides a comprehensive discussion of the proposal against relevant water quality policy provisions on pages 204-205 under Table 6.3.4.7.4 of the AEE. The conclusions of this discussion, including that Mr Stewart has used the smallest mixing zone necessary and that acute toxicity effects will not materialise as concluded by Dr's De Luca and Ross, are considered reasonable to draw and are supported by council.
65. It is accepted that not all the water quality standards of H.3 in the pRP will be achieved, but for those that are not, exceedances result in less than minor or transitory minor effects that are acceptable. The main exceedance is actually a result of bird faeces in the Stormwater Basin and occasional discharges exceed the ammonia standard. Due to predator trapping on the site, birds have found a safe haven and congregate. While methods could be employed to discourage the birds, the minor transitory effects of these discharges are far outweighed by the positive effects of the safe bird habitat. The other main exceedance will soon be avoided as a new process chemical replaces the one that currently causes the exceedance.
66. Currently contaminants to determine water quality are measured from samples at the discharge point, and out in the mixing zone. The mixing zone is in the main Harbour channel which is 20m deep and has very high tidal velocities. Table Two in the Conditions combines all the discharge thresholds for contaminants to be measured at the discharge point. By back calculating via use of dilution factors in the mixing zone, sampling in the mixing zone is no longer necessary and can all be done at the discharge point. The method of measuring contaminants via dissolved or total was interrogated, and the applicant agreed to convert the contaminant thresholds in Table Two to totals.
67. Refining NZ has incorporated all the Terrestrial Monitoring recommendations of the technical reporting into the Monitoring Plan. The only change is the interim removal of monitoring on Mt Manaia due to an inability to gain a concession from the Department of Conservation (as Ngati Wai does not support intrusive investigations). This change is accepted as appropriate as there are sufficient other monitoring locations available for use and requiring the site in the knowledge that a third-party approval is not possible would be ultra vires. It is noted that there is nothing precluding the Mt Manaia site being used again in the future in the event Ngati Wai has a change in position and a concession can be secured.

68. The applicant has agreed to a condition that requires a site remediation plan to be provided to council in the 20th year of the consents, or within 12 months of all the applicant's activities ceasing on site. The purpose of this plan is to set out the actions necessary to maintain compliance with the conditions of the consents for the discharges of contaminants from refining, storage and/or transport of petroleum hydrocarbons to the receiving environment, particularly to groundwater and the coastal marine area, how coastal structures are to be dealt with, and the frequency and duration of any monitoring necessary to demonstrate compliance. This remediation plan was a factor in Patuharakeke Trust Board and Te Parawhai ki Tai accepting a 35 year term of consent.
69. The conditions proposed by the applicant and agreed with Council, maintain the same or increase the stringency of the limits to air quality discharges and control sulphur dioxide concentrations and opacity in particular. The discharge standards have been derived through the relevant Ministry for the Environment Good Practice Guides and Ambient Air Quality Guidelines and recommendations of the technical experts. The applicant has also reasonably demonstrated that the proposed discharges are the best practicable option.
70. The applicant agreed to a coastal permit condition enabling public access beneath the Jetty's in the area between Mean High and Mean Low Water Springs to enable public access along the walkable section of coastal marine area.

7. COMMENTARY ON CONDITIONS OF CONSENT

71. Proposed conditions are included below. The conditions were formulated through an interactive process between the applicant, council officers and Te Patuharakeke Trust Board and Te Parawhai ki Tai as the opposing submitters.
72. The condition text and structure is based on the existing conditions of Refinery held consents for dischargers and structures and updated to:
- Reflect recommendations in the application documentation and technical reports;
 - Incorporate learnings from the use and implementation of the existing conditions;
 - Include conditions agreed between and the applicant and opposing submitters to address the identified Cultural effects; and
 - Address the principal issues identified in section 5 above.
73. The key matters that have influenced the condition evolution are discussed in sections 5 and 6 above.

8. RELEVANT STATUTORY PROVISIONS

8.1 Policy Statements and Plan Provisions

74. In considering this application, the council has had regard to the matters outlined in Section 104 of the Act. In particular, the council has had regard to the relevant provisions of the following planning documents:
- (a) The New Zealand Coastal Policy Statement 2010 (NZCPS);
 - (b) The National Policy Statement for Freshwater Management August 2020 – replaces the 2017 version ('the NPSFM');

- (c) The National Environmental Standard for Sources of Human Drinking Water (NESHDW);
 - (d) The operative Regional Policy Statement for Northland (RPS);
 - (e) The National Environmental Standard for Air Quality 2004 (NESAQ).
 - (f) The operative Regional Air Quality Plan for Northland – 22 November 2008 ('the oAQP');
 - (g) The operative Regional Coastal Plan for Northland – 2nd of February 2016 ('the oRCP');
 - (h) The operative Regional Water and Soil Plan for Northland – 15th of July 2014 ('the oWSP'); and
 - (i) The proposed Regional Plan for Northland (Appeals Version) – June 2020 ('the pRP').
75. Where the NZCPS contains a clear directive(s) that is directly relevant to a proposal and where such a directive is not included in the RPS, then the NZCPS provisions must be given greater weight and consideration. The RPS was prepared after the NZCPS so its provisions have given effect to the NZCPS.
76. The pRP Decision version was notified on 4 May 2019. The appeal period ended on the 17 June 2019. The pRP Appeals Version was updated on the 29 August 2020, relevant provisions in the pRP are considered to have similar if not more weighting than those in the oRCP, oRAQP and oRWSP, and give effect to the NZCPS and RPS.
77. The NPSFM came into effect during processing of the proposal. The paramount concept of Te Mana o te Wai is retained and the body of the NPS is expanded. Beneath Te Mana o te Wai sits Part 2 comprising a hierarchical 3-part objective and beneath that 15 policies. This document is given particular attention below, due to its enactment date following the above relevant planning documents and lodgement of the proposal.
78. The NESHDW and NESAQ contain no objectives, policies or assessment that need to be considered in this instance.
79. The following provides an assessment of the relevant National level provisions and the RPS. Matters relevant to the Regional Plan level provisions have been incorporated into the key issues and main findings of fact sections above and as the pRP gives effect to these higher order planning provisions, consistency can generally be inferred, particularly as the RPS was recently adopted and the pRP is at appeals stage with greater weight than the operative regional plans.

8.2 Enabling provisions

80. Objective and policies that are considered enabling for the proposal include:
- *NZCPS Objective 6 (Activities in the Coastal Environment)*
 - *oRPS Objective 3.7 (Regionally Significant Infrastructure) 3.9 (Security of energy supply) and Policies 5.3 (Regionally Significant Infrastructure).*
 - *oRCP Section 29 (Marine 5 (Port Facilities) Management Area (MM5A)).*
 - *pRP Section D.5.8 and D.5.9 (Marsden Point Port Zone).*
 - *pRP Objective F.1.5 and Policy D.2.5 – D.2.9*

81. The NZCPS Objective 6 links to the NZCPS Policy 6 which relates to activities in the coastal environment. It is a policy aimed at managing appropriate development within the coastal environment and directs consideration of the appropriateness of the activity, the functional need for the activity to be in the coast, ensuring that activities are appropriately located, and promotes the efficient use of occupied space. These policies are reflected in objectives 3.5, 3.10, 3.15 and relevant policy 4.8.1 of the oRPS, Objective F.1.5 and policies D2.5 – D.2.9 of the pRP are about recognising the benefits of regionally significant infrastructure and enabling its development, operation, maintenance, repair, upgrading and removal. They closely mirror the relevant provision of the oRPS.
82. The refinery has demonstrated a functional need for the Jetty and Spillway overflow structures to be located within the coastal marine area. The location of the jetties within the coastal marine area, enables the efficient unloading of crude product for refinement and loading of refined product, supporting the economic wellbeing within the region and nationally. The sites location adjacent to the CMA and the BPO conclusion that the spillway is an appropriate piece of infrastructure to manage stormwater discharges in intense weather events renders this structure having a functional need to locate in the CMA. It is noted that conditions require sand replenishment on top of the structure after its occasional use, so its physical presence in the CMA is only temporarily apparent.
83. The oRPS identifies Marsden Point Oil Refinery as regionally significant infrastructure. Both the oRPS and pRP contain provisions about regionally significant infrastructure and how applications for resource consents relating to regionally significant infrastructure should be considered and include enabling provisions to support the Port activities in this location.
84. The provisions in the oRPS on regionally significant infrastructure have, in effect, been carried through (largely repeated verbatim) into the pRP. As discussed in relation to Section 105 and 107 below, a recommendation to grant these consents subject to a robust and appropriate suite of conditions, recognises and provides for this regionally significant infrastructure.

8.3 NZCPS

85. In section 6.3.4.1 of the AEE the applicant provides an extensive 6-page analysis of the proposal against the relevant provision of the NZCPS. This with this analysis is supported and relied upon, along with the conclusion that the proposal demonstrates consistency with the policy directives of the NZCPS.
86. Of particular note, public access along the edge of the CMA is provided for in the proposed conditions. On-site methods to control the quality of discharges along with bottom line contaminant discharge thresholds have been set in the conditions to protect the quality of the receiving environment. Cultural conditions, including for monitoring have been proposed to reflect principles of Te Tiriti o Waitangi, kaitiakitanga and recognise and provide for Tangata Whenua involvement and use of matuaranga.
87. The NZCPS contains a number of bottom line 'avoid' policies and those that are relevant include Policy 11 - Indigenous Biological Diversity, Policy 13 – Preservation of Natural Character, Policy 15 – Natural Features and Natural Landscapes and Policy 23 – Discharge of Contaminants. On the basis that the discharge effects are at worst minor, and that adverse effects on natural character, landscapes and features that arise from the flaring is temporary and minor, the proposal substantively achieves the avoidance of these effects and issues.

8.4 NPSFM

88. The NPSFM directs regional councils to, amongst other things, make or change regional plans so that they contain freshwater objectives, fresh quality and quantity limits, and methods (including rules) to ensure that freshwater objectives are met and limits not breached. Most of the policy direction in the NPSFM relates to the content of regional plans which NRC has indicated will be addressed by 2025. The provisions of the NPSFM are therefore not reflected in the provision of lower order planning documents.
89. Policy 1 – *Freshwater is managed in a way that gives effect to Te Mana o te Wai* is relevant when considering this application as there is a connection between the impact of freshwater (with contaminants) that is discharged from site to ground and then into the coastal marine area or directly, and the abstraction of groundwater are required to be considered collectively. The impacts these discharges may have on cultural values, ecosystem and human health, and the economy.
90. The approach of Te Mana o te Wai is carried forward from earlier version of the NPSFM and because it has not substantively changed, it can be reasonably concluded that the integrated approach to seeking consent renewals supported by a compressive suite of technical assessments embodies the outcome sought by application of Te Mana o te Wai and its six principles.
91. The outcome of Te Patuharakeke and Te Parawhau ki Tai withdrawing their right to be heard and the extensive cultural conditions proposed, demonstrates that the applicant has taken reasonable steps to involve and work with PTB and Te Parawhau in relation to these discharges and to give effect to the policy outcomes of Tangata Whenua involvement of decision making around freshwater use and allocation.
92. Effects of the discharges were assessed as minor or less and the sites location at the end of the groundwater gradient directly adjacent to the coast, means that the discharges and takes will not degrade the freshwater system and the takes are efficiently allocated.

8.5 Regional Policy Statement

93. The oRPS contains relevant provisions to manage adverse effects of the proposal on water quality and quantity, indigenous ecosystems and biodiversity, natural character, features landscapes and historic heritage, and the use and allocation of common resources. Section 6.3.4.3 of the AEE provides an assessment of the proposal against these provisions and this with this assessment is considered to be accurate.
94. As is statutorily required, the oRPS has heavily influenced the provisions of the pRP, but not the operative Regional Plans and for this reason more weight must be accorded to the pRP.

8.6 S105 and s107

95. The granting of this resource consent contravenes Section 15 of the Act, and therefore the council has also had regard to the matters outlined in Section 105 of the Act. The applicant considers s105 in section 6.2.1.1 of the AEE and concludes these matters have been satisfactorily addressed in the proposal, principally through the Assessment of Alternative undertaken by Ms Thompson as summarised above in the Findings of Fact section. This position is accepted, and it is concluded that the applicant has demonstrated reasonable use of the Best Practicable Option method to justify the proposed choice of discharge(s).

96. Discharges from the site activities have been occurring since its establishment in the 1970's. Because it is not a new activity there is an extensive baseline understanding of the nature of the discharges and how they manifest in the receiving environment. For this reason the opinions of Mr Stewart and Dr De Luca on behalf of the applicant can be robustly relied upon to reasonably conclude that the nature of the discharges will not contravene s107(1) subject to successful implementation of the proposed conditions and the Management and Monitoring Plans.
97. Through the condition's workshops, council officers sought the inclusion of a Sludge Management Plan for the SWB and a Site Remediation Plan to avoid adverse effects of discharges in the event of cessation of site activities. Both these conditions speak to the staged nature of interventions through the term of the consent as enabled under s107(3).
98. The council is therefore satisfied that none of the effects outlined in Section 107 of the Act will occur after reasonable mixing.

8.7 Iwi Management Plans

99. In terms of this assessment, the Patuharakeke, Hapu Environmental Management Plan 2014, and Ngatiwai Iwi Environmental Policy Document 2015 have also been reviewed and considered. The granting of this consent is not contrary to the objectives and policies contained within these plans and there are no identified customary activities which would be put at risk by the implementation of the proposal.
100. Tangata Whenua submitters withdrew their right to be heard, reinforcing the conclusion that the proposal has meaningfully enabled Maori to influence the decision-making process, exercise Kaitiakitanga and to incorporate Matauranga during the exercise of the consents. The proposal therefore is consistent with the statutory provisions and Iwi Management Plans relating to cultural values.

8.8 Summary

101. On the basis of the above, it is determined that the granting of this resource consent, is not inconsistent with the relevant objectives and policies contained in these relevant planning provisions.

9. DURATION OF THE CONSENT

102. A period of 35 years was requested by the applicant. Regard has been had to pRP Policy D.2.1.2 (Duration of resource consent) which requires decision makers to have particular regard to security of tenure of the investment, the alignment of expiry dates for similar activities within the catchment, certainty of effects of the activity, whether the activity is associated with regionally significant infrastructure, and the applicants past compliance with the conditions of previous resource consent and the applicants voluntary adoption of good management practice. The applicant has addressed this provision on page 202 in section 6.3.4. of the AEE.
103. It is the council's practice to endeavour to have consistency of expiry dates in an area or catchment, while also recognising individual circumstances such as the capital investment involved in the activity, likely environmental effects, whether during the first term of a consent the effects were as predicted; and if a structure is involved, the life of the structure. Consistency of expiry dates in an area or catchment enables a comprehensive review of all consents to be undertaken at the agreed time in the future.

104. The applicant's activities are peculiar so there are no other permitted activities in the vicinity that would warrant alignment of expiry dates. The applicant does hold a number of permits for significant capital dredging works and these expire in 2053, being 32 years' time. While 3 years is a relatively short duration, given the significant value of the Refinery and terminal assets, and the significant value of past and predicted future investment.
105. Furthermore, while not certain, indications are that these capital dredging permits may not be implemented by the applicant, particularly if the site becomes a terminal and ceases refining activities. On that basis there is a weakened rationale to restrict the term of consent to 32 years and a term of 35 years is reasonable

DECISION

Pursuant to Section 104B of the Act, the council GRANTS resource consent for all activities, subject to conditions imposed pursuant to Section 108 as contained in Attachment 3.

REASONS FOR THE DECISION

In reaching this decision, the council has considered the matters outlined in Part 2 and Section 104 of the Act. It has been determined that:

- (a) The proposal will enable a regionally significant Infrastructure to continue its efficient functioning, while appropriately avoiding, remedying or mitigating its adverse effects;
- (b) Cultural impacts of the proposal will be remedied and mitigated through the conditions that seek to directly recognise and provide for Tangata Whenua involvement in environmental management on the site and on the site's discharges to land, air and waters;
- (c) Reasonable operational flexibility is provided to the applicant to manage its site while achieving clear environmental bottom lines, particularly for the discharges, that will be regularly monitored and reported on, and mechanisms in the conditions enable process and control changes to adapt over time;
- (d) The applicant has provided a robust assessment of alternatives to justify that the proposed approach to managing discharges represents the best practicable option;
- (e) The requirement for a time-bound Site Remediation Plan provides certainty that in the event refining and or terminal operations cease on the site, that legacy contamination effects will be remediated, and this assists the justification for a full 35 year term of consent along with the significant value of the infrastructure
- (f) The environmental effects of the renewal of resource consent for Refinery NZ have been assessed and are considered to have minor adverse effects when subject to the extensive controls within the proposed conditions, including the Management and Monitoring Plans.
- (g) After considering the relevant objections and policies outlined in the NZCPS, NPSFM, RPS, the oRCP, oRAQP, oRWSP and pRP, the proposal is generally consistent with, and certainly not inconsistent with these planning provisions.
- (h) The granting of this resource consent achieves the purposes of the Act.

Issued this Third day of March 2021



Stuart Savill
Consents Manager

Attachment 1 – Summary of Submissions

RESOURCE CONSENT APPLICATION – APP.008319.01.05 – RENEWAL OF RESOURCE CONSNETS, THE NZ REFINERY COMPANY

| Date Received | Name of Submitter | Oppose/Support | Wish to be Heard | Submission Comments | Relief Sought |
|---------------|--|----------------|------------------|--|---------------|
| 02/09/2020 | Robert Stanley Mountjoy | Support | Heard | <ul style="list-style-type: none"> Marsden Point refinery is of national security importance, without which New Zealand by be fully reliant on imported refined products, with a great reduction in supply Chain flexibility. A major regional employer and one of very few industrial Employers where skills and experience with oil and gas and the related engineering disciplines, can be fostered and passed on, to the benefit and skills diversity of NZ. It would be a very great shame if the refinery was forced to stop functioning due to resource management issues. The refinery is clearly well maintained and well operated. An occasional minor odour is a trivial price to pay for the benefit the refinery brings to our community and our country. | Grant |
| 03/09/2020 | Richard Graham Chatfield | Support | Not Heard | <ul style="list-style-type: none"> Not stated. | Grant |
| 09/09/2020 | EE Jagger | Support | Not Heard | <ul style="list-style-type: none"> Resided for over 40 plus years at 7 Ody Road, Taurikura, with only one complaint. Regarding the flare of C Block, which was rectified, and then lived in harmony. | Grant |
| 18/09/2020 | John Leslie Richards and Glenys Richards | Support | Not Heard | <ul style="list-style-type: none"> Not stated. | Grant |
| 22/09/2020 | Grant Tucker | Oppose | Not Heard | <ul style="list-style-type: none"> Oppose the whole application | Refuse |
| 22/09/2020 | GW Tucker | Oppose | Not Heard | <ul style="list-style-type: none"> The beaches near the refinery like McGregors Bay are filling up with silt and mud destroying the environment. Oysters are taking over; the smell can be very strong. | Refuse |

| Date Received | Name of Submitter | Oppose/Support | Wish to be Heard | Submission Comments | Relief Sought |
|---------------|---|----------------|------------------|--|---|
| 22/09/2020 | Anna and Andrew Davies | Oppose | Not Heard | <ul style="list-style-type: none"> Flaring – is not only in emergency, it is constant. The flare is always going. Air Quality around and what we are breathing in coming out of the flare and Block B, C. | <p>Refuse</p> <p>An easier way to report odour complaints and transparent, until this limited notification was unaware of any process at all.</p> <p>More information on the flaring and why would like publicly easy to find water quality information available.</p> |
| 22/09/2020 | Janice Ellen Boyes | Support | Heard | <ul style="list-style-type: none"> Retain limits for particles that discharge into the air, including ones that cause smells. Continue monitoring of all emissions into the air, as at present, and continue to search for the reasons for smells. As a member of the Whangarei Heads Citizens Association, the Refinery should utilise these organisations for consultation, who host meetings, and ask for submission. My other comment is the 'less than minor' effect you use to decide all other emissions and actions like dredging. Everything you do has 'more than minor' effect, and because these consents for ongoing operations happen rarely, a much wider group of people should be able to submit. | <p>Grant</p> <p>Levels of discharge should be no more lenient than it has been.</p> |
| 23/09/2020 | Selwyn and Mira Norris (on behalf of Te Parawhau) | Oppose | Heard | <ul style="list-style-type: none"> Marine Mammals, significant adverse effects, could be remedies or mitigated. Birds, Potential risk on shorebird habitats identified as high at Mair Bank and low-moderate at Reotahi Bay, disruption of birds (Kororā/Little Penguin and Oi/Grey faced petrel) due to turbidity (plume), lighting, noise etc during dredging operation as they commute between nesting and feeding habitat. Benthic Fauna, Loss of benthic species which is kaimoana for other species. Risk of "Adventive" marine pest species recolonizing disturbed footprint. | <p>Refuse</p> <p>Review of all Operations plans, guidelines, management plans, monitoring plan.</p> <p>Cultural Monitors as Kaitiaki</p> <p>Post dredging bird surveys - Tangata whenua require review of any detailed monitoring plans, guidelines etc, fully resourced and involvement in physical monitoring.</p> <p>Councils could grant Tangata Whenua Matauranga practice and methodology. Coffey is recommending. i.e:</p> |

| Date Received | Name of Submitter | Oppose/ Support | Wish to be Heard | Submission Comments | Relief Sought |
|---------------|-------------------|-----------------|------------------|---|--|
| | | | | <ul style="list-style-type: none"> Air Ambient Report Climate Change, Bigger Picture – Refinery is a sunset industry, and will it ever be able to compete with SE Asian mega refineries? Does economic benefit of substantial modification to the harbour outweigh the environmental cultural loss and Tangata Whenua DNA blueprint removal. Where is their low carbon transmission plan and real assessment of alternatives? Mauri, Already a past impact, heavily degraded/ diminished Mauri, cumulative and future impacts. | <p>fund/contribution to rehabilitation initiatives – specifically seagrass and shellfish enhancement Tangata whenua require review of any detailed monitoring plans, fully resourced Involvement in physical monitoring programme.</p> <p>Tangata Whenua require more Monitoring sites on the outside boundary of RNZ. •Mair Road</p> <ul style="list-style-type: none"> On the beach A site between Port Corp and RNZ A site at Takahiwai A site at One Tree Point. Cultural Monitors to be fully funded and an Independent company to review the findings each month for a 3-year period. <p>Protection of Culture for future generations.</p> <p>How do you mitigate? Restoration fund; Part of a Harbour Restoration Management Plan and must have representation from Te Parawhau ki Tai x 2.</p> <p>Restoration Fund lead by Hapu.</p> |

| Date Received | Name of Submitter | Oppose/Support | Wish to be Heard | Submission Comments | Relief Sought |
|---------------|---|----------------|------------------|---|---|
| | | | | <ul style="list-style-type: none"> Kaimoana/Customary Fisheries, Kaimoana stocks already in perilous position. No consideration since 1960 has been implemented to Protect our Culture. Article 1 Treaty of Waitangi. Kaitiakitanga, Knowledge and practice of kaitiakitanga affected by loss of access to our traditional sites and species and our rights to practice Maturanga Maori traditions We Whakapapa to many taonga species, and are kaitiakitanga of the Whenua, but our responsibilities have been over layered by an unwilling system to protect our Cultural Rights, even with the RMA 1990 Act . Cultural Landscapes and seascapes, Potential to impact on amenity values and “cultural landscapes/seascapes”- E.g. potential exacerbation of loss of Mair Bank – loss of identifier/marker. Te Tiriti o Waitangi He Whakaputanga Rangatiratanga, The impact a 35 year consent period will have on Māori rights and interests that are yet to be confirmed via the customary marine title and protected customary activity process under the Marine and Coastal Area (Takutai Moana) Act 2011 (MACA Act). The impact on Māori customary and commercial fishing rights, have been overridden by other fishing interest groups and organisations that have a collaborative relationship and/or partnership with RNZ. In an RMA context – have the principles of the Treaty been addressed through this proposal. Bigger Picture, who pays for future site remediation costs at refinery? (estimated to be \$300 Million) To be answered before a 35 year Consent Renewal | <p>Restoration fund as above Capacity building – i.e. Bonded full scholarships environmental and or science through to post grad for as long as the neglect has been happening x 5.</p> <p>Restoration fund as above Capacity building – i.e. Bonded full scholarships environmental and or science through to post grad for as long as the neglect has been happening x 5.</p> <p>True partnership is sought. Director/governance position on RNZ Board?? Charitable Trust, Joint committee, MOU's etc as per above.</p> <p>RNZ to assist prepare a low carbon transition strategy for Marsden Point Oil Refinery; RNZ and other stakeholders Prepare a full harbour restoration plan.</p> |
| 23/09/2020 | Gilbert Paki (Patuharakeke Te Iwi Trust Board Inc.) | Oppose | Heard | <ul style="list-style-type: none"> Acknowledgement of previous consultation, in accordance with the MOU and RA between the applicant and PTB. Reference to the Cultural Effects Assessment (CEA) appended as Annexure 5 of the application. | <p>Refuse in its current form.</p> <p>To monitor the state of kaimoana populations there, he cultural health or</p> |

| Date Received | Name of Submitter | Oppose/Support | Wish to be Heard | Submission Comments | Relief Sought |
|---------------|-------------------|----------------|------------------|--|--|
| | | | | <ul style="list-style-type: none"> • Recognition of technical report within the application, and that they did not identify any significant adverse effects, however Whangarei Tereng Paraoa is in a state of degrade, unable to support a range of cultural and traditional uses. The refinery being an immediate neighbour to the Poupouwhenus Mataitai is contributing to the decline. • Potential effects identified within the CEA, and that do not align with the Hapū Environmental Management Plan (HEMP), and policy directions within the RMA Framework relate particularly to Mauri of water and air and thereby health. • Effects on cultural landscapes and seascapes and customary access, the adverse effects of the coastal structures are considered to be significant. • Ongoing engagement with the applicant to resolve and implement recommendations through resource consent conditions, a relationship agreement or both. | <p>mauri of the site and to advance solutions for its ongoing management and restoration.</p> <p>Inclusion of a consent conditions that will ensure that a holistic cultural health monitoring regime and adaptive restoration management plan is developed and implemented for Poupouwhenua Mātaaitai.</p> <p>PTB seek that a Cultural Landscape Design Framework be prepared to better identify and avoid, remedy or mitigate adverse effects of activities that are subject to these consents, including mitigation of adverse effects through works to restore and enhance the cultural landscape and contribute to tiakitanga of habitats for taonga species.</p> <p>Effects on the mauri of ranginui, the air, mauri ora (our cultural health and wellbeing) and related cultural values, can be appropriately managed by the recommendations of the CEA.</p> <p>Encourage the Refinery to seek positive and pragmatic solutions and responses to climate change going forward.</p> <p>Seek appropriate management measures be put in place to address odour to avoid this significant adverse effect.</p> |

| Date Received | Name of Submitter | Oppose/Support | Wish to be Heard | Submission Comments | Relief Sought |
|---------------|-------------------|----------------|------------------|---------------------|--|
| | | | | | We seek a maximum 15-year consent term with 3 yearly reviews in order to reassess adverse effects in light of new monitoring information, and impose additional or revised management requirements |

Attachment 2 – s95 Notification Decision Report

NOTIFICATION DECISION REPORT

APPLICATION DETAILS

Applicant: The New Zealand Refinery Company Limited trading as Refining NZ.

Application Number: APP.00831.01.05

Description of Activity: Renewal of the various resource consents required for the ongoing operations of its Marsden Point refinery, which includes discharges to air, sea, land, groundwater extraction and marine structures.

Note: This form should only be completed once sufficient information is available to make such a determination.

STEP 1 Request for Public Notification

Has the applicant requested public notification?

- ☒ No → Go to **Step 2**.
- ☐ Yes → Go to **Step 20**. Tick the **Publicly Notified** box as the application must be publicly notified as required by section 95A(2) of the Resource Management Act (RMA).

STEP 2 Has the Applicant Refused a section 92 Request

- ☒ No → Go to **Step 3**.
- ☐ Yes → Go to **Step 20**. Tick the **Publicly Notified** box as the application must be publicly notified as required by section 95A(2) of the RMA.

STEP 3 National Environmental Standard (NES)

Is there a NES that precludes public notification of each activity?

- ☒ No → Go to **Step 4**.
- ☐ Yes → Name of NES: **INSERT NAME**. Go to **Step 9 – Special Circumstances**.

STEP 4 Plan Provisions Regarding Public Notification

Is there a rule or provision in a Regional Plan that precludes public notification of this type of application?

- ☒ No → Go to **Step 5**.
- ☐ Yes → Rule **INSERT RULE**. Go to **Step 9 – Special Circumstances**.

STEP 5 Classification of Activity

Are all the resource consents either:

- (a) “controlled” activities; or
- (b) “restricted discretionary” or “discretionary” activities for a residential activity only?

Note: Residential activity is defined in section 95A(6) and relates to consents that are for the use of one or more dwelling houses solely for residential purposes and can include residential subdivisions.

- ☒ No → Go to **Step 6**.
- ☐ Yes → Go to **Step 9 – Special Circumstances**.

STEP 6 National Environmental Standard (NES)

Is there a NES that precludes public notification of each activity?

- ☒ No → Go to **Step 7**.
- ☐ Yes → Name of NES: **INSERT NAME**. Go to **Step 20**. Tick the **Publicly Notified** box as the application must be publicly notified as required by section 95A(7) of the RMA.

STEP 7 Plan Provisions Regarding Public Notification

Is there a rule or provision in a Regional Plan that requires this type of application to be publicly notified?

- ☒ No → Go to **Step 8**.
- ☐ Yes → Rule **INSERT RULE**. Go to **Step 20**. Tick the **Publicly Notified** box as the application must be publicly notified as required by section 95A(7) of the RMA.

STEP 8 Adverse Effects

What do the potential effects of the activity relate to? (tick as many as appropriate)

- | | |
|--|---|
| <input type="checkbox"/> Downstream flows | <input checked="" type="checkbox"/> Air quality |
| <input checked="" type="checkbox"/> Aquifer levels | <input checked="" type="checkbox"/> Human health |
| <input type="checkbox"/> Flooding | <input checked="" type="checkbox"/> Natural character |
| <input type="checkbox"/> Scouring | <input checked="" type="checkbox"/> Archaeological/historic sites |
| <input checked="" type="checkbox"/> Water quality | <input checked="" type="checkbox"/> Public/recreational access |
| <input checked="" type="checkbox"/> Cultural | <input checked="" type="checkbox"/> Navigation |
| <input checked="" type="checkbox"/> Ecological | <input checked="" type="checkbox"/> Structural security |

☒ Habitat/wildlife ☒ Other Economic, Social & Tourism.

Is it considered that the activity will have, or is likely to have, adverse effects on the environment that are more than minor?

Note: *The requirements of section 95D of the RMA shall be taken into account when determining whether the adverse effects of any activity will be more than minor.*

- ☒ No → State reasons below, then go to **Step 9**.
- ☐ Yes → State reasons below. Go to **Step 20**. Tick the **Publicly Notified** box as the application must be publicly notified as required by section 95A(7) of the RMA.

Reasons:

The applicant has provided a very detailed AEE for the proposal that covers the following broad topics for which individual reports were provided:

- Landscape, Visual and natural Character;
- Groundwater;
- Air quality;
- Water quality
- Marine ecology
- Marine Mammal ecology
- Human health
- Avifauna ecology
- Terrestrial ecology
- Archaeology and Historic Heritage
- Cultural
- Economic
- Recreation and tourism
- Social

The council had peer reviews undertaken of the reports for following topics:

- Landscape, Visual and natural Character;
- Groundwater;
- Air quality;
- Water quality
- Marine ecology
- Marine Mammal ecology

As a result of these peer reviews and an assessment of the other reports, the adverse effects on the environment as a consequence of the consenting of the discharges to air, sea, land, groundwater extraction and marine structures are considered generally to be less than minor.

The detailed assessment of the effects is contained in **Attachment 1** to this Notification Decision Report.

STEP 9 Special Circumstances

Is it considered that special circumstances exist in relation to the application that would warrant the application being publicly notified?

Note: *"Special Circumstances" are those that are unusual or exceptional and those where there are indications that a case is out of the ordinary. If what is proposed is specifically envisaged by the Plan, it cannot be described as being out of the ordinary and giving rise to special circumstances. The fact that some*

persons have concerns about a proposal does not of itself give rise to “special circumstances” but may be a contributing factor.

- ☒ No ➔ Go to **Step 10**.
- ☐ Yes ➔ State reasons below. Go to **Step 20**. Tick the **Publicly Notified** box as the application may be publicly notified as required by section 95A(9) of the RMA.

Reasons:

In this instance, I have turned my mind specifically to the existence of any special circumstances and conclude that there is nothing to suggest that public notification should occur. There is nothing arising from the application that is otherwise unusual or contentious from an overall planning perspective.

Accordingly, in this instance I conclude there are no special circumstances under s95A(9).

STEP 10 Customary Rights and Customary Marine Title Groups

Note: These are a right or groups which are recognised by the Crown by either an order or an agreement.

Could the activity have adverse effects on a protected customary right or the exercise of the rights applying to a customary marine title group?

- ☒ No ➔ State reasons below. Go to **Step 11**.
- ☐ Yes ➔ State protected customary right and/or customary marine title group and reasons below. Go to **Step 11**.

Reasons:

There are no holders of Customary Marine Title (CMT) for the area. There are a number of CMT applicants which have identified the location as being within the area of their application. Prior to the receipt of the application by the council the applicant provided notice to the CMT applicant groups in accordance with section 62 of the Marine and Coastal Area (Takutai Moana) Act 2011.

STEP 11 Statutory Acknowledgement Areas

Will the activity have a minor or more than minor adverse effect on the trustees of any statutory acknowledgement area?

- ☒ No ➔ State reasons below. Go to **Step 14**.
- ☐ Yes ➔ State statutory acknowledgement area, affected Iwi group(s) and reasons in table below. Go to **Step 12**.

Reasons:

No Settlement Acts cover this area.

STEP 12 Written Approvals

Has the applicant provided the written approval of every person who are potential adversely affected in **Steps 10** and **11**?

☐ Yes → Complete the table below. Go to **Step 14**.

☒ No → Complete the table below. Go to **Step 13**.

The following are considered to be affected by this activity:

| Name of Affected Group | Written Approval Provided? (Y/N) |
|---|-------------------------------------|
| Northport - Jon Moore | Y |
| BOC – Hugh Jones | Y |
| Air Liquide – Graham Morris | Y |
| Marsden Maritime Holdings Ltd – Felix Richter | Y |
| Department of Conservation – Sue Reed-Thomas | Y |

STEP 13 Unreasonable to get Written Approvals

Is it considered unreasonable in the circumstances to require the applicant to obtain the written approval of the adversely affected group who has/have not provided written approval?

☒ No → Go to **Step 20**. Tick the **Limited Notified** box. Serve notice of the application only on those groups that have not provided written approval. Then go to **Step 14**.

☐ Yes → State reasons below. Go to **Step 14**.

Reasons:

STEP 14 National Environmental Standard (NES)

Is there a NES that precludes the limited notification for each activity to other persons?

☒ No → Go to **Step 15**.

☐ Yes → Name of NES: **INSERT NAME**. Go to **Step 19 – Special Circumstances**.

STEP 15 Plan Provisions Regarding Limited Notification

Is there a rule or provision in a Regional Plan that precludes the limited notification of this type of application to other persons?

☒ No → Go to **Step 16**.

☐ Yes → Rule **INSERT RULE**. Go to **Step 19 – Special Circumstances**.

STEP 16 Other Affected Persons

Will the activity have a minor or more than minor adverse effect on any other persons?

Note: The requirements of section 95E of the RMA shall be taken into account when determining affected persons.

- ☒ Yes ➔ List persons and reasons in table for Step 17. Go to **Step 17**.
- ☐ No ➔ State reasons below then go to **Step 19 – Special Circumstances**.

Reasons:

Adverse effects on persons are considered within Section and Annexure 3 of the submitted AEE.

The assessment of the adverse effects undertaken by council, which is in **Attachment 1** to this Notification Decision Report, concludes that the following parties are potentially affected to a minor degree for the reasons stated:

- Properties in the bays across the harbour to the northeast of the Refinery due to odour from the discharges to air from the refinery;
- The Patuharakeke Trust Board due to impacts on cultural values as a result of the applicant's operations in general; and

In addition to Patuharakeke, it is noted that the rohe of Te Parawhau also covers the area of these activities. The applicant has undertaken consultation with Te Parawhau prior to lodging this application, as is recorded in Section 5 of the AEE. Te Parawhau expressed a desire to provide a Cultural Impact Assessment (CIA) and the applicant has provided all the technical documents for this to occur. To date a CIA has not been forthcoming from Te Parawhau. Council therefore does not have any information on how Te Parawhau considers these applications affect them culturally.

On the basis of Cultural effects being minor, and no information to demonstrate Te Parawhau is not adversely affected, it is reasonable to conclude a potentially minor level of effect on Te Parawhau cultural values.

Ngati Wai Trust Board is in a similar position, however a verbal discussion with the Resource Management Unit Manager (21/8/2020) confirmed that Ngati Wai will defer to Patuharakeke on this matter.

Check the following:

- ☒ All persons we have protocols with have been sent a copy of the application for comment.

STEP 17 Written Approvals

Has the applicant provided the written approval of every other person who is adversely affected by the activity?

- ☐ Yes ➔ Complete the table below, then go to **Step 19 – Special Circumstances**.
- ☒ No ➔ Complete the table below, then go to **Step 18**.

Note:

Council has identified approximately 400 property owners/occupiers within the air shed modelled area of effects. A table of affected parties cannot therefore be presented in this report. The mailing list for the notification is on the application file.

STEP 18 Unreasonable to get Written Approvals

Is it considered unreasonable in the circumstances to require the applicant to obtain the written approval of the adversely affected person(s) who has/have not provided written approval?

- ☒ No ➔ Go to **Step 20**. Tick the **Limited Notified** box and serve notice of the application only on those persons that have not provided written approval. Then go to **Step 19 – Special Circumstances**.
- ☐ Yes ➔ State reasons below, then go to **Step 19 – Special Circumstances**.

Reasons:

STEP 19 Special Circumstances

Is it considered that special circumstances exist in relation to the application that would warrant notification of this application to any other person not already determined to be eligible for limited notification?

Note: “Special Circumstances” are those that are unusual or exceptional and those where there are indications that a case is out of the ordinary. If what is proposed is specifically envisaged by the Plan, it *cannot* be described as being out of the ordinary and giving rise to special circumstances. The fact that some persons have concerns about a proposal does not of itself give rise to “special circumstances” but may be a contributing factor.

- ☒ No ➔ Go to **Step 20**.
- ☐ Yes ➔ State reasons below. Go to **Step 20**. Tick the **Limited Notified** box as the application may be limited notified as required by section 95A(10) of the RMA.

Reasons:

In this instance, I have turned my mind specifically to the existence of any special circumstances and conclude that there is nothing to suggest that public notification should occur. There is nothing arising from the application that is otherwise unusual or contentious from an overall planning perspective.

Accordingly, in this instance I conclude there are no special circumstances.

STEP 20 Notification Decision

- ☐ Non-notified
- ☒ **Limited Notified**
- ☐ Publicly Notified

Signed:



Blair Masefield
Consultant Planner

Date: 21 August 2020

Authorised under delegated authority by:

Signed: 
Stuart Savill
Consents Manager

Date: 21 August 2020

Attachment 1

Step 8: Detailed assessment of adverse effects

The application is for renewal of resource consents, required for the ongoing operations of its Marsden Point refinery, which includes discharges to air, sea, land, groundwater extraction and marine structures.

The key environmental effects associated with the proposal are outlined and discussed within the AEE, and Technical Reports attached within the Annexures. These are:

| Effects | Applicants Expert | NRC Expert |
|--------------------------------------|--|--|
| Landscape Visual | Stephen Brown (Brown NZ Ltd) | Melean Absolum (Melean Absolum Ltd) |
| Groundwater | Ms Schiess and Mr Simpson (Tonkin and Taylor) | Greg Murphy (Pattle Delamore Partners Ltd (PDP)) |
| Air Discharges | Mr Richard Chilton (Tonkin and Taylor) | Andrew Curtis (PDP) |
| Human Health | Dr Francesca Kelly (Environmental Medicine Limited) | |
| Water Quality | Dr Mike Stewart (Streamlined Environmental Ltd) | Dr Jennifer Gadd and Dr Rob Bell (NIWA) |
| Marine Ecology | Dr Sharon De Luca and Dr Philip Ross (Boffa Miskell) | Dr Drew Lohrer (NIWA) |
| Marine Mammals | Deanna Clements (Cawthron Institute) | Dr Krista Hupman (NIWA) |
| Avifauna Ecology | Graham Don (Bioresearches) | |
| Terrestrial Ecology | Tim Martin and Jessica Reaburn (Wildland Consultants) | |
| Archaeology and Historic Heritage | Dr Rod Clough and Simon Bickler (Clough and Associates Ltd) | |
| Cultural | Patuharakeke Te Iwi Trust Board (PTB) | |
| Economic | Mr Peter Clough (New Zealand Institute of Economic Research (NZIER)) | |
| Recreation and Tourism | Mr Rob Greenaway and Associates | |
| Alternatives | Jane Thompson (Refining NZ) | |

The conclusions regarding the key effects from the AEE and the expert opinions from technical specialists engaged by the NRC are further evaluated and considered below, with a planning conclusion on level and extent of effects drawn

Landscape, Visual and Natural Character Effects

The Landscape Assessment carried out by Stephen Brown of Brown NZ Ltd, attached within Annexure 3 of the application AEE, identified three existing activities and structures that are subject to further consideration in regard to landscape effects in relation of the current application:

- Air emissions from the current oil refinery – essentially smoke and gas flares from a visual/landscape standpoint;
- Stormwater discharge from the refinery, again focusing on their visual character and effects; and
- The refinery's jetty, oil unloading gantries and berthage dolphins.

Mr Brown's assessment discussed the actual and potential effects in relation to each of these activities in turn. Mr Brown concludes from his assessment that:

"On the basis of this assessment, including evaluation of the proposal against relevant statutory provisions, it is considered that the proposed air emissions, stormwater discharges and jetty would typically have a very low level of effect (less than minor) on the landscape, natural character and amenity values of Whangarei Harbour, Whangarei Heads and Bream Bay"

The 'proposals' would adhere to the maxim of concentrating new development and related effects within parts of the CMA and Coastal Environment that are already significantly modified, and would avoid having a direct adverse effect on those parts of Whangarei Heads, Marsden Point and Bream Bay that are identified as having outstanding landscape or natural character values. They would also avoid having a significant effect in relation to the rest of the coastal environment and surrounding landscapes. Most components and activities associated with the project would have a quite limited impact on perceptions of the area's character, identity or sense of place.

Mr Browns landscape assessment was peer review by Melean Absolum, of Melean Absolum Ltd. Ms Melean ascertains *"Having carefully considered all the matters addressed in the revised Landscape Assessment, I concur with Mr Brown's various conclusions, in terms of the scale of potential effects of the proposal. As such, it is my opinion that the proposal will not create adverse effects on landscape, natural character or amenity values that necessitate notification of the application"*

Mr Brown also acknowledged the concerns raised by Patuharakeke Te Iwi Trust Board (PTB), in relation to their concerns regarding the Landscape Effects of the proposal. These are recognised and considered within the Landscape Assessment. Ms Melean is also satisfied that the Landscape Assessment addresses her concerns and recommendations which includes information provided within the Cultural Effects Assessment (CEA).

I agree with the conclusions of the Landscape Assessment and peer review findings, that the actual and potential adverse landscape effects of the renewal of the resource consent will be less than minor, particularly when considered in the context of the surrounding natural and man-made/industrial landscapes.

Groundwater Effects

Ms Schiess and Mr Simpson of Tonkin and Taylor, were commissioned to prepare a hydrogeological conceptual site model report to support the application for renewal of existing resource consents. The purpose of this report is therefore to bring together the current knowledge of the site conditions to allow for an up-to-date assessment of the current and future potential effects on the environment. The findings of the assessment were used to consider what (if any) additional intervention or remediation is required to ensure the effects on the environment are acceptable. A full copy of the technical report is contained within Annexure 3 of the application AEE.

As summarised in the AEE Ms Schiess and Mr Simpson conclude:

“That the present regime of pumping is considered to be an appropriate and effective means of avoiding adverse effects associated with saline intrusion because outward hydraulic gradients are maintained. They go on to report that this is supported by the operational data and monitoring for the wells. They also report that the prevention of saline intrusion is designed to protect a freshwater resource (coastal aquifer) from becoming contaminated such that it cannot be used for other purposes. According to Ms Schiess and Mr Simpson, in the case of the aquifer system beneath the Refinery, it is clear that the resource is already contaminated due to the presence of hydrocarbons in groundwater and for this reason, the resource has little value for other purposes. Further, in the case of the Refinery, they state that even if saline intrusion into the aquifer were to occur, seawater is enriched in electron acceptors that promotes the natural attenuation of dissolved phase hydrocarbons. They therefore conclude that the saline intrusion could be considered beneficial, in that it would reduce the source of aquifer contamination.”

Greg Murphy of Pattle Delamore Partners Limited (PDP) reviewed the Hydrogeological Conceptual Site Model and related supporting information. Mr Murphy notes that the objective of the groundwater take is primarily to contain groundwater contamination and avoid its discharge to the harbour. He identified a number of technical matters that required further clarification to clarify the justification for the proposed changes, an increase to the volume and the location of the wells of the water take and the flow on effect to the Light Non Aqueous Phase Liquid LNAPL recovery.

Despite these technical clarifications Mr Murphy agrees with the applicant’s assessment *“that the potential for other groundwater users to be affected by the proposed take is less than minor”*. This is based on the drawdown effects at the location of the BOC well, which were calculated to be less than 1m. The location of this assessment is representative for other bores in the vicinity, and as noted in the AEE, groundwater contours show a gradient eastward is maintained by the current level of pumping, which is sought to continue.

Accordingly, I rely on the opinions of these experts and on that basis am satisfied the effects of the proposal on the groundwater resource to be minor and on adjacent users to be less than minor.

Air Quality Effects

An Air Quality Assessment has been completed by Mr Richard Chilton of Tonkin and Taylor. The assessment considers the actual and potential effects of the proposal on air quality. A full copy of the technical report is contained within Annexure 3 of the application AEE.

The key environmental effects associated with the proposal in relation to Air Quality where classified in relation to the following emissions:

- Combustion Emissions;
- Fugitive Emissions;
- Odour Emissions; and
- Dust Emissions

Mr Chilton's report discusses the emissions in detail including dispersions and meteorological modelling concluding that the proposed discharges to air require resource consent, and that the ongoing discharges to air from the Refinery will have less than minor effects on the environment. The effects on human health/environment regarding nickel exposure is further considered by Dr Francesca Kelly of Environmental Medicine Limited, assessment. Based on Dr Kelly's conclusions Mr Chilton considers the potential effects to also be less than minor.

Mitigation and monitoring are also discussed within the assessment, outlining the current processes and timing of activities to stay within the existing consent limits and avoid excessive discharges. The installation of a flue gas desulphurisation to reduce SO₂ emissions is considered by Mr Chilton, as a further control measure that can be employed for new discharge sources to manage potential adverse effects. Due to the existing scale and nature of the refinery, and consideration of the environmental effects of the SO₂ emissions which are less than minor, it is not a practicable option at this time.

Jane Thomson of Refinery NZ reconfirms that the installation of a sulphur dioxide scrubber to treat furnace flue gas is considered prohibitively expensive, and the environmental effects associated with this discharge do not warrant this level of investment, through the Assessment of Alternatives report contained in Annexure 3.

Andrew Curtis of PDP undertook the technical review of Mr Chilton's Air Quality Assessment and sought technical clarification in relation to more detail of the identified sensitive receptors locations, additional monitoring data for Nickel concentrations and fugitive emissions, and commentary on dust emissions from abrasive blasting at height.

From subsequent discussions with Mr Curtis [Pers. Comm] he agrees with the findings and conclusion of the technical reporting that the actual and potential adverse effects from discharges to air are less than minor. The matters identified for clarification were to provide a more complete understanding of effects and appropriate management measures but would not change that position on level of effects.

The exception is regarding odour effects. No odour modelling was provided and Mr Curtis does not believe this is necessary. Predicting likely extent of potentially objectionable and offensive odour has been informed by the plume modelling for the sulphur dioxide combined with an appreciation of the wind behaviour in this location.

The area from the McLeod Bay jetty through to the Peninsula at the southern end of Taurikura Bay has been identified as potentially experiencing a minor level of objectionable and offensive odour during light west to southwest winds. Due to the predominance of strong winds from the east and north east and the high dispersive nature of these winds, the residential areas of Marsden Cove, One Tree Point and Ruakaka were not identified as experiencing minor odour effects.

Accordingly, I rely on the opinions of these experts and on that basis am satisfied the effects of the proposal from discharges to air to be less than minor with the exception of odour discharges on the bays to the north east of the refinery who potentially experience a minor level of odour effect.

Human Health Effects

An assessment of the effects in relation to exposure to the identified hazardous contaminants from the findings of the technical reports, carried out by Boffa Miskell, Tonkin and Taylor, Streamline Limited and Northland Regional Council, through inhalation (particularly SO₂, shellfish (Kaimoana) consumption, drinking water and coastal recreation was completed by Dr Francesca Kelly of Environmental Medicine Limited. A full copy of the report is contained within Annexure 3 of the application AEE.

The potential to produce health effects from exposure to the identified hazardous contaminants depends on the amount and duration of exposure. Dr Kelly noted *“that some groups of people are generally recognised to be more vulnerable than others to adverse effects from contaminants in food, water and air.”* Dr Kelly went on to state *“that another possible susceptibility is when exposures to more than one contaminant are at a concentration to produce health effects.”* However, the exposure concentrations are low or below detection, combined effects are unlikely to be a particular issue.

Dr Kelly’s overall found that the risk of adverse health effects from the discharges brought about by the refinery operations subject to this proposal are less than minor to negligible.

I agree with the conclusions drawn from the assessments.

Water Quality/Water Chemistry Effects

The applicant commissioned a Water Quality Assessment, which was fulfilled by Dr Mike Stewart of Streamlined Environmental Ltd. The technical report assesses the water quality and chemistry of the surface and ground water discharges produced as part of the refining process.

The application site contains two drainage system, the Continuously Oil Contaminated System (COC) and the Accidentally Oil Contaminated System (AOC), and the stormwater storage basin (SWB) which discharges into the Whangarei Harbour, via a pipe along No.2 Jetty. A hydraulic containment system has operated at the site since 1983 to manage hydrocarbon contamination of groundwater, comprising of a number of recovery wells. A full copy of the technical report is contained within Annexure 3 of the application AEE.

Dr Stewart’s assessment overall considers the discharge of most contaminants from the Refinery SWB to have a less than minor effects on water quality in the marine receiving environment outside the current mixing zone. With three contaminants ammoniacal nitrogen, Faecal Coliforms and Cortrol OS7780 (soon to be replaced with Cortrol OS5614, a more benign alternative) identified as exhibit no more than minor and transitory effects.

A peer review of Dr Stewart’s Report was undertaken by Dr Jennifer Gadd and Dr Rob Bell of NIWA. Dr Gadd agrees overall with Dr Stewart’s assessment, that the effects on water quality are expected to be no more than minor and transitory.

Dr Bell, after reviewing the spatial plots of both near-surface and near-bottom dilutions as well as the depth-average dilution plots, confirmed that the dilutions largely meet the derived Risk Quotients for extreme infrequent events of short durations. Therefore, Dr Bell is in agreement that the contaminants from the Refinery Stormwater Basin will have a less than minor effect on water quality in the marine receiving environment outside the current mixing zone, and that a few contaminants may exhibit minor and transitory effects.

On this basis, I am satisfied that an adequate assessments of the infrastructure, systems, discharge and sampling regime has been undertaken to ensure that the discharges of surface water and groundwater are within the recommended guidelines, and that the predicted adverse effects on water quality will be less than minor.

Despite the expert's conclusion of occasional minor effects on water quality, in my opinion the manifestation of adverse water quality effects are assessed through the subsequent effect on the flora and fauna, recreational and cultural values associated with the water resource. As detailed below these have been concluded as less than minor, with the exception of cultural effects on the Mauri of the harbour.

Marine Ecology Effects

Dr Sharon De Luca and Dr Philip Ross of Boffa Miskell were engaged by the applicant to undertake an assessment of the effects of the refinery operations on the marine ecological values of the Coastal Marine Area (CMA). A copy of the report is contained within Annexure 3 of the application AEE.

The following have been considered within the assessment:

- Process Chemicals
- Discharge of Treated Stormwater and Wastewater
- Discharge of uncontaminated Seawater
- Marine Structures
- Cumulative Effects

The findings of Dr Sharon De Luca and Dr Philip Ross assessment found that the majority of the marine discharges from the Refinery are quickly dispersed due to the rapid and high dilution afforded by the exchange of water beneath the Refining NZ jetty. This results in a low duration of exposure, and low risk to marine organisms from the discharges.

Despite the marine environment having high ecological values and containing a presence of diverse marine intertidal and subtidal soft and hard-shore communities, comprising of a number of indicator species of stress in marine environments, the magnitude of effect of the proposed discharge and occupation range is concluded to be very low to negligible and as such, the overall level of effect of the activities proposed on marine ecology ranges between negligible to less than minor.

Dr Drew Lohrer, NIWA, peer reviewed the assessment carried out by Boffa Miskell, and stated that he generally agrees with the authors' assessment, in that the marine ecological values at and adjacent to the Refinery jetty are high but that the rapid dispersal results in a low level of effect.

Accordingly, I am satisfied that there is a negligible to less than minor effect on the marine ecology within the vicinity of the coastal structures, discharge mixing zone and marine receiving environment

Marine Mammal Ecology Effects

Deanna Clements of the Cawthron Institute has assessed and considered the actual and potential effects of the proposal, specifically the coastal discharge, on marine mammals. A full copy of the report is contained within Annexure 3 of the application AEE.

Key Issues with regard to the susceptibility of marine mammals relate to bioaccumulation and biomagnification of contaminants associated with the coastal discharge. The report findings were that bioaccumulation occurs largely in near shore populations and there are no resident colonies of marine mammals. Potentially affected species are migratory and therefore only intermittently feeding in and around the refinery location. On this basis Ms Clements findings concluded that the potential effects on marine mammals from the proposal are considered negligible, and no mitigation is warranted.

Dr Krista Hupman of NIWA peer reviewed the report and determined that Ms Clements has made a good assessment of the potential effects based on the known information on marine mammal distribution and movements around the impact region. Dr Hupman generally agrees with the assessment that there is likely to be negligible effects from the proposal on marine mammals.

I agree with the conclusions of the assessment and peer review that potential effects of the proposal on marine mammals will be less than minor.

Avifauna Ecology Effects

A Coastal Bird Assessment was completed by Graham Don of Bioreserches. The report presents a summary of the existing environment as it relates to coastal birds (species, habitats, populations and values) and an assessment of effects – air discharges, water quality, marine ecological and occupation of the seabed. A full copy of the report is contained within Annexure 3 of the application AEE.

The application AEE summarised the finding of the report as:

Overall, Mr Don states that based on the detailed assessments of the various independent experts engaged by Refining NZ to consider the effects of the air discharges, wastewater and other liquid discharges; their resulting conclusions regarding existing water and sediment quality, toxicity testing and the occupation of the seabed; and the information gained from the various coastal bird surveys; that the effects of the reconsenting Proposal on coastal birds at all of their life stages is considered negligible.

Further, Mr Don notes that there is no demonstrable or predicted effect on the habitat of coastal birds that could adversely affect their feeding, resting, roosting or breeding. He states that the Refinery Jetty and associated structures in the CMA provide well-used roosting habitat which is an overall positive effect. Similarly, Mr Don indicates that there is no evidence that the Refinery complex itself has a significant adverse effect on coastal birds.

He concludes that by providing resting, roosting and nesting habitat for species that are considered to be at risk on a national basis, that the Proposal has an overall positive effect. He also advises that no avoidance or remediation measures are required regarding coastal birds and similarly, that no regular monitoring is recommended with respect to the Proposal.

Accordingly, I am satisfied that there will be less than minor effect on the coastal birds within the vicinity of the Refinery as a result of the proposal.

Terrestrial Ecology Effects

Wildland Consultants have provided an assessment of the effects of the air discharges on terrestrial flora and fauna, in particular the potential effects of sulphur dioxide (SO₂) and nitrogen oxides (NO_x) discharges. A full copy of the report is contained within Annexure 3 of the application AEE.

The assessment includes parts of Manaia and Waipu Ecological Districts, separated by the Whangarei Harbour. The extent of the receiving environment has been defined based on the modelling of air discharged from the Refinery. The ecosystems and species groups within the receiving environment have been considered on a pollutant-by-pollutant basis with a literature review providing the bases for identification of potential effects.

The assessment concludes that they do not expect the air discharge to result in any detectable adverse effects on the indigenous terrestrial ecosystems. With the exception, of the adverse effects occurring on lichens within one kilometre of the discharge point, which may be a result of localised air discharge, within a modified habitat of low ecological value.

The importance of the existing monitoring programme is noted and, if the application is granted, that an updated monitoring regime is proposed to ensure the potential adverse effects of air discharge on terrestrial ecology are effectively monitored and managed throughout the duration of the consent.

Accordingly, I am satisfied that the air discharges, with specific reference to the concentrations of sulphur dioxide and nitrogen oxides, and deposition rate of sulphur and nitrogen are below levels at which adverse effects are likely to occur on the terrestrial flora and fauna, particularly on any threatened or at risk species.

Archaeological and Historic Heritage Effects

The site has previously been investigated and assessed regarding archaeological site, historic heritage sites and sites of wahi tapu, during the development of the site, and more recently as part of the Crude Shipping Project by Dr Rod Clough. A full copy of the archaeological assessment report is contained within Annexure 3 of the application AEE.

Dr Clough's advised that the proposal, which does not involve activities relating to the disturbance to land / seabed, will not adversely affect any recorded archaeological sites. This is further confirmed by the Cultural Effects Assessment (CEA) stating that the proposal *"will not impact an on any individual archaeological sites or wahi tapu"*.

Based on the information provided within the assessments, I am in agreement, and satisfied that the proposal is unlikely to adversely affect archaeological, heritage or wahi tapu sites as a result of the proposal, particularly as no physical works are sought by the consent renewal application. Any associated maintenance activities will be covered by accidental discovery protocols and the provisions of the Heritage New Zealand Pouhere Taonga Act.

Cultural Effects

The applicant has engaged Patuharakeke Te Iwi Trust Board (PTB) to prepare a Cultural Effects Assessment (CEA) in relation to the cultural effects of the proposal on its cultural values. A full copy of the CEA is contained within Annexure 5 of the application AEE.

PTB has structured the CEA under the four well-beings:

- Environmental Effects
- Cultural Effects
- Social Effects
- Economic Effects

The pertinent observation from PTB is that it considers Whangarei Terenga Paraoa to be in a degraded state which is unable to support a range of cultural and traditional uses. The CEA discusses the details of the four well-beings in detail and the relevant technical reports, noting that the technical reports do not identify any significant adverse effects.

The CEA concludes that the proposal will have:

- More than minor effects on water quality and Poupouwhenua Mahinga mataitai;
- Minor effects on air quality;
- Moderate to high effects on cultural landscapes, seascapes and customary access to the Takutai Moana, in regard to the consenting of the coastal structures;
- Minor to more than minor effects on the social wellbeing; and
- Neutral effects on Patuharakeke economic well-being.

Nevertheless, PTB consider that the effects identified in the CEA to be acceptable, provided the suite of recommendations, including resource consent conditions and term of consent within the CEA are implemented by the applicant and/or Council. PTB suggest that limited notification of the application would be appropriate in their view to tangata whenua and potentially other affected parties.

Taking into account the existing environment and the mitigation offered and supported by PTB, I conclude that effects on Cultural values are minor.

Economic Effects

Mr Peter Clough of the New Zealand Institute of Economic Research (NZIER) has compiled a report on the actual and potential effects of the proposal on the economy. A full copy of the report is contained within Annexure 3 of the application AEE.

Mr Clough report is detailed and covers several scenarios, including the flow on effects to the local, regional, nation and international economy, depending on if the proposal is consented or not. If consenting was not undertaken, the refinery would need to be decommissioned and rehabilitated.

The report concludes that consenting is required to enable continuation of the refinery operations, which contributes approximately \$428 million per year in GDP to the Northland economy, about 7% of the region's total, and provides 636 jobs. Without consenting, much of the beneficial impacts of the refinery would diminish. The AEE in section 4.13.1 provides commentary on the impact of Covid 19 on the activity and production levels of the Refinery and asserts that the consents as sought are largely required, irrespective of the future state of the Refinery operations.

Accordingly, I am satisfied that there is an economic requirement to consider consenting the proposal to enable the refinery to continue operating without significant adverse effects.

Recreation and Tourism Effects

Mr Rob Greenaway and Associates completed a Recreation and Tourism Effects Assessment as part of the Crude Shipping Project proposal, which is relevant to this proposal due to its close proximity to the site. A full copy of the report is contained within Annexure 3 of the application AEE.

As noted in the summary contained in the AEE "Mr Greenaway advises that the Whangārei Harbour, the Harbour entrance, and the marine and coastal marine settings between Marsden Point and Bream Head, are intensely used recreation settings. He records that the recreation and tourism activities undertaken include swimming / beach activities, surfing, fishing, shell fishing, diving and snorkelling and boating. We understand Mr Greenaway's advice to be that the reason for the number of recreation activities is due to the quality of the environment (which is high)."

After considering the technical report mentioned within Annexure 3, Mr Greenaway concludes *"Overall, when all things are considered, the actual and potential recreation and tourism effects of the Proposal are expected to be less than minor."*

While I note the report provides limited values to the particulars of this application, based on the information provided within Mr Greenaway's assessments, I am in agreement with the conclusion that the proposal will have less than minor effects on recreation and tourism.

Social Effects

As noted in the AEE "In order to determine if the Proposal results in social effects, we are of the opinion that regard must be paid to all of the technical reports that have been summarised in section 4.0 of this AEE and the conclusions drawn within the same. Further, the outcomes of the consultation undertaken by Refining NZ must be considered. Having considered the consultation outcomes and technical analysis, we are of the opinion that the Proposal is unlikely to generate unacceptable adverse social effects and that it is likely to generate impacts that benefit individuals, families and communities".

Large scale projects often cause adverse social impacts due to uncertainty around scale, timing and unknown effects. This is not the case with this consenting proposal as the manifestation of the Refinery and its effects are present, well understood, and enabled through the District Plan provisions.

Key Social effects associated in the regional consents include:

- recreation and access;
- contamination of drinking water;
- air quality; and
- employment.

I agree with the conclusions drawn from the summary of the technical reports mentioned above with specific consideration to social effects outlined in the AEE, and that the proposal will result in less than minor social impacts.

Summary

Overall, for the reasons outlined above, I am of the opinion that adverse effects on the environment as a consequence of the consenting of the discharges to air, sea, land, groundwater extraction and marine structures will generally be less than minor, with the exception of a minor level of effects on:

- Properties in the bays to the northeast of the Refinery from potentially obnoxious and offensive odour; and
- Cultural values.

Attachment 3 – Conditions and Appendices

THE NEW ZEALAND REFINING COMPANY LIMITED

To undertake the following activities associated with the refining, and import and distribution, of petroleum hydrocarbons at Marsden Point:

Note: All location co-ordinates in this document refer to Geodetic Datum 2000, New Zealand Transverse Mercator Projection (unless expressly stated otherwise).

- | | |
|-------------------------|---|
| AUT.008319.01.05 | To discharge treated process wastewater from the refining of petroleum hydrocarbons; stormwater; groundwater; and ballast water to Whangarei Harbour, via a diffuser at or about location co-ordinates 1735261E 6033230N. |
| AUT.008319.02.03 | To discharge contaminants into the air from all Site activities associated with the refining, storage and/or transport of petroleum hydrocarbons on Section 10 Blk VIII Ruakaka SD, identifier NA70A371. |
| AUT.008319.04.02 | To discharge water and contaminants to ground (including associated passive discharges) as a result of activities associated refining, storage and/or transport of petroleum hydrocarbons and from wet and dry abrasive blasting, on Section 10 Blk VIII Ruakaka SD, identifier NA3D/1472. |
| AUT.008319.05.02 | To take groundwater from bores on Section 10 Blk VIII Ruakaka SD, identifier NA70A371, for water table depression purposes. |
| AUT.008319.06.02 | To occupy, on an exclusive basis, and use the coastal marine area with the refinery wharf and jetty extension and associated structures, including toilets and sewage holding tanks, fire pump diesel tanks, slops tanks, mooring dolphins and breasting moorings, a diffuser structure and diffuser bypass structure on Section 10 Block VIII Ruakaka SD and Lot 1 DP 52379 Blk VIII Ruakaka SD, Whangarei Harbour, identifier NA3D/1472. |
| AUT.008319.11.02 | To discharge contaminants into the air from dry abrasive blasting and spray-painting operations on Section 10 Block VIII Ruakaka Survey and Lot 1 DP 52379 Blk VIII Ruakaka SD, identifier NA3D/1472 (excluding the coastal marine area). |
| AUT.008319.13.02 | To discharge treated process wastewater; stormwater; groundwater; and ballast water into the coastal marine area of Whangarei Harbour via the stormwater basin diffuser bypass, at or about location co-ordinates 1735261E 6033230N. |
| AUT.008319.16.02 | To discharge treated process wastewater; stormwater; groundwater; and ballast water into the coastal marine area of Whangarei Harbour via an overflow spillway from the stormwater basin, at or about location co-ordinates 1735369E 6033122N. |
| AUT.008319.17.02 | To use and occupy the coastal marine area with part of a stormwater basin overflow spillway structure. |
| AUT.008319.18.02 | To disturb (and deposit sand on) the foreshore and coastal marine area during maintenance and repair of a stormwater basin overflow spillway structure. |

AUT.008319.28.01 Dam and divert stormwater in the Accidentally Oil Contaminated System, Continuously Contaminated System.

Subject to the following conditions:

DEFINITIONS

Best Practicable Option: In relation to a discharge of a contaminant or an emission of noise, means the best method for preventing or minimising the adverse effects on the environment having regard, among other things, to:

- (a) The nature of the discharge or emission and the sensitivity of the receiving environment to adverse effects; and
- (b) The financial implications, and the effects on the environment, of that option when compared with other options; and
- (c) The current state of technical knowledge and the likelihood that the option can be successfully applied.

Certification: Where any condition requires the Consent Holder to submit a report, Management Plan, or Monitoring Plan to the Council for “*certification*” it shall mean the process set out in the following paragraphs (a) to (d) and the terms “*certify*” and “*certified*” shall have the equivalent meanings:

- (a) The Consent Holder supplies a report, Management Plan, or Monitoring Plan to the Council’s Compliance Manager, and the Council assesses the documentation submitted to ensure that it achieves the requirements of the relevant condition(s) of consent (for the Management Plan and Monitoring Plan, this will include that the plan proposed for certification meets the objective(s) and content requirements set out in the condition(s));
- (b) Should the documentation supplied in accordance with (a) above, in the opinion of the Council, achieve the requirements of the relevant condition(s), the Council’s Compliance Manager shall issue a written confirmation (certification) to the Consent Holder that the requirements of the relevant condition(s) have been satisfied;
- (c) If the Council is not satisfied that the documentation supplied in accordance with (a) above achieves the requirements of the relevant condition(s), the Council’s Compliance Manager shall advise (in writing) the Consent Holder of the Council’s concerns and ask that the report, Management Plan, or Monitoring Plan be modified so as to address the concerns, and then be resubmitted;
- (d) This process shall be repeated until the Council’s Compliance Manager is able to confirm (certify) that the requirements of the applicable condition(s) have been satisfied.

Where no written confirmation, pursuant to either (b) or (c) above is provided within 20 working days of a report, Management Plan, or Monitoring Plan being provided to the Council the report, Management Plan, or Monitoring Plan shall be deemed to be certified for the purpose of the respective condition to which the document pertains.

Coastal Marine Area: Means the foreshore, seabed, and coastal water, and the air space.

Above the water:

- (a) Of which the seaward boundary is the outer limits of the territorial sea:

- (b) Of which the landward boundary is the line of mean high water springs, except that where that line crosses a river, the landward boundary at that point shall be whichever is the lesser of:
- (i) 1 kilometre upstream from the mouth of the river; or
 - (ii) The point upstream that is calculated by multiplying the width of the river mouth by 5.

Council: Means the Northland Regional Council.

Management Plan: Means the Management Plan required by conditions 7-10 (**Appendix A**).

Mixing Zone: Is defined as the volume of water vertically beneath a rectangular surface area, the axis of which is a line through the fixed mooring dolphins at the Marsden Point oil terminal and whose landward and seaward boundaries are determined by lines parallel to that axis at a distance of 100 metres from it. The Location Co-ordinates of the corners of this rectangular are as follows:

Table One: mixing zone coordinates

| Corner Point | Easting | Northing |
|--------------|----------|----------|
| NW Corner | 1735124E | 6033381N |
| NE Corner | 1735765E | 6033003N |
| SE Corner | 1735656E | 6032833N |
| SW Corner | 1735025E | 6033211N |

Monitoring Plan: Means the Monitoring Plan required by conditions 11-14 (**Appendix B**).

RMA: Means the Resource Management Act 1991.

Site: Unless otherwise specified Site means the land comprising 118.86 hectares more or less being legally described as Section 10 Block VIII Ruakaka SD, identifier NA70A371.

Suitably Qualified and Experienced Person: Means a person or persons:

- (a) With a recognised tertiary qualification(s) relevant to the topic being assessed; and
- (b) Who has more than 5 years relevant experience in the topic being assessed.

Working day: Means a day of the week other than:

- (a) A Saturday, a Sunday, Waitangi Day, Good Friday, Easter Monday, Anzac Day, the Sovereign's birthday, and Labour Day; and
- (b) If Waitangi Day or Anzac Day falls on a Saturday or a Sunday, the following Monday; and
- (c) A day in the period commencing on 20 December in any year and ending with 10 January in the following year.

GENERAL CONDITIONS

- 1 These consents shall not lapse until their expiry.
- 2 No later than one month after the date that these consents have commenced in accordance with s116 of the RMA, the Consent Holder shall give written notice to the Council (in accordance with s138(a) of the RMA) that it surrenders the following consents:
 - AUT.008319.01.04;
 - AUT.008319.02.02;
 - AUT.008319.03.01;
 - AUT.008319.04.01;
 - AUT.008319.05.01;
 - AUT.008319.06.01;
 - AUT.008319.11.01;
 - AUT.008319.12.02;
 - AUT.008319.13.01;
 - AUT.008319.14.01;
 - AUT.008319.16.01;
 - AUT.008319.17.01; and
 - AUT.008319.18.01.
- 3 The Consent Holder shall maintain all facilities covered by these consents in good order and repair. Except to the extent authorised by these resource consents, the facilities shall not be altered, added to, demolished or removed, in part or in whole, without obtaining any relevant resource consents that are required from the Council.
- 4 Prior to changing the use of any process chemicals which may discharge to water and which may materially change the nature and/or quantity of contaminants discharged, the Consent Holder shall seek certification from the Council that the use of such chemicals and the consequential effects of their discharge remain within the scope of these consents, being that the Risk Quotient based on a dilution factor of 175:1 at the SE Corner of the Mixing Zone boundary is less than or equal to 1. In certifying any change, the Council shall consider the feedback from the Mana Whenua Roopu which the Consent Holder shall consult prior to seeking certification.

Advice Note: *The dilution factor shall be calculated based on the methodology set out in the Management Plan.*
- 5 The Consent Holder shall keep the coastal marine area free of debris resulting from the Consent Holder's activities.
- 6 The Consent Holder shall, on becoming aware of any material escape of a contaminant associated with the Consent Holder's operations otherwise than as authorised by these consents:

- (a) Immediately take such action(s) as is necessary and appropriate to stop and/or contain such escape; and
- (b) Immediately notify the Council by phone, and Patuharakeke Trust Board during business hours by phone of an escape of contaminant; and
- (c) Take all reasonable steps to remedy or mitigate any adverse effects on the environment resulting from the escape; and
- (d) Report to the Council's Compliance Manager and Patuharakeke Trust Board in writing within one week on the cause of the escape of the contaminant and the steps taken or being taken to effectively control or prevent such escape.

For telephone notification during the council's normal opening hours the Council's assigned Compliance Officer for these consents shall be contacted. If that person cannot be spoken to directly, or it is outside of the council's normal opening hours, then the Environmental Hotline shall be contacted.

Advice Note: *The Environmental Hotline is a 24 hour, 7 day a week, service that is free to call on 0800 504 639.*

Management Plan

- 7 The Consent Holder shall undertake the activities authorised by these consents in accordance with the Management Plan at **Appendix A**.
- 8 The objective of the Management Plan is to set out best practicable options in respect of operational management methodologies and requirements to be implemented by the Consent Holder to minimise the potential for non-compliance with the conditions of these consents.
- 9 The Management Plan shall set out management methodologies and/or requirements relating to the following:
 - (a) Discharges to water/occupation and use of the coastal marine area, including:
 - (i) The operation and maintenance of the stormwater basin discharges to water, including via the diffuser, the diffuser bypass, and the overflow spillway;
 - (ii) Shutdown procedures to minimise the risk of adverse environmental effects;
 - (iii) Measures to minimise the discharge of contaminants to the coastal marine area and to ground, including measures regarding contaminated land management, and spill response;
 - (iv) Contingency measures for unforeseen or emergency situations;
 - (b) Discharges to air, including:
 - (i) The Best Practicable Option to minimise smoke and objectionable odours associated with the exemptions listed in the air discharge component of the consents (see Condition 63);
 - (c) Discharges to ground, including:
 - (i) Measures to minimise the discharge of contaminants to ground within the Site to the extent reasonably practicable; and
 - (d) Water takes, including:

- (i) Measures to effectively manage the migration of contaminants in groundwater within the Site.

Review

- 10 The Consent Holder shall review the Management Plan and provide it to the Council for Certification at no greater than five yearly intervals from the date when these consents commence. Activities undertaken by the Consent Holder after such review and certification shall be in accordance with the certified revised Management Plan.

Monitoring Plan

- 11 The Consent Holder shall monitor and report on the consents in accordance with the Monitoring Plan at **Appendix B**.
- 12 The objective of the Monitoring Plan is to ensure that appropriate monitoring and reporting is being conducted to determine compliance with these conditions of consent.
- 13 The Monitoring Plan shall set out monitoring and reporting methodologies and/or requirements relating to the following:
 - (a) Discharges to water:
 - (i) Discharge volumes and discharge water quality (including with respect to the water quality parameters in Table Two of Condition 41);
 - (ii) Methodologies for assessing shellfish body burden contamination;
 - (iii) Analytical methodologies for water quality sampling required by these conditions; and
 - (b) Discharges to air:
 - (i) Air quality: stack emissions of sulphur oxides and fine particulate matter 2.5 microns in diameter (PM_{2.5}) or less, and opacity of stack emissions;
 - (ii) Methodologies for calculating sulphur dioxide emissions required by these conditions (see Condition 64);
 - (iii) Certain methodologies for assessing vegetation, lichens, and soil (see Condition 65); and
 - (c) Groundwater takes;
 - (i) Take quantities;
 - (ii) Groundwater levels;
 - (iii) Groundwater quality;
 - (d) Reporting methods.

The monitoring, analysis and reporting required by these consents shall be supervised by a Suitably Qualified and Experienced Person.

Review

- 14 The Consent Holder shall review the Monitoring Plan and provide it to the Council for Certification at no greater than five yearly intervals from the date when these consents commence. Monitoring and reporting undertaken by the Consent Holder after such review and certification, shall be in accordance with the certified revised Monitoring Plan.

Refining NZ Marsden Point Liaison Committee (MPLC)

- 15 The Consent Holder shall resource the existing Marsden Point Liaison Committee with respect to the activities authorised by these consents. The MPLC shall include a person or persons from the following groups:
- (a) Whangarei Heads Citizens' Association Inc;
 - (b) Ruakaka Residents and Ratepayers Association Inc;
 - (c) The Urquharts Bay Association Inc;
 - (d) Northland Regional Council; and
 - (e) Any other directly affected party that the MPLC identifies and recommends for inclusion with the agreement of the Consent Holder.
- 16 The role of the MPLC shall include (without limitation):
- (a) To receive reports from the Consent Holder regarding the activities authorised by these consents, including environmental incidents and environmental complaints in relation to the exercise of these resource consents;
 - (b) To receive the results of published monitoring undertaken by the Consent Holder and Council in relation to the activities covered by these consents and to be advised of the implications of the monitoring results.
 - (c) To discuss the review of the Monitoring Plan to ensure that relevant concerns of MPLC members are taken into account as part of the review.
- 17 The Consent Holder shall appoint two senior officers, either one of whom will represent the Consent Holder at all meetings of the MPLC.
- 18 The Consent Holder shall organise the venue and administrative support for all meetings of the MPLC.
- 19 The Consent Holder shall hold meetings with the MPLC at least twice every 12 months, unless a simple majority of the representatives decide otherwise. A record of each MPLC meeting held shall be kept. Meeting records shall list the names of those who attended the meeting, the main topics of discussion and any agreed outcomes/areas of disagreement. They shall also record any decision of the majority to reduce the frequency of the recurrent meetings. Records of meeting shall be supplied to the Council and attendees.

Mana Whenua Roopu

20 Within 6 months of the exercise of these consents through until the expiry of these consents, the Consent Holder shall establish and maintain a Mana Whenua Roopu (MWR) for the purpose of providing cultural values input to the ongoing management and monitoring of environmental effects from the exercise of these consents. The Consent Holder shall invite (Patuharakeke Trust (PTB), Te Pouwhenua o Tiakiriri Kukupa Trust ki Tai (Te Parawhau ki Tai), and Ngātiwai Trust Board to join the MWR. The Consent Holder shall facilitate a meeting with the MWR twice annually and on other occasions as reasonably requested by one or all members of the MWR. As part of this liaison process, the Consent Holder shall:

- (a) Support the establishment of the terms of reference for the MWR outlining the roles, responsibilities and activities below, including for Condition 21;
- (b) Present and discuss with the MWR results of the consents compliance reporting by the Consent Holder and reports from the Northland Regional Council and associated matters for the period since the last meeting of the MWR;
- (c) Seek input from the MWR into the development of the Management Plan and Monitoring Plans associated with the resource consents, as attached in Appendix A and B before submitting these Plans to council for certification;
- (d) Seek input from mana whenua on the Consent Holder's periodic reviews of the Management Plan and Monitoring Plans undertaken under conditions 10 and 14 respectively at least 3 months prior to being submitted to council for certification;
- (e) Provide a summary of input from mana whenua (explaining any matters of disagreement / or reasons why any feedback was not incorporated) to Council when seeking certification of the above plans.

Advice Note: *The Consent Holder acknowledges that the parties listed in condition 20 above have a special and enduring relationship with Poupuwhenua and the Whangarei Harbour and therefore have a specific role and function in relation to the effects on the environment relating to the refining, storage and/or transport of petroleum hydrocarbons at Marsden Point.*

21 The Consent Holder shall meet the reasonable costs of the MWR to support attendance and the function of the MWR.

22 Within 12 months of the exercise of these consents, the Consent Holder shall establish a monetary fund to assist the MWR with capacity building and the practical expression of kaitiakitanga in relation to the Whangarei Harbour / Poupuwhenua. The Consent Holder shall initially make available a sum of \$50,000 per annum CPI adjusted (excluding GST) for the term of these consents. This sum shall be subject to review as set out in Condition 23. The Consent Holder, in conjunction with the Mana Whenua Liaison Group shall determine a process for allocation of the funds. It is anticipated funding could include, but not be limited to:

- (a) Restoration projects in the Whangarei Harbour, particularly in and around Poupuwhenua;
- (b) Studies to inform restoration projects, such as survivability, life stage dispersal, restoration and reseedling of pipi at Mair and Marsden Banks;
- (c) Training for cultural monitoring and scholarships for relevant tertiary study.

- 23 The quantum, and effectiveness of the monetary fund shall be subject to three yearly reviews undertaken by the Consent Holder in conjunction with the MWR. Any significant changes to the operations of the Consent Holder shall also be taken into account when reviewing the quantum of the fund.
- 24 The Consent Holder and the members of the MWR will use best endeavours to ensure that any dispute which may arise between them out of or in connection with Conditions 20 to 23 is resolved in good faith.

In the event that any dispute should arise between the above Parties which is unable to be resolved through discussion, then such a dispute will be referred to mediation.

Poupouwhenua Cultural Health

- 25 Within six months of the consents being exercised, the Consent Holder shall, in conjunction with PTB, develop a Poupouwhenua Cultural Health Monitoring Programme (PCHMP) consistent with the Patuharakeke Hapū Environmental Management Plan for the purposes of assessing the impacts of the discharges to air, water and the coastal marine area authorised by these consents. The monitoring programme will include the development of cultural monitoring frameworks such as the Takutai Health Analysis (Cultural Health Indicator Monitoring) and others, specifically for Te Poupouwhenua and environs to assist in the monitoring of any adverse effects linked to discharges to Poupouwhenua and the Whangarei Harbour. The PCHMP including its long-term approach shall be informed by mātauranga Maori.

The development of the PCHMP shall include, but not be limited to the following matters:

- (a) Effects on Natural Character – e.g. Odour, access;
- (b) Ecological effects – (marine/terrestrial, particularly mahinga mātaimai species) aquatic life/bird life/natural habitat;
- (c) Protocols for customary practices such as rahui and tapu to be followed in the event of observed instances of environmental or ecological impacts;
- (d) Continuation of annual pipi biomass surveys at Mair and Marsden Banks;
- (e) Continuation of annual Takutai Health Analysis (Cultural Health Indicator Monitoring);
- (f) Shellfish body burden sampling programme;
- (g) Sediment sampling programme;
- (h) Inclusion of Marine Biosecurity methods for detection and management of marine pests;
- (i) Development of cultural trigger thresholds for adverse effects that will result in changes to the management of discharges to reverse or avoid adverse effects that are identified in the monitoring programme;
- (j) Requirements to initiate the collaborative review clause here as a result of (i) above triggers; and
- (k) Identification of the parties to undertake the monitoring requirements of the PCHMP.

The finalised Poupouwhenua Cultural Health Monitoring Programme shall be submitted to Council for information within 12 months of the exercise of these consents.

Advice Note: *The Consent Holder should, in conjunction with PTB seek advice from an appropriate research and/or educational organisation that they may work with in the co-development of the research and monitoring programme. It is anticipated that the PCHMP outputs will be led by PTB with potential for other mana whenua (e.g. Te Parawhau ki Tai) involvement and will support Council's general state of the environment reporting of Te Poupouwhenua and environs.*

- 26 The Consent Holder shall fund the development and implementation of the PCHMP.
- 27 Within 12 months of exercising these consents the Consent Holder shall, in conjunction with PTB, develop a Cultural Landscape Management Plan consistent with the Patuharakeke Hapū Environmental Management Plan to mitigate adverse effects on the cultural landscape and seascape in Te Poupouwhenua relating to the operation of the petroleum refinery at Marsden Point, and a Cultural Landscape Design Framework (CLDF) to demonstrate the historical narrative of the impact relating to the operation of the petroleum refinery at Marsden Point. The development of the CLMP shall include, but not be limited to, the following matters:
- (a) Development of a Dune Restoration Plan to further restore and enhance the cultural landscape and contribute to tiakitanga of habitats for taonga species;
 - (b) Preparation of a Cultural Landscape Design Framework to set out cultural narrative, interpretation and design elements around the Marsden Point area; to support public and community education around the history and values of the cultural landscape/seascape to mana whenua.
 - (c) Development of an Education and Advocacy Programme (EAP) to develop a range of resources for advocacy with refinery staff, local schools, and the general public, i.e. video resources, e-books, and literature regarding customary fisheries management restrictions and observation of other relevant bylaws (e.g. Vehicles, dogs, fires etc).
 - (d) Te Parawhau ki Tai, Whangarei District Council and the Department of Conservation shall be consulted when (a) and (b) above are being developed.

Advice Note: *It is anticipated that the CLMP outputs will be led by PTB with potential for other mana whenua (e.g. Te Parawhau ki Tai) involvement.*

- 28 The Consent Holder shall fund the development and implementation of the CLMP.

Reporting

- 29 The Consent Holder shall compile an annual monitoring report for the year ending 31 March in conjunction with PTB for each year that this consent is current summarising the results and outcomes of the monitoring and other actions required by the PCHMP prepared in accordance with Condition 25 and the CLMP required by Condition 27 (as appropriate). As a minimum the report shall:
- (a) Include a summary of monitoring data collected;
 - (b) Compare data with previously collected and reported results and identify and comment on any emerging trends;
 - (c) Review the PCHMP and CLMP and make recommendations on any potential alterations/additions to the PCHMP and CLMP;

- (d) Include any feedback received from the MWR as a result of reporting to twice yearly hui.
- (e) Detail any other issue considered important by the Consent Holder.

The report shall be forwarded to the Council for information by 30th September each year.

Complaints

- 30 The Consent Holder shall keep a register of complaints lodged with it in respect of the exercise of these resource consents.
- 31 The register maintained in accordance with Condition 30 shall record the following details for each complaint that is made:
 - (a) The date and time of the complaint;
 - (b) The name and contact details of the complainant (if they are provided to the Consent Holder);
 - (c) A description of the complaint, including the nature of the complaint, the duration of the event giving rise to the complaint when provided, and the location from which the complaint arose (if available);
 - (d) A description of the wind speed and direction when the complaint was made;
 - (e) Any investigations that the Consent Holder undertook in response to the complaint;
 - (f) Any action that was undertaken to address the concerns raised in the complaint; and
 - (g) Any feedback provided to the complainant.
- 32 The Consent Holder shall provide a copy of the complaints register to the council's Compliance Manager within five Working Days of receiving a request to do so from the council, and each time the Management and/or Monitoring Plans are supplied to the Council for certification.

Review

- 33 The Council may, in accordance with s128(1)(a) of the RMA, (or any subsequent section of relevant legislation) serve notice on the Consent Holder of its intention to review the conditions of these consents. Such notice may be served in the next month of March following the commencement of these consents, and thereafter at three yearly intervals in the month of March. The review may be initiated for any one or more of the following purposes:
 - (a) To deal with any adverse effect on the environment which may arise from the exercise of these consents and which it is appropriate to deal with at a later stage, or to deal with any such adverse effects following assessment of the results of the monitoring of the consents and/or as a result of the monitoring of the state of the environment in the area.
 - (b) To require the adoption of the best practicable option to remove or reduce any adverse effect on the environment; and
 - (c) To require consistency with a current Marsden Point Air Quality Strategy prepared in accordance with a Proposed or Operative Regional Plan for Northland;
 - (d) To assess the need for ongoing monitoring of soils, vegetation, and lichens as required by Condition 65;

- (e) If the information made available to the Council by the Consent Holder for the purposes of the application contained inaccuracies which materially influenced the decision made on the application and the effects of the exercise of these consents are such that it is necessary to apply more appropriate conditions; and
- (f) To assess the need for any reasonable recommendations of the MPLC or the MWR.

Site Remediation Plan

- 34 During the 20th year of the exercise of these consents or at least twelve months prior to the complete cessation of Refinery and Import and Distribution activities authorised by these consents, whichever is the sooner, the Consent Holder shall submit to the Council for certification a Site remediation plan. The purpose of the Site remediation plan is to set out the actions necessary to maintain compliance with the conditions of the consents for the discharges of contaminants from refining, storage and/or transport of petroleum hydrocarbons on the Site to the receiving environment, particularly to groundwater and the coastal marine area, and how coastal structures are to be decommissioned and removed from the coastal marine area (or consents transferred), and the frequency and duration of any monitoring necessary to demonstrate compliance.

DISCHARGES TO WATER - AUT.008319.01, AUT.008319.13, and AUT.008319.16

Sludge Management Plan

- 35 The Consent Holder shall prepare a Stormwater Basin Sludge Management Plan. The purpose of the Management Plan is to detail the methodology for managing sludge build up in the stormwater basin so as to minimise the potential discharge of significant quantities of sludge which may result in nonconformance with the discharge standard. The Consent Holder shall provide the Management Plan to the Mana Whenua Roopu for comment. The Management Plan shall be provided to Council for certification within 18 months of exercise of these consents.

Marine Monitoring

- 36 The Consent Holder shall prepare a monitoring programme to monitor contamination in shellfish and marine sediments in proximity to the Site. The monitoring programme shall include, but not be limited to:
- (a) The sites to be sampled;
 - (b) Sampling methods;
 - (c) The frequency of sampling and the contaminants to be analysed.

The monitoring programme shall be prepared with the Patuharakeke Trust Board and in consultation with the Mana Whenua Roopu. The monitoring programme shall be provided to the Council for certification within 12 months of the exercise of the consents for inclusion in Schedule 1.

Discharge quantity

- 37 The quantities authorised to be discharged via the diffuser are:
- (a) A combined discharge of treated process wastewater, groundwater, and ballast water or ship tank wash water that does not exceed an average of 8,000 cubic metres per “dry weather discharge” day, as calculated using the most recent 30 “dry weather discharge” days (including nil discharge dry weather days);
 - (b) An intermittent discharge of stormwater which, when combined with the above discharges, will give a total discharge flow of not more than 2,000 cubic metres per hour.

For compliance purposes, a “dry weather discharge” day is defined as when:

- (c) There has been 2 millimetres or less of rainfall on that day, being 8.00am to 8.00am; and
 - (d) That day occurs after two consecutive days with 2 millimetres or less of rainfall on each day.
- 38 The total quantity of water discharged from the stormwater basin diffuser and the stormwater basin diffuser bypass shall not exceed 3,200 cubic metres per hour.
- 39 The Consent Holder shall maintain flow measuring devices to measure total flow through the diffuser and diffuser bypass with an accuracy of $\pm 5\%$ over the range of 130 to 3,200 cubic metres per hour. The Consent Holder shall also maintain instrumentation to permit the estimation of total flows to the diffuser in the event of failure of the above devices.

Discharge Quality

- 40 For discharges from the stormwater basin diffuser and the stormwater basin diffuser bypass the quality of the discharge measured in the composite sample taken in accordance with the Monitoring Plan at **Appendix B** shall not exceed the standards in both column A and column B of **Table Two** below.
- 41 For discharges from the stormwater basin overflow spillway, the quality of the discharge measured within the overflow spillway channel after the oil control overflow structure shall not exceed the standards in column A of **Table Two** below (the standards in column B do not apply):

Table Two: water quality standards (at source of discharge)

| Parameter | Unit | A* | B* |
|------------------|--------------------|--------|------|
| Temperature | Degrees of Celsius | 39 | NA |
| pH | Range | 6 to 9 | NA |
| BOD ₅ | mg/L | 70 | 40 |
| TSS | mg/L | 100 | 30 |
| COD | mg/L | 540 | 280 |
| Ammoniacal 'N' | mg/L | 70 | 25 |
| Sulphides | mg/L | 0.5 | 0.15 |

| | | | |
|-------------------|------|-------|----|
| Benzene | mg/L | 0.08 | NA |
| Arsenic | mg/L | 0.1 | |
| Cadmium | mg/L | 0.005 | |
| Chromium | mg/L | 0.05 | |
| Copper | mg/L | 0.05 | |
| Lead | mg/L | 0.01 | |
| Nickel | mg/L | 0.06 | |
| Zinc | mg/L | 1 | |
| Phenol | mg/L | 0.001 | |
| Pentachlorophenol | mg/L | 0.005 | |
| Phenanthrene | µg/L | 0.2 | |
| Naphthalene | µg/L | 10 | |
| Fluoranthene | µg/L | 0.2 | |
| Benzo(a)pyrene | µg/L | 0.2 | |
| Anthracene | µg/L | 0.2 | |

** Column A is the maximum permitted concentration on any one day and Column B is the maximum permitted average concentration calculated using data from any 30 consecutive days.*

Advice Note: *For the purposes of compliance monitoring for stormwater basin discharge standards, a proportional sample will be used whether normal and/or diffuser bypass modes of discharge are active (i.e. Being used).*

- 42 The Consent Holder shall maintain easy access to NRC Sampling Site ID: Loc.105105 and Site ID: Loc.327259 (at approximately 1735217E 6032887N).

Conditions applying to discharges of stormwater basin water via diffuser - AUT.008319.01

- 43 The diffuser shall be maintained so as to ensure it remains operationally effective to ensure that a minimum of 175:1 dilution is achieved at the SE Corner of the **Mixing Zone**.
- 44 The Consent Holder shall make an underwater examination of the diffuser and pipelines at least once every two years, and take such measures as are necessary to ensure that the diffuser operates as designed and that all the effluent passes through the diffuser.
- 45 A written report on all such examinations and action taken to remedy defects shall be made to the Council within one month of the examination.

Conditions applying to discharges of stormwater basin water via diffuser bypass - AUT.008319.13

- 46 This consent shall apply only to the consent area as generally identified on **Appendix C** (Northland Regional Council Plan No: 4229).
- 47 Other than for test purposes, discharges through the outlet approved by this consent shall only take place as a direct result of conditions that are likely to result in the overtopping of the stormwater basin (as set out in activation Scenario One and Scenario Two in Appendix 3 of the Management Plan contained in **Appendix A** of these consents). For the purposes of this condition, the Consent Holder shall obtain weather forecasting from MetService or subsequent Government Meteorological Bureau.

- 48 Each time that a discharge occurs from the diffuser bypass, the Consent Holder shall, within one month of opening the outlet diverter valve, provide the following information in writing to the Council's Compliance Manager:
- (a) The record of the rainfall event covering the period from 24 hours before the event to 24 hours after the event;
 - (b) The inflows to the stormwater basin that were occurring at the time that the outlet diverter valve was opened; and
 - (c) The volume of water in the stormwater basin at the time that the outlet diverter valve was opened.
- 49 If not used for a continuous period of two years or more, the Consent Holder shall examine and test in situ the diverter valve and take such measures as are necessary to ensure that the diverter valve operates as designed.
- 50 The Consent Holder shall report on all examinations and testing required by Condition 49 to the Council's Compliance Manager, in writing, within one month of the examination or test.

Discharges of stormwater basin water via overflow spillway – AUT.008319.16

- 51 This consent shall only be exercised to avoid overtopping the stormwater basin during an extreme rain event once all other authorised discharges from the stormwater basin are being exercised to their current maximum capacity, subject to the availability of electricity supply to operate the discharge pumps.
- 52 If a severe weather warning event that could result in the exercise of this consent is predicted to occur with reasonable certainty (based on MetService or subsequent Government Meteorological Bureau forecasting), then the storage capacity of the stormwater basin shall be maximised by lowering the water level to a depth of 3.5m or below, in accordance with the conditions of these consents.
- 53 Each time this consent is exercised, the Consent Holder shall within 6 hours of the overflow discharge commencing notify the Council by calling its 24/7 Environmental Hotline (0800 504 639). PTB shall be notified within 24 hours of this consent being exercised.
- 54 Each time this consent is exercised, the Consent Holder shall undertake monitoring and reporting in accordance with the *"discharge from overflow spillway"* section of the Monitoring Plan.
- 55 The Consent Holder shall, prior to undertaking such work, notify the Council's Compliance Manager in writing of all proposed increases to the impermeable surface area within the stormwater basin contributing catchment area that will increase stormwater runoff into the basin. This written notification shall also describe any measures to attenuate the additional flows so that there is no increase in the expected frequency that this consent will be exercised.
- 56 The oil control overflow inlet structure shall be maintained in general accordance with the Plans in **Appendix D**.

Discharges to air from the site – AUT.008319.02

57 Notwithstanding the maximum discharge limits prescribed in this consent, the Consent Holder shall at all times adopt the Best Practicable Option with respect to the discharges authorised by this consent, including the operation, maintenance, supervision, monitoring and control of processes on Site.

58 Subject to the exclusions in Condition 62 for visible smoke, the Consent Holder's discharge of contaminants to the air, from the Site shall not cause a noxious or dangerous effect, or an offensive or objectionable odour, beyond the boundary of the Site, in the opinion of a suitably qualified Monitoring Officer of the Council.

Advice Note: *Determining offensive or objectional odour can be achieved by applying the FIDOL factors set out in the MfE "Good Practice Guide for Assessing and Managing Odour".*

59 All stacks, with the exception of the flare and D Block stacks, discharging contaminants into the air shall be equipped with instrumentation to continuously measure opacity. The installed instruments shall be maintained and calibrated in accordance with manufacturer specifications.

60 The opacity of discharges to air from all stacks, with the exception of the flare and D Block stacks, when measured by photoelectric means, shall not equal or exceed a value of 20% for more than two minutes continuously, or for an aggregate of four minutes in any period of 60 minutes.

61 The opacity of discharges to air from the D Block stacks, when measured in accordance with AS3542:2014, shall not exceed a value of Ringlemann Shade 1 when measured for more than two minutes continuously, or for an aggregate of four minutes in any period of 60 minutes.

62 Notwithstanding Condition 60 and 61 above, the Consent Holder may, during the following circumstances, discharge visible smoke other than in accordance with the opacity limits specified in those conditions, subject to the requirements specified in Condition 63:

- (a) Smoke emissions from the respective Refinery stack(s) during the two-hour period immediately following the restarting of a process furnace or steam-raising boiler from cold;
- (b) Smoke emissions from the respective Refinery stack(s) during the period of one hour immediately following the change of the fuel supply to a process furnace or steam-raising boiler from liquid to gas, or vice versa;
- (c) Smoke emissions from the respective Refinery stack(s) during soot-blowing or shot-cleaning operations at a process furnace or steam-raising boiler;
- (d) Smoke emissions from the flare stacks; and
- (e) Smoke emissions from the premises during fire-fighting training operations.

63 The exemptions specified in Condition 62 shall be subject to the following requirements:

- (a) The Consent Holder shall ensure that during the circumstances set out in Condition 62, the Best Practicable Option (which shall be detailed in the Management Plan at **Appendix A**) is employed to minimise emissions of smoke;

- (b) The Consent Holder shall report to the Council at monthly intervals, any periods during which smoke was discharged from any process(es) which would contravene the requirements of Conditions 60 and 61, including those allowed by these exemptions;
- (c) Fire-fighting training is restricted to the requirements of the Consent Holder's own safety programme and shall not be conducted when it is anticipated (based on MetService or subsequent Government Meteorological Bureau forecasting) that the wind conditions will take smoke towards the area between Darch Point and the junction of Ody and Whangarei Heads Roads; and
- (d) For each fire-fighting training exercise there shall be a wind speed and direction indicator in the vicinity of the fire-fighting-training Site. The Consent Holder shall measure and confirm compliance with (c) above prior to ignition.

Sulphur Dioxide

- 64 The discharge of sulphur dioxide from the refinery in aggregate shall not exceed:
- (a) 12 tonnes per day averaged over the Gregorian calendar year; nor
 - (b) 1,000 kilograms per hour as a 90th percentile of all emissions over the Gregorian calendar year for any one hour period; nor
 - (c) 1,250 kilograms per hour as a 99th percentile of all emissions over the Gregorian calendar year for any one hour period; nor
 - (d) 1,700 kilograms per hour as a 99.9th percentile of all emissions over the Gregorian calendar year for any one hour period.

For the purpose of determining compliance with this condition, the use of calculated emission values based on the sulphur content of fuel, as described in the Monitoring Plan (**Appendix B**) is acceptable.

Monitoring of vegetation, lichens, and soil

- 65 The Monitoring Plan shall include methodologies for an assessment of the vegetation, lichens, and soil:
- (a) On areas identified as being under stress in the consent application where practicable; and
 - (b) At least at one suitable control site.

This monitoring shall be carried out at intervals of not greater than two years.

Discharge to air from abrasive blasting – AUT.008319.11

- 66 Ultra-high pressure water blasting, wet abrasive blasting, or vacuum blasting, shall be used in preference to dry abrasive blasting. Dry abrasive blasting shall only be used when the coating specification requires one of the following standards to be used: NACE NO. 1/SSPC-SP 5; NACE NO. 2/SSPC-SP 10; NACE NO. 3/SSPC-SP 6; or NACE NO. 4/SSPC-SP 7.
- 67 Any abrasive material used for dry abrasive blasting shall contain less than two percent by dry weight free silica.

- 68 When undertaking external dry abrasive blasting without erecting covers, tarpaulins, cladding or other means, only first pass (previously unused) garnet that meets the requirements of Condition 67 shall be used.
- 69 Open air blasting operations shall only take place if, due to an object's size, shape or weight, it is unable to be practicably transported and suitably contained within an enclosed abrasive blasting booth.
- 70 When undertaking external dry abrasive blasting within 100 metres of the Coastal Marine Area (CMA) and without erecting covers, tarpaulins, cladding or other means, the Consent Holder shall either:
- (a) Cease dry abrasive blasting when the wind direction is towards the CMA; or
 - (b) Cease dry abrasive blasting when the hourly average concentration of PM₁₀ measured using a nephelometer instrument at the adjacent boundary of the CMA records a trigger concentration of 150 µg/m³ or higher.
- 71 Monitoring of PM₁₀ to be undertaken in accordance with Condition 70(b) shall be:
- (a) In general accordance with AS/NZS 3580.12.1:2015 guidelines; and
 - (b) Fitted with an alarm system that will send a warning when the trigger concentration specified in Condition 70 (b) is reached to Site personnel responsible for managing dust effects associated with the abrasive blasting.

Groundwater takes – AUT.008319.05

- 72 The total ground water quantity taken from all bores within the Site shall not exceed 2,700 cubic metres per day.
- 73 The total ground water quantity taken from all bores within the Site shall not exceed 796,851 cubic metres per year.

Advice Note: Any water takes from new bores installed will be subject to the general water take limit in conditions 7272 and 73.

- 74 Unless authorised under a separate resource consent or permitted under the applicable regional plan(s), no new bores for the purposes of water extraction may be constructed within 300m of any existing groundwater take bores (as at 1 July 2020) on the adjacent BOC Gas site (Lot 2 DP 199563).

Advice Note: Any new bores within 300m of any existing groundwater take bores (as at 1 July 2020) on the adjacent BOC Gas site (Lot 2 DP 199563) will need to be authorised by separate resource consents (if required).

- 75 The Consent Holder shall install a meter on the rising main of each pumped well to measure the quantities of water taken from the aquifer with an accuracy of ±5%.
- 76 The operation of any of the Consent Holder's bores shall not lower the groundwater level of Western Site Boundary Wells P1, P19, P20 to more than 20cm below the Seasonal Low Groundwater Level.

- 77 If the chloride level in groundwater from any of the Western Site Boundary Wells P1, P19 or P20 is measured by standard methods to be greater than 250 grams per cubic metre, the Consent Holder shall:
- (a) Notify the Council Compliance Manager in writing;
 - (b) Take steps to reduce chloride concentrations to below 250 grams per cubic metre, at the Western Site Boundary Well(s) in accordance with the groundwater management plan contained in the Management Plan; and
 - (c) Carry out daily monitoring of groundwater in accordance with the Monitoring Plan, until the chloride level measures as below to below 250 grams per cubic metre in 5 consecutive daily tests.
- 78 In the event that there is a risk of escape of hydrocarbon beyond the Site boundary steps shall be taken to prevent the escape of hydrocarbon in accordance with the groundwater management plan contained in the Management Plan.

Jetty and associated structures - AUT.008319.06

- 79 This consent is for the Consent Holder to occupy, on an exclusive basis, and use for the purposes of the consent those parts of the Whangarei Harbour associated with the jetty and identified on New Zealand Refinery Company Limited Plan No. 62736 (**Appendix E**).
- 80 Notwithstanding Condition 79 the Consent Holder shall allow for the reasonable public walking access under the jetty in the portion of the CMA below the jetty between mean high water springs and the mean low water spring, except as required to ensure operational or public safety, or in an emergency response scenario.

Stormwater basin overflow spillway structure - AUT.008319.17

- 81 This consent is for the Consent Holder to occupy and use for the purposes of the consent those parts of the coastal marine associated with the stormwater basin overflow spillway structure identified at **Appendix D**.
- 82 The basin stormwater overflow spillway structure shall be maintained in general accordance with the plans at **Appendix D**.
- 83 The Consent Holder shall ensure that the overflow spillway structure does not unnecessarily impede public access within, and along, the coastal marine area.

Maintenance of the stormwater basin overflow spillway structure -AUT.008319.18

- 84 The Consent Holder shall ensure that the overflow spillway's scour apron is covered with sand within two weeks of each stormwater basin overflow spillway discharge occurring. The sand shall be consistent in colour and texture with sand in the surrounding beach environment. Sand used for this purpose shall be sourced from outside the coastal marine area.
- 85 The Consent Holder shall notify the Council's Compliance Manager in writing each time that maintenance or repair work is to be undertaken on the overflow spillway that will involve the use of machinery within the foreshore or coastal marine area, at least one working day beforehand.

- 86 Repair and maintenance work shall only occur between the hours of 7am to 7pm Monday to Saturday inclusive, and no repair and maintenance work shall occur on Sundays or public holidays.
- 87 While repair and maintenance work is occurring, appropriate temporary markings and barriers shall be erected that define the area of the works.
- 88 Vehicles and machinery associated with the works may enter the coastal marine area but shall not enter coastal water.
- 89 An oil spill kit that is appropriate for the machinery being used to undertake repair and maintenance work shall be available at the area of the works at all times.
- 90 Refuelling and servicing of machinery shall not be carried out on the foreshore or within 50 metres of the foreshore and shall not be carried out in such a way that land or water at the site is contaminated. Where an accidental spillage to land occurs all contaminated material shall be collected and removed to a legally authorised disposal site / facility. Where an accidental spillage to water occurs, the Consent Holder shall comply with Condition 6.
- 91 The Consent Holder shall notify the Council's Compliance Manager in writing as soon as the particular repair and maintenance work is completed, on each occasion.
- 92 All unwanted materials and refuse shall be removed from the area of the works upon the completion of the works, to the satisfaction of the Council's Monitoring Officer.
- 93 The coastal marine area within 100 metres of the overflow spillway structure shall be kept free of debris resulting from the occupation and use of the overflow spillway structure.

EXPIRY DATE: These consents shall expire 35 years from the date of commencement, as in accordance with s116 of the RMA.



APPENDIX A: MANAGEMENT PLAN

Environmental Management Plan

1. Environmental Management Plan Scope

This Environmental Management Plan (EMP) provides a summary of the key procedures used by Refining NZ to ensure compliance with Northland Regional Council (NRC) resource consents AUT.008319.01-02, 04-06, 11, 13 and 16-19. This EMP shall be reviewed in consultation with the NRC and Iwi in accordance with General Condition 9 of the Resource Consent.

Refining processes are complex and therefore many of the standard procedures are technical in nature to suit the target audience and therefore the various controls are summarised in this document or where the procedure is less technical it is provided in the attached appendices. This document is intended to provide a high-level overview of the ways in which various processes and activities on the Site are managed to ensure compliance with consent conditions or to deal with emergency situations.

Discharges to Air – exemptions

Stack Discharge Opacity.

The Opacity of any discharge to air when measured by Photoelectric means, or visually for discharges from the flare stack burners or D & E Block stacks, shall not equal or exceed a value of 20% for more than 2 minutes continuously, or for an aggregate of four minutes in any period of 60 minutes.

Specific Responsibilities

| Party | Specific Responsibilities |
|----------------------------|---|
| Production Controller (PC) | <ul style="list-style-type: none"> • Notify the Asset Managers of any major excursion from the above • It is the Production Controller's responsibility to take actions¹ necessary to return Emissions below the designated maximum. NOTIFICATION to the Production Controller is via the Panel Operator, Asset North. • To ensure the Refinery stays within the discharge limits. • To log any excursions above the maximum target. This is logged in the Production Controller's Shift Log & via MAXIMO. • Depending on the severity and timeline of the problem the Environmental Adviser & Duty Manager are to be informed, who will in turn notify Northland Regional Council. |

¹ The various operational excursions that can lead to an increase in stack discharge opacity are numerous and as such the various actions are not listed in detail.



Flaring

Any instances of excessive flaring may be expected to give rise to smoke. They also represent significant loss of earnings. The flare is designed to perform a basic safety function and our primary concern at times of excessive flaring should be to ensure that this design function is not constrained.

Taking into account the safety function of the flare, under no circumstances should it be necessary to allow excessive flaring for a period in excess of 24 hours. Any instance of excessive flaring under “normal” operating conditions should be immediately investigated by the on-duty shift to ascertain the source of flaring and corrective action should be taken.

MP steam is injected at the flare tip to ensure smokeless burning. The amount of steam shall be manually adjusted to minimise visible smoke from the flare

Specific Responsibilities

| Party | Specific Responsibilities |
|-----------------------|--|
| Production Controller | <p>Normal Day Hours</p> <ul style="list-style-type: none"> The Asset Managers, Refining Manager and Environmental Adviser should be promptly advised of the flaring, the reasons for it and the likely duration. <p>Out of Hours</p> <ul style="list-style-type: none"> Promptly notify the Duty Manager and Environmental Adviser of the flaring, the reasons for it and the likely duration. A strategy should be developed, in consultation with the Asset Manager or the Duty Manager, to return the plant to normal operating conditions. Reporting excessive flaring into Maximo as an event. Attending Friday morning planning meeting and recording planned unit maintenance work that will impact on flaring. |

Planned Flaring

In some circumstances, taking critical items of equipment out of service for maintenance/startup of process units, makes flaring for extended periods unavoidable. The plan put in place for such events will ensure minimum nuisance to the public and minimum loss of Hydrocarbons:

- The public should be informed via the social media of the possibility of a larger than normal flare during such planned maintenance / start up periods.
- Asset Engineering Controllers should communicate the need for flaring in advance to the Environmental Adviser who will notify Northland Regional Council.
- A third boiler should be brought on line (subject to availability) to ensure that adequate steam will always be available to minimise smoke formation from the flares.
- The Asset Manager, Duty Manager should formally review the throughput and configuration of all plants over a reasonable time frame to ensure that everything possible is being done to minimise excessive flaring.



Sootblowing

Soot blowing and shot blowing is undertaken regularly to remove carbon deposits from the convection bank tubes on furnaces. This maintains efficiency of the furnaces. The soot blowing generates a darker than normal discharge from the stack. The duration of soot blowing is short and undertaken at night to minimise the visual impact of the discharge. Soot blowing is undertaken in accordance with standard operating procedures (WIPT.G.036).

Odours

Regular monitoring of pumps around the Site is undertaken and where seal failure is detected a work order is raised to repair the seal and where there is a standby pump the pumping duty is switched to the standby pump. This serves to reduce fugitive emissions from pump equipment.

There is a tank maintenance programme for the Site. When a tank is scheduled for maintenance the tank shell is inspected to ensure its integrity is maintained. For floating roof tanks the roof seal is inspected and either repaired or replaced to minimise fugitive emissions from the tank roof seal.

When an odour complaint is received the Environmental Affairs team responds to the complaint and investigates potential sources for odour. Such things as maintenance work, plant trips, spills, shipping and an off-grade bio-treater can result in abnormal odour conditions. Where the source of the odour is positively identified and practicable steps can be taken to reduce odour these are implemented in consultation with the one or all of the following; Production Controller, Process Engineers and Duty Manager

Discharge to Harbour.

The discharge from the Stormwater Basin (SWB) is monitored continuously for;

- Total Organic Carbon
- pH
- Temperature
- Total Suspended Solids
- Sulphides.

When any of these parameters exceed a pre-determined value in the Refinery Control Systems the pumps are automatically switched off. This serves to reduce the risk of noncompliance with the discharge standard.

The SWB is managed in accordance with ROW-030 Management of Stormwater Basin Discharge a summary of the key points of the document is provided in Appendix 1, (Appendix 2), WIPT.3900.104 Emergency Bypassing of the Stormwater Basin Discharge Diffuser and Spillway Activation (Appendix 3), and WIPT.3900.106 Inclement Weather Preparation Plan (Appendix 4).

The greatest risk of compliance issues is during heavy rain and the heavy rain procedures are important to minimise the risk of noncompliance.



Shutdown Procedures to minimise environmental effects

Complex planning goes into the preparation for Shutdowns these are to ensure that shutdown proceeds in a safe and timely manner. Planning includes an Environmental Management Plan tailored to the shutdown being planned. MQ-24 Shutdown Management (Appendix 5) and WIPT.3900.912 (Appendix 6) Asset Shutdown Monitoring are key procedure documents used to ensure a shutdown with no compliance issues.

Spills and contaminated Land Clean up and Management.

Despite best efforts on Site RNZ does experience the occasional spill. Spill response and cleanup is covered in Appendix 7.

When undertaking blasting of objects that cannot be moved offsite, RNZ assesses the best practicable option for containing the discharge through use of scaffold and tarps and drop cloths both to minimise the discharge of contaminants to land from abrasive blasting. Frequently scaffolding and drop cloths are used to reduce the discharge of contaminants to ground from the activity.

RNZ has a consent under the NES for Management of Contaminated Soils

Groundwater Management.

The following management measures are to be undertaken to minimise the potential for noncompliance with the relevant conditions of consent, specifically, measures to effectively manage the migration of contaminants in groundwater within the Refinery Site.

Table 3.1: Triggers and contingencies

| Trigger | Monitoring Measure | Contingency |
|--|--|---|
| Exceedance of groundwater take | Weekly total quantity of water taken from all groundwater abstraction bores exceeds 2,700 cubic metre per day (based on 7 day total) | Reduce groundwater abstraction rate starting in abstraction wells recording the least volume of hydrocarbons recovered. Check Site-wide water level data to confirm hydraulic containment. Should the allowable abstraction rate be found to be insufficient for hydrocarbon recovery and/or containment, consider installation of additional bores while maintaining total allowable amounts (per day and year). |
| The groundwater elevation measured at a Western Site Boundary Well (as defined) is lower than 20 cm below Seasonal Low | Monthly water levels in western Site boundary perimeter wells indicate a water level 20 cm below the seasonal low groundwater level | Reduce groundwater abstraction rate from relevant well(s). |



| | | |
|--|--|--|
| Groundwater Level (as defined) as calculated from the average of annual lowest water levels at the same location | | |
| The chloride level at a Western Site Boundary Well is greater than 250 grams per cubic metre. | Monthly EC measurements in any western Site boundary perimeter well (P1, P19, P20) exceeds 150 mS/m. | Measure chloride level. If chloride exceeds 250 grams per cubic metre, implement measures noted below. |

Further contingency actions

Should the level of chloride in groundwater at any of the western Site boundary wells be found to exceed 250 grams per cubic meter, the following actions shall be taken:

- Should hydraulic containment be confirmed, decrease recovery well pumping to allow water levels to rise in the vicinity of saline intrusion.
- Carry out daily monitoring water levels and EC at all Western Site Boundary Wells.

Should elevated contaminants be detected at the perimeter well boundaries closest to the coast, the following actions shall be taken;

- Assess water level data from all monitored wells to confirm hydraulic containment is occurring.
- Assess contaminant concentrations at all perimeter wells to confirm containment of contaminants.
- Should either hydraulic or actual (as evidenced by contaminant levels) containment be compromised, increase pumping rate in nearest recovery well to the perimeter wells where elevated contaminant concentrations are detected and/or consider adding recovery wells while maintaining overall maximum pumping rate (daily and annual).
- Once this is done, use water level and contaminant concentrations to confirm containment.

Implications of saline intrusion

It should be noted that although all reasonable measures should be taken to limit saline intrusion at the Site (through limiting/modifying recovery well pumping), it is acknowledged that the containment of hydrocarbons is the primary goal and limited saline intrusion (that which will not impact adjacent consented water takes) is actually helpful for the natural degradation of petroleum hydrocarbons dissolved in groundwater.

Pre Plans for unforeseen and emergency situations

RNZ has numerous pre plans to deal with unforeseen and or emergency situations. The individual pre-incident plans are intended to provide information to the Duty Manager, Incident Controller, Operations, Emergency Services (internal and external) in the event of a specific emergency. Pre Plans have been developed for specific situations in various assets as well as Site wide incidents these are summarised in Appendix 8



APPENDIX 1

Summary of ROW-030 Management of Stormwater Basin Discharge General Requirements Responsibilities & Duties

| Job Title | Responsibilities & Duties |
|--------------------------|--|
| Process Engineer Offplot | <ul style="list-style-type: none"> Provide advice to Operations to ensure: the SWB is operated within the framework of the Resource Consent. |
| Environmental Advisor | <ul style="list-style-type: none"> Submit monthly reports to Council |
| Inspection & Maintenance | <ul style="list-style-type: none"> Carry out periodic inspection and maintenance, where required. |
| Shift Operating Teams | <ul style="list-style-type: none"> Carry out routine and non-routine sampling to comply with the monitoring programme as outlined in the resource consent. Ensure that all plant is operated in such a way as to comply with all conditions of the Resource Consent. |

Resource Consent Limits

Discharge Quantities

Each day, we are permitted to discharge the quantities of water shown in Table 1.

Table 1 - Maximum discharge quantities

| Source | Consent limits |
|--|---|
| Treated process wastewater and groundwater | Up to a 30 Dry Weather Day Average of 8000m ³ (see definition below) |
| Stormwater | Balance with above sources to maintain a flow of less than 2,000m ³ /hr |
| Stormwater Diffuser Bypass | With Diffuser Bypass open (see conditions below), up to 3200m ³ /h (76,800m ³ /d) |

Operational Guidelines

The daily discharge to the harbour cannot exceed 8000 cubic metres per 30 dry weather day average, unless one of the following conditions is met:



1. When rain is falling. The discharge may reach up to 48000 cubic metres per day (2,000m³/hr) including ballast water if any, or
2. When rain has fallen within the last two days and one of the following applies;
 - The water level in the SWB is still above normal operating conditions (3 metres or more) as a result of the rain, or
 - The discharge has been stopped to meet water quality guidelines, or
 - Water from one or more tank compounds is being drained as a result of the rain, or
 - The discharge may reach up to 48000 cubic metres per day including ballast water, if any to get back to normal operating water levels.

When a severe weather watch is in place and we consider there is a risk that the SWB may overflow or hydrocarbon measures may fail the SWB diffuser bypass can be opened (see WIPT.3900.104 in place for opening and closing of the bypass.)

Dry Weather Day

A dry day is where less than 2mm of rain has fallen today, yesterday, or the day before.

Wet Weather Day

A wet day is where greater than 2mm of rain has fallen today, yesterday or the day before yesterday. In this case the discharge limit is 48000m³ per day. If yesterday's storm water has been carried over from a wet day and has been off-grade preventing a discharge then this day is classed as a wet day and the discharge limit is 48000m³ per day.

Setting the 30 day Rolling Average

The 30 Day rolling average process water discharge consist of all water discharged on the previous 30 dry days. The DCS calculation may indicate a higher value and shut down the pumps as it includes 8000m³ of the wet weather day discharge. This calculation is deliberately conservative. The Pump Stop can be over-ridden.

Water Quality

We discharge refinery wastewater from the Stormwater Basin (SWB) to the harbour via the outfall at the end of Jetty 2. Effluent water must meet certain quality standards as outlined in the resource consent. These standards are shown in Table 2.

Each day we are required to collect a proportional effluent water sample based on the flow discharged to the harbour. The sample is analysed in accordance with the approved Monitoring Programme attached to the consent. This sample must comply with the Daily Limits shown outlined in condition 28 of the Consent. In addition, we must also comply with a 30 day limit based on the rolling average of the proportional sample daily results. The 30 day rolling average is defined as being the unweighted numeric average of all results available for any 30 consecutive day period.

We are required to keep the Coastal Marine Area free of debris resulting from our activities.



Monitoring

General Requirements

We are required to carry out and report on monitoring of our effluent water discharges. In conjunction with the Council, we shall review the monitoring programme at least once every seven years to ensure the most appropriate monitoring and reporting is being conducted. Following the review, monitoring and reporting will be in accordance with the revised programme.

Discharge Volumes

We are required to record the following (expressed as m³/hr):

- Total daily discharge
- Median daily discharge rate
- Maximum daily discharge rate
- Minimum daily discharge rate

Continuous Monitoring

Our consent requires that we monitor a number of effluent discharge parameters on a continuous basis. These are as follows:

- pH
- Temperature
- Total Organic Carbon (TOC).
- TSS
- Sulphides

These online analysers will be operated and maintained in accordance with good quality assurance procedures.

Should the average daily reading on the TOC analyser be greater than 20mg/L on a day where a proportional analysis is not required, and then such an analysis shall be performed.

Reporting

Monitoring Programme

To comply with the Resource consent, we are required to report the results of the monitoring programme to the Council on a monthly basis. The report is to be sent to the council within 2 weeks of the end of the month in question and must contain the following information:

1. Discharge Flow

- Total daily discharge (m³)
- Median daily flow (m³/hr)
- Maximum daily flow (m³/hr)
- Minimum daily flow (m³/hr)



2. Online Analysis

- Daily median value
- Daily maximum value
- Daily minimum value

3. Laboratory Analysis

- Flow proportioned sample results as required.
- Grab sample result for faecal coliforms as required.

For the purposes of the Consent, a day is defined as being a 24 hour period from 06:00. We have written advice from the Council allowing us to use a 24 hour period starting at 08:00.

Incidents

Any incident or situation that results in us breaching the consent conditions must be immediately advised to the Council. A written report on the cause, effects and the actions taken to mitigate the effects on the environment and to prevent recurrence must be submitted to the Council within one week of the event.

Complaints

We are required to report to the Council as soon as is practicable following receipt of any complaint relating to discharge of contaminants into the Harbour. The Consent requires us to maintain records of any complaints and the Council may request us to supply the following information:

- The name and address of the complainant, where provided.
- The date and time the complaint is received.
- The nature of the complaint.
- The duration of the event that gave rise to the complaint.
- The location from which the complaint arose.
- The weather conditions prevailing at the time.
- Any events in the management and operation of any processes that may have resulted in the increased discharge of contaminants.
- Any actions taken by us, where possible, to minimise the contaminant discharge.

Maintenance

A report on the inspection and maintenance of the underwater diffusers shall be sent to the Council within one month of the inspection.

Plant Changes

We are required to advise the Council before we carry out any changes to process chemicals which may significantly change the nature or quantity of contaminants discharged.



Maintenance

We are required to maintain all facilities in the Coastal Marine Area in good order and repair. The facilities shall not be altered, added to, demolished or removed in part or in whole without obtaining prior consent of the Council.

Diffuser Monitoring

The outfall and diffusers are to be maintained so as to achieve a minimum dilution of 175 to 1 with a discharge in the range 130 to 2000m³/hr. The dilution ratio needs to be achieved by the time the discharge plume reaches the edge of the mixing zone.

The diffusers and any underwater pipelines are required to be inspected every two years for corrosion and any problems that will prevent them from working as intended. Corrective actions will be undertaken as necessary.

Spillway Triggering

The Emergency Overflow Spillway is a design that will prevent oil discharge into the harbour. Providing the SWB level is actively managed the Emergency Spillway should never become operational except in the most severe of weather events.

Resource Consent demands, all existing SWB level control measures that are available must be in force before the Spillway may be Utilised, these are: Both P3991 A and B in service, Diffuser Bypass in use, all Tanks bund AOC drain valves must be fully closed, The retention basin outlet guillotine blades are lowered or shut to reduce inflow to the SWB. Additional measures may consist of: logic defeated to enable P3992A operation, diverting AOC canals via pumping into available Tank Compounds.

More information on operation of the spillway is covered in WIPT.3900.104 - Emergency Bypassing of the Storm Water Basin Discharge Diffuser and Spillway Activation.

Flow Measurement

Maintain the effluent water discharge flowmeter to measure total flow through the diffusers with an accuracy of 5% over the range 130 to 2000m³/hr (3114 to 47915T/d).



APPENDIX 2

Summary of SWQP Stormwater Basin Quality plan

Specific Responsibilities

AO is responsible in ensuring that SWB Effluent qualities meet the specifications.

Assets are responsible for the quality of water streams leaving refining processes, destined for the Storm Water Basin. Reference sections 4.5.1 - 4.5.2 - 4.5.3.

Resource Consent to Discharge Effluent Water from SWB

Discharge of effluent water from the Stormwater Basin (SWB) is governed by the conditions laid down in our Resource Consent. Among other things, the Resource Consent states the following:

- Limits on the quantity of wastewater we can discharge.
- Limits on the quality of the wastewater we discharge.
- Details the minimum requirements for monitoring the quantity and quality of the discharged water including laboratory analysis and analytical methods to be used.
- Requirements for reporting the results of the monitoring programme, incidents and complaints to the Northland Regional Council.
- Maintenance requirements on plant and equipment.

Document ROW-030 is RNZ's interpretation of the Resource Consent and contains detailed requirements for the above items.

Process Water Streams to SWB – Qualities Overview Table

RNZ produces wastewater from refinery processes. The following table outlines the impact of each Major Wastewater Source, sampling criteria and specification tests.

Points in the process that critically affect waste water qualities:

- A point during the refining process where the quality of waste water is critically affected and / or controlled.
- A Point during the refining process where the quality of waste water is affected but not controlled.

| | COC – Continuously Oil Contaminated Water Streams | | | | | | AOC – Accidentally oil Contaminated |
|-----------------------|---|----------------------|----------------------|-----------------------------|------------------------------------|---------------------------------|---|
| Specification | Dedicated plant drains | Storage Tank Bottoms | Process Plant drains | HCU Sour Water to Unit 8200 | CDU1 CDU2 HCU2 Sour water | Desalter Effluent from CDU1 / 2 | Tank Bunds Road Surface Water Storm Water Systems including canals and oil skimmers Ground Water Wells TPI Water Side |
| Continuous Monitoring | | | | | | | |



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| | | | | | | | |
|---------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Temperature | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| TOC | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Volume Discharge | <input type="checkbox"/> | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ |
| Ammoniacal Nitrogen | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | ■ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| COD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Phenols | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| BOD 5 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Salinity | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| TSS | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| TPH | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Sulphides | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| pH | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

1.1.1 SWB Operating Strategy

The stormwater basin has a nominal capacity of 30,000m³ which, during dry weather, represents several days production of effluent water. Wastewater is entering the basin on a continuous basis which makes it necessary to maintain a constant discharge. A discharge of 5000m³ per day will normally hold the basin at a static level. Weather can change quickly and contaminants can enter the SWB putting spec's off grade preventing us from discharging to the harbour so our aim is to maximise ullage at all times. Normal SWB Level is maintained at 3-3.5m. (Levels below this result in TSS problems as the silt on the basin floor is disturbed). The basin Maximum level is set at 6.75m, the level at which the basin will overflow via the spillway.

1.1.2 SWB Contingency Plan

In the event of an off-grade condition in the SWB, a number of actions are required to bring the excursion back within parameters to re start SWB discharge. Contingency Action Plan via the following link:

1.1.3 High Basin Level/Inclement Weather

During periods of high inflow to the SWB it is possible that the water quality may be offspec at which point discharge decision will made in accordance with Emergency Pre Incident Plan.

An emergency pre-plan is in place via the following Link:

[RW-001-1 Pre Incident Plans](#). Reference should also be given to WIPT.3900.104 – Emergency bypassing of the SWB discharge diffuser and spillway activation, and WIPT.3900.106 Inclement weather preparation plan

1.1.4 Sample Pump P3934

The sample pump provides a constant supply of water to the five online analysers, and the proportional sampler, **39QX007**. This pump is left running at all times and is only shut down when steps have been taken to ensure the discharge pumps are isolated. We are in breach of consent if the sample pump is not running and we are discharging.



1.1.5 Discharge Pump Control

To prevent effluent water discharge that may be off spec, the TDC logic is set up to shut down the discharge pumps should any of the pH, Temperature, TSS, Sulphides or TOC analyser's alarm. This is done by automatically raising the SWB level set point to a high range value. Overrides are available for this function and are only used during maintenance of the analysers.

1.2 Monitoring Programme

1.2.1 Sampling and Analysis of Discharged Water - Flow Proportional Sample

To determine compliance with our discharge consent, a flow proportional composite sample is taken each day from the proportional sampler. This sample is collected over 24 hours from 08:00 to 08:00 the following day. Under the conditions of the Resource Consent, RNZ is only required to analyse the proportional sample every second day.

The following Laboratory tests are carried out on the sample:

- Ammoniacal Nitrogen
- BOD5
- COD
- Phenols
- Salinity
- Sulphide
- TSS
- TPH

1.2.2 Sampling and Analysis of Discharged Water - Daily Grab Sample

While the flow proportional sample is representative of water discharged over the previous 24 hours, it does not provide any information on the quality of the water currently in the basin and for this reason a grab sample is collected each day from the grab sample point and submitted to the laboratory at the same time as the proportional sample.

No Laboratory tests are currently carried out on the sample unless requested.

1.2.3 Days of Low Discharge

Quantities of water to be discharged can vary each day. The amount of sample collected from the proportional Sampler can be between 0 and 100%. On days of low discharge there may be insufficient sample to carry out all of the analyses listed above. Laboratory staff are to prioritise the testing performed as per IPL Standing Instructions. For this reason, it is important that the Proportional Sampler bottles are sent to the laboratory every day, whether they contain sufficient sample or not.

1.2.4 Sampling Locations

A number of approved sampling locations have been established around the SWB/canal network to provide a consistent, structured approach to monitoring and problem solving. Locations of the sample points are shown in:

WIPT.3900.320 Drawing 1 - Stormwater Basin Routine Sample Points

WIPT.3900.321 Drawing 1 - Non-Routine Sample Points

WIPT.3900.321 Drawing 1 - Non-Routine Sample Points

Where a sample is to be drawn from outside of these pre-defined locations, co-ordination with the laboratory will be required to ensure that the results reach the intended recipient.



1.2.5 Online Analysers

We have five online analysers monitoring the quality of the water in the basin close to the discharge pumps. These are used to ensure that the water we discharge meets the discharge standards in our consent. Values from the pH, Temperature, and TOC analysers are reported to the Council and are left running and online at all times. Sulphide analyser 39QA013 and TSS analyser 39QA024 are used for internal purposes only as a warning for when either TSS or sulphide content of the basin are approaching the limit. All five of these analysers will shut down the discharge on high results.

1.2.5.1 Sample Analysis

Analytical methods that we employ for the SWB samples are as per the table in the Resource Consent:

1.3 Planned Shutdown Water Quality Monitoring

Asset shutdowns are a time when the SWB is particularly at risk. For Planned unit shutdown a specific Environmental Control Plan is drawn up to highlight the activities and associated hazards. Environmental Monitor" or watchdog is nominated from Asset operations during the shutdown.

1.4 Measurements Critical to Water Quality

1.4.1 Instruments and Calculations

Instruments and calculations that are used in the treatment of water streams entering the SWB are classified as critical to the quality of the SWB. The document that describes the procedure for calibration is under the ownership of Instruments and Electrical. Referenced from this document a spreadsheet provides listings of all instruments associated to each Quality Plan, the required calibration and frequency for those instruments.

1.4.2 Quality Measurement Instruments (QMIs)

Procedures for the validation of QMI's critical to the process of Treating water are documented in MW-080-335 Routine Calibration of Critical QMI's.

Four analysers measure water qualities, TOC, TSS, pH and Sulphides. All Four analysers have an alarm, also shutting down discharge pumps. Discharge Temperature will also shut down the pumps.

2 RECORDS

| Record | Owner | Location | Retention Time |
|-------------|------------|-----------------|----------------|
| SWB Results | Operations | WinLims/Labware | Evergreen |

2.1 Data Storage

All monitoring data (routine and non-routine) is stored in PI for easy access. Laboratory results are stored under PI tags with the tag of the sample location. Reporting

| Reporting | Location | Communication | Retention |
|---|------------|---|-----------|
| RNZ Board Reporting - Monthly by Executive Team | Electronic | Board Report – all ENVIRONMENTAL non-compliance events – Based on information supplied to NRC | Evergreen |



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| EXTERNAL REPORTING | | | |
|--|-----------------------|---|-----------|
| SWB Water Results – Monthly by Environmental Team Advisor to | Electronic & Hardcopy | Resource Consent reporting – self monitoring | Evergreen |
| <ul style="list-style-type: none"> Patuharakeke Te Iwi Trust | | | |
| <p>SWB Water Results – Monthly by Environmental Team to NRC</p> <p>Reports are generated in accordance with the Work Instructions. (reports of a suitable standard of external circulation).</p> | Electronic & Hardcopy | <p>Resource Consent reporting – self monitoring.</p> <ul style="list-style-type: none"> TOC - pH & Temperature minimum - daily median & daily maximum value during periods of discharge only. Flow Average 30 day dry weather flow. Total daily discharge in m3, daily minimum, daily median & daily maximum rate of discharge in m3/hr. Proportional sample results see Section 4.3 Overview Table for proportional specs. To be reported for every day that a result is available. This exceeds the conditions of the consent. Faecal coliforms Summer months. 30 consecutive rolling day averages - | Evergreen |



APPENDIX 3

Summary of WIPT.3900.104 Emergency Bypassing of the Stormwater Basin Discharge Diffuser and Spillway Activation

| | |
|--|--|
| Emergency Rationale | <p>Inclement weather (Heavy Rain), has on occasion caused the Storm Water Basin and the SWB AOC feed canal to overflow, allowing hydrocarbons to uncontrollably flood on to the surrounding property, beach and into the harbour causing deep scouring of the sand surrounding the Jetty access way support pylons.</p> <p>Refining NZ Resource Consent for operation of the Storm Water Basin permits Emergency discharge via a bypass of the normal discharge diffuser. The Resource consent also allows use of the Emergency Overflow Spillway when all operational SWB level control measures have been overwhelmed.</p> |
| Spillway Design and Use | <p>The Emergency Overflow Spillway is designed to minimise an uncontrolled oil discharge into the harbour. The overflow level is set to start out flowing when the SWB normal level control High and High-High alarm settings are breached, while successfully remaining below the known low flood levels of the SWB inlet AOC Canal feed system. This prevents uncontrolled upstream flooding while allowing only genuine emergency outflows into the harbour.</p> <p>Manually operated Control gates are installed on the North side of the reinforced Jetty access road bridge, for two reasons:</p> <ul style="list-style-type: none"> • To prevent any windblown sand plugging the under over outlet bay. • Exclude King tides, high tide harbour swells and storm generated surges back flowing into the SWB from the Harbour. <p>All Storm Water Basin level control measures must be fully utilised to maintain the level below the high-high alarm. Approximately 10mm to 20mm above the indicated High-High alarm the Basin Emergency Spillway will commence flowing. Full spillway discharge is restricted until the control gates are manually opened.</p> |
| Spillway Utilisation Conditions | <p>Providing the SWB level is actively managed the Emergency Spillway will rarely become operational. Resource Consent demands, all existing SWB level control measures that are available must be in force before the Spillway may be Utilised. These are as follows:</p> <ul style="list-style-type: none"> • Both P3991 A and B in service. • Diffuser Bypass in use. • All Tanks bund AOC drain valves must be fully closed. • The retention basin outlet guillotine blades are lowered or shut to reduce inflow to the SWB. |



| | |
|----------------------|---|
| | <ul style="list-style-type: none"> • Providing the set criteria is met, the available extra pumping capacity of P3992A can now be utilised in combination with P3991A/B to mitigate the risk of a SWB overflow through the Emergency Spillway. • A last resort measure is by means of diverting AOC canals via pumping into available Tank Compounds if ullage allows. <p>Effective Management of the SWB will require some or all of the above. If a Severe Weather warning is forecast or if the Company considers the SWB Emergency Spillway overflow is probable. Expedient early operation of the Diffuser Bypass will be approved by the Production Controller or Duty Manager to maintain SWB level under control. Approval will be granted using Metconnect data and the specifically prepared SWB level prediction Spreadsheet.</p> |
| Control Gates | <p>Manually operated Control gates are installed on the North side of the reinforced Jetty access road bridge</p> <p>The normal operating mode of these gates is closed. Any potential restrictions to a SWB overflow within the Spillway from the control gates to the channel outfall, any extensive sand build up or driftwood debris against the gates must be reported in CMMS (MAXIMO) for removal. Monitoring is performed via the Black Oils weekly Audit check list. (Excessive sand build up blocking the Spillway channel outfall results in the entire SWB level increasing above the design overflow point, the consequence of which, can be a damaging uncontrollable outflow once the sand blockage begins eroding and is eventually swept away).</p> <p>Controlled Containment:</p> <p>The Spillway Control gates may be utilised to retain water within the SWB if level control is deemed to be imminent considering the following.</p> <ul style="list-style-type: none"> • Heavy Rain must have eased or stopped and surface water runoff is reducing. • The Rain Radar must indicate clearing conditions. • An out of service SWB discharge pump is being reinstated. • During a Controlled SWB Containment step, the actual SWB level cannot be raised up to the API Oil/Water separator bays (swim lanes) outlet weirs. • When abandoning a Controlled SWB Containment step, The Spillway Control gates may be extremely hard to raise, and must only be cracked open slowly to prevent a massive damaging outflow. |



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| Diffuser Bypass Utilisation | <p>Resource Consent for operating the Storm Water Basin specifies two trigger points (scenarios) for operating the Discharge Diffuser Bypass valve.</p> <ol style="list-style-type: none"> 1. A severe weather warning for the area; and Refining NZ considers there is a high risk the Storm Water Basin may overflow or associated hydrocarbon control measures may fail. 2. When the above scenarios are not met, and Refining NZ considers there is significant risk of the SWB Emergency Overflow Spillway operating, then Refining NZ must notify the Northland Regional Council Hotline by phone immediately the decision is made. <p>The Storm Water Basin discharge Diffuser Bypass must be closed when the trigger points are no longer a threat and Refining NZ considers its use is no longer required.</p> <p>As a guide if a weather warning is received forecasting rain of more than 100mm in 24 hours then the above criteria has been met and the bypass should be opened at the earliest opportunity.</p> <p>When RNZ Marsden Point Site is under an active heavy rainfall warning and the current rainfall is steadily increasing the stormwater basin level is up to the critical 4 metre level. The SWB discharge diffuser bypass must be opened, failure to do so risks overflowing the basin via the Spillway.</p> <p>If SWB discharge pumping capacity is limited or local rainfall intensities are particularly high, opening the bypass at lower total rainfall predictions is permissible, provided reporting and sampling requirements are met as outlined in this document.</p> |
| Bypass Valve Location | <p>The valve is located just prior to the Jetty Tee on the West side of the Jetty access way, with a guard railed walkway over the pipe wrack.</p> |

| SUBHEADING | WORK INSTRUCTION |
|----------------------------|--|
| Mandatory Reporting | <ul style="list-style-type: none"> • The Production Controller, Duty Manager or Environmental Manager must notify the council's Monitoring Officer as soon as possible after a SWB overflow discharge via the Spillway commences. <p>Additional inspection and reporting will be done by Environmental Affairs personnel.</p> <ul style="list-style-type: none"> • Whenever the Emergency Overflow Spillway operates a grab sample must be taken from the weir outlet bay and all normal Discharge tests performed. |



| | |
|---|--|
| | <ul style="list-style-type: none"> • The grab sample must be taken within the first hour of the Emergency overflow starting then every 24 hours if the discharge exceeds one day. • The actual time and current SWB level must be recorded in the OM Panel Operators log immediately a SWB overflow discharge via the Spillway commences. • The actual time and current SWB level must be recorded in the OM Panel Operators log immediately the Diffuser Bypass valve is opened and again when the valve is closed. |
| Control Gates Operation | <ul style="list-style-type: none"> • If all SWB level control measures are in full service these gates must be opened when the SWB level reaches 6.7m and activates the High Level Alarm. A High-High Alarm is set at 6.75. The Spillway outlet to the beach becomes flooded 10-20mm above the High-High alarm. • Before the spillway begins out flowing into the Harbour, Emergency services or Security must ensure the beach area below the Spillway is clear and visibly highlight the flow path at the high tide mark with reflective cones to warn anyone that may traverse the flow path. • If the Storm Water Basin is off-grade during an emergency, the Production Controller must inform the Regional Council that we have discharged and a report will be dispatched to the council at the earliest occasion by the Refining NZ Environmental Affairs Dept. |
| Off-Grade Discharge | <ul style="list-style-type: none"> • If possible, an Off Grade discharge shall occur on an ebb tide. |
| Conditions for Using the Diffuser Bypass | <ul style="list-style-type: none"> • Both P3991s must be operating. Do not start the SWB discharge pumps when the bypass is open to avoid tripping the pumps on overload. • All Tank Compound AOC drains must be closed. Ensure compound levels are not damaging tank bases or causing tanks to float. • Check current weather conditions from Refining NZ weather website. • Establish the current and predicted inflow into the basin and assess the need to use the bypass at the earliest opportunity – do not wait until level becomes critical. • During an active heavy rainfall warning and current rainfall is steadily increasing the stormwater basin level up to the critical 4 metre level. The SWB discharge diffuser bypass must be opened. |



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| | <p>Maximising SWB Discharge with the Diffuser Bypass open: To maximise SWB discharge during an emergency situation, P3992A can be used in conjunction with P3991A/B to mitigate the risk of the SWB overflowing via the Spillway. A pump Start Button is provided in graphic DETUTX33 and can be used if the following conditions are met:</p> <ul style="list-style-type: none"> • The SWB Diffuser bypass MUST BE OPEN before starting P3992A. (If the bypass is closed, the higher discharge pressure from P3991A/B severely limit P3992A capacity). • The Production Controller, Asset Manager or Operations Controller has approved the operation of P3992A in combination with P3991A and B. • 39HS828 Operational Override Switch is provided in the SWB OOS graphic, this must be actuated to activate P3992A Start Button and the mandatory OOS documentation must also be completed. • The EXPERION Supervisor Access level must be engaged to permit full access to the pump start button. • P3992A is now not running via SWB level controller 39LC049. It's manually started from the button and is manually shutdown from the button. • If 39HS828 Operational Override Switch is removed at any stage the P3992 will stop. <p>All SWB automatic pump shutdown functions remain valid:</p> <ul style="list-style-type: none"> • All Pumps will stop if the SWB quality is off grade. • All Pumps will stop if the max daily or monthly discharge volumes are met. |
| Operating the Diffuser Bypass | <ul style="list-style-type: none"> • Contact the Duty Manager or the Production Controller (out of hours) to request approval to Bypass the Diffuser. • Ensure the 8000m³ daily maximum discharge is overridden. • To exceed 48000m³ use the override. If any override is required, please liaise with the duty manager before continuing. • Request the Day Operator or the Black Oils Operator on nights to open the Diffuser Bypass. • Slowly open the bypass valve to avoid overloading and tripping the pumps, if manning allows direct an operator to monitor both discharge Pumps RCU amps. • The actual time and current SWB level must be recorded in the OM Panel Operators log immediately the Diffuser Bypass valve is opened and again when the valve is closed. |



| | |
|--|--|
| | <ul style="list-style-type: none">• P3992A must be off line prior to closing the diffuser bypass• Because the diffuser bypass valve comes directly off the bottom of the discharge line, The diffuser bypass valve must be fully closed before all SWB pumps are allowed to stop. This prevents draining or partially emptying the complete discharge line, and losing the full line prime that safeguards against potential major water hammer/line surge damage occurring upon restarting the SWB discharge). |
|--|--|



APPENDIX 4

Summary of WIPT.3900.106 Inclement Weather Preparation Plan

| | |
|-------------------|--|
| Precedent: | <p>Previous inclement weather systems (prolonged Heavy Rain) have exceeded the capacity of our drainage systems. Several defence initiatives have been established to reduce the impact of these events.</p> <p>Asset Management must determine the possible impact on drainage systems from the predicted Weather forecast. If considered necessary shall initiate defence measures to minimise possible flooding of Unit Drain systems, Canals, Retention Basin and SWB.</p> |
|-------------------|--|

| SUBHEADING | WORK INSTRUCTION |
|---|--|
| Extreme Weather Alert Broadcast: | <p>24-48hrs before Storm arrives:</p> <ol style="list-style-type: none"> 1. Independently flush "A" Block, "B" Block, "C" Block process area drains and EWT unit COC drains. Gully Suck any oil from the water side sumps of S3972/S3974/S3975. 2. Remove any oil from individual bays of both SWB and Retention Basin. Gully suck any oil remaining in the skimmer sumps. 3. Ensure the terms for using the Storm-water Basin Diffuser Bypass are understood. Consult the Duty Manager or Environmental Affairs Manager for authorisation to operate the SWB diffuser bypass earlier rather than later to maximise available ullage in the SWB. Ensure any Bypass use is logged. 4. Check Cattery area sump pumps. Ensure drain inlet is clear of debris and pump suctions are clear 5. Check the RAP sump and remove hydrocarbon with gully sucker. This will prevent it flooding over into the AOC canal. |
| Extreme Weather Alert Declared: | <p>6-12hrs before Storm arrives</p> <ul style="list-style-type: none"> • The predicted day of the event empty oil sumps of S3974, S3975 V3503/P3503 (retention basin inlet). T3605, T90 oil skimmer sump. T3976 Rd 3 canal skimmer sump. P3601 Newcastle express sump. • Back flush strainers of oil sump pumps, (Air hose agitation from inside the pump NRV works best). • Empty the Wet slop tanks T125/6 into dry slops tank T127. • Suspend all draining into the COC system (free water only) prior to the forecasted weather event. • If on grade ensure the Storm Water Basin is at minimum level. Verify with the Production Controller use of the SWB Discharge Diffuser Bypass is approved and authorised. • The actual time and current SWB level must be recorded in the OM Panel Operators log immediately the Diffuser Bypass valve is opened and again when the valve is closed. • Arrange for standby Vacuum (Gully Sucker) trucks to remove oil from canals and sumps to be deposited into T3801 or S3975 oil side, if required S3973 may be used. |



| | |
|--|--|
| | <ul style="list-style-type: none"> • Ensure absorbent booms are available from Marine Office store room. These may be used to confine oil at strategic locations for removal via Vacuum trucks. |
|--|--|

Heavy rain commences

- If SWB on grade run both P3991A/B. – try to maintain SWB level rise at minimum.
- Suspend all Tank Compound draining to the minimum required for safe access.
- It may be necessary to open the Diffuser bypass. This can be opened when the conditions stated in WIPT.3900.104 - Emergency Bypassing of the SWB Discharge Diffuser and Spillway Activation are met.
- The actual time and current SWB level must be recorded in the OM Panel Operators log immediately the Diffuser Bypass valve is opened and again when the valve is closed.
- Check if this coincides with a spring high tide, and consider monitoring and closing the spillway gates for the highest point of the tide.



APPENDIX 5

Key Aspects of MQ-024 Shutdown Management.

Management Processes

The shutdown management process outlined in this section are required to ensure shutdown objectives are achieved. The Shutdown Management Framework (SMF) provides guidance on how these systems and processes can be successfully implemented. The shutdown manager is encouraged to make full use of the SMF.

Shutdown Drivers, Objectives, KPI's

Shutdown drivers and key shutdown objectives shall be documented for each shutdown. A simple Driver Sheet is appropriate for minor shutdowns whereas a Project Charter should be developed for major shutdowns. The Driver Sheet or Project Charter should be developed and agreed with key shutdown stakeholders.

Key Performance Indicators (KPIs) that enable measurement and reporting of performance against the key shutdown objects shall also be established for all shutdowns.

Preps and Execution Planning

Thorough planning for the shutdown preps and execution phases is necessary to assure the success of each shutdown. The shutdown manager is responsible for establishing a competent shutdown team and for developing and communicating the Shutdown Execution Plan (SEP) to all stakeholders. For major shutdowns the SEP will typically be developed and reissued as the shutdown planning progresses. The initial issue of the SEP will focus on preps phase activities and the final issue will include all phases the shutdown.

Risk Management

A formal risk management process shall be established for all shutdowns. The process shall involve systematic identification of risks and opportunities, development of action plans to both mitigate the risks and realise the opportunities. All action plans shall be allocated an owner who is responsible for driving the action plan to fruition. The risk management process shall also ensure new and existing risks and opportunities are regularly reviewed and action plans are progressing satisfactorily.

Communications Planning

Communications play a key role in delivering a successful shutdown. A communications plan shall be developed that outlines how stakeholders are kept up to date with the shutdown status. The communications plan should address:

- Schedule for reoccurring meetings including meeting objectives, agenda, and means of recording actions (e.g. minutes, rolling action plans, visual management boards)
- Listing of key documentation, distribution and means of promulgation
- Progress reporting requirements and frequencies
- External communications and RNZ focal points
- Critical records and file locations

The communications plan may be a standalone document or be included as part of the SEP.



Quality Assurance

All shutdown activities shall meet RNZ business as usual Quality Assurance requirements. Shutdown specific Quality Assurance requirements shall be identified in the SEP or dedicated Shutdown Quality Management Plan as appropriate.

A Quality Assurance programme should be established in consultation with subject matter experts for all large shutdowns. This programme may be documented in the form of a QA matrix.

HSE Management

HSE is integral to all activities undertaken at RNZ. All work executed for and on behalf of the shutdown shall meet or exceed RNZ H&S and Environment procedures. A shutdown specific H&S Plan and Environmental and Waste Management Plan shall be developed for every shutdown. The Environmental and Waste Management plans may be included as part of the SEP for smaller shutdowns.

Hazards potentially present during the physical execution of shutdown work shall be considered when developing job plans. Specialist PPE, tools and any HSE support required to execute the job safely shall be identified in the job plans. H&S management tools such as HAZID workshops and JRA's shall be used as appropriate.

Where work is planned and executed by Contractors then RNZ shall ensure process hazards are clearly identified in the work scopes issued to contractors.

Continuous Improvement

Lessons learnt from recent shutdowns of a similar nature should be reviewed by the shutdown manager and actioned so that previous mistakes are not repeated and opportunities identified are realised. Specific actions should be included in the SEP.

Lessons learnt from the current shutdown are to be captured and included in a close-out report to be issued by the shutdown manager upon completion of the shutdown. Shutdown procedures and/or the Shutdown Management Framework documentation should be updated where significant improvements are identified.

Organisation

Shutdown Governance

Each shutdown shall be subject to a governance process, with a governance entity assigned. For minor shutdowns the governance entity is typically the Asset Engineer. For major shutdowns a Shutdown Steering Group shall be appointed. Governance decision rights include:

- Approval of shutdown drivers and KPI's
- Approval of Shutdown Manager selection (should be independent of the project owner)



- Approval of the shutdown budget
- Approval of shutdown timing and duration
- Approval of the SEP and HSE Plan
- Approval of changes to any of the above
- Signalling the 'green light' following the a 'readiness to go' review

The governance entity should also endorse the shutdown organisation charts and RFA's prepared by the Shutdown Manager. Members of the Steering Group should be sufficiently senior in the organisation to have the ability to assist the Shutdown Manager with removing roadblocks etc.

Shutdown Manager

The Engineering Development Manager is responsible for appointing a Shutdown Manager with the appropriate competencies for the size of the shutdown. Selection shall be subject to endorsement by the governance entity. The shutdown manager is accountable for the shutdown success and as such must be delegated the authorities necessary to execute his responsibilities outlined in Section 0.

Shutdown Organisation

The Shutdown Manager shall prepare organisation charts for the preps and execution phases of the shutdown and obtain agreement with line managers for mobilisation and demobilisation timing of individuals.

The preps phase organisation chart should include all personnel with significant involvement in shutdown management, basic work scoping and detailed planning of shutdown activities. The organisation chart and RFA (Type 2 estimate of cost) should be endorsed by the shutdown governance entity prior to mobilisation of the team. Once endorsed, change management process shall be applied to proposed changes to the organisation.

The execution phase organisation chart includes all management overhead positions and should extend down to individual work supervisors. Funding of the execution organisation is authorised via the shutdown execution RFA obtained prior to shutdown pre-works execution.

Key Responsibilities

The following sub-sections outlined the key responsibilities and accountabilities for key shutdown team members and stakeholders.

Shutdown Manager

The Shutdown Manager is accountable for the success of the shutdown. Responsibilities include:

- Establishing the shutdown drivers, objectives and KPIs in consultation with the key stakeholders
- Developing the Shutdown Execution Plan (SEP) and communicating this with the shutdown team and stakeholders
- Developing and communicating the HSE Plan for the shutdown
- Developing the shutdown preps plan and monitoring performance against this plan
- Managing the preps team and tracking the progress of deliverables from supporting departments / organisations
- Establishing service level agreements with RNZ Department Managers and contractors (where applicable)
- Establishing and driving the shutdown management processes



- Executing the shutdown safely and efficiently, and ensuring work meets RNZ quality standards
- Managing the shutdown engineering budget (noting this excludes catalyst activities and operations activities)
- Delivering the shutdown in accordance with the objectives and KPIs above

RNZ Department Managers

Responsible for:

- Providing skilled resources for secondment into the shutdown organisation in accordance with the agreed mobilisation demobilisation plan
- Quality Assurance of deliverables provided to the shutdown

Pre-Shutdown

Shutdown Execution Plan

A Shutdown Execution Plan (SEP) shall be prepared every shutdown. The SEP is a key document which defines the scope of the shutdown, management structure, and planning and execution methodologies. The SEP also specifies the “drivers” for the shutdown in terms of HSE, cost, schedule and quality performance, criteria for development of the work list.

The document will clarify roles and responsibilities of shutdown team members and provide a common understanding of the management approach to the shutdown.

The initial issue of the SEP should be issued soon after the kick-off meeting with the preps team and focus on the preps phase activities. At this stage it may be premature to define execution phase processes and responsibilities. In this case the SEP will be subsequently revised and re-issued as planning for the shutdown is consolidated.

HSE Plan

Every shutdown shall have a shutdown specific HSE Plan which shall include the Shutdown HSE Policy, Shutdown HSE targets, the responsibilities of individual personnel with respect to HSE, and specific requirements relating to job hazards, emergency procedures, and incident reporting.

Environmental Plan (including Waste Management)

An Environmental Plan shall be produced based on the “*Environmental Aspects*” approach, using the Environmental Aspects register as a starting point. This is done jointly with the Environmental Team and Operations. It should include a list of all estimated waste that is communicated to the Waste Manager prior to the shutdown. The handling of the waste shall be as per the Waste Management Work Instructions. This may be covered in the HSE Plan.

Shutdown Execution

The shutdown window commences with feed-out and is completed when the unit is producing on-grade products at the required throughput.



Meetings

Meetings shall be held and recorded in accordance with the communications plan to regularly review, discuss and disseminate HSE issues and shutdown progress issues. Supervisors should take their own notes for communication to the workers.

Progress Updating/Monitoring

Supervisors are required to provide accurate daily updates on their crew's progress to the Scheduler. The Scheduler shall then update the Schedule and adjust work priorities and accommodate emergent work as necessary to achieve the overall shutdown objectives. Updated look-ahead schedules shall be issued to the Supervisors daily.



APPENDIX 6

Summary of WIPT.3900.912) Asset Shutdown Monitoring

| Asset Shutdown Monitoring | Shutdowns increase the possibility of hydrocarbons, contaminants and chemicals entering the AOC as equipment is opened, drained and flushed. It is important that Process blocks are made aware of their responsibilities in controlling shutdown activities. The immediate reporting of any loss of containment to AOC can reduce the possible effect downstream to the SWB. | | | | | | | | |
|---|--|--|-----------------|--|--|-------|--------|--------------------|-----------------|
| Who Carries out the Sampling and Checking of the Results | <p>An Operator of member of the Environment Team is appointed and tasked with the taking of extra samples from set AOC canal ‘Non Routine Sample’ point locations. The designated QPX sample points are selected to monitor the areas of canal to the SWB which may be impacted by the shutdown activities.</p> <p>The Operator is to monitor the results, maintain an Environmental Monitoring Log and keep the Panel and Senior Operator informed. When night activities require monitoring the shift Senior Operator will designate who will monitor.</p> | | | | | | | | |
| Environmental Monitoring Recording during Asset Shutdowns | <p>A Log is to be maintained via a table or spreadsheet document formatted as below.</p> <table><tr><th colspan="4">ENVIRONMENTAL CONTROL PLAN – _ BLOCK SHUTDOWN 20__</th></tr><tr><th>ISSUE</th><th>HAZARD</th><th>CONTROLS & ACTIONS</th><th>WHO will action</th></tr></table> | ENVIRONMENTAL CONTROL PLAN – _ BLOCK SHUTDOWN 20__ | | | | ISSUE | HAZARD | CONTROLS & ACTIONS | WHO will action |
| ENVIRONMENTAL CONTROL PLAN – _ BLOCK SHUTDOWN 20__ | | | | | | | | | |
| ISSUE | HAZARD | CONTROLS & ACTIONS | WHO will action | | | | | | |
| Sample Points, Tests Required and Frequency | <p>The sample point locations are set out on a Refinery plot plan:</p> <p>WIPT.3900.912 Drawing 1 - Non Routine Sampling</p> <p>WIPT.3900.912 Drawing 2 - Non Routine Sampling</p> <p>The sample point locations, tests and frequency will be decided in consultation with the Operations Controller or his designate.</p> | | | | | | | | |

| SUBHEADING | WORK INSTRUCTION | | | |
|------------|---|----------------|----------------|--|
| | <ul style="list-style-type: none">Carry out sampling of canals as per the example of the table below. | | | |
| | Location | Tests Required | Frequency | Comment |
| | QPX007 | pH, ToC | Once per shift | pH regularly during shutdown and at least twice per day. ToC sample taken in event of known incident, visual change to canals. Or significant pH change. |
| | | sulphide | As required | |
| | QPX008 | pH, ToC | Once per shift | pH regularly during shutdown and at least twice per day. ToC sample taken in event of known |

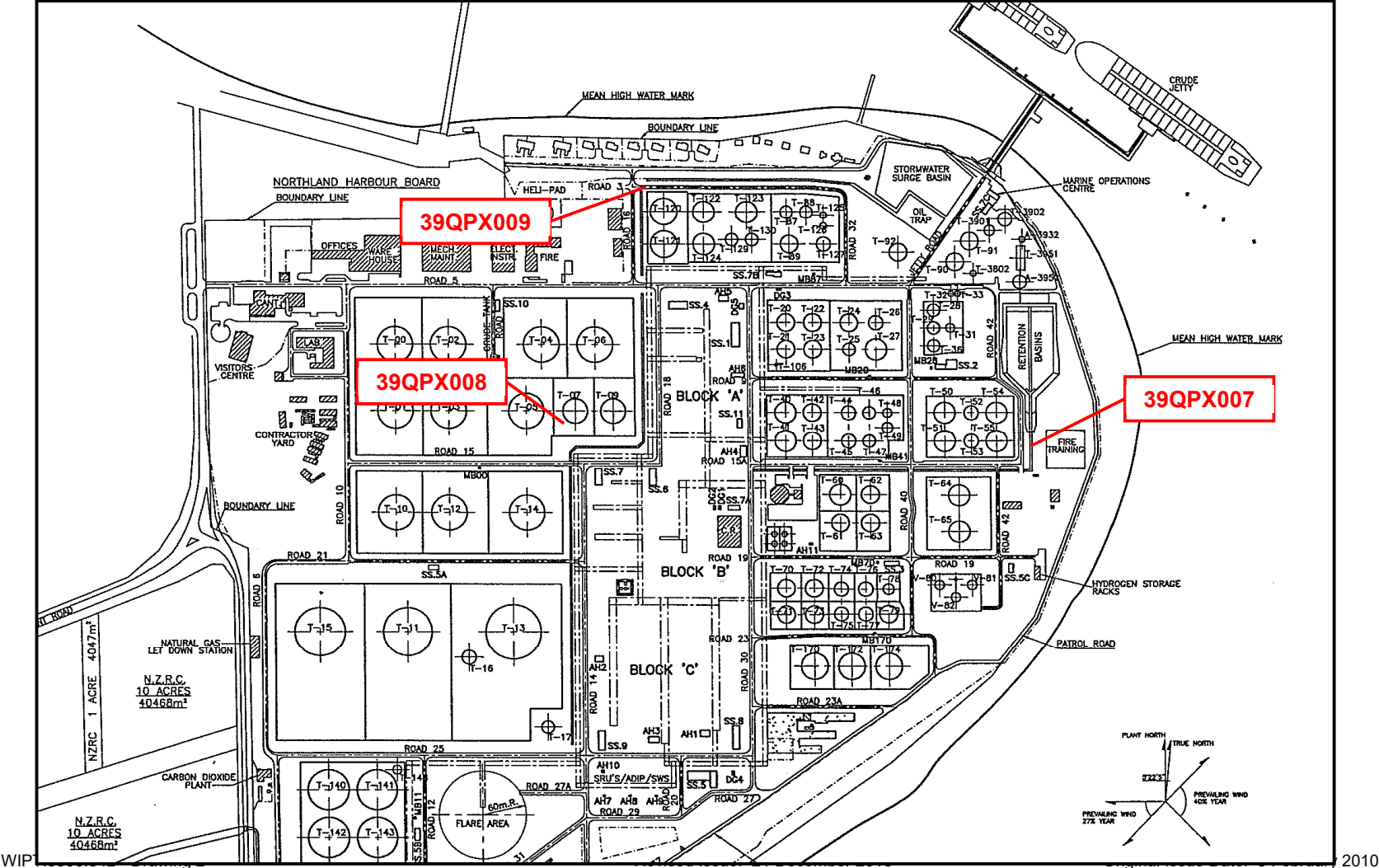


| | | | |
|-----------------|-----------------------|------------------|---|
| | | | incident, visual change to canals. Or significant pH change. |
| | sulphide | As required | Day shift only |
| QPX009 | pH, ToC | Once per shift | pH regularly during shutdown and at least twice per day. ToC sample taken in event of known incident, visual change to canals. Or significant pH change. |
| | sulphide | As required | Day shift only |
| QPX006 | pH, ToC, sulphide | As required. | Frequency to be determined during shutdown. |
| QPX005 | pH, TOC, sulphide | As required. | Frequency to be determined during shutdown. |
| Location | Tests Required | Frequency | Comment |
| QPX007 | pH, NPOC | Once per shift | At the beginning of the shift |
| | sulphide | Once per day | Day shift only |
| QPX008 | pH, NPOC | Once per shift | At the beginning of the shift |
| | sulphide | Once per day | Day shift only |
| QPX009 | pH, NPOC | Once per shift | At the beginning of the shift |
| | sulphide | Once per day | Day shift only |
| QPX006 | pH, NPOC, sulphide | As required. | Frequency to be determined during shutdown. |
| QPX005 | pH, NPOC, sulphide | As required. | Frequency to be determined during shutdown. |

- Each shift monitors results using the Lab report.
- For any abnormal results, carry out contingency plans as per WIPT for individual off grade spec affecting the storm water basin.



Non Routine Sample Points Drawing 2












WIP



APPENDIX 7

Summary of RW-001-SW-008 Spill response and Clean-up procedure.

| PRODUCT | SPILL FROM | FLASH POINT | AUTO IGNITION |
|--------------------|-------------------------------------|-----------------|-----------------|
| Crude | Pumps Piping Tanks Vessels | -18°C | 230-250°C |
| Mogas | | -40°C | 280°C |
| Jet | | 38-60°C | 228°C |
| Kerosene | | 30-90°C | 230°C |
| Gasoil | | 45-120°C | 225-330°C |
| Light Naphtha Tops | | -40°C | 290°C |
| Heavy Naphtha | | -40°C | 230-255°C |
| Residue/Bitumen | | 180-250°C | 340-440°C |
| DIPA | | -13°C | 316°C |
| Caustic | Pumps/Piping/Tanks | N/A | N/A |
| Sulphur | Pumps/Loading arm/Tanks | 180°C (as dust) | 232°C (as dust) |

| PRODUCT | UN No. | HAZCHEM | Flammability Range | WES Limit | MSDS |
|-----------------|-------------------------------|--|--------------------|--------------|-----------------|
| Crude | 1267 |  3WE | 1.6-17% | H2S 5ppm TWA | Refer Chemwatch |
| Mogas | 1203 |  3YE | 1-8% | 300ppm TWA | Refer Chemwatch |
| Jet | 1863 |  3Y | 0.7-5% | 300ppm TWA | Refer Chemwatch |
| Kerosene | 1223 |  3Y | 1-6% | 300ppm TWA | Refer Chemwatch |
| Gasoil | 1202 |  3YE | 1.4-7.6% | 300ppm TWA | Refer Chemwatch |
| Naphtha | 1268 Light Tops 1270 Heavy |  3YE | 1-7% | 20ppm TWA | Refer Chemwatch |
| Residue/Bitumen | 1999 |  3YE | N/A | N/A | Refer Chemwatch |
| DIPA | 1158 |   3WE | 1.1-7.1% | N/A | Refer Chemwatch |
| Caustic | 1824 |  2R | N/A | N/A | Refer Chemwatch |
| Sulphur | 2448 |  1Z | 26-1068ppm (dust) | 8ppm (dust) | Refer Chemwatch |



SCENARIO DESCRIPTION

"All Chemical and Hydrocarbon Spills and leaks should be treated as emergencies, Call Emergency Services on Radio Channel 902"

Spill of hydrocarbons or other chemicals onsite from:

- Pump seal leak / flange leak
- Pipe leak
- Instrumentation / valve failure
- Corrosion
- Drain valve left open
- Vessel or tank overfill
- In storage Chemicals or mobile chemicals and Hydrocarbon products.

Chemicals may be explosively reactive, detonate and/or release heat – see individual Safety Data Sheet (SDS).

Note: For Marine Oil Spills see the site Tier 1 Marine Oil Spill Contingency Plan.

ESCALATION AND RESPONSE TACTICS

ISOLATE, CONTAIN, IDENTIFY, Make SAFE, Clean UP

- Control ignition sources.
- Place in safe cordons and remove all non-essential people.
- Local or wider area evacuation dependant on wind direction, product type and hazard, spill quantity.
- Use appropriate PPE in accordance with the HAZCHEM Emergency response actions (see Appendix 1), FENZ procedures and SDS.
- Stop the source - isolate and contain leak, prevent entering drains, waterways and unsealed ground.
- Vapour suppression – but consult SDS first. Do not deplete your entire Firefighting Foam stocks to provide vapour suppression. Foam will only provide adequate vapour suppression for 10-15 minutes before further Foam application.
- Recovery of spilled product.
- Environmental clean-up of contaminated gravel, soil and sand (ensure the clean-up doesn't spread the contamination, have effective decontamination and containment controls in place).
- A thorough and correct decontamination of Responders must occur. Refer to Fire & Emergency New Zealand (FENZ) decontamination procedures or the SDS.
- Appropriate disposal of spilled substance, spill containment equipment and contaminated gravel, soil and sand (contact the Waste Manager).
- Restocking of spill response / containment equipment.

ESCALATION

- Large spills may require external support and notification.
- Chemical spill control mandate sits with FENZ.
- If the spill appears greater than our capability to respond with our onsite staff / resources, then consider notification and request for support from FENZ.



ENVIRONMENTAL RESPONSE

CLEAN UP & PREVENT FURTHER CONTAMINATION

Whenever a spill occurs action must commence to immediately stop the spill, contain and clean.

If spilled material is hosed to the COC then the drainage system must be sufficiently flushed to ensure that it reaches the TPI's.

The priority for removing the residual material after the initial spill response is flexible.

Priority depends on location and type of product spilled:

- Heavy Fuel Oil spill contained on concrete may not require immediate attention;
- Mogas spill onto open ground i.e. Sand / gravel, compacted brown rock will require urgent action.

This is to prevent groundwater contamination.

The longer a spill is left the further it can spread, substantially increasing clean-up effort, costs.

Clean up priority – shall occur in accordance with the following guideline table:

| Product | Soil Type | Clean up Priority* |
|---------------------------------------|------------------------------|---|
| Naphtha, Kero, Gas Oil and Crude | Sand | < 2 Days |
| Naphtha, Kero, Gas Oil and Crude | Compacted Brown Rock on sand | < one week |
| Naphtha, Kero, Gas Oil and Crude, VGO | Blue Chip on sand | < Four days |
| Long Residue/Fuel Oil | Sand | < month |
| | Blue Chip on sand | < month |
| | Compacted Brown Rock | < 2 months |
| Short Residue/Asphalt | Sand | < 2 months |
| | Compacted Brown Rock | < 2 months |
| | Blue Chip | < 2 months |
| Other Chemicals, eg caustic, PERCH | Any type | Contact Emergency Services and Environmental Team |

* Dependent on **volume** spilled, consult with the Environmental Team.

PHOTOS AND PLOT PLAN

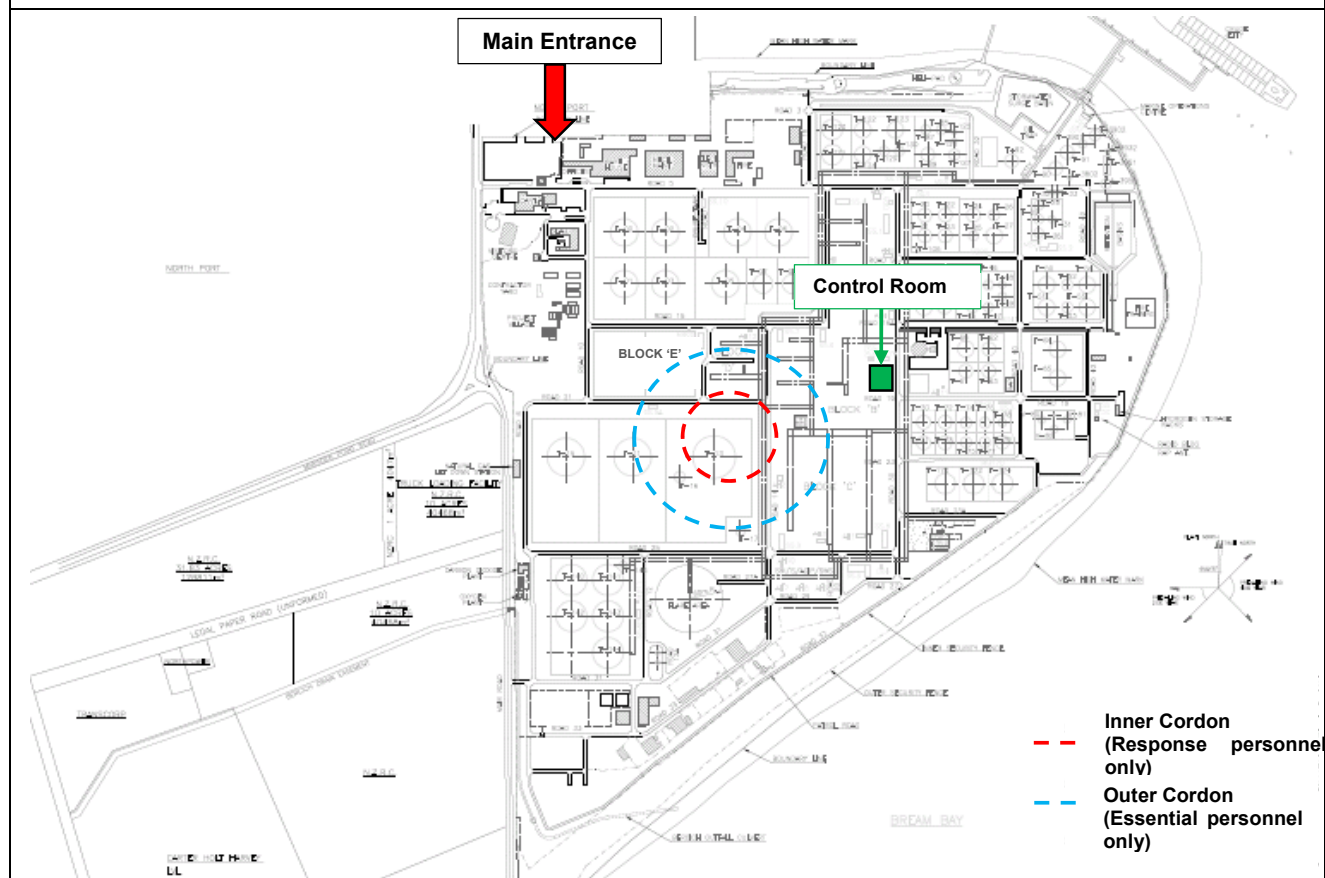
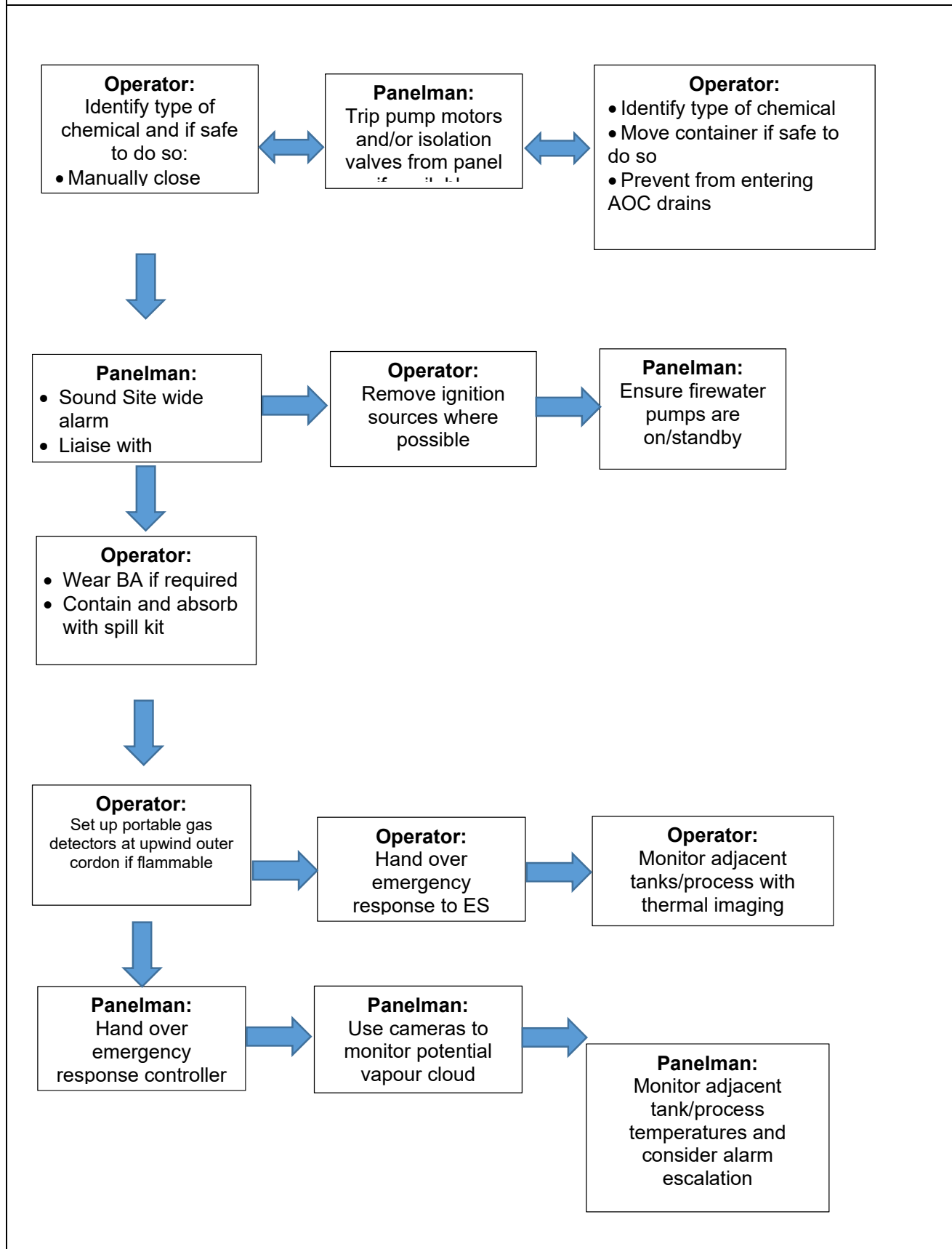


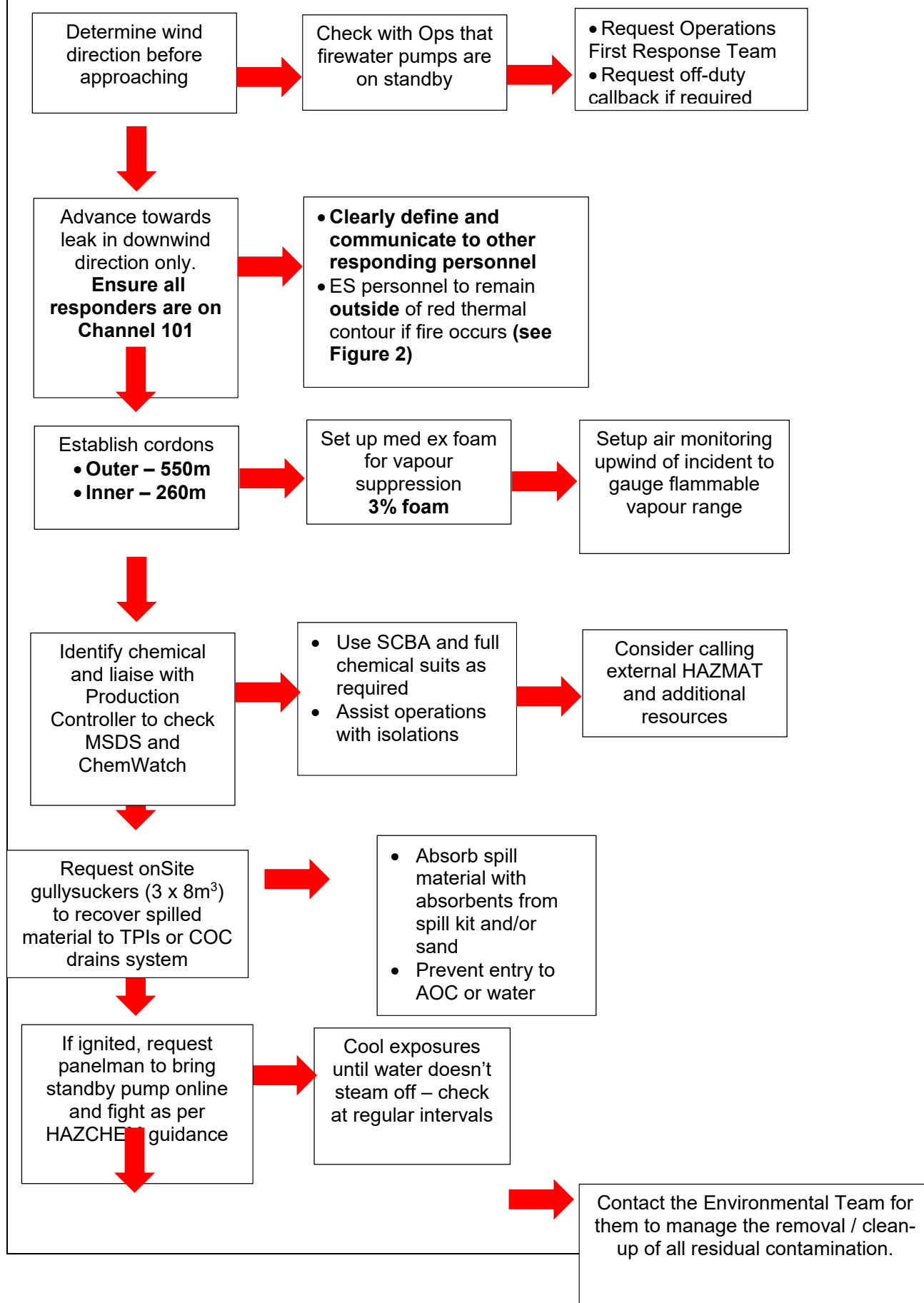
Figure 1: Overall Site Plan (worst case spill)

| AVAILABLE FIREFIGHTING EQUIPMENT | |
|--------------------------------------|---|
| Foam requirement | 3510L foam compound for 3% application @ 1800L/min for 65 mins FOR HYDROCARBONS |
| Firewater requirement | 1746L/m (for foam application) FOR HYDROCARBONS 2200L/min (for cooling application) |
| Access Issues | No access into tank compounds, limited/congested access in process areas |
| Specialist PPE Required | SCBA, Full structural firefighting kit, Portable Gas Monitor |
| Specialist Equipment Required | Foam, full encapsulation chemical suits, decontamination kit, chemical spill kits |

OPERATIONS RESPONSE: WORK INSTRUCTION (once incident is detected and/or alarm raised)



EMERGENCY SERVICES RESPONSE: WORK INSTRUCTION (after alarm raised and incident briefing)



THERMAL RADIATION CONTOURS

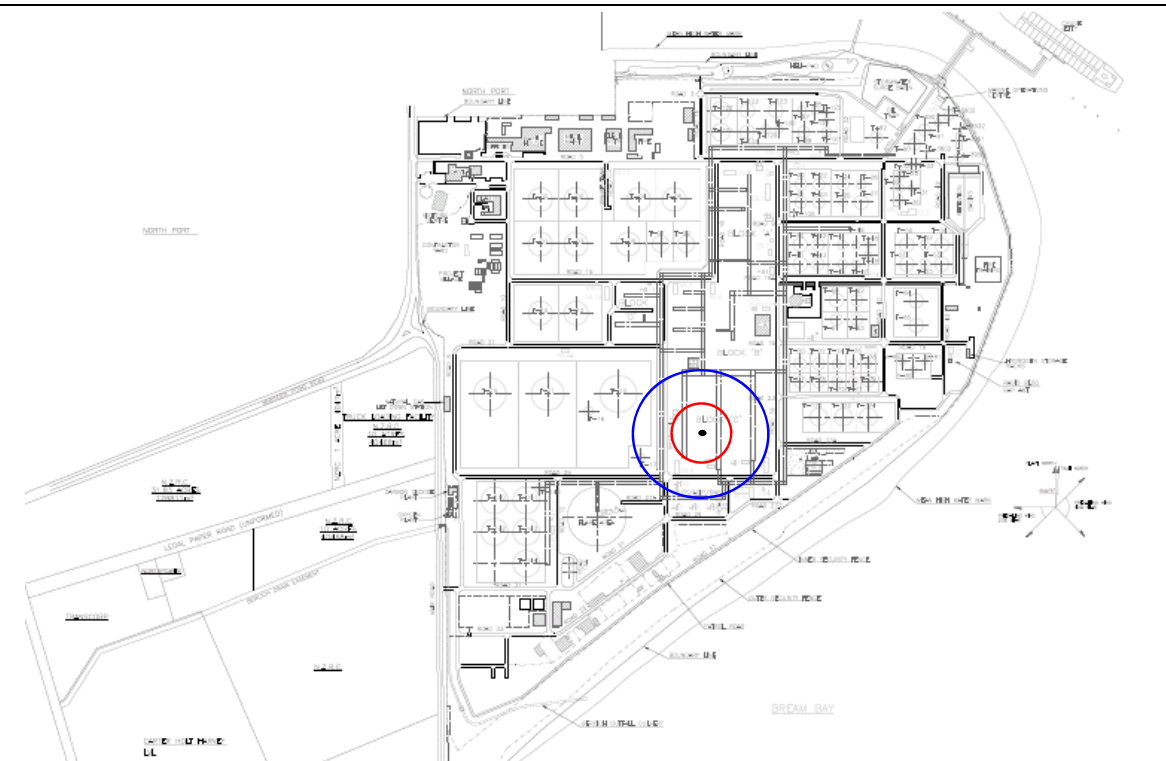


Figure 2: Thermal Radiation Contours (for worst case spill)

Blue Circle: 4.73 kW/m² thermal radiation contour (radius 180m)

Personnel wearing standard PPE should exit this area as quickly as possible to avoid harm.

Personnel wearing professional firefighting clothing (Level 2 Firefighting Garment) may be able to withstand working for 15-30minutes in this area. Crews should be rehydrated, rotated and rested at regular intervals.

Red Circle: 12.5 kW/m² thermal radiation contour (radius 82m)

Personnel SHOULD NOT enter inside this area without the appropriate fire protection equipment and backup. Unprotected steel equipment within this area will require cooling to avoid escalation.

APPENDIX 8**Summary of Pre Plans****Asset Offplot Pre Incident Plans**

| Asset | Unit Number | Appendix Number | Pre-Incident Plan Title |
|------------------|---------------------|-----------------|--|
| White Oils | 1150 | RW-001-AO-001 | Butane Storage Area Spheres/Pumps Liquid Pool Fire/Jet Fire/BLEVE and Vapour Release V80/81/82 |
| White Oils | 1150 | RW-001-AO-002 | Butane Spheres Jet Fire/BLEVE |
| White Oils | 1150 | RW-001-AO-003 | Butane Pumps Fire |
| Crude Oils | 1150 | RW-001-AO-004 | Crude Tank Farm Large Bund Release |
| Crude Oils | 1150 | RW-001-AO-005 | Crude Tank Farm Tank Top Fire |
| White Oils | 1150 | RW-001-AO-006 | Floating Roof Tanks Mogas Component and Product Release/Fire Tk60's Tk70's & Tk170's |
| White Oils | 1150 | RW-001-AO-007 | Mogas and Distillate Floating Roof Tank Top Fire |
| White/Black Oils | 1150 | RW-001-AO-008 | Shipping Pumps Release |
| White/Black Oils | 1150 | RW-001-AO-009 | Fixed Roof Tank Release/Fire |
| White/Black Oils | 1150 | RW-001-AO-010 | Fuel Additives Spill |
| B2 | 8100/8200/8300/8400 | RW-001-AO-011 | B2 Units SWS/ADIP H2S Release/Fire |
| B2 | 8500/8600/8700/8750 | RW-001-AO-012 | B2 Units SCOT/SRU H2S Release/Fire |
| B2 | 8800 | RW-001-AO-013 | Sulphur Loading Area Release |
| Jetty | 3750 | RW-001-AO-014 | Hydrocarbon Spill or Fire on Jetty |
| Jetty | 3750 | RW-001-AO-015 | Hydrocarbon Release to Sea |
| Jetty | 3750 | RW-001-AO-016 | H2S Release at Jetty |
| Jetty | 3750 | RW-001-AO-017 | Fire Onboard Berthed Ship |
| Jetty | 3750 | RW-001-AO-018 | Ship Collision |
| B2 | 8500/8600/8700 | RW-001-AO-019 | Oxygen Enrichment Leak |
| Flare | 3400 | RW-001-AO-020 | Flare Area Emergencies |
| RAP | 1700 | RW-001-AO-021 | RAP Pump Emergencies |
| Offplot | 1150 | RW-001-AO-022 | Bund Recovery Plan |
| Offplot | 8800 | RW-001-AO-023 | Sulphur Plant Emergency |

Asset North Pre Incident Plans

| Asset | Unit Number | Appendix Number | Pre-Incident Plan Title |
|----------------|-------------|-----------------|---|
| Distillation 1 | 150 | RW-001-AN-001 | P187 A or B Seal Fire |
| Distillation 1 | 150 | RW-001-AN-002 | V155 Sight Glass Leak |
| Distillation 1 | 150 | RW-001-AN-003 | P150 Pressure Gauge Leak |
| Distillation 1 | 150 | RW-001-AN-004 | Crude Transfer Line from F151 F152 to C150 Flange Leak Fire |
| Distillation 1 | 150 | RW-001-AN-005 | Analyser House Fire |
| Distillation 1 | 150 | RW-001-AN-006 | A Block Lift Failure |
| Distillation 1 | 150 | RW-001-AN-007 | Chemical Incident |
| HDT | 250 | RW-001-AN-008 | P203 A or B Pressure Gauge Damage |
| HDT | 250 | RW-001-AN-009 | V250 Sight Glass Leak Fire or Vapour |
| HDT | 250 | RW-001-AN-010 | V252 Utility Connection Fire or Vapour |

| | | | |
|----------------|------|---------------|--|
| HDS1 | 350 | RW-001-AN-011 | P351A or B Pressure Gauge Leak – Kero Mode |
| HDS1 | 350 | RW-001-AN-012 | K351/K352B H2 Leak |
| Platformer | 450 | RW-001-AN-013 | P403A or P403B LPG Pressure Gauge Leak |
| Platformer | 450 | RW-001-AN-014 | V402 6" Line Flange Leak |
| Bitumen | 650 | RW-001-AN-015 | P656 Pressure Gauge Leak |
| Distillation 2 | 5100 | RW-001-AN-016 | P5111A or P5111B Flange Fire |
| Distillation 2 | 5100 | RW-001-AN-017 | Crude Transfer Line from F5101 to C5101 Flange Leak Fire |
| Distillation 2 | 5100 | RW-001-AN-018 | P5104 Seal Leak – Fire |
| Distillation 2 | 5100 | RW-001-AN-019 | P5107 Pressure Gauge Leak |
| Distillation 2 | 5100 | RW-001-AN-020 | V5103 Sight Glass Leak |
| Distillation 2 | 5100 | RW-001-AN-021 | E5121 Flange Leak |
| Distillation 2 | 5100 | RW-001-AN-022 | C5101 Top Reflux Line Flange Leak |
| Future Fuels | 5400 | RW-001-AN-023 | E5404 Vent Line Failure |
| Future Fuels | 5400 | RW-001-AN-024 | E5409 Inlet Flange Leak |
| Future Fuels | 5400 | RW-001-AN-025 | E5412 Vent Line Failure |
| Future Fuels | 5400 | RW-001-AN-026 | K5401 Pressure Gauge Failure |
| Future Fuels | 5400 | RW-001-AN-027 | P5403 Pressure Gauge Failure |
| Future Fuels | 5400 | RW-001-AN-028 | R5401 Flange Leak |
| Future Fuels | 5400 | RW-001-AN-029 | V5406 Pressure Gauge Failure |
| KHDS | 5500 | RW-001-AN-030 | P5501 Pressure Gauge Failure |
| KHDS | 5500 | RW-001-AN-031 | P5503A or B Pressure Gauge Leak |
| Future Fuels | 5700 | RW-001-AN-032 | Future Fuels K5701 Pressure Gauge Failure |
| Future Fuels | 5800 | RW-001-AN-033 | Future Fuels C5801 Failed Instrument Tapping |
| Future Fuels | 5800 | RW-001-AN-034 | P5801 Pressure Gauge Failure |
| Future Fuels | 5800 | RW-001-AN-035 | R5801 Flange Leak |
| Future Fuels | 5800 | RW-001-AN-036 | V5802 Sight Glass Failure |
| Future Fuels | 5800 | RW-001-AN-037 | V5803 Sight Glass Failure |
| Future Fuels | 5800 | RW-001-AN-038 | V5804 Pressure Gauge Failure |
| Future Fuels | 5800 | RW-001-AN-039 | Leak on E5806 |
| Future Fuels | 5900 | RW-001-AN-040 | V5901 Flange Leak |
| ADIP | 8900 | RW-001-AN-041 | P8902 A or P8902 B Seal Leak |
| ADIP | 8930 | RW-001-AN-042 | LPG Leak Unit 8930 |
| Instrument Air | 9700 | RW-001-AN-043 | H2S In the Refinery Air System |

Asset South Pre Incident Plans

| Asset | Unit Number | Appendix Number | Pre-Incident Plan Title |
|-------|-------------|-----------------|------------------------------------|
| HVU | 6100 | RW-001-AS-001 | F6101 Tube Failure |
| HVU | 6100 | RW-001-AS-002 | E6105 Channel Head Leak (Flushing) |
| HVU | 6100 | RW-001-AS-003 | P6107 A or B Pressure Gauge Leak |
| BDU | 6500 | RW-001-AS-004 | P6501 Seal Leak |
| BDU | 6500 | RW-001-AS-005 | P6502 or P6503 Pressure Gauge Leak |
| BDU | 6500 | RW-001-AS-006 | E6501 Channel Head Leak |
| HMU | 7100 | RW-001-AS-007 | V7101/V7151 Flange Leak |

| | | | |
|--------------|------|---------------|------------------------------------|
| Hydrocracker | 7600 | RW-001-AS-008 | E7625 Leak Shell Side |
| Hydrocracker | 7600 | RW-001-AS-009 | V7603 Sight Glass Leak |
| Hydrocracker | 7600 | RW-001-AS-010 | P7604 Pressure Gauge Leak |
| Hydrocracker | 7600 | RW-001-AS-011 | E7652 Inlet Flange Leak Shell Side |
| Hydrocracker | 7600 | RW-001-AS-012 | P7691 Seal Leak Fire |
| Hydrocracker | 7600 | RW-001-AS-013 | U7600 Chemical Incident |
| Hydrocracker | 7500 | RW-001-AS-014 | Hydrogen Release from HCU |

[\\S-DATA03\DATA\\$\RBU\Pre Incident Plans\Pre-Incident Plans Refinery Link.docx](\\S-DATA03\DATA$\RBU\Pre Incident Plans\Pre-Incident Plans Refinery Link.docx) Refinery Site Wide

Pre Incident Plans

| Site Wide Pre-Incident Plan Title | Appendix Number |
|--|-----------------|
| Earthquake/Tsunami Response | RW-001-SW-001 |
| Biological Hazard | RW-001-SW-002 |
| Security Incident | RW-001-SW-003 |
| Control Room Evacuation | RW-001-SW-004 |
| Adverse Weather Warning | RW-001-SW-005 |
| Drinking Water Contamination | RW-001-SW-006 |
| Medical Response or Mass Casualty Incident | RW-001-SW-007 |
| Chemical Release <100m3 | RW-001-SW-008 |
| Pizza Hut Evacuation | RW-001-SW-009 |
| Building Evacuation | RW-001-SW-010 |
| Substation Fire | RW-001-SW-011 |
| Water Supply Outage | RW-001-SW-013 |
| Rescue from Height | RW-001-SW-014 |
| Confined Space Entry Rescue | RW-001-SW-015 |
| Working over Water Incident | RW-001-SW-016 |
| Vehicle or Machinery Entrapment | RW-001-SW-017 |
| Site Wide Evacuation | RW-001-SW-018 |
| Fire and HAZMAT Response to IPL | RW-001-SW-019 |
| TLF Emergency | RW-001-SW-020 |
| Oil in Canals Recovery | RW-001-SW-021 |
| Natural Gas Leak | RW-001-SW-022 |
| Dangerous Goods Stores | RW-001-SW-023 |
| Total Loss of Nitrogen Stocks and Pressure | RW-001-SW-024 |
| Stoppage of Natural Gas Importation – Under Direction of First Gas | RW-001-SW-025 |

APPENDIX 9

1. Risk assessment methodology for new process chemicals.

1.1 Potential to enter into the discharge to Harbour

When a new process chemical product is being considered for use by RNZ prior to its approval for use on Site the following assessment shall be undertaken.

An assessment shall be made by a suitably qualified RNZ Process Engineer to determine the potential for the proposed new chemical to enter into process wastewater and/or for the discharge to harbour. If the proposed new process chemical has the potential to enter into the process wastewater and/or discharge to harbour it shall be assessed in accordance with the following procedure.

1.2 Identification of process chemical formulations.

The individual chemicals contained within the formulation for the proposed new process chemical shall be obtained from the Safety Data sheet (SDS). Where the SDS is incomplete regarding the exact individual chemical components and amounts of each component within the formulation the missing information shall be obtained from the manufacturer².

For the formulation being assessed, where possible, the following physical and chemical properties shall be obtained:

- form (liquid or solid);
- water solubility (miscible or immiscible);
- pH (as supplied);
- logP,^{3,4}
- logD (at pH 5.5 and pH 7.4);^{3,4}
- BCF (at pH 5.5 and pH 7.4).³

The following information shall be obtained for each individual chemical within a formulation was:

- composition in the formulation (weight %);
- CASRN (Chemical Abstracts Registry Number – unique identifier for each chemical);
- chemical formula/structure;
- molecular weight.

² Where a non-disclosure agreement is required to obtain the missing chemical information the non-disclosure agreement shall be complied with.

³ LogP, logD and bioaccumulation concentration factor (BCF) generated by ACD Labs (in the first instance) or ChemAxon (if not available). LogD and BCF values at pH 5.5 and 7.4. If only one value present, then it is pH independent.

⁴ The partition coefficient, P, is a measure of the differential solubility of a compound in two immiscible solvents. The most commonly used solvent system is octanol/water. The partition coefficient is the descriptor of lipophilicity for neutral compounds, or where the compound exists in a single form. For ionizable solutes, the compound may exist as a variety of different species in each phase at any given pH. D, the distribution coefficient, is the appropriate descriptor for ionizable compounds since it is a measure of the pH-dependent differential solubility of all species in the octanol/water system. P and D are typically used in the logarithmic form, logP and logD (https://www.acdlabs.com/download/app/physchem/logp_vs_logd.pdf)

1.3 Environmental Risk Assessment

The information obtained above shall be provided to a suitably qualified person to undertake the ecological risk assessment in accordance with the method detailed in the Sections 1.4 and 1.5.

1.4 Identification of ecotoxicological effects

Ecotoxicological information is extracted from the SDS for the formulation and individual chemicals within the formulation (if this exists). Where ecotoxicological data were not provided in the SDS, these need to be sourced primarily from a Sigma Aldrich⁵ SDS for the chemical, or from an SDS from another manufacturer, where the chemical is not available at Sigma Aldrich.

To provide a more robust assessment, the following international ecotoxicology databases shall be searched, using the unique chemical identifier (CASRN). These are:

1. the United States Environmental Protection Agency (USEPA) Ecotox knowledgebase database⁶, extracting lowest LC₅₀/EC₅₀⁷ for marine species (where present), or freshwater species (where no marine species data);
2. the European Chemicals Agency (ECHA)⁸ information on chemicals database, extracting the lowest predicted no-effects concentration (PNEC) for marine water.

Using the most conservative approach (representing the worst-case scenario), the lowest marine water ecotoxicological value (PNEC) will be used for the majority of chemicals in the risk assessment mass balance calculation.

However, when a PNEC is not available, it needs to be estimated from toxicity data following guidelines from Table R.10-5 from ECHA (2008)..

1.5 Risk assessment

The risk assessment will be undertaken using a tiered approach.

1. A worst-case stormwater basin (SWB) concentration of each chemical within each formulation shall be provided by RNZ through a mass balance calculation.
2. An assessment is made of the worst-case scenario SWB concentration against the lowest ecotoxicological guideline by calculating a risk quotient. The risk quotient (RQ1) is calculated by dividing SWB concentration by the ecotoxicological guideline concentration, with a value >1 indicating a potential ecotoxicological effect. The RQ indicates the dilution required to reduce the concentration of the chemical to below ecotoxicological guidelines.
3. Where RQ1 is >1, allowance for oil and water partitioning will be undertaken, and an updated risk quotient (RQ2) calculated.
4. Where RQ2 is >1, an updated risk quotient (RQ3) will be calculated using the worst case dilution of 175 to 1 at the edge of the mixing zone as defined in the Resource Consent and was calculated from 3D hydrodynamic modelling of various scenarios (MetOcean Solutions, 2019).
5. Where RQ1 or RQ2 are <1 then no further assessment is required.

⁵ <https://www.sigmaaldrich.com/new-zealand.html>

⁶ <https://cfpub.epa.gov/ecotox/search.cfm>

⁷ LC₅₀ is the concentration at which 50% of the test population dies, while EC₅₀ is the concentration at an effect is recorded for 50% of the test population.

⁸ <https://echa.europa.eu/information-on-chemicals>

1.5.1 Worst-case SW basin concentration scenario (RQ1)

A mass balance calculation is undertaken to provide the worst-case scenario formulation concentration in the SWB using the following formula.

$$SWB \text{ formulation worst-case concentration } \left(\frac{mg}{L} \right) = \frac{\text{Formulation usage } \left(\frac{mg}{day} \right)}{SWB \text{ discharge volume } \left(\frac{L}{day} \right)}$$

The worst-case scenario assumes that the concentration in the SWB is then discharged to the marine receiving environment without further dilution.

1.5.2 Assessment of worst-case SWB concentration against lowest ecotoxicological guideline

The ecotoxicological guideline (e.g. PNEC) is adjusted for each individual chemical in a formulation by the formula:

$$\text{Adjusted ecotoxicological guideline } \left(\frac{mg}{L} \right) = \frac{\text{Lowest ecotoxicological guideline for individual chemical } \left(\frac{mg}{L} \right)}{\text{proportion of formulation } (\%)}$$

The risk quotient (RQ1) (dilution of each chemical required to meet the lowest ecotoxicological guideline) is calculated by:

$$RQ1 = \frac{SWB \text{ formulation "worst-case" concentration } (mg/L)}{\text{Adjusted ecotoxicological guideline } (mg/L)}$$

Where $RQ1 < 1$ (i.e. The concentration being discharged from the SWB is below the lowest ecological guideline), the chemical (and therefore formulation) is flagged as “no ecological risk”. No further action is required. This needs to be valid for all chemicals assessed within each formulation.

Where $RQ1 > 1$ (i.e. The concentration being discharged from the SWB is above the lowest ecological guideline), the chemical (and therefore formulation) is flagged as “potential ecological risk”. This needs to be valid for at least one chemical assessed within each formulation. For each chemical with $RQ1 > 1$, oil/water partition calculations need to be undertaken.

1.5.3 Oil/water partition calculation

As most⁹ process chemicals come into contact with the crude oil refinery process, their fate is determined by the equilibrium between the oil and water phases.¹⁰ Lipophilic (lipid loving) chemicals will preferentially associate with the oil phase and be retained, while hydrophilic (water loving) chemicals will preferentially associate with the water phase and be discharged to the SWB. In practice, chemicals will sit somewhere between these two extremes, in which case the proportion of each chemical in oil or water can be calculated based on the partition coefficient (P) for neutral chemicals, or the dissociation coefficient (D) for ionisable chemicals (see footnote 3).

The percentage of each chemical in the oil phase was calculated by:

$$\text{oil percentage} = \left(\frac{P}{P + 1} \right) * 100$$

By the conservation principle, the percentage of each chemical in the water phase was calculated by:

$$\text{water percentage} = 100\% - \text{oil percentage}$$

For example:

- If $P = 100,000$ ¹¹ then the oil percentage will be $(100,000/100,000+1)*100 = 99.999\%$.
The water percentage will be $100\% - 99.999\% = 0.001\%$.

⁹ Chemicals that do not come into contact with hydrocarbons through the refinery process should not be subjected to oil and water partitioning calculations..

¹⁰ Notwithstanding other processes, such as thermal or hydrological degradation, in the absence of any contradictory information, conservation of each chemical was assumed. These other processes were only assessed where specific information was available (see, for example, hydroquinone).

¹¹ $\log P = 5$, which are properties of a highly lipophilic chemical.

- If $P = 1.0^{12}$ then the oil percentage will be $(1/1+1)*100 = 50\%$. The water percentage will be $100\%-50\% = 50\%$.
- If $P = 0.03^{13}$ then the oil percentage will be $(0.03/0.03+1)*100 = 3.07\%$. The water percentage will be $100\%-3.07\% = 96.93\%$.

The same formulas apply for the dissociation coefficient (D) used for ionisable chemicals. The oil/water proportions are calculated for all chemicals subjected to this process for both P and D and the most conservative value used.

Dilution (after correction for oil/water partition) that is required to meet lowest ecological guideline (RQ2), is calculated from the formula:

$RQ2 = RQ1 * \text{percentage of each chemical in water phase}$

1.5.4 Dilution required at the edge of the mixing zone (RQ3)

Each process chemical with $RQ2 > 1$ will have the dilution of 175 to 1 applied to assess whether receiving environment concentrations may lead to adverse effects, which is indicated by $RQ3 > 1$.

1.6 Determination of potential ecological effects.

Once the above process has been undertaken for all chemical constituents of the process chemical being assessed the RQ values for all chemicals in the formulation shall be assessed. Where the RQ values calculated in accordance with the methodology above for all chemical constituents in the formulation are at or below 1 then the process chemical is considered to be of “negligible ecological risk”.

If the end point RQ value for any of the chemical constituents is greater than 1 then the proposed process chemical formulation is not considered suitable for use at Refining NZ and an alternate chemical needs to be considered.

If a proposed process chemical has met the requirements of the above assessment (end point $RQ \leq 1$) the results of the assessment shall be presented to the Mana Whenua Roopu (MWR) for comment and once received the assessment along with the comments from the MWR shall be submitted to the Northland Regional Council for certification in accordance with Condition 4 of the Resource Consent.

¹² $\log P = 0$, which are properties of a balanced lipophilic/hydrophilic chemical.

¹³ $\log P = -1.5$, which are properties of a highly hydrophilic chemical.

APPENDIX B: MONITORING PLAN

The Consent Holder shall undertake the following monitoring:

ONE: DISCHARGES TO WATER

Discharge Volumes

- 1 The Consent Holder will record:
 - (a) The total daily discharge (expressed as cubic metres);
 - (b) Median daily discharge rate (expressed as cubic metres per hour);
 - (c) Maximum daily discharge rate (expressed as cubic metres per hour); and
 - (d) Minimum daily discharge rate (expressed as cubic metres per hour).

Water Quality

Continuous monitoring

- 2 The following determinands will be measured directly in the final discharge to the diffuser by way of online analysers. Results for these measurements shall be recorded on each day a discharge occurs in the required manner (see Section Four on Reporting).
 - (a) Total Organic Carbon (TOC);
 - (b) Temperature; and
 - (c) pH.
- 3 The online analysers will be operated and maintained in accordance with good quality assurance procedures.
- 4 If an online analyser fails with respect to TOC, the following applies:
 - (a) 12-hourly grab samples (Council Site ID: Loc.327259) and TOC analysis shall be undertaken until the affected analyser(s) is online/operational;
 - (b) The discharge shall be managed using the following criteria:
 - (i) If TOC is $<20\text{g/m}^3$ – discharge with no further action;
 - (ii) If TOC is $20\text{--}30\text{g/m}^3$ – continue discharging but undertake 6 hourly sample and analysis as per the analytical methods specified in **Schedule 1**; and
 - (iii) If TOC is $>30\text{g/m}^3$ – stop discharging until TOC returns to $\leq 30\text{g/m}^3$.
- 5 If an online analyser fails with respect to temperature, the following applies:
 - (a) 6-hourly grab samples (Council Site ID: Loc.327259) and temperature measurements shall be undertaken until the affected analyser(s) is online/operational;
 - (b) The discharge shall be managed using the following criteria:
 - (i) If temperature is $<30^\circ\text{C}$ – discharge with no further action;

- (ii) If temperature is 30-39° C – continue discharging but undertake hourly grab samples and temperature measurements; and
- (iii) If temperature is >39° C – stop discharging until temperature returns to ≤39° C.

6 If an online analyser fails with respect to pH, the following applies:

- (a) 6-hourly grab samples (Council Site ID: Loc.327259) and pH measurements shall be undertaken until the affected analyser(s) is online/operational;
- (b) The discharge shall be managed using the following criteria:
 - (i) If pH is >6.2 and <8.8 – discharge with no further action;
 - (ii) If pH is ≤6.2 (but not <6) or ≥8.8 (but not >9) – continue discharging but undertake hourly grab samples and pH measurements; and
 - (iii) If pH is <6 or >9 – stop discharging until pH returns to the levels in (i) or (ii).

Composite sample analysis

7 On Monday, Wednesday, Friday and Saturday, or on the following day if no discharge occurs on one of these days, a flow proportioned composite sample (Council Site ID: Loc.105105) taken over the preceding 24 hours will be analysed for the following determinands:

- (a) Ammoniacal Nitrogen;
- (b) Chemical Oxygen Demand (COD);
- (c) Five Day Biochemical Oxygen Demand (BOD5);
- (d) Total Suspended Solids (TSS); and
- (e) Sulphide.

8 On the second Wednesday of a month when no Northland Regional Council monitoring is planned or on the following day if no discharge occurs on that day, a flow proportioned composite sample (Council Site ID: Loc.105105) taken over the preceding 24 hours will be analysed for the following determinands:

- (a) Arsenic
- (b) Cadmium
- (c) Chromium
- (d) Copper
- (e) Lead
- (f) Nickel
- (g) Zinc
- (h) Phenol
- (i) Pentachlorophenol
- (j) Phenanthrene
- (k) Naphthalene
- (l) Fluoranthene

(m) Benzo(a)pyrene

- 9 Notwithstanding the above sampling and analysis schedule, should the average daily TOC, as measured by the online analyser, exceed 20g/m³ on a day when analysis is not required, then the analyses specified in 7 above will be undertaken on the flow proportioned composite sample taken during the preceding 24 hours.
- 10 In the event where a discharge has occurred and there is inadequate flow proportioned composite sample and analysis is required, then the daily grab sample (Council Site ID: Loc.327259) shall be analysed for the above determinands.
- 11 Each determinand will be analysed for in accordance with the analytical methods specified in **Schedule 1**.

Discharge from overflow spillway

- 12 Each time this consent is exercised, the Consent Holder shall:
 - (a) During the overflow spillway discharge event, collect a grab sample of the discharge from the overflow spillway channel after the oil control overflow structure. If the discharge exceeds a 24-hour period, then an additional grab sample shall be collected during each subsequent 24-hour period. Each grab sample shall be analysed for the determinands specified in 7 and 8 above.
 - (b) Undertake a visual inspection of the foreshore area within 100 metres each side of the overflow spillway within 24 hours of the discharge from the overflow spillway ceasing. The inspection record shall detail any erosion, debris or hydrocarbon deposits present and provide photographic confirmation of the state of the foreshore area.

TWO: DISCHARGES TO AIR

- 13 The Consent Holder will carry out daily tests to determine the quantity of total sulphur in all fuel components used for onsite process combustion using standard methods to the satisfaction of the Council.
- 14 The quantity of sulphur dioxide discharged from the Site will be continuously calculated using the results from the testing above and measured fuels flows to all furnaces. Sulphur dioxide discharges determined in this way will be continuously logged, and records retained for at least 24 months. In the event of flaring, estimated SO₂ discharges from the flare shall also be included in the calculated SO₂ discharge.
- 15 The Consent Holder will conduct stack emission tests for:
 - (a) Sulphur dioxide as a:
 - (i) continuous 10 minute average emission rate;
 - (ii) continuous 1 hour average emission rate; and
 - (iii) a daily average emission rate;
 - (b) Sulphur trioxide; and

- 16 Fine particulate matter less than 2.5 microns in diameter (PM_{2.5}). Stack emission tests will be carried out by qualified and competent persons using appropriate methods to the satisfaction of the Council, on all discharges from stacks within the A, B, C, E and utilities blocks. All data collected during the monitoring of these emissions will be reported with the results, e.g. Field notes, temperature and flow rates etc.
- 17 Stack emission tests will be conducted within six months of the date of commencement of these consents and every nine months thereafter. Testing will be conducted as far as is practicable during normal process conditions and the results will be reported to the Council within eight weeks of the testing being completed.
- 18 In-stack opacity measurements will be continuously logged at the following locations and the results recorded:
- (a) Utilities;
 - (b) B Block;
 - (c) C Block;
 - (d) A Block (two opacity meters); and
 - (e) E Block.

Recorded data shall be retained by the Consent Holder for a minimum of 12 months. Reporting shall be subject to the requirements of the "Reporting" section below and in addition shall be made available to the Council immediately upon request.

- 19 The Consent Holder will operate and maintain continuous ambient sulphur dioxide monitors at the following locations:
- (a) Urquharts Bay;
 - (b) Whangarei Heads School; and
 - (c) Little Munro Bay.
- 20 The ambient monitoring of sulphur dioxide will be carried out in accordance with an appropriate standard to the satisfaction of the Council.

Fire-fighting

- 21 For each fire-fighting training exercise the Consent Holder shall measure and record wind direction and strength prior to ignition.

Lichens, vegetation, and soils

- 22 Monitoring of lichens, vegetation, and soils (and associated reporting) shall be undertaken in accordance with *Annexure 1: Monitoring Plan for lichens, vegetation, and soils* to monitor the effects of air discharges from the Marsden Oil Refinery.

THREE: GROUNDWATER TAKES

- 23 The Consent Holder will record the following:

- (a) The total quantity of water taken from all groundwater abstraction bores on a weekly basis;
 - (b) Weekly groundwater level and hydrocarbon recovered from RW15a, RW19b and RWSEQ;
 - (c) Monthly measurement of conductivity at perimeter wells P1, P19, P20;
 - (d) Monthly water levels in perimeter wells P1 to P20 as detailed in the application;
 - (e) Monthly hydrocarbon vapour levels in perimeter wells P1 to P20;
 - (f) Monthly total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene (BTEX) levels in the three perimeter wells with highest hydrocarbon vapour levels at any time; and
 - (g) Results of samples taken six monthly from the pumped wells, and analysed for total petroleum hydrocarbons, chlorides, pH and conductivity.
- 24 Results of the measurements and sampling undertaken in points (a) to (d) above shall be provided to the Council by the 14th of the following month.

FOUR: REPORTING

- 25 The Consent Holder is to report the results of the above monitoring on a monthly basis, unless otherwise stated, to the Council within two weeks of the following month's end.
- 26 All results reported shall be in a format that is to the satisfaction of the Council and any non-compliance with consent limits shall be clearly identified.
- 27 Results from the on-line analysers will be reported on the following basis:
- (a) Median value;
 - (b) Maximum value; and
 - (c) Minimum value.
- 28 The following will be reported from the discharge flow meters:
- (a) The total daily discharge volume; and
 - (b) The 30 day rolling average dry weather day discharge volume.
- 29 In addition to the above values, the daily rainfall will also be reported.
- 30 The above values are to be calculated using data collected over a twenty-four hour period ending at 8am each day.

Stormwater basin overflow spillway

- 31 Each time the Consent Holder undertakes a discharge via the stormwater basin overflow spillway, the Consent Holder shall, within two weeks of the date that the overflow discharge commenced, provide the following information in writing to the Council's Compliance Manager:
- (a) The complete rainfall record for the extreme rainfall event until 24 hours after the discharge via the overflow spillway ceased;

- (b) Any issues with the operation of the other authorised discharge consents from the basin during the extreme rain event;
- (c) The depth of water in the stormwater basin prior to the commencement of the extreme rain event;
- (d) The results of the stormwater basin overflow spillway discharge monitoring undertaken in accordance with this Monitoring Plan; and
- (e) A report on the results of a visual assessment undertaken in accordance with the monitoring program. The inspection record shall detail any erosion, debris or hydrocarbon deposits present and provide photographic confirmation of the state of the foreshore area. It shall also set out the work that is to be undertaken / has been undertaken to remedy the erosion, and remove any discharge related debris and hydrocarbon deposits

Tank leakage

- 32 The Consent Holder shall, for the purposes of adequately monitoring the consents, on becoming aware of any significant tank leakage, advise the Council of the discharge within 24 hours. The Consent Holder shall then supply a written report to the Council within two weeks detailing:
- (a) The location of the discharge;
 - (b) The time of discharge;
 - (c) The duration of discharge;
 - (d) The quantity of contaminant discharged;
 - (e) The measures taken to stop the discharge; and
 - (f) The proposed measures to minimise the risk of similar discharges in future.

Incidents

- 33 For the purpose of adequately monitoring the consent, the Consent Holder on becoming aware of any incident or situation that does not comply with these consents shall immediately advise the Council via the Council's 24 hour environmental hotline of the incident or situation. The Consent Holder will then supply a written report to the Council on the cause, effects, and the actions taken to mitigate the effects on the environment and to prevent recurrence. The written report will be submitted to the Council within one week of the incident occurring.

MONITORING PLAN: SCHEDULE 1

METHODS FOR REFINING NZ DISCHARGE CONSENT MONITORING

(1) Ammonia in Water

APHA Method 4500-NH₃E Ammonia-Selective Electrode Using Known Addition Phenol/hypochlorite colourimetry. Flow injection analyser. (NH₄-N = NH₄⁺-N + NH₃-N). APHA 4500-NH₃ H (modified) 23rd ed. 2017.

LOD = 0.01 mg/l

(2) Biological Oxygen Demand (BOD)

APHA Method 4500-O G and APHA 5210 B

Incubation 5 days, DO meter, no nitrification inhibitor added, seeded.

APHA 5210 B (modified) 23rd ed. 2017.

(3) Chemical Oxygen Demand (COD)

Hach Method 8000

LOD = 50 mg/L

Dichromate/sulphuric acid digestion in Hach tubes, colorimetry. Trace

Level method. APHA 5220 D 23rd ed. 2017.

(4) Hydrocarbons (Total) in Water

TPH in water by FTIR IPL E049 (in house method)

LOD <0.2mg/l

Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.

Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.

LOD = 0.7mg/l

(5) Sulphide (Total) in Water

Sulphide by Methylene Blue HACH 8131

LOD (total sulphide concentration in sample) = 0.03 mg/L

In-line distillation, segmented flow colorimetry. APHA 4500-S2- E

(modified) 23rd ed. 2017.

LOD = 0.002 mg/l

(6) Total Suspended Solids

APHA Method 2540 D Total Suspended Solids Dried at 103-105⁰ C

Filtration using Whatman 934 AH, Advantec GC-50 or equivalent filters (nominal pore size 1.2 - 1.5µm), gravimetric determination. APHA 2540 D (modified) 23rd ed. 2017.

(7) Salinity

APHA Method 2520 B Electrical Conductivity Method

(8) Heavy metals, totals, trace As,Cd,Cr,Cu,Ni,Pb,Zn

Nitric acid digestion, ICP-MS, trace level. APHA 3125 B 23rd ed. 2017 / US EPA 200.8.

Nitric acid digestion. APHA 3030 E (modified) 23rd ed. 2017.

(9) Phenols

Liquid / liquid extraction, derivitisation, GC-MS analysis. In-house based on US EPA 8270..

(10) Polycyclic Aromatic Hydrocarbons

Liquid / liquid extraction, GC-MS analysis. In-house based on US EPA 8270

MONITORING PLAN: ANNEXURE 1

**Monitoring Plan for lichens, vegetation, and soils to assess the effects of air discharges from the
Marsden Oil Refinery**

MONITORING PLAN FOR LICHENS, VEGETATION, AND SOILS TO ASSESS THE EFFECTS OF AIR DISCHARGE FROM THE MARSDEN OIL REFINERY



 providing
outstanding
ecological
services to
sustain
and improve our
environments



Wildlands

R4230g

MONITORING PLAN FOR LICHENS, VEGETATION, AND SOILS TO ASSESS THE EFFECTS OF AIR DISCHARGE FROM THE MARSDEN OIL REFINERY



Lichens at monitoring site Home Point Upper, Whangarei Heads. 5 December 2018.

Contract Report No. 4230g

October 2020

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1. INTRODUCTION

Refining NZ commissioned Wildland Consultants to prepare a monitoring plan for lichens, vegetation and soils at Whangarei Heads, Northland. Refining NZ is required to undertake regular monitoring as part of its resource consent conditions (AUT008319.01-06) to monitor the impact of emissions authorised by the consent. The monitoring programme to date has included an assessment of the soil, vegetation, and saxicolous (rock-dwelling) lichens at Whangarei Heads. Photographic monitoring of lichens has occurred since 1976 (Bioresearches 1976), with additional quantitative monitoring of lichens implemented in 1990 (Bioresearches 1990). Monitoring of soil and vegetation has occurred since 2002 (Bioresearches 2002). Wildland Consultants completed all components of this monitoring in February 2017 and December 2018.

As the quantitative study of lichens at Whangarei Heads began in 1990, 30 years ago, the taxonomy of the lichens present, and their diversity, needed to be revised and understood in the context of current knowledge; this was undertaken for the 2017 monitoring round by Wildland Consultants (2017). The 2017 monitoring event also included an independent critique of this quantitative lichen study. The methods employed in 2017 sought comparability with the data for previous monitoring events, whilst increasing the repeatability, and therefore value of data, for future monitoring events. This was achieved, in particular, through ensuring the repeatability of plot placement and undertaking accurate identification of lichens to genus or species level. In 2019, Wildland Consultants undertook a review of the monitoring undertaken to date, and suggested revisions to the existing monitoring programme to improve the quality of the data obtained (Wildland Consultants 2020).

On the basis of the monitoring results to date, and the review of the monitoring methods completed in 2017, this report provides the methods for future monitoring of ecological effects of the air discharge from the Marsden Oil Refinery. The monitoring programme has three key components; lichens, vegetation, and soils.

2. QUANTITATIVE MONITORING OF LICHENS

2.1 Introduction

Lichens, with their slow growth and large surface area, accumulate pollutants such as heavy metals and other contaminants. As such, they are useful as indicators of air pollution (De Temmerman *et al.* 2001). Previous monitoring of air pollution for the oil refinery has focussed on the detection of changes in lichen communities, i.e. diversity and composition. This approach aligns with the ecological indicator concept discussed by De Temmerman *et al.* (2001), as any change will be the integrated result of climate and pollution effects over a long period of time.

For ecological indicators to be useful, they must meet certain criteria. The indicators should be able to be easily assessed and quantified, and for plant-based studies, the substrate should be uniform between study sites. When using lichens as indicators, restriction of substrates to rocks alone is insufficient to ensure substrate uniformity. Studies have shown that across sites with the same climate and air pollution characteristics, lichen communities can differ significantly between rock types, and

along altitudinal gradients (e.g. Asta *et al.* 2002). Thus, air pollution studies that utilise lichen communities on a specific rock type at the same altitude are more likely to be successful at detecting effects than studies that utilise a wide range of rock types and or altitudes across the monitoring sites. Site selection for detection of air pollution effects from a point source should also avoid potentially confounding factors such as proximity to major roads (Larsen *et al.* 2006), and eutrophication effects due to cattle grazing (Giordani and Brunialti 2015).

Use of the same observer between monitoring rounds is also helpful (De Temmerman *et al.* 2001); differences in botanical skills can cause significant errors, and species diversity is often underreported, even when sampling occurs within a predetermined plot. Any changes in lichen communities, which coincide with a change in operator, should be treated with caution, particularly for long-term studies (Giordani and Brunialti 2015).

There are two key approaches for detecting the potential effects of emissions on lichen health and abundance:

- Measurement and analysis of change between years (a temporal approach) for a series of marked plots, or
- A ‘snapshot’ to evaluate effects by studying sites at differing distances from the emission source (a spatial approach).

Any temporal approach requires the same plots to be assessed during each monitoring event, so that the data from each monitoring event can be compared to prior rounds.

2.2 Methods

2.2.1 Study sites

Seven monitoring sites will be assessed for each monitoring round. Site details for six of the sites are summarised in Table 1, with locations shown in Figure 1; five of these sites are included in monitoring to date, and a new control site will be established at Ody Road. A seventh site at an unknown location, to replace sites at Mount Aubrey and Reotahi¹, will be selected and included in the study. For previous monitoring rounds, the grid coordinates for the location of each station were recorded using a GPS unit (Appendix 1: Location of Monitoring Stations). Photographs of monitoring sites, including numbering of rocks where a site encompasses multiple outcrops, are provided in Appendix 2.

¹ Mount Aubrey is now very shaded with a flora dominated by mosses. Reotahi is now a housing development.

Table 1: Lichen monitoring sites at Whangārei Heads.

| Site Name | Elevation (m) | Geology | Distance from Refinery (km) | SO ₂ Annual Mean(Sum of Discharge and Ambient) |
|--------------------------------------|---------------|--|-----------------------------|---|
| Castle Rock | 60 | Andesitic volcanoclastics with lava flows and associated andesite, diorite, and granodiorite intrusions. | 1.8 | c.2.5 µg/m ³ |
| Taurikura | 5 | Landslide material from Mount Manaia. | 3.1 | c.3.0 µg/m ³ |
| Urquharts Jetty | 60 | Andesitic volcanoclastics with lava flows and associated andesite, diorite, and granodiorite intrusions. | 3.3 | c.2.5 µg/m ³ |
| Home Point Upper | 120 | Andesitic volcanoclastics with lava flows and associated andesite, diorite, and granodiorite intrusions. | 3.0 | c.2.0 µg/m ³ |
| Ody Road ¹ (Control Site) | 60 | Andesitic volcanoclastics with lava flows and associated andesite, diorite, and granodiorite intrusions. | 6.5 | c.1.5 µg/m ³ |
| Mount Lion | 320 | Andesitic volcanoclastics with lava flows and associated andesite, diorite, and granodiorite intrusions. | 4.7 | c.2.5 µg/m ³ |

The study design will use the measurement and analysis of change between years at sites with a range of sulphur dioxide concentration (a temporal and spatial approach). The study design will enable the following:

- The quantification of abundance in terms of occurrence and percentage cover.
- Comparison between stations for each species at each monitoring event.
- The determination of change through time (between surveys) for each species at each station.

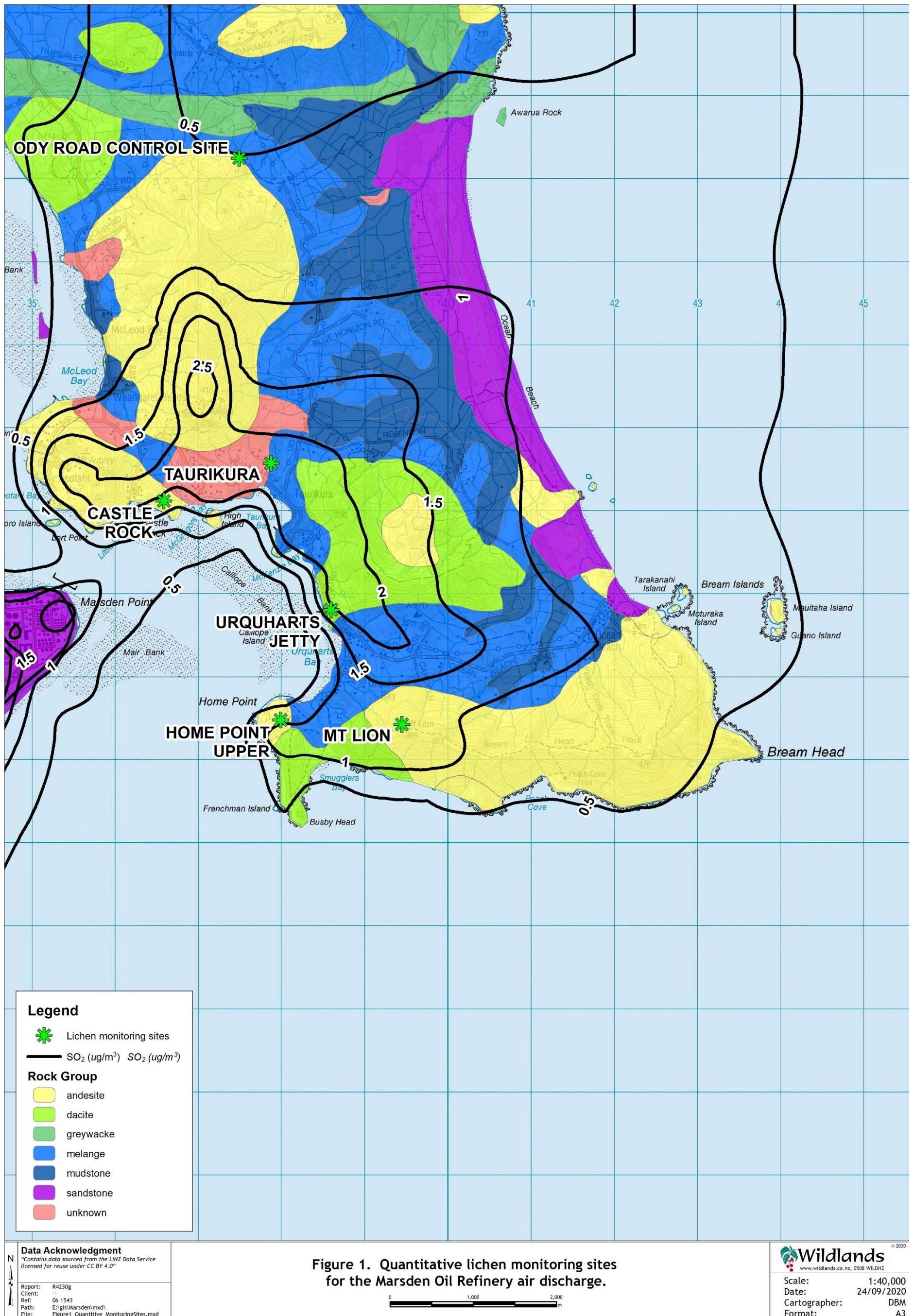
The control station at Ody Road is predicted to have no effect of SO₂ on lichen communities as it is the furthest from the refinery, and has sulphur dioxide concentrations close to the ambient level. The geologies of the study sites were determined using QMap (Edbrooke and Brooke 2009).

2.2.2 Sampling design

Sampling design will follow the methods of the 2017 and 2018 monitoring rounds, and apply these methods to establish a replacement control site at Ody Road, and a replacement site for Mount Aubrey and Reotahi.

At each of the monitoring sites, 20 plots will be sampled. Each plot is 0.5 × 0.5 metres, subdivided into 100 50 × 50 millimetre quadrats (Plate 1). Plots will be located within a sampling area 30 metres long, and 0.5-1.5 metres above the ground. Where the site comprised multiple rock outcrops, intervening “non-rock” habitat will be excluded from sampling. The location of the ‘zero metre’ mark on each sampled rock will be recorded using a hand-held GPS unit.

¹ Location known, but yet to be established (i.e. marked and measured).



A random number generator will be used to select the length and height at which the 20 plots will be located. If the random numbers generate a location unsuitable for a plot (e.g. on a lump of rock protruding from the rock face, or in a dense clump of vascular plants), the nearest suitable location that did not overlap with another plot will be used. When facing the rock face, the bottom left hand corner of every 0.5×0.5 metre plot will be permanently marked, using a concrete drill, a bolt, and masonry adhesive. Every plot location will be marked and labelled with a metal tag, stamped with a unique number. For every plot, the length (x coordinate) and height (y coordinate) along the transect, and the metal tag number, will be recorded. For sampling of the $10 \times 50 \times 50$ millimetre quadrats, the location of these will also be recorded. Thus, the location of every plot and quadrat will be permanently marked and recorded (e.g. Station 1, Plot 1 of 20, x: 0.5 metres, y: 1.24 metres, Tag WC 041, location of 50×50 millimetre quadrat coordinates: 2, 4). The same plot and quadrat coordinates will be assessed for each monitoring round.

By application of the sampling methods above 200 samples will be obtained per station. Within each of the 200 sample quadrats, the species of foliose and fruticose lichens, and their percentage cover, will be recorded. Percentage cover will also be estimated for mosses, and for crustose lichens, leprose lichens, and bare rock.

During each monitoring round, any tags that are coming loose or deemed a risk of not staying in the rock will be replaced with a new tag and glued into the rock again. Any quadrats with missing tags will be relocated using the quadrat coordinates, and if possible, the holes in the rock formed by previous bolt placement.

2.2.3 Lichen collection and identification

Any species not able to be identified in the field will be collected. These specimens will then be identified to either genus or species level using a range of laboratory techniques, including microscopy, chemical testing, and DNA testing.

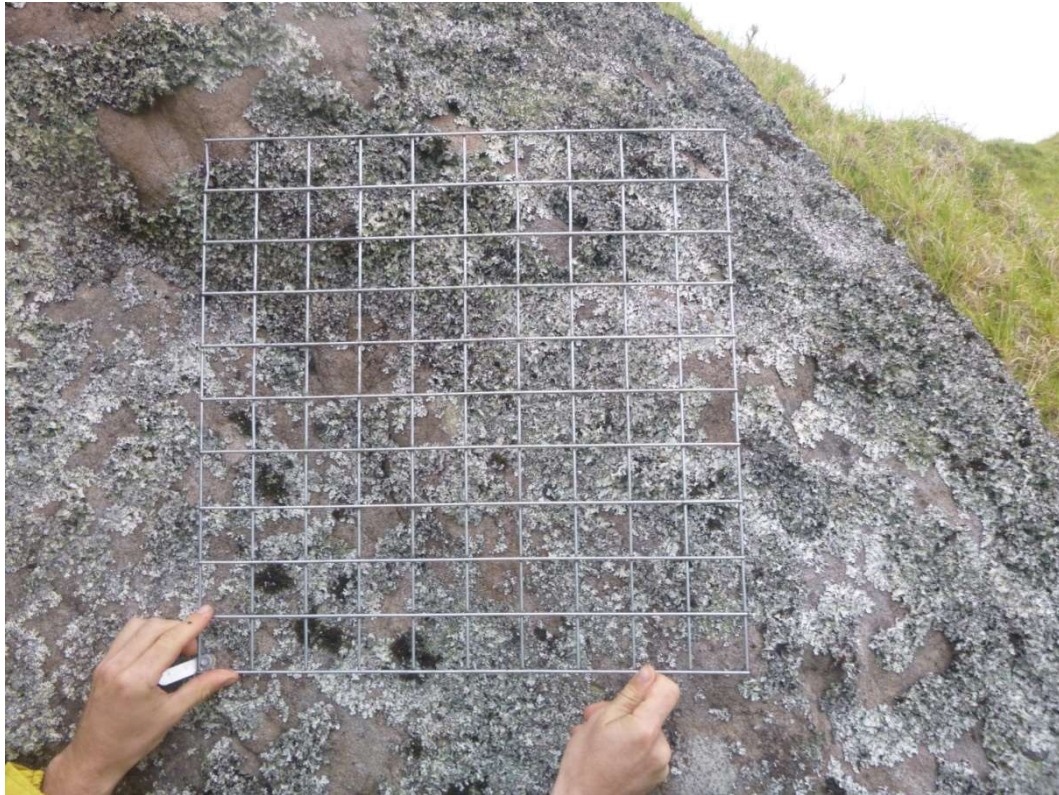


Plate 1: The 0.5 × 0.5 metre plot divided into 50 × 50 millimetre quadrats in use at Home Point Upper. Note the permanent marking of plot location using a bolt and numbered metal tag in the bottom left corner of the plot (when facing the rock face). 5 December 2018.

2.2.4 Data analysis

Mean percentage cover (by species) and frequency (by species) will be presented using bar charts, with their 95% confidence intervals. The data is presented using bar charts as the time intervals between events are not regular (e.g. 1990 followed by 1993, and 1993, followed by 1994). If the confidence intervals for any two mean covers or frequencies do not overlap, this will be interpreted as a significant difference between years. The confidence intervals for covers and frequencies will be calculated using the following formula, on the assumption that the data approximated a normal distribution:

$$\hat{p} \pm z \sqrt{\frac{1}{n} \hat{p} (1 - \hat{p})}$$

3. PHOTOGRAPHIC MONITORING OF LICHENS

3.1 Location of quadrats

Photographic monitoring of lichens (Figure 2) will be undertaken at:

- Urquharts Jetty, Home Point Upper, and Home Point Lower (the three sites monitored in 2017 and 2018)
- Ody Road (a control site), to replace the Mt Aubrey site
- Taurikura, to replace the site at Reotahi
- The rock faces will be selected based on having a population of lichens representative of that found on rocks in the general area. The location of the quadrat will be determined based on being relatively easy to access and locate, free from stock interference, and being flat enough to simplify photographic monitoring.

Station 1 – Ody Road

An appropriate site at Ody Road will be selected to establish a control site, and to replace the former monitoring site at Mt Aubrey that is now very shaded and dominated by mosses.

Station 2 – Taurikura

An appropriate site at Taurikura will be selected to replace the former monitoring site at Reotahi that is now a housing development.



Station 3 - Urquharts Jetty

The station is located directly above the Jetty at Urquharts Jetty. Access is best obtained by parking at Urquharts Bay and walking inland through the pasture to the site. The photographic monitoring quadrat is located on Rock 3 (Plate 2).



Plate 2: Urquharts Jetty quantitative and photographic lichen monitoring site.
Rock 1 - 2 February 2017. Rock 2 - 7 February 2017. Rocks 3 and 4 - 9 February 2017.

Station 4 - Home Point Upper

The station is located on the upper slope of Home Point Hill, facing west towards the refinery (Plate 3). The site is at the top of the hill, directly above Home Point Lower.



Plate 3: Home Point Upper quantitative and photographic monitoring site. 3 February 2017.

Station 5 - Home Point Lower

This station is located on the lower, west-facing slopes of Home Point (Plate 4).



Plate 4: Home Point Lower photographic monitoring site. 03 February 2017.

3.2 Marking techniques

At the start of the monitoring project, quadrats will be permanently marked as follows: a hole will be drilled roughly 1.5 to 2.0 metres high from the ground in the rock face selected, using a quarter-inch “Terrier” self-drilling masonry anchor and setting punch. Another hole will be drilled horizontally one metre from the original hole. These two holes mark the upper corners of the quadrat. The lower corners will be established by viewing the rock face through the viewfinder of the camera and aligning the two upper holes with the top of the frame, and the two lower corner holes will be drilled where they align with the bottom corners of the frame. Although the quadrat will appear rectangular in the view finder, this will not always be the case on the rock face itself.

3.3 Recording data

The border of the quadrat will be outlined with a tape measure. A single photograph will then be taken capturing the entire quadrat.

The tape measure will then be placed diagonally across the quadrat, from the top left to the bottom right. Four or five close-up overlapping photographs will be taken across the quadrat, with the tape measure lying across the top edge of the photograph (refer to Appendix 3). The photographs from the previous monitoring round will be taken into the field so the photograph locations can match the previous monitoring rounds for each site. The sites will be photographed and analysed bi-annually.

3.4 Analysis

Direct comparisons will be made between the close-up photographs from each monitoring event to assess overall changes in the lichen community, including:

- Any changes in composition
- Any changes in extent of lichen cover versus substrate (i.e. bare rock)
- Any evidence of dieback or discolouration.

3.5 Lichen growth rates

Lichen growth between monitoring years will be assessed in two ways:

- An obvious feature such as a crack or well-defined rock substrate will be used as a reference point. The distance between the advancing lichen (of a known species) and the reference point will be measured on the rock face using a ruler (in millimetres). The amount the lichen has grown in that direction for the interval between monitoring events will be calculated by subtracting the latest monitoring value from the oldest. By dividing this amount by the number of years between monitoring events, an approximate annual growth rate (i.e. an annual radial increase in millimetres) will be calculated.
- When two lichens of the same species are advancing towards each other, the gap between the two leading edges will be measured on the rock face for each year using a ruler. The average annual growth rate for the two colonies (rounded to the nearest millimetre) will be calculated by subtracting the distance in the current monitoring round from the previous monitoring round, dividing the result by the number of years between monitoring rounds, and then dividing by two (because there are two lichens growing instead of one).

Negative values will not be included in the analysis as these are measures of dieback rather than growth.

The measured lines between lichen colonies will be depicted on photographs for each monitoring event, and the lines colour-coded by the species being measured. As much as possible, measurement lines will only be placed between two lichens of the same species, as lichen growth rates can differ significantly between species. Future monitoring will continue the following measurements where possible, acknowledging the potential need to revise species and or numbers of measurements due to changes in lichen communities at a site:

For *Parmotrema* species:

- five measurements of growth rates for *Parmotrema* sp. at Urquhart Bay,
- five measurements of growth rates for *Parmotrema* sp. at Home Point Upper,
- five measurements of growth rates for *Parmotrema* sp. at Home Point Lower.

For *Xanthoparmelia* species:

- five measurements of growth rates for *Xanthoparmelia* at Home Point Upper,
- five measurements of growth rates for *Xanthoparmelia* at Home Point Lower.

Photographs of the photographic and growth rate monitoring locations are provided in Appendix 3.

Additional measurements of lichen growth rates will be taken of known species at Ody Road and Taurikura. The preferred genera for these measurements are *Parmotrema* and *Xanthoparmelia* species. If possible, a minimum of five measurements will be taken for each genus at each site.

4. VEGETATION AND SOILS

4.1 Study sites

Soil and vegetation will be monitored at three locations as per the previous monitoring regime; Mount Manaia, where the vegetation has previously been noticed to show undesirable effects, possibly in connection to the refinery's air emissions; Mount Aubrey, which is closer to the refinery than Mount Manaia, but with a similar slope and exposure; and Kauri Mountain, which is located further away from the refinery, but with a similar south-facing aspect, allowing it to act as a control site.

4.1.1 Kauri Mountain

The Kauri Mountain vegetation and soil monitoring station is situated at map reference NZMS 260 Q07: 500-016. It is 8.5 kilometres NE of Marsden Point Refinery. Mamaku (*Cyathea medullaris*) and māhoe (*Melicactus ramiflorus*) comprised the majority of the understory, with the canopy dominated by kahikatea (*Dacrydium dacrydioides*), kauri (*Agathis australis*), and other broadleaved species.

Three replicate samples will be collected within 30 metres of a point 50 metres in from the road edge.



4.1.2 Mount Manaia

The Mount Manaia vegetation and soil monitoring site is situated at map reference NZMS 260 Q07: 472-966. It is 3.3 kilometres northeast of and within sight of Marsden Point Refinery and has a southerly aspect. This site has previously been found to have vegetation showing chlorotic effects, with a suggestion that Marsden Point Refinery's emissions are the cause.

The vegetation was very similar to that observed at Mount Aubrey, with nīkau (*Rhopalostylis sapida*) also present in the understorey.

The sample station is located off the path approximately 100 metres uphill from the large water tanks (Plate 5). Three replicate samples will be taken within 50 metres of this point.



Plate 5: Mount Manaia vegetation and soil sampling location, February 2017.

4.1.3 Mount Aubrey

The Mount Aubrey vegetation and soil monitoring site is situated at map reference NZMS 260 Q07: 459-966. It is 2.7 kilometres north-northeast of Marsden Point Refinery with a southerly aspect, and is within sight of the refinery. The understory around the sampling site is dominated by *Coprosma macrocarpa* subsp. *minor* and kawakawa (*Piper excelsum*) and the canopy by māhoe and tītoki (*Alectryon excelsus*). The sample site is located directly beneath a large pūriri (*Vitex lucens*) tree.

Three replicate samples will be collected within fifty metres of the pūriri tree at the sampling location.

4.2 Soil sampling

Each of the three stations will have three replicate soil samples collected and tested for a range of soil quality parameters. Each replicate will be made up of 10 soil cores 20 millimetres in diameter and 75 millimetres deep, taken using a metal auger. The 10 soil cores will be taken randomly within a 2 × 2 metre square. Each replicate will be stored in a zip-locked polyethylene bag, chilled, and transported to the laboratory for analysis within 48 hours.

Each soil sample will be tested for pH, Olsen P, potassium, calcium, magnesium, sodium, cation exchange capacity (CEC), base saturation, volume weight, sulphate-S and nitrate-N.

4.3 Vegetation sampling

As per the soil sampling, three vegetation replicate samples will be taken per station. Māhoe is reasonably abundant at all three sites, and all vegetation samples should be taken from this species, with 15 recently-matured leaves from one tree collected per replicate.

Each vegetation sample will be tested for nitrogen, phosphorus, potassium, sulphur, calcium, magnesium, sodium, iron, manganese, zinc, copper, and boron.

4.4 Data analysis

Mean values and 95 percent confidence intervals (CI) for the means will be calculated for each soil and vegetation parameter. For Nitrate-N values of <1 mg/kg, means will be calculated by substituting <1 for 0.5 mg/kg. The confidence intervals provide an indication of where the true population mean is likely to fall given the sampling variance. Temporally paired 95% confidence intervals which do not overlap will be interpreted as true differences in the mean value of a given variable between those sites.

ACKNOWLEDGMENTS

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GPS LOCATION DATA FOR THE “ZERO METRE MARK” FOR ROCK FACES AT PREVIOUSLY ESTABLISHED QUANTITATIVE LICHEN MONITORING STATIONS

| Site Name/Rock | Latitude | Longitude | Elevation (m) |
|------------------------|--------------|------------|---------------|
| Castle Rock | -35.827564 | 174.51211 | 61 |
| Taurikura | -35.82329996 | 174.526303 | 14 |
| Urquharts Rock1 | -35.83907101 | 174.534595 | 77 |
| Urquharts Rock2 | -35.839284 | 174.534506 | 72 |
| Urquharts Rock3 | -35.83929003 | 174.534321 | 51 |
| Urquharts Rock4 | -35.83933203 | 174.534353 | 53 |
| Home Point Upper Rock1 | -35.85110701 | 174.528114 | 114 |
| Home Point Upper Rock2 | -35.85116602 | 174.528134 | 125 |
| Home Point Upper Rock3 | -35.85125201 | 174.528317 | 135 |
| Home Point Upper Rock4 | -35.85101397 | 174.528016 | 116 |
| Mount Lion | -35.85137699 | 174.544253 | 390 |

PHOTOGRAPHS OF PREVIOUSLY
ESTABLISHED QUANTITATIVE
LICHEN MONITORING SITES

Castle Rock



Plate 6: Castle Rock quantitative monitoring site. 7 February 2017.

Taurikura



Plate 7: Quantitative monitoring site at Taurikura. 8 February 2017.

Urquharts Jetty



Plate 8: Quantitative and photographic lichen monitoring site at Urquharts Bay.
Rock 1 - 2 February 2017. Rock 2 - 7 February 2017. Rock 3 - 9 February 2017.

Home Point Upper

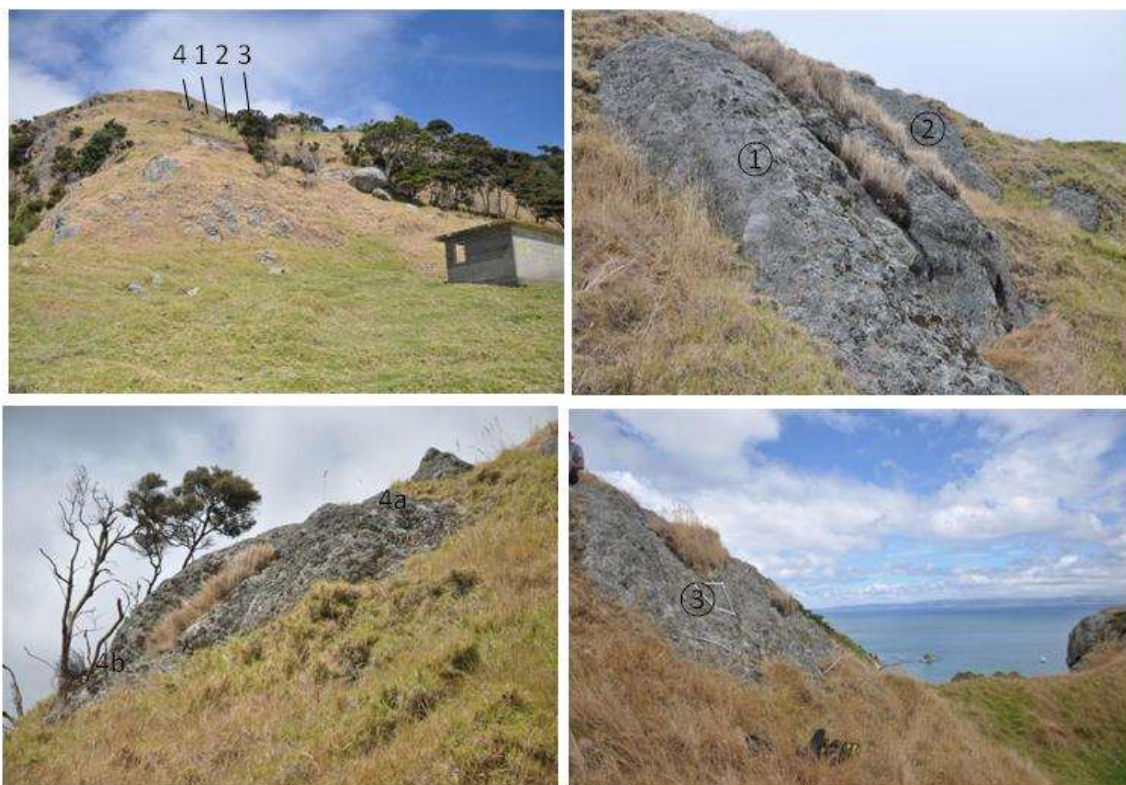


Plate 9: Quantitative and photographic monitoring site at Home Point Upper. 3 February 2017.

Mount Lion (Station 9)

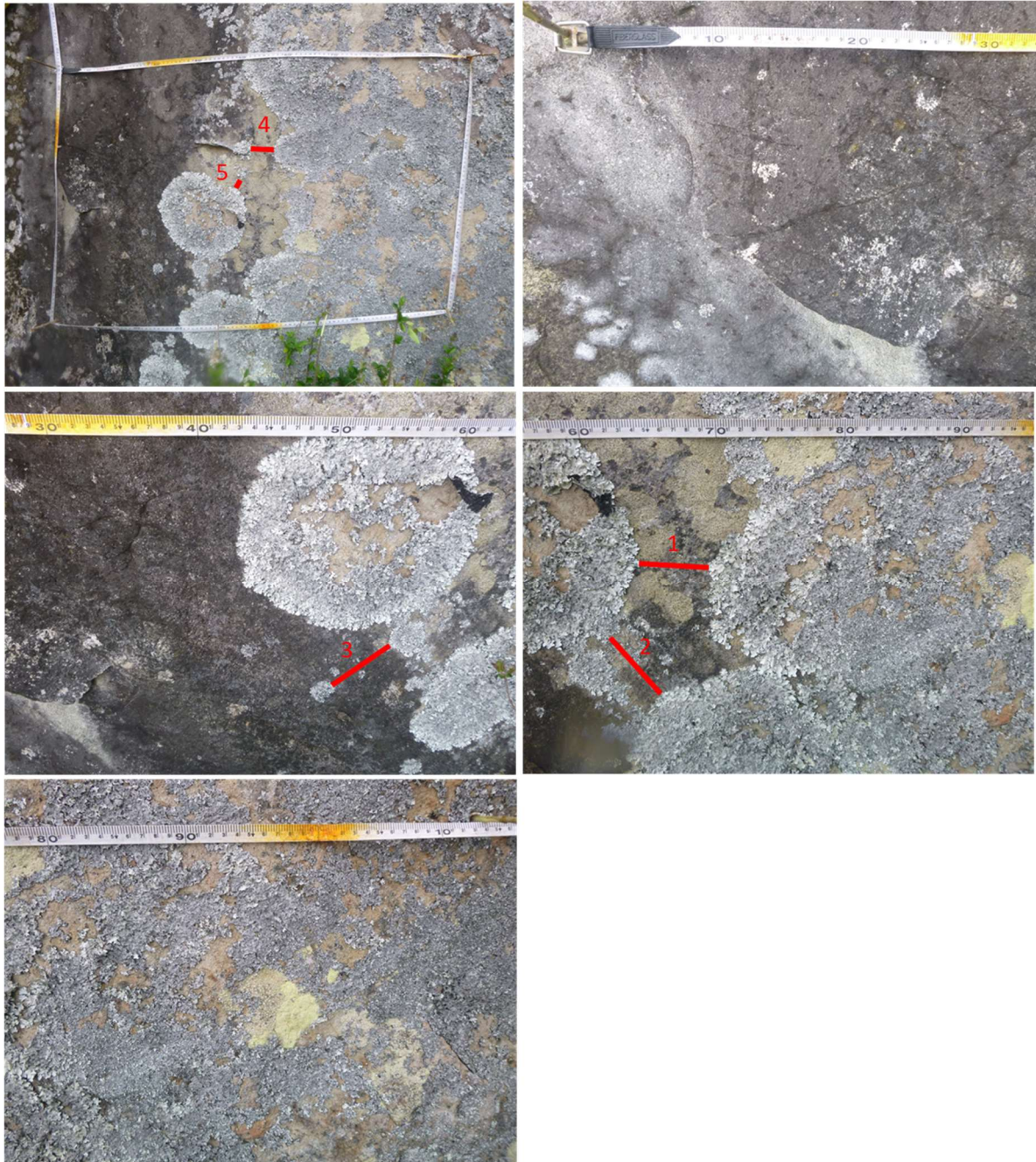


Plate 10: Mount Lion quantitative monitoring site. 10 February 2017.

PHOTOGRAPHS OF
PHOTOGRAPHIC LICHEN
MONITORING SITES AND
LOCATIONS OF LICHEN GROWTH
RATE MEASUREMENTS

GROWTH RATE MEASUREMENTS FOR URQUHARTS JETTY

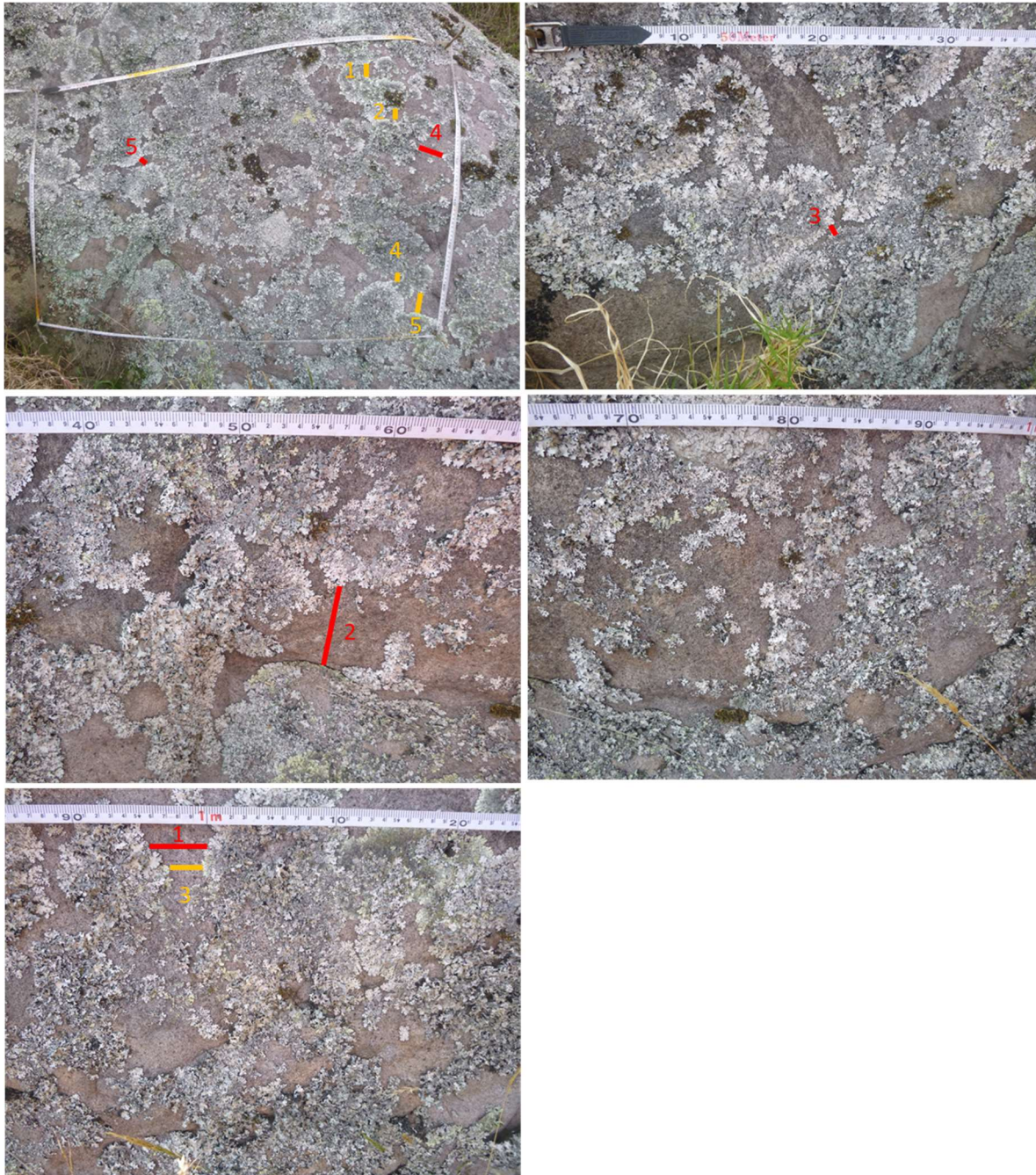
2018



Note: Red lines indicate the distance measured (in millimetres and in the field) between colonies of *Parmotrema* sp.

GROWTH RATE MEASUREMENTS FOR HOME POINT (UPPER)

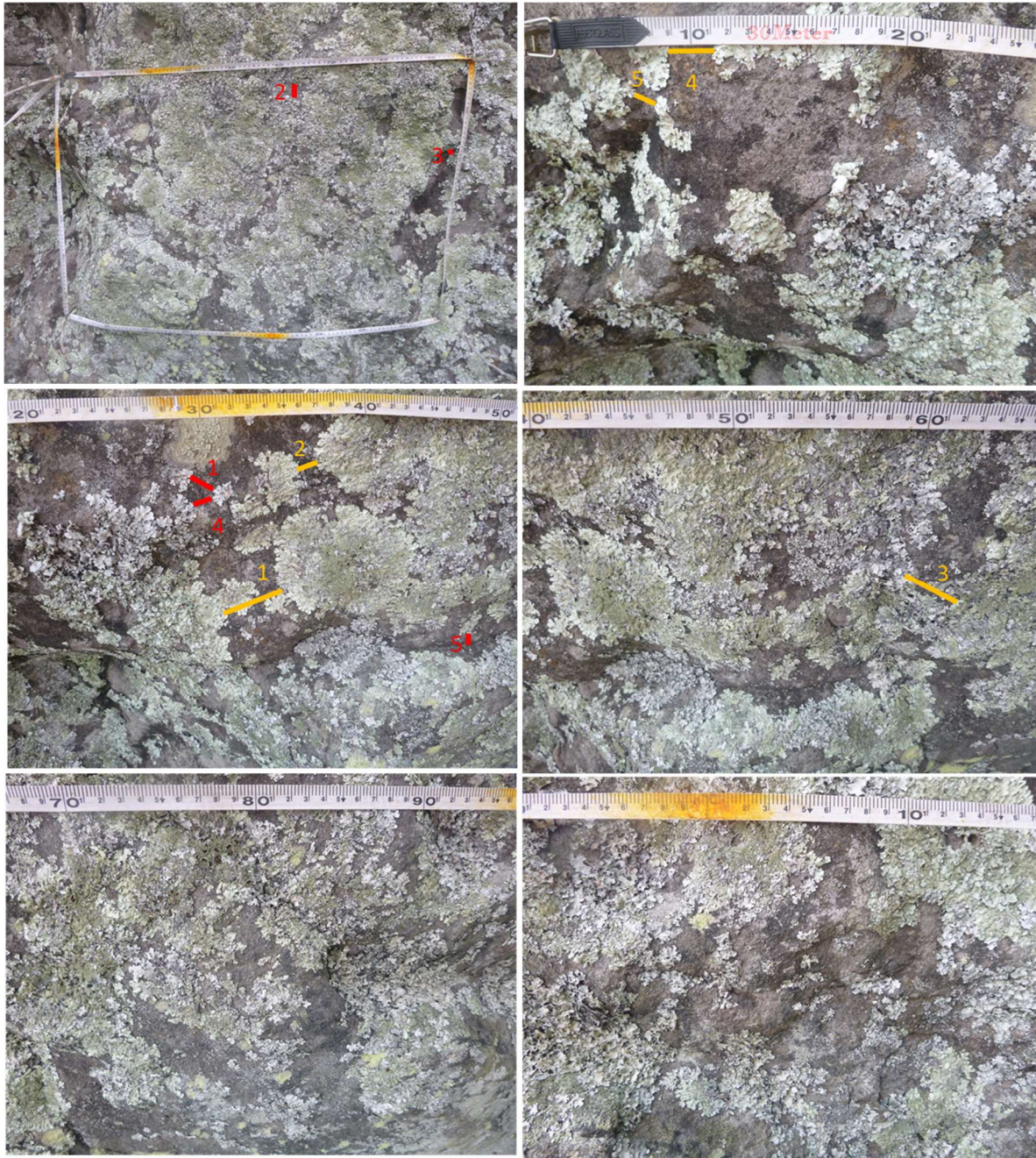
2018



Note: Red lines indicate the distance measured (in millimetres and in the field) between colonies of *Parmotrema* sp, and yellow lines between colonies of *Xanthoparmelia* sp.

GROWTH RATE MEASUREMENTS FOR HOME POINT (LOWER)

2018



Note: Red lines indicate the distance measured between colonies of *Parmotrema* species (in millimetres and in the field), yellow lines indicate the distance measured between *Xanthoparmelia* species.



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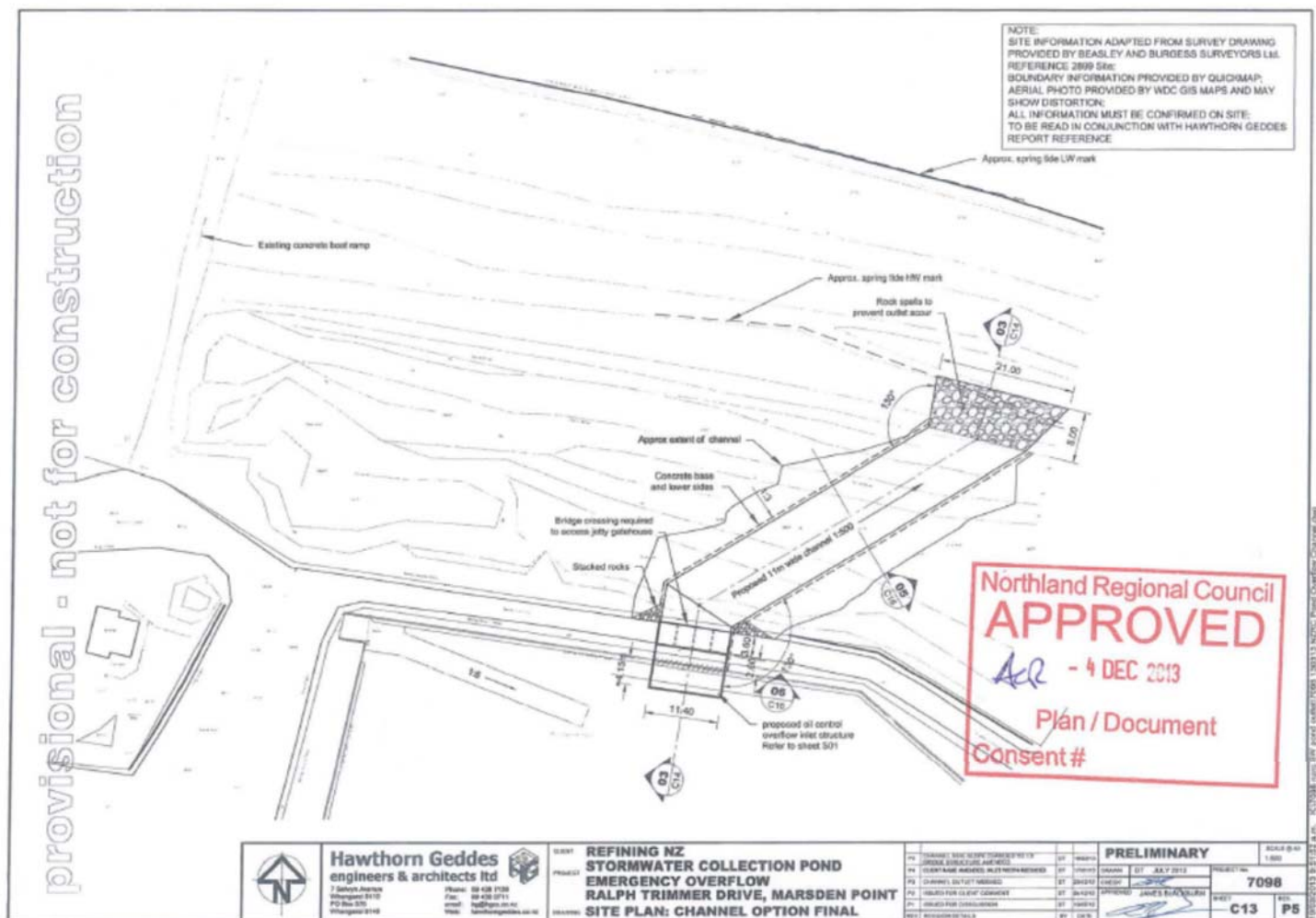
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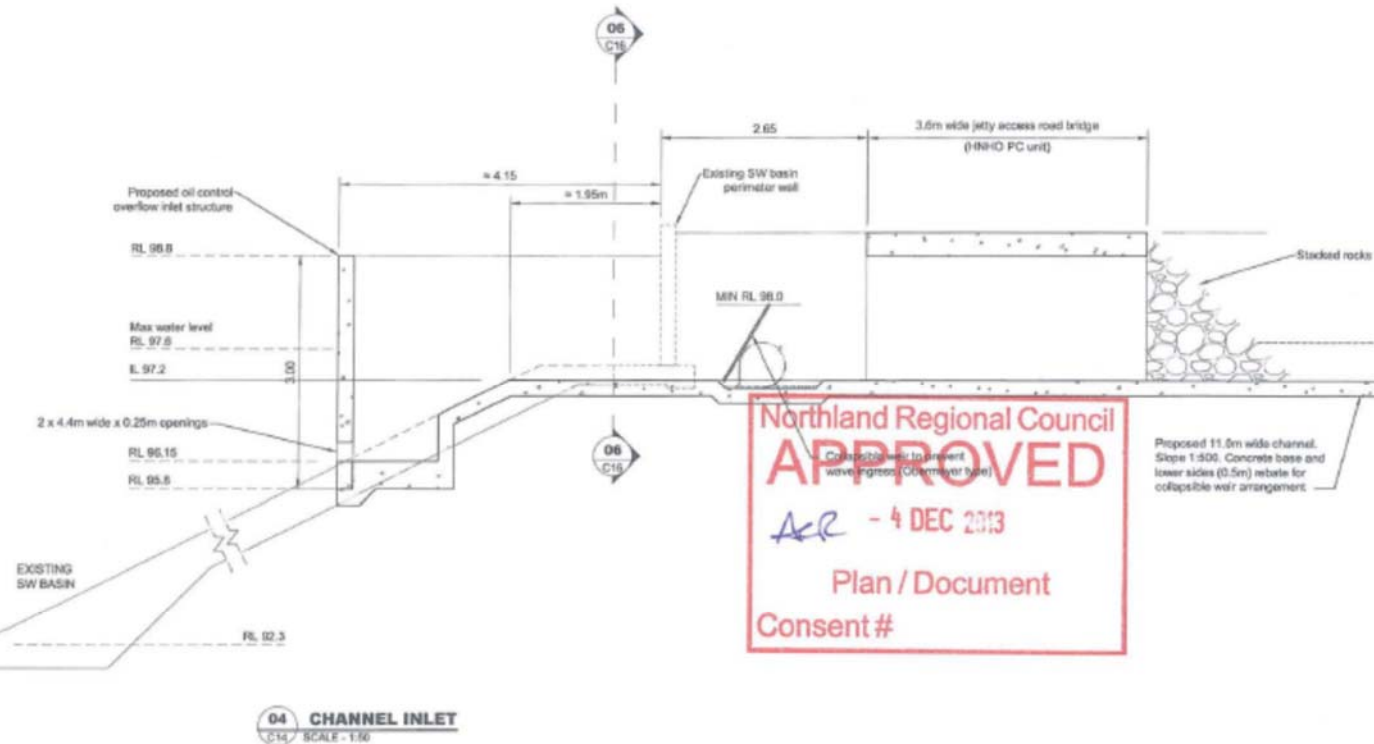
APPENDIX C





APPENDIX D



provisional - not for construction



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|  | Hawthorn Geddes engineers & architects ltd 3 Selwyn Avenue Whangarei (01 91) PO Box 419 Whangarei (01 40) Phone: 09 438 1138 Fax: 09 438 0111 email: hgd@hgd.co.nz web: hawthorngeddes.co.nz |  | SU001 | REFINING NZ STORMWATER COLLECTION POND EMERGENCY OVERFLOW RALPH TRIMMER DRIVE, MARSDEN POINT DETAILS | PA | NEXT WORKING WEEKEND BRIDGE NEW TYPICAL DESIGN | 01 | 10/04/13 | PA | CLIENT REVIEW | 02 | 10/04/13 | PD | DESIGN DEVELOPMENT | 03 | 10/04/13 | PE | DESIGN FOR CONSTRUCTION | 04 | 10/04/13 | PF | DESIGN FOR CONSTRUCTION | 05 | 10/04/13 | PG | DESIGN FOR CONSTRUCTION | 06 | 10/04/13 | PH | DESIGN FOR CONSTRUCTION | 07 | 10/04/13 | PI | DESIGN FOR CONSTRUCTION | 08 | 10/04/13 | PJ | DESIGN FOR CONSTRUCTION | 09 | 10/04/13 | PK | DESIGN FOR CONSTRUCTION | 10 | 10/04/13 | PL | DESIGN FOR CONSTRUCTION | 11 | 10/04/13 | PM | DESIGN FOR CONSTRUCTION | 12 | 10/04/13 | PN | DESIGN FOR CONSTRUCTION | 13 | 10/04/13 | PO | DESIGN FOR CONSTRUCTION | 14 | 10/04/13 | PP | DESIGN FOR CONSTRUCTION | 15 | 10/04/13 | PQ | DESIGN FOR CONSTRUCTION | 16 | 10/04/13 | PR | DESIGN FOR CONSTRUCTION | 17 | 10/04/13 | PS | DESIGN FOR CONSTRUCTION | 18 | 10/04/13 | PT | DESIGN FOR CONSTRUCTION | 19 | 10/04/13 | PU | DESIGN FOR CONSTRUCTION | 20 | 10/04/13 | PV | DESIGN FOR CONSTRUCTION | 21 | 10/04/13 | PW | DESIGN FOR CONSTRUCTION | 22 | 10/04/13 | PX | DESIGN FOR CONSTRUCTION | 23 | 10/04/13 | PY | DESIGN FOR CONSTRUCTION | 24 | 10/04/13 | PZ | DESIGN FOR CONSTRUCTION | 25 | 10/04/13 | QA | DESIGN FOR CONSTRUCTION | 26 | 10/04/13 | QB | DESIGN FOR CONSTRUCTION | 27 | 10/04/13 | QC | DESIGN FOR CONSTRUCTION | 28 | 10/04/13 | QD | DESIGN FOR CONSTRUCTION | 29 | 10/04/13 | QE | DESIGN FOR CONSTRUCTION | 30 | 10/04/13 | QF | DESIGN FOR CONSTRUCTION | 31 | 10/04/13 | QG | DESIGN FOR CONSTRUCTION | 32 | 10/04/13 | QH | DESIGN FOR CONSTRUCTION | 33 | 10/04/13 | QI | DESIGN FOR CONSTRUCTION | 34 | 10/04/13 | QJ | DESIGN FOR CONSTRUCTION | 35 | 10/04/13 | QK | DESIGN FOR CONSTRUCTION | 36 | 10/04/13 | QL | DESIGN FOR CONSTRUCTION | 37 | 10/04/13 | QM | DESIGN FOR CONSTRUCTION | 38 | 10/04/13 | QN | DESIGN FOR CONSTRUCTION | 39 | 10/04/13 | QO | DESIGN FOR CONSTRUCTION | 40 | 10/04/13 | QP | DESIGN FOR CONSTRUCTION | 41 | 10/04/13 | QQ | DESIGN FOR CONSTRUCTION | 42 | 10/04/13 | QR | DESIGN FOR CONSTRUCTION | 43 | 10/04/13 | QS | DESIGN FOR CONSTRUCTION | 44 | 10/04/13 | QT | DESIGN FOR CONSTRUCTION | 45 | 10/04/13 | QU | DESIGN FOR CONSTRUCTION | 46 | 10/04/13 | QV | DESIGN FOR CONSTRUCTION | 47 | 10/04/13 | QW | DESIGN FOR CONSTRUCTION | 48 | 10/04/13 | QX | DESIGN FOR CONSTRUCTION | 49 | 10/04/13 | QY | DESIGN FOR CONSTRUCTION | 50 | 10/04/13 | QZ | DESIGN FOR CONSTRUCTION | 51 | 10/04/13 | RA | DESIGN FOR CONSTRUCTION | 52 | 10/04/13 | RB | DESIGN FOR CONSTRUCTION | 53 | 10/04/13 | RC | DESIGN FOR CONSTRUCTION | 54 | 10/04/13 | RD | DESIGN FOR CONSTRUCTION | 55 | 10/04/13 | RE | DESIGN FOR CONSTRUCTION | 56 | 10/04/13 | RF | DESIGN FOR CONSTRUCTION | 57 | 10/04/13 | RG | DESIGN FOR CONSTRUCTION | 58 | 10/04/13 | RH | DESIGN FOR CONSTRUCTION | 59 | 10/04/13 | RI | DESIGN FOR CONSTRUCTION | 60 | 10/04/13 | RJ | DESIGN FOR CONSTRUCTION | 61 | 10/04/13 | RK | DESIGN FOR CONSTRUCTION | 62 | 10/04/13 | RL | DESIGN FOR CONSTRUCTION | 63 | 10/04/13 | RM | DESIGN FOR CONSTRUCTION | 64 | 10/04/13 | RN | DESIGN FOR CONSTRUCTION | 65 | 10/04/13 | RO | DESIGN FOR CONSTRUCTION | 66 | 10/04/13 | RP | DESIGN FOR CONSTRUCTION | 67 | 10/04/13 | RQ | DESIGN FOR CONSTRUCTION | 68 | 10/04/13 | RS | DESIGN FOR CONSTRUCTION | 69 | 10/04/13 | RT | DESIGN FOR CONSTRUCTION | 70 | 10/04/13 | RU | DESIGN FOR CONSTRUCTION | 71 | 10/04/13 | RV | DESIGN FOR CONSTRUCTION | 72 | 10/04/13 | RW | DESIGN FOR CONSTRUCTION | 73 | 10/04/13 | RX | DESIGN FOR CONSTRUCTION | 74 | 10/04/13 | RY | DESIGN FOR CONSTRUCTION | 75 | 10/04/13 | RZ | DESIGN FOR CONSTRUCTION | 76 | 10/04/13 | SA | DESIGN FOR CONSTRUCTION | 77 | 10/04/13 | SB | DESIGN FOR CONSTRUCTION | 78 | 10/04/13 | SC | DESIGN FOR CONSTRUCTION | 79 | 10/04/13 | SD | DESIGN FOR CONSTRUCTION | 80 | 10/04/13 | SE | DESIGN FOR CONSTRUCTION | 81 | 10/04/13 | SF | DESIGN FOR CONSTRUCTION | 82 | 10/04/13 | SG | DESIGN FOR CONSTRUCTION | 83 | 10/04/13 | SH | DESIGN FOR CONSTRUCTION | 84 | 10/04/13 | SI | DESIGN FOR CONSTRUCTION | 85 | 10/04/13 | SJ | DESIGN FOR CONSTRUCTION | 86 | 10/04/13 | SK | DESIGN FOR CONSTRUCTION | 87 | 10/04/13 | SL | DESIGN FOR CONSTRUCTION | 88 | 10/04/13 | SM | DESIGN FOR CONSTRUCTION | 89 | 10/04/13 | SN | DESIGN FOR CONSTRUCTION | 90 | 10/04/13 | SO | DESIGN FOR CONSTRUCTION | 91 | 10/04/13 | SP | DESIGN FOR CONSTRUCTION | 92 | 10/04/13 | SQ | DESIGN FOR CONSTRUCTION | 93 | 10/04/13 | SR | DESIGN FOR CONSTRUCTION | 94 | 10/04/13 | SS | DESIGN FOR CONSTRUCTION | 95 | 10/04/13 | ST | DESIGN FOR CONSTRUCTION | 96 | 10/04/13 | SU | DESIGN FOR CONSTRUCTION | 97 | 10/04/13 | SV | DESIGN FOR CONSTRUCTION | 98 | 10/04/13 | SW | DESIGN FOR CONSTRUCTION | 99 | 10/04/13 | SX | DESIGN FOR CONSTRUCTION | 100 | 10/04/13 | SY | DESIGN FOR CONSTRUCTION | 101 | 10/04/13 | SZ | DESIGN FOR CONSTRUCTION | 102 | 10/04/13 | TA | DESIGN FOR CONSTRUCTION | 103 | 10/04/13 | TB | DESIGN FOR CONSTRUCTION | 104 | 10/04/13 | TC | DESIGN FOR CONSTRUCTION | 105 | 10/04/13 | TD | DESIGN FOR CONSTRUCTION | 106 | 10/04/13 | TE | DESIGN FOR CONSTRUCTION | 107 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 108 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 109 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 110 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 111 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 112 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 113 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 114 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 115 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 116 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 117 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 118 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 119 | 10/04/13 | TF | DESIGN FOR CONSTRUCTION | 120 | 10/04/13 | TF | 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APPENDIX E

