Marsden Point Refinery:

A Resource Consent Application to Renew 20 Resource Consents from the Northland Regional Council



Prepared for: ChanceryGreen on behalf of The New Zealand Refining Company Limited, trading as 'Refining NZ'

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The value of consent renewal

Economic assessment of reconsenting discharges and structures at the Marsden Point Refinery

NZIER report to Refining New Zealand 2 July 2020

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Key points

This report considers the economic effects associated with reconsenting the discharges to air and water, and the occupation of coastal marine area by jetty structures and mooring dolphins associated with Refining NZ's Marsden Point Refinery. It describes the existing environment with the refinery in operation, a counter-factual without reconsenting and the refinery "turned off", and the effect of reconsenting to enable continued refinery operation.

The refinery is pivotal in supplying transport fuels...

The Marsden Point Refinery currently supplies most of New Zealand's demands for petrol, diesel and aviation fuel and all of its fuel oil for shipping. The balance of those demands is met by imported refined products.

The refinery operation is a significant contributor to the Northland regional economy, responsible in 2018 for nearly 7% of regional GDP and 1% of regional employment. The difference between proportional shares of GDP and employment indicates the refinery has high labour productivity, its wages and salaries paid are above the average for the region, and these wages and salaries and payments to contractors amount to 2.7% of payments in the region and 3.5% of payments made within Whangarei District.

At least 90% of regional economic contribution is at risk...

If consents are not renewed for discharges to air and water, the refinery could not remain in operation and New Zealand would be reliant on imported refined product for all its transport needs. The Marsden Point site might still function as an oil import terminal, but overseas experience suggests this would reduce expenditures and employment to about one tenth of their current level, with corresponding contraction of spending and incomes earned in other industries in the region. As oil terminals make some discharges to air, land and water, decline of all discharge consent applications would mean RNZ could not provide even this reduced regional economic contribution.

If consents are not renewed for wharf structures of jetties and mooring dolphins, it is unlikely that Marsden Point could function as an oil import terminal. That would cause all the refinery's current contribution to regional spending and incomes to cease, and more investment would be needed in other ports' landing facilities and tank storage to make up for the loss of oil import capability at Marsden Point. This would also bring forward the date of decommissioning and rehabilitating the refinery site. All the value added of refining oil products would accrue to overseas based refineries.

RNZ has substantial investment in the Marsden Point site and its workforce, so the company has incentive not to write this off but rather adapt to changing market conditions and regulatory requirements, such as those arising from the Zero Carbon Act. Some of the site and its equipment has potential for use in other production in the transition to a low carbon economy, such as blending of biofuels or production of hydrogen which could be used to power transport in future. The viability of the site for such transitional services could be undermined if consents are not renewed for discharges, wharf structures and jetties, forgoing an opportunity for a New Zealand firm to supply the country with alternative fuels and contribute expenditure, value added and employment to a constituent part of the Northland economy.

Reconsenting reduces risk of losing contribution...

Renewing consents for both discharge and structures would enable the refinery to continue operating as at present, and maintain its contribution to the Northland regional economy. This may not be indefinite, as the refinery faces competition from overseas suppliers and the longer term challenge of transitioning to a lower carbon emitting economy. In early 2020 RNZ embarked on a strategic review to consider its options into the longer term.

However, whatever the outcome of that review, the company will likely require most of the resource consents it has applied for whether it operates as a refinery or as an import facility, and to retain options for smoothing its adjustments in the future. Prolonging the operation of the refinery in New Zealand would support economic activity in the region and allow the company to secure a better return from its substantial investment by enabling it to re-purpose its facilities to assist energy transition to lower emitting energy sources.

By keeping the refinery in operation, reconsenting would also provide revenue for RNZ to continue with environmental remediation. It would give RNZ more options to explore transitional energy investments, such as a solar power plant on the company's site, and new innovative re-purposing of refinery infrastructure to provide lower carbon emitting fuels.

Decisions on consents will be based on a wide range of considerations, not just economic ones. However, if the decision is not to renew consents, it will have an opportunity cost in restricting or even preventing the refinery's continued operation, reducing its contribution to the local economy and to the national energy supply that would become dependent on imported refined product. For a 'decline to renew' decision to be economically rational the value gained by declining consents would need to match or exceed the value forgone by withholding consents, which implies that at least some of the environmental and societal improvements sought from such a decision would need to be very large and significant indeed.

The Covid-19 pandemic has caused a drop in world oil demand and economic activity which put more pressure on the continued viability of the refinery. Although return to normality is uncertain, that event does not change the findings of this report that the refinery provides significant benefit to the Northland economy in its continued operation and the potential it presents for future production of lower carbon emitting fuels. This benefit would be lost if consents were not approved or subject to limiting conditions, and might be considered even more significant during the post-Covid period when other businesses have shed jobs or closed.

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1. Introduction

This report has been prepared to inform an Assessment of Environmental Effects in support of a resource consent application by Refining New Zealand. The application seeks to renew a suite of existing consents for discharges into air and water and for occupation of the coastal marine area by jetties and mooring dolphins at the Marsden Point Wharf.

Applications for resource consent are usually taken as evidence that a proposal benefits the applicant, so the RMA focus is on external "spillover effects" that might arise. That includes external effects on natural and physical resources and also on the economic conditions within the environment.

1.1. Economics in the Resource Management Act (RMA)

Although commonly conflated with commercial or financial matters, economics in its broadest sense is the study of how limited resources are used in satisfaction of potentially unlimited needs and wants. This is relevant to operational and regulatory powers under the RMA, such as allocating land space and water to different activities, and allocating discharge capacity into different environmental media of air, soil and water. Economics can both indicate the likely economic consequences of proposals and inform the choices made under the Act.

The purpose of the RMA is to promote the sustainable management of natural and physical resources. Section 5 defines sustainable management as managing the use, development and protection of natural and physical resources in a manner which enables people and communities to provide for their social, economic and cultural well-being while:

- sustaining natural and physical resources to meet foreseeable needs;
- safeguarding life-supporting capacities of environmental media; and
- avoiding, remedying or mitigating adverse effects of activities on the environment.

The Act defines environment broadly to include social, economic and cultural conditions.

Explicit economic considerations under the Act include section 5's references to enabling communities to provide for their economic well-being, and section 7(b)'s requirement to have regard to efficient use and development of natural and physical resources. Section 32 requires consideration of alternatives, benefits and costs before a proposed planning measure is put into effect, but section 32 is not a specific requirement under the Act when considering resource consent applications, although it may influence how economics is considered. More relevantly, Schedule 4 to the Act requires an applicant for resource consent to include an assessment of:

- the actual or potential effect on the environment (which, as noted above, includes economic conditions) of the activity;¹ and
- any effect on those in the neighbourhood and, where relevant, the wider community, including any social, economic, or cultural effects.²

The sustainable management purpose of the Act, and in particular enabling people and communities to provide for their social, economic and cultural wellbeing, is carried into a number of high level policies and plans authorised under the Act – including, for example Objective 6 of the New Zealand Coastal Policy Statement, the Northland Regional Policy Statement and the operative and proposed Northland Regional Plans.

Further, section 104 of the Act requires a consent authority, when considering an application for resource consent to have regard to any effects (positive or adverse) on the environment of allowing the activity. As noted above, the definition of environment includes economic considerations.

Because Refining NZ's reconsenting application is affected by section 124, section 104(2A) of the RMA requires that regard must be had to the value of the investment of the existing consent holder. RNZ has tangible assets of property, plant and equipment with a book value of over a \$1 billion, three-quarters of which is in refining plant which would become largely redundant without the ability to continue to import and process crude oil. That eventuality would have a major impact on the company, the district, the region and the national economy and national energy supply system.

The RMA does not specify a method for economic assessment, so various approaches may be used to inform decisions around consent approval, including:

- Economic impact analysis (EIA) which examines how an activity impacts on the surrounding area and stimulates business in other firms that either supply the activity or meet the consumption from enhanced incomes
- Cost benefit analysis (CBA) compares the stream of value gained from a given investment, including environmental effects such as greenhouse gas emissions avoided and the cost of mitigation measures, which give an implied economic value of avoiding the adverse effects being mitigated
- Other complementary measures that broaden the analysis to consider other effects on community well-being, including ways in which effects on the environment can be attributed to causing economic harm to people.

A description of these methods, their similarities and differences is provided in this report's Appendix A.

1.2. The economic effects of the refinery

The Marsden point refinery creates oil products of value to the wider community, fuelling its vehicles and vessels and facilitating mobility of people and transportation of goods in the economy. The refinery remains viable as a private going concern if the value of its product output exceeds the costs of inputs used in producing it.

¹ Clause 6 of Schedule 4.

² Clause 7 of Schedule 4.

From a private perspective these inputs include crude oil feedstocks, supplies bought to enable refinery operation and labour (both employees and contractors). From a community perspective the jobs provided by the refinery can be regarded as beneficial in boosting incomes for people in the region, including those with the requisite skills to work at the refinery who earn more than they would otherwise do. Spending by RNZ on inputs, and spending of enhanced incomes by refinery workers, both boost the incomes of owners and employees in other businesses that supply the refinery directly with inputs, and indirectly those that supply consumer goods and services in the region. Thus, the refinery operation supports people's income and well-being in the community around Whangarei, in the Northland regions, and in New Zealand at large.

A community perspective also considers costs and benefits that fall outside the purview of RNZ. These are effects external to RNZ's private calculations about investment and return. Discharges to air, water or land that affect the quality of the receiving environment experienced by others in the community, or occupation of sea space by structures that preclude access to others for recreation, seafood gathering or simply enjoyment of the environment, can cause adverse effects that detract from people's well-being in the wider environment. The RMA exists to assess the scale and significance of adverse effects and set conditions that avoid, mitigate or remedy them so as to reduce the adverse effects on the community. Such conditions may have financial or economic cost for the refinery, but also provide a benefit of improving the environment (compared to a situation with no conditions) which can also have economic value (e.g. with air quality, reducing the cost of medical treatments and productivity losses from days off work for people who would suffer reduced health outcomes in a situation without the conditions in place).

1.3. The setting for reconsenting

The refinery currently operates under a suite of resource consents for its discharges into the environment and for its structures located within the coastal marine area. The need to reconsent raises the possibility that new consents may be declined or subjected to more restrictive conditions.³

If consents are discontinued, the refinery will have to cease its current operation or bring it into compliance at some additional cost that will affect its viability, and all that flows from it would be affected accordingly. If operations cease the environment would not immediately revert to pristine condition, as it would contain any legacy impacts from previous legally consented discharges and structures.

The most visible legacy issues are the structures of jetty and mooring dolphins, but for reasons drawn from previous legal decisions, these are to be considered as removed from the environment in the "refinery off" mode, effortlessly and without the adverse effects on sea-bed and surroundings that would arise if structures were physically removed. Reconsenting would reinstate them, although not with the impact on seabed and surroundings that would arise if the dolphins and jetty were being physically installed anew.

Accordingly, in examining economic effects we describe:

³ We are advised that the consents being applied for by Refining NZ are 'bundled' and that the overall activity status is discretionary. As such, under section 104B the consent authority may grant or refuse the application, and if it grants the application, may impose conditions.

- The existing environment with the refinery in operation
- The "counterfactual" without consents, with the refinery still in existence but its operation curtailed by inability to legally discharge and land shipments at the wharf
- The "factual" with reconsenting and continued refinery operation, which may vary with the costs of meeting conditions for avoidance, remedy or mitigation that might be applied to the consents
- The differing abilities to generate income under the counterfactual and the factual that also affect the ability to fund remediation of the environment.

The existing environment – economic effects of Marsden Point Refinery

2.1. Current supply of oil products in New Zealand

2.1.1. Refining NZ in national oil supply

Since the building of the Marsden Point refinery in the 1960s, New Zealand's oil supply has relied upon a mixed system, in which the bulk of oil is imported as crude feedstocks and refined into products at the Marsden Point refinery, with a smaller proportion of refined oil products imported from sources in Australia and Asia. The refinery's products are distributed across New Zealand via the Refinery-Auckland Pipeline (RAP), by road tanker around Northland, and by coastal tankers to oil depots at other ports around New Zealand, from where they are distributed inland by road tankers.

Refining NZ currently supplies:

- all of New Zealand's fuel oil for ships
- around 85% of the country's jet fuel
- 67% of its diesel
- 58% of its petrol
- most bitumen for roading.

It also produces sulphur that is used in fertiliser manufacture, and carbon dioxide that is used in the food and beverage industries.

Refining NZ's refinery processes crude oil for its customers, the major oil product wholesalers in New Zealand,⁴ and it charges a tolling fee for its refinery services. Refining NZ's customers bear the costs and associated risks of crude purchasing, shipping and maintaining crude feedstock and product inventories. But the tolling fee charged by the refinery for processing is calculated as if the refinery bears these costs (using international market assessments and freight rate benchmarks) to calculate a notional margin, of which 70% is ascribed to the refinery fee (subject to a fee floor and margin cap) and 30% to the oil companies.

Reconsenting of refinery discharges and wharf structures at Marsden Point is crucial for continued operation of the refinery and this mixed supply system. Without the refinery operation all refined oil products would be imported, and the economic value added by refining would be lost to Northland to the benefit of overseas refineries.

⁴ RNZ's main customers are ExxonMobil, BP, Z Energy Ltd (which also operates the Caltex brand under licence from Chevron International): these three are also major shareholders in RNZ, which also has 5,000 individual shareholders.



Figure 1 RNZ in New Zealand's Oil Supply

Source: NZIER

2.1.2. Current oil demand and supply security

According to the Ministry of Business Innovation and Employment (MBIE) document, *Energy in New Zealand 2019*, in calendar year 2018, oil was the source of 34% of the primary energy used in New Zealand.⁵ From a high of 50% in 1975 that share dropped to 27% in 1993 then recovered to the mid 30%-40% range in the 2000's where it has fluctuated since then. Despite that apparent decline, oil still accounted for 48% of total consumer energy in 2018 (up from 41% in 1993), and 99% of all energy used in transport. Transport accounts for about 84% of all oil and oil product consumption in New Zealand and is also a major input underpinning the tourism industry. Other major users are the primary industries of agriculture forestry and fishing (5.3% for combined primary industries), other industry (6.6%), commercial (2.3%) and residential users (1.3%).

⁵ At time of writing, the latest Energy in New Zealand report is dated 2019, with data for calendar year 2018.

Oil and oil products remain of critical importance to New Zealand, and for many of their uses (particularly transport) there currently are no large scale practical or cost effective substitutes available in the short to medium term, making security of supply of oil products an international issue. In 1974, in response to major oil market disruptions, the International Energy Agency (IEA) was set up by the OECD, requiring that member countries like New Zealand hold supply in hand for at least 90 days of their previous year's consumption.

However, the New Zealand government's recent reviews of oil supply security have viewed the principal strategic risks for fuel supply to be from internal transport failures rather than disruption at the refinery, assuming the ready availability of imported oil products.⁶ However, the rupture of the Refinery to Auckland Pipeline in September 2017 illustrated the importance of RNZ's non-refining assets in supplying oil products into Auckland.

2.2. Influences on future oil demand

New Zealand relies on imports for its oil product supply, as most of the crude oil and condensate produced in New Zealand is exported. In 2018 crude imports accounted for 81% of the primary energy from oil, and imported oil products for the balance. New Zealand is reliant on movements in prices that emerge in international oil markets.

There are no official New Zealand-oriented assessments of oil prospects. MBIE prepared its latest Energy Supply and Demand Forecasts in 2011 for the period to 2040. These showed New Zealand's primary energy growing at 1% per annum on average over that period, with oil growing at 0.6% per annum so that its share of primary energy slips from 34% to 29%. Most energy sources show a similar decline in share of primary energy, with the principal exception of geothermal energy which forecasts suggest will have a share rising from 21% to 35% over the period.

MBIE forecast oil to hold up better as a share of total consumer energy, remaining at 44% over most of the forecast period. Its annual average growth rate is 0.8% over the period. Most oil products also recorded positive growth throughout the forecasts, with the exception of gasoline that declined by 0.2% per annum on average.

2.2.1. Long term influence of a changing climate

There are many influences on oil demand and fuel efficiency. Change in car ownership patterns, climate change policy and the emergence of alternative fuels and electric vehicles have all been suggested as factors that moderate future demand for oil. Their influence may be observed in forecast oil demand growing slower than general economic growth, but not markedly so in the next few decades in these forecasts. There were around 17,500 electric cars on New Zealand roads at the end of 2019, compared to a light passenger vehicle fleet of over 3.2 million, so on current rates of vehicle purchases it will take many years before use of electric vehicles makes a significant impact on transport oil demand.

The passing of the Zero Carbon Act in 2019 and the establishment of a Climate Change Commission to advise and hold Government to account on its emission reduction

⁶ <u>https://www.mbie.govt.nz/building-and-energy/energy-and-natural-resources/energy-generation-and-markets/liquid-fuel-market/oil-security-in-new-zealand/</u>

policies may increase the ambition and enforcement of emission reductions in years ahead, but that effect is not yet reflected in energy and emission forecasts for New Zealand.

2.2.2. Short term shock and aftermath of Covid-19

Internationally oil production has run ahead of demand in recent years reducing oil prices. The Covid-19 pandemic and subsequent moves to contain its spread, with closure of international borders and lock downs of sections of national economies, has reduced demand for passenger transport fuels and caused a collapse in oil demand, leaving the global market over-supplied as oil production built up inventories and overwhelmed storage facilities. In the US the price of crude turned negative in April 2020 to -\$40 a barrel of West Texas Intermediate as oil producers paid to have oil taken off their hands. But that was an extreme fall in the US market, and current prices remain in positive territory around \$41 a barrel of Brent crude. The oversupply should be a temporary situation as oil production scales down and demand picks up with loosening of Covid-related restrictions later in 2020.

Nevertheless, the International Energy Agency in its latest forecasts is warning of oil demand being at its lowest level in 25 years because of the lockdowns across numerous countries, and even if travel restrictions ease in the second half of the year, global oil demand in 2020 will recover only to levels experienced about 10 years ago.⁷ The IEA forecasts global refinery output to fall by about 9% over the course of the year and the market will be disrupted by refinery shut-downs and increased availability of both crude and refined product at low prices until demand picks up and inventories come down.

In New Zealand the border closures and lockdown have reduced demand for transport and oil products. Those closures have also affected inbound tourism, forestry and construction and the livelihoods of those who depend on these industries. Jobs have been shed and some businesses closed due to the disruption of trading in early 2020. The impact on economic activity as measured by GDP depends on the length of lockdown and the speed with which restrictions are eased. Recent estimates at NZIER of a range of different scenarios of Alert level easing suggest the level of GDP in 2020 may be between 2.2% and 7.1% smaller than in 2019. If the largest decrease occurs (7.1%), New Zealand's GDP will be about the same in calendar year 2020 as it was in 2016, having lost the effect of three years of growth, and it will take at least an additional four years to return GDP to pre-Covid levels.

There is large uncertainty around how the post-Covid recovery will unfold, both within New Zealand and in the global economy at large. Despite the short term dip in demand for oil products in 2020, we assume oil's predominant share of the transport fuels market will continue into the medium term future with only marginal shifts into new technologies, as while oil remains cheap there is less incentive to bring alternative energy into use. In the longer term policy shifts to enable achievement of zero carbon by 2050 will increase uptake of new technologies, but oil products will remain in demand, albeit with declining share of consumer energy, until the stock of oil-using

⁷ IEA (2020) Oil Market Report - April 2020, International Energy Agency, Paris <u>https://www.iea.org/reports/oil-market-report-april-2020</u>

equipment has been transformed by replacement with equipment powered by other energy sources.

2.3. Regional implications of RNZ operation

Given its role in supplying transport fuels, the refinery is regarded as significant infrastructure at national, regional and district levels. Refining New Zealand accounted for about 0.3% of national GDP but appears more significant at regional level.

Our estimate of the size of the contribution over the past five years based on economic data for the region⁸ and Refining NZ annual reports is included in Table 1 below.

Table 1 Economic contribution of Refining NZ

Contribution 2014 2015 2016 2017 2018 **Gross Domestic Product¹** (\$million) Petroleum Manufacturing² 519 542 436 417 430 5,681 Northland Region Total 5,940 5,961 6,154 6,323 9.1% 9.1% 7.3% 6.8% 6.8% **Refining NZ share of Northland** GDP Employment³ (number of people) **Refining NZ employees** 397 394 386 396 390 178 293 **Refining NZ contractors** 117 96 265 Refining NZ jobs 514 490 564 689 655 Whangarei ⁵ 35,700 36,800 37,400 38,900 40,000 Northland Region 64,200 65,800 67,800 70,100 72,500

Contribution to economic activity and employment

Notes:

1. GDP is stated in 2010 prices and estimated by Infometrics.

- 2. Refining NZ is assumed to be the only enterprise recorded in the category
- 3. Headcount from Refining NZ Annual Report 2018
- 4. Whangarei District (Territorial Local Authority)

Source: NZIER analysis of regional reports prepared by Infometrics

⁸ These statistics are taken from the Infometrics database of regional economic activity available at http://ecoprofile.infometrics.co.nz/Northland%2bRegion/Gdp/Structure. The estimates prepared by Infometrics are based on regional GDP and income and employment data by Statistics New Zealand

Northland is a region that has been struggling in comparison to its resource base and other regions for several decades.⁹ It has a higher share of employment in the primary sector, a sector in which employment has been falling. It also has the highest age dependence ratio (proportion of people under 15 and over 65) of any New Zealand region, and this is forecast to significantly increase as the able bodied move to other regions in search of jobs. It has the second-lowest labour force participation and second-lowest employment rate of all New Zealand regions. Median household income in the region is approximately 20 percent lower than median household income across all New Zealand.

As a substantial employer in the Whangarei District, offering relatively highly–skilled and highly paid job opportunities¹⁰ the refinery is a significant driver of economic activity for the region, and it is recognised as significant infrastructure in both District and Regional plans. Refining NZ currently pays about \$77 million per year to people working for the refinery. The Refining NZ annual report for the year ended 31 December 2018 reported wage and salary payments to employees of \$56 million and payments to contractors of \$21 million. We understand from Refining NZ that almost all of these payments (94 percent) are made to employees and/or contractors' businesses residing in the region. Refining NZ jobs are more highly paid than the average for the region and we estimate that RNZ's wage, salary and contractor payments account for about 2.7 percent of such payments for the region and 3.5 percent of such payments made in the Whangarei territorial local authority.

In addition to the 'steady' annual employment described above, Refining NZ also employs additional staff for annual shutdowns. These vary in size and duration each year but can offer work for around 500 people for a period of 3 to 4 weeks.¹¹

The RMA's section 104(2A) requires consent authorities to have regard to the value of investment by the consent holder. As consent holder RNZ has substantial value in this investment and incentive to sustain its operation and earn return as long as possible. RNZ's 2018 Annual Report shows its tangible assets of plant and equipment had a book value of \$1,082 million,¹² including \$784 million in refining plant which would become largely redundant without the ability to continue to import and process crude.

This represents a substantial investment in assets in the region that are highly specific to the refining activity and that would become stranded and unusable without the consents to land crude at the wharf and continue discharges to air and water from its operations. There may be alternatives to the current discharge regime but these are all likely to be more costly than current arrangements, otherwise RNZ would likely have sought to implement them already to save costs.

There may also be alternatives to having vessels tied alongside the existing wharf and structures for bringing oil ashore, but these also have their own risks and costs and

⁹ MBIE Regional Economic Activity Report 2015

¹⁰ Based on data from Refining NZ annual report and Infometrics we estimate that average annual earnings per employee/ contractor working at Refining NZ in 2015 was in excess of \$120,000 compared with an average of \$50,000 across the region.

¹¹ The expenditure on shutdowns is capitalized in the Balance Sheet of the Refining NZ Annual Report rather than being recorded as an expense in the Income Statement (in the year in which it was incurred). Employment created by such shutdowns is unlikely to be attributed to the 'Petroleum Manufacturing' industry in the economic data we have summarised in Table 1, which hence understates the full impact of RNZ in the region.²

¹² Covering the categories of Buildings and jetties, refining plant, refinery to Auckland pipeline and capital work in progress

would be being pursued already if they provided clear operational advantages for RNZ. Failure to consent either the discharges or the mooring structures presents a risk of reducing the refinery's operating capabilities or forcing it to seek higher cost alternatives to current discharges and use of structures. This would affect the viability of the refinery and potentially make it incapable of continuing its principal activity.

An *Alternatives Assessment* report prepared by Jane Thomson for RNZ concludes that current treatments of refinery discharges are the best practical options, and removing structures would not be justified given the ecological effects of existing structures are very low. All alternatives identified either involved significant additional cost or would place constraints on refinery operations, with impacts on refinery viability.

RNZ's refining is a capital intensive business with a long history of periodic investment in capital renewal and upgrading projects which have injected substantial funds into the regional economy. Over the past 12 years RNZ has invested around \$735 million to produce low sulphur diesel, remove benzene from petrol and improve energy intensity and reduce carbon emissions profile.¹³ RNZ is also investigating installation of 31 hectares of solar panels on its land to lower its costs and provide foundation for new low carbon business lines n future.¹⁴ Over the past four years it has spent \$24 million in maintaining and improving the site's environmental integrity.¹⁵

The refinery's substantial links to other industries and contractors in the region were illustrated in the economic assessment of the CCR project (NorthTec 2012). That project involved total expenditure of \$365m, of which \$147m was spent in Northland, \$27m in the rest of New Zealand and \$191m overseas, with estimated employment in Northland of up to 350 in construction and a further 657 jobs stimulated in industries supplying the project, as summarised in Table 2.

NorthTec Impact Report CCR project	Direct \$m	Indirect \$m	Total \$m	Multiplier ¹⁶
Total spending \$m	365			
Imported \$m	191			
Northland source \$m	147	100.0	247.0	1.7
Rest of New Zealand \$m	27	40.5	67.5	2.5
Employees (number)	350	657	1007	2.8

Table 2 Summary impacts from the CCR project

Source: NorthTec

The incomes earned by Refining NZ staff and contractors directly help retain nearly 500 households in the region and their consumption of goods and services generates income and employment for local businesses in Whangarei. Periodic shutdowns and

¹³ These investments included the \$180 million Future Fuels Project in 2005, the \$190 million Point Forward Project in 2009 and the \$365 million Continuous Catalyst Regeneration Platformer (CCR) project completed in 2015.

¹⁴ New Zealand Herald July 8 2019 <u>https://www.nzherald.co.nz/business/news/article.cfm?c_id=3&objectid=12247544</u>

¹⁵ Jane Thomson (2019) Alternatives Assessment report for Refining New Zealand

¹⁶ These multipliers indicate the gross flow-on effects through the regional economy, before netting off potential offsetting effects where business stimulus increases demand for inputs and raises their price, reducing productivity and input availability for other businesses.

investments provide additional incomes in the region, and expenditure by the company and its employees has flow on effects in stimulating other business in the economy. As these investments are capitalised into the company's balance sheet they are additional to the income and expenditure due to the company's routine operation.

3. Economic consequences of consent renewal

3.1. The future without consent renewal

The weakening margins at the end of 2019, the announcement of a strategic review and the impact of the Covid 19 pandemic have created some uncertainty over the future of the refinery, Possible alternative futures include closure of the refinery and conversion or the site to an import terminal for refined oil products, or conversion of the site to produce alternative fuels to aid transition to a lower carbon emitting future.

All of these options would also need consents. Without consents the current operations could not continue and site's economic contribution to the region would be much reduced.

If the Marsden Point refinery and import facility ceased operating, all its current expenditures and payments to suppliers of inputs and labour in the region would cease. RNZ would be faced with the decommissioning and rehabilitation of the site being brought forward in time which may inject some spending into the region over the short term, but otherwise Northland would be faced with around 7% of its regional GDP contribution not continuing into the future.

Some labour and other input resources would be redeployed to other industries in the region, but these would be less productive uses than those currently found in the refinery (if that were not the case, labour would be already departing the refinery). But some labour with highly specialised oil industry skills would have difficulty finding alternative employment in the region, or even in New Zealand, so would likely relocate, and their earning potential and spending capacity would be lost to the region.

Releasing labour from the refinery would increase the supply of labour relative to the demand in the region, potentially lowering the average level of wages and incomes in the region. This however could provide a boost to other industries in the region, so while the initial impact may be to reduce regional GDP by 7% in the short to medium term some of that would be recovered by increased activity in other sectors. Overall however the regional economy would face some disruption and shrinkage of economic activity, to the detriment of regional well-being.

Partial renewal of consents for discharges and structures

If consents were declined so that the refinery would be unable to operate, the Marsden Point wharf and tank farm could continue to be used as an oil product import terminal, supplying oil products to Northland by truck and via pipeline to Auckland, but refining activity would cease. This would reduce Marsden Point's contribution to local jobs and spending to about 10% of its current level, reducing the local economy and making it more difficult to retain people living and working in the region. As even an oil terminal requires some discharge capability, if consents were declined in their entirety even such reduced site use and economic contribution would not be legally permissible.

If RNZ's consents for jetty and structures were declined, then no ships would be able to land crude or oil product at the wharf. Even if discharge consents were granted to allow refining technically to continue, it would be shut down by inability to access crude feedstocks. Without access to the Marsden Point oil terminal facilities, New Zealand would be faced with accommodating increased imports of refined oil products at other ports around the country. That may involve costs for installing additional tank capacity at other ports to make up for removal of accessible capacity at Marsden Point.

As was evident with the temporary closure of the Refinery-Auckland pipeline in September 2017 after the pipeline sustained damage from farm work, supplying fuel to Auckland without the pipeline is logistically challenging. Auckland lacks capability to land bulk fuel from ships and faced temporary shortages during the pipeline closure, relying in large part on fuel being trucked in from Tauranga and Marsden Point.

That latter option would be unavailable if the jetty structures were not reconsented, increasing the challenges of supply in the short term. In the medium to long term the internal distribution system would adjust to new circumstances and increase capacity to shift fuel by road or rail into Auckland. However, this is still likely to cost more to supply Auckland than the current arrangement that makes use of the lower cost per litre fuel transported via pipeline than via tanker wagons, both in narrow financial terms and broader economic terms of impacts of additional traffic on the road networks and surrounding environment.

Reconsenting with tighter conditions

If consents are issued but with more restrictive conditions than under the former consents, the refinery and terminal may continue operating but will face increased costs in complying with the new conditions. RNZ faces competition from more scale efficient refineries in Asia, and raising compliance costs through more restrictive consent conditions would squeeze its margins and create further challenges for its continued operation.

A number of refineries in Australia have recently closed or been converted to refined product import terminals (with a workforce of about a tenth of that of the refinery operation), including Shell Clyde (Sydney 2015), Caltex Kurnell (Sydney 2012) and BP Bulwar Island (Brisbane 2015). All closures have been attributed to competition from more modern, larger and efficient refineries in the Asian region driving structural change on the supply chain.¹⁷

Competition from larger refineries offshore exerts continuous pressure on refinery margins which at some point could cause production to no longer be worthwhile. In that case RNZ might choose to shut down the refinery and New Zealand would move to importing all its refined oil products. RNZ's expenditures and employment in Northland would cease except to the extent it retained some oil terminal operations to receive imported products and feed them into the Refinery-Auckland Pipeline.

This implies the choice between consenting and not reconsenting can be summarised as:

¹⁷ See <u>http://www.smh.com.au/business/shell-shelves-refining-at-clyde-20110412-1dbxn.html</u> <u>http://www.bp.com/en_au/australia/media/media-releases/bulwer-island-refinery-processing-halt.html</u> <u>http://uk.reuters.com/article/uk-australia-bp-refinery-idUKKBN00J0PX20150603</u>

- With reconsenting on current terms and conditions, the refinery is likely to continue operating, and RNZ retains its competitiveness, maintaining its spending and employment in the Northland regional economy
 - While there is some question of how long the refinery remains able to operate, in view of market conditions and technological and policy shifts brought about under the influence of the Zero Carbon Act, the refinery represents a substantial piece of infrastructure that can be adapted to aid the transition to a zero carbon future, such as by producing biofuels or hydrogen, and possibly also addressing New Zealand's growing solid waste volumes if it becomes technically and economically feasible to render waste plastics into refinery feedstock; so there is strong likelihood of the refinery continuing throughout the consenting period if the new consents for discharges and structures are granted
- With reconsenting on more restrictive terms, the refinery can continue
 operating but incurs higher cost to comply with new conditions or
 implement alternative treatments of its discharges and crude landings,
 weakening its competitiveness (other things held constant) and increasing
 the probability of premature refinery closure; as indicated above, the
 Alternatives Assessment report indicates current discharge treatments are
 the best practical options for current operations
- Without reconsenting
 - of discharge consents, the refinery would not be able to operate unless an as yet unknown technology emerges which is more cost effective in dealing with processing discharges than the current discharging to air, land and water; but Marsden Wharf could continue to act as an oil product import terminal, distributing products via pipeline to Auckland
 which would reduce its economic contribution to the regional economy to about 10% of its current level
 - of structure consents, the Marsden Point wharf could not be used to import either crude or refined oil products, so the refinery and most of the oil terminal equipment would be closed down as redundant, unless repurposed for some other use than oil storage – so virtually all of the refinery's current contribution to the regional economy would stop, some of the labour and other resources would be redeployed in other activities, which can be expected to be less productive than their current uses (otherwise they would be doing it already); and some labour and resources may relocate out of the region.

Other likely consequences include:

- If Marsden Point refining ceased and the site converted to an import terminal, crude oil tankers would no longer visit and refined product imports would arrive in smaller vessels of 55 to 80 kilo-tonnes capacity plus, imports of black products (bitumen and heavy fuel oil) in 20 kilo-tonne vessels
- Closure of the refinery could also lead to discontinuation of coastal tanker distribution, as Marsden Point becomes a terminal serving only Auckland, via the Refinery-Auckland Pipeline, and Northland via road tanker wagons;

other regions would import refined oil products directly from overseas sources: there would be fewer movements of tankers into Marsden Point as large crude carriers stop and are replaced by smaller refined product tankers delivering to it and directly to other ports around New Zealand, but some of those ports may need investment in new storage facilities, with potential to increase costs for refined product deliveries into New Zealand.

3.2. The future with consent renewal

If consents are renewed with current conditions, the refinery can continue its current operation, refining crude oil into oil products and distributing to Auckland via the pipeline and to the rest of New Zealand via coastal tankers. It would remain a regionally and nationally significant infrastructure with a crucial role in energy security, as was evident during the disruption caused in 2017, particularly in Auckland, by damage to the RAP. Its contribution to the regional economy would continue, subject only to market fluctuations, regulatory developments including the ETS and Zero Carbon Act, and changes in the competitiveness situation brought about by circumstances beyond RNZ's control.

The conditions attached to any resource consents which might be granted are also relevant here. Pursuant to the RMA, resource consent conditions can address a broad range of matters and can have material compliance costs. Clearly, the higher the compliance cost RNZ is likely to face, the less margin it has to face the competitiveness challenge from larger refineries overseas.

The recent decline in global oil prices caused by supply running ahead of demand, and the significant short-term shock of the Covid-19 pandemic, have altered the prospects from how they seemed a year ago. The demand drop caused by Covid lockdowns puts increasing pressure on small refinery margins and increases the likelihood of further small refinery closures across the globe, with newer and larger refineries increasing their share of the global market. The timing of economic recovery from the Covid-19 shock is uncertain, but both global and local economic forecasters are expecting return to pre-Covid levels of oil demand and economic activity to take a few years.

RNZ is not immune to the challenges facing oil refining worldwide, and in April 2020 embarked on a strategic review of its future. This includes examining options for improving the profitability of the existing business model, closing the refinery and continuing to operate as an import terminal for imported oil products, or separating into different companies the infrastructure assets of wharf, tanks and RAP from the more risky refinery assets which could be repurposed to producing biofuels or hydrogen fuels to assist New Zealand's transition to a lower carbon-emitting future.

The outcome of that review will be determined by the financial considerations facing the company and its owners, and has economic implications for the region. However, whatever the outcome, the company needs the option to choose within a range of possibilities defined by its consented activities. So while it may seem that the short term market upheavals are challenging to the refinery, , the company still needs consents for continued operation, so it has the widest possible choice in determining future use of those assets. Declining consents would curtail the value obtainable from the investment at the site, and apart from causing some upheaval in RNZ's economic contribution to the Northland region, it would restrict the company's options for transitioning the site to other purposes. <u>Further, if consents were declined, it would</u> also likely mean that other positive benefits associated with the operation of the refinery would be foregone.

The following section focuses on two future possibilities of Marsden Point being used for oil refining or converted to an import terminal for refined oil products. Other possible uses of the site for biofuels or hydrogen fuels have not been costed or included. However, retaining the option for such uses in future is an unquantified but positive part of the value of continued operation of the Marsden Point facilities.

3.2.1. Effects on the local economy

The direct impact of the reconsenting involves retention of the spending and income generation of the refinery in the Northland regional economy. The main effect on the local economy is derived from the maintenance of the refinery's competitiveness and its effect of increasing the probability of continuation of current operations. This will prolong the period over which the refinery can deliver the economic contribution outlined in section 2.3 above.

3.2.2. Effects on the wider economy

A principal difference between the outcome with and without the reconsenting is that reconsenting discharges and structures avoids or defers an increase in imports of refined products, by retaining the operational viability of the refinery. In principle, increasing imports can have impacts on balance of payments and pressure on the exchange rate. As the value difference between imported crude and imported refined product is a small proportion of the cost of supplying oil products to New Zealand, such macro-economic effects will not be significant in this case.¹⁸

If consents for the structures of jetty and mooring dolphins are not renewed, the Marsden Point Refinery could no longer access feedstock to continue operating, and it is unlikely that many of the oil terminal facilities would continue to be used. The counter-factual of no future consents includes risk of stranded assets and of bringing forward site remediation costs and new investments in the oil distribution network within New Zealand. The principal assets potentially at risk are the Refinery to Auckland Pipeline (RAP), which handles direct transport into Auckland, and the RNZ refinery terminal infrastructure. Although the RAP would continue to be the least costly way of transporting product, its use, volume carried and its cost advantage would be substantially reduced if crude oil or refined oil products were no longer able to be landed at Marsden Point.

Refined products would most likely be imported directly into other coastal terminals in New Zealand to avoid the double handling of imported products, so the distribution of refined product from the refinery through coastal shipping would cease. This would result in contraction of shipping business at Marsden Point.

Section 2.4 above describes the regional implications of Refining NZ's operations (Table 1) and its proportionate share of national economic activity will be small (around 0.2%). Any reduction in refinery activity is likely to be met by increases in refined product imports. The refinery adds value through its refining margin on processing imported crude, whereas importers add rather less value through their procurement processes, the difference between New Zealand refined and imported oil products that switch at the margin will be smaller still and have little effect on the total economy.

3.2.3. Effects on the natural environment

Effects on the natural environment fall into four broad categories: effects on air quality, effects on water quality, effects on broadly defined cultural amenity and effects on other vessels and activities sharing the harbour entrance. Economic valuations of environmental protection are rarely explicitly used in RMA settings because of practical difficulties in estimation, but economic principles still apply to the consideration of environmental effects. We note that separate assessments relating to effects on a range of environmental disciplines have been commissioned from other consultants with respect to this reconsenting. We comment only on the economic implications of changes, as summarised in Table 3.

Without reconsenting	Comment	With reconsenting
Reduction in Marsden Point's contribution to air quality deterioration and associated health costs in Whangarei and surroundings	This depends on Marsden Point's share of discharges in airsheds and the strength and direction of prevailing winds. Refinery discharges would need to be a large share to incur large impacts on health costs	Continuation of current impacts
Reduction in Marsden Point's contribution to water quality deterioration and associated restrictive activities and risks	This depends on Marsden Point's share of discharges into the harbour and the level of water use and contact. A large share would be needed to incur significant costs	Continuation of current impacts
Reduction in broadly-defined cultural impacts of discharges and structures, e.g. displacement of activities from water space (recreation) and encroachment onto other areas of interest (visual impacts, iwi sensibilities)	Structures occupy a small share of harbour and substitute sites for recreation and visual appreciation are not scarce. Structures would need to cause large displacement to incur significant costs	Continuation of current impacts
Reduction in vessel movements around Marsden Point and approach channel, if non-renewal of consents for structures closes the ability to land product at the terminal	This would reduce vessel movements around Whangarei Harbour but increase them elsewhere in NZ. It would reduce spending brought to the region by vessel movements and increase cost of oil product distribution elsewhere across NZ.	Continuation of current impacts

Table 3 Effects of not reconsenting

Source: NZIER

3.3. Longer term prospects

Looking to the future, the Government is pursuing a policy of Net Zero Carbon by 2050 as a measure of climate change amelioration. If that is achieved, demand for oil products faces a finite timeline before transport systems are converted to alternative, low emission propulsion sources (e.g. vehicles powered by electricity or hydrogen fuel). Net zero carbon does not mean no greenhouse gas emissions or no oil products, rather that emissions that arise in future will need to be offset by emissions reductions or carbon sequestration (such as tree planting) elsewhere. While alternativelypowered vehicles would substantially reduce demand for oil products, the timing of vehicle electrification is unlikely to significantly affect the economic gains from reconsenting, as most of the changes are likely to be many years ahead when the present value of costs and benefits will be diminished.

New technologies like electric vehicles require a lead time to become commercially viable, and then to achieve sufficient market penetration to transform the national vehicle stock. These new technologies are not yet at the stage to displace internal combustion engines, and there need to be technological improvements in the travel distance achieved between battery recharges, the rapidity of battery recharge from infrastructure installed throughout the country, and reduced cost of long range batteries, before electric vehicles are likely to be widely adopted instead of internal combustion powered vehicles. Oil based fuels will still be required for other transport like aviation for the foreseeable future.

The likely period required to turn over the vehicle fleet will be considerable even if the Net Zero Carbon by 2050 target is on track. Foreign vehicle suppliers and governments in UK and France have indicated they expect continued manufacture of internal combustion powered vehicles until around 2040, and it may be many years before a sufficiently broad range of alternatively fuelled vehicle models becomes available for importing into New Zealand and makes serious inroads into the national stock of vehicles. Consents may only be granted for a term of up to 35 years and as net zero carbon does not require absolute zero emissions there is likely to be continued use for the refinery throughout the term of these consents.

A report Forsyth Barr prepared for its clients¹⁹ suggests the time at which refinery operation becomes uneconomic due to falling petrol demand is likely to arrive between 2042 (with forecast high Electric Vehicle uptake) and 2048 (with forecast base forecast Electric Vehicle uptake). This leaves most of three decades in which petrol is likely to remain in demand and in which the refinery and or the oil terminal facilities are likely to remain of value to RNZ and the regional economy in their current uses. Continued operation of the refinery could also help facilitate and fund the transitional energy developments over that period such as blended biofuels, hydrogen production, and possibly rendering plastic waste into refinery feedstock.

Another challenge facing RNZ is that New Zealand has recently chosen to ratify the International Maritime Organisation MARPOL VI policy under which, from 2020, all shipping under New Zealand's jurisdiction must meet low sulphur emission standards. This reduces the market for RNZ's heavy fuel oils which do not meet these standards, and will only be usable under this policy by ships with sulphur scrubbers fitted to their exhaust systems.

Reconsenting will prolong the operational life of the Refinery and push back its future decommissioning, and in so doing reduce the present value of the costs of that decommissioning. The future timing of refinery closure is uncertain but the present value of closure can be compared for different dates deferred in the future. If declining consents for structures required decommissioning of the Refinery and site remediation today, that has been estimated by RNZ to cost around \$300 million.²⁰ If it occurred in

¹⁹ Forsyth Barr "The future is electrifying, gradually"; New Zealand Equity Research client briefing, 21 June 2017

²⁰ Information from Dave Martin, Business Opportunities Manager at RNZ, in an email from 25 August 2015

10 years' time, it would have a present value of \$167 million (discounted at the Treasury's default discount rate of 6%)²¹. If it was deferred from 10 to 20 years as a consequence of the reconsenting, its present value would be \$93 million, and if it was deferred until 35 years' time its present value would be just \$39 million, a saving of \$261 million. Even if that cost figure is revised, the same principle applies: the further the decommissioning is deferred into the future, the lower its present value cost.

Without predicting the closure of the Refinery, it is clear that the longer that time is deferred, the smaller the present value cost for the region of such a sizable reduction in jobs and employee payments. Markets are gradually developing the technologies to transform the transport fleet, and it will be less costly if that transformation occurs gradually than if withdrawal of consents forces sudden disruption of New Zealand's oil product distribution, interim fixes to maintain oil based fuel supplies and later transformation to alternative fuels.

A similar argument applies to the adjustment of the Northland economy to a future in which the Refinery may not be such a significant source of value and employment to the region if it does not transition to a new business more aligned with a low carbon future. It will be less disruptive on the economy to ease into a future Zero Carbon world, by maintaining operation with gradual adjustments over 20-30 years than to endure a sudden sharp contraction of activity due to consents being declined, which would reduce jobs, incomes and well-being in the regional economy for an indefinite period until other industries arise to provide alternative employment.

The substantial investment at Marsden Point gives RNZ strong incentive to seek ways to use this asset to continue operating and adapt to changing energy needs. This gives the region a stake in enabling RNZ to develop opportunities for assisting the transition to carbon-lowering energy options.

²¹ The PwC Cost of Capital Report in March 2019 identified a weighted average cost of capital (WACC) for Refining New Zealand of 5.0%, less than the 7.5% average for all utility industries of 7.5% which is dragged up by some high cost electricity generation. But RNZ's future in transition business for a low carbon world involves risk that warrants a higher discount rate than its current WACC.

4. Conclusions

Reconsenting is required to enable continuation of the refinery operations at Marsden Point. In 2018 these operations contributed \$430m per year in GDP to the Northland economy, about 6.8% of the region's total, and provided 655 jobs that year for employees (390) and contractors (265). This is about (16 percent of the Whangarei total and 1 percent of the Northland total). The corresponding averages over the past three years are contributions of \$428m in GDP and 636 jobs, so the contribution has been relatively stable in absolute terms, although declining slightly in proportion to the Northland economy as it has grown.

Reconsenting also defers the date at which the refinery site would need to be decommissioned and rehabilitated. Although this will inject some spending into the region and result in a site available for other activities, there are substantial resource costs in decommissioning, the present value of which is smaller the further they are deferred into the future.

Much of this benefit is lost without consenting

Without reconsenting, much of the beneficial impact of the refinery would diminish. If discharges are not consented, the refinery could no longer function as a refinery. It would still need most of the consents being applied for to continue operating as an import terminal, landing and storing imported refined product and distributing to Northland and via the pipeline to Auckland. In that case RNZ's contribution would drop to around 10% of its current level, i.e. around \$43m in GDP and 48 FTE jobs per year. Some of RNZ's investment in refinery facilities would become stranded assets with limited recoverable value for sale to other uses or scrap.

RNZ's assets currently exceed \$1 billion with three-quarters of that value in refinery plant and equipment, which would face substantial value drop if it were not able to operate as a refinery. That would be a loss for the company, but also for the region for all the employees, contractors and other residents who have a role in maintaining those assets.

If reconsenting is not forthcoming for mooring structures and jetties, it is unlikely that Marsden Point could continue to function as an import terminal. Then most of the facilities would become stranded assets, and while oil products could still be delivered up the pipeline from Auckland and use some of the Marsden Point tanks for storage pending delivery around Northland, the volume would be much lower than at present, reducing the efficiency of the operation of these remaining facilities.

In this case all jobs at the refinery would cease, apart from a few time-limited roles engaged in the rehabilitation of the refinery site and managing legacy matters. Those with skills most specific to oil refining would most likely leave the region to seek jobs elsewhere. Others may find jobs in the region, but at lower remuneration than is currently provided by the refinery. Some other resources may also be redeployed to other industries, but overall there will be significant contraction in economic value.

To give some sense of the scale of that contraction, Table 4 provides estimates of economic consequences of reconsenting discharges and structures at the Marsden Point Refinery. based on a range of assumptions. Current average annual

remuneration of refinery staff is around \$157,000 before tax and for contractors is estimated at \$79,000before tax, which is well above the average remuneration of employees in Northland. The Linked Employer Employee Database (LEED) indicates the average remuneration is \$51,363 per year, and the Ministry of Business, Innovation and Employment's regional data tool²² suggests an average remuneration of \$61,430 per employee in the more technically skilled than the average electricity, gas, water and waste management "utility" industries.

If we assume that staff shed by the refinery would be employed in other industries at the remuneration of the utility industries, and estimate the other components of GDP from the ratio of each component to employee compensation for all industries in Statistics New Zealand's input-output tables, we arrive at a reduction in incomes after redeployment of \$48 million per year, and reduction in GDP of \$312 million per year. These are losses in contribution to incomes (and well-being) to the Northland economy and to the wider aspects of operating surplus and fixed capital consumption in GDP, which provide for infrastructure maintenance and investment for the future.

Table 4 Summary of impacts with and without reconsenting

Without reconsenting	With reconsenting		
 After cessation of RNZ's regional contributions to: Value Added: \$118m/year (\$312m lower) Incomes: \$29m/year (\$48m lower) Employment: reduced due to loss of jobs at refinery Exodus of skilled oil industry professionals Redeployment of remaining labour and resources to less productive uses in other industries 	 RNZ's Regional contributions to: Value Added \$430m/year Incomes \$77m/year Employment: 476 FTE of employees & contractors averaged over past three years Population retention due to job continuity 		
Immediate need for refinery decommissioning costing \$300 million	Present value cost and (saving) of deferring date of refinery decommissioning by: 10 years PV\$167m (PV\$133m) 20 years PV\$93m (PV\$207m) 35 years PV\$39m (\$261m)		
Increased cost of oil supply and distribution			
Sudden transition to new interim fuel distribution pending transition to Zero Carbon	Gradual transition to low carbon power sources such as renewable electricity, biofuels and hydrogen		
Avoidance of Refinery share of discharges to air and associated impacts	Refinery share of discharges to air and associated health & productivity impacts		
Avoidance of Refinery share of discharges to water and associated impacts	Refinery share of discharges to water and associated health & productivity impacts		
Avoidance of Refinery intrusion on recreation, amenity and cultural interest	Refinery share of intrusion on recreation, amenity and cultural interest		

(Bracketed figures are the difference from continuation of the current situation)

²²

http://webrear.mbie.govt.nz/theme/earnings-by-industry/map/timeseries/2016/northland/electricity-gas-water-andwaste-services?accessedvia=northland&areatype=ta&right-transform=absolute

Source: NZIER

These estimates are illustrative and may be different in practice. The 'without reconsenting' results for jobs and GDP will be smaller the more current skilled staff leave Northland for greener pastures elsewhere. They might be larger if other industries emerge offering above average remuneration for the skillsets shed by the refinery, but at present it is unclear what such industries might be to offer the scale of employment of the refinery. The without-reconsenting GDP estimates will also be smaller the greater the disruption in the regional labour market and the longer it takes for shed staff to find suitable new employment. But they could be larger to the extent that, over time, growth in the economy creates demand for employees and provides opportunities for staff to retrain for new careers.

In summary therefore the most direct economic effects of not reconsenting refinery discharges and structures will be a loss in in average year annual contribution of around \$312 million of regional GDP and around \$48 million in regional incomes for employees. There will also be indirect impacts in loss of business flowing from the refinery to suppliers of its inputs and to the businesses that benefit from higher levels of expenditure enabled by higher earning employees in the refinery. Over the longer term there would also be loss of the periodic shut-down projects at the refinery. Those losses adversely affect economic well-being by reducing incomes and consumption. They also reduce RNZ's funding available to invest in environmental improvements, causing further effects on societal, cultural and environmental well-being.

In addition, not reconsenting brings forward the date of recommissioning and rehabilitating the refinery site, the cost of which increases in present value terms the earlier it occurs. And it is likely to require other investments to be made in other ports around New Zealand to enable landing and distribution of refined oil products, enabling more secure delivery into Auckland than is currently possible in the absence of Marsden Point and a functioning RAP. As these other investments would be additional to what would otherwise be a functional internal distribution system, and they may have a relatively limited economic life given transition to alternative fuels under Zero Carbon policies, they would increase the cost and reduce the efficiency of oil product distribution within New Zealand.

Recent events and the disruption caused by the Covid-19 pandemic have led to a drop in world oil demand and economic activity, the full extent of which and time taken to recover to previous levels is open to much uncertainty. However, the basic pattern described in this report remains the same: the refinery provides significant benefit to the Northland economy in its continued operation and the potential it presents for aiding transition to lower carbon emitting fuels, and most of this would be lost if it was restricted by consenting limitations to operating as an oil terminal or not operating at all. In the short term until the economy recovers from the Covid impact, when other businesses have shed jobs or closed, its significance for the Northland economy could be considered even stronger.

Environmental benefits have economic cost

If consents are declined and cause contraction of the refinery's current operations there could be a number of improvements to the natural environment, including:

- Reduction of the refinery's contribution of discharges to air that may contribute to reduced air quality
- Reduction of the refinery's contribution of discharges to water that may contribute to reduced water quality
- Reduction of the impacts of jetty and mooring structures on visual amenity, restriction of recreational use in proximity to the Marsden Point Wharf and displacement of other cultural interests in the area.

If refusal of resource consents can be attributed to reducing the level of environmental "bads" experienced in the vicinity of the refinery, the economic value of such benefits could be estimated as the avoided cost of ill health, restricted activities, foregone seafood harvesting and so on. This has not been done here as it is extremely difficult to quantify both the scale and value of those benefits. These impacts would have to be substantial to outweigh the potential loss of around \$50 million per year from curtailing the income generation for the region from refinery operation.

Reconsenting the refinery's discharges and structures would defer that loss of income generation to the future, when changes in market conditions, technologies and policy settings around a Zero Carbon future may necessitate refinery closure or transformation to producing other forms of energy in the transition to other energy sources. The refinery is the only one in New Zealand and occupies a pivotal position in supplying oil products which will continue to fuel transport in New Zealand over the medium to long term future. Enabling it to continue to operate would contribute to regional well-being by continuing to provide incomes and spending in Northland, enables resource use efficiency by not prematurely stranding infrastructure assets, and would enable RNZ to extract more return from its investment and maintain an efficient operating asset. This in turn would enable it to develop opportunities for low emissions energy forms and contribute and transition to a low carbon future.

Appendix A Economics for the RMA

A.1 Methods of economic analysis

Although the RMA does not specify a method for economic assessment, a common approach is **economic impact analysis (EIA)**, which shows how an activity impacts on aggregate measures of the economy such as spending, contribution to GDP, incomes and employment. EIA often uses economic multipliers which show how the *direct* spending and job creation by the activity stimulates *indirect* spending and job creation in other local sectors which either supply inputs to, or use the outputs from the project. But multipliers are confined to impacts on "the economy" and cannot account for external effects on the environment. They can also exaggerate impacts of changes in the economy, as being derived from a static model of inter-industry transactions they do not account for new demands changing prices and re-allocating resources across the economy.²³ Multipliers do exist, but their quantification is difficult and prone to misplaced precision and overstatement by multiplier analysis. Because of these limitations such analysis is not used here.²⁴

Another useful approach is **cost benefit analysis (CBA)**, the standard economic method of investment appraisal for determining whether a project or proposal is worthwhile. It compares the economic value of the activity against the costs of implementing it, not just for the company but for the wider economy. Costs and benefits are defined as those that are "additional" to the counter-factual that would have occurred without the proposed project. CBA measures the economic surpluses generated by the inputs in the project, which are principally surpluses to consumers (increase in value their consumption) and surpluses to producers (added profits for businesses, increases in incomes for employees).

In principle CBA can cover external effects of activities that fall on third parties and it can include the value of non-market effects on the environment. In practice non-market services are difficult to value in monetary terms and may be incompletely covered. NZIER have adopted the CBA approach in undertaking this assessment.

Such analyses are commonly used in consent applications. For instance, a CBA approach was set out by the Environment Court in *Port Gore Marine Farms v Marlborough District Council*²⁵ for assessing economic effects as the sum of net addition to producer surplus, consumer surplus, and positive externalities less negative externalities. Cost benefit analysis directly addresses the issues of gain in well-being and efficiency of resource use, and even if not fully quantified applies a logical framework for comparing outcomes with and without a proposed change.

²³ A better tool is General Equilibrium (CGE) Analysis, which does account for resource constraints and price effects, but is rather more complex than the commonly encountered multiplier analysis.

²⁴ Multipliers' methodological weaknesses are recognised in the government sector and rarely taken seriously by decisionmakers For an overview of these weaknesses, see publications by the <u>Australian Productivity Commission</u>, the <u>New Zealand</u> <u>Treasury</u> and <u>MBIE</u>. All three clearly state that multipliers over-state economic impacts and thus lack credibility for policy analysis.

²⁵ [2012] NZEnvC 72.

In its draft Cultural Effects Assessment, Patuharakeke Trust Board suggested triple bottom line accounting with addition of a cultural component as an assessment framework. Triple bottom line accounting is used by companies to demonstrate their corporate social responsibility, by reporting on financial, environmental and social impacts of their activities. It is one of many alternative frameworks, including Natural Capital Accounting and Net Economic Welfare Accounting, that incorporate interdisciplinary indicators beside economic ones. The Resource Management Act processes perform a similar function in considering evidence from a range of specialist disciplines to arrive at balanced conclusions, and there is no particular advantage in using another framework in that partially overlaps that process.

A.1.1 What is well-being?

In economic terms well-being can be regarded as equivalent to economic welfare, the conceptual measure of the amount of consumption of goods available through markets, through public services provided by local and central government funding, and through the availability of less tangible non-market services of natural ecosystems that contribute to people's quality of life. Those non-market ecosystem services²⁶ derive from environmental functions that support human well-being, including supply of:

- Provisioning services, affecting the quantity and quality of food, fibre, energy and minerals extractable from the natural environment
- Regulatory services, affecting the environment's ability to buffer and protect its income potential for future use (e.g. the role of mangrove forest as protection against coastal erosion, carbon sequestration against climate change)
- Cultural services, covering human-based value for recreation, amenity, natural and historic heritage and special associations of communities and tangata whenua.

Government this year (2019) released what it called its first Well-being Budget, to broaden the focus of assessment of societal progress from traditional economic measures like growth in Gross domestic product (GDP) to include indicators of a broader range of social outcomes. This was aligned to a Living Standards Framework that the Treasury has been developing since 2011, which is intended to monitor progress against different domain indicators while maintaining stocks of physical capital, natural capital, human capital and social capital at levels to sustain well-being into the future.²⁷

One measure of well-being is the sum of economic surpluses inferred from a cost benefit analysis. As non-market services are difficult to value in monetary terms, in practice cost benefit analyses may not include them, leaving decisions on the level of non-market effects to be determined by political or judicial systems in which economic value is implicit (rather than explicit) in the decisions.²⁸

²⁶ See the UN's Millennium Ecosystem Assessment (2005) <u>https://www.millenniumassessment.org/en/Framework.html</u>

²⁷ See https://treasury.govt.nz/information-and-services/nz-economy/living-standards/our-living-standards-framework

For instance, if a planning rule upheld by legal process determines that a given area should be set aside for conservation, it implies the area is worth to the public at least as much as the highest value alternative use for the area. Such considerations are not often explicit in such decisions, raising the risk that value can be very variable across different decisions.

Access to markets and publicly funded services depend on individual and collective willingness to pay within the community, the principal marker of which is local incomes. Income depends on the availability and productivity of employment in the District, and any transfer payments obtained from outside it (such as social welfare benefits). Income can either be measured through surveys or censuses of residents in a district, or inferred from the economic accounts used for measuring economic value added, or GDP. GDP consists of the following principal components:

- Employee compensation, comprising salaries and wages for labour
- Fixed capital consumption, a measure of economic depreciation or the amount of repairs and maintenance required to offset the wearing out of capital equipment and plant
- Operating surplus, which is a profit measure from which business owners pay dividends on capital or retain funds to expand their businesses
- Indirect taxes paid to government, net of subsidies received from government, where these are embedded in market prices and difficult to extract from them (like excise taxes, road user charges and financial assistance from the land transport fund).

As business owners may reside outside the region, employee compensation is the principal source of income in the region.

Although well-being is a function of consumption, income generated by the refinery's continued operation can be a proxy measure, as this enables consumption by people in Northland and New Zealand at large.

A.1.2 What is efficiency?

Efficiency in economics is obtained by maximising the value of outputs from available inputs, or minimising the inputs for a given level of outputs. The general principle to achieve it is to apply resources to a given outcome to the point where the marginal value of an additional unit of outcome is just equal to the marginal cost of achieving it. This is the principle applied in economic cost benefit analysis, although implementation may vary according to what can feasibly be measured and included in such analysis. In the case of refinery discharges, efficiency can be determined through CBA or, if environmental effects cannot be valued, by cost effectiveness analysis of different options for achieving desired improvements. In that case efficiency is achieved by selecting the option that achieves a given outcome at lowest cost over time.

A.2 The economics of discharges and structures

Discharges to air and water are problematic in economic terms if they result in reduction in value of some other activity that depends on air and water quality. For example, in the case of deteriorating air quality, at some point increasing concentrations of pollutants over the short term can trigger adverse health impacts for people with existing respiratory conditions, while long term exposure can be implicated in causing respiratory conditions. Re-consenting may be seen as an opportunity to reduce the discharges that lead to short term or long term elevated pollution.

However, there are also costs in abating the level of discharges that cause pollution. These can come either from additional costs incurred in cleaning up the discharges at sources or by the opportunity cost of making less use of the discharge facility. Abatement of discharges to zero is achieved at high cost and is unlikely to be economically efficient, as a more optimal level of pollution occurs where the combined cost of damages and abatement is minimised (Figure 2).

Figure 2 indicates that it is unlikely to be economically optimal to aim for zero pollution if the full costs of abating emissions are taken into account. Abatement costs include both the expenses incurred in achieving abatement (e.g. the cost of fitting scrubbers in smoke-stacks) and the opportunity cost of any reduction in production to achieve lower discharges. The economic optimum will arise where there is some abatement, and some damage, and their combined cost is lower than any other combination of discharge and abatement. The same principle applies whether considering discharges to air, discharges to water, and the potential for visual intrusion and ecological impacts of mooring structures in the seabed.

Figure 2 Optimal level of pollution



Source: NZIER

A.2.1 Environmental effects of reconsenting

Consents are being sought for the refinery's discharges into the marine environment, land and air. In economic terms such discharges cause localised "externality effects" that fall on nearby residents and visitors, and that vary with the discharge characteristics of the refinery, the volume of throughput for refinery processes that cause discharges, and the population at risk of exposure to the environmental externalities created by the refinery's discharges into air and water. Discharges into air and water will spread away from the source, reducing concentration and potential for harm as they become more diffuse.

Discharges to air

Emissions to air can be associated with deteriorating air quality.

Air quality is affected in the short term by emission spikes or "exceedances" of particular emitted substances, which are monitored through daily emission levels. Long term exposure to high levels of emissions, which is monitored through annual emission levels, can cause adverse health effects.

Particulate matter, derived from incomplete combustion or the chemical transformation of precursor gases such as sulphur dioxide in the air, is the air pollutant most commonly measured in New Zealand, but its monitoring provides limited data for identifying how serious it is and in what locations. Motor vehicles, domestic heating and some industrial processes are the principal identified sources of such particulate emissions across most of New Zealand.²⁹

The principal economic impacts of environmental effects of deteriorating air quality are related to the costs of ill-health, which include:

- Resource costs such as medical expenditures, from increased doctors' visits, hospital admissions and treatments and medicines used.
- Opportunity costs of loss of productivity from days off work and school, which involves both loss of production of goods and services and loss of profits and income derived from it by business owners and their employees.
- The human "disutility" cost of reduced quality of life or life expectancy.

There can also be some non-health related environmental effects. Sulphur and nitrogen compounds in air can combine with rainwater to form acids that can corrode building facades, plant and machinery, and increase cleaning costs. Nitrogen oxides can also add to the loading of deposited nitrates in water, to the detriment of natural ecosystem functioning and productivity of fish and other extractable material.

At the minimum, therefore, the economic value of reducing polluting emissions and improving air quality reflects the avoidance of these health and environmental costs. There may be further public value in improved peace of mind from reducing the dread of long term exposure to poor air quality that lowers quality of life and life expectancy.

In principle, consent-induced changes in emissions could be valued by estimating the cost of individual components of economic "bads" caused by emissions and hence valuing the incremental improvement achieved by their reduction. But given the limited data on outdoor air quality in New Zealand, estimating this is complicated by numerous required assumptions on the share of an individual resource in total emissions and on predominant meteorological conditions.³⁰

Discharges to water

Risks of water pollution stem from addition of chemical contaminants or soluble nutrients like nitrates and phosphates that encourage nuisance algal growth; introduction of micro-organisms like e-coli and cyanobacteria that pose a risk to people

²⁹ See Ministry for the Environment & Stats NZ (2018). New Zealand's Environmental Reporting Series: Our air 2018. Retrieved from www.mfe.govt.nz and www.stats.govt.nz.

³⁰ The Health and Pollution in New Zealand study estimated air pollution across New Zealand from human activities in 2006 was responsible for 1,175 premature deaths, 607 extra hospital admissions, 1.49 million restricted activity days (number of days x number of locations x population affected) with a societal cost of \$4.3 billion per year. http://www.hapinz.org.nz/HAPINZ%20Update_Vol%201%20Summary%20Report.pdf_MfE's Air Domain Report of 2014 recorded 1,000 premature deaths, 520 hospital admissions and 1.35 million restricted activity days attributed to air pollution in 2012, a slight reduction on all three counts from 2006. https://www.mfe.govt.nz/publications/air-environmental-reporting/new-zealand%E2%80%99s-environmental-reporting-series-2014-air

or dogs ingesting water or render fish and shell-fish unfit for consumption; and ecological disruption such as where algal growths disrupt normal food chains. Economic costs can arise from ill-health consequences of contact with polluted water, productivity losses from resultant absenteeism from work or loss of harvestable fish, and displacement costs where, for instance, people incur costs in seeking clean water for recreation further away from their homes.

Water quality improvements create benefits for the region in reducing the costs of extracting, treating and using it, and also by creating benefits for amenity, recreation, biodiversity and the cultural sensitivities of tangata whenua. If future residents have to travel further than they do now to find water of a quality to partake in water-based recreation, they will face costs of travel expenses and time that detract from their incomes and ability to pay for other things, which reduces their well-being compared to a situation where there is water of suitable quality closer to home.

Structures in the sea

Environmental effects of structures such as mooring dolphins and jetties include the disturbance of seabed material and deposition during installation, the occupation of sea-space and displacement of other activities that would otherwise take place there, and the visual impact on appreciation of surroundings. Installation disturbance does not apply to reconsenting of existing structures, but sea-space occupation and displacement of activities can involve economic costs in the same way that localised pollution does: local users incur costs either because displacement requires them to travel further to reach alternative areas for recreation, or because they partake in less recreation as a result of higher costs. As the dolphins and jetty are positioned in water that is already used for industrial activities with an exclusion zone within which the public are not permitted, and their backdrop from publicly accessible viewpoints is of the refinery plant and equipment, it is unlikely that there is much recreational activity or visual appreciation taking place in that location. The structures occupy a very small proportion of the Whangarei Harbour and do not significantly reduce the area of harbour available or accessible for other activities. So, unless there is something exceptionally special about the structures' locations (e.g. last existing habitat of a valued wildlife species) the opportunity cost of other activities is likely to be small and any displacement of other activities would not have significant economic value.

A.3 Net economic effects

In assessing the net economic effect of refinery operation while taking account of environmental effects, it is necessary to weigh up different components of costs and benefits, as outlined in the Port Gore vs Marlborough District Council decision. These components are:

- Gains in consumer surplus (lower prices, greater range or security of goods)
- Gains in producer surplus over alternative uses of input resources, both
 - Gains in profitability for the owners of businesses
 - Gains in income for labour in the business (i.e. higher incomes than labour would gain elsewhere, not just jobs for the otherwise unemployed)

- Netting off adverse externality effects, principally
 - o Increase in health costs from adverse air (and water) quality effects
 - o Increase in displacement of other activities, recreation, appreciation

Measures to reduce adverse externalities tend to also reduce gains in economic surpluses. If those measures make the refinery unviable, producers lose all the value in their investment and may incur further cost, e.g. for labour in finding alternative work and potentially relocating to do so. Such costs would count at losses of economic surplus in the CBA framework outlined above.