Attachment 2

Pakiri Sand Extraction – High level assessment of economic effects

3 May 2024

m.e consulting

Pakiri Sand Extraction:

Assessment of Economic Effects

Prepared for

McCallum Bros Ltd.

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1 Introduction

Auckland is New Zealand's largest city, and main economic service centre. The city is experiencing strong population growth and despite challenging economic conditions associated with the inflationary period, investment in buildings and infrastructure is ongoing. In addition to the demands associated with the growth patterns, there are significant infrastructure deficits. The Infrastructure Commission highlights the shortfall and suggests that a business as usual approach to renewals and investment will see the deficit grow. The historical deficit arose out of an investment slump during the 1980s and 1990s and the investment during the 2000s has not been sufficient to meet infrastructure demands.

Construction is an essential part of the infrastructure investment, and the entire supply chain must be efficient to ensure that infrastructure delivery can occur. A central message relating to addressing the infrastructure deficit is that a simplistic approach to building our way out of the deficit is unlikely to succeed. Instead, infrastructure efficiency, and maximising the return on infrastructure spending, are critical considerations. Estimates suggest that New Zealand's infrastructure spending would need to increase from 5.5% of GDP to 9.6% of GDP to deliver the infrastructure we need – a significant increase. This type of increase cannot occur in isolation and with limited financial resources, difficult trade-offs will be needed, reflecting decisions between hospitals, schools, housing, and other areas.

Sand is an essential ingredient in concrete, and specialist sand[1] is required for high-strength concrete applications. Sand is a key component in the production of ready-mix concrete, with between 400 and 450 kilograms of sand in each cubic metre of concrete. Concrete is used throughout the urban environment to meet the needs of residential, business and road construction requirements. Given the importance of concrete for Auckland's economy, Auckland's built future is effectively reliant upon maintaining sustainable sources of sand. Because sand is a key component in a range of different building applications, much of New Zealand's future productive growth is reliant on sand in one form or another. This means that the impact of sand extends significantly further than just the construction sector.

1.1 Objectives

Auckland's sand market is concentrated with most of the market supplied from a handful of sand extraction operations. This concentrated nature presents several risks and arguably the ability to source enough sand, from suitable locations, is the key issue. This economic assessment provides a high-level economic assessment of the Pakiri sand extraction application and is structured in a way that addresses the eligibility criteria for projects under the Fast-track Approvals Bill. The project's regional or national significance is outlined, and the following sub-clauses are addressed:

- *Clause 17(3) of the Bill:*

  (b) will deliver regionally or nationally significant infrastructure

  (d) will deliver significant economic benefits

  (f) will support development of natural resources, including minerals and petroleum

[1] Principally marine sand.

(g) will support climate change mitigation, including the reduction or removal of greenhouse gas emission

(h) will support adaptation, resilience, and recovery from natural hazards

(i) will address significant environmental issues

Access to suitable, and sufficient volumes of high-quality sand, from appropriate locations is critical. Sand is a high volume, low value commodity – transporting it from the source to where it is used is expensive. Beyond the financial costs, environmental externalities also arise from transporting sand.

This economic analysis provides high level estimates of:

- the sand market and the demand-supply outlook,
- the potential benefits associated with enabling sand extraction at Pakiri.

The results are described in terms of the eligibility criteria listed above.

1.2 Information sources

Several sources were consulted as part of preparing this economic assessment, including:

- Information provided by McCallum Brothers Limited
- Market Economics Limited in-house regional economic dataset
- Auckland Council information and data
- Central government guidance and datasets:
    - Ministry of Transport
    - New Zealand Transport Agency
    - Ministry for the Environment
    - StatsNZ
- Industry sources and releases.

1.3 Structure

The balance of this brief report is structured as follows:

- Section 2 describes the Auckland growth outlook, specifically the demand for sand and the supply situation. The net position of the Auckland sand market is highlighted, and the economic implication of the net position is illustrated.
- Section 3 draws on the analysis and summarises the potential economic costs of a sand-supply crunch and the flow-on implications.
- Section 4 clarifies the links between the economic analysis and the eligibility criteria.

2 Sand market and outlook

Economic growth is in part related to urban development and expansion, meaning that the ability to cater for increases in population and economic outputs is heavily reliant on and directly linked to the sustained availability of sand. Sustaining GDP growth and economic performance aims, as well as catering for sustained household growth, requires continued access to sand of appropriate quality and quantity, in an accessible location. Ensuring local sources of sustainably mined sand ensures it can be provided to the market at a cost-effective price.

This section starts with a summary of key demand parameters describing the sand market. These parameters are then applied to illustrate the demand outlook for Auckland. A short commentary about sand-markets in Waikato and Northland is included. Next, the supply situation is summarised – the anticipated supply crunch is highlighted.

2.1 Demand patterns

Official information about the volume of sand used, or extracted, is not available. There is a statistically significant relationship between population and ready-mix concrete. Sand also has other uses in landscaping, industrial applications, turf and golf, equestrian activities, and beach renourishment. These uses combine for the total demand for sand.

The relationship between sand and concrete is fixed and can be used to express sand demand on a per capita basis. The revealed per capita (concrete) sand demand is:

- 5 year average 0.38 tonnes per capita
- 10 year average 0.37 tonnes per capita
- 20 year median 0.34 tonnes per capita

Construction activity increased over the past decade. Notwithstanding the effects of disruptions associated with the shock such as the Global Financial Crises (GFC) and the Covid-lockdowns, construction remains solid and a key part of economic activity. The per capita demand for concrete has trended upward over the short term. The GFC saw a period of low investment in infrastructure and capital assets and consequently, demand for concrete slowed down. During this period, the per capita demand for concrete sand dropped to a ratio of 0.26 tonnes per capita (2009, when construction investment was very low). Post GFC, demand for concrete was relatively flat until 2013 when a clear upswing ensued. The significant disruptions during Covid are evident in ready-mix data. However, a large upswing in demand was experienced in the period following the lockdowns. Currently, the slowing business cycle is reducing demand, but the construction pipeline remains positive looking forward.

Industry sources indicate the Statistics New Zealand Ready Mix Concrete volume is under-estimated by 10 – 20%. This means that using any ratio based on the StatsNZ ready-mix information is likely to understate total demand. However, the analysis uses the official, StatsNZ data.

Historic information indicates that other uses (landscaping, turf and so forth), account for another 25% to 30% of total demand. Expressing this portion on a per capita basis suggests that the per capita use for these other applications is in the order of 0.16 tonnes per capita.

Therefore, the overall demand per capita from all applications, including non-ready-mix concrete is estimated at:

- Bottom end of range 0.50 tonnes per capita
- Upper end of the range 0.53 tonnes per capita.

These demand ratios provide a robust way to estimate current demand and the growth outlook.

Auckland Council has adopted a March 2023 set of population projections to inform its planning processes, specifically the intensification plan change work, and the Future Development Strategy work. The medium projection series is the preferred option underpinning the work. The current demand levels for sand are estimated at:

- Ready-mix concrete sand:
  - Estimated at between 605,000 tonnes and 615,000 tonnes.
- Other applications
  - Estimated at between 261,000 tonnes and 265,000 tonnes.

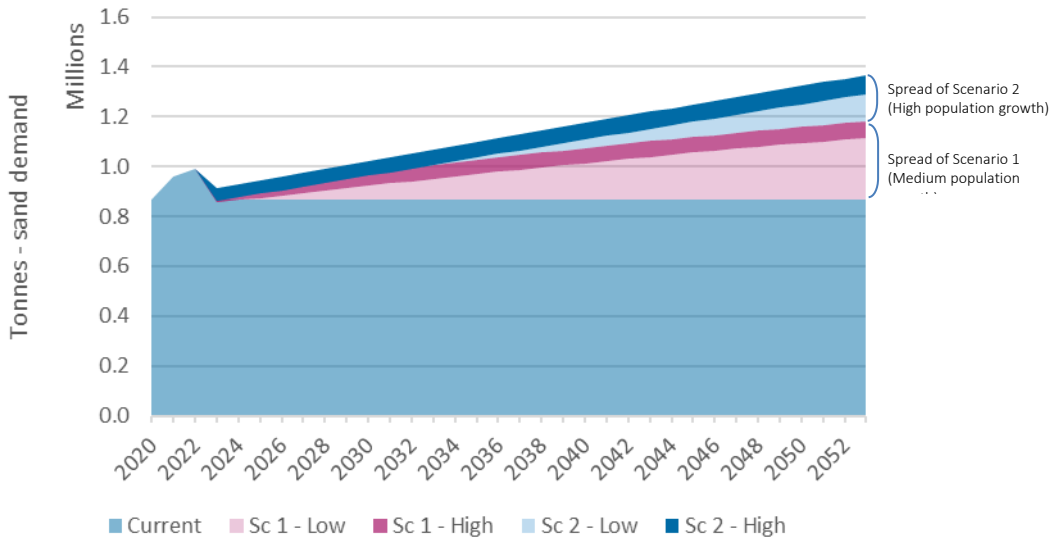
These estimates suggest that based on historic use patterns, annual demand for sand in the Auckland market is in the order of 866,000 to 880,000 tonnes. These estimates are below the peaks seen immediately after the Covid-lockdowns when pent-up demand was in the system. The current levels are broadly in line with the patterns experienced in the 2016/17 period when the economy was growing but before the very strong growth period seen immediately before Covid.

The growth outlook is presented using two scenarios and the results are shown in Figure 2-1. The scenarios reflect:

- the medium population projections,
- the high population growth settings.

The scenarios are both combined with the lower and upper end ratios (for tonnes per capita). The anticipated increase in demand for sand is illustrated.

Figure 2-1: Demand for sand - outlook



The demand outlook for sand in the Auckland market is positive, and demand is projected to grow under all scenarios. The shift in demand is considerable and by 2053, the annual increase in demand is estimated as follows:

- Under scenario 1, the additional sand that will be demanded (per year), is estimated at between 246,200 tonnes and 313,100 tonnes,
- Using the high population growth suggests that Auckland will require between 421,300 tonnes and 498,800 tonnes of sand (per year).

These changes are substantial, representing a percentage change from current levels of between +28% to over +57%. Based on the current growth pathway and sand use patterns, production levels will need to increase over time by almost a third, at the low end, to more than doubling at the upper end of estimates.

The ability of the market to deliver sand is crucial. The supply patterns are a function of appropriate sand (quality) and location. New Zealand has a range of different sand resources, but it is often economically unviable to access due to distance implications.

2.2 Supply patterns

Sand is one of the world's most consumed raw materials. Globally, 40 to 50 billion tonnes of sand are extracted per year for use in construction, primarily to make concrete. Global rates of sand use have tripled over the last two decades as urbanisation surged. Most sand for concrete needs to be sourced from either the sea, from rivers, or from relict river or dune deposits. This is because the grains do not have all their edges eroded away, meaning that the sand binds better with cement to make stronger concrete. Sand that is wind eroded – such as that found in deserts – has a much rounder profile, meaning it is not good for making concrete. In the New Zealand context, the choices are narrower. Due to the continued eruptions from the silica rich andesitic volcanoes of the central north island, the river sands north of Taupo have high levels of alkali reactive minerals. This makes them less desirable for concrete manufacture and civil construction. Within the Auckland market there are three source typologies for sand:

- Land based sources,
- River based,
- Marine sourced.

There are several existing sand extraction sites within Northland, Auckland and Waikato that supply the upper North Island markets. Most of the consented volumes – as well as extraction sites – are located within the Auckland Region. However, current sand supply is highly concentrated with most sand supply now sourced from the Kaipara Harbour – since off-shore sand extraction at Pakiri has been limited by a temporary consent. Two key consents are located at the Taporapora sandbank north of Helensville. The recent major reduction in the volumes of sand that can be extracted from the Mangawhai Pakiri embayment has resulted in a significant reduction in the availability of proven sand that can be used in the Auckland sand market. At the time, the Pakiri inshore and offshore consents accounted for 28% of Auckland's sand sales (346,600 tonnes). While one consent is currently on appeal to the High Court after its refusal by the Environment Court, a temporary consent allowing limited extraction has been granted until a final consent is granted by no later than July 2026. The reduced quantity of Pakiri sand in the Auckland market represents a significant decline in the availability of sand, particularly high quality marine

sand for concrete manufacturing[2]. Available information suggests that during December 2023, the local sand market experienced critical sand shortages, and nearly ran out of sand suitable for concrete production. A similar situation was experienced in February 2024.

Total consented volume of sand provides an indication of the *theoretical* market supply, but this needs to be tempered by practical consideration, such as:

- Sand quality
- Practical and logistical considerations
- Existing allocations
- Location relative to the end-users.

Table 2-1 offers a basic summary of Auckland's key sand sources and additional information is provided in Appendix 1.

Table 2-1: Auckland Sand Sources

Source	Operator	Consented Volume (tonne)	Usable Volume (tonne)	Expiry
Pakiri	McCallum Bros Ltd	136,000	**136,000**	2026
Kaipara	Winstone Aggregate	475,200	**220,000**	2027
	Atlas	604,800	**196,000**	2027
	Semenoff/Winstones Aggregate	45,000	**0**	2025
Tomorata*	Semenoff Group	96,721	**75,000**	
Pukekawa	Winstone Aggregate	129,600	**82,000**	2046
Tuakau	Fulton Hogan	194,400	**96,000**	2038

*Sand Glass Corporation has consented volume of 150,000 tonnes from the Tomorata resource. However, substantial investment in equipment is needed before this resource can be accessed. It is also located a considerable distance from Auckland.

Auckland's sand resources reveal the following key dimensions:

- Total consented volume is estimated at 1.8 million tonnes but the estimated usable value is significantly lower, estimated at 0.81 million tonnes. This includes the Pukekawa and Tuakau resources even though these resources supply non-Auckland users, are at capacity and only a portion of this resource is used in the Auckland market.
- The usable volume reflects adjustments based on sand processing, infrastructure and logistic constraints and market realities. This adjustment process removes around half of the consented volumes.
- The total consented and usable volumes as reported in the preceding points include the Pakiri temporary consent which expires no later than 2026. While the associated volumes form a relatively small part of the consented maximum, this sand is high quality and desirable for high strength concrete applications. It accounts for 17% of usable volumes.

[2] Due to the uncertainty of outcome associated with this consent, and its relatively small size, it is excluded from the wider analysis.

- Excluding the Pakiri resource from the usable values reduces the usable volumes to 669,000 tonnes. At these levels, sand needs to be either imported from other regions, or existing operations need to increase production levels to avoid shortfalls.

The relative importance of marine sand to Auckland's market is evident as shown by the contribution of the Kaipara resource:

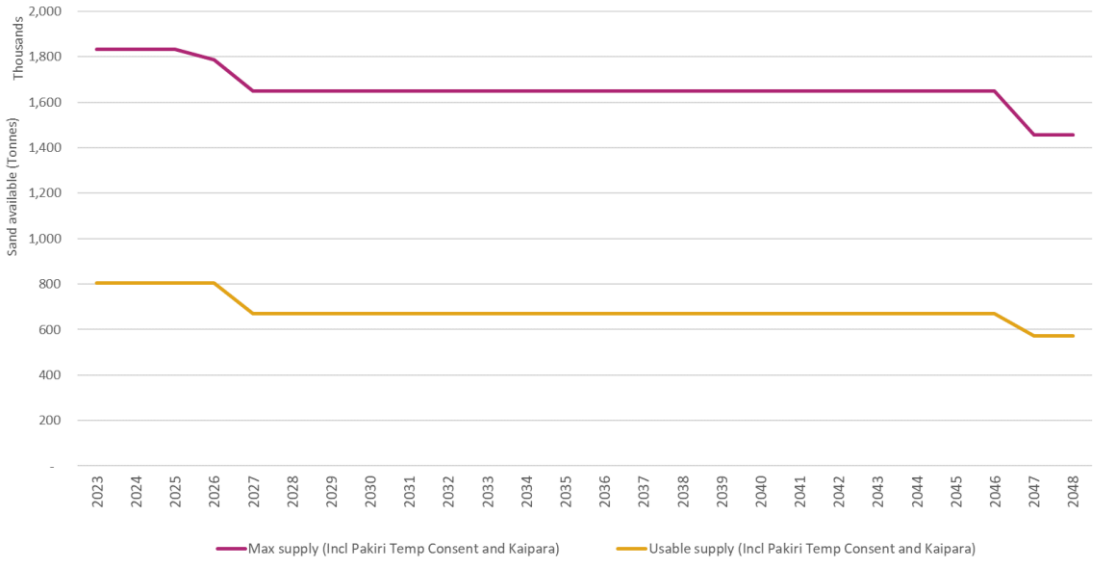
  - 61% of consented volume is associated with the Kaipara resource,
  - 44% of usable sand is associated with the Kaipara sand,
  - Excluding the Pakiri resource from the analysis increases the Kaipara's relative shares to 66% of consented volume, and 50% of usable volume.

Auckland's sand market is heavily reliant on the Kaipara resource, and there are significant concentration risks associated with such reliance. Other sources must be developed to reduce the reliance and to improve supply chain resilience.

Manufactured sand is often raised as a potential alternative to natural sand. Bringing a new product to the market is normally subject to tests to ensure that the alternative meets all the necessary requirements, and to understand/uncover any limitations and nuances. Some of the proponents of manufactured sand have been operating since 2007. However, there is limited evidence of the market taking up manufactured sand as a mainstream option and as a substitute for natural sand. While manufactured sand is promoted as a possible alternative, it remains in the testing and piloting stages. There are no clear market signals that users (demand) are accepting this new technology and manufactured sand remains a speculative option.

The effects of consents expiring on the consented maximums and usable sand are crucial, forming a binding constraint. Figure 2-2 illustrates the spread between the maximum volume and usable sand.

Figure 2-2: Maximum and usable sand – outlook



Note: The figure includes the Tuakau and Pukekawa resource even though it is fully subscribed and allocated to other users.

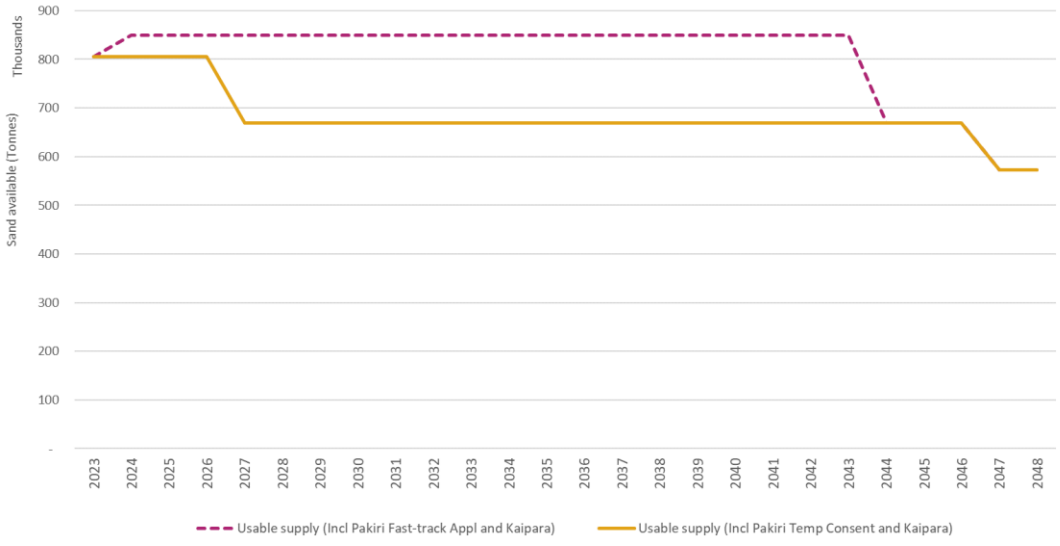
The figure shows:

- There is a significant difference between the consented volumes and the usable volumes. This reflects the well-known operational and technical constraints and limits associated with scaling operations associated with the Kaipara resource (e.g., operating barges on the Helensville River, tidal limitations, vessel size and draft constraints).
- The downward step change in usable sand supply is associated with the temporary Pakiri consent.

As mentioned earlier, the current annual demand for sand in the Auckland market is in the order of 866,000 to 880,000 tonnes, and normal demand levels are greater than the supply. The current supply position shows that the sand market is tight – with the usable sand volumes in line with the demand levels – this is because the current economic slowdown is also felt in the construction sector, with below average activity. Significant pressures on sand supply will become evident and will constrain construction activity as soon as the economy returns to trend-levels. As mentioned in the preceding section, pressures, and an inability to supply sand to the Auckland market are emerging. These pressures are being amplified by the Pakiri consents expiring. Uncertainty around the offshore consent (under appeal) is adding to market concern.

The potential contribution of a different consent, to access the Pakiri sand resource will add to Auckland's access to high quality sand. Figure 2-3 shows the associated lift in sand supply. M.E understands that the annual usable sand is estimated at 100,000 m^3/year. This volume translates into 180,000 tonnes per year. Crucially, the temporary consent will be replaced by the Fast-track Approval consent if successful. The two consents would not run concurrently.

Figure 2-3: Contribution of Pakiri Fast-track Application



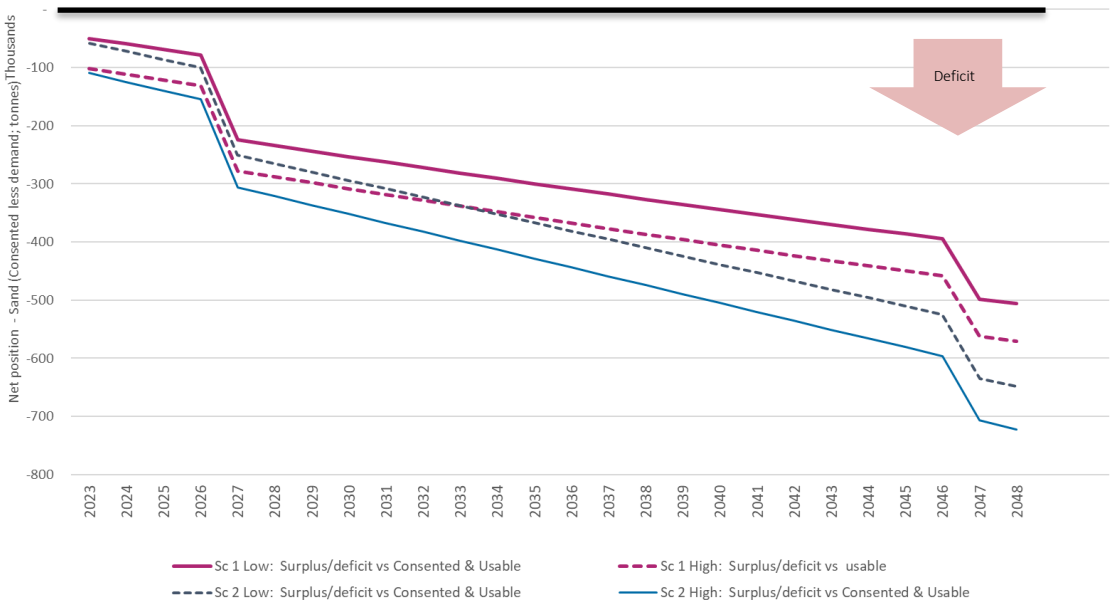
Enabling the Pakiri Fast-track consent sand extraction will add a sizeable resource to the Auckland sand market. The amount will be immediately usable in the market, alleviating pressures on the supply market. The attributes of this resource are well-known and will avoid any costs associated with testing the sand for high strength concrete applications. The addition will provide immediate relief to the constrained sand

market and ensure that sand shortages do not inhibit investment and growth activities when the economic/business cycle returns and an uptick in investment occurs.

2.3 Sufficiency position

The supply position and the demand outlook are combined to identify the future supply-sufficiency position. If demand exceeds supply, then a deficit is expected. Figure 2-4 shows the position of the Auckland market based on Pakiri sand (temporary consent) being available until 2026 and the Kaipara sand continuing to be available to the market over the long term. The sufficiency assessment is based on the usable sand volumes, not theoretical maximums.

Figure 2-4: Sufficiency Position (current values)

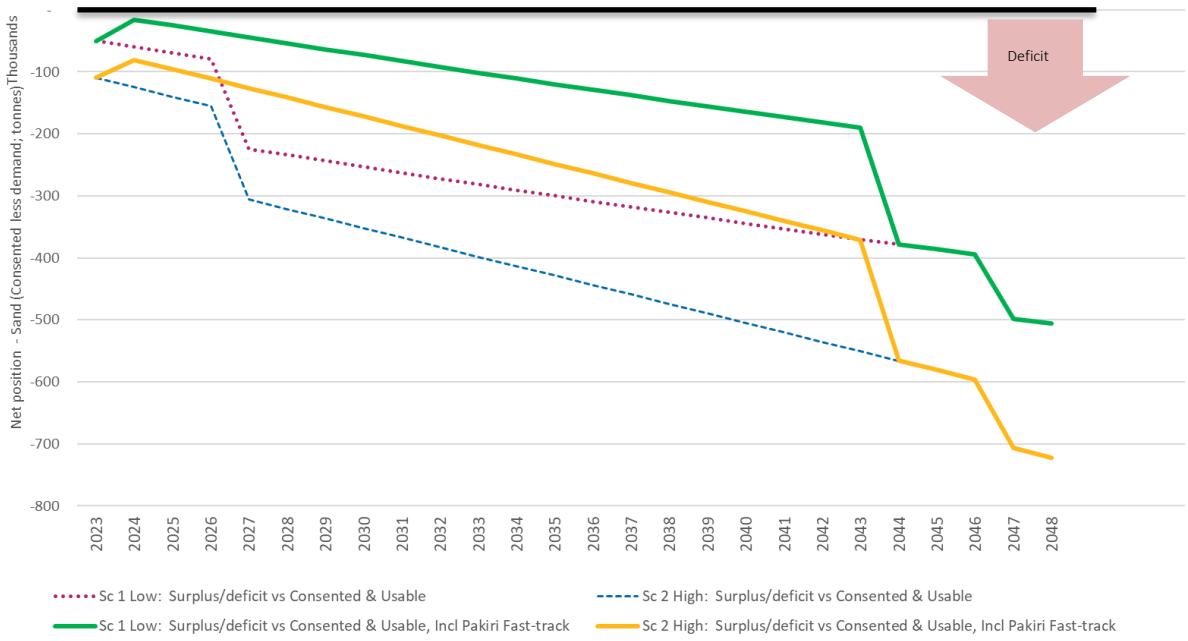


Based on historic sand demand levels, Auckland is expected to see pressures around supply and ability to secure sand. The current economic slowdown and below trend construction and investment are masking the magnitude of the deficit. As the economy recovers, price inflation normalises (returns the Reserve Bank's target range) and interest rates are lowered, an upswing in construction and investment will occur. However, as demand for sand picks up, the true scale of the constrained sand supply issue will emerge. There is limited capacity in the sand market to address any growth pressures. For example, the Kaipara supplied sand would need to increase by between 12% and 26% to meet the shortfall. By 2030, the required lift increase considerably – to between 61% and 85% of current supply levels. These are significant shifts in the required levels and must be seen in the context of the operating environment (i.e., barges and limited technical ability to scale operations due to tidal issues, and vessel sizes). Similarly, the available information suggests that there is inadequate flexibility to respond to short term issues. Looking at the long term,

without a new sand supply, a significant shift to alternatives, or a lift in production volumes, the deficit position will increase.

The Pakiri FTA consent will ensure that there is sufficient capacity in the sand supply market to provide supply chain resilience while supporting efficient market operation and avoiding concentration risks.

Figure 2-5: Sufficiency with Pakiri Fast Track enabled



The Pakiri Fast-track Application consent will add to the Auckland market's sand supply options, with an immediate lift in total supply. This will assist over the short term by addressing crucial gaps in the supply position, and help close the gap between demand and supply. However, even with the Fast-track Application proceeding, a deficit remains. Importantly, the Fast-track application will provide important supply to assist the market adjust to the constraints. Over the short term, the net additional sand that will become available to the market from the Pakiri FTA consent is marginally greater than that associated with the temporary consent – the difference is 44,000 tonnes/year (up to 2026). This means the short term lift in capacity associated with the Pakiri FTA consent will generate two key benefits:

- Provide a crucially important lift in the short term to assist with addressing supply shortages,
- Reduce the potential economic shocks that would arise when the temporary consent expires.

Supporting Auckland's ability to grow and deliver infrastructure means that a sand deficit must be avoided. The Pakiri FTA consent will assist in addressing supply constraints and in doing so will alleviate some of the adverse economic effects associated with insufficient supply. Examples of these effects include:

- **Price increases:** One of the most immediate effects of a supply constrained market is price increases. Sellers can increase prices in response to demand because normal competitive pressures are overridden by demand pressures. These price increases then flow into other, related goods and services, generating price pressures elsewhere in the overall value chain. In the sand market context, any price increase will be embedded in the construction costs, including all infrastructure related spending. Consequently, the price increases mean that available budgets are even more constrained.

- Rationing: One way in which sellers could manage supply constraints is through rationing sand across clients. This could mean that higher-value or priority clients, receive preferential treatment. In such situations, some client might miss out and be forced to change their behaviour, accept higher prices, or use inferior products.
- Shifting demand patterns: If shortages persist, then alternatives are explored, and demand patterns shift. For sand, the shift could include the use of manufactured sand or accessing suppliers that are located outside of Auckland in the Waikato or Northland. However, specialist applications have strict requirements and a simple switch between suppliers is not always possible and pricing can prohibit change (transporting sand is expensive, with direct implications for the delivered price).
- Opportunity for new suppliers: High demand relative to supply can signal market opportunities. Expanding existing operations, investing in additional equipment to lift output, or establishing new operations are all potential responses. These responses are however difficult to implement and take some time to implement. The regulatory processes around sand quarrying or extraction present high barriers and the response is normally slow. Nevertheless, this can lead to increased competition in the long run, which may help to alleviate the shortage. McCallum Bros Ltd's efforts to continue to make the high quality Pakiri sand available to the market is an example of this effect.

2.4 Conclusion

Sand is an essential input into a wide range of applications that are critically important to everyday life. Auckland's sand market is showing signs of supply pressures. Notwithstanding the current economic slowdown, population growth is translating into ongoing demand for infrastructure investments, and therefore concrete and sand. The sand market relies heavily on a small number of consents, with Kaipara Harbour consents playing a key role. However, despite access to a large volume of (consented) sand in the Kaipara, technical and operational considerations act as a natural limit on the usable capacity that can be accessed.

Auckland needs access to multiple sand sources to ensure that the sand industry can respond to future growth pressures, especially during periods of high growth.

3 Significant benefits

Enabling sand to be extracted from Pakiri through the FTA consent, instead of through the temporary consent, to support the Auckland sand market will have direct benefits associated with the construction sector. The construction sector is regionally significant. It generates $8.7bn of GDP, equal to 6.1% of the City's total GDP. Construction is also a significant employer, with 10% of Auckland's employment falling in this sector. However, the true benefits of providing secure access to sand extraction relate to the facilitated effects i.e., it would support construction, and underpin infrastructure delivery. The immediate benefits of high quality infrastructure in the city-wide context are:

- Hard infrastructure requires concrete, and these investments include economic assets such as roads, bridges, ports, and railways. It is critically important to ensure that the infrastructure supports and improves the efficiency of moving goods, people, and information. If sand is not available, and infrastructure cannot be delivered in a cost-efficient or timely manner, then this will lead to cost/budget increases, travel delays and disruptions, long travel times and productivity losses for both individuals and businesses. Overall, these impacts reduce welfare standards.
- Infrastructure enables trade by reducing transaction costs between local boards, and the other regions. These connections stimulate and support growth.
- Well-developed infrastructure attracts domestic and foreign investment. The investment case is stronger for regions with reliable and robust transportation, communication, and energy network.
- Infrastructure investments in areas such as healthcare, education, and three waters contribute to improving the quality of life. This, in turn, enhances productivity, innovation, and economic competitiveness.
- Infrastructure investments can enhance resilience to natural disasters, climate change, and other shocks. For example, flood defences can reduce the economic costs associated with disruptions and damages. In addition, addressing damage after an event requires a strong supply chain, with the ability to access raw materials and processing capacity from diverse sources.
- Infrastructure projects often have long-term benefits that extend beyond immediate economic gains.

Sand is a direct input into Auckland's construction sector, enabling investment in projects delivering significant regional benefits. As New Zealand's primary economic centre – 38% of GDP – the city sees a large share of economic activity and growth. Catering for growth requires investment in infrastructure.

As indicated in the preceding section, the Auckland sand market is tight, with supply not matching demand. Looking forward these pressures are projected to intensify. Using the Pakiri resource offers an opportunity to deliver sand to the Auckland market from a high quality and known resource. Using this resource offers an ability to supply sand to the Auckland market in a way that not only satisfies market demand but does so in a way that delivers a range of wider economic benefits.

The sand market, and its functioning in the context of construction and infrastructure delivery, is regionally significant. Without sufficient sand, the market cannot operate efficiently, and infrastructure delivery will be constrained with adverse flow on effects. At the same time, if the sand is sourced from alternative regions, such as the Waikato and Northland, then the transport function adds other costs, such as:

- Direct transport costs,
- Emissions costs,
- Social costs.

Avoiding these costs can be seen as a benefit. The relative benefits of using the Pakiri resource are that the transport function avoids significant emissions, and these can be quantified and expressed in monetary terms. Despite the Kaipara resource's technical/operational challenges, and the considerations around increasing production, this resource is used as a principal alternative because:

- It has theoretical capacity to accommodate growth,
- It is of a quality that can be used in concrete production,
- Is a known resource.

Using the Kaipara resource as an alternative means that the estimated costs are the 'at least' cost. All other options face greater transport distances that will generate greater externalities.

The section starts by illustrating the link between infrastructure, growth, and concrete (and sand) demand. This is performed by showcasing the types of projects that are underway or planned in Auckland and how these projects generate demand for sand. Next, the section summarises the avoided costs by first offering a short summary of the approach before presenting the results.

3.1 Auckland's significance

Auckland is New Zealand's largest city and is the economic centre. Most of New Zealand's economic and population growth will be centred in Auckland. Building and construction are key parts of Auckland's growth story. Crucially, the growth generates pressures and investment is needed in response to new pressures. However, the city is facing legacy issues that also require investment. Central government and Auckland Council are both undertaking significant investments to address old and new issues. Sand is a key input into concrete that is used in projects that are designed to address these issues.

As mentioned, Auckland is NZ's largest population centre and hosts 1.7m people – a third of NZ's total population. Over the past decade or so (2012 to 2022), Auckland's population grew by 15%. Looking ahead, the five-year period to 2028 will see another[3] 4% increase. Over the longer term (2028-2048) the population is expected to increase by 20%. In contrast, the total New Zealand population is expected to increase by 14%. This outlook underlines Auckland's significance in the New Zealand context. **The city is a key destination for population growth and economic activity, and it will continue to act as NZ's premier population and investment destination.**

Over the past ten years, Auckland has experienced strong growth[4], and GDP is estimated at $133.7bn (in 2022). Overall, the city generates 38% of the national economic value (GDP). Over the last decade, Auckland's growth rate has exceeded that of New Zealand as a whole, with a 3.4% real terms annual increase, compared to the 3.0% national rate.

From 2001 to 2022, Auckland contributed to 41% of New Zealand's overall GDP growth. The growth translates into investment requirements associated with:

[3] This is based on the medium projections.

[4] Sourced from Infometrics.

- Housing and residential areas
- Roads, and transport infrastructure (bridges etc)
- Three waters infrastructure
- Business locations
- Commercial and industrial buildings
- Social and civic amenities and buildings

In terms of GDP per employee (one way to reflect productivity), Auckland is outperforming the rest of NZ. This reflects the city's economic structure and composition. Auckland's GDP per employee is around 6% higher than the national average. Over the past decade (2012 and 2022), Auckland's GDP per capita grew broadly in line with the rest of the economy. **Again, this underlines Auckland's role in the national economy, as well as a direct requirement to ensure that the infrastructure and investment activities support the city's growth. Infrastructure spending is critical, including investment in new assets together with ensuring that existing assets are maintained.**

3.1.1 Infrastructure investment

New Zealand's infrastructure challenges are well-documented. Auckland is in a similar position and the 2023 flooding events highlighted infrastructure deficiencies, caused widespread damage, and initiated a renewed interest in the city's infrastructure resilience and risk exposure. Supporting population and economic growth will require ongoing investment to cater for that growth. At the same time, legacy issues must be addressed, and resilience must be built into the infrastructure landscape.

A NZTA report noted there has been a deficit in infrastructure re-investment for the medium term which, when coupled with strong population growth, means that much public infrastructure is coming to the end of its useful and/or economic life[5]. Combining the historic shortfalls with growth means that the demands on infrastructure investment are likely to become even more acute over the short-term to medium-term.

The investment pipeline shows the size of the infrastructure challenge. There are several large-scale infrastructure projects that will generate considerable demand for concrete, and therefore sand. The National Construction Pipeline report (MBIE) shows infrastructure construction activity in Auckland is forecast to grow consistently and by 12% to 2027 – this is despite the economic slowdown. The Infrastructure Commission's work lists several large projects that will generate significant demand for concrete, and sand. Examples of current, and funded (or funding sources confirmed) projects include:

- Kainga Ora projects:
    - Mt Roskill Precinct Project Bundles 1- 3, stormwater and utilities,
    - Mangere Precinct Projects and rail station upgrades.
    - Tamaki Precinct Projects Bundles 1 and 2, and stormwater and water supply projects.
- Watercare
    - Central Interceptor,
    - Queen Street wastewater diversion and piping,
- Ministry of Education
    - 24 projects ranging from new schools, to expanding facilities in response to roll growth.
- Auckland Transport

[5] https://www.nzta.govt.nz/assets/resources/research/reports/693/693-aggregate-supply-and-demand-in-new-zealand.pdf

- Several projects, including the Carrington Road projects.
- Eke Panuku projects
  - Including Osterley and Amersham Way Streetscape works.

These projects' budgets sum to $1.8bn and are occurring over the next 4-5 years. Projects beyond this time horizon are not funded (so not included in this list). Other high-profile projects that are in the pipeline include:

- **Auckland Airport:** The airport is a crucial component of New Zealand's domestic and international economy. The investment in the airport and associated facilities is a $3.9bn programme over the next 6 years. Some of the announced projects were put on hold due to the uncertainty introduced by Covid-19, but these are now starting up again.
- **Second harbour crossing and North Shore Light Rail**: The Government have announced approximately $40bn of investment for North Shore rail ($25bn) and the second harbour crossing under Waitematā Harbour ($15bn), with work expected to begin within the decade. While the future of light rail is uncertain, ongoing investment in transport infrastructure will be needed.
- **Penlink corridor**: this project is underway and is a 7km transport connection between the Whangaparāoa Peninsula and SH1 at Redvale, which will include new local road connections and a bridge crossing the Wēiti River. These works are estimated to be completed in late 2026 and will cost around $830m.
- **Maungarongo Unitec RC2 Project:** This project relates to a mixed-up development at 1 Carrington Road, Mt Albert. This project is described as five 6-10 story buildings that are mostly residential in nature. The total area is 7,860m^2. The buildings will contain 274 residential apartments as well as commercial and retail space.

In addition to the very large items listed above, NZTA, Auckland Transport and various other public bodies and agencies have numerous ongoing and planned projects to improve the region. Taken together, their cumulative demand is a large part of total demand.

The Central Rail Link is a large project that will transform Auckland's urban form. Using basic facts about this project highlight the critical nature of high quality sand in supporting infrastructure investment.

Example project: Central Rail Link

Over the course of the project, more than 20,000 truckloads of concrete have been delivered to site, nearly 100,000 m³ of concrete has been poured and over a dozen concrete mixes have been used – including some unique mix designs. On average, more than 880 m³ of concrete was delivered to site every week. The sand component associated with this volume of concrete is 42,500 – 45,000 tonnes. The vast majority of this sand was from the McCallum Bros Ltd's Pakiri site.

Infrastructure spending is often designed with the specific purpose of supporting economic productivity and is subject to extensive cost-benefit analysis. This evaluation process considers all costs and all benefits – direct, indirect and consequential. It is essential to have enough natural resources, including sand, to support any infrastructure delivery programme.

3.1.2 Concentration risk

Having access to sufficient sand is an important aspect, but supply chain resilience is also key. Currently, more than half of Auckland's usable sand is in the Kaipara. Using two or more sources at different locations adds resilience to the supply side of the market. Relying on only one resource means that the entire concrete system is at risk because there is limited redundancy to cope with any failure of an individual part or critical piece of infrastructure. If the Kaipara sandbank is the only source of sand and delivery is disrupted[6], then the wider construction supply chain will face significant delays and disruptions. Any disruption is likely to be expensive with unnecessary costs. The importance of having resources on Auckland's west and east coast is further highlighted when considering Waikato sand as a potential replacement source. Waikato sand is nearly fully allocated to existing users, so reallocating Waikato sand to Auckland users will simply create a shortfall elsewhere. But crucially, Waikato sand is less suitable for high strength concrete due to the Alkali Silica risks it presents. This limitation is in addition to the transport costs that are likely to be prohibitive. It is difficult to see the Waikato sand resource as a meaningful substitute for Auckland sand issues.

3.2 Avoided costs are benefits

Transporting sand is expensive, with costs directly linked to distance. Industry information indicates that to move a tonne of sand 1km along the road network costs 27 cents. Transporting sand further has an immediate impact on the delivered cost, and therefore infrastructure budgets. For example, delivering sand to Auckland from Helensville (serving the Taporapora sand banks) to the concrete plants in Penrose needs a 65km road trip. After accounting for different transport distances and accounting for transportation from the Port to Penrose, the additional cost of supplying sand to Penrose (compared to Pakiri option) is estimated at $535/truck – a 36% cost increase due to greater distances. Furthermore, this transport cost can effectively be doubled to $1,070 as the truck needs to return to the plant and is unlikely to have any load to offset the price. This brings the cost of transport up to 72% of the base sand cost. Because McCallum Bros Ltd uses a barge for dredging and transport, they can deliver the sand to Auckland CBD (and then to concrete plants in Auckland via truck) at a significantly lower rate, without adding to congestion issues already seen on Auckland's motorways as would be the case with sand shifted from Helensville.

To put this direct cost into context, the Central Rail Link used more than 20,000 truckloads of concrete. Using this quantum and applying it to the cost difference shown above, the associated sand movements would have cost an additional $3.3m in transport costs alone.

Auckland uses concrete throughout the city and sand is delivered to concrete plants that are located at key points, forming a network. In addition, the sand is used for non-concrete applications (e.g., turf and pre-cast) and these are also distributed throughout the city. However, the supply shortage means that these applications are being rationed.

Currently, most of the sand extracted from Kaipara is allocated to users that are in the west and north of Auckland. Pakiri sand is (and will be) barged to the Ports of Auckland, and then distributed to concrete

[6] This could include mechanical issues, logistic issues, weather events or related disruptions.

plants and other users. There are considerable transport cost savings in avoiding a portion of the transport function when distributing the sand from the CBD compared to Helensville.

In addition to the direct transport costs that flow through to end users, other costs can be distinguished, including:

- Emission costs,
- Social costs,
- Other costs.

3.2.1 Direct transport cost savings

The distance sand is transported has a direct bearing on the delivered price. Using the Pakiri resource, instead of Kaipara sand to meet demand in central and south Auckland will avoid direct transport costs estimated at $4.2m per year. This represents a significant portion of the total value of the sand. Currently, sand sells for approximately $45 per tonne (delivered). Servicing the market using the principal alternative would see costs increase to $7.1m per year relative to using Pakiri sand. The potential cost saving relates to the change in costs. The avoided costs are substantial and incurred every year.

On a cost per tonne basis, the additional transport drives the price up by at least 54% - a significant price increase that will have an inflationary impact on all construction, including residential developments, infrastructure, social amenities, and other sand applications.

Clearly, enabling ongoing access to Pakiri sand will generate direct transport cost savings relative to the principal alternative. These savings arise because the need to transport sand over land is reduced i.e., a more efficient transport mode is used to supply sand to end-users. Other benefits that arise from enabling a lower-cost provider include:

- Lower sand prices reduce, or at least suppress, the concrete price component of infrastructure project budgets.
- Extra competition ensures that the market remains efficient.
- End users have wider choice in terms of sand supply options. This supports competition and helps to keep prices low.

3.2.2 Environmental Costs

The role of transport in generating emissions is well document and undisputed. Therefore, reducing transportation distances and costs and seeking the most efficient means of transporting goods is vital to ensuring New Zealand meets its obligations under the Paris Agreement.

Avoiding sand delivery trips, or using a distribution approach with less total distance will avoid environmental costs associated with emissions. Total emissions include all transport modes, including the barges associated with delivering the sand from the marine sources, i.e., Taporapora (Kaipara) or Pakiri. The emission calculation also includes road movements and travel distances are based on historic supply patterns.

Using Pakiri sand instead of Kaipara sand will enable significant emission savings. Delivering the sand from Helensville to central Auckland's sand users generates considerably more emissions than a Pakiri approach. The additional road transport generates (for every km travelled):

- 5,240g of CO_2 for every km travelled,
- 10.6g of CO,
- 32.83g of NOx,
- 1.15g of hydrocarbons and
- 0.64g of PM_{10} particulates.

When applied to the additional distance required to meet McCallum's current client need, there is an additional 2,975 tonnes of emissions generated to transport 180,000 tonnes annually. This estimate includes the emissions associated with barging the sand to Helensville or Auckland CBD as well as truck movements. It does not include any flow-on emission arising from congestion on the road network due to extra trucks.

Emissions are valued using official, whole-of-government, parameters and we considered the shadow price of emissions. This means that CO_2 emissions are valued in a range and projected to rise over time. To take account of this, the annual shadow price between 2023 and 2048 is used in the analysis. The current estimates for 2023 prices range between $64/tonne and $184/tonne. The mid estimate[7] of $87/tonne is used. Over time, the shadow price increases considerably, with the mid value increasing to $286/tonne by 2048. This increase highlights the critical importance of reducing emissions.

Based on the estimated distance, the associated emissions and the value of emissions, the potential annual environmental savings is estimated at $0.7m, increasing to $1.7m by 2044.

3.2.3 Social Costs

Additional to the direct transport and environmental costs are the social costs associated with injuries and deaths. For every extra truck kilometre travelled, there comes an increase in the likelihood of injuries, serious injuries, and deaths.

Using official valuation approaches, the risks associated with travel distances are translated into social costs, specifically deaths, serious injuries and minor injuries. Applying the Ministry of Transport's metrics suggests that avoiding the additional transport function would generate savings. Considering that the Value of a Statistical Life (VoSL) is estimated at $14.2m, a serious injury is valued at around $739,200 and a minor injury is $78,200, then there is value in removing/mitigating the risk of injuries.

Annual avoided cost is estimated at $187,500 if the Pakiri resource can be used for the Auckland sand market. As with the environmental costs, these are likely to rise as the Value of Statistical Life, and other social cost metrics increase over time.

[7] Note that the mid estimate is not the average between the low and high shadow prices. It reflects the midpoint across different model runs.

3.2.4 Cement requirements

The physical attributes of sand play a critical role in cement requirements when preparing specialist (high strength) concrete applications. The amount of cement needed has direct cost implications based on cement costs. In addition, cement has high CO emissions associated with its manufacturing. While advances and innovation in cement manufacturing and concrete production are lowering overall emissions and cement requirements, the potential savings are substantial. The attributes and cement requirements associated with Pakiri sand are well-known, and the potential cement (and cost) savings relative to using sand from other sources, are significant.

Assuming that on a per cubic meter of concrete basis, approximately 4kg less cement is required (relative to Kaipara sand), then using Pakiri sand would:

- Save on cement costs $362,700/y
- Emissions saving[8]
    - Year 1 $123,700/y
    - Year 20 $187,000/y.

3.3 Total benefits

The benefits associated with enabling better use of the Pakiri resource will deliver significant benefits to Auckland. Quantifying the size of these benefits must reflect an appropriate counterfactual. In this case, the counterfactual includes the volumes associated with the temporary consent. The annual values presented in the preceding sections are used to illustrate the significant economic benefits associated with enabling the sand extraction associated with the fast-track application. The benefit position is expressed in present value terms by discounting future values. Essentially, the discounting process reduces the relative importance of future benefits (or costs) relative to short term benefits. Using a default rate of 5%, and a 20-year period suggests that the present values of the benefits are:

- Direct transport costs $46.0m
- Environmental costs $17.4m
    - *Health related costs* *$11.8m*
    - *Shadow price of Carbon* *$5.6m*
- Social costs $2.0m
- Cement use and emissions $6.7m
- **Total** **$72.1m**

Based on the above transport, environmental and social costs that would be avoided by enabling Pakiri sand extraction, are valued at $72.1m.

This represents the economic benefit (in the form of avoided costs) that accrue to Auckland's economy - and ultimately households. This is likely to be conservative, as it assumes that the Helensville plants can meet Auckland's growing appetite for sand. The transport costs will be significantly higher if sand is

[8] Values increase over time because the shadow price of carbon increases.

transported from sources that are located further from Auckland than the Kaipara resource (e.g., from Northland and Waikato).

4 Conclusions

Efficient and sustainable access to sand will be an important factor in both facilitating Auckland's economic growth aspirations and providing infrastructure such as roading, buildings, and other infrastructure to support Auckland's rapidly growing population and economy. Table 4-1 provides commentary illustrating how the Pakiri sand Fast-track application aligns with the eligibility criteria as outlined in Clause 17(3) of the Bill. The presence of the sand and the ability to utilise it sustainably contributes significantly to the economic wellbeing of Aucklanders.

Table 4-1: Alignment with Fasttrack legislation criteria

Eligibility criteria Clause 17(3):	Comment
(b) will deliver regionally or nationally significant infrastructure	Sand is an essential ingredient of concrete, and concrete is needed across the entire urban landscape. Pakiri sand offers an opportunity to avoid the adverse effects of a constrained sand market, while also reducing cost pressures. These are critical considerations associated with business as usual processes, but the processes will be critically important when delivering any significant infrastructure. Auckland generates 38% of New Zealand's GDP, and without sufficient, high quality sand, the city's economic performance will suffer.
(d) will deliver significant economic benefits	Supplying the Auckland sand market using the Pakiri resource, instead of the principal alternative will avoid considerable costs. The avoided costs are seen as benefits and the analysis shows that the present value of these avoided costs is $72.1m – avoiding these costs translates into a significant economic benefit.
(f) will support development of natural resources, including minerals and petroleum	Auckland's sand market is showing signs of constraints with demand levels starting to exceed supply capacity. The current economic slowdown is masking the size of these pressures Developing the Pakiri resource as a mineral option is consistent with developing resources in a responsible and efficient way.
(g) will support climate change mitigation, including the reduction or removal of greenhouse gas emission	Minimising the distance that sand, and concrete, travels to end users ensures that the associated emissions are kept to a minimum. The analysis illustrates that barging sand to Auckland CBD and then distributing the sand to end users generates less emissions than souring sand from the principal alternative (Kaipara). However, the Kaipara consents are expiring in three years, and renewal is not guaranteed. Sourcing sand from other resources will generate even greater emissions than those estimated here. The value of the saved emissions is estimated at $5.6m using the mid-point values (the emissions associated with using additional cement is estimated at $1.9m).
(h) will support adaptation, resilience, and recovery from natural hazards	Apart from ensuring that there is enough sand to support Auckland's growth, enabling Pakiri will enhance the sand market's resilience because key supply sources will be available from Auckland's east and west coasts. The Kaipara resource is the largest resource and sand is barged to Helensville. Operational factors, such as tidal and marine conditions present risks. Enabling multiple sources reduces concentration risk. In a post-disaster situation, reinstating infrastructure as fast as possible is crucial. It is plausible that the natural event that caused widespread damage could also damage the sand-infrastructure at Helensville. Developing and maintaining multiple sources of sand is prudent.

(i) will address significant environmental issues	High quality sand is used in specialist concrete applications in infrastructure that are designed to address legacy issues. Auckland's Central Interceptor is an example of such a project. Without enough high quality sand, there will be delays in delivering the concrete used to deliver such projects. Limited sand supply will mean that sand is rationed across concrete suppliers, and investments in environmental infrastructure will compete for concrete, and other resources, meaning that delivery timeframes will be pushed out.

Appendix 1: Sand extraction operations – key facts

Region	Region Supplied	Owner	Operator	Consent expiry	Max. Annual Volume	Converted Saleable Tonnes	Estimated Tonnes Sold	Theoretical Spare Capacity	Comment
Taporapora Sand Bank Kaipara	Auckland	Winstone Aggregates	Winstone Aggregates	21/05/2027	264,000	475,200	220,000	255,200	Extracted by Mt Rex Shipping. They are currently unable to supply any further volume due to operational constraints.
	Auckland	Atlas	Mt Rex Shipping	21/05/2027	336,000	604,800	196,000	408,800	Extracted by Mt Rex Shipping. They are currently unable to supply any further volume to customers due to operational constraints.
	Auckland/Northland	Semenoff Group/Winstone Aggregates	Kaipara Water Transport	30/05/2025	25,000	45,000	-	45,000	Currently not being extracted from. Is a partnership with Firth concrete and was used to supply the northern plants from Whangarei north
Tomarata	Auckland/Northland	Semenoff Group	Semenoff Group		53,734	96,721	75,000	21,721	Volume sold into at least one concrete plant in Auckland (Holcim) . Volume going into some Northland plants but spare capacity for Holcim created by start of Ruakaka sands and supply to Firth block and concrete plant
		Tomarata Sand Glass Corporation	NA		80,000	150,000	5,000	145,000	Small volumes going locally. There is no processing plant on site so it is not a finished product
Pukekawa Sand Plant	Auckland / Waikato	Winstone Aggregates Ltd	Winstone Aggregates	30/06/2046	120,000	129,600	82,000	47,600	Volume not sold into Auckland concrete plants but sold into Firth block plant. MBL purchase sand from quarry and they are at capacity with supply based on a quota. Therefore no spare capacity assumed as an operational issue
Tuakau sand Plant	Auckland / Waikato	Fulton Hogan	Fulton Hogan	7/02/2038	180,000	194,400	96,000	98,400	Volume sold into some Auckland concrete plants that MBL cant supply. They also supply some Waikato plants and a lot of the turf customers now. Yield of No.1 sand is 60% as per Winstone Aggs sand extraction in Pokeno. We have been told they have no spare capacity but have managed to supply concrete plants needing sand. They may have installed a new spiral to increase capacity

Attachment 3

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29 April 2024

Hon Shane Jones, Minister for Oceans & Fisheries, Minister Regional Development
Parliament Buildings
Wellington 6160

Email: shane.jones@parliament.govt.nz

Dear Minister Jones

Re: Auckland Concrete Market – Sand Supply Security

Hynds Pipe Systems is the largest manufacturer of pre-cast concrete products for use in NZ's water infrastructure. We also manufacture a broad range of non-water related civil and rural concrete products. For supply into the North Island the large majority of these products are manufactured at our Pokeno plant just south of Auckland. This is a state-of-the-art manufacturing facility utilizing high performing specialized concrete mixes.

Concrete manufactured at this site relies on raw materials being as consistent as possible with minimal variation to achieve performance requirements. Hynds has used sand from McCallum Brothers Ltd as a key ingredient in our concrete for over 20 years.

Due to the restriction on McCallum Brothers Ltd extracting sand offshore from Pakiri Beach, sand supply for the entire Auckland and Northern Waikato concrete markets is under extreme pressure. Fortunately for Hynds, McCallum's have prioritized our supply needs ahead of other concrete and non-concrete customers. However, we remain with significant supply uncertainty and have run short of supply on several occasions. Switching to alternative suppliers would be extremely challenging as none of the other suppliers have capacity to lift production to anywhere near the shortfall faced by McCallum's.

This current tight supply situation is in a market that has declined approximately 20% over the last year as the NZ economy has slowed. Demand will, however, recover over coming years and if there is not secure sources of quality consistent concrete sand the Auckland construction market and the NZ economy will be in serious trouble.

Hynds believe it is critical that McCallum Brothers secure ongoing sand resources, and that utilizing the proposed fast-track consenting process to progress supply options either offshore at Pakiri or in Bream Bay could significantly reduce time and supply risk. McCallum's have already completed extensive research and investigation regarding the impacts of these activities.

Thank you for the time in considering what is an extremely important issue for the Auckland region.

Sincerely

Andrew Moss
Chief Executive Officer

SUPPORTING STATEMENT OF PATRICK JOHN BRIDGEMAN IN SUPPORT OF MCCALLUM BROS LIMITED APPLICATION TO FAST TRACK A SAND EXTRACTION CONSENT FROM A SITE IN THE MANGAWHAI PAKIRI EMBAYMENT.

1. My name is Patrick John Bridgeman and I am the Managing Director of Bridgeman Concrete Limited ("BCL").

2. BCL produces and delivers ready mixed concrete throughout the North Island. We primarily produce concrete for the Auckland, Waikato, Bay of Plenty and Hawkes Bay markets.

3. I am making this statement to support the application by McCallum Bros. Ltd (MBL) for inclusion as a fast track project under the Fast Track Amendment Bill. The application is for consent to extract sand from a ~10 km^2 site in the Mangawhai/Pākiri Embayment, North Auckland.

4. I want to explain some of the issues BCL would face if, following the Environment Court's decision declining the application for the offshore sand extraction consent at Pakiri, MBL is unable to supply BCL with marine sand for concrete manufacture.

5. BCL supplies between 6% and 7% of the ready mixed concrete used in New Zealand, and between 15% and 18% of the ready mixed concrete used in the Auckland market (for both residential and commercial supply). BCL also supplies from time-to-time specialist concrete mixes for public infrastructure works, including the City Rail Link and the Central Interceptor.

6. BCL has plants in Hastings, Napier, Hamilton, Papakura, East Auckland, Avondale and has interests in plants in Tauranga and Rotorua through joint ventures. BCL's three Auckland plants receive about 40 - 45 truck and trailer loads of sand per week (700 -850m^3). The plants in Papakura, East Tamaki and Avondale use the Pakiri sand and Avondale supplies have more recently been supplemented by some Kaipara Harbour sand delivered by MBL. At present sand from the Kaipara Harbour supplied by Mt Rex shipping Ltd is the only other sand suitable in sufficient quantities for the majority of our concrete making

processes.

7. From time to time, the plants in Hawkes Bay and Tauranga have also used some Pakiri sand. This need arises when the quality of sand from the Hawkes Bay and the Waikato falls in quality. The Pakiri sand is needed to help balance out the lower quality sand from those areas.

8. I am also involved in a cement plant in Mt Maunganui, HR Cement. HR Cement supplies about 10% of the New Zealand market with cement. HR Cement's plant is currently producing a low carbon cement product "Ecocem", which it supplies to the market. Ecocem is a cement product with significantly lowered embodied carbon compared to standard concrete.

9. BCL are wholly reliant on sand from MBL for its three Auckland plants. If MBL were unable to provide us with sand, the three Auckland plants would have to close and the cement plant would reduce to half its productivity (as it would not be providing the cement for our Auckland plants).

10. As part of my role as Managing Director at BCL, I have investigated the availability of alternative sand supplies and I am in regular contact with others within the industry, including various sand suppliers. I am aware that there is a shortage of sand suitable for high strength concrete in the Auckland market. Since the end of July 2023 when MBL had to greatly reduce the volume of sand from Pakiri there has been a worsening shortage of marine sand in the Auckland market. As stockpiles of the Kaipara sand have been seriously depleted, MBL has begun to introduce rationing of its sand supply to all of its customers including BCL. We have been forced to purchase a re-screened aggregate contaminated sand to maintain production at the rate required by our customers. These problems would have been far worse had the Auckland construction market not suffered a downturn in the last 12 months.

11. The current position is that if further marine sand is not made available Auckland concrete manufactures will have to accept further cuts in supply and face reduced concrete production. The result would be a shortage of concrete for development and construction in the Auckland market and in particular for any infrastructure projects which rely on the high strength concrete for which marine sands is an essential component. As the construction industry picks up the position will only become worse and could become critical.

12. Access to Kaipara Harbour sand is controlled by Mt Rex Shipping, which is

controlled by the owners of Atlas Concrete Limited ("Atlas"). I doubt that BCL would be able to obtain reliable supplies of Kaipara Harbour sand from Atlas/Mt Rex Shipping in sufficient amounts to keep the Auckland plants running.

13. As Atlas is also a concrete producer and a direct competitor to BCL, I am doubtful that they will be prepared to sell Kaipara sand to us on acceptable terms or possibly at all. Whilst MBL are able to act as a middle man for a short period of time to provide us with some Kaipara sand, that is not a long term solution.

14. In addition, if the entire Auckland concrete market was reliant on the Kaipara Harbour sand source and only one supplier, it would be highly exposed to the risk of supply failure. For example, if Mt Rex Shipping ran into an issue and the supply of this sand was affected (i.e. because a barge broke down, or production and extraction rates dropped), there would be a material impact on the sand available for supply to the wider Auckland concrete industry.

15. If MBL is unable to supply us with marine sand and BCL cannot source a suitable alternative, BCL's ongoing ability to operate in Auckland would be threatened. BCL does not hold a stockpile of sand. Once sand is received, it is used to make concrete. Without suitable sand coming in regularly, we will no longer be able to produce and deliver concrete.

16. If BCL's three Auckland plants were to close, this closure would affect approximately 100 employees and/or contractors who work with those plants (including 19 independent owner/operator truck drivers who rely on BCL). The Auckland plants would not be able to operate until an alternative supply is found which could be significantly more expensive. This closure would have a flow on effect with an immediate reduction in concrete supplied to the Auckland market and a corresponding effect on the construction industry.

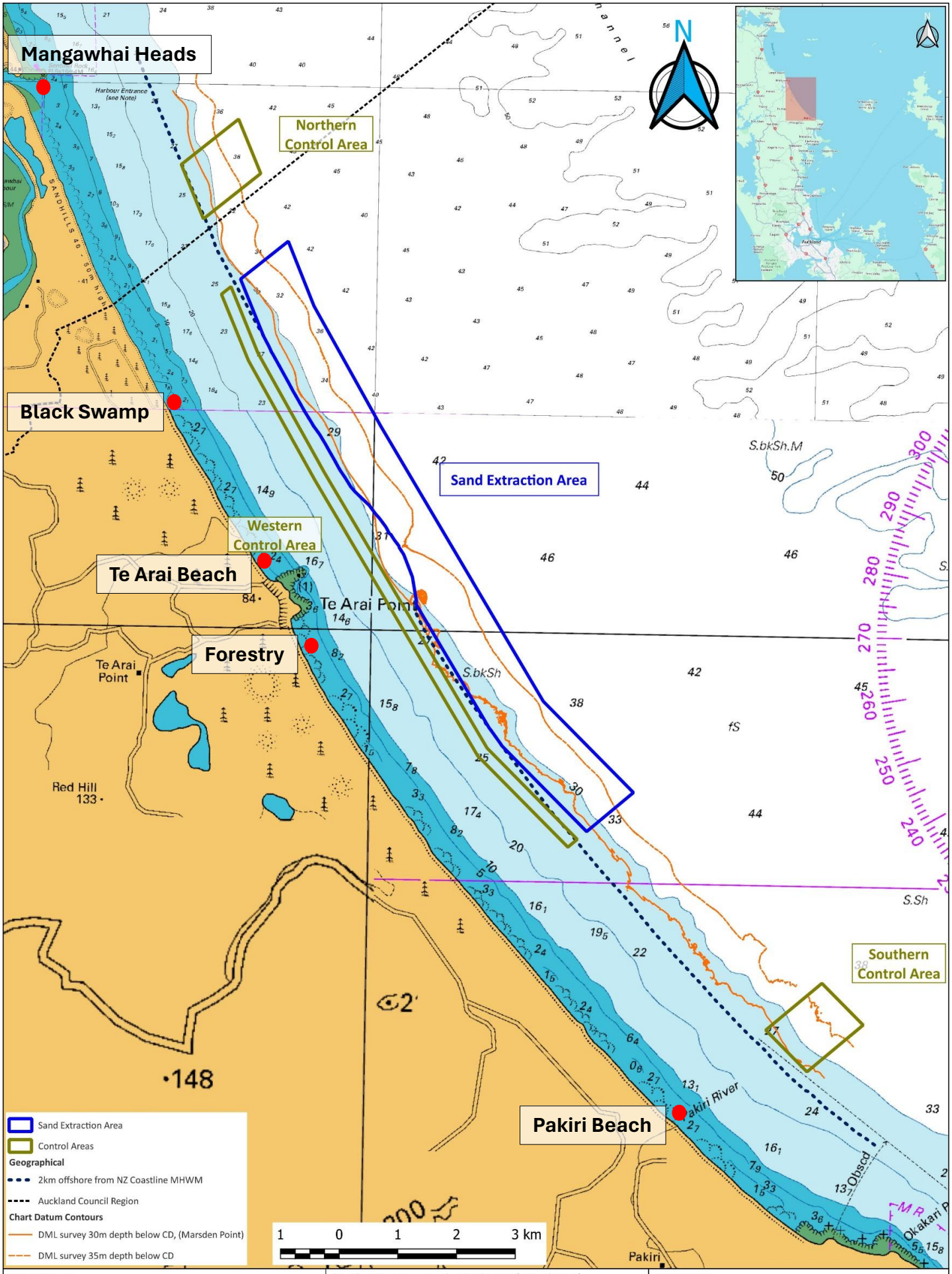
17. A recent development has been the introduction of a trial production of sand manufactured from rock at Kaipara Ltd's quarry in Brookby. BCL's previous experience with manufactured sand has not been satisfactory. We have, however, undertaken trial manufacture of concrete with the new Brookby product but have found it in its present form unsatisfactory in a number of aspects. It is not easy to pump and does not finish as well in certain inferior characteristics.

18. I believe that the shortage of marine sand in the Auckland market and the

possibility of worse shortages to come as construction and infrastructure development increases in the future is the most serious threat that our business has faced in our 56 years of operating.

PATRICK JOHN BRIDGEMAN

Attachment 6: Locations of Recognised Surfbreaks



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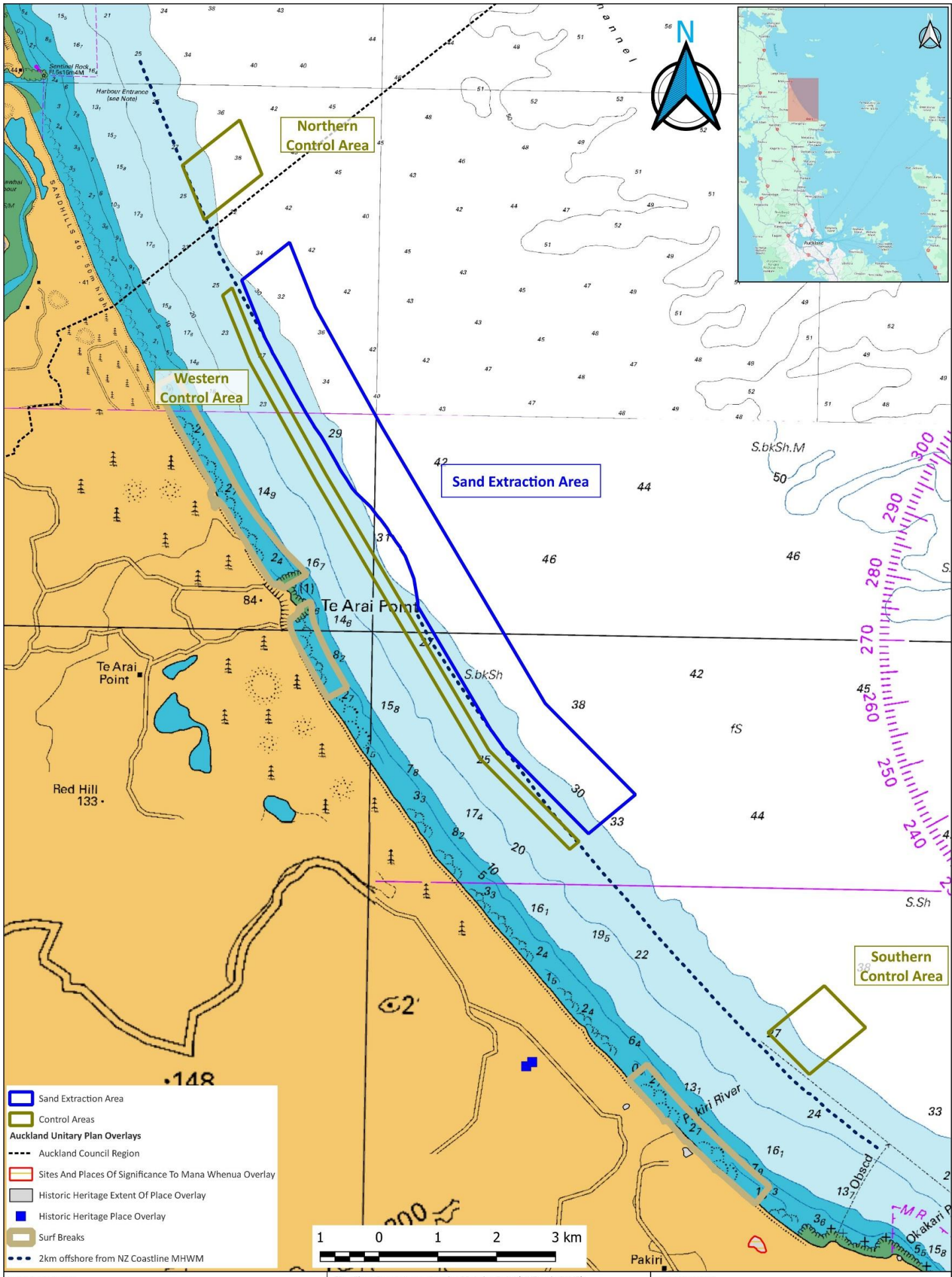
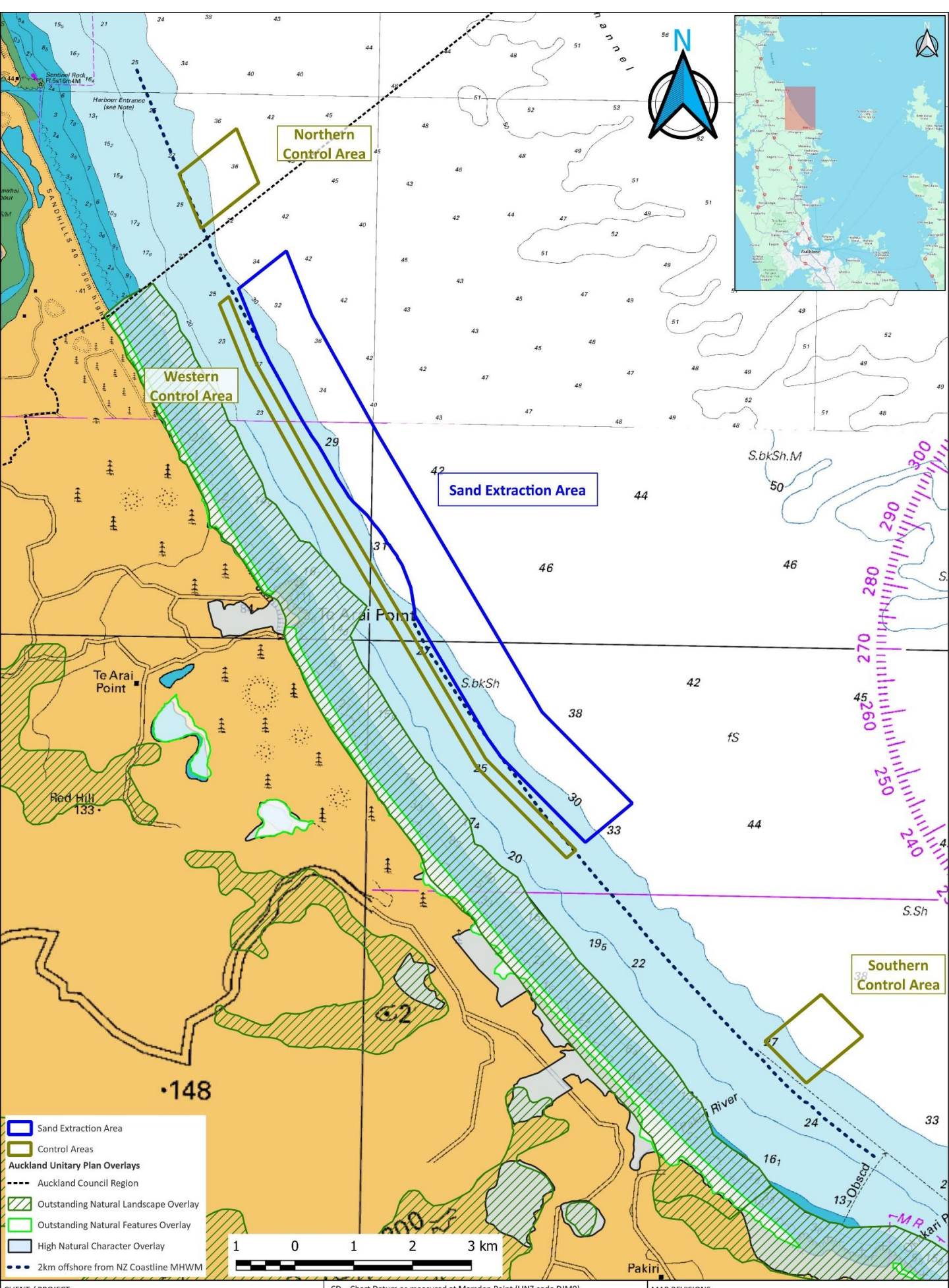
MAP FILE NAME **Proposed Offshore Sand Extraction Area and Control Areas**		Bioresearches

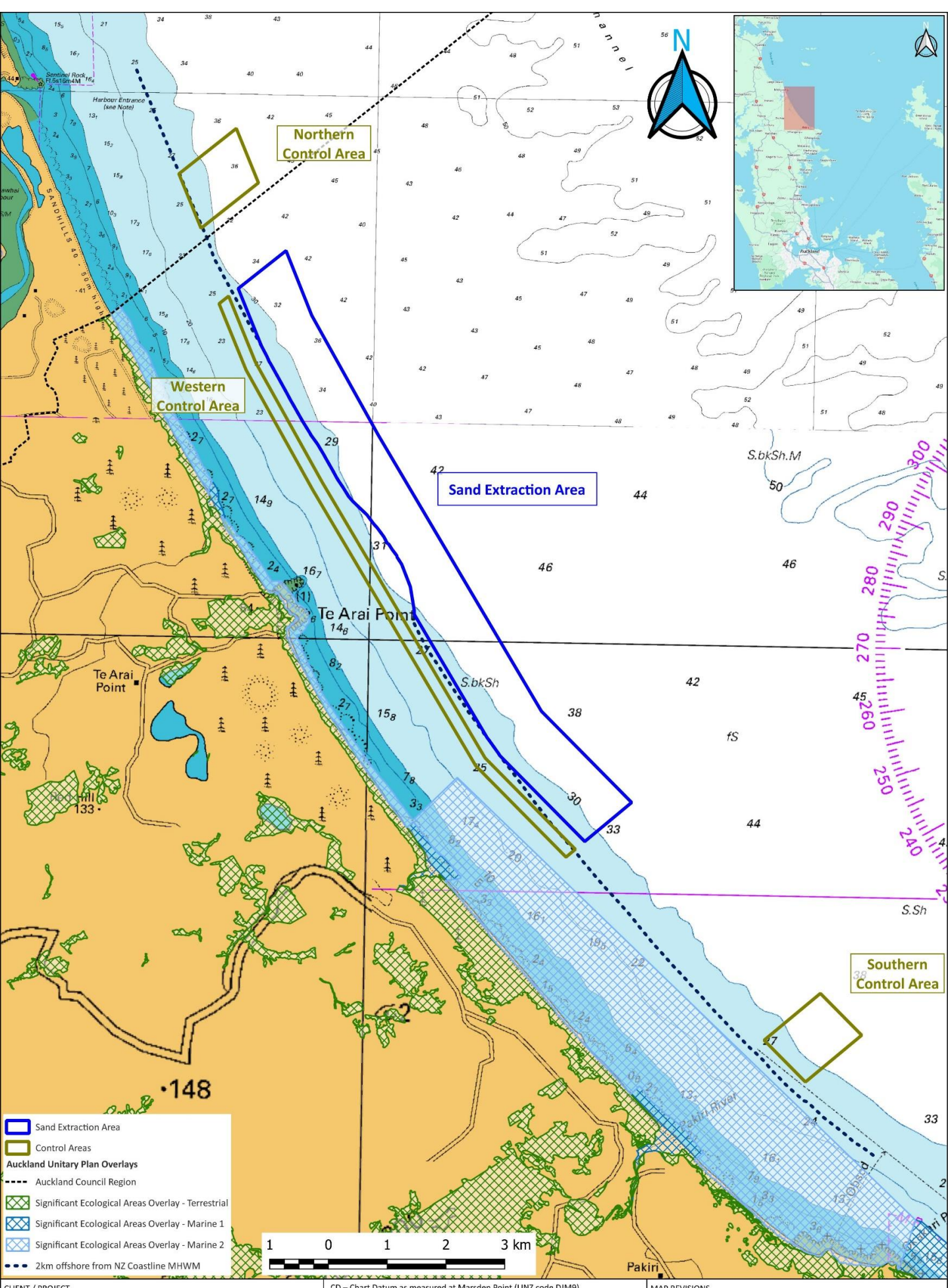
Attachment 7



CLIENT / PROJECT McCallum Bros. Ltd.	CD – Chart Datum as measured at Marsden Point (LINZ code DJM9) Map projection - NZ Transverse Mercator EPGS:2193 GPS points - WGS 84 EPGS:4326	MAP REVISIONS Drawing Date: 1/05/2024 Version 1.4.1 by SW.
MAP FILE NAME **Proposed Offshore Sand Extraction Area and Control Areas with Auckland Unitary Plan Surf Breaks and Historical Heritage Overlays**		Bioresearches



CLIENT / PROJECT McCallum Bros. Ltd.	CD – Chart Datum as measured at Marsden Point (LINZ code DJM9) Map projection - NZ Transverse Mercator EPGS:2193 GPS points - WGS 84 EPGS:4326	MAP REVISIONS Drawing Date: 1/05/2024 Version 1.3.2 by SW.
MAP FILE NAME **Proposed Offshore Sand Extraction Area and Control Areas with Auckland Unitary Plan Landscape and Character Overlays**		Bioresearches



CLIENT / PROJECT McCallum Bros. Ltd.	CD – Chart Datum as measured at Marsden Point (LINZ code DJM9) Map projection - NZ Transverse Mercator EPGS:2193 GPS points - WGS 84 EPGS:4326	MAP REVISIONS Drawing Date: 1/05/2024 Version 1.2.2 by SW.
MAP FILE NAME **Proposed Offshore Sand Extraction Area and Control Areas with Auckland Unitary Plan Significant Ecological Areas Overlay**		Bioresearches

ATTACHMENT 9

ASSESSMENT AGAINST THE AUCKLAND REGIONAL POLICY STATEMENT

The AUPOP (which incorporates the Auckland Regional Policy Statement ("RPS")) was prepared after the New Zealand Coastal Policy Statement and the Hauraki Gulf Marine Park Act 2010 were enacted. The AUPOP has to give effect to these planning instruments.

Mineral extraction is specifically addressed in the AUPOP at both RPS level and in the Regional Coastal Plan. The explanation and principal reasons for adoption for the minerals section of the RPS (B7.6) notes that "*minerals are essential for Auckland's development*" and "*Given the anticipated increases in demand for and Auckland's dependence on minerals, an accessible supply of minerals is a matter of regional importance. This means that the use of aggregate resources needs to be used as efficiency and effectively as possible*." For the coastal marine area, mineral extraction objectives and policies are included in the Regional Coastal Plan (F2.6).

B7.6 (Minerals)

In respect to Objective B7.6.1 (minerals), granting consent for sand extraction site ensures that the sand resource is utilised in an effective and efficient manner. Sand extraction and delivery to the market can be undertaken at a volume and at a cost which currently meets in part the community requirements.

Pakiri is a regionally significant mineral resource and is critical for Auckland's continuing development. This sand resource underpins the construction sector, which is a major employer for Aucklanders and contributes more than $6 billion to the economy. Without access to this mineral resource, the economic viability of many construction and infrastructure projects could be disrupted or face cost increases.

This sand resource is instrumental in delivery of the urban form sought by the National Policy Statement on Urban Design, the AUPOP and the Auckland Plan. Auckland's future urban form is predicated on the delivery of intensification. Urban intensification depends on higher density residential typologies, like apartment buildings, which are dependent on concrete in their construction. Similarly, urban intensification requires large-scale infrastructure investment. Without access to high quality concrete, the cost management and delivery timeframes of infrastructure projects is put at risk.

Turning to the supporting policies, Policies B7.6.2(1) and (4) are relevant. The the site is a suitable area for sand extraction as sand extraction can be undertaken in a manner which avoids significant adverse physical effects, with sand product delivered to the Auckland community in a timely, secure and cost-effective manner.

B4 (Natural Heritage)

The proposed sand extraction site is not within any landscape overlays. It is considered:

- Given the nature of the proposal and its potential effects it is considered that the sand extraction would not impact on the two outstanding natural landscape and the High Natural Character overlays in the wider area (or any cultural landscape values associated those overlay areas).
- The proposal is not an inappropriate development in terms of Objective B4.2.1(i) 1 or supporting Policies B4.2.2(3) and (6) as the physical and visual integrity of the Outstanding Natural Feature, Outstanding Natural Landscape and High Natural Character overlay areas (including any cultural landscape values associated with them) is not being adversely affected.

In terms of the potential longer-term landscape and visual effects associated with coastal processes as no effects on the shoreline profile are anticipated the extraction of sand is not anticipated to cause onshore erosion or fundamental changes to the natural heritage values associated with the Pakiri shoreline

B6 (Mana Whenua)

The sand extraction at the proposed site would have negligible to minor effects on coastal processes, ecological values, water quality, recreational uses, heritage and landscape/character values (although less than significant effects would arise from one viewpoint). This is due in part to the proposed sand extraction location, the use of the trailing suction draghead, the discharge method and controls on operational hours and lighting. There is no direct linkage between the proposed sand extraction activity and effects on kaimoana gathering or disturbance of wāhi tapu sites.

The importance of the intrinsic elements of the Māori world view, including kaitiaki and mauri, is acknowledged and the sand extraction may be considered by some as having significant adverse cultural effects. This is likely to be dependant on their relationship with the extraction area and with Pakiri sand.

When taking a holistic view of the potential impacts, consideration also needs to be given to the economic and social well-being benefits of an efficient and secure sand supply to mana whenua in Auckland and in terms of the Māori economy.

B7 (Natural Resources)

Objective B7.2.1 seeks to protect significant indigenous biodiversity from adverse effects arising from use of the coastal marine area. The proposed sand extraction site does not have significant indigenous biodiversity. Although there is a variety of species present, these organisms are neither nationally significant nor have a protected conservation status. It is recognised that Stony Coral have been identified in the wider area and the Pre-Application assessment will exclude areas from extraction if these are found in the

extraction area. The benthic ecology present is also able to rapidly recolonise dredged areas.

Many faunal species' presence would be transitory. This is particularly true of seabirds, fin fish and marine mammals. In these instances, extraction activities are limited in duration and would be predominately at night, when some species are unlikely to be active. Nocturnal species would be principally protected through controls of vessel lighting, which would limit the attraction of prey and bird species that could be attracted by bright lights. Any potential adverse effects would not be beyond minor.

In addition, minimal if any adverse effects are anticipated on the identified Significant Ecological Areas in the Pakiri vicinity.

In terms of B7.4 (coastal water, freshwater and geothermal water) the discharge from the sand extraction operation involves excess seawater, oversized material and a small amount of fine clay sized particles. These discharges do not contain any introduced or foreign contaminants. By discharging underneath the vessel, the material disperses rapidly with the bulk of the material sinking to the seafloor. This occurs within a short period of time.

This discharge does not degrade the water quality with any plume only lasting a short time. No potential significant adverse ecological effects have been identified from this discharge and plume.

In terms of Objective B7.4.1(6) and supporting Policy B7.4.2(7)(d), mana whenua values are recognised and there would be no direct effects from the discharge on wāhi tapu, wāhi taonga and mahinga kai.

<u>B8 (Coastal Environment)</u>

In respect to B8.2 (Natural character) the sand extraction area is outside the areas of the coastal environment identified as having outstanding or high natural character. Given the nature of the proposal and its potential effects it is considered that the sand extraction would not impact on the two outstanding natural landscape or the High Natural Character overlays in the wider area.

No permanent or fixed structure within the coastal marine area are required for the sand extraction operation at Pakiri. Sand extraction would occur in 3-to-5 hour periods with most of this time being the hours of darkness. During all other periods there is no effect on the areas of outstanding or high natural character. Even if it was considered that adverse effects may arise from the presence of the *William Fraser*, then these effects would be temporary and intermittent.

The proposal would not have significant adverse effects on those areas of the coastal environment which are not otherwise identified as having outstanding or high natural character.

Given the identified sand movement pathways, the sand volumes in the embayment, the sites history of sand extraction in the embayment, the lack of significant habitats, features and values, the ability to monitor the site and its accessibility to the Auckland market, it is considered that the proposed sand extraction site is an appropriate area for sand extraction. In particular, sand extraction, site monitoring and delivery of sand to the Auckland market can be undertaken at this site in an efficient manner. The use of a trailer suction draghead and the proposed volume limits and consent duration along with the other recommended operational conditions result in the proposal being of an appropriate form and with appropriate limits.

The proposal would not result in any degradation of the coastal environment in this location or the net loss of sensitive marine ecosystems. The extraction site is 2 km off-shore and approximately 3.8 km from the Cape Rodney-Okakari Marine Reserve. The proposed activity would not adversely impact on any regional park, offshore conservation islands or Department of Conservation land.

The potential presence of stony coral and scallop beds in the wider area have been identified and the use of the pre-sand extraction assessment methodology would identify such areas and allow for these areas to be excluded from the approved sand extraction areas.

B10.2 Natural Hazards and Climate

The sand extraction activity is not subject to any specific natural hazard risks that require consideration.

The sand extraction activity will not exacerbate the erosion risk along the shoreline.

THE AUCKLAND UNITARY PLAN OPERATIVE IN PART – REGIONAL AND DISTRICT OBJECTIVES AND POLICIES

Chapter F - Regional Coastal Plan

The site is within the General Coastal Marine zone.

In terms of the Regional Coastal Plan F2.5 (Disturbance of the Foreshore and Seabed), F2.6 (mineral extraction), F2.11 (discharges), F2.14 (use, development and occupation in the CMA) and F2.18 (underwater noise) and considered of relevance to this application.

In terms of F2.5 the sand extraction seaward of the depth of closure is not expected to result in erosion the Pakiri shoreline. A detailed monitoring and review programme is proposed to continually assess this. Effects from the disturbance of the seabed would be short term and minimal. It is therefore considered that granting consents would not be contrary to Objective F2.5.2(1) or (2) or Policy F2.5.3(1).

In terms of Policies F2.5.3(4) and (5), the proposal has been developed and conditions proposed to avoid, remedy or mitigate the identified adverse effects to an appropriate level. This includes limitations on the sand extraction area, volume and consent duration (including two consent duration review points).

As there would be no adverse effects on surf breaks, the proposal is consistent with Policy F2.5.3(6).

F2.6 sets out the objectives and policies for mineral extraction in the coastal marine aera. In terms of Objective F2.6.2 and taking into account the studies to date and the recommended conditions, sand extraction can be undertaken in a manner which does not have significant adverse effects on the coastal marine area and the near-shore environment. It is recognised that same parties consider all sand mining has have an adverse cultural effect.

Turning to supporting Policy F2.6.3(1), the site is considered appropriate for sand extraction for the following reasons:

- Has a suitable sand resource that can be efficiently extracted;
- Does not have specific features or values that need to be, or can only be, protected by avoiding sand extraction; and
- Extraction can be undertaken in a manner that does not have significant adverse effects on the coastal marine area (including both the site and the surrounds) and the adjoining foreshore and beach environment.

In terms of Policy F2.6.3(2), a precautionary approach is being undertaken which includes an adaptive management approach through the implementation of an

Environmental Monitoring Management Plan. This policy lists the following matters which could be used in the adaptive management approach:

(a) Staging the operation;

(b) The location of the activity;

(c) The maximum volume of minerals, sand, shingle, shell and other natural material to be extracted;

(d) The term of consent; or

(e) Environmental monitoring.

The approach taken in the application, recommended conditions and proposed monitoring mirrors those matters by:

(a) Limiting and controlling the rate and extent of extraction;

(b) Defining the location of the sand extraction;

(c) Setting a maximum volume of sand extraction;

(d) Setting a consent duration of 20 years; and

(e) Proposing an environmental monitoring management plan with comprehensive pre- and post-extraction analysis and reporting and foredune and beach monitoring.

Sand extraction is to be excluded from areas where sensitive benthic communities, benthic macrofauna (including shellfish) and benthic species protection under the provisions of the Wildlife Act 1953 have been identified in the pre-sand extraction assessment. This recognises that the location of these species may change over time due to changing natural conditions.

Those matters listed under policy F2.6.3(3) have been assessed and, where relevant, addressed in the recommended consent conditions. Taking into account the recommended consent conditions and how they avoid, remedy and/or mitigate potential identified adverse effects there are no residual significant adverse effects that require further consideration.

In terms of Policy F2.6.3(4), a range of mitigation measures have been incorporated into the limitation of the sand extraction area, the sand extraction methodology and the proposed consent conditions and environmental monitoring management plan.

Turning to F2.11 (Discharges), the discharge would not adversely affect the water quality of the Mangawhai-Pakiri embayment (or the wider Hauraki Gulf) due to the nature and manner of the discharge. Likewise, there would be none or negligible effects on the life

supporting capacity of the Hauraki Gulf from the discharge. The proposal is therefore consistent with Objectives F2.11.2(1) and (2).

There are no practicable alternatives to the discharge. The ability to immediately discharge screened material back to the sea floor is considered to be appropriate for the materials and volumes proposed.

Any effects on fin fish and marine mammals have been assessed as being from nil to negligible.

Given the location and form of the discharge, it is considered there is unlikely to be any effects on recreational activities, including recreational fishing or uses associated with the beach/foreshore such as swimming, fishing, surfing and walking. Likewise, no potential risks to human health from the discharge have been identified. No discharge of bilge water occurs in the sand extraction area.

Section F2.14 sets out the Use, Development and Occupation in the coastal marine area objectives and policies. Public access is not affected by the sand extraction operation. The extraction of marine sand has a functional and operational requirement to be located below mean high-water spring and in the coastal marine area. There are no known activities which have coastal permits for occupation within the sand extraction area.

The underwater noise objectives and policies are set out in Section F2.18. The AUPOP specifically recognises and provides for noise generated from the operational requirements of vessels and activities such as dredging. The sand extraction operation does not involve underwater blasting, impact or vibratory piling or marine seismic surveys. No significant adverse effects are expected to arise from the underwater noise generated based on the monitoring and modelling undertaken to date.

D9 – Significant Ecological Areas ("SEA") Overlay

The proposed sand extraction site is outside any SEA overlays. There are a number of SEAs in the wider Mangawhai/Pakiri embayment area (both on land and within the coastal marine area).

In respect to Objectives D9.2(1) and (2), no areas of significant indigenous biodiversity value have been identified within the site. The sand extraction would also not adversely impact on the dune system and therefore the habitats they support including that of the Tara Iti. Likewise, adverse effects on the SEA values would not arise from effects on water quality from discharges, the movement of vessels, lighting, biosecurity risks or noise.

Overall, there would be no permanent loss of the biodiversity values associated with the SEA's in the wider area through the sand extraction activity.

It is further considered that the proposal is not contrary to the supporting policies in D9.3 (1) and (2) on that basis that no loss of the identified values of any SEA in the wider area would arise.

E1 – Water Quality and Integrated Management

Negligible effects would arise from the discharges.

E15 – Vegetation Management and Biodiversity

Policy E15.3.9(a)(i) is of relevance in terms of Tara Iti, Brydes Whale and marine mammals. The proposal is not contrary to this policy as the residual effect of any impacts from sand extraction activities on local and visiting marine mammals (which includes Byyde's Whale) is considered to be less than minor to negligible when considering the types of effects, their spatial scales and durations, likelihood, potential consequences and the mitigation options that are currently implemented.

In terms of the Tara iti, the nearshore boundary of the sand extraction area is 2km from the shoreline which it outside the normal foraging distance from the shoreline for the Tara iti.

E18 – Natural Character of the Coastal Environment

In terms of E18 (Natural Character of the Coastal Environment), the natural characteristics and qualities that contribute to the natural character of the coastal environment in this area would be maintained.

E19 – Natural Features and Natural Landscapes in the Coastal Environment

The sand extraction area is not within a High Natural Character Overlay area.

In respect to the High Natural Character Overlay - Area 48, Te Ārai and Pakiri (which runs along the shoreline and landward), given the nature of the proposal it is considered that the proposal will not impact on the values of this overlay. In particular, the operation would not impact on the feeling of remoteness on the varying landforms or landward vegetation or on other significant landforms or habitats connected to this overlay.

As the extraction is to be seaward of the depth of closure it is not expected that potential adverse erosion effects on the shoreline will arise which may impact on the Outstanding Natural Landscapes Overlay - Area 22, Pakiri Beach or Outstanding Natural Landscapes Overlay – Area 28 Coastline from Pakiri Beach to Omaha Cove.

Finally, the proposal would not impact on this Outstanding Natural Feature - ID 149, Pakiri Beach. In particular the proposal does not introduce new built forms on the beach or dunes and does not impact on the surf breaks, dune system or dune lakes. Furthermore, although the *William Fraser* would be seen in the distance (at least 2 km from the beach) on occasions, the temporary presence of a moving vessel off-shore (either during the day

or at night when it has its lights on) does not detract from the “wild and scenic coastline” experienced by parties on the beach.

E25 – Noise and Vibration

Based on the monitoring and modelling to date, the proposal is not contrary to the relevant objectives and policies under E25 and in particular Objective E25.2(1) and Policies E25.3(2) and (8).