Attachment 2

Bream Bay Sand Extraction – High level assessment of economic effects

1 May 2024

m.e consulting

Bream Bay 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, form suitable locations, is the key issue. This economic assessment provides a high-level economic assessment of the Bream Bay 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 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 Bream Bay.

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 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 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 is relatively flat until 2013 when a clear upswing is noticeable. 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.

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.

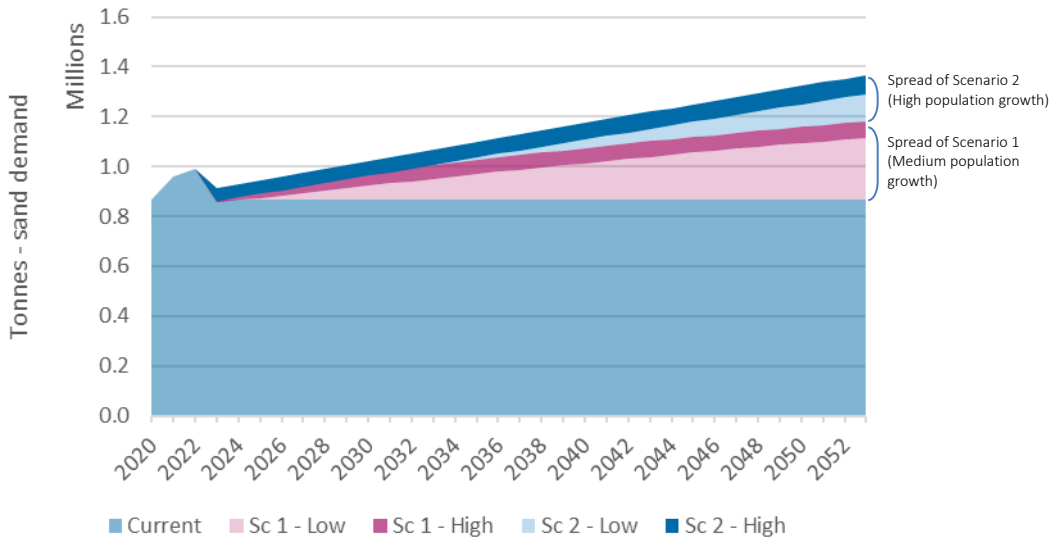
These estimates suggest that currently annual demand of sand in the Auckland market is in the order of 866,000 to 880,000 tonnes. These estimates are below the peaks seen immediately after the Covid-lockdowns when pent-up demand was in the system. The current levels are broadly in-line with the patterns 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 is 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 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 the 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 worlds 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, the current sand supply is highly concentrated with most sand supply now sourced from the Kaipara – since off-shore sand extraction at Pakiri has been limited to 76,000 m^3 per annum under 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 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 the offshore consent is currently on appeal to the High Court after its refusal by 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 to 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.

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
	Altas	604,800	**196,000**	2027
	Semenoff/Winstones Aggregate	45,000	**0**	2025
Tomarata*	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 Tomarata 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 if 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:

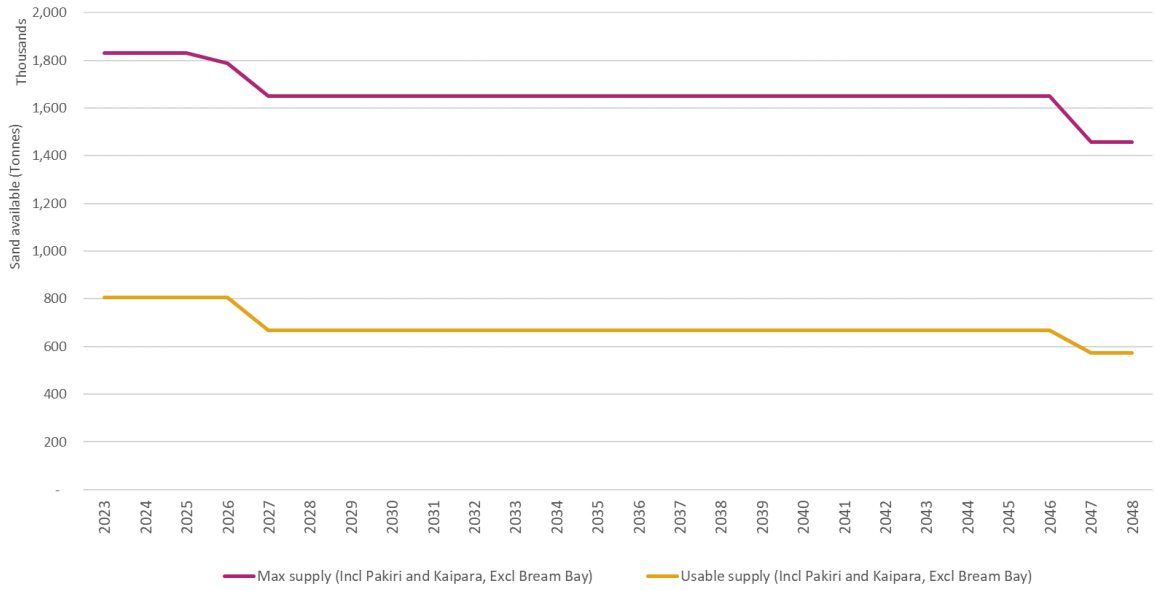
  - 61% of consented volume is associated with the Kaipara resource,
  - 44% of usable sand is associated with the Kaipara sand,
  - Excluding the Pakiri resource from the analysis increases the Kaipara's relative shares to 66% of consented volume, and 50% of usable volume.

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 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 is 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:

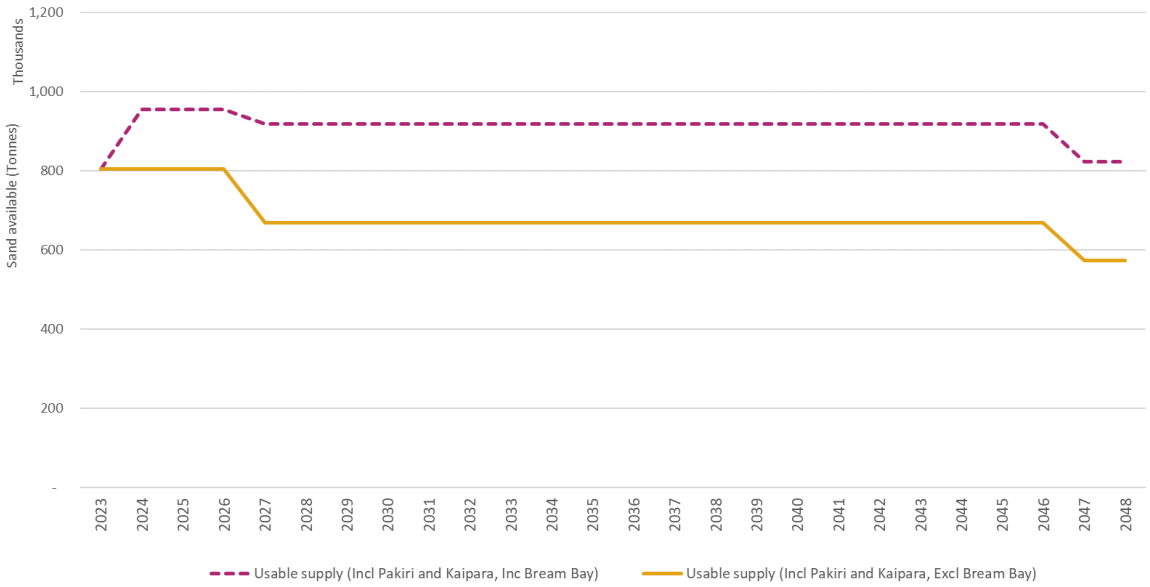
- There is a significant difference between the consented volumes and the usable volumes. This reflects the well-known operational and technical constraints and limits associated with scaling operations associated with the Kaipara resource (e.g., operating barges on the Helensville river, tidal limitations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

As mentioned earlier, the current annual demand of 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 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 evident. 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 the Bream Bay resource to providing secure access to high quality sand is illustrated in Figure 2-3. M.E understands that the annual usable sand that could be used is estimated at 150,000 m^3/year for the first three years, before scaling up to 250,000 m^3/year for the balance of the 35 year term requested. These volumes translate into the following weights:

- 270,000 tonnes for years 1 through 3,
- 450,000 tonnes for the balance of the consent period.

Figure 2-3: Contribution of Bream Bay

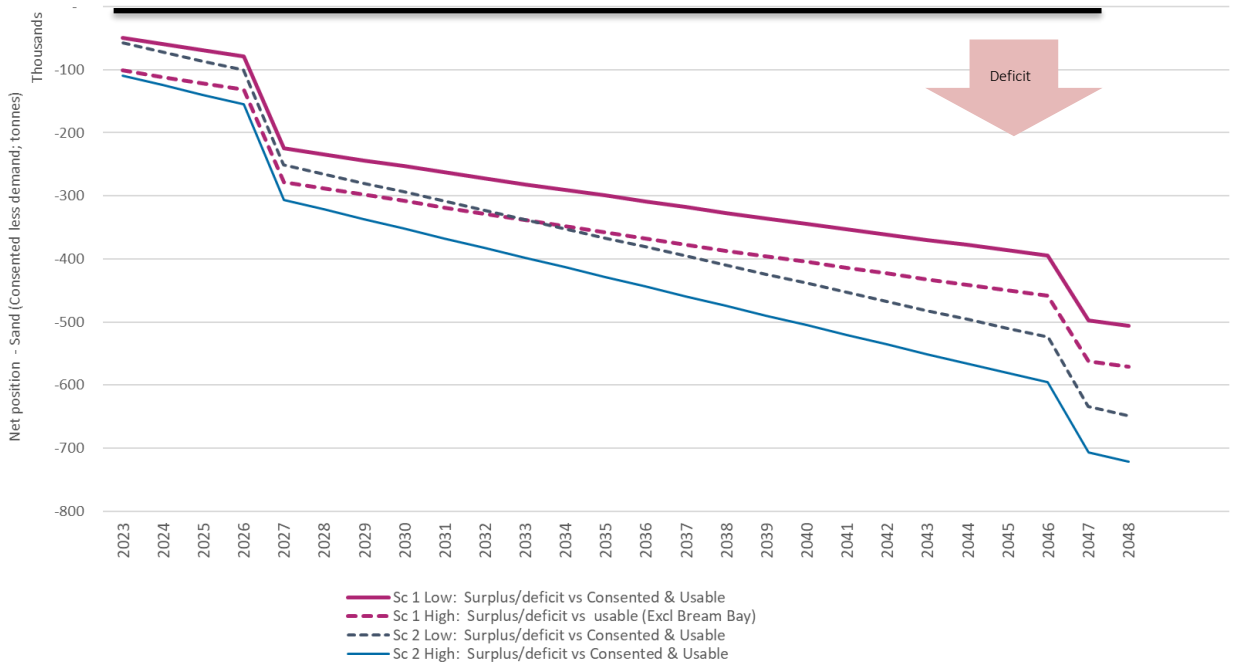


Enabling Bream Bay sand extraction will add a sizable resource to the Auckland sand market. The amount will be immediately usable in the market, alleviating pressures on the supply market. The addition will provide immediate relief to the constrained sand market and ensure that sand shortages do not inhibit investment and growth activities.

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 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

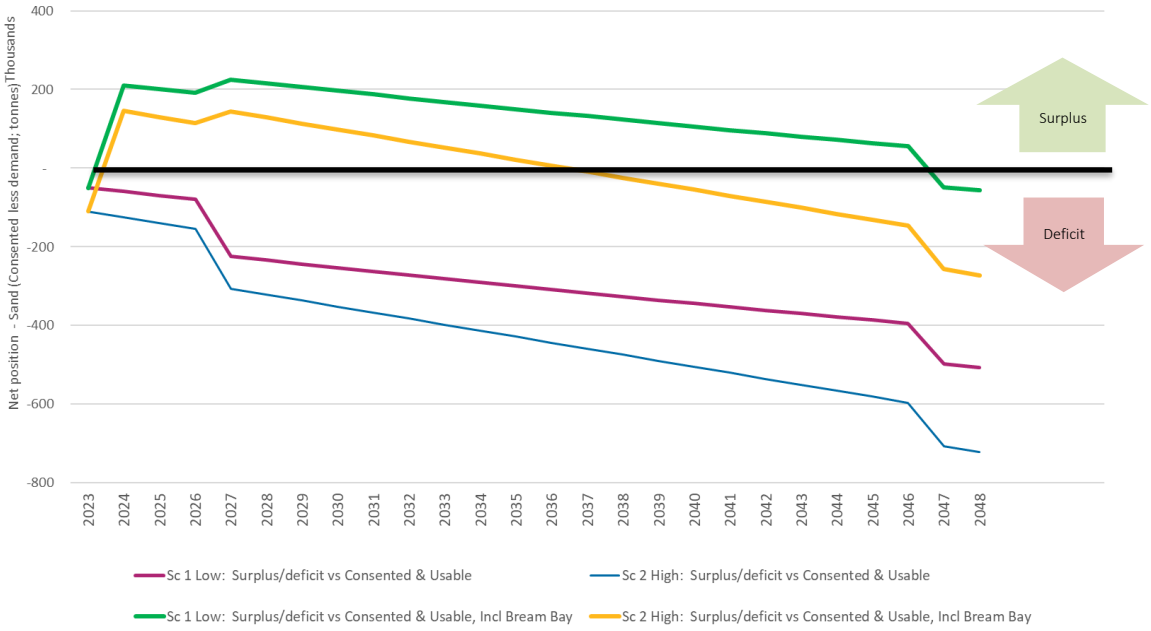


Based on historic sand demand level, the Auckland is expected to see pressures around supply and an ability secure sand. The current economic slowdown and below trend construction and investment are masking the magnitude of the deficit. As the economy recovers, price inflation normalises (returns the 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. Similarly, the available information suggests that there is inadequate flexibility to respond to short term issues. Looking at the

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

Enabling Bream Bay extraction 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 Bream Bay enabled



Enabling Bream Bay extraction will add to the Auckland market's sand supply options, with an immediate lift in total supply to above demand levels. The loss of Pakiri sand resulted in a substantial downward shift of the overall sufficiency position. Under the high growth scenario, a deficit position is expected around 2037 and under the medium growth position, the deficit position is reached in 2047. The positive contribution that enabling Bream Bay extraction will make is clear in the figure.

Supporting Auckland's ability to grow and deliver infrastructure means that a sand deficit must be avoided. Accessing the Bream Bay sand is a suitable option to avoid 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 means 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 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 are normally slow. Nevertheless, this can lead to increased competition in the long run, which may help to alleviate the shortage. McCallum Bros efforts to establish the Bream Bay resource is evidence of this market 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 consents playing a key role. However, despite access to a large volume of 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 Bream Bay 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 employment falling in this sector. However, the true benefits that enabling Bream Bay sand extraction relates 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 an 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 forwards these pressures are projected to intensify. Using the Bream Bay resources offers a unique opportunity to deliver sand to the Auckland market. 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 Bream Bay 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 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 firstly 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 investment 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 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 surpassed 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:

- Housing and residential areas

[3] This is based on the medium projections.

[4] Sourced from Infometrics.

- 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-, to medium terms.

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
    - Several projects, including the Carrington Road projects.

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

- Eke Panuku projects
    - Including Osterley and Amersham Way Streetscape works.

These projects' budgets sum to $1.8bn and are occuring 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.

<u>Example project: Central Rail Link</u>

Over the course of the project, more than 20,000 truckloads of concrete have been delivered to site, nearly 100,000m^3 of concrete has been poured and over a dozen concrete mixes have been used – including some unique mix designs. On average, more than 880m^3 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 a specific purpose of supporting economic productivity and subject to extensive cost-benefit analysis. These evaluation process consider all costs and all benefits – direct, indirect and consequential. It is essential to have enough natural resource, including sand, to support any infrastructure delivery programme.

3.1.2 Concentration risk

Have access to sufficient sand is an important aspect, but supply chain resilience is also key. Currently, more than half Auckland's usable sand is located 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 resource on Auckland's west and east cost 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 Bream Bay 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 use 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 that the associated sand movements would have costed an additional $3.3m in transport cost 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.

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

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

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 Bream Bay resources, instead of Kaipara sand to meet demand in central and south Auckland will avoid direct transport costs estimated at $6.3m per year for the first three years, before increasing by $10.5m per year as tonnages increase. 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 $10.6m per year for the first three years, increasing to $17.7m as operations scale up– the exact increase is subject to the final contract details around quantity, quality, timing, and so forth. 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 Bream Bay sand extraction will generate direct transport cost savings relative to the principal alternative. These saving 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 delivering the sand from the marine sources, i.e., Taporapora (Kaipara) or Bream Bay.

The emission calculation also includes road movements and travel distances are based on historic supply patterns.

The Bream Bay operation would enable significant emission savings. Delivering the sand from Helensville to central Auckland's sand users generates considerably more emissions than a Bream Bay 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 4,319 tonnes of carbon dioxide generated annually over the short term (3 years), before increasing to 7,198 tonnes from year 4 onwards. 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-point value 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 $1.0m, increasing to $3.5m by 2048.

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 injury 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 minor injury is $78,200, then there is value in removing/mitigating the risk of injuries.

Annual avoided cost is estimated at $281,000 in the first three years, increasing to $468,700 as tonnages increase, if the Bream Bay sand 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 increases overtime.

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. While the specific attributes and cement requirements associated with Bream Bay sand are unknown, the potential savings could be significant.

If Bream Bay sand attributes are consistent with sand from the Pakiri Embayment, and the same cement requirements, then the annual cement (direct costs) and production emissions can be estimated. Assuming that on a per cubic meter of concrete basis, 4kg less cement is required (relative to Kaipara sand), then using Bream Bay resource would:

- Save on cement costs:
  - During first three years $544,000/y
  - Subsequent years $906,700/y
- Emissions saving[7]
  - During first year $108,000/y
  - Value in year 4 $329,600/y
  - Value in year 35 $612,970/y

3.3 Total benefits

The benefits associated with adding Bream Bay sand to Auckland's supply network will be felt over multiple years. The annual values can be 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 35-year period suggests that the present value of the benefits are:

- Direct transport costs $196.0m
- Environmental costs $39.3m
  - *Health related costs* *$15.8m*
  - *Shadow price of Carbon* *$23.4m*
- Social costs $7.5m
- Cement use and emissions $22.7m
- **Total** **$265.5m**

Based on the above transport, environmental and social costs that would be avoided by enabling Bream Bay extraction, is valued at $265.5m.

This is based on the costs required to transport the 270,000 tonnes - growing to 450,000 tonnes of sand from Bream Bay to end users in central and south Auckland, as compared to a principal alternative of serving the market from Kaipara. This represents the economic benefit (in the form of avoided costs) that

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

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. However, looking forwards, the transport costs will be significantly higher if sand is transported from sources that are located further 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 Bream Bay application aligns with the eligibility criteria as outlined in Clause 17(3). 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. Bream Bay 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 Bream Bay resources will avoid considerable costs. The avoided costs are seen as benefits and the analysis shows that the present value of these avoided costs is $265.5m – 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 Bream Bay 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 $23.4m using the mid-point values (the emissions associated with using additional cement is estimated at $7.0m).
(h) will support adaptation, resilience, and recovery from natural hazards	Apart from ensuring that there is enough sand to support Auckland's growth, enabling Bream Bay 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 for sand is prudent.
(i) will address significant environmental issues	High quality sand is used in specialist concrete applications in infrastructure that is designed to address legacy issues. Auckland's Central Interceptor is an example of such 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 Chris Bishop, Minister of Housing, Minister for Infrastructure, Minister Resource Management
Parliament Buildings
Wellington 6160

Email: Chris.bishop@parliament.govt.nz

Dear Minister Bishop

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 BREAM BAY.

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 17 km^2 site in Bream Bay, Northland.

4. I want to explain some of the issues BCL would face if, following the Environment Court's decision declining the application for a similar offshore sand extraction consent at Pakiri, MBL is unable to supply BCL with marine sand with similar characteristics for concrete manufacture. I understand that Bream Bay offshore sand would be a suitable substitute.

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 from 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

STATEMENT OF PAUL DONOGHUE IN SUPPORT OF MCCALLUM BROS LIMITED APPLICATION TO FAST TRACK A SAND EXTRACTION CONSENT FROM A SITE IN BREAM BAY.

1. My name is Paul Donoghue
2. I am a Registered Engineering Associate and a NZCE (Civil), I hold a National Diploma Civil Engineering from Technikon Witwatersand, Johannesburg and National Higher Diploma Material Testing from Technikon Pretoria, both from South Africa. I have spent over 36 years in the concrete industry with 16 years in New Zealand and 20 years internationally in South Africa and Dubai.
3. I currently have two jobs. My primary role is as the Manager – Training and Certification for Concrete New Zealand. My other role is an independent plant engineer and concrete consultant.
4. My role for Concrete New Zealand entails presenting training courses to concrete technicians, plant auditors and ready mix concrete plant managers.
5. I am also:
    - The chair of the plant audit committee which oversees the plant audit scheme to ensure all concrete plants maintain their audit status in accordance with NZS3104:2021; and
    - The convenor of the Concrete New Zealand Health and safety forum, cement technical committee and the ready-mix technical committee.
6. As an independent plant engineer my role involves the evaluation of raw materials and designing concrete mixes for some of the smaller independent producers. I also provide consulting services and dispute resolution assistance.
7. Prior to these two roles, I was a plant engineer for Firth Industries for 15 years and have considerable experience with concrete in Waikato, the Bay of Plenty, Hawkes Bay and the Taranaki region.
8. I have been approached by McCallum Bros Limited to provide an assessment of the Bream Bay sand for its use in the Auckland concrete industry.
9. As part of the preparation of my statement, I viewed a consolidated sample of the Bream Bay sand and compared it to other similar sand types. A consolidated sample means that it was made up from a number of sub-samples (16 in this case) taken across the proposal site, in order to take out point sample differences. A photograph

of the sand is below in Figure 1. This photograph does show the characteristics of the sand.

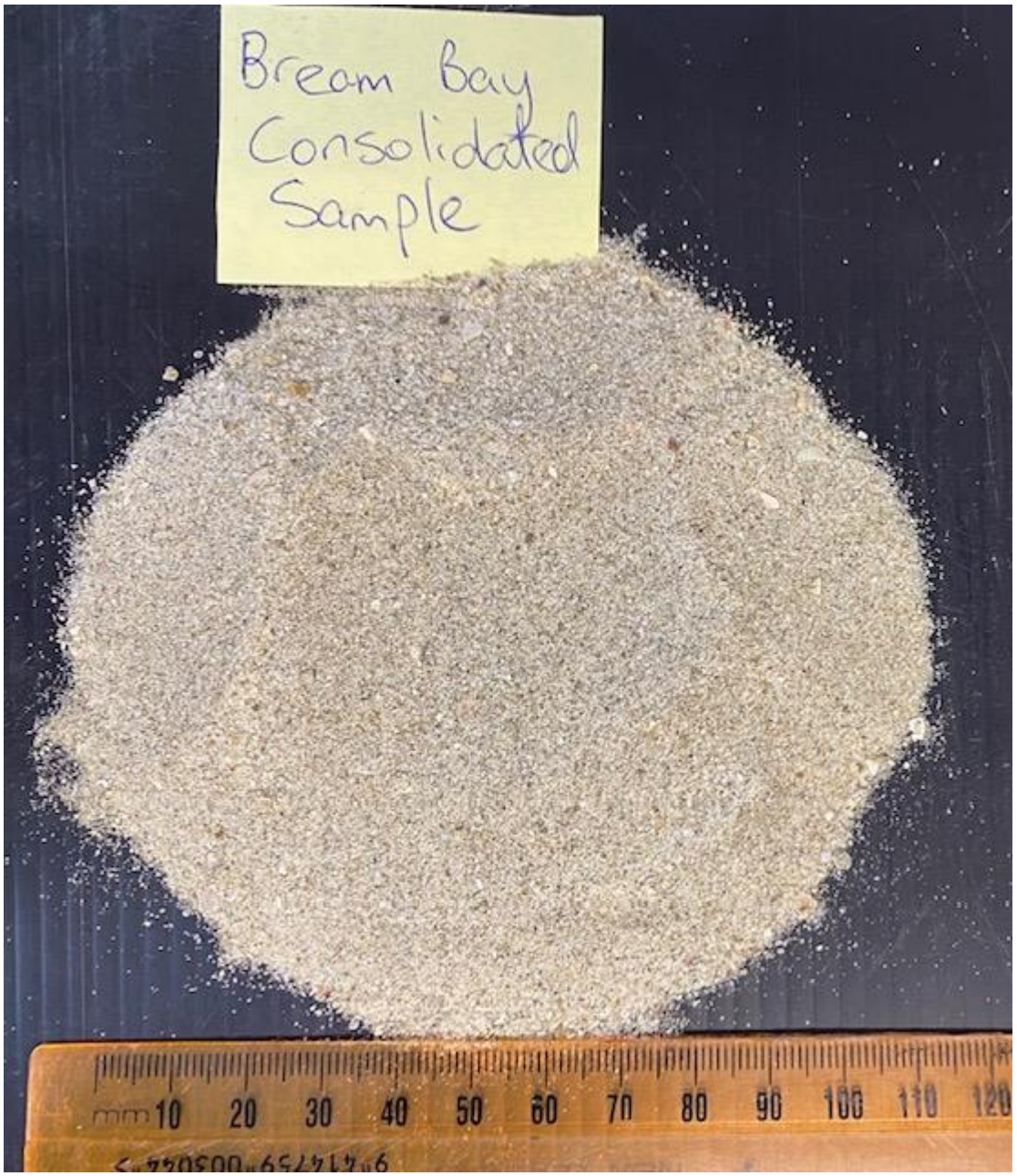


Figure 1: A consolidated sand sample of the Bream Bay sand.

10. The Bream Bay sand is a fine sand with a uniformly graded distribution with sub rounded but sound strong particles. The sample contains very little silt but this small amount can be controlled by washing. There are also some minor shell fragments but of insufficient quantity to be detrimental. It is of the same provenance as Pakiri sand, being the Waikato River when it emptied in the Firth. Being of the same provenance as Pakiri sand, it will be non-reactive in terms of the risks of an Alkali Silica reaction which can cause concrete to deteriorate over time. This will permit its use in applications where higher cement quantities are needed such as in high strength concrete mixes.

11. This sand would work well in concrete when blended with the much coarser crushed PAP sand sources found in the upper North Island. The PAP sand sources are missing the particle sizes offered by the Bream Bay sand. The resultant concrete would pump and finish well resulting in resilient concrete with a hard durable finish.

12. The blend ratios would be dependent on the final particle size distribution of both sands but I would expect to see a sand blend of 35% to 45% Bream Bay sand and 65% to 55% PAP.

13. The cleanness of this coastal sand will also help reduce the risk of plastic shrinkage and long term drying shrinkage.

14. When concrete is still fresh/wet or plastic and used in flat slabs there will be a layer of water form on top of the concrete. This water is called bleed water. Having a correctly graded sand and thus mix means the rate of bleed is controlled. If the bleed rate is wrong and the rate of evaporation is too high and this bleed water is lost to the concrete very quickly, as happens on hot windy days, it causes cracks to form in the plastic or wet concrete.

15. All concrete shrinks with time. This is mostly due to moisture loss within the concrete. This is called long term drying shrinkage. Having clean sands with a good particle shape, consistent grade and very little ultra- fine particles helps reduce the initial water demand for a mix leading to a lower water demand and thus lower long term drying shrinkage and less cracking which in turn means increased durability.

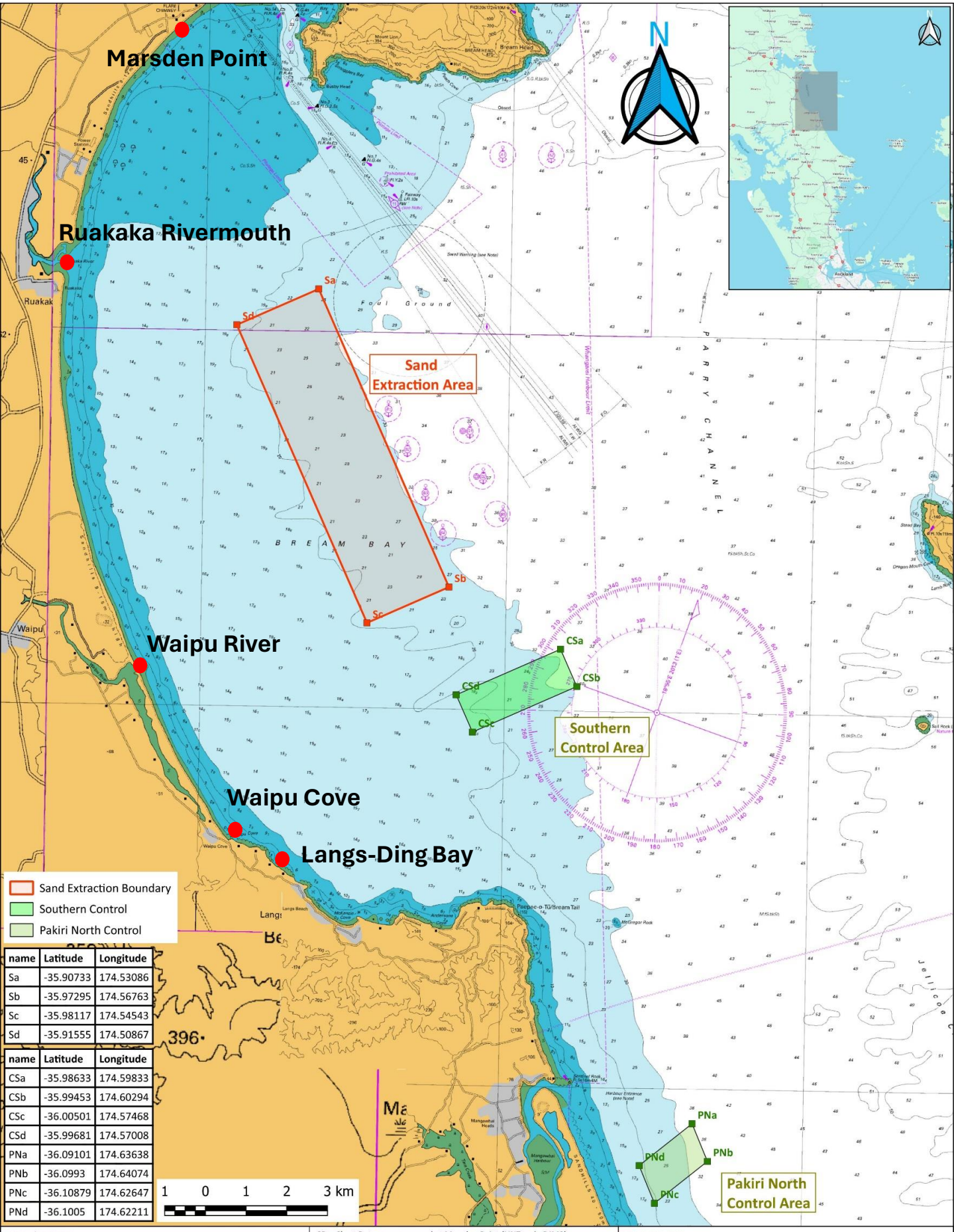
16. This sand is suitable for making high strength self-consolidating concrete and standard high strength concrete. Due to the good shape and correct particle size these sands make it easier to make this special concrete more easily and consistently.

17. Whilst the sand is sourced from the coastal marine area it will contain some soluble chlorides and shell fractions, however these do not cause any issues within the concrete. Having used similar sands regularly and tested for chlorides as required by NZS3101 and NZS3109 for many years I have never seen any test result showing chloride levels near or above the limits imposed by the concrete industry. Even when chloride calculations are done assuming high levels of chloride content in the sand, resultant chloride levels in the concrete are always well below any limits set in the standards.

18. The physical and mineralogical attributes that Bream Bay sand has make it suitable for use in high strength and specialist concrete mixes of the type used in large infrastructure projects. It would be a suitable replacement for Pakiri or Kaipara Harbour sand and could be used in applications where a high quality marine sand is required for the mix. The availability of this sand would avoid the major supply issues facing the concrete industry following the reduction in supply from McCallum Bros Limited at Pakiri.

Paul Donoghue.

ATTACHMENT 7: LOCATIONS OF REGIONALLY SIGNIFICANT SURF BREAKS



name	Latitude	Longitude
Sa	-35.90733	174.53086
Sb	-35.97295	174.56763
Sc	-35.98117	174.54543
Sd	-35.91555	174.50867

name	Latitude	Longitude
CSa	-35.98633	174.59833
CSb	-35.99453	174.60294
CSc	-36.00501	174.57468
CSd	-35.99681	174.57008
PNa	-36.09101	174.63638
PNb	-36.0993	174.64074
PNc	-36.10879	174.62647
PNd	-36.1005	174.62211

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: 17/04/2024 Version 1.0.2 by SW.

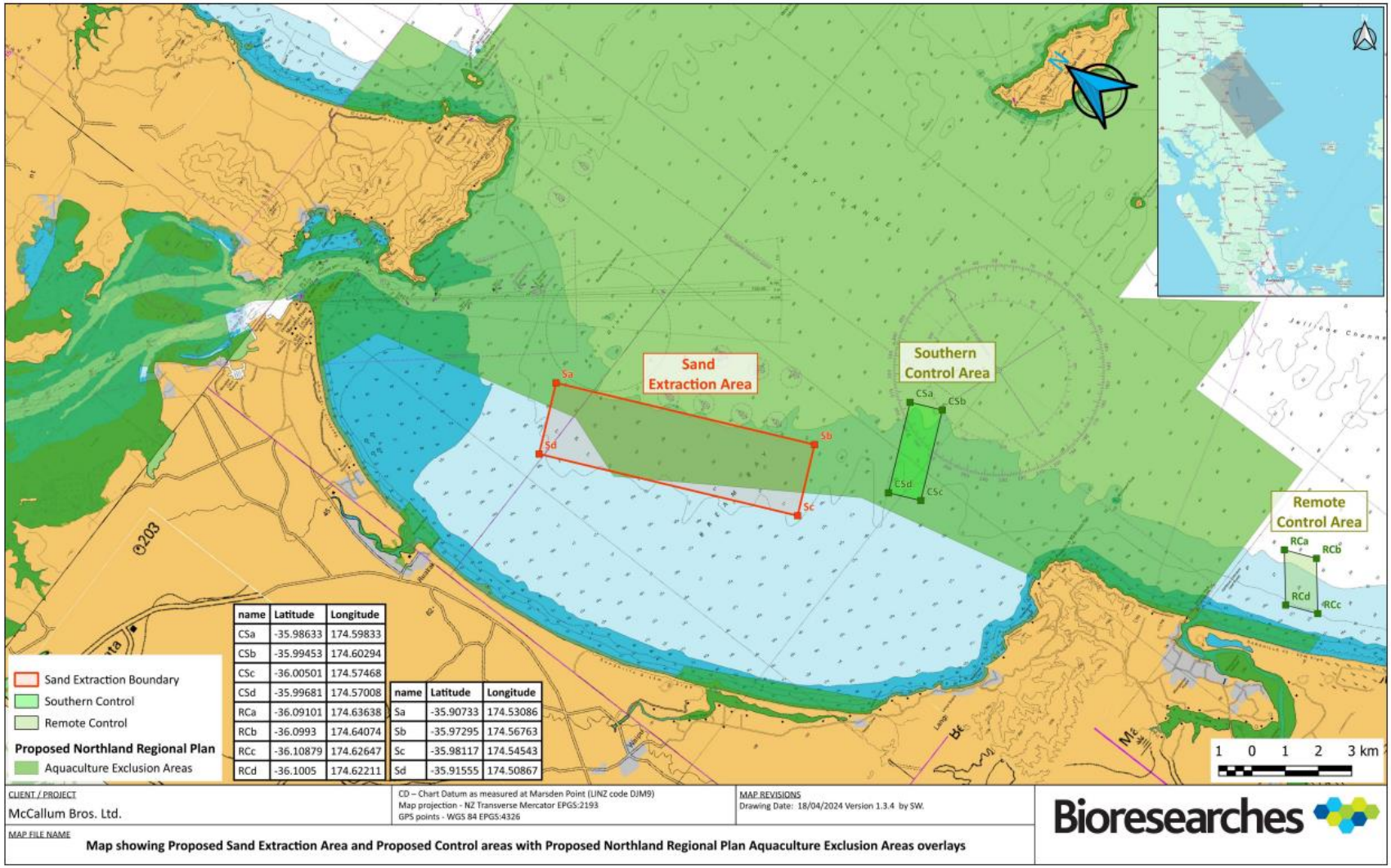
MAP FILE NAME

Map showing Proposed Sand Extraction Area and Proposed Control Areas

Bioresearches

ATTACHMENT EIGHT: PROPOSED NORTHLAND REGIONAL PLAN OVERLAYS (7 MAPS)

Aquaculture Exclusion Area Overlay:



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RCd	-36.1005	174.62211

name	Latitude	Longitude
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Sb	-35.97295	174.56763
Sc	-35.98117	174.54543
Sd	-35.91555	174.50867

CLIENT / PROJECT
McCallum Bros. Ltd.

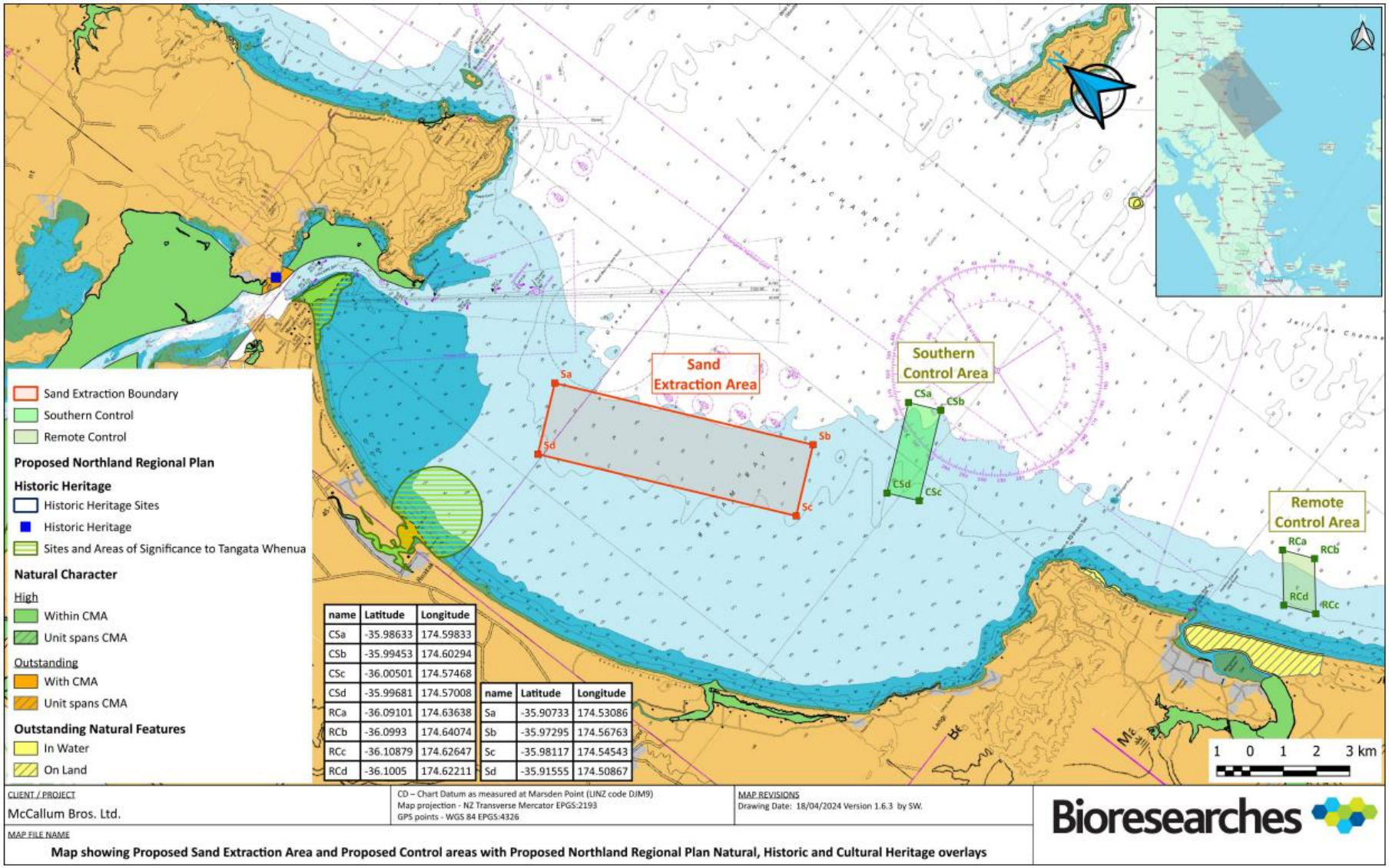
CD – Chart Datum as measured at Marsden Point (LINZ code DJM9)
Map projection - NZ Transverse Mercator EPGS:2193
GPS points - WGS 84 EPGS:4326

MAP REVISIONS
Drawing Date: 18/04/2024 Version 1.3.4 by SW.

Bioresearches

MAP FILE NAME
Map showing Proposed Sand Extraction Area and Proposed Control areas with Proposed Northland Regional Plan Aquaculture Exclusion Areas overlays

Natural, Historic and Cultural Heritage Overlays:



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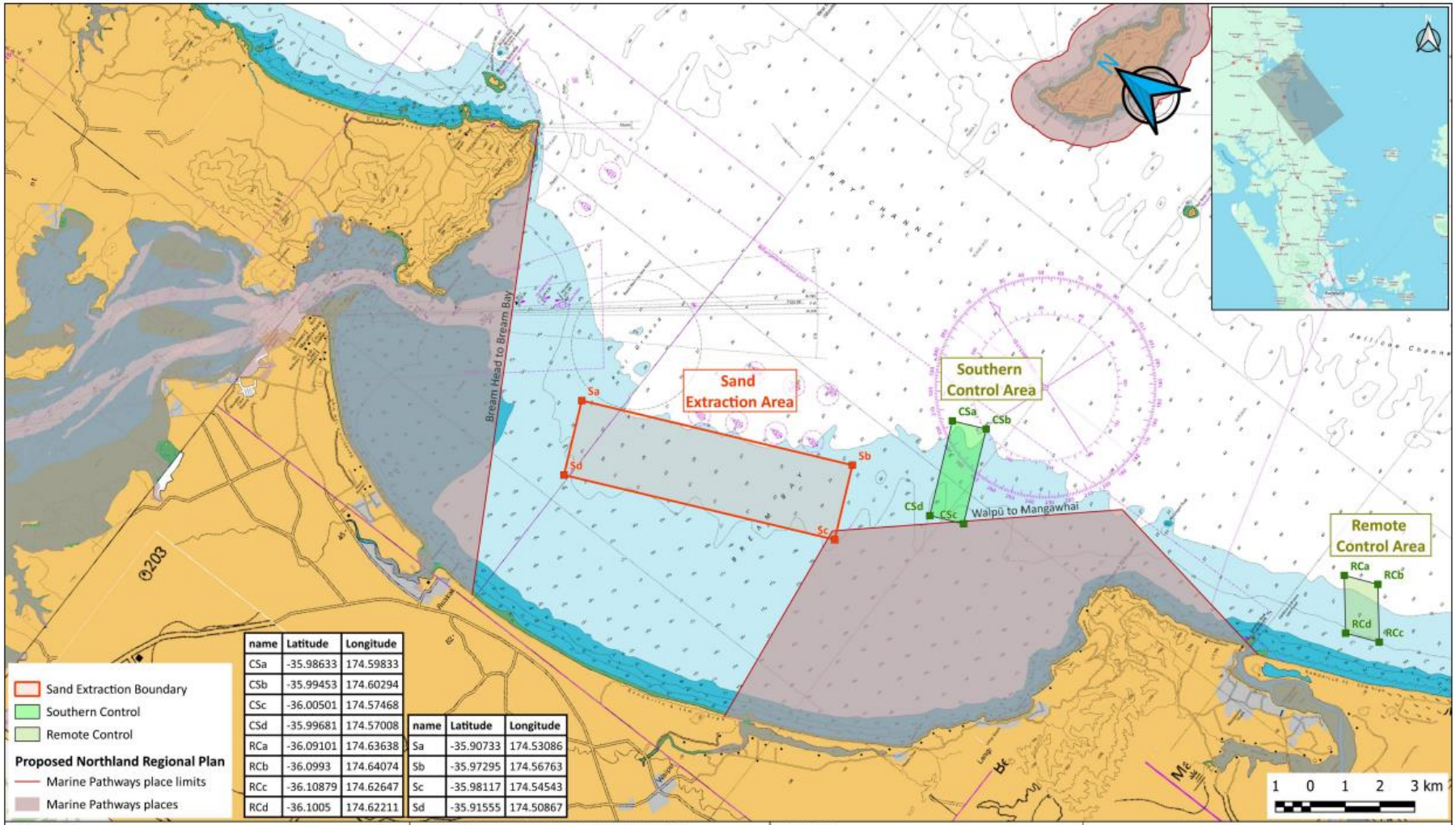
Marine Pathways Overlay:



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RCc	-36.10879	174.62647
RCd	-36.1005	174.62211

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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

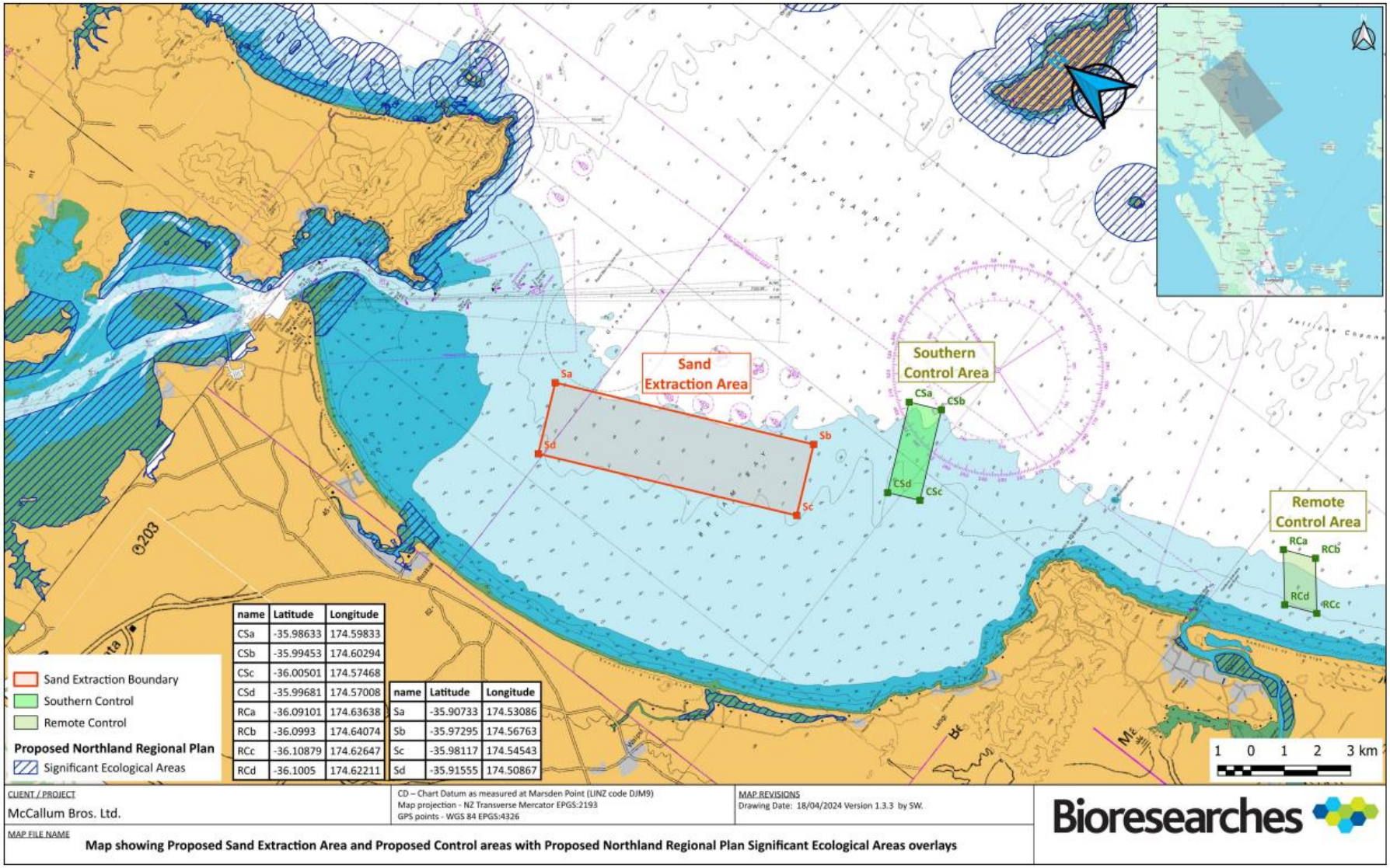
MAP REVISIONS
Drawing Date: 18/04/2024 Version 1.4.3 by SW.

MAP FILE NAME

Map showing Proposed Sand Extraction Area and Proposed Control areas with Proposed Northland Regional Plan Marine Pathways overlays

Bioresearches

Significant Ecological Areas Overlay:



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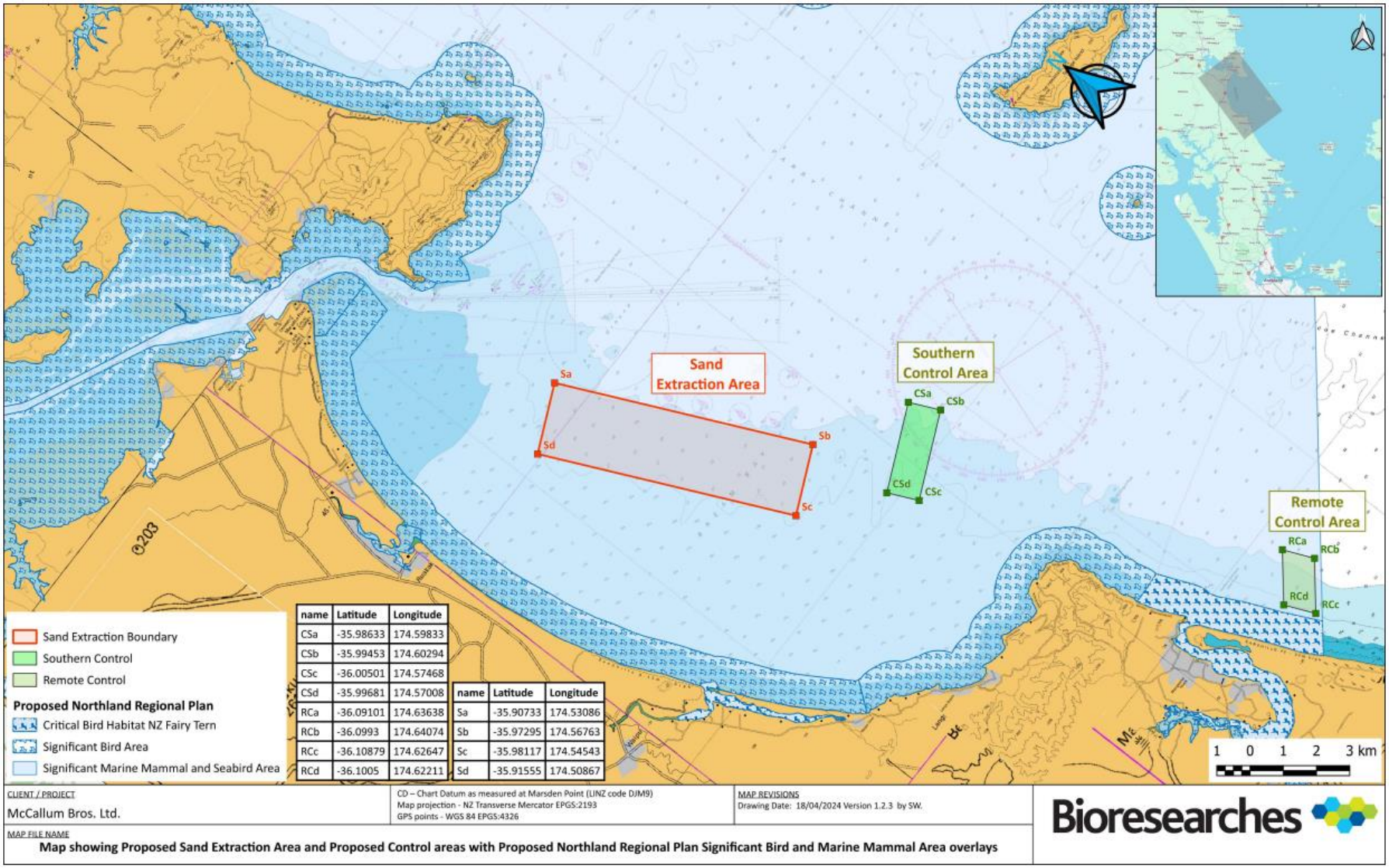
Significant Bird and Marine Mammals Overlay:



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CSd	-35.99681	174.57008
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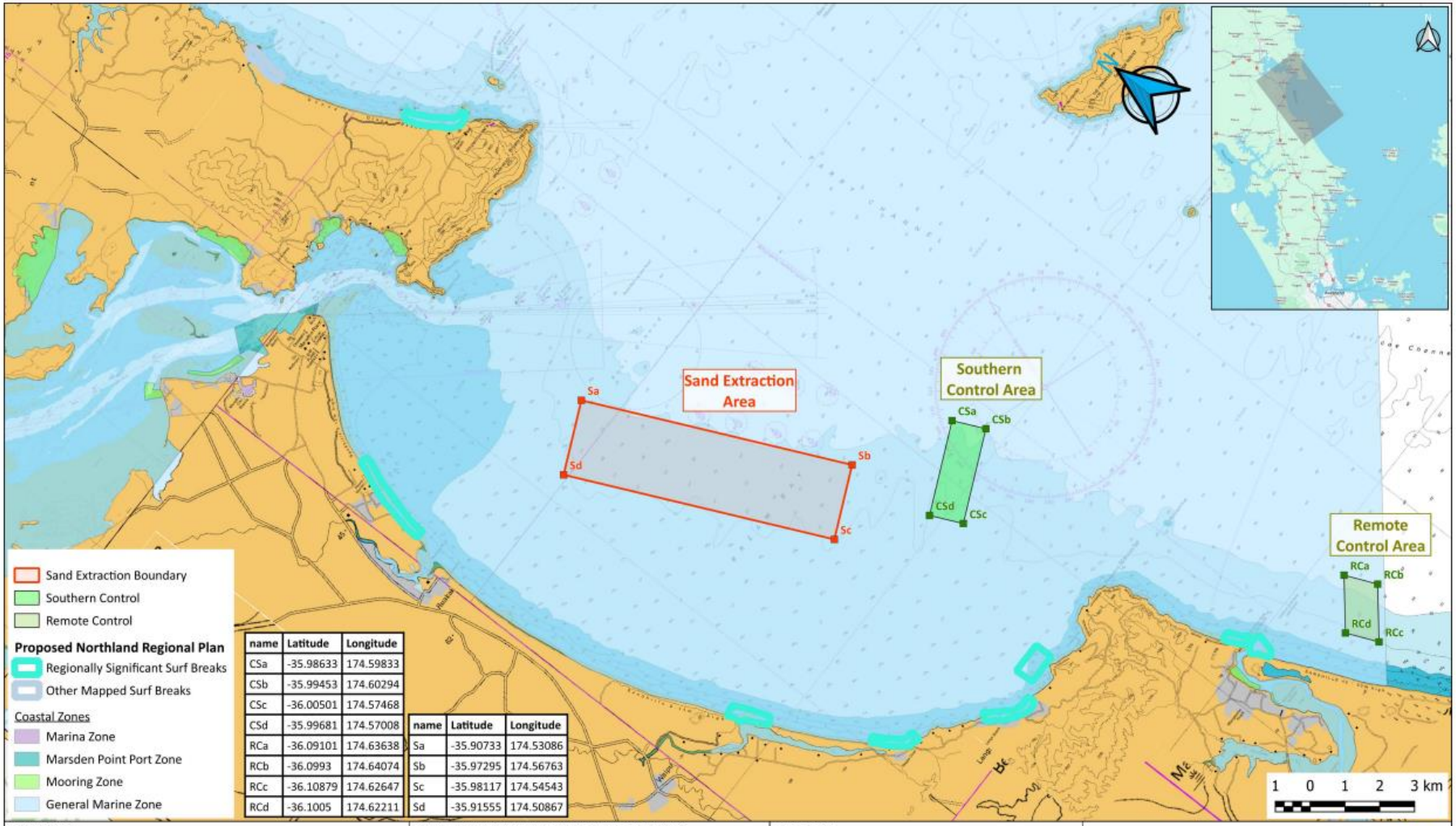
Sb	-35.97295	174.56763
Sc	-35.98117	174.54543
Sd	-35.91555	174.50867

Zoning and Surf Breaks Overlay:



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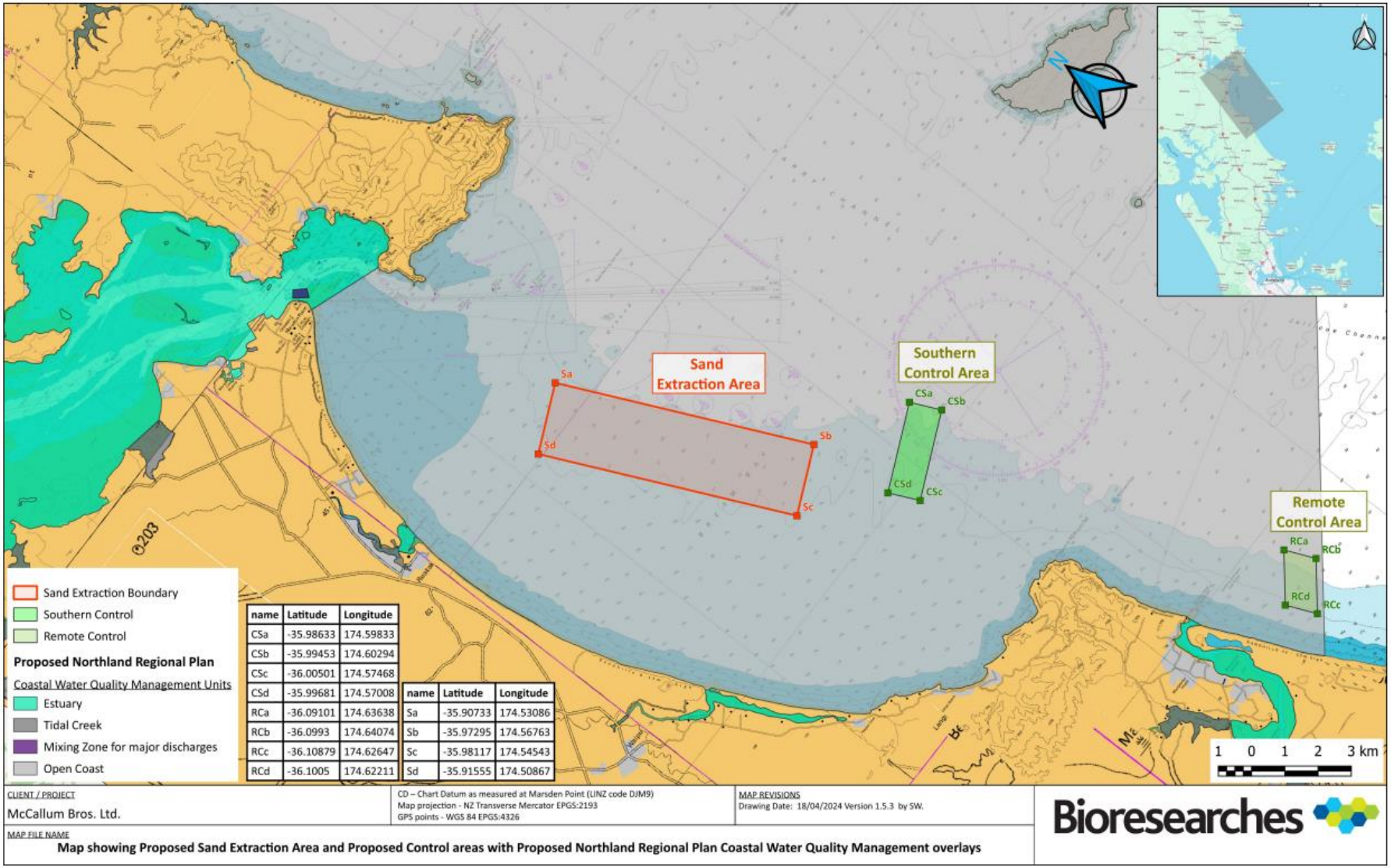
Sb	-35.97295	174.56763
Sc	-35.98117	174.54543
Sd	-35.91555	174.50867

Coastal Water Quality Management Overlays:



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ATTACHMENT TEN: ASSESSMENT OF NORTHLAND REGIONAL POLICY STATEMENT AND PROPOSED NORTHLAND REGIONAL PLAN OBJECTIVES AND POLICIES

NORTHLAND REGIONAL POLICY STATEMENT

Objective 3.4 Indigenous Ecosystems and Biodiversity

Safeguard Northland's ecological integrity by:

a) Protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna;

b) Maintaining the extent and diversity of indigenous ecosystems and habitats in the region; and

c) Where practicable, enhancing indigenous ecosystems and habitats, particularly where this contributes to the reduction in the overall threat status of regionally and nationally threatened species.

Assessment

The proposed sand extraction area is not within an area identified as having significant habitats of indigenous fauna. Given the distance to the nearest significant ecological areas (as identified in the Proposed Northland Regional Plan) and the nature of the effects arising from the sand extraction operation, no effects on these significant ecological areas are expected.

The site is within a very extensive area identified in the Proposed Northland Regional Plan as a Significant Marine Mammals and Bird Area. In terms of marine mammals, it is recognised that certain marine mammal species will be transient in this area but the proposed sand extraction will not result in affecting the extent and diversity of their habitat or the presence of marine species in this wider embayment. Likewise, no effects on fish or avifauna species are expected.

Given the very localised nature of the sand extraction and its effects, there will not be an overall effect on the extent and diversity of indigenous ecosystems and habitats in the Northland Region.

It is considered, that c) is not applicable to this application.

Objective 3.5 Enabling Economic Wellbeing

Northland's natural and physical resources are sustainably managed in a way that is attractive for business and investment that will improve the economic well-being of Northland and its communities.

Assessment

The proposal is consistent with this objective as the sand resource is predominantly for the Auckland concrete production market and in Stage 2 is expected to be available for the Northland market. Concrete is an essential element for the built environment which is critical for the social and economic well-being of the community.

An Economic Assessment has been prepared and is included as Attachment Two.

Objective 3.6 Economic activities – reverse sensitivity and sterilisation

The viability of land and activities important for Northland's economy is protected from the negative impacts of new subdivision, use and development, with particular emphasis on either:

(a) Reverse sensitivity for existing:

(i) Primary production activities;

(ii) Industrial and commercial activities;

(iii) Mining; or*

(iv) Existing and planned regionally significant infrastructure; or

(b) Sterilisation of:

(i) Land with regionally significant mineral resources; or

(ii) Land which is likely to be used for regionally significant infrastructure.

**Includes aggregates and other minerals*

Assessment

No potential reverse sensitivity effects have been identified. The proposal will not impact on the use or operation of the anchorage area or on Marsden Point or Northport.

Objective 3.10 Use and Allocation of Common Resources

Efficiently use and allocate common natural resources, with a particular focus on:

(a) Situations where demand is greater than supply;

(b) The use of freshwater and coastal water space; and

(c) Maximising the security and reliability of supply of common natural resources for users.

Assessment

The sand resource in this location can be efficiently extracted and delivered to the Auckland, Northland and Coramandel markets. There are no other sand extraction operations within the coastal marine area in Bream Bay.

The rate of the extraction of sand reflects the demand for the sand product by the Auckland and Northland markets. Significant stockpiling of sand is not undertaken, and the sand is not exported outside New Zealand.

The occupation of the coastal marine area for sand extraction is temporal and does not impact on the use of the coastal marine area by other parties.

The first objective of the proposal is to significantly improve the resilience of the sand supply to the Auckland market.

3.14 Natural character, outstanding natural features, outstanding natural landscapes and historic heritage

Identify and protect from inappropriate subdivision, use and development;

(a) The qualities and characteristics that make up the natural character of the coastal environment, and the natural character of freshwater bodies and their margins;

(b) The qualities and characteristics that make up outstanding natural features and outstanding natural landscapes;

(c) The integrity of historic heritage

Assessment

The qualities and characteristics of the natural character of the coastal environment in this part of Bream Bay have been addressed in the existing environment description.

The proposed extraction area is close to the anchorage sites used by fuel tankers and log carriers, and with viewing distances to the extraction area starting 4.2km from the shoreline of Bream Bay, both the William Fraser and its sand extraction operations would be difficult to distinguish from other maritime movements and operations. The William Fraser would have a smaller profile than the other vessels at anchor and would appear quite remote. Sand extraction occurs underwater and would not be visible from the shoreline or close to it. The plume created by the discharge is both limited in size and temporal in nature and does not result in a long-term or significant adverse visual effect.

On the basis that the sand extraction would not create any significant holes or trenches that might give rise to sand eroding from Bream Bay's beachfront and dune corridor, the shoreline would, for all intents and purposes, remain as it currently is.

Given the separation distance to the identified outstanding natural features and outstanding natural landscapes and the temporary nature of vessels associated with the sand extraction in the area, it is considered that these outstanding natural features and natural landscapes will not be impacted upon.

As a result, it is considered that any landscape and visual effects would be of a very low to insignificant order.

No historic heritage features have been identified in the immediate area which may be impacted upon.

Policy 4.4.1 Policy – Maintaining and protecting significant ecological areas and habitats

(1) In the coastal environment, avoid adverse effects, and outside the coastal environment avoid, remedy or mitigate adverse effects of subdivision, use and development so they are no more than minor on:

(a) Indigenous taxa that are listed as threatened or at risk in the New Zealand Threat Classification System lists;

(b) Areas of indigenous vegetation and habitats of indigenous fauna, that are significant using the assessment criteria in Appendix 5;

(c) Areas set aside for full or partial protection of indigenous biodiversity under other legislation.

(2) In the coastal environment, avoid significant adverse effects and avoid, remedy, or mitigate other adverse effects of subdivision, use and development on:

(a) Areas of predominantly indigenous vegetation;

(b) Habitats of indigenous species that are important for recreational, commercial, traditional or cultural purposes;

(c) Indigenous ecosystems and habitats that are particularly vulnerable to modification, including estuaries, lagoons, coastal wetlands, dunelands, intertidal zones, rocky reef systems, eelgrass, northern wet heathlands, coastal and headwater streams, floodplains, margins of the coastal marine area and freshwater bodies, spawning and nursery areas and saltmarsh.

(4) For the purposes of clause (1), (2) and (3), when considering whether there are any adverse effects and/or any significant adverse effects:

(a) Recognise that a minor or transitory effect may not be an adverse effect;

(b) Recognise that where the effects are or maybe irreversible, then they are likely to be more than minor;

(c) Recognise that there may be more than minor cumulative effects from minor or transitory effects.

<u>Assessment</u>

The marine mammals most likely affected by the proposal include the few species that frequent the wider region associated with Mangawhai / Bream Bay year-round or on a semi-regular basis. These species include common dolphins, bottlenose dolphins, orcas, Bryde's whales, leopard seals and fur seals.

It is expected that the overall risk of any significant adverse effects for marine mammals arising (from both the sand extraction activity and transiting of the extraction vessel to and from the site) will be no greater than minor.

The key avifauna species in this wider area are listed in the existing environment description. It is considered that the risk of adverse effects on threatened and at risk avifauna species in this area from the proposed sand extraction operation is very low.

As part of the pre-sand extraction monitoring a baseline assessment utilising sampling is undertaken prior to sand extraction occurring. In the unlikely event any protected species or sensitive habitats are identified, then that specific area can be excluded from sand extraction.

Policy 4.6.1 Policy – Managing effects on the characteristics and qualities natural character, natural features and landscapes

(1) In the coastal environment:

a) Avoid adverse effects of subdivision use, and development on the characteristics and qualities which make up the outstanding values of areas of outstanding natural character, outstanding natural features and outstanding natural landscapes.

b) Where

(a) does not apply, avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of subdivision, use and development on natural character, natural features and natural landscapes. Methods which may achieve this include:

(i) Ensuring the location, intensity, scale and form of subdivision and built development is appropriate having regard to natural elements, landforms and processes, including vegetation patterns, ridgelines, headlands, peninsulas, dune systems, reefs and freshwater bodies and their margins; and

(ii) In areas of high natural character, minimising to the extent practicable indigenous vegetation clearance and modification (including earthworks / disturbance, structures, discharges and extraction of water) to natural wetlands, the beds of lakes, rivers and the coastal marine area and their margins; and

(iii) Encouraging any new subdivision and built development to consolidate within and around existing settlements or where natural character and landscape has already been compromised.

(3) When considering whether there are any adverse effects on the characteristics and qualities of the natural character, natural features and landscape values in terms of (1)(a), whether there are any significant adverse effects and the scale of any adverse effects in terms of (1)(b) and (2), and in determining the character, intensity and scale of the adverse effects:

a) Recognise that a minor or transitory effect may not be an adverse effect;

b) Recognise that many areas contain ongoing use and development that:

(i) Were present when the area was identified as high or outstanding or have subsequently been lawfully established

(ii) May be dynamic, diverse or seasonal;

c) Recognise that there may be more than minor cumulative adverse effects from minor or transitory adverse effects; and

d) Have regard to any restoration and enhancement on the characteristics and qualities of that area of natural character, natural features and/or natural landscape.

Assessment

The proposed sand extraction area is some distance from the nearest outstanding natural character, outstanding natural features and outstanding natural landscapes identified in the Proposed Northland Regional Plan. Attachment Four includes the plans showing the overlays in the Proposed Northland Regional Plan.

Taking into consideration the nature of the proposal and the transitory nature of vessels undertaking the sand extraction in this area, it is considered that any adverse risks to these features is negligible.

Policy 5.2.1 Managing the Use of Resources

Encourage development and activities to efficiently use resources, particularly network resources, water and energy, and promote the reduction and reuse of waste.

Assessment

It is considered that this proposal is an efficient use of the Bream Bay sand resource.

PROPOSED NORTHLAND REGIONAL PLAN

Objective F.1.2 Water Quality

Manage the use of land and discharges of contaminants to land and water so that:

1) existing water quality is at least maintained, and improved where it has been degraded below the river, lake or coastal water quality standards set out in H.3 Water quality standards and guidelines, and

....

3) the life-supporting capacity, ecosystem processes and indigenous species, including their associated ecosystems, of fresh and coastal water are safeguarded, and the health of freshwater ecosystems is maintained, and 302

4) the health of people and communities, as affected by contact with fresh and coastal water, is safeguarded, and

...

8) kai is safe to harvest and eat, and recreational, amenity and other social and cultural values are provided for.

Assessment

The discharge back into the coastal marine area from the extraction vessel is comprised of seawater, shells, oversize sand and fauna. No contamination of this material can occur through the process and before it is discharge back into the coastal marine area through the moon pool system.

The discharge therefore does not affect the life-supporting capacity, ecosystem processes and indigenous species of the receiving environment nor kai moana or the ability to use the coastal water for recreational purposes such as fishing.

F.1.3 Indigenous Ecosystems and Biodiversity

In the coastal marine area and in fresh waterbodies, safeguard ecological integrity by:

1) protecting areas of significant indigenous vegetation and significant habitats of indigenous fauna, and

2) maintaining regional indigenous biodiversity, and

3) where practicable, enhancing and restoring indigenous ecosystems and habitats to a healthy functioning state, and reducing the overall threat status of regionally and nationally Threatened or At Risk species, and

4) preventing the introduction of new marine or freshwater pests into Northland and slowing the spread of established marine or freshwater pests within the region.

Assessment

The proposed sand extraction area is outside any identified significant ecological areas and to date no significant habitats of indigenous fauna have been identified within the sand extraction area.

The proposal will not adversely impact on regional indigenous biodiversity.

MBL undertake regular cleaning of their vessels, and this is undertaken to maintain the vessels' performance and stay within Maritime NZ regulatory requirements. The discharging of any bilge water is to be avoided while at the sand extraction sites. The potential biosecurity effects are therefore considered to be negligible.

F.1.4 Enabling Economic Well-being

The use and development of Northland's natural and physical resources is efficient and effective and managed in a way that will improve the economic, social and cultural well-being of Northland and its communities.

Assessment

The proposal is consistent with this objective as the sand resource is predominantly for the Auckland then Northland concrete production market. Concrete is an essential element for the built environment which is critical for the social and economic well-being of the community.

The efficient supply of concrete is critical for the development and maintenance of a well-functioning urban environment and therefore the economic and social well-being of the community.

F.1.8 Use and Development in the Coastal Marine Area

Use and development in the coastal marine area:

1) makes efficient use of space occupied in the common marine and coastal area, and

2) is of a scale, density and design compatible with its location, and

3) recognises the need to maintain and enhance public open space and recreational opportunities, and

4) is provided for in appropriate places and forms, and within appropriate limits, and

5) is undertaken in a way that recognises it can have effects outside the coastal marine area.

Assessment

The proposal does not require the establishment of permanent structures within Bream Bay or exclusive occupation of the coastal marine area. The vessels undertaking sand extraction are of a form and size which is not dissimilar to vessels currently using the

anchorage area of which could be expected to traverse this general location to and from Northport.

The proposal does not impact on public access or recreational opportunities (including recreational fishing or surfing) within Bream Bay.

F.1.12 Natural character, outstanding natural features, historic heritage and places *of significance to tāngata whenua*

Protect from inappropriate use and development:

1) the characteristics, qualities and values that make up:

a) outstanding natural features in the coastal marine area and in fresh waterbodies, and

b) areas of outstanding and high natural character in the coastal marine area and in fresh waterbodies within the coastal environment, and

c) natural character in fresh waterbodies outside the coastal environment, and

d) outstanding natural landscapes in the coastal marine area, and

2) the integrity of historic heritage in the coastal marine area, and

3) the values of places of significance to tāngata whenua in the coastal marine area and freshwater bodies

Assessment

Given the proposed location of the sand extraction some distance from identified outstanding natural features and areas of historic heritage and places of significance to tangata whenua it is considered that the proposal is not an inappropriate use of this part of Bream Bay.