Pakiri Sand Extraction Resource Consent Application

McCallum Brothers Limited

Assessment of Effects on the Environment - Renewal of Existing Resource Consents

IZ111900-NP-RPT-0002 | Final

12 February 2020

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Document history and status

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Contents

Executive Summary

McCallum Brothers Limited (MBL) seek resource consent under sections 12 and 15 of the Resource Management Act to undertake the continued extraction of sand within the inshore coastal marine area (between 5m and 10m water depths) at Pakiri, North Auckland. An extraction rate of 76,000 m^3/year is sought, being the currently consented combined extraction volume (under a number of existing consents). In addition, consent is sought for the discharge from extraction vessels of sediment, seawater and biota into the coastal marine area, with this material resulting from disturbance of the local seabed and being separated from the sand resource.

This resource consent application will operate within the parameters set by an existing package of coastal permits (ARC28165, ARC228172, ARC28173 & ARC28174). This current consent regime was approved by the Environment Court in May 2006 and expires on 6th September 2020, with MBL having operated at Pakiri for more than 70 years. Given the impending expiry date for these consents, MBL now seek a renewal of the existing extraction volumes and locations, with no additional extraction volumes or areas proposed under this application.

The sand resource at Pakiri is of regional importance to Auckland because of its critical role for concrete production and ease of transport to urban Auckland via sea vessels to the Port of Auckland. Currently, operations at Pakiri supply at least 43% of the sand used to manufacture concrete in Auckland and with the projected population growth and quality compact form planned by Auckland Council, concrete will be of increasing importance as a building material. Without continued access to this resource, Auckland will be reliant on sand resources which are of lower quality due to their chemical composition and/or are a greater distance away from Auckland.

These other sand resources at the Kaipara Harbour, Tomorata and in the Waikato Region, require long distance road transport to market, causing road congestion and increased greenhouse gas emissions. Of these sands, the Waikato sourced aggregates are also not favoured in Auckland due to the increased risk of alkali silica reaction and higher cement required to reach target strength. As such, these other sand sources generate additional greenhouse gas emissions. These factors also increase the cost of sand sourced from these other locations and the cost of concrete production, thereby affecting the affordability of building and Auckland's new homes and infrastructure. These impacts are further detailed by Market Economics in the economic assessment provided with this application in Appendix D.

A range of technical assessments have been undertaken which demonstrate that the extraction activity will have less than minor adverse effects on the environment, including effects on ecological, water quality, coastal processes, marine mammals, cultural and landscape values.

Regarding ecological effects, it has been demonstrated that the biodiversity values between the existing extraction areas and those outside the extraction areas are largely similar, demonstrating the limited impact that the current extraction activity has on benthic species. Acoustic assessments have also shown that the activity avoids any significant effects on local marine mammal species, while avifauna and fin fish are also largely unaffected by the extraction activity.

The activity also has limited effects on local water quality. The discharge is limited to material extracted from the seabed and is currently returned to coastal waters via flume pipes. As such, it only contains sediment and biota removed from the seabed, with sediment testing finding no contaminants of concern. Furthermore, the sediment plume from the extraction vessels rapidly disperses, thereby avoiding any significant effects throughout the water column.

MBL have also engaged with mana whenua to ensure that cultural values and effects are addressed. The cultural values associated with the landscape, kaimoana, other taonga and the mauri of coastal waters have all been considered, with any significant effects avoided. In addition, Cultural Impact Assessments (CIAs) have also been sought from local iwi and these will be provided to Auckland Council once they become available.

The activity also avoids significant effects on landscape values, in part due to its temporary nature and the change to more night-time and weekday timed operations. In addition, the rapid dissipation of the sediment plume assists in minimizing visual effects, while the lack of erosion effects avoids any impacts on the landward

dune system or surf breaks. Lastly, it is noted that the activity does not require any onshore facilities at Pakiri, further avoiding onshore effects.

The commissioning of the William Fraser (which was commissioned in late 2019) has further improved the environmental performance of the extraction activity. In addition, the introduction of an altered extraction schedule which focuses extraction activities during night-time hours will also assist in reducing any adverse effects from the activity.

The sand extraction areas are also subject to several overlays under the Auckland Unitary Plan (Operative in Part) (AUP(OP)), including Significant Ecological Areas and landscape overlays, triggering the need for resource consent under both sections 12 and 15 of the Resource Management Act (1991). Overall, resource consent for a non-complying activity is required.

The activity has been shown to be consistent with the relevant statutory tests and documents of the RMA. This includes the New Zealand Coastal Policy Statement (NZCPS), the AUP(OP) and Part 2 of the RMA.

Accordingly, it is considered that **resource consent can be granted for this application**.

Important note about your report

This report has been prepared by Jacobs New Zealand Limited (Jacobs) for McCallum Brothers Limited (the Client) for the purposes of a resource consent application for the inshore extraction of marine sand at Pakiri, Auckland. Jacobs accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report (or any part of it) for any other purpose.

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and/or from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client (if any) and/or available in the public domain at the time or times outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report.

Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report may also describe specific limitations and/or uncertainties which qualify its findings. Accordingly, this report should be read in full and no excerpts are to be taken as representative of the findings unless any such excerpt and the context in which it is intended to be used have been approved by Jacobs in writing.

PART A: RESOURCE CONSENT APPLICATION

To: Auckland Council

Address: Private Bag 92300

Auckland 1142

McCallum Brothers Limited requires a coastal permit under sections 12(1), 12(2) and 15(1) of the Resource Management Act 1991 informed by (but not limited to) the following plan provisions:

Auckland Unitary Plan (Operative in Part)

Coastal Permit (s12(1) and s12(2))

- The proposal involves the disturbance of coastal marine area within the General Coastal Marine Zone for mineral extraction. Pursuant to Rule F2.19.4 (A28), this is a **discretionary activity**.
- The proposal involves the disturbance of the coastal marine area within an Outstanding Natural Landscape overlay for mineral extraction. Pursuant to Rule F2.19.4 (A28), this is a **non-complying activity**.
- The proposal involves the disturbance of the coastal marine area within a Significant Ecological Area – Marine 2 overlay for mineral extraction. Pursuant to Rule F2.19.4 (A28), this is a **non-complying activity**.
- The proposal involves the disturbance of the coastal marine area within a High Natural Character Area for mineral extraction. Pursuant to Rule F2.19.4 (A28), this is a **non-complying activity**

Coastal Permit (s15)

- The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within the General Coastal Marine Zone. Pursuant to Rule F2.19.2 (A15), this is a **discretionary activity**.
- The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within an Outstanding Natural Landscape. Pursuant to Rule F2.19.2 (A15), this is a **non-complying activity**.
- The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within a Significant Ecological Area – Marine 2 . Pursuant to Rule F2.19.2 (A15), this is a **non-complying activity**.
- The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within a High Natural Character Area. Pursuant to Rule F2.19.2 (A15), this is a **non-complying activity**.

Overall, consent is required for a **non-complying activity**.

The extraction activity is proposed between the following co-ordinates at Pakiri, Auckland:

Northern Area		Southern Area	
NZTM2000 Projection	**NZGD2000 Projection**	**NZTM2000 Projection**	**NZGD2000 Projection**
1745987.4, 6001965.8	36 06 58S 174 37 20E	1749100.9, 5996074.1	36 10 07S 174 39 28E
1746186.8, 6002065.1	36 06 54S 174 37 27E	1749400.1, 5996274.4	36 10 00S 174 39 40E
1748196.6, 5997771.1	36 09 13S 174 38 51E	1751308.1, 5992579.6	36 11 59S 174 40 59E
1748496.4, 5997872.1	36 09 09S 174 39 03E	1751507.5, 5992879.9	36 11 49S 174 41 07E

Assessment of Environmental Effects

In accordance with the Fourth Schedule of the RMA, an assessment of environmental effects is provided in Section 6 of this report comprising detail that corresponds with the scale and significance of the actual and potential effects that the proposed activity may have on the environment.

PART B: ASSESSMENT OF ENVIRONMENTAL EFFECTS

List of Abbreviations

Acronym	Meaning
AEE	Assessment of Effects on the Environment
ADCP	Acoustic Doppler Current Profiler
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG (2018)	Australian and New Zealand Guidelines for Freshwater and Marine Water Quality
AUP(OP)	Auckland Unitary Plan (Operative in Part)
CIA	Cultural Impact Assessment
CMA	Coastal Marine Area
CMT	Customary Marine Title
CO_2	Carbon Dioxide
CTD	Conductivity, temperature and depth
HNC	High Natural Character
KL	Kaipara Excavators Limited
MBL	McCallum Brothers Ltd
mgs	Mean Grain Size
MPSS	Mangawhai-Pakiri Sand Study
NZCPS	New Zealand Coastal Policy Statement
ONL	Outstanding Natural Landscape
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Total Polychlorinated Biphenyls
RMA	Resource Management Act 1991
RUB	Rural Urban Boundary
SEA	Significant Ecological Area
SQGs	Sediment Quality Guidelines
TSHD	Trailing Suction Hopper Dredgers
TSS	Total Suspended Solids
WETlabs	WETlabs WQM

1. Introduction

This Assessment of Effects on the Environment (AEE) has been prepared to support the resource consent applications for the continued extraction of sand from the Coastal Marine Area (CMA) at Pakiri, North Auckland. Currently McCallum Brothers Ltd ® (MBL) operate vessels within the inshore area at Pakiri under a package of coastal permits ((ARC28165, ARC228172, ARC28173 & ARC28174) which allow for the combined extraction of 76,000 m^3/year of sand (from the nearshore area between 5 m and 10 m water depths) in the areas shown in Figure 1-1: Location of extraction areas (Jacobs) This current consent regime was approved by the Environment Court in May 2006 and expires on 6th September 2020. Given the impending expiry date for these consents, MBL now seek a renewal of the extraction volumes and locations.

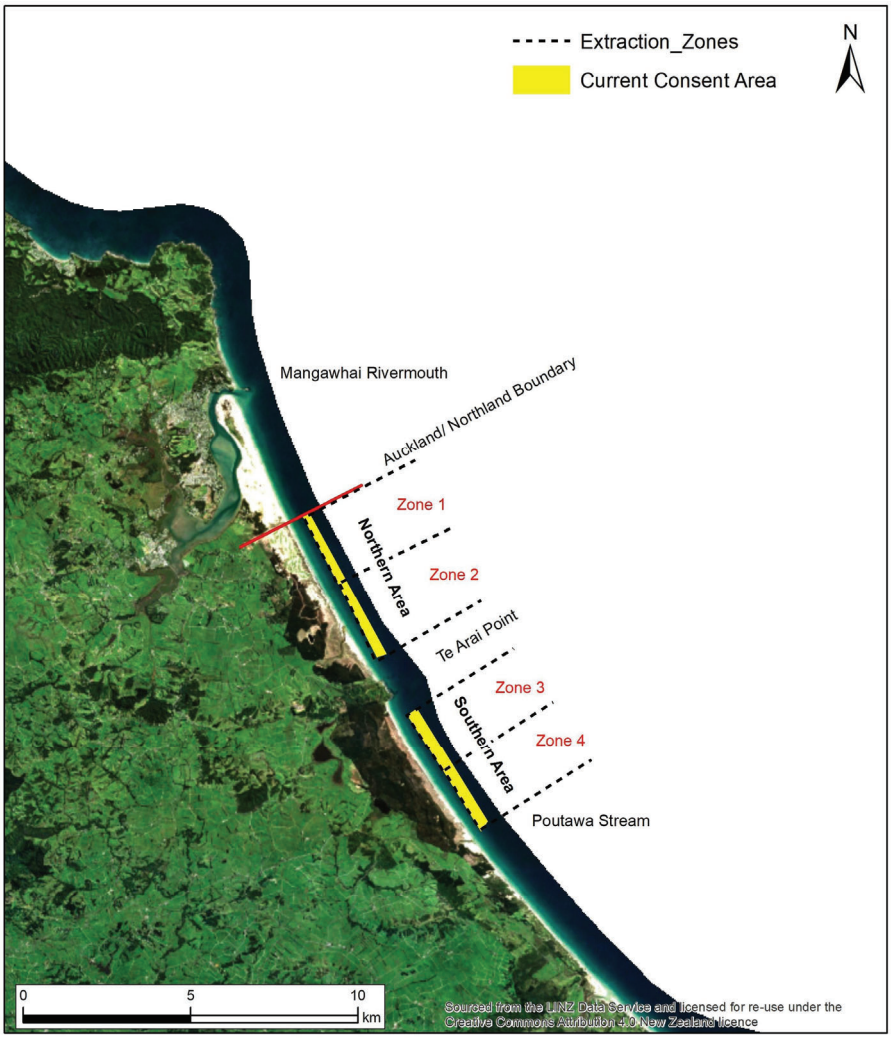


Figure 1-1: Location of extraction areas (Jacobs)

In addition to its own approved extraction activity, MBL also undertake additional offshore extraction activities at Pakiri under consents held by Kaipara Excavators Limited (KL), which allows for a total of 2 million m^3 of sand to be removed over a 20-year period from February 2003. Annual extraction within the CMA locations approved by KL's consents is limited to a maximum of 150,000 m^3/year, with sand permitted to be removed at seabed depths greater than 25 m off Pakiri (which includes a 3 km exclusion area from the Leigh/Cape Rodney Marine Reserve). KL have also lodged a resource consent application for additional extraction activities at Pakiri, although the extraction areas sought by KL do not overlap with MBL's current extraction areas.

Since 2004, MBL have extracted from both MBL and KL extraction areas an average of 137,000 m^3/year out of a total maximum consented extraction volume of 266,000 m^3/year, with a maximum yearly extraction volume of

218,270 m^3 of sand extracted in 2019. Further details of MBL's operations, including its vessels, is provided in Section 2 of this AEE.

Figure 1-2: MBL vessels in operation during June 2018 (Source: Jacobs)

The sand resource at Pakiri is of regional significance to Auckland given its role as a construction material and ease of transport to central Auckland. Auckland is projected to experience significant growth over the coming 30 years, with an additional 720,000 residents requiring 313,000 homes over this time[1]. As discussed in Section 3, this population growth will be focused within the existing urban core, driving an increased demand for concrete as a building material for new homes, business premises, transport assets, social infrastructure and network utilities. Without a secure and reliable source of sand for concrete manufacturing, the ability of the construction sector to meet Auckland's needs will be compromised, with subsequent negative consequences for Aucklanders' quality of life and housing affordability. The importance of the sand resource and the benefits of the activity are elaborated on in Sections 3 and 6.2.

Regardless, MBL are cognisant of the high natural, social and cultural values at Pakiri (as identified in Section 4). Considering this, a range of technical reports have been commissioned to investigate the effects of the extraction activity and what, if any, mitigation is required. This has included a landscape assessment, consideration of potential effects on marine ecology, effects on avifauna, coastal process and erosion, cultural effects and water quality effects.

In addition, a new vessel has recently been commissioned, the William Fraser. This vessel has been designed to be quieter and with its extra loading capacity, it will require less time on station at Pakiri to undertake sand extraction. The William Fraser has been designed, in part, to improve the overall environmental performance of MBL's operation at Pakiri and was commissioned specifically for MBL. In addition, MBL propose to switch to greater reliance on nighttime extraction and will limit any extraction on weekends and public holidays. The benefits of both the new vessel and the altered extraction schedule are discussed further in Section 6 and Appendix B.

Section 8, in conjunction with Appendix B of the AEE addresses statutory matters under sections 104, 104D, 105 and 107 of the Resource Management Act 1991 (the RMA). This assessment includes consideration of the

[1] Auckland Plan 2050, Auckland Council

Auckland Unitary Plan (Operative in Part) AUP(OP), the Hauraki Gulf Marine Park Act, the New Zealand Coastal Policy Statement, the Auckland Plan 2050 and the Hauraki Gulf Marine Spatial Plan.

Finally, MBL is aware of the interest that three iwi (Ngāti Manuhiri, Ngāi Tai ki Tāmaki, and Te Kawerau a Maki) have in coastal activities at Pakiri given the presence of statutory management areas within the Coastal Marine Area (CMA). As such, MBL request that the application undergoes limited notification, with notice served to these three iwi (as detailed in Section 7).

2. Description of Activity

2.1 Background

MBL has been dredging sand in the Mangawhai-Pakiri embayment for more than 75 years. Throughout this time, this high-quality sand has been primarily used to supply concrete plants in the greater Auckland area and is an essential construction material for the continued growth of the Auckland region. With MBL's current consents and related operations further off-shore under consents held by Coastal Resources Limited (owned by KL), MBL supplies from the Mangawhai-Pakiri embayment, approximately 43% of construction sand for the Auckland Region. Pakiri sand extracted by MBL is also used for sports fields, beach nourishment and equine activities, although the majority of extracted material is used for concrete production.

The current coastal permits were granted by the Environment Court in May 2006 for a 14-year period. The permits allow MBL to extract up to 76,000 m^3/year of sand from the inshore area between the Auckland/Northland regional boundary and the Poutawa Stream as shown in Figure 1-1, subject to monitoring coastal erosion rates, bathymetric changes and regular reporting to Auckland Council. MBL have regular submitted monitoring reports and sought to comply with these conditions throughout the implementation of these consents. A copy of the consent conditions is provided as Appendix A.

All extraction activities rely on dredging and pumping of a sand slurry from the seabed to one of the MBL dredge vessels. Once the dredge vessel is fully loaded, it returns directly by sea to a depot at the Port of Auckland for unloading. As such, there are no local on-shore components to the extraction operation, avoiding any modifications to the Pakiri foreshore, while also saving on transportation costs and reducing the potential environmental effects associated with long-haul road transport (e.g. greenhouse gas emissions).

MBL has made a number of changes to the current dredging operation that will further reduce any potential effects on the environment. This has included stopping the use of stationary dredging and moving solely to the use of Trailing Suction Hopper Dredgers (TSHD). In addition, a new purpose-built dredge, the William Fraser, has been commissioned by MBL and has commenced sand extraction operations at Pakiri.

The current predominant form of sand extraction on this permit has been stationary dredging, which is undertaken by anchoring a barge in one location and lowering a dredge head to a single point that extracted sand from that location. This resulted in a deeper area of extraction within a circular area. By contrast TSHDs operate by sucking material from the seabed as a sand slurry using a trailing suction head fitted to pipes that trail over the bed as the vessel travels over the extraction area. The sand pumps lift the extracted sand slurry through the pipework to pass through sand screens which are to be deposited in the onboard hopper. A schematic diagram of a TSHD is shown by Figure 2-1: Schematic Diagram of Trailing Suction Hopper Dredge (note not an actual MBL vessel) below.

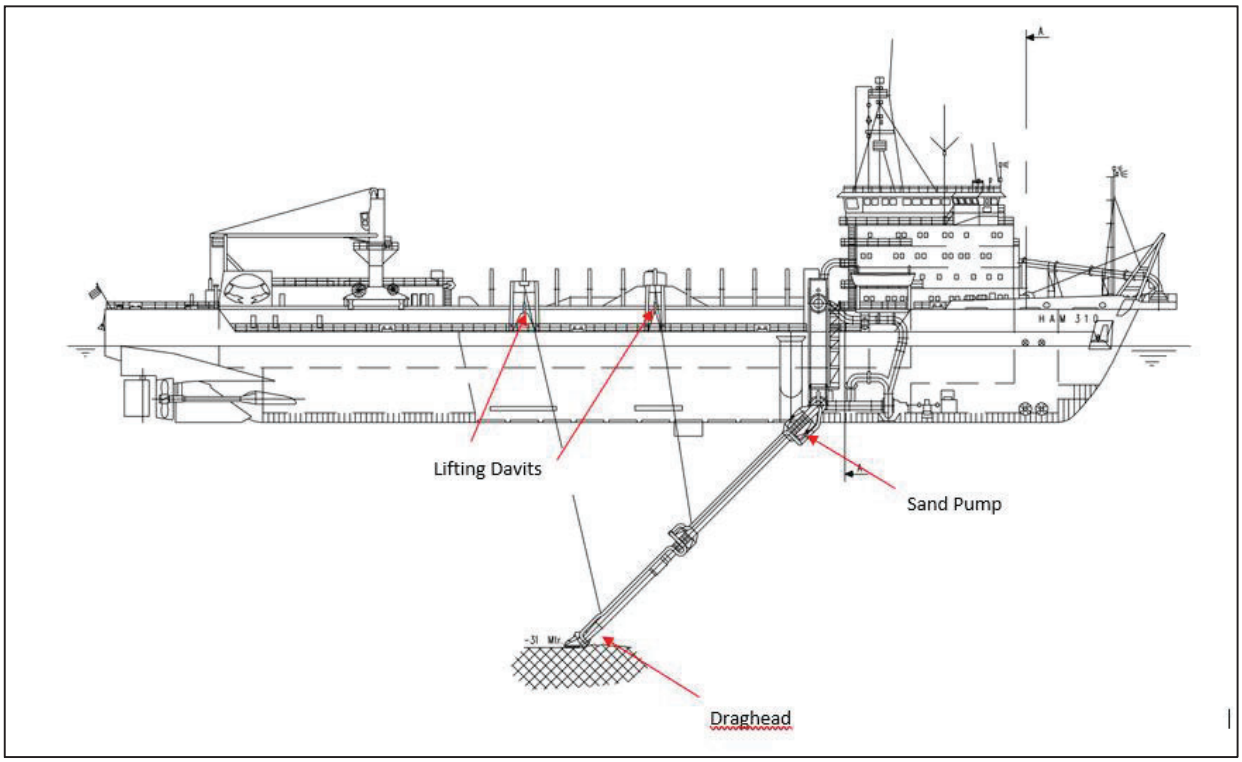


Figure 2-1: Schematic Diagram of Trailing Suction Hopper Dredge (note not an actual MBL vessel)

2.2 Consent Area and Volumes

This consent application is for the renewal of an existing activity, which is currently approved under a package of coastal permits ((ARC28165, ARC228172, ARC28173 & ARC28174), under one comprehensive consent, at the same combined annual volume (76,000 m^3/year) and from the same area as shown in Figure 1-1.

The northern and southern boundaries, plus the dredge exclusion area around Te Ārai Point are defined in the current consent by NZMS260 (R08) map references, which have been converted to the following coordinates in NZTM2000[2] projection as well as latitudes and longitudes in NZGD2000[3] projection:

Table 2-1: Co-ordinates of renewal consent area (NZTM projection)

Northern Area		Southern Area	
NZTM2000 Projection	**NZGD2000 Projection**	**NZTM2000 Projection**	**NZGD2000 Projection**
1745987.4, 6001965.8	36 06 58S 174 37 20E	1749100.9, 5996074.1	36 10 07S 174 39 28E
1746186.8, 6002065.1	36 06 54S 174 37 27E	1749400.1, 5996274.4	36 10 00S 174 39 40E
1748196.6, 5997771.1	36 09 13S 174 38 51E	1751308.1, 5992579.6	36 11 59S 174 40 59E
1748496.4, 5997872.1	36 09 09S 174 39 03E	1751507.5, 5992879.9	36 11 49S 174 41 07E

The landward and seaward boundaries of the current consent are defined by water depths, being the 5 m[4] and 10 m depths, with the area shown in Figure 1-1 being determined from the position by these inferred depth contours mapped on the LINZ Bathymetric Chart NZ522. It is noted that these depth contours are in terms of chart datum, being close to LAT[5], which is a different datum to the bathymetry presented in this report, which is

[2] New Zealand Transverse Mercator 2000 projection. Used for NZ Topo50 (1:50,000) mapping. The Topo50 map for the dredge area in AY31, with the map reference being the rounding of the 2nd to 5th digit of the NZTM co-ordinates.
[3] New Zealand Geodetic Datum 2000
[4] The landward limit of extraction is also to be no closer than 100 m seaward of the crest of the nearshore bar.
[5] LAT" Lowest Astronomical Tide

in terms of mean sea level (MSL), being 1.9 m above chart datum for Auckland. Therefore, the water depths shown in the mapping presented and discussed in this AEE are in the order of 2 m deeper than on Bathymetric Chart NZ522, with the defined consent area as shown in Figure 1-1 having water depths between 7 m and 12 m below MSL. To avoid confusion, it is proposed that the renewal consent area be demarcated solely by the above coordinates without reference to the water depths.

The southern limit of the consent area is located approximately 9.5 km from the northern limit of the Goat Island Marine Reserve.

This consent area extends a total of 10.8 km along the Pakiri Beach shoreline, excluding the 1.9 km long dredge exclusion area around Te Ārai Point. The extraction area (excluding Te Ārai Point) covers an area of 2.57 km^2. The dimensions of the two parts (northern and southern) of the consent area are presented in Table 2-2: Dimensions of the renewal consent area.

Table 2-2: Dimensions of the renewal consent area

	Northern Area	Southern Area
Length	4.8 km	4.1 km
Width	230-320 m	330-345 m
Area	1.3 km^2	1.27 km^2
Distance from shoreline (0 m Contour)	280-410 m	350-375 m

2.3 Dredge Volumes

This consent application is for the renewal of an existing extraction activity at the same combined annual volume (76,000 m^3/per consecutive 12-month period). MBL also propose to continue the current consent condition of limiting the extraction to a maximum of 15,000 m^3 over any consecutive 30 days.

The current consent also has a condition that the sand shall be extracted in approximately equal volumes from the four extraction zones shown in Figure 1-1: Location of extraction areas (Jacobs). However, this condition is not relevant for trailing suction dredging which will move across zones within each of the northern and southern areas. Therefore, it is proposed that the renewal consent be for the extraction in approximately equal volumes from each of the northern and southern extraction areas balanced over 12 monthly periods.

2.4 Dredging Vessels and Equipment

As indicated above, sand extraction will be undertaken by TSHDs with stationary dredging being phased out before the renewal consent becomes operative. MBL has phased out its older TSHD, the Coastal Carrier and has commissioned its new dredge vessel (the William Fraser).

Table 2-3 presents the specifications and dredging equipment employed for these TSHDs by way of comparison between the existing vessel operating under the current consent (the Coastal Carrier), and the new vessel that has been commissioned by MBL (the William Fraser). Although the William Fraser is larger, it is anticipated that the use of improved technology (such as moon pools and quieter engines) on the vessel will result in reduced potential environmental effects of the dredging operation than under the Coastal Carrier.

While it is proposed that all sand extraction under the renewal consent will be by TSHD and that initially this will be undertaken by the William Fraser, MBL do not want to limit the operation of the consent to only this vessel. The use of similar types of vessels in the future may be likely, with the potential effects on the environment from the use of alternative dredge vessels anticipated to also be better than the existing dredge operation currently carried out by the William Fraser. In addition, unforeseen circumstances (such as maintenance) may also require the use of a different vessel.

Table 2-3: Comparison of MBL's Trailing Suction dredge vessel used in the existing Pakiri nearshore sand extraction with the new vessel to be used, the William Fraser

	Existing Vessel - Coastal Carrier	New Vessel - William Fraser
Photo		
Commissioned	1968	2019
Length	56.65 m	68 m
Beam	12 m	16 m
Deck Size	28 m x 10 m	43 m x 10 m
Hopper Capacity	460 m^3	900 m^3
Loaded Draft	2.8 m	4.2 m
Vessel extraction speed	1.2 knots	1.5 knots
Draghead Width	1.2 m	1.5 m
Sand pump capacity	300 mm	400 mm
Sand screen size	2.5 mm	2.5 mm

The William Fraser is designed to be able to operate in swells up to 2.5 m in height, compared to the 1.5 m swell limit for the Coastal Carrier. Both vessels have wind operating limits of 25 knots from the NW to SE (clockwise) and 40 knots from west to south (anti-clockwise). Based on wave and wind hindcast data presented by MetOcean (2019), the William Fraser should be able to operate for 99% of days on an annual basis, with the lowest workability during July, when winter conditions prevail.

2.5 Dredging Operation

Once the dredge vessel arrives in the extraction location, speed is reduced to 1 to 1.5 knots and the generator is started to power the davits for lowering the pipes and the sand pump. The drag-head is unsecured from the vessel, the davits extend the pump and dredge pipework over the side and are slowly lowered to the seabed. The pump is started as the drag head descends to the seabed and water will start coming on board the vessel through the pipework and screen gear. Once the drag head reaches the seabed, pumping of the sand slurry begins and continues as the vessel moves forward along a pre-determined dredge track. With the William Fraser, the extraction process utilises recent advances in international industry practice allowing a greater sand to water ratio to be drawn into the drag-head, more efficient screening systems and moon pools to reduce turbidity, therefore increasing the efficiency of the extraction operation.

The optimum operation involves the dredger staying on the same dredge track for as long as possible, starting at the end of either extraction area and staying on the same track to the other end of the area. However, the dredge exclusion area around Te Ārai Point prohibits the ability to have a continuous track up the whole length of the extraction area. Once a dredge run reaches the end of the extraction area, the drag-head is lifted off the seabed and the vessel turns back and then resumes its dredging in the reverse direction on another dredge track. When the dredge hopper is full, the drag-head is lifted and the pump pushes water through the flumes to clear the system of any sand. The pumps and generator units are shut-down, the pipes are lifted back into their storage place(s) and secured to the cradle on the vessel. The vessel with a full hopper then returns to the depot (at the Port of Auckland) for unloading. For the Coastal Carrier the time for a round trip from the Port of

Auckland and return with a full hopper is in the order of 18 hours, which is expected to reduce by at least two hours for the William Fraser. Most of this time (e.g. 12-14 hours) is in transit to and from the Pakiri extraction area.

The anticipated dredge trench parameters and time required to complete a dredge run with the William Fraser is presented in Table 2-4. For comparison with the existing operation, the same information for the Coastal Carrier is also presented. Photographs of the drag-head in operation during dredging from the Coastal Carrier and the resulting dredge trench are shown in Figure 2-2.

Table 2-4: Dredging Characteristics for MBL dredge Vessels

Vessel	Coastal Carrier	William Fraser (anticipated)
Width of extraction trench	Average 1.2 m	Average 1.6 m
Depth of extraction trench	Average 0.15 m	Average 0.65m
Extraction trench shape	Trapezoidal	Trapezoidal
Hopper volume capacity	460 m^3	900 m^3
Volume required to be extracted from seabed to fill hopper	1100 m^3	1350 m^3
Length of extraction track needed to fill hopper	6 km	13.1 km
Time to fill hopper	3 -4 hrs	4 – 5 hrs
Number of trips in 30 consecutive days for 15,000 m^3 limit	33 trips	17 trips

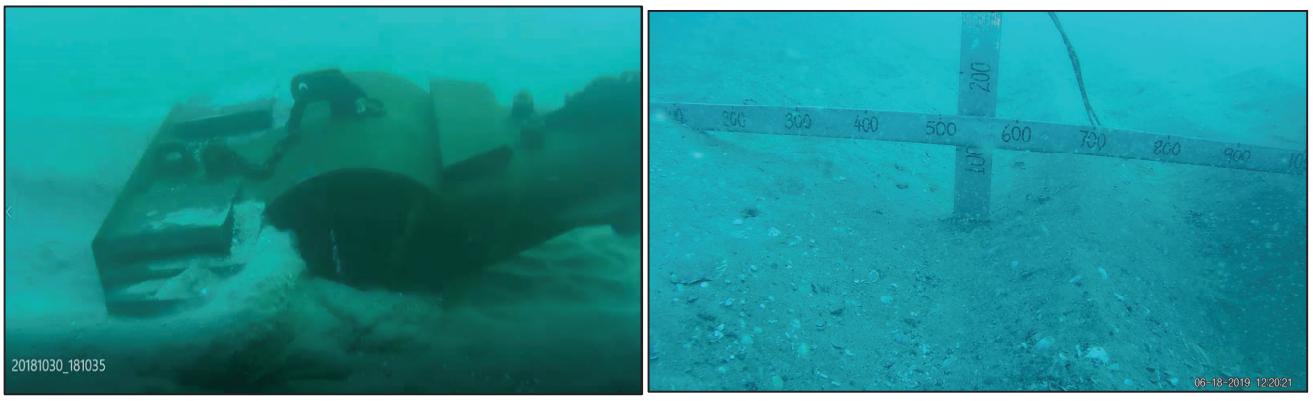


Figure 2-2: Coastal Carrier draghead in operation in 10 m water depth and resulting dredge trench 8 hours post-dredging.

Taking dredge efficiency as the ratio of seabed take to hopper capacity, the information presented in Table 2-4**: Dredging Characteristics for MBL dredge Vessels** indicates that the William Fraser has a 66% efficiency compared to the 42% efficiency of the Coastal Carrier. Therefore, for the same volume of sand in the hopper, the volume of sand taken from the seabed and the volume of sand discharge not retained in the hopper with the William Fraser will both be less than currently achieved with the Coastal Carrier. This increased efficiency is due to the use of improved dredge technology on the Willian Fraser and the use of a “screen deck” to provide a much larger screening capability than on the Coastal Carrier. This is discussed further in Section 2.6.

Based on the dimensions of the extraction areas and assuming that dredge trenches are spaced at least 5m apart (noting that the draghead width is only 1.6 m), the total volume able to be extracted by the William Fraser without re-dredging the same 5 m wide trench strip is in the order of 21,600 m^3 from the northern area and 26,500 m^3 from the southern area. Therefore, there is capacity within the existing extraction volumes and consent area for a trench strip to be dredged no more than once every six months. The position fixing and

dredge tracking technology of the William Fraser will allow this to be monitored to ensure that trenches have the maximum time to infill by natural sediment transport processes. By comparison, applying the same calculations under the current regime for the Coastal Carrier results in only a net volume of 20,500 m^3 being able to be extracted from a single pass over the whole extraction area. As such, each trench strip would have to be dredged three or four times each year if the maximum annual extraction volume of 76,000 m^3 occurs.

The other operational change to the dredging that has been occurring and will continue with the renewal consent is to continue with more night dredging. Currently (September 2018 to August 2019), 67% of dredging was carried out in the hours of darkness. With the quicker vessel turn-around time with the William Fraser there is the opportunity to move more dredging to a night time operation. This is considered to be beneficial in reducing potential visual impacts of the extraction operation.

2.6 Discharge of Water and Dredged Material to the Ocean

Discharge to the ocean from the dredge vessel occurs in the following two ways, which are discussed further in the following sub-sections.

- Discharge of by-wash containing oversized material that is too large to pass through the sand screens to the hopper; and
- Discharge over the weir boards as the hopper fills with sand.

2.6.1 By-Wash and Over-sized Material Discharge

The existing by-wash and over-sized material discharge from the Coastal Carrier occurs from the end of the 250mm Diameter flume pipes as shown in Figure 2-3.

Figure 2-3: Discharge from the Coastal Carrier of by-wash from overhead flumes and from the deck over hopper weir boards.

Under this current operation the sand slurry passes over individual sand screens located along the bottom of the flume pipe with material less than 2.5 mm in size passing through the screen to the hopper and over-sized material (e.g. shells) carrying on and subsequently discharged back to the sea via the end of the flume located

approximately 2-3.5 m above the sea surface. Due to the need to maintain a high pumping rate to prevent sand slurry blocking the pipes and the lower capacity of the sand screens with a combined surface area of 2.2 m^2 to pass all of the sand slurry into the hopper, the by-wash discharge includes a large percentage of sand (resulting in the lower efficiency of the current operation).

From sampling undertaken as part of the consent investigations, the indicative Total Suspended Sediment (TSS) in this discharge is in the order of 200 mg/L or less. Once discharged, the concentration quickly reduces back to ambient conditions in both depth and distance from the discharge point. Further information on the investigations into and effects on water quality are summarised in Section 6.3 and presented in detail in Appendix F.

With the William Fraser, new sand screening technology is being used with the sand slurry passing over an 8m^2 "screen deck' (Figure 2-4: Diagram of sand "Screening Deck" on the 'William Fraser') and is then transported to the hopper via two pipes with nine discharge points located along the front and side of the vessel so that the load in the hopper can be balanced. The use of the "screen deck" gives an effective screen area 3.6 times greater than currently available on the Coastal Carrier, with the volume of sand able to be discharged into the hopper and the dredging efficiency considerably improved.

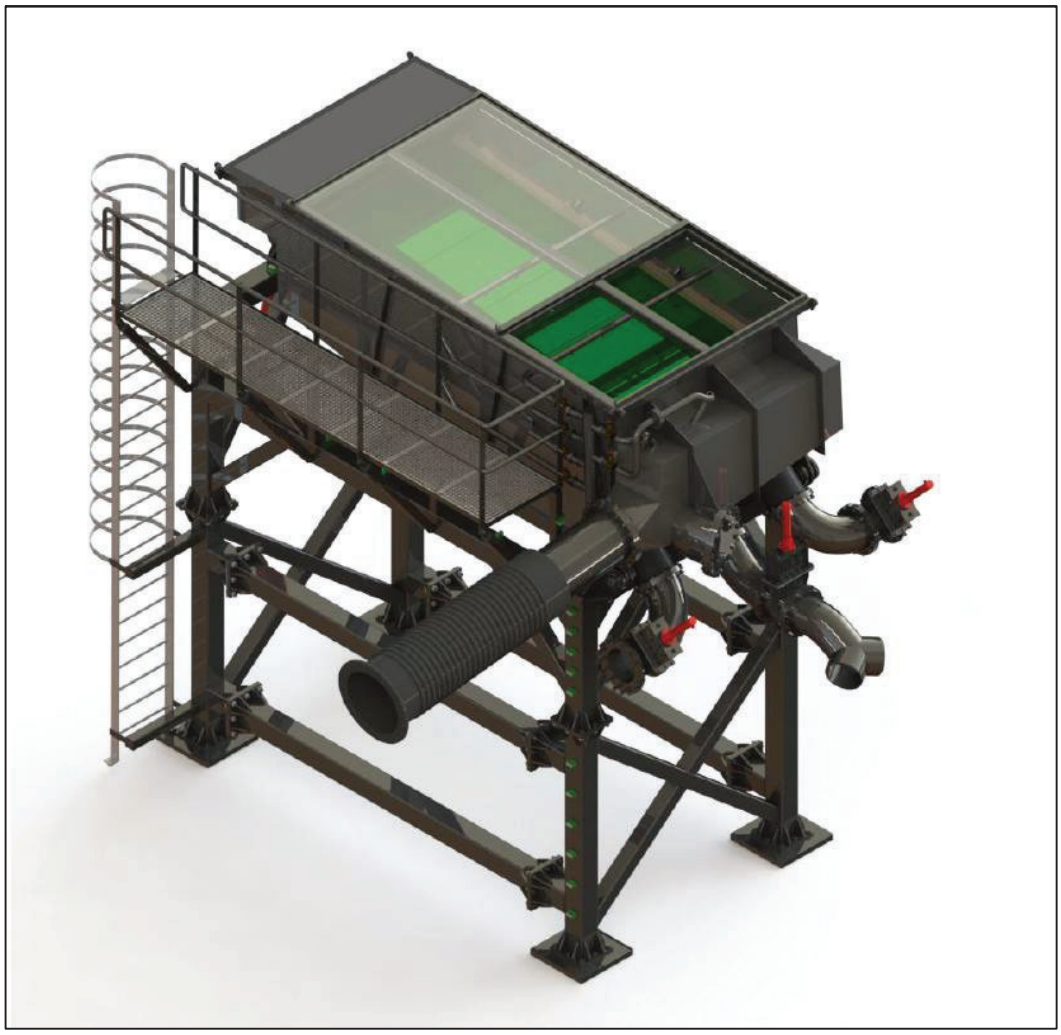


Figure 2-4: Diagram of sand "Screening Deck" on the 'William Fraser'

The discharge method for this by-wash and over-sized material also changes from overhead flume to being collected via a series of "moon pools" along the sides of the hopper. These discharge at least 1.5 m below the water's surface along the keel of the vessel. Sub-surface discharges are considered to be good industry practice, reducing the environmental effects by providing improved visual clarity at the sea surface, smaller

sediment footprint settling back into the area that has been dredged, and less spread of sediment plume (due to less inaction with wave activity and aeration of the discharge water).

2.6.2 Discharge over the Hopper Weir Boards

Under the current operation with the Coastal Carrier, the sand settles out in the hopper with the water and finer particles on the top passing over a series of weir boards across gaps in the hopper sides that are raised in height as the hopper fills. This material flows over the deck of the vessel around the outside of the hopper to discharge over the side of the vessel to the sea surface as shown in Figure 2-3.

With the William Fraser, hopper weir boards will still be used to drain excess water and fines from the hopper. However, this material will be collected in six “moon pools” that discharge below the keel of the vessel, at least 1.5m below the sea surface. Therefore, surface discharges will be eliminated from the dredging operation.

2.7 Noise Discharge

Styles Consulting Group undertook underwater acoustic monitoring of the ‘Coastal Carrier’ between March and June 2019 (Appendix H). This monitoring utilised a single measurement array (containing 6 SoundTrap recorders) and measured the current vessel undertaking standard extraction activities at Pakiri. Overall, dredging noise levels are lower when compared to larger trailing suction hopper dredges (previously assessed in New Zealand waters, with the average source level of the Coastal Carrier approximately 170 dB re 1 µPa @ 1m (the measured noise level of the William Fraser is 168 dB re 1 µPa @ 1m)

While it is important to acknowledge the low underwater noise generated by the Coastal Carrier, the William Fraser will be even quieter. This is due to more efficient engines and the incorporation of soundproofing into the vessel’s hull design. On top of that, due to the increased hopper capacity the amount of time the vessel is on site extracting will also reduce, further minimising the noise effects.

3. The Pakiri Sand Resource and its Strategic Importance to Auckland

The underlying purpose of this application is to allow MBL to continue the extraction of sand from the inshore area of Pakiri. This sand is a vital resource for the ongoing sustainable growth and development of the Auckland region, not least because of its importance to the construction sector. In light of this, the following section details both the regional significance of the sand resource at Pakiri, but also its role in addressing the strategic growth and economic pressures facing Auckland.

Figure 3-1: Sand Delivery at the Port of Auckland during June 2018 (Source: Jacobs)

3.1 The Pakiri Sand Resource

Sand is a ubiquitous resource in modern life. It is key component in the manufacture of concrete and glass. It is used for the restoration of eroding beaches and as a surface treatment in many of Auckland's parks. However, not all sand is created equal. Given its origins from weathered rock and ground shells, its chemistry, grain size and sediment content can alter between marine, freshwater or land-based locations, thereby affecting its usefulness for construction and industry requirements.

As noted in the Concrete Industry Report by Brett Beatson (Appendix E), East Coast sands (i.e. Pakiri sand), is ideal for concrete production and the construction sector. Mr Beatson states that coastal sand is:

"very clean, has consistent grading, good particle shape, is strong and durable and contains very few ultra-fine particles; these characteristics greatly reduces the risk of early plastic shrinkage or long-term drying shrinkage issues."

In comparison, sand extracted from the Waikato is less useful for concrete production given its chemical and physical properties. These sands contain a number of minerals which are of a volcanic origin and consequently have a higher reactivity to cement alkalis. This has resulted in cases of Alkali Silica Reaction (ASR), leading to significant damage in structures. The potential adverse outcomes of using high alkali reactive sands is reflected in construction standards (NZS 3104:2003), which places a maximum limit of 2.5 kg/m^3 of total alkali in concrete when potentially reactive aggregate or sand is used. Therefore, complying with this standard can be quite challenging where Waikato sourced sands are used.

The Kaipara Harbour is also used as a source of sand. However, given its ecological importance (including to West Coast fisheries), it's largely undeveloped nature and high cultural values, the future of continued sand

extraction within the Kaipara Harbour is uncertain. This uncertainty in long-term supply increases the strategic importance of other sand resources.

Furthermore, its location on Auckland's East Coast assists in the transport of this bulk commodity to market. Given that sand is a low value, high volume commodity, transport and handling costs must be kept to a minimum. Extraction on the East Coast can be undertaken by sea vessel and then easily transported to the Port of Auckland. Other sand resources, such as those on the Kaipara Harbour or from the Waikato, require additional handling and road transport of a significant distance to reach central Auckland and the region's urban growth hubs.

Having undertaken a wider assessment of the regional marine sand resource, Market Economics (Appendix D) have identified that sand extraction at Pakiri supplies at least 43% of all sand to the Auckland market, with the remaining supply mainly coming from operations in the Kaipara Harbour. This figure highlights the importance of the Pakiri sand resource to the Auckland region and the importance of continued access for its extraction, especially given the technical difficulties and environmental sensitivities associated with extraction in the Kaipara Harbour, as well as the reduced usefulness of Waikato sourced sand for the construction industry.

3.2 Auckland's Sand Demand

The second strand to the importance of this sand resource is Auckland's high demand for low cost building materials as the city grows. As noted by the Auckland Plan 2050 (the Auckland Plan), the key challenge facing the region is population growth[6]. From an existing population of 1.66 million, this growth is expected to generate a population increase of 720,000 people over 30 years, with Auckland reaching 2.4 million residents. These additional residents need new homes (313,000 extra dwellings), workplaces, schools, roads, rail lines, hospitals and utilities[7]. All of these features of modern urban life will require concrete and as such, a steady and reliable source of sand.

Underlying this future urban growth is the Auckland Council's strategic direction for a quality compact urban form[8]. This direction is reflected in the Auckland Plan's development strategy, which details that the majority of growth is to occur within the existing Rural Urban Boundary (RUB). While some greenfield locations exist within the urban area (e.g. Flatbush, Red Hills and Whenuapai), most development within this area can be categorised as "brownfield" (including development in metropolitan and town centres). Regardless of this brownfield and greenfield split, in order to accommodate the required extra dwellings there will be a move to higher density housing typologies.

This move towards more multi-storey, multi-unit residential building types is reinforced by the AUP(OP)'s own urban zonings. For instance, within the Residential – Terrace Housing and Apartment Buildings Zone, a maximum building height of 16m is provided for. Underpinning this new higher density urban form will be concrete. While some new buildings may use other materials such as steel or wood for their structures, almost all buildings will rely on concrete for foundations, their utility connections and the transport networks which serve them.

This demand is further elaborated on by the report by Market Economics, who estimate that current market demand for sand from Auckland suppliers is 750,000 tonnes/year, with approx. 600,000 tonnes/year being used to produce ready mix concrete. As shown in Figure 3-2, additional demand for concrete (as driven by Auckland's growth) will result in increases of at least 290,000 to 450,000 additional tonnes of sand per annum by 2043.

[6] Page 13, Auckland Plan 2050.
[7] Page 13. *Ibid.*
[8] Page 89, *Ibid.*

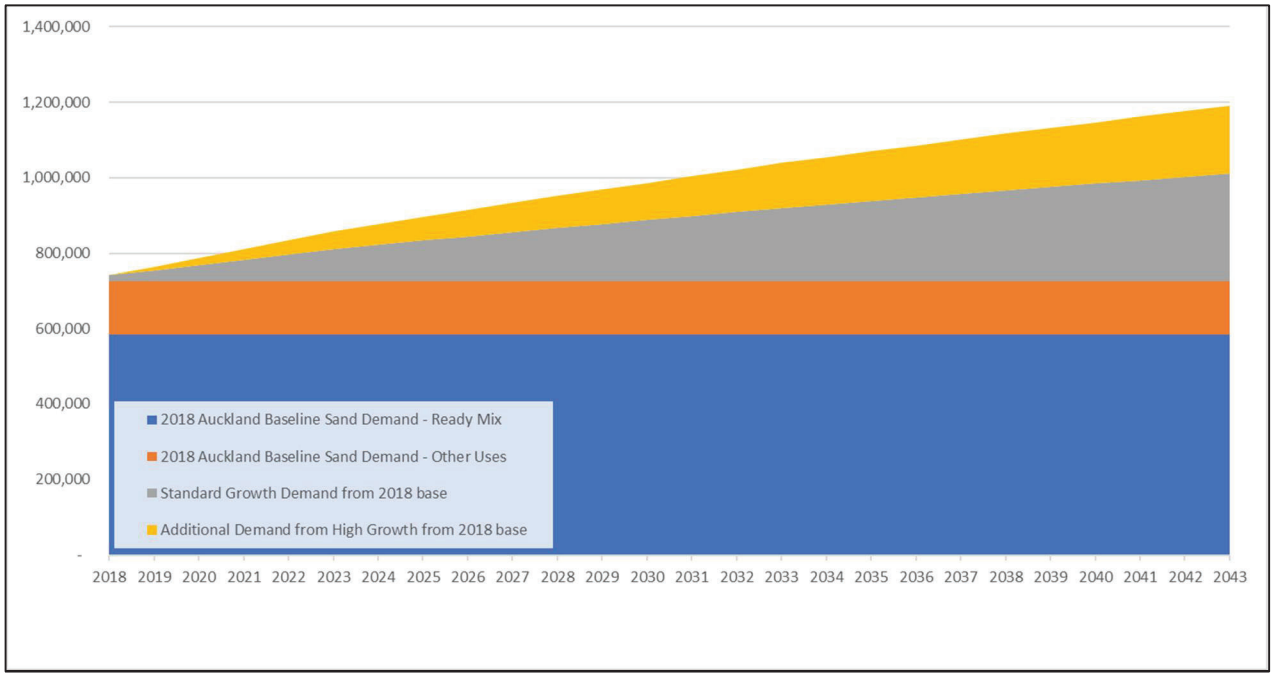


Figure 3-2: Projected Future Sand Demand (Standard- and High-Growth Scenarios) (Source: Market Economics)

This demand for additional concrete and sand is also driven by the planned infrastructure spend over the next three decades. Auckland Council's 30-Year Infrastructure Strategy document[9] details that up to $30 billion of infrastructure investment is needed to meet projected population growth. This infrastructure will include major assets for the 3 waters[10], transport, parks and community facilities. Further infrastructure investment will be required by Central Government for education, health, electricity transmission, state highways and rail; while private providers in the telecommunication and energy sectors will also need to upgrade and improve their networks. This infrastructure investment will place further pressure on sand supplies given the significant volumes of concrete required.

Given the above factors, the marine sands at Pakiri represent a strategic mineral resource for Auckland. They are uniquely placed for ease of transport to Auckland's urban core, are ideal for construction purposes and can provide an ongoing secure supply of sand to meet Auckland's significant growth pressures. The continued access to this resource and its ongoing extraction is critical to meet Auckland Council's own strategic goals and ensure the wellbeing of the community and the economy.

[9] The 30 Year Infrastructure Strategy was prepared for the 2018 – 2029 Long Term Plan.
[10] 3 waters is a standard terminology for potable water, wastewater and stormwater infrastructure.

4. Site Location and Existing Environment

4.1 Location and Surrounding Development

The proposal is located at Pakiri, North Auckland between Poutawa Stream and the Auckland/Northland regional boundary (Figure 1-1). Pakiri itself is a 14 km long coastal beach on Auckland's East Coast, which runs between Cape Rodney in the south to Bream Tail[11] in the north (Figure 4-1).

The coastal edge includes a large dune system, several creeks (including the Poutawa Stream) and Te Ārai Point. Historically, the area has been used for pastoral farming and tourism/recreation, which is reflected in the presence of the Pakiri Beach Holiday Park (to the south), two regional parks (Te Ārai and Pakiri) and numerous holiday homes/baches along the length of the beach. Recreational activities undertaken at Pakiri Beach include surfing, fishing (both from vessels and surf casting), swimming, horse trekking and walking/hiking. It is noted that no permanent mooring or berthing facilities are provided at Pakiri. The nearest boat ramp is at Mangawhai, with any boat launches at Pakiri reliant on a beach launch.

Plantation forestry, featuring exotic pines, is spread over two large blocks north and south of Te Ārai Point. These forestry blocks were established in the 1970s to stabilise the natural dune system and are now reaching harvest maturity. At the time of writing, significant forestry clearance has commenced thereby altering the appearance of the coastal environment.

More recently, the Tara Iti golf course and associated development has occurred at the Northern edge of Te Ārai Beach. It is also understood that the owner of the golf course has plans to undertake further expansion of the golf course and visitor facilities. North of the Tara Iti golf course and immediately outside the Auckland Region is Mangawhai, including Mangawhai Harbour. Mangawhai is home to approximately 1400 people and is a popular holiday destination.

Figure 4-1: Aerial View of the Pakiri Area (Source: Auckland Council GeoMaps)

[11] It is noted that Mangawhai Heads is located in the Northland Region.

4.2 Auckland Unitary Plan Controls and Overlays

The Auckland Unitary Plan (Operative in Part) (AUP(OP) is the primary planning document for the Auckland Region, and both the zoning for the Pakiri area, as well as the controls and overlays present must be considered.

4.2.1 Zoning

As shown in Figure 4-2, the proposed extraction operation will be located within the General Coastal Marine Zone. Chapter F2 describes the purpose of the zone as:

"to provide for use and development in the coastal marine area, in particular those forms of use and development that have a functional or operational need to be undertaken or located in the coastal marine area, while:

- *Enabling people and communities to provide for their social and economic wellbeing, through the appropriate use and development of the coastal marine area;*
- *Enabling the construction, operation, maintenance and upgrading of infrastructure within the coastal marine area (that cannot be practicably located on land) where it has a functional or operational need;*
- *Protecting natural character, landscape values and natural features;*
- *Maintaining and enhancing water quality and the life-supporting capacity of the marine environment;*
- *Protecting significant ecological values;*
- *Protecting historic heritage values;*
- *Recognising and providing for Mana Whenua values in accordance with tikanga Māori;*
- *Maintaining and enhancing public access, open space, recreational use, amenity values, and access to and along the coastal marine area;*
- *Not increasing the risk of subdivision, use and development being adversely affected by coastal hazards; and*
- *Managing conflicts between activities within the coastal marine area.*[12]*"*

It is noted that the zone recognises the importance of enabling social and economic wellbeing and the operational or functional need for certain activities (e.g. mineral extraction) to take place in this zone.

[12] Chapter F2, AUP(OP)

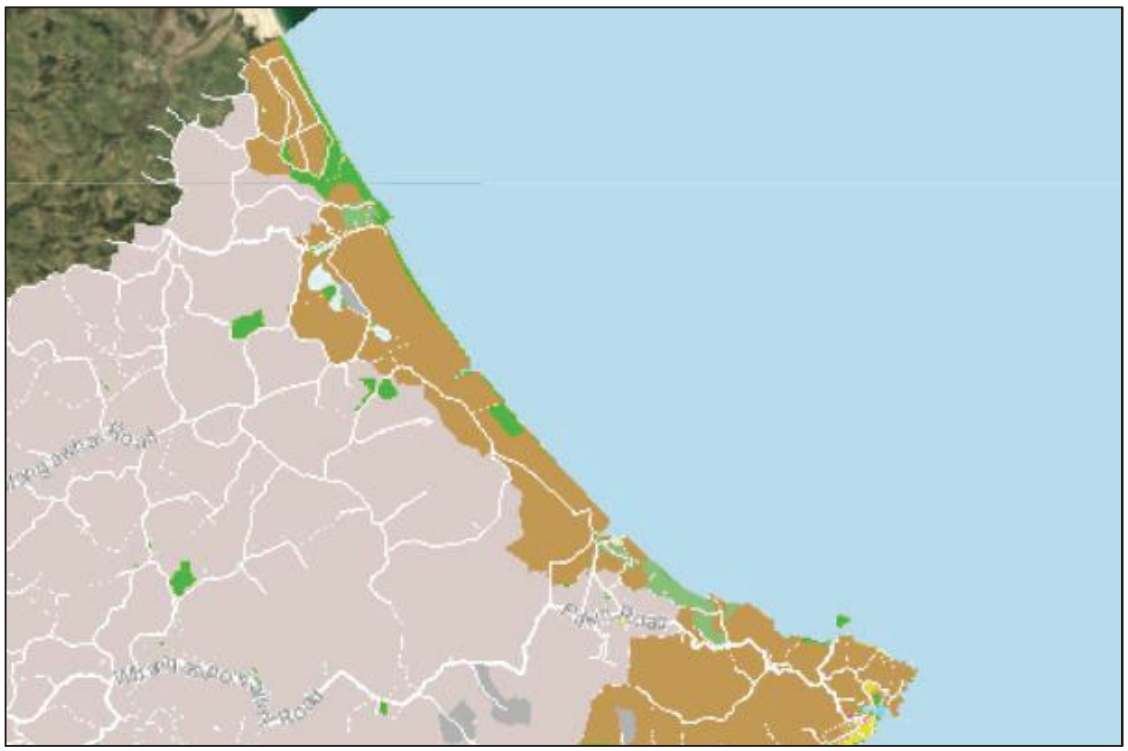


Figure 4-2: AUP(OP) Zoning (Source: Auckland Council GeoMaps)

4.2.2 Significant Ecological Areas

Three marine Significant Ecological Areas (SEAs) are present within the Pakiri Area (Figure 4-3: SEA Locations (Source: Auckland Council GeoMaps). These are identified by the AUP(OP) as:

- SEA-M2-87a (Pakiri Beach);
- SEA-M2-87b;
- SEA-M2-87c (Poutawa stream mouth); and
- SEA-M1-87d (Te Ārai Stream Mouth).

The largest of these SEAs is SEA-M2-87a, which is described by the AUP(OP) as:

"Pakiri Beach is the only exposed mainland east coast surf beach free of housing and backed by extensive sand dunes and dune lakes, and is of regional significance. The endemic threatened sedge, pingao (Ficinia spiralis) ('relict'), is found on the dunes along the Pakiri coast.

Regionally significant populations of the threatened sand coprosma (Coprosma acerosa) ('Declining') are also present on the back dunes. Mangawhai is a breeding area for the largest flock of New Zealand dotterels ('nationally vulnerable') in the Auckland Region and is one of only three[13] nesting sites in the country for the 'nationally critical' New Zealand fairy tern.

Other birds in the Pakiri area include white-faced heron, blue reef heron ('nationally vulnerable'), banded rail ('naturally uncommon'), pied stilt ('declining') and variable oystercatcher ('declining'). The beach exhibits a gradation in the type of sediment and associated fauna from the shore out to the edge of the off-shore sand-body. The fauna diversity decreases getting closer to the shore because of the decreasing stability of the substrate, but the population densities increase.

[13] It is noted that that there are actually four such nesting sites - Waipu, Papakanui Spit, Mangawhai and Pakiri River Mouth

The sands of the beach are an important habitat for a variety of plants and animals. The areas of natural vegetation include important areas of pingao/spinifex, Muehlenbeckia shrubland, manuka scrub, and pohutukawa forest. The Department of Conservation has selected this area as an Area of Significant Conservation Value (ASCV).

Pakiri Beach and River has been identified as an Important Bird Area for NZ fairy tern and NZ dotterel. The NZ fairy tern forage both within the Pakiri River and up to 2 km out to sea."[14]

While the ecological values of the area described further in sections 4.4.7 and 4.4.8 , it should be noted that MBL have avoided any extraction activities within SEA-M1-87d (Te Ārai Stream Mouth), as mineral extraction in this SEA is not provided for.

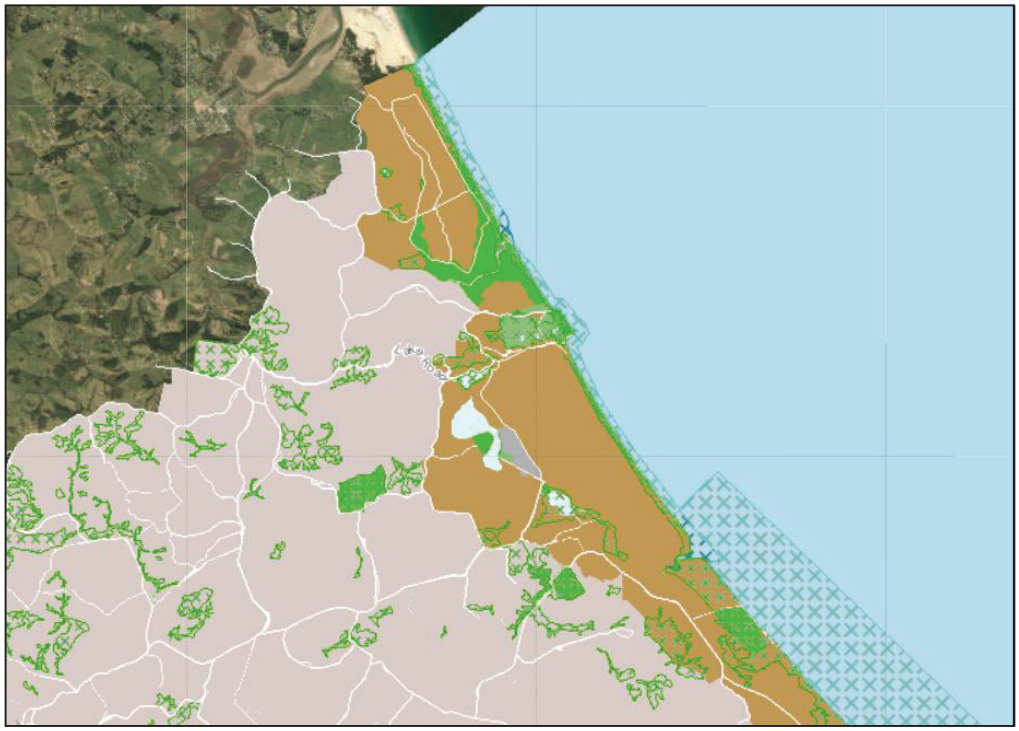


Figure 4-3: SEA Locations (Source: Auckland Council GeoMaps)

4.2.3 Landscape Overlays

While the landscape values of the area are discussed in Section 4.4.5 of this report, it is noted that two landscape related overlays are present at Pakiri. The first of these is a "High Natural Character Overlay – Te Ārai and Pakiri Beach[15]", which runs for the length of Pakiri Beach. This overlay extends up to approx. 1650 m inland and approx. 1340 m offshore, with the AUP(OP) describing this area as:

"An extensive unit comprising remote beaches, sand dunes and dramatic coastal cliffs and scarps which descend to rock shoals and coves. Very little development is evident throughout the unit, which adds to the feeling of remoteness. Natural vegetation is variable – being influenced to the north by adjacent forestry vegetation – but is extensive in the upper reaches of the Pakiri River, with the regenerating native forest on the ridges above Pakiri Road and the remnant native forests on the coastal scarps between Leigh and Pakiri."[16]

[14] Schedule 4, AUP(OP)
[15] Area 48, Schedule 8, AUP(OP)
[16] Ibid

The other landscape overlay present is an "Outstanding Natural Landscape Overlay – Pakiri Beach[17]. This overlay runs the length of Pakiri Beach and extends approx. 130 m inland to approx.1340 m offshore. The AUP(OP) describes the area within the boundaries of this overlay as:

"Coastal Wild nature (coastal) - Pakiri Ocean Beach extending into dune system for most of its length together with some coastal terrace landforms at the southern end near Pakiri Stream[18]."

It is noted that mineral extraction is currently undertaken within these overlays and the application seeks to continue the activity at these locations. In addition, forestry clearance, bach construction and the establishment of the golf course has occurred within these overlays.

4.2.4 Surf Breaks

As shown in Figure 4-4 and Figure 4-5, the AUP(OP) has identified three surf breaks at Pakiri[19]. These three breaks are described by the AUP(OP) as:

- Te Ārai Beach - *"Exposed beach break that is frequently suitable for wave riding. Good wave quality suitable to all skill levels. Offers a 'wilderness' experience with lack of development. Good access."*
- Pakiri Beach (North - 'Forestry') – *"Exposed beach break that is frequently suitable for wave riding. Good wave quality suitable to all skill levels. Offers a 'wilderness' experience with lack of development. Good access."*
- Pakiri Beach (South) – *"Exposed beach break that is frequently suitable for wave riding. Good wave quality suitable to all skill levels. Offers a 'wilderness' experience with lack of development. Good access."*

It is noted that the AUP(OP) does not include any specific rule associated with surf breaks, rather any activities in the CMA are required to consider their potential effects on them. Furthermore, it its recognised that all three surf breaks are located outside the extraction area and are not identified by the New Zealand Coastal Policy Statement 2010 (NZCPS) as nationally significant surf breaks.

[17] Area 22, Schedule 7, AUP(OP)
[18] *Ibid*
[19] Referred to as Breaks 1, 2 and 3 (AUP(OP) Appendix 4)

Figure 4-4: Surf Breaks 1 (Te Ārai Beach) and 2 (Pakiri Beach North) (Source: Auckland Council GeoMaps)

Figure 4-5: Surf Break 3 (Pakiri Beach South) (Source: Auckland Council GeoMaps)

4.3 Cultural Aspects

An examination of Auckland Council GeoMaps records for the Pakiri area show the following iwi and hapū as having an interest in the Pakiri onshore and/or offshore areas (in no particular order):

- Ngāti Manuhiri;
- Ngāi Tai ki Tāmaki;
- Ngāti Maru;
- Ngāti Te Ata;
- Ngāti Wai;
- Ngāti Whanaunga;
- Ngāti Whātua o Kaipara; and
- Ngāti Whātua Ōrākei.

4.3.1 Treaty Settlements and Other Claims

It is noted that the Pakiri area has been subject to claims under the Treaty of Waitangi and the Marine and Coastal Area (Takutai Moana) Act 2011. As a result of these processes (noting that the Marine and Coastal Area (Takutai Moana) Act 2011 claims are ongoing), the following Mana Whenua interests have been identified in the Pakiri Area:

- Coastal Statutory Acknowledgement Areas for Ngāti Manuhiri, Ngāi Tai ki Tāmaki, and Te Kawerau a Maki;
- Commercial redress settlement land at the South Mangawhai Forest for Ngāti Manuhiri;
- Financial and commercial redress settlement land at the Mangawhai Forest for Te Uri O Hau; and
- 21 applications for customary marine title[20].

4.3.2 Cultural Values

MBL have engaged with Mana Whenua and have requested the preparation of Cultural Impact Assessments (CIAs). Once these CIAs are received, they will be used to further detail the cultural aspects of the Pakiri area and provided to Auckland Council.

4.4 Existing Environment

4.4.1 Introduction

This section provides a summary of the bio-physical characteristics of the existing environment. This information is obtained through field work, literature reviews and laboratory testing. The methodologies associated with each subject area are also detailed in the respective technical reports attached to this AEE. Areas considered and described include:

- Climate and currents;
- Sediment and sand quality;
- Geomorphology and bathymetry;

[20] At the time of writing, no customary marine titles have been issued for any area of the CMA at Pakiri.

- Landscape and Visual;
- Marine ecology;
- Water quality; and
- Noise (Underwater and Terrestrial).

4.4.2 Climate and Currents

As an exposed coastal location, Pakiri features a marine climate with frequent sea breezes. Sea breezes mostly frequently occur between November and March, on approximately 20% of summer days. According to NIWA:

"Between 8 am and 10 am, breezes are initiated from the harbours in the region (Waitemata, Manukau, Kaipara) and along Auckland's east coast, and in the late morning these 'elementary' breezes are augmented by 'mature' breezes from the main water bodies surrounding the region (Tasman Sea and outer Hauraki Gulf)."[21]

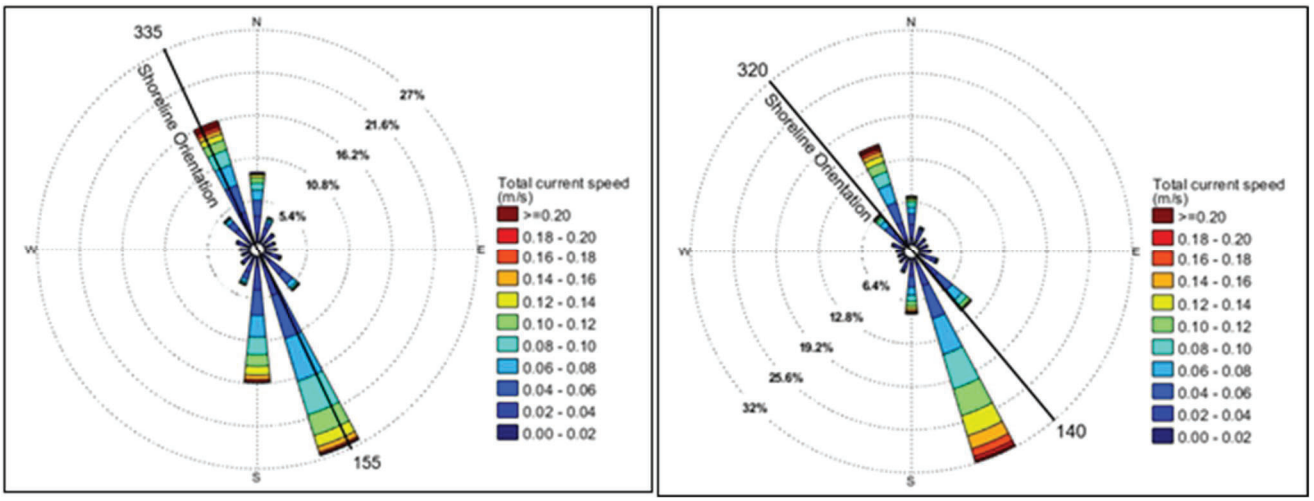
These breezes are augmented by sea swells and waves. NIWA's summary of Auckland's climate states:

"On the east coast of Auckland, swells from an easterly or north-easterly direction tend to predominate. These can originate from tropical cyclones well to the north of New Zealand or from anticyclones far to the east. Of all swells observed on the east coast the frequency of those less than one metre is about 40%, while for those greater than two metres is 8%. The islands in the Hauraki Gulf form a buffer to large swells for the majority of the region."[22]

It is noted that the majority of these waves come from the east or east-north.

There is also the potential of the Pakiri area to be affected by severe storm events. As noted in the coastal processes report (Appendix G), the highest significant waves recorded were 8.06 m high (June 1996), followed by 4.2 m high waves (January 1996). However, storm waves are generally lower, reaching between 2 m and 4 m in height.[23]

Underpinning these surface conditions are the area's sub-surface currents. Modelling undertaken for this application (using data collected from two offshore locations at Pakiri) as shown in FiguresFigure 4-6 Figure 4-7, show similar current conditions along the entire length of Pakiri beach, with only minor differences in non-tidal dominant current directions between the north and the south of the beach.



[21] Climate and Weather of Auckland, 2nd Edition, NIWA
[22] Ibid
[23] It is noted that sand extraction does not occur in storm conditions.

Figure 4-6 Modelled near bed non tidal current directional roses over 19 years (2000-2018) for a) P1 and b) P2 (Source: Jacobs)

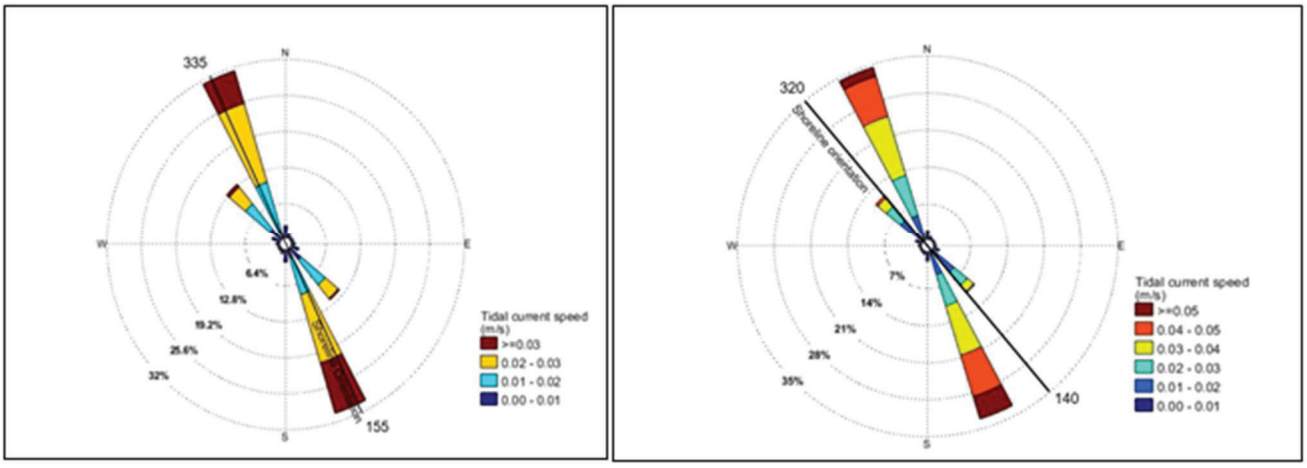


Figure 4-7 Modelled depth averaged tidal current directional roses over 19-years (2000-2018) for a) P1 and b) P2 (Source: Jacobs).

These currents are largely responsible for the movement of sand both to and from the Pakiri area. As noted by the coastal processes assessment (Appendix G), local water currents are responsible for the following sand movement:

"While only about 5% of these near bed currents at 30 m water depth have sufficient speed to entrain fine sand (from sampling 15% of sediment at this depth) and only 2% have sufficient speed to entrain medium sand (from sampling 70% of sediment at this depth), the current velocities are sufficient to transport this sand for around 50% of the time if it has already been entrained by wave currents. Although the currents at both sites are bi-directional, as shown by the inclusion of the shoreline orientation on the directional roses, the near bed currents around the 30 m contour are net onshore (56% of the time near at P1 to the north of Te Arai Point, and 54% of the time on the P2 to the south of the Te Ārai headland).

For tidal currents, the modelled results were similar to those presented in the MPSS, being pre-dominantly along the coast at low velocities and "net current being near zero. These tidal currents are insufficient to initiate sand transport on the sea bed, and are likely to provide little additional assistance to the transport of sand already entrained.

In comparison to the Mangawhai-Pakiri Sand Study (MPSS) current recordings, the modelled data indicates higher non-tidal current velocities in greater water depths, (e.g. max and 10 percentile near bottom velocities modelled at 30 m depth of 0.5 m/s and 0.11 m/s respectively compared to MPSS velocities of 0.27 m/s and 0.098 m/s near the bed (1 m) in 15 m water depth."

These currents and associated sand movements contribute to the area's sediment, sand and bathymetry characteristics as outlined in Section 4.4.4 below.

4.4.3 Geomorphology and Bathymetry

The geomorphology of the Mangawhai-Pakiri sand body is formed from a wedge of sediment comprising dunes, beach and seabed sands extending seaward to a depth of approximately 40 m (as shown in Figure 4-8). The material which comprises the sand body is a mixture of modern Holocene quartz-feldspathic sands overlaying older iron-stained consolidated Pleistocene sediments. The volume of this material is estimated to be 174-694 million m^3[24], which includes 70-120 million m^3 located between MHWS and 25 m water depth.

[24] Based on a depth to 40 m below the seabed.

The original source of the local sand is believed to be the ancient Waikato River, which previously flowed into the Hauraki Gulf during periods of low sea level (during Pleistocene glacial periods), with this sand then transported via wave action during Holocene sea level rise (approximately 4500 BCE).

As noted in the coastal processes report, the sand in the Pakiri area is sourced from outside the area, as well as from some local sources. Sand and sediment are transported into the area by water currents from the continental shelf and by longshore drift. These inputs are augmented by biogenic sand production (i.e. by shell production and breakdown), coastal erosion and sediment from local rivers/streams. These sources highlight that the Pakiri area is not a closed system, but rather has a sediment budget supported by a variety of sources.

It is noted that while some fluctuation in shoreline position has occurred in modern times, this is primarily due to storm events (including a 1978 storm which affected much of the Auckland east coast). Shoreline stabilisation has also been assisted by the adjoining forestry estates and the construction of artificial dunes at several locations along the coastal edge.

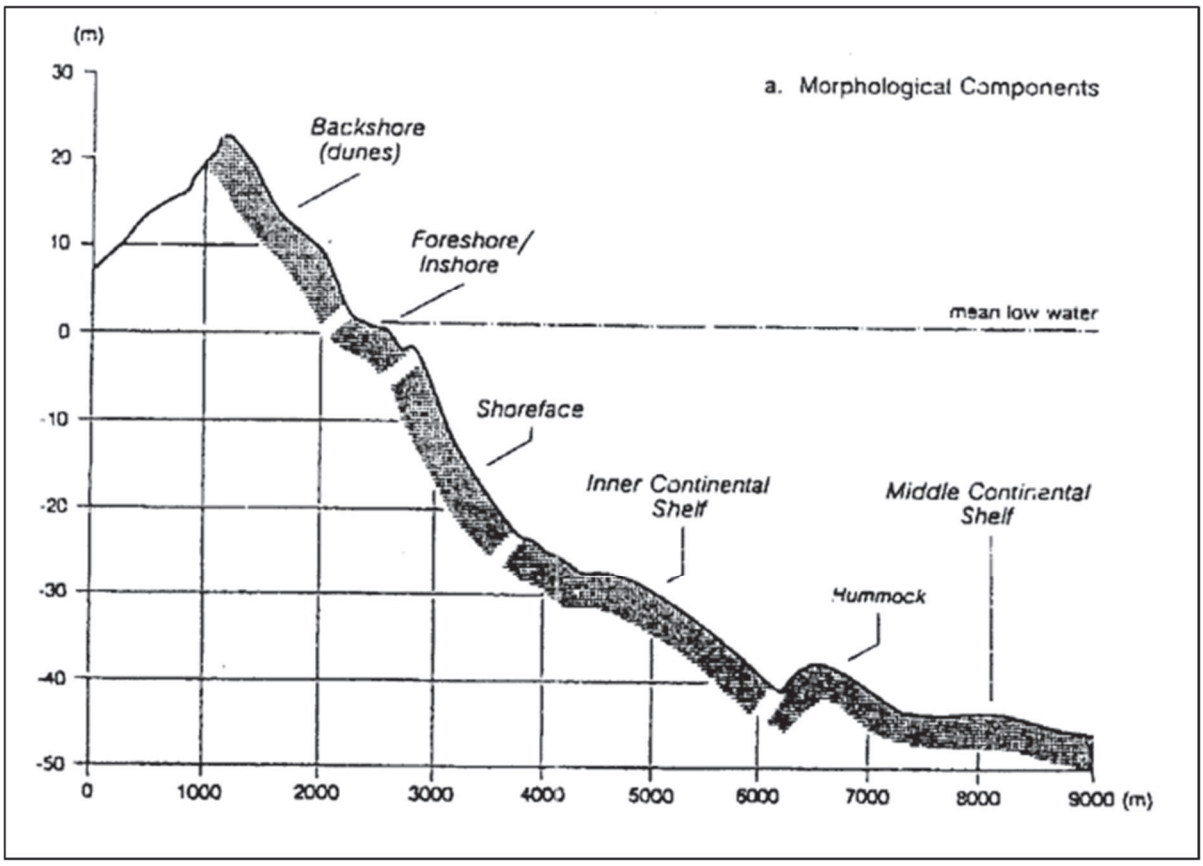


Figure 4-8: Morphological components of the Mangawhai-Pakiri embayment (Hilton, 1990)

With regard to bathymetry, hydrographic surveys were undertaken by MBL during March and October of 2019. These surveys found the shoreface bathymetry profiles along Pakiri Beach to be largely similar along its entire length, with little variation present for the longshore seabed slopes either. The results of the surveys are shown in Table 4-1. In addition, depths on the beach side of the extraction area were found to generally range from -6 to -8 m below MSL and on the seaward side from -14 m to -16 m.

Table 4-1: Seabed Slopes from 2019 bathymetric survey (Source: Jacobs)

Profile	Seabed slope -5 m to -20 m contour	Seabed slope <-20 m
P1	1:52	1:102 (To -27 m contour)
P2	1:46	1:109 (to -29 m contour)
P2b	1:51	1:108 (to -28 m contour)
P2a	1:51	1:104 (To -3 0m contour)
P3	1:49	1:106 (To -30 m contour)
P4	1:41	1:126 (To -28 m contour)
P5	1:44	1:110 (To -30 m contour)
P6	1:49	1:96 (To -26 m contour)
P7	1:48	1:87 (To -23 m contour)

4.4.4 Sediment and Sand Quality

The characteristics of marine sediment and sands at Pakiri has been investigated in the development of this application. The MPSS found the following patterns present in regard to the physical characteristics of local seabed sediments:

- Foreshore sediments comprise of well to moderately sorted medium sands (mean grain size (mgs) 0.44 – 0.27 mm);
- Nearshore sediments (0-15 m water depths) are very well sorted fine sands (mgs 0.25 mm) which get finer as water depth approaches 15 m;
- Medium to coarse sands (mgs 0.71-1.0 mm) are found on the inner continental shelf, which end abruptly at water depths of around 40 m;
- Very coarse sands (mgs >1 mm) containing granules and pebbles are found around the 40 m water depth; and
- Muddy fine sands (mgs 0.18 mm) with mud content of 10-15% are found on the middle continental shelf (e.g. depths > 40 m).

Further sediment sampling has been undertaken by MBL and Bioresearches, with 421 samples taken at water depth bands of 0-15 m, 15-25 m, 30 m and 40 m (AppendicesAppendix G andAppendix J). The results of this sampling were:

- 0 m to -15 m contour (27 MBL samples), which includes the MBL extraction consent renewal area: Very well sorted Fine to Medium sand with sample mean grain sizes (mgs) in the range 0.22 mm to 0.48 mm and average mgs across all samples of 0.26 mm. The Fine sand samples are scattered along the embayment, with a small concentration in the vicinity of Te Ārai Stream. No samples contained material finer than 0.075 mm, or had more than 5% coarser than 1.18 mm. The average medium grain size (D_{50}) was 0.25 mm. There does not appear to be any differences in the sediment size distributions between the extraction areas and the southern control area;
- -15 m to -25 m contour (49 MBL samples): Still a very well sorted sand but with a slightly coarser mgs of predominantly Medium sand (38 samples) with areas of fine sand off the mouths of Te Ārai and Poutawa Streams (combined 11 samples). Across all samples in this contour band the mgs had a similar range (0.22 mm to 0.47 mm) but with a slightly higher average mgs of 0.32 mm. Again, no samples contained material finer than 0.075 mm, or had more than 5% coarser than 1.18 mm. The average medium grain size (D_{50}) was 0.33 mm;

- -25 m to -35 m contour (40 MBL samples): The MBL samples were predominantly very well sorted Medium sands (90% of samples), with the remainder being well sorted Coarse sand mostly located off the Te Ārai Point headland. Across all samples in this contour band the mgs had a range of 0.28 mm to 0.84 mm, with an average mgs of 0.46 mm. Again, no samples contained material finer than 0.075 mm, or had more than 5% coarser than 1.18 mm. The average medium grain size (D_{50}) was 0.43 mm. The samples presented by Bioresearches (2017) from this depth band tended to be coarse sand to the north of Te Ārai Point, fine sand offshore of the southern extraction area, and a combination of both size classes in the southern control area; and
- -35 m to -45 m contour: The Bioresearches (2017) samples from this contour band predominantly had mgs in the Coarse sand class.

The source of these sediments and sand is from both offshore reservoirs in the Outer Hauraki Gulf (as identified in Section 4.4.2 and biogenic processes (i.e. from discarded shells and dead organisms).

In addition to the physical characteristics of local sediment, chemical testing of seabed samples taken at 5 m and 20 m depths offshore of the Pakiri River, Poutawa Stream, and Te Ārai Stream did not find any exceedances[25] of heavy metal, Polycyclic Aromatic Hydrocarbons (PAHs) or Total Polychlorinated Biphenyls (PCBs) as shown in Table 4-2 and detailed in Appendix F.

Table 4-2: Analysis and Comparison between WETlabs WQM, Goat Island and In-Situ Sampling (Source: Jacobs)

Contaminant	ANZG DGV	ANZG GV-High	Pakiri River 5 m	Pakiri River 20 m	Poutawa Stream 5 m	Poutawa Stream 20 m	Te Ārai Stream 5m	Te Ārai Stream 20 m
Heavy Metals (mg/kg dry weight)								
Total Recoverable Arsenic	20	70	5.9	6.2	6.2	6.2	5.9	8.8
Total Recoverable Cadmium	1.5	10	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.011
Total Recoverable Chromium	80	370	10.8	11.7	9.4	12.4	10.5	14.1
Total Recoverable Copper	65	270	0.5	0.5	0.4	0.4	0.6	0.5
Total Recoverable Lead	50	220	0.89	1.79	0.84	1.48	1.06	1.7
Total Recoverable Mercury	0.15	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Total Recoverable Nickel	21	52	2.6	2.4	2.3	2.8	2.4	2.8

[25] As taken from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018.

Contaminant	ANZG DGV	ANZG GV-High	Pakiri River 5 m	Pakiri River 20 m	Poutawa Stream 5 m	Poutawa Stream 20 m	Te Ārai Stream 5m	Te Ārai Stream 20 m
Total Recoverable Zinc	200	410	10.6	10.7	9.4	11.7	17.9	12.4
Total Polycyclic Aromatic Hydrocarbons (PAH) (µg/mg dry weight)								
Total PAH	10,000	50,000	< 1,500 (0.2% TOC)	< 1,500 (0.2% TOC)	< 1,500 (0.2% TOC)	< 1,500 (0.2% TOC)	< 1,500 (0.2% TOC)	< 1,500 (0.2% TOC)
Total Polychlorinated Biphenyls (PCB) (µg/mg dry weight)								
Total PCB	34	280	< 5 (0.2% TOC)	< 5 (0.2% TOC)	< 5 (0.2% TOC)	< 5 (0.2% TOC)	< 5 (0.2% TOC)	< 5 (0.2% TOC)

4.4.5 Landscape and Visual Values

A detailed landscape assessment has been prepared for this application by Brown NZ Limited (Appendix L). Mr Brown has highlighted in significant detail the existing landscape values for the Pakiri area, including those described in the AUP(OP), which are summarised as.

"Pakiri Beach, extending either side of Te Ārai and Eyres Points, is the largest of the Region's eastern ocean beaches. Its broad crescent, defining the coastal edge of the Jellicoe Channel (which extends out to the Hen and Chicken Islands to the north, and Little Barrier Island to the south), provides an expansive 'gateway' to the Pacific Ocean, with its rolling seas and surf backed by a series of dune formations that culminate in the massive dunes of Mangawhai Heads. This dune corridor, much lower down most of the rest of the beach, spreads out to enclose three dune lakes south of Te Ārai Point: Slipper Lake, Spectacle Lake and Tomarata Lake; while behind the northern-most of these dunes, low lying, formations of sand, mud and peat underpin a coastal terrace that extends from near Mangawhai to Te Ārai Point Road. A mixture of underlying mudstone and sandstone formations combine to then form a sequence of more elevated, rolling to gently rolling, ridges and foothills, that provide the backdrop to most of the beach and its dune / terrace hinterland."

Within this underlying natural form, Mr Brown has described the variety of contributing factors to the existing landscape, including those both on and offshore. Onshore, he has noted the significant contribution that exotic pine plantations provide to the delineation between sea and land[26]. These plantations run along the coastal edge (between 230 m and 1000 m from mean highwater spring) for most of the extraction areas' boundaries and are only interrupted by Te Ārai Point at their centre and the Tara Iti Golf Course at the northern edge of the extraction areas. Behind these plantations is a pastoral landscape, with interspersed rural-residential development, country roads and patches of regenerating bush.

Looking offshore, open and uninterrupted views are provided to the outer Hauraki Gulf, including those towards Little Barrier Island and the Hen and Chicken Islands. Within the offshore area are also numerous vessels, including large container ships transiting to and from the Port of Auckland. This offshore environment is also dynamic, with the view changing with passing weather.

Figure 4-9 andFigure 4-10 show the largely undeveloped nature of Pakiri, including the extensive dune systems and limited human development.

[26] It should be noted that clearance of these forestry plantations has since occurred.

Figure 4-9: View of Pakiri Beach looking south (Source: Jacobs)

Figure 4-10: Pakiri Beach looking north (Source: Jacobs)

Overall, the open and largely natural landscape of Pakiri is a contributor to its sense of place and its importance to both residents and visitors.

4.4.6 Water Quality

A water quality investigation for Pakiri has been undertaken by Jacobs, including field work May 2019 to confirm current water quality conditions (Appendix F). Ambient water quality monitoring was undertaken using a µWQ (micro water quality) buoy at a water depth of 25 m immediately north of the proposed extraction areas site. This included a downward-facing RDI Sentinel V50 500kHz Acoustic Doppler Current Profiler (ADCP) mounted to the base of the buoy and a WETlabs WQM (water quality instrument) attached via a 20 m line to a position just above the seabed. The ADCP measured water column current velocities and near-surface temperatures, whilst the WETlabs WQM measured:

- Temperature;
- Salinity;
- Chlorophyll-a;
- Turbidity;
- Conductivity;
- Dissolved oxygen.

Site-specific water quality sampling was undertaken prior to the dredge plume sampling, with samples taken at the surface, mid water and at the seabed with the Van Dorn[27]. Additional in-situ sampling was undertaken, using a Seabird SBE19plus CTD instrument with integrated WETlabs fluorometer (Chl-a and Turbidity) and Van Dorn. These samples were tested for

- Temperature;
- Salinity;
- Turbidity;
- Conductivity;
- Dissolved Oxygen;
- Density; and
- Photosynthetic Active Radiation (PAR).

Overall, the samples and their subsequent testing show that the CMA at Pakiri has high water quality[28]. For instance, the WETlabs WQM results show consistent Total Suspended Solids (TSS) and turbidity concentrations across the two-month sampling period, while Figure 4-11: WETlabs WQM Mean Turbidity Resultsand Figure **4-12** show that there was limited variance in these measures during the two-month monitoring period.

Table 4-3: WETllabs WQM Results

Parameter	Analysis	WETlabs WQM	Goat Island	*In-Situ Sampling*		
				WETlabs Deployment	WETlabs Retrieval	Prior to Dredge Plume Sampling
Turbidity (NTU)	Result	*N/A*	*N/A*	1.29	1.28 – 2.33	1.3
	Mean	0.31	0.58			
	Median	0.29	0.40			

[27] Van Dorn bottles provide a means of obtaining water samples at selected depths below the surface. They consist of an open-ended clear plastic cylinder that can be attached to the hydrographic wire (the steel wire wound on the winch) and lowered to any desired depth.
[28] When considered under the Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2018.

	Max	3.11	13.30			
	Min	0.14	0.15			
	80th Percentile	0.34	0.64			
	90th Percentile	0.39	0.95			
	Standard Deviation	0.15	0.86			
TSS (mg/l)	Result	*N/A*	*N/A*	<3	<3	1.30 – 1.5
	Mean	1.04	4.03			
	Median	0.98	3.10			
	Max	10.46	28.00			
	Min	0.47	0.40			
	80th Percentile	1.14	5.68			
	90th Percentile	1.31	7.65			
	Standard Deviation	0.51	3.27			

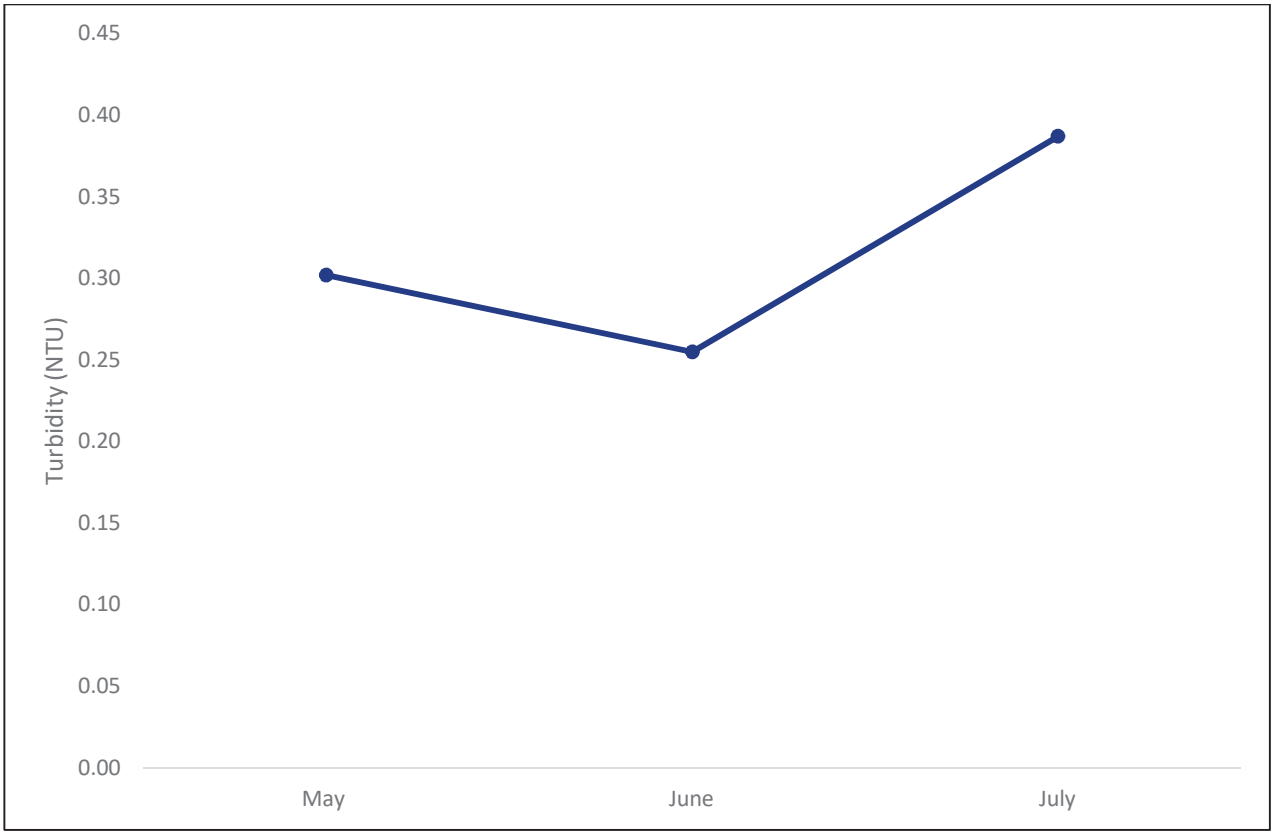


Figure 4-11: WETlabs WQM Mean Turbidity Results

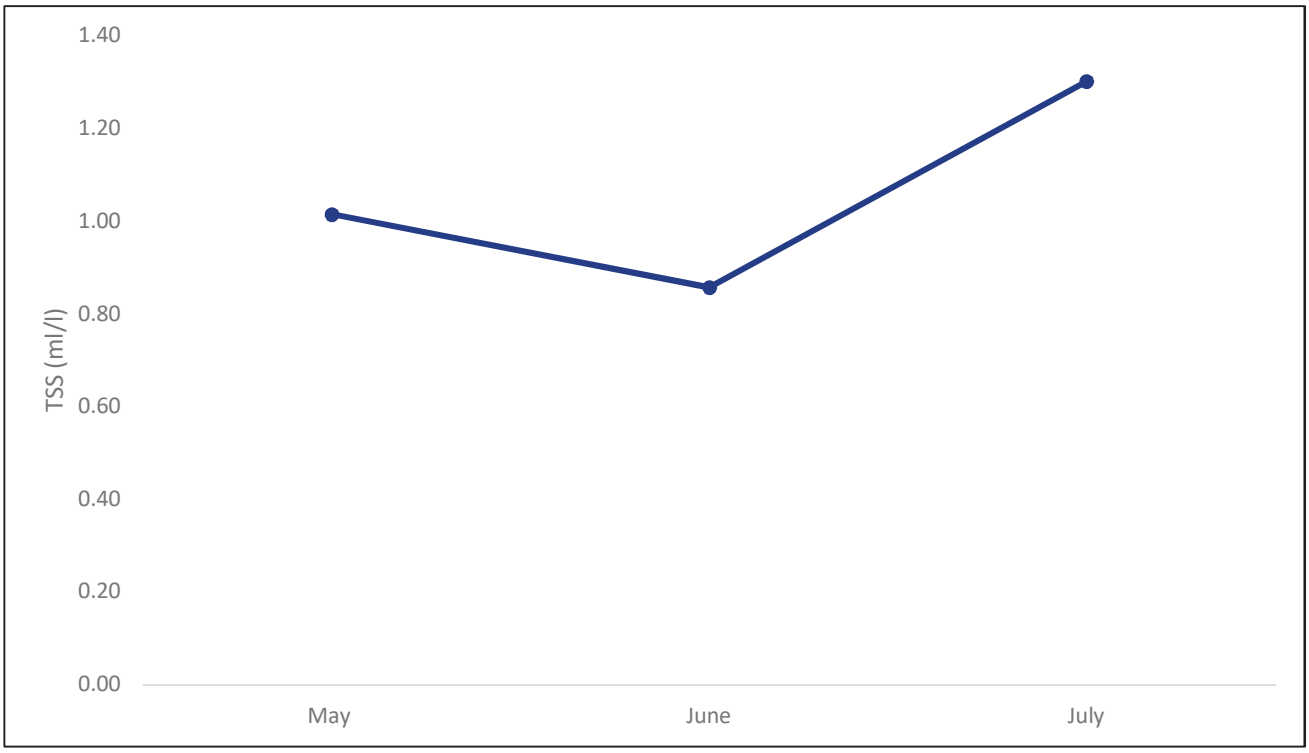


Figure 4-12: WETlabs WQM Mean TSS (mg/l) Results

While some variation in samples did exist, these are naturally occurring and are similar to other test locations on the East Coast (e.g. Goat Island) as determined by the literature review that was undertaken. In addition, the sediment testing did not indicate any sources for heavy metals, PABs or PAHs which could contaminate coastal waters.

4.4.7 Marine Ecology

The marine ecology values of the extraction area have been considered by both the assessment of ecological effects by Bioresearchers Limited (Bioresearchers) (Appendix JAppendix J and the marine mammal assessment by the Cawthron Institute (Cawthron) (Appendix K).

4.4.7.1 Fish, Invertebrates and Benthic Ecology

In order to assess the current ecological values, Bioresearches undertook both field work (including scallop tow dredging and box dredge sampling) in the proposed extraction areas and a control, as well as a literature review of earlier surveys undertaken by Dr Roger Grace[29].

Both scallop and box dredging was undertaken to ascertain the benthic communities present both within the extraction areas and control locations.

A total of 30 box dredge samples were collected in early 2019, with a sample width of 180mm, and a bite depth of about 75 mm, producing sample volumes of up to 4.5 L. The dredge was lowered to the seabed, towed to full and bought to surface for processing. Two 100 mL sub-samples were then collected from the dredged material and screened through a 1 mm mesh, with the remaining sampled material passed through a 3.5 mm mesh. The resulting screened benthic organisms underwent taxonomic identification and population counts.

Larger epibenthic macrofauna were sampled using a scallop tow dredge on 14 separate tows. As shown in Figure 4-13: Location of Benthic Sampling (Source: Bioresearches) this involved a series of 300 m long tows of

[29] Dr Grace undertook field work in 1990 and 2005 for earlier extraction applications.

a 650 mm wide dredge. The dredge was fitted with a 15 mm square mesh bag and was run at 5 and 10 m contours. Any species captured during each tow were removed and immediately sorted, photographed, identified, measured and then returned to the sea alive.

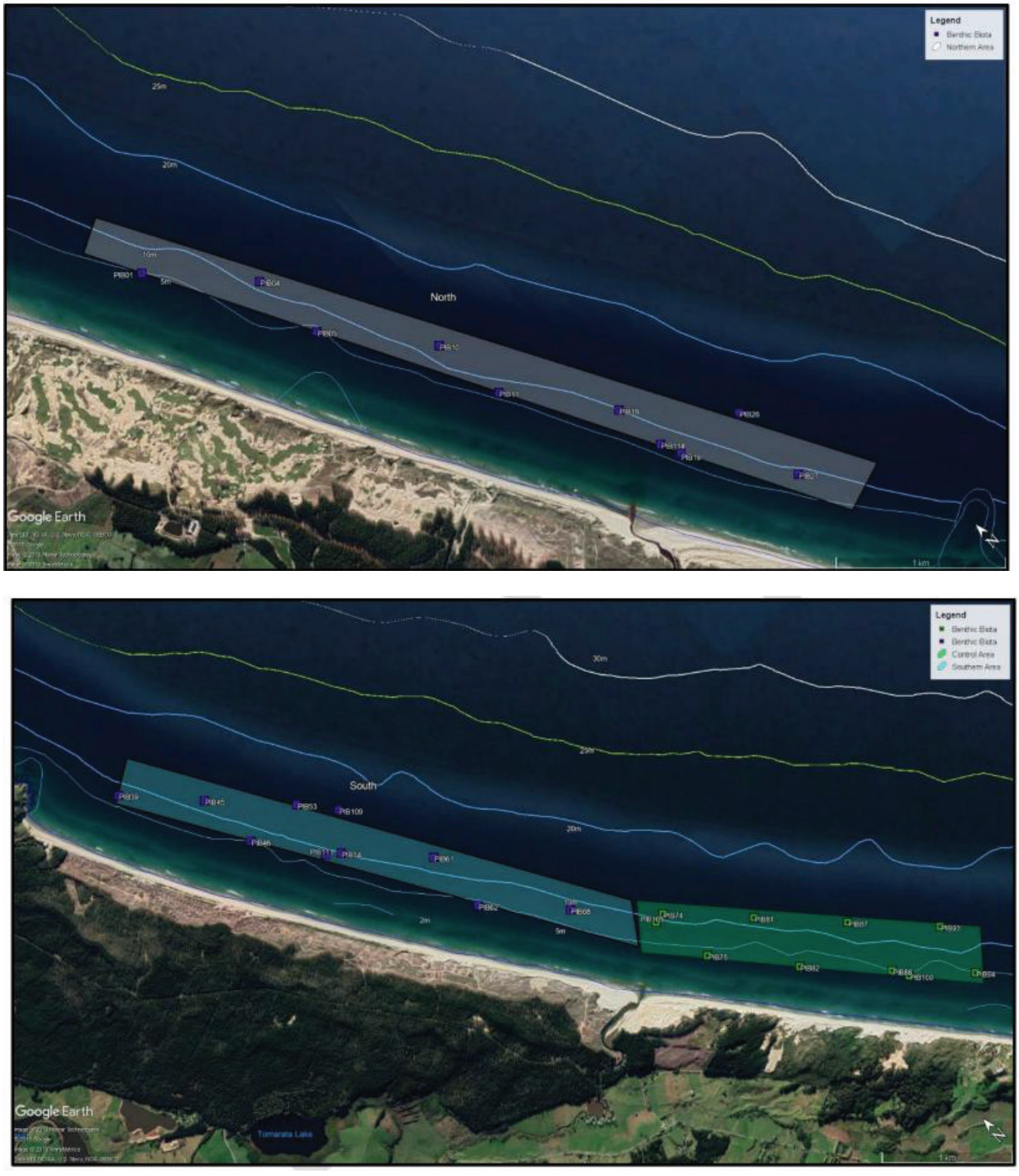


Figure 4-13: Location of Benthic Sampling (Source: Bioresearches)

Macrofauna survivorship sampling was also undertaken. This involved collecting five replicate samples while the sand extraction dredge operated along the inshore edge of the south area, as well as five replicate samples while the sand extraction dredge operated along the offshore edge of the south area. The sand extraction intake

pump was run at a normal stable operating speed and all wastewater was discharged via a single pipe, with samples collected by a sampling net. Sampling from water level was to ensure that, as much as possible, the shellfish collected represented those discharged during normal operation. The material collected on each net set was then retrieved, photographed, sorted and all macrofauna were collected, bagged with site labels and chilled prior to later assessment on shore. Each sample was sorted by species and level of damage, and the size of individuals was recorded or estimated.

Overall, the field work demonstrated benthic biodiversity values between both the extraction areas and control locations were largely identical, highlighting the difficult conditions (i.e. high wave energy and lack of reefs or sea grass for shelter) for benthic species. These exposed conditions are illustrated by Figure 4-14, which shows the limited shelter available on the seabed for fauna to colonise or create habitat for other species.

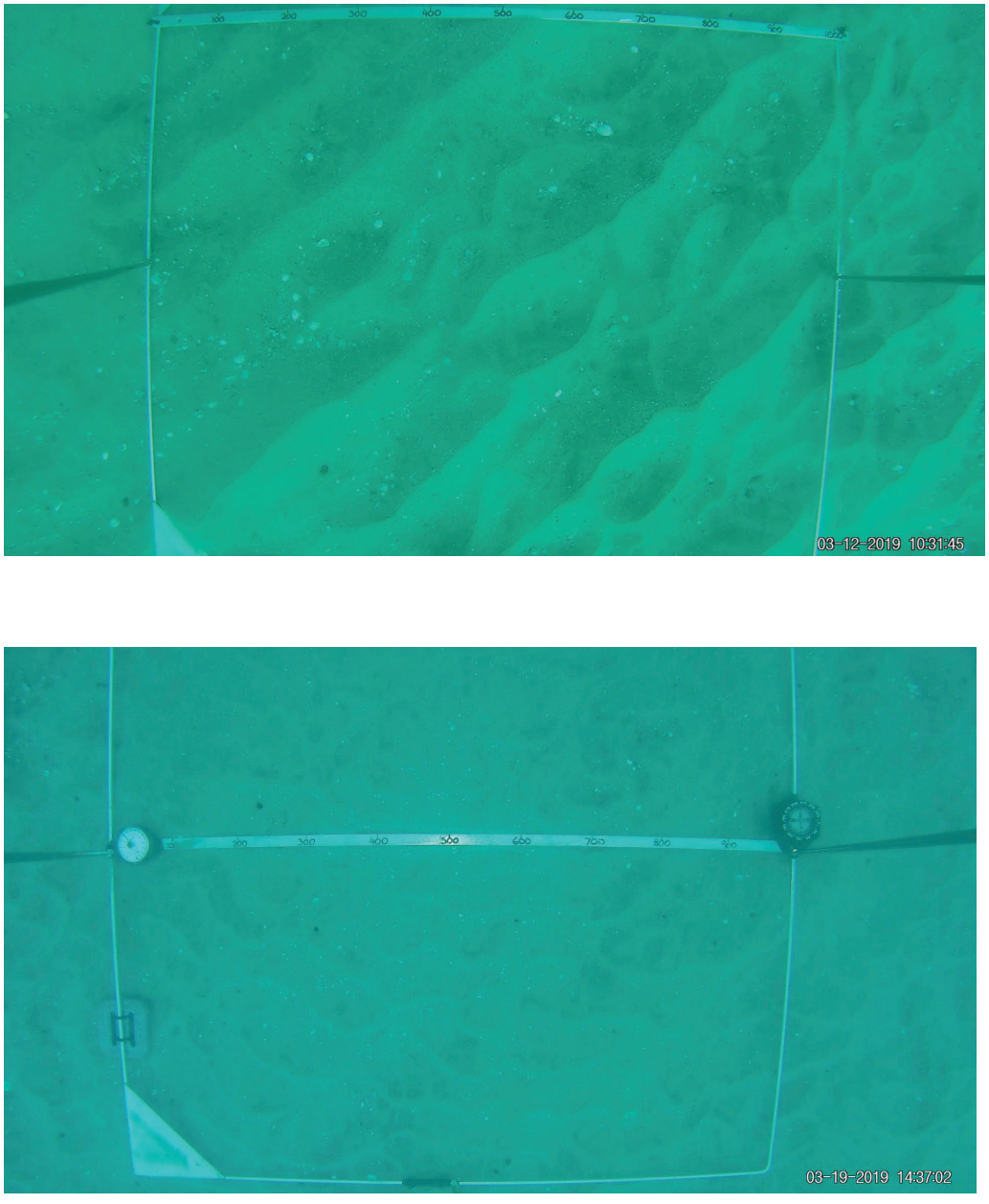


Figure 4-14: Standard seabed conditions at Southern Pakiri (Top) and Southern Te Ārai (Bottom)

The box dredge results found 75 species/taxa present, made up from 742 individuals. Little differentiation was found between samples located in either the extraction or control areas. The scallop dredge which found a total of 18 different benthic species (118 individuals). These species included polychaete worms, gastropods,

amphipods and echinoderms. It was found that species diversity is greater in the shallow near shore (i.e. 5m deep) than in greater depths of the extraction area (i.e. 10 m). In addition, bivalves were absent in the deeper tows, while the sand dollar (*Fellaster* sp.) was the most abundant taxa collected.

In regard to the macrofauna survivorship sampling, the most abundant species represented in the dredge discharge at both bathymetries (5 m and 10 m) was the surf clam (*Dosinia subrosea*) with more than 70% of total number. The other species found were gastropods, crabs, shrimps and some echinoderms (5 m only).

No reefs or any coral were identified in the study area. Furthermore, no unique or endangered benthic species were found to inhabit the extraction areas.

In regard to fin fish, it is noted that only limited surveys have historically been undertaken in the Pakiri area. However, species that are known to inhabit further offshore or are likely to occupy parts of the extraction areas include:

- Snapper (*Pagrus auratus*);
- Red gurnard (*Chelidonichthys kumu*)
- Blue cod (*Parapercis colias*);
- Sole (*Peltorhamphus novaezeelandiae*);
- Tarakihi (*Nemadactylus macropterus*);
- Kahawai (*Arripis trutta*); and
- John Dory (*Zeus faber*).

In addition, it is anticipated that shark species, such as bronze whalers (*Carcharhinus brachyurus*), will also be present in the Pakiri area. It is noted that a number of these fish species are also commercially fished in the Hauraki Gulf or are sought by recreational fishermen.

4.4.8 Marine Mammals

While no specific marine mammal studies have been undertaken for the Pakiri area, a number of studies have been undertaken in the Bay of Islands and Hauraki Gulf since the mid-1990s. Cawthron's assessment was based on these earlier studies, as well as sighting data. They note that:

"the proposal area is not considered ecologically more significant in terms of feeding, resting or breeding habitats for any marine mammal species relative to other nearby coastal regions or those further along the north-eastern coastline based on current knowledge."

Current data indicates that at least 27 cetacean and two pinniped species have been observed or stranded along the north-eastern coastline of New Zealand and include:

- Common dolphin (*Delphinus delphis/capensis*);
- Bottlenose dolphin (*Tursiops truncates*);
- New Zealand Fur Seal (*Arctocephalus forsteri*)
- Orca (*Orcinus orca*);
- Bryde's whale (*Balaenoptera rydei/edeni*); and
- Pilot whale (*Globicephala melas /macrohynchus*).

It is also noted that while some of these species are seasonal visitors or semi-resident, others will only be migrating through the area. However, none of these species are expected to have home ranges solely restricted to the Pakiri area, with their distribution and conservation status further detailed in Table 4-4 below.

Table 4-4: Residency patterns of marine mammal species known to frequent Mangawhai / Bream Bay and nearby waters

Common Name	Species Name	NZ Threat Classification System	IUCN Listing	Residency Category in Northland	Patters of Seasonality
Common dolphin	*Delphinus delphis/capensis*	Not Threatened	Least Concern	Seasonal to Year-Round Resident	Common throughout north-eastern waters year-round. Feed on schooling or more pelagic fish species. Generally observed in waters deeper off Mangawhai / Bream Bay with occasional inshore sightings in the proposal area.
Bottlenose dolphin	*Tursiops truncatus*	Nationally Endangered	Data Deficient	Seasonal to Year-Round Resident	Resident sub-population to north in Bay of Islands that ranges between Doubtless Bay, Great Barrier Island and Tauranga. Occasional visits to Mangawhai / Bream Bay perhaps more over summer months. Generalist feeders. Currently in decline.
NZ fur seal	*Arctocephalus forsteri*	Not Threatened	Least Concern	Seasonal to Year-Round Resident	Present year-round with multiple haul-out sites and breeding colonies in the Hauraki Gulf and regular sightings on offshore islands and Bay of Islands. More susceptible to human effects in breeding colonies. Feed mainly over shelf waters but inshore regions as well.
Orca (killer whale)	*Orcinus orca*	Nationally Critical	Data Deficient	Seasonal to Semi-Resident	Frequent north-eastern waters year-round, more common in late winter / early spring. Forage in harbours, estuaries and sandy beaches on rays, fish and other marine mammal species.
Bryde's whale	*Balaenoptera brydei/edeni*	Nationally Critical	Data Deficient	Seasonal to Semi-Resident	Most commonly observed whale species in north-eastern waters year-round. Feed on small schooling fish and sometimes krill. Regularly move through Mangawhai / Bream Bay travelling between Bay of Islands and Hauraki Gulf.
Pilot whale	*Globicephala melas / macrohynchus*	Not Threatened to Data Deficient	Data Deficient	Offshore Semi-Resident	While a more offshore species, inshore sightings occur mainly over summer months. Forages off shelf waters. Known for frequent and mass strandings in Bream Bay and surrounding waters

Southern right whale	*Eubalaena australis*	At Risk – Recovering	Least Concern	Seasonal Migrant	Frequent more inshore, shallow regions of Northland during seasonal migration periods, particularly with new-born calves. Once present, they can remain in the Northland region for several days to weeks. Most often seen between August and November.
Humpback whale	*Megaptera novaeangliae*	Migrant	Endangered	Seasonal Migrant	Pass by Mangawhai / Bream Bay on both north and south migrations but more prevalent and closer to shore on southern return migration when with calves (mainly Oct to late Dec).
Sperm whale	*Physeter macrocephalus*	Not Threatened	Vulnerable	Offshore Visitor	Increased sightings along the north-eastern coasts, mainly over summer and autumn months. Taonga species.

4.4.9 Aviafauna

The AUP(OP)'s description of the Marine SEAs at Pakiri identify the following bird species as present in the area:

- New Zealand dotterels;
- New Zealand fairy tern;
- White-faced heron;
- Banded rail;
- Pied stilt; and
- Variable oystercatcher.

It is noted that the New Zealand fairy tern is New Zealand's rarest native breeding birds, with approximately 45 individuals present in the wild. It is also ranked as a critically endangered species and carries a 'Category A' priority for conservation action. Its only nesting locations are located on the east coast between Auckland and Whangarei at Waipu, Mangawhai, Pakiri and the South Kaipara Head.

Within the wider Hauraki Gulf numerous shearwater and gull species are present, as is the Northern blue penguin and shags. While some of these species nest in the area, it is noted that feeding within the immediate vicinity of the extraction vessel is largely limited to shearwaters, gulls and shags.

4.4.10 Terrestrial Noise Conditions

Terrestrial noise conditions were measured and recorded for this application by Styles Group (Appendix H). As noted in that assessment, noise measurements were undertaken in a range of swell and weather conditions to enable an accurate dataset of existing noise conditions. In all instances, noise measures were taken from either the top of the dune system or grassed areas above the beach with a Bruel & Kjaer 2250 or 2270 sound level meter on a tripod and with wind screens employed[30].

[30] All noise measurements were performed in accordance with NZS6801:2008.

The measurements taken showed that ambient noise levels can vary considerably depending on local weather and swell conditions, with the assessment stating:

"In the calmest of the conditions measured, the LAeq(15min) levels are typically around 50 dB, with background L_{A90} levels typically between 40 dB and 45 dB. The lowest L_{Aeq}(1sec) levels are between 30 dB and 35 dB. By our observations, the lowest noise levels are observed over very short periods of time (1-2 seconds) when there is a lull between the breaking waves.

On days when the wind is blowing on shore, the L_{Aeq}(15min) noise levels are typically as high as 65 dB, with background L_{A90} levels generally around 60 dB. The L_{Aeq}(1sec) noise level typically stays above 60 dB on the windy days. The breaking waves are constant along the beach and there are no 'lulls' or quiet periods."

In summary, there are few human generated noises in the Pakiri area, with the majority of noise generated by either wind or waves.

4.4.11 Underwater Noise Conditions

As with surface noise conditions, Styles Group have also been employed to undertake measurements and recordings of the existing underwater noise conditions (Appendix I). These measurements utilised four SoundTrap 300HF recorders (two arrays, providing sampling redundancy) at the locations shown in Figure 4-15. The sampling rates were at 96 kHz, while the click detectors operated at the full sampling rate of 576 kHz. The arrays were deployed along the 30m depth contour between 19 March and 25 April 2019, and then again between 9 May and 10 June 2019.

In addition to the above monitoring and in recognition that the existing environment includes the current extraction activity, underwater noise measurements of the William Fraser were also undertaken in November 2019[31]. This involved the use of a measurement array comprising six SoundTrap 202STD recorders a shown in Figure 4-16. Using GPS tracking, the William Fraser undertook a dredging run through the area and was recorded by the array, with any noise contamination (e.g. from other vessels) excluded from the subsequent assessment by Styles Group.

Further contributing to the noise environment is the area's bathymetry, its sea-floor composition (i.e. sediment and sand types), water temperature and density (salinity). With the on-site monitoring and measurements collected and the technical data available regarding the physical attributes of Pakiri, Styles Group was able to determine that the existing noise conditions are those typical of a sandy beach habitat with limited vessel passage. While some noise level increases did occur due to vessel traffic, these were infrequent enough to have limited impact on the averaged and median sound levels. These underwater noise results were also shared with Cawthron to assist them in undertaking a marine mammals effects assessment (Appendix K and Section 6.5.4 of this AEE).

[31] The monitoring was undertaken in fine weather conditions (i.e variable 10 knot breeze, sea state zero and no swell).

Figure 4-15: Location of hydrophone arrays (Source: Styles Group)

Figure 4-16: PS track of the TSHD William Fraser in relation to the measurement (hydrophone) array (ST1 through 6) on 28 November 2019 in fine weather conditions. (Source: Styles Group)

4.5 Other marine activities

Further to MBL's own activities in the CMA, there are a number of other commercial operations undertaken in the coastal environment of the Outer Hauraki Gulf. These include fishing, shipping and the sand extraction performed by MBL on-behalf of KL.

Species commercially fished in the Hauraki Gulf include Snapper, John Dory, scallops and crayfish using a variety of fishing methods. Within the Pakiri area seasonal exclusions of trawl of Danish seine nets are imposed, while permanent bans on such fishing techniques from vessels larger than 20 m are also imposed.

The outer Hauraki Gulf is also the main transit point for commercial vessels entering and exiting the Port of Auckland. Such vessels must remain at least 5 nautical miles offshore upon entering the Hauraki Gulf and the Jellicoe Channel. No anchorages or permanent moorings are provided at Pakiri Beach.

Lastly, KL is also engaged in sand extraction at Pakiri Beach, although this extraction is currently undertaken on-behalf of KL by MBL (as noted in Section 1). KL's consented extraction regime allows for a total of 2 million m^3 of sand to be removed over a 20-year period (having started in February 2003). Annual extraction is limited to a maximum of 150,000 m^3/year inside the 30 m bathymetric contour (with further extraction allowed outside that depth), with sand permitted to be removed at seabed depths greater than 25 m and within the area off Pakiri shown in Figure 1-1, which includes a 3 km exclusion area from the Leigh/Cape Rodney Marine Reserve.

5. Consent Requirements

5.1 Reasons for Consent

The following regional resource consents have been triggered under the AUP(OP):

Table 5-1: Relevant Auckland Unitary Plan (Operative in Part) rules

Reference	Rule	Activity status	Assessment
Chapter F2 - Coastal – General Coastal Marine Zone			
F2.19.2 (A15)	Disposal or storage of waste or other matter arising directly from, or related to, the exploitation and associated offshore processing of seabed mineral resources	**Discretionary activity**	The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within the General Coastal Marine Zone.
F2.19.2 (A15)	Disposal or storage of waste or other matter arising directly from, or related to, the exploitation and associated offshore processing of seabed mineral resources	**Non-complying activity**	The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within an Outstanding Natural Landscape.
F2.19.2 (A15)	Disposal or storage of waste or other matter arising directly from, or related to, the exploitation and associated offshore processing of seabed mineral resources	**Non-complying activity**	The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within a Significant Ecological Area – Marine 2 for mineral extraction.
F2.19.2 (A15)	Disposal or storage of waste or other matter arising directly from, or related to, the exploitation and associated offshore processing of seabed mineral resources	**Non-complying activity**	The proposal involves disposal of materials arising directly from the offshore processing of a seabed mineral resource within a High Natural Character for mineral extraction.
Rule F2.19.4 (A28)	Coastal marine area disturbance for mineral extraction (excluding petroleum)	**Discretionary activity**	The proposal involves the disturbance of coastal marine area for mineral extraction
Rule F2.19.4 (A28)	Coastal marine area disturbance for mineral extraction (excluding petroleum)	**Non-complying activity**	The proposal involves the disturbance of the coastal marine area for mineral extraction within an Outstanding Natural Landscape.
Rule F2.19.4 (A28)	Coastal marine area disturbance for mineral extraction (excluding petroleum)	**Non-complying activity**	The proposal involves the disturbance of the coastal marine area within a Significant Ecological Area – Marine 2 for mineral extraction.
Rule F2.19.4 (A28)	Coastal marine area disturbance for mineral extraction (excluding petroleum)	**Non-complying activity**	The proposal involves the disturbance of the coastal marine area within a High Natural Character overlay for mineral extraction.

5.1.1 Consents required

MBL seeks coastal permits under sections 12 and 15 of the RMA.

Overall, consent is required as a **non-complying** activity. As such, assessment against section 104D is required (Section 9.10).

6. Assessment of Effects on the Environment

The following sections present an assessment of the actual and potential environmental effects of the proposed works. The following effects are considered relevant to the current application:

- Positive effects;
- Water quality effects;
- Coastal erosion effects;
- Ecological effects;
- Cultural effects;
- Biosecurity effects;
- Surface and underwater noise effects;
- Effects on recreation; and
- Landscape and visual effects;

The assessment of effects[32] has taken into account the existing environment as detailed in Section 4 and includes:

- The presence of marine SEAs and a terrestrial SEA;
- An outstanding natural landscape and a high natural character area overlays; and
- Active resource consents held by MBL and KL for sand extraction.

Furthermore, consideration has been given to the permitted baseline, which is considered appropriate to the application. The permitted baseline includes:

- The passage of vessels through the General Coastal Marine Zone; and
- The noise standards of Chapter E25 for the General Coastal Marine Zone.

Reference should also be made to the assessment methodology utilised for the attached technical assessments. This methodology details how each technical specialist was to approach determining effects and a description of this methodology is provided as Appendix C.

6.1 Crown Minerals Act

It is noted that Section 5(2)(a) of the RMA excludes the sustainable management of minerals from the purpose of the Act. In principle, this means that the long-term depletion of a mineral[33] resource is not an effect or matter for consideration under the Act and as such, has been excluded from the following assessment and is not a matter for Auckland Council to consider when processing the current resource consent application.

[32] The assessment of a proposal's adverse effects against the existing environment is an established principle in law (Hawthorn Estate Limited NZRMA 424). Under this case, the existing environment may include unimplemented resource consents and utilisation of rights to carry out permitted activities under a district or regional plan. It does not include future possible resource consents or the ecological potential of waterbodies.

[33] "Mineral" is defined under section 2 of the Crown Minerals Act 1991 as *"a naturally occurring inorganic substance beneath or at the surface of the earth, whether or not under water; and includes all metallic minerals, non-metallic minerals, fuel minerals, precious stones, industrial rocks and building stones, and a prescribed substance within the meaning of the Atomic Energy Act 1945*". As such, sand is considered to be a mineral.

6.2 Positive Effects

As identified in Section 3, the sand resources at Pakiri are of regional importance to Auckland, principally due to its use for concrete production. Market Economics has identified that sand at Pakiri provides approximately 43% of Auckland's sand for concrete production. With demand for sand production growing at a rate of at least 2.5% per annum and the large projected population growth and construction requirements of the Auckland Plan, the sand resource at Pakiri will be of increasing importance to Auckland's economic and social wellbeing. Pakiri sand provides several benefits over those sourced from either the Kaipara Harbour or the Waikato, thereby delivering a number of benefits to Auckland.

Firstly, it is a low-cost resource in comparison to the other sources available to Auckland. As highlighted by Market Economics (Appendix D):

"transporting sand is a costly process. Industry information indicates that to move a tonne of sand 1km along the road network costs 17 cents[34]. Given that the nearest available source of sand within Auckland is from the Winstone/Atlas storage yards in Helensville which are 55km away from Ports of Auckland, this means that every truck movement (with 30 tonnes of sand into the CBD) along the road network costs $280.50. With sand costing approximately $35 per tonne delivered to a concrete plant ($1,050 per truckload), road transport to the Auckland CBD area from Helensville represents a 27% increase in the overall price. Furthermore, this transport cost can effectively be doubled, as the truck needs to return to the plant and is unlikely to have any load to offset the price. This means that the delivered cost of that sand is significantly higher than sand delivered by barge to the CBD."

The cumulative transport cost to move this extra sand from Helensville, rather than from Pakiri, would be an additional $6.1M to $7.6M per year. When applying the same costs to Winstone Aggregate's Pukekawa Sand Plant (located in the Waikato) a further $7.2M and $9.0M per year of additional costs would be borne by the construction industry and ultimately home buyers. These costs increase even more when other sand sources (e.g. those from Cambridge) are considered. It is also noted that these costs would increase with rises in fuel, road user charges and the inclusion of costs for additional road repair and maintenance.

A further benefit is a reduction in greenhouse emissions, given the energy efficiencies when sea shipping to truck transport is compared. Market Economics has calculated that a reliance on Kaipara Harbour sourced sand would require an additional 21,000 return truck journeys to move sand between Helensville and Central Auckland. Based on current volumes, this equates to an additional 2.3 million kilometres of truck movements on Auckland's roads, resulting in a CO_2 emissions increase of 1,304 tonnes per year, with further emissions generated as demand and transported volumes grow. These CO_2 emissions and truck distances will also increase further if Waikato source sands are used and/or if any emission related taxes are applied in the future.

The high quality of Pakiri sourced sand also provides cost savings and improved performance when producing ready mix concrete, as identified in the concrete industry report (Appendix E) . Due to its chemical and physical composition, Pakiri sourced sand used in ready mix concrete production allows the manufacturer to reduce the cement content whilst still achieving the same target strength. A saving of between 20 and 40 kg of cement per cubic metre of concrete is common but depends on the fines content of the crushed rock (termed a PAP) also being used in the mix[35]. Given that the current market price for cement is approximately $220/tonne, this equates to $4.40 per tonne of sand used versus a Waikato sourced sand. This cost saving is doubled if 40 kg of cement per cubic metre is saved. This reduction in cement requirement also delivers further CO_2 reductions, with an estimated reduction of 12,600 tonnes as compared to concrete manufactured using Waikato sourced sand[36].

The reduced costs associated with using Pakiri sand are of a significant benefit to Auckland and its economy. Without access to this sand resource or a greater reliance on more distance/less useful sand, the increased costs associated with concrete production will be passed onto the consumer, while any disruptions to concrete supply would affect the stability of the construction sector. These factors would impact on the affordability of

[34] Based on the average cost to run a truck a specified distance. The average cost is calculated based on a full load one-way priced at 34 cents and an empty load back at 0 cents. This does not include any profit margin for contractor rates.
[35] Based on a 20mpa mix, the amount may be higher depending on the quality of the other aggregates used in the mix.
[36] Based on 20kg per cubic metre of concrete.

concrete and subsequently on the cost of home ownership and infrastructure investment. This would be harmful to both the social and economic wellbeing of the community, not least due to the projected demand for new homes, business premises and related infrastructure projects. Given that 313,000 new homes are required and the current concerns regarding affordability, the sand resource at Pakiri is needed to avoid both a disruption to concrete supply and the availability of homes in Auckland.

In summary, the continued extraction of sand from Pakiri will deliver significant benefits to Auckland and help achieve the strategic outcomes sought by the Auckland Plan. These include assisting in meeting the demand for new housing, making better use of the region's transport networks and supporting climate change mitigation initiatives.

6.3 Water Quality Effects

As discussed in Table 6-1, Jacobs has undertaken an assessment of the extraction activity's water quality effects (Appendix F). The ambient water quality monitoring undertaken shows that Pakiri has high water quality, due in part to the sandy seabed and lack of contaminants, while the receiving environment has a "good capacity to absorb the proposed changes" and have a negligible sensitivity to discharges.

The fieldwork for the water quality assessment also included sampling of the dredge plume at multiple locations in the water column during the operation of the extraction activity and confirmed the limited water quality effects expected to be generated by the extraction activity. As shown in Table 6-1, the results found that the majority of the material (60-85%) could be classified as coarse silt to fine sand.

Table 6-1: Results from Weir Board Samples

Sample	PSD (Mean) µm	Percentage (%) of Silts (10.0 – 62.5 µm)	Percentage (%) of Sands (62.5 – 500 µm)
Weir Board 1	129.53	13.97	86.04
Weir Board 2	81.36	40.88	59.12
Weir Board 3	121.11	13.45	86.55

While the Jacobs water quality assessment found high TSS concentrations and turbidity close to the point of discharge, these decline rapidly to levels just above ambient concentrations. Figure 6-1 shows that within 50m distance from the rear of the extraction vessel, TSS levels drop to almost match ambient conditions within all sections of the water column.

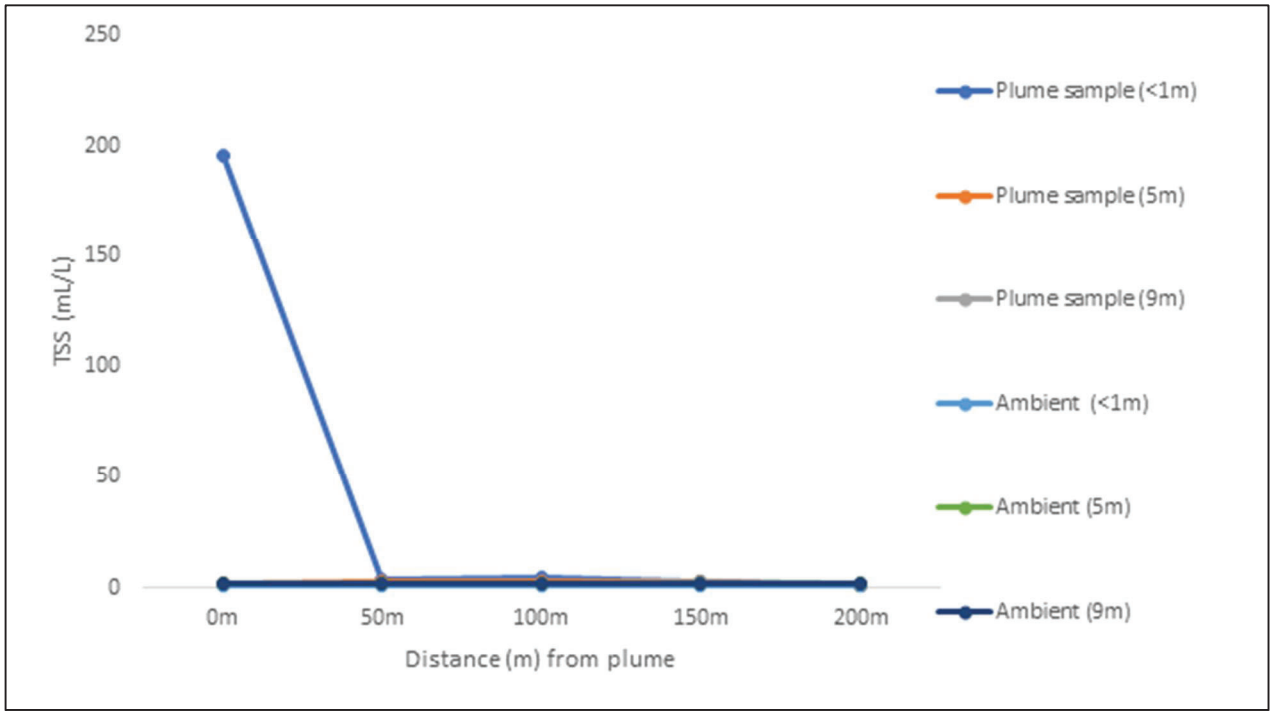


Figure 6-1: TSS (mg/l) at 50m Intervals from Plume Source

As shown in Figure 6-2, turbidity levels take slightly longer to reach ambient levels, but are back to almost ambient levels at all sections of the water column within 150 m of the vessel.

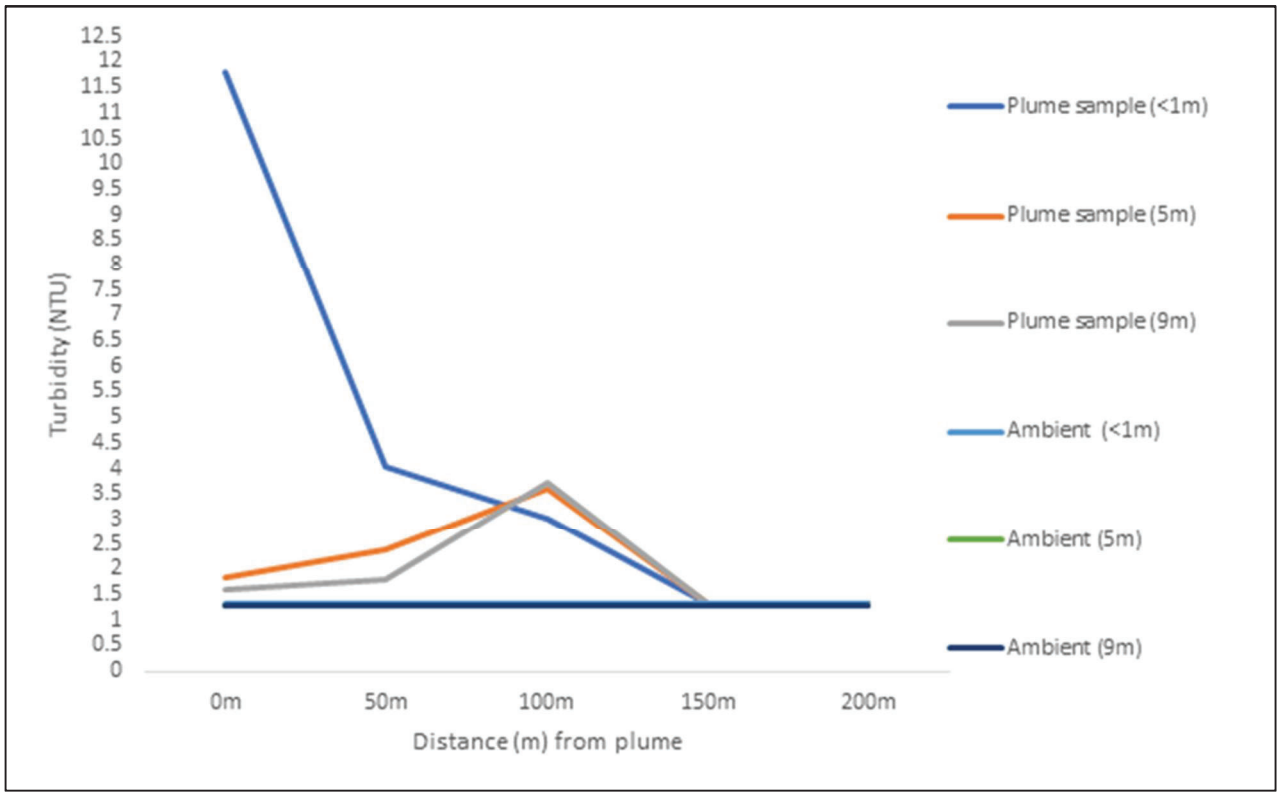


Figure 6-2: Turbidity Results at 50 m Intervals from Plume Source

The report then states:

"The results discussed in Section 5 show elevated TSS (196 mg/l) and turbidity (12 NTU) concentrations at the point of discharge that rapidly decline over 50 m behind the vessel to just above ambient concentrations (TSS 4 mg/l and turbidity 4 NTU). The TSS concentrations return to ambient levels (TSS - 1.5 mg/l and turbidity 1.3 NTU) within 1,000 m (approximately 22 and a half minutes) and turbidity within 800 m (approximately 17 and a half minutes) from the point of discharge.

The rapid initial decline indicates that the majority of the water at the point of discharge comprises over-sized material that falls rapidly through the water column. TSS and turbidity concentrations after the initial 50 m are still just above ambient demonstrating some residual sediment fines settling through the water column over 800 to 1,000 m. The TSS and turbidity concentrations observed after 50 m are below the observed concentrations from the Stats NZ Tatauranga Aotearoa data, demonstrating they are within ranges expected of a coastal marine environment."

It is also noted that with the introduction of the William Fraser, the level of disturbance and discharge will decrease. The number of extractions per area will also decrease, reducing the potential adverse effects of the discharge, while the large areas available for dredging by KL and MBL help prevent the generation of cumulative effects on water quality.

Furthermore, the introduction of the William Fraser is not expected to generate greater water quality effects, despite the use of a moon pool and a potentially more concentrated plume footprint beneath the vessel. This is due to the physical qualities of the discharge remaining the same given it comes from the same source material, and the avoidance of aeration. Furthermore, the William Fraser is a new vessel that has a number of significant improvements in technology and design to reduce the associated impacts of the activity.

Lastly, to address the potential but negligible effects of the activity on water quality, MBL proposes to employ the following controls as good practice:

- All project associated vessels to have and implement a waste management plan compliant with the International Convention for the Prevention of Pollution from Ships (1973/1978) (Marpol 73/78) and its Annexes;
- An Oil Spill Prevention and Response Plan;
- All project associated vessels are to work to Maritime New Zealand standards or similar[37] and the International Maritime Organisation (IMO) standards;
- Any non-routine discharges to be kept to a minimum through the use of good practice codes on collision avoidance and vessel manoeuvring; and
- All staff and any contractors will be required undertake training and maintain good housekeeping standards including appropriate occupational health and safety.

In summary, the proposed extraction activity and related discharge will have a less than minor adverse effect on water quality given the type of discharge proposed, the bio-physical characteristics of the disturbed material and the management measures proposed by MBL.

6.4 Coastal Processes Effects

As noted in Sections 4.4.3 and 4.4.4, a coastal processes assessment has been undertaken by Jacobs (Appendix G). Using the information gathered during the discharge of the current extraction permits, monitoring undertaken for the current extraction activity and investigations undertaken during 2019, it is possible to determine the sand budget for the Pakiri area, the effect of the proposed extraction on this budget and what, if any, effects impact Pakiri geomorphology.

[37] The standards will depend on the country the vessel is registered in.

The coastal processes assessment also highlights that the extraction activity will have less than minor adverse effects on geomorphology. This is confirmed by both the examination of historic aerial photographs of the area (including those taken while the current extraction activity has been in operation) and the results of drone surveys undertaken between October 2017 and March 2019.

As shown in Table 6-2: Summary of shoreline movements from aerial photographs 1961/1963 to 2018 (Source: Jacobs), there has been erosion at times along the Pakiri coastline, although the coastal processes assessment has determined that this erosion is due to natural processes and cannot be attributed to the extraction activity itself.

Table 6-2: Summary of shoreline movements from aerial photographs 1961/1963 to 2018 (Source: Jacobs)

Area	DSAS Transects (1)	Total period 1961/1963 - 2018			Rate 1961/63 – 1982 (m/yr)	Rate 1982 - 2018 (m/yr)
		Envelope of movement (m)	Net Movement (m)	Net Movement Rate (m/yr)		
Control Area – Pakiri River to south of Poutawa Stream	1-14: North of Pakiri R. 50-57: South Poutawa 1-57: whole control area	Range: 15.1 – 189.4 m Avg: +64.3 m Range: 14.7 – 48.8 m Avg: +29.3 m (2)	Range: 1.6 – 10.3 m Avg: +5.7 m Range -3.8 - -48.8 m Avg: -21.2	Range: +0.10 – +0.19 Avg: +0.11 m/yr Range: -0.07 - -0.85 Avg: -0.37 m/yr	Range: -0.37 – -9.39 Avg: -2.91 m/yr Range: -0.29 - -1.58 Avg: -0.97 m/yr	Range: +0.38 – +5.23 Avg: +1.77 m/yr Range: -1.19 - +0.45 Avg: -0.05 m/yr Range: -1.19 - +5.23 Avg: 0.71 m/yr
Southern Extraction Area – north of Poutawa Stream to Te Ārai Point	64-106	Range: 6.4 – 56.3 m Avg: 30.3 m	Range: -17.9 – +40.9 Avg: 8.9 m	Range: -0.31 – +0.71 Avg: +0.15 m/yr	Range: -2.66 – +1.51 Avg: -0.62 m/yr	Range: -0.23 – +1.56 Avg: +0.59 m/yr
North Extraction Area – Te Ārai Point to northern boundary	110-165	Range: 8.4 – 220 m Avg: 68.6 m	Range: -3.1 – +171.1 Avg: 8.9 m	Range: -0.05 – +2.98 Avg: +0.99 m/yr	Range: --3.61 – +3.41 Avg: +0.33 m/yr	Range: -1.8 – +6.08 Avg: +1.39 m/yr

With regard to the drone survey results, the coastal processes assessment employed an Excursion Distance Analysis (EDA). This allows for the identification of any trends in coastal morphology changes. Using EDA plots at 1 m, 2 m, 3.5 m and 5.5 m contours at historic profile sites (those sites monitored since 2007). Given the issues with the reliability of both the 1 m and 2 m contours (given their proximity to the foreshore and wave action), the EDA relied on the 3.5 m and 5.5 m contours. Overall, the EDA results showed the following general trends over the last 12 years of monitoring:

- At individual sites the dune contours can vary in position by up to 20 m between 6-monthly surveys, particularly to the south of Te Ārai Point (e.g. P2A, P4, P5 and P7), these are short-duration changes that are generally reversed by the next survey. This suggests that some of the variability may be due to uncertainly in the interpolation of profiles from the topographical surveys.
- Apart from profile P2B (accretion), and profile P5 (erosion), the net movements of all sites over the 12-year period are less than ± 10 m for both the dune toe and dune face positions. At P2B, the dune toe accreted 22.8 m and the dune line accreted by 38 m, while at P5 the dune face eroded 22.9 m.
- While only three sites had net advance of the dune toe contour (3.5 m), 6 of the 10 sites with surveys till March 2019 displayed net advance of the dune face contour (5.5 m).
- The control profiles to the south of Poutawa Stream experienced the greatest net dune toe retreat, with all four sites covering the total survey period having net retreat of greater than -10 m. For all of these sites the majority of the retreat occurred in the first survey period (April – September 2007).

- A weak pattern of general retreat over winter periods and accretion over summer periods is evident across all contours.

These coastal erosion observations reinforce the sediment budget shown in Table 6-3. The sediment budget was calculated using a variety of information sources, including the previous Environment Court evidence, a biogenic sand supply assessment by Bioresearches and modelling data by MetOcean Solutions. The sediment budget highlights that there is no net loss from the system caused by extraction activities, given the open nature of the system. Any excess sand entering the local Pakiri system also contributes to on-shore dune accretion and helps repair any shoreline erosion resulting from storm events.

Table 6-3: Sediment budget out to 25 m CD water depth on basis that inputs exceed losses over last 50 years due to storage as shoreline accretion.

Inputs		Losses/Storage	
Source	**Volume (m^3/yr)**	**Source of Losses**	**Volume (m^3/yr)**
Cliffs	6,000	Onshore winds	2,000
Rivers	17,000	Mangawhai Inlet	3,000
Biogenic from <25m depth	7,000	Around Cape Rodney	1,000
Around Bream Tail	25,000	Extraction from < 25 m depth	90,000
Diabatic supply (cross-shore from >25m depth	76,500	**Total Losses** **Storage/Surplus**	**96,000**
		Storage in dune/beach as accretion	35,000
Total	**131,500**		**131,500**

The coastal process assessment details that:

"the sand budget supports ongoing inshore sand extraction of 90,000 m^3/yr whereas, in this application, MBL is proposing future annual extraction at the rate of only 76,000 m^3. It follows that if the budget were adjusted to allow for future sand extraction at a rate of 76,000 m^3, the inferred diabathic supply necessary to achieve a balanced budget would be 62,500 m^3. This illustrates the fact that in a budget of this kind the inferred volume of diabathic supply is a variable and does not represent a fixed estimate of actual diabathic supply volumes. In fact, in the Mangawhai - Pakiri embayment there are several indications that the annual volume of diabathic supply is greater than 76,500 m^3/yr. For example, the volume of storage in the dunes/beach (shown as 35,500 m^3) is very conservative and does not allow for greater volumes of accretion to the north of Te Arai Point measured since 1982 and accretion has continued in the face of sea level rise which suggests addition storage in the vicinity of 38,000-50,000 m^3/yr."

To reiterate, the calculated sand budget demonstrates the open system character of sand movements at Pakiri, the large volumes of sediment/sand entering the embayment and the volumes available for extraction (above that which MBL is seeking). This reinforces observations made during the monitoring of the current consents.

In addition, the coastal processes report has addressed the potential for cumulative effects from the extraction activities of both KL and MBL, with no discernible cumulative effects anticipated. This is due to:

- A lack of evidence of any effect on sea bed levels less than the -30 m contour from the combined extraction of 2.2 million m^3 of sand since 2004;
- No evidence of beach erosion from the combined extraction since 2004;

- The extraction by KL will have no influence on the ability of wave and current processes to transport sand across the -25 m CD contour boundary to the sediment budget. This extraction will also not reduce the availability of the sand to be transported at this depth by these processes; and

- The cross-shore diabathic transport rates into the nearshore and the MBL extraction area will be unchanged to those previously calculated and the sediment budget will continue to be in surplus.

In summary, both the EDA and the aerial photography demonstrate that any coastal erosion in the Pakiri area cannot be attributed to the extraction activity and rather is the result of natural coastal processes. This is reinforced by the sediment budget, which highlights the large volumes of material entering the local Pakiri system and the lack of discernible cumulative effects. As such, the activity has less than minor effects on coastal processes and coastal erosion.

6.5 Ecological Effects

The potential ecological effects of the activity have been discussed in detail by Bioresearches (Appendix J) and Cawthron (Appendix K).These ecological reports cover benthic, fish, birds and marine mammals as detailed in the following section.

6.5.1 Benthic ecology

With regard to benthic fauna, Bioresearches note that such fauna is sparse in the proposed extraction area as the environment is naturally harsh, with high wave energy and currents. Furthermore, the surveys identified that there are no shellfish of any conservation significance or rarity, with no significant difference in biodiversity between the extraction areas or control area. There are also no corals, kelp beds or reefs present which could provide a more diverse ecological environment are \within the extraction area. However, it is noted that some disturbance to those benthic species present will occur, both through the initial disturbance of the seabed and their subsequent discharge from the extraction vessel (in part due to increased predation between the extraction vessel and the seabed by other local fauna). When extraction occurs, the habitat of benthic organisms is disturbed (albeit temporarily), with organisms either buried entrained as the dredgehead passes. However, Bioresearches have identified that disturbed areas are readily colonised by local benthic species, with recovery possible between likely extraction periods. Furthermore, no unique or endangered benthic species inhabit the extraction areas, thereby avoiding any biodiversity effects on regionally or nationally significant species.

As identified in the water quality report, the lack of sediment bound contaminants also prevents adverse effects on benthic or pelagic ecology due to seabed disturbance. No environmentally harmful concentrations of PAHs, PABs or heavy metals are present at Pakiri nor will any be introduced by the extraction activity. As such, species colonising freshly disturbed areas of the seabed are able to do so without exposure to harmful compounds.

The other effect on benthic species results from their passage through the extraction vessel's screen and discharge back into the CMA. The fieldwork undertaken by Bioresearches showed that bivalves are the more likely to suffer from shell damage and mortality than gastropods, while soft bodied organisms (e.g. polychaete worms) are the most vulnerable. Regardless, no significant difference in the diversity of species was found between the existing extraction area or the control area. This demonstrates that the extraction activity has little, if any, adverse effects on benthic biodiversity.

Furthermore, any such effects will be reduced with the introduction of the William Fraser, due to the reduced frequency which the vessel will need to visit any particular section of the extraction area (in comparison to the current vessel, the Coastal Carrier). This will increase the time between seabed disturbances and provide additional opportunities for the recolonization of the seabed by benthic organisms. It is also noted that discharges from the William Fraser will dissipate faster, resulting in minimal water quality effects on any benthic organisms.

Given these factors, the proposed extraction will have less than minor adverse effects on benthic ecology.

6.5.2 Fish

The Bioresearches report also addresses the potential effects of the extraction activity on fish species. It notes that fish can be affected by:

- Noise effects;
- Entrainment;
- Sub-lethal effects from suspended sediment; and
- Food source reduction.

The underwater noise report from Styles Group (Appendix I) has demonstrated that any underwater noise generated by the vessel and dredge will have not have significant effects on any fish species given the low levels of noise generated during extraction activity. Bioresearches also do not expect the activity to have an impact on fish through entrainment. This is due to the relatively low speed of the dredgehead (1 – 1.5 knots for the Coastal Carrier and 2 – 2.5 knots for the William Fraser) and the ability for most mobile species to avoid it at those speeds (given the swimming speeds of local fish species). Some slow moving or bottom dwelling fish (e.g. sole and sand-divers) could be expected to pass through the dredge and may experience mortality or injury, though overall impact on fish populations will be as limited as currently occurs.

Potential effects from suspended sediment are also expected to be limited. This is due to the short time that any sediment is suspended in the water column, as well as the limited concentrations of fine sediment in the discharged material. In addition, given the lack of significant effects on benthic species, only limited effects are anticipated on food sources for fish with the remaining undisturbed CMA also providing food sources.

Given the above, the proposed extraction activity is considered to have less minor adverse effects on fish species.

6.5.3 Birds

The Bioresearches assessment identifies that the extraction activity acts as an attractor to birds, such as the red billed gull, largely due to their opportunistic feeding within the discharge plume. However, given that the extraction activity will be largely limited to night-time hours, such behaviour from local birdlife will be limited given most local species are day feeders. Furthermore, given the limited effects on both benthic and fish species, food sources for any bird species will be unaffected. Lastly, the lack of any coastal erosion generated by the extraction activity avoids the loss of any on-shore dune habitat and breeding areas for bird species.

Given these factors, the extraction activity will have less than minor adverse effects on birds.

6.5.4 Marine mammals

The assessment by Cawthron (Appendix K) has identified four potential sources of adverse effects on marine mammals:

- Underwater noise;
- Vessel lighting;
- Entanglement; and
- Indirect effects due to habitat disruption.

With regard to underwater noise effects, Cawthron have relied on the underwater noise monitoring, the recording the passage of the William Fraser past 6 underwater noise arrays and modelling undertaken by Styles Group (Appendix I). They note that any effects from underwater noise will be transitory and non-injurious based on the findings of the operational noise assessment and measurements of both vessel's underwater noise. This

is due to the limited noise generated by the vessels and dredge, the presence of other louder vessels in the area (such as cargo and naval vessels) and the likely limited population of marine mammals in the Pakiri area.

While Cawthron acknowledges that the effects of artificial lighting on marine mammals is relatively unknown (given a lack of research), it is noted that any light spill from the vessel is likely to be confined to within a few hundred metres at both the surface and sub-surface. Such lighting has the potential to attract small marine species (e.g. bait fish and larvae) and as a consequence mammal species which would feed on them. Given this, MBL will seek to minimise the volume of lighting used on its vessels during night-time extraction activities (noting that navigation compliant lighting must still be used).

Cawthron also note that marine debris can pose a risk to mammals due to entanglement. However, such high-risk debris is typically loose and/or thin fishing lines and nets. No such equipment is proposed for the extraction vessels given the need to keep the dredgehead free of debris. In addition, MBL employ NZ Maritime compliant waste management procedures onboard their vessels, thereby avoiding the accidental release of debris into the Hauraki Gulf.

With regard to indirect effects, the extraction activity will have less than minor effects on water quality and ecology as previously discussed. As a consequence of these limited effects, Cawthron have not identified any possible effects due to habitat disruption. Marine mammals will still have access to food sources in the Pakiri area, and they will also not be exposed to harmful contaminants due to seabed disturbance.

Further to the above, MBL will also employ a range of measures to avoid any potential conflicts between the extraction activity and mammals. These will be based on the following three management goals:

- Minimise the risk of dredge vessel collisions with any marine mammal and aim for zero injury/mortality, noting that the passage of MBL's vessels between Pakiri and the Port of Auckland is a permitted activity under the AUP(OP);
- Minimise the avoidance (attraction) or potential for injury of marine wildlife to dredging activities; and
- Aim to minimise entanglement with a goal of zero mortality.

Given the above, the activity will have less than minor adverse effects on marine mammals.

6.6 Cultural Effects

As identified in Section 4.3, the Pakiri area has a number of iwi owned sites, statutory acknowledgement areas and CMT applicants.

With regard to the physical effects of the extraction activity, it is noted that it will not affect the ability of iwi to undertake customary fishing. This is due to the less than minor effects on marine ecology and the limited time that the extraction vessels are present. Important customary fish species, such as snapper and terakihi, will remain available to customary fishermen despite the proposed sand extraction.

Iwi onshore sites will also be unaffected by the proposal, including the two forestry blocks owned by Ngāti Manuhiri and Te Uri o Hau and any undisturbed archaeological sites within the local dune system. This is due to the limited erosion effects of the sand extraction and the lack of any onshore facilities needed by MBL to undertake the sand extraction. As such, the continued use of these sites and the preservation of their cultural values will be maintained.

Regardless of the above, MBL have engaged with mana whenua, as highlighted in Section 8. Through this engagement, MBL has commissioned CIAs and these will be provided to the Council once they are available. In addition, MBL are aware that Ngāti Manuhiri, Ngāi Tai ki Tāmaki, and Te Kawerau a Maki all have statutory management areas within the CMA and are therefore considered affected parties under section 95B(2) – 95B(4).

Given that the written approval of these three iwi has not been obtained, it will be necessary to serve them with notice of the application under a limited notified process. This is further discussed in Section 7.2

6.7 Biosecurity Effects

Given the frequent movement of MBL's vessels between the Port of Auckland and Pakiri, MBL is aware of its duties to avoid the transfer of pest marine species via its vessels. The potential for such a biosecurity incident is minimised by MBL undertaking regular cleaning of its vessels' hulls (this is also undertaken to maintain the vessels' performance and stay within Maritime NZ regulatory requirements) and avoiding the discharge of bilge water at Pakiri. As such, the likelihood of MBL's vessels introducing new pests to the Pakiri area is considered very low and the potential adverse biodiversity effects to be less than minor.

6.8 Terrestrial Noise Effects

While the effects of underwater noise have been addressed in Section 4.4.8, the amenity effects arising from vessel noise has also been assessed by MBL. As discussed in the technical report from Styles Group (Appendix H105) and using the measurements taken of the ambient soundscape and the operation of the Coastal Carrier (as well as modelling), it was found that the noise levels of the beach environment are rarely as low as the predicted noise level of dredging. In most conditions, the ambient noise level in the coastal environment will be well over 50 dB LAeq. When it is very calm, the ambient noise level can drop to close to 30 dB LAeq(1sec).

Due to the ambient noise levels primarily being attributed to wave action, the dredging noise will be unnoticeable in most conditions. Furthermore, the noise from dredging will be compliant with the relevant noise limits of the AUUP(OP) by a significant margin, including at night when the noise limits applying at any future notional boundary in the RCZ is 40 dB LAeq. In addition, the noise level at any future notional boundary at the adjoining landward zone is likely to be less than 15 dB LAeq and barely audible to residents and visitors. Lastly, any noise effects will be further reduced by the replacement of the Coastal Carrier with the William Fraser.

Given these factors, the activity will have less than minor surface noise effects.

6.9 Recreational Effects

The potential adverse effects on recreational activities and beach users have also been considered by MBL. These effects include those on surfing and fishing/boating.

6.9.1 Effects on surf breaks

As identified in the coastal processes report (Appendix G), the extraction activity does not affect the three surf breaks at Pakiri Beach. In addition, no changes to the bathymetry or location of the breaks can be attributed to sand extraction activities, while no extraction occurs directly within the areas occupied by the three breaks. It is also noted that no impacts on the surf breaks have been observed during the 70-year operation by MBL.

Furthermore, given the lack of extraction within the surf breaks, MBL's vessels will not present a safety issue to surfers, with access to the surf breaks remaining unobstructed. It is also noted that with a greater reliance on night-time operations and reduced extraction times even less conflict between surfing and extraction activities will occur.

As such, the activity has nil effects on surfing at Pakiri Beach.

6.9.2 Effects on recreational fishing and boating

Pakiri Beach is a popular recreational fishing and boating location given its proximity to the Whangateau and Mangawhai Harbours, as well as two regional parks. However, the extraction activity is not anticipated to have any significant impacts on either recreational fishing and boating given its less than minor adverse effects on fish stock and the short duration that is required to extract sand from the seabed. Furthermore, the increased reliance on night-time and weekday extraction activities will ensure that MBL's vessels avoid operating when public use of the Pakiri area is highest.

As such, the activity is considered to have less than minor effects on recreational fishing and boating.

6.10 Landscape Effects

As identified in Section 4.3, a landscape assessment has been undertaken by Stephen Brown (Appendix L). Mr Brown's assessment has been based on five critical viewpoints:

- Viewpoint 1 - Te Ārai Regional Park Car Park
- Viewpoint 2 – Pakiri Beach North (near the Tara Iti Golf Course)
- Viewpoint 3 – Eyres Point Track
- Viewpoint 4 – Pakiri River Mouth; and
- Viewpoint 5 – M Greenwood Road and Pakiri Regional Park

From these viewpoints, Mr Brown has focused his assessment based on the existing values, legibility, landscape and natural character. The following effects on landscape values were identified:

Table 6-4: Summary of landscape and visual effects

Viewpoint	Landscape Effects Rating	Natural Character Effects Rating
Viewpoint 1 - Te Ārai Regional Park Car Park	No Effect / Very Low Effect	No Effect / Very Low Effect
Viewpoint 2 – Pakiri Beach North (near the Tara Iti Golf Course)	No Effect / Very Low Effect	Very Low Effect
Viewpoint 3 – Eyres Point Track	No Effect	Very Low Effect
Viewpoint 4 – Pakiri River Mouth; and	No Effect	No Effect
Viewpoint 5 – M Greenwood Road and Pakiri Regional Park	No Effect	No Effect

As part of his assessment, Mr Brown acknowledges that MBL's vessels are part of the existing landscape. Vessels of various sizes and designs have been operated at Pakiri by MBL for over seven decades, establishing them as part of an otherwise largely natural landscape. The presence of other vessels, namely cargo ships transiting to and from the Port of Auckland is also recognised, as well as the ability for MBL's vessels themselves to also pass through the area without the need for a resource consent.

The other critical factor in determining these effects is the altered extraction regime, as proposed by MBL. By moving to more night-time and weekday operations, MBL's vessels will be present at times when there are less observers at Pakiri and the surrounding area, while low light conditions obscure views of the vessels. Both of

these changes to MBL's operation are mitigation to landscape effects, particularly given the proximity of the extraction areas to the Te Ārai Regional Park.

The introduction of the William Fraser is likely to further reduce the landscape effects of MBL's operation, given its increased capacity and dredging efficiency. Both of these contribute to requiring less time at Pakiri, further limiting impact of extraction on landscape values. In addition, the William Fraser has a reduced sediment plume associated with the discharge. By discharging under the keel of the vessel, the plume will be less aerated and will settle faster than older MBL vessels, thereby reducing any potential visual effects from the discharge.

Further to Mr Brown's report, it is noted that the extraction activity does not affect coastal processes including either erosion rates or the morphology of the surf breaks. Both the coastal dune system and the inshore surf are key components of the area's sense of wildness and neither will be adversely affected by the continued extraction of seabed sand.

Given the above, the proposal will have less than minor adverse effects on landscape values.

6.11 Summary of Effects

In summary, the continued inshore extraction of sand at Pakiri will have less than minor adverse effects on the environment, as compared to the existing environment and the current sand extraction activity.

As demonstrated by the technical reports prepared for this AEE, these effects are also largely temporary in nature, with the natural environment able to adapt to continued extraction. While seabed disturbance and sediment discharge will occur, local benthic fauna are able to rapidly recolonise the disturbed areas and their populations are able to recover from any mortality caused by the extraction activity.

Larger and more mobile fauna, such as fin fish and marine mammals, will also be largely unaffected given the low noise generated by MBL's vessels, their ability to avoid the dredgehead and the limited disruption to their local food sources. Seabirds and shorebirds will also be largely unaffected, with the protection of their food sources and onshore habitats.

Effects on residents, mana whenua and beach visitors are also limited. This is due, in part, to the continued uninterrupted use of the wider coastal environment, the lack of erosion effects on the coastal edge and the altered extraction regime proposed by MBL. The continued extraction activity will not affect the ability for residents and visitors to enjoy the landscape values of Pakiri, while recreational fishing, boating and surfing activities will also remain unaltered by MBL's activity as has been the situation for the last 70 years of MBL's business.

The adverse effects of the activity will be mitigated in part by the introduction of a new vessel (the William Fraser), the modified extraction schedule and the management practices proposed by MBL. These measures reduce the time needed at Pakiri, minimising any visual effects or direct impacts on marine fauna. The design of the William Fraser also reduces the time needed for the dispersal of the discharge plume, reducing effects on water quality and visual amenity.

Lastly, these less than minor adverse effects are offset by the significant benefits that the extraction activity provides to Auckland's social and economic wellbeing. The sand resource at Pakiri is a vital supply of sand for concrete manufacture, without which the economic and environmental costs of providing Auckland with this critical building material would be immense. Without access to this resource, the increase in truck movements, the limited usefulness of Waikato sands, the increased costs in construction and the rise in CO_2 emissions from accessing other sand sources would be detrimental to Auckland at a regional scale. Consequently, access to the Pakiri sand resource must and can be retained.

7. Notification assessment

7.1 Public Notification Assessment (section 95A)

The test that must be considered by the consent authority when deciding whether or not to publicly notify an application are set out in section 95A of the RMA.

Step 1: Mandatory public notification in certain circumstances (s95A(2) – (3))

No mandatory notification is required as:

- The applicant has not requested that the application is publicly notified (s95A(3)(a))
- There are no outstanding or refused requests for further information (s95C and s95A(3)(b)), and
- The application does not involve any exchange of recreation reserve land under s15AA of the Reserves Act 1977 (s95A(3)(c)).

Step 2: If not required by step 1, public notification precluded in certain circumstances (s95A(4) – (6))

The application is not precluded from public notification as:

- The activities are not subject to a rule or national environmental standard (NES) which precludes public notification (s95A(5)(a)), and
- The application for resource consent is for a non-complying activity, but not a boundary activity and therefore not precluded from public notification (s95A(5)(b)(iii)).

Step 3: If not precluded by Step 2, public notification in certain circumstances (s95(7) – (8))

The application is not required to be publicly notified as:

- The activities are not subject to a rule or national environmental standard (NES) which require public notification (s95A(8)(a)), and
- The activity will not have adverse effects on the environment that are more than minor (s95A(8)(b)).

Step 4: Special circumstances (s95A(9))

Section 95A(9) of the Act states that an application may be publicly notified if 'special circumstances' exist, notwithstanding the satisfaction of the statutory tests that would allow for non-notification. 'Special circumstances' are not defined in the Act. Case law has identified 'special circumstances' as something outside the common run of things which is exceptional, abnormal or unusual but less than extraordinary or unique. A 'special circumstance' would be one which makes notification desirable despite the general provisions excluding the need for notification. The local authority should be satisfied that public notification may elicit additional information on the aspects of the proposal requiring resource consent. It is considered that there are no 'special circumstances' that exist to justify the public notification of this application due to:

- The application is for the continuation of an existing lawfully established activity in the CMA;
- Mineral extraction and discharges in the CMA are activities anticipated by the AUP(OP);
- No regionally, nationally, or internationally significant conservation species are affected by the activity; and
- The effects of the activity are largely limited to technical matters of assessment, which have demonstrated to have less than minor effects.

Public notification conclusion

It is considered that public notification of the application under s95A is not required.

7.2 Limited Notification Assessment (section 95B)

Step 1: Certain affected protected customary rights groups must be notified (s95B (2) – (4))

There are no protected customary rights groups or customary marine title groups affected by the proposed activity (s95B(2)). However, it is noted that the extraction area is within three statutory acknowledgement areas under Schedule 11 of the RMA, these being Ngāti Manuhiri, Ngāi Tai ki Tāmaki, and Te Kawerau a Maki. As such, these three iwi are required to be served notice of the application.

Step 2: Further notification in special circumstances (s95B(10))

The application does not warrant notification to any other persons not already determined to be eligible for limited notification under this section given the special circumstances discussion provided in Section 7.1.

Limited notification conclusion

It is considered that limited notification of the application under s95B(3) is required.

7.3 Notification Summary

Based on the above assessment, the following persons/parties should be served with notice of the application as part of a limited notified process given the presence of statutory acknowledgement areas within the extraction areas:

- Ngāti Manuhiri;
- Ngāi Tai ki Tāmaki; and
- Te Kawerau a Maki.

8. Consultation

The purpose of the consultation undertaken to date is to assist interested persons to understand the ongoing operational extraction of marine sands, gather their potential concerns and where possible, minimise any adverse effects from MBL's operation. In addition, MBL is aware of its duties under the RMA to engage with stakeholders and in particular with iwi. A summary of this consultation is provided in the following section with further details provided in Appendix M.

8.1 Auckland Council

8.1.1 Regulatory Services

Meetings were held with resource consents department staff in September 2018 and October 2019 to discuss MBL's proposed continued extraction operation at Pakiri. Matters discussed with Auckland Council's planners, coastal specialists and landscape architect included the technical reports required and the confirmation of the methodologies employed for data gathering.

8.2 Mana Whenua

8.2.1 Local Mana Whenua Groups

MBL has engaged with the following mana whenua groups given the location of the activity within recognised rohe:

- Ngāti Manuhiri;
- Te Uri O Hau; and
- Ngāti Wai.

This engagement has involved e-mails to these parties, as well as follow up meetings and the sharing of documentation with those groups who have expressed an interest in the application. In addition, Ngāti Manuhiri and Te Uri O Hau have been commissioned to prepare CIAs and these will be provided to Council once completed.

8.2.2 Customary Marine Title Applicants

In addition to the mana whenua groups identified in Section 8.2.1, MBL has also contacted the CMT claimants identified in Table 8-1. The majority of claimants have not responded to MBL's consultation, but MBL will advise Council if any further correspondence is received.

Table 8-1: CMT Claimant Consultation

CMT claimant	Feedback
Mahinepua Reserve Ririwha Trust	None received
Nga Hapu o Ngai Tahuhu	None received
Ngati Kawau te Kotuku Te Uri o Te Aho Ngati Kuri Te Waiariki Korora nga Hapu o ngapuhi nui tonu	Objection raised but based on requiring funding from the NZ government
Nga Puhi Nui Tonu (Te Kotahitanga Marae)	Meet and Greet requested
Nga Puhi Nui Tonu (Waitangi Marae)	None received
Nga Puhi Nui Tonu (Awataha Marae)	None received
Nga Puhi Nui Tonu Kota - Toka - Tutaha - Moana o Whaingaroa	None received
Nga Puhi, Ngati Wai, Haki Pereki and Ngawhetu Sadler Whanau Trust	Acknowledgement received.
Ngai Tai ki Tamaki Trust	None received
Ngati Wai Whairepo Trust	None received
Ngati Whanaunga	None received
Pakiri G Trust	None received
Reti Whanau	None received
Taumata A Whanau	None received
Taumata B Block Whanau - Hauturu	None received
Taumata B Block Whanau - Mahuki	None received
Taumata B Block Whanau - Motairehe	None received
Taumata B Block Whanau - Omaha 1	None received
Taumata B Block Whanau	None received
Taumata B Block Whanau - Pakiri T	None received
Taumata B Block Whanau -Pakiri U	None received
Taumata B Block Whanau - Rangiahau	None received
Te Hikutu Whanau and Hapu	None received
Te Iwi, Whanau and Hapu of Ngati Wai	None received
Te Kaunihera Maori o Te Tai Tokerau	None received
Te Kawerau a Maki	None received
Te Parawhau Hapu	None received

8.3 Department of Conservation

MBL has made contact with the Department of Conservation and is awaiting confirmation of a follow up meeting with its Senior RMA advisor. This is not expected to occur until all application documents have been provided and considered by the Department and its experts. Such a follow up meeting is not expected until March 2020.

8.4 NZ Fairy Tern Trust

The NZ Fairy Tern Trust was contacted in February 2019 with an offer to discuss the proposed continued extraction activity at Pakiri and any potential effects on the local fairy tern colonies. Since this initial contact, the

Trust has advised that they wish to be kept informed of the proposal but that they would be unlikely to get formally involved in the RMA process.

8.5 Friends of Pakiri

Initial contact regarding this application was made with the Friends of Pakiri in February 2019. Contact between MBL and the Friends of Pakiri is ongoing and any matters in these discussions will be addressed by MBL.

8.6 University of Auckland

Given the proximity of the activity to the Leigh Marine Laboratory, MBL contacted the University of Auckland in late February 2019 to discuss the application. This was followed with a meeting in March 2019 with the Director of Marine Sciences. They are waiting to view the application documents before a further meeting can be set.

8.7 Other groups

MBL has also engaged with Forest and Bird, the Environmental Defence Society (EDS), the Mangawhai Harbour Restoration Society, Surfbreak Protection Society, Te Ārai Preservation Society and Pelco NZ Fisheries. This has involved providing copies of application documents to these parties (where requested). It also is noted that the EDS expressed that they were unlikely to wish further involvement in the application process.

9. Statutory Considerations

The following assessment is provided in accordance with the relevant sections under the RMA applicable to this proposal.

9.1 Part 2 (Purposes and Principles) - Sections 5, 6, 7, and 8

Part 2 provides a common set of principles to be applied to the management of all resources.

9.1.1 Section 5 assessment

The RMA has a single overarching purpose: to promote the sustainable management of natural and physical resources. Sustainable management is defined in Section 5 as:

> *...managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –*
>
> *(a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
>
> *(b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and*
>
> *(c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.*

Assessment

As highlighted throughout this AEE, the sand resource at Pakiri is vital for the continued sustainable development of the Auckland Region. This includes the delivery of a quality compact urban core and a low carbon future. Pakiri is the source of at least 43% of the sand for Auckland's concrete production and without access to this resource the cost of concrete in Auckland would increase, while the availability of sand to the market would become critically short with a likely shortfall in availability. These increased costs would have adverse effects on the economic wellbeing of Auckland, as well as on the supply of affordable housing with subsequent negative impacts on social wellbeing.

Furthermore, the sand resource at Pakiri is the most efficient sand resource to transport, given its ability to be shipped directly into central Auckland. Alternative sources in the Kaipara Harbour and Waikato require long-distance road transport, increasing transport costs, contributing to road congestion and generating additional CO_2 emissions. Also, Pakiri sand requires less cement than Waikato sourced sand (per cubic metre of concrete produced), improving the cost efficiency and minimising CO_2 generation during concrete production.

The proposed sand extraction will also be undertaken in a manner which protects the social and cultural values of Pakiri. The vessels operated by MBL will not obstruct the continued use of the CMA for other commercial and recreational activities, including surfing and fishing. In addition, no culturally important features will be affected and access to kaimoana will also be retained.

It has also been demonstrated that sand extraction can be undertaken while safe-guarding the life-supporting capacity of water and local ecosystems. The assessments undertaken for this AEE have detailed the limited differences in water quality and ecological values between the extraction areas and the adjoining CMA. The biodiversity of the Pakiri area will be retained and the food sources for fish, birds and marine mammals will be largely unaffected. Lastly, while the extraction activity will require the discharge of some sediment into the CMA, it has been shown that this discharge will not significantly affect water quality, is free of any noticeable contaminants and any effects generated will only be of a short duration, leaving benthic organisms, fish, birds and marine mammals largely unaffected.

Given these factors, the proposal is consistent with section 5 of the RMA.

9.1.2 Section 6 Assessment

In achieving the purpose of the RMA, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the matters of national importance as set out in Section 6 of the Act.

Matters of national importance relevant to this application include:

(a) the preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development.

(b) (the protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development.

(c) the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna.

(d) the maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers.

(e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, wāhi tapu, and other taonga.

(g) the protection of protected customary rights:

(h) the management of significant risks from natural hazards.

Assessment

As detailed in this AEE, the natural character of the Pakiri area will be preserved. This is due to the limited duration needed on-station for extraction, the alteration to a weekday and night-time focused extraction schedule and the lack of any visual disruption caused by MBL's vessels. Furthermore, no boat handling facilities are required on-shore nor are any permanent moorings required in the CMA.

It is also noted that the extraction activity will not affect the accretion or erosion of the coastal dune system or the bathymetry of the surf breaks. As such, the contributions that these features make to natural character of the landscape will be unaffected and retained for the ongoing enjoyment of residents and visitors.

The ecological assessments by Bioresearches and Cawthron have not identified any significant marine habitats for native flora and fauna, with similar biodiversity values present within the extraction areas and the wider CMA. Given the lack of erosion effects, the extraction activity also avoids impacting on any terrestrial ecological values as the coastal dune system will remain unchanged.

Furthermore, the short duration of each extraction period and the distance of MBL's vessels offshore allows for the continued access of the public to Pakiri beach. This includes continued enjoyment of its surf breaks, recreational fishing and boating. The lack of erosion effects also ensures that the public access to the beach remains available to the general public.

MBL is also cognisant of the area's cultural values and the relationship of Maori with this landscape. It has been demonstrated that kaimoana or other customary rights will be unaffected by the extraction activity, while the mauri of coastal waters will be protected given the limited effects associated with sediment disturbance and discharge. Furthermore, the lack of erosion effects allows for the protection of any wāhi tapu and other taonga which may be present in the coastal dune system.

Lastly, the extraction activity will not exacerbate any natural hazard risks in the Pakiri area. The lack of erosion effects attributable to the activity ensures that any risks from coastal storms or climate change are not amplified by the continued extraction of sand.

Given these factors, the proposal is consistent with section 6 of the RMA.

9.1.3 Section 7 Assessment

Other matters that shall have particular regard to when managing the use, development and protection of natural and physical resources include;

(a) kaitiakitanga:

(aa) the ethic of stewardship:

(b) the efficient use and development of natural and physical resources

(c) the maintenance and enhancement of amenity values

(d) intrinsic values of ecosystems:

(f) maintenance and enhancement of the quality of the environment:

(i) the effects of climate change:

Assessment

MBL is aware of the importance of kaitiakitanga and has engaged with mana whenua throughout the development of the current proposal. This includes developing strong relationships with mana whenua representatives to ensure that cultural values were considered in the proposed operation of the extraction activity, while ensuring that the ongoing access to culturally important resources is not impinged by MBL's operation.

As identified in Sections 3 and 6.2, the continued access to this sand resource is critical to the delivery of affordable housing and the quality-compact urban growth model sought by Auckland Council's strategic planning documents. By delivering a high-quality and affordable source of concrete, the proposed extraction activity will assist in the efficient use and development of resources across the Auckland region. As identified by the Auckland Plan and AUP(OP), the quality compact urban development of Auckland will help protect valuable soils, reduce congestion, help mitigate climate change, assist economic growth and provide housing choice. However, the ability to meet these efficient resource uses will be more difficult and expensive if the proposed extraction is not allowed for.

At a local level it is also considered that amenity values will be maintained. The extraction activity does not affect the rate of erosion of the coastal dune system or the quality and appearance of the surf breaks. As such, both these landscape elements will continue to contribute to the high amenity values at Pakiri, while public access to the coast will also remain unaffected.

The extraction activity also recognises the intrinsic values of ecosystems and will not affect local biodiversity values. The food sources for marine mammals and fish species will also be largely unaffected, while the lack of erosion protects any onshore species' habitat. It is also noted that benthic species are able to recolonise disturbed areas quickly, returning the seabed to its natural condition.

Overall, the activity will maintain the current quality of the environment, with no discernible effects beyond the existing extraction activity. The altered extraction regime, including the use of increased night-time and weekday operations, will also assist with the enhancement of amenity values. Public enjoyment of Pakiri will also remain

uninterrupted, with the ability for the public to enjoy surfing, fishing and boating in the CMA continuing even while extraction is occurring.

Lastly, the effects of climate change, including coastal erosion have been taken into account in the development of this application. The extraction activity does not affect the rate of sand loss at Pakiri and MBL propose to continue to undertake regular monitoring of the dunes and foreshore for the duration of the consented activity.

Given the above, the application is consistent with section 7 of the RMA.

9.1.4 Section 8 Assessment

The principles of the Treaty of Waitangi shall be taken into account when managing the use, development, and protection of natural and physical resources.

Assessment

As previously discussed, MBL are aware of Mana Whenua's rights and role in resource management, having engaged with a number of iwi through the development of the current proposal. This has included making contact with CMT applicants, the iwi identified by Auckland Council as having an interest in the area and the three iwi with statutory acknowledgments at Pakiri.

Furthermore, it is recognised that the proposed extraction will not impact on the physical characteristics of local cultural resources. Access will still be retained to kaimoana and the wider CMA, while erosion of the dune system and the subsequent disturbance of any undiscovered taonga is not anticipated.

Lastly, CIAs have been commissioned from Ngāti Manuhiri and Te Uri o Hau. These will be provided to Auckland Council once they become available.

9.2 Section 104(1)(a)

This section of the Act requires that regard is given to any actual and potential effects on the environment of allowing the activity.

A detailed assessment of the actual and potential environmental effects is included in Section 6 of this report. In summary, the extraction activity and associated discharge will have less than minor adverse effects on the environment. However, these effects are largely transitory and will be reduced with the introduction of the William Fraser and the altered extraction regime.

In addition, the proposal has significant benefits for the social and economic wellbeing of Auckland. The sand resource at Pakiri is a vital resource for the production and supply of concrete, providing at least 43% of the sand used for Auckland's concrete production. Without access to this resource, more expensive, less appropriate and less secure sources of sand would be required. This would have subsequent adverse effects on the region's transport networks, housing affordability, housing supply and CO_2 emissions.

9.3 Section 104(1)(b)(i)

This section of the Act requires that regard is given to any relevant provisions of a national environmental standard.

Assessment

There are no national environmental standards relevant to the application.

9.4 Section 104(1)(b)(ii)

This section of the Act requires that regard is given to any relevant provisions of any other regulations.

Assessment

No other regulations are considered to be relevant to the application.

9.5 Section 104(1)(b)(iii)

This section of the Act requires that regard is given to any relevant provisions of a national policy statement (NPS).

Assessment

Section 9(4) of the Hauraki Gulf Marine Park Act 2000 requires consent authorities to have regard to sections 7 and 8 of that Act as if they were a National Policy Statement.

Section 7 of the Act states:

"(1) The interrelationship between the Hauraki Gulf, its islands, and catchments and the ability of that interrelationship to sustain the life-supporting capacity of the environment of the Hauraki Gulf and its islands are matters of national significance.

(2) The life-supporting capacity of the environment of the Gulf and its islands includes the capacity—

(a) to provide for—

(i) the historic, traditional, cultural, and spiritual relationship of the tangata whenua of the Gulf with the Gulf and its islands; and

(ii) the social, economic, recreational, and cultural well-being of people and communities:

(b) to use the resources of the Gulf by the people and communities of the Gulf and New Zealand for economic activities and recreation;

(c) to maintain the soil, air, water, and ecosystems of the Gulf."

The proposal is consistent with Section 7 of the Act as it will not adversely affect the life-supporting capacity of the Hauraki Gulf nor the matters raised in section 7(2). Only less than minor adverse effects will be generated, with the majority of these effects temporary in nature. The water quality of Pakiri will be maintained, as will the existing biodiversity values. Cultural values will also be protected, via uninterrupted access to kaimoana and the wider CMA, while the lack of erosion effects will avoid the disturbance on any onshore sites of cultural significance.

Furthermore, MBL's operation is vital for the social and economic wellbeing of the community given the importance of the sand resource to the construction sector. The high quality of the sand resource and the efficiency of its transport to central Auckland make it vital to the delivery of affordable homes, business premises and infrastructure.

Section 8 of the Act states:

"To recognise the national significance of the Hauraki Gulf, its islands, and catchments, the objectives of the management of the Hauraki Gulf, its islands, and catchments are—

(a) the protection and, where appropriate, the enhancement of the life-supporting capacity of the environment of the Hauraki Gulf, its islands, and catchments:

(b) the protection and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments:

(c) the protection and, where appropriate, the enhancement of those natural, historic, and physical resources (including kaimoana) of the Hauraki Gulf, its islands, and catchments with which tangata whenua have an historic, traditional, cultural, and spiritual relationship

(d) the protection of the cultural and historic associations of people and communities in and around the Hauraki Gulf with its natural, historic, and physical resources:

(e) the maintenance and, where appropriate, the enhancement of the contribution of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments to the social and economic well-being of the people and communities of the Hauraki Gulf and New Zealand:

(f) the maintenance and, where appropriate, the enhancement of the natural, historic, and physical resources of the Hauraki Gulf, its islands, and catchments, which contribute to the recreation and enjoyment of the Hauraki Gulf for the people and communities of the Hauraki Gulf and New Zealand."

The extraction operation is consistent with section 8 of the Act given that it will have less than minor adverse effects on the Hauraki Gulf's environment, including its natural resources, communities and cultural values. Both the ecological and landscape values of the Hauraki Gulf will be largely unaltered by the sand extraction, while public access to the CMA and their enjoyment of the wider coastal environment will remain uninterrupted by the activity. MBL have also engaged with Mana Whenua to ensure cultural values have been taken into account during the development of this application and iwi prepared CIAs will be provided to Auckland Council once they become available.

9.6 Section 104(1)(b)(iv)

This section of the Act requires that regard is given to any relevant provisions of a National Policy Statement.

Assessment

Given the activity's location, the NZCPS is relevant. In particular, the following objectives and policies are considered relevant to the current application:

- Objectives 1, 2, 3, 6 and 7;
- Policies:
    - Policy 1: Extent and characteristics of the coastal environment;
    - Policy 2: The Treaty of Waitangi, tangata whenua and Māori;
    - Policy 3: Precautionary approach;
    - Policy 4: Integration;

- Policy 6: Activities in the coastal environment;
- Policy 11: Indigenous biological diversity (biodiversity);
- Policy 13: Preservation of natural character;
- Policy 15: Natural features and natural landscapes; and
- Policy 23: Discharge of contaminants.

Firstly, the proposal is consistent with the objectives and policies of the NZCPS given that the integrity, form, functioning and resilience of the coastal environment and its ecosystems is maintained. As detailed in Section 6 of this AEE, the extraction activity has limited effects on biodiversity and the natural landscape at Pakiri. While seabed disturbance and sediment discharge does occur, these are temporary and the local ecosystem is resilient to these activities in the CMA. There are no attributable effects of the existing activity on biodiversity or the wellbeing of fin fish, marine mammals or seabirds, including any at-risk or declining species.

In addition, the physical effects of the extraction on coastal forms and processes is also limited. Historically collected data shows that the extraction does not impact the coastal dune system, while the form and function of the surf breaks remains unaffected. Significant effects are avoided, when any effects caused by the presence of MBL's vessels or the discharge of sediment limited to the short duration of each extraction period. These effects will be further reduced and mitigated by the introduction of the William Fraser, given its improved efficiency in extraction (i.e. shorter and fewer times on-station at Pakiri), as well as the change to more night-time and weekday operations. In addition, sand extraction at Pakiri has been occurring for more than seven decades, with the vessels operating during this time becoming part of the accepted landscape. It is also noted that numerous other vessels transit the area, as they enter and leave the Port of Auckland or undertake commercial fishing.

MBL also recognise the cultural relationship that Mana Whenua have in the Pakiri area and have engaged with various iwi to discuss any concerns or issues associated with the extraction activity. No customary fisheries will be affected by the activity, while access to the CMA will be maintained. Furthermore, the extraction activity will not cause any erosion of the dune system which could expose taonga or wāhi tapu.

The Pakiri area is also important to the general public and local residents given its landscape and recreational values. MBL's operation does not obstruct the public's access or enjoyment of the coastal environment, with the continued ability for the public to surf, fish and boat in the CMA. The extraction activity is also not a permanent activity, with only limited time needed at Pakiri to undertake the sand extraction. Effects are further limited as no onshore facilities are needed by MBL to undertake the activity.

Lastly, the extraction activity does not introduce new contaminants or human waste products into the environment. The discharge from MBL's vessels is limited to sediment, biota and seawater extracted from Pakiri itself. It is processed onboard the vessels and rapidly discharged without the addition of any other material or contaminants. On-site monitoring and testing have also shown that this discharge rapidly dissipates and does not affect local biodiversity.

Given the above, the proposal is consistent with the NZCPS.

9.7 Section 104(1)(b)(v)

This section of the Act requires that regard is given to any relevant provisions of a regional policy statement (RPS) or proposed regional policy statement.

Assessment

An assessment of the proposal against the RPS objectives and policies of the AUP(OP) is provided as Appendix B. In summary, the proposal is consistent with the RPS given the scale of effects generated and the importance of the sand resource to Auckland's social and economic wellbeing.

9.8 Section 104(1)(b)(vi)

This section of the Act requires that regard is given to any relevant provisions of a plan or proposed plan.

Assessment

An assessment of the proposal against the relevant objectives and policies of the AUP(OP) is provided as Appendix B. In summary, the proposal is consistent with these objectives and policies, including those associated with the General Coastal Marine Zone, as well as ecological and landscape overlays.

9.9 Section 104(1)(c)

This section of the Act requires consent authority to consider any other matter relevant and reasonably necessary to determine the application.

9.9.1 Auckland Plan 2050

As highlighted in Section 3.2, Auckland is predicted to experience significant population growth over the next 30 years, with an additional 720,000 residents living in the region at the end of this period. These residents will require an additional 313,000 homes based on the Auckland Plan's quality compact urban form. In order to meet this housing demand, while also achieving the desired urban form, an affordable and secure supply of concrete is needed.

Pakiri is an appropriate source for construction sand and it can be provided without the adverse effects on transport networks and the Auckland Plan's climate change objectives which other sources have. Furthermore, the proposed extraction activity can be undertaken in a manner which avoids significant effects on the natural environment or cultural values, thereby recognizing the Auckland Plan's wider environmental objectives.

Given these factors, the proposal is consistent with the Auckland Plan.

9.9.2 Hauraki Gulf Marine Spatial Plan

It is noted that the proposal is consistent with the desired outcomes of the Hauraki Gulf Marine Spatial Plan. In particular, it does not affect the biodiversity of the wider Hauraki Gulf, with limited effects on marine species and the provision of adequate food sources for seabirds, fish and marine mammals. As such, both commercial and recreational fish populations will be unaffected, while the conservation status of at risk, endangered or declining species will also be unaffected.

Minimal habitat disturbance will be caused, with local benthic populations readily able to recolonise any dredged areas. This disturbance and associated surface discharge will have limited temporary effects, with any plumes rapidly dispersing back in the receiving environment. Any discharges will not contain significant concentrations of contaminants and do not pose a risk to local fauna.

Lastly, engagement with Mana Whenua has also been undertaken in recognition of the cultural values or Pakiri and in the spirit of kaitiakitanga. This has included the commissioning of CIAs and recognising the Treaty claims and CMT applications present in the area.

9.10 Section 104D

As a non-complying activity, the RMA requires assessment of the activity against section 104D, otherwise known as the 'gateway test'. This section of the RMA states:

(1) Despite any decision made for the purpose of notification in relation to adverse effects, a consent authority may grant a resource consent for a non-complying activity only if it is satisfied that either—

(a) the adverse effects of the activity on the environment (other than any effect to which section 104(3)(a)(ii) applies) will be minor; or

(b) the application is for an activity that will not be contrary to the objectives and policies of—

(i) the relevant plan, if there is a plan but no proposed plan in respect of the activity; or

(ii) the relevant proposed plan, if there is a proposed plan but no relevant plan in respect of the activity; or

(iii) both the relevant plan and the relevant proposed plan, if there is both a plan and a proposed plan in respect of the activity."

It is noted that the proposal has been assessed as having less than minor adverse effects on the environment (Section 6) while also being consistent with the objectives and policies of the AUP(OP) (Sections 9.7 and 9.8). Given this, the proposal meets the statutory tests of section 104D.

9.11 Consent duration

Given the less than minor adverse effects generated by the extraction activity as demonstrated by the supporting technical assessments, the use of standard consent conditions and the strategic importance of sand resource to Auckland, MBL seek consent durations of 35 years for both the coastal permit and discharge permit.

MBL has demonstrated that the extraction activity can occur for this duration without generating significant effects on the local environment, with the use of regular monitoring to ensure that the effects of the activity do not exceed those described in the application. Furthermore, MBL agree to the imposition of a condition under section 128 which allows Auckland Council to review the consents should any issues arise during the duration of the consents.

9.12 Sections 105 and 107

It is also noted that s105 and s107 of the RMA address discharge applications. In particular, s105 states that a discharge permit under s15 of the RMA must have regard to:

(a) the nature of the discharge and the sensitivity of the receiving environment to adverse effects; and

(b) the applicant's reasons for the proposed choice; and

(c) any possible alternative methods of discharge, including discharge into any other receiving environment.

As addressed by this AEE and the associated water quality assessment, the discharge associated with the sand extraction does not contain any noticeable levels of contaminants. The ecological assessments by Cawthron and Bioresearches further note that the local environment is able to receive this discharge given its transitory nature and lack of contaminants.

Lastly, no practicable alternatives exist for the discharge. Without undertaking a discharge directly after dredging, a much larger vessel would be required to carry the volume of target sand, unwanted material and seawater which is collected during the extraction process.

Section 107 states that a discharge shall not generate the following effects:

a) the production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials;

b) any conspicuous change in the colour or visual clarity;

c) any emission of objectionable odour;

d) the rendering of fresh water unsuitable for consumption by farm animals; and

e) any significant adverse effects on aquatic life.

It is noted that the effects of the discharge will not create any conspicuous changes in water quality and will not include any grease films, scums or foam. Any discolouration from the discharge will be transitory and rapidly dispersed with the return of discarded material to the seabed. Furthermore, the discharge does not give rise to any objectionable odours, and will not significantly affect marine species present at Pakiri.

10. Conclusion

Consent is sought for the continuation of the existing sand extraction operation at Pakiri. This will provide up to 76,000 m^3/year of sand extraction (from the nearshore area between 5 m and 10 m water depths) within two extraction areas for a duration of 35 years.

MBL have demonstrated through the operation of the current activity, the attached technical assessments and this AEE that the proposal will generate less than minor adverse effects on the environment, including any effects on ecological, water quality, cultural and landscape values. The introduction of the William Fraser and the altered extraction regime will further reduce the adverse effects of the activity.

In addition, the sand resource at Pakiri is a vital material for the construction industry, supplying at least 43% of sand for Auckland's concrete production. Without the continued secure supply of this resource, Auckland will be reliant on more distance and lower quality sand resources. This would have significant impacts on building costs, road congestion and greenhouse gas emissions, with such an outcome being contrary to the Auckland Plan and other strategic documents.

The proposal is also consistent with the relevant statutory tests and documents of the RMA. This includes the NZCPS, the AUP(OP) and Part 2 of the RMA

Accordingly, it is considered that **resource consent can be granted for this application**.

Appendix A. Previous Consent Conditions

Appendix B. Objectives and Policies

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
B4 – Natural Heritage			
Objective B4.2.1	(1) Outstanding natural features and landscapes are identified and protected from inappropriate subdivision, use and development. (2) The ancestral relationships of Mana Whenua and their culture and traditions with the landscapes and natural features of Auckland are recognised and provided for.	Yes	As demonstrated by the Visual Impact Assessment (Appendix L) and discussed in the AEE (Section 6.10), the proposal is considered to have less than minor effects on the landscape values at Pakiri. The continuation of the existing sand extraction operation only involves a temporary presence at Pakiri, including within the areas covered by ONL and HNC overlays, as the extraction operation's location continually changes within the inshore extraction area. In addition, MBL propose to move the operation towards more night-time and weekday extractions, thereby further limiting the potential audience for any visual effects. Further to the immediate visual effects associated with the operation of the extraction vessels in the inshore environment, it is noted that the onshore landscape will also be unaffected by the activity. As discussed in the coastal processes report (Section 6.4), the proposed extraction levels will not accelerate natural coastal erosion or accretion at Pakiri. This will ensure that the coastal dune system and surf breaks will continue to contribute to the natural character of Pakiri and retain their own form. It is also recognised that no onshore facilities are required at Pakiri for MBL to continue sand extraction.
Policy B4.2.2	(8) Manage outstanding natural landscapes and outstanding natural features in an integrated manner to protect and, where practicable and appropriate, enhance their values.		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
			Ongoing erosion monitoring is also proposed to ensure that effects on landscape values from erosion are avoided. In addition, MBL has approached mana whenua to produced CIAs. Two CIAs have been commissioned and will be provided to Council once they are available. It is also noted that the lack of physical effects on the landscape will avoid the disturbance of any culturally significant sites within the dune system or further onshore.
B6 – Mana Whenua			
Objective B6.3.1	(1) Mana Whenua values, mātauranga and tikanga are properly reflected and accorded sufficient weight in resource management decision-making. (2) The mauri of, and the relationship of Mana Whenua with, natural and physical resources including freshwater, geothermal resources, land, air and coastal resources are enhanced overall. (3) The relationship of Mana Whenua and their customs and traditions with natural and physical resources that have been scheduled in the Unitary Plan in relation to natural heritage, natural resources or historic heritage values is recognised and provided for.	Yes	MBL has engaged with mana whenua, including those iwi who have statutory acknowledgement at Pakiri and those who have an interest in the area registered with Auckland Council. In addition, MBL have made contact with the CMT applicants for the Pakiri area. It is acknowledged that the Hauraki Gulf is culturally significant to mana whenua, including its importance for food gathering and as a traditional transport route. However, the extraction activity will not affect kaimoana resources at Pakiri, while uninterrupted access to the CMA will continue. As discussed above, the lack of coastal erosion effects will also avoid impacts on any onshore culturally significant sites or taonga. Both forestry blocks (as owned by two iwi) will also be unaffected by the extraction activity.
Policy B6.3.2	(1) Enable Mana Whenua to identify their values associated with all of the following: (a) ancestral lands, water, air, sites, wāhi tapu, and other taonga; (b) freshwater, including rivers, streams, aquifers, lakes, wetlands, and associated values; (c) biodiversity;		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(d) historic heritage places and areas; and (e) air, geothermal and coastal resources. (2) Integrate Mana Whenua values, mātauranga and tikanga: (a) in the management of natural and physical resources within the ancestral rohe of Mana Whenua, including: (i) ancestral lands, water, sites, wāhi tapu and other taonga; (ii) biodiversity; and (iii) historic heritage places and areas. (b) in the management of freshwater and coastal resources, such as the use of rāhui to enhance ecosystem health; (c) in the development of innovative solutions to remedy the long-term adverse effects on historical, cultural and spiritual values from discharges to freshwater and coastal water; and (d) in resource management processes and decisions relating to freshwater, geothermal, land, air and coastal resources. (3) Ensure that any assessment of environmental effects for an activity that may affect Mana Whenua values includes an appropriate assessment of adverse effects on those values. (4) Provide opportunities for Mana Whenua to be involved in the integrated management of natural and physical resources in ways that do all of the following: (a) recognise the holistic nature of the Mana Whenua world view; (b) recognise any protected customary right in accordance with the Marine and Coastal Area (Takutai Moana) Act 2011; and (c) restore or enhance the mauri of freshwater and coastal ecosystems. (6) Require resource management decisions to have particular regard to potential impacts on all of the following: (a) the holistic nature of the Mana Whenua		In recognition of the broader cultural values associated with Pakiri, two CIAs have been commissioned from iwi and these will be provided by MBL to Auckland Council once they are available. Any assessment of effects on the mauri of Pakiri and other cultural aspects will be undertaken once the CIAs are received.

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(b) the exercise of kaitiakitanga; (c) mauri, particularly in relation to freshwater and coastal resources; (d) customary activities, including mahinga kai; (e) sites and areas with significant spiritual or cultural heritage value to Mana Whenua; and (f) any protected customary right in accordance with the Marine and Coastal Area (Takutai Moana) Act 2011.		
B7 – Natural Resources			
Objective B7.2.1	(1) Areas of significant indigenous biodiversity value in terrestrial, freshwater, and coastal marine areas are protected from the adverse effects of subdivision, use and development. (2) Indigenous biodiversity is maintained through protection, restoration and enhancement in areas where ecological values are degraded, or where development is occurring.	Yes	It is noted that while some extraction will be undertaken within three SEA-M2s, the effects of the activity are transitory and less than minor, as well as being the continuation of an existing consented extraction activity at these locations. The assessments undertaken by Bioresearches and Cawthron (Appendix J & Appendix K) demonstrate that little difference in ecological values exists between the existing extraction areas and control areas sampled at Pakiri. This demonstrates that the local ecological values are largely unaffected by the inshore extraction related activities. The seabed within the extraction areas is a rapidly changing environment, given currents and wave energy, with populations of mobile marine fauna. While some benthic organisms and seabed dwelling fin fish species may experience increased mortality due to capture within the draghead, overall biodiversity remains largely unaffected with rapid re-colonisation of disturbed areas.
Policy B7.2.2	(5) Avoid adverse effects on areas listed in the Schedule 3 of Significant Ecological Areas – Terrestrial Schedule and Schedule 4 Significant Ecological Areas – Marine Schedule.		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
			Larger marine species, such as sharks and mammals, are also largely unaffected given their own transitory behaviour, the low noise levels emitted by MBL's vessels and the retention of adequate food sources within the extraction areas. Local bird populations are also unaffected by the extraction activity. With a move to more night-time operations, effects on daytime feeding bird species will be avoided. It is also noted that the lack of coastal erosion effects avoids effects on onshore habitat and breeding areas, while the limited effects on benthic and fin fish species also ensures that adequate food sources are retained in the Pakiri for these larger animal species.
Objective B7.4.1	(1) Coastal water, freshwater and geothermal water are used within identified limits while safeguarding the life-supporting capacity and the natural, social and cultural values of the waters. (2) The quality of freshwater and coastal water is maintained where it is excellent or good and progressively improved over time where it is degraded. (6) Mana Whenua values, mātauranga and tikanga associated with coastal water, freshwater and geothermal water are recognised and provided for, including their traditional and cultural uses and values.	Yes	During the extraction activity, excess seawater and unwanted extracted materials (e.g. rock) will be discharged back into coastal waters. These discharges will not include any materials that are not already present at Pakiri (e.g. no fuels or foreign sediments). The water quality assessment (Appendix F) has demonstrated that this material readily disperses and settles on the seabed within a short period of time and distance from MBL's vessels. This discharge does not degrade the water quality values of Pakiri nor cause any significant effects on the area's ecological values.
Policy B7.4.2	(7) Manage the discharges of contaminants into water from subdivision, use and development to avoid where practicable, and otherwise minimise, all of the following: (b) adverse effects on the quality of freshwater and coastal water;		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(c) adverse effects from contaminants, including nutrients generated on or applied to land, and the potential for these to enter freshwater and coastal water from both point and non-point sources; (d) adverse effects on Mana Whenua values associated with coastal water, freshwater and geothermal water, including wāhi tapu, wāhi taonga and mahinga kai;		
Objective B7.6.1	(1) Auckland's mineral resources are effectively and efficiently utilised.	Yes	As noted throughout the AEE (in particular Section 3), Pakiri has a regionally significant mineral resource and is critical for Auckland's continuing development. With 43% of sand for Auckland's concrete coming from Pakiri, continued access to this resource is required to ensure that the quality compact urban model sought by Auckland Council's strategic plans is achieved. Concrete is a ubiquitous building material and will be increasingly important as higher density urban development is constructed. Without this sand resource, concrete production will be more costly, have a greater impact on the region's road network and generate higher levels of CO_2 emissions. MBL has also demonstrated that the extraction can occur without generating significant adverse effects on the environment. The effects of the extraction will be less than minor and are largely transitory, while the environmental performance of MBL's operation will improve further with the introduction of the William Fraser and the proposed alterations to extraction timing.
Policy B7.6.2	(1) Provide for mineral extraction activities within appropriate areas to ensure a secure supply of extractable minerals for Auckland's continuing development. (4) Require mineral extraction activities to be established and operated in ways which avoid, remedy or mitigate significant adverse effects on the environment.		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
B8 – Coastal Environment			
Objective B8.2.1	(1) Areas of the coastal environment with outstanding and high natural character are preserved and protected from inappropriate subdivision, use and development. (2) Subdivision, use and development in the coastal environment are designed, located and managed to preserve the characteristics and qualities that contribute to the natural character of the coastal environment. (3) Where practicable, in the coastal environment areas with degraded natural character are restored or rehabilitated and areas of high and outstanding natural character are enhanced.	Yes	As demonstrated by the Visual Impact Assessment (Appendix L) and discussed in the AEE, the proposal will have less than minor effects on the landscape values at Pakiri. The continuation of the existing sand extraction operation only involves a temporary presence at Pakiri, including within the areas covered by ONL and HNC overlays, as the extraction operation's location continually changes within the inshore extraction area. In addition, MBL propose to move the operation towards more night-time and weekday extractions, thereby further limiting the potential audience for any visual effects. Further to the immediate visual effects associated with the operation of the extraction vessels in the inshore environment, it is noted that the onshore landscape will also be unaffected by the activity. As discussed in the coastal processes report (Appendix G), the proposed extraction levels will not accelerate natural coastal erosion or accretion at Pakiri. This will ensure that the coastal dune system and surf breaks will continue to contribute to the natural character of Pakiri and retain their own form. It is also recognised that no onshore facilities are required at Pakiri for MBL to continue sand extraction.
Policy B8.2.2	(3) Preserve and protect areas of outstanding natural character and high natural character from inappropriate subdivision, use and development by: (a) avoiding adverse effects of activities on natural character in areas of the coastal environment scheduled as outstanding natural character; and (b) avoiding significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on natural character in all other areas of the coastal environment. (4) Avoid significant adverse effects and avoid, remedy or mitigate other adverse effects on natural character of the coastal environment not identified as outstanding natural character and high natural character from inappropriate subdivision, use and development.		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
			Ongoing erosion monitoring is also proposed to ensure that effects on landscape values from erosion are avoided.
Objective B8.3.1	(1) Subdivision, use and development in the coastal environment are located in appropriate places and are of an appropriate form and within appropriate limits, taking into account the range of uses and values of the coastal environment. (2) The adverse effects of subdivision, use and development on the values of the coastal environment are avoided, remedied or mitigated. (3) The natural and physical resources of the coastal environment are used efficiently and activities that depend on the use of the natural and physical resources of the coastal environment are provided for in appropriate locations.	Yes	MBL's operation has a functional and operational requirement to operate in the coastal environment. This is where the sand resource is most easily accessed, is of a high quality and can be transported to market with the least environmental effects. The sand resource at Pakiri is regionally significant and is critical to the ongoing social and economic wellbeing of Auckland. As a resource for the construction industry, the sand sourced from Pakiri will support the sustainable development of urban Auckland. It will help build the additional 313,000 homes required under the Auckland Plan, will form part of the regions' numerous new employment centres and the $30 billion infrastructure spend needed over the coming decades. It is also noted that the extraction activity does not require any onshore infrastructure at Pakiri, avoiding the need to modify natural character or appearance of the coastal edge. In addition, any adverse effects arising from the activity are less than minor and transitory. It has been demonstrated that little differences exist in the water quality and ecological values between the extraction areas and non-extraction areas, while the activity does not
Policy B8.3.2	(1) Recognise the contribution that the use and development of the coastal environment make to the social, economic and cultural well-being of people and communities (3) Provide for use and development in the coastal marine area that: (a) have a functional need which requires the use of the natural and physical resources of the coastal marine area; (c) have an operational need making a location in the coastal marine area appropriate and that cannot practicably be located outside the coastal marine area (4) Require subdivision, use and development in the coastal environment to avoid, remedy or mitigate the adverse effects of activities above and below the mean high-water springs, including the effects on existing uses and on the coastal receiving environment. (5) Adopt a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown or little understood, but could be significantly adverse.		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
			contribute to any changes in coastal morphology. Lastly, the effects of the activity can be managed and mitigated by the measures proposed by MBL and the imposition of the proposed conditions.
Objective B8.4.1	(1) Public access to and along the coastal marine area is maintained and enhanced, except where it is appropriate to restrict that access, in a manner that is sensitive to the use and values of an area.	Yes	The extraction activity will not affect public access to the CMA. MBL's vessels do not exclude the public from using the Pakiri inshore area for fishing, surfing or boating. Furthermore, the extraction activity does not contribute to any changes in coastal morphology, thereby avoiding any changes to onshore access points to the coastal edge.
Policy B8.4.2	(1) Subdivision, use and development in the coastal environment must, where practicable, do all of the following: (a) maintain and where possible enhance public access to and along the coastal marine area		
Objective B8.5.1	(1) The management of the Hauraki Gulf gives effect to sections 7 and 8 of the Hauraki Gulf Marine Park Act 2000. (3) Economic well-being is enabled from the use of the Hauraki Gulf's natural and physical resources without resulting in further degradation of environmental quality or adversely affecting the life-supporting capacity of marine ecosystems.	Yes	The proposed activity is consistent with sections 7 and 8 of the Act. It does not affect the life supporting capacity of the CMA, nor does it adversely affect the social, economic, recreational, and cultural well-being of people, communities or Mana Whenua. The activity avoids any cumulative effects on ecological or amenity values, given the similarity of the extraction areas' ecological values to those elsewhere in the area, the lack of any noticeable effects on these values from the existing activity and the measures which will be employed (e.g. introducing the William Fraser and more night-time extraction) by MBL to limit what limited effects that do occur.
Policies B8.5.2	(2) Require the integrated management of use and development in the catchments, islands, and waters of the Hauraki Gulf to ensure that the ecological values and life-supporting capacity of the Hauraki Gulf are protected, and where appropriate enhanced. (3) Require applications for use and development to be assessed in terms of the cumulative effect on the ecological and amenity values of the Hauraki Gulf, rather than on an area-specific or case-by-case basis. (13) Require management and decision-making to take into account the historical, cultural and spiritual relationship of Mana Whenua with the		

CHAPTER B – REGIONAL POLICY STATEMENT			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	Hauraki Gulf, and the ongoing capacity to sustain these relationships. (17) Provide for commercial activities in the Hauraki Gulf and its catchments while ensuring that the impacts of use, and any future expansion of use and development, do not result in further degradation or net loss of sensitive marine ecosystems.		MBL have also engaged with Mana Whenua and will continue to do so in recognition of the various iwi interests in the area. Lastly, the extraction activity is a vital commercial operation for the social and economic wellbeing of Auckland. It has a functional need to occur in the CMA and it will not result in the degradation or net loss of any sensitive marine ecosystems.
B10 – Environmental Risk			
B10.2.1	(2) The risks to people, property, infrastructure and the environment from natural hazards are not increased in existing developed areas. (3) New subdivision, use and development avoid the creation of new risks to people, property and infrastructure. (4) The effects of climate change on natural hazards, including effects on sea level rise and on the frequency and severity of storm events, is recognised and provided for.	Yes	As noted by the coastal processes assessment, the activity will not increase the risk of natural hazards (i.e. erosion or storm surge) affecting either the landscape features that contribute to the area's natural character or the risks to dwellings and infrastructure. Any potential issues with increased beach erosion (due to the increased frequency and severity of storm events) will be captured through regular erosion monitoring and the ability to modify the parameters of the activity via s128 of the RMA.

CHAPTER E – AUCKLAND WIDE			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
E1 - Water Quality and Integrated Management			
Policy E1.3	(26) Prevent or minimise the adverse effects from construction, maintenance, investigation and other activities on the quality of freshwater and coastal water by:	Yes	As discussed in the water quality assessment, the seabed disturbance and coastal discharge from

CHAPTER E – AUCKLAND WIDE			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(a) adopting best management practices and establishing minimum standards for the discharges; or (b) where Policy E1.3(26)(a) is not practicable, have regard to the following: (i) the nature, volume and concentration of the contaminants in the discharge; (ii) the sensitivity of the receiving environment to the contaminants in the discharge; (iii) other practicable options for the discharge, including reuse or discharge to the trade sewer; and (iv) practicable measures to reduce contaminant concentrations prior to discharge or otherwise mitigate adverse effects.		MBL's vessels generates less than minor adverse effects on coastal water quality. Only minimal contaminants are present in the disturbed sediments, while no new contaminants are introduced by the activity. As such, less than minor effects on ecology will occur. In addition, the proposed discharge represents the best practicable option for the disposal of excess sediment, seawater and organisms given that they are returned to their area of origin and are efficiently removed from the targeted sand resource.
E18 - Natural Character of the Coastal Environment			
Objective E18.2	(1) The natural characteristics and qualities that contribute to the natural character of the coastal environment are maintained while providing for subdivision, use and development.	Yes	As discussed in the AEE and the landscape assessment (Appendix L), the natural characteristics and qualities that contribute to the coastal environment will be maintained. The extraction activity does not contribute to coastal erosion processes, leaving the surf breaks and dune systems unaffected. The biological qualities of the Pakiri area are also largely unaffected, with adequate food sources remaining for fin fish, mammals and birds (all of which contribute to the sense of naturalness at Pakiri). The lack of any onshore structures also assists in retaining the natural character of the area, while the proposed move towards more night-time and weekday extraction events
Policies E18.3	(3) Manage the effects of subdivision, use and development in the coastal environment to avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects, on the characteristics and qualities that contribute to natural character values, taking into account: (a) the location, scale and design of the proposed subdivision, use or development; (b) the extent of anthropogenic changes to landform, vegetation, coastal processes and water movement; (c) the presence or absence of structures, buildings or infrastructure; (d) the temporary or permanent nature of any adverse effects; (e) the physical and visual integrity of the area, and the natural processes of the location; (f) the intactness of any areas of significant vegetation, and vegetative patterns;		

CHAPTER E – AUCKLAND WIDE			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(g) the physical, visual and experiential values that contribute significantly to the wilderness and scenic values of the area; (h) the integrity of landforms, geological features and associated natural processes, including sensitive landforms such as ridgelines, headlands, peninsulas, cliffs, dunes, wetlands, reefs, freshwater springs, streams, rivers and surf breaks; (i) the natural characteristics and qualities that exist or operate across mean high-water spring and land in the coastal environment, including processes of sediment transport, patterns of erosion and deposition, substrate composition and movement of biota, including between marine and freshwater environments.		(as well as the efficiency benefits of introducing the William Fraser) further limit the landscape effects of MBL's activity.
E19 - Natural Features and Natural landscapes in the Coastal Environment			
Objective E19.2	(1) The characteristics and qualities of natural landscapes and natural features which have particular values, provide a sense of place or identity, or have high amenity value, are maintained while providing for subdivision, use and development in the coastal environment.	Yes	As noted in the assessment of Objective E18.2 and Policies E18.3, the characteristics and qualities of the natural landscape will be maintained. No onshore changes to landforms are proposed, either from the extraction activity itself or the construction of any related infrastructure. This lack of effects assists in maintaining the ecological linkages between the sea and the shore, including protecting the breeding and feeding areas of seabirds and shorebirds. The ongoing extraction will also be monitored to ensure that any changes to coastal features are identified and modifications to the extraction activity undertaken to prevent effects on landscape values. In addition, the use of a modified extraction schedule and the improved efficiency of the William Fraser will further assist in the
Policies E19.3	(1) Manage subdivision, use and development in the coastal environment adjoining scheduled outstanding natural landscapes or outstanding natural features to: (a) protect visual and biophysical linkages between the site and outstanding natural landscapes or outstanding natural features; and (b) avoid adverse cumulative effects on the values of outstanding natural landscapes or outstanding natural features. (2) Manage the effects of subdivision, use and development in the coastal environment to avoid significant adverse effects, and avoid, remedy or mitigate other adverse effects on the characteristics and qualities of natural landscapes and natural features which have particular values, provide a sense of place or identity, or have high amenity values, taking into account: (a) the location, scale and design of the proposed subdivision, use or development; (b) the extent of anthropogenic changes to the natural characteristics and qualities;		

CHAPTER E – AUCKLAND WIDE			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(c) the presence or absence of structures, buildings or infrastructure; (d) the temporary or permanent nature of any adverse effects; (e) the physical and visual integrity and the natural processes of the location; (f) the intactness of any areas of significant vegetation, and vegetative patterns; (g) the physical, visual and aesthetic values that contribute significantly to the natural landscape's values; (h) the integrity of landforms, geological features and associated natural processes, including sensitive landforms such as ridgelines, headlands, peninsulas, cliffs, dunes, wetlands, reefs, freshwater springs, streams, rivers and surf breaks;		protection of the natural character of Pakiri.
E25 – Noise and Vibration			
Objectives E25.2	(1) People are protected from unreasonable levels of noise and vibration.	Yes	As detailed by the Surface Noise Assessment (Appendix H), the noise generated by MBL's vessels is compliant with AUP(OP) standards. The noise levels will be further improved with the introduction of the William Fraser and do not affect the ability of residents and visitors to enjoy Pakiri or the CMA.
Policies E25.3	(2) Minimise, where practicable, noise and vibration at its source or on the site from which it is generated to mitigate adverse effects on adjacent sites.		

CHAPTER F – Coastal			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
F2 – General Coastal Marine Zone			
Objective F2.6.2	(1) The extraction of minerals, sand, shingle, shell, petroleum, and other natural material occurs in a manner that does not have significant adverse effects on the coastal marine area or near-shore environments.	Yes	As detailed throughout the AEE, the proposed extraction activity will not have significant adverse effects on the CMA or near-shore environment.
Policy F2.6.3	(1) Provide for the extraction of minerals, sand, shingle, shell, and other natural material from		

CHAPTER F – Coastal			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	appropriate areas, having regard to the values of the area and the natural rate of sediment being deposited over sediment lost from the area where extraction is proposed. (2) Adopt a precautionary approach to applications for petroleum exploration and for mineral extraction within the coastal marine area, which may include using an adaptive management approach in terms of the following: (a) staging the operation; (b) the location of the activity; (c) the maximum volume of minerals, sand, shingle, shell and other natural material to be extracted; (d) the term of consent; or (e) environmental monitoring.		This sand resource is vital for the social and economic wellbeing of Auckland and can be extracted at a rate which does not exceed the natural rate of sediment supply to the coastal system. As such, the extraction of 76,000 m^3/year of sand (from the nearshore area between 5 m and 10 m water depths) can be accommodated for a period of 35 years and managed by the proposed consent conditions.
Objectives F2.11.2	(1) Water and sediment quality in the coastal marine area is maintained where it is excellent or good and progressively improved over time in degraded areas. (2) The life-supporting capacity and resources of the Hauraki Gulf are protected and, where appropriate, enhanced.	Yes	As detailed in the water quality assessment (Appendix F) and the AEE, the proposed discharge from the extraction activity will not detract from the life-supporting capacity of the Hauraki Gulf, while water and sediment quality will also be largely unaffected. Any effects from the disturbance of the seabed and the discharge of material from MBL's vessels are temporary, with the rapid dispersal and deposition of material assisting in minimising the effects of the activity. The proposed discharge is also the best practicable option available for disposal of unwanted sediment, biota and seawater. The immediate discharge of these substances and material allows it to be returned to its source, preventing any cross-contamination and assisting
Policies F2.11.3	(1) Avoid the discharge of contaminants where it will result in significant modification of, or damage to any areas identified as having significant values. (2) Require any proposal to discharge contaminants or water into the coastal marine area to adopt the best practicable option to prevent or minimise adverse effects on the environment, having regard to all of the following: (a) whether it is practicable or appropriate to discharge to land above mean high water springs; (b) whether there is a wastewater network in place that should be used; (c) whether the receiving environment has the capacity to assimilate the discharged contaminants after reasonable mixing, particularly within areas identified as degraded or as having significant ecological value;		

CHAPTER F – Coastal			
Reference	**Objective/Policy**	**Is the Proposal Consistent?**	**Comment**
	(d) the extent to which present or foreseeable future adverse effects have been avoided, remedied or mitigated on: (i) areas of high recreational use; (ii) relevant initiatives by Mana Whenua established under regulations relating to the conservation or management of fisheries; (iii) the collection of fish and shellfish for consumption (e) high ecological values; (f) cleaner production methods are used where practicable to minimise the volume and level of contaminants being discharged; and (g) the discharge after reasonable mixing, does not either by itself or in combination with other discharges results in any or all of the following effects: (i) oil or grease films, scums or foams, or floatable or suspended materials; (ii) conspicuous change in the colour or visual clarity; (iii) any emission of objectionable odour; (iv) any significant adverse effects on aquatic life; or (v) any significant effects of aesthetic or amenity values. (3) Provide for discharges that are unavoidable but intermittent, where: (a) the discharge occurs infrequently; (b) there are technical and practical difficulties which prevent measures being taken to avoid, remedy or mitigate adverse effects of the discharge;		with the re-colonisation of disturbed seabed. Effects are also avoided on recreational activities, with no risks presented to human health (such as recreational fisheries, contact activities or traditional food gathering) Lastly, the discharge is consistent with the requirements of section 105 and 107 of the RMA, including avoiding any odours, greasy films or significant amenity effects.
Objective F2.18.2	(1) Underwater noise from identified activities is managed to maintain the health and well-being of marine fauna and users of the coastal environment.	Yes	As detailed in the underwater noise and marine mammal reports (Appendix I and Appendix K), the extraction activity produces minimal underwater noise. This noise does will have less than minor effects marine mammals or fish species and is only transitory in nature.

Appendix C. Effects Assessment Methodology

Overview

The AEE predicts and assesses the Project's likely positive and negative effects, in quantitative terms to the extent possible. For each of the environmental aspects listed above, the assessment determines the sensitivity of the receiving environment, identifies impacts, and assesses the magnitude and overall significance of environmental impacts. An AEE will always contain a degree of subjectivity, as it is based on the value judgment of various specialists and AEE practitioners. The evaluation of significance is thus contingent upon values, professional judgement, and dependent upon the environmental context. Ultimately, impact significance involves a process of determining the acceptability of a predicted impact.

Defining Effect

There are a number of ways that effects may be described and quantified. The RMA defines the meaning of effect as:

In this Act, unless the context otherwise requires, the term effect includes—

(a) any positive or adverse effect; and

(b) any temporary or permanent effect; and

(c) any past, present, or future effect; and

(d) any cumulative effect which arises over time or in combination with other effects— regardless of the scale, intensity, duration, or frequency of the effect, and also includes

(e) any potential effect of high probability; and

(f) any potential effect of low probability which has a high potential impact.

The assessment of the significance of effects and determination of residual effects takes account of any inherent mitigation measures incorporated into the Project by the nature of its design.

In broad terms, effect significance can be characterised as the product of the degree of change predicted (the magnitude of effect) and the value of the receptor/resource that is subjected to that change (sensitivity of receptor). For each impact the likely magnitude of the effect and the sensitivity of the receptor are defined. Generic criteria for the definition of magnitude and sensitivity are summarised below.

Direct vs Indirect Effects

A direct effect, or first order effect, is any change to the environment, whether adverse or beneficial, wholly or partially, resulting directly from an environmental aspect related to the project. An indirect effect may affect an environmental, social or economic component through a second order effect resulting from a direct effect. For example, removal of sand may lead to a risk of increased beach erosion (direct effect) which causes an indirect effect on terrestrial ecosystems through changes to the dune habitats (indirect effect).

Magnitude Criteria

The assessment of effect magnitude is undertaken by categorising identified effects of the Project as beneficial or adverse. Then effects are categorised as ‘major’, ‘moderate’, ‘minor’ or ‘negligible’ based on consideration of parameters such as:

- Duration of the effect – ranging from ‘well into operation’ to ‘temporary with no detectable impact’.
- Spatial extent of the effect – for instance, within the site boundary, within district, regionally, nationally, and internationally.

- Reversibility – ranging from 'permanent thus requiring significant intervention to return to baseline' to 'no change'.
- Likelihood – ranging from 'occurring regularly under typical conditions' to 'unlikely to occur'.
- Compliance with legal standards and established professional criteria – ranging from 'substantially exceeds national standards or international guidance' to 'meets the standards' (i.e. effects are not predicted to exceed the relevant standards) presents generic criteria for determining effect magnitude (for adverse impacts). Each detailed assessment in this AEE will define effect magnitude in relation to its environmental or social aspect.
- Any other effect characteristics of relevance.

Table C1 below presents generic criteria for determining effect magnitude (for adverse effects). Each detailed assessment will define effect magnitude in relation to its environmental or social aspect.

Table C1: General criteria for determining effect magnitude

Category	Description
Major	Fundamental change to the specific conditions assessed resulting in long term or permanent change, typically widespread in nature and requiring significant intervention to return to baseline; would violate national standards or Good International Industry Practice (GIIP) without mitigation.
Moderate	Detectable change to the specific conditions assessed resulting in non-fundamental temporary or permanent change.
Minor	Detectable but small change to the specific conditions assessed.
Negligible	No perceptible change to the specific conditions assessed.

Sensitivity Criteria

Sensitivity is specific to each aspect and the environmental resource or population affected, with criteria developed from baseline information. Using the baseline information, the sensitivity of the receptor is determined – factoring in proximity, number exposed, vulnerability and the presence of receptors on site or the surrounding area. Generic criteria for determining sensitivity of receptors are outlined in Table C2 below. Each detailed assessment will define sensitivity in relation to its environmental or social aspect.

Table C2: General criteria for determining effect sensitivity

Category	Description
High	Receptor (human, physical or biological) with little or no capacity to absorb proposed changes
Medium	Receptor with little capacity to absorb proposed changes
Low	Receptor with some capacity to absorb proposed changes
Negligible	Receptor with good capacity to absorb proposed changes

Effect Evaluation

The determination of effect significance involves making a judgment about the importance of project impacts. This is typically done at two levels:

- The significance of project effects factoring in the mitigation inherently within the design of the project; and
- The significance of project effects following the implementation of additional mitigation measures.

The effects are evaluated taking into account the interaction between the magnitude and sensitivity criteria as presented in the effect evaluation matrix in Table C3 below.

Table C3: Effect matrix

		Magnitude			
		Major	**Moderate**	**Minor**	**Negligible**
Sensitivity	**High**	Major	Major	Moderate	Negligible
	Medium	Major	Moderate	Minor	Negligible
	Low	Moderate	Minor	Negligible	Negligible
	Negligible	Minor	Negligible	Negligible	Negligible

The objective of the AEE is to identify the likely significance of effects on the environment and values of the project area. In this effects assessment, effects determined to be 'moderate' or 'major' are deemed significant. Consequently, effects determined to be 'minor' or 'negligible' are not significant. Where impacts are determined to be significant then mitigation measures are required to reduce these effects.

Mitigation

Mitigation measures are actions taken to avoid or minimise adverse environmental or social effects. Mitigation includes those embedded within the design (already considered as part of the impact evaluation) and any additional mitigation required thereafter. Additional mitigation will be implemented to reduce significant effects to an acceptable level, which is referred to as the residual effect. The mitigation hierarchy should be followed: avoid, minimise, restore or remedy, offset, compensate. Mitigation measures should be clearly identified and linked to specific proposed resource consent conditions and/or environmental management plans.

Monitoring

Monitoring is not linked to the effect evaluation but is an important component of the AEE. Monitoring and follow-up actions should be completed to:

- Continue the collection of environmental data throughout the lifespan of the resource consent.
- Evaluate the success of mitigation measures, or compliance with specific standards or requirements.
- Assess whether there are effects occurring that were not previously predicted.

Residual Effects

Those effects that remain once mitigation has been put in place will be described as residual effects, and re-assessed using Table 4 set out above.

Cumulative Effects

The cumulative effect of the Project is the incremental effect of the Project when added to effects from other relevant past, present and reasonably foreseeable developments. Cumulative effects can result from individually minor but collectively significant activities taking place over a period of time. The AEE will consider cumulative effects that are recognised as important on the basis of scientific concerns and/ or reflect the concerns of stakeholders that are identified through consultation.

Appendix D. Economic Assessment

Appendix E. Concrete Industry Report

Appendix F. Water Quality Assessment

Appendix G. Coastal Processes Assessment

Appendix H. Terrestrial Noise Assessment

Appendix I. Underwater Noise Assessment

Appendix J. Ecological Effects Assessment

Appendix K. Marine Mammal Assessment

Appendix L. Landscape and Visual Effects Assessment

Appendix M. Consultation Summary