TĀNGARO TUIA TE ORA ENDANGERED SPECIES FOUNDATION

Sand Supply Options to Meet and Exceed Demand

18 August 2025

This report highlights sustainable alternatives to seabed sand mining, including manufactured sand and on-land sand mining, which can more than meet the sand demand of Northland, Auckland, Waikato and beyond.

Executive Summary

The proposals to expand seabed sand mining in Te Akau, Bream Bay, Mangawhai-Pakiri by McCallum Bros Ltd (MBL) poses significant environmental, economic, and cultural risks.

- Proposed sand extraction volumes for Bream Bay on the North Auckland east coast are for up to 8,450,000m3 in total over 35 years, based on up to 150,000m3/year for the first three years and up to 250,000m3 /year for the remaining 32 years.
- In Mangawhai / Pakiri consent permits the extraction of up to 76,000 m3 per annum until all appeals with respect to a new consent are determined or until August 2026, whichever is earlier. MBL have also sought new resource consents to extract up to 9 million cubic meters of sand over a 35-year period from the Mangawhai-Pākiri embayment1.

However, new, comprehensive research reveals that numerous sand alternatives, including manufactured and on-land sand mining operations, offer plentiful and viable solutions to meet supply needs, while protecting and enhancing the economic potential of fisheries and eco-tourism.

Recent analysis including a new report from BECA[2], confirms that **alternative sand sources could provide in excess of 1,000,000 m^3/year**, compared to Auckland's current ready-mix concrete sand demand of **310,000 m^3/year to 610,000 m^3/year**. This represents a supply capacity that is **60-220% above current demand**, demonstrating that marine sand extraction is not necessary.

MBL has implied their application urgently addresses a sand supply crisis, whereas investigation has discovered that no crisis exists. Competitors (including one who was previously mining marine sand) have invested considerable resources in developing alternatives that are environmentally and economically more sustainable.

Key Findings:

Supply Capacity vs Demand:

- Auckland's current sand demand: 310,000-610,000 m^3/year
- Total alternative supply capacity: >1,000,000 m^3/year

Alternative Sources Available:

1. **Kaipara Harbour (Taporapora Banks)**: Currently operating at 50% capacity with 290,000 m^3/year underutilised
2. **Brookby Quarry**: Manufactured sand facility producing 230,000 m^3/year with expansion capability to 460,000 m^3/year
3. **Multiple Waikato and Bay of Plenty quarries**: Combined capacity exceeding demand
4. **Te Ārai South Holdings**: Fast-track project proposing 300,000 m^3/year
5. **Kayasand**: Manufactured sand from quarry waste – potential to expand capacity in three Northland quarries

Sand Volume Assessment:

The evidence clearly demonstrates that on-land and sustainable alternatives can more than meet demand and that seabed mining is not needed:

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[1] https://www.rnz.co.nz/news/national/466962/auckland-council-rejects-35-year-pakiri-sand-mining-bid

[2] Review of Alternative Sand Sources - BECA Report 14.7.25

Category	Volume (m^3/year)
Current (Known) Annual Extraction	~1,718,000
Possible (Known) Extraction	~14,569,000
Total (Known Current + Possible)	**~16,287,000***

*These figures are based on the best available information regarding current and potential sand extraction volumes. Not all industry data was accessible at the time of reporting, and figures may not reflect recent changes in market activity or consented volumes. The author takes no responsibility for fluctuations in supply or demand. Given the limitations in available data, actual extraction capacity is likely be higher than estimated here.

Conclusions:

- **Sand Supply Security:** Total alternative capacity (>16 million m^3/year) far exceeds Auckland's maximum projected demand, ensuring long-term supply security without damage to key economic drivers of fisheries and tourism.
- **Risk Mitigation:** Avoiding seabed mining protects marine ecosystems and supports the transition to sustainable, scalable sand production methods.
- **Economic Opportunities:** Sustainable alternatives offer job creation, regional development, innovation opportunities, and export potential.

Recommendations:

1. **Reject all seabed sand mining proposals** and prioritise sustainable sand supply development
2. **Support existing on-land sand mining** projects that meet environmental standards and support local economic development
3. **Invest in sustainable sand alternatives** including manufactured sand and recycled materials

By embracing on-land and sustainable sand alternatives, New Zealand can easily and adequately meet all construction needs while developing innovative, environmentally responsible sand production methods to boost economic growth.

Contents

1. Issues and Risks of Seabed Mining

Environmental Destruction Caused by Coastal Sand Mining

Coastal sand mining has led to significant environmental damage worldwide, particularly in countries where demand for sand has driven unsustainable extraction. Sand mining across the world is being linked to coastal erosion, habitat destruction, the spread of invasive species and impacts on fisheries. The most severe impacts include:

- **Coastal Erosion and Land Loss**: Removing sand from beaches accelerates erosion, leaving communities more vulnerable to storms and rising sea levels
- **Destruction of Marine and Bird Habitats**: Critical breeding grounds destroyed, contributing to biodiversity loss
- **Salinisation of Freshwater**: Disrupts natural groundwater flows, leading to saltwater intrusion
- **Increased Climate Vulnerability**: Stripping natural coastal defences makes communities more susceptible to climate change impacts

The Silent Sand Crisis

Sand is one of the most extracted natural resources on Earth, and it's also at the centre of a hidden environmental crisis due to the massive damage sand extraction causes to marine ecosystems. International scientists have called for more recognition of the environmental harm caused by sand mining, noting that sand and gravel extraction is the second most widespread human activity in coastal areas after fishing.

Photo: Bjorn Hilke, Pakiri sand loss 2021

Proposals to Sand Mine Mangawhai-Pakiri and Te Akau Bream Bay

Mangawhai-Pakiri

McCallum Bros Ltd (MBL), an Auckland-based mining company continues sand extraction in Mangawhai Pakiri under a temporary offshore consent, which permits offshore dredging while ceasing inshore operations[3].

This temporary consent permits the extraction of up to 76,000 m3 per annum until all appeals with respect to a new consent are determined or until August 2026, whichever is earlier.

MBL have also sought new resource consents to extract up to 9 million cubic meters of sand over a 35-year period from the Mangawhai-Pākiri embayment[4].

Sand loss Mangawhai Heads Beach

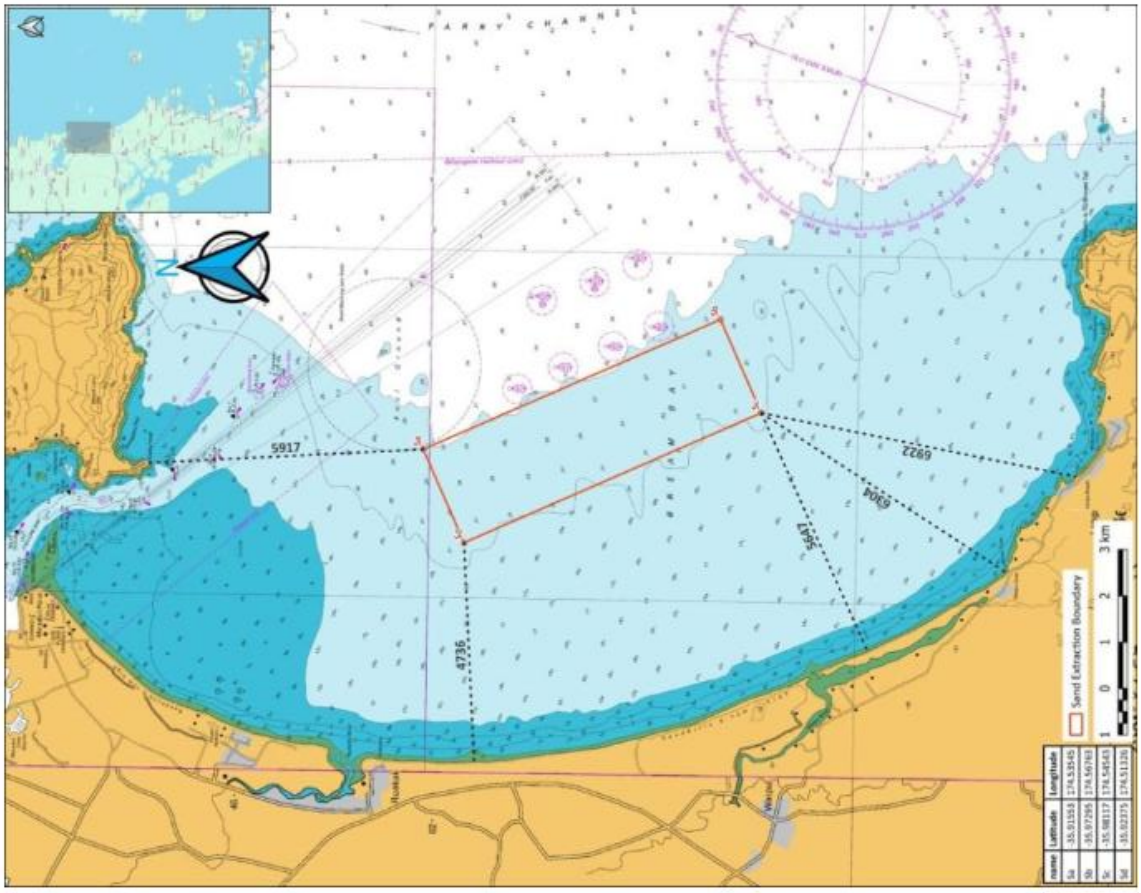
McCallum Bros Ltd's sandmining barge, the William Fraser.

[3] https://www.localmatters.co.nz/environment/court-slams-sand-miner-with-hefty-costs

[4] https://www.rnz.co.nz/news/national/466962/auckland-council-rejects-35-year-pakiri-sand-mining-bid

Te Akau, Bream Bay

As part of the Fast Track Applications, MBL has also proposed extracting 8.45 million cubic metres of sand from the seabed in Te Akau Bream Bay over the next 35 years.



This operation, which involves dredging up to five nights a week for six hours at a time, poses significant risks to local economies:

- **Environmental Degradation:** Sand mining destroys sea floors, erodes coastal protections, and creates massive plumes that smother marine life, leading to dead zones. This irreversible damage would devastate fish populations, surf breaks, and the overall marine ecosystem.
- **Impact on Local Fisheries:** The destruction of marine habitats would negatively impact the ability of locals to fish and feed their whānau, undermining a culturally significant activity.
- **Threat to Tourism:** The degradation of beaches and marine life would diminish the appeal of Te Akau, Bream Bay as a tourist destination, leading to fewer visitors and economic losses for local businesses. The fast-track consent process excludes any consultation with local businesses who depend on tourism directly and indirectly.
- **No Local Benefits:** While MBL stands to generate $270 million in revenue (approximately $7.7 million annually), Te Akau, Bream Bay will see no economic benefits - only lasting harm.

2. Sand Alternatives to Meet Supply Needs

Current Supply Status

Estimated annual ready-mix concrete demand in Auckland shows a 12.5% reduction from Financial Year 2022 to Financial Year 2025, from 1.57 million m^3 to 1.37 million m^3. Current sand demand is approximately 550,000 t/year (310,000 m^3/year) to 1.1 million t/year (610,000 m^3/year).

A wide range of on-land sand mining operations already exist across Aotearoa, providing a substantial and sustainable supply of sand for construction, infrastructure, and industrial use. These operations utilise land-based extraction methods, reducing reliance on marine sand mining and its associated environmental risks.

Kaipara Harbour supplied 308,000 m^3 to Auckland's concrete industry in 2024 (over 60% of supply) and multiple alternative sources are already operational and expanding.

Table 1: Comparison of existing sand supply options across different locations[5]

Company	Location	Consented Extraction	Type of Sand	Other Detail
Taporapora Banks, Atlas Concrete/Mt. Rex Shipping)	Kaipara Harbour (Taporapora Banks)	600,000m^3 per year	Marine sand (quartz 50%, feldspar 20%)	Sand dredged and barged to distribution yard, supplying Atlas Concrete. Consent expires in 2027. Estimated annual replenishment volume of 2,600,000 m^3 . Of this, it was estimated that a sustainable volume of sand extraction could range from 780,000-1,300,000m3 per year[6].
Brookby Quarry	Whitford, Auckland	230,000 m^3/yr current, 460,000 m^3/yr expansion capability	Manufactured sand from greywacke	Commercially integrated into Allied Concrete mainstream supply since October 2024. Proven 100% replacement for marine sand across all applications.
Semenoff Group	Tomarata, Auckland/Northland	~100,000m^3/yr)	Land-based feldspar and quartz sand	Used in Auckland concrete industry. consented extraction volume is 2,000,000m3

[5] *Review of Alternative Sand Sources, Prepared by BECA Ltd, July 2025; Review of Alternative Sand Sources, Prepared by BECA Ltd, 1 July 2022.*

[6] *Statement of evidence of Eleanor Frances Grant on behalf of Friends of Pakiri Beach Inc, 20 April 2023*

				over up to 20 years (i.e. average 100,000m3 per annum), consent granted in 2010.
Sandglass Ltd	Te Arai, Auckland	84,000m^3 per year	Land-based feldspar and quartz sand	Permitted until ~2043. Estimated total resource of 30,000,000m^3.
Coombes Sand	Ngahinapouri, Waikato	80,000m^3 per year (+potential 826,000m^3)	Pit sand	Could supply concrete with investment in processing. Total = 1,600,000m^3 over 20 years.
Revital Group	Cambridge, Waikato	~31,000m^3/yr 40,000 tonnes/yr	River sand (quartz 65%, aluminum oxide 15%)	Supplies concrete and sports fields. Fine, angular sand.
Envirosand Mercer Ltd	Mercer, Waikato	Substantial land consented but underutilised	Sand (potential for concrete)	Could supply ~1/3 of Waikato's concrete sand demand.
Monavale Sand	Monavale, Waikato	Not publicly known	Concrete sand	Major Waikato concrete sand supplier. Underutilised capacity.
Tirau Sands (Bowers Brothers Concrete)	Tirau, Waikato	Not publicly known	Washed concrete sand, pit sand	Supplies Bowers Brothers' concrete plants.
Fulton Hogan (Stevenson)	Bell Road, Bay of Plenty	Operating at capacity	Concrete sand	Meets NZ Standard 3121 for water and aggregates.
Paengaroa Sands Ltd	Paengaroa, Bay of Plenty	Not publicly known	Concrete sand	Supplies Firth Certified Mount Maunganui plant.
Ausperl	Atiamuri, Waikato	Not publicly known	Washed sand (quartz 67%, aluminium oxide 16%)	Land-based. Fine sand with a D50 of 0.5mm.
Fletcher Building (Winstone Aggregates)	Tamahere, Waikato	Extraction rights until ~2034	Concrete sand	Acquired from Waikato Aggregates Ltd in 2019.
Semenoff Sands Group	Ruakākā, Northland	Total consented volumes 140,000 m^3 and 180,000m^3.	Land-based feldspathic sand (70% feldspar, 23% quartz)	Supplies concrete industry and sports fields. In operation since 2009.

Fulton Hogan (Stevenson)	Tūākau, Waikato	Produces approx. 750 m3 – 937 m^3 per day (1,200-1,500 tonnes of raw material daily.	Sand and pumice - material used to supply concrete manufacturers.	20-30 year consent (expires ~2036). Potential to process 300,000 to 375,000 tonnes of raw material per annum.
Allied Concrete Limited	Several concrete plants across NZ, including Auckland	Allied Concrete produces the READY eco-glass concrete at several of their concrete plants across New Zealand, including Auckland.	Glass used to replace sand aggregate required in concrete production, so quality and consistency of product is not compromised.	The Allied READY ecoglass concrete is deemed most suitable for use in residential applications such as house slabs and driveways.

KNOWN CURRENT ANNUAL EXTRACTION: Total = ~1,718,000 m^3/year

If Brookby's **full expansion** is included a**dd +230,000 m^3/year:** Revised Total = ~1,948,000 m^3/year.

Additional Sand Supply Options

In addition to existing on-land sand mining operations, many alternative supply options exist across Aotearoa. These sources include land-based quarries, river and pit sands, dredged marine sands, and industrial by-products.

Table 2: Possible sand supply options across different locations[7]

Company	Location	Possible Extraction / Production	Type of Sand	Other Detail
Ngāti Manuhiri	Te Ārai Precinct	6,000,000 m^3 cubic metres	Land-based feldspar and quartz sand	Currently a Fast-Track Project
Kayasand	Waikato (Northland potential)	Auckland annual concrete sand demand of 1.2-1.4 million tonnes could be fully met by just four Kayasand V7-120 plants	Manufactured sand from quarry waste.	Currently operates 2 plants (Waikato and Sydney) and expects to have at least 15 more by 2030[8]. Potential to expand operations to three Northland quarries.
Tauranga Entrance Channel	Bay of Plenty	15,000,000m^3 total (10,000,000m^3 removable from CMA)	Fine to medium marine sand (0.35mm avg. size)	50-55% volcanic glass, 25% sodic plagioclase, 20% quartz; volcanic glass requires management for concrete use
Waikato North Head Iron Sands Tailings	Waikato (West Coast)	Up to 5,300,000 m^3 (4-7 million tonnes) mined annually	By-product of iron sand extraction	Contains residual ferrous/metal particles; environmental consent restricts use
Marsden Point Navigation Channel	Whangārei	Capital: 3,700,000m^3; Maintenance: 122,000m^3/year (until 2052)	Fine to medium marine sand (D50 ~0.4mm)	Capital dredging: 468,000m^3 fine sand, 2,257,000m^3 medium sand; 2-6% silts/clays; extraction restricted between October-January
RS Sand Limited	Waikato	Up to 3,000,000m^3 (400,000 tonnes) of sand per year for approximately 25 years		Quarry made up of a 23-hectare pit and a 4-hectare plant area for processing and stockpiling

[7] *Review of Alternative Sand Sources, Prepared by BECA Ltd, July 2025; Review of Alternative Sand Sources, Prepared by BECA Ltd, 1 July 2022.*

[8] https://kayasand.com/news/groundbreaking-concrete-pour-a-new-zealand-first.aspx

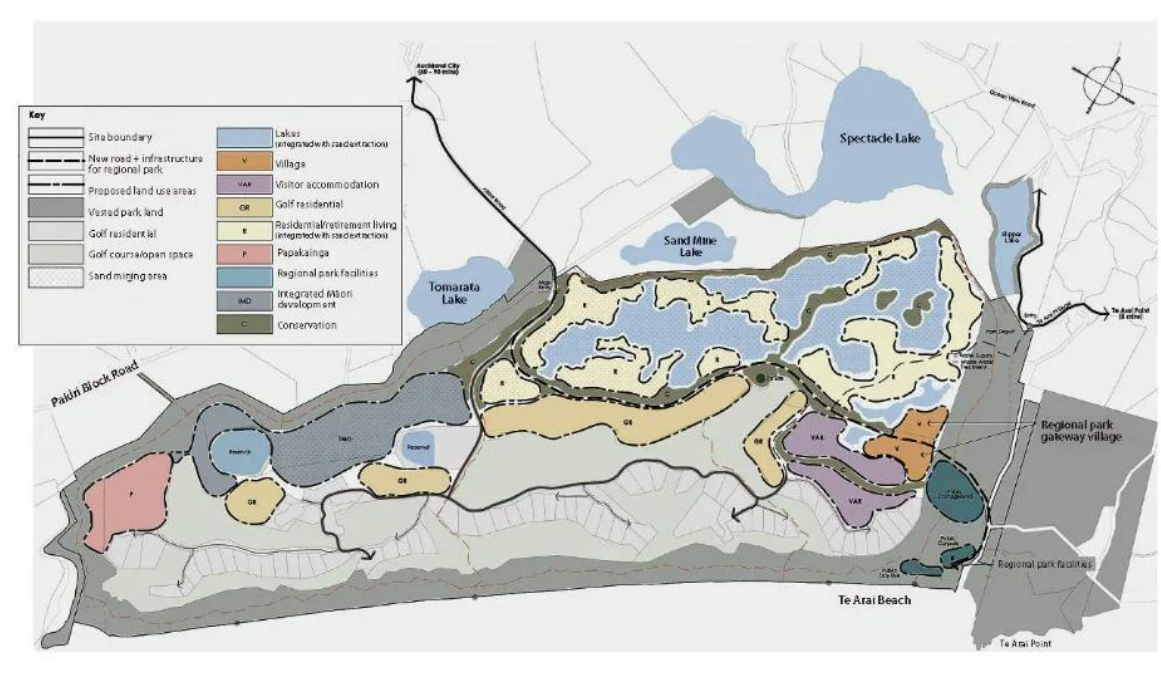
Online Sand Limited	Waikato	1,000,000m^3 of sand per annum for up to 20 years (50,000m^3 per year)		Quarry will consist of a processing plant and an operating excavation area
Pukekawa Quarry (Winstone Aggregates/ Fletcher Concrete)	Waikato	Ongoing; ~72,000m^3/year	River sand	Used for concrete masonry blocks and pavers (not ready-mix concrete)
Kaipara Harbour (Waikeri Bank/Millers Bank and Lady Franklin Bank)	Northland	Consented in 2009; ceased in 2013; 25,000m^3/year	Fine, well-sorted marine sand (50% quartz, 20% feldspar)	More angular than land-based sand; dredged sand was barged to Dargaville and trucked onwards.
Tomarata	Northland	Two sites at Tomarata (total consented volumes 2,000,000m3 and 2,940,000m3 or 84,000m3 /year) have been confirmed.		
Muriwai	Auckland	An additional land-based source has been identified at Muriwai which has potential for use as ready-mix concrete sand.		

TOTAL (KNOWN) POSSIBLE EXTRACTION: 14,569,000m^3

Ngāti Manuhiri On-land Sandmining

The Ngāti Manuhiri Settlement Trust (NMST) and Te Ārai South Holdings' fast-tracked development plan for Te Ārai South includes expanding land-based sand mining operations to extract up to 300,000 cubic metres of sand annually for up to 35 years.

This initiative, part of the government's Fast-track Approvals Bill, aims to address Auckland's growing demand for sand, particularly for construction, roading, and infrastructure projects.



The map of Te Arai South included with NMST and Te Ārai South Holdings' fast-track application.

The project builds on existing mining permits and consents, with total accessible sand reserves estimated at over 6 million cubic metres, valued at more than $180 million once processed. By expanding sand mining operations, NMST aims to fill the gap left by declining sea-based sand dredging consents off Pakiri and Mangawhai, ensuring a steady supply of sand for Auckland's construction needs.

In addition to sand mining, the integrated development plan includes housing, aquaculture, and regional park improvements, contributing over $2 billion to the Auckland and Northland economies. The project also emphasizes environmental and community benefits, such as creating dune lake systems for aquaculture, enhancing public access to Te Ārai Regional Park, and providing affordable housing.

With fast-track approval, NMST aims to streamline the consenting process, ensuring efficient and sustainable sand supply while supporting regional economic growth and ecological enhancement[9].

[9] https://www.localmatters.co.nz/environment/thirty-five-years-of-sand-mining-included-in-te-arai-fast-track-bid/?#gf_17

Manufactured Sand: A Thriving Sector

New Zealand already replaces 55% of natural sand in concrete, and new technology now allows for 100% replacement using high-quality engineered sand from quarries. The construction industry is rapidly adapting, with reliance on dredged sand decreasing significantly.

Dredged sand is not essential for concrete. Advances in quarry technology now produce high-quality engineered sand that is both sustainable and commercially viable. The construction industry is rapidly adapting, and reliance on dredged sand is decreasing. For example, when the Environment Court reduced MBL's permitted extraction at Mangawhai-Pakiri, Brookby Quarry was able to enter the market with manufactured sand.

This shift is part of a broader national and global movement away from natural sand due to environmental concerns.

The Need to Support Manufactured Sand

Approving future seabed mining proposals would not only harm the fishing industry, eco-tourism, and local communities it will also enable anti-competitive practices that stifle innovation. Instead, investment should focus on scaling sustainable sand solutions, creating jobs, supporting local economies, and fostering a circular industry. Alternative supplies are already available and expanding across the country.

In 2019, three key strategies emerged as a foundation for enhancing the governance of sand resources:

1. Minimising unnecessary natural sand consumption in construction.
2. Utilising alternative materials as substitutes for natural sand.
3. Mitigating the environmental impacts of sand extraction through existing standards and best practices.

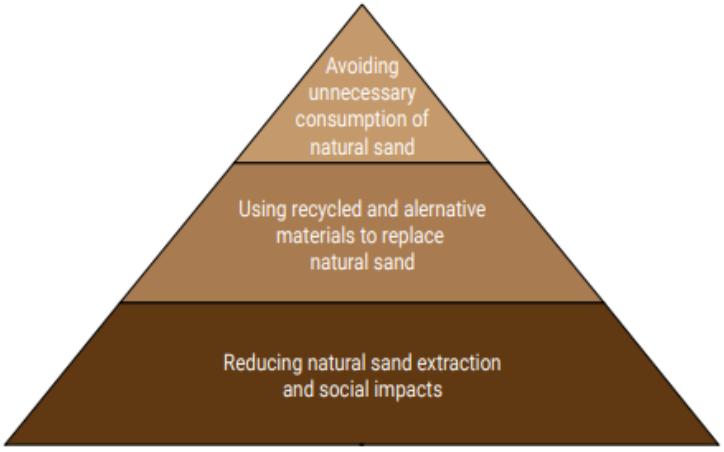


Figure 1. Suggested hierarchy of available solutions[10]

[10] Sand and Sustainability: Finding new solutions for environmental governance of global sand resources, UN Environment Programme, 2019, Pp 29. https://unepgrid.ch/storage/app/media/documents/Sand_and_sustainability_UNEP_2019.pdf

Allied Concrete Partnership Success

Allied Concrete has been working closely with Brookby Quarry in Auckland to pioneer the use of a fully engineered manufactured sand, now a key component in a majority of our Auckland concrete mixes supplied from our Penrose plant[11]. This partnership represents a significant breakthrough in sustainable sand alternatives.

Key Achievements:

- By October 2024, Allied Concrete Penrose had commercially introduced the new sand into production
- A comparative trial was carried out in March 2023 at Brookby Quarry, where two slabs were poured using mix designs, differing only in their sand component. One used our traditional blend of PAP7 (Crushed Fines) and fine marine sand and the other used 100 percent of the newly developed manufactured sand. Performance was indistinguishable during placement and finishing, while the engineered sand achieved higher strength values and provided an opportunity for significant reductions in water and therefore, cement demand
- The engineered sand has been rigorously tested across a wide range of applications, using familiar mix designs and performance benchmarks. From residential slabs to commercial floors and infrastructure

Production Capacity: Brookby Quarry's investment in a purpose-built manufactured sand processing plant and new power infrastructure underpins this shift. Their site now has a production capacity of 230,000 m^3 per annum of this material, with an expansion capability of up to 460,000 m^3 if required. This breakthrough demonstrates that manufactured sand is not just a theoretical alternative but a proven, commercially viable solution already operating at scale in Auckland.

Brookby Quarry Outputs

- **Currently operational** manufactured sand plant producing 230,000 m^3 annually
- **Expansion capability** of up to 460,000 m^3 if required
- **Successfully integrated into mainstream supply** at Allied Concrete Penrose since October 2024
- Uses greywacke quarry material to produce high-quality engineered sand
- **Proven performance** across residential, commercial, and infrastructure applications
- **100% replacement capability** - comparative trials show indistinguishable performance during placement and finishing, with higher strength values achieved
- **Enables significant reductions** in water and cement demand, supporting sustainability goals

Photo: Aggregate products, Brookby Quarry

Kayasand - Revolutionary Sand Manufacturing Technology

Kayasand processes materials such as recycled glass, concrete, and quarry by-products into fine sand suitable for concrete production and other construction applications. To date, over

[11] https://www.alliedconcrete.co.nz/engineered-sand/

300 Kayasand plants have been established across Asia, supporting the region's infrastructure development and promoting sustainable construction practices[1].

Kayasand's engineered sand is meticulously processed to achieve specific particle size and shape, ensuring consistency and quality. This precision not only enhances the strength of concrete but also reduces the amount of cement required, leading to lower carbon emissions.

Market Expansion

- **Auckland's annual concrete sand demand** of 1.2-1.4 million tonnes could be **fully met by just four Kayasand V7-120 plants**
- Received $3.5 million investment from New Zealand Green Investment Finance in 2023
- Currently operates 2 plants in Waikato, New Zealand and Sydney, Australia and expects to have at least 15 more by 2030[12].
- Technology allows for **20% less cement use**, reducing carbon emissions

"Sands that are precision engineered for performance are the future.

They give us much better control of the outcome and are more environmentally sustainable than natural sands."

Bram Smith,
Kayasand CEO

[12] https://kayasand.com/news/groundbreaking-concrete-pour-a-new-zealand-first.aspx

3. Economic Analysis: No Crisis Exists

Auckland Sand Supply Security Confirmed

Even without marine extraction by McCallum Bros Ltd, Auckland's current annual demand and future projections can be **fully met and exceeded**. The evidence shows:

- Auckland's current demand of ~310,000-610,000 m^3/year can be **fully met without McCallum Bros Ltd's marine sand**
- **Total alternative capacity exceeds 16 million m^3/year**
- **Quarry-based manufactured sand** alone could replace 100% of the demand
- Many **more potential on-land sand projects** are awaiting approval

While marine sand has historically contributed to supply, alternative sources such as on land sand mining and manufactured sand offer more sustainable and scalable solutions. The table below outlines the capacity of other suppliers, showing that Auckland's sand demand can be met and exceeded without relying on marine sand extraction.

Table 3: Current and Potential Operations that can Exceed Auckland's Sand Demand

Category	Volume (m^3/year)
Current (Known) Annual Extraction	~1,718,000
Possible (Known) Extraction	~14,569,000
Total (Known Current + Possible)	**~16,287,000***

*These figures are based on the best available information regarding current and potential sand extraction volumes. Not all industry data was accessible at the time of reporting, and figures may not reflect recent changes in market activity or consented volumes. The author takes no responsibility for fluctuations in supply or demand. Given the limitations in available data, actual extraction capacity is likely be higher than estimated here.

TOTAL CAPACITY: >16,000,000 m^3 per year

Conclusions and Recommendations

Alternative sources of sand, such as manufactured sand from quarries, recycled materials, and on-land sand mining operations, provide a sustainable and scalable solution to Auckland's sand demand, eliminating the need for marine sand mining.

Sustainable sand alternatives offer:

- Zero marine environmental impact
- Job creation and regional development
- Innovation and export opportunities
- Protection of fisheries and tourism industries
- Alignment with climate goals and circular economy principles

To maximise the potential of the manufactured and on-land sand mining sector, while simultaneously protecting marine ecosystems and the economic potential of fisheries and eco-tourism, the following recommendations are made:

1. **Reject all seabed sand mining proposals** and prioritise sustainable sand manufacturing
2. **Support existing on-land sand mining** projects that meet environmental standards and support local economic development

3. **Invest in sustainable sand alternatives** including manufactured sand and recycled materials.

By embracing sustainable sand alternatives and prioritising the protection of marine ecosystems, Aotearoa New Zealand can safeguard its fisheries, boost eco-tourism, and ensure a prosperous future for coastal communities while meeting all construction industry needs.