

Before the Expert Fast-track Panel

FTAA-2511-1150

Under the Fast-track Approvals Act 2024 (**FTAA**)

And

In the Matter of an application for approvals by **MCCALLUM BROTHERS LIMITED** for the Te Ākau Bream Bay Sand Extraction Project located at Te Ākau Bream Bay, Northland

Evidence of Paul Donoghue on behalf of McCallum Brothers Limited in Response to Invited Comments

(Concrete Suitability)

12 August 2026

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Introduction

1. My name is Paul Donoghue.
2. I am a concrete technologist. I am a Registered Engineering Associate and a NZCE (Civil), I hold a National Diploma Civil Engineering from Technikon Witwatersand, Johannesburg and National Higher Diploma Material Testing from Technikon Pretoria, both from South Africa.
3. I have 40 years' experience as a concrete technologist. Currently I have two roles. The first is Manager Training and Certification for Concrete New Zealand. The second is as an independent concrete plant engineer and concrete consultant.
4. This evidence is provided as part of McCallum Brothers Limited's (MBL) response to comments from some parties invited to comment on MBL's application under the Fast Track Approvals Act (FTAA) for consent for the extraction of sand from an identified site in Bream Bay.
5. I have previously prepared statements of evidence in support of MBL's FTAA application as follows:
 - a. Report titled "Concrete Suitability Report" of Paul Donoghue in Support of MBL's Application. This report is included as Attachment 20 to MBL's Assessment of Environmental Effects.
 - b. A response to the Panel's Minute 4 and Minute 5, attaching Requests for Information (**RFIs**) 1 and 2 respectively.

Code of Conduct

6. Although this is not a hearing before the Environment Court, I confirm that:
 - a. I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023 (**Code**); and

- b. My responses in the paragraphs that follow below have been authored by me and:
 - i. Are within my area of expertise (except where I state that I rely upon the technical reports of other expert witnesses provided in support of the application);
 - ii. Have been prepared in accordance with the Code; and
 - iii. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed.

Scope of Evidence

- 7. This evidence is provided as part of MBL's response to Section 53 submissions from other parties in regard to the Te Ākau Bream Bay Sand Extraction Project (**Project**).
- 8. This statement sets out my response to comments from the following persons:
 - a. comments and allegations from Allied Concrete Ltd and Brookby Quarries Ltd (the joint comments) presented as an Attachment to the documents filed by the Bream Bay Guardians (BBG). The joint comments are mentioned at 3.17 of the BBG submission but have not been allocated an attachment or appendix number.
 - b. Information provided by Dr James Mackechnie as part of the submission by Bream Bay Guardians and attached to their submission (not numbered). Discussed in paragraphs 3.17 to 3.20 of the BBG submission.
 - c. The response statements by Dr Richard Meade for Patuharakeke Te Iwi Trust Board (Attachment 9). The document discusses the potential replacement of PAP7 and natural sand in various proportions at paragraph 33 to 34.3.

Response to Allied Concrete Ltd and Brookby Quarries Ltd Comments

9. In structuring my response to the joint comments I shall quote the relevant sections from the document (in blue) and address each point in turn. The paragraphs stated in bold as headings refer to paragraphs in my original Concrete Suitability Report.
10. It is important to understand what is meant by the terms commonly used in the industry that refer to the different components of the finer aggregate portion of the ingredients of concrete blends. In my Concrete Suitability Report and in this statement in response to comments, I use the relevant terms to have the meanings set out in Table 1 below.

Table 1: Glossary of Terms

Sand Type	Origin and Description	Particle Size	Comments
Natural sand	In the Auckland market the natural sand available for concrete manufacture is a naturally occurring quartz/feldspar fine aggregate typically characterised by a rounded particle morphology. The principal sources are from the Kaipara Harbour (and until recently from Pakiri), and dune sand from Tomorata.	Particle sizes after screening typically range from 2mm down with the bulk of the material within the 0.15mm to 1.18mm size fractions.	The use of natural sand provides the range of particle sizes and morphology to produce optimum blends for all concrete mixes.
PAP7/PAP	Virtually all PAP7/PAP produced in Auckland is made from crushed greywacke rock. PAP7 comprises the largest proportion of fine aggregate used in concrete manufacture.	PAP7 (Premium All Passing 7 mm) is an industry term used by aggregate suppliers in New Zealand to describe a fine aggregate where 100% of the material passes a 7 mm screen.	Although I have used the term PAP7 throughout my Concrete Suitability Report and my response to RFI's, in fact, different quarries in Auckland do produce PAP to slightly different specification including PAP5, PAP6 and

			PAP7. The most common is PAP7 and I have adopted that term as being typical of the PAP used in most concrete mixes in Auckland.
Manufactured Sand	The term manufactured sand can give rise to some ambiguity as it is sometimes used as being synonymous with the term PAP7. However, within the Auckland concrete industry manufactured sand is a further processed PAP7 (greywacke in origin). This is re-crushed, washed or air blown and then screened. The resulting product is finer than PAP7 and is promoted as being a suitable substitute for natural sand.	A purpose-engineered crushed fine aggregate, with at least 95% passing the 4.75 mm sieve, produced to a controlled grading envelope and particle shape specification.	Although the range of particle sizes in manufactured sand overlaps the particle sizes in both natural sand and PAP7, it is my experience that manufactured sand is better used as a substitute for PAP7 in most concrete mixes than as a substitute for natural sand.
Engineered Manufactured Sand	I use this term in my evidence interchangeably with "manufactured sand" as they are essentially the same product.	As above	As above

Paragraph 3

Mr. Donoghue states that he is employed by Concrete NZ as the Manager - Training and Certification and outlines several tasks that he performs for Concrete NZ. He therefore has a duty of care to correctly represent the facts regarding Manufactured Sand which is not the case in attachment twenty. Given several of his assumptions in attachment twenty we believe he has a conflict of interest with his involvement in Concrete NZ and authoring this report in support of the Bream Bay application regarding use and suitability of Manufactured Sand in concrete in the Auckland market. Accordingly, ACL has raised this matter directly with the CEO of Concrete NZ and our

understanding is that organisation is looking into this matter. Brookby has also raised the issue with the CEO of the AQA.

11. As I stated in my Concrete Suitability report I am employed by Concrete NZ but I also operate as an independent consultant for many concrete manufacturers and other participants in the concrete industry. I conduct that business under the trade name “Concreteman”. I was approached by McCallum Bros. Ltd (MBL) as an independent consultant and prepared my Concrete Suitability Report in that capacity. I regret that I did not make this entirely clear in the introductory paragraphs of my Report.
12. When I accepted MBL’s approach, I did not see any potential conflict arising from my role with Concrete NZ. My work with Concrete NZ is as Training and Certification Manager for a number of courses and qualifications which Concrete NZ offers as part of the services it provides to the concrete industry. I am also the Chair of the Concrete NZ Plant Audit Committee.
13. I accept that as an independent expert consultant I have a duty to ensure that the facts I rely on and present are accurate to the best of my knowledge and belief. That was the case at the time I wrote my Report in May and June of 2025. In fact, so far as the industries use of manufactured sand, and in particular Allied Concrete’s concrete mixes and constituents at the time are concerned, I relied on personal discussions with Bob Officer and other Allied personnel over the period of December 2024 to April 2025. I was satisfied the information they gave me was correct at the time and that consequently the information in my report concerning the use of manufactured sand by Allied was correct. At that point the Allied Concrete Penrose plant was the only Auckland concrete plant using manufactured sand as a partial substitute for natural sand in High Strength concrete. So far as I am aware, that remains the position today, although Counties Concrete is now using manufactured sand as a partial replacement for natural sand in some concrete mixes.
14. It is clear from the joint comments that, so far as Allied Concrete are concerned, their current concrete mixes have significantly changed since I wrote my report. However, I entirely reject the allegations that my report

was inaccurate, misleading or in any way misrepresentative or maligning Allied and Brookby's businesses.

15. To illustrate my point it is interesting to revisit Mr Steve Riddell's views on manufactured sand when he gave evidence on behalf of Kaipara Ltd during the hearing of Kaipara Ltd's Pakiri Offshore sand extraction application before Auckland Council appointed Commissioners dated the 16 April 2021; *"While the technical challenges of manufactured sand can potentially be addressed in the short term the commercial viability for additional manufactured sand cannot. From the pre-feasibility work we have completed to date we do not see this changing in the short to medium term and perhaps even the long term"* (paragraph 27 in the Evidence in reply of Steve Riddell).
16. Clearly, as Brookby's interest in manufactured sand has developed in the last few years Mr Riddell's understanding of the matter has changed.
17. Furthermore, with respect to the authors of the joint comments, they confuse the large tonnages of manufactured "sand" used and to which they refer, with PAP7 (finer aggregate from 0.075mm up to 7mm grain size). There is no argument that fine aggregate has for many decades been used as an important component of all concrete in the form of PAP7. What has changed in recent years in New Zealand are improvements in the grading and shape of that material to the point where some of that material can be described as "engineered manufactured sand". This recently developed manufactured sand is now capable of partially substituting for the natural sand and all of the PAP7 as part of the fine aggregate mix. However, it is only that proportion which does or may substitute for natural sand which is of relevance to discussions of volume in the context of this application to extract natural sand. I refer to this point further in the below at paragraphs 19 and 20. However, I reiterate, that to date in Auckland, Allied Penrose is the only plant which is using the material in large volumes in that way.

Paragraph 12.

The assumptions made in this paragraph relating to the Manufactured Sand product in entirely and factually incorrect. In their current financial year ACL

have successfully produced and sold 69,500 cubic metres of concrete using Manufactured Sand from their Penrose Plant. During this period ACL has used 64,000 tonnes of Manufactured Sand and only 5,000 tonnes of natural sand in all grades and mixes of concrete that were sold. ACL's use of marine sand is restricted to lower strength pump mixes and decorative mixes which are historic and being reviewed. This is completely the opposite to the note in Appendix 12 regarding ACL's usage. Over the past 7 months, marine sand represents only 7% of the sand used to make concrete from this plant and 93% is Manufactured Sand.

18. At the time the statement was prepared the values were correct and applied to the previous financial year due to the timing of the submission. Commentary on the use of the various sands was based on information supplied at the time by Mr Bob Officer to myself and in meetings between MBL, Mr Bob Officer and Mr Hans Fuchs General Manager of ACL at the time. Processes and admixture technology have changed in the subsequent period meaning that the amount of natural sand used by ACL in its concrete mixes has changed. This has happened after my original evidence was prepared and MBL's application lodged. Had these changes occurred before my evidence was filed, I would have referred to them.
19. The volumes and tonnages stated in this paragraph of the joint comments are confusing. In an earlier paragraph of the joint comments under the heading "A Sustainable and Scalable Resource" it is claimed that Brookby quarry currently has a production capacity of 300,000 tonnes per annum of manufactured sand with an expansion capability of up to 600,000 tonnes if required and demand for the product increased.
20. My understanding of what is being referred to here when the term "manufactured sand" is used, is the manufacture of a product with 98% of the particle sizes ranging from 0.075mm to 4.75mm compared with PAP7 which has a range in its particle sizing from 0.075 to a 7mm range. An essential point is that the smaller manufactured sand product provides an acceptable substitute for PAP 7 and the major proportion of Brookby's production of that product will be used for that purpose rather than as a substitute for natural sand.

21. What this means is that not all of the manufactured sand produced by the Brookby quarry would be available to replace natural sand, as it also replaces the PAP7 that is currently being used by all concrete plants except ACL Penrose. In the example provided by Brookby this would mean that of the 64,000 tonnes of manufactured sand used by ACL 42,000 tonnes replaces the PAP7 in a traditional concrete mix (based on a 30mpa mix as per the volumes described in my paragraph 21 and Figure 1). The inference made by the joint comments is that all of the 64,000 tonnes replaces natural sand which is not the case.
22. I understand from discussions with Senior Plant Engineers around Auckland that the main objection to using manufactured sand is the difficulties they have with workability and finishability of the concrete it produces.

Paragraph 31

Again, the statement relating to Bream Bay Sand pertaining to Chlorides are easily managed by washing.... James Mackechnie has assured ACL that this statement – i.e. over NZ history there have never been any results near or above limits specified by NZS 3101 - is patently false particularly for concrete used in pre-stress elements which have a lower allowable limit for chloride. In any case the presence of chloride, while it improves early strength, can be detrimental to 28-day strength.

23. I stand by my statement that the issue as it relates to marine sand is easily managed by washing or by stockpiling larger volumes to weather. MBL has sold huge volumes of marine sand to the concrete industry over the last 80 years and I am advised that they manage this issue by washing their extracted sand and/or stockpiling. These methods can be used in isolation or combined to effectively reduce chloride content.

The table below illustrates the point.

Customer	Date	Acid Soluble Chloride Content (g Cl/100g sand)	Location
Stock Deliveries	8-Mar, 2020	0.14	Taken straight from the barge William Fraser to stockpile after washing.
Stock Deliveries	12-Mar, 2020	0.04	After stockpiling for four days
Stock Deliveries	14-Mar, 2020	0.03	After stockpiling for six days

24. The chlorides originate from presence of salt in the sea water and are not bound in the make-up of the aggregate but rather on the outside of the sand particles in the same way a swimmer is salty after swimming in the sea. By washing the sand the chloride content on the sand is greatly reduced and test results show very little chloride content. Concrete NZ Readymix Technical note 8 “Chloride testing of concrete” also supports this and states clearly:” Chloride testing carried out on two sources of marine sands taken saturated off the barge to two different test methods, were within allowable NZS 3101 levels “

Paragraph 58

Suitability for use in high strength concrete. Mr. Donoghue’s report states the opposite of ACL’s experience, save for some pre – existing project mixes, which are coming to an end, ACL use Manufactured Sand exclusively (i.e. no marine sand) in higher strength mixes – standard mixes for 30 MPa and above, pump mixes 35MPa and above. Higher binder – cement and/or SCM – content enhance the suitability of Manufactured Sand for use. It is also of note that while historically the proportion of marine sand in mixes was typically between 45 and 55%, of the fine aggregate portion, that since the introduction of manufactured sand, marine sand makes up no more than 15% of the fine aggregates. Mr. Donoghue’s statement in this paragraph that there are potential limitations on the use of Manufactured Sand relating to its particle shape, distribution of particle sizes and other factors that make the concrete

less suitable for higher strength pumping etc. are erroneous and as such factually incorrect. ACL and Brookby find these statements misleading and as such potentially meet the threshold as defamatory to ACL products in the market.

25. The comments in this paragraph appear to reflect Brookby and ACL's experience with manufactured sand and its use over the twelve months since I completed my report. I repeat that to the best of my knowledge and belief the statements I made in my report were correct at the time I made them and again reiterate that although ACL has chosen to place heavy reliance upon manufactured sand other Auckland concrete manufacturers are not following that example. I maintain that there are limitations on the use of manufactured sand; its particle shape, distribution of particle sizes, workability, finishability and other factors that can make the concrete less suitable for higher strength applications, notwithstanding the improvements claimed in the joint comments from ACL and Brookby.

26. It is worth noting, it is only the ACL plant at Penrose that uses manufactured sand exclusively at present. The other ACL plant at Silverdale, is still using marine sand and PAP7 as the finer aggregate portion in its concrete mixes. Almost all the other producers in Auckland also prefer a marine sand option with only one other concrete supplier, Counties Concrete, using manufactured sand in some of its concrete mixes.

Paragraph 61

ACL's experience of using manufactured sand in all facets of concrete at various strengths and applications clearly shows that natural sand can be replaced by manufactured sand and accordingly refute the comments made in this paragraph based on a cursory review of international literature which is the basis of the reference in this paragraph by the author. In other parts of the world the need to use marine sand equally depends on the alternatives that the local geology provides to marine sands in the manufacture of high strength concrete.

27. In my paragraphs 24 and 25, I have addressed ACL's account of its experience in using manufactured sand in various strengths and applications. To summarise, based on my experience I do not accept that natural sand can satisfactorily be replaced by manufactured sand as an ingredient in many concrete mixes.
28. I reject the suggestion that my enquiries into international practice were based on a cursory review of international literature. I have some years of international experience myself and with the benefit of that conducted a thorough review of the literature that I considered relevant.
29. At the time that my Concrete Suitability Report was finalised, my evidence was correct and was partly based again on information supplied by Mr Bob Officer in discussions with myself. I acknowledge that ACL Penrose is now using manufactured sand in substantial volumes but maintain my reservations about the product as stated above.

Paragraph 63

The manufactured sand process developed at Brookby was undertaken in house using our own technical advice and input on the required specification from ACL. This is not a process that was promoted by Mimico. In short, the paragraph does not describe or show any understanding of how Brookby's manufacturing sand process works and therefore this statement is completely incorrect. Brookby has confirmed that it has not been approached by Mr. Donoghue at any time to confirm his understanding and statements made in this paragraph relating to Manufactured Sand nor has he visited the site to understand the process. Neither Brookby nor ACL have been requested by Mr. Donoghue to provide samples of the product and can confirm that the samples shown in Figure 4 are not representative of Brookby Pap 7 or Brookby Manufactured Sand.

30. These criticisms are inaccurate. On or about the 7 November 2024 I contacted by telephone Mr Noel Herkt, the marketing and sales manager for Kaipara Ltd, who own both the Brookby and Smythes quarries. I had previously worked with Mr Herkt when Kaipara Ltd supplied concrete plants in the Coromandel region where I was the plant engineer. During a pleasant discussion, I

requested a sample of manufactured sand from him. Mr Herkt asked that I send him a request for a sample by email. This was done on Friday 8 November 2024. Mr Herkt then responded on November 11, 2024 asking who the sample was for. I responded on November 11, 2024 by telling him it was my MBL project. I have not heard further from Mr Herkt. I have then made the assumption that as Brookby quarry were not going to give me a sample, there was even less chance of being permitted a site visit. Copies of the relevant emails are attached.

31. MBL obtained samples of both materials, the Brookby PAP7 and Brookby manufactured sand from a number of concrete plants who were trialling Brookby's manufactured sand and using their PAP7 in their standard concrete mixes. I was and am assured by MBL that the samples were actual products manufactured at Brookby quarry. Mr Shayne Elstob refers to the point in his response to the joint comments at paragraphs 15 to 18.

Paragraph 64

That manufactured sand has been successfully used in the Auckland market for the past 12 months with the volumes exceeding 110,000 tonnes. The information relating to the grading curve and other information on its specification as stated in this paragraph is not accurate and simply not true.

32. I am unaware of the basis for the allegation that the grading curve is inaccurate or not true. These grading curves were undertaken from manufactured sand produced at Brookby quarry and I have made my assessment based on those actual grading curves. Brookby has not provided its own grading curves for its manufactured sand.

Paragraph 65 and 67

Paragraph 65 - The statement contained in this paragraph is incorrect based on ACL's experience, ACL use only Manufactured Sand in Self Compacting Concrete, high strength mixes and in our specialist flooring mixes for which finishing characteristics are vital.

Paragraph 67 – The key take away from this statement is that both too much fine material and too little fine material may result in difficulties when finishing the concrete surface. Manufactured Sand has been designed, and trialled through several iterations, to provide optimal amounts of the various size factions. Consistently achieving this outcome when blending two variable materials – marine sand and PAP7 – can be more challenging.

33. The joint comments claim that manufactured sand has been developed to produce an acceptable range of particle sizes. I note that Brookby has not provided any grading curves in the joint comments to enable verification of these claims. In the absence of grading curves, I have no way of assessing whether the “iterations” referred to have led to any improvements since my Concrete Suitability Report was prepared.

Paragraph 21 and Figure 3

This figure is completely inaccurate and is very misleading. While Manufactured Sand is used by itself, Marine sand is not used in a mix in isolation; it can only be used and always has been in a blend with PAP7 (0-7mm aggregate dominantly greywacke in the Auckland market). The blend will result in an overall grading for the “sand fraction” broadly like that of the Manufactured Sand that requires no blending of the sand as shown. The table in Appendix 3 shows this is a ratio of 60% PAP7 to 40% marine sand.

34. The data in my Figure 3 is correct and shows the grading curves for each individual product and does not show any blended sands. Brookby and ACL have not read the description for this Figure correctly and the explanation clearly states it shows only the grading curve for each individual natural sand or manufactured sand. The two Brookby material gradings may have changed since the original suitability report was written in June of 2025 but I have no control or visibility of what this change could be, if any. The Figure is not intended to show any blends of sands or PAP7 or manufactured sand.

Paragraph 71 Bleed Rate

One of the factors our industrial flooring customers value in our concrete using Manufactured Sand is the reliability and predictability of bleed when compared with previous mixes using the blended PAP and marine sand products. In simple terms ACL's experience with its clients has shown Manufactured Sand mixes have provided a superior product and outcome.

35. At the time the original statement of evidence was prepared these blends of sands were correct and this was partly based again on information supplied by Mr Bob Officer in discussions with myself.
36. I stand by my statements on bleed rate in paragraph 71 of my Concrete Suitability Report. Whether problems with bleed rate occur in any particular concrete depends upon the mix of aggregates used and this is detectable without a grading curve relating to the relevant aggregates. My statement in paragraph 71 is drawn from the grading curves provided of Brookby manufactured sand which were supplied to me at the time. It is impossible for me to comment on the claims made in the joint comments about the "Superior product and outcome" of Brookby manufactured sand without seeing the grading curves that Brookby and Allied appear to be relying on.
37. It is worth noting, however, that it is only ACL Penrose using this manufactured sand in any significant volume at present whereas the other ACL plant (Silverdale), some 40 km away from ACL Penrose, is still using marine sand blends. All the other major producers in Auckland prefer the marine or dune sand options with only one other supplier (Counties Drury) trialling using manufactured sand in some mixes.

Paragraphs 65 - 72

These paragraphs generally just offer Mr. Donoghue's personal opinions and are therefore quite subjective. The key response to this is the ability of Manufactured Sand to be adaptable and manufactured to a specified grading and/or particle size. Using Manufactured Sand avoids the reliance of blending of two materials (Sea Sand and pap7) which are both variable products.

38. All sands regardless of source will vary to some degree due to the nature of the parent material however the most consistent sand I have used in my now 40 years in this industry is the marine sand from Pakiri and the Kaipara Harbour. As I conclude in my Concrete Suitability Report (paragraphs 31 and 82), I expect Bream Bay sand to have the same quality and consistency.

Paragraph 74

In response to the reference to James MacKechnie's results referenced in this paragraph ACL contacted Mr. MacKechnie and asked him to review and comment on the statement in this paragraph. Mr. MacKechnie's response ". The literature quoted is from an unpublished report not accessible to the reader but as the author I can state the initial report never stated this but rather that 100% Manufactured Sand produced the best concrete in terms of workability and strength. Two conference papers state the same from the original research on Kayasand material in 2024 and subsequent later work."

39. The McKechnie report referred to in the joint comments is available on the Kayasand website and is thus in the public domain. It has also been submitted to the panel as part of the materials provided to the Panel by Bream Bay Guardians; kayasand.com/f/Kayasand-Concrete-Trial-Results-2024.pdf. The "initial" report by McKechnie does in fact support the statements in paragraph 74 of my Concrete Suitability Report that the best concrete is made with a blend of engineered manufactured sand and marine sand. The improvement was largely due to the superiority of the engineered manufactured sand as a replacement for the PAP7 rather than as a replacement for the marine sand.

Paul Donoghue

12 August 2026