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memorandum

TO	Taharoa Ironsands Limited	FROM	Andrew Curtis and Cameron Brown
		DATE	22 June 2026
RE	Response to comments relating to Air Quality on the Taharoa Ironsands Fast-track Application		

1.0 Introduction

In October 2025, Pattle Delamore Partners Limited (PDP) prepared an Air Quality Assessment[1] (AQA) for the substantive application submitted by Taharoa Ironsand Limited (TIL) for the Central and Southern Blocks Mining Project under the Fast-track Approvals Act 2024 (FTAA). The AQA supported an overall application under the FTAA.

In May 2026, TIL received comments on the application from invited parties. Comments relating to air quality were primarily made by Waikato Regional Council (WRC)[2], who engaged Air Quality New Zealand Limited (AQNZL) to review the application, Ngāti Mahuta ki to Hauaaruru Charitable Trust, and the Roy Wetini Whaanau Trust. Other comments relating to air quality were received from co-submitters Natasha Willison-Reardon and Mirumiru Pā ki Marokopa – Marokopa Marae.

This memorandum sets out PDP's responses to the comments from the above parties relating to air quality. Comments relating to recent dust complaints are addressed in the MinterEllisonRuddWatt's Memorandum of Counsel dated 22 June 2026.

To help respond to the comments received, PDP undertook a site visit on 27 May 2026 to collect samples for analysis and observe current site conditions and the effectiveness of mitigation.

This report has been prepared in accordance with the Environment Court's Code of Conduct for expert witnesses, contained in the Environment Court's Practice Note 2023. The authors of this report agree to comply with the Code of Conduct, and confirm that unless otherwise stated, the issues addressed in this report are within the area of expertise of the authors. No material facts have been omitted that might alter or detract from the opinions expressed in this report.

[1] Pattle Delamore Partners Limited, 10 October 2025. *Taharoa Ironsands – Central and Southern Block Fast-track Mining Project – AQ Assessment*, attached as Appendix S to the Substantive Application Report.
[2] Mitchell Daysh Ltd, 20 May 2026, *Waikato Regional Council Section 53 Comments*

2.0 Qualifications and Experience

This memorandum has been prepared by Cameron Brown and has been reviewed and approved by Andrew Curtis. References in this report to PDP are the opinions of both Cameron Brown and Andrew Curtis.

Cameron has three and half years' experience in Air Quality at PDP and holds a Bachelor of Engineering Technology. Cameron has been the lead author on numerous sites when emissions of dust and smaller, health-related airborne contaminants have been assessed. In particular, Cameron has worked on the air quality assessment for the Hunua Quarry, Drury Quarry, Brookby Quarry, Belmont Quarry, and the Rotowaro Coal Mine, amongst other sites across New Zealand. In addition to authoring, or co-authoring the assessments, Cameron has also led the Air Quality monitoring for each of the sites. Cameron has visited the site three times, most recently in May 2026 and has a very good understanding of the site operations and surrounding environment.

Andrew is one of the leading air quality professionals in New Zealand with almost 40 years of engineering experience and has specialised in air pollution for 30 years. This experience has ranged from the assessment and correction of air pollution problems and the design of air pollution control equipment to providing advice to and preparing resource consent applications for a wide range of industries. He is often engaged to assess applications for regulatory bodies, and he is regularly called upon to provide expert evidence at Boards of Inquiry, the Environment Court and Council resource consent hearings. Andrew is also an accredited Independent Hearing Commissioner, and a Certified Air Quality Professional.

3.0 Summary of Comments Received

Key air quality themes raised in the comments include:

- Effectiveness of dust mitigation measures, including coconut matting and rehabilitation;
- Management of exposed and unstabilised areas over time;
- Adequacy of monitoring approach, including use of Total Suspended Particulates (TSP) instead of PM_{10} (Particulate Matter less than 10 microns in diameter);
- Representativeness of monitoring data and background conditions;
- Potential dust contributions from elevated tailings and exposed areas;
- FIDOL[3] assessment conclusions and interpretation of wind and frequency data;
- Health-related particulate effects including PM_{10}, $PM_{2.5}$, and Respirable Crystalline Silica (RCS);
- Effects of removal of ridgeline and vegetation screening near receptors, particularly R4;
- Adequacy and prescriptiveness of proposed consent conditions and Environmental Management Plan (EMP) framework; and,
- Community concerns relating to dust nuisance and amenity effects in the Marokopa and Kiritehere areas.

Each of these are discussed in the following sub-sections.

[3] Qualitative assessment considering the (F)requency, (I)ntensity, (D)uration, (O)ffensiveness, and (L)ocation of effects.

4.0 Waikato Regional Council (WRC)

4.1 Rehabilitation and Stabilisation Measures: Coconut Matting Trials

WRC Comment (Summarised by WRC)

It would be helpful for the air quality assessment to provide further information regarding the effectiveness of the coconut matting trial, whether wider implementation of this mitigation measure will be progressed, and how dust emissions from large, exposed tailings and nominated rehabilitation areas are proposed to be managed on an ongoing basis.

PDP Response

PDP considers that coconut matting can generally be an effective resource and adds surface stability which in turn reduces the potential for wind-blown dust to be generated. This surface stability also leads to an increased likelihood of any planting undertaken within the matting of being protected and forming an established root structure. Planting is a proven effective dust mitigation measure, and the support of planting is valuable.

While the effectiveness of the coconut matting trial has not been assessed quantitatively, PDP's opinion is that other mitigation measures are likely to be more effective. This is based on on-site observations which indicates that over time sand has deposited on the matting, thereby creating an exposed surface from which these particulates can then be re-entrained by strong winds. PDP and TIL consider that more effective dust mitigation measures are available. PDP understands that for these reasons, the coconut matting will not be continued for other rehabilitation projects by TIL.

To manage the dust risk from large, exposed areas, TIL has committed to a number of ongoing stabilisation and rehabilitation methods. These are set out in proposed draft consent conditions 8, 9, and 10 as well as Schedule 1 of the General Conditions 13, 14, 18, and 20 and Chapter 6 of the Draft EMP.

4.2 Progressive Rehabilitation and Exposed Area Management

WRC Comment (Summarised by WRC)

It would be useful for the assessment to provide an update on the effectiveness and success of the recent rehabilitation works (i.e. the planting of 25,000 plants in the Eastern Block), including whether the planted areas have achieved successful stabilisation and vegetation establishment, and dust mitigation. It is also unclear how long the planted rehabilitation would take to become effective in reducing windblown dust emissions.

PDP Response

Areas of previous rehabilitation across the site have been successful as shown in Figure 1, where planting has become well established . This planting is an effective surface stabilisation method and controls the risk of airborne particulates caused by wind erosion. Coconut matting has been used to aid some planting across the site. However, for the reasons set out above, TIL does not intend to continue the use of coconut matting.

Figure 1: Established TIL Rehabilitation (View Looking Southwest from Southern Boundary of Central Block)

At the time of writing the AQA, PDP was aware of a plan to plant more than 25,000 plants (predominantly pine in accordance with the landowner's requirements) to rehabilitate parts of the Eastern Block (which does not form part of the site related to TIL's substantive application). Since then, this planting has been undertaken.

4.3 Cumulative Effects

WRC Comment (Summarised by WRC)

The applicant should explain how cumulative dust effects associated with large, exposed areas will be managed over the long term, and whether consideration has been given to including more prescriptive controls on the extent of exposed surfaces.

PDP Response

As previously discussed, to manage the dust risk from large, exposed areas, TIL has committed to a number of ongoing rehabilitation and stabilisation methods. These are set out in proposed draft consent conditions 8, 9, and 10 as well as Schedule 1 of the proposed – General Conditions 13, 14, 18, and 20 and Chapter 6 of the Draft EMP.

With regard to cumulative effects, the potential for these to occur at each of the identified receptors is discussed in detail in Section 8 of the AQA. In summary, these assessments conclude that risk of cumulative effects occurring at each of the receptors are:

- R1 to R4: Very Low Risk; and,
- R5 to R10: Low risk.

These risk categories are primarily due to the layout of the site in relation to the predominant wind and the locations of the nearby receptors.

4.4 Representativeness of MP4 as Background Monitoring

WRC Comment (Summarised by WRC)

Additional explanation or analysis is required to demonstrate why MP4 can reasonably be considered representative of naturally occurring background dust conditions, rather than being influenced by mining related dust sources.

PDP Response

In the AQA, monitor MP4 was used to determine upwind TSP concentrations when compared to monitor MP2 (which is located nearer to the Taharoa township). PDP's intention with this comparison was to understand changes in upwind and downwind concentrations due to wind-blown (naturally occurring) dust. The intention was not to set MP4 as a true 'background' monitor and we agree that concentrations recorded by this monitor can be influenced by areas upwind of it on the site as well as naturally occurring sources.

PDP's analysis therefore compares the relative spatial patterns in TSP concentrations between MP2 and MP4, these being an upwind and downwind monitor, with the downwind located closer to Taharoa Village (MP2). The observed trend of consistently higher TSP concentrations at MP4 compared to MP2 is therefore more reflective of the dispersion of concentrations as onshore winds blow across the site and towards the township.

To monitor more representative background concentrations, PDP has recommended that monitor MP5 be moved from its current location further south to capture upwind concentrations during the strong southwesterly winds. This recommendation is also in line with WRC's recommended monitor locations. The location of this monitor is discussed further in Section 5.5 of this memorandum.

4.5 Elevated Tailings and High Elevation Sources

WRC Comment (Summarised by WRC)

The assessment should include elevated tailings and other unstabilised high elevation areas and assess their potential contribution to off-site dust effects.

PDP Response

The dust deposition analysis presented in the AQA focused on near-surface dust generation and assumed a release height of three metres (m), which is typical of general earthworks activities (i.e. the height of an excavator bucket). To present a more conservative and 'worst-case-scenario' analysis, PDP has undertaken additional dust deposition calculations for a range of release heights (from 10 to 30 m). The analysis has been undertaken for the particle sizes used in PDP's initial analysis (Ironsand: 200 and 100 micrometre (µm) and clay: 20 µm) with graphs of the results presented in Appendix A.

It is important to note that these calculations are indicative only, and do not account for the complexity of the terrain and physical obstructions on the site, site mitigation measures, or the topography of surrounding areas. They also do not account for the initial, pre-mining works elevation of the site and sand dunes which in other areas of the coastline can exceed 30 metres from sea level. The calculations also assume a uniform wind speed and direction and therefore are theoretical only.

The analysis in summary shows that 20 µm particles could be transported significant distances (5 kilometres (km) in 5 m/s winds when released from a height of 30 m, and further in stronger winds). In large quantities, these particles will cause visible plumes if not properly mitigated. When considering the particle size distribution (PSD) sampling undertaken by PDP (discussed in detail in Section 5.1) it is clear that the on-site material contains relatively few particles in the sub-20 micron size fraction. Therefore, there is a lower chance of these particles becoming airborne, creating a visible plume and being

transported the distances discussed in the updated analysis. If they were to be conveyed theses distances however, it is likely the particles will disperse significantly to a point where they do not cause nuisance effects when settled.

The particles which have a greater potential to cause nuisance effects (these being the larger ironsand particles) are likely to only be transported less than 50 m (for the 200 µm particles) under the same release height and wind speed, and up to 450 m for the 100 µm particles when released from a 30 m elevation under a wind speed of 15 m/s. Again, it is noted that these distances do not consider the topography between the dust source and the receptor, and just because the particles can travel the stated distances, does not mean that they will be deposited at that distance or that they will cause offensive or objectionable effects.

To determine whether offensive or objectionable effects are likely or not, all five FIDOL factors need to be considered. PDP is confident that the FIDOL conclusions set out in Section 7.6 of the AQA that state that it is unlikely that activities under the control of TIL will result in offensive or objectionable dust effects being experienced off-site remain accurate after undertaking this analysis of varying release heights.

This is primarily due to the larger particles (100 µm in diameter) that are more likely to cause nuisance effects and that make up a higher percentage of the on-site material, during extremely strong winds (15 m/s) are predicted to be transported up to 450 m if unmitigated. When considering the particle release height (in this case 30 m) together with the surrounding environment, distance from a source to the receptor, and the implemented site mitigation measures, this transportation is likely to be significantly shorter and therefore unlikely to cause nuisance effects at nearby receptors.

While it is acknowledged that fine particles transported in significant intensities have the potential to cause nuisance dust effects, these effects are expected to be infrequent and primarily associated with activities involving clay soils during periods of exceptionally strong winds. Under these conditions, TIL will continue to implement the proposed dust mitigation measures; however, the effectiveness of additional mitigation may be limited by the prevailing meteorological conditions. It is also noted that airborne dust concentrations during strong wind events are likely to be influenced by contributions from other exposed surfaces and fine particulate sources in the surrounding area, including off-site sources such as nearby beach and marine environment.

5.0 FIDOL Assessment Conclusions

WRC Comment

The FIDOL assessment in the PDP Air Quality Assessment concludes that receptors R1 to R3 and R5 to R10 are likely to experience low nuisance dust effects, primarily due to separation distances and the conclusion that these receptors are relatively infrequently downwind of the Central and Southern Blocks during higher wind speed conditions.

However, the assessment indicates that some receptors are downwind of the CSB for approximately 23.1% of the time during winds greater than 5 m/s and 13.4% of the time during winds greater than 7.5 m/s. In total, winds greater than 5 m/s occur for over 36% of the time.

In my opinion, these frequencies do not appear obviously low, particularly in the context of nuisance dust effects associated with strong wind events. Accordingly, it appears that the conclusion of low nuisance dust effects relies significantly on assumed effectiveness of mitigation measures. Given the history of dust complaints and observations of windblown dust from elevated tailings areas, it would be helpful for the applicant to provide further explanation supporting this conclusion.

PDP Response

Table 8 in Section 7.1 of the AQA contains a breakdown of the wind data relevant to each of the identified receptors.

The receptor WRC is referring to is R6 which is downwind of the Central and Southern Blocks (CSB) where 23.1% of the time wind speeds are greater than 5 m/s, and 13.4% of the time wind speeds are greater than 7.5 m/s. PDP assumes that the comment which states that in total, winds greater than 5 m/s occur for over 36% of the time has come about by adding the 13.4% to the 23.1% values.

This is incorrect as the 13.4% for greater than 7.5 m/s speeds is a subset of the 23.1% for greater than 5 m/s wind speeds. In other words, 23.1% is the maximum potential frequency of exposure. These two percentages generally align with moderate and high risk dust conditions (the stronger the wind speed the greater the risk of wind-blown dust).

When considering the wind data, it is also important to note that the frequency percentages do not account for rain during these periods (which acts as a natural dust suppressant).

PDP acknowledges that the wind speed frequencies in isolation are not necessarily 'low', and when compared to the frequency guidance contained in the Institute of Air Quality Management (IAQM), every receptor is considered to be downwind of the CSB either moderately frequently, frequently, or very frequently, when assuming all days are dry days.

PDP's comment in Section 7.1 (Frequency section of the FIDOL assessment) of the AQA regarding receptors R1 to R3, and R5 to R10 referred to these receptors experiencing a low frequency of dust as opposed to low nuisance dust effects. PDP's conclusion that a low frequency of dust could be expected at these receptors considers the separation distances also presented in Section 7.1 (and Section 7.5) of the AQA. Section 7.5 states that all receptors, with the exception of R4, are located either distant (200 to 400 m from dust source), or further than distant (more than 400 m from dust source) when adopting the downwind distance classifications set out by the IAQM[4].

PDP acknowledges that there is some crossover between the Frequency and Location sections of the FIDOL assessment and for clarity, these could have been more clearly separated and considered holistically after assessing each individually.

However, PDP is comfortable with the conclusion reached in its FIDOL assessment, that it is unlikely that activities under the control of TIL will result in offensive or objectionable dust effects being experienced off-site, when the proposed mitigation is implemented.

5.1 PM_{10} Assessment

WRC Comment (Summarised by WRC)

Given that PM10 is regulated under the National Environmental Standards for Air Quality (NESAQ) and the elevated TSP concentrations that have been measured around the site, plus the large scale of the activity and proximity of receptors, a detailed assessment of PM10 is required.

[4] Institute of Air Quality Management, May 2016. *Guidance on the Assessment of Mineral Dust Impacts for Planning* (v1.1), Table A3-3.

PDP Response

As correctly stated by WRC, PM_{10} is regulated under the National Environmental Standards for Air Quality (NESAQ). The NESAQ contains the New Zealand Ambient Air Quality Standards (NZAAQS), which includes a 24-hour average concentration for PM_{10} (50 µg/m³), amongst values for other airborne contaminants. For completeness, it is noted that one exceedance of the PM_{10} standard is permitted in a 12-month period.

The ambient air quality TSP monitoring data currently collected by TIL is not directly comparable to this standard as the measurement technique measures all particulate, not just PM_{10}.

Therefore, to fully respond to this question, detailed long term PM_{10} monitoring would be required. Undertaking this monitoring is not practical in the time available.

To provide a response to WRC's comment, PDP has used a surrogate method which considers the size distribution of material on site. A substantial amount of time is required to undertake an airborne PM_{10} study and subsequently determine the site's contribution to those measured PM_{10} concentrations. Therefore, this surrogate method provides detailed, source specific sizing of the material that could be discharged from the site. PDP considers this is a robust surrogate approach which provides a screening level assessment of the proportion of particles in the material that are less than 10 microns in diameter and therefore could contribute to ambient PM_{10} concentrations if they become airborne.

PDP has collected samples from five different areas of the site and had PSD analysis prepared for each sample[5]. Figure 2 presents the locations where PDP collected samples during its site visit on 27 May 2026.

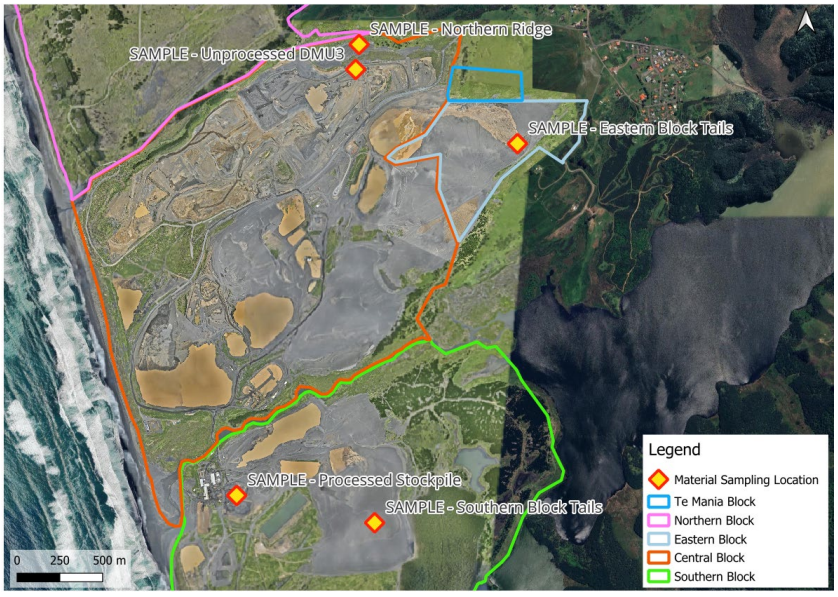


Figure 2: PSD and RCS Sample Locations

[5] PSD is typically undertaken by two methods. Wet PSD for the <63 µm particles and hydrometer for the <63 µm particles, however at least 10% passing 63µm wet PSD analysis is required to undertake the hydrometer analysis.

The detailed results of these are presented in Appendix B, and a summary of the size distribution is presented in Table 1. Only two of the five samples ('Unprocessed DMU3' and 'Processed Stockpile') contained material that was less than 0.063 mm (63 µm) in the wet sieve PSD analysis[6].

Given that there is a very low percentage of material passing the 63 µm size fraction, there will also be a very low percentage of the material in those smaller size fractions, these being the particulates that have the potential to cause human health effects.

Table 1: Particle Size Distribution

Sample	Percentage of Sample (%)							
	< 4.75 mm	< 2 mm	< 0.6 mm	< 0.3 mm	< 0.15 mm	< 0.09 mm	< 0.075 mm	<0.063 mm
Northern Ridge	-	-	100	92	14	1	-	-
Unprocessed DMU3	-	100	100	78	16	2	1	1
Eastern Block Tails	-	-	100	75	10	1	1	-
Southern Block Tails	-	100	100	87	14	1	1	-
Processed Stockpile	100	99	98	97	68	9	5	3

Additionally, PDP has been provided with the most recent on-site workplace exposure monitoring undertaken by TIL for both inhalable and respirable particulates, as well as RCS (which is later discussed). This monitoring supports the conclusion that there is a very low percentage of inhalable and respirable particulates (approximately PM_{10} and PM_4) with measured concentrations less than 50% of the relevant New Zealand Workplace Exposure Standard (WES) for both respirable and inhalable particulates. These values are set out in Table 2.

As seen, the **maximum inhalable** particulates value recorded was **0.84 mg/m³**, with the **maximum respirable** value being **0.1 mg/m³** as 12-hour time weighted averages (TWA). For a 12-hour TWA, the WES for inhalable and respirable particulates are:

- **Inhalable**: 5.0 mg/m³; and,
- **Respirable**: 1.5 mg/m³.

Given this analysis has been undertaken on-site where workers are closer to sources of dust, PDP considers that the potential for off-site effects from PM_{10} is very low given the low on-site concentrations and the dispersion that occurs between a source and the receptors.

[6] Because of method limitations it was not possible to determine the size fractions for the material less than 63 µm in size.

Table 2: Respirable and Inhalable Particulates from Worker Exposure Monitoring

Inhalable Sample	Inhalable Particulates – 12 hour TWA (mg/m³)	Respirable Sample	Respirable Particulates – 12 hour TWA (mg/m³)
Bulldozer Operator	0.27	Bulldozer Operator	0.069
Dredge 8 Operator	0.17	Bulldozer Operator	0.054
Dredge 8 Operator	0.31	Bulldozer Operator	<LOD
Dredge 14 Operator	0.39	Dredge 8 Operator	<LOD
Excavator Operator	0.23	Dredge 8 Operator	0.049
Maintenance Personnel – During Ship Loading	0.64	Dredge 14 Operator	<LOD
Maintenance Personnel – During Ship Loading	0.18	Excavator Operator	0.10
Maintenance Personnel – During Ship Loading	0.73	Maintenance Personnel - Electrician	<LOD
Truck Operator	0.78	Maintenance Personnel - Electrician	0.058
Truck / Excavator Operator	0.22	Maintenance Personnel - Fitter	0.047
Truck / Excavator Operator	0.09	Water Cart Operator	<LOD
Truck / Excavator Operator	0.84		

5.2 $PM_{2.5}$ and Respirable Crystalline Silica

WRC Comment (Summarised by WRC)

It would be helpful for the applicant to briefly confirm the low level of risk associated with PM2.5 or respirable crystalline silica (RCS) as pollutants of concern to provide reassurance to the local community and cover off the potential risk associated with these potential discharges.

PDP Response

After reviewing the PSD analysis (the results of which are discussed in detail in Section 5.1) it is clear that there is a very low percentage of sub-63 µm particles in the samples collected on site. Only two of the samples detected any material less than 63 µm, and those that did accounted for 1 and 3% of the sample material.

$PM_{2.5}$ is not currently regulated in New Zealand by the NESAQ, however, it should be noted that the MfE has undertaken consultation[7] on introducing a NES for $PM_{2.5}$ which was equivalent to the WHO 2005 AQG and would allow three exceedances in a 12-month period of the 24-hour standard. Regardless, the PSD results show a very low percentage of fine material and when considering that only a small portion of the sub-63 µm material will be sub-2.5 µm particles. PDP considers that there is an extremely low potential of adverse $PM_{2.5}$ related health effects being experienced off-site resulting from on-site material.

[7] Ministry for the Environment, *Proposed amendments to the National Environmental Standards for Air Quality – Particulate Matter and Mercury Emissions*, February 2020.

In terms of Respirable Crystalline Silica (RCS), PDP collected samples of the sand (in the locations identified in Figure 2) during the site visit on 27 May, which were sent to a NATA accredited laboratory for X-Ray Diffraction (XRD) analysis to determine the presence of crystalline silica compounds in each sample.

The only crystalline silica compound detected in any of the samples was quartz.

The samples were sieved to the smallest size fraction possible for the laboratory (38 µm) however this is larger than the respirable (4 µm) size fraction. The percentage of crystalline silica in the 38 µm sample therefore overestimated the RCS percentage of the sample which provides a level of conservatism to the results which are summarised in Table 3. The full set of XRD results are presented in Appendix C.

Table 3: XRD Results for Crystalline Silica

Sample	Percentage of Crystalline Silica (Quartz) in 38 µm Sample
Northern Ridge	0.3%
Unprocessed DMU3	0.5%
Eastern Block Tails	No <38 µm particles present. No quartz detected in 38 to 150 µm size fraction.
Southern Block Tails	0.9%
Processed Stockpile	1.7%

RCS can pose significant health risks when inhaled, as prolonged or repeated exposure may lead to serious respiratory diseases such as silicosis, lung cancer, and chronic obstructive pulmonary disease. Crystalline silica in all forms is classified as a human carcinogen by WorkSafe New Zealand.

There are no New Zealand standards or guidelines for ambient concentrations of RCS; therefore, PDP has considered how RCS has been assessed in other jurisdictions. The California OEHHA chronic Reference Exposure Level (REL) concentration limit is 3 µg/m^3 for RCS[8]. This REL is used for assessment against long-term exposure of RCS, which the OEHHA defines as being anywhere between 1 year and a lifetime. PDP has used this as an annual assessment criterion.

To assess against this criterion, PDP has undertaken a screening assessment and taken the maximum percentage of crystalline silica in the 38 µm sample (1.7% - from the processed stockpile sample) and applied this value to the 2024 annual average TSP concentration recorded by each of the on-site monitors.

This provides a conservative assessment as the 1.7% crystalline silica value is for all particles sub 38 µm in size. RCS is only particles in the respirable (PM_4) size fraction; therefore, the true RCS percentage is likely to be lower.

The results of these calculations are presented in Table 4.

[8] California Office of Environmental Health Hazard Assessment, 11 October 2023. *OEHHA Acute, 8-hour and Chronic Reference Exposure Level (REL) Summary.* https://oehha.ca.gov/air/general-info/oehha-acute-8-hour-and-chronic-reference-exposure-level-rel-summary

Table 4: 2024 TSP Annual Average and Assumed RCS Annual Average

Monitor	TSP Annual Average	Calculated <38 µm Crystalline Silica Annual Average	OEHHA Chronic REL for RCS	Percentage of OEHHA REL[1]
	µg/m³			
MP1	9.7	0.17	3	6%
MP2	10.7	0.18		6%
MP3	8.0	0.14		5%
MP4	11.0	0.19		6%
MP5	5.9	0.10		3%
MP6	6.9	0.12		4%
MP7	11.2	0.19		6%
MP8	9.4	0.16		5%

Notes:

1. *Assumes <38µm crystalline silica content is the same as the respirable (<4µm) crystalline silica content.*

As shown in Table 4, all of the conservatively calculated values are less than 10% of the of the OEHHA REL concentration for RCS of 3 µg as an annual average, with the maximum value being 6% of the guideline. These results align with what PDP would expect given the site mines ironsand (primarily for the titanomagnetite compound) which typically has a very low crystalline silica content as opposed to silica sand which is rich in crystalline silica.

As previously discussed, TIL has undertaken workplace health and safety exposure monitoring, which included monitoring for RCS. During this monitoring, 11 staff members undertaking outside mining activities were fitted with RCS samplers for the period of their shift (12-hours). Seven of these samples returned values below the limit of detection, which for a 12-hour sampling period following the same methodology is 0.008 mg/m³ (8 µg/m³)[9]. All samples recorded RCS concentrations less than half of the Workplace Exposure Standard of 25 µg/m³.

Given the general low level of RCS exposure for workers, the relatively low abundance of crystalline silica found in the samples collected on-site, and the separation distances between the site and the nearby receptors, PDP considers that any RCS particulates will be dispersed so that there is an extremely low potential of adverse health effects from RCS to be experienced off-site. PDP's XRD analysis and screening assessment using annual-average TSP monitoring data also supports this conclusion.

5.3 Changes in Site Screening and Potential Dust Effects

WRC Comment (Summarised by WRC)

It would be helpful for the applicant to provide further information on the effect of the removal of the ridgeline along the eastern / northern boundary and some mature pine trees that have been removed along the eastern site boundary of the Central and Southern Blocks on potential dust effects at receptor R4, including whether the loss of this physical screening and sheltering has been considered in the assessment.

[9] Minimum LOD for the laboratory X-Ray Diffraction crystalline silica compounds are 5 µg.

PDP Response

5.3.1 Ridgeline near R4

WRC commented that some of the ridgeline at the northern end of the Central Block had been removed, which would reduce the screening potential to the nearby receptors, in particular receptor R4 (which PDP notes is incorrectly defined in the WRC memo as the Wetini property but is actually the Kana property).

PDP is aware that works are currently being undertaken on this ridgeline as part of TIL's continued operations – these works may be completed before or soon after the Panel's decision is due. These works will remove the ridge and any screening that it provides. However, TIL is intending to place tailings back into this area, after which it will complete stabilisation works and ultimately rehabilitation.

To manage the potential for effects to occur at R4, TIL has committed to a number of ongoing stabilisation and rehabilitation methods. These are set out in proposed draft consent conditions 8, 9, and 10 as well as Schedule 1 of the proposed draft – General Conditions 13, 14, 18, and 20 and Chapter 6 of the Draft EMP.

To mitigate the potential risks from the removal of this ridgeline, PDP has suggested that a 100 m priority stabilisation area (PSA) (Figure 3 below replicated from the AQA is implemented, which has been included as part of the proposed consent conditions (Condition 9 AUTH142035.01.01). The details around timing and works performed in this PSA are set out in Section 5.4, which includes the proposed amended conditions around this area to provide further certainty around timing of stabilisation of any exposed surfaces.

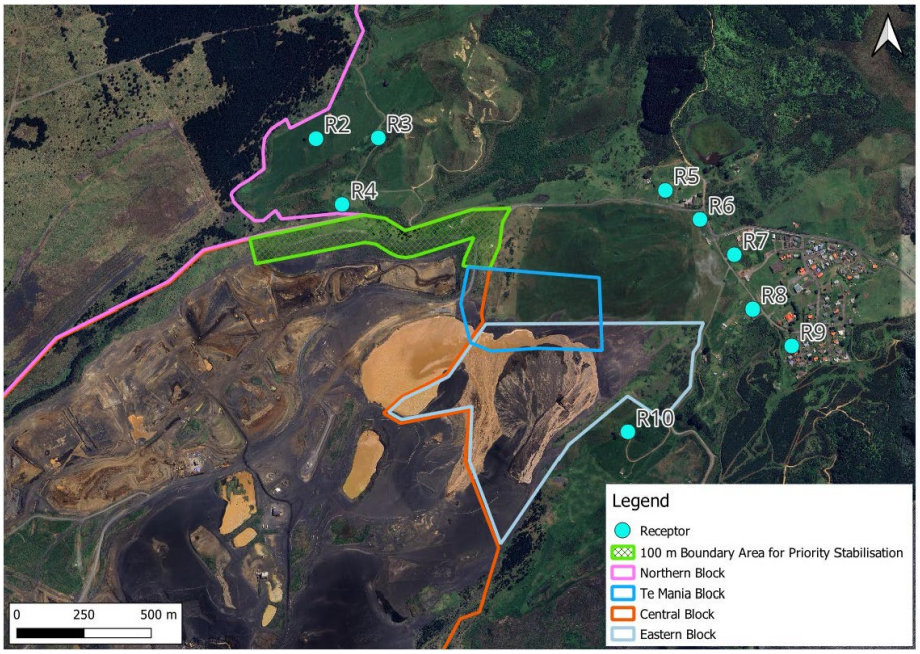


Figure 3: Priority Stabilisation Area in the Central Block (Figure 19 of PDP assessment)

5.3.2 Pines on Eastern Boundary

WRC refers to the removal of mature pine trees along the eastern boundary of both the Central and Southern Blocks, which provided some level of dust screening and mitigation. PDP is not aware of the specific removal of any pines in recent years. As far as PDP is aware the most recent removal of pines in the Central Block was circa 2016/2017 and was undertaken by previous site operators (not TIL). PDP is not aware of the removal of any pine trees in recent years that would cause a loss of screening and would consequently affect dust transport.

5.4 Review of Proposed Resource Consent Conditions

TIL provided a draft set of consent conditions with its application, attached as Appendix BB to the Substantive Application Report. WRC provided comments on a number of matters it considers should be contained within consent conditions.

PDP has proposed the following changed conditions in AUTH142035.01.01 to address the matters raised by WRC. The initial set of draft conditions included PM_{10} monitoring, however the proposed changes discussed below, and attached as Appendix D (showing the changes in underline and strike through), further enhance the rigorousness of the management of potential dust effects.

5.5 Replacement of TSP monitoring with PM_{10} and Consent Conditions

WRC Comment (PDP Summarised)

WRC recommends PM_{10} monitoring is undertaken in place of TSP monitoring as a practical proxy for both health effects and nuisance dust management.

WRC recommends including trigger levels and response actions in the EMP.

WRC considers the MfE indicative trigger (150 µg/m³ as a 1-hour average) is too high for real-time operational management using non-NESAQ instruments. They therefore propose lower 1-hour trigger levels based on recent quarry consents:

- 55 µg/m³ - investigation and additional mitigation; and
- 65 µg/m³ - cease dust-generating activities (excluding dust suppression).

Monitoring locations should be shown on a plan and located near site boundaries and sensitive receptors.

Not all monitors need to be NESAQ-compliant, but at least one (e.g. near Taharoa School) should be, to:

- Enable comparison against NESAQ standards; and,
- Support calibration/correlation with the wider network.

WRC has also recommended that monitor MP3 is re-located to in between the northern boundary of the Central Block and R4.

PDP Response

PDP notes that the conditions of consent submitted as part of the Substantive Application already provided for PM_{10} monitoring which has now also been recommended by WRC. PDP considers this is a practical option, and as stated, can monitor for potential health effects while still being a valuable tool for managing nuisance dust. The monitoring conditions have been enhanced with the relevant conditions set out in Appendix D.

In addition to the monitors currently on-site, TIL has agreed to install one NESAQ compliant PM_{10} monitor at the Taharoa Kura (school) to monitor the potential effects from PM_{10} off-site. This monitor will be used for periodic co-location studies of the other non-NESAQ compliant monitors on-site.

PDP also recommends that a PM_{10} monitor is operated on the western, coastal side of the site. This monitoring will be referenced as a background concentration monitor for the predominant strong wind direction (south-westerly) which blow towards the kura. This monitor will provide valuable data to indicate the likely contribution to on-site PM_{10} concentrations from the adjacent marine environment, with particulate sources including sea-spray and beach sand. PDP understands that monitor MP5 has been having issues with data transmission, most likely caused by the cellular connection coverage in its current

location. The new proposed location is near the processed stockpile area and buildings where it assumed that a stable cell coverage is present.

With regard to the relocation of MP3, PDP agrees that this location would monitor the potential effects at R4, and TIL has agreed to this relocation. The new indicative location for MP3 has been included in Figure 4, along with the location of the PM_{10} reference monitor at the kura, and the recommended relocation of MP5.

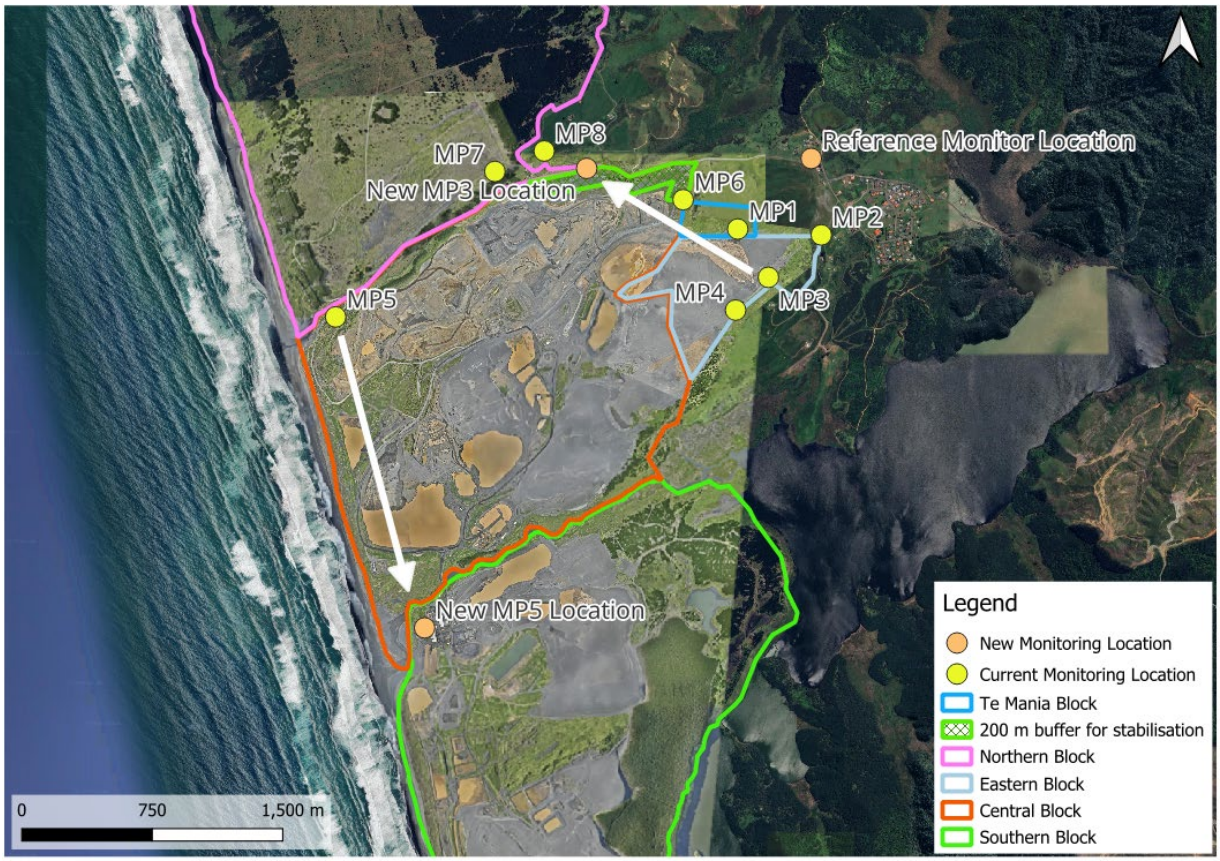


Figure 4: Current (yellow) and New (orange) Monitoring Locations

PDP does not agree with WRC's proposed monitoring trigger levels, as we consider that they could be triggered by off-site sources of PM_{10}, in particular marine aerosols from sea-spray and naturally occurring dust from undisturbed beaches particularly in strong wind conditions which occur frequently at this location.

As previously stated, no PM_{10} monitoring has been undertaken on-site to date and therefore PDP cannot determine what appropriate trigger levels for PM_{10} would be. PDP considers that one year of PM_{10} monitoring will be required to determine what appropriate trigger levels are for the site's PM_{10}, given that WRC is recommending these are tied to cessation of some activities.

PDP considers that the trigger levels need to be tied to site contribution, rather than the absolute quantum of the emissions.

Implementation of the NESAQ New Zealand Ambient Air Quality Standards (NZAAQS) 24-hour PM_{10} limit of 50 $\mu g/m^3$ will however be applied to the NESAQ compliant monitor located at the kura with mining activities considered if any exceedances are recorded, noting the potential for non-mining related PM_{10} sources to cause exceedances. This NZAAQS is in place, and PDP has recommended it is adopted to implement a level of health protection to all those at the kura and in the nearby areas. All of our recommendations set out above are accounted for in the amended air quality conditions set out previously.

6.0 Roy Wetini Whaanau Trust

Roy Wetini Whaanau Trust Comment (PDP Summarised)

The Roy Wetini Whaanau Trust (RWWT) raises concerns that mining and excavation activities are generating off-site clay dust, including visible dust plumes and dust deposition on neighbouring properties. RWWT alleges that dust has accumulated on outdoor surfaces, vehicles, roofs, laundry, water tanks and within dwellings, affecting indoor surfaces and household amenities, and contends that these effects have resulted in adverse amenity effects and health concerns for nearby residents.

RWWT states that the removal of previous ridge-line landforms, pine shelter belts, and other vegetation buffers has reduced natural screening from mining activities and increased the exposure of nearby residents to dust emissions. RWWT also raises concerns regarding the adequacy of rehabilitation and the removal of established vegetation in relation to dust effects.

RWWT contends that the application does not adequately assess or mitigate air quality effects, particularly cumulative dust effects associated with multiple mining areas. RWWT considers the proposed setbacks and mitigation measures insufficient and seeks larger setbacks, stronger rehabilitation requirements and additional planting to reduce off-site dust impacts. RWWT also links dust effects to impacts on cultural values and the wellbeing of ancestral lands.

RWWT goes on to state that it supports the conditions of consent outlined in the Commissioners Decision (App142035) which RWWT considers would address its concern regarding air quality effects.

PDP Response

PDP has reviewed the RWWT comments and is aware of reports of clay dust visible over the site and surrounding areas in March 2024. This occurred during very strong winds where regardless of mitigation measures, there is the potential for wind to transport dust especially in naturally exposed sandy coastal environments.

PDP acknowledges that historically the mining operations (including those undertaken by previous site operators) has led to a reduction in screening to the nearby sensitive receptors, predominantly during the southwesterly winds. PDP has recommended that one of the current real-time monitors is moved from its existing location to the northern boundary of the central block to monitor the likely effects at R4 and the other nearby properties, including properties occupied by members of the Wetini whānau. More specific detail on the proposed locations of the dust monitors is discussed in Section 5.5.

In addition to the more targeted monitoring locations, TIL will implement the dust mitigation measures set out in the in the proposed draft consent conditions 8, 9, and 10 as well as Schedule 1 of the proposed draft – General Conditions 13, 14, 18, and 20 and Chapter 6 of the Draft EMP. PDP considers that when implemented, these measures will suitably control dust discharges from the site.

PDP has also undertaken an assessment of the potential off-site health effects from PM_{10}, $PM_{2.5}$, and RCS which have been presented in Sections 5.1 and 5.2. These assessments conclude that there is a very low potential off-site effects from PM_{10}, and an extremely low potential of adverse health effects from RCS or $PM_{2.5}$ to be experienced off-site.

7.0 Ngāti Mahuta ki to Hauaaruru Charitable Trust

Comment (PDP Summarised)

Ngāti Mahuta ki to Hauaaruru Charitable Trust (NMktHCT), like RWWT, has raised concerns about how the removal of pine trees has reduced visual and environmental buffering, the changing landscape character and increasing the village's exposure to dust and other operational effects. NMktHCT believes that dust impacts are already being experienced by whānau living in Taharoa, affecting amenity, health, and daily living conditions. NMktHCT considers that the site's compliance history and monitoring performance are important considerations when assessing the adequacy of proposed management measures, particularly given the alleged lack of rehabilitation to mitigate ongoing air quality effects.

PDP Response

As discussed in Section 5.3.2, the most recent removal of pine trees PDP is aware of occurred circa 2016/2017 prior to TIL operating the site. PDP acknowledges that the removal of historical ridgelines has reduced screening for nearby properties and consequently has recommended the movement of one of the on-site monitors (discussed in Section 5.5) to the location most affected by the southwesterly winds.

In addition to the more targeted monitoring locations, TIL will implement the dust mitigation measures set out in the in the proposed draft consent conditions 8, 9, and 10 as well as Schedule 1 of the proposed draft – General Conditions 13, 14, 18, and 20 and Chapter 6 of the Draft EMP. PDP considers that when implemented, these measures will suitably control dust discharges from the site.

8.0 Joint Comments of Natasha Willison-Reardon and Te Aroa Pou – Co-Chair, Mirumiru Pa ki Marokopa - Marokopa Marae

Comment (PDP Summarised)

Requests that dust monitoring is extended south of the site to include Marokopa and Kiritehere stations, with binding trigger levels for northerly wind events.

PDP Response

These two locations are approximately 12 and 15 km from the site respectively. Due to this separation distance, there is an extremely low to negligible potential for any particles to be transported this distance from the site. In the event that particles did travel this far, they would be at a concentration which would not cause offensive or objectionable effects. When considering the meteorology of the site (discussed in Section 2.2 of the AQA), northerly winds account for 4.4% of all winds, and winds from this direction above 7.5 m/s only account for 0.5% of all winds, which is very infrequent.

If monitoring was undertaken in the Marokopa and Kiritehere areas, the concentrations recorded would be dominated by particulate sources between the site and the monitor during northerly conditions which include exposed areas of natural sand, which would impact any data collected.

For these reasons, PDP considers that particulate monitoring in Marokopa and Kiritehere is not required.

9.0 Conclusions

PDP has reviewed and responded to the air quality matters raised by WRC, AQNZL, RWWT, NMktHCT, and other invited parties.

The additional investigations undertaken for this memorandum, including the further site visit, PSD analysis, crystalline silica testing, review of workplace exposure monitoring data, and supplementary dust deposition assessment, do not alter the conclusions of the AQA. The results indicate that the materials present on site contain a very low proportion of fine particulate matter capable of contributing to airborne PM_{10}, $PM_{2.5}$, or RCS concentrations. The screening assessments undertaken therefore support the conclusion that there is a very low potential for adverse off-site human health effects associated with the mining activities.

PDP acknowledges that dust generation can occur during periods of very strong winds, particularly within exposed coastal environments such as Taharoa. However, when the proposed rehabilitation, stabilisation, monitoring, and operational dust management measures are implemented, PDP considers that activities undertaken within the Central and Southern Blocks are unlikely to result in offensive or objectionable dust effects beyond the site boundary.

PDP considers that the initially proposed, and subsequently revised, consent conditions and EMP provide a robust framework for managing dust effects. This framework includes continuous PM_{10} monitoring around the site in targeted locations, a NESAQ-compliant PM_{10} monitor at Taharoa kura, monitoring near sensitive receptors, progressive rehabilitation requirements, and a targeted Priority Stabilisation Area.

Overall, PDP considers that the assessments presented within the AQA, together with the additional investigations and responses contained in this memorandum, demonstrate that the adverse air quality effects associated with the proposed activities can be appropriately managed through the proposed monitoring programme, consent conditions, and EMP. Accordingly, PDP maintains its conclusion that the proposed activities are unlikely to result in offensive or objectionable air quality effects on surrounding communities, provided the proposed mitigation and management measures are implemented.

10.0 Limitations

Where this memorandum identifies that it has been prepared by PDP on the basis of information provided by Taharoa Ironsands Limited, PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the memorandum. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This memorandum has been prepared by PDP on the specific instructions of Taharoa Ironsands Limited for the limited purposes described in the memorandum. PDP accepts no liability if the memorandum is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

Prepared by

Cameron Brown

Air Quality Engineer

Reviewed and Approved by

Andrew Curtis

Technical Director – Air Quality

Appendix A: Dust Deposition Analysis

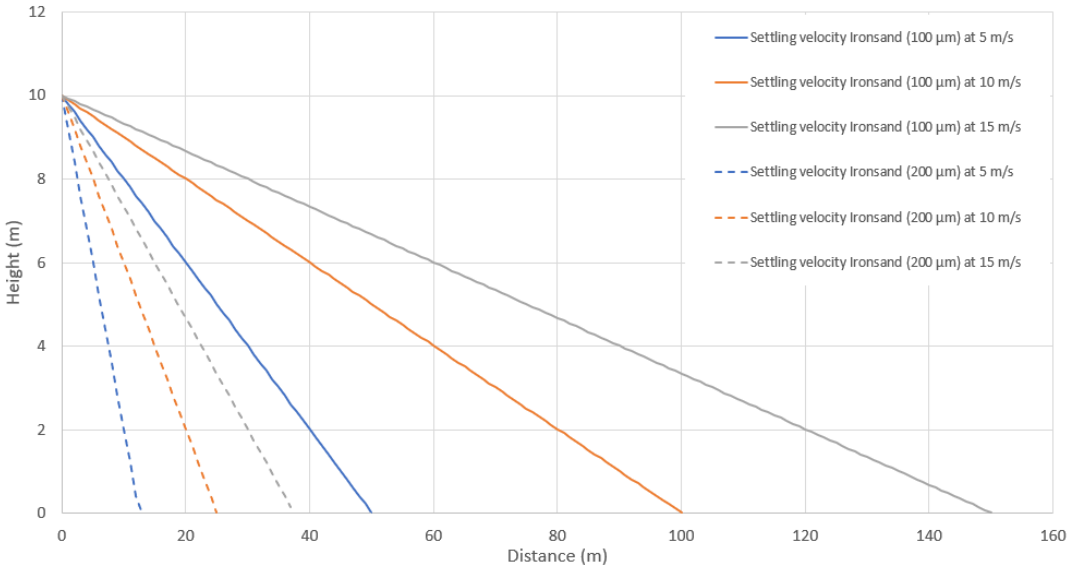


Figure 5: Ironsand Deposition Distances – 10 m Release Height

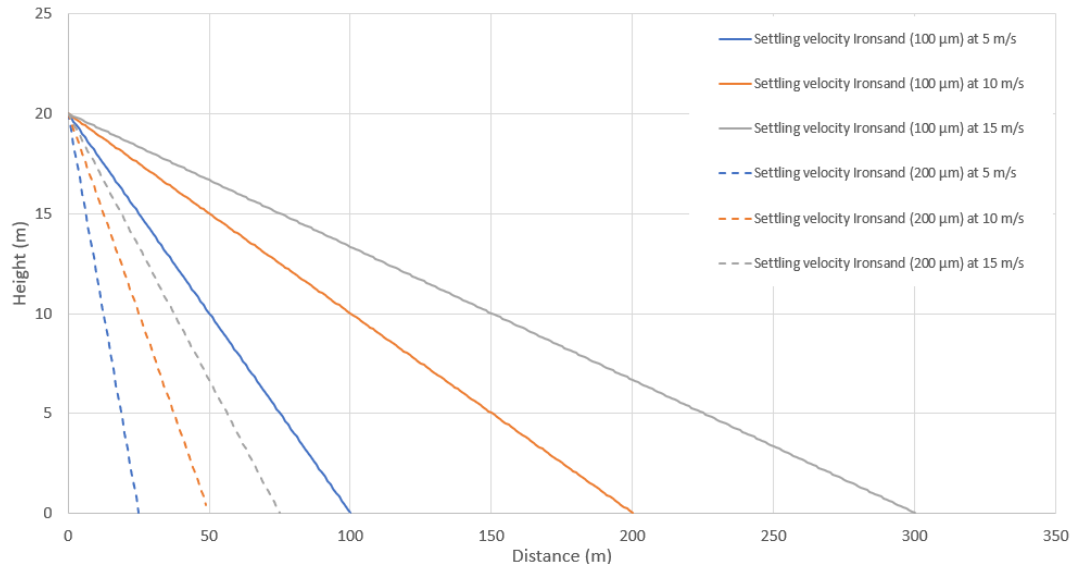


Figure 6: Ironsand Deposition Distances – 20 m Release Height

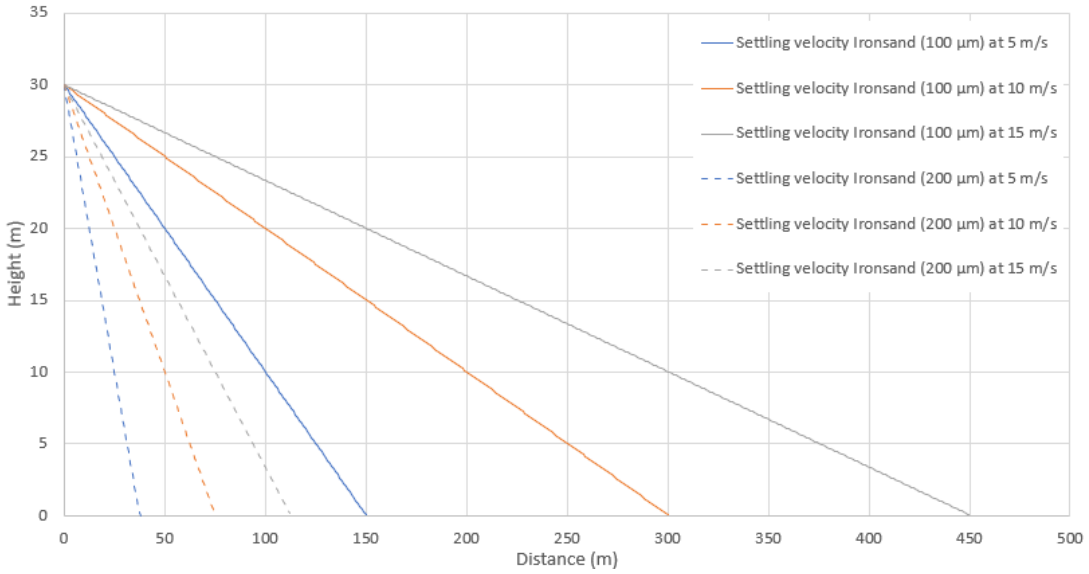


Figure 7: Ironsand Deposition Distances – 30 m Release Height

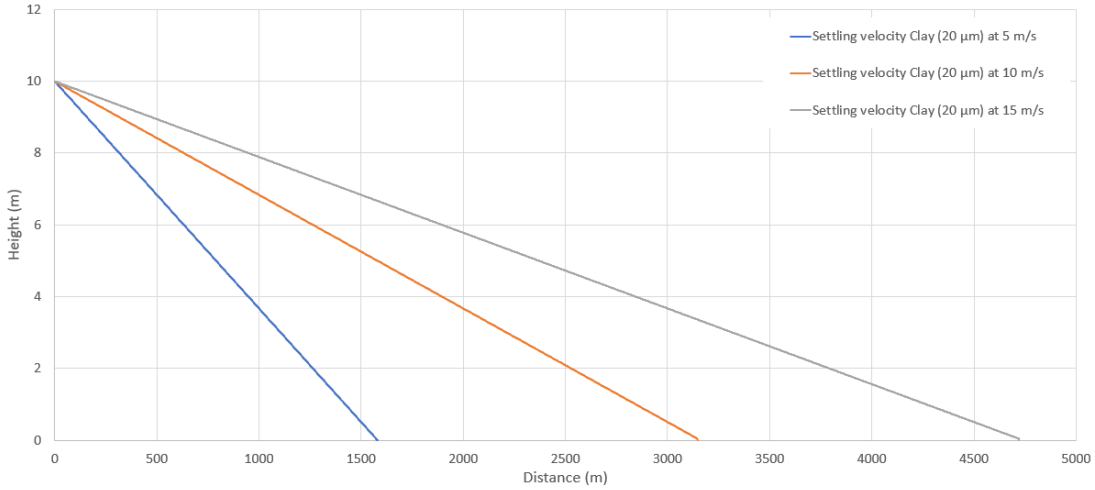


Figure 8: Clay Deposition Distances – 10 m Release Height

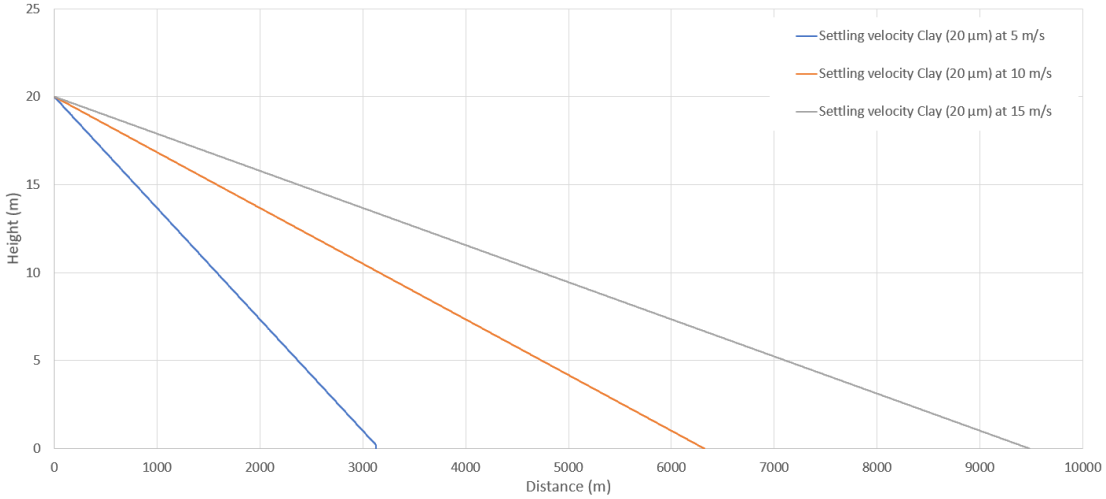


Figure 9: Clay Deposition Distances – 20 m Release Height

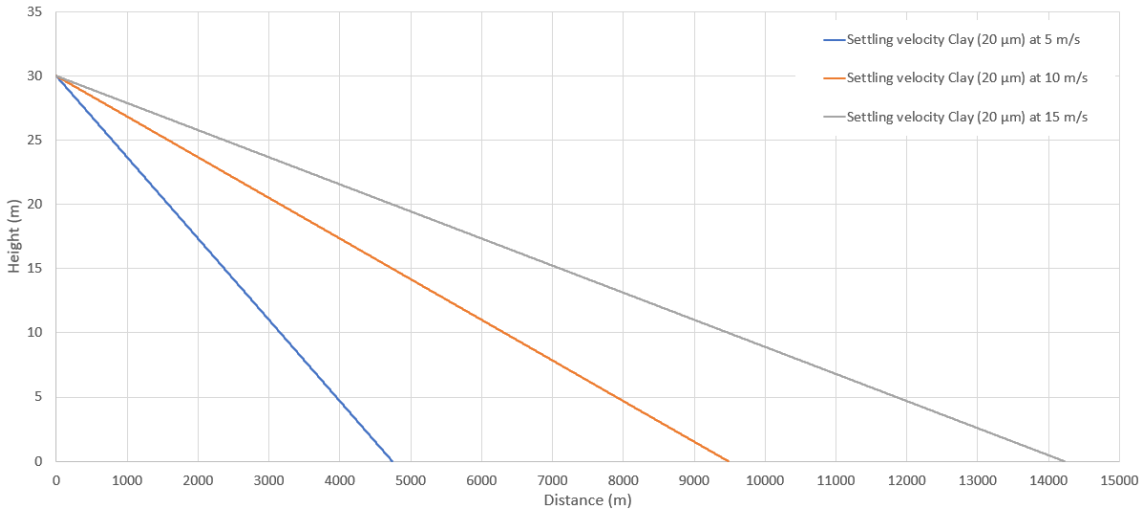


Figure 10: Clay Deposition Distances – 30 m Release Height

Appendix B: PSD Results

3 June 2026
Our Ref: 1103177.0000.0.0/Rep1
Customer Ref: A038800001

Pattle Delamore Partners Limited
P O Box 9528
Newmarket
Auckland 1149

Attention: Cameron Brown

Dear Cameron

Taharoa Central and Southern

Laboratory Test Report

Samples from the above-mentioned site have been tested as received according to your instructions and the results are included in this report. Results apply only to the sample(s) tested.

Descriptions are enclosed for your information but are not covered under the IANZ endorsement of this report.

This report has been prepared for the benefit of Pattle Delamore Partners Limited, with respect to the particular brief given to us and it cannot be relied upon in other contexts or for any other purpose without our prior review and agreement.

This report may be reproduced only in full.

Samples not destroyed during testing will be retained for one month from the date of this report before being discarded. If we can be of any further assistance, feel free to get in touch. Contact details are provided at the bottom of this page.

GEOTECHNICS LTD

Report approved by:

.....
Eliza Morton
Laboratory Manager
Key Technical Person

Authorised for Geotechnics by:

.....
Corey Papu-Gread
Project Director

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

3-Jun-26
\\ttgroup.local\corporate\GeotechnicsGroup\Projects\1103177\IssuedDocuments\Report 1

GEOTECHNICS

1 Hill Street
Onehunga
Auckland 1061
New Zealand
p. +64 9 356 3510

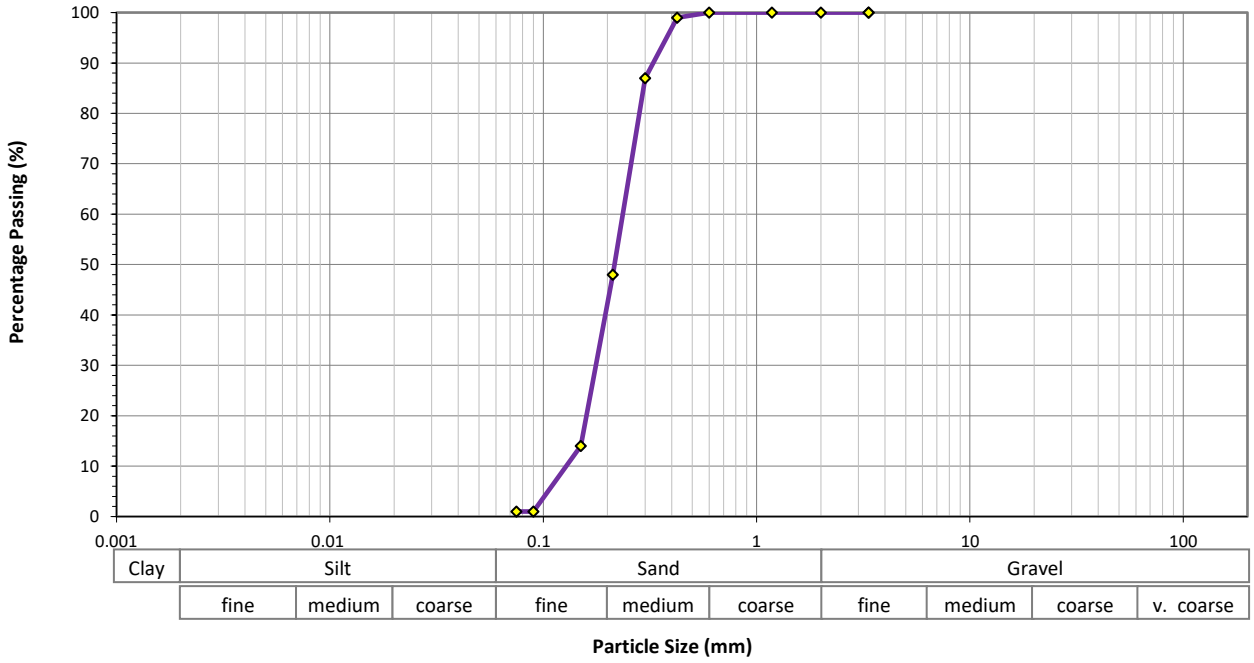
Geotechnics Project ID	1103177.0000.0.0
Customer Project ID	A038800001

Determination of the Particle Size Distribution - NZS 4402:1986 Test 2.8.1 (Wet Sieve)

TEST DETAILS

LOCATION	**ID**	-		
	Description	Taharoa Central and Southern		
	Data	N/A		
SAMPLE	**Geotechnics ID**	AKL1398.1		
	Reference	South Tails 15	**Depth**	0.05
	Description	Fine SAND; grey. Moist		
SPECIMEN	**Reference**	-	**Depth**	N/A
	Description	-		

TEST RESULTS



Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	-	0.300	87
100	-	19.0	-	3.35	100	0.212	48
75.0	-	16.0	-	2.00	100	0.150	14
63.0	-	13.2	-	1.18	100	0.090	1
53.0	-	9.50	-	0.600	100	0.075	1
37.5	-	6.70	-	0.425	99	0.063	-

TEST REMARKS

• The material used for testing was natural, whole soil. • The percentage passing the <0.063mm was obtained by difference.

This test result is IANZ accredited.

Approved by KTP	ELMO	**Date**	3/06/2026

Our Ref: 1103177.0000.0.0/Rep1

GEOTECHNICS

1 Hill Street
Onehunga
Auckland 1061
New Zealand
p. +64 9 356 3510

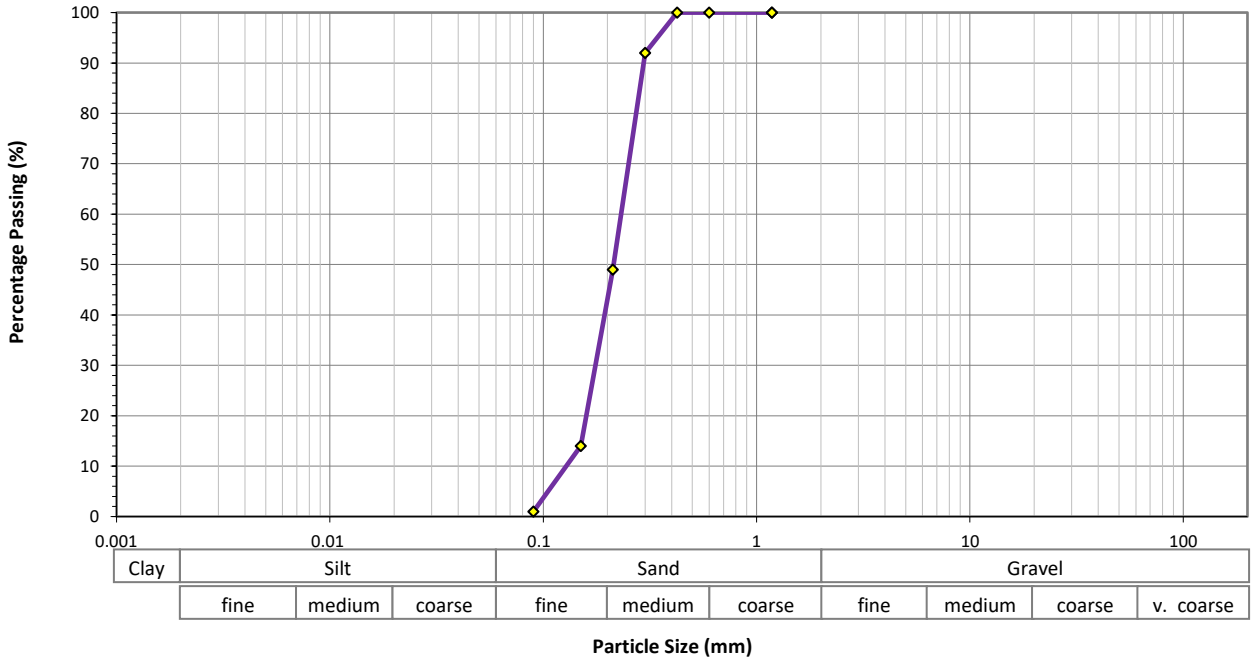
Geotechnics Project ID 1103177.0000.0.0
Customer Project ID A038800001

Determination of the Particle Size Distribution - NZS 4402:1986 Test 2.8.1 (Wet Sieve)

TEST DETAILS

LOCATION	**ID**	-		
	Description	Taharoa Central and Southern		
	Data	N/A		
SAMPLE	**Geotechnics ID**	AKL1398.2		
	Reference	Central - N Ridge	**Depth**	0.05
	Description	Fine SAND; grey. moist		
SPECIMEN	**Reference**	-	**Depth**	-
	Description	-		

TEST RESULTS



Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	-	0.300	92
100	-	19.0	-	3.35	-	0.212	49
75.0	-	16.0	-	2.00	-	0.150	14
63.0	-	13.2	-	1.18	100	0.090	1
53.0	-	9.50	-	0.600	100	0.075	-
37.5	-	6.70	-	0.425	100	0.063	-

TEST REMARKS

• The material used for testing was natural, whole soil. • The percentage passing the <0.063mm was obtained by difference.

This test result is IANZ accredited.

Approved by KTP ELMO **Date** 3/06/2026

Our Ref: 1103177.0000.0.0/Rep1

GEOTECHNICS

1 Hill Street
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New Zealand
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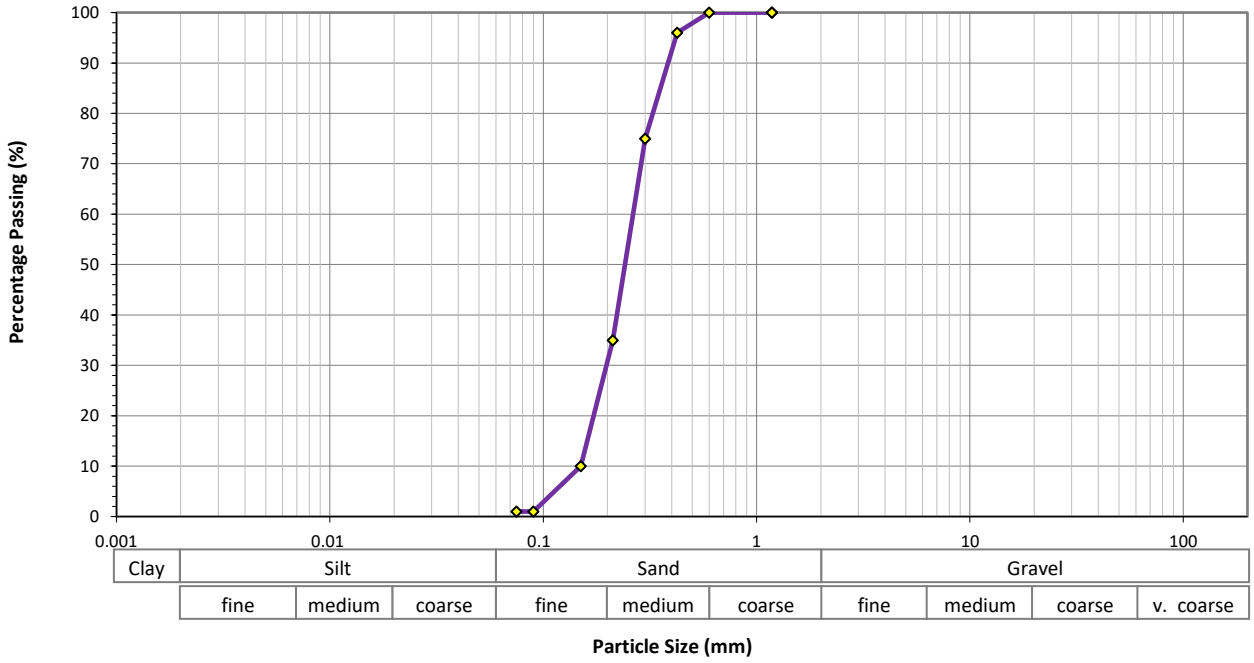
Geotechnics Project ID	1103177.0000.0.0
Customer Project ID	A038800001

Determination of the Particle Size Distribution - NZS 4402:1986 Test 2.8.1 (Wet Sieve)

TEST DETAILS

LOCATION	**ID**	-		
	Description	Taharoa Central and Southern		
	Data	N/A		
SAMPLE	**Geotechnics ID**	AKL1398.3		
	Reference	NE Central Tails	**Depth**	0.05
	Description	Fine SAND; grey. Moist		
SPECIMEN	**Reference**	-	**Depth**	-
	Description	-		

TEST RESULTS



Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	-	0.300	75
100	-	19.0	-	3.35	-	0.212	35
75.0	-	16.0	-	2.00	-	0.150	10
63.0	-	13.2	-	1.18	100	0.090	1
53.0	-	9.50	-	0.600	100	0.075	1
37.5	-	6.70	-	0.425	96	0.063	-

TEST REMARKS

• The material used for testing was natural, whole soil. • The percentage passing the <0.063mm was obtained by difference.

This test result is IANZ accredited.

Approved by KTP	ELMO	**Date**	3/06/2026

Our Ref: 1103177.0000.0.0/Rep1

GEOTECHNICS

1 Hill Street
Onehunga
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New Zealand
p. +64 9 356 3510

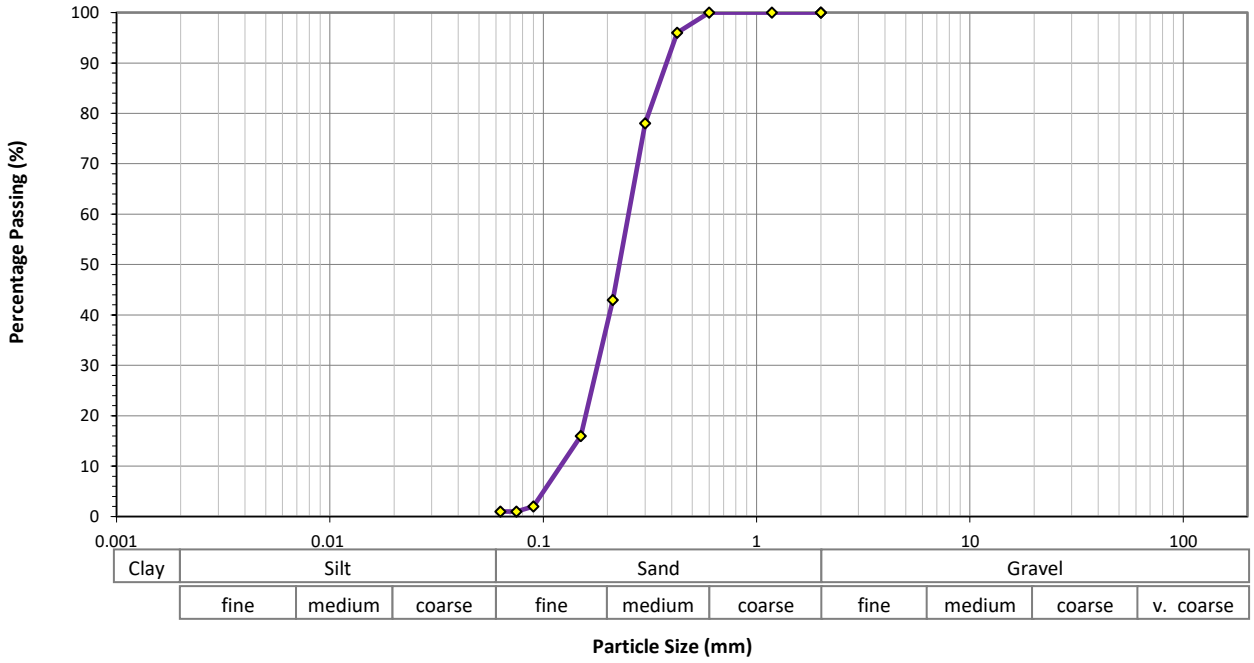
Geotechnics Project ID	1103177.0000.0.0
Customer Project ID	A038800001

Determination of the Particle Size Distribution - NZS 4402:1986 Test 2.8.1 (Wet Sieve)

TEST DETAILS

LOCATION	**ID**	-		
	Description	Taharoa Central and Southern		
	Data	N/A		
SAMPLE	**Geotechnics ID**	AKL1398.4		
	Reference	Unprocessed DMU3	**Depth**	0.05
	Description	Fine SAND; dark grey. Moist		
SPECIMEN	**Reference**	-	**Depth**	N/A
	Description	-		

TEST RESULTS



Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	-	0.300	78
100	-	19.0	-	3.35	-	0.212	43
75.0	-	16.0	-	2.00	100	0.150	16
63.0	-	13.2	-	1.18	100	0.090	2
53.0	-	9.50	-	0.600	100	0.075	1
37.5	-	6.70	-	0.425	96	0.063	1

TEST REMARKS

• The material used for testing was natural, whole soil. • The percentage passing the <0.063mm was obtained by difference.

This test result is IANZ accredited.

Approved by KTP	ELMO	**Date**	3/06/2026

Our Ref: 1103177.0000.0.0/Rep1

GEOTECHNICS

1 Hill Street
Onehunga
Auckland 1061
New Zealand
p. +64 9 356 3510

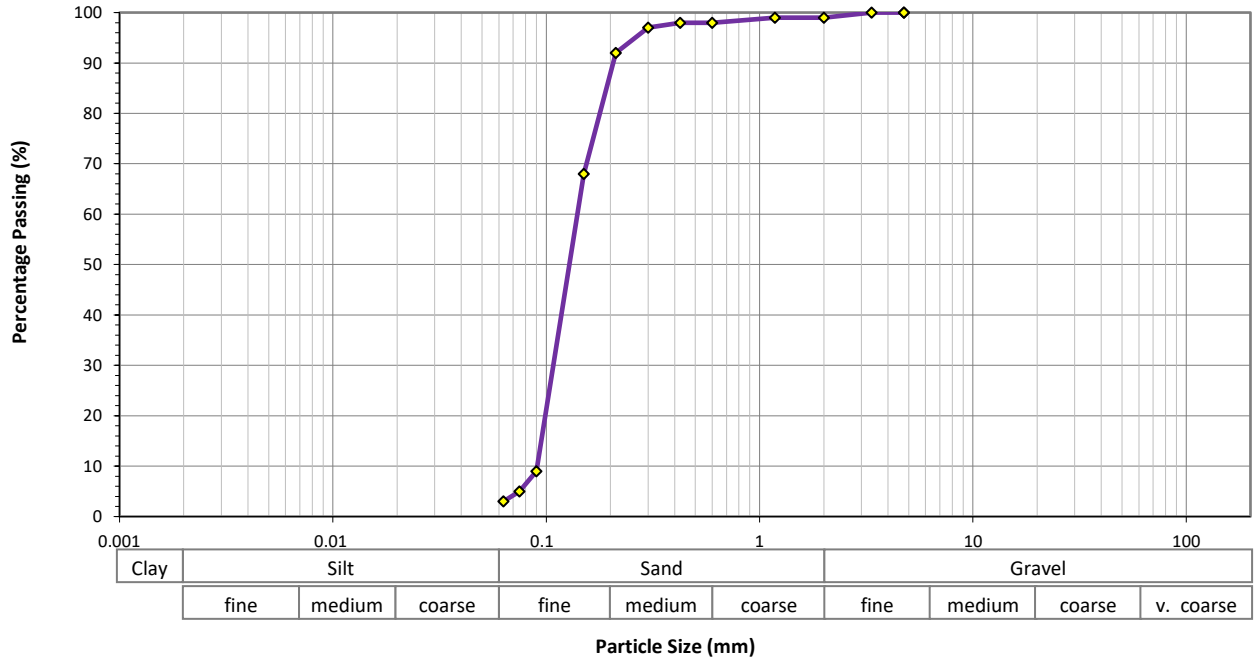
Geotechnics Project ID 1103177.0000.0.0
Customer Project ID A038800001

Determination of the Particle Size Distribution - NZS 4402:1986 Test 2.8.1 (Wet Sieve)

TEST DETAILS

LOCATION	**ID**	-		
	Description	Taharoa Central and Southern		
	Data	N/A		
SAMPLE	**Geotechnics ID**	AKL1398.5		
	Reference	Processed Stockpile	**Depth**	0.05
	Description	Fine SAND; black. Moist		
SPECIMEN	**Reference**	-	**Depth**	-
	Description	-		

TEST RESULTS



Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)	Sieve Size (mm)	Percentage Passing (%)
150	-	26.5	-	4.75	100	0.300	97
100	-	19.0	-	3.35	100	0.212	92
75.0	-	16.0	-	2.00	99	0.150	68
63.0	-	13.2	-	1.18	99	0.090	9
53.0	-	9.50	-	0.600	98	0.075	5
37.5	-	6.70	-	0.425	98	0.063	3

TEST REMARKS

• The material used for testing was natural, whole soil. • The percentage passing the <0.063mm was obtained by difference.

This test result is IANZ accredited.

Approved by KTP ELMO **Date** 3/06/2026

Our Ref: 1103177.0000.0.0/Rep1

Appendix C: XRD Results

XRD Adelaide Laboratory - 3/224 Glen Osmond Road, Fullarton, SA 5063
Agon Environmental Pty Ltd ABN 29 167 746 063
admin@agonenviro.com.au (08) 8166 2410
www.agonenviro.com.au

Crystalline Silica Report

CLIENT:	Pattle Delamore Partners Limited	**AGON JOB NO:**	JH25.0042-38
ATTENTION:	Cameron Brown	**CLIENT CONTACT:**	0212267415
YOUR REF:	PO A038800001	**RECEIVED IN LAB:**	10 June 2026
SITE:	Taharoa Mine		

INTRODUCTION

The samples were received via CES Ltd, Lower Hutt. They were heat-treated at 120°C for 3 hours to satisfy AQIS that all living organisms had been killed. A request was received to determine the crystalline silica content of the smallest sieved size fraction available. The laboratory holds a 0.038mm (38 micrometre) sieve.

PROCEDURE

The samples were dry-sieved at 150µm and 38µm. The purpose of the 150µm sieve was to prevent overloading of the 38µm sieve. The -38µm size fraction was analysed by X-ray diffraction to determine the minerals present. XRD identifies crystalline substances via their crystal structure. Quartz was detected in four of the samples and its content determined by XRD measurements of the sample and of a pure quartz standard. The X-ray absorbencies of the samples were considered to be similar to that of quartz and hence no corrections were applied. In sample NE Central Tails there were no -38µm particles and the -150µm +38µm size fraction was analysed instead.

RESULTS

CES Lab Sample ID	Client Sample ID	Crystalline Silica (Quartz) content of the -38µm size fraction (estimated wt%)
212137	Processed Stockpile	1.7
212138	Unprocessed DMU3	0.5
212139	Central – N Ridge	0.3
212140	NE Central Tails	There were no -38µm size fraction particles Not detected in the -150µm +38µm size fraction
212141	South Tails 15	0.9

The raw data is given below

Michael Till
Testing Officer
Senior Mineralogist

XRD Adelaide Laboratory - 3/224 Glen Osmond Road, Fullarton, SA 5063
Agon Environmental Pty Ltd ABN 29 167 746 063
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Client Sample ID	Sample Weight (g)	-38µm Size Fraction (g)	Quartz content of the -38µm size fraction (est wt%)	-38µm quartz as a % of the total sample
Processed Stockpile	76.6	0.504	1.7	0.0112
Unprocessed DMU3	58.7	0.084	0.5	0.0007
Central – N Ridge	81.9	0.043	0.3	0.0002
NE Central Tails	60.4	6.57*	Not detected	
South Tails 15	89.8	0.104	0.9	0.0010

* Weight of the -150µm +38µm size fraction

Client Sample ID	Other minerals detected in the -38µm size fraction
Processed Stockpile	Titanomagnetite, diopside, andesine, clay, hematite
Unprocessed DMU3	Andesine, diopside, titanomagnetite, hornblende
Central – N Ridge	Andesine, diopside, titanomagnetite
NE Central Tails^	Titanomagnetite, diopside, hornblende, hematite, albite
South Tails 15	Titanomagnetite, diopside, andesine, hornblende

^ -150µm +38µm size fraction

Appendix D: Proposed Changes to Draft AQ Consent Conditions

Appendix E – Amendment to conditions of AUTH 142035.01.01 and the Schedule 1 General Conditions

Dust Effects Management

8 The Consent Holder shall implement measures to manage dust to ensure that all activities in the Consent Area comply with the following:

(a) There shall be no discharge of contaminants beyond the boundary of the Consent Area that has adverse effects on human health, or the health of flora and fauna.

(b) There shall be no discharge of particulate matter that is objectionable to the extent that it causes an adverse effect at or beyond the boundary of the Consent Area.

(c) The discharge shall not significantly impair visibility beyond the boundary of the Consent Area.

9 The Consent Holder shall ensure that within the 100m Priority Stabilisation Area shown in green in Figure 1 below:

a) extraction of sand is completed within 12 months of the date of commencement of this consent; and

b) ~~, within three months of all mining being completed within the 100m Priority Stabilisation Area shown in green in Figure 1 below, any exposed surface within that area shall be stabilised~~ stabilisation of any exposed surfaces shall be completed within 3 months of mining operations being completed. Stabilisation in this area involves compaction and surface stabilisation to minimise the potential for discharges of dust.

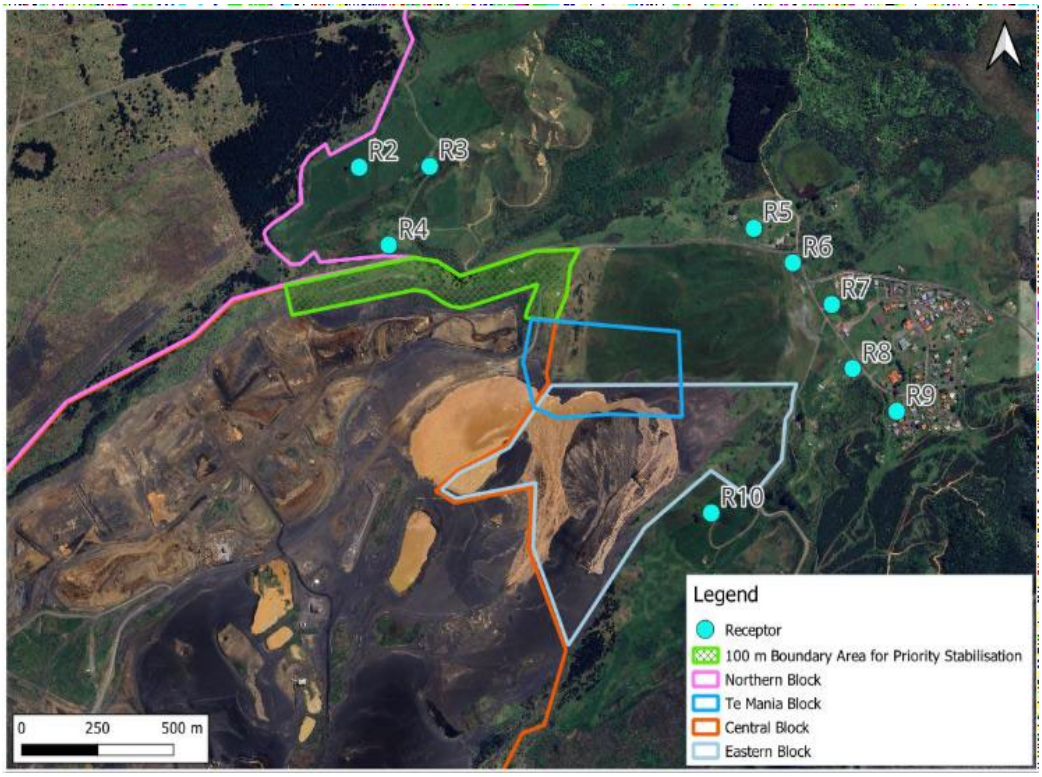

Figure 1

10. The Consent Holder must continuously monitor dust discharges using at least six (6) PM_{10} dust monitors ~~located within the Consent Area~~, including one located upwind and one located downwind of the Consent Area, one located in proximity to Taharoa school/Kura, one located between the boundary of the Central Block and receptor R4, and one located in proximity to the ~~three nearest residential~~ receptors R2 and R3.

11. The PM_{10} monitor adjacent to Taharoa school/Kura shall use an Approved Method compliant with Schedule 2 of the National Environmental Standards for Air Quality (NESAQ).

12. The continuous PM_{10} monitors shall provide a minimum of 75% validated data.

13. The PM_{10} monitor adjacent to Taharoa school/Kura shall be installed and operational within 6 months of the commencement of this consent.

14. The Concentrations of PM_{10} recorded at the monitor adjacent to Taharoa school/Kura shall not exceed 50µg/m^3 as a 24-hour average.

15. With the exception of the monitor at Taharoa school/Kura the dust monitors in the locations required by condition 10 shall, for a maximum of 16 months from the commencement of this consent, monitor Total Suspended Particulate (TSP). The TSP data shall be used to inform PM_{10} trigger values and responses that shall be included in the dust management chapter of the Environmental Management Plan for the site required by condition 18 of the General Conditions in Schedule One.

16. With the exception of the monitor at Taharoa school/Kura, the PM_{10} dust monitors in the locations required by condition 10 shall be installed and operational within 4 months of the date of certification by Waikato Regional Council of the Environmental Management Plan for the site.

Consequential Amendment to EMP condition in the Schedule 1 General Conditions to reflect the above:

18. The Consent Holder must prepare a dust management chapter, the objective of which is to avoid offensive or objectionable dust discharges and dust related effects from the mining operations on the site in accordance with the requirements of conditions 8 to 10 inclusive of AUTH142035.01.01. The dust management chapter must include:

    (a) A general description of the activities and main potential sources of dust emission;
    (b) A description of the dust mitigation mechanisms which will be deployed on site, including an inventory of relevant equipment, materials and relevant operating procedures, Total Suspended Particulate and PM_{10} trigger levels for the implementation of dust suppression measures, an inventory of relevant equipment and materials, and contingency procedures;
    (c) A description of the staff training required, including areas relevant staff are to be trained in, mitigation methods to be used, frequency of training and where training records are to be kept; and
    (d) Monitoring procedures~~, including frequency and kind of monitoring to be undertaken to comply with condition 8 and 10 of AUTH142035.01.01,~~ records to be kept and a process for review and reporting where required.