IN THE MATTER	of the Resource Management Act 1991
AND	
IN THE MATTER	of an application for resource consents by **TIGA MINERALS AND METALS LTD**
AND	
IN THE MATTER	of a submission by the
	COAST ROAD RESILIENCE GROUP INC

Lay witness statement of evidence of Suzanne Hills
For COAST ROAD RESILIENCE GROUP INC
Topic Hydrology and Functional Need

Dated: 31 January 2024

Coast Road Resilience Group Inc

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INTRODUCTION

1. My full name is Suzanne Denise Hills. I have a B.Tech (Hons) in Biotechnology and Bioprocess Engineering, Massey University, 1992. I had a career in the food industry in New Zealand and the UK in technologist, technical management and auditing roles for 17 years. Before moving to the West Coast I spent 8 years on a life's sailing adventure. I hold current roles of West Coast branch chair of Forest & Bird; chair of Coast Road Dawn Chorus Inc, and trustee of the West Coast Penguin Trust.

2. I am a member of the Coast Road Resilience Group Inc. (CRRG). I have been asked by the CRRG to provide lay witness evidence in relation to hydrology and functional need. I am not an expert in this matter and this report is not intended as expert evidence. I have prepared this statement of evidence for the CRRG in relation to this application.

3. I am familiar with the TIGA application site because I have lived on the Barrytown Flats for 7 years.

4. In preparing this statement of evidence, I have reviewed the following documents:

    - TiGa RC Application AEE Final and all of the application's attachments; all of the Amendment to Application documents; and all of the Request for Information documents.
    - Final Terrestrial Ecology Peer Review by Mike Harding
    - Both WGA hydrological and hydrogeological Peer Reviews
    - Statement of evidence of Jens Haaye Rekker
    - Statement of evidence of Gary Bramley
    - Statement of evidence of Robert Brand
    - Statement of evidence of Cameron Andrew Wylie
    - Statement of evidence of Gary Charles Teear
    - Statement of evidence of Michael George Fitzpatrick
    - Statement of evidence of Mark Roper
    - Statement of evidence of Professor Brian L. McGlynn
    - Submissions 189, 223, 237, 241, 256
    - GDC and WCRC s42a Officers Reports
    - Grey District Significant Natural Areas Assessment – 1 June 2006 [PUN-W034]

5. In addition to providing this statement in support of the CRRG, I also lodged a personal submission in relation to the TIGA Minerals and Metals Ltd application.

SCOPE OF EVIDENCE

6. This evidence focusses on the hydrology and functional need. Other CRRG members and expert witnesses will be providing evidence on other aspects of the application.

Summary

1. The proposal would likely disrupt the area's complex naturally functioning hydrological system, with the potential to cause permanent adverse changes to the hydrology of the site and surrounding area.

2. The proposed management activities and the 20m buffer from wetlands are not sufficient to avoid adverse effects. The proposal is likely to result in partial drainage, changes in the water level range or hydrological function of the area's wetlands.

3. I could not find evidence in the application that MODFLOW (which was used to design the water quantity management system) has been validated for a mineral sands mining operation in an area with similar geology and high rainfall.

4. The applicant has not demonstrated functional need to mine at the proposed site. Under regulation 45D(6) of the National Environmental Standards for Freshwater Regulations 2020, the consent cannot be granted.

5. The proposal is inconsistent with The NZ Coastal Policy Statement (NZCPS) 2010 requiring that activities avoid significant adverse effects on vulnerable coastal ecosystems, including lagoons and coastal wetlands.

Resource Management (National Environmental Standards for Freshwater) Regulations 2020, s45D

6. Regulation 45D lists discretionary activities. The application is a discretionary activity under s45D(3), (4), and (5):

   (3) Earthworks or land disturbance outside a 10 m, but within a 100 m, setback from a natural inland wetland is a discretionary activity if it— (a) is for the purpose of the extraction of minerals and ancillary activities; and (b) results, or is likely to result, in the complete or partial drainage of all or part of the wetland.
   (4) The taking, use, damming, or diversion of water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if— (a) the activity is for the purpose of the extraction of minerals and ancillary activities; and (b) there is a hydrological connection between the taking, use, damming, or diversion and the wetland; and (c) the taking, use, damming, or diversion will change, or is likely to change, the water level range or hydrological function of the wetland.
   (5) The discharge of water into water within, or within a 100 m setback from, a natural inland wetland is a discretionary activity if— (a) the discharge is for the purpose of the extraction of minerals and ancillary activities; and (b) there is a hydrological connection between the discharge and the wetland; and (c) the discharge will enter the wetland; and (d) the discharge will change, or is likely to change, the water level range or hydrological function of the wetland.

7. Regulation 45D(6) states: *A resource consent for a discretionary activity under this regulation must not be granted unless the consent authority has first— (a) satisfied itself that the*

extraction of the minerals will provide significant national or regional benefits; and (b) satisfied itself that there is a functional need for the extraction of minerals and ancillary activities in that location; and (c) applied the effects management hierarchy.

8. In the applicant's Ecological Effects Assessment the existence of wetlands within 100m of the proposed site and mine disturbance area is fully acknowledged:
   1.3 Because the site is located in the coastal environment and adjoins streams and wetlands,...
   3.1.2 ...in the coastal lagoon and wetlands surrounding the site...
   3.2 We have assumed here that natural inland wetlands are present near the site (i.e., within 100 m).
   4.1 ...have assumed that these areas are natural inland wetlands and effects must therefore be avoided in accordance with the NPS-FM.
   5.1 ...we have assumed that wetlands are present and that effects on wetlands outside the site will need to be avoided
   9.3 *...affect wetlands north of the property boundary, including the flax wetlands on the upstream side of Rusty Lagoon and the area of kahikatea wetland in the vicinity of PZ12,...*

9. The presence of wetlands ***within*** the site is also acknowledged in the AEE:
   1.3 The findings with respect to wetlands at the site (Section 5).
   *8.2 The lagoon [Canoe Creek coastal lagoon] is well connected to **other wetland areas** immediately nearby...*[bold my emphasis]

10. In the same Ecological Effects Assessment (EEA) it is stated in *8.2 **There are no wetlands within the site...***[bold our emphasis]. Figure 7 of the EEA indeed delineates the site boundary and excludes Canoe Creek coastal lagoon. However, in the both the applicant's earlier **Att B – TiGa Site Plan**, and **Att F – Amended Site Plan**, there is no 'site boundary' delineated. Instead there is an 'Application Area' delineated by a red line which *includes* Canoe Creek coastal lagoon, and a 'Mining Disturbance Limit' that excludes the lagoon. Additionally, **section 5 Wetlands** of the Ecological Effects Assessment, refers to the Canoe Creek coastal lagoon. And **section 5.2 Coastal Lagoon** details the wetland values of the coastal lagoon. Further, in the applicant's **Att Q – Compliance Assessment**, it is stated on p14: *For the avoidance of doubt, there are no wetlands within the application area.* Clearly the applicant is in error when purporting that *there are no wetlands within the application area* (or site).

11. Mining, land re-contouring, water treatment ponds excavations, and the taking, use, diversion and discharge of water are proposed up to 20m from inland wetlands. The proposed activities are likely to result in partial drainage, change to water levels or hydrological function.

12. The design of the water quantity management system is based on MODFLOW (a hydrogeologic model). I could not find confirmation in the application that MODFLOW has been validated for a mineral sands mining operation in a high rainfall area. In other words, it is unclear that MODFLOW has been tested for an operational site with similar geology and

rainfall i.e. one operating below groundwater in a complex interconnected hydrological system that has a high and extensive water table, receives high annual rainfall [https://niwa.co.nz/climate/information-and-resources/citizen-science-new-zealand-rainfall-monitoring-network, site: F21232 Fagan Creek Rainfall Station] and is connected to a large high altitude catchment area with very high annual rainfall.

13. This leaves the proposed operation as an experiment and puts the complex naturally functioning hydrological system at risk of being disrupted, potentially permanently. I highlight an excerpt from paragraph 23 of Professor Brian L. McGlynn's statement of evidence: *Models such as those as employed here are merely hypothesis and almost certainly wrong, representing only first approximations of the assumptions and limited data used to initialise and constrain them. Models such as MODFLOW can be self-fulfilling prophecies and are sensitive to almost countless assumptions, data and model limitations, and unforeseen parameter interactions and uncertainty propagations.*

14. The statement of evidence of Jens Rekker appears to acknowledge that model validation for the site is ongoing, stating in paragraph 41: *Mitigation would be guided by water level and flow monitoring (perhaps 4 years of data defining seasonal patterns) and prior computer groundwater modelling. This data would be employed to apply the infiltration water in locations for most benefit in minimising water table lowering or surface water depletion.*

15. The applicant has acknowledged that they are likely to change the water level range. Section 9.3 **Effects on Wetlands** of the Ecological Effects Assessment (p.56):
    "The proposed management concept would maintain ground water levels at or above the pre-mining median at the site boundary and therefore in the adjoining wetlands. This would likely reduce the upper water levels to some degree (i.e., the wetlands wouldn't get as wet following large rain events), and also raise the lower levels (i.e., they wouldn't get as dry during periods of low rainfall)."

16. The application by Westland Mineral Sands (WMS) for the operation at Okari Road commissioned Mr Zeb Etheridge of Kōmanawa Solutions as their hydrological expert - the same person and company used by this applicant. WMS were subsequently issued with an abatement notice for sediment discharges over consented limits. Mr Mudgway of WMS acknowledged in a Westport News article dated 14th June 2023:
    "The ponds don't actually drain in the way the experts thought they would. The sand is so thick it doesn't actually drain in that way. It actually just accumulates."

    See Figure 1 below:

Mineral sand mine ordered to stop discharge

12/06/23

Ellen Curnow

The West Coast Regional Council has ordered Westland Mineral Sands (WMS) to stop discharging sediment from its Cape Foulwind mine site.

Compliance officers had visited the site after receiving a complaint, said a report to this month's Resource Management Committee meeting.

When the officers made a follow-up visit and found the site was still discharging sediment, they took samples and issued an abatement notice ordering WMS to cease the discharge.

"The analysis of the samples taken show that the discharge was over its consented limits."

The council hadn't recommended enforcement action at the time the report was written.

WMS received one of just two formal abatement notices listed in this month's report. The other was for unauthorised discharge to water at a landfill at Coal Creek in Grey District.

The News is seeking comment from WMS.

'Whingers'

13/06/23

Ellen Curnow

Former West Coast Regional Council chair Allan Birchfield says the council's compliance officers are receiving too many complaints.

"We have become a nation of whingers," Cr Birchfield told councillors at today's Resource Management Committee.

The council investigated 12 complaints and issued two abatement notices in May, council staff reported.

"You see it here," Cr Birchfield said. "Pages and pages of complaints. Whenever anyone tries to do anything there's always somebody ringing up complaining."

He echoed National Party leader Christopher Luxon who was filmed talking to North Island farmers on Monday.

"We have become a very negative, wet, whiny, inward-looking country and we have lost the plot and we have got to get our mojo back," Mr Luxon said to one farmer.

"John (sic) Luxon's on the mark," Cr Birchfield said today.

Mine breach fixed – Mudgway

News 14/06/23

Ellen Curnow

Westland Mineral Sands (WMS) managing director Ray Mudgway says it's "bloody disappointing" the company's mine breached its consent agreements.

But the issue had now been fixed, he said.

The West Coast Regional Council this week reported that compliance officers twice visited the Cape Foulwind site and found sediment discharge over consented limits. The council issued an abatement notice ordering WMS to stop the discharge.

Mr Mudgway said the company would not hide from the fact it had breached its consent.

The site had settlement ponds which water ran to after it had been through the processing plant. It was supposed to seep through and leave sand behind, he said.

But the system did not work as planned.

"It was after a rain event and what had happened was the wall of the pond had washed away a bit in the storm. Not completely but there's a hole in it. So, the water out of that settlement pond was overflowing and into the farmland which we own but is not part of the consent."

The farmland was humped and hollowed for drainage, and dirty water ran down to the farm drain and into Blind River to the south.

WMS did not have consent to discharge sediment to land.

"The discharge from the settling ponds is supposed to go through the land, not onto the land... That's a breach of consent, therefore they have to issue an abatement notice, so that's what they did."

Mr Mudgway said he wasn't aware of any complaint from neighbouring property owners. The council report listed the breach as a complaint. Mr Mudgway believed the issue was self-reported.

Ray Mudgway

"We do monthly reports to the council, and we do water quality monitoring on various things. And one of them is turbidity."

There was no issue with chemical discharge because the plant did not use chemicals. The breach related to discolouration in the water.

"Basically, what happened is we did a report and we'd exceeded turbidity. So, we flagged that in our report, so they came out and inspected."

Mr Mudgway said he was not aware the council had twice found the mine in breach. He said the issue was fixed as soon as the notice was issued, and council officers had since visited and found the site compliant.

"We had 10 days to fix it and we actually shut down and fixed it within a couple of days. So, we got into it straight away. When the council came back after 10 days it had been fixed and there's been no issue since."

Finding the settling ponds "not really fit for purpose" meant WMS had learnt better ways to use its water, Mr Mudgway said.

"The ponds don't actually drain in the way the experts thought they would. The sand is so thick it doesn't actually drain in that way. It actually just accumulates."

The company had now installed pumps in the pond and was recirculating water back to the plant.

"Now we have times where we don't use any water because we're recycling more water. So that's a silver lining, if you like, from the issue."

News 14/06/23

Figure 1- Westport News article 14 June 2023 on WMS abatement notice

17. Regulation 45D(3), (4) or (5) are established as applying. Regulation 45D(6) provides that consent must not be granted unless the consent authority has

    (b) satisfied itself that there is a functional need for the extraction of minerals and ancillary activities in that location; and

    (c) applied the effects management hierarchy.

18. In relation to Regulation 45D(6)(b): functional need for the *extraction of minerals and ancillary activities in that location,* functional need is defined in the NPS Freshwater Management 2020 and is distinct from operational need (as defined in the National Planning Standards):

    ***Functional Need**: means the need for a proposal or activity to traverse, locate or operate in a particular environment because the activity can only occur in that environment.*

    ***Operational Need:** means the need for a proposal or activity to traverse, locate or operate in a particular environment because of technical, logistical or operational characteristics or constraints.*

19. Clearly the applicant has an operational need to locate in the particular environment of the proposed site because they have an access arrangement with the landowner and the logistical advantage of operating on a site adjacent to a state highway. The statement of evidence of Jens Rekker takes a very narrow view of functional need, stating in paragraph 32:

> *In instances where water management infrastructures, such as mitigation wells and trenches and Ponds 3 and 4 (see Project description for location and extent), would fall within 100 metres of a wetland. There is a functional need for the infrastructural elements to be so placed due to the geometry of the Mine Panels and the requirement to be in a location for catching the mine water flows not otherwise utilised in active mitigation.*

20. The applicant holds an 800ha mining permit (MP60785) covering the vast majority of the Barrytown Flats north of Canoe Creek. The NZ Petroleum and Minerals recommendation report for the issue of the mining permit [Refer to Attachment 1, CRRG Indigenous Biodiversity statement of evidence] delineates an indicated mineable mineral resource:

> *Para 51: In the application area* [of the 800ha mining permit]*contains variably indurated black sands thought to originate from the Alpine Schist. Up to 12 strandlines are identified in the Barrytown area. The westernmost strandlines form echelon ridges at an angle to the current coastline with the more eastern strandlines forming a series of long parallel ridges. This is demonstrated in Figure 4. HMC strandlines within the application area.*

The above recommendation report includes the attachment *Mining Permit Application: Supplementary Information by RCS*. Figure 10 on page 31 of this attachment shows fourteen separate areas of *Major Mineral Resource Areas (Ilmenite) within MP application (excluding DOC land).*

The applicant has also applied for an extension of MP60785 and a minerals exploration permit (60917.01) for hundreds of hectares of land on the Barrytown Flats south of Canoe Creek.

21. The application therefore fails the functional need test, as the NZ Petroleum and Minerals recommendation report demonstrates there are other mineral sands deposits on the Barrytown Flats covered by the applicant's mining permit. There are also other mineral sand deposits elsewhere on the West Coast (some of which Westland Mineral Sands is pursuing). Alternative locations can be identified that are not within 100m of a natural inland wetland. Therefore, under regulation 45D(6) of the National Environmental Standards for Freshwater, consent cannot be granted.

22. A consent condition of 100m setbacks from inland wetlands would not necessarily resolve the hydrological concerns. The complexity of the hydrology and the applicant's complicated management systems, along with the multitude of proposed activities of mining; land re-contouring; water treatment ponds excavations; and the taking, use, diversion and

discharging of water, would require a comprehensive hydrology re-assessment and re-design of the applicant's water quantity and water quality management systems. I note paragraph 52 of Professor Brian L. McGlynn's statement of evidence:

> *Earthworks, land drainage, takes, or discharges of water critical to wetland function can occur in, near, or distal to the boundary of wetlands since wetlands are typically an expression of landscape hydrology. 10m or 100m buffers around wetlands are arbitrary and can be inadequate depending on the landscape setting of a given wetland. Significant changes to surface and subsurface water flow patterns, magnitudes, and quality at distances much great than 100m can negatively impact wetland function and health. Assessment of whether a landuse change, drainage change, or major earthworks will negatively impact a given wetland necessitates consideration of the wetland water support areas and pathways regardless of distance.*

The New Zealand Coastal Policy Statement 2010

23. The proposal is inconsistent with The NZ Coastal Policy Statement 2010 requiring that activities avoid significant adverse effects on vulnerable coastal ecosystems, including lagoons and coastal wetlands.

Submissions and peer reviews

24. I endorse Mike Harding's terrestrial ecology peer review and note he covered in some detail *Modification of Vegetation/Habitats by Altered Hydrology* in paragraphs 62 to 68 and *Hydrology and Wetlands* in paragraphs 132 to 134.

25. I endorse the Forest & Bird submission (237) and share the organisation's concern: *"The activity will likely have adverse effects ... on freshwater ecosystems and the coastal marine area..."*

26. I agree with the Department of Conservation submission (241) and highlight the department's concerns regarding effects on freshwater values: *"The proposed mining activity has the potential changes to surface water hydrology (wetlands and streams) due to groundwater/surface water interactions. "*

27. I note many individual community members raised concerns regarding the impacts on the area's hydrology. In particular I wish to highlight the following submissions:

    - S Freeman (189): *There are potential impacts from hydrological changes on adjoining indigenous vegetation and wetlands. The hierarchy of alternative mitigation measures proposed suggest the applicant is unclear about the potential hydrological impacts.*
      The proposal has the potential for causing permanent adverse changes to the hydrology of the site and surrounding area.

There are potential impacts from mine water discharges to the surrounding water bodies.

- Dr R Gamlen-Greene (223): *The proposed augmentation plan is not sufficiently detailed to convince me that it will be successful.*

- D Langridge (256): *Tiga trial and error approach could lead to permanent adverse impacts to coastal environment, neighbouring properties and SNA. There is doubt, from people who know, about Tiga's water management methods.*

s42A Officers Report for WCRC

28. Para 4:*... there is not a sufficient case for granting the resource consents. The key element of the application is the need for it to establish a "functional need" for the activity in this location. Specifically, the relevant location is the Canoe Creek Lagoon (a natural inland wetland) and the margin of 100m around it ...*

    I agree with this conclusion, but note that there are additional inland wetlands adjoining the proposed site to the north. Specifically: the wetlands of Rusty Lagoon (which Dr Durand may have considered is a part of the Canoe Creek Lagoon system) and the kahikatea wetland further east of Rusty Lagoon. I refer to my paragraph 8 above where the applicant acknowledges these wetlands. They are within 100m of the proposed activities of mining and land re-contouring; taking, use, or diversion of water; and/ or the discharge of water. Therefore regulation 45D also applies to these two additional locations out to the 100m margin.

29. Further to the above, I note that para [127] does not list the wetlands of the Rusty Lagoon and the kahikatea wetland.

30. I agree with the fundamentally important point made in para [145] *In practice this may be too complex to achieve and show compliance...*and reiterate the point made in paragraph 12 that this leaves the proposed operation as an experiment, and puts the complex naturally functioning hydrological system at risk of being disrupted.

31. I agree with para [153] along with the excellent and comprehensive analysis on functional need in para [163].

32. I agree with para [159] *By this logic I cannot see that the application passes the functional need test in Regulation 45D(6) of the NES-F. The application must be declined on that basis.*

s42A Officers Report for GDC

33. Para 229: *With this statement in mind, there remains uncertainty regarding the viability of the proposed management measures to mitigate groundwater and surface water effects and subsequently the effects on the adjoining ecosystems.*

I agree with this conclusion and add that uncertainty entails risk. Valuable and vulnerable coastal wetlands and lagoons should not be put at risk.

Conclusions

34. The proposal would likely disrupt the area's complex naturally functioning hydrological system, with the potential to cause permanent adverse changes to the hydrology of the site and surrounding area.

35. The proposed activities of mining; land re-contouring; water treatment pond excavations; and the taking, use, diversion and discharging of water up to 20m from wetlands and coastal lagoons are likely to result in partial drainage, changes in the water level range or hydrological function of the area's wetlands.

36. The applicant has not demonstrated functional need to mine at the proposed site. Under s45D(6) of the National Environmental Standards for Freshwater Regulations 2020, consent cannot be granted.

37. The proposal is inconsistent with the NZCPS: it does not avoid significant adverse effects on vulnerable coastal ecosystems, including lagoons and coastal wetlands.