Before the Hearing Commissioners
Appointed by the Grey District Council
and West Coast Regional Council

Under	the Resource Management Act 1991
In the matter of	Resource consent applications by TiGa Minerals and Metals Ltd to establish and operate a mineral sands mine on State Highway 6, Barrytown (RC-2023-0046; LUN3154/23)

Supplementary Evidence Statement of Gary Neil Bramley

8 March 2024

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Summary of evidence

1 My name is Gary Bramley.

2 I prepared a statement of terrestrial ecological evidence dated 19 January 2024 and a summary statement and rebuttal evidence dated 2 February 2024. I have also prepared the draft Avian Management Plan which accompanied the application. My qualifications and experience are set out in my primary statement of evidence.

3 I repeat the confirmation given in that statement that I have read and agree to comply with the Code of Conduct for Expert Witnesses in the Environment Court.

4 My role in relation to TiGa Minerals and Metals Limited's (**TiGa**) application (the **Application**) has been to provide terrestrial ecological advice since July 2021.

Purpose and Scope

5 I have prepared this evidence to:

(a) Set out how I anticipate the condition set should work to protect the ecological values within and surrounding the proposed mining site, particularly where a tāiko interaction is detected;

(b) Provide the lighting management plan (LMP) I have developed and which is included as **Appendix 1** to this evidence. The relevant conditions proffered by the applicant are set out in Section 1.6 of the LMP. The LMP has been informed by a preliminary lighting design plan prepared by IHC mining which explains the fixed residual lighting during the hours of darkness and is included as **Appendix 2** to this evidence;

(c) Provide an updated draft Avian Management Plan (AMP) which is included as **Appendix 3** to this evidence. The relevant conditions proffered by the applicant are set out in Section 1.3 of the AMP; and

(d) Make explicit the connection between the changes to the draft proposed conditions which Ms McKenzie and I have developed and the matters raised in the evidence of Dr Susan Waugh (on behalf of the West Coast Road Resilience Group), Ms Kate Simister (on behalf of the Director General of Conservation), Ms Melissa McCluskie (on behalf of the New Zealand Penguin Initiative), Ms Inger Perkins (on behalf of the West Coast Penguin Trust) and Mr Bruce Stuart-Menteath. These matters relate specifically to the consent conditions relating to avian management, the draft Avian Management Plan and the draft Lighting Management Plan.

How the Condition Set would work

6 The purpose of the draft proposed conditions is to manage environmental effects on the ecological values identified during the baseline ecological surveys which have informed the Assessment of Ecological Effects which accompanied the application. At this site these values include wetlands and a variety of threatened and at-risk birds including tāiko.

7 The conditions are intended to achieve this by setting standards, outcomes, requirements or limits to the particular activities that must be achieved and are clear, certain and enforceable. For example, one such outcome is avoiding adverse effects on wetlands within 100m of the site. Another is that adverse effects of artificial lighting on wildlife (specifically tāiko) are avoided (condition 16.3).

8 The conditions of consent could set out how these outcomes are to be achieved, but that is not the approach taken with respect to this application. Instead, the draft proposed conditions of consent provide for the preparation of a number of management plans. The two most relevant to protection of wildlife values are the draft Avian Management Plan and the draft Lighting Management Plan.

9 When the conditions of consent rely on management plans, the "how" the outcomes are to be achieved is set out in the management plans. The conditions specify what must be included in the management plan to achieve the outcome specified in the conditions and the detailed actions are left to the management plan. With that in mind, the conditions with the prefix 18 set out the key species protection measures that must be in the Avian Management Plan. As an example, condition 18.7 requires that if a tāiko interaction is detected, the consent holder must follow the procedure set out in the AMP, which must include a review of the AMP by a suitably qualified ecologist to determine what additional measures can be taken to avoid any further interactions with tāiko. The relevant procedure is set out in Sections 5.2 – 5.4 in the AMP which details monitoring using trail cameras, reporting of all interactions[1] and a process for dealing with accidental discoveries of birds at the site. Recording one tāiko interaction would prompt a review of the AMP and the Lighting Management Plan. Two interactions within four weeks of each other, or a grounding, would result in all operations in the hours of darkness being suspended at the site until the management plans have been reviewed and any actions necessary to protect tāiko incorporated into mine operations as required by Condition 18.8.

[1] An interaction is defined in the AMP as the presence of a bird or birds within close proximity to the mining infrastructure, including buildings, vehicles and plant where they are or could be put at risk.

Residual Lighting

10 Mining and trucking from the site will only occur during daylight hours. The Wet Concentrator Plant will operate 24/7, but will be enclosed within a building. This building will have no windows, but will have personal access doors and roller doors. The lights inside the building will be used throughout the hours of darkness. Lighting will be contained inside this building except when the doors are being used.

11 Exterior (fixed) lights will be present on the WCP building. The exterior lights will only be used during the hours of darkness when maintenance of equipment supporting the WCP plant which cannot be deferred until daylight is required, or when staff are moving between buildings. These external lights will be activated by motion sensors or push buttons with short duration timers where appropriate to minimise light spill.

12 All exterior lighting will be selected, designed and installed in accordance with the Australian Government's National Light Pollution Guidelines for Wildlife January 2020 (or subsequent revision).

13 If the Mine Water Facility or equipment in the Mine Pit area (pumps) require maintenance which cannot be deferred until morning, vehicles towing or carrying mobile light sets to the desired location to provide lighting where and when needed. This mobile lighting would only be used in the hours of darkness if the situation is urgent and cannot wait until daylight. All mobile lights would deploy the same type of equipment and approach as outlined for fixed external lighting.

14 The other source of mobile lighting at the site is vehicle movements to or from the site during shift change overs. I have discussed traffic movements with Mr Fuller and he presents in Table 2 and Attachment 1 of his Supplementary Evidence an analysis based on the currently proposed shift times. Having done this analysis, the applicant has agreed to amend shift times from 6am to 6pm to 7am to 7pm which demonstrates there will be no vehicle movements during the hours of darkness between October and February and 2 – 8 vehicle movements during the hours of darkness between March and September. There are eight movements per day in May, June and July with fewer movements in the other months. There will be no vehicle movements to or from the site during the hours of darkness during the high-risk period for tāiko groundings, and very few vehicle movements during the hours of darkness at other times of the year.

15 On that basis, the residual lighting at the site is limited to that required for movement between buildings and to the carpark area, urgent repairs of breakdowns and a small number of daily vehicle movements between March

and September. The residual lighting activities would be controlled via the transport management plan (limiting speed on site, requiring reporting of interactions) and the lighting management plan (with controls on duration, area of illumination, intensity and temperature). As I have set out above, any documented interactions would require a review of the lighting management plan with a view to avoiding further interactions of the same type and avoiding effects on tāiko. The residual effects of lighting are therefore very low and I consider that adverse effects on tāiko will be avoided.

Matters raised by Dr Waugh

16 In paragraph 25 of her evidence Dr Waugh notes that dogs should be explicitly excluded from the mine site to protect wildlife. This matter has been addressed via the conditions of consent (condition 18.3) and in Section 3.2 of the updated Avian Management Plan attached as Appendix 2 to this evidence.

17 In paragraph 26 of her evidence Dr Waugh suggests that the proposal contravenes s63(1) of the Wildlife Act (1953). The 'lawful authority' she refers to is the Wildlife Act Authority (or Wildlife Permit) required to undertake the wildlife management which has not yet been obtained. It signals in both the conditions of consent (Advice note associated with condition 18.13) and Section 1.6 of the draft AMP that such an authority would be necessary and it is intended to be included as Appendix A of the AMP once it has been obtained. The purpose of the proposed activities is to provide protective benefit to the wildlife species referred to (including kororā). Similar activities have been approved throughout the country where wildlife are occupying construction sites. Three that I have been directly involved with recently are the Picton – Waitohi ferry terminal redevelopment (Picton), Ariki Tahi Sugarloaf wharf redevelopment (Coromandel) and Mangawhai Central development (Northland). I have also peer reviewed a similar proposal for Eastland Port at Gisborne and am aware similar management was undertaken at the port at Napier and at a recent marina construction at Waiheke Island. The goal of these works is safeguarding existing populations and ensuring no net loss of individuals. In my experience, maintenance, rather than restoration, of populations is usually a requirement of Wildlife Act Authorities and indeed restoring populations at such sites is often undesirable because of the potential for conflict between human activities and wildlife. Restoration at other sites nearby (without the potential for conflict) is often a secondary goal of such works (e.g. at Picton where kororā have been relocated to a fenced sanctuary at Kaipupu Point). With respect to this proposal the likelihood of kororā being significantly affected is low and population restoration is not proposed unless monitoring confirms it is required. Monitoring as set out in Section 4 of the AMP is intended to detect individuals which are significantly affected and if any burrows are removed, they must be replaced with nest boxes in a ratio of 2:1 (see condition 18.9 and Section 3.4 of the AMP)

and a specific management response developed to protect the affected individuals. The proposed pest control around the edge of the mining area could assist with population survival and recruitment, although I note that the scale of the pest control, whilst commensurate with the level of effects, is relatively modest and would be subject to continual reinvasion by pests from outside.

18 In paragraph 46 of her evidence Dr Waugh notes that chicks or adult petrels affected by the mining could come from any of the 27 sub-colonies at the breeding site and goes on to say (from paragraph 73) that she considers monitoring there is necessary. My understanding is that the applicant now proposes to address the matter of monitoring at the colony via the programme of work developed as part of achieving the goals of the memorandum of understanding with Ngāti Waewae, outside of this consent process.

19 In paragraph 66 of her evidence Dr Waugh recommends independent assessment of the number and nature of petrel-human interactions. I understand her point, that self reporting creates a situation where under reporting could be the norm. This matter is addressed to some extent by the use of wildlife cameras (as recommended in her paragraph 67). The use of cameras is set out in Section 4 of the AMP for kororā and Section 5.2 for tāiko, and is required by condition 18.5. It is proposed that the footage be reviewed by an independent ecologist and that the footage be retained for a period of six months and provided to the Department of Conservation on request.

20 In paragraph 68, Dr Waugh suggests that the AMP should detail how operations would be stopped or paused and set a threshold for the number of interactions before a halt in activities and a review of the management plan. This matter is addressed via conditions 18.7 and 18.8 and set out in Section 5.3 of the AMP.

21 In paragraph 69, Dr Waugh considers that the AMP should take into acount the costs of any petrel management required by outside parties, including the Department of Conservation. The normal expectation is that the applicant would meet any costs associated with implementing the management plan, but the matter of costs is not normally specifically included in the plan.

22 In paragraph 72 of her evidence Dr Waugh noted that annual reporting was insufficient to ensure proper action is taken. Sections 6.2 and 6.3 of the AMP now sets out more frequent reporting including weekly throughout the period November – January and monthly for the rest of the year as recommended by Dr Waugh.

23 In paragraph 84 of her evidence Dr Waugh states that the measures proposed to avoid adverse impacts such as creating disturbance by machinery to reduce the nesting activity for penguins are not appropriate. Those methods are not proposed for penguins, rather they are proposed for pipit, dotterel and perhaps

oystercatcher prospecting for nests in the pasture areas which would be mined during the upcoming breeding season as set out in Section 3.2 of the AMP. No potential penguin burrows have been located anywhere within the proposed mining area to date, but the presence of penguin would be verified by a penguin dog prior to the works commencing and any penguin detected would be managed as set out in Section 4 of the AMP.

24 In Paragraph 85 Dr Waugh agrees with Mr Harding that the methods proposed to deter dotterel and pipit are unproven. These methods were first developed by the New Zealand Transport Authority[2] in consultation with the Department of Conservation and Auckland Council because dotterel nesting on bare soil disturbed by roading projects was a significant issue for them. NZTA evaluated the success of the various methods in (limited) field trials as shown in Table 1 below. I note that the methods are part of a suite of management actions, and if birds do establish nests (as does happen), then those nests are protected and monitored as required by condition 18.2 and set out in Sections 3.3 and 6.1 of the AMP.

25 The application of the methods is informed by a decision flow chart developed by NZTA reproduced as Figure 1 below. The elements of this flow chart have been incorporated into the relevant sections of the AMP, particularly Section 3.3.

[2] https://nzta.govt.nz/assets/innovation-uploads/upload-12307/Guidance-in-relation-to-dotterels-Final-20-comb.pdf

Table 1: Methods for deterring prospecting dotterels (from NZTA 2012).

Method	Description	Suitable For:	Success	Comments
Dog	Walk a dog on a leash and disturb adult dotterels.	All sites.	Success	Walk dog throughout the day for a number of days.
False hawk	Use a 'false hawk' to circle the area.	Where it won't interfere with traffic or overhead lines.	Unsuccessful	It worked for a short time and then the birds got used to it.
Long grass	Allow grass to grow long so not considered by dotterels to be a good place to lay eggs.	Sites that will be worked at some point during breeding season that have existing grass.	Success	Grass has to be long. It should be left to grow from at least April before the earth works season.
Machinery	Park large machinery close to where dotterels are showing an interest. Start the engine from time to time.	Construction sites with large machinery.	Moderate	Machinery cannot be left for long periods or the birds may get used to it.
Silt fences	Erect shade cloth at knee height. Place in rows. Space at 5– 10 m.	All sites.	Success	They block the birds' view Hay bales could potentially be used.
Metallic tape	Tape/ streamers that flutter when there is wind.	All sites	Moderate	It worked for 3 weeks then the birds got used to it.

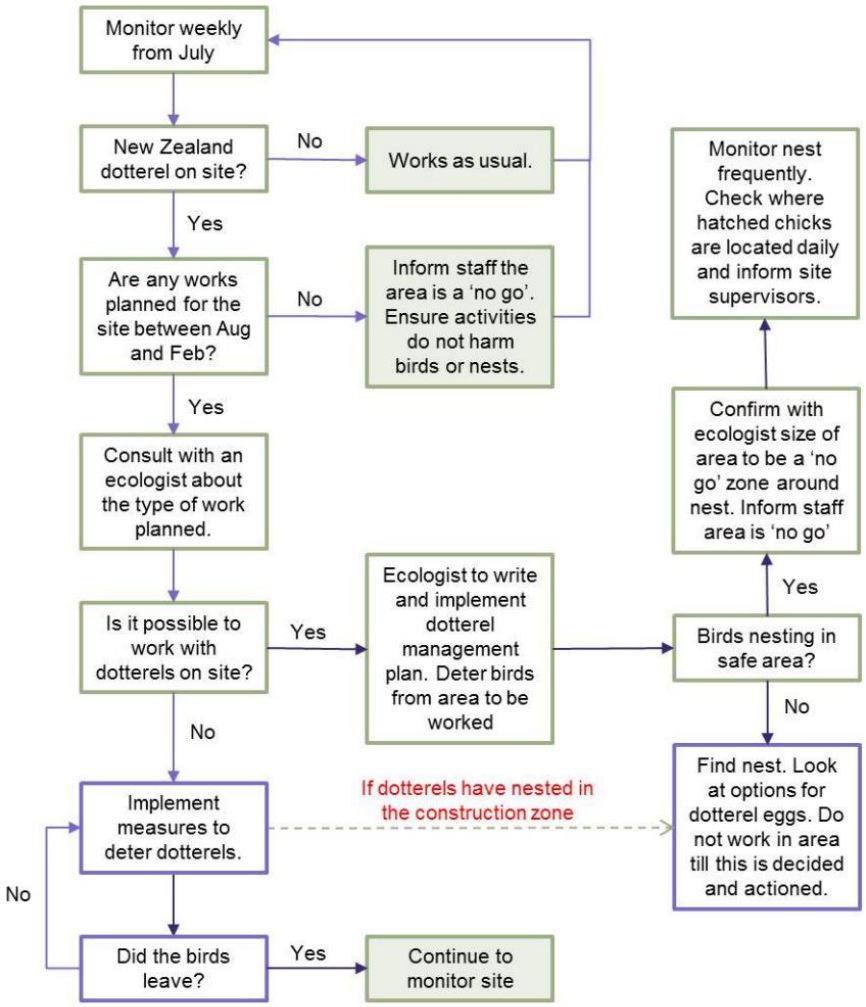


Figure 1: Decision flowchart for the management of dotterels on construction sites (from NZTA 2012).

26 These methods have been widely used, including during the construction of Hobsonville School in Auckland[3]. I have used these methods myself at various locations, the largest project being a residential subdivision in Mangawhai where no dotterel had been recorded at the site during our baseline surveys undertaken over two years, but as many as 50 birds came to occupy the Stage One earthworks area once works commenced. At that location the methods were not completely successful at deterring prospecting birds with five pairs establishing nests in 2020, one pair in 2021, four pairs in 2022 and three pairs in 2023, but the number of birds establishing nests has remained low relative to the number of adult birds present and no adult birds or chicks have been killed by the works. No chicks have successfully fledged at Mangawhai either, but

[3] https://www.aucklandcouncil.govt.nz/UnitaryPlanDocuments/nor_hps2_appendix_f_dotterel_management_plan.pdf

the cause of nest failure has been attributed to either non-viable eggs (a small number) or predation by other native birds (including pūkeko) with no confirmed mammal predation since 2020. Based on tracking tunnels and nest monitoring at Mangawhai, the accompanying pest control (which is similar to that proposed here, with a perimeter line and a supplementary line(s) established once nests are detected) has been effective at reducing mammal pest numbers there.

27 In paragraph 88(c) of her evidence, Dr Waugh notes that penguins may use lagoons and rivers and this should be taken into account. This has been incorporated into Section 4 of the AMP.

28 In paragraph 88(d) Dr Waugh notes that Westland petrels circle around the Barrytown flats for some time and windows on any side of the building may pose a risk. The WCP building is designed without windows.

29 In Paragraph 88(e) of her evidence, Dr Waugh notes that Section 4.3.2 of the AMP does not set out how the applicant will respond to repeated groundings and deaths. I have discussed this matter in Paragraph 9 above.

30 Also in that paragraph, Dr Waugh suggests the purpose of autopsy is to determine whether the death was due to mining activities. This is not the purpose, rather autopsy, particularly of freshly recovered animals, is helpful for a gathering a range of general information useful for species management. This information would be provided to the Department of Conservation and other interested parties and contribute to the data available with respect to the species autopsied. I note that Ms Perkins has requested any penguin autopsy data to be provided to the Department of Conservation (and that is proposed in Condition 18.9).

31 In Paragraph 88(f) Dr Waugh notes that penguin energy balance is delicate and stressing birds at any time of the year can reduce their survivorship. I have amended the wording of the AMP on page 14 to acknowledge that.

32 In Paragraph 88(g) Dr Waugh finds it difficult to reconcile species management with the Wildlife Act. I would note that any penguin management required would occur outside the breeding and moulting period (as set out in Section 4 of the AMP) and would be undertaken to protect penguins from the works in accordance with a Wildlife Act Authority. I have described in paragraph 7 above other locations where similar works have been undertaken with the relevant regulatory approval.

33 In paragraph 88(h) Dr Waugh considers a 1km buffer from penguin nests would be more suitable than the 50m proposed. The only data I am aware of with respect to measuring effects of disturbance on penguins in New Zealand was cited in Paragraph 109 of my evidence in chief. That study indicated that levels

of 80dB for short periods during the day associated with pile drilling did not appear to affect the productivity or behaviour of kororā at Waiheke Island. This study is not directly comparable to this proposal, but as stated in Paragraph 109 of my evidence in chief, setbacks of 20, 30 and 50m are common in consents I have been involved in (either as the applicant or as a peer reviewer). I have never heard of a setback of 1km and no of no evidence to support such a large setback.

34 I understand that the panel requested a copy of the condition relating to noise and penguins from the IReX (Wellington ferry terminal, condition ECOL4b)iii) and Te Ara Tupua (Wellington Coastal cycleway, condition EM.6C(b)iii). I have included copies of both of these conditions below.

ECOL4	a) Within the 24 hours prior to each construction activity undertaken between 16 June to 28/29 February, a kororā detector dog shall confirm the presence or absence of active nests or moulting kororā; b) If an active nest or moulting kororā is discovered under clause (a), until such time that nesting or moulting is complete the following applies: i. No rock removal or piling activities shall be undertaken within 10 metres of the active nest or moulting kororā; and ii. People and plant are able to move past the active nest or moulting kororā to access other works sites across the Project, subject to the movement occurring as quickly as practicable and avoiding unreasonable noise; and iii. Except as provided for by clauses (i) and (ii), no other activity may occur in proximity to an active nest or moulting kororā unless that activity can achieve a maximum sound level of 75 dB LAeq(15min) as measured outside of the entrance of an active kororā nest or moulting kororā roost or at the point of a surface nest. c) If an active nest or moulting kororā is discovered in an area within 20 metres of the work site(s), fortnightly monitoring shall be undertaken to confirm whether nesting or moulting is ongoing at the site until nesting or moulting is complete.

EM.6C[3]	(a) Within the 24 hours prior to each Enabling Works or each Construction Works activity undertaken between ~~1 July to 30 March~~ 16 June to 28/29 February[72], a penguin detector dog shall confirm the presence or absence of active nests or moulting penguin; (b) If an active nest or moulting penguin is discovered under clause (a), until such time that nesting or moulting is complete the following: applies: ~~in an area within 20 metres of the work site(s), works within this 20 metre buffer shall be delayed and no person or machinery shall enter the buffer area until nesting or moulting is complete; and~~ i No rock removal or piling activities shall be undertaken within 10 metres of the active nest or moulting penguin; and ii People and plant are able to move past the active nest or moulting penguin to access other works sites across the Project, subject to the movement occurring as quickly as practicable and avoiding unreasonable noise; and iii Except as provided for by clauses (i) and (ii), no other activity may occur in proximity to an active nest or moulting penguin unless that activity can achieve a maximum sound level of 75 dB LAeq(15min) as measured outside of the entrance of an active penguin nest or moulting penguin roost. (c) If an active nest or moulting penguin is discovered in an area within 20 metres of the work site(s), fortnightly monitoring shall be undertaken to confirm whether nesting or moulting is ongoing at the site until nesting or moulting is complete.

35 In her powerpoint presentation to the panel, Dr Waugh suggested that repeated revisions of the AMP indicate that the applicant doesn't really understand the effects of the proposal. That is incorrect. There are a number of reasons for updating management plans, including as in this case, changes to the proposed activities, changes to the proposed conditions, and proffering additional mitigation in response to matters raised by submitters.

36 Also in her powerpoint presentation to the panel, Dr Waugh stated that overmonitoring can lead to nest failures (in relation to species nesting in the mining area). I agree and that is why a 50m no-go zone is established around any nests discovered and monitoring occurs using binoculars and the like until the fate of the nest can be ascertained as required by condition 18.2 and set out in Section 3.3 of the draft AMP.

37 Dr Waugh considers that the draft AMP assumes a high level of interactions with tāiko and finds that concerning. On the contrary, I expect the number of interactions to be very low, but given the importance of the petrel population the significance of those interactions is very high, therefore the proposed actions need to be suitably precautionary and each interaction, and potential type of interaction, needs to be accounted for.

Evidence of Ms Simister

38 In her evidence Ms Simister relies on the hours of operation proposed in the application (see paragraphs 32, 33 and 36). This has been superseded by the proposal to only mine and truck during daylight hours.

39 In Paragraph 38 of her evidence, Ms Simister considers that effective mitigation for mobile lighting cannot be robustly managed. I have set out in Section 3 of the draft Lighting Management Plan how mobile lighting will be managed at the site when it is required. The draft LMP also sets out the number and types of lighting to be used.

40 In Paragraph 47 of her evidence Ms Simister refers to an outdated version of the AMP which was superseded by the one provided as Appendix A to my Summary Statement and Rebuttal evidence dated 2 February 2024.

41 In Paragraph 50 of her evidence Ms Simister notes that peak traffic movements will be generated within 30 minutes of sunrise or sunset for several months of the breeding season (winter). I have discussed this matter in Paragraph 15 above, including the change in shift hours to 7am to 7pm. Most groundings occur between October and January as shown in Figure 6 of the draft AMP. There will be no vehicle movements in the hours of darkness during this period. During the March – September period between 2007 and 2022 there were 31 groundings recorded which equates to 8.7% of all the (354) total groundings between August 2007 and January 2023 shown in that figure. Sixteen groundings occurred in the May – July period (4.5% of all groundings). The number of light vehicle movements has been substantially reduced during the hours of darkness by the use of company transport (minivans) to and from the site. Mine vehicles would be required to log all interactions with wildlife in accordance with condition 18.6 and the requirements of the draft AMP (Section 5.1.4).

42 In Paragraph 54 of her evidence, Ms Simister disagrees with the management actions proposed and considers that they carry an inherent risk of harm. As I have described above, these actions are based on industry established guidelines developed with the Department of Conservation and subject to a Wildlife Act Authority. As part of the Wildlife Act Authority process the local Department staff and technical experts (as well as iwi) will have the opportunity to comment and refine the approaches used as required. I am not aware of any threatened or at risk species which has been harmed in the projects I have been involved in using these methods and I note that they are intended to have a protective benefit (moving animals from harm's way in advance of the activities occurring).

43 In paragraph 55 of her evidence, Ms Simister notes that penguins are difficult to deter from using a site. It is not proposed to try and deter penguins from using existing sites,, rather the existing accessways are to be maintained and any works affecting that area undertaken outside the breeding/moulting period (see Section 4 of the draft AMP). In the event that relocation of kororā was proposed, it would require a separate Wildlife Act Authority from the Director General and I have amended Section 4 of the AMP to make this clearer.

44 It has always been intended that the bird surveys and other monitoring (including walkthrough surveys) be undertaken by a suitably qualified and experienced ecologist as required by condition 18.14. I have amended the draft AMP to make this explicit.

45 In Paragraph 59 Ms Simister refers to lighting at the mine at night. The lighting at the site is described in the draft Lighting Management Plan. Lighting at the pit is only proposed in the event of unavoidable (i.e., can't wait until daylight) maintenance being required and would only be used when needed. Other lighting will be managed using a range of techniques including motion detectors, switches attached to timers and lighting colour, intensity and location as set out in the draft Lighting Management Plan. I consider that the risks of lighting have been eliminated to the extent that they can be.

46 In Paragraph 62 Ms Simister refers to shift times. These have been amended as set out in the Supplementary Evidence of Mr Fuller.

Evidence of Ms Perkins

47 The majority of Ms Perkins suggested amendments to the AMP have been incorporated in the relevant sections. Many of Ms Perkins statements are in support of other experts, which I have addressed above.

48 Ms Perkins suggests the kōrora management plan should be a separate document. I have considered this approach, but in terms of site management it is helpful to minimise the number of plans required so as to avoid either duplication or things being missed. I have amended the draft AMP with additional detail relating to kororā and have also included a requirement that the need for an additional plan be reconsidered once the initial conservation dog survey is undertaken and the number and location of kororā affected is more certain. Draft proposed condition 18.9(iv) requires a specific penguin management plan in the event that penguins are found within the mine site.

49 Ms Perkins recommends extending the penguin footprint surveys beyond November and this has been included in the revised AMP with the frequency increased to quarterly and supplemented with wildlife camera footage (see

Section 4.2). She also recommends use of a penguin dog and this has now been included as a requirement in condition 18.14 and Section 4.2 of the AMP.

50 Since the AMP will form part of the Wildlife Act Authority documentation, any amendments to the AMP will require consultation and approval of the Department of Conservation as part of the Wildlife Act Authority process. I have amended the AMP to make this clear.

Evidence of Ms McLuskie and Mr Stuart – Menteath

51 Both Ms McLuskie and Mr Stuart – Menteath suggested practical changes to the AMP (with respect to kororā in the case of Ms McLuskie and lighting and petrel management in the case of Mr Stuart – Menteath. Some of these matters were also raised by other submitters and have been addressed above. In particular Ms McLuskie recommended that kororā management should be implemented following the completion of baseline surveys and affected individuals should be microchipped and subject to a specific response plan. These have been accepted in the AMP. I note that Ms McLuskie recommended two years of baseline surveys an and this is required by condition 18.9. Mr Stuart – Menteath in particular recommended 2000k lights should be used and this has been included in condition 16.3 and the Lighting Management Plan. I have incorporated their other suggestions where I consider them useful and achievable.

Conclusion

52 In my view the draft proposed conditions prescribe appropriate standards necessary to protect the species, particularly the threatened and at-risk species, using the habitats within and adjoining the mining area at Barrytown. The management approaches necessary to achieve those standards are widely used and have been identified and set out in the appropriate management plans. The reporting framework is robust and will allow management to be adjusted if and when habitat use at the site changes as mining progresses. Adverse effects have been avoided and the risk to species using those habitats is very low.

Gary Bramley

Dated this 8th day of March 2024

To:	John Berry
C.C.:	Alex Booker, Kate McKenzie, Gary Bramley
Date:	7 March 2024
From:	Tom Lawson
Subject:	Barrytown JV - External Plant Lighting
Job No.	2487

In support of Mr Miller's Rebuttal Evidence that the Wet Concentrator Plant (WCP) building, which operates 24/7, is fully enclosed to prevent light emissions, this Project Memo elaborates on the design approach and detail for the fixed and mobile exterior lighting across the site.

The WCP building has no windows, but does have personal access doors and roller doors for vehicle access to the building. All doors will be selected with frames and seals so light is contained within the building. The outdoor lighting will be as described herein outlining the considerations in the design.

Generally, IHC lighting designs are carried out to minimise lighting spill to mitigate the effects on the surrounding environment. A preliminary lighting study was carried out as part of the Feasibility Study engineering work. The lights inside the building are active throughout the hours of darkness. The exterior lights will only be on during the hours of darkness when maintenance of equipment supporting the WCP plant is required, or when staff are moving between buildings. These external lights will be activated by motion sensors or push buttons with short duration timers where appropriate to minimise emissions.

Fixed Exterior Lighting

All exterior lighting will be selected, designed and installed in accordance with the Australian Government's National Light Pollution Guidelines for Wildlife January 2020 (or subsequent revision).

The light fittings currently specified for exterior lighting are PL150 Type II mounted on 2.4m swing type poles. These are currently configured in their standard form. The following design enhancements will be implemented as the design progresses through to detail design and procurement:

- Exterior lights are only located where operating equipment, with an electrical supply, external to the WCP may require human interaction.
- Each light fitting has an included angle of 120 degrees (60 degrees either side of vertically down), so they predominantly shine down onto the equipment, or area, they are lighting up. The design will be optimised to ensure the light is directed downwards to minimise spillage.
- The light fittings will be fitted with motion sensors to illuminate only when approached to minimise time where any light is present in the areas outside the WCP building during the hours of darkness. For example, the process tanks and pumps area will have the ability to illuminate each small area separately as required, so that you only light up the immediate vicinity that you need to.
- The selected lights will use luminaires of 2000K in accordance with the lighting guidelines for protecting wildlife, meaning the light will be 'warmer' and as such will emit a more subtle glow.
- For the admin/car park area, push button type timer switches will be used to give personnel adequate time to access their vehicle or the toilet facility. This is considered superior to motion sensor lights which may be nuisance tripped by wildlife or other movements. The push button lights will provide necessary lighting for safe passage of personnel at the site while minimising the usage time of lighting in this area during the hours of darkness. The push buttons will be configured such that only the lights necessary to safely illuminate an immediate section of pathway will turn on and not all lights in the car park area.

- All exterior lights will be fitted with backing shields where possible, which are designed to limit leakage of light in the opposite direction to the equipment it is illuminating.

Mobile Lighting

Mobile lighting units will be utilised for areas around the Mine Water Facility and the Mine Pit area should equipment need maintenance and fixed lighting is not available or suitable. Vehicles can carry, or tow, mobile lighting sets to the desired location to provide lighting where and when needed for breakdown situations. Mobile lighting will only be used in the hours of darkness if the situation is urgent and can not wait until the daylight hours the next day.

All mobile lights will implement the same type of equipment and approach as outlined for fixed external lighting.

Mining Unit Plant

The Mining Unit Plant (MUP) will incorporate similar design features to the WCP for both fixed and mobile lighting requirements. To meet OH&S safe working protocols, lighting may be used during periods of low light, such as dark, overcast daylight hours. It must also be noted here that when mining is being conducted at full pit depth the MUP will be substantially below the natural ground level (NGL), operating on the bench with topsoil and overburden removed, which will further shield the lit area from the surrounding environment. The MUP will only be operated during daylight hours.

In conclusion, the lighting design can meet the obligations of the consent conditions and minimise impact on the environment. IHC believes these methods outlined herein, coupled with the TiGa commitments to no mining during the hours of darkness will successfully minimise lighting impacts outside the WCP building.

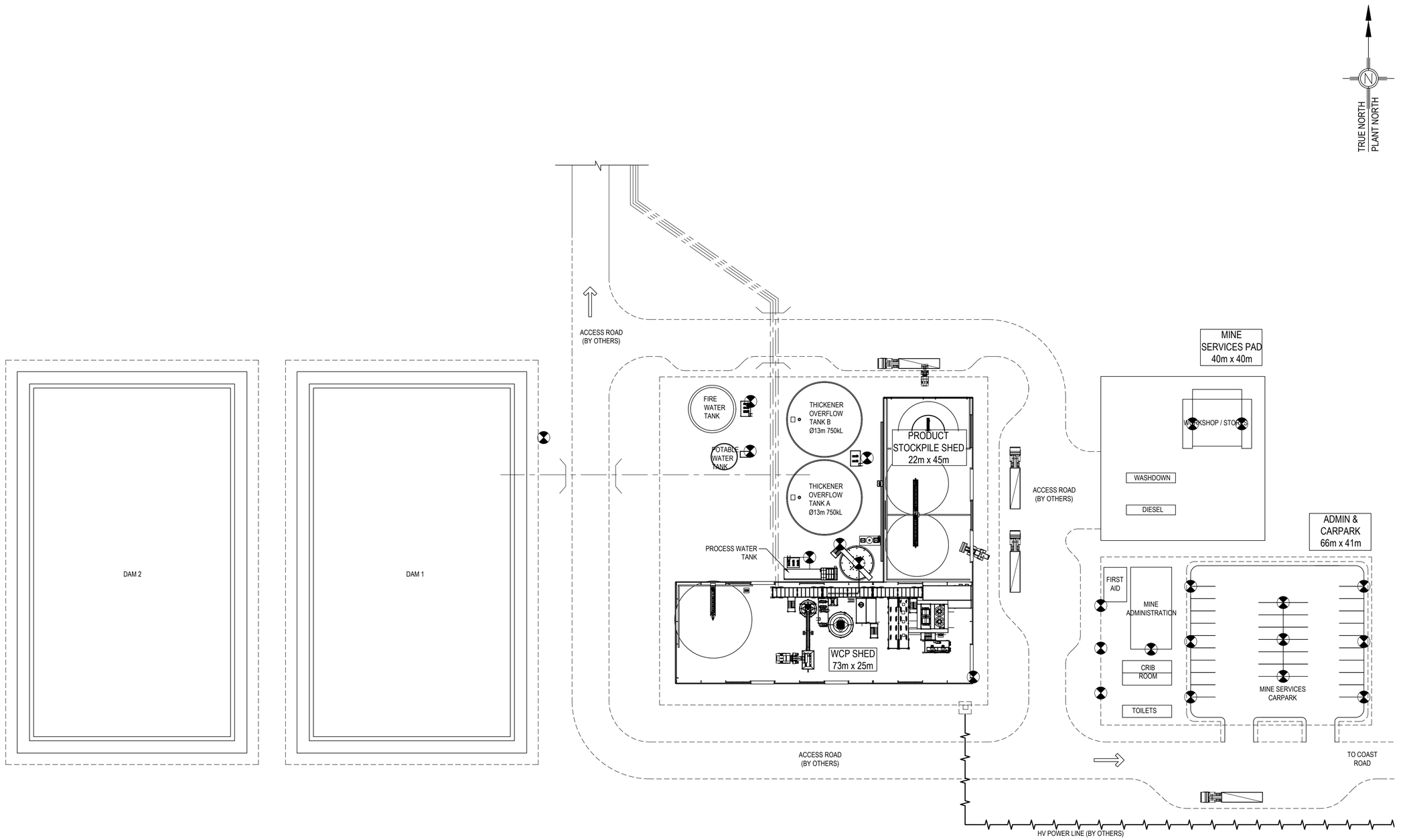
Kind Regards,

Tom Lawson
BD Manager
IHC Mining

Attachments:

WCP and Admin Site Area Layout

ORIGINAL SHEET SIZE = A1



LEGEND:

=2000K EXTERIOR FIXED LIGHT FITTING EITHER PUSH BUTTON TIMER OR MOTION SENSOR ACTIVATED.

Scale 0 5 10 15 20 25 m A1/A3 1:500/1:1000

NOTES:

1. LAYOUT IS CONCEPTUAL ONLY AS ADMINISTRATION AND MINE SERVICES AREAS ARE NOT WITHIN THE AGREED SCOPE OF IHC MINING'S REMIT ON THIS PROJECT.
2. ALL FIXED LIGHTING WILL BE DIRECTED DOWNWARD AND SHIELDED TO PREVENT LIGHT SPILL.
3. LIGHT TEMPERATURE WILL BE NO MORE THAN 2000K AND FILTERED TO REDUCE BLUE AND VIOLET WAVE LENGTHS.
4. LIGHTS WILL ONLY ILLUMINATE THE OBJECT OR AREA INTENDED.
5. FIXED LIGHTS WILL BE MOUNTED AS CLOSE AS PRACTICABLE TO THE GROUND.
6. EXTERNAL LIGHTING WILL COMPLY WITH WH&S REQUIREMENTS.
7. EXTERNAL LIGHTING WILL BE EQUIPPED WITH EITHER MOTION SENSORS OR TIMERS.

DO NOT USE FOR CONSTRUCTION OR FABRICATION

PRELIMINARY

DRAWING IN PROGRESS

REV	DATE	DESCRIPTION	DRN	CHK	APD
A	04.03.24	FOR PRELIMINARY DISCUSSION	GS		

IHC Mining

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CLIENT: TiGa MINERALS & METALS

PROJECT: BARRYTOWN JV MINERAL SANDS PROJECT

TITLE: WET CONCENTRATOR PLANT
SITE INFRASTRUCTURE
SITE LAYOUT SKETCH

DRAWN	DATE	JOB No.	Dimensions - NOT - SET
GS	04.03.2024	2019	SCALE 1:250 @ A1

CLIENT DRG No.

IHCR DRG No. **2019-G-SK-0000-0011** REV A

Plot Date=07-03-2024 12:41:55 Plotted By=Skinner, Gordon Cad File: G:\Projects_...\2019 BJV CONCEPTS_DO Drawing Office\2022 - Second Stage\DWGs\2019-G-SK-0000-0011_WCP site layout.dwg