

**ENVIRONMENT COURT OF NEW ZEALAND
WELLINGTON REGISTRY**

**I MUA I TE KOOTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA**

ENV-2023-WLG-000005

Under the Resource Management Act 1991

In the matter of the direct referral of applications for resource consent and notices of requirement under sections 87G and 198E of the Act for the Ōtaki to North of Levin Project

By Waka Kotahi NZ Transport Agency

**STATEMENT OF EVIDENCE OF GREGOR JOHN MCLEAN
ON BEHALF OF WAKA KOTAHI NZ TRANSPORT AGENCY**

EROSION AND SEDIMENT CONTROL

Dated: 4 July 2023

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INTRODUCTION

1. My full name is **Gregor John McLean**.
2. I am a Director of Southern Skies Environmental Limited (**SSEL**), an environmental consultancy company specialising in erosion and sediment control (**ESC**), environmental management and planning.
3. I prepared the Erosion and Sediment Control Technical Assessment Report (**ESC Report**), which was appendix 4.3 to the Design and Construction Report (**DCR**) prepared for the Ōtaki to north of Levin highway Project (**Ō2NL Project** or **Project**).
4. The DCR and ESC Report were included in Volume II of the Assessment of Environmental Effects (**AEE**), which accompanied the application for resource consents and notices of requirement for designations (**NoRs**) lodged with Manawātū-Whanganui Regional Council (**Horizons**), Greater Wellington Regional Council (**GWRC**), Horowhenua District Council (**HDC**) and Kāpiti Coast District Council (**KCDC**) in November 2022 in respect of the Ō2NL Project.
5. My qualifications and experience are set out at paragraph 14 of Appendix 4.3 to the DCR (Appendix 4 to Volume II of the AEE).
6. I have been involved in matters related to the Project since March 2021.
7. In preparing the ESC Report and my evidence:
 - (a) I have provided a design and assessment of the ESC measures and management approach to be implemented during the construction phase of the Project;
 - (b) My role has included the preparation of related management plans, namely the Erosion and Sediment Control Plan (**ESCP**) and its appendices (Appendix 4.3.3 to the DCR);
 - (c) I have visited the Project area three times: on 25 March 2021, 3 August 2021 and 7 September 2022; and
 - (d) On the 7 September 2022 site visit I was accompanied by Mr Kerry Pearce (Horizons' ESC expert) and Mr Logan Brown (Horizons' freshwater expert).

8. I assisted with the response to a number of questions in the section 92 further information requests from the Councils related to ESC.

Code of conduct

9. I confirm that I have read the Code of Conduct for expert witnesses contained in section 9 of the Environment Court Practice Note 2023. This evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Purpose and scope of the evidence

10. The ESC Report assesses the likely erosion and sediment related effects associated with the Project's construction.
11. My evidence does not repeat in detail the matters discussed in the ESC Report. Rather, in this evidence I:
- (a) present the key findings of the ESC Report in an executive summary, updated to reflect any additional work carried out since lodgement;
 - (b) provide a more detailed description of any additional work carried out, information obtained, and discussions held since lodgement, and the implications for my assessment;
 - (c) comment on the issues raised in submissions received in respect of the Project; and
 - (d) comment on the section 87F/198D reports prepared by Horizons, GWRC, HDC and KCDC (**council reports**).

EXECUTIVE SUMMARY

12. The Ō2NL Project route will cross five major catchments; these are: tributaries to the Waitohu Stream, the Waikawa Stream (including the Manakau Stream and Waiauti Stream), the Ohau River, the upper groundwater catchment of Punahau / Lake Horowhenua, and the Koputaroa Stream (which is located in the Manawatū River catchment)) and multiple sub-catchments. The current water quality in these streams range from generally high (in the Ohau River and Waikawa Stream) to poor (in the Koputaroa Stream and tributaries to the Waitohu Stream).

13. The objectives of the ESC management for the Project, which in my view are achieved and reflected through the ESC conditions (including Schedule 8), are:
- (a) to minimise the potential for sediment generation and sediment yield by maximising the effectiveness of ESC measures associated with earthworks; and
 - (b) to take all reasonable steps to avoid or minimise potential adverse effects on freshwater environments within and beyond the Project area that may arise from the discharge of sediment during the construction of the Project.
14. My proposed ESC design approach for the Project is based on Auckland Council Erosion and Sediment Control Guidelines for Land Disturbing Activities in the Auckland Region (**GD05**),¹ and Waka Kotahi Erosion and Sediment Control Guidelines for State Highway Infrastructure, September 2014 (**Waka Kotahi ESC Guidelines**) (together, the **Guidelines**). This approach represents industry best practice and has proven to be effective on other large scale infrastructure projects such as the MacKays to Peka Peka, Peka Peka to Ōtaki, and Te Ahu a Turanga Waka Kotahi projects. In my experience this will minimise the discharge of sediment during the construction phase to an acceptable extent and ensure that any potential adverse off-site effects are temporary.
15. The assessment of potential effects from the discharge of treated sediment laden runoff to the freshwater receiving environments has been based on estimates of sediment yield for various parts of the Project, using the Universal Soil Loss Equation (**USLE**). Having considered USLE estimates undertaken for other Waka Kotahi, infrastructure, and land development projects that I am familiar with, and comparing those Project USLE estimates with recorded sediment retention pond (**SRP**) performance within the other sites, I am satisfied that the sediment yield estimates undertaken for the Project are realistic, and likely to be conservatively high, when compared to likely actual sediment yields that will occur during construction.
16. The ESC management of the Project will be guided by the ESCP which describes the overall principles and methodology to be adopted. The ESCP is supported by a range of management plans and procedures; including

¹ Horizons refer to GD05 as the Guideline to be used when preparing ESCPs.

Concept ESC Drawings, a Chemical Treatment Management Plan (**ChemTMP**) and the Erosion and Sediment Control Management Plan (**ESCMP**),² which details the extensive and ongoing monitoring and maintenance of ESC measures that will be implemented throughout the construction period.

17. The detail of the ESC measures to be implemented within a given area of the Project will be provided in Site Specific Erosion and Sediment Control Plans (**SSESCPs**). Those plans will provide the design detail of individual ESC measures to be implemented in an area and will be prepared and submitted to Councils for certification against the Guidelines and relevant consent conditions, prior to works commencing in that area.
18. The maintenance of best practice ESC will be driven by a dedicated Environmental Management Team, led by the Environmental Manager and supported by an Environmental Technical Specialist, Environmental Coordinator and Environmental Supervisor. Day to day operation and maintenance of ESC measures will be undertaken by ESC Foremen and ESC Labourers.
19. In my experience the Project Environmental Management Team and Construction Management Team will work closely with Councils' compliance monitoring inspectors for the duration of the Project, to ensure a high standard of compliance and a no-surprises approach to design changes and site management.

WORK SINCE LODGEMENT

20. Since the application was lodged, I have been involved in further work related to erosion and sediment control as set out below.

Response to section 92 requests for further information

21. I have assisted with the response to further information requests from the Councils related to ESC. These requests have been in relation to the appropriateness of the ESC Guidelines that have been used as the basis for the ESCP, and the water quality monitoring proposed for the Project.

² See set 13 of Volume III: Drawings and Plans, and appendix 4.3.3 of the DCR (Appendix 4 to Volume II of the AEE).

Discussions with Councils

22. I have contacted both Mr Logan Brown and Mr Pearce, however they are unavailable to meet until early July. Once we have met to discuss any unresolved issues, we will be able to provide the Court with any updates necessary.

COMMENTS ON SUBMISSIONS

23. **Carl and Emma Chalmers** have questioned how earthworks may affect a watercourse that runs through their property at 366 Arapaepae South Road.
24. ESC devices and measures will be installed to provide treatment for all exposed surfaces within the Project footprint, in line with the SSESCP (which in turn will implement best practice, the ESCP, the Guidelines and the relevant consent conditions). These will be monitored pre-, during and post-rainfall events to ensure that they are performing as designed. The ESC measures that will be implemented for the Project will ensure that any potential sediment-related effects on the watercourse running through the Chalmers' property are adequately managed, and the regular monitoring will provide continual feedback to ensure successful ESC performance and early detection of any issues.
25. **KiwiRail** have concerns regarding the impact of construction (sediment discharges) on their downstream assets.
26. Again, ESC devices and measures will be installed in line with the SSESCP, and will be monitored to ensure that they are performing as designed. The ESC measures will ensure that any potential sediment-related effects on KiwiRail's assets are adequately managed, and the regular monitoring will provide continual feedback to ensure successful ESC performance and early detection of any issues.

COMMENTS ON THE COUNCIL REPORTS

Section 87F reports

27. I have reviewed the section 87F reports, with a focus on Appendix 3 (water quality and ecology) prepared by Mr Brown and Appendix 6 (erosion and sediment control) prepared by Mr Pearce. I have also provided comments on Ms Justine Bennett's reporting in Appendix 5 of Helen Anderson's section 198D report.

28. In general terms, Mr Pearce comments in a positive way on the approach I have recommended that Waka Kotahi adopt for ESC management.
29. Mr Pearce's key concerns are outlined at paragraph 14 of his report and relate to the applicability of the Waka Kotahi ESC Guidelines.³
30. It is intended to design the erosion and sediment control measures for the Project using both Auckland Council GD05⁴ and the Waka Kotahi ESC Guidelines. I have referred to these as the "Guidelines" in my Erosion and Sediment Control Technical Report.
31. Mr Pearce supports the use of GD05 however he has concerns relating to the use of Waka Kotahi ESC Guidelines, specifically in relation to the sizing of devices and their performance.
32. I have proposed that the Waka Kotahi ESC Guidelines are to be utilised solely for the sizing of sediment retention devices where the predominant soils are gravels.⁵ In three of the five Geological Units that make up the soils across the alignment, the gravel component is >40%.
33. When selecting erosion and sediment control best management practices for projects, GD056 outlines three steps, the first step is to undertake a site assessment which includes:
- (a) Land type, including:
 - (i) Topography;
 - (ii) Soil type;
 - (iii) Hydrological patterns;
 - (iv) Climatic conditions;
 - (v) Contamination; and
 - (vi) Groundcover;
 - (b) Sensitivity of the receiving environment; and

³ Waka Kotahi NZ Transport Agency 2014 *Erosion and sediment control guidelines for state highway infrastructure*.

⁴ Auckland Council Guideline Document 2016/005 *Erosion and Sediment Control Guideline for Land Disturbing Activities in the Auckland Region*.

⁵ SH1 Ōtaki To North Levin - Technical Report – Geotechnical.

⁶ GD05 Section C1.3.

- (c) Community values and concerns.
34. After the site assessment, the designer must consider the construction methodology and then select the erosion and sediment control measures, based on all contributing factors.
35. Similarly, the Waka Kotahi ESC Guidelines recommend that in developing an ESCP, the site should be visited to understand the topographic, vegetative, drainage, soil and receiving system characteristics.⁷ It is clear that both Guidelines require the site's soils to be investigated to inform the ESC development process.
36. GD05 has been developed primarily for Auckland's clay-based soils. In many instances I would agree with Mr Pearce that it is considered industry best practice and is adopted by several regions, and is otherwise consistent with various other regional guidelines. However, Auckland does not generally have gravel based soils and therefore GD05 does not provide design solutions in this regard.
37. It is important to take into account Project soil conditions when designing ESCPs, therefore, noting the high gravel content of a significant amount of the soils across the alignment as well as the need for a clear site assessment process, in my view utilising both guidelines in this instance is appropriate to ensure site and soil specific ESC methods are adopted for the Project, to achieve the appropriate water quality outcomes. I also note that both GD05 and Waka Kotahi ESC Guideline documents are guidelines rather than standards, allowing for flexibility in their usage depending on what is required in the circumstances.
38. Mr Pearce states that the proposal by Waka Kotahi to use the Waka Kotahi ESC Guidelines where soils are predominantly gravel, while justified by reference to the soils on which the Waka Kotahi Guideline devices will be utilised, fails to sufficiently account for site conditions that may differ from those documented in the geotechnical investigations and for the compaction of the gravel soils that will occur during construction.⁸ He also expresses concerns in relation to the performance of devices designed in accordance with the Waka Kotahi ESC Guidelines.

⁷ Section 5.4.1 Waka Kotahi ESC Guidelines.

⁸ Section 87F Report, Appendix 6, Technical Report of Kerry Pearce at paragraph [33].

39. I agree with Mr Pearce that if site conditions differ from those documented then runoff from the Project may increase.
40. Any sediment retention ponds (**SRPs**) designed using the Waka Kotahi ESC Guidelines will still have the same functionality as a SRP designed using GD05, albeit be smaller in size.
41. During rain events, manual clarity checks will be undertaken on all SRPs and Decanting Earth Bunds (**DEBs**), regardless of which guideline has been used for their design, as required by Condition RES9.
42. Where a sediment retention device fails to achieve the performance target of 100mm clarity (as required by Condition RES1(d)(ii), pursuant to Conditions RES1(e)-(g) an investigation and report must be undertaken. Condition RES9 also requires regular monitoring of all ESC structures against the performance targets set out in condition RES1.
43. Mr Pearce notes that chemically treated SRPs and DEBs are the predominant sediment control devices.⁹ He goes on to say that chemically treated SRPs are more efficient than DEBs, and in order to achieve the highest level of sediment treatment, all runoff practicable should be directed to an SRP for treatment. I agree that chemically treated SRPs are more effective than DEBs and where practicable runoff will be diverted to SRPs for treatment. This approach will be detailed in the SSESCPs as provided for in Condition RES5.
44. Chemical treatment is proposed as a key tool to increase the efficiencies of DEBs and SRPs. Mr Pearce considers that it has not been specifically provided for in the consent conditions.¹⁰ A Draft ChemTMP is provided as an appendix of the ESCP. An updated ESCP is required to be prepared and certified by Conditions RES2 and RES3. In my opinion, no changes are required to address Mr Pearce's concerns.
45. Mr Pearce comments on the ChemTMP management framework, noting that the ChemTMP does not include any preliminary bench testing to determine the effectiveness of on the site's soils. I have undertaken preliminary bench testing and append the results to this evidence. The results indicate that chemical treatment is effective on a selection of the site's soils.

⁹ Technical Report of Kerry Pearce at paragraph [40].

¹⁰ Technical Report of Kerry Pearce at paragraph [44].

46. Mr Pearce has concerns about how chemical treatment could be delivered on Waka Kotahi ESC Guideline devices and the site's gravel soils. Regardless of which Guideline is used to size devices, the chemical treatment delivery system would not differ.
47. In the ChemTMP I have outlined two dosing methods, rainfall activated and batch dosing. If a rainfall activated system was used in gravel soils, minor modifications to the system would need to be made to delay the dose of chemical to reflect the likely delayed arrival of runoff to the device (i.e., the high infiltration rate into the site soils). This could be simply by placing artificial turf in the catchment tray to delay the transfer of water to the header tank, or rearranging the header tank dosing holes to allow a greater amount of rainfall to be collected prior to dosing.
48. Although not detailed in the ChemTMP, flow activated chemical dosing systems are also available. These systems dose the sediment laden runoff as it passes a sensor upstream of the SRP or DEB.
49. Any modifications or amendments of the dosing rate or method would be outlined in the updated ChemTMP. The As Built Plan required by Condition RES8 also requires amongst other things:
- (b) The as-built plans required by clause (a) must include the expected dose rate, and corresponding catch tray and header tank outlet pipe sizes, for each chemical treatment system to be implemented for sediment retention ponds and decanting earth bunds within the areas covered by the Site Specific Erosion and Sediment Control Plan and the chemical treatment set out in the certified Erosion and Sediment Control Plan.*
50. In paragraph 47 of Mr Pearce's report he identifies that the ESCP has a focus on progressive and rapid stabilisation of disturbed areas and that he believes that an additional specific condition is required to enforce the progressive stabilisation of completed areas, as currently this is only indirectly provided for by Condition REW2.
51. This key principle (progressive stabilisation) is reflected in the ESCP as Mr Pearce identifies. That, and other ESC principles, will be given effect through the SSESCPs as required by Conditions RES4 and RES5 and Schedule 8: Objective and Content of the Erosion and Sediment Control Plan. I also note that Condition REW2 requires that progressive and temporary stabilisation must be in accordance with the Guidelines, and for completed areas, within 14 days or as provided for in the SSECP.

52. Therefore, Condition REW2 as drafted does directly require progressive stabilisation and no adjustments in that respect are needed.
53. The proposed dewatering standards for construction activities are established through Conditions RGW1 and RES1. I consider that these are adequate to address Mr Pearce's concerns expressed in paragraph 49, and that no further amendments are required.
54. In his paragraph 61, Mr Pearce identifies that the post rainfall trigger event ESC monitoring will focus on priority catchments (as determined by **Mr Keith Hamill**). It not my intention that monitoring would be limited to the priority catchments. However, I do consider it appropriate to focus the Project monitoring resources on the more priority catchments to start with and then move onto the remaining catchments.
55. Mr Pearce considers that in catchments that are considered a higher priority, then consideration should be given to a higher standard of monitoring and discharge for these areas. I disagree with Mr Pearce that a higher standard of monitoring or discharge standards should apply in these catchments. I discuss this further below.
56. Mr Pearce discusses the Project's discharge standards in terms of clarity and pH. He acknowledges that Mr Brown supports the use of clarity as a performance standard. Mr Brown has recommended more stringent discharge standards that reflect the sensitivity of the receiving environment and Mr Pearce supports this approach.
57. Mr Brown supports the intent of a clarity standard / target as proposed by Conditions RGW1(d) and RES1(d), however considers this must be related to the sensitivity of the receiving environment.
58. Mr Brown agrees that the correct sensitivity has been applied to each of the Project's catchments and he has proposed clarity standards across the Project ranging from 100mm – 200mm clarity.¹¹ Mr Brown considers that while a discharge standard will provide some certainty,¹² it is possible that meeting the discharge standard will not always result in the protection of the stream values.
59. All ESC devices will be designed, installed and operated in accordance with the approved ESCP and each SSESCP, which are based on the Guidelines.

¹¹ Section 87F Report, Appendix 3, Technical Report of Logan Brown at paragraph [68].

¹² Technical Report of Logan Brown at paragraph [71].

This approach, which adopts the recommendations of the Guidelines, is industry best practice and is anticipated to ensure that any sediment laden water is adequately treated prior to discharge. This approach is supported by **Mr Hamill**, who suggests that construction risks are managed using a robust aquatic monitoring and response framework that has clear responses if triggers are exceeded. A draft Aquatic Monitoring and Response Framework has been prepared (and appended to the evidence of **Mr Hamill**) to describe the triggers, targets and responses for each type of monitoring.

60. The ESCMP contains a comprehensive range of monitoring to be undertaken, including weekly, pre-rain event, pre rain event with forecast of 20mm/24hrs, and rainfall trigger monitoring (>50mm/24hrs and 15mm/hr).
61. Post 'rainfall trigger monitoring' includes clarity monitoring with 100mm clarity determined as the trigger for further assessment, and, if necessary, responses. In the first instance the monitoring is focussed on those catchments which have been identified by **Mr Hamill** as having a higher sediment related risk and the receiving environments are more sensitive.
62. The proposed 100mm clarity is a trigger for action rather than a standard. The 100mm clarity is not related to instream effects, rather it is related to the correct operation of a DEB or SRP. In general terms, if the DEB or SRP has 100mm of clarity when discharging, the device is treating water to an acceptable level. It is also critical to note that the sediment retention devices will only discharge during, and immediately after, rainfall, when the receiving water bodies are also subject to elevated flows and turbidity, and reduced clarity. Not all DEBs and SRPs will discharge directly to watercourses, some will discharge to ground. The SRPs and DEBs will not be discharging into the streams during the highest water quality (baseline) state of those water bodies.
63. The Aquatic Monitoring and Response Framework (proposed in draft form by **Mr Hamill**) will provide actual data of the state of the streams during the construction phase. Any exceedance of that trigger will result in a series of actions to identify and remedy any issues that may have contributed to the trigger being exceeded.
64. I am comfortable that the proposed suite of monitoring outlined in the ESCMP is appropriate and will ensure a high level of sediment treatment.

65. I agree with Mr Pearce that greater care is required when working in and around streams.¹³ Mr Pearce considers a condition requiring that all stream works be undertaken in the 'dry' is required. I consider that this requirement is contained within existing Conditions RES1(a)(ii), RES6, RWB2 and the ESCP, including Schedule 8.
66. The ESCP contains stream works procedures, including the requirement that works will be undertaken in the 'dry'. The SSECPs, as required by condition RES5 and as outlined in Schedule 8, will include a detailed methodology for any stream works and culvert installation, including sizing calculations and drawing of stream diversions.

Section 198 Report

67. Ms Bennett agrees the ESC and operational controls are generally best practice.¹⁴ She considers that more detail is required to explain how more susceptible earthwork areas will be managed during peak earthworks and what additional levels of controls will be provided for more sensitive receiving environments. She also has concerns about how the ESC will evolve and adapt.
68. As explained above, all earthworks will be subject to the development of an SSESCP. The SSECPs will be designed, constructed, operated, and maintained in accordance with the Guidelines. Also as explained above, the ESCMP contains a comprehensive range of monitoring to be undertaken including weekly, pre-rain event, pre rain event with forecast of 20mm/24hrs, and rainfall trigger monitoring (>50mm/24hrs and 15mm/hr). I consider that the monitoring proposed and reporting where triggers are exceeded are adequate to inform any improvements that are needed to the site's ESC.
69. In relation to the use of Waka Kotahi's ESC Guidelines, I refer to my previous points above.
70. Ms Bennett supports the use of an industry best solution for ESC and on that basis, is of the opinion that additional controls should be provided to protect sensitive areas or locations for higher risk activities (fuel or chemical storage or concrete batching plants).¹⁵

¹³ Technical Report of Kerry Pearce at paragraph [75] – [76].

¹⁴ Section 198D Report, Appendix 5, Technical Report of Justine Bennett at paragraph [20] and [43].

¹⁵ Technical Report of Justine Bennett at paragraph [44].

71. I am unclear precisely what "*additional controls*" Ms Bennett is seeking, however, as an overall point (and as per my comments above), I note all earthworks areas will have SSESCPs prepared in accordance with the Guidelines (as provided for in Schedule 8 to the conditions), and those SSESCPs will factor in higher risk activities within specific sites, and provide ESC tailored to those higher risk activities.
72. I also note that the Hazardous Substances Procedure (which will also fall within the ESCP as set out in Schedule 8) addresses "*approaches to concrete works*" and Condition RWB2 (works in the bed of water bodies standards) addresses how to approach concrete near water bodies. Fuel or chemical storage is dealt with by Condition RCM4 (construction management standards) and Schedule 2 (Construction and Environmental Management Plan). In my view this is appropriate and in line with usual ESC practices and the Guidelines.
73. Ms Bennett, at paragraph 45, raises an issue regarding how the manual clarity checks on ESC devices relate to potential adverse effects on the environment.
74. As discussed above, the manual clarity check is related to the correct operation of a DEB or SRP, rather than a measure of effects.
75. Ms Bennett discusses adaptive management plans (**AMP**) at paragraphs 65-72 of her report, and uses the Puhoi to Warkworth project as an example (Attachment 1 to her report). She has suggested that a condition requiring an adaptive management plan be imposed.
76. I disagree that an AMP is required as part of the earthworks management. AMPs, in my opinion, on earthworks sites, are essentially a robust monitoring plan. The majority of the AMP condition that has been proffered by Ms Bennett is already included in the existing suite of ESC management plans and freshwater monitoring as outlined by **Mr Hamill**.

Gregor John McLean

4 July 2023