

**In the Environment Court  
I Mua I Te Kōti Taiao O Aotearoa**

Under the Resource Management Act 1991 (**RMA**)

and in the matter of the direct referral of an application for resource consents by  
Meridian Energy Limited in respect of the proposed Mt Munro wind farm under section  
87G of the Resource Management Act 1991

**Meridian Energy Limited**  
Applicant

and

**Tararua District Council, Masterton District Council, Manawatū-  
Whanganui Regional Council and Greater Wellington Regional Council  
(Councils)**  
Consent Authorities

and

**s 274 Parties**

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**Statement of Evidence of Graeme Ridley on behalf of Meridian Energy  
Limited**

**24 May 2024**

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## INTRODUCTION

1. My name is Graeme John Ridley. I am a Director of Ridley Dunphy Environmental Limited (**RDE**), an environmental consultancy that specialises in environmental management of development sites and in particular, erosion and sediment control. I set out my relevant qualifications and experience below.
2. I have a Bachelor of Agricultural Science from Massey University, Palmerston North (1986).
3. I am a Certified Professional in Erosion and Sediment Control (CPESC Number 7629), a qualification that is achieved through Envirocert International and previously the International Erosion Control Association.
4. Prior to forming RDE, I was employed as an environmental consultant with Environmental Management Services Limited. Prior to that I was employed by the former Auckland Regional Council ("ARC") in numerous roles including Manager of Consents and Compliance, Manager of the Land and Water Quality Team, and Manager of the Sediment and Stormwater Management Team.
5. A particular focus of my career has been in the field of erosion and sediment control. I have over 30 years' experience in this area. I have a broad range of experience in erosion and sediment control, including detailed involvement for councils and the development community. I am responsible for the design and monitoring of erosion and sediment controls on a number of development sites throughout New Zealand.
6. I have considerable experience in all aspects of earthworks, streamworks and stormwater activities. I have had intimate involvement with policy development and implementation, research, education and regulation covering all aspects of the development cycle.
7. I have specific on-site experience and consenting experience with a number of major earthwork projects including, but not limited to, Transmission Gully, Puhoi to Warkworth, North Canterbury Transport

Infrastructure Recovery, and Tauriko Business Estate. Having been directly involved with all erosion and sediment control aspects of large-scale infrastructure projects, I am aware of the issues, opportunities and practicalities with planning and onsite implementation. I have also had specific erosion and sediment control technical input into several windfarms, including Central Wind, Waitahora, Hauauru ma raki, Turitea, Te Uku and Kaimai Wind farm projects.

8. I was the primary author of the ARC Technical Publication Number 90 "Erosion and Sediment Control Guidelines for Land Disturbing Activities" ("TP90"), which was the primary tool promoted and used by the former ARC, and now Auckland Council, for the management of erosion and sediment associated with development sites. I was one of the authors and peer reviewers of the New Zealand Transport Agency Erosion and Sediment Control Standard for State Highway Infrastructure September 2014. I have had contribution into the development of the Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region June 2016 Guideline Document 2016/005 (GD05). My on-site experience has included significant implementation and interpretation of these guidelines and ensuring best practice and effective implementation.
9. I am a past director and vice president of the Australasian chapter of the International Erosion Control Association.

## MY INVOLVEMENT IN THE PROJECT

10. My evidence is given in support of the application for the consents required to construct, operate and maintain the proposed Mt Munro Windfarm (**Mt Munro** or the **Project**).
11. My involvement with the Project has been the preparation of a Construction Water Management Plan and Effects Assessment report (**CWMP**), which was included as Appendix F to the Assessment of Effects on the Environment (**AEE**) for the Project. I also prepared the following technical memoranda in response section 92 requests made by the Councils:

- (a) A technical memorandum attached as Appendix 10 to Meridian's s92 response dated 7 September 2023;
  - (b) A technical memorandum attached as Appendix 2 to Meridian's s92 response dated 25<sup>th</sup> October 2023; and
  - (c) A technical memorandum attached as Appendix 2 to Meridian's s92 response dated 31 January 2024.
12. I have visited the Mt Munro site on multiple occasions in order to inform my assessments.<sup>1</sup> During these visits I viewed the full alignment and turbine locations and discussed various technical aspects with the expert Meridian team. The visit on the 19<sup>th</sup> June 2023 was an overview visit for Councils where we traversed the relevant areas of the full site. I have also viewed and assessed the works associated with Old Coach Road widening as part of these site visits, and confirm the same management approach and effects assessment applies to this as the wider Project.
13. Further to the CWMR I have assessed, contributed to and responded to various further information requests from Councils. This includes the response to Council dated 7<sup>th</sup> September 2023, 25<sup>th</sup> October 2023 and 31<sup>st</sup> January 2024 as per Paragraph 11 above.
14. Throughout the Project I have worked closely with other consultants and Meridian employees; in particular:
- (a) Mr Nick Peters (Geologist);
  - (b) Mr Maurice Mills (Construction Design);
  - (c) Mr Nicholas Bowmar (Project Manager);
  - (d) Dr Vaughan Keesing (Freshwater Ecologist); and
  - (e) Mr Tom Anderson (Planning)

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<sup>1</sup> 25<sup>th</sup> November 2021, 17<sup>th</sup> March 2023 and 19<sup>th</sup> June 2023

15. In the preparation of my evidence, I reviewed the following documents:
- (a) the AEE accompanying the Application;
  - (b) submissions which are relevant to my area of expertise;
  - (c) the statements of evidence prepared by Mr Nicholas Bowmar, Dr Vaughan Keesing, Mr Maurice Mills and Mr Chris Jones;
  - (d) The Erosion and Sediment Control Report prepared by Mr Kerry Pearce (**Mr Pearce's Report**), and attached as Appendix 10 to the Councils' section 87F Report; and
  - (e) The Councils' proposed draft conditions of consent attached as Appendix 23 to the s 87F Report.

## **CODE OF CONDUCT**

16. I confirm that I have read the 'Code of Conduct for Expert Witnesses' contained in the Environment Court Consolidated Practice Note 2023. I agree to comply with this Code of Conduct. In particular, unless I state otherwise, this evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

## **SCOPE OF EVIDENCE**

17. My evidence will outline the proposed construction water management measures for the Project, with specific reference to erosion and sediment control. My evidence is limited to the environmental management of civil construction works and covers the following matters:
- (a) Proposed erosion and sediment control methodology and techniques;
  - (b) Matters raised in submissions;
  - (c) Relevant matters raised in the s 87F Officers' report; and

- (d) Comment on proposed conditions.

## **A COMMENT ON PROPOSED CONDITIONS OF CONSENT**

18. In the documentation lodged with the AEE, Meridian included a set of Proffered Regional Consent Conditions (see section 8.2 of the AEE). This included proposed erosion and sediment control conditions, which were then refined through the s92 response process. I note that the Section 87F Report included a revised and updated set of conditions, which incorporated Mr Pearce's recommendations. I am in general agreement with Mr Pearce on these conditions, with some minor exceptions. My recommended amendments to this set of conditions are included in Meridian's updated proffered condition set, which is attached to Mr Anderson's evidence. I consider that these conditions will robustly and appropriately manage erosion and sediment control issues for Mt Munro.
19. I include comments on these conditions below in the context of my overall assessment, and in my response to the s87F Report.
20. All references to conditions of consent within this evidence is directly linked to Meridian's updated proffered condition set, as attached to Mr Anderson's evidence.

## **CONSTRUCTION WATER MANAGEMENT OVERVIEW**

21. While preparing the CWMR, I assessed and incorporated the GWRC Guideline<sup>2</sup> for erosion and sediment control alongside best practice experience. The CWMR references construction water management in relation to all construction activities, but has a direct focus on erosion and sediment control. The erosion and sediment control measures detailed within the CWMR reflect the current state of knowledge (including as per the GWRC Guidelines), the specific physical

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<sup>2</sup> Erosion and Sediment Control Guide for Land Disturbing Activities in the Wellington Region dated February 2021

conditions of the Mt Munro site, and the experience and knowledge gained by the Meridian team from other wind farm projects.

22. The proposed approach to the environmental management (in particular erosion and sediment control) during construction of the Mt Munro wind farm is to use current best practice. My best practice experience specific to wind farms has been gained from the input, including construction in some cases, of Central Wind, Waitahora, Hauauru ma raki, Turitea, Te Uku wind and Kaimai wind farms. Meridian has also had further experience with construction of Te Āpiti, White Hill, West Wind, Mill Creek, and Harapaki wind farms.
23. As noted in Mr Bowmar's evidence, Meridian is committed to continuous improvement as part of its wind development. This includes ongoing best practice implementation of erosion and sediment control. Central to this approach is the recognition that environmental management is a core consideration and activity, and that adequate resourcing needs to be made available to ensure that the best outcomes that can reasonably be achieved, are achieved.
24. The construction of wind farms typically involves large amounts of earthworks and as a result erosion and sediment control is a significant focus. The primary objective for erosion and sediment control is to ensure the limiting of the extent and duration of any erosion or sediment generation, and effective and efficient treatment of this sediment generation to minimise sediment discharges.
25. Consistent with its other projects, to achieve these objectives Meridian is proposing:
  - (a) The use of management and monitoring plans;
  - (b) Adoption of best practice methods to minimise erosion and sediment generation;
  - (c) Adoption of best practice methods to minimise sediment discharges through the provision of best practice sediment control measures; and



- (d) Effective management practices to ensure compliance with management and monitoring plans.
26. The above matters are set out in the recommended conditions of consent<sup>3</sup> which I discuss later in my evidence. Implementation of these conditions will ensure that any sediment generation and discharge risks are managed appropriately and that no significant adverse effects will arise from the construction activities.

## KEY PROJECT PARAMETERS

27. As detailed within the CWMR, and explained in the evidence of Mr Bowmar, Meridian is taking an 'envelope approach' in seeking consents for:
- (a) A Turbine Envelope Zone within which all turbines and certain other infrastructure will be located.
  - (b) A Turbine Exclusion Zone where other infrastructure (excluding wind turbines) will be located.
  - (c) A transmission corridor and terminal substation to electrically connect the wind farm to the national electrical grid.
28. The key project parameters are detailed within the AEE and responses to s92 requests. Fill site locations, volumes and areas were all updated through the application process.

## MANAGEMENT PLAN OVERVIEW

29. Both Manawātū-Whanganui Regional Council (**Horizons**) and Greater Wellington Regional Council (**GWRC**) have developed/adopted the GWRC Guideline as a best practice erosion and sediment control (ESC) guide for land disturbing activities. This GWRC Guideline provides a minimum standard for designing, implementing and maintaining ESC measures and the development of an associated

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<sup>3</sup> Included as Appendix A to Mr Anderson's evidence.

erosion and sediment control plan (ESCP) as part of resource consent and permitted activities for earthwork activities.

30. As part of the construction water management assessment for this Project, the GWRC Guideline was considered and incorporated with best practice experience. This reflects the current state of knowledge, the specific physical conditions which will be encountered for this Project and the knowledge of the Meridian team (from other similar projects). These factors will all be reflected in the ESC measures adopted. Where there is any uncertainty as to the specific design to be implemented, the GWRC Guideline will take precedence.
31. From an overall perspective the key management plan documents that will be used for the environmental management of construction activities are outlined in Table 1 below. The preparation and implementation of these documents will form part of the resource consent conditions, as proposed. I note that the updated set of proffered conditions attached to the evidence of Mr Anderson incorporates most of the recommendations made in Mr Pearce's Report with some amendments. I confirm that I have been involved in the development of these updated ESC conditions, and in my opinion, these are appropriate and reflect best practice.

*Table 1: Key documents for erosion and sediment control*

<b>Management Instrument</b>	<b>Comment</b>
Construction Water Management Plan and Effects Assessment report ( <b>CWMR</b> )	The CWMR identifies the environmental management principles and practices for construction water on site and identifies processes and procedures for the whole project with specific details provided for focus areas. This CWMR is referred to as the overarching Project ESCP within the conditions provided. For the purpose of this evidence this is referred to as the Overarching ESCP from this point forward to ensure consistency in terminology with conditions of consent.

Management Instrument	Comment
Specific Environmental Management Plan (SEMP)	SEMPs as detailed within the CWMR are prepared for specific locations and activities on site considering the specific environmental and ecological values. The SEMP's identify in detail the most effective and appropriate forms of construction water management practices to be implemented. For the purpose of this evidence these are referred to as Site Specific Erosion and Sediment Control Plans (SSESCPs) from this point forward to ensure consistency in terminology with conditions of consent.
Contract Documentation	Erosion and sediment control activities are a core part of the project. To ensure this view is conveyed to the civil contractor, the erosion and sediment control requirements and expectations will be carefully stipulated in the contract documents for wind farm construction.

32. If resource consents are granted, the Project would move into a detailed design phase with more specific details and plans being developed. It is also envisaged that through the detailed design phase the contents of the Overarching ESCP will be refined and amended to include specific Project construction and earthworks analysis. This will occur prior to earthworks (or any stream works) commencing and will assist in the formation of SSESCPs.
33. These SSESCPs will be submitted to Horizons and GWRC for certification against the consent conditions, the Overarching ESCP and best practice ESC. The SSESCPs will be informed by the principles of the Overarching ESCP and will enable specific construction constraints and opportunities to be incorporated into the final design for the works at that location. The SSESCPs further will allow for flexibility, innovation, enhanced outcomes and an opportunity for implementing improved practices based on any new knowledge and Project outcomes.

34. The SSES CPs will be developed prior to works commencing in the specific locations or for specific activities. They will consider the specific environmental and ecological values and will then determine the most effective and appropriate form of construction water management practices required on a site-by-site basis during the construction period. The number of SSES CPs to be developed will be directly linked to the construction sequence and timing and this will be determined prior to implementation. For ease of implementation, however, the number of SSES CPs will be minimised as far as practicable throughout the construction period. This will assist with minimising confusion between numerous SSES CPs and allow more effective monitoring and compliance.

## **EROSION AND SEDIMENT CONTROL PRINCIPLES AND APPROACH**

35. As detailed above, the fundamental guiding ESC principles from the GWRC Guidelines are set out in Appendix B of the CMWR, and are required to be utilised in the SSES CPs.
36. To expand on these overarching principles further, the following matters within paragraphs 37 to 45 will apply to all earthworks associated with the Project and are reflected in the conditions of consent.
37. Erosion and sediment control will, where practicable, be undertaken and implemented with a hierarchy and priority order as follows:
- (a) Erosion control will be provided for in all circumstances by minimising sediment generation through a range of structural (physical measures) and non-structural (methodologies and construction sequencing) erosion control measures.
  - (b) Sediment control will be implemented for all sediment laden discharges.
38. Construction water management measures will be outlined in detail in the SSES CPs. All ESC measures will, where practicable, meet the minimum criteria as detailed in the Overarching ESCP and will

incorporate innovative ideas and procedures to ensure best practice applies and to match the local challenges and opportunities.

39. The development of SSESCPs, in accordance with the direction and principles of the Overarching ESCP, will allow for future innovation, flexibility and practicality of approach to erosion and sediment control and shall allow the ability to adapt appropriately to changing conditions.
40. Progressive and rapid stabilisation of disturbed areas using mulch, aggregate and geotextiles will be on-going during the construction phase. Stabilisation of clean water diversion bunds will also occur using turfing from adjacent grass areas and layering this on exposed soil surfaces. If other stabilisation alternatives such as polymer/soil binder products are applied they will need to be verified as a stabilisation media, demonstrated to have no residual impacts and will need to be trialled on site to demonstrate appropriateness prior to use. Temporary stabilisation will apply, particularly with respect to stockpiles, access track batters, ground improvement locations where topsoil is removed and concentrated flow paths.
41. Stabilisation will need to be appropriate to the soil surface geology with the intent of achieving an 80% vegetative cover or non-erodible surface over the entire exposed area of earthworked areas. Stabilisation is designed for both erosion control and dust minimisation and will be progressively implemented, including temporary stabilisation of those areas of earthworks not actively worked for more than a 14-day period.
42. All Sediment Retention Ponds (SRPs), Hybrid Decanting Earth Bunds (HDEBs) and Decanting Earth Bunds (DEBs) will be fitted with floating decants with a mechanism to control (or cease) outflow during dewatering pumping activities to these structures if required. Pumping will be such that pump volumes will only be to the same level as that able to be fully captured within the retention structure and discharged out the designed decant structure.
43. All Project SRPs, HDEBs and higher risk DEBs (as identified in the SSESCPs) will be chemically treated with a flocculant appropriate for the soil type and discharge location unless the SSESCP for that location confirms that there are no benefits from such use.

44. Stream works will be undertaken in a manner that recognises the higher risk of this activity, from a sediment generation and discharge perspective, and the sensitivity of the receiving environments. Where practical, works within perennial stream channels, will be undertaken in a “dry” environment. This will be based upon diversion of flows around the area of works or undertaking construction “off–line”. Consideration will also be given to downstream water users (if any), peak fish spawning and fish migration periods (if relevant), during which time instream works will be carefully managed.<sup>4</sup>
45. A monitoring and management approach which allows continuous improvement in response to monitoring outcomes will be utilised for the construction activity through:
- (a) A risk assessment tool within the SSESCPs to help identify and rate construction risks, identify any specific risk management approaches, and inform the construction planning and approach to construction water management;
  - (b) Proactive water quality monitoring, both qualitative and quantitative, during Project implementation as a way of assessing the effectiveness of the treatment and allowing for improvements/modifications as the Project works continue; and
  - (c) Qualitative monitoring, including visual surveys of the discharges and downstream environment. Quantitative monitoring will include some sampling and testing of sediment control device discharges for turbidity and also upstream and downstream sampling to assess against baseline water quality parameters.

## **EROSION CONTROL MEASURES**

46. ESC measures and practices are used to minimise the effects of earthworks on the receiving environment. In general, steep slopes with long slope lengths generate a greater amount of energy and hence increase erosion as rainfall lands and runs down a slope. Any reduction

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<sup>4</sup> Appendix 2 of S92 response 24<sup>th</sup> October 2024

of this energy through the use of erosion control measures will reduce erosion and hence any subsequent sediment generation and yield.

47. Erosion control is the prevention of sediment generation, while sediment control is the management of sediment after it has been generated.
48. Reducing erosion at source leads to a consequential reduction in sediment generation. The proposed erosion and sediment control measures for the Project have been designed to minimise the extent of erosion and sediment yield from the site.
49. As noted above, it is proposed to adopt best practice to minimise erosion and the generation of sediment. These erosion control measures are summarised in Table 2 below as per the CWMR.

*Table 2: Erosion control measures*

<b>Erosion Control Measures</b>	
<b>Device/ Methodology</b>	<b>Criteria</b>
Clean water diversions (CWD)	Clean water diversion channels and bunds will be designed to cater for the 20-yr ARI 1 hour duration rain event plus 300mm freeboard.
Construction staging and sequencing	Staging and sequencing are both important non-structural measures and will be implemented and details of the staging and sequencing of works will be within the SSESCP.
Contour drains	Contour drains will be designed and implemented in accordance with the GWRC Guidelines.
Device location	All ESC devices should be located outside the 20-year ARI flood level unless no other viable alternative exists.
Dirty water diversions (DWD)	Dirty water runoff diversion channels will be sized to cater for the 20-year ARI 1 hour duration rain event plus 300mm freeboard. Sediment sumps of 2m <sup>3</sup> minimum capacity per sump will be installed in all DWD at 50m intervals.

Erosion Control Measures	
Device/ Methodology	Criteria
Pipe drop structures/ Flumes	Flumes will be used in accordance with the GWRC Guidelines to safely transfer runoff from the top to the bottom of the batter slopes.
Rock check dams	Rock check dams will be designed and implemented in accordance with the GWRC Guidelines.
Stabilisation for erosion and dust management purposes	Progressive and rapid stabilisation of disturbed areas using topsoil (where necessary) and seed, mulch, hydroseed, turfing and geotextiles will be ongoing throughout the Project. Alternative stabilisation measures will need to be detailed and confirmed within the SSES CPs.
Stabilised entrance ways	Stabilised entrance ways will be established at all ingress and egress points of the site from a public road network in accordance with the GWRC Guidelines.

## SEDIMENT CONTROL MEASURES

50. In general, the sediment control measures to be applied to the Project are as set out in Table 3 below:

*Table 3: Sediment control measures*

Sediment control measures	
Device/ Methodology	Criteria
Sediment Retention Ponds (SRPs)	All SRPs will be implemented based a 3% volume criterion applied in relationship to catchment size (i.e. 300m <sup>3</sup> SRP volume per 10,000 m <sup>2</sup> of contributing catchment). Maximum catchment areas will be a 5ha limit however there may be circumstances where slightly larger catchments may be appropriate as detailed within the SSESCP



Sediment control measures	
Device/ Methodology	Criteria
Hybrid Decanting Earth Bunds (HDEBs)	<p>All HDEB will be designed based on a volume of 2% of the contributing catchment area and will have floating decants. These are designed for catchments between 0.3 and 0.5ha and for works that are of less than 4 months duration.</p> <p>HDEBs will have a sump established at the inlet end with a geotextile lined bund between this sump and the main body of the HDEB. The volume of this sump is based on 10% volume of the main body volume.</p>
Decanting Earth Bunds (DEBs)	<p>All DEBs established will be based on a volume of 2% of the contributing catchment area. All DEBs will be fitted with floating decants.</p> <p>Decants have a mechanism to control (or cease) outflow during pumping activities to these structures.</p>
Flocculation	<p>Flocculation will be applied on all SRPs, HDEBs and high risk (as defined in the SSESCP) DEBs based on an approved chemical treatment management plan unless otherwise outlined within the SSESCP for that location.</p> <p>Manual batch dosing will be carried out as required.</p> <p>Flocculant socks will be used as alternative and/or additional measures as required.</p> <p>Soil bench tests were undertaken on 4 soil types which are illustrated within the CWMR. These soils represent the soils expected to be encountered during the earthworks activity and include silts, sandstone, clay silts and sands. The results, for the samples taken, show that PAC achieved effective removal of suspended solids. Some minor settlement was recorded without any addition of PAC however PAC was noted to have an immediate effect and improve the clarity provided. Minimal impact on pH was recorded with the addition of PAC.</p>

Sediment control measures	
Device/ Methodology	Criteria
Flocculation (continued)	Settlement with PAC occurred relatively quickly. At a higher dose rate for some soils the turbidity was noted to increase slightly within the bench test results. This may indicate resuspension of the sediments and it is recommended that lower dose rates will achieve a better outcome.
Super silt fences and silt fences and filter socks	All super silt fences, silt fences and filter socks will be based upon the design criteria within the GWRC Guideline. SSF fabric will be installed with 200mm of fabric upslope at the base of the trench.

51. Further below in Table 4 are the other key measures and methodologies that will apply.

*Table 4: Other measures*

Other Measures/Methodologies	
Decommissioning of devices	Removal of devices will be in accordance with the SSESCP and is based on removal only after stabilisation.
Pumping activities	Pumping of sediment laden runoff and groundwater during construction will be to SRPs, HDEBs, DEBs to existing grass buffer zones or to temporary sediment retention devices.
Streamworks	At all practical times these activities, and any associated works within these environments will be undertaken in an offline 'dry' environment with the detail for these works confirmed within a SSESCP.

52. All ESC measures will remain in place until such a time as the catchment contributing to that device is stabilised. Once the contributing catchment is considered stabilised, or other measures are in place as agreed through the SSESCPs process, the measure will be decommissioned in consultation with Horizons and GWRC. The decision process and procedure for this will be outlined within the SSESCPs.

## MANAGEMENT PLAN DETAIL FOR EROSION AND SEDIMENT CONTROL

### *Overarching Erosion and Sediment Control Plan*

53. As detailed above, I note that Mr Pearce has recommended an overarching Erosion and Sediment Control Plan (**ESCP**), and a certification requirement for that document in proposed conditions. I address these proposed conditions in my response to the s 87F Report later in my evidence, but I confirm here my general acceptance of such a condition. However, it is worth noting at this stage within this evidence that the proposed content of the ESCP is the same as that already provided in the CWMR. I consider, therefore, that the existing CWMR can be used as the framework for the Overarching ESCP through the conditions of consent. I have recommended an advice note for Condition # ES3 to reflect this.
54. This Overarching ESCP will also utilise the erosion and sediment control principles detailed in Appendices B and C of the CWMR, and will act as a reference document which identifies processes and procedures for management of effects during construction.
55. In particular, Appendix B is lifted from the GWRC Guidelines, and sets out the fundamental principles of erosion and sediment control.
56. This Overarching ESCP will be confirmed and finalised once the final locations of the turbines and other infrastructure within the Turbine Envelope Zone have been confirmed through detailed design, and prior to construction. The required content of the Overarching ESCP is detailed within the recommended conditions of consent, which are discussed later in my evidence<sup>5</sup>.

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<sup>5</sup> Condition # ES3 in Appendix A to Mr Anderson's evidence.

### *Site Specific Erosion and Sediment Control Plans*

57. The SSESCPs will be submitted to the Horizons and GWRC for certification against the consent conditions. The SSESCPs will be informed by the principles of the Overarching ESCP and will enable specific construction constraints and opportunities to be incorporated into the final design for the works at that location.
58. The content of the SSESCPs, the process for their development and subsequent certification by Horizons and GWRC are detailed in conditions ES5 and ES6, as attached to Mr Anderson's evidence.
59. The conditions require the SSESCPs to include specific information as appropriate, including:
- i. *A plan or a series of plans showing:*
    - *Catchment boundaries and contours;*
    - *Areas to be disturbed;*
    - *Fill areas;*
    - *Soil stockpile areas;*
    - *Culverts;*
    - *Erosion and sediment control measures.*
  - ii. *The specific erosion and sediment control measures that will be applied to each stage (if applicable) of earthworks, including the location(s), dimension(s) and capacity of any control structure(s);*
  - iii. *Details of any further chemical treatment bench testing and recommendations as per Condition ES10 and specific to the SSESCP;*
  - iv. *Supporting calculations and design drawings of all erosion and sediment control structures;*
  - v. *Expected commencement dates for the implementation of erosion and sediment control measures;*
  - vi. *Location(s) of stabilised entranceway(s);*

- vii. *Details of any dewatering and how this will be undertaken in accordance with the Dewatering Management Procedure;*
- viii. *Any exclusions / “no go” areas including but not limited to ecological features such as wetlands, any identified contaminated areas, any potential archaeological sites;*
- ix. *Identification of erosion and sediment control risk, the nature of the risk, the exposure of works to heavy rainfall and specific actions to manage this risk;*
- x. *Details of any temporary and / or permanent stabilisation;*
- xi. *Construction methodologies applying to any proposed instream structures;*
- xii. *Details of who is undertaking the work and contact details;*
- xiii. *Monitoring and maintenance for all erosion control measures on a regular frequency or within 24 hours of a rain or snowfall event that could impair the function or performance of the control measures;*
- xiv. *Expected removal or decommissioning of erosion and sediment control measures;*
- xv. *An inspection and reporting schedule, in particular in response to adverse weather conditions;*
- xvi. *Maintenance activities.*

## **SPECIFIC METHODOLOGIES AND FOCUS AREAS WITHIN THE CWMR**

60. The CWMR includes the details of ESC measures and methodologies required to manage erosion and sediment runoff from the various construction activities associated with the Project. The activities include:
- (a) Roading and corridor access establishment and upgrade;
  - (b) Wind turbine foundations;
  - (c) Ancillary structures and site compound;
  - (d) Underground cable network construction;
  - (e) Fill placement; and

(f) Streamworks and culverts.

61. The CWMR also provides some ESCPs for five identified focus areas<sup>6</sup>. These have been undertaken to demonstrate the feasibility of the approach and to ensure that the key construction activities have been considered in full.
62. Overall, five specific Focus Areas were identified and ESCPs developed for each of these. These five areas were determined to represent typical earthworks activities that would occur on the Project. ESC Plans were drafted and ground-truthed to ensure that the proposed ESC measures and methodologies as provided for within the CWMR could be practically implemented and maintained throughout.
63. One of these focus areas is a fill site which demonstrated the approach to be undertaken during construction. For the fill sites themselves the first step that will be undertaken is the confirmation that the fill site is appropriately sited, avoids direct filling over stream systems and where practicable avoids vegetated areas. This exercise has already occurred as part of the advancement of the Project design, however will be able to be fine-tuned prior to filling activity. The SSESCPs will confirm this process. The criteria against which fill sites are to be finalised and selected are that these sites:
- (a) are within the Turbine Envelope Zone or the Turbine Exclusion Zone;
  - (b) avoid natural inland wetlands and streams where practicable;
  - (c) avoid vegetation removal (excluding pasture) where practicable;
  - (d) are subject to a geotechnical assessment;
  - (e) are subject to a visual landscape assessment;

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<sup>6</sup> Appendix C of the CWMR

- (f) have a catchment area above the fill site minimised (5ha maximum) and where this exists it can be practically diverted around the fill area; and
- (g) ensure there is sufficient room to allow for placement of ESC measures.

## **RISK MANAGEMENT**

- 64. The Project will largely involve works occurring along ridge tops on several fronts. The earthworks areas will be subject to ongoing stabilisation as works progress to minimise the open areas of earthworks and the potential for sediment generation (erosion) and subsequent sediment yield from the Project.
- 65. The key elements of construction related environmental risk for this Project are the exposure of bare land, the steep nature of the topography in sections of the Project and works within or adjacent to watercourses. Key risk locations for this Project are therefore assessed as:
  - (a) Works adjacent to wetlands and stream systems;
  - (b) Cut and fill operations in steep high-risk erosion areas; and
  - (c) Fill site establishment and placement.
- 66. To assist with an understanding of the nature and magnitude of this risk I have evaluated the existing topography and location of freshwater systems through site visits and plan assessments. This has occurred in association with Dr Keesing. In addition, through the development of SSESCPs<sup>7</sup> we will confirm and identify steeper locations as higher risk and will manage this accordingly.
- 67. Those areas with slopes exceeding 20-degrees, and other identified high-risk locations, will be subject to a higher level of detailed design and ongoing contractor monitoring, as outlined in the CWMR. These

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<sup>7</sup> Condition #ES5 in Appendix A to Mr Anderson's evidence.

monitoring and maintenance procedures will be defined further and confirmed through the SSESCPs. In summary, the monitoring and maintenance will, in particular, focus on pre-forecast rainfall monitoring and post rainfall monitoring to ensure all ESC measures are in place, are working as intended and are achieving the required outcomes, and will also include a water quality monitoring programme of the receiving environment.

68. Overall sediment yield risk is assessed for the proposed earthworks within the Project area, in the context of both event probability and associated consequence. The Project earthworks area is not particularly significant, and works will be undertaken in various stages. The risk from the earthworks themselves will be reduced by reducing exposed open areas at any one time and as part of this, progressively stabilising as works proceed. The erosion control practice of cut and cover methodologies will therefore have a significant impact on reducing overall sediment generation and yield.
69. To assist in this process, a 14-day maximum period of leaving exposed areas with no works occurring is assessed as a critical risk reduction element, and will in itself, encourage progressive stabilisation. I note this is addressed in the Mr Pearce's Report, which I endorse as appropriate, and has been carried through to Meridian's updated proposed condition set<sup>8</sup>.
70. Within all earthworks areas, including the higher risk locations, ESCs will be installed to minimise generation, and to capture and treat sediment laden runoff that may enter the receiving environments. Additionally, for the higher risk locations the duration and timing of works will be minimised as far as practical to minimise disturbed soils exposed to heavy rainfall. It is recommended that as part of the SSESCPs process, this risk is specifically identified, the nature of the risk understood, the exposure of works to heavy rainfall assessed, and specific actions to manage this risk identified and implemented.

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<sup>8</sup> Condition # ES4 (I) in Appendix A to Mr Anderson's evidence.



Meridian's updated proffered condition set captures this recommendation.<sup>9</sup>

71. Indicative methodologies for both fill deposition area establishment and placement and streamworks/culvert placement have been developed and are outlined in the CWMR. Again, these methodologies will be defined further and confirmed through the SSESCPs development.
72. It is also recognised that wetter periods of the year (e.g. May to September), which also corresponds to colder air and soil temperatures, may pose a higher risk for sediment discharges. This is due to increased rainfall, saturated soil profiles and also cooler temperatures reducing the ability for revegetation to occur. Earthworks within this period will need to reflect this higher risk which will be achieved through the SSESCP process, whereby works during wetter periods will require additional management procedures. This is further supported by winter works "restrictions"<sup>10</sup> where works over that period will be aligned with the climatic conditions, and also the SSESCPs process which includes the identification of risk and risk management.
73. In areas where earthworks activities are required during the winter months, the Horizons and GWRC winter works standard procedures will apply, unless otherwise provided for under a SSESCP process. This winter works application will be prepared and submitted prior to works commencing.
74. As captured by Meridian's updated proffered condition ES9 (which I note contains some amendments to the Councils' version), during the winter period this risk assessment, which shall be undertaken within the SSESCPs process, will specifically consider:
  - (a) The scope/nature of the proposed works;
  - (b) Structural controls proposed, or existing, that will be/are installed;

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<sup>9</sup> Condition # ES5 (c)(viii) in Appendix A to Mr Anderson's evidence.

<sup>10</sup> Condition # ES9 in Appendix A to of Mr Anderson's evidence.

- (c) Additional non-structural controls to be implemented (e.g. increased on site monitoring and staging); and
  - (d) Maintenance consideration of structural controls to ensure effective access can be achieved to undertake the maintenance and controls continue to work efficiency.
  - (e) Compliance history and performance of the site, if available; and
  - (f) Sensitivity of the receiving environment subject to the winter works.
75. I assess that provided these conditions are complied with the associated risk of winter works will be managed appropriately.

## **MONITORING**

76. Once the erosion and sediment controls are in place, ongoing site monitoring by the Project team will occur to ensure that those measures have been installed correctly, are functioning effectively and are continually improved throughout the works, if required. In addition to this, a regular council inspection is expected to occur as part of consent condition monitoring.
77. The construction manager will have an important role, to ensure that visual assessments of the receiving environment are maintained regularly throughout the works period with particular attention paid before, during and after periods of rainfall.
78. In the context of visual assessment, the receiving environment is defined as the immediate receiving environment adjacent to the area of works. However, the wider freshwater environment will also be subject to visual inspections.
79. Any noticeable change in water clarity following a rainfall event, or to the water clarity upstream of the site of works as a result of the earthworks activity will result in a review of the measures and practices in place. Additional measures will be implemented and changes made as necessary under the adaptive management procedures.

80. To assist with identification of higher risk periods, such as during rainfall events, the Project will utilise on site manual rainfall gauges to provide data for the Project relating to rainfall quantities and intensities which will assist with confirming adequacy of the ESC measures and methodologies.
81. In addition, the Project will utilise rain forecasting (such as MetVUW) to understand forecast weather patterns and therefore enable more focused management of higher risk activities during rainfall periods. This may include ensuring that any works within stream or channel systems are fully stabilised prior to rain events to minimise scour and erosion. This will also support the recommended 14-day maximum period for leaving exposed areas with no works occurring and will act as a further critical risk reduction element.
82. Monitoring of onsite devices is referred to as 'Devices Monitoring' and refers to environmental compliance for the Project during the construction period. It is based upon the appropriate installation, location, maintenance, and monitoring of control devices. It is important that within the context of monitoring, the devices are not restricted to physical structures and will also include work practices and methodologies.
83. The purpose of the devices monitoring is to check that all practices, control measures and devices are constructed, operated and maintained so they remain fully effective at all times.
84. Devices monitoring is aimed at the early detection of activities or problems that have the potential to result in an adverse environmental effect.
85. The frequency of the devices monitoring will vary throughout the year and will reflect areas of changing activity and risk along the Project. During the construction period the monitoring will be undertaken daily and more frequently during heavy rainfall (defined as 25mm in 24 hrs or 7mm in a one-hour period). The inspections will include qualitative monitoring of the following:

- (a) The integrity and effectiveness of all construction related water management devices;
  - (b) Construction activities onsite upstream of the water management devices;
  - (c) General site conditions and other land disturbing activities occurring within the catchment; and
  - (d) General status of the immediate receiving environment.
86. The monitoring data will help to determine whether any further action is necessary. Where issues with the integrity and/or effectiveness of the devices and/or methodologies are observed these shall be rectified immediately.
87. In addition to the above, quantitative monitoring will be undertaken on the Project. The objective of this monitoring programme is to provide data for an array of rainstorms of different magnitudes and intensities to support the ESC effectiveness and identify areas of improvement.
88. This monitoring will be based on manual monitoring of all SRP discharges and the receiving environment streams (upstream and downstream) during a rainfall event as defined above, unless the health and safety of the sampling personnel may be compromised. This monitoring will include determination of turbidity using a field turbidity meter.
89. This manual monitoring will allow for ongoing comparative analysis over time and will provide for continuous improvement and adaptive management of the ESC measures and methodologies adopted on the site.

### *Monitoring Triggers*

90. Further monitoring will be undertaken in response to certain “triggers”. The triggers for these more intensive / repeat investigations include observations such as:

- (a) Activities observed to be happening on-site that are likely to compromise the effectiveness or integrity of that site’s erosion and sediment controls;
- (b) Taking into account antecedent climatic conditions, a conspicuous change of water colour at the downstream receiving environment that is very different to the colour that is normally associated with conditions at the same site, and with such change in colour not evident at upstream locations above the construction zone;
- (c) Obvious accumulation of sediment in the vicinity of the discharge points, or anywhere else within or in proximity to the active construction zones;
- (d) Streambank collapse or obvious signs of channel erosion / instability in the immediate receiving environments;
- (e) Visual reports / evidence of uncharacteristic changes to downstream substrate composition, increased macrophyte bed cover in stream or discolouration of instream plant communities; and
- (f) Spillage / accident reports by site personnel.

91. If the results of any routine device monitoring identify any of these triggers, then a more detailed response will occur as follows:

- (a) Ascertain that in all probability the issue is associated with the Project earthworks;
- (b) Inform and liaise with Horizons and Greater Wellington Regional Council;

- (c) Ascertain the magnitude of the adverse effects (this may involve undertaking immediate monitoring of the ecological variables);
  - (d) If the effects have been more than minor, ascertain what response is necessary including any ecological response;
  - (e) Determine how to monitor the effectiveness of the response(s);  
and
  - (f) Implement and monitor the response.
92. A continual feedback loop is included in this process until it has been verified that the implemented responses have been successful. Changes to earthwork site practices or to specific devices may also need to be implemented to avoid any future similar events.
93. If chemical treatment is utilised within the ESC methodologies, then a specific chemical treatment management plan will be developed and this will include monitoring of associated discharges from these devices.

## **ASSESSMENT OF CONSTRUCTION EFFECTS**

94. The following key points are noted for the Project.
- (a) The statutory framework and policy guidance from Horizons and GWRC require that the Project be aware of and ensure implementation of appropriate construction water management (including ESC) controls including construction and maintenance of these devices.
  - (b) It is clear that those works associated with the steep topography of the Project are of a higher risk and need careful and pro-active management and monitoring to ensure that the construction effects are minor.
  - (c) A range of ESC measures, including innovative approaches, are proposed on the Project. ESCs will be based on both structural

and non-structural measures with an emphasis placed on the non-structural management techniques.

- (d) The Project will rely on detailed SSESCPs to be submitted to Horizons and GWRC at a later date, before any construction activity takes place, to allow for contractor input.
- (e) An adaptive monitoring programme will be implemented which will allow for ongoing continuous improvement of the construction water methodologies.

95. I assess that based on the nature of the earthworks, the proposed erosion and sediment control measures and the information gathered through this assessment and the site visits, that the earthworks can occur with an overall minor effect only.
96. I have recommended conditions of consent that reflect the approach as outlined within this evidence and in particular the SSESCP process and adaptive management and monitoring regime. In addition, the criteria associated with the identification of the fill sites is important and should be reflected within conditions of consent. I consider that Meridian's updated proffered condition set addresses the points outlined above, and with the proposed measures effects will be managed in accordance with best practice.

## **FURTHER INFORMATION RESPONSES**

97. In the documentation provided to Horizons and GWRC through the provision of further information I confirm some key elements as set out in the paragraphs below. Some of this detail is already included in above paragraphs however is repeated below to ensure any amendments through the s92 process are clearly documented.

### *Earthworks*

98. The extent of exposed soil and length of time that area is exposed has a direct influence on the sediment yield leaving a particular area of the site. Earthworks and construction activities will be staged and

sequenced in order to limit the area of exposed soil required to complete an element of the work. Open earthworks areas will be progressively stabilised to reduce the potential for erosion to occur with a 14-day period recommended.

99. Section 7.1 of the CWMR notes “To assist in this process, it is recommended that a 14-day maximum period of leaving exposed areas with no works occurring is assessed as a critical risk reduction element, and will in itself, encourage progressive stabilisation”. The intent of this 14-day period is that the earthworks areas will not be left in an un-stabilised state for a period of time with no works occurring. If earthworks in a particular location are completed, they will be progressively stabilised and at no time will areas remain open for more than a 14-day period. This provision ensures that areas of earthworks are not unnecessarily undertaken and then left in an unstable state for a period of time.
100. The management of this will require progressive stabilisation of cut and fill batters as they are established for all earthwork locations. This is a similar provision that applies on many earthworks sites with similar conditions and can be implemented successfully. The nature of the stabilisation is further defined within Section 4.2 and 5.1.5 of the CWMR.
101. Stabilisation as defined within the CWMR is recognised as the industry best practice definition of stabilised. If applications such as hydroseeding and traditional grass sowing methodologies are utilised, these will not achieve a stabilised surface and in that case the downstream sediment control measure will need to remain in place until stabilisation is achieved. The alternative option in this scenario is application of a surface cover that achieves stabilisation.
102. In recent years there has been a significant use of soil binders and polymers on earthworks sites, and these are recognised to have benefits but will not always achieve a stabilised surface. In the circumstance that these are utilised they will need to be verified as stabilised, demonstrated to have no residual impacts and will need to be trialled on site to demonstrate appropriateness prior to use. This is detailed within Section 5.1.5 of the CWMR.



### *Sediment Control Devices*

103. It is well recognised that SRPs, HDEBs and DEBs all provide a robust and proven sediment control function with SRPs the most effective of these options. This is not to diminish the value and effectiveness of the alternatives (HDEBs, DEBs, Super silt fences etc) but simply confirms the highly efficient nature of SRPs for larger areas of earthworks. The Project will implement SRPs wherever room availability and best practice assessment applies. This will be documented in a SSES CP and reviewed and certified by Council.<sup>11</sup>
104. As specified in Section F2.1.5 of the GWRC Guidelines it states that DEBs can benefit from chemical treatment. This is recognised and accepted within the CWMR with the process being confirmed through the SSES CP process. It is not possible to determine if some DEB catchments will benefit or otherwise from chemical treatment until such a time as the SSES CP is established and the activity and nature of the works is understood. The key driver to chemical treatment implementation or otherwise is based on bench testing of the soils that apply to the area of interest with the bench testing undertaken to date demonstrating that very low dose rates are required in some soil types.
105. The soil type and bench test analysis, the duration of works, the nature of the works themselves, the vicinity of water bodies and the slope length and angle of the catchments all assist with risk determination and through the SSES CP process will be documented to allow a risk profile to be understood and as part of this the need or otherwise for chemical treatment of DEBs. It is assessed that the SSES CP process remains as the best practice and most appropriate place for this determination.
106. It is proposed to undertake a geotechnical assessment of the location of the SRPs to ensure that the location is suitable from a structural perspective for the purpose of a functional SRP device. This has been further assessed through the application process and it is determined that all SRPs, DEBs and HDEBs will all be subject to geotechnical assessment with respect to location of the devices and in addition,

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<sup>11</sup> Condition ES4 and ES5

SRPs shall be subject to geotechnical supervision during construction<sup>12</sup>. If geotechnical constraints occur, then alternative locations will be determined and / or geotechnical solutions established for the ESC measure in question.

#### *Streamworks*

107. The locations of the culverts and streamworks are identified within the overarching s92 response. These locations have all been viewed on the ground and have been assessed based on the ability to install structures and methodologies in accordance with the CWMR. It remains my assessment that the methodologies outlined are appropriate and that only when detailed design and specific location is confirmed can we then determine the specific ESC approach and supporting plan. This will be provided for full review (and further feedback if required) through the SSESCP process.

#### *Monitoring*

108. In the event of breaching a monitoring trigger the erosion and sediment control management system will be investigated to determine whether there has been a discharge from the devices. If there has been a discharge, manual water quality monitoring from the discharges and receiving environment will occur and a detailed response undertaken including full review of the ESC measures and processes associated with that specific trigger.

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<sup>12</sup> Condition # ES4 (o) in Appendix A to Mr Anderson's evidence.

## RESPONSES TO ISSUES IN SUBMISSIONS

109. A number of submissions raised concerns about effects arising resulting from construction activities. Many of these submissions were of a general nature. Others have provided more detail about their concerns, and I have responded to these submissions.

### *Water Quality*

110. Several submissions raised concerns related to water quality and construction effects.<sup>13</sup> The process associated with the SSESs and the monitoring are a key part of ensuring that water quality, including for stock supply, is not compromised.
111. I have reviewed these submissions and further assessed the proposed approach to be taken with construction water management. It remains my view that the effects related to erosion and sediment control will be minor overall, where there is a robust process of development and review of SSESs prior to commencement of works.
112. I further confirm that a best practice approach is proposed in relation to ESC for Mt Munro, and is supported within the updated proffered consent conditions. These conditions will require specific construction water management measures to be implemented to ensure sediment, and other contaminant discharges, are minimised.
113. With respect to monitoring, a comprehensive and adaptive monitoring programme is to be implemented which will allow for checking of the water quality outcomes from the construction, assessing the effectiveness of the measures installed and then adapting as required. This is robust and provides certainty for the outcomes.
114. Further submissions raise concerns related to construction timeframes and the potential for weather events over that period.<sup>14</sup> I confirm that

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<sup>13</sup> Ms Davies (6), Mr Berry (7), Mr Clarke (8), Mt Munro Protection Society Inc (13), Dr Doering (14), Wellington Fish and Game (18), Ms Semmens (21), Mr N Oliver (24), Mr I Oliver I(30), Glen Opel Limited (34), Miss Needham (36), Mr Merrin (40), Mrs Tomlin (41), Braddicks (43 and 44), Mr Hamilton (45), Mrs Braddick – Tahiariki (46), Mr M Braddick (47 and 49), Ms McIlraith (56) and Ms Sutherland (67))

<sup>14</sup> Mr Oliver (37), Braddick (43, 47 and 48)

the area of earthworks to be undertaken is relatively small. Fill volumes are more significant; however, these activities are undertaken with specific erosion and sediment controls in place, geotechnical supervision, ongoing monitoring and progressive stabilisation. These aspects are all supported through conditions of consent, and I remain confident that all earthwork activities can be managed appropriately in this regard.

- 115. It is acknowledged that there is potential for significant rain events over the estimated 2.5-year construction period. However, this is managed through weather forecasting, robust ESC measures, and in particular progressive stabilisation.
- 116. I confirm that within the CWMR I have referred to Masterton rainfall figures to illustrate the annual rainfall pattern. This will not reflect exact site conditions. However, through the construction process, and in particular through the SSESCPs process, specific design of controls will be based on local data. In addition, weather forecasting is required and will continue to inform construction staging, sequencing and programme.
- 117. My experience with other earthwork projects provides me with confidence that the earthworks for this Project can be effectively managed.
- 118. I assess that based on the nature of the earthworks, the proposed erosion and sediment control measures and the information gathered through the CWMR process and the site visits, that the earthworks can occur within the design envelope and achieve an overall minor effect only.

## SECTION 87F REPORT

119. I have read Mr Pearce's Report and generally agree with the conclusions reached. Mr Pearce has suggested amendments to, and new, conditions to reflect the CWMR and also his own assessment.
120. The earthworks conditions proposed by Horizons and GWRC generally mirror those offered in the resource consent application. There are, however, a few aspects of the Councils' proposed conditions which I will comment on below.
121. **Condition ES3:** While I am comfortable with this condition, I confirm that the existing CWMR already achieves the purpose of the ESCP as per this condition. I assess that an updated CWMR, in the form of an Overarching ESCP, can be provided prior to construction to reflect updated design details. However, this should be based on the existing CWMR.
122. **Condition ES4(e):** Sub-condition (e) specifies that devices must be designed and operated to achieve targets as specified. The targets specified are listed as items that must be achieved. It is important that these targets remain targets rather than limits which, if breached, could result in compliance and enforcement action. The intent of a target is that a breach will result in further investigation and adaptive management rather than penalties and therefore it is assessed this should be linked to Condition ES4(g).
123. **Condition ES4(g):** This condition sets out the detail of actions if the target is not met. I recommend that the condition cross references ES4(e) to ensure that it is clear that an investigative and adaptive management response approach will follow a breach of a target.
124. **Condition ES4(e)** must also ensure that the targets specified relate to the discharges from the devices, in particular the 100mm clarity provision.
125. **Condition ES4(o)** refers to geotechnical input required for location assessment of SRPs, DEBs and HDEBs. I confirm that for SRPs that geotechnical input into both the location and construction of the device

is necessary. This is primarily due to the longer-term nature of these controls and also their physical size. For the other devices as mentioned, this geotechnical input may not be necessary during construction. I recommend that the condition should reflect this, while also ensuring that the location is geotechnically sound. To achieve this, I recommend that Condition ES4(o) be amended so that:

- (a) SRPs are subject to geotechnical overview for both location and device construction; but
- (b) DEBs and HDEBs are only subject to geotechnical overview for their location.

126. **Condition ES5(c)** specifies the information that must be included within a SSESCP. I am comfortable with this content and have amended this to ensure this content reflects the various amendments suggested. I would recommend that a further provision be inserted for risk identification and management. This should specify risk identification, the nature of the risk, the exposure of works to heavy rainfall and specific actions to manage this risk. My recommended wording is included in Meridian's updated proffered conditions.
127. I further consider that, to ensure there is a clear linkage and understanding of stabilisation during construction, condition ES 5(c)x cross references to ES4 k) and l). This ensures a clear understanding of the 14-day stabilisation provision and also ongoing progressive stabilisation.
128. **Condition ES5(d)** specifies as built information required prior to works commencing. I have recommended amendments to this condition to ensure that it is clear that the certification is required to confirm compliance with the certified SSESCP and the GWRC Guidelines. This also will ensure that the form of the certification will be dependent upon the ESC measures that are specified within the SSESCP.

## **CONCLUSIONS**

- 129. If the construction of the wind farm is undertaken in accordance with the proposed Overarching ESCP and SSESCP method and the conditions proffered by Meridian, I consider effects arising from the construction activities can be effectively managed.
- 130. The proposed conditions of consent, into which I had input, allow for flexibility for the contractor to implement the Project, while providing certainty that effects of the Project can be managed appropriately. These conditions include the development of a future SSESCPs that will allow for innovation and amendments as necessary.
- 131. In addition to specific practices and methodologies, the CWMR (and consequently the Overarching ESCP) outlines the comprehensive monitoring that will occur to ensure that erosion and sediment control measures and methodologies are fully effective and remain this way.
- 132. My experience in erosion and sediment control confirms that the Project is proposing a best practice approach with effective structural and non-structural measures. Overall, with the controls that are proposed, I conclude that the effects of sediment discharges from the Project will be minor.

**Graeme Ridley**

24 May 2024