IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of applications by Meridian Energy Limited to Manawatū-Whanganui Regional Council, Greater Wellington Regional Council, Tararua District Council and Masterton District Council for resource consents to enable the construction, operation, and maintenance of a new wind farm on Mount Munro, located approximately 5km south of Eketāhuna

SECTION 87F REPORT OF NEIL ANDREW CRAMPTON – GEOTECHNICAL

MANAWATŪ-WHANGANUI REGIONAL COUNCIL, GREATER WELLINGTON REGIONAL COUNCIL, TARARUA DISTRICT COUNCIL AND MASTERTON DISTRICT COUNCIL

15 March 2024

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A. OUTLINE OF REPORT

1 This report, required by section 87F of the Resource Management Act 1991 (**RMA**), addresses the issues set out in sections 104 to 112 of the RMA, to the extent that they are relevant to the applications lodged with the Manawatū-Whanganui Regional Council (**Horizons**), Greater Wellington Regional Council (**GWRC**), Tararua District Council (**TDC**) and Masterton District Council (**MDC**).

2 The resource consents applied for, by Meridian Energy Limited (**Meridian or the Applicant**), are required to authorise the construction, operation and maintenance and improvement of a new wind farm on Mount Munro, located approximately 5km south of Eketāhuna. The project is known as the Mt Munro windfarm project (the **Mt Munro Project or Project**).

3 In this report I address geotechnical aspects of the resource consent applications lodged with Horizons and GWRC (the **Regional Councils**) and TDC and MDC (the **District Councils**) (the **Application**).

4 While this report is pursuant to section 87F of the RMA, I have in accordance with section 42A(1A) and (1B) attempted to minimise the repetition of information included in the Application and where I have considered it appropriate, adopt that information.

B. QUALIFICATIONS / EXPERIENCE

5 My name is Neil Andrew Crampton. I am a Technical Director Geotechnics at Pattle Delamore Partners Limited (**PDP**). I have been in that position since October 1994.

6 My role involves project management and technical review of most aspects of the geotechnical projects carried out by PDP including slope instability, geohazard risk assessments and remediation earthworks. The projects I manage and review include a range of project stages including site investigation, engineering geology assessment, remediation and monitoring.

7 I hold the qualifications of Bachelor of Science in Geology and Master of Science in Engineering Geology both from the University of Canterbury. I am

a member of the New Zealand Geotechnical Society; a technical group of Engineering New Zealand.

8 I have over 35 years' experience as an engineering geologist. During this time I have worked on projects throughout New Zealand gaining experience in the following areas most relevant my assessment:

(a) Engineering geology site investigations, construction supervision, remediation and monitoring for landslides;

(b) Engineering geology and hydrogeology model development and review for geothermal and wind farm projects, dams, tunnelling and underground and open cast mining;

(c) Corridor route selection, construction supervision and monitoring system design. Post-construction slope instability investigation, assessment, remediation and monitoring;

(d) Natural hazards assessment, hazards register development and risk evaluation;

(e) Aggregate and dimension stone resource investigation and batter stability assessment;

(f) Projects in a wide variety of rock types including schist, greywacke, limestone, marble, granite, ignimbrite, volcanic rocks and "soft rock" mudstone and siltstone. Soil types include glacial outwash gravels, loess, clay/silt, and central North Island volcanic soils; and

(g) Technical assessment reports and AEEs for resource consent applications and Notice of Requirement proceedings, including preparation and presentation of evidence.

9 I am familiar with site and surrounding area. I visited the site with Meridian representatives on 23 August 2023.

C. CODE OF CONDUCT

10 I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. This technical report has been prepared in accordance with that Code. In particular, unless I state otherwise, the opinions I express are within my area of expertise, and I have not omitted to consider material facts that might alter or detract from the opinions that I express.

11 I have all the information necessary to assess the Application within the scope of my expertise and am not aware of any gaps in the information or my knowledge.

D. EXECUTIVE SUMMARY

12 The key conclusions of my report include:

(a) I consider the project is feasible from a geotechnical perspective based on the information provided on geology, natural hazards and geotechnical matters;

(b) I consider the table of earthworks volumes for the project provided through further information provided under the RFI process to be sufficient for outlining the indicative earthworks volumes associated with the works for consenting purposes. This table indicates that the maximum volume of excess fill requiring disposal within the designated project zones is approximately 1.4M m^3;

(c) I consider that the Indicative Fill Disposal Areas Plan provided through further information under the RFI process adequately represents the sites required to accommodate the maximum excess fill volume;

(d) Adequate fill area preparation, fill compaction and surface stabilisation will be required to ensure stable fill slopes. The Applicant has provided indicative methodologies to achieve these requirements including additional investigations as part of detailed design and construction monitoring to constrain fill within the zone

boundaries. Erosion and sediment control measures associated with earthworks (including fill sites) are addressed by Mr Pearce;[1]

(e) Further investigations will be required to confirm geotechnical conditions required for detailed design of a range of project components including road cut batter stability, treatment of existing slope instability, fill batter stability, turbine foundations and facilities located on potentially liquefiable ground. Such investigations are part of normal practice to inform detailed project design and the Applicant has indicated that a range of investigations will be carried out. I have recommended a number of conditions to ensure these matters are addressed adequately;

(f) Seismic design for the project components including turbines, the water supply pond and buildings (e.g. substation) are required to be carried out in accordance with New Zealand industry standards;

(g) Geotechnical related submissions can be grouped under earthquakes and fault lines, landslides and rockfalls and detailed geological survey. I consider all the matters raised in the submissions are adequately addressed by information in the Application and through the RFI process including provision for further geotechnical investigations and the range of mitigation measures that can be adopted as part of construction.

(h) I have recommended a number of changes to conditions to address the matters I cover in this report.

E. SCOPE OF REPORT

13 My report focuses on issues related to geotechnical and associated natural hazard aspects of the Application. It covers the following topics:

(a) A description of the site geology;

[1] Section 87F Report – Erosion and Sediment Control (15 March 2024) from [32].

(b) Completing the proposed work within the proposed turbine and turbine exclusion zones;

(c) Earthworks cut and fill volumes including cut to fill balance and excess fill disposal areas within the proposed turbine and turbine exclusion zones;

(d) Slope instability features and the proposed measures to mitigate potential effects of these features;

(e) The presence of faults;

(f) The water supply pond required for construction of the project;

(g) Seismic aspects of the application as they pertain to industry standards for seismic design including liquefaction;

(h) Clarification of the scope of further geotechnical investigations proposed for detailed windfarm design; and

(i) Engineering geology site investigations, construction supervision, remediation and monitoring for landslides.

14 I have reviewed and relied on the information provided by:

(a) "Assessment of Environmental Effects on behalf of Meridian Energy Limited Mt Munro Wind Farm Project May 2023." (**AEE**). Prepared by Tom Anderson of Incite and dated 22 May 2023;

(b) Mount Munro Windfarm Geotechnical Factual Report, prepared by Tonkin + Taylor (job no. 1016884.1000 v2), dated May 2023;

(c) Mount Munro Windfarm Geological and Geotechnical Information to Support Civil Engineering Report, prepared by Tonkin + Taylor (job no. 1016884.1000 v6), dated May 2023;

(d) Mt Munro Windfarm Civil Engineering Report, prepared by Tonkin + Taylor (job no. 1016884.1000 v6), dated May 2023;

(e) Parts of Meridian Energy Mt Munro Wind Farm Construction Water Management Plan and Effects Assessment Report, prepared by Ridley Dunphy, dated May 2023;

(f) Response to the Mt Munro Proposed Wind Farm Resource Consent Application Section 92 Additional Information Request dated 6 July 2023 (**RFI#1**), prepared by Incite, dated 7 September 2023 (**RFI#1 Response 1**). Specifically, Appendix 15, Mount Munro Section 92 Response to Items 96 – 109, prepared by Tonkin + Taylor;

(g) Clarification of Meridian's Response to the Mt Munro Proposed Wind Farm Resource Consent Application Section 92 Additional Information Request, prepared by Incite, dated 25 October 2023 (**RFI#1 Clarification response**). Specifically, Appendix 15, Mount Munro Section 92 Response to Items 96 – 109, prepared by Tonkin + Taylor;

(h) Email providing updated fill site volumes table and indicative fill disposal areas plan from Tonkin + Taylor dated 30 October 2023; and

(i) Response to 20 December 2023 section 92 Additional Information Request (**RFI#2**) prepared by Incite, dated 31 January 2024 (**RFI#2 Response 1**). Specifically, response to S92 Question 1 associated with relic landslide features prepared by Tonkin + Taylor.

15 When I refer to the section 92 responses received as part of the Application process, I refer to the correspondence described in sub-paragraphs 14(f)-(i) above (**the RFI responses**).

16 In preparing this report, I have relied on the expert advice of Mr Pearce.

F. BACKGROUND

17 The following background focuses on geotechnical and natural hazard information within the Application or further information provided, as far as these matters inform my assessment. My background summary is based on relevant Application documents unless it is clearly indicated to be based on my desktop assessment or my site visit observations.

Geology

Key geological units/rock types at the site comprise:

(a) Topsoil and Loess – near surface soils with loess being wind-blown deposits of silt and sand;

(b) Colluvium – slope wash deposits typically overlying the greywacke bedrock on slopes in elevated parts of the site. Colluvium typically comprises a mixture of soil types including silts, sands and gravels. Colluvium also includes landslide debris, where present;

(c) Alluvium – recent alluvium from streams in the valley floors and in gullies and older alluvium on the river terraces in the western part of the site;

(d) Greywacke Rock - the greywacke bedrock comprises interbedded sandstone with lesser mudstone and siltstone. The rock typically ranges from weak to moderately strong. The greywacke is typically moderately to highly weathered and in places has weathered to become residual soil. The greywacke has closely to very closely spaced fractures (joints) with zones of sheared rock. Locally the rock contains areas of chert which are strong to very strong and form prominent ridge top outcrops.

Groundwater

(a) Groundwater seepages and springs have typically been observed on gullies and on the lower slopes;

(b) All except two test pits carried out during site investigations encountered groundwater with inflows varying from slow seepage to rapid inflow. Given that most of the test pits were located on or near the ridge crests, groundwater can be expected in higher slope and ridge crest areas as well as on the lower slopes;

(c) A number of gullies along the proposed access roads exhibited seepages or a steady water flow which coincides with boggy, wet ground and soft soils;

(d) Seepages were sometimes observed to coincide with shallow landslides and earthflows.

Slope Instability

(a) Slope instability observed on site include the features outlined below.

i. Shallow soil creep typically less than 0.5 m deep on steep slopes;

ii. Shallow translational slides and earthflows typically less than 1 m deep and a few metres wide;

iii. Rockfalls and rockslides are expected to occur on rock cut batters where unfavourable rock mass fracture orientations are present. These rock slope instabilities could range from 1 – 2 m wide to tens of metres wide.

(b) There is a risk of isolated shallow instability on cut and fill batters during construction and operational phases. For example, shallow soil slides are expected to occur on slopes above some roads which sidle across areas exhibiting existing instability; and

(c) Minor localised areas of erosion should be expected on yet to be vegetated cut and fill batters during extreme rainfall events.

Faults

(a) There are no recorded active faults within the site area;

(b) There are five active faults within 10 km of the site boundary. The nearest active fault is the Mangaoranga Fault while the greatest seismic hazard to the windfarm is likely to be from the Wairarapa Fault which is approximately 4 km from the site;

(c) Inactive faults are inferred to be present within the site area. A splay (offshoot) of the Rongomai Fault is inferred to cross the site in a south west – north east direction just to the south east of the western turbine envelope zone; and

(d) Broken and crushed greywacke can be expected in any fault zones encountered such as in road batter slopes.

Seismic Considerations

Earthquake shaking

(a) The nearest identified major fault is the Wairarapa Fault. This is 4 km away from the site. This major fault is likely to subject the site to near fault amplification effects.

Site subsoil class

(a) New Zealand Standard NZS 1170.5:2004 defines the site subsoil class for input into seismic assessment. Assessments of the subsoil class in the application are based on observations and investigations across the site;

(b) The wind turbines are expected to be founded on greywacke rock. A subsoil class B can be assumed for turbines founding on greywacke rock and turbine founding conditions are to be confirmed during construction;

(c) For laydown areas off Old Coach Road, a site subsoil class C should be assumed. Founding conditions for the laydown areas should be confirmed prior to construction to determine if subsoil class B or C is to be assumed for seismicity aspects of design; and

(d) For the design of earthworks and infrastructure across the site the subsoil class is likely to be site subsoil class B or C. Assessment of the site subsoil class will need to be made by the designer at each location and confirmed during construction.

Liquefaction

(a) The in-situ greywacke rock presents no liquefaction hazard. The liquefaction risk to the proposed turbines, infrastructure and the majority of the road network is very low; and

(b) The investigations to date indicate that the existing surficial silt and sand soils could fall within the liquefaction susceptibility criteria with respect to particle size distribution and density. However, liquefaction is only a risk where the materials are also saturated. This is likely to occur only in localised low lying areas and gullies containing alluvium. The liquefaction risk to infrastructure or earthworks can be mitigated by locally undercutting these materials first and replacing with non-liquefiable material. Soils away from the low lying areas and gullies are typically not saturated and therefore present a low risk of liquefaction.

G. ASSESSMENT OF APPLICATION

18 As an overview comment, I consider the project is feasible geotechnically from a geology, geotechnical and natural hazards perspective based on the Application and RFI responses.

19 In particular, having received the further information provided as part of the RFI responses, I am in general agreement with the Applicant's approach to assessing and managing geotechnical matters for the Mt Munro Project.

20 I agree with the Applicant that a range of further investigations and construction monitoring will be required to confirm geotechnical conditions for detailed design of a range of project components including road cut batter stability, treatment of existing slope instability, fill batter stability, turbine foundations, facilities located on potentially liquefiable ground and soil sub classes for seismicity assessment. Such investigations are part of normal practice to inform detailed project design and construction. However, as I discuss later, in my view, there should be targeted conditions to ensure investigations and monitoring occur in an appropriate manner.

Basis for Turbine and Zone Widths

21 The Application adopts the use of zones (turbine and turbine exclusion) to define the areas within the site where project works will be carried out.

22 From a geotechnical perspective, the zone approach is appropriate provided the zone width is sufficient to encompass all the proposed earthworks components such as cut slopes, roading/culvert related fill areas and disposal areas for excess fill. This means selection of the zone widths must be informed by, not only the expected in situ ground conditions for cuts and fill placement but also an allowance for unexpected ground conditions such as a contingent zone width increase for lower cut slope angles or placed fill batter angles.

23 The basis for selecting the width of the turbine exclusion and turbine envelope zone is described in general terms in the Application and can be summarised as follows:

(a) The development of the preliminary internal roading layout has been an iterative process;

(b) As well as the civil design considerations, input from landscape, ecology, the site entrance location, turbine locations, existing farm tracks and previous civil design work, were all considered when selecting the general layout geometry. The output of this iterative process was defined zones (typically 120m wide) on which all roads and infrastructure could be located; and

(c) The RFI responses clarified geotechnical inputs and influences on the zone widths, including cut slope angles, fill placement and disposal areas. Further information has also been provided in the RFI responses regarding mitigation measures that could be adopted to ensure the works could be carried out within the defined zones.

24 I consider the RFI responses provided by the Applicant to be satisfactory in terms of confirming that the proposed works can be carried out within the defined zones either by adopting the proposed cut slope angles and fill

placement methodology or by addition of specific stabilisation measures as required by ground conditions encountered during construction. Subject to the imposition of appropriate conditions (which I discuss later in this report), I consider it to be appropriate to finalise any site-specific mitigation measures as part of detailed design and/or during construction.

Total Earthworks Volumes

25 The RFI responses and direct discussion with the Applicant's geotechnical specialist has confirmed the total earthworks volumes required for the Project. These included inputs used to derive the earthworks volumes such as cut slope and fill batter angles, volume of excess fill requiring disposal, contingencies and bulking factor.

26 I consider that the table of earthworks volumes provided in the RFI responses and associated discussion sufficiently outlines the indicative earthworks volumes associated with the works for consenting purposes. The earthworks volumes are presented in Table 1 below.

Table 1: Mt Munro Fill Site Volumes (dated 30/10/23 – Tonkin +Taylor)

Earthworks source	Earthworks volumes - Current Design			Maximum Earthworks		Minumum Earthworks	
	Topsoil stripping	Cut	Fill	Cut (Current design + 10% contingency ***)	Fill (Current design)	Cut (Current design less 10%)	Fill (Current design)
Internal wind farm roads	47,000	850,300	305,200	935,300	305,200	765300	305,200
Cabling	(incl. in wind farm roads)	13200	12,700	13,200	12,700	13,200	12,700
Turbine platforms	39,600	651,500	109,400	716,600	109,400	586400	109,400
Turbine foundaton excavation	(incl. in turbine platforms)	42,000	21,000	42,000	21,000	42,000	21,000
Concrete batching plant	1500	6,000	6,000	6,000	6,000	6,000	6,000
Construction compound/laydown area	3500	5000	5000	5,000	5,000	5,000	5,000
Sub station	2500	5000	5000	5,000	5,000	5,000	5,000
Old Coach Road		5000	5000	5,000	5,000	5,000	5,000
Site won road base material (assumes 300mm layer over internal wind farm roads and turbine platforms)			32000		32,000		32,000
Total (m3)	**94,100.00**	**1,578,000**	**501,300**	**1,728,100**	**501,300**	**1,427,900**	**501,300**
Fill disposal volume			1,076,700		1,226,800		926,600
Bulking factor (1.15)			161,505		184,020		138,990
Total fill disposal volume (m3)			**1,238,205**		**1,410,820**		**1,065,590**

Fill Disposal Sites

27 The RFI responses and direct discussion with the geotechnical specialist in relation to the location and footprint of the fill disposal sites has confirmed there is a maximum of approximately 1.4M m^3 of excess fill requiring disposal. This accounts for the updating of fill disposal sites and footprints to accommodate the updated excess fill volume provided by the Applicant in Table 1 (reproduced above).

28 The finalised plan of excess fill disposal sites is **attached** as Figure 1 to this report. I am of the view that Figure 1 adequately represents the sites required to accommodate the indicated maximum excess fill that will be generated by the proposed earthworks for the project.

29 I note that the Applicant has outlined a methodology for fill placement to maximise fill stability including specific construction methods to constrain fill within the zone boundaries.[2] These fill area methodologies include:

(a) An inspection by a suitability qualified engineer or geologist to approve the fill site location and the proposed batter slope profiles;

(b) Fill disposal areas should be chosen in areas that are visibly free of groundwater seepages and instability;

(c) All topsoil and soft or loose surficial soils to be removed prior to fill placement where needed to ensure fill slope stability;

(d) Bench in the base of the fill disposal area into stiff or medium dense soil, or rock;

(e) Engineer to determine under drainage details. This would include layout and centres, additional drains and capacity to be installed over potential seepage zones;

[2] Mt Munro Windfarm Civil Engineering Report, prepared by Tonkin + Taylor (job no. 1016884.1000 v6), dated May 2023.

(f) Fills should be placed and compacted in layer thicknesses and to compaction standards defined during detailed design; and

(g) Fill placement should be inspected by a suitably qualified engineer or geologist.

(h) There is sufficient room that allows for placement of erosion and sediment control measures.

30 Erosion and sediment control measures associated with the fill sites are addressed by Mr Pearce.

Slope Instability

31 The information provided by the Applicant on instability features in the Application is adequate for enabling the assessment of effects, subject to the point I have noted below.

32 My assessment of aerial imagery, both historic and recent, identified potential large instability features on the slopes crossed by road R01 in its southern section. Proposed excess fill areas are also located in this area. These instability features are inferred to be relic/very old and are unlikely to be currently active. These instabilities were raised in the RFI#2. I am satisfied with the response of the Applicant as to how these features and any other relic landslides features along the proposed zones would be identified as part of mapping for detailed design and during construction.[3]

33 The Applicant also provided a range of methodologies that would be carried out as part of detailed design and construction to investigate and mitigate instability features that might be identified or occur. Detailed design examples are provided in the Indicative Further Geotechnical Investigations for Detailed Windfarm Design subsection later in this section. Methodologies during construction include inspection of natural and cut slopes by a suitably qualified engineer or geologist and if instability is observed, recommendations would be provided on appropriate mitigation

[3] RFI#2 Response 1.

measures such as material clearance, slope batter reprofiling/benching, localised drainage controls or localised slope stabilisation measures.

Main Storage Laydown Area Pond

34 A single water supply pond with approximate dimensions 100 m long by 50 m wide by 4 m deep and a working volume of approximately 13,200 m3 was confirmed via the RFI response for this area. The location of the pond is to be confirmed as part of the detailed design process. I note that a pond with these indicative dimensions and working volume is not classifiable under the Dam Safety Regulations (2022) under the Building Act 2004.

Seismic Considerations

35 Seismic considerations for the project including earthquake shaking, site subsoil classes and liquefaction are described in the Application.[4] I have summarised these earlier in my report.[5]

36 Key seismicity considerations and additional information requirements are summarised below:

(a) The Applicant has stated that the Wairarapa Fault, located approximately 4 km from the site, is likely to subject the site to near fault amplification effects. These effects will need to be considered in detailed design of project structures;

(b) The Applicant has stated that assessment of the site subsoil classes for the various soil and rock types across the site will need to be made by the designer at each location and confirmed during construction as this is required by relevant New Zealand standards for design of turbines, the main storage laydown area, substation, earthworks and infrastructure. By way of an example, the requirements in New Zealand Standard NZS 1170.5:2004 requires

[4] Mount Munro Windfarm Geological and Geotechnical Information to Support Civil Engineering Report, prepared by Tonkin + Taylor (job no. 1016884.1000 v6), dated May 2023, Section 6.

[5] At section F.

comprehensive geotechnical investigation at each turbine site to inform seismic design of the structures; and

(c) RFI#1 Response 1 clarified that further investigations will be undertaken to determine liquefaction potential at the main storage laydown area and terminal substation which maybe underlain by soils susceptible to liquefaction.[6]

Indicative Further Geotechnical Investigations for Detailed Windfarm Design

37 My initial assessment of the Application concluded that additional targeted geotechnical investigations would be required to inform most elements of the windfarm design as investigations to date have been sparse and focussed on the turbine envelope zone along the ridge tops. These additional investigations would need to address, among other matters, conditions identified during the completed site investigations including the presence of high groundwater/ground water inflows in elevated areas that will influence design of roading cuts and fills and the presence of any saturated alluvium in the low-lying areas in the west.

38 The Application and the RFI process has clarified that key project infrastructure will be investigated at the detailed design stage once locations have been confirmed. I consider this to be appropriate in the circumstances and not unusual for projects of this scale and nature. The scope and type of investigation will be confirmed at detailed design stage, however investigations are likely to comprise combinations of geological mapping, test pitting, boreholes, downhole geophysics, laboratory testing and other methods like cone penetration testing, if required. Additional geotechnical assessment would also be carried out, as required, as part of construction monitoring to further refine the design of key project infrastructure.

6 RFI#1 Response 1, Appendix 15 at Section 10.1.

H. SUBMISSIONS

39 I have reviewed submissions relating to geotechnical and natural hazards matters associated with the Mt Munro Project. Submissions covering similar topics have been grouped under the topic heading. The submission number for each submission is provided in parentheses.

Earthquakes and Fault Lines

Submissions

40 A number of submissions[7] mentioned earthquakes and/or fault lines. There are also submissions mentioning earthquake and/or fault line in relation to damage in past geological disturbances,[8] pollution caused by an earthquake,[9] and devastation caused by wind turbines in an earthquake.[10] Some submitters also mentioned a solution/condition to further develop plans around earthquake risk.[11]

Assessment

41 I consider the submissions related to earthquakes and fault lines are adequately addressed through identification of seismicity considerations and further information requirements outlined in the Application. I have addressed these matters in paragraphs 35 and 36 of this report. By way of an example relevant to the submissions, the requirements in New Zealand Standard NZS 1170.5:2004 will be adopted for design of the wind turbines. This standard requires comprehensive geotechnical investigation at each turbine site to inform seismic design of the structures.

7 Submissions 8, 13, 21, 34, 37, and 48.
8 Submissions 8, 13, 21, 34 and 48.
9 Submissions 8, 13 & 48.
10 Submission 21.
11 Submissions 8 & 13.

Landslides and Rockfalls

Submissions

42 Some submissions mention landslides and rockfalls.[12] In particular, landslides/rockfalls exacerbated by construction and operation of the windfarm,[13] damage to water ways,[14] and the presence of landslides/rockfalls on host properties.[15] Those same submitters also mentioned a solution/condition to undertake a geological survey to assess stability.

Assessment

43 I consider the submissions related to landslides and rockfalls are adequately addressed by these features being identified in the Application and clarified in the RFI responses.

44 Additionally, I note the following matters:

(a) Further investigations and assessments of landslides and rockfalls are proposed as part of detailed design and during construction; and

(b) The range of possible mitigation methods for landslides and rockfalls are outlined in the Application and summarised in paragraph 33 of this report.

Detailed Geological Survey

Submissions

45 One submission[16] refers to the failure to conduct a detailed geological survey. Specifically, the submitter suggests that a solution/condition would be to commission a detailed geological survey, including ground testing.

12 Submissions 13 and 34.
13 Submission 13.
14 Submission 13.
15 Submission 34.
16 Submission 34.

Assessment

46 I consider the submission related to a detailed geological survey is adequately addressed in the Application and the RFI response through provision for additional investigations as part of detailed design and construction. I have discussed this further in paragraph 38 of this report.

I. CONDITIONS

47 I have reviewed the draft conditions offered by the Applicant for the Mt Munro Project. I have worked with the reporting planners on the recommended conditions, to ensure the matters I have discussed in this report are covered. In particular, conditions relating to the following:

(a) Cut and fill locations and stability:

(i) Locations and geotechnical criteria relating to disposal of excess fill material in fill disposal areas;

(ii) Maximum gradients for fill areas;

(iii) Further investigations to confirm geotechnical conditions for detailed design;

(iv) Assessment during construction of road cuts, batter angle and fill placement;

(v) Assessment of stability of permanent cut slopes during and following construction, and mitigations where there is instability;

(vi) Inspection by a suitably qualified engineer or geologist to approve cut slopes and fill locations, batter slopes and placement;

(b) Stabilisation of disturbed areas:

(i) Height limits for disturbed areas;

(ii) Progressive temporary stabilisation of disturbed areas to minimise sediment runoff;

(iii) Permanent stabilisation of completed earthworks within a set timeframe, except where a certified SSESCP provides otherwise;

(iv) Standards for stabilisation works and processes for their certification;

(v) End of season stabilisation of disturbed areas;

(c) Restrictions on winter works, expect where management conditions are met or written approval from MWRC is received;

(d) Submission and certification of plans:

(i) Requirements for the submission of a detailed design report and final design drawings before construction commences;

(ii) Specific requirements for slope stability assessment of cuts and fills to be provided prior to construction; and

(iii) Submission of as-built plans once construction is completed.

Neil Crampton

15 March 2024

J. FIGURE

Figure 1: Indicative Fill Disposal Areas Plan, T+T Drawing No. 1016884.10000-016 titled Rev 3, Oct 23.

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LEGEND

- 350 — ELEVATION MAJOR CONTOUR
- ELEVATION MINOR CONTOUR
- FULL SITE BOUNDARY
- REGIONAL BOUNDARY
- TURBINE ENVELOPE ZONE
- TURBINE EXCLUSION ZONE
- FILL BATTER SLOPE
- CUT BATTER SLOPE
- 18 — FILL DISPOSAL AREAS FOR MINIMUM EARTHWORKS VOLUME
- 21 — ADDITIONAL FILL DISPOSAL AREAS FOR MAXIMUM EARTHWORKS VOLUME
- EXISTING FLOW PATHS

FIL SITE ID	AREA (m2)	MIN VOLUME (m3)	MAX VOLUME (m3)
1	19,500	68,250	68,250
2	23,000	80,500	80,500
3	28,200	98,700	98,700
4	7,900		27,650
5	17,300	60,550	60,550
6	14,700		29,400
7	9,000		31,500
8	15,800	47,400	47,400
9	10,900		27,250
10	14,000		35,000
11	19,900	59,700	59,700
12	19,200	57,600	57,600
13	19,100	57,300	57,300
14	19,200	48,000	48,000
15	16,200	56,700	56,700
16	10,700		26,750
17	19,500	48,750	48,750
18	18,300	82,350	82,350
19	22,200	66,600	66,600
20	52,200	261,000	261,000
21	16,000	56,000	56,000
22	6,100		21,350
23	21,700	75,950	75,950
24	11,600		40,600
	TOTAL	1,225,850	1,484,850

OLD COACH ROAD
FALKNER ROAD
SMITHS LINE
COACH ROAD SOUTH
HALL ROAD
HORIZONS REGIONAL COUNCIL
TARARUA DISTRICT COUNCIL
GREATER WELLINGTON REGIONAL COUNCIL
MASTERTON DISTRICT COUNCIL

A3 SCALE 1:15000
0 0.2 0.4 0.6 0.8 1.0 (km)
ORIGINAL IN COLOUR

Tonkin+Taylor
Exceptional thinking together www.tonkintaylor.co.nz

REV	DESCRIPTION	CAD	CHK	DATE
3	REVISED DRAFT RESOURCE CONSENT ISSUE		MGM	Oct 23
2	DRAFT RESOURCE CONSENT ISSUE		MGM	Oct 23
1	DRAFT RESOURCE CONSENT ISSUE	JOAB		

DESIGNED	MGM	AUG.23	DRAWING STATUS
DRAWN	JOAB	AUG.22	RESOURCE CONSENT
DESIGN CHECKED			
DRAWING CHECKED			

NOT FOR CONSTRUCTION

THIS DRAWING IS NOT TO BE USED FOR CONSTRUCTION PURPOSES UNLESS SIGNED AS APPROVED

APPROVED DATE

CLIENT **MERIDIAN ENERGY LIMITED**
PROJECT **MOUNT MUNRO WIND FARM**
TITLE INDICATIVE FILL DISPOSAL AREAS PLAN

SCALE (A3) 1:15000 DWG No. 1016884.1000-016 REV 3