

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 DEBORAH RYAN – GREENHOUSE GAS EMISSIONS

**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**), are required to authorise the construction, operation and maintenance and improvement of a new wind farm on Mt 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 greenhouse gas (**GHG**) emissions and the effects of land use on climate change in relation to the resource consent applications lodged with Horizons and GWRC (the **Regional Councils**) and TDC and MDC (the **District Councils**).
- 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 Deborah Ryan. I have a dual role as Strategic Director Sustainability and Technical Director Air Quality at Pattle Delamore Partners Limited (**PDP**). I joined PDP as a Technical Director Air Quality in April 2019. I formally commenced the Strategic Director Sustainability role in December 2022, although I had responsibilities for developing PDP's Sustainable Business Strategy prior to this.
- 6 My dual role involves delivering independent air quality advice for policy and planning, resource consents, monitoring and compliance in the industry, government and transport sectors. Increasingly, my work includes

considering the GHG aspects of proposals including land use change and discharges to air, and I am also supporting the business to provide services advising on GHG emissions and life cycle carbon assessments.

7 Part of my role at PDP also involves overseeing the development and certification of our inhouse GHG inventory and our GHG emissions reduction strategy.

8 I hold the following qualifications:

(a) Bachelor of Technology, Biotechnology and Bioprocess Engineering, Massey University, 1992.

(b) Post Graduate Diploma in Business Administration and Management, Massey University, 2020 – incorporating Corporate Social Responsibility and Business & Sustainability.

(c) Certified RMA commissioner under the Making Good Decision Programme (2020).

(d) Certified Air Quality Professional, CASANZ, since 2016.

9 I am individually, or as part of PDP, a member of the:

(a) Clean Air Society of Australia and New Zealand, New Zealand Branch Secretary and the Climate Change Special Interest Group.

(b) Climate Leaders Coalition (TBC).

(c) Infrastructure Sustainability Council (TBC).

10 I have more than 30 years of experience working in the assessment of effects on the environment under the RMA, particularly discharges to air. More recently, with the advent of the COVID-19 Recovery (Fast-track Consenting) Act 2020 (**FTCA**) and restrictions under the RMA on considering GHG emissions being removed, I have been involved with assessing GHG emissions resulting from both land use and discharge to air proposals.

11 I am familiar with the site and surrounding area. I visited the site along with other experts of the Regional Councils and District Councils on 21 June 2023 with representatives of Meridian.

C. CODE OF CONDUCT

12 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 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.

13 I wish to note that project GHG emission assessment is an emerging area of practice – primarily because, until recently, this matter was specifically excluded from RMA decision making. I acknowledge the uncertainty as to how effects on climate change should be considered and managed, both due to a lack of precedent, and relevant policy and plan provisions to guide decision making. I have therefore provided context for decision makers to consider the GHG emissions from the proposal under the RMA, as well as my opinions as to how the effects of the proposal on climate change may be managed.

D. EXECUTIVE SUMMARY

14 The key conclusions of my report include:

- (a) The Mt Munro Project will assist Aotearoa in meeting renewable energy targets and targets for decarbonisation.
- (b) No assessment of the GHG emissions or opportunities for reductions have been put forward by Meridian. Meridian has, however, stated commitments, such as through its Carbon Action Plan, to reduce emissions.
- (c) There are opportunities to ensure that carbon emissions are reduced on the Mt Munro Project compared to the business as usual case,

through considering life cycle carbon in the design, construction, operation and end of life of the wind farm.

- (d) Overall, I consider that for a large scale infrastructure development these opportunities are a material consideration to ensure sustainability over the long term. The Mt Munro Project provides opportunities to reduce emissions while constructing, operating and maintaining the wind farm and maximising resource recovery at end of life.
- (e) I consider that it would be in-line with emerging good practice for Meridian to identify how it intends to incorporate lifecycle GHG emission matters into the Mt Munro Project.

E. SCOPE OF REPORT

15 My report focuses only on issues related to GHG emissions and effects on climate change. It covers the following topics:

- (a) The benefits that the Mt Munro Project will provide by generating renewable energy, which is needed to mitigate climate change; and
- (b) The effects of GHG emissions related to consents to construct, operate and maintain the Project, and the opportunity to ensure these are managed over the project life cycle.

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

- (a) Incite, Assessment of Effects on behalf of Meridian Energy Limited, Mt Munro Wind Farm Project, May 2023 (**AEE**).
- (b) Incite, Response to the Mt Munro Proposed Wind Farm Resource Consent Application Section 92 Additional Information Request, 7 September 2023 (**RFI#1**); and
- (c) Jen Purdie, 'Climate change impacts on the proposed Mt Munro wind farm', ClimateWorks, February 2024 (**the ClimateWorks report**).

F. BACKGROUND

17 Meridian proposes to construct, operate and maintain a wind farm, including all ancillary activities such as earthworks, transmission lines and substations, on a greenfield site known as Mt Munro. The AEE describes the Project in detail, and to avoid repetition I adopt that description.¹

G. ASSESSMENT OF APPLICATION

18 Section 5.1 of the AEE sets out the positive effects of the Mt Munro Project. I agree with Meridian as to the project benefits. There is a need for the project to add renewable energy capacity to the national grid for decarbonising, which is critical to mitigate the effects of climate change and meet Aotearoa New Zealand’s Paris Agreement Commitments with the aim to limit warming to 1.5°C. I discuss the benefits of the project further starting at paragraph 36.

19 RFI#1 sets out Meridian’s commitments to action on climate change, which includes managing its own emissions from its operations.² I discuss Meridian’s commitments starting in paragraph 47 of this report.

20 Meridian has provided the ClimateWorks report, which assesses the effects of climate change on the operation of the Project, and outlines the importance of constructing renewable energy infrastructure for meeting Aotearoa’s climate goals.³ However, it does not address the GHG emissions resulting from construction/establishment of the wind farm, assess their climate change effects, or provide an approach to manage, reduce, or mitigate those emissions and effects.

21 I agree with the ClimateWorks report where it addresses the importance of new renewable electricity projects to New Zealand’s decarbonisation goals. The ClimateWorks report includes the projected climate change impacts on wind in the region, which is not within the scope of my review of the effects

¹ Pages 3–31, Assessment of Effects on behalf of Meridian Energy Limited, Mt Munro ind Farm Project, May 2023.

² Page 19.

³ Jen Purdie, Climate change impacts on the proposed Mt Munro wind farm, ClimateWorks, February 2024.

of the Project. The ClimateWorks report is therefore, not referred to any further in my report.

Assessment context

22 Section 2 of the RMA describes climate change as:

a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

23 Climate change is caused by a cumulative build-up of GHGs in the atmosphere from many different sources. It is an example of a “*cumulative effect which arises over time or in combination with other effects*”, bringing it within consideration of “*actual and potential effects*” in s 104(1)(a). In this respect, I understand that climate change is a relevant consideration for decision makers under s 104(1)(a) of the RMA.

24 Prior to 30 November 2022, s 104E of the RMA prohibited consent authorities from having regard to effects on climate change when considering applications for discharge of GHG emissions. Since the 2022 amendments, the effects of GHGs are no longer excluded as a consideration when making decisions on consents. As such, regional councils now may consider GHGs, particularly as part of their assessment process for air discharges, and district councils may also consider potential effects on climate change of land use proposals.

25 Further, the first national Emissions Reduction Plan (ERP) has been published under the Climate Change Response Act 2002.⁴ For applications that are particularly relevant to Aotearoa’s response to climate change, the ERP may be a relevant matter to consider under s 104(1)(c).

26 The first Emissions Reduction Plan supports the following:

⁴ Chapter 12, Te hau mārohi ki anamata Towards a productive, sustainable and inclusive economy: Aotearoa New Zealand's first emissions reduction plan, May 2022.

- (a) Using low-emission building materials;
 - (b) Using more energy-efficient built forms; and
 - (c) Reducing waste from construction and demolition.
- 27 MfE has provided a guidance note which covers five principles of the ERP to be considered in plan development.⁵ The fifth principle includes:⁶

Planning and infrastructure – planning decisions about land use, resources and infrastructure that require, promote and support reducing emissions and increasing resilience to the effects of climate change. This part of the principle involves integrating growth, land use and infrastructure planning with funding and financing, to achieve a low-emission urban environment and efficient infrastructure investments; and

Circular economy and bioeconomy – an approach that involves eliminating waste and pollution from our economy, keeping resources in use for as long as possible, and recovering value from products and materials at the end of their lifecycle.

- 28 In my view, both of the above principles are potentially relevant to the Mt Munro Project.
- 29 The Climate Change Commission’s (**CCC**) advice for the second Emissions Reduction Plan⁷ notes that embodied carbon⁸ will increasingly need to be measured, reported, and addressed during the second emissions budget period. The Ministry of Business, Innovation and Employment’s (**MBIE**) *Building for Climate Change* programme⁹ has proposed whole-of-life embodied carbon reporting requirements for new buildings from 2025.

⁵ Ministry for the Environment, National adaptation plan and emissions reduction plan: Resource Management Act 1991 guidance note, December 2022.

⁶ Page 17.

⁷ Page 258, He Pou a Rangi Climate Change Commission 2023 Advice on the direction of policy for the Government’s second emissions reduction plan.

⁸ The sum of emissions involved in making a product, sometimes termed the “carbon footprint”.

⁹ <https://www.mbie.govt.nz/building-and-energy/building/building-for-climate-change/>

- 30 Section 3 of the AEE sets out the planning framework for the applications. As relevant to the effects on climate change, Incite has addressed the *National Policy Statement for Renewable Electricity Generation 2011 (NPSREG)* and provisions of the relevant plans and regional policy statements, which broadly consider the benefits of the project in providing renewable energy.
- 31 I note that, given the amendment removing restrictions on considering GHG emissions is relatively recent, there is little in the way of regional and district plan policies to provide a decision-making framework for considering the matters specifically relating to GHGs emissions or defining the scope of those considerations – for example, whether emissions associated with the project construction, operation and end of life should be considered. Considering climate change effects in the merits of proposal under s 104(1)(a) as part of the sustainability of a project in the long-term, however, is consistent with sustainable management in my view.
- 32 As described in Section 3.7.1 of the AEE, I understand that the Greater Wellington Regional Policy Statement Proposed change 1, has relevant objectives that seeks to ensure a low emission future for the Wellington Region:
- (a) Objective CC.1 sets out a low-emission and climate resilient vision for the region by 2050, which includes mitigation of emissions being a part of sustainable management of resources, well-functioning environments and well-planned infrastructure.
 - (b) Objective CC.3 seeks that greenhouse gas emissions from various sectors including transport, agriculture, stationary energy, waste, and industry in the Wellington Region are reduced, with an overall target of net-zero emissions by 2050.
- 33 While Meridian has assessed the benefits of renewable energy as contributing to the objectives, the project is a significant infrastructure investment that also has its own emissions and carbon footprint. In my view, some form of assessment of the project GHG emissions and how they will be managed to contribute to this objective would be of assistance.

34 While the focus of guidance and policy advice to date is on “buildings”, the same principles apply to construction of infrastructure. In my view, there is a missed opportunity for design and construction of the Mt Munro Project if it does not consider the embodied carbon, maintenance and end-of-life aspects in its design and construction, especially because these are likely material due to the nature and scale of a project. I discuss starting at paragraph 47 that Meridian has publicly committed to considering management of these emissions throughout the project life cycle for its projects.

35 While there is some guidance on how to consider the effects of emissions on climate change as discussed above, there is a lack of clear policy direction in RMA plans on considering the effects on climate change. I have adopted a broad approach to the matters that decision makers may wish to consider, while acknowledging that the weighting of those matters will be up to the decision-maker.

Beneficial effects of the project on Climate Change

36 Section 2.2 of the AEE sets out the positive effects of wind farms in providing renewable energy. As noted, wind farms are necessary for meeting national climate change commitments and energy strategy, and any relevant plans that recognise the benefits of renewable energy.

37 The Application notes the commitments made under the Paris Agreement in 2015, the Climate Change Climate Change Response (Zero Carbon) Amendment Act 2019 and the ERP also refers to the National Policy Statement on Renewable Electricity Generation 2011. I agree that these are the relevant matters for consideration.

38 I further note that the latest advice from the CCC¹⁰ for the Second Emissions Reduction Plan states that electrification is key for decarbonisation and that the renewable electricity generation build therefore needs to scale up quickly. To meet demand, the CCC estimates that each year from 2025, new

¹⁰ Page 53, He Pou a Rangi Climate Change Commission 2023 Advice on the direction of policy for the Government’s second emissions reduction plan.

generation to supply over 1 TWh per year will need to be built, equivalent to around two very large wind farms being completed every year.

39 The Government has committed to reaching net zero for long-lived gases by 2050. It has set a target that 50% of total energy consumption will come from renewable sources by 2035 and has an aspirational target of 100% renewable electricity by 2030.¹¹

40 I agree with Meridian that the project has significant benefits in providing renewable energy that is needed to assist with decarbonisation in Aotearoa. Further, wind farms can provide a low GHG emission source per unit of electricity. Walmsley et al (2016) used a life cycle assessment approach to calculate the average footprint, as energy return on carbon, for Aotearoa's wind energy farms over a 20 year life, which was 2.1 kg CO_{2e}/GJ.¹² This is compared to geothermal at 35.5 kg CO_{2e}/GJ, gas combined cycle at 117 kg CO_{2e}/GJ and coal fired power stations at 204 kg CO_{2e}/GJ. No energy return on carbon data were reported for other renewable such as solar, wave or hydro power. The study determined, however, that there are a range of energy return on carbon values for wind farms, and there are opportunities to ensure comparatively low values in future designs.

Project GHG emissions assessment

41 In relation to wind farms, the Energy Efficiency and Conservation Authority notes that embodied emissions are those from the construction of wind turbines, which require significant energy and material input, including steel, concrete, copper, and some rarer minerals.¹³ This means that a new wind farm will have 'embodied emissions' that may take a year or two to pay back with clean electricity generation.

42 Meridian has not provided any information as to what GHG emissions could be associated with the Mt Munro Project and how they will be managed or

¹¹ [New Zealand Energy Strategy | Ministry of Business, Innovation & Employment \(mbie.govt.nz\)](https://www.mbie.govt.nz)

¹² Walmsley T., Walmsley M. R. W., Atkins M., & Matthews L. Energy Return on Energy and Carbon Emissions Investments for New Zealand Wind Energy Farms, University of Waikato, 2016.

¹³ www.eeca.govt.nz/insights/energys-role-in-climate-change/renewable-energy/wind/

reduced. I understand that KiwiRail and Waka Kothai, as two developers of large infrastructure projects, have committed to sustainability ratings for projects of a certain scale. The rating process includes life cycle GHG assessments. I consider life cycle GHG assessments to be emerging good practice for large scale infrastructure.

43 As such, I am of the view that it would be appropriate for Meridian to consider an assessment of GHGs, such as in accordance with the following frameworks:

- (a) ISO 14067 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification;
- (b) ISO 14040 Environmental management — Life cycle assessment — Principles and framework; and
- (c) ISO 14044 Environmental management — Life cycle assessment — Requirements and guidelines.

44 In my view, at least a high-level assessment of the potential positive and negative impacts on GHG emissions associated with the project life cycle stages would be useful to identify whether a more detailed assessment is warranted, and/or where a reduction strategy could add the most value for emissions reductions.

45 As noted above, however, I acknowledge there is little precedent for considering these matters under the RMA. I have reviewed two more recent wind farm applications for GHG matters, bearing in mind that GHG emission effects on climate change have only been able to be considered since 30 November 2022. Both of the following projects were considered under the FTCA, which contained specific provisions relating to mitigating climate change and significant adverse effects, including GHG emissions.

- (a) Waiuku Wind Farm (December 2023) – 85.8 megawatts (MW) with an estimated electricity output of 230–300 gigawatt-hours (GWh) per year. The focus of the assessment is on the project’s contribution to providing renewable energy to support decarbonisation.

Assessment of GHG emissions associated with the project is not quantified but the application acknowledges the matter of construction emissions, with the application stating:¹⁴

The construction phase of the project will result in greenhouse gas emissions by way materials production and transport; however, the transport emissions will be minimised due to the proximity of the site to an urban area that can supply the labour force and the relative proximity of the Auckland Port. As such effects on greenhouse gas emissions are low.

(b) Te Rere Hau Repowering, (November 2022) 500 GWh – the application includes both life cycle carbon assessment, and the positive effects of renewable energy.

46 For Te Rere Hau, carbon emissions modelling for a full life cycle analysis covered the construction footprint and material costs, emissions contributing to ongoing operation, and/or recycling of wind turbine components. The total carbon emissions generation was 52,900 tCO_{2e} over the life of the windfarm.¹⁵ I note that Te Rere Hau repurposed and reused some of the existing infrastructure so its footprint would be comparatively lower compared to a greenfield project. For Te Rere Hau, the assessment established that 3.7 grams of CO_{2e} were emitted per kWh of electricity generated (1.0 kg CO_{2e}/GJ) compared to baseline average emission by the grid as a whole calculated in 2020 to be 145 grams of CO_{2e} per kWh. The assessment concluded that:¹⁶

The upfront emissions are significant, but after Year 3 of operation the cumulative emissions per-kWh are considerably lower than the NZ Grid. This normalised figure only reduces further over time, even as the grid itself decarbonises. Additionally, reductions in construction impacts can be achieved through careful

¹⁴ Page 87, Resource Consent Application, Waiuku Wind Farm, LET Capital Number 3 Partnership, December 2023, SLR .

¹⁵ Page 65, Te Rere Hau Repowering Project, Assessment of Effects on the Environment, NZ Wind Farms Limited, November 2022, Aurecon.

¹⁶ Page 1, Appendix AA, Te Rere Hau Repowering Project, Assessment of Effects on the Environment, NZ Wind Farms Limited, November 2022, Aurecon.

specification of lower-embodied carbon materials within the foundation design.

Reasonableness of providing a project GHG emissions assessment

- 47 While Meridian has been silent on the total emissions from construction for this project, they have previously acknowledged that total emissions from construction can be assessed and minimised on a project-by-project basis. Their Climate Action Plan states (my emphasis):¹⁷

We know we can minimise the emissions from our construction activities and how important it is to decouple the growth of our development pipeline with growth in associated emissions – both during construction as well as operational life of our assets...

Our Harapaki Wind Farm is setting a new standard for the low-carbon design, construction and operation of wind farms across Aotearoa. In 2023, we introduced guidance for sustainable construction across our business **to capture and build on the lessons from Harapaki so they can be applied to future projects**, such as the Ruakākā battery project, and beyond.

So far, we estimate Harapaki has reduced its emissions by between 15,000 and 20,000 tCO_{2e}, with half of that coming from on-site actions during construction as result of an innovate-as-we-go approach. The other half of reduction comes from the design process, such as through reducing concrete and steel use. We also set sustainability key performance indicators relating to carbon impact reports, waste diversion, transport emissions targets and the delivery of continuous improvement initiatives.

- 48 Further, Meridian has also set a reduction target of “Half by 30.” That is, Meridian has committed to a strategy of reducing gross operational emissions by 50 percent by 2030 compared to the 2021 financial year baseline. This target has an exclusion for one-off emissions from the major

¹⁷ Page 5.

maintenance and construction of renewable generation assets. Meridian states:¹⁸

We seek to minimise one-off construction emissions associated with renewable energy generation assets by project specific KPIs, including for suppliers. For example, the Harapaki wind farm and Ruakākā Energy Park, both under construction include a range of KPIs addressing emissions reporting, emission reduction initiatives, the adoption of continuous improvement initiatives etc. This year we introduced guidance for sustainable construction across our business to capture and build on the lessons from Harapaki so they can be applied to future projects.

49 Given this and given that Meridian appears to acknowledge that total emissions from construction “*matter*”, I consider that it is appropriate and feasible for them to provide a project GHG emissions assessment here.

50 I readily acknowledge that Meridian has made public commitments through its Sustainability Policy,¹⁹ to:

- (a) A refreshed live Climate Action Plan; and
- (b) Science-aligned gross emission reduction targets.

51 Meridian is also a member of the Climate Leader’s Coalition (CLC). The CLC requires members to pledge to a statement of ambition that includes carbon reduction targets aligned to limit warming to 1.5 degrees Celsius, and to measure and publicly report emissions. How these commitments are reflected in the full life cycle for the Project is not addressed in the Application.

52 In RFI#1 Response 1,²⁰ Meridian also responded on GHG and carbon life cycle matters. Meridian highlights that it is a significant developer of renewable energy projects, which are important for Aotearoa to decarbonise. As discussed above, I agree with Meridian’s assessment of the benefits and

¹⁸ Page 10, Meridian Group GHG Inventory Report FY23.

¹⁹ Sustainability Policy, 14 December 2022.

²⁰ Page 19.

need for renewable energy, including wind farms, to enable a transition from fossil fuels.

53 As such, I am confident that Meridian is conscious of the effects of construction emissions and will work to minimise these as this project progresses. However, a decision-maker could have greater confidence that these ‘embodied emissions’ would be minimised if a life cycle assessment were completed, or if this is infeasible, if a high-level construction emissions management plan were prepared.

54 As shown in Meridian’s reported carbon emission savings for Harapaki (albeit for 41 turbines generating 176 MW (70,000 average households)) the GHG savings from a concerted effort to minimise construction emissions can be significant.

H. SUBMISSIONS

55 Three submissions were received relating to the effects of the Project on climate change.

56 Submitter #12 supports the applications and noted that the project would provide much needed growth in renewable electricity generation for NZ and considers this is crucial to help mitigate climate change.

57 Submitter #46 is in opposition to the project and considers that “windmills” are not a renewable resource as they cannot be built without fossil fuels and materials will not last more than couple of decades.

58 Submitter #52 supports the applications and notes that project is needed for NZ to meet its climate change commitments and to deliver the renewable energy that consumers require as we decarbonise our economy.

59 I agree with the submitters who are in support of the Project, that it has significant benefits in contributing to Aotearoa’s ability to decarbonise as a key mitigation needed to reduce the effects of climate change.

60 I also agree with Submitter #46 that the Mt Munro Project also contributes emissions from fossil fuels, embodied carbon of materials and that there are

end-of-life considerations in relation to waste. The Energy Efficiency and Conservation Authority advises that embodied emissions are a limitation of wind energy, with new wind farms having ‘embodied emissions’ that may take a year or two to pay back with clean electricity generation.²¹ As a form of electricity generation wind does, however, have a low rate of emissions per unit of electricity generated compared to historical generation and the average for the grid. Equally, I consider emerging good practice to also address these matters specifically as part of this Application.

61 In my view, there is an opportunity for the Mt Munro Project to ensure that the emissions are as low as possible. This would be consistent with Meridian’s high-level commitments to minimise construction related emissions under its Carbon Action Plan and its commitment to apply Harapaki learnings to future projects.

I. CONDITIONS

62 The Applicant has not proffered any conditions relating to the effects on climate change. I am not aware of any precedent for conditions to address the adverse effects of GHG emissions for wind farms, or other infrastructure projects.

63 Conditions addressing consideration of the life cycle carbon emissions could form part of conditions such as: relating to requiring design reports, and construction management plans prior to commencement. Specific plans could also be required for example:

- (a) A design options report to consider/include the GHG life cycle analysis of the built infrastructure;
- (b) To manage or minimise GHG emissions during construction, for example, including waste and energy management; and

²¹ [Wind | EECA](#).

- (c) To manage or minimise GHG emissions during operation and at end-of life.

Deborah Ryan

15 March 2024