

Your Comment on the Lodestone Energy Limited- Application for Haldon Station Solar Farm Proposal

Please include all the contact details listed below with your comments and indicate whether you can receive further communications from us by email to substantive@fasttrack.govt.nz

1. Contact Details			
Please ensure that you have authority to comment on the application on behalf of those named on this form.			
Organisation name (if relevant)	Canterbury Regional Council		
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Email (a valid email address enables us to communicate efficiently with you)	[REDACTED] [REDACTED] [REDACTED]		

2. We will email you draft conditions of consent for your comment			
<input checked="" type="checkbox"/>	I can receive emails and my email address is correct	<input type="checkbox"/>	I cannot receive emails and my postal address is correct

Please provide your comments below, include additional pages as needed.

Thank you for your comments

30th January 2026



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Hon Raynor Asher

Haldon Solar Expert Panel Chair

substantive@fasttrack.govt.nz

Tēnā koutou,

Attention: The Chair and Members of the Expert Panel for Haldon Solar Farm Proposal by Lodestone Energy Limited

RMA261598 – Lodestone Energy Limited Fast Track Proposal

Haldon Solar – Haldon Station, Mackenzie Basin

Section 53 Panel invite to comment on substantive application

Thank you for your email, dated 15 December 2025, inviting comment on the Haldon Solar Farm proposal under sections 53 and 54 of the Fast-track Approvals Act (FTAA).

I understand that comments are due back to the panel by 2 February 2026, and that no waiver to this time limit can be applied.

Please find the Canterbury Regional Council's comments attached below.

If you have any questions, please don't hesitate to get in touch.

Canterbury Regional Council (CRC) has reviewed the substantive application for the Haldon Solar Farm Fast-track application and provides the following written comments, made in accordance with section 53(2) of the FTAA.

These comments summarise CRC's overall feedback on the proposal. The technical support for the feedback is contained in Appendices 1 – 8 attached to these comments, and a marked-up version of the Condition Set is in Appendix 9.

Canterbury Regional Council look forward to continuing to work with the Panel on this project.

Summary

1. CRC's review of the application has identified outstanding concerns that need to be addressed.
2. CRC notes the proposal is generally considered to align and be consistent with the relevant objectives and policies and rules set out in the Canterbury Regional Policy Statement (CRPS), Canterbury Land and Water Regional Plan (LWRP), and the Canterbury Air Regional Plan (CARP).
3. CRC considers that any adverse environmental effects that may arise from the proposal can be appropriately avoided, remedied, mitigated, or offset/compensated. Noting that the Application does not currently provide direction on this, the panel could request further information from the applicant under s67 of FTAA to address these matters. CRC considers the (amended) conditions of consent in Appendix 9 to be a starting point. Given that updated information is ongoing, CRC considers conditions will likely change as a result, should the Panel approve the application.
4. CRC acknowledges that the Applicant has commissioned the additional ecological reports requested by the Panel. However, the reports were not received until 22 January 2026, leaving approximately 7 working days within the statutory timeframe for CRC to review and incorporate technical input into its Section 53 response.
5. This timeframe has not been sufficient to undertake the detailed technical assessment ordinarily required for reports of this nature. CRC has therefore been limited to a high-level review only, rather than a comprehensive evaluation of methodology, assumptions, and conclusions.
6. CRC further notes that the reports remain in draft form and rely on assumptions pending completion of field survey work. This reduces the level of certainty that can be placed on the findings at this stage. The Panel should take these timing and

information constraints into account when considering the scope and weight of CRC's comments.

7. CRC has been engaging with the Applicant to refine proposed consent conditions ahead of these comments. However, CRC anticipates that further substantive revisions will be necessary, as the conditions provided to date primarily involve minor drafting changes and do not yet adequately respond to the matters raised.
8. The key outstanding matters in the condition set relate to:
 - a. The Applicant will need to provide the relevant plans/management plans attached to each condition set and referred to in the conditions that identify the location and/or area of the activity.
 - b. Further conditions to account for mitigation/offset/compensation/remediation in relation to subsequent ecological reports (*Terrestrial Invertebrate Assessment and Lizard Assessment*) commissioned by the Applicant and findings of those reports. As currently there are just suggestions and assumptions outlined in these draft reports, with no direction or input from the Applicant regarding their approach. As such CRC considers this matter crucial before conditions can be worked through.
 - c. The interplay with a wildlife approval sought under the Wildlife Act 1953. It is currently unclear how the consents bundled in this proposal will marry up with the wildlife approval sought and confirmed by the Applicant to be worked through outside of this Fast-track project/process.
9. CRC is open to continuing to work with the Applicant on the conditions as we move forward.
10. While acknowledging the Panel will determine the application under the purpose and provisions of the FTAA and will give more weight to the purpose of the FTAA than to the relevant parts of the Resource Management Act 1991 (RMA), clause 17 of the FTAA still requires the Panel to consider the matters listed in the RMA on an individual basis, prior to standing back and conducting an overall weighting.¹ CRC has therefore considered the proposal through an RMA lens, focusing on Parts 2, 3, and 6 of the RMA as relevant. A full statutory assessment under section 104(1) of

¹ Record of Decisions of the Expert Panel under Section 87 of the Fast-track Approvals Act 2024, for the Bledisloe North Wharf and Fergusson North Berth Extension, at [121(b)]

the RMA has not been undertaken, rather an exercise undertaken to better understand the scale and nature of potential effects and how these might measure up. CRC planners consider the proposal aligns with the purpose and principles of the RMA.

Background

11. The substantive application by Lodestone Energy Limited (Lodestone) was lodged on 29 August 2025 and deemed complete under section 46(2) of the FTAA by the Environmental Protection Authority (EPA) on 22 September 2025.

12. List of documents reviewed:

a. Initial Lodgement Documents

- I. Haldon Solar Farm - Substantive Application and Assessment of Environmental Effects
- II. Appendix 1: Record of Title
- III. Appendix 2: Haldon TMP DRAFT
- IV. Appendix 2: Haldon ESCP DRAFT
- V. Appendix 2: Proposed Conditions MDC
- VI. Appendix 2: Proposed conditions ECan
- VII. Appendix 3: Listed Land Use Register - Haldon Landfill
- VIII. Appendix 3: Listed Land Use Register – Haldon Station
- IX. Appendix 4: Geotechnical Assessment
- X. Appendix 5A: Solar Array Flood Risk Assessment
- XI. Appendix 5B: Substation Array Flood Risk Assessment
- XII. Appendix 5C: Flood Risk Summary
- XIII. Appendix 6: Landscape Assessment
- XIV. Appendix 7: Ecological Assessment
- XV. Appendix 8: Transportation Assessment
- XVI. Appendix 9: Grid Connection
- XVII. Appendix 10: Economics Assessment
- XVIII. Appendix 11: Noise Assessment
- XIX. Appendix 12: Ngai Tahu/MDC/FENZ/NZTA/MDC/CRC/MfE/Transpower Consultation
- XX. Appendix 13: Permitted Activities Assessment
- XXI. Owners and Occupiers of the Sites and Land Adjacent

b. Further Documents Supplied Post Lodgement

- I. Haldon Solar - Minute 1-5 of the Panel Convener

- II. Department of Conservation – Haldon Site Invertebrate Survey Report – Warren Chinn
- III. Department of Conservation – Haldon Site Vegetation Report – Mike Harding
- IV. Department of Conservation – Haldon Site Avifauna Report - Colin O'Donnell
- V. Williamson Water & Land Advisory - Preliminary Site Investigation (PSI)
- VI. SLR - Terrestrial Invertebrate Assessment (Draft)
- VII. Blueprint Ecology - Lizard assessment (Draft)

Consultation

13. Consultation between CRC and the Applicant has been occurring since pre-lodgment of the Application. Planning and technical staff have corresponded via meetings and emails throughout the process. Internally, CRC staff have met to discuss the Application to provide an opportunity for staff across different relevant disciplines to raise questions, identify issues and provide comments within their respective areas of expertise.
14. CRC provided high-level feedback via the Memorandum² filed for the purposes of the Panel Convenor Conference and the 'Issue' list in this Memorandum formed the basis of discussions going forward. CRC was provided with additional information that comprised of a Preliminary Site Investigation (PSI) for contaminated land, further ecological reports specialising in both Invertebrates and Lizards and the updated proposed conditions along with Minutes 1-5 of the Panel. Since then, CRC has sought planning and technical advice and have met with the Applicant to discuss the issues raised and the changes advanced in the updated information.

Key Issues

15. CRC acknowledges that the Applicant has provided a substantial volume of technical reports and supporting information to date. However, the key issues identified during the section 46 stage and subsequent discussions have currently not been addressed.
16. The key issues raised by the Application that are relevant to CRC are identified as:

² Lodestone Energy - Haldon Solar - s46 Substantive Completeness Check Response, Dated 16th September 2025.

- a. Terrestrial Ecology Effects including effects to avifauna, invertebrates, and lizards, and lack of mitigation/offset/compensation to balance those effects.
 - b. Lack of updated proposed conditions and management plans in-line with CRC advice.
17. CRC's review of these key issues has been undertaken across the relevant areas of technical expertise (refer to Appendices 1-8) and documented in the table of feedback below. This table of feedback captures the Applicant's assessment (summarised), CRC's assessment and any of CRC's recommended actions and/or conditions.
18. CRC considers that the Applicant has not currently responded adequately to the potential effects across the key areas relevant to CRC. As several post lodgement reports remain in draft, additional information is still expected. CRC remains available to work collaboratively with the Panel and Applicant and recommends that the Panel invite further information under section 67 of the FTAA to facilitate a comprehensive assessment.
19. CRC considers that the key issues identified in the application could potentially be appropriately managed in-line with the intent of the FTAA, by the applicant proffering appropriate offsetting/compensation measures and conditions.

Applicant's assessment summary	CRC technical assessment summary	CRC Changes required/conditions sought to address CRC's comment
Invertebrate Ecology		
<ul style="list-style-type: none"> • The applicant commissioned SLR Consulting to produce a <i>Terrestrial Invertebrate Assessment</i> report after direction by the panel into further understanding the effects on ecology, as they considered further information was necessary in order to quantify effects of the proposal appropriately. • The Applicant's Terrestrial Invertebrate ecologist assessed the site in relation to Terrestrial Invertebrates by targeted field survey. • The ecologist concluded that on-site vegetation is highly modified. Indigenous vegetation has been cleared and land planted with exotic pasture grasses, crops and trees. • The <i>Terrestrial Invertebrate Assessment</i> Makes suggestion to both avoidance (excluding up to 100 ha from the development), minimisation via spacing (increasing the spacing between the panels so it is wider than at other Lodestone solar farms sites) and reducing extent (only building the eastern half to protect robust grasshopper habitat). In addition to trapping and relocation (Capture of threatened invertebrates prior to construction activities 	<ul style="list-style-type: none"> • CRC engaged external specialist, Dr Barbara Barratt who has peer reviewed the Application including the <i>Terrestrial Invertebrate Assessment</i>. Their technical advice is outlined in Appendix 1 and their views are summarised below. • Dr Barratt agrees with the Applicant's <i>Terrestrial Invertebrate Assessment</i> that there will unavoidably be impacts on invertebrates and their habitat from the construction and operation of the solar farm. • She further agrees that the operational effects that will occur post-construction will result in changes to shading which in turn will have flow on changes to soil and surface moisture and temperature. Resulting in a change in the plant species composition that will impact invertebrate species in an unpredictable manner. • Dr Barratt also notes and agrees that the avoidance and minimisation options mentioned in the <i>Terrestrial Invertebrate Assessment</i> are unlikely to be acceptable to the applicant with offsetting/compensation also being hard to implement while potentially also being unacceptable in some cases. • Dr Barratt proffers the following solutions: 	<ul style="list-style-type: none"> • The Applicant has currently not proposed updated conditions since this <i>Terrestrial Invertebrate Assessment</i> was commissioned. • CRC Notes that the <i>Terrestrial Invertebrate Assessment</i> is does not reference the decision making requirements of the National Policy Statement for Renewable Energy Generation 2011, Amended 2025 (NPS-REG). • Policy F of the NPS-REG states decision-makers must enable REG assets and activities in all locations and environments and gives direction on what decisionmakers are to consider and give regard to. Notably, Policy F(5) requires decision makers to have regard offsetting or compensation measures where residual adverse effects of REG assets or activities cannot be avoided, remedied, or mitigated. Given the ecological advice received, it seems unlikely that adverse effects of altering such a large site could be sufficiently avoided, remedied, or mitigated while maintaining the scale of development sought by the applicant. As such, CRC considers that offsetting or compensation is likely appropriate to address residual effects. The applicant has yet to propose any such measures, and CRC considers it appropriate for the applicant to consult the relevant

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<p>in the solar farm site and translocation to transmission corridor or unaffected areas). While also considering remedying (post earthworks altering of the habitat with additional gravel/cobble material to further provide potential habitat for invertebrates). With consideration also given to Offset/Compensation (creation of an invertebrate reserve for threatened species, undertake restoration planting, pest plant management, invertebrate translocation with ongoing monitoring to ensure success). However, it should be noted that these suggestions have not been agreed or explored by the Applicant.</p> <ul style="list-style-type: none"> The ecologist concluded, however, that an approach reflecting the avoidance and minimisation options are unlikely to be acceptable to the applicant. In addition, the offsetting/compensation will either be unacceptable to the Applicant or will require significant effort to achieve. The ecologist notes that a robust grasshopper was found, this grasshopper is listed in Schedule 7 of the Wildlife Act 1953 and is therefore absolutely protected under the Act. A Wildlife Act Authority will be required to disturb or kill this species. 	<ul style="list-style-type: none"> a. Avoidance - not go ahead with the solar farm. b. Minimisation - reduce the size of the solar farm to retain areas where threatened invertebrates are known to be present. c. Offset/compensation - find areas suitable for a reserve for some of the species at risk at the solar farm site. d. Offset/compensation – go ahead with the project on the condition that a research program is established at the outset to investigate the ecological impact of this solar farm project in this environment. This will not manage the issue but will inform future similar projects. <ul style="list-style-type: none"> Dr Barratt disagrees with the use of foreign gravels to provide for invertebrate habitat post construction, as the importation of aggregate/fill to the site creates a risk that unwanted chemicals/toxins/seed and other animal and plants could be introduced to the site. Therefore, if pursued, careful mitigation should be followed as this has the potential to introduce significant effects of its own. 	<p>invited parties in determining what offsetting or compensatory measures are appropriate.</p> <ul style="list-style-type: none"> CRC also notes that after further discussions with the Applicant, they will be pursuing a wildlife approval under the Wildlife Act 1953 separate to this fast-track consent process in the coming months. CRC considers that a Wildlife Approval condition set should complement resource consents. CRC is willing to work with the applicant further in the preparation of conditions to address the mitigation of effects on terrestrial invertebrates. See CRC's comments on conditions in Appendix 9, CRC s9 Land Use Consent, conditions [8] and [22-27] – below

Applicant's assessment summary	CRC technical assessment summary	CRC Changes required/conditions sought to address CRC's comment
Lizard Ecology		
<ul style="list-style-type: none"> The applicant commissioned Blueprint Ecology Limited to produce a <i>lizard assessment</i> after direction by the panel into further understanding the effects on ecology. The panel considered further information was necessary in order to quantify effects of the proposal appropriately. The Applicant's ecologist assessed the site in relation to the presence or absence of native lizards and to assess and map their habitat values. The <i>lizard assessment</i> report demonstrates that Habitat for lizards on site is very limited as the site has been modified in the past. As such it contains isolated pockets of native flora and is dominated by exotic vegetation that is unlikely to be occupied by any At Risk or Threatened lizard species. The conclusions of the <i>lizard assessment</i> highlight that although no visual confirmation currently demonstrates that McCann's skink (Not Threatened) is present, expertise and results from the preliminary lizard assessment suggest a permanent and self-sustaining population is likely present. While also suggesting that it is unlikely that any regionally or locally significant lizard population (At Risk or Threatened) is present. 	<ul style="list-style-type: none"> CRC's engaged external specialist, Dr Mandy Tocher has peer reviewed the Application and the <i>lizard assessment</i>. Her technical advice is in Appendix 2 and her views are summarised below. Dr Tocher generally agrees with the information provided in the <i>lizard assessment</i> and notes it addresses concerns highlighted in the original ecologist report, as the lizard survey was undertaken using acceptable methods recommended by CRC. Dr Tocher, further notes that No effects assessment has been provided in the draft <i>lizard assessment</i> as results of the lizard survey are pending. The actual extent of lizard habitat is currently unknown but is estimated to be 1 ha spread across 30 sites. The number of lizard species affected is currently unknown, but the Applicant considers only McCann's skink (not threatened) will occur over the solar project footprint. Dr Tocher agrees that McCann's skink is most likely to be the only species present over the solar project footprint, and in relatively low numbers over small areas of fragmented habitat. The extent of habitats, however, is unknown and contingent on the results of the lizard survey report yet to be completed. As such the presence of 	<ul style="list-style-type: none"> Currently no lizard-related conditions have been proffered by the applicant in the substantive application as they await completion of the lizard survey. CRC notes Mackenzie District Council (MDC) 'ecology and landscape' conditions are covered in Appendix 12 of the application (Conditions 27-32). Given the relatively low risk to lizards, general mitigation of fencing of the solar site footprint could suffice. However, if threatened/endangered species were present then CRC considers further mitigation is likely to be necessary; This further mitigation should be clearly outlined by the Applicant If the results of the finalised <i>lizard assessment</i> show at risk species are present at the site. CRC is willing to work with the applicant further in the preparation of conditions to address the mitigation of effects on lizards See CRC's comments on conditions in Appendix 9 – MDC s9 Land Use Consent conditions 27-32 - below.

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<ul style="list-style-type: none"> The <i>lizard assessment</i> does not provide specific mitigation measures to mitigate adverse effects on lizards, but makes reference that the applicant should apply for a Wildlife Act Authority from the Department of Conservation in the event that lizards are present and the avoidance of their habitat is not practicably feasible for the proposal going ahead. 	<p>Southern Alps gecko and/or Southern grass skink therefore cannot be determined until the survey is complete.</p> <ul style="list-style-type: none"> The significance of lizard habitats over the solar project footprint is currently unknown. The number of individuals affected over the solar project footprint is currently unknown but is estimated to be "low numbers". Neither the initial documents or <i>lizard assessment</i> proposes any lizard-related 'mitigation' actions. Dr Tocher notes, however, that the AEE in Section 6.5. 'Ecology' proposes a rabbit proof fence over the solar project footprint that may over the long term provide cover for lizards to move into the site and reduce prey for lizard predators. Dr Tocher further notes once more substantive information is received after completion of the lizard survey. lizard values and proposed mitigation will be able to be appropriately quantified. 	
Terrestrial Ecology		
<ul style="list-style-type: none"> The Applicant provided further reports after direction by the panel into the need to better understand the effects on ecology. Points discussed above in Invertebrate Ecology and Lizard Ecology are relevant here. 	<ul style="list-style-type: none"> CRC's specialist, Dr Jean Jack has peer reviewed the Application. Dr Jack's technical advice is in Appendix 3 and her views are summarised below. Additional surveys of the site and commentary by experts of both the Applicant 	<ul style="list-style-type: none"> Dr Jack notes that largely Residual effects to Ecology resulting from this proposal are unavoidable. As such Consideration should be given to compensation and or offsets. She recommends a condition relating to a Plant

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	<p>and the Department of Conservation have provided further information to inform her consideration of the proposal's potential effects on terrestrial ecology.</p> <ul style="list-style-type: none"> • Further information provided by the Department of Conservation and the Applicant reported eight threatened plant species occur at the site including the endemic plant <i>Lepidium solandri</i>, a Threatened - Nationally Critical species for which less than 1000 are known in the wild. • While incomplete, the additional survey information (<i>Terrestrial Invertebrate Assessment lizard assessment</i>) confirms that the site holds ecologically significant values which will be adversely impacted by the existing proposal. Effects on significant indigenous vegetation and significant invertebrate habitat is unavoidable. • Dr Jack considers that the proposed solar farm will alter environmental conditions of 320ha of nationally rare and ecologically significant dryland habitat. These changes will favour exotic plant species and exclude / reduce the abundance of native dryland species. This will result in unavoidable residual effects for which compensation and offsets would be required. Dr Jack considers 	<p>Monitoring Plan that is reviewed by a suitably qualified and experienced practitioner.</p> <ul style="list-style-type: none"> • CRC considers, offsetting, or compensation should be offered given the unavoidable effects to unique ecology as determined from the advice from SLR Consulting, Blueprint Ecology Limited, DOC, Dr Barrat, Dr Tocher and Dr Jack. • CRC's comments on the NPS-REG in the Invertebrate Ecology section of this Table above are considered relevant here. • CRC is willing to work with the applicant further in the preparation of conditions to address the mitigation of effects on terrestrial ecology. • See CRC's comments on conditions in Appendix 9, MDC consent conditions 27-32 - below.

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	<p>that certain ecological benefits of the project currently exist, these include:</p> <ol style="list-style-type: none"> a. Fencing may inadvertently improve habitat complexity for invertebrates and lizards due to increased grassland sward density. b. Pest control is mentioned by the Application, and this may benefit indigenous flora and fauna; however, I have not seen the detail of this proffered action and would require outcome monitoring to ascertain if any benefit to indigenous species results. c. Monitoring proposed as part of the development could provide insights into how solar farms affect terrestrial ecology. <ul style="list-style-type: none"> • Dr Jack agrees with Dr Barratt that the Changes to soil moisture gradients; shading and stormwater management will transform environmental conditions of 320ha of ecologically significant dryland habitat • Moreover, Dr Jack notes that loss of bird feeding and breeding for Threatened or at-risk bird species is likely to arise, in addition to uncertain bird strike effects. • Dr Jack further notes that all advice remains as s46 comments. 	

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Groundwater (Quantity & Quality)		
<ul style="list-style-type: none"> The applicant has provided a desktop analysis and description of groundwater conditions as the proposed site. The applicant notes that the site is over an unconfined or semi-confined aquifer and the closest groundwater monitoring bore I39/0005, in which groundwater levels on the site likely fluctuate between 0.26m-6.76m below ground level. Information was received from secondary sources (CRC existing wells/GIS). 	<ul style="list-style-type: none"> CRC's specialist, Ms Kate Bailue has peer reviewed the Application. Ms Bailue's technical advice is in Appendix 4 and her views are summarised below. Ms Bailue notes that there is no onsite assessment of groundwater quality to establish baseline groundwater quality. Ms Bailue notes the applicant stated that groundwater may be intercepted as cables are buried 2.5 m below ground level. Therefore, minor dewatering may be required. There is a lack of detail around the scale of the dewatering required from the applicant. All advice remains as s46 comments as no new information supplied from Applicant. 	<ul style="list-style-type: none"> CRC considers that there are no details on the expected contaminants in the operational stormwater discharge. Particularly near the substation and buildings has not been currently provided. Operational stormwater will have stormwater soakage pits for associated buildings. There is no detail on the design to determine if they will intersect groundwater. CRC considers that the above comments could be managed by conditions. CRC is willing to work with the applicant further in the preparation of conditions to address the mitigation of effects on groundwater quantity and quality. See CRC' comments on conditions in Appendix 9 - CRC261667, Condition 9 - below.
Natural Hazards		
<ul style="list-style-type: none"> The Applicant provided comprehensive Flood modelling to support this application (Solar Array Flood Risk Assessment, Substation Flood Risk Assessment and Flood Risk Summary). The Applicants flood modelling concluded that the Haldon Solar Project will not increase flood risk beyond the site boundary, with runoff rates, flow paths, and discharge 	<ul style="list-style-type: none"> CRC's specialist, Mr Oliver Hermans has peer reviewed the Application. Mr Herman's technical advice is in Appendix 5 and his views are summarised below. Mr Hermans agrees the proposed solar farm site is not in a high natural hazard zone Mr Herman's main concern is in relation to offsite effects of flooding. However 	<p>CRC is satisfied that the location is not in a high natural hazard zone and as a result have no objections to the proposal or mitigation methods proposed.</p>

Applicant's assessment summary	CRC technical assessment summary	CRC Changes required/conditions sought to address CRC's comment
<p>points remaining unchanged from pre-development conditions. In addition, any minor localised realignment of overland flow paths within the site (e.g. around internal roads or the grid injection point) will be mitigated through design measures and will not result in adverse effects on surrounding land or sensitive receptors.</p>	<p>considering the location, he doesn't consider it to be a significant concern.</p> <ul style="list-style-type: none"> All advice remains as s46 comments as no new information supplied from Applicant. 	
Contaminated Land		
<ul style="list-style-type: none"> The Application did not initially include a preliminary Site Investigation (PSI). However, this was supplied post Section 46 stage on 7 November 2025. The PSI report concluded that the proposed Haldon solar farm is located on largely undeveloped rural land. No HAIL activities were identified within the proposed development area, further noting that HAIL activities adjacent to the site do not pose a risk to the solar farm establishment and operation. The PSI noted that while the presence of pylons along the transmission corridor could potentially lead to highly localised release of metals as a result of weathering or water blasting of the galvanised steel, the transmission line area is excluded from the proposed development. In addition, the closed landfill is adjacent to a small portion 	<ul style="list-style-type: none"> CRC's specialist, Dr Hannah Mirabueno has peer reviewed the Application. Dr Mirabueno's technical advice is in Appendix 6 and her views are summarised below. Dr Mirabueno's initial concerns were regarding the Applicants assumption that the proposed site was not considered to be contaminated land, as it did not appear on the indicative HAIL/Contaminated land site register layer on GIS/Canterbury Maps. Dr Mirabueno recommended a PSI report should be undertaken by the Applicant to demonstrate presence/absence of contaminated land. Dr Mirabueno agrees with the conclusions of the PSI report. Specifically in relation to the potential risk from landfill gas being low. She also agrees that the exclusion of earthworks from transmission pylon areas will result in a low risk of contamination mobilisation. 	<ul style="list-style-type: none"> As a result of Dr Mirabueno's review of the PSI report, CRC recommends a condition around the requirement for a management plan during construction phase to cover the risks should earthworks intersect the landfill. Additionally, CRC also recommends a discovery protocol condition if unknown contamination is encountered during construction phase. CRC is willing to work with the applicant further in the preparation of conditions to address the mitigation of contaminated land. See CRC's comments on conditions in Appendix 9 - CRC261665 - S9 Land Use Consent , condition 25 - below.

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<p>of the western boundary of the proposed solar farm. Based on the topography, the geology, the inferred small size of the landfill and the lack of manned or otherwise buildings near the landfill, the risk of landfill gas migration into enclosed spaces is minimal.</p>	<ul style="list-style-type: none"> • However, Dr Mirabueno notes that the PSI was largely informed by information from drone, aerial photography and other information supplied by the owner. Whereas a site walkover in the areas of interest (landfill area) could have yielded some additional details. • Further Dr Mirabueno considers that the conceptual site model (CSM) should have included earthworks during construction of road access as this would likely intersect the HAIL site. Because of this she disagrees that the conceptual site model (CSM) in the PSI report has completely identified all the potential risks from the solar farm establishment. • As a result of Dr Mirabueno's review of the PSI report, she recommends a condition around the requirement for a management plan during construction phase to cover the risks should earthworks intersect the landfill. Additionally, she also recommends a condition regarding discovery protocol if unknown contamination is encountered during the construction phase. • Other advice remains as s46 comments which relate to further details around the ESCP, SMP regarding remedial action for 	

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	when exceedances occur. The applicant has not yet responded to these concerns.	
Land Resources		
<ul style="list-style-type: none"> The applicant supplied appropriate information regarding this aspect within the AEE. Their assessment concluded that the soils on the site are not Highly Productive Land (HPL), and the agricultural value of the site is relatively low in its current state. In addition, the soils are considered to be well-draining, as such there is low likelihood that there will be generation of significant runoff from the solar array area once the structures are installed and pasture species are established. Moreover, the AEE mentioned that there is a minimum setback of 200m from Lake Benmore and includes an Erosion and Sediment Control Plan (ESCP) to reduce any potential runoff resulting from soil compaction from heavy machinery in the construction phase. 	<ul style="list-style-type: none"> CRC's specialist, Dr Matthew Riddle has peer reviewed the Application and notes that All advice remains as s46 comments as no new information supplied from Applicant in relation to his area of expertise. Dr Riddle's technical advice is in Appendix 7 and his views are summarised below. Dr Riddle agrees with the Applicant that the land currently holds low agricultural value, in addition he agrees that stormwater and runoff risks to be generally low due to soil characteristics and setbacks proposed from Lake Benmore. In addition he notes that rehabilitation after decommissioning of the solar farm is important to retain future land value, particularly given nearby irrigated land. Dr Riddle further Broadly agrees with the proposed conditions, however notes that an integrated, long-term soil and stormwater monitoring programme is recommended, with defined sampling, review intervals, mitigation triggers, and safeguards to address potential contamination and groundwater pathways. 	<ul style="list-style-type: none"> CRC agrees that the conditions proffered by the applicant in relation to land resources aspects are largely appropriate. However, amended conditions recommended in-line with advice from Dr Riddle during the s46 stage offer more certainty. Noting these amendments have been partially included in updated condition set from 27.01.2026 supplied by the Applicant. The amended conditions include: <ul style="list-style-type: none"> a. Inclusion of a general mitigation plan regarding potential exceedances in guideline soil concentrations (now included) b. Inclusion of Land Resources team as part of CRC certification process in addition to Compliance. c. Additional condition to original condition 27, in the S9 Land use consent that requires the consent holder to revisit the site after 6 months. CRC is willing to work with the applicant further in the preparation of conditions to address the mitigation of effects on land resources.

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		<ul style="list-style-type: none"> See CRC comments on conditions in Appendix 9 - CRC261665 - S9 Land Use Consent, conditions 22-27 – below
Policy Planning		
<ul style="list-style-type: none"> The applicant supplied appropriate information regarding policy within the AEE and associated reports consisting of Cultural Impact Assessment, Liquefaction Risk Assessment and Ecological Management Plan. 	<ul style="list-style-type: none"> CRC's specialist, Ms Rachel Tutty has peer reviewed the Application. Ms Tutty's technical advice is in Appendix 8 and her views are summarised below. Largely, Ms Tutty's advice remains as s46 comments, except where discussed below. Her initial advice is summarised as: <ul style="list-style-type: none"> No cumulative effects assessment of solar farms in the area (Haldon, Twizel, The Point, Grampians) has been provided. Little information has been provided on the current use of the site and whether land will be used for grazing once the solar array is constructed. No Management plans have been provided in the proposed conditions for ecological restoration at the site (unlike similar proposals in the area). Comments by Ms Tutty during the s46 stage requesting a PSI be undertaken are rescinded as this has been completed. In addition, Ms Tutty notes that CRC Natural Hazards Scientist is in agreement with the 	<ul style="list-style-type: none"> CRC considers that Consent conditions should be crafted to ensure that significant indigenous vegetation is protected, agreeing in principle that a management plan that enhances indigenous biodiversity could be a good starting point regarding offsetting/compensation. What is stated above for Invertebrate and Terrestrial Ecology regarding the NPS-REG should also be taken account here.

Applicant's assessment summary	CRC technical assessment summary	CRC Changes required/conditions sought to address CRC's comment
	<p>Flood Hazard Assessment supplied by the Applicant, as such initial comments during the s46 stage relating to adequacy of that assessment are to be disregarded.</p> <ul style="list-style-type: none"> • Further Ms Tutty agrees with the determination by CRC Terrestrial Ecology (also of Mr Harding) that the proposed site meets the Canterbury Regional Policy Statement criteria for Significant Indigenous Vegetation and Habitats. 	
Cultural Values		
<ul style="list-style-type: none"> • The applicant supplied cultural information within the AEE and associated Iwi consultation documents (Appendix 12). 	<ul style="list-style-type: none"> • CRC notes that Mana Whenua are best advised to make comment on matters that affect them. 	<ul style="list-style-type: none"> • As Mana Whenua are invited under s53(2)(b) of the FTAA as a relevant iwi authority to make comment on the application, CRC will leave cultural matters to Mana Whenua to assess.

Regional benefits

20. The purpose of the FTAA is to facilitate the delivery of infrastructure and development projects with significant regional or national benefits.

21. While ultimately a matter for the Panel, the application has described the regional and national benefits of the Haldon Solar development at Haldon Station.

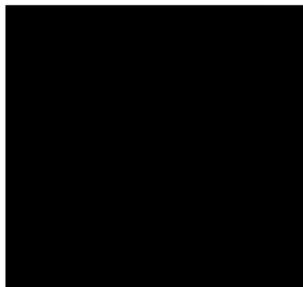
22. The Applicant's economic consultant, M.E Consulting, has assessed the regional benefits of the proposal. It is expected to deliver significant regional economic benefits in both the construction and operational phases. The project is expected to support approximately 235 - 242 direct jobs, 290 - 291 indirect jobs, and 219 - 220 induced jobs, while economic value added is estimated at \$134.0 million - \$135.4 million (direct + indirect) and rises to \$189.0 million - \$189.5 million when induced effects are included.

23. Further, the site is expected to generate approximately 370 GWh of renewable electricity annually, which can meet the energy needs of around 45,105 households.

24. The benefits of the Haldon Solar development at Haldon Station as set out by M.E Consulting, are not being questioned by CRC. An economic assessment was not undertaken by CRC.

CRC's Concluding Comments

25. CRC have reviewed the substantive application and technical appendices for the proposed Haldon Solar Farm Development by Lodestone Energy Limited. CRC's view is that there are no fundamental issues that cannot be resolved through ongoing discussions with the Applicant to work through mitigations, compensation and/or offsets and collaboratively amend conditions. CRC is already in discussions with the Applicant, who has indicated a willingness to agree to a set of working conditions. These can be progressed collaboratively between the two parties, with the finer details worked through as discussions continue.



Brett Aldridge

Director Operations

Appendices- as separate attachments

Appendix 1- CRC Technical Advice- Invertebrate Ecology

Appendix 2- CRC Technical Advice- Lizard Ecology

Appendix 3: CRC Technical Advice- Terrestrial Ecology

Appendix 4: CRC Technical Advice- Groundwater

Appendix 5: CRC Technical Advice- Natural Hazards Science

Appendix 6- CRC Technical Advice- Contaminated Land

Appendix 7- CRC Technical Advice- Land Resources

Appendix 8- CRC Technical Advice- Policy Planning

Appendix 9- Applicant's Proposed Conditions with CRC Comment

Appendix 1: CRC Technical Advice- Invertebrate Ecology

From: Barbara Barratt – Canterbury Regional Council Engaged Invertebrate Ecology Scientist

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	26 Jan 2026
To	Jeremy Ecker, Consent Planner, Environment Canterbury
From	Dr Barbara I.P. Barratt, Emeritus Principal Scientist, Bioeconomy Science Institute
Project advice provided for	Haldon Solar Farm proposal – Loadstone Energy Ltd.
Documents referred to	<p><u>Reports:</u></p> <p>Lodestone Energy 2025. Draft Invertebrate Survey Methodology – Haldon Solar Farm 7 Nov 2025</p> <p>Jack, J. 2025. Review of proposed study methodology – Ecological Survey and assessment for Lodestone Energy Lyd – Haldon Solar Project, Environment Canterbury, 11 Nov 2025</p> <p>AgScience Ltd. 2025. Haldon Solar Project: Ecological Impact Assessment, 31 July 2025</p> <p>SLR Consulting New Zealand Limited. Terrestrial Invertebrate Assessment: Haldon Solar Farm. Report for Lodestone Energy Ltd.: SLR Consulting New Zealand Limited; 2026 20 Jan 2026. Contract No.: SLR Project No. 875.01640.00001.</p> <p><u>Other publications:</u></p> <p>Jeala C, Perolda V, Seymoura CL, Ralston-Patonc S, Ryan PG. Utility-scale solar energy facilities – Effects on invertebrates in an arid environment. <i>Journal of Arid Environments</i>. 2019;168:1-8.</p> <p>Zitzmann F, Stern M, Schmidt M, Schirmel J. Carabid beetles in solar parks: assemblages under solar panels are severely impoverished compared to gaps between panel rows and edge areas. <i>Journal of Insect Conservation</i>. 2024;28:763–76</p> <p>Wang Y, Cheng Y, Ban L, Yin X, Wei S, Sun W, et al. Insect community diversity in photovoltaic power station and its response to environmental factors. <i>Biology</i>. 2025;14(1388).</p> <p>Lec'hvien A, Bienvenu L, Isselin-Nondedeu F, Bischoff A, Gros R, Schatz B. Effects of solar panels and management on pollinators and their interactions with plants in Southern French solar parks. <i>Biological Conservation</i>. 2025;307(111209).</p>

Introduction/Summary

1. I have provided advice throughout this project (from pre-application discussions) and have been involved in the following technical discussions:

I have provided no advice pre-application.

Table 1

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
Dr Jean Jack (JJ) (ECan) 8 Nov 25	JJ approached BIPB about the proposal	JJ explained the proposal, scope and timelines	Yes, BIPB agreed to advise on survey methods and then to review the report of the invertebrate survey
Dr Jean Jack 10-11 Nov 25	Study methodology	JJ provided BIPB with the 'Draft Invertebrate Survey Methodology' document for review and comment.	Yes, BIPB gave feedback and provided references to relevant literature to assist in determining best sampling methods.
Dr Jean Jack 13 Nov 25	Plan for site visit	Arrangements made to visit Haldon Station, inspect the site and recommend areas for invertebrate sampling	Yes, BIPB agreed to visit the site on 20 Nov 25
Dr Jean Jack and others 20 Nov 25	Site visit	BIPB visited the site and inspected the environment by foot and driving with JJ, and herpetologist Mandy Tocher. Conditions were clear and became windy later in the day. We were accompanied during the inspection by one of the Lodestone staff. Some invertebrates observed during the visit were photographed and	Yes, after the inspection, BIPB indicated to JJ on the site map the 4 areas that would be best to focus on for the invertebrate sampling. Recommended pitfall trapping and Malaise trap sampling over at

		uploaded to iNaturalist. Of particular note was a population of the minute grasshopper, <i>Sigaus minutus</i> .	least a one-week period.
ECan administrator 15 Dec 25	Contract discussed	Purchase order received by BIPB to undertake the RMA261235 - Lodestone Energy Ltd Review by 26 Jan 2026	Yes, conditions agreed

Missing information – pre application advice and substantive check

2. The following information is needed to fully understand the proposal/effects of the proposal:
 - a. Presence, distribution and abundance of invertebrates at the proposed Lodestone Solar Farm (LSF) site (Haldon Station), particularly those that are recorded as being threatened, at risk, or declining as defined in the NZ Threat Classification System (NZTCS).
 - b. Environmental disturbance that will occur as a result of vehicle movements, pile driving, soil disturbance, roading, foreign materials imported to the site etc. so that likely impact on invertebrates can be evaluated.
 - c. Information on the reduction of sunlight (shading) to the ground and obstruction of precipitation that will be caused by the presence of the completed LSF so that the likely impact on threatened invertebrates and the invertebrate communities in general, can be assessed.
 - d. Source of soil and other materials (potential contaminants, seed and organisms etc.) being brought onto the site as part of the construction process. Efforts made to minimise impacts from imported materials needs to be outlined.
 - e. Presence of native plants that might be necessary for the survival of endemic invertebrates needs to be investigated.

Summary of effects

3. There are a number of outstanding issues, specifically:
 - a. Point 2d above has not been addressed to my knowledge.

Agreement with the applicant

4. Of particular note:
 - a. I agree with the applicant’s *Terrestrial Invertebrate Assessment* that there will unavoidably be impacts on invertebrates and their habitat from the

construction of the LSF including mortality from vehicle movements, soil disturbance etc.

- b. I agree that operation effects that will occur post-construction will eventuate as a result of shading and the consequence of this on soil and surface moisture and temperature. This is likely to change the plant species composition that will impact invertebrate species in a variety of ways that will be hard to predict.
- c. I agree that the avoidance and minimisation options mentioned in the *Terrestrial Invertebrate Assessment* are unlikely to be acceptable to the applicant, and that any offsetting/compensation will also either be unacceptable to Lodestone Energy or will require significant effort to achieve, e.g. to avoid net loss of significant biodiversity values.
- d. I support the suggestion in the SLR *Terrestrial Invertebrate Assessment* that research projects carried out before and after solar panel installation would be highly beneficial. On this note I agree with the conclusion of the SLR report (page 20) that there is uncertainty on the effects of the LSF because of the lack of research on their impact and because none have previously been constructed in the Mackenzie Basin, a unique dryland environment.

5. I do wish to make the following comments:

- a. The SLR assessment notes that there is no existing research on the effects of solar farms on NZ invertebrates. I concur that this appears to be the case. However, there is a body of evidence from published research undertaken overseas, some of which is likely to be quite relevant to this proposal. For example, a recent study in China and showed that insect abundance and diversity was reduced under solar panels (Wang et al. 2025) and in an arid area in South Africa, there was an altered community composition of ground-dwelling invertebrates inside solar farm installations compared with surrounding rangeland (Jeal et al. 2019). A French study showed that the number of pollinators and plant-pollinator interactions was reduced under solar panels in pasture (Lec’hvien et al. 20254). A comprehensive literature review might be useful to fully comprehend the extent and nature of impacts of solar farms on invertebrate biodiversity and abundance and if/how these impacts have been managed, and an evaluation of how they might be applied to this LSF proposal.
- b. The discovery of *Sigaus robustus* (robust grasshopper) at the site was very significant since this is ‘Nationally Endangered’ and is protected under the

Wildlife Act 1953. This means that a permit from DOC would be required to kill or catch or move specimens.

- c. The SLR *Terrestrial Invertebrate Assessment* listed 92 invertebrate taxa recorded of which 2 are 'nationally endangered', 1 is 'nationally vulnerable' and 2 are 'At risk-Declining'. Given that this was a survey carried out:
- i. in a very short time frame
 - ii. with insufficient time for all taxa found to be fully identified to species
 - iii. undertaken only at one time of year
 - iv. focussed only on ground-dwelling species,
- I interpret these findings as being significant, and suggestive of an environment that has appreciable invertebrate values.

Benefits of the project

6. There are no specific benefits that I am aware of with respect to my area of expertise. However, in general, the project might potentially prevent other forms of land management from taking place at the Haldon Station that might have an even greater impact on invertebrates than the LSF.

Outstanding areas of contention and significance of these.

Outstanding areas of contention

- 7 a. The importation of aggregate/fill to the site creates a risk that unwanted chemicals/toxins/seed and other animal and plants could be introduced to the site. This requires mitigation.
- b. I believe that given the time frame for the evaluation SLR have undertaken a thorough assessment and added considerably to the earlier AgScience Ltd. ecological impact assessment (conducted at a similar time of year), which while it did not focus on invertebrates, did assert that *Sigaia minutus* was not present at the site. This is clearly not the case since I saw several specimens during my site visit on 20 Nov 2025, and furthermore almost 100 were found by the SLR ecologists while walking the transects across the site. This suggests that there is a substantial population of *S. minutus* at this site.
- c. A minor area of contention is that the SLR report (pages 8-9) notes that *S. minutus* r numbers were lower where there was cover of hawkweed and briar and higher where cover was lichens/moss/herbs/*Raoulia* and exposed gravels and soils.

Reference to the data in Table 5 would indicate to me that the differences in those numbers were very small and unlikely to be significant. However, the report does not make any further assertions or conclusions on the basis of those data.

d. A minor correction needed to the SLR assessment. The authors have used both the genus names *Sigauss* and *Brachaspis* for robust grasshopper in various parts of their report. It should be corrected to *Sigauss robustus*.

Significance of these matters

- i. The issue of imported aggregate/fill to the site during construction is significant. Depending upon the source of these materials it is possible that seeds of invasive weed species, or any species currently not present at the site could change the botanical composition of the vegetation possibly replacing species which some invertebrates might depend upon. The imported material might also contain invertebrates or other organisms that again might present a risk to the fauna. The other matters raised are not highly significant.

Solutions and/or comments on conditions

- ii. Issue: A number of threatened invertebrate species are present at the LSF site which will undoubtedly be negatively impacted by the installation and presence of the solar farm.

Solutions:

- a. Avoidance - not go ahead with the solar farm. This is the only complete solution, is not in itself onerous, and will manage the issue.
- b. Minimisation - reduce the size of the solar farm to retain areas where threatened invertebrates are known to be present. Comparative assessments should be undertaken to monitor presence and abundance of selected species and assess impact of solar panels. This might pose practical challenges, and assessments will need to be funded but would not be onerous. This is a partial solution and will partially manage the issue.
- c. Offset/compensation – find area suitable for a reserve for some of the species at risk at the LSF site. This is a partial solution, probably onerous, and possibly unsuccessful and may not manage the issue.
- d. Offset/compensation – not a solution at all - go ahead with the project on the condition that a research program is established at the outset to investigate the ecological impact of this solar farm project in this environment. This will not manage the issue, but will inform future similar projects, will not be onerous but will require adequate funding.

Appendix 2: CRC Technical Advice- Lizard Ecology

From: Mandy Tocher – Canterbury Regional Council Engaged Lizard Ecology Scientist

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	25 January 2026
To	Jeremy Ecker, Consent Planner
From	Dr Mandy Tocher, Herpetologist <i>LizardExpertNZ</i>
Project advice provided for	Haldon Solar project – Lodestone Energy Ltd
Documents referred to	<ul style="list-style-type: none"> • Draft Lizard (Herpetofauna) Survey Methodology – Haldon Solar Farm, 5 November 2025. • Haldon Solar Project Ecological Impact Assessment, 31 July 2025. AgScience. • Lodestone Energy Limited Haldon Solar Project Application for Approvals Under the Fast-Track Approvals Act 2024, Mitchell Daysh, 29 August 2025 (Application and AEE). • Appendix 2 of the Application/AEE-Conditions for ECAN and Mackenzie District Council (MDC) dated 29 August 2025. • Appendix 12 of the Application/AEE- Engagement with ECAN pre-application and on Conditions. • Haldon Station Solar Farm: preliminary lizard assessment, 22 January 2026. Draft memo from Tony Payne, Blueprint Ecology Ltd.

Introduction/Summary

1. I have provided advice throughout this project from November 10th when first approached by Jean Jack, ECAN to assist. Since then, I have been involved in the following technical discussions:

Table 1

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
Dr Jean Jack, ECAN, November 12 2025	Proposed survey Methodology	I provided suggested edits/comments on the 5 November proposed survey methods. Advice was that the methods were 'odd' and almost	Yes, Tony Payne ultimately carried out the lizard survey using acceptable methods as detailed in his draft assessment memo.

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
		certainly not put together by a herpetologist.	
Dr Peter Espie, during site visit 20 November 2025	Likely lizard values of the solar array footprint; possible mitigation measures	Based on a cursory site visit, lizard values over the footprint appeared to be low/absent. Lizard values near the footprint, however, were much higher e.g., the exotic grassland habitats near to the Lake and possibly the exposed rock under the pylons through the centre of the site. Should lizards be found, obvious mitigation actions should be focussed within the lake-side grassland/shrubland habitats where lizards were easily detected, as well as on-site mitigation e.g., in the Pylon corridor.	Yes, in that Lodestone had commissioned a lizard survey and Tony Payne was beginning this while the site visit was being undertaken.
Jeremy Ecker, ECAN 5-13 th January 2026	Scope of advice/consents triggered	Two emails were sent to me Jan 5 th 2026 relating to ECAN scope of advice and a second email Jan 13 th , 2026, relating to MDC advice.	Yes, in part: consents triggered under the Regional and District plans were provided by ECAN via email.

Missing information – pre application advice and substantive check

2. The following information is needed to fully understand the proposal/effects of the proposal:
 - a. No lizard-specific engagement was carried out pre-application.
 - b. As I understand it, a lizard survey was requested by ECAN (Jean Jack) prior to my involvement. Results of the lizard survey are absent and represent a critical information gap.
 - c. Further information is needed on which, if any, parts of the solar project footprint are already rabbit fenced and what level, if any, existing rabbit control is undertaken (additionality principle of best-practice compensation).

- d. Further information is required on what pest control is planned inside the rabbit exclusion fence; for example, the MDC conditions limit control to only rabbits.

Summary of effects

3. There are a number of outstanding issues, specifically:
 - a. No effects assessment has been provided in the draft lizard assessment memo as results of the lizard survey are pending.
 - b. The actual extent of lizard habitat is not known but is estimated to be *ca.* 1 ha spread across 30 sites.
 - c. The number of lizard species affected is not known but the Applicant considers only McCann's skink [not threatened] will occur over the solar project footprint.
 - d. The significance of lizard habitats over the solar project footprint is not known.
 - e. The number of individuals affected over the solar project footprint is not known but is estimated to be "low numbers".
4. Agreement with the applicant
 - a. I agree McCann's skink is most likely to be the only species present over the solar project footprint, and in relatively low numbers over small areas of fragmented habitat. The extent of habitats, however, is unknown and contingent on the results of the lizard survey (not provided). Also, the presence of Southern Alps gecko and/or Southern grass skink (both At Risk – Declining) also cannot be determined until the lizard survey is complete.
5. I do wish to make the following comments:
 - a. The lizard assessment asserts that habitat has been removed from the site by *"Farm practices such as top dressing, tilling, and attempts to convert the land to pasture has been highly destructive to the ecosystem, including habitats for native lizards. The site has largely had rocks, debris and long vegetation removed, and now it lacks the cover needed for lizards to persist in the environment"*. I am not sure this is correct insofar as it relates to rock habitat being removed. Instead, wind-blown sediment has covered much rock over the site.

Benefits of the project

6. There are no specific benefits with respect to my area of expertise unless the final lizard assessment contains actions to avoid, remedy, mitigate or compensate for any lizard-related effects that result in a *net gain in habitat or lizard individuals of the site.*

7. Neither the AEE, EclA nor the draft lizard assessment proposes any lizard-related 'mitigation' actions. I note, however, that the AEE in Section 6.5. 'Ecology' proposes a rabbit proof fence over the solar project footprint that may over the long term provide cover for lizards to move into the site and reduce prey for lizard predators. The rabbit exclusion fence is touted in the AEE as a positive effect for vegetation. Part of the solar project footprint, as I understand it, was already rabbit proofed meaning this proposed action is only partially additional.
8. Pest control (unspecified in the Substantive Application but restricted to rabbits in the Conditions proffered to MDC) is also planned, However, in the absence of pest monitoring, pest control may yield unexpected outcomes to lizards e.g., an increase in lower-order lizard predators (rats, mice and weasels).

Outstanding areas of contention and significance of these.

9. None at present but awaiting substantive information on lizard values and proposed mitigation following the completion of the lizard survey.
10. Potential contention regarding the positive effects of the proposed rabbit fence and pest control proffered in conditions, and debate about how additional the fence actually is.

Significance of these matters

11. The proposal cannot be assessed in term of lizard effects until the lizard survey results have been provided, along with proposed mitigation measures. Monitoring of pests inside the rabbit exclusion fence maybe required. Further

Solutions and/or comments on conditions

12. I have reviewed proffered conditions in s, and note the following:
 - a. No lizard-related conditions have been proffered in the substantive application as they await completion of the lizard survey. I note MDC 'ecology and landscape' conditions are covered in Appendix 12 of the application (Conditions 27-32).

Appendix 3: CRC Technical Advice- Terrestrial Ecology

From: Jean Jack – Canterbury Regional Council Team Leader, Land Ecology Science

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	27/01/2026
To	Dr Jean Jack, Land Ecology Team Leader
From	Jeremy Ecker, Consent Planner
Project advice provided for	Haldon Solar Farm – Loadstone Energy
Documents referred to	<ul style="list-style-type: none"> • The Application dated August 2025, - Fast Track - Haldon Solar Farm - Substantive Application and Assessment of Environmental Effects – design and specifically section 3.13, 6.5 & 7.2 relating to ecology; - (the Application) C25C/214331-3 RMA261235 • Appendix 2 - Proposed Conditions – Ecan Fast Track - Haldon Solar Farm - Appendix 2 C25C/214331-9 RMA261235; & MDC conditions under C25C/214331-8 • Appendix 7 - Ecological Assessment (the Ecology Report) C25C/214331-17 RMA261235 <p>Documents reviewed after the Application documents above:</p> <ul style="list-style-type: none"> • C26C/18664 RMA261235 - Haldon Solar - Loadstone Energy - Advice Note - Risks to birds of construction and operation of the proposed Haldon solar farm (DOC Expert Advice, Dr Colin O'Donnell). December 2025. • Department of Conservation post-site visit terrestrial invertebrate and vegetation assessments by Technical advisors W. Chinn (invertebrates) and M. Harding (vegetation). 18th January 2026. • C26C/18821 RMA261235 - Applicant Supplied Further Ecology Reports: Attachment 1. Haldon Station Solar Farm: preliminary lizard assessment, 22 January 2026. Draft memo from Tony Payne, Blueprint Ecology Ltd. Attachment 2. SLR Consulting New Zealand Limited. Terrestrial Invertebrate Assessment: Haldon Solar Farm. Report for Lodestone Energy Ltd.: SLR Consulting New Zealand Limited; 2026 20 Jan 2026. Contract No.: SLR Project No. 875.01640.00001. • C26C/19731 RMA261235 - s53 comments - Invertebrate Ecology. January 2026. (Review of C26C/18821 – Invertebrates by B. Barratt) – Attachment 2. • C26C/18856 RMA261235 - s53 Comments - Lizard Ecology. January 2026. (Review of C26C/18821 – Lizards by M. Tocher) – Attachment 3.

Introduction & Summary

1. My comments provide advice regarding the potential effects of the Haldon Solar Farm – Loadstone Energy proposal on terrestrial ecology.
2. Initially I reviewed the application and provided 546 comments (**Attachment 1**). Subsequently I met with the Applicant to discuss the potential effects of the proposal on terrestrial ecology and data deficiencies of the application. Online discussions led to a site visit alongside other ecology experts to better understand the site's ecological values and inform my recommendations for further site surveys to assist an assessment of effects. **Table 1** outlines my discussions with the Applicant and experts.
3. Additional surveys of the site and commentary by experts of both the Applicant and the Department of Conservation have provided further information to inform my consideration of the proposal's potential effects on terrestrial ecology.
4. Further information provided by the Department of Conservation and the Applicant reported eight threatened plant species occur at the site including the endemic plant *Lepidium solandri*, a Threatened - Nationally Critical species for which less than 1000 are known in the wild. Further survey effort would be required to understand the spatial distribution of this and other Threatened or At-Risk species across the site. It is likely that further survey effort would find additional indigenous species to the sixteen recorded.
5. Further information provided by the Applicant and the Department of Conservation regarding invertebrates confirmed several threatened species including a substantial population of the minute grasshopper (*Sigauss minutus*: Threatened - Nationally Vulnerable) being present across the entire project site, and the occurrence of robust grasshopper (*Sigauss robustus*: Threatened - Nationally Endangered), Otago short-horned grasshopper (*Phaulacridium otagoense*; At Risk – Declining) and the Tekapo ground wētā (*Hemiandrus 'furoviarius'*; Threatened - Nationally Endangered). As noted by Dr Barratt who reviewed the Applicant's report (**Attachment 3**), these species will be adversely impacted by the installation and presence of the solar farm.
6. Further information provided by the applicant regarding lizards is preliminary, although it suggests lizards are present at the site albeit in low numbers and within discrete areas. As noted by Dr Tocher who reviewed the report (**Attachment 3**), the proposal's potential effects on lizards cannot be fully assessed until the lizard survey results have been provided, along with any proposed mitigation measures.

7. While incomplete, the additional survey information confirms the site holds ecologically significant values which will be adversely impacted by the existing proposal. Effects on significant indigenous vegetation and significant invertebrate habitat is unavoidable.
8. Considering the additional survey information, and reviewer comments, I maintain my conclusions and advice provided within my initial s46 comments.
9. The proposed solar farm will alter environmental conditions of 320ha of nationally rare and ecologically significant dryland habitat. These changes will favour exotic plant species and exclude / reduce the abundance of native dryland species. This will result in unavoidable residual effects for which compensation and offsets would be required.
10. Solar farms are not compatible with maintaining sensitive dryland values due to the inherent disturbance of land surfaces on which such values arise and the alteration of microclimates (i.e., moisture gradients) in which indigenous species persist. Solar farm development also risks adversely impacting freshwater avifauna and their habitat.
11. The best way to avoid these impacts is to locate solar farms outside the Mackenzie Basin. Should solar farms be established within the Mackenzie Basin, the best way to avoid impacting terrestrial ecology values is to limit such developments to already Converted and Partially Converted Land (see **Attachment 1**).

Table 1

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
Provided s46 comments	Application review for Land Ecology matters	Data deficiencies for flora and fauna values and assessment of effects. Disagreement with the Application and the Ecology Report's conclusions regarding potential ecological effects and their significance.	Partially. Site visit undertaken and additional flora and fauna assessments undertaken.
Met with Applicant alongside	Discussed key ecological issues and	Recommended further ecological surveys and advised of unavoidable	No - No changes to application or conditions have been received/reviewed.

Consents Planners	data deficiencies of application	effects on ecology. Site visit offered and accepted.	
Site visit December 2025 with Applicant and various experts from DOC, ECan and Applicant.	Further inventory survey and survey planning of site values.	Further ecological values at site confirmed. The site visit reiterated and informed my recommendation for further inventory surveys for invertebrate and lizards - and these were commissioned by the Applicant. Points made to the Applicant post-site visit (email 25 th Nov): DOC plant survey work limited to occurrence not spatial distribution; the issue of bird habitat loss, and that unavoidable residual effects would occur from establishing a solar farm at this site.	Yes. Further site surveys could be undertaken to continue to inventory and better understand site values in terms of species presence and their spatial distribution to inform effects management. However, I have enough information to inform my assessment that unavoidable residual effects would occur from establishing a solar farm at this site.

Missing information – pre application advice and substantive check

12. The following information was requested to fully understand the proposal/effects of the proposal:

- a. Further survey for invertebrates and lizards;
- b. Spatial distribution of fauna and flora values across the site;
- c. Further details of solar infrastructure construction and operation.

13. Further information on invertebrates was received from the Department of Conservation and the Applicant. The Applicant's report was reviewed by Environment Canterbury's external expert Dr Barratt (**Attachment 2**). Some further information on invertebrates is still to be reported by the Applicant following further survey effort.

14. A preliminary report on lizard habitat values was received from the Applicant and reviewed by Environment Canterbury's external expert Dr Tocher (**Attachment 3**). A final report on lizard values is still to be submitted by the Applicant following field survey effort.

15. Further information on the site's indigenous vegetation values was collated by the Department of Conservation and circulated. The Department also circulated further comments on the potential effect of bird strike.

Summary of effects

Agreement with the applicant

- a. See my s46 Comments.

Benefits of the project

16. There are national or regional benefits overall that should be noted. The proposal will contribute to solar power generation.

17. Benefits of this project with respect to my area of expertise are:

- I. Fencing may inadvertently improve habitat complexity for invertebrate and lizards due to increased grassland sward density; however, this benefit is uncertain.
- II. Pest control is mentioned by the Application, and this may benefit indigenous flora and fauna; however, I have not seen the detail of this proffered action and would require outcome monitoring to ascertain if any benefit to indigenous species results.
- III. Monitoring proposed as part of the development could provide insights into how solar farms affect terrestrial ecology, thereby informing future development decisions and management approaches.

Outstanding areas of contention and significance of these.

Outstanding areas of contention & Significance of these matters

18. See my s46 Comments and reviewed summary **Table 2**.

Solutions and/or comments on conditions

19. I have reviewed proffered conditions and note there is little detail regarding management of ecological effects.
20. Considering the further surveys undertaken I have reviewed my consideration of the outstanding areas of contention outlined within my s46 Comments. Given that surveys confirmed the ecological significance of the site's ecological values, albeit for addressing some of the data deficiencies, my overall assessment of outstanding issues and solutions remains unchanged. **Table 2** provides a reviewed summary of issues, solutions and or conditions sought (track-changes indicate edits to my s46 Comments).

21. Table 2

Issue / Outstanding area of contention	Reason for significance	Solution
<p>Changes to soil moisture gradients; shading and stormwater management will transform environmental conditions of 320ha of ecologically significant dryland habitat.</p> <p>Level of effect I consider the potential level of effect to be: Significant - Moderate level of effect.</p>	<p>Loss of 320ha of ecologically significant habitats.</p> <p>These changes will favour exotic plant species and exclude / reduce abundance of native dryland vegetation and associated fauna.</p>	<p>Residual effects unavoidable.</p> <p>Reduce solar farm footprint – reduce shading extent.</p> <p>Consider compensation and or offsets. i.e. physical and legal protection of dryland outwash habitat of equivalent type and extent</p> <p>Proffered condition: a Plant Monitoring Plan. Review by a suitably qualified and experienced practitioner. This may provide insights into the effect but will not manage it.</p>
<p>Construction disturbance</p> <p>Direct disturbance of habitats and vegetation clearance to install pilings, roading infrastructure, perimeter and ESC fencing, or undertake levelling of</p>	<p>Loss of ecologically significant habitats and naturally uncommon ecosystem landform.</p>	<p>No cut and fill activities.</p> <p>If not already, undertake pile testing to ascertain if disturbance predictions for pile driving is accurate.</p>

<p>site landforms including naturally uncommon inland outwash gravels ('cut and fill' activities).</p> <p>Level of effect</p> <p>I consider the potential level of effect on indigenous vegetation from construction to be of a Significant - Low-Moderate level.</p> <p>I consider the potential level of effect on avifauna from construction to be Significant - Low-Very Low.</p> <p>Potential impacts on lizards and invertebrates are unclear due to data deficiencies.</p>	<p>Outwash gravel landforms cannot be restored once cleared/removed.</p> <p>Disturbance of avifauna breeding habitat during construction could result in the loss of nests and chicks.</p>	<p>Ground disturbance mitigations: Works to avoid construction following or during rainfall and frost events / when surface ponding is apparent or soils are saturated/frozen.</p> <p>Habitat disturbance avoidance and mitigations:</p> <p>Reduce solar farm footprint.</p> <p>Collate detailed vegetation and habitat mapping of the site:</p> <ul style="list-style-type: none"> • Address survey deficiencies for invertebrates and lizards; partially addressed and confirmed occurrence of threatened invertebrate species across the site. • Identify notable ecological features to avoid including occurrences of mat daisies, spatially dominant areas of Muehlenbeckia axillaris (identified by additional DOC survey @ Plot 8) and potential invertebrate and lizard habitats ; partially addressed and confirmed occurrence of threatened invertebrate species across the site and lizard habitat likely on perimeter and along transmission line. • Utilise pre-work bird surveys or, as suggested by the Ecology Report, avoid works during the nesting season [p.43]. <p>Management of effects on herpetofauna led through a Department of Conservation permit and an associated Lizard Management Plan.</p> <p>Management of effects on invertebrates led through a Department of Conservation permit and an associated Invertebrate Management Plan.</p> <p>Partial remediation: establishment of habitats such as stone piles and consideration of perimeter fencing design to benefit herpetofauna. The cost of this may be comparable in price and logistics to the already proffered deer and rabbit fencing, and stone piles might be sourced from earthwork spoils. Discrete eco-sourced and outwash-appropriate plantings for herpetofauna might be established near Transect 7 within moister areas (Ecology Report). These would not affect landscape considerations and not require irrigation to establish.</p>
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		Biosecurity to avoid introduction of new weed species to the site is also noted by the Ecology Report and a reiterated concern of Dr Barratt.
<p>Loss of bird feeding and breeding habitat.</p> <p>Level of effect is conservatively assessed as Significant - potentially Low-Moderate level.</p>	Threatened or at-risk species including the NZ pipit, banded dotterel, black-fronted tern, black-billed gull and SI pied oystercatcher might be affected through loss of foraging or nesting habitat.	<p>Residual effects unavoidable.</p> <p>Consider compensation and or offsets.</p> <p>A programme of pest control within the exclusion area is proffered.</p> <ul style="list-style-type: none"> - Pest control is best with a predator proof fence but for avifauna benefit must include control of cats, mustelids, rats and hedgehogs.
<p>Bird strike risk.</p> <p>Mortality of birds may occur through collisions with solar farms, electrocution, and secondary predation of injured or stunned birds.</p> <p>In Aotearoa this issue is an unresolved risk.</p> <p>Level of effect is Uncertain.</p>	While potential impacts of solar farms are unlikely to exceed existing pressures on vulnerable species, they may introduce an additional stressor that further exacerbates already small and or declining populations such as the black-fronted tern or kaki.	<p>No known, easy fix.</p> <p>Establish solar farms and undertaken monitoring at alternative locations first to ascertain the risk of this potential effect prior to establishing solar farms in the Mackenzie Basin – an internationally important area for freshwater avifauna.</p> <p>Consultation with the Department of Conservation to inform the management of this potential effect and any proposed Avifauna monitoring plan is important.</p> <p>Potential mitigations (some of which are proffered):</p> <ul style="list-style-type: none"> ●Providing clear areas between solar panel arrays may allow birds to navigate the access corridors and avoid bird strikes when landing or departing from the site. Gaps between panels to avoid presenting a continuous visual stimulus that looks like a lake – the proposal notes max ground cover when panels are horizontal of 40% [Ecology report page 6].

		<ul style="list-style-type: none"> ●Positioning of panels at night to avoid reflection of light ●Anti-reflective coatings to panels (inferred by Application but not confirmed). ●Minimise night lighting ●Monitoring of the solar farm should be undertaken <u>before and after</u> the construction phase and during the lifetime of the solar farm, to assess whether mortality due to bird strike occurs. ●Adaptive management – although the feasibility of adaptive options is unclear. <p>Further potential risk management options outlined by DOC including:</p> <ul style="list-style-type: none"> ● Place all transmission cables underground to avoid collisions with power lines. ● Minimise or eliminate bird-attracting lighting at night ● Insulate all electric connections to avoid electrocuting birds ● Construct low-security fences to avoid collisions with tall fences. ● Minimise or avoid installing night lighting (which may attract birds). <p>For residual effects – monitoring-triggered adaptive management and or compensation.</p>
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Attachment 1 s46 Comments – Land Ecology Advice September 2025

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	14/9/2025
To	Reuben Herz-Edinger, Consents Planner
From	Dr Jean Jack, Land Ecology Team Leader, Science
Project advice provided for	Lodestone Energy Limited – Haldon Solar Project - RMA261235
Documents referred to	Application, C25C/207069 – design and specifically section 3.13, 6.5 & 7.2 relating to ecology; - (the Application) Appendix 2, Draft Conditions for Ecan, C25C/207109 - (the Proposed Conditions) & MDC conditions under C25C/214331-8 Appendix 7, Ecological Assessment, C25C/207314 (the Ecology Report)

Executive summary/overview

- The proposal and solar array design for which I have considered potential effects on ecology is described as:
 - A utility-scale solar farm at the 320 ha Haldon Station site in Mackenzie Country (**Map 1**).
 - Site is between Haldon Arm Road & Lake Benmore, as seen on Page 15 (p. 41/181 of PDF numbering) of the Substantive Application.
 - Proposal includes solar arrays, battery energy storage system (BESS), earthworks for roading and cabling, and a substation facility to connect to overhead lines running through the site.
 - The design uses a single module configuration (1P) with:
 - a single axis tracking table that typically results in a ground cover ratio of approximately 40% when modules are in the 90 degree (horizontal position).
 - The solar module array is a linear structure, and along the array there will be undulations in the topography which do not need to be levelled or infilled during construction. In those locations, the height between the bottom of the undulation and the top of the module may be slightly larger than 2.6 m but should not exceed 3 m in height.
 - Construction of perimeter deer fencing at a height of approximately 2.0 m, including a rabbit fence along the lower portion, is proposed.

2. The proposed solar farm will alter environmental conditions of 320ha of ecologically significant dryland habitat. These changes will favour exotic plant species and exclude / reduce the abundance of native dryland species. This will result in unavoidable residual effects for which compensation and offsets would be required.
3. Solar farms are not compatible with maintaining ecologically significant dryland values due to the inherent disturbance of land surfaces on which such values arise and the alteration of microclimates (i.e., moisture gradients) in which indigenous species persist. Solar farm development also risks adversely impacting freshwater avifauna and their habitat.
4. The best way to avoid these impacts is to locate solar farms outside the Mackenzie Basin. Should solar farms be established within the Mackenzie Basin, the best way to avoid impacting terrestrial ecology values is to limit such developments to already Converted and Partially Converted Land (**Attachment 1**).
5. Key concerns of the proposal for terrestrial ecology include:
 - I. Direct disturbance of avifauna, invertebrate and lizard habitats and vegetation clearance to install pilings, roading infrastructure or undertake levelling of site landforms including naturally uncommon inland outwash gravels ('cut and fill' activities).
 - II. Changes to soil moisture gradients; shading and stormwater management will transform environmental conditions of 320ha of ecologically significant dryland habitat. These changes will favour exotic plant species and exclude / reduce abundance of native dryland vegetation and, potentially, the associated fauna.
 - III. Loss of (potential) bird habitat. Threatened or at-risk species including the NZ pipit, banded dotterel, black-fronted tern, black-billed gull and SI pied oystercatcher might be affected through loss of foraging or nesting habitat.
 - IV. Bird strike. Mortality of birds may occur through collisions with solar farms, electrocution, and secondary predation of injured or stunned birds. In Aotearoa this issue is an unresolved risk.
6. These concerns for terrestrial ecology are very similar to those I recently identified in my review of another solar farm proposal nearby – the Far North Solar Farm³ - and as considered for a solar farm proposed near Lake Tekapo, currently under appeal to the Environment Court after joint hearing commissioners for Mackenzie DC and

³ Also currently being considered under the Fast-track Approvals Act 2024.

Environment Canterbury refused the consents in November 2023 based on these ecological concerns⁴.

7. Given the context of this proposal with other nearby solar farm developments (**Attachment 2**), consideration for cumulative effects on terrestrial ecology (and other matters) is warranted.
8. I set out below my review of the Application, the associated Ecology Report, and the proposed conditions with respect to potential effects on terrestrial ecology.
9. An overview of my advice is provided in **Table 1**.

⁴ McGarry, S., Justice, M., & Millar, D. (2023, November 8). *Joint report and decision of the hearing commissioners: Applications CRC224567, CRC230898 & RM220048 (A. W. & K. F. Simpson—solar array, 397 Braemar Road, Tekapo)*. Mackenzie District Council & Canterbury Regional Council (Environment Canterbury).

Map 1: The proposed solar farm footprint and layout as presented by Figure 3 of the Ecology Report (Page 7). Lower image shows solar array layout in greater detail illustrating gaps between panels which may mitigate the risk of bird strike.

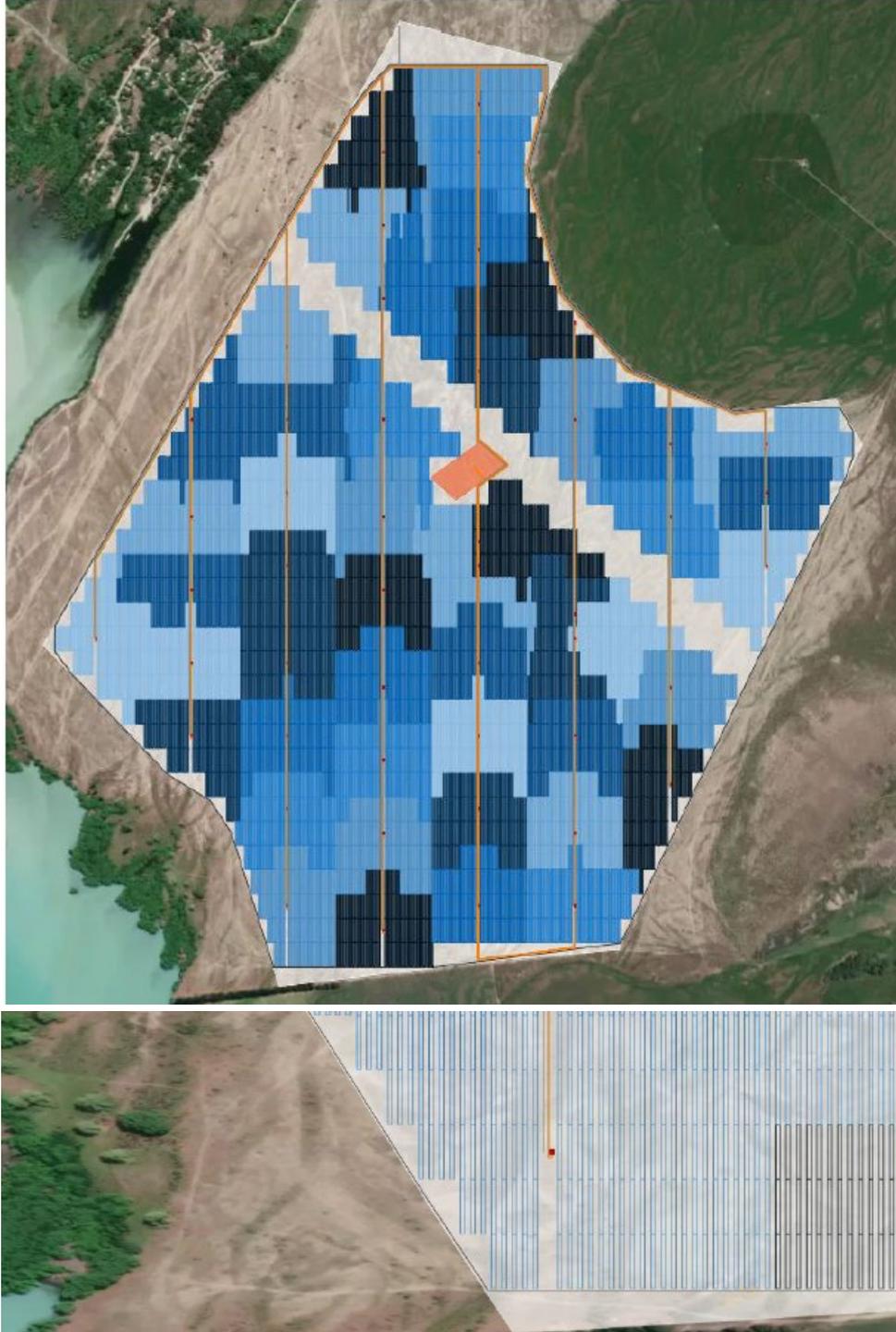


Table 1: outstanding areas of contention		
Outstanding area of contention	Reason for significance	Solution
<p>Changes to soil moisture gradients; shading and stormwater management will transform environmental conditions of 320ha of ecologically significant dryland habitat.</p> <p>Level of effect I consider the potential level of effect to be: Significant - Moderate level of effect.</p>	<p>Loss of 320ha of ecologically significant habitats.</p> <p>These changes will favour exotic plant species and exclude / reduce abundance of native dryland vegetation and associated fauna.</p>	<p>Residual effects unavoidable.</p> <p>Consider compensation and or offsets.</p> <p>Proffered condition: a Plant Monitoring Plan. Review by a suitably qualified and experienced practitioner. This may provide insights into the effect but will not manage it.</p>
<p>Construction disturbance</p> <p>Direct disturbance of habitats and vegetation clearance to install pilings, roading infrastructure, perimeter and ESC fencing, or undertake levelling of site landforms including naturally uncommon inland outwash gravels ('cut and fill' activities).</p> <p>Level of effect</p> <p>I consider the potential level of effect on indigenous vegetation from construction to be of a Significant - Low-Moderate level.</p> <p>I consider the potential level of effect on avifauna from construction to be Significant - Low-Very Low.</p>	<p>Loss of ecologically significant habitats and naturally uncommon ecosystem landform.</p> <p>Outwash gravel landforms cannot be restored once cleared/removed.</p> <p>Disturbance of avifauna breeding habitat during construction could result in the loss of nests and chicks.</p>	<p>No cut and fill activities.</p> <p>If not already, undertake pile testing to ascertain if disturbance predictions for pile driving is accurate.</p> <p>Ground disturbance mitigations: Works to avoid construction following or during rainfall and frost events / when surface ponding is apparent or soils are saturated/frozen.</p> <p>Habitat disturbance avoidance and mitigations:</p> <p>Collate detailed vegetation and habitat mapping of the site:</p> <ul style="list-style-type: none"> • Address survey deficiencies for invertebrates and lizards. • Identify notable ecological features to avoid including occurrences of mat daisies, spatially dominant areas of Muehlenbeckia axillaris and potential invertebrate and lizard habitats. • Utilise pre-work bird surveys or, as suggested by the Ecology Report, avoid works during the nesting season [p.43].

<p>Potential impacts on lizards and invertebrates are unclear due to data deficiencies.</p>		<p>Partial remediation: establishment of habitats such as stone piles and consideration of perimeter fencing design to benefit herpetofauna. The cost of this may be comparable in price and logistics to the already proffered deer and rabbit fencing, and stone piles might be sourced from earthwork spoils. Discrete plantings for herpetofauna might be established near Transect 7 within moister areas (Ecology Report). These would not affect landscape considerations and not require irrigation to establish.</p> <p>Biosecurity to avoid introduction of new weed species to the site is also noted by the Ecology Report.</p>
<p>Loss of bird feeding and breeding habitat.</p> <p>Level of effect is conservatively assessed as Significant - potentially Low-Moderate level.</p>	<p>Threatened or at-risk species including the NZ pipit, banded dotterel, black-fronted tern, black-billed gull and SI pied oystercatcher might be affected through loss of foraging or nesting habitat.</p>	<p>Residual effects unavoidable.</p> <p>Consider compensation and or offsets.</p> <p>A programme of pest control within the exclusion area is proffered.</p> <ul style="list-style-type: none"> - Pest control is best with a predator proof fence but for avifauna benefit must include control of cats, mustelids, rats and hedgehogs.
<p>Bird strike risk.</p> <p>Mortality of birds may occur through collisions with solar farms, electrocution, and secondary predation of injured or stunned birds.</p> <p>In Aotearoa this issue is an unresolved risk.</p> <p>Level of effect is Uncertain.</p>	<p>While potential impacts of solar farms are unlikely to exceed existing pressures on vulnerable species, they may introduce an additional stressor that further exacerbates already small and or declining populations such as the black-fronted tern or kaki.</p>	<p>No known, easy fix.</p> <p>Establish solar farms and undertaken monitoring at alternative locations first to ascertain the risk of this potential effect prior to establishing solar farms in the Mackenzie Basin – an internationally important area for freshwater avifauna.</p> <p>Consultation with the Department of Conservation to inform the management of this potential effect and any proposed Avifauna monitoring plan is important.</p> <p>Potential mitigations (some of which are proffered):</p>

		<ul style="list-style-type: none">●Providing clear areas between solar panel arrays may allow birds to navigate the access corridors and avoid bird strikes when landing or departing from the site. Gaps between panels to avoid presenting a continuous visual stimulus that looks like a lake – the proposal notes max ground cover when panels are horizontal of 40% [Ecology report page 6]. ●Positioning of panels at night to avoid reflection of light ●Anti-reflective coatings to panels (inferred by Application but not confirmed). ●Minimise night lighting ●Monitoring of the solar farm should be undertaken <u>before and after</u> the construction phase and during the lifetime of the solar farm, to assess whether mortality due to bird strike occurs. ●Adaptive management – although the feasibility of adaptive options is unclear.
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Agreement with the applicant

10. I agree with the Applicant regarding:

- i. The potential mitigations to address potential effects on nesting birds during construction;
- ii. Uncertainty regarding the potential level of effect of the proposed solar farm operations on avifauna feeding habitat and the potential for bird strike;
- iii. The solar array will increase moisture levels across the site;
- iv. Fencing will provide positive benefits for grazing sensitive [introduced] vegetation. (Further consideration of outcomes from fencing is necessary).

11. I disagree with the Applicant's conclusions on a number of points and address these in the following sections. These include:

- i. The approach to assess potential adverse effects of the project in terms of an overall level of effect, as well as overall levels of ecological value and magnitude of effect used to determine level of effect.
- ii. The ecological significance of the site and its values – these are significant.
- iii. The extent of ground disturbance - this will be greater than predicted.
- iv. The level of effect on indigenous vegetation – this will be significant (Low-Moderate) rather than Very Low.
- v. The level of effect on invertebrates and lizards, although this is hampered by a lack of survey data.
- vi. Removal from grazing does not promote indigenous community recovery – contrary evidence exists to suggest recovery does occur when grazing is removed.

Benefits of the project

12. Fencing may inadvertently improve habitat complexity for invertebrate and lizards due to increased grassland sward density.

13. Pest control is mentioned by the Application, and this may benefit indigenous flora and fauna; however, I have not seen the detail of this proffered action.

14. Monitoring proposed as part of the development could provide insights into how solar farms affect terrestrial ecology, thereby informing future development decisions and management approaches.

Outstanding areas of contention and significance of these.

Discussions with applicant

15. I have had no expert discussions with Applicant or their experts.

Outstanding areas of contention

16. The Application and its associated Ecology Report underestimate the potential for terrestrial ecology to be adversely affected by the proposal.

17. In the following sections I review of the proposal's approach to ecological significance and determination of level of effect and consider the effects on terrestrial ecology relating to: ground disturbance, indigenous vegetation and fauna including avifauna (birds), herpetofauna and invertebrates.

18. Importantly, a 'low' effect is still a significant adverse effect that will, if unmitigated, result in loss of significant indigenous biodiversity values and is therefore not consistent with Resource Management Act and Canterbury Regional Policy Statement requirements to protect (s6c) and maintain (s 30) biodiversity.

19. Each section highlights where I consider the Application or Ecology Report to have underestimated the nature or scale of potential adverse effects, and where additional assessment, consultation, or precautionary management is required – or where proffered impact management is supported.

Ecological significance

20. Contrary to the Ecological Report, I consider the site would meet criteria of rarity and distinctiveness and ecological context. While somewhat data deficient (see my comments with regards to faunal survey below), the site would meet significance Criteria 4, 6 and 8 of the Canterbury Regional Policy Statement.

21. The site meets Criteria 4 as it supports at least four at-risk plant species and likely supports several threatened animals including freshwater birds such as black-fronted terns (Nationally Critical) which likely forage across the site. Criteria 6 is met. Albeit of only moderate distinctiveness, the association of species and or spatially discrete areas where indigenous plants dominate, occur on a naturally uncommon ecosystem (inland outwash gravels). And Criteria 8 is met as the site

contributes to a network of dryland environments, including its bare soil and stoney substrates, which allow indigenous species adapted to harsh dryland environments to persist across their natural range.

22. The Ecology Report also considers⁵, perhaps unnecessarily⁶, the site's flora in terms of it meeting Significant Natural Area (SNA) criteria of the National Policy Statement for Indigenous Biodiversity 2023 (NPSIB). And concludes the site does not qualify as an SNA as the flora are widespread – meeting an exclusionary provision of the instrument⁷.

23. While I agree that the site would not qualify as a SNA if the sole basis for its identification were the presence of at-risk plant species which are widespread, there are other criteria under which the site does meet the SNA threshold (see above). The exclusionary provision applies only where Threatened, or At-Risk plant species are the sole reason for ecological significance.

Level of environmental effects – approach of the Applicant and Ecology Report

24. The Application AEE summarises that *No anticipated adverse environmental effect of the Project has been assessed to be more than minor*⁸.

25. Both the Application⁹ and the Ecology Report¹⁰ provide an overall assessment of the ecological values at the site being low. Such overall assessment is unhelpful to the management of ecological effects, which needs to consider each potential effect rather than average these out and thereby downplay effects of concern.

26. The level of effect concluded by the Ecology Report was based on an overall impact of the project and an overall assessment of effect. As noted above, this is unhelpful when determining potential effects on certain ecological values. Rather, level of effect on an ecological feature requires consideration of its value and the magnitude of any potential effect on that feature. A feature might be a population, habitat or community, and may be considered at various scales and contexts (i.e., site, ecological district, region or national/international).

Ground disturbance.

⁵ Ecology Report [p.38]

⁶ The National Policy Statement on Indigenous Biodiversity Section 1.3 nullifies the application of the instrument for considerations of renewable electricity generation asset development.

⁷ Appendix 1, clause 1(3) of the National Policy Statement for Indigenous Biodiversity 2023 sets out criteria for what qualifies as an SNA including exclusion from such qualification where an area qualifies solely on the grounds that it contains one or more indigenous flora species that are Threatened or At Risk (declining), and those species are widespread in at least three other regions.

⁸ Application [section 6.14, p.94].

⁹ Applications [p.39].

¹⁰ Ecology Report [p.40].

27. Ground disturbance, and consequently vegetation clearance, will result from earthworks associated with piling, cable trenching, roading and building/substation foundations. Stockpiling, laydown areas, erosion and sediment control measures and fencing will involve further ground disturbance.
28. Page 85 of the Application states *The installation of the solar panels will involve piling with minimal ground disturbance* and estimates only 13 hectares of vegetation clearance. The Ecology Report also considers only small areas will be disturbed by the development. I disagree with this.
29. Disturbance will very likely exceed that of the estimated earthworks footprints¹¹. In my experience and observations of other solar farm development, the establishment of solar arrays and its associated infrastructure require heavy machinery to track across much of a site causing significant disturbance to any landform and associated vegetation. The risk of this is exacerbated by any works carried out during or after rainfall or frost events when surfaces are more vulnerable to damage from heavy vehicle tracking.
30. It is also unclear whether any pile testing has been carried out. Should the outwash gravels present difficulty in pile driving (i.e., bouldery substrates preventing direct piling), additional earthworks and ground disturbance to that initially estimated will result.
31. Solar farm applicants commonly characterise construction disturbance as minor, on the basis that works affect only the shallow soil horizon rather than deeper profiles. Consequently, such disturbance is treated as negligible, particularly when proposals are compared with larger earth-moving projects. However, much of the site's biodiversity arises from and is maintained by microclimates created by the subtle microtopography of the outwash gravel landform. These values occur within the shallow soil horizon (<15 cm) and on the surface, including lichen-encrusted stones and widespread moss fields.
32. Associated with ground disturbance is the Applicants proposed dust and erosion management¹². Dust management often includes establishing grass cover directly following disturbance while water is often applied to reduce exposed soil becoming airborne. Erosion management, as outlined by the proposed conditions, might include the laying down of gravel or mulching strips beneath solar panels and the establishment of silt fencing. Such dust and erosion mitigations will be averse to any indigenous dryland vegetation and its recovery.

¹¹ Application [p.57]

¹² Application [p.92]

Indigenous vegetation

33. The Ecology Report states that the site no longer comprises indigenous vegetation. However, the Mackenzie District Plan defines indigenous vegetation as *a community of vascular plants, mosses and/or lichens that includes species native to the ecological district*¹³. The vegetation of the site includes such a community and therefore is considered indigenous vegetation from a planning perspective.
34. The Ecology Report refers to the extent of locally protected conservation areas¹⁴, correctly noting that the site area occurs within a ‘critically under-protected’ land environment where only 10% of this environment is protected.
35. The vegetation assessment utilised a stratified random design incorporating plot sampling along multiple transects. I am aware that sampling mixed indigenous-exotic plant communities such as that of the project site requires consideration of the spatial clustering of indigenous species to avoid lower than actual estimates of their occurrence¹⁵. I am however not experienced with the vegetation assessments undertaken by the Ecology Report and recommend its approach, and findings are reviewed by a suitably qualified biostatistician familiar with the monitoring of Mackenzie Basin vegetation to ascertain its appropriateness and conclusions. If requested, I can suggest suitably qualified and experienced persons.
36. Four vascular native plants with conservation status of ‘at-risk’ were reported to occur at the site by the Ecology Report. These included desert poa (*Poa maniototo*), scabweeds (*Raoulia australis* and *R. beauverdii*) and the celadon mat daisy (*R. parkii*). The desert poa was common across all four transects of the proposed solar farm footprint, while the location of the scabweed and mat daisy is unclear as these were not recorded within measurement plots, presumably observed outside plot areas. The Ecology Report also lists the native herb *Luzula ulophylla* from its plot assessments¹⁶, however does not account for this in its presentation of the conservation status of native vascular species¹⁷.
37. Other native vascular plants recorded include relatively frequent sedges (*Carex* spp.), orchids (*Microtis uniflora* and *Thelymitra longifolia*) and *Muehlenbeckia axillaris*. This latter species was prevalent across transect five, and, as a host plant to native butterflies, has implications for fauna (see below).

¹³ Mackenzie District Plan, Definitions, Section 3 – Definitions, updated Dec 2023.

¹⁴ Ecology Report [p.27]

¹⁵ Walker, S., Price, R., & Rutledge, D. (2016). Sampling method and sample size affect diversity and indigenous dominance estimates in a mixed grassland community. *Ecological Indicators*, 66, 306–314.

¹⁶ Ecology Report [p. 31], Table 7.

¹⁷ Ecology Report [p.32], Table 8.

38. Non-vascular plants included approximately six native mosses while native lichen, primarily the At-Risk Resurrection lichen (*Xanthoparmelia semiviridis*) alongside *X. reptans*, and *X. mougeotina*, are prevalent across the site. Resurrection lichen is a windblown species that occupies large areas of the Mackenzie Basin. While secure overseas it is At-Risk in New Zealand due to incremental loss of suitable dryland habitat and is prone to extreme fluctuations in distribution¹⁸.
39. Collectively, this suite of species has moderate value - which is somewhat recognised by the Ecology Report¹⁹. Although the species persist within a community now dominated by exotic plants, together they represent a distinctive assemblage of indigenous species whose continued presence, although sparse, is important, as comparable groupings are seldom found elsewhere in New Zealand outside the Mackenzie Basin.
40. As noted by the Ecology Report these species occur elsewhere within the Mackenzie Basin, including within conservation estate reserves²⁰. However, the conservation status of these species takes this into account. Rather it is the sparseness of the known occurrences of these plants, habitat loss and modification of the dryland habitats they occupy, and a general lack of data which raises their conservation status. Further loss of these species and their potential habitat would exacerbate their conservation status.

Potential effects on indigenous vegetation

41. The Ecology Report states that *the occurrence of Poa maniotito and lichens are attributable to survival or expansion in the modified open secondary succession dryland vegetation with greater light availability, and this is not likely to be significantly altered by solar development*²¹. I disagree with this conclusion, as it is my understanding that solar arrays will significantly alter solar radiation reaching the ground and will alter moisture gradients to the detriment of the indigenous species. This is confirmed as much by the Application:
42. The Application states: *Overseas studies suggest that the main environmental effects of shading from solar arrays are reduced incident radiation, reduced wind ground speed, reduced vapour pressure deficits and increased soil moisture. Drawing on studies undertaken in a fescue tussock grasslands environment on the*

¹⁸ de Lange, P., Blanchon, D., Knight, A., Elix, J., Lücking, R., Frogley, K., Harris, A., Cooper, J., & Rolfe, J. (2018). Conservation status of New Zealand indigenous lichens and lichenicolous fungi, 2018. New Zealand Threat Classification Series 27. Department of Conservation, Wellington. 64 p. and Knight, A. (2019). Lichens of New Zealand: An introductory illustrated guide. Dunedin.

¹⁹ At page 47 the Ecology Report states that if weight is placed on the threat ranking of the four At Risk, Declining [plant] species then the areas ecological value would be Moderate.

²⁰ Ecology Report [p.38].

²¹ Ecology Report [p.42].

west of Lake Tekapo, the imposition of artificial shade is anticipated to increase total species richness and cover, whilst reducing the cover of bare ground, lichens, and wire moss. Invasive weed species may increase, but could be managed, if necessary, via ongoing control²².

43. The anticipated changes to soil moisture gradients; shading and stormwater management will alter environmental conditions of 320ha of ecologically significant dryland habitat. These changes will favour exotic plant species and exclude / reduce the abundance of native dryland species.
44. The potential impact of additional moisture on both vascular and non-vascular species is indicated by the findings of the Ecology Report where moist areas did not support these native species²³ while the exotic sweet briar shrub increased in both density and growth²⁴.
45. Solar farm development will also cause direct disturbance to the site's indigenous vegetation from its ground disturbing activities. And post construction conditions will favour the reestablishment of exotic vegetation.
46. The proposed deer and rabbit fencing²⁵ will exclude grazing from the site (presumably stock is to be excluded). The Application considers this will provide positive benefits for grazing sensitive vegetation. It is unclear if this is with reference to native or introduced species, however the findings of the Ecology Report would indicate the latter. Findings from the long-term enclosure area at Haldon Station indicate that without grazing the cover of exotics including Hieracium and chewings fescue as well as infrequent native plants remain constant, while introduced grasses and herbs replace bare soil and stone.²⁶
47. The the Ecology Report presents results from long-term studies of the effects of grazing and browser exclusion on vegetation in the Mackenzie Basin²⁷ and concludes that the removal from grazing does not promote indigenous community recovery, and the area is not capable of recovery. These conclusions are disputed. Other research has demonstrated recovery of dryland outwash communities following grazing removal can and does occur and that Hawkweed (*Hieracium*) invasion did not retard recovery.²⁸

²² Application [p.85]; and also noted by the Ecology Report [p.44].

²³ Ecology Report [p.29], Table 4.

²⁴ Ecology Report [p.33], Table 9.

²⁵ The Application [p.85] – [p.86].

²⁶ Ecology Report [p.29], Table 5.

²⁷ Ecology Report [p.24] and [p.37].

²⁸ Walker, S., Comrie, J., Head, N., Ladley, K. J., & Clarke, D. (2016). Hawkweed invasion does not prevent indigenous non-forest vegetation recovery following grazing removal. *New Zealand Journal of Ecology*, 40(1), 137–149

48. In summary, construction activities will directly remove some native vegetation and lichen cover, the increased moisture levels due to panel shading will further reduce native species cover, and fencing will have uncertain benefit for native vascular plants while potentially reducing habitat for non-vascular plants and lichen. Further consideration on the benefits of fencing is required.
49. Adopting the approach of the Ecology Report with regards to the EIANZ guidelines, the ecological value of the vegetation is, as assessed by the Ecology Report, Moderate (assuming weight is, as it should be, placed on the occurrence of four At-Risk species). The Ecology Report considers the magnitude of any adverse effect on vegetation arising from the development to be negligible. I disagree with this assessment due to my understanding of the likely changes the development will have on the sites microclimate which supports the persistence of the indigenous species throughout the site. And due to my anticipation for much broader ground disturbance than estimated by the Application. While I agree the species are widespread and occur elsewhere, I would still consider the permanent (>25years) loss of 320ha of habitat for these species to present either the alteration of a key element of baseline conditions (i.e. dryland conditions) or at least a minor shift away from baseline conditions, and that this will have some effect on the various populations. This Low to Moderate magnitude of effect coupled with the vegetation's Moderate value would amount to a Low-Moderate level of effect.
50. While potential impacts of the proposal on indigenous vegetation may be low, the cumulative and interlinked consequences of ongoing indigenous biodiversity losses in the Mackenzie Basin compounds adverse effects on remaining biodiversity, amounting to a significant effect on indigenous biodiversity.
51. Mitigation for indigenous vegetation impacts could include the mapping and avoidance of mat daisies, spatially dominant areas of *Muehlenbeckia axillaris* or other native plants.

Wetlands

52. From desktop review wetland habitats appear to occur at the south-west extent of the proposed solar array footprint. It is unclear if these areas were formally surveyed to ascertain wetland status and extent (**Attachment 3**) however the Ecology Report notes seepage depressions at the sites southern extent were dominated by non-hydrophytic species²⁹.
53. If present within the wider area, these wetland habitats adjacent to Lake Benmore would not be considered natural inland wetlands under the National Policy

²⁹ Ecology Report [p.13].

Statement for Freshwater 2020 as they have been induced by the constructed waterbody of the lake. However, they may provide habitat to indigenous fauna and thereby warrant consideration for potential effects of the proposal (see below fauna considerations).

Fauna – Avifauna assessments

54. Avifauna populations and their habitat found within the MacKenzie Basin are ecologically significant and nationally important. Endemic and Threatened or At-Risk species which might fly over the site or utilise its habitats for feeding or breeding include banded dotterel (*Charadrius bicinctus bicinctus*), black-billed gull (*Larus bulleri*), black-fronted tern (*Chlidonias albostratus*), black stilt (*Himantopus novaezelandiae*), South Island pied oystercatcher (*Haematopus finschi*) and wrybill (*Anarhynchus frontalis*).

55. The Ecology Report recorded two Threatened or At-Risk avifauna at the site including black-fronted tern and variable oystercatcher (*Haematopus unicolor*). This latter species would be an unusual sighting as this is a coastal species rarely seen so far inland. Additionally, the report notes the threat status of this species as Not Threatened, however it is At-Risk - Recovering³⁰. More likely the observed species was the South Island pied oystercatcher; however, this could be clarified with the report author(s).

Potential effects on avifauna

56. The site is located at a hot spot for Nationally Threatened and At-Risk bird species which frequent the Ohau-Tekapo river delta at Lake Benmore. Flight paths of these birds are known to traverse directly across the proposed solar farm site. This is known in detail for at least one species – black fronted tern - from recent research which placed transmitters on birds' flight revealing their flight routes³¹ (see **Attachment 4**).

57. The implication of this is that a solar farm development at this location presents a risk of bird strike and the potential loss of feeding and breeding habitat. Construction activities might also disturb nesting birds.

58. Bird mortality associated with solar farms—due to collisions and secondary predation of injured or disoriented birds—has long been recognised as a significant

³⁰ Robertson, H. A., Baird, K. A., Elliott, G. P., Hitchmough, R. A., McArthur, N. J., Makan, T. D., Miskelly, C. M., O'Donnell, C. F. J., Sagar, P. M., Scofield, R. P., Taylor, G. A., & Michel, P. (2021). *Conservation status of birds in Aotearoa New Zealand, 2021*. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.

³¹ Gurney F.E. 2022: Breeding movements and post-breeding dispersal of black-fronted terns/tarāpirohe (*Chlidonias albostratus*) in the Mackenzie Basin. Master of Science thesis, Lincoln University. 96p.

environmental impact overseas. In New Zealand, the risk posed by collisions with solar panels remains an unresolved concern, particularly for mobile wetland species and at sites where a relatively high proportion of threatened bird species are present – such as in the MacKenzie Basin.

59. Although bird strike risk of solar farms has not yet been studied in N.Z., I consider the range of adverse effects documented in overseas studies are likely.
60. While the potential impacts of solar farms are unlikely to exceed existing pressures on these species, they may introduce an additional stressor that further exacerbates already small and or declining populations³².
61. There are no known easy fixes for bird strike risk, however several mitigations have been suggested including solar array spacing (as proposed by the Application³³), positioning of panels at night, anti-reflective coatings, minimization of night lighting and, importantly, monitoring and adaptive management. Although the feasibility of adaptive management once a solar farm is established, particularly if the mitigation provisions noted above are already adopted as would be recommended here, is questionable.
62. The precautionary approach to resolve this risk is to undertake monitoring of solar farms for bird strike at locations of less importance to avifauna - prior to their establishment within a nationally important habitat area such as the Mackenzie Basin.
63. I recommend that consultation be undertaken with the Department of Conservation, specifically with their technical science advisors and ornithologists, to ensure the decision maker is fully informed of the potential effects on freshwater avifauna and appropriate management measures.
64. Appropriate mitigation to address potential disturbance to nesting birds during construction, as suggested by the Ecology Report, might include avoiding the breeding season or undertaking pre-work bird surveys.
65. The Ecology Report is unsure if solar arrays will affect avifauna foraging. While the foraging habitat appears to be of low value to avifauna, given the uncertainty, I would conservatively consider feeding habitat might be impacted to a Low-Moderate degree and the residual effects of this unavoidable.

³² In particular, black-fronted tern number approximately 5,000 individuals and face declines of 10-15%; black stilt number only around 150 wild birds with recruitment dependent on a captive breeding programme (Hitchmough et al. 2021).

³³ The Application [p.85]

Herpetofauna

66. Seven lizard species are potentially present at the site, based on records within a 15-kilometre radius, and these include: McCann's skink (*Oligosoma maccanni*, Not Threatened), Southern grass skink (*Oligosoma* aff. *polychroma* Clade 5, At Risk – Declining), Southern Alps gecko (*Woodworthia* “Southern Alps”, At Risk – Declining), Jewelled gecko (*Naultinus gemmeus*, At Risk – Declining), and three Threatened – Nationally Vulnerable larger bodied skinks including Scree skink (*Oligosoma waimatense*), Mackenzie skink (*Oligosoma prasinum*) and Lake's skink (*Oligosoma* aff. *chloronoton* “West Otago”)³⁴ (**Attachment 5**).
67. Of these, and as recognised by the Ecology Report, the species most likely to occur at the site are McCann's skink and Southern grass skink. I would expect Southern Alps gecko is also possible albeit to a lesser degree, while the large-bodied skinks are unlikely but cannot be ruled out. Survey effort has been limited across the site and the wider area generally, so the available information is limited.
68. While information provided, including a few photographs of the area, and desktop aerial imagery indicates the habitat complexity across most of the site is low and presents poor habitat quality, I consider a substantial level of uncertainty remains with regards to sites herpetofauna assemblage.
69. Methodology employed to survey herpetofauna included pitfall traps of a depth of 10.5cm. This is inadequate to trap all lizards, particularly large-bodied species such as the Mackenzie skink which occurs in the wider area. While any size pitfall might be used, depths need to ensure the largest individuals of the target species cannot climb out³⁵. Typically, a depth of 11.5cm is required to trap small-bodied skinks (such as the McCann's and Southern grass skinks, likely to be found at this site). And depths of 18cm or more would be needed to trap large-bodied skinks. Surveys were also of a limited extent and replication (10 traps across 320ha), and it is not clear if traps were micro-sited to increase the likelihood of detection of lizards. It is also unclear if all apparent habitat at the site was surveyed (see below). Furthermore, survey conditions (i.e., weather, temperature, wind speeds) although noted as suitable were not recorded to verify conditions were optimal to detect lizards³⁶.

³⁴ Threat status of lizards from Hitchmough, R.A.; Barr, B.; Knox, C.; Lettink, M.; Monks, J.M.; Patterson, G.B.; Reardon, J.T.; van Winkel, D.; Rolfe, J.; and Michel, P. 2021: *Conservation status of New Zealand reptiles, 2021*. New Zealand Threat Classification Series 35. Department of Conservation, Wellington.

³⁵ Hare, K. M. (2012). *Herpetofauna: pitfall trapping* (Version 1.0). *Inventory and monitoring toolbox: herpetofauna*. Department of Conservation. (DOC/DM-760240).

³⁶ Generally, Oct-Apr is suitable for lizard surveys in Canterbury. Optimal conditions vary with the methods used (e.g. for checks of *Onduline* the optimal temperature range is c. 12-18 degrees (too hot or cold and lizards are not underneath the *Onduline* retreats)). Similar temps are good for visual searching but if live (pitfall or funnel) trapping if undertaken much warmer temperatures are recommended.

70. From desktop review potential habitat of lizard (and other fauna) appears to occur at the southern and eastern extents of the proposed solar array footprint near both the lake and Mt Maggie. It is unclear if these areas were searched or formally surveyed. Much of this potential habitat lies outside the proposed footprint (**Attachment 6**), however it is recommended potential habitat is surveyed and or avoided, including the adoption of exclusion zones for any construction activities from potential habitat areas.
71. Potential effects on lizards primarily relate to injury, death and disturbance from construction activities, while solar arrays may reduce habitat quality due to shading and habitat fragmentation.
72. The proposal may also enhance lizard habitat, as the vegetation cover predicted to increase with the establishment of the solar array and fencing could add to habitat complexity.
73. I recommend that further consideration of habitat and surveys occur to inform the assessment of effects, or that potentially suitable habitat is identified and avoided/considered. Perimeter fencing design might also consider any benefits to the inclusion of habitat areas for lizards.
74. Appropriate survey methodology would require a permit to be attained under the Wildlife Act 1953 from the Department of Conservation to catch and handle lizards or disturb their habitat.

Invertebrates

75. Invertebrates were not formally assessed by the Applicant. The Ecology Report, albeit with a lack of survey, considered invertebrate populations not to be at risk from the development due to the limited extent of invertebrate habitat anticipated to be disturbed by the development³⁷ (see my comments regarding ground disturbance, paragraph 27 - 32).
76. When concluding that invertebrate habitat will not be appreciably altered the Application equates ground disturbance to 0.4% of the total site area,³⁸ which is incorrect as 13 hectares across a 320-hectare site equates to 4%. As noted above, I anticipate the area of disturbance would be greater than 4%.
77. Several invertebrate species of conservation concern may occur at the site. As noted by the Ecology Report these include the robust grasshopper (*Brachaspis robustus*, Threatened – Nationally Endangered; Trewick et al. 2022) and the minute

³⁷ Ecology Report [p.4].

³⁸ Application [p.40]

grasshopper (*Sigaus minutus*, Threatened – Nationally Vulnerable; *Ibid.* 2022), and – I would add - the short-horned grasshopper (*Phaulacridium otagoense*, At Risk – Declining).

78. Moth species were considered; however, butterflies (Papilionoidea) were not. The Southern blue butterfly (*Zizina oxleyi*, Not Threatened³⁹) and copper butterflies (*Lycaena* spp.⁴⁰) are also likely to be present. While specific surveys for these taxa were not undertaken, their known distributions overlap with the wider Mackenzie Basin, and the habitat characteristics of the site, including host plants⁴¹ being present throughout the site as well as and nearby observations⁴², suggest their occurrence is likely.

79. I recommend further surveys occur to inform the assessment of effects and, if consent was granted, that conditions minimise ground disturbance.

Uncertainty.

80. Uncertainty is acknowledged throughout the Ecology Report regarding the level of effects, particularly on fauna.

81. The Ecology Report recognises uncertainty when considering effects on terrestrial ecology. These uncertainties are stated by the report⁴³ including:

82. *The subsequent effect of solar arrays on avian breeding or habitat use is not known in New Zealand...*

83. *The long term effects of solar panels in the Mackenzie Ecological Region are unknown as no solar farms have been built. Overseas studies show that the main environmental effects from solar arrays are reduced incident radiation, reduced wind ground speed, reduced vapour pressure deficits and increased soil moisture.*

84. *How solar arrays affect Mackenzie birds is unknown...*

85. *The effect of shading on sweet briar is not known...*

³⁹ Hoare, R. J. B., Dugdale, J. S., Edwards, E. D., Gibbs, G. W., Patrick, B. H., Hitchmough, R. A., & Rolfe, J. R. (2017). Conservation status of New Zealand butterflies and moths (Lepidoptera), 2015. New Zealand Threat Classification Series 20. Department of Conservation, Wellington. 13 p

⁴⁰ The genus is under ongoing taxonomic research.

⁴¹ Host plants for copper butterflies include *Muehlenbeckia axillaris* (this was present in all plots of transect 5 and some plots of transect 6 across the proposed solar farm footprint); host plants for blue butterflies include legumes (Fabaceae) including clovers (*Trifolium* spp.) which was recorded in plots along all transects of the proposed solar farm footprint.

⁴² iNaturalist. (n.d.). *Observations of Zizina oxleyi & Lycaena (map view)*. Retrieved 13 September 2025, from https://www.inaturalist.org/observations?subview=map&taxon_id=366343; https://www.inaturalist.org/observations?subview=map&taxon_id=54010

⁴³ Ecology Report [p.43]-[p.44].

86. I highlight this issue of uncertainty as it is important to consider when contemplating effects that, although they might be unlikely, they may be significant, and a precautionary approach is warranted.

Proposed conditions

87. The Application notes the following proffered management and monitoring of potential effects including:

- a. Construction and maintenance of a rabbit proof fence around the site over the life of the project for purposes of rabbit exclusion; and
- b. A programme of pest control within the exclusion area; and
- c. a Plant Monitoring Plan under the guidance of a suitably qualified and experienced practitioner in plant ecology with the objective of determining changes in plant communities amongst and beneath the solar installation and to monitor their responses to reduced pressure from rabbit browsing; and
- d. an Avifauna Monitoring Plan under the guidance of a suitably qualified and experienced practitioner in avifauna with the objective of determining any interactions (positive or negative) between birds and the solar installation.

88. As discussed above the consequence of fencing is uncertain or is anticipated to have limited benefit for indigenous vegetation, although may offer some habitat improvement for lizards.

89. The proposed programme of pest control within the exclusion area. This may have benefit to both indigenous vegetation and fauna if carried out with sufficient intensity and scale. For avifauna control of cats, mustelid, rats and hedgehogs would be necessary. Monitoring of pest control outcomes would be required to ascertain the programme's effectiveness.

90. The Plant and Avifauna Plan should be reviewed by suitably qualified and experienced persons.

91. As noted in my review of the Ecology Report, the technical ornithologists from the Department of Conservation should be engaged to review any avifauna management approach.

92. And a suitably qualified biostatistician familiar with the monitoring of Mackenzie Basin vegetation would best be engaged to ascertain any Plant Monitoring Plan to ensure its ability to determine changes in plant communities from solar farm

development. If requested, I can suggest suitably qualified and experienced persons.

93. While Plant and Avifauna Plans might assist with further understanding the effects of the solar farm development on terrestrial ecology, they will not mitigate the potential effects themselves.

Conclusions and recommendations

94. I disagree with the assessment of effects provided by the applicant ecologist which did not follow the statutory ecological assessment criteria or an appropriate effects assessment process.

95. The most obvious unavoidable adverse effect of this proposal will be direct loss of 320 ha ecologically significant dryland habitats and many of the species that utilise these habitats. The applicant has offered little offset or compensation for this effect

96. **Table 1** summarises my assessment of the anticipated level of effects of the project on terrestrial ecology and potential solutions. However, I consider this proposal will have adverse effects on indigenous biodiversity and ecosystems and that proposed mitigations will not fully address these effects. I recommend that alternative, less ecologically damaging options for new solar installation be explored elsewhere.

97. While the various potential impacts of the proposal may be low to moderate, they are significant and the cumulative and interlinked consequences of ongoing indigenous biodiversity losses in the Mackenzie Basin compounds adverse effects on remaining indigenous biodiversity.

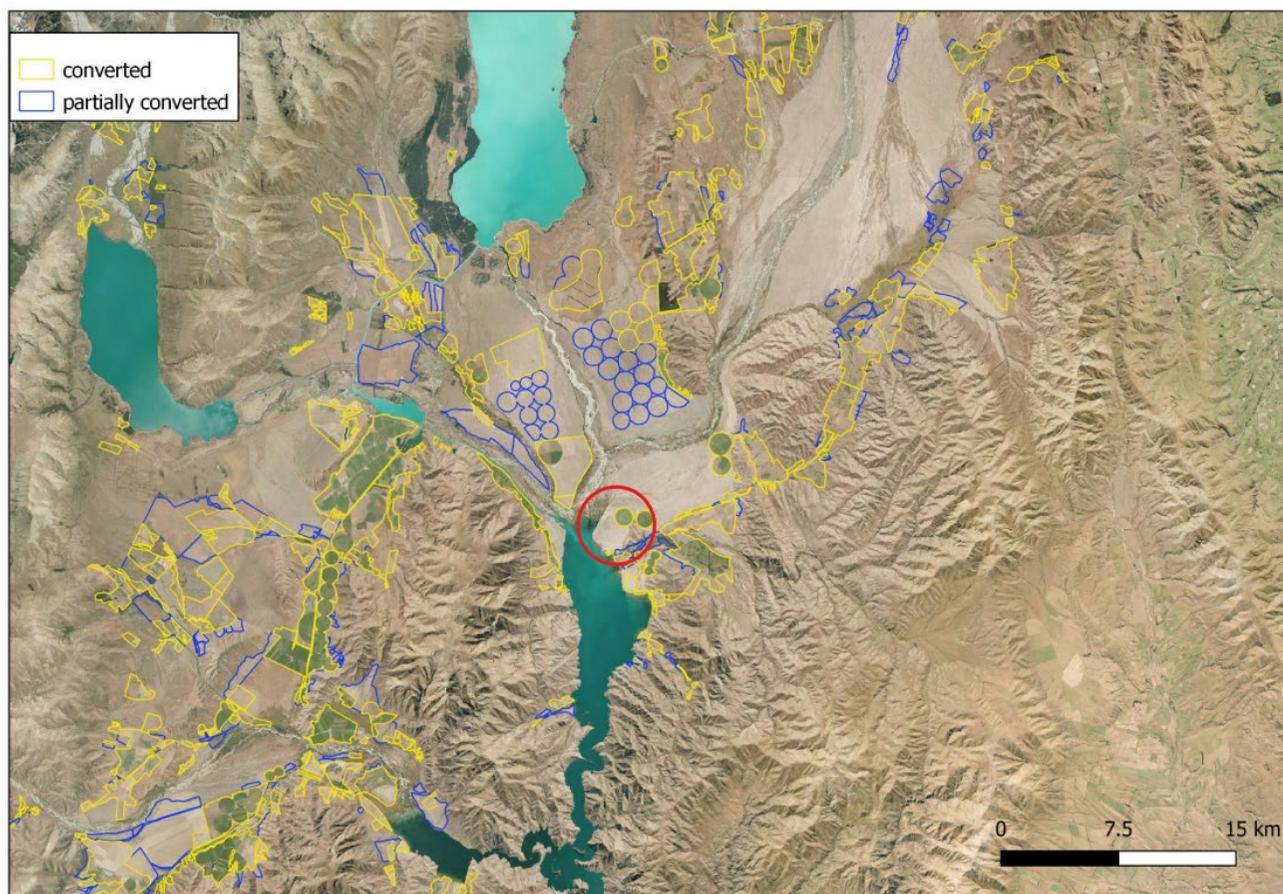
98. Alternative locations for solar farm development should be considered. It has been suggested during the consideration of other solar developments in the Mackenzie Basin that areas of converted or partially converted land which meet definition of improved pasture, and canals or building surfaces might offer more appropriate locations for solar development in the Mackenzie as this would avoid the loss of significant indigenous vegetation and some habitats -albeit not address the potential risk of bird strike (**Attachment 1**)⁴⁴.

⁴⁴ See Harding, M. (2020). *Evidence – Attachment 3: Converted and Partially Converted Land, Mackenzie Basin*. Prepared for Mackenzie District Council, Plan Change 18 Indigenous Biodiversity Hearing available at: [District Plan Changes and Consultation | Mackenzie District Council](#); and Walker, S. (2023, July 26). *Statement of evidence of Dr Susan Walker on behalf of the Mackenzie Guardians*. Evidence submitted to the Hearings Panel for applications CRC224567, CRC230898 (Environment Canterbury) & RM220048 (Mackenzie District Council) by A. W. & K. F. Simpson, 397 Braemar Road, Balmoral Station, Lake Tekapo, available at <https://api.ecan.govt.nz/TrimPublicAPI/documents/download/4950304>.

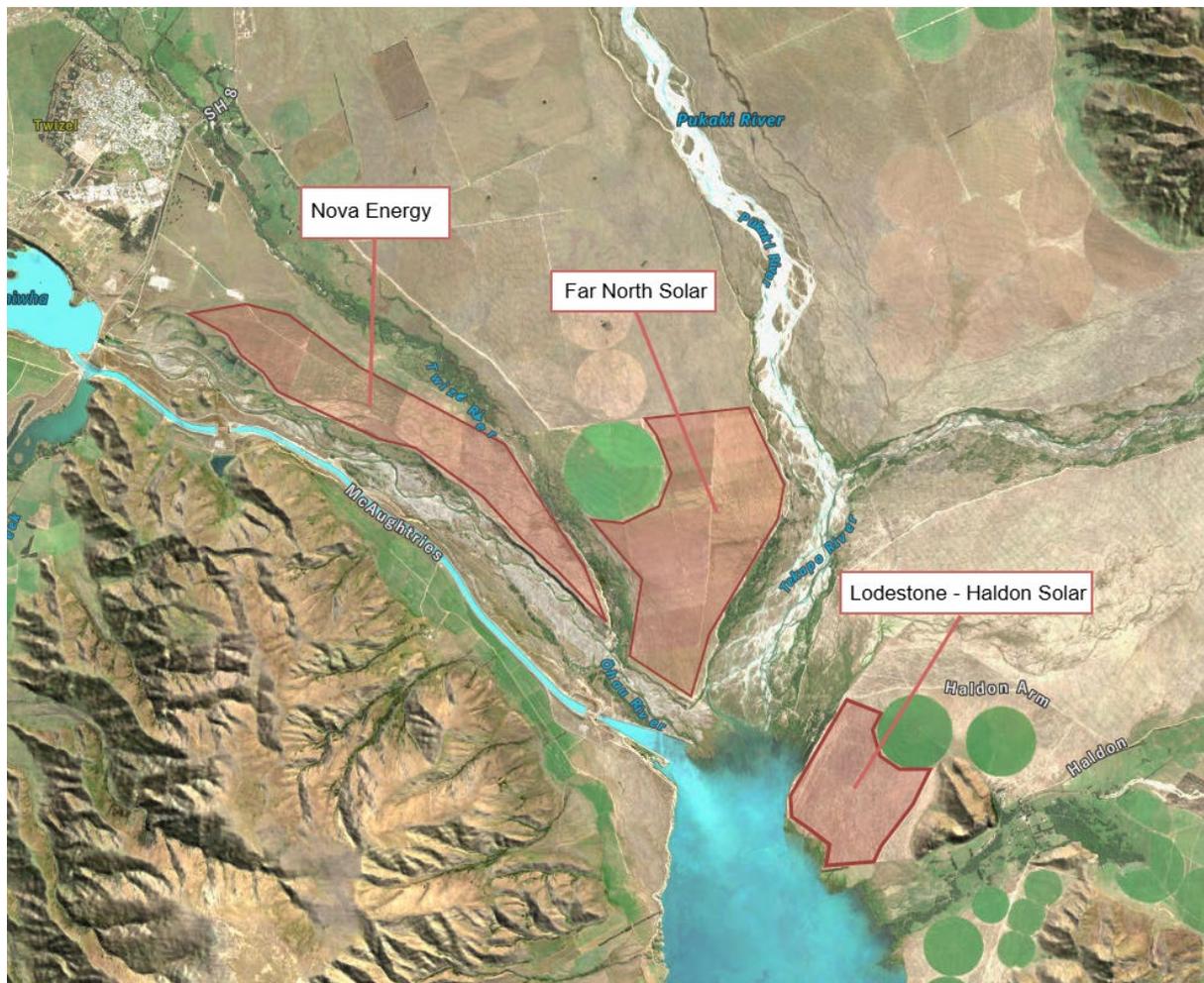
99. Proposed conditions relating to the management and monitoring of potential effects require the development of detailed plans and these should be reviewed by suitably qualified and experienced persons.

Attachment 1: Map below from Harding, M. (2020). Evidence – Attachment 3: Converted and Partially Converted Land, Mackenzie Basin. Prepared for Mackenzie District Council, Plan Change 18 Indigenous Biodiversity Hearing. Page 2 of 2. Available at https://www.mackenzie.govt.nz/_data/assets/pdf_file/0010/516655/Harding-Attachment-3.pdf The general location of the proposed site is circled in red (my annotation).

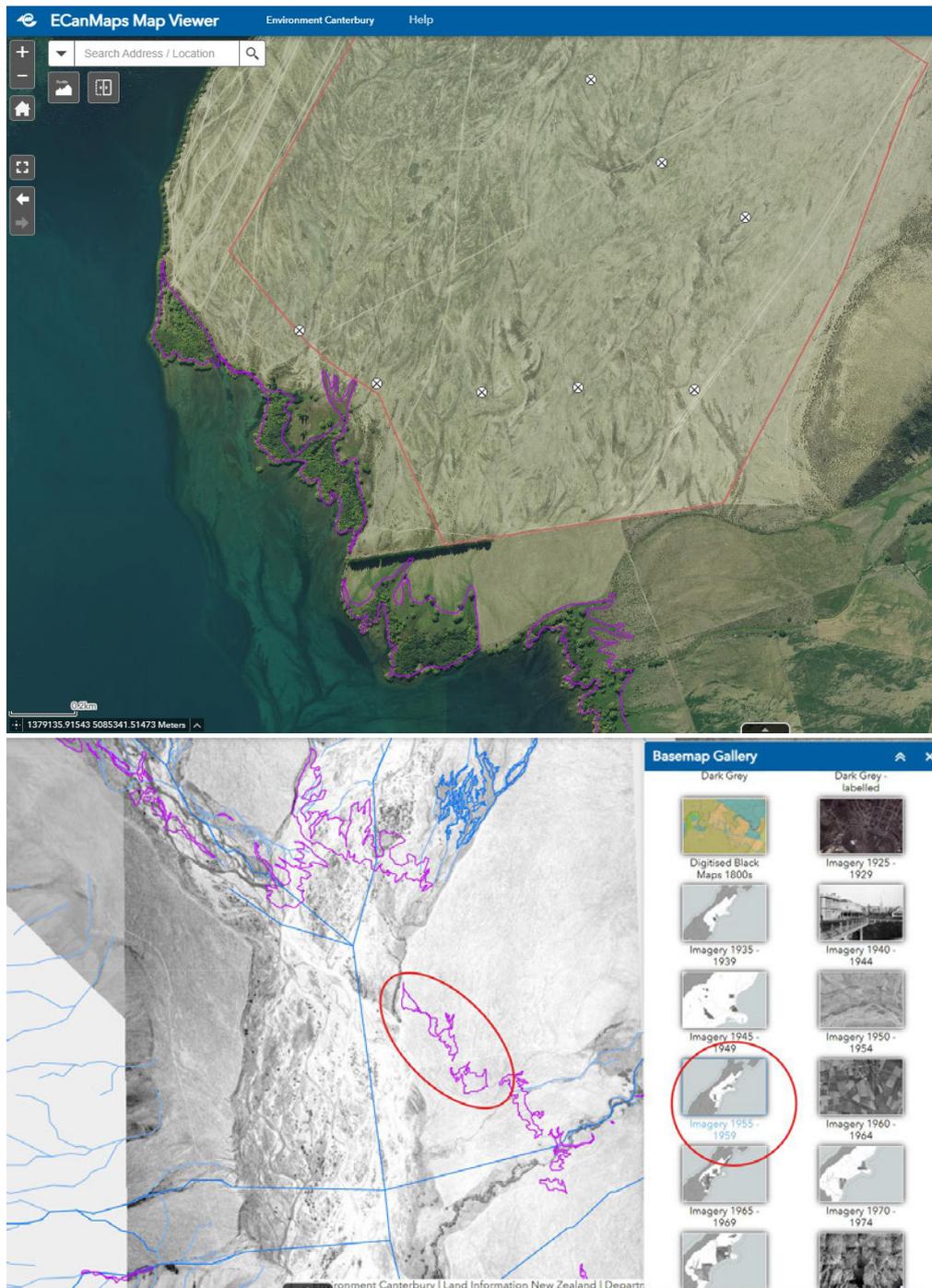
Mackenzie Basin South (1:200,000)



Attachment 2: Context of proposal with other nearby solar farm proposals Nova Energy and Far North Solar



Attachment 3: Indicatively mapped wetland extents adjacent to the proposal. Upper image shows the extent currently mapped by Environment Canterbury lying just outside the proposed footprint. Extents would not be considered to be natural inland wetland under the NPS-FM due to being induced by the construction of Lake Benmore (lower image shows the area was contiguous inland outwash gravels prior to construction). However, the area may provide habitat to indigenous fauna, offering suitable complexity of habitat to terrestrial species including invertebrates and lizards.



Attachment 4: Flight heat map of black fronted tern from Gurney (2022). The proposed solar farms occur directly under the hot spot of tern activity to the east, where the species is known to roost during evenings at the Tekapo Delta of Lake Benmore. I recommend that further consultation be undertaken with the Department of Conservation, particularly with their technical science advisors and ornithologists, to ensure the decision maker is fully informed of the potential effects on freshwater avifauna and appropriate management measures.

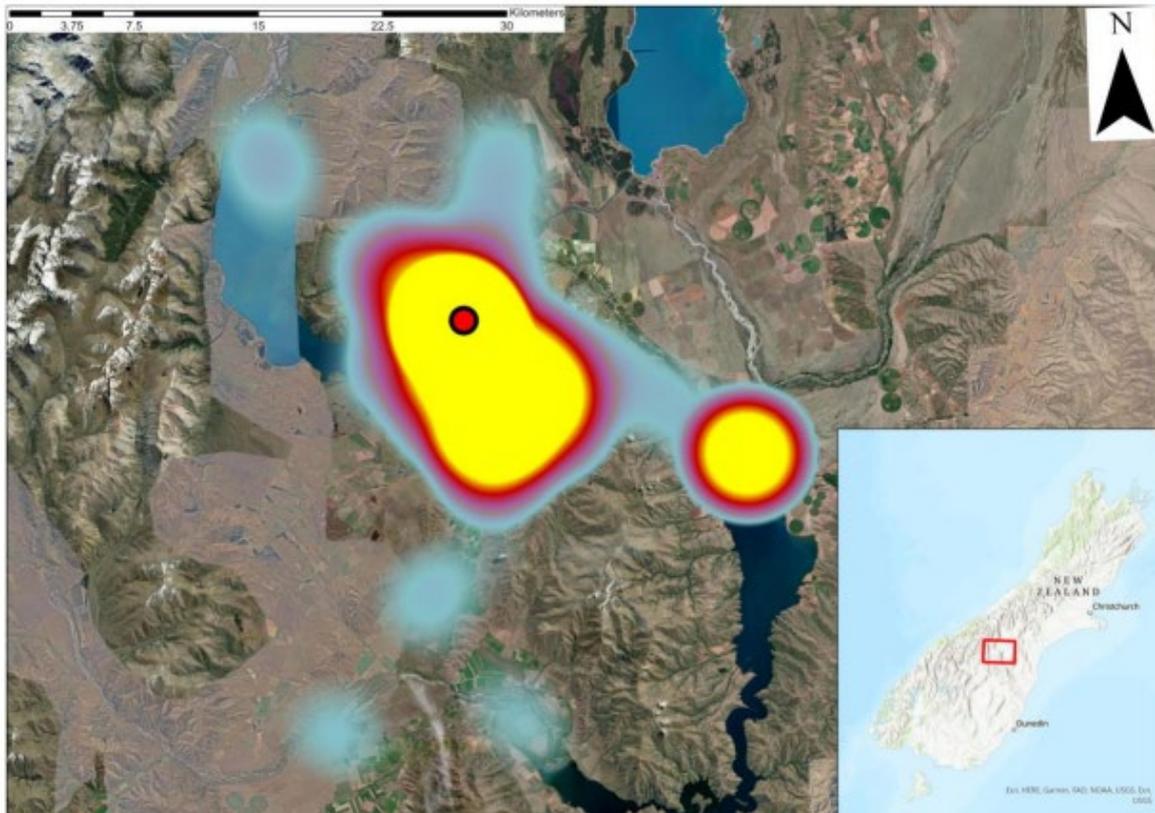


Figure 13: Heat map showing the density of GPS points from black-fronted terns from the Ohau Colony. The colours indicating density go from blue through to yellow, with blue being low density and yellow high density. The solid red circle is the Ohau colony, the right hand yellow cluster of high density GPS points is the roost at the Tekapo delta. Created in ArcGIS Pro.

Attachment 5: Consideration of lizard species potentially occurring at the site.

Common Name	Scientific Name	Threat Classification	Habitat Preference	Distance of closest record from the site	Likelihood of Presence on Site
McCann's skink	<i>Oligosoma maccanni</i>	Not Threatened	Open habitats – dry rocky environments such as rock outcrops and montane grassland.	3km	Likely: may be found in areas with dense grass.
Southern grass skink	<i>Oligosoma</i> aff. <i>polychroma</i> Clade 5	At Risk – Declining	Prefers damp or well vegetated habitats such as rank grasslands, wetlands, stream/river edges, and gullies. Widespread from Banks Peninsula to Stewart Island.	10km	Possible: may be found in areas with dense grass.
Southern Alps gecko	<i>Woodworthia</i> "Southern Alps"	At Risk – Declining	Rocky scrubland, talus, boulderfield, scree, stony river terraces and creviced rock outcrops (from lowland and montane valleys to alpine areas, <1,900 m).	2.5km	Possible: may be found in areas with dense grass and stoney substrates.
Jewelled gecko	<i>Naultinus gemmeus</i>	At Risk – Declining	Scrubland, forest and tussockland. Often trees and shrubs like beech, mānuka, kānuka, mingimingi, matagouri, snow tussock and other dense vegetation.	2.5km	Unlikely: little appropriate habitat (indigenous shrubland) appears on-site.
Scree skink	<i>Oligosoma waimatense</i>	Threatened – Nationally Vulnerable	Creviced rock bluffs, alluvial outwash plains, dry river cobbles and terraces, talus slopes, boulderfield and scree (from lowland to alpine areas, ≤1,500 m).	2.5km	Possible: potential habitat (tussock grassland, rock piles, low woody vegetation) at S & E edge of site.
Lakes skink	<i>Oligosoma</i> aff. <i>chloronoton</i> "West Otago"	Threatened – Nationally Vulnerable	Scrubland, tussockland, rocky areas, scree, herbfield, fellfield, stony riverbeds and terraces.	2.5km	Possible: potential habitat (tussock grassland, rock piles, low woody vegetation) at south and east edge of site. Although known south of Pukaki River, possibly occurs elsewhere.

Mackenzie skink	<i>Oligosoma prasinum</i>	Threatened – Nationally Vulnerable	Open grassy areas, rocky river terraces and tussock grasslands, scree, rock piles and fellfield habitats.	15km	Possible: potential habitat (open grassy areas, tussock, rock piles) available at south and east edge of site.
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Attachment 6: Potential faunal habitats for lizards & invertebrates for which further survey effort is recommended (yellow highlight). Also shown: the approximate boundary of proposed solar array project footprint (red outline) and locations of the ten avifauna and lizard survey points of the Ecology Report (black-white cross). Much of the potential habitat lies outside the proposed footprint. It is recommended potential habitat is surveyed and or potential habitat is avoided, including the active exclusion of the areas from any construction activities.



Land Information New Zealand, Environment Canterbury, Environment Canterbury Waikaiti B/C, LINZ

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	26 Jan 2026
To	Jeremy Ecker, Consent Planner, Environment Canterbury
From	Dr Barbara I.P. Barratt, Emeritus Principal Scientist, Bioeconomy Science Institute
Project advice provided for	Haldon Solar Farm proposal – Loadstone Energy Ltd.
Documents referred to	<p><u>Reports:</u></p> <p>Lodestone Energy 2025. Draft Invertebrate Survey Methodology – Haldon Solar Farm 7 Nov 2025</p> <p>Jack, J. 2025. Review of proposed study methodology – Ecological Survey and assessment for Lodestone Energy Lyd – Haldon Solar Project, Environment Canterbury, 11 Nov 2025</p> <p>AgScience Ltd. 2025. Haldon Solar Project: Ecological Impact Assessment, 31 July 2025</p> <p>SLR Consulting New Zealand Limited. Terrestrial Invertebrate Assessment: Haldon Solar Farm. Report for Lodestone Energy Ltd.: SLR Consulting New Zealand Limited; 2026 20 Jan 2026. Contract No.: SLR Project No. 875.01640.00001.</p> <p><u>Other publications:</u></p> <p>Jeala C, Perolda V, Seymoura CL, Ralston-Patonc S, Ryan PG. Utility-scale solar energy facilities – Effects on invertebrates in an arid environment. <i>Journal of Arid Environments</i>. 2019;168:1-8.</p> <p>Zitzmann F, Stern M, Schmidt M, Schirmel J. Carabid beetles in solar parks: assemblages under solar panels are severely impoverished compared to gaps between panel rows and edge areas. <i>Journal of Insect Conservation</i>. 2024;28:763–76</p> <p>Wang Y, Cheng Y, Ban L, Yin X, Wei S, Sun W, et al. Insect community diversity in photovoltaic power station and its response to environmental factors. <i>Biology</i>. 2025;14(1388).</p> <p>Lec'hvien A, Bienvenu L, Isselin-Nondedeu F, Bischoff A, Gros R, Schatz B. Effects of solar panels and management on pollinators and their interactions with plants in Southern French solar parks. <i>Biological Conservation</i>. 2025;307(111209).</p>

Introduction/Summary

1. I have provided advice throughout this project (from pre-application discussions) and have been involved in the following technical discussions:

I have provided no advice pre-application.

Table 1

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
Dr Jean Jack (JJ) (ECan) 8 Nov 25	JJ approached BIPB about the proposal	JJ explained the proposal, scope and timelines	Yes, BIPB agreed to advise on survey methods and then to review the report of the invertebrate survey
Dr Jean Jack 10-11 Nov 25	Study methodology	JJ provided BIPB with the 'Draft Invertebrate Survey Methodology' document for review and comment.	Yes, BIPB gave feedback and provided references to relevant literature to assist in determining best sampling methods.
Dr Jean Jack 13 Nov 25	Plan for site visit	Arrangements made to visit Haldon Station, inspect the site and recommend areas for invertebrate sampling	Yes, BIPB agreed to visit the site on 20 Nov 25
Dr Jean Jack and others 20 Nov 25	Site visit	BIPB visited the site and inspected the environment by foot and driving with JJ, and herpetologist Mandy Tocher. Conditions were clear and became windy later in the day. We were accompanied during the inspection by one of the Lodestone staff. Some invertebrates observed during the visit were photographed and uploaded to iNaturalist. Of particular note was a population of the minute grasshopper, <i>Sigaus minutus</i> .	Yes, after the inspection, BIPB indicated to JJ on the site map the 4 areas that would be best to focus on for the invertebrate sampling. Recommended pitfall trapping and Malaise trap sampling over at least a one-week period.

ECan administrator 15 Dec 25	Contract discussed	Purchase order received by BIPB to undertake the RMA261235 - Lodestone Energy Ltd Review by 26 Jan 2026	Yes, conditions agreed
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Missing information – pre application advice and substantive check

2. The following information is needed to fully understand the proposal/effects of the proposal:
 - a. Presence, distribution and abundance of invertebrates at the proposed Lodestone Solar Farm (LSF) site (Haldon Station), particularly those that are recorded as being threatened, at risk, or declining as defined in the NZ Threat Classification System (NZTCS).
 - b. Environmental disturbance that will occur as a result of vehicle movements, pile driving, soil disturbance, roading, foreign materials imported to the site etc. so that likely impact on invertebrates can be evaluated.
 - c. Information on the reduction of sunlight (shading) to the ground and obstruction of precipitation that will be caused by the presence of the completed LSF so that the likely impact on threatened invertebrates and the invertebrate communities in general, can be assessed.
 - d. Source of soil and other materials (potential contaminants, seed and organisms etc.) being brought onto the site as part of the construction process. Efforts made to minimise impacts from imported materials needs to be outlined.
 - e. Presence of native plants that might be necessary for the survival of endemic invertebrates needs to be investigated.

Summary of effects

3. There are a number of outstanding issues, specifically:
 - a. Point 2d above has not been addressed to my knowledge.

Agreement with the applicant

4. Of particular note:
 - a. I agree with the applicant’s *Terrestrial Invertebrate Assessment* that there will unavoidably be impacts on invertebrates and their habitat from the construction of the LSF including mortality from vehicle movements, soil disturbance etc.
 - b. I agree that operation effects that will occur post-construction will eventuate as a result of shading and the consequence of this on soil and surface moisture

and temperature. This is likely to change the plant species composition that will impact invertebrate species in a variety of ways that will be hard to predict.

- c. I agree that the avoidance and minimisation options mentioned in the *Terrestrial Invertebrate Assessment* are unlikely to be acceptable to the applicant, and that any offsetting/compensation will also either be unacceptable to Lodestone Energy or will require significant effort to achieve, e.g. to avoid net loss of significant biodiversity values.
- d. I support the suggestion in the SLR *Terrestrial Invertebrate Assessment* that research projects carried out before and after solar panel installation would be highly beneficial. On this note I agree with the conclusion of the SLR report (page 20) that there is uncertainty on the effects of the LSF because of the lack of research on their impact and because none have previously been constructed in the Mackenzie Basin, a unique dryland environment.

5. I do wish to make the following comments:

- a. The SLR assessment notes that there is no existing research on the effects of solar farms on NZ invertebrates. I concur that this appears to be the case. However, there is a body of evidence from published research undertaken overseas, some of which is likely to be quite relevant to this proposal. For example, a recent study in China and showed that insect abundance and diversity was reduced under solar panels (Wang et al. 2025) and in an arid area in South Africa, there was an altered community composition of ground-dwelling invertebrates inside solar farm installations compared with surrounding rangeland (Jeal et al. 2019). A French study showed that the number of pollinators and plant-pollinator interactions was reduced under solar panels in pasture (Lec'hvien et al. 20254). A comprehensive literature review might be useful to fully comprehend the extent and nature of impacts of solar farms on invertebrate biodiversity and abundance and if/how these impacts have been managed, and an evaluation of how they might be applied to this LSF proposal.
- b. The discovery of *Sigaus robustus* (robust grasshopper) at the site was very significant since this is 'Nationally Endangered' and is protected under the Wildlife Act 1953. This means that a permit from DOC would be required to kill or catch or move specimens.
- c. The SLR *Terrestrial Invertebrate Assessment* listed 92 invertebrate taxa recorded of which 2 are 'nationally endangered', 1 is 'nationally vulnerable' and 2 are 'At risk-Declining'. Given that this was a survey carried out:

- i. in a very short time frame
- ii. with insufficient time for all taxa found to be fully identified to species
- iii. undertaken only at one time of year
- iv. focussed only on ground-dwelling species,

I interpret these findings as being significant, and suggestive of an environment that has appreciable invertebrate values.

Benefits of the project

6. There are no specific benefits that I am aware of with respect to my area of expertise. However, in general, the project might potentially prevent other forms of land management from taking place at the Haldon Station that might have an even greater impact on invertebrates than the LSF.

Outstanding areas of contention and significance of these.

Outstanding areas of contention

- 7
 - a. The importation of aggregate/fill to the site creates a risk that unwanted chemicals/toxins/seed and other animal and plants could be introduced to the site. This requires mitigation.
 - b. I believe that given the time frame for the evaluation SLR have undertaken a thorough assessment and added considerably to the earlier AgScience Ltd. ecological impact assessment (conducted at a similar time of year), which while it did not focus on invertebrates, did assert that *Sigaus minutus* was not present at the site. This is clearly not the case since I saw several specimens during my site visit on 20 Nov 2025, and furthermore almost 100 were found by the SLR ecologists while walking the transects across the site. This suggests that there is a substantial population of *S. minutus* at this site.
 - c. A minor area of contention is that the SLR report (pages 8-9) notes that *S. minutus* r numbers were lower where there was cover of hawkweed and briar and higher where cover was lichens/moss/herbs/*Raoulia* and exposed gravels and soils. Reference to the data in Table 5 would indicate to me that the differences in those numbers were very small and unlikely to be significant. However, the report does not make any further assertions or conclusions on the basis of those data.

- d. A minor correction needed to the SLR assessment. The authors have used both the genus names *Sigauss* and *Brachaspis* for robust grasshopper in various parts of their report. It should be corrected to *Sigauss robustus*.

Significance of these matters

- i. The issue of imported aggregate/fill to the site during construction is significant. Depending upon the source of these materials it is possible that seeds of invasive weed species, or any species currently not present at the site could change the botanical composition of the vegetation possibly replacing species which some invertebrates might depend upon. The imported material might also contain invertebrates or other organisms that again might present a risk to the fauna. The other matters raised are not highly significant.

Solutions and/or comments on conditions

- ii. Issue: A number of threatened invertebrate species are present at the LSF site which will undoubtedly be negatively impacted by the installation and presence of the solar farm.

Solutions:

- a. Avoidance - not go ahead with the solar farm. This is the only complete solution, is not in itself onerous, and will manage the issue.
 - b. Minimisation - reduce the size of the solar farm to retain areas where threatened invertebrates are known to be present. Comparative assessments should be undertaken to monitor presence and abundance of selected species and assess impact of solar panels. This might pose practical challenges, and assessments will need to be funded but would not be onerous. This is a partial solution and will partially manage the issue.
 - c. Offset/compensation – find area suitable for a reserve for some of the species at risk at the LSF site. This is a partial solution, probably onerous, and possibly unsuccessful and may not manage the issue.
 - d. Offset/compensation – not a solution at all - go ahead with the project on the condition that a research program is established at the outset to investigate the ecological impact of this solar farm project in this environment. This will not manage the issue, but will inform future similar projects, will not be onerous but will require adequate funding.
- iii. I have reviewed proffered conditions, and note the following:
 - a. I am unaware of any proffered conditions in relation to invertebrates.

Attachment 3: Review of Applicant’s lizard report C26C/18821 by Dr Tocher.

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Date	25 January 2026
To	Jeremy Ecker, Consent Planner
From	Dr Mandy Tocher, Herpetologist <i>LizardExpertNZ</i>
Project advice provided for	Haldon Solar project – Lodestone Energy Ltd
Documents referred to	<ul style="list-style-type: none"> • Draft Lizard (Herpetofauna) Survey Methodology – Haldon Solar Farm, 5 November 2025. • Haldon Solar Project Ecological Impact Assessment, 31 July 2025. AgScience. • Lodestone Energy Limited Haldon Solar Project Application for Approvals Under the Fast-Track Approvals Act 2024, Mitchell Daysh, 29 August 2025 (Application and AEE). • Appendix 2 of the Application/AEE-Conditions for ECAN and Mackenzie District Council (MDC) dated 29 August 2025. • Appendix 12 of the Application/AEE- Engagement with ECAN pre-application and on Conditions. • Haldon Station Solar Farm: preliminary lizard assessment, 22 January 2026. Draft memo from Tony Payne, Blueprint Ecology Ltd.

Introduction/Summary

1. I have provided advice throughout this project from November 10th when first approached by Jean Jack, ECAN to assist. Since then, I have been involved in the following technical discussions:

Table 1

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
Dr Jean Jack, ECAN, November 12 2025	Proposed survey Methodology	I provided suggested edits/comments on the 5 November proposed survey methods. Advice was that the methods were ‘odd’ and almost certainly not put together by a herpetologist.	Yes, Tony Payne ultimately carried out the lizard survey using acceptable methods as detailed in his draft assessment memo.
Dr Peter Espie, during site visit	Likely lizard values of the solar array footprint;	Based on a cursory site visit, lizard values over the footprint appeared to	Yes, in that Lodestone had commissioned a

Expert and date of discussion	Subject	Summary	Matter resolved? Y/N
20 November 2025	possible mitigation measures	be low/absent. Lizard values near the footprint, however, were much higher e.g., the exotic grassland habitats near to the Lake and possibly the exposed rock under the pylons through the centre of the site. Should lizards be found, obvious mitigation actions should be focussed within the lake-side grassland/shrubland habitats where lizards were easily detected, as well as on-site mitigation e.g., in the Pylon corridor.	lizard survey and Tony Payne was beginning this while the site visit was being undertaken.
Jeremy Ecker, ECAN 5-13 th January 2026	Scope of advice/consents triggered	Two emails were sent to me Jan 5 th 2026 relating to ECAN scope of advice and a second email Jan 13 th , 2026, relating to MDC advice.	Yes, in part: consents triggered under the Regional and District plans were provided by ECAN via email.

Missing information – pre application advice and substantive check

2. The following information is needed to fully understand the proposal/effects of the proposal:
 - I. No lizard-specific engagement was carried out pre-application.
 - II. As I understand it, a lizard survey was requested by ECAN (Jean Jack) prior to my involvement. Results of the lizard survey are absent and represent a critical information gap.
 - III. Further information is needed on which, if any, parts of the solar project footprint are already rabbit fenced and what level, if any, existing rabbit control is undertaken (additionality principle of best-practice compensation).
 - IV. Further information is required on what pest control is planned inside the rabbit exclusion fence; for example, the MDC conditions limit control to only rabbits.

Summary of effects

3. There are a number of outstanding issues, specifically:

- I. No effects assessment has been provided in the draft lizard assessment memo as results of the lizard survey are pending.
 - II. The actual extent of lizard habitat is not known but is estimated to be *ca.* 1 ha spread across 30 sites.
 - III. The number of lizard species affected is not known but the Applicant considers only McCann's skink [not threatened] will occur over the solar project footprint.
 - IV. The significance of lizard habitats over the solar project footprint is not known.
 - V. The number of individuals affected over the solar project footprint is not known but is estimated to be "low numbers".
4. Agreement with the applicant
- I. I agree McCann's skink is most likely to be the only species present over the solar project footprint, and in relatively low numbers over small areas of fragmented habitat. The extent of habitats, however, is unknown and contingent on the results of the lizard survey (not provided). Also, the presence of Southern Alps gecko and/or Southern grass skink (both At Risk – Declining) also cannot be determined until the lizard survey is complete.
5. I do wish to make the following comments:
- I. The lizard assessment asserts that habitat has been removed from the site by *"Farm practices such as top dressing, tilling, and attempts to convert the land to pasture has been highly destructive to the ecosystem, including habitats for native lizards. The site has largely had rocks, debris and long vegetation removed, and now it lacks the cover needed for lizards to persist in the environment"*. I am not sure this is correct insofar as it relates to rock habitat being removed. Instead, wind-blown sediment has covered much rock over the site.

Benefits of the project

6. There are no specific benefits with respect to my area of expertise unless the final lizard assessment contains actions to avoid, remedy, mitigate or compensate for any lizard-related effects that result in a *net gain in habitat or lizard individuals of the site.*
7. Neither the AEE, EclA nor the draft lizard assessment proposes any lizard-related 'mitigation' actions. I note, however, that the AEE in Section 6.5. 'Ecology' proposes a rabbit proof fence over the solar project footprint that may over the long term provide cover for lizards to move into the site and reduce prey for lizard predators. The rabbit exclusion fence is touted in the AEE as a positive effect for vegetation. Part of the solar

project footprint, as I understand it, was already rabbit proofed meaning this proposed action is only partially additional.

8. Pest control (unspecified in the Substantive Application but restricted to rabbits in the Conditions proffered to MDC) is also planned, However, in the absence of pest monitoring, pest control may yield unexpected outcomes to lizards e.g., an increase in lower-order lizard predators (rats, mice and weasels).

Outstanding areas of contention and significance of these.

9. None at present but awaiting substantive information on lizard values and proposed mitigation following the completion of the lizard survey.
10. Potential contention regarding the positive effects of the proposed rabbit fence and pest control proffered in conditions, and debate about how additional the fence actually is.

Significance of these matters

11. The proposal cannot be assessed in term of lizard effects until the lizard survey results have been provided, along with proposed mitigation measures. Monitoring of pests inside the rabbit exclusion fence maybe required. Further

Solutions and/or comments on conditions

12. I have reviewed proffered conditions in s, and note the following:
 - I. No lizard-related conditions have been proffered in the substantive application as they await completion of the lizard survey. I note MDC 'ecology and landscape' conditions are covered in Appendix 12 of the application (Conditions 27-32).

Appendix 4: CRC Technical Advice- Groundwater

From: Kate Bailue – Canterbury Regional Council Groundwater Resources Senior Scientist

Table 1. Technical Advice Summary				
Technical Team	Canterbury Regional Council technical expert considers all expected technical reports are provided	Canterbury Regional Council technical expert has identified gaps in the provided technical reports	Canterbury Regional Council technical expert considers the conditions are appropriate	Comments (Key Findings & Concerns) [Consent Planner clarifying comments]
Consent Planning	Yes – All required consents applied for.			Assessments against CRPS and LWRP
Groundwater (quantity)	Yes – AEE provides a basic description of groundwater, but it lacks a specific discussion on the effects of the proposed activities on groundwater.	No onsite assessment of onsite groundwater levels. Desktop analysis only using CRC’s existing wells, which are not located in optimal locations. No detailed Geotech assessment Dewatering may be required to lay cables.	The applicant classifies the dewatering as a permitted activity (Rule 5.119). This is likely the case, but there are a few areas that are not completely covered off. <ul style="list-style-type: none"> - Are the excavations outside the HAIL? - What is the expected dewatering rate given the sub-surface conditions? - Can the discharge meet LWRP TSS limits? - How close to Lake Benmore will the dewatering occur? 	The application lacks detail on the nature of the earthworks. The applicant has mentioned that groundwater may be intercepted as cables are buried 2.5 m below ground level. Therefore, minor dewatering may be required. There is a lack of detail around the scale of the dewatering required. Operational stormwater will have stormwater soakage pits for associated buildings. There is no detail on the design to determine if they

			<p>Excavations over aquifers <i>Relevant conditions</i></p> <ul style="list-style-type: none"> - Accidental Artesian Aquifer Interception 	<p><i>will intersect groundwater.</i></p> <p><i>The aquifer is considered unconfined or semi-confined and therefore unlikely to intercept artesian aquifer conditions.</i></p>
Groundwater (quality)	<p><i>Yes – AEE provides a basic description of groundwater, but it lacks a specific discussion on the effects of the proposed activities on groundwater.</i></p>	<p><i>No onsite assessment of groundwater quality to establish baseline groundwater quality.</i></p>	<p>Construction phase stormwater (to land) <i>Relevant proposed conditions</i></p> <ul style="list-style-type: none"> - ESCP plan - Spill management - <i>Visual monitoring of the discharge for contaminants (oil or grease)</i> - <i>Disturbed areas stabilised and/or re-vegetated</i> <p>Excavations over aquifers <i>Relevant conditions</i></p> <ul style="list-style-type: none"> - ESCP plan - Accidental discovery of contaminants - Spill management <p>Operational phase stormwater (to land) <i>Relevant proposed conditions:</i></p> <ul style="list-style-type: none"> - <i>Stormwater management plan including details of Soil monitoring</i> 	<p>Unsure if excavations are potentially over HAIL (landfill site)</p> <p>No details on the expected contaminants in the operational stormwater discharge. Particularly near the substation and buildings.</p> <p>Galvanised steel piles will be installed from 1.5 to 3 m below ground level. Shallow groundwater can be as high as ground level. There is a long-term risk of zinc potentially leaching to groundwater from the galvanised steel piles. Any contaminants that find their way to groundwater are likely to flow to</p>

			(soil health, metals, PFAS) - Spill management - ESCP plan	Lake Benmore. The risk would depend on the nature of the galvanised steel piles and the number. Maintenance schedule of the solar panels. Any cleaning detergents proposed?
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Appendix 5: CRC Technical Advice- Natural Hazards Science

From: Oliver Hermans – Canterbury Regional Council Natural Hazards Scientist

From: Oliver Hermans [REDACTED]

Sent: Friday, 23 January 2026 10:32 am

To: Jeremy Ecker <[REDACTED]>

Subject: Re: Haldon Solar s53 Comments - Fast-track request due 26 Jan 2026 - RMA261235

Hi Jeremy,

Assuming that nothing has changed from what they presented last time around (and it doesn't sound like it has changed looking at the flood assessment). The comments I made regarding flood risk remain current and accurate. As an aside I would imagine that the bigger hazard is likely to be high winds rather than flooding, but I've got no real basis for that. Again the main concern would be off site effects, but considering the location I don't imagine that this will be a significant concern in this instance.

Let me know if you need something more from that.

Regards,

Oliver

- As such the comments made during the s46 stage remain valid, I have reproduced these below.

From: Oliver Hermans [REDACTED]
Sent: Friday, 12 September 2025 10:37 am
To: Reuben Herz-Edinger [REDACTED]
Subject: Re: Fast-Track Request - Lodestone Energy lodgement 3/9/25 - RMA251941

I'd be pretty comfortable if they're going to put culverts in. If that's what they're doing then culvert size would be good to know. If they're not doing that then realistically so long as they're not going to be filling the swales in I think the biggest issue they'd face is scouring of the roads if the flows get going at a decent clip. Which is going to be more of their issue than anything else.

In a more general sense, my biggest concern with something like this would be potential for off site effects, but accounting for the topography and location the odds of the neighbouring properties being affected are pretty minimal.

From: Reuben Herz-Edinger [REDACTED]
Sent: 12 September 2025 10:31 AM
To: Oliver Hermans [REDACTED]
Subject: RE: Fast-Track Request - Lodestone Energy lodgement 3/9/25 - RMA251941

Hey Oliver,

All good, thanks for getting back so fast!

The only thing I'd note is that they will be constructing criss-cross roads at the site (see site layout p.70/181 of application doc - C25C/214331-3), including around the easter/northern perimeters.

Would they need further comment on the roading impacting flow paths, or perhaps would culverts solve that issue if they proposed them?

Many thanks,
Reuben

From: Oliver Hermans [REDACTED]
Sent: Friday, 12 September 2025 9:24 am
To: Reuben Herz-Edinger [REDACTED]
Subject: Re: Fast-Track Request - Lodestone Energy lodgement 3/9/25 - RMA251941

Hi Reuben,

Apologies on the delay on getting back to you, there's been a lot of stuff that's come in over the last few weeks and its proving tricky to stay on top of everything.

We have not carried out an investigation in this area and hold no information specific to this location.

- Do you think the 450-year ARI is appropriate to use for the substation freeboard level?
I am unaware of any required standard as far as substation elevation. The 450 ARI appears to be a measure adopted by Transpower rather than any specific requirement. In saying that as per the modelling supplied by the and our own observations in the area

generally flood waters can be expected to be predominantly confined to the overland flow paths in the area for most events. As flood size increases, the risk of flood waters reaching ground of more average height increases, however the 300 mm elevation reduces the likelihood of such flows impacting the substation. When looking at the area, due to its wide, and relatively flat topography, water will spread out and it is unlikely that depths will be significant enough to impact the substation.

- Do you think the 100-year ARI is appropriate to use for the solar array freeboard level? I am broadly in agreement that our knowledge of the area indicates that the modelling is correct in that the majority of flows will be confined to the swales/ channels. I am unaware of what if any standards are applied to infrastructure from a flood risk perspective, noting that the only controls I am aware of MDC imposing are with regard to residences (300 mm above the 500 year ARI flood). As it is unlikely that there are going to be residences at this locations such a standard is likely excessive.

300 mm allows for uncertainties in the modelling and any changes brought about by development of the site. Broadly I consider it appropriate, again noting that there does not seem to be any real requirement as far as elevation/ floor levels and based on the modelling flood waters are unlikely to breach the swales except in extreme circumstances so long as they are not altered/ blocked.

- Do you think the assessments provided are adequate to support this application, or would you have further questions that need to be answered?

The assessment looks to be robust and aligns with what we (Ecan) would note about the site. Again noting that Ecan itself has not undertaken an investigation itself into this area. Depths look to be relatively low and I consider it unlikely that even in larger events, a significant increase in water depth can be assumed. As stated above, I am unaware of any freeboard requirement for an activity of this type and from what I can tell the proposed freeboard is something that Transpower have implemented themselves.

So long as there are no significant alterations to the swales or actions to impede the flow of water through these swales I see no reason to think that the assessment is lacking or incomplete. I am satisfied that the location is not high hazard and as a result have no objections to the proposal or mitigation methods proposed.

Regards,

Oliver

Appendix 6: CRC Technical Advice- Contaminated Land

From: Hannah Mirabueno – Canterbury Regional Council Contaminated Land Senior Scientist

From: Hannah Mirabueno [REDACTED]
Sent: Tuesday, 27 January 2026 6:29 pm
To: Jeremy Ecker [REDACTED]
Cc: Reuben Herz-Edinger [REDACTED]
Subject: RE: Haldon Solar s53 Comments - Fast-track request due 26 Jan 2026 - RMA261235 - Check in with Contaminated Land

Hi Jeremy

Ideally, there should be a site walkover done to the application site as part of the preliminary site investigation. But in this report, the authors only relied on information from drone, aerial photographs and other information supplied by the owner. Whilst I do not expect that they will walk the entire site, I would have thought that the areas of interest would have been given a site check such as the landfill area. Where the landfill abuts into the application site, based on the figures in the PSI, earthworks during construction of road access would likely intersect the HAIL site. This was not included in the conceptual site model (CSM) presented in the PSI report. Thus, I do not think that the conceptual site model (CSM) in the PSI report has completely identified all the potential risks from the solar farm establishment.

Because the extent of the landfill has not been physically confirmed, I suggest for the inclusion of a condition around the requirement for management plan during construction phase to cover the risks should earthworks intersect the landfill. Additionally, I also would recommend that they have discovery protocol if unknown contamination is encountered during construction phase.

They have found potential HAIL in the pylon alignment, but they are prohibited by the NES on transmission lines to do any earthworks. In fact, they exclude the pylon areas therefore I expect the potential risk of mobilising contamination in these areas would be low.

I agree that the potential risk from landfill gas is also low. Also, the risk is primarily a concern during earthworks under the Health and Safety at Work Regulations 2017 by WorkSafe, not by the regional council.

In my previous email on 12 September 2026, I have made some other comments. I am not sure if they responded to the other concerns I raised. I will send a copy of the email shortly after I send this email to you.

Regards

Hannah

- The below initial advice regarding some aspect of the PSI has been superseded with the Applicant providing a PSI report, however the other comments below are still relevant.

From: Hannah Mirabueno [REDACTED]
Sent: Friday, 12 September 2025 9:51 am
To: Reuben Herz-Edinger [REDACTED] Jean Jack
[REDACTED] Matt Riddle [REDACTED] Kate Bailue
[REDACTED] Rachel Tutty [REDACTED]
Cc: Anna Stewart <[REDACTED]> David Sluter <[REDACTED]>
Amanda Thompson <[REDACTED]> Daniel Clark [REDACTED]
Subject: RE: Fast-Track Request - Lodestone Energy DUE 12/9/25 - RMA251941

Hi Reuben

1. A landfill is noted adjacent to the application site. There is a possibility that the application site could encroach in the landfill footprint. Thus, the applicant has missed assessing the potential risk from the landfill that may impact the application site. The polygon for the landfill extent in the LLUR is indicative only. This can be addressed as a consent condition by requiring a preliminary site investigation (PSI) report. If a HAIL site is identified on the site by a PSI, a detailed site investigation, remedial action plan and site validation report could be required prior to start of works.
2. There was no assessment provided in terms of potential HAIL across the wider application site i.e. a preliminary site investigation that may be present in the application site. As there will be anticipated earthworks over a large area to prepare the site, including access roads, the construction of substation etc., there should be as a minimum an assessment of potential contamination/HAIL that may be present within the application site. While some assessment on HAIL has been made, it was highly reliant on the LLUR. However, the LLUR does not hold a complete record of activities that were undertaken on the site. It is only through a preliminary site investigation (PSI) that the potential for the presence or absence of HAIL sites can be ascertained. For a site that is adjacent to several rivers, it is important that the site is assessed for potential contamination prior to earthworks commencing on the site. I suggest the submission of a PSI report be part of the consent conditions. If HAIL site is identified on the site by a PSI, a detailed site investigation, remedial action plan and site validation report could be required. All investigation pertaining to contaminated land shall be undertaken by a suitably qualified and experienced practitioner (SQEP) in contaminated land. Can we please add this as a consent condition?
3. In the ESCP, it was mentioned that a substation platform and power stations will be constructed. This will involve the placement of 26,000m³ of imported fill. It was not assessed in the AEE or elsewhere what the composition of this fill material will be. I suggest requiring the fill to consist of cleanfill as per the definition in the Technical WasteMINZ Guideline (2023) or meeting the adopted values for Controlled fill in Table C-3 of the Technical WasteMINZ Guideline (2023).

UNCLASSIFIED

4. A Site Management Plan (SMP) is proposed that include a representative soil sampling regime to monitor for the potential discharge of any contaminants not authorised by this resource consent (Conditions 9 and 10 of Discharge permit – to discharge Operational Stormwater to Land).

There are also proposed conditions around soil monitoring in the land use consent (Consent conditions 22-26). Please seek clarification from the applicant of the intent to have two separate monitoring conditions.

5. For the purpose of monitoring the potential long-term effects to the soil from the activity (i.e. potentially contaminating the soil), conditions 22-26 in the land use consent have sufficiently included appropriate details such as soil monitoring parameters, distribution, frequency and reporting. I am happy with the approach that monitoring will be undertaken by a suitably qualified and experienced practitioner in soil health. The proposed conditions related to monitoring included target limits and some corresponding remedial action should the limits are exceeded. However, I would like to confirm that they will use the adopted values of Table C-3 for Controlled fills of the Technical Guideline for Disposal to Land (WasteMINZ, 2023). Please note that of the proposed analytes to be monitored only Cd, Cu, Pb and ZN have trigger concentrations. Please ask the applicant to provide trigger limits/concentrations in soil for silver, antimony and PFAS.

Contaminant	Trigger concentrations (mg per kg)
Cadmium	0.8
Copper	220
Lead	160
Zinc	190

6. Whilst there are some proposed corresponding remedial action for when exceedances occur, there are no clear remedial actions proposed. Thus, the applicant should provide a proposal for remedial actions that ECan can review and approve.
7. Should HAIL sites are identified, these sites may require remediation. remediated the SMP should also included mitigation and management measures on contaminated land to minimise discharges during construction phase.
8. This is a relatively big solar farm, so I expect substantial wastes to be generated. There is no information provided e.g. a plan for the end-of-life disposal of solar farm components. It may be included in the decommissioning management plan (DMP).
9. Proposed additional conditions for proper management of wastes:
 - End of life solar farm panels and any other associated wastes shall be taken to consented e-waste collection points or solar PV recycler, or if not recyclable should be disposed to a consented landfill whose waste acceptance criteria would be met.



Regards
Hannah

Appendix 7: CRC Technical Advice- Land Resources

From: Matthew Riddle – Canterbury Regional Council Land Resources Senior Scientist

Noting no further information was received from the Land Resources scientist before the deadline to provide the section 53 comments, as such as there is no further information from the Applicant on the matters addressed during the s46 stage regarding the Land Resources comments. As such I defer to their original comments as still being valid. Noting that the applicant has not provided confirmation if they will amend their proposed conditions to that suggested below.

From: Matt Riddle <[REDACTED]>
Sent: Friday, 12 September 2025 9:36 am
To: Reuben Herz-Edinger <[REDACTED]>
Cc: Hannah Mirabueno <[REDACTED]> Kate Bailue <[REDACTED]>
Subject: RE: Fast-Track Request - Lodestone Energy DUE 12/9/25 - RMA251941

Hi Reuben,
Here are my comments,
Cheers
Matt

- As mentioned in the AEE the soils are not Highly Productive Land (HPL), and the agricultural value of the site is relatively low in its current state. However, there are areas close by that do have centre pivot irrigation, which will increase productivity. Therefore, there is still value in this land and therefore rehabilitation post removal of the solar array structures is also important.
- I agree that due to the well-draining soils, there is low likelihood that there will be generation of significant runoff from the solar array area once the structures are installed and pasture species are established.
- There should be checks following re filling of trenches to make sure they have not sunken and created flow pathways which could result in surface runoff and erosion.
- During the construction phase, earthworks carried out could result in runoff due to soil compaction from heavy machinery. However, I consider the mitigations outlined in the erosion and sediment control plan (ESCP) are satisfactory to reduce the risk of runoff from most rainfall events.
- I consider stormwater production during the operational phase, not to be an issue for production of surface runoff.
- The suggested setback from Lake Benmore is a minimum of 200 m, this should be adequate for minimising risk of any construction phase and operational phase stormwater/sediment runoff reaching the lake. I would suggest that dense ground

vegetation is encouraged in this set back zone to maximise filtration of any surface runoff from the site.

- In the AEE it states that “*Lodestone Energy will ensure the disturbed ground is appropriately rehabilitated following the completion of the works*” It is also suggested that a decommissioning plan will be developed 12 months prior to the actual decommissioning. I would like to see a draft of what this plan would look like before consent is given, so there are no surprises when the actual plan is produced. Specifically, what is actually meant by restoration of disturbed land and what would that look like?
- Will there be any grazing on the site to control grass growth? Or how will the site be managed for long grass and therefore fire risk?
- Wind erosion is a potential for the site, however there is increased shading under the panels which may increase soil moisture and therefore plant growth during summer. Exposed soil will be prone to both wind and rainfall-based erosion and will therefore require planting with relevant species, be that native grasses or exotic, to stabilise the soil. There is mention that post cable trenching and for soil stabilisation in general, there will be revegetation through seeding and mulching or aggregate cover to reduce sediment generation. It would be good to get additional conditions around evaluating revegetation after a period of 2, 6, 12 months post completion of installation to make sure there is no bare soil from the excavations remaining over the site. It would also be prudent to maximise the drier periods of the year for when most excavation takes place.
- There is no mention of what will happen with the stripped fill from the substation earthworks etc. Will this be removed from site, stockpiled for the rehabilitation stage, or levelled out over the surrounding area? I would encourage it is left on site for future rehabilitation.
- The site is located right next to Lake Benmore which could indicate potential for any contaminants from the operational stage could potentially enter groundwater and then enter the lake, should there be connectivity there. This includes those contaminants to be analysed in soil, outlined in condition 23b.
- Consent condition 22-29 regarding soil monitoring is very thorough. I think this and the Stormwater Management Plan condition 9.c in the Discharge Permit – to Discharge Operational Phase Stormwater to Land could be joined together into one programme as follows:
 - a) An initial soil survey before commencing works on site as stated in conditions 22-29. The site could be divided into 3 sections (~110 ha each). 50 sub samples per section are taken at 0-7.5 cm and each section is bulked together and a sample analysed for:
 - i. pH
 - ii. Electrical Conductivity
 - iii. Silver
 - iv. Cadmium
 - v. Copper
 - vi. Lead
 - vii. Antimony

- viii. Zinc
 - ix. Per-fluorinated compounds (PFAs)
- (b) At 3 sub sites within each of the 3 sections, to a depth of 7.5 cm the following are analysed:
- i. bulk density
 - ii. aggregate stability
- (c) 5 years after installation repeat sampling as in (a) above.
- (d) At 10 years post installation repeat as in (a) above.
- (e) If values returned in (d) are below recommended limits, then extend sampling intervals to 10-year intervals.
- (f) If any values returned in (d) are above guideline limits, a **mitigation plan**¹ is required to reduce those concentrations which have exceeded the limits. Repeat sampling as for (c) at 5-year intervals.
- (g) At cessation of the consent period and before removal of the solar arrays, repeat the sampling outlined in (a). Once the site has been rehabilitated repeat the sampling in (b) to ensure a similar soil quality as at the start of the consent period.

Notes for mitigation plan¹:

-There is currently no mitigation plan if guideline soil concentrations are exceeded at any point during the consent duration. I suggest a general mitigation plan should be produced before consent is granted, outlining the procedures that will be followed, should any exceedances occur.

General notes for sampling:

- 5 and 10-yearly sampling should be undertaken directly under the driplines to determine if there is any contamination coming from the panels themselves.

- Sampling locations should be marked by GPS to allow for re sampling at the same locations at follow up visits.

- Condition 26 suggests that compliance should view the Soil Monitoring Plan 20 working days prior to the commencement of any physical works. I would like the Land Resources Team to be included in the list of teams to be required to view this plan.
- Condition 27 focuses on after the works are completed. I would like an additional condition that requires the consent holder to revisit the site after 6 months (or closest practical time) to ensure vegetation has established and there is canopy closure. If any slumping of soil in excavated areas has occurred, this should then be re filled.
- As the groundwater depth is uncertain and with potential for driven structural piles to intercept groundwater, there is risk that artificial macropores are created when driving these piles through stony soil. These pores are therefore an expressway for surface contaminants to get to groundwater. I would suggest that there are checks made to ensure the soil has sealed around the piles at the time of insertion and also after a period of 6 months post installation to check for any slumping of the soil recreating further macropores.
- Removal of the piles when site rehabilitation occurs at the conclusion of the consent period could also create large macropores as identified above. To prevent this, the pile holes should be re filled with soil sourced from the site and replaced at a bulk density that is as close as possible to that at the site's establishment.

Appendix 8: CRC Technical Advice- Policy Planning

From: Rachel Tutty– Canterbury Regional Council Planning Principal Planner

From: Rachel Tutty [REDACTED]

Sent: Monday, 19 January 2026 11:19 am

To: Reuben Herz-Edinger [REDACTED]

Cc: Amanda Thompson [REDACTED]

Subject: RE: Haldon Solar s53 Comments - Fast-track request due 26 Jan 2026 - RMA261235

Kia ora Reuben,

I hope you had a lovely break.

I have taken another look at this. For the most part, I am happy to stick with the s46 comments I made. There are a couple of changes I would like to make as a result of new information that has become available:

1. I note that a Preliminary Site Investigation (PSI) into contaminated and potentially contaminated land has been carried out and the resulting report supplied by the Applicant. As such I would like to remove my comments requesting that such an investigation be carried out.
2. I note that the ECan Natural Hazards team are happy with the Flood Hazard Assessment supplied by the Applicant. As such, I would like to remove my comments relating to the adequacy of that assessment.
3. I note that the vegetation assessment carried out by Mr Harding considers that the site meets the CRPS criteria for “Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna”. That assessment agrees with that of the CRC ecologist (Jean Jack) in her s46 comments. As a result, I would like to amend my s46 comments as out lined below to take that status into account

Applicant's assessment summary	CRC technical assessment summary	CRC Changes required/conditions sought to address CRC's comment
Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna		
<ul style="list-style-type: none"> The site has low ecological value (Ecological assessment supplied by the Applicant) 	<ul style="list-style-type: none"> Mr Harding's Vegetation Assessment and Ms Jack's (ECan) Land Ecology Technical Advice, both conclude that the site meets the CRPS criteria for Significant Indigenous Vegetation and Habitats. <p>RPS Objective 9.2.3 requires the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna</p> <p>RPS Policy 9.3.1. seeks the protection of significant natural areas and sets out the criteria for assessment that have been used by both Mr Harding and Ms Jack to determine that the site is a significant natural area. It also requires that areas identified as significant will be protected to</p>	<ul style="list-style-type: none"> Consent conditions need to ensure that significant indigenous vegetation is protected. Any impacts on significant vegetation should be avoided or mitigated. Residual effects should be offset where possible to ensure no net loss.

Applicant's assessment summary	CRC technical assessment summary	CRC Changes required/conditions sought to address CRC's comment
	<p>ensure no net loss of indigenous biodiversity or biodiversity values as a result of land use activities.</p> <ul style="list-style-type: none"> • The Mackenzie District Plan definition for Significant indigenous vegetation and significant habitats of indigenous fauna includes areas that meet the CRPS criteria. <p>MDP Rule REG-R7 classifies REG activities including associated clearance of indigenous vegetation within an area of significant vegetation as a discretionary activity</p>	

I hope this all makes sense. I'm happy to discuss.

Kind regards

- The below initial advice has been superseded in aspects relating to the PSI as the Applicant has since provided a PSI report, in addition to the flood modelling risk satisfied upon response of CRC Natural Hazard scientist. As well as the vegetation assessment carried out by Mr Harding confirming that site meets the CRPS criteria for “Significant Indigenous Vegetation and Significant Habitats of Indigenous Fauna”. however, the other comments not relating to these matters below are still relevant.

Response to questions:

1. Are all the technical reports we would expect to see for this sort of application have been provided by the applicant – if not, what is missing?
 - Cultural impact assessment
 - Liquefaction risk assessment
 - Ecological Management Plan
2. Are there any gaps in the technical reports that have been provided, and if so, what is missing?
 - There is no consideration of the cumulative effects of solar farm development in the area (Haldon, Twizel, The Point, Grampians). This should definitely be taken into account in transport and landscape assessments and when considering where workers will be accommodated. Of particular concern is the effects on State Highway 8 if construction is taking place concurrently at different sites, and impacts on Haldon Road if the Grampians and Haldon Solar farms are under construction simultaneously.
 - Little information has been provided on the current use of the site and whether the land will continue to be used for grazing once the solar array has been constructed. This lack of information makes it difficult to determine the effects of the proposal on the productive use of the land.
 - Unlike the proposals for other solar arrays in the area, no plans have been provided for any ecological restoration at the site. Restoration and enhancement of indigenous biodiversity, particularly in the margins of the adjacent waterbodies, would assist the project to comply with RPS objectives and policies.
3. If the technical report relies on sufficient or appropriate data/ investigation/ survey for your relevant area of expertise?
 - The flood hazard assessment supplied has not identified high hazard areas at the site using the 1 in 500 year flood event criteria required under the RPS and recommended by Canterbury Regional Council technical experts.
4. If the draft conditions are appropriate.
 - Do you have any concerns, please explain basis for those.

- Unlike the proposals for other solar arrays in the area, no plans have been provided for any ecological restoration at the site. Restoration and enhancement of indigenous biodiversity, particularly in the margins of the adjacent waterbodies, would assist the project to comply with RPS objectives and policies.
- o If only minor changes needed and you can suggest them, please do.
- Are there gaps in proposed mitigation management/ missing conditions to manage effects?

Summary

Table 1. Technical Advice Summary				
Technical Team	Canterbury Regional Council technical expert considers all expected technical reports are provided	Canterbury Regional Council technical expert has identified gaps in the provided technical reports	Canterbury Regional Council technical expert considers the conditions are appropriate	Comments (Key Findings & Concerns) [Consent Planner clarifying comments]
Planning	<p><i>Additional reports required:</i></p> <ul style="list-style-type: none"> • <i>Cultural Impact Assessment</i> • <i>Liquefaction Risk Assessment</i> • <i>Ecological management Plan</i> 	<p><i>Gaps identified:</i></p> <ul style="list-style-type: none"> • <i>No consideration of cumulative effects of solar farm developments in the area – needs to be taken into account in landscape and transport assessments and when considering where workers will be accommodated.</i> • <i>Little information has been provided on the current</i> 	<ul style="list-style-type: none"> • <i>Unlike the proposals for other solar arrays in the area, no plans have been provided for any ecological restoration at the site. Restoration and enhancement of indigenous biodiversity, particularly in the margins of the adjacent waterbodies, could be included as</i> 	<p><i>RPS:</i></p> <p><i>Further details are included in the following document which should be attached as an appendix to the response.</i></p> <p>Haldon Solar project response.docx</p> <p><i>The main points in the assessment are:</i></p> <ul style="list-style-type: none"> • <i>The project would enable people to provide for their economic and social well-being but further information is required to determine effects on cultural well-</i>

		<p><i>use of the site and whether the land will be grazed once the solar array has been constructed.</i></p> <ul style="list-style-type: none"> • <i>Unlike the proposals for other solar arrays in the area, no plans have been provided for any ecological restoration at the site. Restoration and enhancement of indigenous biodiversity, particularly in the margins of the adjacent waterbodies, would assist the project to comply with RPS objectives and policies.</i> <p><i>Also in regards to whether a technical report relies on sufficient or appropriate data –</i></p> <ul style="list-style-type: none"> • <i>The flood hazard assessment supplied has not identified high hazard areas at the site using the 1 in 500 year flood event criteria required under the RPS and</i> 	<p><i>a consent condition. Such activities would give better consistency with RPS Chapter 9 objectives and policies.</i></p> <ul style="list-style-type: none"> • <i>A condition could be included requiring that access to and along the Tekapo River and Lake Benmore should be provided.</i> 	<p><i>being. The site lies within an identified Site of Significance to Māori and is adjacent to Lake Benmore which is a Statutory Acknowledgement Area.</i></p> <ul style="list-style-type: none"> • <i>The project would increase the sustainability and reliability of New Zealand’s electricity supply, however the Mackenzie Basin already supplies a significant amount of New Zealand’s electricity and greater diversification of location would be desirable, especially locating generation closer to major users such as urban areas.</i> • <i>The project site is in close proximity to the existing national grid and is sited in an area of high sunlight and on level land. This makes the site suitable for solar electricity generation so long as adverse effects can be managed.</i> • <i>The project is within the Mackenzie Basin Outstanding</i>
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		<p><i>recommended by Canterbury Regional Council technical experts.</i></p>	<p><i>Natural Landscape. A landscape assessment has been provided which identifies the likely impacts on landscape values, but no mitigation measures have been proposed, and cumulative effects of several solar farms in close proximity have not been considered.</i></p> <ul style="list-style-type: none"> • <i>Unlike in other similar proposals, no plans have been provided for ecological enhancement of the riparian margins of adjacent waterbodies, including Lake Benmore which is identified as a Site of Natural Significance in the Mackenzie District Plan.</i> • <i>There are some risks from natural hazards at the site:</i> <ul style="list-style-type: none"> ○ <i>The site lies within the Flood Hazard Assessment Overlay in the Mackenzie District Plan. Although a flood</i>
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				<p><i>assessment has been provided by the applicant, it does not use the 1 in 500 year modelling required under the RPS.</i></p> <ul style="list-style-type: none"> <i>○ Part of the site is covered by the Hydro Inundation Overlay. No assessment of risk has been provided.</i> <i>○ Part of the site is also covered by the Liquefaction Assessment Overlay. No assessment of risk has been provided.</i> <ul style="list-style-type: none"> <i>● The project would at least partially foreclose the use of the land for primary production. More information is needed on the current use of the land and whether grazing will</i>
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				<p><i>continue once the solar array is in place.</i></p> <ul style="list-style-type: none"><i>• Further information is needed on how pest species, including wilding conifers, will be managed at the site.</i><i>• An old landfill has been identified close to the site. Further information on how potentially contaminated land will be managed is needed in order to determine compliance with the RPS.</i><i>• Given the size of the site, and provided good construction management techniques are adhered to, dust and nuisance effects should be managed appropriately so that it is not a danger to people's health and safety.</i><i>• It is likely that the site will contain areas where hazardous substances are stored. Provided this storage occurs in accordance with relevant legislation and it carried out</i>
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				<p><i>appropriately, it is considered that the proposed activity would be consistent with this policy.</i></p> <ul style="list-style-type: none">• <i>Further information is needed to determine how public and Ngāi Tahu access to and along the Tekapo River and Lake Benmore might be affected by the proposal.</i>
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Appendix 1: Consistency with Canterbury Regional Policy Statement (CRPS)

Relevant definitions in the CRPS:

Definition	Relevance to the Haldon Solar project proposal
<p>Critical Infrastructure <i>Infrastructure necessary to provide services which, if interrupted, would have a serious effect on the communities within the Region or a wider population, and which would require immediate reinstatement. This includes any structures that support, protect or form part of critical infrastructure. Critical infrastructure includes:</i></p> <ol style="list-style-type: none"> 1. <i>regionally significant airports</i> 2. <i>regionally significant ports</i> 3. <i>gas storage and distribution facilities</i> 4. <i>electricity substations, networks, and distribution installations, including the electricity distribution network</i> 5. <i>supply and treatment of water for public supply</i> 6. <i>storm water and sewage disposal systems</i> 7. <i>telecommunications installations and networks</i> 8. <i>strategic road and rail networks (as defined in the Regional Land Transport Strategy)</i> 9. <i>petroleum storage and supply facilities</i> 10. <i>public healthcare institutions including hospitals and medical centres</i> 11. <i>fire stations, police stations, ambulance stations, emergency coordination facilities.</i> 	<p>The new substation and additional tower would be covered under the definition of critical infrastructure, as would the existing national grid towers and lines that cross the site.</p> <p>State Highway 8 is also critical infrastructure, and while it is not adjacent to the site, the construction materials will be transported along it, as will construction workers. It is proposed that the intersection between State Highway 8 and Haldon road would need to be upgraded to accommodate the heavy vehicles involved.</p>
<p>Electricity transmission network <i>The electricity transmission network/ electricity transmission activities/ assets/ infrastructure/ resources/ system, all being part of the national grid of transmission lines and cables (aerial, underground and undersea, including the high-voltage</i></p>	<p>The new substation and additional tower would form part of the electricity transmission network, as do the existing national grid towers and lines that cross the site.</p>

<p><i>direct current link), stations and sub-stations and other works used to connect grid injection points and grid exit points to convey electricity throughout the North and South Islands of New Zealand.</i></p>	
<p>Essential Structures <i>Structures that support or form part of:</i></p> <ol style="list-style-type: none"> <i>1. a maritime, road or rail transport network or service;</i> <i>2. water supply, including irrigation infrastructure;</i> <i>3. a telecommunications or radio-communication network;</i> <i>4. an energy generation, supply or transmission facility or network;</i> <i>5. a flood-protection work or facility;</i> <i>6. water containment, flow or diversion infrastructure;</i> <i>7. a water level or flow-measurement facility;</i> <i>8. a drainage or sewerage system; or</i> <i>9. the infrastructure forming parts of other network utilities. This includes any structures that support essential infrastructure.</i> 	<p>The proposed solar arrays, substation, inverters, batteries and new towers would qualify as essential structures under ‘energy generation, supply or transmission facility or network’, as would the existing towers and lines that cross the site. The supporting infrastructure (related to the proposal that wouldn’t fall under clause (4) of the definition) would be captured by clause (9) of the definition.</p>
<p>Hazardous activity or industry <i>An activity or industry that appears on the Hazardous Activity and Industry List (HAIL) 2004. The HAIL is published as Schedule A in the Contaminated Land Management Guidelines - Ministry for the Environment (2004) updated September 2007.</i></p>	<p>The HAIL includes: <i>B – Electrical and electronic works, power generation and transmission</i></p> <ol style="list-style-type: none"> <i>1. Batteries including the commercial assembling, disassembling, manufacturing or recycling of batteries (but excluding retail battery stores)</i> <i>2. Electrical transformers including the manufacturing, repairing or disposing of electrical transformers or other heavy electrical equipment</i> <i>3. Electronics including the commercial manufacturing, reconditioning or recycling of computers, televisions and other electronic devices</i>

	<p>4. <i>Power stations, substations or switchyards</i></p> <p>The proposal would include HAIL activities.</p>
<p>High hazard area <i>High hazard areas are:</i></p> <ol style="list-style-type: none"> <i>1. flood hazard areas subject to inundation events where the water depth (metres) x velocity (metres per second) is greater than or equal to 1 or where depths are greater than 1 metre, in a 0.2% annual exceedance probability flood event;</i> <i>...</i> <p><i>When determining high hazard areas, projections on the effects of climate change will be taken into account</i></p>	<p>The project site lies within the Flood Hazard Assessment Overlay identified in the Mackenzie District Plan. While a flood hazard assessment has been carried out and included in the application materials, this has not identified high hazard areas at the site using the 1 in 500 year flood event criteria required under the RPS and recommended by Canterbury Regional Council technical experts. An updated assessment should be provided by the applicant.</p>
<p>Historic cultural and heritage landscapes <i>A landscape that has:</i></p> <ol style="list-style-type: none"> <i>1. significant historic cultural value arising from a relationship or association between people and the environment, or beliefs about them; and/or</i> <i>2. significant historic heritage value that forms a cohesive and collective record of the history of an area.</i> <p><i>Such a landscape may include linkages, networks and nodes that are integral to its values. Such values may be tangible or intangible.</i></p>	<p>The entire site lies within the Tauwharekura / Grays Hills kāinga / Mahika Kai Area. This area was a traditional place where ancestors used to work and holds the memories, stories and traditions of rūnaka tupuna.</p> <p>The site is close to Te Pā-o-Kāti- Kurī / Mount Maggie Mountain range which is a kāinga Mahika kai where weka, tuna and kōareare were gathered during the seasonal and annual trips to Te Manahuna / Mackenzie Basin.</p> <p>The site is also close to Te Ao Mārama / Lake Benmore which is a statutory acknowledgement area. This is because it overlays the path of the</p>

	Waitaki River which is highly significant for Kāi Tahu.
<p>Margin <i>Land immediately adjacent to the bed of a river, wetland, lake or estuary which is likely to be affected by a high water table, flooding, fluvial erosion, or sediment deposition, and often contains significant vegetation. The size of the margin will vary according to local site factors but may extend to the limits demarcated by natural river terraces and constructed stopbanks.</i></p>	The site is bounded by Te Ao Mārama and the Takapō River, although it is set back at least 200m from those waterbodies.
<p>Primary production <i>The production (but not processing) of primary products including agricultural, horticultural, pastoral, aquacultural, and forestry products and includes the use of land and auxiliary buildings for these purposes.</i></p>	Little information has been provided on the current use of the land and whether the land will be grazed once the solar array has been constructed. This lack of information makes it difficult to determine whether the land is currently used for primary production and whether that will continue.
<p>Regionally significant infrastructure <i>Regionally significant infrastructure is:</i></p> <ol style="list-style-type: none"> 1. ... 6. <i>National, regional and local renewable electricity generation activities of any scale</i> 7. <i>The electricity transmission network</i> 8. 14. <i>Electricity distribution network</i> 15. <i>Infrastructure defined as ‘strategic infrastructure’ in this regional policy statement. Note: For the avoidance of doubt, this infrastructure is also referred to as ‘infrastructure that is regionally significant’.</i> 	The Haldon Solar project would be considered regionally significant infrastructure.
<p>Renewable Electricity Generation <i>The generation of electricity from solar, wind, hydro electricity, geothermal, biomass, tidal, wave, or ocean current energy sources.</i></p>	The Haldon Solar project is renewable electricity generation.

<p>Renewable electricity generation activities <i>The construction, operation and maintenance of structures associated with renewable electricity generation. This includes small and community-scale distributed generation activities, the system of electricity conveyance required to convey electricity to the distribution network and/or the national grid, and electricity storage technologies associated with renewable electricity.</i></p>	<p>The Haldon Solar project is a renewable electricity generation activity.</p>
<p>Riparian zone <i>In relation to a river or lake the riparian zone is the area of land within their beds and adjacent to the beds where direct interaction occurs between aquatic and terrestrial ecosystems. The riparian zone includes the banks of a river and the margin of a lake. Wetlands and islands may also be part of the riparian zone.</i></p>	<p>The Haldon Solar project site is adjacent to the Takapō River and Lake Benmore. The riparian zones of those waterbodies will need to be protected from adverse effects. The proposed activities are set back from those waterbodies by at least 200m.</p>
<p>Undeveloped <i>Within the context of the high country, this means areas where there has been no significant ongoing or regular addition of fertiliser, cultivation, oversowing or direct drilling with introduced pasture plants.</i></p>	<p>More information is needed on the current land use in order to determine whether the land should be considered undeveloped.</p>
<p>Versatile Soils <i>Land classified as Land Use Capability I or II in the New Zealand Land Resource Inventory.</i></p>	<p>The site is not identified as Land Use Capability I or II. As such it does not meet the definition of versatile soil.</p>

Objective and Policy Assessment:

Objective/ Policy	Assessment
Chapter 5 – Land Use and Infrastructure	
<p>Objective 5.2.1 Location, Design and Function of Development (Entire Region) Development is located and designed so that it functions in a way that:</p>	<ol style="list-style-type: none"> 1. Renewable Electricity Generation closer to existing urban areas, where the bulk of the electricity is used would give better effect to this objective. 2. The project would enable people and the community to provide for their social and economic well-being, by

<ol style="list-style-type: none"> 1. achieves consolidated, well designed and sustainable growth in and around existing urban areas as the primary focus for accommodating the region’s growth; and 2. enables people and communities, including future generations, to provide for their social, economic and cultural well-being and health and safety; and which: <ol style="list-style-type: none"> a. maintains, and where appropriate, enhances the overall quality of the natural environment of the Canterbury region, including its coastal environment, outstanding natural features and landscapes, and natural values; b. provides sufficient housing choice to meet the region’s housing needs; c. encourages sustainable economic development by enabling business activities in appropriate locations; d. minimises energy use and/or improves energy efficiency; e. enables rural activities that support the rural environment including primary production; f. is compatible with, and will result in the continued safe, efficient and effective use of regionally significant infrastructure; g. avoids adverse effects on significant natural and physical resources including regionally significant infrastructure, and where avoidance is impracticable, remedies or mitigates those effects on those resources and infrastructure; h. facilitates the establishment of papakāinga and marae; and i. avoids conflicts between incompatible activities. 	<p>providing employment opportunities as well as a more resilient electricity supply.</p> <p>Further information is needed to determine the effects of the proposal on cultural well-being, especially in terms of effects on landscape values, and indigenous biodiversity. Further engagement will need to take place with manawhenua, and a cultural impact assessment undertaken, to ensure that effects on cultural values are minimised.</p> <p>a. The project is located within an Outstanding Natural Landscape and will have an impact on the values of that landscape and other natural values. Cumulative effects on landscape values arising from several solar array proposals in close proximity to each other will be more significant than the effects identified for this project alone. Lake Benmore is identified as a Site of Natural Significance in the Mackenzie District Plan. Unlike in other similar proposals, no plans have been provided for ecological enhancement of the riparian margins of adjacent waterbodies. Restoration of those areas as part of the proposal would better give effect to this objective.</p> <p>e. The proposal is taking place on rural land, meaning that the ability to undertake rural activities on the same site is diminished, due to the presence of the structures.</p> <p>f. The proposal is compatible with regionally significant infrastructure, insofar as it is a generation activity located near existing transmission lines. The project can be efficiently connected to the network (i.e. the generated electricity would not need to be conveyed over a long</p>
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	<p>distance to reach the network). Based on the information provided by the applicant, Transpower has been engaged with regarding the proposal.</p> <p>g. According to the landscape assessment report provided by the applicant, the proposal does not avoid effects on the outstanding natural landscape values, with the overall impact at a low-moderate level. Cumulative effects on landscape values arising from several solar array proposals in close proximity to each other will be more significant than the effects identified for this project alone.</p> <p>Lake Benmore is identified as a Site of Natural Significance in the Mackenzie District Plan. The proposed setbacks and consent conditions should mitigate any effects on the lake.</p> <p>i. There does not appear to be a conflict of activities, unless the use of rural land, for non-rural use is considered to be a conflict.</p> <p>The Haldon Solar project proposal is not entirely inconsistent with Objective 5.2.1 based on information provided at this point. If developed, the facility itself would be considered regionally significant infrastructure. However, further information is needed to determine if the proposal is consistent with this objective.</p>
<p>Objective 5.2.2 Integration of Land-use and regionally significant infrastructure (Wider Region) In relation to the integration of land use and regionally significant infrastructure:</p> <ol style="list-style-type: none"> 1. To recognise the benefits of enabling people and communities to provide for their social, economic and 	<ol style="list-style-type: none"> 1. The project does enable people and the community to provide for their social and economic well-being, by providing employment opportunities as well as a more resilient electricity supply. Further engagement will need to take place with manawhenua, and a Cultural Impact assessment

<p>cultural well-being and health and safety and to provide for infrastructure that is regionally significant to the extent that it promotes sustainable management in accordance with the RMA.</p> <p>2. To achieve patterns and sequencing of land-use with regionally significant infrastructure in the wider region so that:</p> <ul style="list-style-type: none"> a. development does not result in adverse effects on the operation, use and development of regionally significant infrastructure b. adverse effects resulting from the development or operation of regionally significant infrastructure are avoided, remedied or mitigated as fully as practicable. c. there is increased sustainability, efficiency and liveability. 	<p>undertaken, to ensure that effects on cultural values are minimised.</p> <p>If the solar array is built it would be regionally significant infrastructure. However, a more detailed proposal is needed to determine if this ‘promotes sustainable management in accordance with the RMA’ as per this Objective.</p> <ul style="list-style-type: none"> 2. a. The project would be considered regionally significant infrastructure once built. The applicant has engaged with Transpower to ensure that the project is compatible with existing national grid infrastructure. b. The project is likely to have adverse effects on the landscape, ecological and cultural values of the site. Further consultation with manawhenua will be required to find ways to mitigate the effects of the proposal on cultural values. c. The project will increase the sustainability of New Zealand’s electricity supply by providing more renewable electricity generation, which could replace some of our reliance on fossil fuels. <p>The Haldon Solar project is not entirely inconsistent with Objective 5.2.2 based on information provided at this point. If developed, the solar array itself would be considered regionally significant infrastructure. However, further information is needed to determine if the proposal is consistent with this objective.</p>
<p>Policy 5.3.2 Development Conditions (Wider Region) To enable development including regionally significant infrastructure which:</p>	<ul style="list-style-type: none"> 1. a. The project would be regionally significant infrastructure once built. National Grid transmission lines which are also regionally significant infrastructure pass through the site and the applicant has engaged with Transpower to ensure

<ol style="list-style-type: none"> 1. ensure that adverse effects are avoided, remedied or mitigated, including where these would compromise or foreclose : <ol style="list-style-type: none"> a. existing or consented regionally significant infrastructure; b. options for accommodating the consolidated growth and development of existing urban areas; c. the productivity of the region’s soil resources, without regard to the need to make appropriate use of soil which is valued for existing or foreseeable future primary production, or through further fragmentation of rural land; d. the protection of sources of water for community supplies; e. significant natural and physical resources; 2. avoid or mitigate: <ol style="list-style-type: none"> a. natural and other hazards, or land uses that would likely result in increases in the frequency and/or severity of hazards; b. reverse sensitivity effects and conflicts between incompatible activities, including identified mineral extraction areas; and 3. integrate with: <ol style="list-style-type: none"> a. the efficient and effective provision, maintenance or upgrade of infrastructure; and b. transport networks, connections and modes so as to provide for the sustainable and efficient movement of people, goods and services, and a logical, permeable and safe transport system. 	<p>that the development can be connected to those transmission lines.</p> <ol style="list-style-type: none"> b. Renewable Electricity Generation closer to existing urban areas, where the bulk of the electricity is used would give better effect to this policy. c. The project site has not been identified as Highly Productive Land. Further information is needed as to whether the land would continue to be grazed once the solar array has been constructed. e. According to the landscape assessment report provided by the applicant, the proposal does not avoid effects on the outstanding natural landscape values, with the overall impact at a low to moderate level. <ol style="list-style-type: none"> 2. a. Parts of the project site have been included in the Hydro Inundation overlay for the Waitaki Power Scheme, and the whole site lies within the Flood Hazard assessment Overlay. The proposal is unlikely to increase the frequency or severity of natural hazards. Although a flood hazard assessment has been provided by the applicant, it has not been carried out using 1 in 500 year modelling as required under the RPS and has not adequately identified high flood hazard areas. An assessment should be carried out to determine whether any of the site constitutes a high hazard area for flooding, with inverters, the substation, and the temporary office avoiding any areas identified as such. The inverters and temporary office should also avoid the parts of the site identified in the Hydro Inundation overlay. b. The project could be considered to be incompatible with the nearby campsite. The use of rural land, for non-rural use is considered to be a conflict.
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	<p>3. a. The proposal integrates well with existing electricity transmission infrastructure.</p> <p>b. the site access is off State Highway 8. During the construction phase especially, the use of that access by high numbers of vehicles could hinder the efficient movement of people, goods and services along that highway. Cumulative effects on that highway arising from the construction of several solar array proposals in close proximity to each other will be more significant than the effects identified for this project alone.</p> <p>The Haldon Solar project is not entirely inconsistent with Policy 5.3.2 based on information provided at this point. If developed, the facility itself would be considered regionally significant infrastructure. However, further information is needed to determine if the proposal is consistent with this policy.</p>
<p>Policy 5.3.9 Regionally significant infrastructure (Wider Region) In relation to regionally significant infrastructure (including transport hubs):</p> <ol style="list-style-type: none"> 1. avoid development which constrains the ability of this infrastructure to be developed and used without time or other operational constraints that may arise from adverse effects relating to reverse sensitivity or safety; 2. provide for the continuation of existing infrastructure, including its maintenance and operation, without prejudice to any future decision that may be required for the ongoing operation or expansion of that infrastructure; and 3. provide for the expansion of existing infrastructure and development of new infrastructure, while: 	<ol style="list-style-type: none"> 3. a. Renewable Electricity Generation (REG) activities have logistical and operational constraints because they need to be developed in locations where the electricity they produce can be connected to the national grid. Ideally generation activities should be sited close to where the electricity is used (mainly in urban centres) to minimise energy loss, but failing that, REG activities close to existing infrastructure such as the national grid make sense. <p>Solar arrays also have particular locational requirements, in that they should be in areas with high amounts of sunshine, and on reasonably flat terrain. The proposed site fits those requirements.</p> <ol style="list-style-type: none"> b. According to the landscape assessment report provided by the applicant, the proposal does not avoid effects on the outstanding

<p>a. recognising the logistical, technical or operational constraints of this infrastructure and any need to locate activities where a natural or physical resource base exists;</p> <p>b. avoiding any adverse effects on significant natural and physical resources and cultural values and where this is not practicable, remedying or mitigating them, and appropriately controlling other adverse effects on the environment; and</p> <p>c. when determining any proposal within a sensitive environment (including any environment the subject of section 6 of the RMA), requiring that alternative sites, routes, methods and design of all components and associated structures are considered so that the proposal satisfies sections 5(2)(a) – (c) as fully as is practicable.</p>	<p>natural landscape values, with the overall impact at a low to moderate level.</p> <p>Ecological effects management, such as habitat restoration and the implementation of management plans, is required to manage other potential ecological effects.</p> <p>c. The proposal is within a sensitive environment (Outstanding Natural Landscape, Lakeside Protection Area). It would be interesting to know whether alternative sites and methods have been considered. However, to determine site appropriateness, further information is needed on the values present at the site, and steps taken to avoid, remedy or mitigate any effects. This includes effects relating to:</p> <ul style="list-style-type: none"> - the preservation of the natural character of the adjacent lake and rivers and their margins. - The protection of outstanding natural landscapes from inappropriate subdivision, use and development. - The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna (Lake Benmore). - The relationship of Māori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga. - The management of significant risks from natural hazards, meaning that a hazards (including a more appropriate flooding) assessment should be undertaken. <p>The Haldon Solar project is not entirely inconsistent with Policy 5.3.9 based on information provided at this point. If developed, the facility itself would be considered regionally significant</p>
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	<p>infrastructure. However, further information is needed to determine if the proposal is consistent with this policy.</p>
<p>Policy 5.3.12 Rural production (Wider Region) Maintain and enhance natural and physical resources contributing to Canterbury’s overall rural productive economy in areas which are valued for existing or foreseeable future primary production, by:</p> <ol style="list-style-type: none"> 1. avoiding development, and/or fragmentation which; <ol style="list-style-type: none"> a. forecloses the ability to make appropriate use of that land for primary production; and/or b. results in reverse sensitivity effects that limit or precludes primary production. 2. enabling tourism, employment and recreational development in rural areas, provided that it: <ol style="list-style-type: none"> a. is consistent and compatible with rural character, activities, and an open rural environment; b. has a direct relationship with or is dependent upon rural activities, rural resources or raw material inputs sourced from within the rural area; c. is not likely to result in proliferation of employment (including that associated with industrial activities) that is not linked to activities or raw material inputs sourced from within the rural areas; and d. is of a scale that would not compromise the primary focus for accommodating growth in consolidate, well designed and more sustainable development patterns. and; 	<ol style="list-style-type: none"> 1. a. The project would partially foreclose the ability of using the land for primary production. More information is needed on both the current use of the site and any intended grazing once the solar array has been constructed. b. The project would not result in reverse sensitivity effects that limits or precludes primary production. 2. The project would provide employment opportunities, especially during the construction phase. There is very little housing available in the vicinity of the site, so the impacts of this should be taken into account when considering the application. This is an issue that has not been adequately addressed in the application, so more information needs to be provided, particularly in the context of the cumulative impacts of constructing several solar farms in the vicinity. <ol style="list-style-type: none"> b. The employment is dependent on rural resources, namely the use of rural land. c. It is not considered, based on the available information, that the proposed activity would likely have significant cumulative adverse effects on water quality and quantity. <p>Further detail would need to be provided in relation to availability of rural land, particularly improved pasture within the Mackenzie Basin, and if the use of this site for solar energy generation will impact the rural productive economy.</p> <p>Further information is needed to determine if the proposal is consistent with this policy.</p>

<p>3. ensuring that rural land use intensification does not contribute to significant cumulative adverse effects on water quality and quantity.</p>	
<p>Chapter 7 – Freshwater</p>	
<p>Objective 7.2.3 Protection of intrinsic value of waterbodies and their riparian Zones The overall quality of freshwater in the region is maintained or improved, and the life supporting capacity, ecosystem processes and indigenous species and their associated fresh water ecosystems are safeguarded.</p>	<p>The proposal has been designed to have setbacks from waterways. The applicant is not proposing enhancement (native planting), which would have benefits to the intrinsic values of these waterbodies, but this could be included as a consent condition in order to give better effect to this objective.</p> <p>The proposal will result in construction and operational phase stormwater discharges, and construction phase earthworks could cause discharge of sediment. It is likely that construction phase discharges and associated effects of can be managed through erosion and sediment control plans, spill and refuelling protocols and site management.</p> <p>To determine consistency with this objective, further information would be needed to determine the effects of any construction and operational phase discharges from the site, and conditions imposed to require ecological enhancement of the margins of adjacent waterbodies.</p>
<p>Policy 7.3.1 Adverse effects of activities on the natural character of freshwater To identify the natural character values of fresh water bodies and their margins in the region and to:</p> <ol style="list-style-type: none"> 1. preserve natural character values where there is a high state of natural character; 	<p>Further information is needed to determine the current natural character values of the lake and river that could be affected by the project.</p> <p>The proposal has been designed to have setbacks from waterbodies. The applicant is not proposing any enhancement (native planting), which would have benefits to the intrinsic values</p>

<p>2. natural character values where they are modified but highly valued; and</p> <p>3. improve natural character values where they have been degraded to unacceptable levels;</p> <p>unless modification of the natural character values of a fresh water body is provided for as part of an integrated solution to water management in a catchment in accordance with Policy 7.3.9, which addresses remedying and mitigating adverse effects on the environment and its natural character values</p>	<p>of these waterbodies, but this could be included as a consent condition in order to give better effect to this policy.</p> <p>Further information is required to determine whether the project is consistent with this policy.</p>
<p>Policy 7.3.3 Enhancing fresh water environments and biodiversity To promote, and where appropriate require the protection, restoration and improvement of lakes, rivers, wetlands and their riparian zones and associated Ngāi Tahu values, and to:</p> <ol style="list-style-type: none"> 1. identify and protect areas of significant indigenous vegetation and significant habitats, sites of significant cultural value, wetlands, lakes and lagoons/Hapūa, and other outstanding water bodies; and 2. require the maintenance and promote the enhancement of indigenous biodiversity, inland basin ecosystems and riparian zones; and 3. promote, facilitate or undertake pest control. 	<p>The proposal has been designed to have setbacks from waterbodies. The applicant is not proposing any enhancement (native planting), which would have benefits to the intrinsic values of these waterbodies, but this could be included as a consent condition in order to give better effect to this policy.</p> <ol style="list-style-type: none"> 1. The site is adjacent to a Site of Natural Significance, and lies within Sites and Areas of Significance to Māori, identified in the Mackenzie District Plan. All these areas will need to be protected. More information is required to determine whether this protection will be accomplished. In particular further engagement will need to take place with manawhenua. 2. Further information is needed on the state of riparian zones. 3. Information is needed regarding the presence of pest species (including wilding conifers) on the site and how these will be managed. <p>To fully determine consistency with this policy, further detail on the current state of the site, and proposed mitigations (including the</p>

	suitability of proposed mitigations to protect values) and methodology is required.
<p>Policy 7.3.6 Fresh water quality In relation to water quality:</p> <ol style="list-style-type: none"> 1. to establish and implement minimum water quality standards for surface water and groundwater resources in the region, which are appropriate for each water body considering: <ol style="list-style-type: none"> a. the values associated with maintaining life supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, and natural character of the water body; b. any current and reasonably foreseeable requirement to use the water for individual, marae or community drinking water or stockwater supplies, customary uses or contact recreation; c. the cultural significance of the fresh water body and any conditions or restrictions on the discharge of contaminants that may be necessary or appropriate to protect those values; and d. any other current or reasonably foreseeable values or uses; and 2. to manage activities which may affect water quality (including land uses), singularly or cumulatively, to maintain water quality at or above the minimum standard set for that water body; and 3. where water quality is below the minimum water quality standard set for that water body, to avoid any additional 	<ol style="list-style-type: none"> 2. Further detail on the potential discharges relating to the proposed activity (temporary construction phase and operational phase), as well as and further detail on proposed mitigations and methodology will need to be provided to assess effects on water quality.

<p>allocation of water for abstraction from that water body and any additional discharge of contaminants to that water body, where any further abstraction or discharges, either singularly or cumulatively, may further adversely affect the water quality in that water body:</p> <ol style="list-style-type: none"> a. until the water quality standards for that water body are met; or b. unless the activities are undertaken as part of an integrated solution to water management in the catchment in accordance with Policy 7.3.9, which provides for the redress of water quality within that water body within a specified timeframe. 	
<p>Policy 7.3.7 Water quality and land uses To avoid, remedy or mitigate adverse effects of changes in land uses on the quality of fresh water (surface or ground) by:</p> <ol style="list-style-type: none"> 1. identifying catchments where water quality may be adversely affected, either singularly or cumulatively, by increases in the application of nutrients to land or other changes in land use; and 2. controlling changes in land uses to ensure water quality standards are maintained or where water quality is already below the minimum standard for the water body, it is improved to the minimum standard within an appropriate timeframe. 	<p>2. To determine consistency with this policy, further detail on the proposed discharges relating to the proposed activity (temporary construction phase and operational phase, as well as stocking of sheep), as well as further detail on proposed mitigations and methodology will need to be provided to assess effects on water quality. It is likely that erosion and sediment control measures, including erosion and sediment control plan/ management, if suitable, would help to give effect to this policy.</p>
<p>Chapter 9 – Ecosystems and Indigenous Biodiversity</p>	
<p>Objective 9.2.1 Halting the decline of Canterbury’s ecosystems and indigenous biodiversity</p>	<p>Although the ecological assessment supplied by the applicant concludes that the site has low ecological value, no measures have been suggested to maintain or enhance the remaining indigenous biodiversity. The applicant is not proposing any</p>

<p>The decline in the quality and quantity of Canterbury’s ecosystems and indigenous biodiversity is halted and their life-supporting capacity and mauri safeguarded.</p>	<p>enhancement (native planting), which would have benefits to the intrinsic values of the adjacent waterbodies, but this could be included as a consent condition in order to give better effect to this objective.</p> <p>To fully determine consistency with this objective further detail on proposed mitigations and methodology is required.</p>
<p>Objective 9.2.2 Restoration or enhancement of ecosystems and indigenous biodiversity Restoration or enhancement of ecosystem functioning and indigenous biodiversity, in appropriate locations, particularly where it can contribute to Canterbury’s distinctive natural character and identity and to the social, cultural, environmental and economic well-being of its people and communities.</p>	<p>Although the ecological assessment supplied by the applicant concludes that the site has low ecological value, no measures have been suggested to restore or enhance the indigenous biodiversity within or surrounding the site. The applicant is not proposing any enhancement (native planting), which would have benefits to the intrinsic values of the adjacent waterbodies, but this could be included as a consent condition in order to give better effect to this objective.</p> <p>To fully determine consistency with this objective, further detail on proposed mitigations and methodology is required.</p>
<p>Objective 9.2.3 Protection of significant indigenous vegetation and habitats Areas of significant indigenous vegetation and significant habitats of indigenous fauna are identified and their values and ecosystem functions protected.</p>	<p>The site is adjacent to Lake Benmore which is a Site of Natural Significance identified in the Mackenzie District Plan. This has been identified using the CRPS Appendix 3 criteria.</p> <p>More detail is required to determine how this site will be protected. That information is needed to determine whether the project is consistent with this objective.</p>
<p>Policy 9.3.1 Protecting significant natural areas</p>	

<ol style="list-style-type: none"> 1. Significance, with respect to ecosystems and indigenous biodiversity, will be determined by assessing areas and habitats against the following matters: <ol style="list-style-type: none"> a. Representativeness b. Rarity or distinctive features c. Diversity and pattern d. Ecological context <p>The assessment of each matter will be made using the criteria listed in Appendix 3.</p> <ol style="list-style-type: none"> 2. Areas or habitats are considered to be significant if they meet one or more of the criteria in Appendix 3. 3. Areas identified as significant will be protected to ensure no net loss of indigenous biodiversity or indigenous biodiversity values as a result of land use activities. 	<p>The site is adjacent to Lake Benmore which is a Site of Natural Significance identified in the Mackenzie District Plan. This has been identified using the CRPS Appendix 3 criteria.</p> <p>More detail is required to determine how this site will be protected. That information is needed to determine whether the project is consistent with this policy.</p>
<p>Policy 9.3.2 Priorities for protection</p> <p>To recognise the following national priorities for protection:</p> <ol style="list-style-type: none"> 1. Indigenous vegetation in land environments where less than 20% of the original indigenous vegetation cover remains. 2. Areas of indigenous vegetation associated with sand dunes and wetlands. 3. Areas of indigenous vegetation located in “originally rare” terrestrial ecosystem types not covered under (1) and (2) above. 4. Habitats of threatened and at risk indigenous species. 	<p>Further detail on how these areas will be protected, and whether other areas of indigenous vegetation located in “originally rare” terrestrial ecosystem types are present on the site, is required before a determination can be made as to whether the proposal is consistent with this policy.</p>
<p>Policy 9.3.4 Promote ecological enhancement and restoration</p> <p>To promote the enhancement and restoration of Canterbury’s ecosystems and indigenous biodiversity, in appropriate</p>	<p>Although the ecological assessment supplied by the applicant concludes that the site has low ecological value, no measures have been suggested to enhance or restore indigenous biodiversity. The applicant is not proposing any enhancement (native planting), which would have benefits to the intrinsic values</p>

<p>locations, where this will improve the functioning and long term sustainability of these ecosystems.</p>	<p>of the adjacent waterbodies, but this could be included as a consent condition in order to give better effect to this objective.</p> <p>To fully determine consistency with this policy further detail on proposed mitigations and methodology is required.</p>
<p>Chapter 10 – Beds of Rivers and Lakes and their Riparian Zones</p>	
<p>Objective 10.2.1 Provision for activities in beds and riparian zones and protection and enhancement of bed and riparian zone values Enable subdivision, use and development of river and lake beds and their riparian zones while protecting all significant values of those areas, and enhancing those values in appropriate locations.</p>	<p>Although the proposal includes at least 200m setbacks from the Tekapo River and Lake Benmore, no measures have been suggested to maintain or enhance the remaining indigenous biodiversity within those riparian margins. The applicant is not proposing any enhancement (native planting), which would have benefits to the intrinsic values of the adjacent waterbodies, but this could be included as a consent condition in order to give better effect to this objective.</p> <p>To fully determine consistency with this objective, further detail on proposed mitigations and methodology is required.</p>
<p>Objective 10.2.4 Public and Ngāi Tahu access to and along rivers and lakes Maintenance and enhancement of public and Ngāi Tahu access to and along rivers and lakes.</p>	<p>Further information is needed to determine how access to and along the Tekapo River and Lake Benmore would be impacted by the project.</p>
<p>Policy 10.3.2 Protection and enhancement of areas of river and lake beds and their riparian zones To preserve the natural character of river and lake beds and their margins and protect them from inappropriate subdivision, use and development, and where appropriate to maintain and/or enhance areas of river and lake beds and their margins and riparian zones where:</p>	<p>Although the proposal includes at least 200m setbacks from the Tekapo River and Lake Benmore, no measures have been suggested to maintain or enhance the remaining indigenous biodiversity within those riparian margins. The applicant is not proposing any enhancement (native planting), which would have benefits to the intrinsic values of the adjacent waterbodies, but this could be included as a consent condition in order to give better effect to this policy.</p>

<ol style="list-style-type: none"> 1. they exist in a degraded state and enhancement will achieve long-term improvement in those values; 2. they have ecological values for which protection and/or enhancement will assist in the establishment or re-establishment of indigenous biodiversity or ecosystems, particularly for ecosystems that are threatened or unrepresented in protected areas; 3. they have existing significant trout or salmon habitat; 4. maintenance and/or enhancement will improve or establish connections between habitats and create corridors for indigenous species and trout and salmon and their movement between areas; 5. riparian zones provide a buffer from activities that may adversely affect bed values; 6. opportunities exist to create habitat corridors for plants and animals; or 7. riparian zones provide spawning or other significant habitats for at risk or threatened species, such as inanga or Canterbury mudfish. 	<p>Further information is needed to determine the existing state of the river beds and their riparian margins, and what ecological values are present and appropriate measures to protect and/or enhance them.</p> <p>To fully determine consistency with this objective further detail on proposed mitigations and methodology is required.</p>
<p>Policy 10.3.4 Removal of vegetation and bed material from river beds To manage the use and removal of vegetation and bed material in river beds and their margins to ensure:</p> <ol style="list-style-type: none"> 1. the maintenance of flood-carrying capacity of rivers 2. the protection of essential structures; and 3. erosion control and prevention. <p>provided its management does not adversely affect:</p> <ol style="list-style-type: none"> a. the instream and other values of the beds including habitat and associated ecosystems; or 	<p>To fully determine consistency with this policy, further detail on the proposed site plan, works and construction methodology is required.</p>

<p>b. the stability, performance, operation and maintenance, upgrade and repair of essential structures</p>	
<p>Policy 10.3.5 Maintenance and enhancement of public and Ngāi Tahu access</p> <p>To promote the maintenance and enhancement of public and Ngāi Tahu access to and along the beds of rivers and lakes, and to ensure that subdivision use and development does not result in inappropriate loss of existing access, subject to:</p> <ol style="list-style-type: none"> 1. protecting public health and safety, and avoiding conflict between different types of access; 2. avoiding adverse effects on the values of the beds, or stability of banks; 3. protecting Ngāi tahu cultural values and sites of significance from inappropriate public access; 4. protecting the stability, performance and operation of essential structures in, on, under or over the beds; 5. ensuring the integrity of flood-protection vegetation is maintained; 6. avoiding conflicts with the legal rights and lawful activities of owners/occupiers of river or lake beds and adjacent land, or of the owners/operators of infrastructure in, on, under or over the bed; and 7. engaging with the Walking Access Commission to identify and negotiate issues around public access. 	<p>Further information is needed to determine how access to and along the Tekapo River and Lake Benmore would be impacted by the project.</p>
<p>Chapter 11 – Natural Hazards</p>	
<p>Objective 11.2.1 Avoid new subdivision, use and development of land that increases risks associated with natural hazards</p>	<p>Through Plan Change 28, Mackenzie District Council introduced a flood hazard assessment overlay, which covers the site, and a hydro-inundation overlay (relating to the Waitaki Power Scheme)</p>

<p>New subdivision, use and development of land which increases the risk of natural hazards to people, property and infrastructure is avoided or, where avoidance is not possible, mitigation measures minimise such risks.</p>	<p>that covers parts of the site. Part of the site also lies within the Liquefaction Assessment Overlay.</p> <p>Although a flood assessment has been provided by the applicant, it has not modelled a 1 in 500 year event as required under the RPS. A revised assessment should be carried to ensure that the substation, and transformers are not placed in high flood hazard areas.</p> <p>No assessment has been provided on the risk of liquefaction on the site.</p> <p>To fully determine consistency with this Objective, an updated flood hazard assessment and a liquefaction hazard assessment should be undertaken.</p>
<p>Policy 11.3.1 Avoidance of inappropriate development in high hazard areas To avoid new subdivision, use and development (except as provided for in Policy 11.3.4) of land in high hazard areas, unless the subdivision, use or development:</p> <ol style="list-style-type: none"> 1. is not likely to result in loss of life or serious injuries in the event of a natural hazard occurrence; and 2. is not likely to suffer significant damage or loss in the event of a natural hazard occurrence; and 3. is not likely to require new or upgraded hazard mitigation works to mitigate or avoid the natural hazard; and 4. is not likely to exacerbate the effects of the natural hazard; or 5. Outside of greater Christchurch, is proposed to be located in an area zoned or identified in a district plan for urban residential, industrial or commercial use, at the date of 	<p>Through Plan Change 28, Mackenzie District Council introduced a flood hazard assessment overlay, which covers the site, and a hydro-inundation overlay (relating to the Waitaki Power Scheme) that covers parts of the site. Part of the site also lies within the Liquefaction Assessment Overlay.</p> <p>Although a flood assessment has been provided by the applicant, it has not modelled a 1 in 500 year event as required under the RPS. A revised assessment should be carried to ensure that the substation, and transformers are not placed in high flood hazard areas.</p> <p>No assessment has been provided on the risk of liquefaction on the site.</p>

<p>notification of the CRPS, in which case the effects of the natural hazard must be mitigated; or</p> <p>6. Within greater Christchurch, is proposed to be located in an area zoned in a district plan for urban residential, industrial or commercial use, or identified as a "Greenfield Priority Area" on Map A of Chapter 6, both at the date the Land Use Recovery Plan was notified in the Gazette, in which the effect of the natural hazard must be avoided or appropriately mitigated; or</p> <p>7. Within greater Christchurch, relates to the maintenance and/or upgrading of existing critical or significance infrastructure.</p>	<p>To fully determine consistency with this Objective, an updated flood hazard assessment and a liquefaction hazard assessment should be undertaken.</p>
<p>Policy 11.3.2 Avoid Development in areas subject to inundation In areas not subject to Policy 11.3.1 that are subject to inundation by a 0.5% AEP flood event; any new subdivision, use and development (excluding critical infrastructure) shall be avoided unless there is no increased risk to life, and the subdivision, use or development:</p> <ol style="list-style-type: none"> 1. is of a type that is not likely to suffer material damage in an inundation event; or 2. is ancillary or incidental to the main development; or 3. meets all of the following criteria: <ol style="list-style-type: none"> a. new buildings have an appropriate floor level above the 0.5% AEP design flood level; and b. hazardous substances will not be inundated during a 0.5% AEP flood event; provided that a higher standard of management of inundation hazard events may be adopted where local 	<p>The site is identified as being within the Mackenzie District Council's Flood Hazard Assessment Overlay. It is recommended that a flood assessment (which would determine if the site would be subject to a 0.5% AEP flood event) is undertaken or order for the activity to be assessed under this policy, particularly with respect to clause 3(b) of the policy.</p> <p>3. it is important to note that hazardous substances will need to be stored in a place that will not be inundated during a 1 in 200 year inundation event.</p>

<p>catchment conditions warrant (as determined by a cost/benefit assessment).</p> <p>When determining areas subject to inundation, climate change projections including sea level rise are to be taken into account.</p>	
<p>Policy 11.3.5 General risk management approach For natural hazards and/or areas not addressed by policies 11.3.1, 11.3.2, and 11.3.3, subdivision, use or development of land shall be avoided if the risk from natural hazards is unacceptable. When determining whether risk is unacceptable, the following matters will be considered:</p> <ol style="list-style-type: none"> 1. the likelihood of the natural hazard event; and 2. the potential consequence of the natural hazard event for: people and communities, property and infrastructure and the environment, and the emergency response organisations. <p>Where there is uncertainty in the likelihood or consequences of a natural hazard event, the local authority shall adopt a precautionary approach.</p> <p>Formal risk management techniques should be used, such as the Risk Management Standard (AS/NZS ISO 31000:2009) or the Structural Design Action Standard (AS/NZS 1170.0:2002).</p>	<p>An assessment of natural hazard risks at the site should be undertaken to determine the best approach to management of those risks.</p> <p>Through Plan Change 28, Mackenzie District Council introduced a flood hazard assessment overlay, which covers the site, and a hydro-inundation overlay (relating to the Waitaki Power Scheme) that covers parts of the site. Part of the site also lies within the Liquefaction Assessment Overlay.</p> <p>Although a flood assessment has been provided by the applicant, it has not modelled a 1 in 500 year event as required under the RPS. A revised assessment should be carried to ensure that the substation, and transformers are not placed in high flood hazard areas.</p> <p>No assessment has been provided on the risk of liquefaction on the site.</p> <p>To fully determine consistency with this Objective, an updated flood hazard assessment and a liquefaction hazard assessment should be undertaken.</p>
<p>Chapter 12 – Landscape</p>	
<p>Objective 12.2.1 Identification and protection of outstanding natural features and landscapes</p>	<p>The site is within an Outstanding Natural Landscape. The applicant has provided a landscape assessment, which concludes that the proposal does not avoid effects on the outstanding natural</p>

<p>Outstanding natural features and landscapes within the Canterbury region are identified and their values are specifically recognised and protected from inappropriate subdivision, use, and development.</p>	<p>landscape values, with the overall impact at a low to moderate level.</p> <p>To determine consistency with this objective, more detail is needed on proposed methods to mitigate effects on the landscape values of the site.</p>
<p>Policy 12.3.2 Management methods for outstanding natural features and landscapes To ensure management methods in relation to subdivision, use or development, seek to achieve protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.</p>	<p>The site is within an Outstanding Natural Landscape. The applicant has provided a landscape assessment, which concludes that the proposal does not avoid effects on the outstanding natural landscape values, with the overall impact at a low to moderate level.</p> <p>To determine consistency with this objective, more detail is needed on proposed methods to mitigate effects on the landscape values of the site.</p>
<p>Policy 12.3.4 Consistency of identification and management of outstanding natural features and outstanding natural landscapes Seek to achieve regional consistency in the identification of outstanding natural features and landscape areas and values by:</p> <ol style="list-style-type: none"> 1. considering the following assessment matters which address biophysical, sensory and associative values when assessing landscapes in the Canterbury region: <ol style="list-style-type: none"> a. Natural science values b. Legibility values c. Aesthetic values d. Transient values e. Tāngata whenua values 	<p>2. It is important to note that there are other proposals for large solar arrays on the Mackenzie basin, with at least one adjoining the Haldon Solar project site. Cumulative effects on this Outstanding Natural Landscape should be considered when assessing this application, and others that will be forthcoming. Mitigation measures need to address those cumulative effects.</p> <p>To determine consistency with this objective, more detail is needed on proposed methods to mitigate effects on the landscape values of the site.</p>

<p>f. Shared and recognised values g. Historic values</p> <p>2. requiring methods for landscape management to be developed and considered, having regard to the management methods in adjoining districts or regions, and the extent to which these may, in combination, protect outstanding natural features and landscapes.</p>	
<p>Chapter 14 – Air Quality</p>	
<p>Objective 14.2.1 Maintain or improve ambient air quality Maintain or improve ambient air quality so that it is not a danger to people’s health and safety, and reduce the nuisance effects of low ambient air quality.</p>	<p>Given the size of the site, and provided good construction management techniques are adhered to, dust and nuisance effects should be managed appropriately so that it is not a danger to people’s health and safety. It is considered that the proposed activity would likely be consistent with this objective.</p>
<p>Objective 14.2.2 Localised adverse effects of discharges on air quality Enable the discharges of contaminants into air provided there are no significant localised adverse effects on social, cultural and amenity values, flora and fauna, and other natural and physical resources.</p>	<p>Given the size of the site, and provided good construction management techniques are adhered to, dust and nuisance effects should be managed appropriately so that there are not significant localised effects on social, cultural and amenity values, flora and fauna and other natural and physical resources. It is considered that the proposed activity would likely be consistent with this objective.</p>
<p>Policy 14.3.1 Maintain and improve ambient air quality In relation to ambient air quality:</p> <ol style="list-style-type: none"> 1. To set standards to maintain ambient air quality in Canterbury based on concentrations of contaminants that cause adverse health effects and nuisance 2. Where existing ambient air quality is higher than required by the standards set, to only allow the discharge of 	<p>Given the size of the site, and provided good construction management techniques are adhered to, dust and nuisance effects should be managed appropriately so that it is not a danger to people’s health and safety. It is considered that the proposed activity would likely be consistent with this policy.</p>

<p>contaminants into air where the adverse effects of the discharge on ambient air quality are minor.</p> <p>3. To give priority to ensuring that PM10 ambient air quality improvements are achieved in Rangiora, Kaiapoi, Christchurch, Ashburton, Timaru, Geraldine and Waimate.</p>	
<p>Policy 14.3.3 Avoid, remedy or mitigate localised adverse effects on air quality To set standards, conditions and terms for discharges of contaminants into the air to avoid, remedy or mitigate localised adverse effects on air quality.</p>	<p>Given the size of the site, and provided good construction management techniques are adhered to, dust and nuisance effects should be managed appropriately so that there are not significant localised effects. It is considered that the proposed activity would likely be consistent with this policy.</p>
<p>Chapter 15 - Soils</p>	
<p>Objective 15.2.1 Maintenance of soil quality Maintenance and improvement of the quality of Canterbury’s soil to safeguard their mauri, their life supporting capacity, their health and their productive capacity.</p>	<p>Further detail would be required to understand the contaminant type and concentration to determine potential effects on soil quality. Further information is required to assess the proposed activities against this objective.</p>
<p>Policy 15.3.1 Avoid remedy or mitigate soil degradation In relation to soil:</p> <ol style="list-style-type: none"> 1. to ensure that land-uses and land management practices avoid significant long-term adverse effects on soil quality, and to remedy or mitigate significant soil degradation where it has occurred, or is occurring; and 2. to promote land-use practices that maintain and improve soil quality. 	<p>Further detail would be required to understand the contaminant type and concentration to determine potential effects on soil, and if the proposal could result in significant long-term soil degradation. Further information is required to assess the proposed activities against this policy.</p>
<p>Chapter 16 - Energy</p>	
<p>Objective 16.2.1 Efficient use of energy</p>	<p>4. The siting of the solar farm within such close proximity to the national grid will ensure that there is minimal energy wastage in the conveying of electricity from the proposal substation to the</p>

<p>Development is located and designed to enable the efficient use of energy, including:</p> <ol style="list-style-type: none"> 1. maintaining an urban form that shortens trip distances 2. planning for efficient transport, including freight 3. encouraging energy-efficient urban design principles 4. reduction of energy waste 5. avoiding impacts on the ability to operate energy infrastructure efficiently. 	<p>transmission lines. However, Renewable Electricity Generation closer to existing urban areas, where the bulk of the electricity is used would give better effect to this objective.</p> <p>Further information is required to assess the proposed activities against this objective. Provided Transpower do not raise concerns around their ability to operate their energy infrastructure, the proposed activity would be consistent with this objective.</p>
<p>Objective 16.2.2 Promote a diverse and secure supply of energy Reliable and resilient generation and supply of energy for the region, and wider contributions beyond Canterbury, with a particular emphasis on renewable energy, which:</p> <ol style="list-style-type: none"> 1. provides for the appropriate use of the region’s renewable resources to generate energy; 2. reduces dependency on fossil fuels; 3. improves the efficient end-use of energy; 4. minimises transmission losses; 5. is diverse in the location, type and scale of renewable energy development; 6. recognises the locational constraints in the development of renewable electricity generation activities; and <ol style="list-style-type: none"> a. avoids any adverse effects on significant natural and physical resources and cultural values or where this is not practicable, remedies or mitigates; and b. appropriately controls other adverse effects on the environment. 	<p>If the proposal was to go ahead, it would contribute positively to energy security and add resilience to the energy generation capabilities in Canterbury and New Zealand more broadly. It would also increase New Zealand’s renewable energy capacity.</p> <ol style="list-style-type: none"> 1. The project would make use of the high sunshine hours and flat land on the Mackenzie Basin to generate energy. 2. The project would reduce dependency on fossil fuels. 4. The siting of the solar farm in such close proximity to the national grid will ensure that there is minimal transmission loss in conveying the electricity to existing national grid facilities. <p>However, Renewable Electricity Generation closer to existing urban areas, where the bulk of the electricity is used would give better effect to this objective.</p> <p>5. There are a number of other similar-sized solar farm applications being considered on the Mackenzie Basin, with one such proposal adjacent to this project site. This limits the diversity of location, type and scale of renewable energy development in the area. If all these projects were to go ahead, the Mackenzie Basin would contain at least five solar farms, totalling approximately 2,200ha, and producing approximately 1,328mW of energy. Given the Mackenzie Basin already produces 5,189GWh of energy from Hydro-electricity generation, this would mean that the Mackenzie</p>

	<p>Basin is producing a significant amount of renewable energy. Grouping renewable energy in one sub-region may be inconsistent with Objective 16.2.2.5 which seeks diversity in the location of renewable energy development.</p> <p>6. Renewable Electricity Generation (REG) activities have logistical and operational constraints because they need to be developed in locations where the electricity they produce can be connected to the national grid. Ideally generation activities should be sited close to where the electricity is used (mainly in urban centres) to minimise energy loss, but failing that, REG activities close to existing infrastructure such as substations and the national grid make sense.</p> <p>Solar arrays also have particular locational requirements, in that they should be in areas with high amounts of sunshine, and on reasonably flat terrain. The proposed site fits those requirements.</p> <p>To determine adverse effects and consistency with this objective, further information is needed on the values present at the site, and steps taken to avoid, remedy or mitigate any effects, including cumulative effects of multiple solar farm proposals in the Mackenzie Basin.</p>
<p>Policy 16.3.3 Benefits of renewable energy generation facilities To recognise and provide for the local, regional and national benefits when considering proposed or existing renewable energy generation facilities, having particular regard to the following:</p> <ol style="list-style-type: none"> 1. maintaining or increasing electricity generation capacity while avoiding, reducing or displacing greenhouse gas emissions; 	<ol style="list-style-type: none"> 1. The Haldon Solar project would increase electricity generation capacity and displace greenhouse gas emissions. 2. The project would also increase security of supply at local and regional levels by reducing the reliance on hydro-electricity generation that is dependent on lake levels being maintained. However, as noted above, there are some concerns with concentrating such a large amount of the nation's electricity generation in one location.

<ol style="list-style-type: none"> 2. maintaining or increasing the security of supply at local and regional levels, and also wider contributions beyond Canterbury; by diversifying the type and/or location of electricity generation; 3. using renewable natural resources rather than finite resources; 4. the reversibility of the adverse effects on the environment of some renewable electricity generation facilities; 5. avoiding reliance on imported fuels for the purposes of generating electricity; and 6. assisting in meeting international climate obligations. 	<ol style="list-style-type: none"> 3. The project uses renewable natural resources to generate electricity. 4. Should the project be discontinued at any stage, or come to the end of its life, the structures could be removed from the site and the land returned to its existing use. This would generate a large amount of waste for disposal with significant environmental effects. 5. The project would reduce reliance on imported fuels for electricity generation. 6. By displacing the need to use fossil fuels for electricity generation, the project would assist New Zealand in meeting international climate obligations. <p>While noting the concerns outlined above, it is considered that the proposed activity would likely be consistent with this policy.</p>
<p>Policy 16.3.4 Reliable and resilient electricity transmission network within Canterbury</p> <p>To encourage a reliable and resilient national electricity transmission network within Canterbury by:</p> <ol style="list-style-type: none"> 1. having particular regard to the local, regional and national benefits when considering operation, maintenance, upgrade or development of the electricity transmission network; 2. avoiding subdivision, use and development including urban or semi urban development patterns, which would otherwise limit the ability of the electricity transmission network to be operated, maintained, upgraded and developed; 3. enabling the operational, maintenance, upgrade, and development of the electricity transmission network provided that, as a result of route, site and method selection, where; 	<ol style="list-style-type: none"> 1. The project would have benefits for Canterbury and nationally by allowing for increased supply to the national grid. 3. More detail is required to determine how adverse effects on significant natural and physical resources and cultural values are to be avoided, remedied or mitigated, and other effects on the environment are to be controlled. <p>More information is required to determine whether the project would be consistent with this policy.</p>

<ul style="list-style-type: none"> a. the adverse effects on significant natural and physical resources or cultural values are avoided, or where this is not practicable, remedied or mitigated; and b. other adverse effects on the environment are appropriately controlled. 	
<p>Policy 16.3.5 Efficient, reliable and resilient electricity generation within Canterbury</p> <p>To recognise and provide for efficient, reliable and resilient electricity generation within Canterbury by:</p> <ul style="list-style-type: none"> 1. avoiding subdivision, use and development which limits the generation capacity from existing or consented electricity generation infrastructure to be used, upgraded or maintained; 2. enabling the upgrade of existing, or development of new electricity generation infrastructure, with a particular emphasis on encouraging the operation, maintenance and upgrade of renewable electricity generation activities and associated infrastructure: <ul style="list-style-type: none"> a. having particular regard to the locational, functional, operational or technical constraints that result in renewable electricity generation activities being located or designed in the manner proposed; b. provided that, as a result of site, design and method selection: <ul style="list-style-type: none"> i. the adverse effects on significant natural and physical resources or cultural values are avoided, or where this is not practicable remedied, mitigated or offset; and 	<p>2. As outlined under Objective 16.2.2 above, solar farm projects have locational, functional and operational constraints that make the proposed location suitable for such development. More information is needed to fully assess the environmental and cultural effects of the proposal and how those effects could be appropriately managed.</p> <p>To determine consistency with this policy, further information is needed to determine the potential environmental effects of the proposed energy generation on natural and physical resources.</p>

<ul style="list-style-type: none"> ii. other adverse effects on the environment are appropriately controlled. 3. providing for activities associated with the investigation, identification and assessment of potential sites and energy sources for renewable electricity generation; 4. maintaining the generation output and enabling the maximum electricity supply benefit to be obtained from the existing electricity generation facilities within Canterbury, where this can be achieved without resulting in additional significant adverse effects on the environment which are not fully offset or compensated. 	
<p>Chapter 17 – Contaminated Land</p>	
<p>Objective 17.2.1 Protection from adverse effects of contaminated land Protection of people and the environment from both on-site and off-site adverse effects of contaminated land</p>	<p>The site of the proposed substations and batteries would be considered HAIL sites. Provided these sites are managed appropriately, the proposed activities would likely be consistent with this objective.</p>
<p>Policy 17.3.2 Development of, or discharge from contaminated land In relation to actually or potentially contaminated land, where new subdivision, use or development is proposed on that land, or where there is a discharge of the contaminant from that land:</p> <ul style="list-style-type: none"> 1. a site investigation is to be undertaken to determine the nature and extent of any contamination; and 2. if it is found that the land is contaminated, except as provided for in Policy 17.3.3, the actual or potential adverse effects of that contamination, or discharges from the contaminated land shall be avoided, remedied or mitigated in a manner that does not lead to further significant adverse effects. 	<p>Information available does not indicate that the site in its current condition is contaminated, however it is advised that further investigations are undertaken to determine any contaminant levels (or not) at the site, to ensure that sufficient baseline data is available, and if remediation would be required post-activity. It is likely that this proposed activity would be consistent with this policy.</p> <p>A contaminated site has been identified adjacent to the site and consent conditions should be developed to ensure that this contamination is not spread by the proposed activity.</p>

Chapter 18 – Hazardous Substances	
<p>Objective 18.2.1 Avoid, remedy or mitigate adverse effects Adverse effects on the environment from the storage, use, disposal and transportation of hazardous substances are avoided, remedied or mitigated.</p>	<p>It is likely that the site will contain areas where hazardous substances are stored. Provided this storage occurs in accordance with relevant legislation and it carried out appropriately, it is considered that the proposed activity would be consistent with this objective.</p>
<p>Objective 18.2.2 New contamination of land To avoid contamination of land.</p>	<p>The location of the batteries would be identified as HAIL, but the area containing solar panels would not. Provided appropriate measures are taken with the installation and management of substations and batteries, the proposed activity would likely be consistent with this objective.</p>
<p>Policy 18.3.1 Protection of sensitive areas and activities Avoid actual or potential adverse effects, resulting from the use, storage or disposal of hazardous substances, in the following locations:</p> <ol style="list-style-type: none"> 1. High hazard areas 2. Within a community drinking water protection zone, or within such a distance from a community drinking water supply that there is a risk of contamination of that drinking water source 3. In areas of unconfined or semi-confined aquifer, where the depth to groundwater is such that there is a risk of contamination of that groundwater 4. Within the coastal marine area and in the beds of lakes and rivers 5. Within any area identified by a district or regional plan as being sensitive to the potential effects of hazardous substances, which may include, but are not limited to, areas such as wāhi tapu, urupā, institutions and residential areas. 	<p>It is likely that the site will contain areas where hazardous substances are stored. Provided this storage occurs in accordance with relevant legislation and it carried out appropriately, it is considered that the proposed activity would be consistent with this policy.</p>

<p>Policy 18.3.2 Avoid, remedy or mitigate adverse effects To avoid, remedy or mitigate adverse effects on the environment, including contamination of land, air and water, associated with the storage, use, transportation or disposal of hazardous substances.</p>	<p>It is likely that the site will contain areas where hazardous substances are stored. Provided this storage occurs in accordance with relevant legislation and it carried out appropriately, it is considered that the proposed activity would be consistent with this policy.</p>
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Appendix 9: Applicant's Proposed Condition with CRC Comments

The conditions tables provided below constitute the conditions proffered by the applicant, along with comments from CRC technical teams where any changes were sought.

Given the lack of details around ecological mitigation/offset/compensation conditions, further work is required on the condition set. CRC has discussed this with the Applicant, who are willing to continue to engage on conditions, and a working document can be established for the Applicant to respond to CRC's specific comments provided below, as well as the applicant providing further ecological mitigation/offset/compensation conditions.

CRC notes that the MDC condition set has some overlap and matters commented on, as such CRC would like to work with MDC and the Applicant over these.

Discharge Permit – to Discharge Construction Phase Stormwater to Land

CRC261666 - S15 Discharge Permit

Applicant: Lodestone Energy Limited

Duration: 10 years

Condition Number	Applicant's Proposed Conditions	CRC Comments
Limits		
1.	The activity authorised under this resource consent is limited to the discharge of sediment-laden stormwater from exposed areas during the development of a solar farm and associated National Grid connection at Haldon Station on land legally described as Part Reserve 1358 held in Record of Title CB437/82 and shown in Plan CRC[XXXX].	
2.	Sediment laden stormwater must be discharged: <ul style="list-style-type: none"> a. In accordance with the Erosion and Sediment Control Plan (“ESCP”) required by Condition 6 of this resource consent; and c. Onto and/or into land via soak holes, excavations and bunded areas. 	

	Advice note: Discharge must not occur beyond the perimeter of the site.	
Prior to Commencement of Work		
3.	<p>Prior to the commencement of the activities described in Condition 1, all personnel working on the site must be made aware of and have access to:</p> <ul style="list-style-type: none"> a. The contents of this resource consent document; b. The ESCP and other discharge treatment methodologies; and c. Resource Consents CRC[XXXX] [earthworks land use consent] or any subsequent replacement, and all associated documents. 	
4.	All erosion and sediment control measures detailed in the ESCP required by Condition 6 of this resource consent must be installed prior to the commencement of any earthworks or stripping of vegetation and topsoil occurring on the site.	
5.	<p>No later than five working days prior to the commencement of works on site, the Consent Holder must request a pre-construction site meeting with the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring (via ECInfo@ECan.govt.nz), and all relevant parties, including the primary contractor. At a minimum, the following must be covered at the meeting:</p> <ul style="list-style-type: none"> a. Scheduling and staging of the works; 	

	<ul style="list-style-type: none"> b. Responsibilities of all relevant parties, including confirmation that the person or persons implementing the ESCP on the site are suitably trained and/or experienced; c. Contact details for all relevant parties; d. Expectations regarding communication between all relevant parties; e. Procedures for implementing any amendments; f. Site inspection; and g. Confirmation that all relevant parties have copies of the contents of this resource consent document and all associated erosion and sediment control plans and any other discharge treatment methodologies employed. 	
Erosion and Sediment Control		
6.	<p>No less than 20 working days prior to the commencement of any physical works for the initial construction on the site, the Consent Holder must submit an Erosion and Sediment Control Plan (“ESCP”) to the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring, for certification.</p> <p>Certification is required to demonstrate that the ESCP:</p> <ul style="list-style-type: none"> a. provides the mean to achieve the objective as set out in Condition 7; and 	

	<p>b. complies with the Erosion and Sediment Control Toolbox for the Canterbury Region (“ESCT”) and the conditions of this resource consent.</p> <p>The discharge must not commence until certification has been received from the Canterbury Regional Council that the ESCP is consistent with the ESCT or equivalent industry guideline as per the requirements under Condition 6(b)(ii), and the conditions of this resource consent.</p> <p>If the ESCP has not been reviewed and/or certified within ten working days of the Regional Leader – Compliance Monitoring receiving the ESCP, the discharge may commence.</p>	
7.	<p>The ESCP must demonstrate how earthworks will be managed so as to avoid, remedy or mitigate adverse effects on the environment. To achieve this outcome, the plan must include:</p> <ul style="list-style-type: none"> a. best practicable sediment control measures that will be implemented to ensure compliance with the conditions of this resource consent; b. Be prepared by a suitably qualified person with experience in erosion and sediment control in accordance with: <ul style="list-style-type: none"> i. Canterbury Regional Council’s Erosion and Sediment Control Toolbox for the Canterbury Region (ESCT), which can be accessed under http://escscanterbury.co.nz/; or 	

	<ul style="list-style-type: none"> ii. An equivalent industry guideline. If an alternative guideline is used, the ESCP must provide details of the relevant alternative methods used and an explanation of why they are more appropriate than the ESCT; and c. Be signed by an engineer or suitably qualified person with experience in erosion and sediment control, confirming that the erosion and sediment control measures for the site are appropriately sized and located in accordance with the ESCT or alternative guideline. <p>Advice note: <i>The ESCP may be the same as that required under Condition (6) of CRC[XXXXXX] [earthworks land use consent].</i></p>	
8.	<p>The ESCP required by Condition 6 must also:</p> <ul style="list-style-type: none"> a. Include a map showing the location of all works; b. Provide detailed plans showing the location of sediment control measures, on-site catchment boundaries, and sources of runoff; c. Detail how best practicable measures are taken to minimise discharges of sediment-laden stormwater run-off beyond the boundaries of the site; d. Include drawings and specifications of designated sediment control measures, if these are not designed and installed in accordance with the ESCT; 	

	<ul style="list-style-type: none"> e. Include a confirmation that the erosion and sediment control devices have been sized appropriately in accordance with the ESCT; f. Include a programme of works, including a proposed timeframe for each stage of the works and the earthworks methodology; g. Detail the management of any stockpiled material; h. Detail inspection and maintenance of the sediment control measures; i. Define the discharge points where stormwater is discharged onto land / infiltrates into land; j. Include a description of dust mitigation to be used and details of best practicable options to be applied to mitigate dust and sediment discharge beyond the site boundary; k. Detail the methodology for stabilising the site if works are paused for more than five working days or abandoned; and l. Detail the methodology for stabilising the site and appropriate decommissioning of all erosion and sediment control measures after works have been completed. 	
9.	The ESCP may be amended at any time. Any amendments must be:	

	<ul style="list-style-type: none"> a. Only for the purpose of improving the efficacy of the erosion and sediment control measures and must not result in reduced discharge quality; and b. For the purpose of applying best practicable measures to mitigate dust and sediment transport off-site; c. Consistent with the conditions of this resource consent; and d. Submitted to and certified in writing by the Canterbury Regional Council, Attention: Regional Leader Compliance Monitoring, prior to any amendment being implemented. 	
10.	Erosion and sediment control measures must be inspected regularly and within 24 hours following any rainfall event that results in more than five millimetres of rainfall at the site. Any accumulated sediment must be removed, and repairs made, as necessary, to ensure effective functioning of measures and devices. Records of any inspections must be kept and provided to the Canterbury Regional Council on request.	
11.	If the Consent Holder abandons work on-site, or pauses works for more than five working days, adequate preventative and remedial measures must be taken to control sediment discharged from exposed or unconsolidated surfaces. These measures must be maintained for so long as necessary to prevent sediment discharges from the earth worked areas.	
Dust Management		

<p>12.</p>	<p>No less than 20 working days prior to the commencement of any physical works for the initial construction on the site, the Consent Holder must submit a Dust Management Plan (“DMP”) to the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring, for certification.</p> <p>Certification is required to demonstrate that the DMP:</p> <ul style="list-style-type: none"> a. provides the means to achieve the objective as set out in Condition 13; and b. complies with the requirements of Schedule 2 of the Canterbury Air Regional Plan. <p>The discharge of dust must not commence until certification has been received from the Canterbury Regional Council that the DMP is consistent with the requirements of Schedule 2 of the Canterbury Air Regional Plan or equivalent industry guideline.</p> <p>If the DMP has not been reviewed and/or certified within ten working days of the Regional Leader – Compliance Monitoring receiving the DMP, the discharge may commence.</p>	<p>CRC Consent Planning notes that dust discharges would be permitted by Rule 7.32 of the Canterbury Air Regional Plan, provided that a DMP prepared in accordance with Schedule 2 is provided. I.e., conditions 12-14 relate to a permitted activity.</p> <p>Notwithstanding, CRC considers it appropriate to apply the applicant’s Augier conditions on dust to ensure that the requirement for an appropriate DMP is recorded in the consents.</p>
<p>13.</p>	<p>The DMP must demonstrate how dust generating activities will be managed so as to avoid, remedy or mitigate adverse effects on the environment. To achieve this outcome, the plan must include:</p>	

	<p>a. Best practicable dust control measures that will be implemented to ensure compliance with the conditions of this resource consent;</p> <p>b. Be prepared by a suitably qualified person with experience in air quality control in accordance with the requirements of Schedule 2 of the Canterbury Air Regional Plan or equivalent industry guideline.</p> <p>Advice note: <i>The DMP may be the same as that required under Condition (6) of CRC[XXXXXX] [earthworks land use consent].</i></p>	
14.	<p>The DMP may be amended at any time. Any amendments must be:</p> <p>a. Only for the purpose of improving the efficacy of the dust control measures and must not result in reduced discharge quality; and</p> <p>b. For the purpose of applying best practicable measures to mitigate dust transport off-site;</p> <p>c. Consistent with the conditions of this resource consent; and</p> <p>d. Submitted to and certified in writing by the Canterbury Regional Council, Attention: Regional Leader Compliance Monitoring, prior to any amendment being implemented.</p>	
During Works		
15.	All practicable measures must be taken to:	

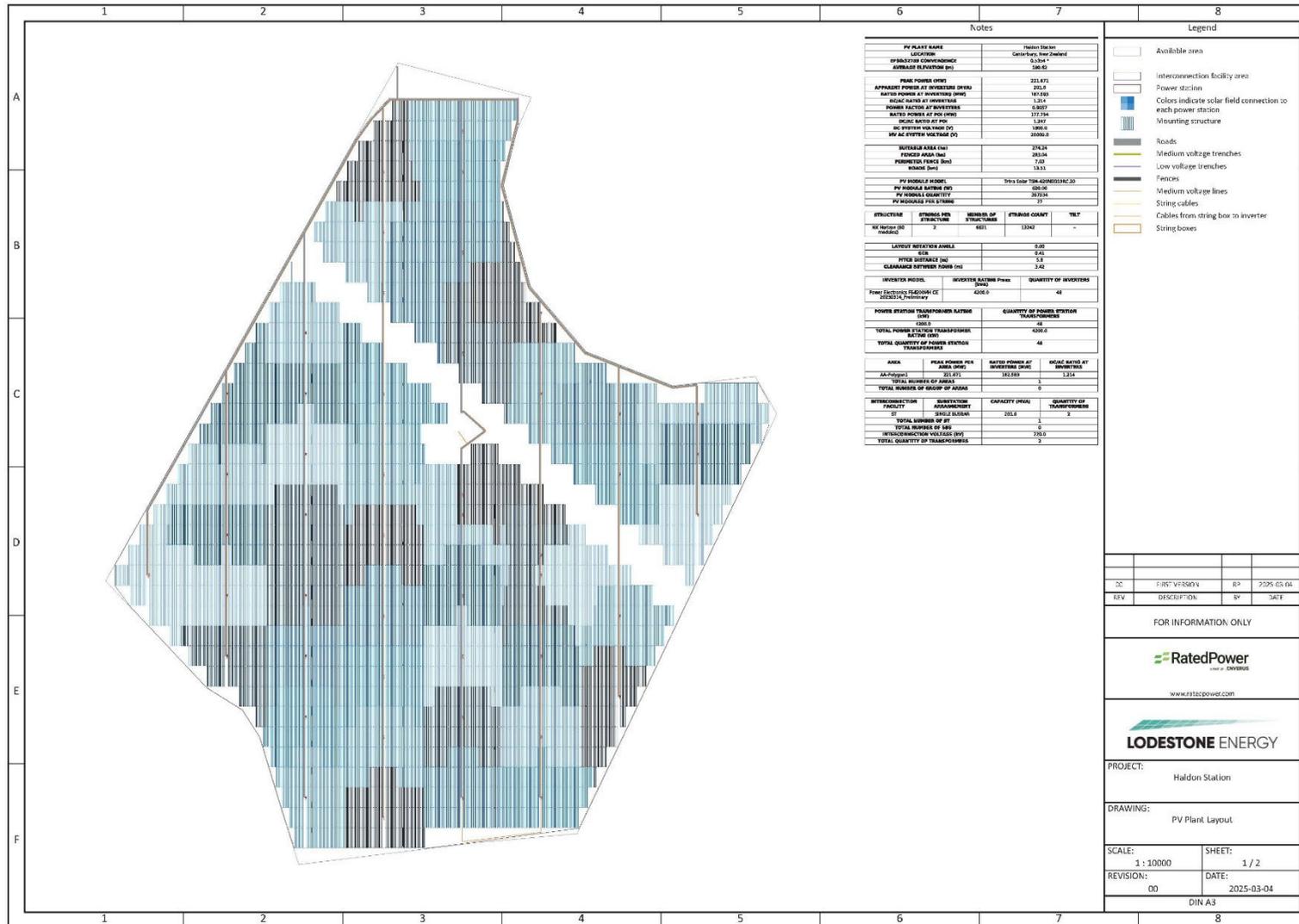
	<ul style="list-style-type: none"> a. Minimise the potential for sediment-laden stormwater runoff to be generated; b. Prevent soil erosion as a result of stormwater runoff generated from the works area; c. Avoid adverse effects on the foundations of any National Grid support structure; d. Avoid placing excavated material in a position where it may become entrained in stormwater runoff and discharged to: <ul style="list-style-type: none"> i. Any surface water body; and/or ii. Any neighbouring site. 	
Monitoring		
16.	<p>During works and when a discharge of construction-phase stormwater is occurring, the stormwater runoff generated during the rainfall and flowing towards the discharge points into land must be visually assessed for:</p> <ul style="list-style-type: none"> a. Any sheen of oil or grease or discoloration (other than discolouration from sediment); and b. Any sludge or emulsion; and c. Observations must be photographed and recorded; and 	

	<p>d. Records of visual assessments including photographs must be kept and provided to Canterbury Regional Council on request.</p>	
<p>Spills</p>		
<p>17.</p>	<p>All practicable measures must be taken to avoid spills of fuel or any other hazardous substances within the site. These measures must include:</p> <ul style="list-style-type: none"> a. Refuelling of machinery and vehicles must not occur within 20 metres of: <ul style="list-style-type: none"> i. Open excavations; ii. Exposed groundwater; iii. Surface water bodies; or iv. Stormwater devices. b. A spill kit must be kept on site that is capable of absorbing the quantity of oil and petroleum products that may be spilt on site at any one time. c. In the event of a spill of fuel or any other hazardous substance, the spill must be cleaned up as soon as practicable, the stormwater system must be inspected and cleaned, and measures taken to prevent a recurrence; d. The Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring, must be informed within 24 hours 	

	<p>of a spill event exceeding five litres and the following information provided:</p> <ol style="list-style-type: none"> i. The date, time, location and estimated volume of the spill; ii. The cause of the spill; iii. The type of hazardous substance(s) spilled; iv. Clean up procedures undertaken; v. Details of the steps taken to control and remediate the effects of the spill on the receiving environment; vi. An assessment of any potential effects of the spill; and vii. Measures to be undertaken to prevent a recurrence. 	
Upon Completion of Works		
18.	<p>Erosion and sediment control measures must not be decommissioned until the site is stabilised and the stormwater system for the developed site is functioning. Decommissioning of the measures must be undertaken in the following order:</p> <ol style="list-style-type: none"> a. All disturbed areas must be stabilised and/or re-vegetated as soon as practicable following completion of the works; b. Any visible debris, litter, sediment and hydrocarbons must be removed from all sediment control measures and disposed at a suitable facility; and 	

	<p>c. Erosion and sediment control measures must be removed.</p> <p>Advice Note: <i>The use of polymers for site stabilisation purposes, including those forming a component of hydro-seeding formulas, may require separate authorisations under the Resource Management Act 1991. Further, polymers are not considered a long-term or permanent stabilisation technique and may require repeated application to ensure the site remains stabilised.</i></p>	
Administration		
19.	<p>The Canterbury Regional Council may annually, on the last working day of May or November, serve notice of its intention to review the conditions of this resource consent for the purposes of:</p> <ul style="list-style-type: none"> a. Dealing with adverse effect on the environment which may arise from the exercise of this resource consent, and which is not appropriate to deal with at a later stage; or b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment. 	
Plan CRC[XXXX]	Site Layout Plan	

Attachment One – Indicative Site Layout Plan



Land Use Consent – to Use land for Earthworks Associated with Establishing a Solar Farm and Connection to the National Grid over an unconfined or semi-confined aquifer

CRC261665 - S9 Land Use Consent

Applicant: Lodestone Energy Limited

Duration: 10 years

Condition Number	Applicant's Proposed Conditions	CRC Comments
Definitions		
	<p>'Earthworks' means the excavation of, and/or filling with topsoil, subsoil, sediments, rock and/or underlying materials on which the site is formed. Earthworks include but are not limited to the construction and maintenance of roads, ground shaping (recontouring), root raking and blading.</p> <p>For the purpose of this consent earthworks excludes the establishment of erosion and sediment control measures.</p>	<p>Comments focus on areas where CRC technical teams have specific concerns or requests. Additional clarifying comments from CRC Consent Planning are provided <i>[in parentheses]</i>.</p>

	<p>'Stabilised' means an area inherently resilient to erosion such as rock (excluding friable sedimentary rocks such as sandstones and mudstones) or rendered resilient to erosion by the application of aggregate, vegetation or mulch. Where vegetation is used on a surface which is not otherwise resistant to erosion, the surface is considered stabilised once 80 percent vegetation cover has been established.</p> <p>'Disturbed land' means land which has not been stabilised.</p>	
Limits		
1	<p>The activity authorised by this resource consent must be limited to excavation and earthworks across the site associated with the development of a solar farm and associated National Grid connection within the site at Haldon Station on land legally described as Part Reserve 1358 held in Record of Title CB437/82 and shown in Plan CRC[XXXX].</p>	
2	<p>No excavation works must be carried out within the exposed water table during times when groundwater levels are higher than the deepest part of the excavations.</p>	

Prior to Commencement of Works

3	<p>Prior to commencement of the works described in Condition 1, all personnel working on the site must be made aware of, and have access to, the following:</p> <ul style="list-style-type: none">a. The contents of this resource consent document and all associated documents;b. Resource Consent CRC[XXXX] [construction stormwater discharge], or any subsequent replacement, and all associated documents, andc. The Erosion and Sediment Control Plan (“ESCP”) required to be prepared and maintained under Condition 7 of this consent.	
4	<p>No later than five working days prior to the commencement of works on site, the Canterbury Regional Council, Attention: Regional Leader - Compliance Monitoring (via ECInfo@ECan.govt.nz) must be informed of the commencement of works.</p>	
5	<p>No later than ten working days prior to the commencement of works on site, the Consent Holder must request a pre-construction site meeting with the Canterbury Regional Council, Attention: Regional Leader - Compliance Monitoring (via ECInfo@ECan.govt.nz), and all relevant parties, including the primary contractor. At a minimum, the following must be covered at the meeting:</p>	

	<ul style="list-style-type: none"> a. Scheduling and staging of the works; b. Responsibilities of all relevant parties, including confirmation that the person [or persons] implementing the ESCP on the site is [are] suitably trained and/or experienced; c. Contact details for all relevant parties; d. Expectations regarding communication between all relevant parties; e. Procedures for implementing any amendments; f. Site inspection; and g. Confirmation that all relevant parties have copies of the contents of this resource consent document and all associated erosion and sediment control plans and any other discharge treatment methodologies employed. 	
6	All erosion and sediment control measures detailed in the ESCP required by Condition 7 of this resource consent must be installed prior to the commencement of any earthworks or stripping of vegetation and topsoil occurring on the site.	
Erosion and Sediment Control		
7	No less than 20 working days prior to the commencement of any physical works for the initial construction on the site, the Consent Holder must submit an Erosion and Sediment Control Plan	

	<p>(“ESCP”) to the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring, for certification.</p> <p>Certification is required to demonstrate that the ESCP:</p> <ol style="list-style-type: none"> a. provides the mean to achieve the objective as set out in Condition 8; and b. complies with the Erosion and Sediment Control Toolbox for the Canterbury Region (“ESCT”) and the conditions of this resource consent. <p>The discharge must not commence until certification has been received from the Canterbury Regional Council that the ESCP is consistent with the ESCT or equivalent industry guideline as per the requirements under Condition 6(b)(ii), and the conditions of this resource consent.</p> <p>If the ESCP has not been reviewed and/or certified within ten working days of the Regional Leader – Compliance Monitoring receiving the ESCP, the discharge may commence.</p>	
8	<p>The ESCP must demonstrate how earthworks will be managed so as to avoid, remedy or mitigate adverse effects on the environment. To achieve this outcome, the plan must include:</p> <ol style="list-style-type: none"> a. best practicable sediment control measures that will be implemented to ensure compliance with the conditions of this resource consent; 	<p>CRC Land Resources: During the construction phase, earthworks carried out could result in runoff due to soil compaction from heavy machinery. However, I consider the mitigations outlined in the erosion and sediment control plan (ESCP) are satisfactory</p>

	<p>b. Be prepared by a suitably qualified person with experience in erosion and sediment control in accordance with:</p> <ul style="list-style-type: none"> i. Canterbury Regional Council’s Erosion and Sediment Control Toolbox for the Canterbury Region (ESCT), which can be accessed under http://escscanterbury.co.nz/; or ii. An equivalent industry guideline. If an alternative guideline is used, the ESCP must provide details of the relevant alternative methods used and an explanation of why they are more appropriate than the ESCT; and <p>c. Be signed by an engineer or suitably qualified person with experience in erosion and sediment control, confirming that the erosion and sediment control measures for the site are appropriately sized and located in accordance with the ESCT or alternative guideline.</p> <p>Advice note: <i>The ESCP may be the same as that required under Condition (6) of CRC[XXXXXX] [earthworks land use consent].</i></p>	<p>to reduce the risk of runoff from most rainfall events.</p> <p>CRC Contaminated Land:</p> <p>Earthworks may intersect HAIL site of landfill <i>[north western boundary of site, opposite campsite]</i>. This was not included in the conceptual model of the PSI. Suggest inclusion of condition requiring a management plan during construction-phase to cover risks of earthworks intersecting landfill. Also recommend discovery protocol <i>[proffered below]</i>.</p>
9	<p>The ESCP required by Condition 7 must also:</p> <ul style="list-style-type: none"> a. Include a map showing the location of all works; b. Provide detailed plans showing the location of sediment control measures, on-site catchment boundaries, and sources of runoff; 	

	<ul style="list-style-type: none">c. Detail how best practicable measures are taken to minimise discharges of sediment-laden stormwater run-off beyond the boundaries of the site;d. Include drawings and specifications of designated sediment control measures, if these are not designed and installed in accordance with the ESCT;e. Include a confirmation that the erosion and sediment control devices have been sized appropriately in accordance with the ESCT;f. Include a programme of works, including a proposed timeframe for each stage of the works and the earthworks methodology;g. Detail the management of any stockpiled material;h. Detail inspection and maintenance of the sediment control measures;i. Define the discharge points where stormwater is discharged onto land / infiltrates into land;j. Include a description of dust mitigation to be used and details of best practicable options to be applied to mitigate dust and sediment discharge beyond the site boundary;k. Detail the methodology for stabilising the site if works are paused for more than five working days or abandoned; and	
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	Detail the methodology for stabilising the site and appropriate decommissioning of all erosion and sediment control measures after works have been completed.	
10	<p>The ESCP may be amended at any time. Any amendments must be:</p> <ul style="list-style-type: none"> a. Only for the purpose of improving the efficacy of the erosion and sediment control measures and must not result in reduced discharge quality; and b. For the purpose of applying best practicable measures to mitigate dust and sediment transport off-site; c. Consistent with the conditions of this resource consent; and <p>Submitted to and certified in writing by the Canterbury Regional Council, Attention: Regional Leader Compliance Monitoring, prior to any amendment being implemented.</p>	
11	Erosion and sediment control measures must be inspected regularly and within 24 hours following any rainfall event that results in more than five millimetres of rainfall at the site. Any accumulated sediment must be removed, and repairs made, as necessary, to ensure effective functioning of measures and devices. Records of any inspections must be kept and provided to the Canterbury Regional Council on request.	
12	If the Consent Holder abandons work on-site, or pauses works for more than five working days, adequate preventative and remedial measures must be taken to control sediment discharged from	

	<p>exposed or unconsolidated surfaces. These measures must be maintained for so long as necessary to prevent sediment discharges from the earth worked areas.</p>	
13	<p>The erosion and sediment control measures must not be decommissioned until the site is stabilised and the stormwater system for the developed site is functioning. Decommissioning measures must be undertaken in the following order:</p> <ul style="list-style-type: none"> a. All disturbed areas must be stabilised and/or re-vegetated as soon as practicable following completion of the works; b. Any visible debris, litter, sediment and hydrocarbons must be removed from all sediment control measures; and c. Erosion and sediment control measures must be removed. 	
Dust Management		
14	<p>No less than 20 working days prior to the commencement of any physical works for the initial construction on the site, the Consent Holder must submit a Dust Management Plan (“DMP”) to the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring, for certification.</p> <p>Certification is required to demonstrate that the DMP:</p> <ul style="list-style-type: none"> a. provides the means to achieve the objective as set out in Condition 15; and 	

	<p>b. complies with the requirements of Schedule 2 of the Canterbury Air Regional Plan.</p> <p>The discharge of dust must not commence until certification has been received from the Canterbury Regional Council that the DMP is consistent with the requirements of Schedule 2 of the Canterbury Air Regional Plan or equivalent industry guideline.</p> <p>If the DMP has not been reviewed and/or certified within ten working days of the Regional Leader – Compliance Monitoring receiving the DMP, the discharge may commence.</p>	
15	<p>The DMP must demonstrate how dust generating activities will be managed so as to avoid, remedy or mitigate adverse effects on the environment. To achieve this outcome, the plan must include:</p> <p>a. Best practicable dust control measures that will be implemented to ensure compliance with the conditions of this resource consent;</p> <p>b. Be prepared by a suitably qualified person with experience in air quality control in accordance with the requirements of Schedule 2 of the Canterbury Air Regional Plan or equivalent industry guideline.</p> <p>Advice note: <i>The DMP may be the same as that required under Condition (6) of CRC[XXXXXX] [earthworks land use consent].</i></p>	
16	<p>The DMP may be amended at any time. Any amendments must be:</p>	

	<ul style="list-style-type: none"> a. Only for the purpose of improving the efficacy of the dust control measures and must not result in reduced discharge quality; and b. For the purpose of applying best practicable measures to mitigate dust transport off-site; c. Consistent with the conditions of this resource consent; and <p>Submitted to and certified in writing by the Canterbury Regional Council, Attention: Regional Leader Compliance Monitoring, prior to any amendment being implemented.</p>	
Accidental Discovery of Contaminants		
17	<p>In the event that any unexpected, contaminated soil or material is uncovered by the works, an accidental discovery protocol must be implemented, including but not limited to the following steps:</p> <ul style="list-style-type: none"> a. Earthworks within ten metres of the encountered contaminants must cease immediately; b. All practicable steps must be taken to prevent the contaminated material becoming entrained in stormwater. Immediate steps must include, where practicable: <ul style="list-style-type: none"> i. diverting any stormwater runoff from surrounding areas away from the contaminated material; and 	<p>CRC Consent Planning: We prefer to avoid “unexpected” or “Accidental” in such condition wording to avoid discussion around what may have been an accident or unexpected. Prefer condition to be titled “Discovery of Contaminants” and wording “In the event that any contaminated soil or material...” etc. Applies to other such conditions below.</p>

	<ul style="list-style-type: none"> ii. minimising the exposure of the contaminated material, including covering the contaminants with an impervious cover; c. Notification of the Canterbury Regional Council, Attention: Contaminated Sites Manager and Regional Leader - Compliance Monitoring (via ecinfo@ecan.govt.nz), within 24 hours of the discovery; d. Earthworks within ten metres of encountered contaminants must not recommence until a suitably qualified and experienced contaminated land practitioner in contaminated land confirms to Canterbury Regional Council, Attention: Regional Leader - Compliance Monitoring (via ecinfo@ecan.govt.nz) that continuing works does not represent a significant risk to the environment; and e. All records and documentation associated with the discovery must be kept and copies must be provided to the Canterbury Regional Council upon request. 	
18	Any material removed from the site during the works that is potentially or confirmed as contaminated, must be disposed of at a facility authorised to receive such material.	
Spills		

19	<p>All practicable measures must be taken to avoid spills of fuel or any other hazardous substances within the site. These measures must include:</p> <ul style="list-style-type: none">a. Refuelling of machinery and vehicles must not occur within 20 metres of:<ul style="list-style-type: none">i. open excavations;ii. exposed groundwater; andiii. stormwater devices.b. A spill kit must be kept on site that is capable of absorbing the quantity of oil and petroleum products that may be spilt on site at any one time, remains on site at all times.c. In the event of a spill of fuel or any other hazardous substance, the spill must be cleaned up as soon as practicable, the stormwater system must be inspected and cleaned, and measures taken to prevent a recurrence;d. The Canterbury Regional Council, Attention: Regional Leader - Compliance Monitoring (via ecinfo@ecan.govt.nz), must be informed within 24 hours of a spill event exceeding five litres and the following information provided:<ul style="list-style-type: none">i. the date, time, location and estimated volume of the spill	
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	<ul style="list-style-type: none"> ii. the cause of the spill; iii. the type of hazardous substance(s) spilled; iv. clean up procedures undertaken; v. details of the steps taken to control and remediate the effects of the spill on the receiving environment; vi. an assessment of any potential effects of the spill; and vii. measures to be undertaken to prevent a recurrence 	
Accidental Artesian Aquifer Interception		
18	<p>In the event of an accidental interception or unanticipated levels of artesian flows, all practicable measures must be undertaken to remedy or mitigate any change in aquifer pressure, water quality or temperature. This must include:</p> <ul style="list-style-type: none"> a. The contractor must immediately cease all works within the immediate area of excavation that caused the interception of the artesian flows; b. The contractor must determine and document whether the flow is constant or increasing, if the turbidity is constant or increasing and if the flow is confined to the excavation; c. The contractor must notify the site engineer and/or other appropriate personnel to determine the emergency 	<p>CRC Groundwater Science: The aquifer is considered unconfined or semi-confined and therefore unlikely to intercept artesian aquifer conditions.</p>

	<p>measures required to arrest the artesian flow. Emergency measures must include, but not be limited to:</p> <ul style="list-style-type: none">i. the installation of a layer of impermeable material to the extent required to reform a capping layer over the aquifer to prevent the upward movement of groundwater through the confining layer; orii. inserting a vertical pipe in the aquifer interception point (if practicable) and provide for a secure seal against the pipe to enable the stabilisation of the artesian flow in the pipe, and to determine the above ground water level to assess any further measures. <p>d. The temporary artesian flow beyond the excavation must be controlled and mitigated with appropriate erosion and sediment control measures;</p> <p>e. The Canterbury Regional Council, Attention: Regional Leader - Monitoring and Compliance (via ecinfo@ecan.govt.nz) must be notified as soon as practicable but no later than two working days after the interception; and</p> <p>f. Upon remediation and arresting of flow from the aquifer interception, the construction methodology must be reconsidered and, if required, revised to avoid future interceptions of the aquifer</p>	
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Accidental Discovery of Archaeological Material

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In the event of any discovery of archaeological material the Consent Holder must immediately:

- a. Cease earthmoving operations in the affected area and mark off the affected area;
- b. Advise the Canterbury Regional Council of the disturbance; and
- c. Advise Heritage New Zealand Pouhere Taonga (HNZPT) of the disturbance.

Advice Notes:

Affected area means the whole or any part of any site known or reasonably suspected to be an archaeological site, and which could be disturbed or otherwise impacted by any works.

This condition may be in addition to any agreements that are in place between the Consent Holder and the Papatipu Rūnanga. (Cultural Site Accidental Discovery Protocol).

Under the Heritage New Zealand Pouhere Taonga Act 2014 an archaeological site is defined as any place associated with pre-1900 human activity, where there is material evidence relating to the history of New Zealand. For sites solely of Māori origin, this evidence may be in the form of accumulations of shell, bone, charcoal, burnt stones, etc. In later sites, artefacts such as bottles

	<p><i>or broken glass, ceramics, metals, etc. may be found or evidence of old foundations, wells, drains, tailings, races or other structures. Human remains/kōiwi may date to any historic period. It is unlawful for any person to destroy, damage, or modify the whole or any part of an archaeological site without the prior authority of Heritage New Zealand Pouhere Taonga. This is the case regardless of the legal status of the land on which the site is located, whether the activity is permitted under the District or Regional Plan or whether a resource or building consent has been granted. The Heritage New Zealand Pouhere Taonga Act 2014 provides for substantial penalties for unauthorised damage or destruction.</i></p>	
20	<p>If accidentally discovered material is suspected to be Kōiwi Tangata (human bones), taonga (treasured artefacts) or a Māori archaeological site:</p> <ul style="list-style-type: none"> a. the Consent Holder must immediately advise the office of the Papatipu Rūnanga (office contact information can be obtained from the Canterbury Regional Council) of the discovery; and b. the nature of the material must be confirmed by a qualified archaeologist appointed by the Papatipu Rūnanga and HNZPT. 	

21	<p>If the archaeological material is determined to be Kōiwi Tangata (human bones) by a qualified archaeologist, the Consent Holder must:</p> <ul style="list-style-type: none"> a. immediately advise the New Zealand Police of the disturbance; b. consult with the Papatipu Rūnanga on any matters of tikanga (protocol) that are required in relation to the discovery and prior to the commencement of any investigation; and c. treat the area with utmost discretion and respect and manage the kōiwi in accordance with both statutory obligations under the HNZPT Act 2014 and tikanga, as guided by the Papatipu Rūnanga. 	
21	<p>If accidentally discovered material is not suspected or confirmed to be Kōiwi Tangata (human bones), taonga (treasured artefacts) or a Māori archaeological site, work may recommence once Heritage New Zealand Pouhere Taonga Trust advises the Consent Holder that work can recommence.</p>	
Soil Monitoring		
22	<p>The Consent Holder must engage a suitably qualified and experienced practitioner in Soil Sciences to develop a Soil Monitoring Plan with the objective of determining potential long-term soil changes from utility-scale solar installations.</p>	<p>CRC Consent Planning: Conditions 22-26 should be under the s15 Discharge Permit for operational stormwater discharges (below), given that ongoing monitoring is required, and it is the effects of potential contaminants</p>

	<p>To achieve this objective, the Soil Monitoring Plan must include:</p> <ul style="list-style-type: none"> a. Identification of appropriate soil health characteristics; b. Monitoring methodologies and frequencies to understand those soil health characteristics; c. Requirements for reporting; and d. The review and evaluation of the Soil Monitoring Plan throughout the life of the project. 	<p>discharges, and soil effects on the discharges, that are of concern, and that s15 consent would apply for 35 years, allowing for the 10-yearly testing in these conditions.</p> <p>CRC Land Resources: Consent condition 22-29 regarding soil monitoring is very thorough. I think this and the Stormwater Management Plan condition 9.c in the Discharge Permit – to Discharge Operational Phase Stormwater to Land could be joined together into one programme as follows:</p> <ul style="list-style-type: none"> a) An initial soil survey before commencing works on site as stated in conditions 22-29. The site could be divided into 3 sections (~110 ha each). 50 sub samples per section are taken at 0-7.5 cm and each section is bulked together and a sample analysed for: <ul style="list-style-type: none"> i. pH ii. Electrical Conductivity iii. Silver iv. Cadmium
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		<ul style="list-style-type: none">v. Coppervi. Leadvii. Antimonyviii. Zincix. Per-fluorinated compounds (PFAs) <p>(b) At 3 sub sites within each of the 3 sections, to a depth of 7.5 cm the following are analysed:</p> <ul style="list-style-type: none">i. bulk densityii. aggregate stability <p>(c) 5 years after installation repeat sampling as in (a) above.</p> <p>(d) At 10 years post installation repeat as in (a) above.</p> <p>(e) If values returned in (d) are below recommended limits, then extend sampling intervals to 10-year intervals.</p>
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		<p>(f) If any values returned in (d) are above guideline limits, a mitigation plan¹ is required to reduce those concentrations which have exceeded the limits. Repeat sampling as for (c) at 5-year intervals.</p> <p>(g) At cessation of the consent period and before removal of the solar arrays, repeat the sampling outlined in (a). Once the site has been rehabilitated repeat the sampling in (b) to ensure a similar soil quality as at the start of the consent period.</p> <p><i>[CRC Consent Planning notes that CRC Land Resources is generally satisfied with the content of these conditions, and combining the conditions into that specified above may not be strictly necessary. Specific sampling rates and depth have also been recommended.]</i></p>
23	<p>The Soil Monitoring Plan must include the following:</p> <ul style="list-style-type: none"> a. Testing for soil health parameters including at least: <ul style="list-style-type: none"> i. Bulk density 	

	<ul style="list-style-type: none"> ii. Aggregate stability iii. pH iv. Electrical conductivity b. Testing for soil contaminants including at least: <ul style="list-style-type: none"> i. Silver – Ag ii. Cadmium – Cd iii. Copper – Cu iv. Lead – Pb v. Antimony – Sb vi. Zinc – Zn vii. Per-fluorinated compounds (PFAS) 	
24	<p>As a minimum, the Soil Monitoring Plan must provide for monitoring at the following intervals:</p> <ul style="list-style-type: none"> a. Prior to commencement of construction; b. Prior to commencement of operation; c. Every tenth year after the commencement of operation; and d. At decommissioning. 	

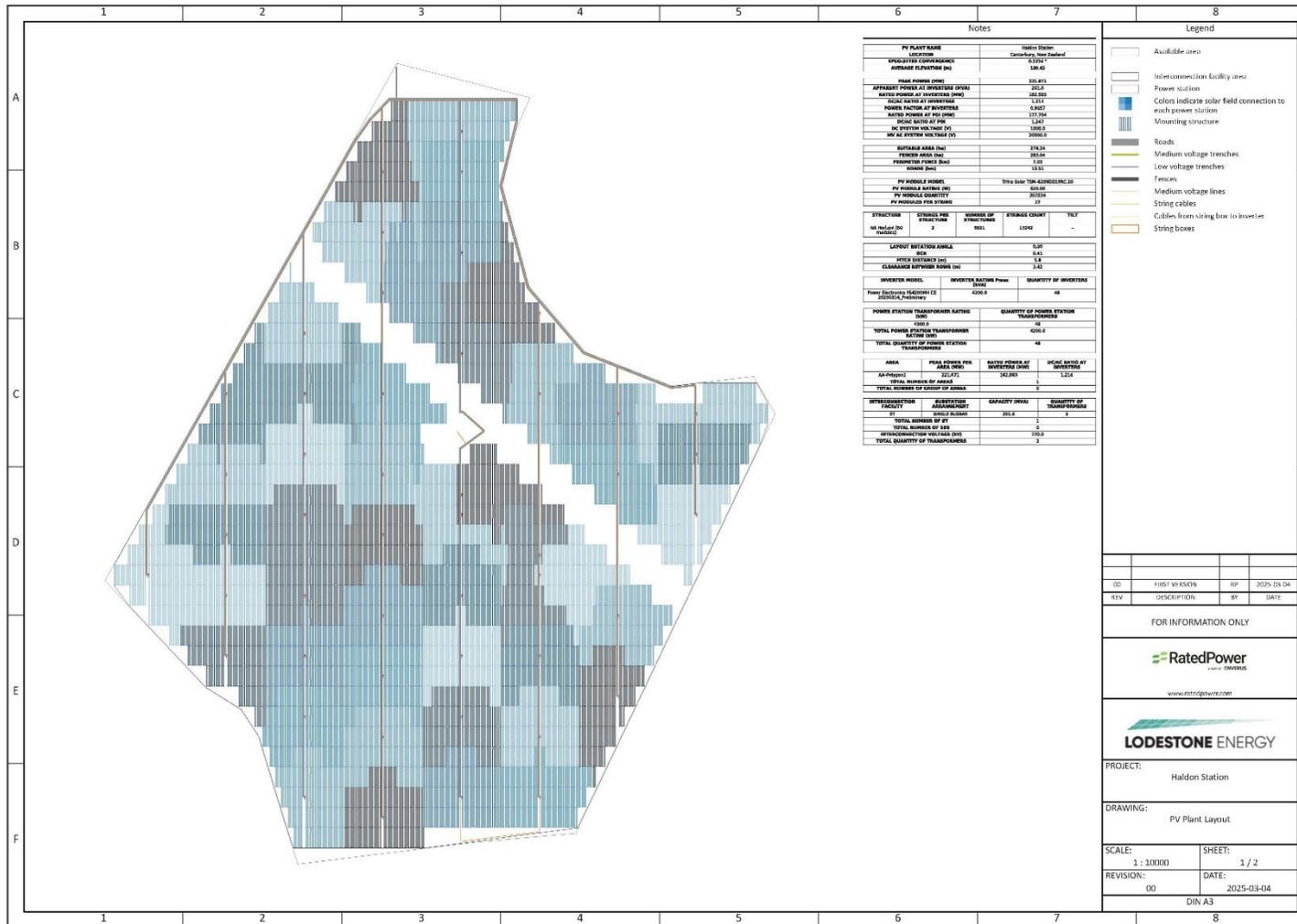
25	<p>Following completion of monitoring at each of the milestones identified in Condition 24, the Consent Holder must prepare and submit a 'Testing Report' on monitoring results to Canterbury Regional Council within two months of monitoring being undertaken. The Testing Report must be prepared by a suitably qualified and experienced practitioner in soil sciences for each testing suite included and must include:</p> <ul style="list-style-type: none"> a. Assessment of the results of soil health testing, and if the results indicate a decrease in soil health; and b. If the soil health testing results indicate a decrease in soil health, details of mitigating actions to be undertaken to avoid further decrease in soil health; and c. Assessment of the results of soil contaminant testing, including if the results indicate any trend of increasing contaminants or if any contaminant exceeds the WasteMINZ Class 4 Guideline values; and d. If the assessments indicate that soil contaminants are increasing or exceed the Guideline values, details of mitigating actions to be undertaken to ensure that Guideline values are not exceeded or further exceeded. 	<p>CRC Contaminated Land: I would like to confirm that they will use the adopted values of Table C-3 for Controlled fills of the Technical Guideline for Disposal to Land (WasteMINZ, 2023). Please note that of the proposed analytes to be monitored only Cd, Cu, Pb and ZN have trigger concentrations. Please ask the applicant to provide trigger limits/concentrations in soil for silver, antimony and PFAS .</p> <table border="1" data-bbox="1386 671 2029 922"> <thead> <tr> <th>Contaminant</th> <th>Trigger concentrations (mg per kg)</th> </tr> </thead> <tbody> <tr> <td>Cadmium</td> <td>0.8</td> </tr> <tr> <td>Copper</td> <td>220</td> </tr> <tr> <td>Lead</td> <td>160</td> </tr> <tr> <td>Zinc</td> <td>190</td> </tr> </tbody> </table> <p>Whilst there are some proposed corresponding remedial action for when exceedances occur (25(d)), there are no clear remedial actions proposed. Thus, the applicant should provide a proposal for remedial actions that ECan can review and approve.</p>	Contaminant	Trigger concentrations (mg per kg)	Cadmium	0.8	Copper	220	Lead	160	Zinc	190
Contaminant	Trigger concentrations (mg per kg)											
Cadmium	0.8											
Copper	220											
Lead	160											
Zinc	190											

26	<p>The Consent Holder must submit the Soil Monitoring Plan to the Canterbury Regional Council, Attention: Regional Leader – Compliance Monitoring, for certification no less than 20 working days prior to the commencement of any physical works for the initial construction of the solar farm. Certification is required to demonstrate that the Soil Monitoring Plan will provide the means to achieve the objective as set out in Condition 22.</p>	<p>CRC Land Resources: Would prefer to be included in the list of teams to be required to view this plan.</p>
After Completion of Works		
27	<p>Within two weeks of the completion of works (or stages of work) authorised by this resource consent:</p> <ul style="list-style-type: none"> a. All disturbed areas must be stabilised and/or revegetated; and b. All spoil and other waste materials from the works must be removed from site. 	<p>CRC Land Resources: Condition 27 focuses on after the works are completed. CRC Land Resources would like an additional condition that requires the consent holder to revisit the site after 6 months (or closet practical time) to ensure vegetation has established and there is canopy closure. If any slumping of soil in excavated areas has occurred, this should then be re-filled.</p> <p>As the groundwater depth is uncertain and with potential for driven structural piles to intercept groundwater, there is risk that artificial macropores are created when driving these piles through stony soil. These pores are therefore an expressway for surface contaminants to get to groundwater. I would suggest that there are checks made to ensure the soil has sealed around the piles at the time of insertion and also after a period of 6 months</p>

		<p>post installation to check for any slumping of the soil recreating further macropores.</p> <p>Removal of the piles when site rehabilitation occurs at the conclusion of the consent period could also create large macropores as identified above. To prevent this, the pile holes should be re filled with soil sourced from the site and replaced at a bulk density that is as close as possible to that at the site's establishment.</p>
Administration		
28	<p>The Canterbury Regional Council may annually, on the last working day of May or November, serve notice of its intention to review the conditions of this resource consent for the purposes of:</p> <ul style="list-style-type: none"> a. Dealing with adverse effect on the environment which may arise from the exercise of this resource consent, and which is not appropriate to deal with at a later stage; or b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment. 	
29	<p>If this resource consent is not exercised before 30 September 2028, it must lapse in accordance with Section 125 of the Resource Management Act 1991.</p>	

	Advice Note: <i>'Exercised' is defined as implementing any requirements to operate this resource consent and undertaking the activity as described in these conditions and/or application documents.</i>	
Plan CRC[XXXX]	Site Layout Plan	

Attachment One – Indicative Site Layout Plan



Discharge Permit – to Discharge Operational Phase Stormwater to Land

CRC261667 - S15 Discharge Permit

Applicant: Lodestone Energy Limited

Duration: 35 year

Condition Number	Applicant's Proposed Conditions	CRC Comments
Limits		
1.	<p>The discharge of stormwater to land must be only stormwater that is generated from:</p> <ul style="list-style-type: none"> a. Solar array panels; b. Roofs; c. Electrical plant items; and d. Roads, hardstand areas, and impervious areas; <p>associated with the proposed solar farm and substation at Haldon Station on land legally described as Part Reserve 1358 held in Record of Title CB437/82 and shown in Plan CRC[XXXX].</p>	
2.	Stormwater must only be discharged onto and into land within the boundary of the site.	

3.	The discharge of stormwater must not arise from a site where any of the activities or industries listed in Schedule 3 (excluding Part B) of the Canterbury Land and Water Regional Plan as at [<i>insert date of issue</i>], which forms part of this consent, are conducted or operated.	
4.	The discharge of stormwater must not arise from: <ul style="list-style-type: none"> a. Copper building materials; b. Unpainted galvanised sheet materials; or c. Solar panels without Glass Laminate Encapsulation. 	
5.	The discharge authorised by this consent must not produce conspicuous oil or grease films, scums, foams, floatable or suspended material.	
6.	Stormwater must be discharged; <ul style="list-style-type: none"> a. In accordance with the Stormwater Management Plan (“SMP”) required by Condition 9 of this resource consent; b. From solar panels to land via infiltration; and c. In a way that causes minimal or no erosion of soil during and after storm events. 	
Inspection and Maintenance		
7.	Throughout the operation of the solar arrays, the Consent Holder must undertake six-monthly checks on the panels for	

	any signs of damage and undertake appropriate maintenance within 10 working days to ensure no internal components are exposed to stormwater.	
8.	<p>During the operation of the solar arrays, if stormwater causes visible channels or rills and there is associated sediment runoff and/or stormwater is visibly pooling on the soil surface for longer than 48 hours and moving laterally, the Consent Holder must:</p> <ul style="list-style-type: none"> a. Implement mitigation measures including, but not limited to, the installation of a strip of gravel, mulch, geotextile or some type of splash distribution panel; and b. Notify the Canterbury Regional Council, Attention: Regional Leader - Compliance Monitoring (via ECInfo@ECan.govt.nz) within 10 working days of the issue arising and within 10 working days of the mitigation measures being implemented. 	
Stormwater Management Plan		
9.	No less than 20 working days prior to commissioning of the Solar Farm, the Consent Holder must submit a SMP to the Canterbury Regional Council, Regional Leader - Monitoring and Compliance for certification. The SMP must demonstrate how stormwater from the operating solar farm will be managed	<p>See comment from CRC Land Resources above.</p> <p>CRC Groundwater:</p>

	<p>to avoid, remedy or mitigate adverse effects on the environment and must include the following information:</p> <ul style="list-style-type: none"> a. Confirmation of the availability of stormwater soakage to alleviate any possible ponding under the solar panel arrays; b. The design of the proposed stormwater soakage to be provided for associated buildings via soakage pits; and c. A representative soil sampling regime to monitor for the potential discharge of any contaminants not authorised by this resource consent. <p>The SMP (and any subsequent amendments) must be considered to be certified by the Canterbury Regional Council if written certification is not provided to the Consent Holder within 20 working days of receipt of the SMP, unless the Canterbury Regional Council stipulate within the timeframe that amendments are required to be made prior to certification.</p> <p>The certified SMP (and any subsequent amendments) must be implemented and adhered to throughout the operation of the solar farm. Any amendments made must be in line with Condition 11.</p>	<p>Soakpits are proposed for the substation areas. Given shallow groundwater in area, these soakpits should have design heights specified in conditions.</p>
10.	The representative soil sampling regime anticipated by Condition 9(c) must be prepared by a suitably qualified and	

	<p>experienced practitioner in soil health and must set out the following:</p> <ul style="list-style-type: none"> a. The parameters to be monitored; and b. The sample distribution and sampling methodology. <p>The initial sampling required by Condition 9(c) must be undertaken prior to the exercising of this consent and subsequently undertaken a minimum of every 10 years across the proposed solar panel array footprint.</p> <p>The samples are to be analysed at an International Accreditation New Zealand (IANZ) accredited laboratory or a laboratory accredited by an organisation with a mutual agreement with IANZ.</p>	
11.	<p>The SMP may be amended at any time. Any amendments must be:</p> <ul style="list-style-type: none"> a. Only for the purpose of improving the efficacy of the stormwater management measures and must not result in reduced discharge quality; b. For the purpose of applying best practicable measures to mitigate adverse effects; c. Consistent with the conditions of this resource consent; and 	

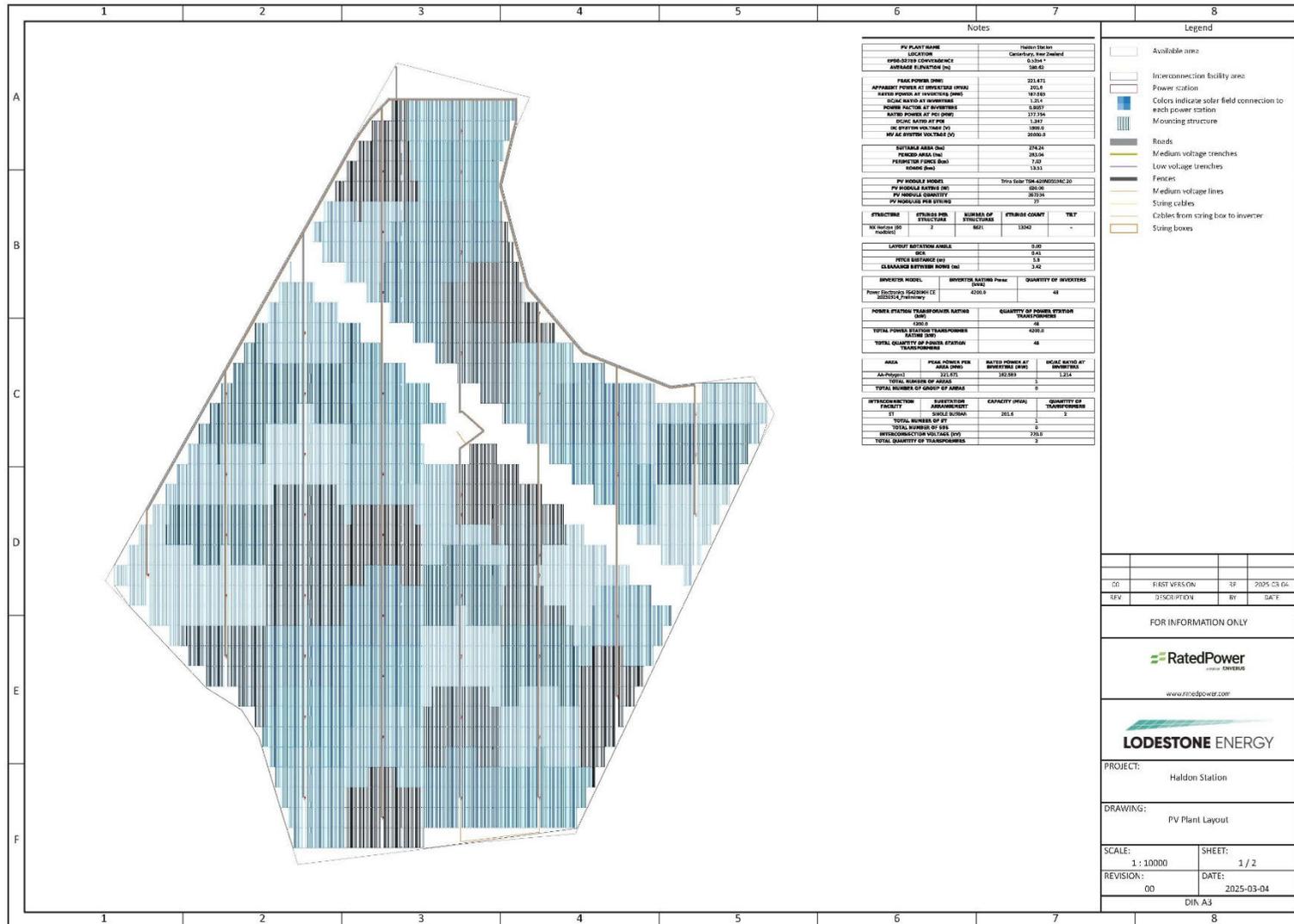
	<p>d. Submitted in writing to the Canterbury Regional Council, Attention: Regional Leader Compliance Monitoring, prior to any amendment being implemented for certification.</p> <p>The amended SMP must be considered to be certified by the Canterbury Regional Council if written certification is not provided to the Consent Holder within 20 working days of receipt of the amended SMP, unless the Canterbury Regional Council stipulate within the timeframe that further amendments are required to be made prior to certification.</p>	
Spills		
12.	<p>All practicable measures must be taken to avoid spills of fuel or any other hazardous substances within the site. In the event of a spill of fuel or any other hazardous substance:</p> <ul style="list-style-type: none"> a. The spill must be cleaned up as soon as practicable, the affected land area must be inspected and cleaned, and measures must be taken to prevent a recurrence; b. The Canterbury Regional Council, Regional Leader - Monitoring and Compliance must be informed within 24 hours of a spill event exceeding five litres and the following information provided: <ul style="list-style-type: none"> i. The date, time, location and estimated volume of the spill; 	

	<ul style="list-style-type: none"> ii. The cause of the spill; iii. The type of hazardous substance(s) spilled; iv. Clean up procedures undertaken; v. Details of the steps taken to control and remediate the effects of the spill on the receiving environment; vi. An assessment of any potential effects of the spill; and vii. Measures to be undertaken to prevent a recurrence. 	
13.	<p>All best practicable options must be used to contain spills or leaks of any hazardous substance from being discharged onto the land. These must include, but not be limited to the following:</p> <ul style="list-style-type: none"> a. Using a tank filling procedure to minimise spills during any fuel delivery; b. Making spill kits available to contain or absorb any hazardous substances used or stored on the site; c. Maintaining signs to identify the location of the spill kits; and 	

	d. Maintaining written procedures in clearly visible locations that are to be undertaken to contain, remove and dispose of any spilled hazardous substance.	
Administration		
14.	<p>The Canterbury Regional Council may, once per year, on any of the last five working days of May or November, serve notice of its intention to review the conditions of this consent for the purposes of:</p> <ul style="list-style-type: none"> a. Dealing with any adverse effect on the environment that may arise from the exercise of the consent; or b. Requiring the adoption of the best practicable option to remove or reduce any adverse effect on the environment. 	
15.	<p>If this consent is not exercised within 5 years of the decision being notified and served on the applicant, it must lapse in accordance with section 125 of the Resource Management Act 1991.</p> <p>Advice Note: <i>'Exercised' is defined as implementing any requirements to operate this resource consent and undertaking the activity as described in these conditions and/or application documents.</i></p>	
Plans		

Plan CRC[XXXX]	Site Layout Plan	
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Attachment One – Indicative Site Layout Plan



Mackenzie District Council – Section 9 Land Use Permit

Applicant's Proposed Conditions

Applicant: Lodestone Energy Limited

Condition Number	Proposed Conditions [Applicant Conditions] From MDC Condition set.	CRC Comments
Landscaping and Ecology		
27.	No permanent structures associated with the development except fencing shall be erected within 300 m of Haldon Arm Road. No permanent structures associated with the development except fencing shall be erected within 300 m of Haldon Arm Road.	
28.	The Consent Holder must install and maintain site perimeter fencing of a specification suitable to exclude rabbits for the life of the project.	CRC Land Ecology: Considered fencing benefiting herpetofauna (lizards) could also provide benefit for lizards.
29.	The Consent Holder must undertake pest control for rabbits inside the perimeter fence with the objective of removing all rabbits from within the fenced area over the life of the project.	
30.	The Consent Holder must engage a suitably qualified and experienced practitioner in Plant Ecology to develop a Plant Monitoring Plan with the objective of determining changes in plant communities amongst and beneath the solar installation and responses to reduced pressure from rabbit browsing.	CRC Land Ecology: Significant, moderate level of effect on ecologically significant dryland habitat. Residual effects unavoidable. Consider compensation and/or offsets.

	<p>To achieve this objective, the Plant Monitoring Plan must include:</p> <ol style="list-style-type: none"> a. Identification and location of representative plant communities within the project site; b. Monitoring methodologies and frequencies to determine changes in those plant communities; c. Requirements for reporting; and d. The review and evaluation of the Plant Monitoring Plan throughout the life of the project. 	<p>The proffered Plant Monitoring Plan may provide insights into the effect, but will not manage it.</p>
<p>31.</p>	<p>The Consent Holder must engage a suitably qualified and experienced practitioner in avifauna to develop an Avifauna Monitoring Plan with the objective of determining any interactions (positive or negative) between birds and the solar installation.</p> <p>To achieve this objective, the Avifauna Monitoring Plan must include:</p> <ol style="list-style-type: none"> a. Identification of bird species that are likely to use or interact with the project site; b. Monitoring methodologies and frequencies to determine that use or interaction; c. Requirements for reporting; and d. The review and evaluation of the Avifauna Monitoring Plan throughout the life of the project 	<p>CRC Land Ecology:</p> <p><u><i>Bird Strike</i></u></p> <p>Bird strike risk may introduce additional stressor on vulnerable species. Level of effect uncertain, but potential to impact sensitive populations such as black-fronted turn or kaki. Potential mitigations not already proffered:</p> <ul style="list-style-type: none"> • Minimise or eliminate bird-attracting lighting at night • Require anti-reflective coating (inferred in Application but not confirmed in conditions) • Monitoring of solar farm site should be undertake both before and after construction phase and during lifetime of solar farm to

		<p>assess whether mortality due to bird strike occurs.</p> <ul style="list-style-type: none"> • Adaptive management, though feasibility of adaptive options is unclear. • For residual effects, monitoring-triggered adaptive management and/or compensation (Per DOC). <p><i>Loss of Habitat</i></p> <p>Loss of bird feeding and breeding habitat seen as significant, low-moderate level effect, and unavoidable. Consider compensation and/or offsets.</p>
32.	The Consent Holder must submit the Avifauna and Plant Monitoring Plans to Mackenzie District Council for certification no less than 20 working days prior to the commencement of any physical works for the initial construction of the solar farm. Certification is required to demonstrate that the Plant and Avifauna Monitoring Plans will provide the means to achieve the objectives as set out in Conditions 30 and 31.	
		Additional Comments Potentially Requiring New Conditions

		<p>CRC Land Ecology: Also of concern is that potential impacts to lizards and invertebrates are unclear due to data deficiencies.</p> <p>Note that effects to lizards and invertebrates will require management via a Department of Conservation permit and associated Lizard Management Plan and Invertebrate Management Plan.</p> <p>Partial remediation of effects to lizards could include stone piles and perimeter fencing to benefit herpetofauna.</p> <p>[CRC Consent Planning – We note that, if further compensation and/or offsetting is required to address the effects of the proposal, these need to be included in conditions. CRC has agreed to work with the applicant on development of such conditions, though CRC still wish to raise that the opportunity to comment on final condition set, including the potential offset/compensation.]</p>
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