







**Jacob Paget**

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**From:** Jacinta Fitzgerald s 9(2)(a)  
**Sent:** Wednesday, 10 May 2023 9:53 am  
**To:** Fast Track Consenting  
**Cc:** Liam Dagg  
**Subject:** RE: [COMMERCIAL]Seeking comments on additional information – Opunake Solar Farm – due by 11 May

**MFE CYBER SECURITY WARNING**

This email originated from outside our organisation. Please take extra care when clicking on any links or opening any attachments.

Dear Jacob

Thank you for your e-mail which we received on 8/05/2023. Council have assessed the additional information and provide the following commentary:

We understand that this modification will mean there will be no need to upgrade the lines.

From Council's reading of the district plan, there will be no change to the existing power network. If there was to be an upgrade of any kind, we think it would fall as a permitted activity in any case:

**14.1.1(a)** development, operation, maintenance and upgrading of the following activities are permitted activities, provided that they comply with the performance standards in Section 14.2:

(ix) Underground and overhead electricity lines and cables, associated support structures (and incidental equipment) not exceeding 110kV.

**14.1.1(b)** The operation and maintenance of existing electricity lines and associated support structures including towers, masts and poles that convey electivity above 110kV.

At worst case, it would be considered a Restricted Discretionary Activity under the following, however, the overall activity would have been considered a Discretionary Activity (the installation of large scale renewable energy) so would have been bundled in with this activity status at worst case.

**14.1.3(c)** Unless listed elsewhere in the District Plan, any permitted activity listed in Section 14.1.1 which does not meet one or more of the performance standards in Section 14.2.

In Council's initial response we didn't address the upgrade or installation of lines or poles. Our matters of concern were more focussed on productive capacity of land and visual impact.

We do not believe this will change our overall advice that we provided on 28/04/2023.

Happy to discuss further if required.

Kind regards

**Jacinta Fitzgerald**

**Executive Assistant - Environmental Services and Infrastructure Services**

Te Kaunihera o Taranaki ki Te Tonga | South Taranaki District Council

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illegal. Please note that this communication does not designate an information system for the purposes of the Contract and Commercial Law Act 2017.

18/05/23

Attention: Todd Wilson  
Energy Farms Limited

Dear Todd

## **High level assessment for 76 MW solar farm at 574 and 575 Kina Road, Oanui, Taranaki**

### **Purpose**

This assessment provides a High-Level Report (HLR) on the feasibility of a 76 MW solar farm proposing to connect to Powerco 33 kV Rahotu (Ngariki) feeder out of Transpower Opunake Grid Exit Point (GXP). This assessment is a quick desktop study only, and information regarding network constraints is considered indicative and must be confirmed via further studies.

### **Summary**

Assumed connection point is 33 kV pole 710772 on Kina Road

Our understanding of your project is that Energy Farms Limited is assessing the feasibility of connecting a 76 MW solar farm that would connect to Powerco 33 kV Rahotu Feeder between Transpower Opunake GXP and Powerco Ngariki Substation.

The 33 KV Rahotu feeder operates is a ring network with two other 33 kV feeder from Opunake GXP. The smallest section on the 33 kV feeder is overhead 19/0.083 CU (10.5 mm diameter) and has a Powerco standard rating of 208 A (12 MVA). Therefore, the indicative hosting capacity on the Rahotu 33 KV feeder is 12 MVA. The remaining 33 kV feeder is Dingo with a Powerco standard summer rating of 280 A (16 MVA). The maximum export would need to match the standard conductor rating of the ring circuit. When the solar farm is operating in voltage control mode it may increase the thermal loading on the conductors further due to exporting and importing reactive power.

A run-back scheme would be recommended to accommodate continent situations during which a circuit is removed from service. A more in-depth study on the operating modes of the run-back scheme would be required.

The preliminary investigation indicates that to allow 76 MW generation, new 33 kV feeders will need to be installed to the Opunake GXP from your site. However, Transpower has indicated that the maximum allowable generation at Opunake GXP is 50 MW (N generation capacity). Therefore, you will need to limit your generation to 50MW. Alternatively, to allow 76MW generation you will need to upgrade the Transpower GXP transformers.

Our studies have identified that at the assumed connection point (pole 710772) would have a short circuit ratio (SCR) of 2.3. We apply a simple ratio based on the network's short circuit level in MVA and the nominal MVA rating of your generating plant. Typically an SCR of below 3 is considered a weak system and may be very sensitive to active/reactive power injections or absorptions. Therefore, it may be difficult to stabilise the system voltage and may require additional studies to understand the impact and additional equipment required to help stabilise the voltage.

## **Network information**

The Transpower Opunake GXP Transformer Nameplate rating is two 110/33 kV 30 MVA Transformers and supply three Powerco Zone Substation, Pungarehu, Ngariki and Tasman. Transpower has indicated that the GXP transformers have a reverse power flow limit of 20 MW.

Transpower currently owns and operates the 33 kV outdoor bus at the GXP and would probably require protection/comms system upgrades. Therefore, Transpower consultation and support remain critical to understanding the project's feasibility.

Powerco has a project in progress for an 33kV outdoor to indoor (ODID) conversion at the GXP and after the completion of the works Powerco will own the 33 kV switchboard. If you would like to proceed with the direct connection to the Opunake GXP you may need to underwrite any cost Powerco may incur to enable your connection such as additional cost for redesigning and expanding the building or cost of additional 33 kV breaker.

The proposed connection point is approximately 11 kM (feeder length) from the Opunake GXP. The 33 kV feeder from the connection point to the GXP is overhead Dingo and 19/0.083 Cu. The operation of the solar farm should not overload the feeder's thermal rating.

The Opunake area and the surrounding 33 kV reticulation are shown in the figure 1 below

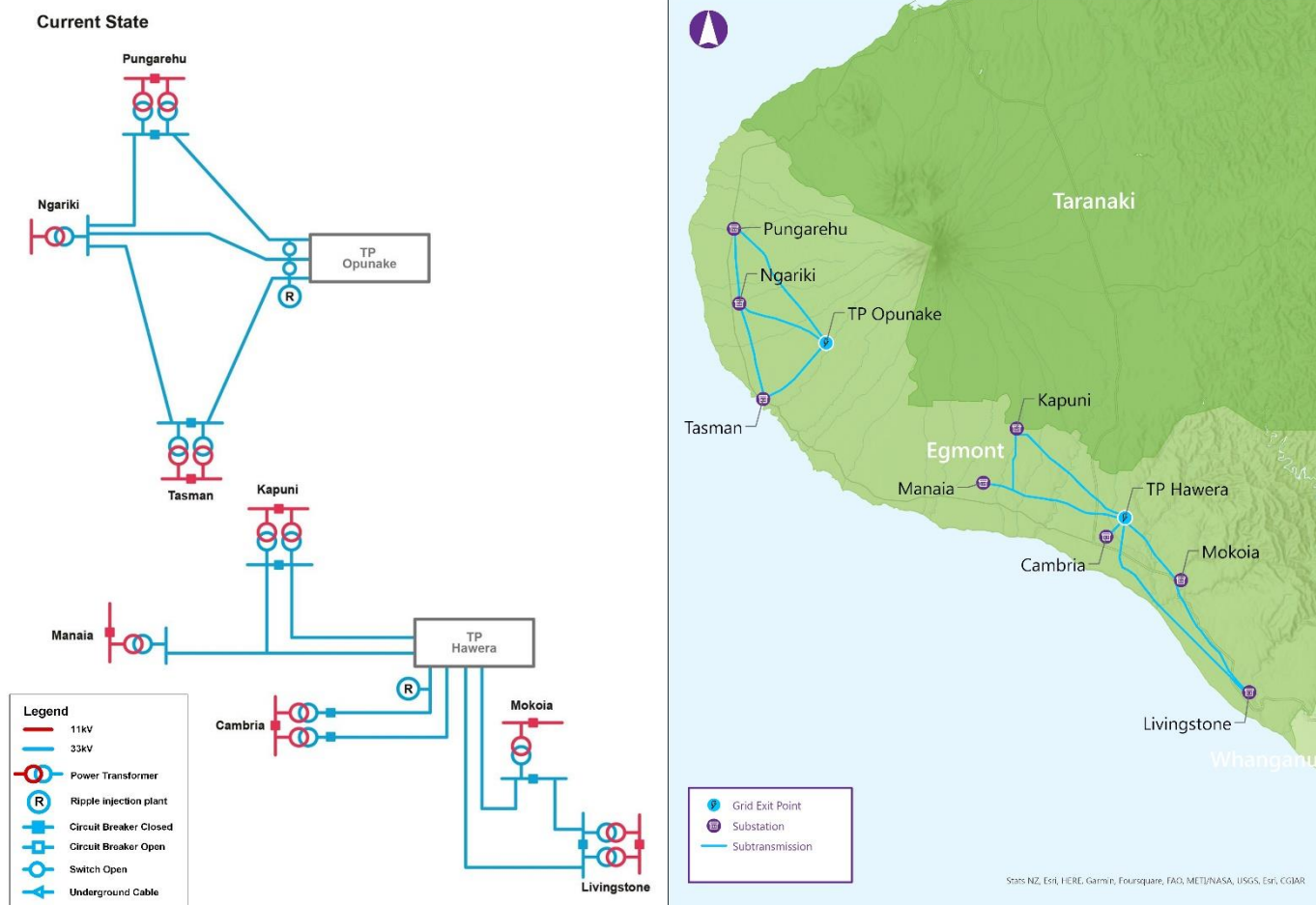


Figure 1: Opunake area overview

## Equipment, design and other considerations

A tee connection into the overhead lines may create particular protection challenges at 33 kV. Therefore, Powerco requires a 'in and out' connection where possible.

A Powerco owned Power Quality Meter (PQM) (likely make model is A-Eberle PQI DA Smart) is to be installed near the Point of Common Coupling (PCC). Arrangements need to be made for the location of CTs and VT supply, auxiliary supply and communications. The intention is to monitor the performance of the plant on the Powerco Network. If there are stability, quality, or protection issues arising after the commissioning of the solar farm or indeed at any stage throughout the life of the plant they will need to be resolved with Powerco. Information from Powerco PQM or relay would be made available.

The solar farm needs to ensure voltage fluctuations including harmonics at PCC should be in accordance with EEA Power Quality Guidelines and assessment methodology in AS/NZS TR IEC 61000.3.6:2012. Additional details on the compliance levels may be given by Powerco during the technical study phase of the project.



Ripple signal measurement to be taken before and after commissioning to confirm no interference with the Ripple Signals. If ripple signals are interfered with, you must immediately cease generation to avoid interference with the Powerco network and look to resolve the issue before reconnection.

Powerco requires the inverter to comply with AS/NZS 4777.2.2020 where applicable. The inverter should have the voltage, controls and protection principles set out in the standard.

Before ordering equipment, please consult regarding the approved equipment on Powerco Network. We will share the relevant standards and approved equipment list with your engineers.

This report does not discuss broader network constraints such as the impact of maximum aggregate generation and the control strategies required to prevent overloading and high/low voltage quality issues following equipment outages. A comprehensive network constraint study should be discussed in the subsequent stage(s) of the project phasing.

You are fully responsible for conducting your own investigation into market opportunities and how the limited capacity of the network and aggregate behaviour of existing and future generation connections including aggregate impact of rooftop solar may impact your options.

The use of historical base load as a base for studies and the calculation of maximum injection is at your own risk. Historical data should not be relied on to make assumptions about base load at GXP or substations. Base load is subject to change (for example, residential roof top solar may reduce load). Powerco makes no guarantee about a base load at any GXP or substation.

## **Conditions**

The solar farm must comply with all relevant New Zealand legislation, Electricity Code, industry and Powerco standards.

This HLR only considers the existing or confirmed large distributed generation connections in this area.

The information provided on this HLR is as current as it stands today. However, our network is subject to change over time which may invalidate parts of this report's findings. If you wish to revisit this HLR at a later stage, it might require re-assessment and may incur additional costs.

## **Obligation to other parties**

We want to highlight we have received initial applications from other distributed generators for large scale generation connections that would have an impact at the Opunake GXP. We are careful to apply an even-handed approach to connection requests in their early phasing. The priority of final applications would be determined as per clause 17, Part 6 of the EIPC.

Your proposed connection would have a significant impact at the Opunake GXP. Your proposed connection should not affect Powerco from meeting its obligations to Transpower. Transpower may request additional studies at later phasing of the project as part of the project.

The Generator needs to engage with Transpower if the generation capability is greater than 1MW and there are 'Code' obligations the generator must meet. Powerco will require a copy of the confirmation and any concerns raised by Transpower.

At any stage, the generation should not risk the quality of supply to other Powerco customers or Powerco equipment, prevent Powerco from meeting its obligations to Transpower.

## Next Steps

If you would like to proceed with the application, the next step would be to meet with Powerco to clarify questions you may have and discuss the information presented in the high-level report.

The next stage in the application process is a feasibility study using an experienced consulting engineer. The load flow assessment should consider the worst case scenario, usually when the network is under summer light load with maximum export from the solar farm. The study should also identify the impact on the network during contingent situations (at minimum fault level). The solar farm may be required to run back during a contingent situation and the results from the study will help identify the specifications of the runback scheme.

The scope of the studies should include:

- 1) Load flow assessment which should consider:
  - a. Details regarding the voltage control strategy of the plant during network normal operation. The generation export would vary in the situation of full sunlight to no sunlight or partial sunlight. This is likely to create voltage fluctuation for Powerco customers. We would like to know how the solar farm could limit the magnitude of voltage change and the rate of voltage change at the PCC. Powerco recommends a voltage study that shows how the voltage movement at the PCC varies across seasons in a year under maximum and minimum load changes at the substation. The results should be presented to show:
    - i. Real and reactive power output of the solar farm with respect to the inverter capability diagram
    - ii. Voltage change at the PCC, Opunake GXP 33 kV bus bar, and Powerco Zone Substation 33kV and 11 kV busbar
    - iii. Opunake GXP 110 / 33 kV transformer real and reactive power flow
  - b. Sudden loss of power from the solar farm.

The results should show the impact on the voltage at the PCC, Opunake GXP 33 kV bus bar, and Powerco Zone Substation 33kV and 11 kV busbar, when there is a sudden loss of power from the solar farm.

- c. Impact on the network during contingent situation (minimum fault level) eg loss of a GXP 110 / 33 kV transformer

The results should be presented to show:

- i. Real and reactive power output of the solar farm with respect to the inverter capability diagram
- ii. Voltage change at the PCC, Opunake GXP 33 kV bus bar, and Powerco Zone Substation 33kV and 11 kV busbar
- iii. Opunake GXP 110/ 33 kV transformer real and reactive power flow

At any stage, the generation should not risk the quality of supply to other Powerco customers or Powerco equipment, prevent Powerco from meeting its obligations to Transpower.

- 2) Preliminary fault level study to identify the fault contribution from the solar farm
- 3) Determine SCR at both the normal system maximum and the contingent system minimum short circuit levels at the point the inverter control system is connected to and controlling. The maximum fault level figure would be used for equipment fault clearing specification. The minimum fault level figure for control system sensitivity/stability. We apply a simple a ratio based on the network's lowest operational short circuit level in MVA and the nominal MVA rating of your generating plant, but it should be calculated at the point where the inverters are doing their control.
- 4) Preliminary single-line and R&I diagram of the connection to the Powerco network and the reticulation at the solar farm
- 5) As per Transpower's Grid Exit Point (GXP) impact studies for Distributed Energy Resource (DER) development ([Link](#)), a Transpower-approved Engineering Consultant will need to be engaged to study changes required to Transpower assets to comply with the EDB's code and contractual obligations. Studies should cover power quality, protection coordination, voltage management, and metering at the GXP. Powerco will then share the studies with Transpower and Transpower will then review the study reports and confirm changes required to Transpower's assets.

We can provide the PSS-Sincal model of our network for conducting the feasibility study to your appointed consulting engineer, provided under the terms of a confidentiality agreement.

Powerco's review of these studies comprises the Feasibility phase, for which we must have received an Initial Application (if not yet submitted), and we will raise an invoice for the Application Fee ahead of internal resource review of the above studies.

The later stages of the connection process are concept design and detailed study, which would include:

- 1) Further investigation of any items of concern identified in the feasibility study
- 2) If applicable, Transpower as the Grid Owner may request additional connection studies to ensure Powerco can meet its obligations at the GXP

- 3) Transpower as the System Operator's may request connection studies as per Transpower Connection Study Guide for Connection New Generating Station (GL-EA-953)
- 4) A harmonics study which considers all the likely frequencies that might emanate from the inverters of the solar farm. The Powerco PQMs monitor up to 9kHz. If required, the study should investigate the plant's harmonics distortion and mitigation design. Harmonic voltages and currents introduced by the solar farm shall not exceed the level specified in the EEA Power Quality (PQ) Guidelines.
- 5) A detailed protection study that needs to be reviewed by a Powerco and Transpower Protection Engineers. The study should include but not be limited to the below:
  - a. Protection scheme and settings design
  - b. Short circuit study
  - c. Fault ride through study
- 6) Engage the consultant to initiate the detailed designs of the arrangement down to the inverters, including circuit impedances, transformer ratings (MVA, impedance and vector group), R&I and high level cost estimation for the works to enable this connection.

Subsequent to the concept design and high-level cost estimation, we will provide an initial view on connection costs which will initiate commercial discussions on Works Agreement and Connection Agreement terms (or the regulated terms will apply). Before placing any orders or starting the work we would need you to enter an Advance Works Agreement to underwrite any such costs Powerco may incur.

Yours sincerely



**Georgin Raju**

Planning Engineer - Connections

**POWERCO**

# Comments on applications for referral under the COVID-19 Recovery (Fast-track Consenting) Act 2020

This form is for persons requested by the Minister for the Environment to provide comments on an application to refer a project to an expert consenting panel under the COVID-19 Recovery (Fast-track Consenting) Act 2020.

Organisation providing comment	Transpower New Zealand Limited
Contact person (if follow-up is required)	Jo Mooar
	Senior Corporate Counsel
	s 9(2)(a)

## Comment form

Please use the table below to comment on the application.

Project name	The Opunake Solar Farm – Energy Farms Limited
General comment	<p>Transpower has been identified as an “other person” for the purpose of section 21(3) of the COVID-19 Recovery (Fast-Track Consenting) Act 2020 (<b>Act</b>). Thank you for the opportunity to provide comments about the Project, and its potential impact on National Grid assets.</p> <p>Transpower supports the application as it “<i>contribut[es] to New Zealand’s efforts to mitigate climate change and transition more quickly to a low emissions economy (in terms of reducing New Zealand’s net emissions of greenhouse gases)</i>” (section 19(d)(vii) of the Act).</p> <p>Transpower is not aware of any reason for the application to be declined.</p> <p>Transpower does not consider the Project to be inconsistent with Policy 10 (in particular) of the National Policy Statement on Electricity Transmission (section 23(5)(c) of the Act).</p> <p>The applicant proposes to connect the generation to Transpower’s Opunake Substation, via an upgrade to a Powerco 110kV line.</p> <p>Transpower has had some discussions with the applicant and PowerCo about the connection to the Grid. Transpower operates a Queue Management Framework for managing investigations into generation connections. This PowerCo connection is in the queue.</p>

	Please let us know if you require any further detailed information.
<b>Other considerations</b>	N/A.
<b>[Insert specific requests for comment]</b>	<p>The following questions have been asked of Transpower:</p> <ol style="list-style-type: none"> <li>1. What additional approvals will the applicant(s) require from Transpower New Zealand Limited to connect to the national electricity grid? The applicant will need to: <ul style="list-style-type: none"> <li>• enter an investigation Services Agreement to fund the costs of Transpower's investigation;</li> <li>• enter a Transpower Works Agreement (TWA) to fund the works identified by the investigation for the connection to the Grid. The TWA would also cover the need to obtain any RMA approvals (eg. outline plan of works and regional consents) and subsequent construction and other works at the substation; and</li> <li>• obtain generating commissioning approval from the System Operator, which is required before generation can occur.</li> </ul> </li> <li>2. Will obtaining the above approvals likely impact on project delivery or timing as outlined in the referral application(s)? The PowerCo connection is towards the back of Transpower's QMF. It could be at least 3 years before any generation could be connected to the Grid via an upgraded PowerCo line.</li> </ol> <p><b><u>Additional comments in relation to further information provided by Energy Farms Limited (8 May email to Transpower)</u></b></p> <p>In further information provided, the applicant proposes to connect via an existing 33kV PowerCo line, without it being upgraded (and discarding the 3 options proposed earlier).</p> <p>It appears feasible that 40MW of electricity could connect to the Grid via an existing PowerCo line (assuming it has the necessary capacity).</p> <p>In terms of approvals required:</p> <ul style="list-style-type: none"> <li>• PowerCo would need to confirm it would comply with its connection agreement with Transpower; and</li> <li>• Energy Farms Limited would need to obtain generating commissioning approval from the System Operator (as indicated above).</li> </ul>

Note: All comments, including your name and contact details, will be made available to the public and the applicant either in response to an Official Information Act request or as part of the Ministry's proactive release of information. Please advise if you object to the release of any information contained in your comments, including your name and contact details. You have the right to request access to or to correct any personal information you supply to the Ministry.