

Chiles Ltd

MEMORANDUM

From: Stephen Chiles
To: Aimee Charmley, Tararua District Council
Andrew Bashford, Evergreen Consulting
Date: 5 November 2022
Subject: Mangamaire Solar Farm – acoustics comments

Introduction

Chiles Ltd has been engaged by the Tararua District Council to comment on acoustics matters associated with a resource consent application as set out below.

<i>Reference</i>	202.2022.136.1
<i>Description</i>	Construction and operation of a solar farm
<i>Location</i>	410 Mangamaire Road, Pahiatua
<i>Information reviewed</i>	<ul style="list-style-type: none">Assessment of noise effects, Marshall Day Acoustics (MDA) dated 28 July 2022Telephone conversation with Peter Ibbotson, MDA, 4 November 2022.
<i>Review type</i>	Desktop
<i>Affected party approvals</i>	<p>The application states that written approval has been provided by owners and occupiers of four properties (129 Tutaekara Road, 154 Tutaekara Road, 346 Mangamaire Road and 410 Mangamaire Road). There appear to be discrepancies between the copies of written approvals in Appendix 5 to the application and the summary table in section 9.2.</p> <p>The MDA report assumes there are no written approvals and assesses noise effects at all properties. For the purposes of the following comments, it is largely irrelevant whether or not noise effects are considered at the four properties listed above because other properties are in proximity to the solar farm where similar issues arise.</p>
<i>District plan</i>	<p>The following are Rural Management Area standards (noting the proposed activity is not permitted/controlled regardless):</p> <ul style="list-style-type: none">operational noise within the notional boundary of dwellings: 5.4.1.2.bconstruction noise: 5.4.1.2.fvibration (including construction vibration): 5.4.1.2.h

<p><i>Sound and vibration levels</i></p>	<p>Operational noise: The MDA report sets out a standard good practice approach of predicting operational sound levels from indicative data for the main sources (inverters, transformers and tracker motors) and using a recognised calculation method (ISO 9613-2). Without attenuation/treatment the predictions show compliance with daytime and night-time permitted activity standards (55 dB and 45 dB respectively) at all houses. While MDA includes cautious assumptions, there remains inherent uncertainty associated with the prediction, particularly in relation to the assumed source levels in Table 3. A minor factor is that MDA has applied a 5 dB penalty for special audible characteristics (tonality), whereas under NZS 6802 this could be 6 dB, increasing calculated levels by 1 dB.</p> <p>MDA has not made a quantitative assessment of operational traffic noise, but states compliance with permitted activity standards based on an assumption of limited traffic and no heavy vehicle movements at night.</p> <p>Construction noise: The MDA report sets out likely construction equipment and indicative sound levels at various distances. From comparison with distances to nearby houses MDA finds that construction noise criteria may be exceeded at times. This matter is not reflected in section 4.3 of the application, which also appears to omit consideration of construction noise effects in sections 9.6, 9.8 and 9.10.</p> <p>Vibration: The MDA report (and wider application) does not address operational or construction vibration. From experience with other types of similar equipment and based on the solar farm equipment described by MDA, operational vibration is expected to be negligible beyond the site boundary. From experience with other projects and based on the description of construction activity in the MDA report, construction vibration might exceed the district plan permitted activity standard.</p>
<p><i>Potential noise effects</i></p>	<p>Operational noise: Despite predicted compliance with district plan daytime and night-time permitted activity standards, MDA identifies that sound from solar farm equipment could cause an appreciable change in the existing environment and may be particularly intrusive due to potential tonality of the inverters. MDA recommends further analysis during detailed design and probably enclosure of the inverters to avoid or minimise this potential noise disturbance. From the MDA report it is unclear whether regular cycles of the tracker motors would be audible and potentially cause greater annoyance due to the intermittent characteristics not represented by the predictions of average sound levels. Due to the characteristics of the solar farm sound sources that are</p>

	<p>not usually found or anticipated in a rural environment, it is considered there is potential for noise disturbance even if there is compliance with the permitted activity standards. This potential effect could be largely avoided by adopting the Best Practicable Option in the solar farm layout and equipment design, generally as outlined in the MDA report.</p> <p>Construction noise and vibration: As is normal for most construction works, there may be temporary disturbance at neighbouring properties. The MDA report recommends a condition requiring a Construction Noise and Vibration Management Plan (CNVMP) to manage the effects of any exceedances. This is a standard approach, and when implemented in accordance with good practice a CNVMP should provide a framework to maintain most work to comply with the noise and vibration criteria and to manage adverse effects of occasional exceedances to an acceptable degree. While there may be unavoidable temporary disturbance, a CNVMP could be used to result in construction noise and vibration effects that should be acceptable for most people at the nearest houses.</p>
<i>Conditions</i>	<p>MDA recommends four consent conditions to give effect to findings in the report. These have been copied into section 13 of the application as volunteered conditions 11 to 14. A number of changes are recommended to the volunteered conditions to adequately manage noise and vibration effects, as follows.</p> <p>Conditions 11 and 12 are appropriate. However, for robust implementation additional details/requirements are recommended:</p> <ul style="list-style-type: none"> • For clarity a map should be included in condition 11 explicitly identifying existing dwellings on other sites. Currently there is some ambiguity given the situation with written approvals and the intended future subdivision of the site containing the solar farm. • A condition should be added requiring a post-construction compliance check with the limits in condition 11. Because of the relatively low sound levels it is unlikely to be practicable to directly measure solar farm sound at houses. A specialist will need to make sound level measurements closer to solar farm equipment and through a combination of site observations and review of predictions determine compliance. A report of this compliance check should be provided to the Council within one month of any stage of the solar farm becoming operational. This report should also include certification that all measures required under

	<p>condition 14 have been correctly implemented, and that sound levels and intrusive sound characteristics have been minimised.</p> <p>Condition 13 is generally appropriate, but it is recommended that:</p> <ul style="list-style-type: none">• Reference be added to vibration criteria.• The CNVMP be required to cover all works and not just those identified as likely to cause exceedances. The CNVMP should provide the framework and procedures for the identification of potential exceedances so cannot itself be triggered by that identification. Furthermore, the CNVMP should be used for minimising and managing the effects of all construction activity regardless of whether there are exceedances. Adverse construction noise effects commonly occur with levels in compliance with the guideline values. The CNVMP should be provided to the Council prior to construction. <p>The apparent intent of condition 14 is supported, but it includes numerous flexible provisions/qualifications that could allow for other outcomes that would not minimise adverse solar farm noise effects. It is understood that detailed information for all equipment is not available at this stage and therefore a prescriptive acoustic treatment or enclosure design cannot be specified. It is recommended that condition 14 be redrafted:</p> <ul style="list-style-type: none">• Condition 14 should not refer to compliance with noise limits as these are specified in condition 11, and should be subject to a post-construction compliance check regardless of condition 14.• There should be an explicit requirement for the detailed design to minimise solar farm sound levels, tonality and intrusive/disturbing sound characteristics from all solar farm equipment, without further qualification. The condition should require consideration of equipment selection, location, orientation, enclosure, screening and any other practicable measures.• The design should be conducted by a specialist and the analysis of options and final details should be set out in a report provided to the Council prior to construction. Any subsequent commissioning processes should be recorded in the post-construction compliance check report recommended above.
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