

**BEFORE THE HEARING PANEL**

**IN THE MATTER** of the Resource  
Management Act 1991

**AND**

**IN THE MATTER** of the applications by  
Energy Bay Limited to the Tararua District  
Council (202.2022.136.1) for resource  
consents to establish and operate a solar  
farm at 410 Mangamaire Road, Pahiatua.

---

**REPORT TO THE COMMISSIONER**

**MR ROB VAN VOORTHUYSEN**

**SECTION 42A REPORT OF STEPHEN CHILES – ACOUSTICS**

---

**1 August 2023**

## **A. INTRODUCTION**

1. My full name is Dr Stephen Gordon Chiles.
2. I have the qualifications of Doctor of Philosophy in Acoustics from the University of Bath and Bachelor of Engineering in Electroacoustics from the University of Salford, UK. I am a Chartered Professional Engineer and Fellow of the UK Institute of Acoustics.
3. I am self-employed as an acoustician through my company Chiles Ltd. I have been employed in acoustics since 1996, as a research officer at the University of Bath, a principal environmental specialist for Waka Kotahi, and a consultant for Arup, WSP, and URS, Marshall Day Acoustics and Fleming & Barron. I am contracted as the principal advisor to provide the Environmental Noise Analysis and Advice Service to the Ministry of Health and Te Whatu Ora.
4. I have made acoustics assessments and designs for numerous infrastructure developments in New Zealand, including major road, rail, electricity, and wind farm projects. I am currently undertaking multiple tasks for Waka Kotahi, KiwiRail and Transpower.
5. I am convenor of the New Zealand reference group for "ISO" acoustics standards and a member of the joint Australian and New Zealand committee responsible for acoustics standards. I was Chair of the 2012 New Zealand acoustics standards review, Chair for the 2010 wind farm noise standard, and a member for the 2008 general environmental noise standards.
6. The Tararua District Council has engaged me to provide acoustics advice in respect of the assessment of resource consent application 202.2022.136.1, made by Energy Bay Ltd to establish and operate a solar farm at 410 Mangamaire Road, Pahiatua.
7. I have undertaken this work on a solely desktop basis and am not personally familiar with the project area beyond the information I have reviewed.
8. I have read and agree to comply with the Code of Conduct for Expert Witnesses as contained in the Environment Court's Consolidated Practice Note (2023). My

qualifications are set out above. I confirm that the issues addressed in this brief of evidence are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

## **B. NOVEMBER 2022 ACOUSTICS COMMENTS**

9. I have attached as Appendix A the memorandum I prepared dated 5 November 2022, setting out my comments on the application. I have reviewed that previous advice and I confirm that it still accurately reflects my opinions on this application. I therefore adopt the memorandum in Appendix A as my evidence and will not repeat those comments.
10. In Appendix A I raised an inconsistency that the applicant's Assessment of Noise Effects report found construction noise criteria might be exceeded at times, but this was not addressed in the application document. Mr Bashford has since forwarded me an email from Catherine Boulton, dated 26 April 2023, stating that "*...they [Solar Bay] are confident that construction noise standards wont be breached...*". I have not seen an update or amendment to the Assessment of Noise Effects report to substantiate this statement, and I therefore consider the issue I raised previously remains unresolved.
11. As set out in Appendix A, to inform my review I discussed the proposal with Peter Ibbotson, who prepared the Assessment of Noise Effects report. I have contacted Mr Ibbotson again when preparing this evidence, with a view to potentially preparing a joint witness statement given that we appear to be largely in agreement on technical issues and should be able to clarify any residual points of difference, if any. However, I understand that Mr Ibbotson's engagement does not allow for conferencing at this stage.

## **C. SUBMISSIONS**

12. I have read the seven submissions made on the application. Four submissions raised concerns explicitly including noise (submission numbers 2, 4, 6 and 7). The noise concerns raised are mainly of a general or unspecified nature, and there are no issues raised that alter my previous advice as set out in Appendix A.

While not altering my previous advice, I have comments on specific questions raised in two submissions.

13. Patricia, Terrence and John Moore (submitter 4) question whether inverter noise will vary. I do not have experience of solar farm inverter operation. I understand from Mr Ibbotson that inverter noise will only occur during the day when electricity is being generated, and that he will provide further information in his evidence.
14. Stewart and Karen Smith (submitter 6) question whether construction will generate more noise than operation. The Assessment of Noise Effects report shows that construction noise is predicted to be at higher levels than operational noise.

**Stephen Chiles**

Acoustics advisor on behalf of Tararua District Council

1 August 2023

## Appendix A

### Memorandum, Mangamaire Solar Farm – acoustics comments, 5/11/22

# 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"><li>Assessment of noise effects, Marshall Day Acoustics (MDA) dated 28 July 2022</li><li>Telephone conversation with Peter Ibbotson, MDA, 4 November 2022.</li></ul>
<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"><li>operational noise within the notional boundary of dwellings: 5.4.1.2.b</li><li>construction noise: 5.4.1.2.f</li><li>vibration (including construction vibration): 5.4.1.2.h</li></ul>

<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"> <li>• 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.</li> <li>• 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</li> </ul>

	<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"><li>• Reference be added to vibration criteria.</li><li>• 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.</li></ul> <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"><li>• 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.</li><li>• 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.</li><li>• 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.</li></ul>
--	--