

**IN THE ENVIRONMENT COURT
WELLINGTON REGISTRY**

**I TE KŌTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA ROHE**

ENV-2024-WLG-001

UNDER the Resource Management Act 1991

IN THE MATTER the direct referral of applications for resource consents by
under section 87G of the Act for the Mt Munro Wind Farm


BY **MERIDIAN ENERGY LIMITED**
Applicant

STATEMENT OF EVIDENCE OF SARAH HELEN NEWALL

**ON BEHALF OF MANAWATŪ-WHANGANUI REGIONAL COUNCIL, GREATER
WELLINGTON REGIONAL COUNCIL, TARARUA DISTRICT COUNCIL, AND
MASTERTON DISTRICT COUNCIL**

SITE CONTAMINATION

Dated: 23 August 2024


Cooper Rapley Lawyers
227-231 Broadway Avenue
PO Box 1945
Palmerston North
DX PP80001

S Johnston
 06 353 5210
 06 356 4345
 sjohnston@crlaw.co.nz

TABLE OF CONTENTS

A.	INTRODUCTION	1
B.	CODE OF CONDUCT	1
C.	SCOPE OF EVIDENCE.....	2
D.	OUTSTANDING ISSUES	3
E.	FURTHER ASSESSMENT INFORMATION	4
F.	RESPONSE TO SECTION 274 PARTY EVIDENCE.....	6
G.	CONDITIONS.....	6
H.	CONCLUSION	7

STATEMENT OF EVIDENCE OF SARAH HELEN NEWALL

A. INTRODUCTION

- [1] My name is Sarah Helen Newall. I am a Site Contamination Specialist with and Director of HAIL Environmental Limited. I have been with HAIL Environmental since February 2021.
- [2] I prepared a report on the application required by s 87F of the Resource Management Act 1991 (**RMA**) on behalf of Manawatū-Whanganui Regional Council (**Horizons**) and Wellington Regional Council (**WRC**) Tararua District Council (**TDC**), and Masterton District Council (**MDC**) (the **Consent Authorities**) dated 15 March 2024 (**s 87F Report**).
- [3] In my s 87F Report, I reviewed the application from Meridian Energy Limited (the **Applicant** or **Meridian**) for resource consent applications lodged with the Consent Authorities for the Mt Munro Wind Farm (**Mt Munro Project** or **Project**) in relation to contaminated land. The s 87F Report provided recommendations to improve or further clarify aspects of the resource consent applications, including with regard to conditions, should the Court be minded to grant resource consents.
- [4] I confirm I have the qualifications and experience set out at paragraphs 5-11 of my s 87F Report.
- [5] Since filing my s 87F Report I have reviewed the information and evidence set out in Section C below. I have not attended any expert conferencing.

B. CODE OF CONDUCT

- [6] I repeat the confirmation provided in my s 87F Report that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023. This evidence has been prepared in accordance with that Code. Statements expressed in this evidence are within my areas of expertise, except where I state I am relying on the opinion or evidence of other witnesses.

C. SCOPE OF EVIDENCE

[7] My statement will cover the following:

- (a) The extent to which issues identified in my s 87F Report have been resolved through the additional work provided by Meridian;
- (b) A response to section 274 party evidence; and
- (c) Conditions.

[8] In addition to the material that was reviewed for my s 87F Report, I have reviewed the following:

- (a) Statement of Evidence of Thomas Anderson (Planning), dated 24 May 2024, on behalf of Meridian;
- (b) The proposed changes to conditions filed with Mr Anderson's evidence (the **Meridian conditions**);
- (c) Further information supplied post-mediation by Meridian, dated 11 July 2024, (**Attachment A**);
- (d) Mount Munro Windfarm Development, Super Bin Contamination Assessment (Tonkin + Taylor (**T+T**) on behalf of Meridian) dated 8 July 2024;
- (e) Evidence of Janet McIlraith (s 274 party) dated 10 July 2024;
- (f) Evidence of Robin Olliver (s 274 party) dated 10 July 2024;
- (g) Evidence of Hastwell/Mt Munro Protection Society Inc. (s 274 party) dated 10 July 2024; and
- (h) Evidence (Social Impact Report) of John Maxwell (s 274 party) dated 10 July 2024.

[9] I have also reviewed the draft conditions attached to the evidence of Mr McGahan, for the Consent Authorities (the **August Proposed Conditions**).

D. OUTSTANDING ISSUES

[10] There are no outstanding issues arising from my s 87F Report. These have been resolved through additional work completed by Meridian since the filing of my s 87F Report, as discussed in the following paragraphs.

[11] I identified the following unresolved matters in my s 87F Report:¹

- (a) Whether a 'piece of land' associated with the 'super bin' exists and if so, what area it covers; and
- (b) Whether the 'piece of land', if one exists, will be intersected by earthworks associated with the access track, and if so, whether the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (the **NES-CS**) and/or relevant discharge rules of the One Plan will apply.

[12] In the s 87F Report I also:

- (a) Recommended completion of a detailed site investigation (**DSI**) of the 'super bin' area to determine the applicability of the NES-CS associated with the construction of the access track in the super bin area.²
- (b) Explained that bulk storage of fertiliser is considered a HAIL³ use due to elevated levels of cadmium in some source rock used to make superphosphate fertilisers. Further, before it was banned, DDT, which was used to control grass grub, was commonly blended with superphosphate fertilisers, to achieve widespread application.⁴

[13] I discuss the additional T+T reporting in further detail below.

¹ Section 87F Report – Sarah Newall (Site Contamination), 15 March 2024 at [53].

² At [55].

³ Hazardous activities and industries list (HAIL). Revised edition. Ministry for the Environment, Wellington, 2011.

⁴ Section 87F Report – Sarah Newall (Site Contamination), 15 March 2024 at [42].

E. FURTHER ASSESSMENT INFORMATION

- [14] T+T completed the DSI on behalf of Meridian in July 2024.⁵ They included a plan (see Figure 1 below) showing the proposed access track alignment (grey), plus a buffer (yellow dotted line), in relation to the 'super bin'.

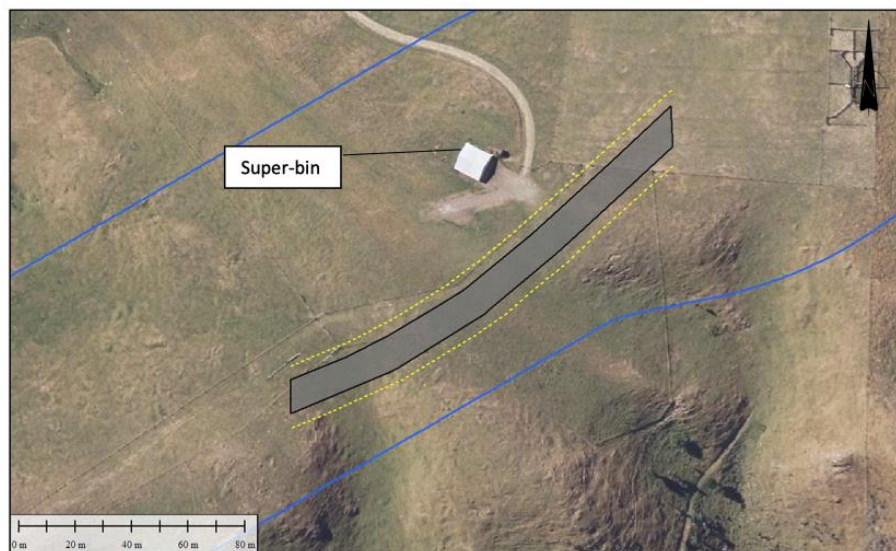


Figure 1: 'Super bin' and proposed access track location within proposed envelope.

- [15] T+T collected ten soil samples from the south western to eastern sides of the super bin, including three from within the proposed access track alignment.
- [16] The sample locations are shown on Figure 2 below, represented by yellow dots. Where concentrations of cadmium were detected above 'background', I have marked these sample locations with a red 'x'.

⁵ Mount Munro Windfarm Development, Super Bin Ground Contamination Assessment', 8 July 2024, completed for Meridian by Tonkin + Taylor Limited.



Figure 2: Sample locations

[17] The results showed cadmium in soil at concentrations above 'background', at most sample locations. Sample locations SB_SS01 to SB_SS03 were selected to represent the likely access track alignment (refer back to Figure 1). Cadmium did not exceed background at SB_SS01 and SB_SS02. Cadmium did exceed background at SB_SS03, however in my opinion this exceedance was not material.

[18] T+T's assessment does not offer any comment on, nor does it define or nominate a 'piece of land' associated with the super bin, i.e., the area more likely than not affected by the HAIL land use. Rather, the assessment stated:⁶

As the result of the samples collected from the area of the proposed roadway were found to be below the applicable background concentration for a rural scenario, the [NES-CS] will not apply to the development of the roadway in the proposed alignment.

[19] However, based on my review of the DSI results, I am satisfied with T+T's assessment that the NES-CS will not apply to soil disturbance works in the proposed access road alignment as shown on Figure 1. Further, and although not specifically addressed by T+T, I am satisfied that the discharge rules in

⁶ At section 4.3, page 5.

the One Plan will not apply to the re-use of soil within the overall project, excavated from the proposed access road alignment as shown on Figure 1.

[20] At paragraph 4 in the covering letter to T+T's report,⁷ Meridian states:

This Assessment provides an indication that no consent is required if the road is built in the location indicated in the report, which is the likely position. However, Meridian will assess the final alignment against this assessment and seek consent if necessary.

[21] I agree with Meridian that re-assessment should be undertaken (and consent(s) sought as necessary) in the event that the final design location of the access road differs to that shown in Figure 1. This re-assessment should address both the NES-CS and relevant discharge rules of the One Plan.

F. RESPONSE TO SECTION 274 PARTY EVIDENCE

[22] I have reviewed the section 274 party evidence and no matters related to site contamination have been raised.

G. CONDITIONS

[23] At the outset I note I am in general agreement with the planning experts' opinion in the Planning JWS that contaminated land matters can be managed through consent conditions.⁸

[24] In my s 87F Report, I recommended that the Consent Authorities should *"require potentially known contaminated sites to be defined and set out for the purposes of avoidance"*.⁹

[25] This recommendation still stands, particularly given the findings of the T+T further investigation and Meridian's proposed approach to avoid earthworks where elevated cadmium has been detected, to avoid triggering the NES-CS.

[26] I have reviewed the August Proposed Conditions. I note:

⁷ Mount Munro Windfarm – further information supplied post-mediation, provided by Meridian, dated 11 July 2024.

⁸ Joint Witness Statement, Planning, 9 August 2024, page 9.

⁹ Section 87F Report – Sarah Newall (Site Contamination), 15 March 2024, at [71].

- (a) I understand that the conditions look to manage contaminated land matters through the two key documents, set out below. I am generally comfortable with this approach. In particular:
- (i) the overall Construction Environmental Management Plan (**CEMP**), which must include procedures that will be followed in the event of unexpected discovery of contamination during works (at Condition CM4(c)); and
 - (ii) the Site Specific Erosion and Sediment Control Plan (**SSESCP**) Plans, must then include plans which show any areas where works are excluded from taking place. That is, the contaminated areas would need to be identified on the SSESCP plans as areas where works could not occur (at Condition ES4(c)(i)). I note that the SSESCP must be certified by Council.
- (b) Unexpected contamination discovery is also addressed in Conditions PCS1 and PCS2. As well as referencing back to the protocol required in the CEMP (see above), Condition PCS1 also sets out minimum requirements, including involving a SQEP immediately, who will advise on the area that is to be isolated. This is preferable to the condition including an automatic setback as I consider nominating a specific setback distance to be arbitrary, which may not be appropriate in all situations.

[27] On the above basis, I support how contaminated land is addressed through the August Proposed Conditions.

H. CONCLUSION

[28] I am satisfied that there are no outstanding issues arising from my s 87F Report. Any contaminated land issues are resolved by the further information, the T+T assessment, and the August Proposed Conditions.

23 August 2024

Sarah H Newall

11 July 2024

Meridian Energy Limited
P O Box 2128 Christchurch,
New Zealand
0800 496 496
Ellie.Taffs@meridianenergy.co.nz
meridian.co.nz

Tēnā koutou parties

ENV-WLG-2024-001- Meridian Energy Limited (Meridian) – Mt Munro Wind Farm – Further information supplied post-mediation

This letter contains some of the further information that Meridian agreed it would provide during court-assisted mediation, held in Palmerston North on 18 and 19 June 2024. This letter is limited to two items that the parties to mediation agreed would be provided prior to expert conferencing.

Old Coach Road Upgrade

1. Meridian agreed to complete work on identified constraints and to undertake additional analysis to understand the extent of works and constraints associated with the potential two-laning of Old Coach Road. This updated analysis has been circulated by email to the parties, and prompted the Tararua District Council (TDC) traffic reviewer to request a memorandum comparing the impacts of the Meridian's original proposal in the Traffic Assessment (TA) and TDC's proposal to widen along the length of the road.
2. This memorandum is attached as **Appendix A** to this letter, and as requested also includes an additional passing bay between Ch 400-650 within the original TA/s92 proposal. The conclusion of this memorandum is that:

Given that the TA/s92 original proposal (when combined with the Draft CTMP measures) has been demonstrated to provide a safe route for both construction and local residential traffic, then it is considered that widening OCR to the TDC proposed 10.6m does not offer any safety benefit and results in not only additional construction work but has a greater negative impact on the local environment and will be an overprovision once construction work has finished.

As requested, an additional passing bay between Ch 400-650 has been included within the original TA/s92 proposal and the impacts of this additional widening are largely the same as those for the original TA proposal.

'Super Bin' Ground Contamination Assessment

3. Meridian agreed to provide results from 'super-bin' investigations (attached as **Appendix B** to this letter). The Super Bin Ground Contamination Assessment found that:

The sample results in the area surrounding the super-bin show that there are no significant constraints, relating to contamination, for the development of the roadway in the proposed alignment, shown in Figure 1.1.

As the result of the samples collected from the area of the proposed roadway were found to be below the applicable background concentration for a rural scenario, the National Environmental Standards for Assessing and Managing Contamination in Soil to Protect Human Health¹¹ (NESC¹¹) will not apply to the development of the roadway in the proposed alignment.

4. This Assessment provides an indication that no consent is required if the road is built in the location indicated in the report, which is the likely position. However, Meridian will assess the final alignment against this assessment and seek consent if necessary.

Ngā Mihi | Kind regards,

Ellie Taffs

Senior Legal Counsel - RMA
Meridian Energy Limited



Enclosed:

- Appendix A: Memo Old Coach Road Widening – Comparison of Impacts of TA original proposal and TDC 10.5m widening proposal by Tonkin + Taylor dated 9 July 2024
- Appendix B: Super Bin Ground Contamination Assessment by Tonkin + Taylor dated 8 July 2024

8 July 2024
Job No: 1016884.0003

Commercial in Confidence

Meridian Energy Limited
PO BOX 2128
Christchurch
Christchurch 8140

Attention: Nick Bowmar

Dear Nick

**Mount Munro Windfarm Development
Super Bin Ground Contamination Assessment**

1 Introduction

Tonkin & Taylor Ltd (T+T) has been commissioned by Meridian Energy Limited to complete an assessment of the area surrounding the super-bin which is within the proposed road envelope of the Mount Munro Windfarm (referred to below as the site). The location of the site, as well as the proposed road envelope and alignment, is presented in Figure 1.1 below.

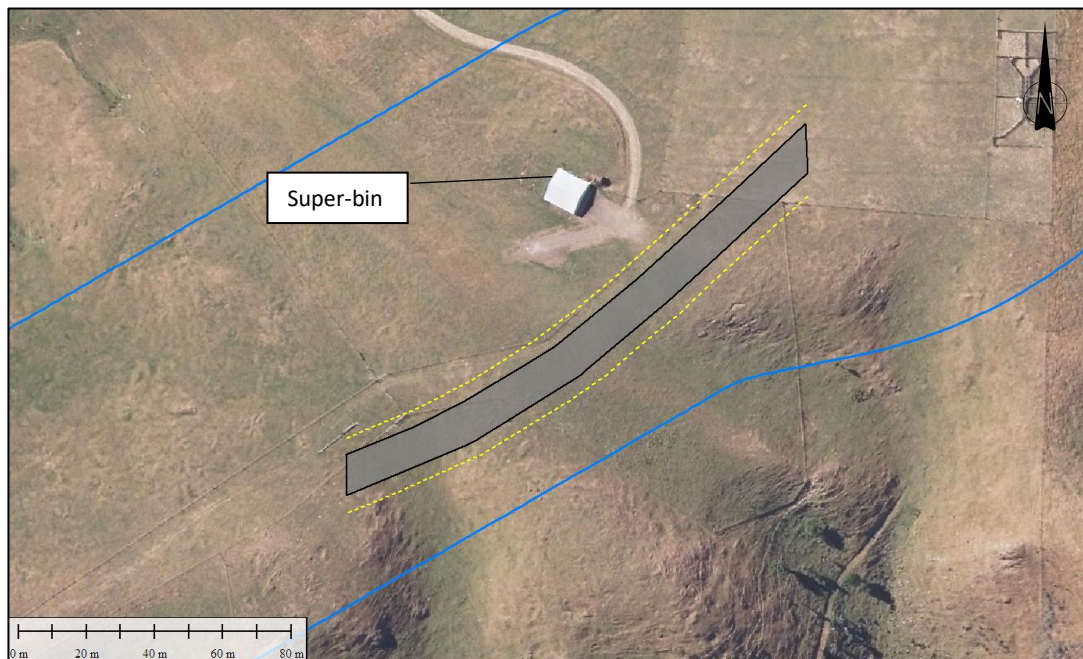


Figure 1.1: Super-bin location within proposed road envelope (shown by blue line) and proposed road alignment (formed road in grey and buffer shown by yellow dotted line).

This report has been prepared in general accordance with the requirements for a DSI referred to in the NESCS regulations, and as outlined in the MfE's Contaminated Land Management Guidelines¹.

The persons undertaking, managing reviewing and certifying this investigation are suitably qualified and experienced practitioners (SQEP), as required by the NESCS and defined in the NESCS Users' Guide (April 2012).

This report was undertaken in accordance with the Variation Order (VO13) of 9 May 2024 to our signed Services Agreement of 16 November 2021.

2 Background and scope

We understand that the proposed road envelope for the Mount Munro Windfarm encompasses the existing super-bin on site, however the super-bin and immediate adjacent area are unlikely to be disturbed as part of the development of the access road. The super-bin area has been identified as an area of concern within the Council's Peer Reviewers comments, within Appendix F of the Section 87F Report².

To address the Council's Peer Reviewers comments within Appendix F of the Section 87F Report, and to undertake the assessment of the potential impacts of the super-bin we have completed the following scope of works additional to the PSI report:

- Preparation for site work (including updating site safety documentation, liaising with laboratory and confirming sampling plan with technical reviewer).
- Carry out a site visit to collect approximately 10 soil samples from the surface and at 0.2 m bgl.
- Submitting samples to, and liaising with, the laboratory. Samples were analysed for contaminants associated with fertiliser storage, including; cadmium and organochlorine pesticides.
- Preparation of this letter report interpreting the sample results and responding to the Section 87F comments relating to Contaminated Land.

¹ Ministry for the Environment, 2021. Contaminated Land Management Guidelines No 1 – Reporting on Contaminated Sites in New Zealand.

² 15 March 2024, Section 87F Report of Sarah Newall – Site Contamination, on behalf of Manawatū-Whanganui Regional Council, Greater Wellington Regional Council, Tararua District Council and Masterton District Council.

3 General information on super phosphate storage bins

Super-bins have historically been used in New Zealand for storage of single superphosphate (SSP: a mixture of monocalcium phosphonate and gypsum) to enable aerial topdressing of hill country farms. The storage bin allows for bulk storage for rapid reloading of planes next to topdressing airstrips. The bins are concrete based and protected from moisture entry with a retractable roof.

The nutrient profile in SSP is 9-10% phosphorus, 11-12% sulphur and 20% calcium. SSP contains an impurity profile of toxic metals, these differ depending on the origin of the phosphate rock, however in practice blending of different rocks by the fertiliser companies to meet quality standards means that final fertiliser batches are typically consistent in composition. The contaminant of primary concern to human health in SSP is cadmium. Currently New Zealand operates to a voluntary industry standard of 280 mg Cd/kg P, this has been in place since 1997. The Fertiliser Association of New Zealand (FANZ) reported that the median cadmium concentration in 7803 samples over the years 2005-2023 was 176 mg Cd/kg P.³ Prior to the mid-1990s there was reliance on Nauru rock phosphate which produced SSP with average cadmium levels of ~550 mg Cd/ kg P.⁴ Based on a bulk product containing up to 10% phosphorus the historical range was up 55 mg/kg cadmium, with more recent long-term trends being 17.6 mg/kg.

³ FANZ, 2024. Fertiliser use in NZ. https://www.fertiliser.org.nz/Site/about-fertiliser/fertiliser_use_in_nz.aspx

⁴ McDowell, R.W., 2012. The rate of accumulation of cadmium and uranium in a long-term grazed pasture: implications for soil quality. New Zealand Journal of Agricultural Research 55, 133-146.

4 Soil sampling

Surface soil sampling was undertaken at 10 locations within the project site. The objective of the soil sampling was to undertake a preliminary assessment of potential contaminant concentrations in soils that are adjacent to the super-bin and within the proposed road envelope.

The following observations were made during the site visit:

- A gravelled area containing the access track to the super-bin and a truck turn around area is present to the east of the super-bin. The remaining area is grassed, with no plant stress evident.
- Samples SB_SS01-SS04 were predominantly silty topsoil with some gravels, increasing in number and size with depth. Samples SB_SS05-SS10 were adjacent to and within the gravelled area and the material encountered in these locations was a silty gravel. Due to the gravels being tightly packed beneath the surface locations SB_SS05-SS08 and SS10 were unable to be excavated to 0.2 m bgl. These locations were outside of the area most likely to be used for the development of the access road.
- An area of spilled fertiliser with visible small green pellets (prills), likely where equipment is loaded, was observed on the southern end of the gravelled track. Sample SB_SS07 was collected within this area and tested for barium and selenium on the basis the pellets could be a barium selenate fertiliser.

The sampling plan showing the sampling locations and nearby features is included in Appendix A Figure 1.

4.1 Soil sampling procedure

Sampling was undertaken on 15 May 2024 by a T+T contaminated land consultant in general accordance with the requirements of the NESCS⁵ and CLMG No. 5⁶, using the following procedure:

- Freshly gloved hands, a spade and a hand-trowel, were used to collect samples directly from the surface soils and sub-surface soil. Surface samples were collected between depths of 0.0 m bgl to 0.1 bgl and deeper samples were collected between 0.15 – 0.2 m bgl.
- Samples were placed into laboratory supplied sample containers.
- The spade and trowel were decontaminated between sample locations using clean water and Decon 90 (a phosphate-free detergent).
- Samples were delivered to IANZ accredited Hill Laboratories under chain of custody documentation for analysis.
- Surface samples collected were selected for initial analysis. Based on the results of these samples, no further analysis on the deeper samples has been required to complete the assessment.

⁵ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

⁶ Ministry for the Environment. Updated 2021. Contaminated Land Management Guidelines No. 5: Site investigation and Analysis of Soils. Ministry for the Environment, Wellington.

4.2 Analytical results

The assessment criteria were selected in accordance with the requirements of the regulatory framework, in particular, in accordance with the MfE Methodology⁷. Commercial/industrial land use criteria were used to provide an assessment for workers completing the construction of the access road. The ecological soil guidance value investigation trigger has been used to assess environmental risk⁸.

A summary table of the analytical results for the tested samples is included as Table 1 in Appendix B and full laboratory transcripts are included in Appendix C. The results indicate:

- Cadmium concentrations were found to be below the human health criteria for a commercial/industrial land use, in all samples.
- Cadmium concentrations were found to be above the applicable background concentrations⁹ in samples collected within 30 m east of the super-bin. Along the transect sample line, concentrations decreased with distance from the super-bin and equipment filling areas, to being below the criteria after 30 m from the source.
- The average cadmium concentration (0.47 mg/kg) across the three sample locations within the proposed roadway area (SB_SS01-03) is below the applicable background criteria of 0.65 mg/kg.
- Cadmium concentrations are highest in the area where the top-dressing plane may be loaded and/or start its take-off, this is consistent with previous reporting of top dressing airstrips.¹⁰
- Cadmium concentrations did not exceed the ecological soil guidance value investigation trigger.
- Barium was detected in sample SB_SS07-0-0.02, where fertiliser and prills were observed on the ground surface. This may relate to a barium salt used in the prills or accumulation over time from the barium content in the SSP. Selenium was not detected in this sample.
- Both metals were found to be below Class A Landfill Screening Criteria, therefore the material is likely to be suitable for landfill disposal, subject to the landfill operators' approval.
- No organochlorine pesticides were detected above laboratory detection limit, in any of the analysed samples.

4.3 Implications for site development

The sample results in the area surrounding the super-bin show that there are no significant constraints, relating to contamination, for the development of the roadway in the proposed alignment, shown in Figure 1.1.

As the result of the samples collected from the area of the proposed roadway were found to be below the applicable background concentration for a rural scenario, the National Environmental Standards for Assessing and Managing Contamination in Soil to Protect Human Health¹¹ (NESCS) will not apply to the development of the roadway in the proposed alignment.

⁷ Ministry for the Environment, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment. Criteria for residential (25% produce) land use used.

⁸ Cavanagh, J., Harmsworth, G., 2022. Exploring the implementation of ecological soil guideline values for soil contaminants

⁹ Ministry for Primary Industries, 2008. Report One – Cadmium in New Zealand Agriculture. National Cadmium Background Concentration.

¹⁰ Taylor, M., Kratz, S., Kim, N., Drewry, J., 2014. Fertiliser associated trace elements in 2 transects of soils away from an airfield fertiliser bin sampled 20 years apart. Proceedings of the NZ Trace Elements Group Conference 2014, Wellington.

¹¹ Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

5 Summary

T+T has been commissioned by Meridian Energy Limited to undertake a Ground Contamination Assessment for the super-bin located within the Mount Munro Windfarm development area.

A summary of the findings is below:

- The average cadmium concentration across the three sample locations within the proposed roadway area (SB_SS01-03) is below the applicable background criteria.
- Cadmium was found to be above background concentrations within 30 m of the super-bin, however below the relevant human health and soil ecological risk criteria. Cadmium concentrations present in soils, show decreasing concentrations with distance from the super-bin and area where fertiliser spreading equipment is loaded. The results show that the material is below the Class A Landfill Screening Criteria and, subject to approval from the landfill operator, is likely to be suitable for disposal to a landfill facility.

6 Applicability

This report has been prepared for the exclusive use of our client Meridian Energy Limited, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that this report will be used by Masterton District Council, Tararua District Council, Greater Wellington regional Council and Horizons Regional Council in undertaking their regulatory functions in connection with assessing the consent application for the development of the Mount Munro Windfarm.

Tonkin & Taylor Ltd

Report prepared by:



Kasey Pitt
Contaminated Land Consultant

Authorised for Tonkin & Taylor Ltd by:



Nick Peters
Project Director

Report certified by a suitably qualified and experienced practitioner as prescribed under the NESCS and the NESCS Users Guide (April 2012):



Dr Andrew Pearson
Senior Environmental Consultant

8-Jul-24

\\ttgroup.local\corporate\Christchurch\TT Projects\1016884\1016884.1000\IssuedDocuments\20240708_Super Bin Ground Contamination Assessment.docx

Appendix A Sample Location Plan



Appendix B Results Summary Table

Table 1: Soil Samples Results - Mount Munro Windfarm Super-Bin ¹

Sample ID	SB_SS01_0-0.1	SB_SS02_0-0.1	SB_SS03_0-0.1	SB_SS04_0-0.1	SB_SS05_0-0.02	SB_SS06_0-0.05	SB_SS07_0-0.02	SB_SS08_0-0.1	SB_SS09_0-0.1	SB_SS09_0.2	SB_SS10_0-0.02	DUP1 Duplicate of SS06_0-0.02	National Background Range ²	Eco-SGVs Combined Site Investigation Trigger Values ³	Soil Contaminant Standard for Outdoor Worker (unpaved) ⁴	Class A Landfill Screening Criteria ⁵
Laboratory Reference	3582667.01	3582667.03	3582667.05	3582667.07	3582667.09	3582667.1	3582667.11	3582667.12	3582667.13	3582667.14	3582667.15	3582667.16				
Date	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024	15/05/2024				
Depth (m)	0-0.1	0-0.1	0-0.1	0-0.1	0-0.02	0-0.05	0-0.02	0-0.1	0-0.1	0.2	0-0.02	0-0.02				
Geological unit	SILT	SILT	SILT	SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT	Gravelly SILT				
Heavy Metals																
Barium	-	-	-	-	-	-	171	-	-	-	-	-	-	-	750 ⁵	2,000
Cadmium	0.22	0.38	0.81	0.78	1.57	1.12	7.2	6.9	0.82	0.29	1.05	1.04	0.65	12	1,300	20
Selenium	-	-	-	-	-	-	<20	-	-	-	-	-	-	-	80 ⁵	200
Organochlorine Pesticides (OCs) ⁷																

Notes:

7.2	Exceeds applicable background concentration
-----	---

1. All results in mg/kg
2. Upper limit of background concentrations from Landcare Research, 2016. Predicted background soil concentrations for sandstone soil type.
3. Criteria from MPI, 2008. Report One: Cadmium in New Zealand Agriculture. National Cadmium Background Concentration.
4. Criteria from MfE, 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (unless otherwise stated).
5. Criteria from Canadian Council of Ministers of the Environment, 2013. Canadian Soil Quality Guidelines for the Protection of Environmental and Human Health - Agricultural Land Use.
6. Criteria from MfE, 2004. Landfill Waste Acceptance Criteria and Landfill Classification.
7. No OCPS were detected above laboratory detection limit and therefore have not been included within the results table.

Appendix C Laboratory Transcript

Certificate of Analysis

Page 1 of 3

Client:	Tonkin & Taylor	Lab No:	3582667	SPV1
Contact:	Kasey Pitt	Date Received:	16-May-2024	
	C/- Tonkin & Taylor	Date Reported:	22-May-2024	
	PO Box 2083	Quote No:	130984	
	Wellington 6140	Order No:	1016884.0003	
		Client Reference:	1016884.0003	
		Submitted By:	Kasey Pitt	

Sample Type: Soil

Sample Name:	SB_SS01_0-0.1 15-May-2024	SB_SS02_0-0.1 15-May-2024	SB_SS03_0-0.1 15-May-2024	SB_SS04_0-0.1 15-May-2024	SB_SS05_0-0.02 15-May-2024
Lab Number:	3582667.1	3582667.3	3582667.5	3582667.7	3582667.9

Individual Tests

Dry Matter	g/100g as rcvd	72	78	73	69	84
Total Recoverable Cadmium	mg/kg dry wt	0.22	0.38	0.81	0.78	1.57

Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
alpha-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
beta-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
delta-BHC	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
4,4'-DDE	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
2,4'-DDT	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.09	< 0.08	< 0.08	< 0.09	< 0.08
Dieldrin	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endosulfan I	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endosulfan II	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endrin	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Endrin ketone	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Heptachlor	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012
Methoxychlor	mg/kg dry wt	< 0.014	< 0.013	< 0.014	< 0.015	< 0.012

Sample Name:	SB_SS06_0-0.05 15-May-2024	SB_SS07_0-0.02 15-May-2024	SB_SS08_0-0.1 15-May-2024	SB_SS09_0-0.1 15-May-2024	SB_SS09_0.2 15-May-2024
Lab Number:	3582667.10	3582667.11	3582667.12	3582667.13	3582667.14

Individual Tests

Dry Matter	g/100g as rcvd	83	80	85	80	78
Total Recoverable Barium	mg/kg dry wt	-	171	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	1.12	7.2	6.9	0.82	0.29
Total Recoverable Selenium	mg/kg dry wt	-	< 20	-	-	-



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		SB_SS06_0-0.05 15-May-2024	SB_SS07_0-0.02 15-May-2024	SB_SS08_0-0.1 15-May-2024	SB_SS09_0-0.1 15-May-2024	SB_SS09_0.2 15-May-2024
Lab Number:		3582667.10	3582667.11	3582667.12	3582667.13	3582667.14
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
alpha-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
beta-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
delta-BHC	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
4,4'-DDE	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Total DDT Isomers	mg/kg dry wt	< 0.07	< 0.08	< 0.07	< 0.08	< 0.08
Dieldrin	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endosulfan I	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endosulfan II	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endrin	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Endrin ketone	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Heptachlor	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013
Methoxychlor	mg/kg dry wt	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013

Sample Name:		SB_SS10_0-0.02 15-May-2024		DUP1 15-May-2024	
Lab Number:		3582667.15		3582667.16	
Individual Tests					
Dry Matter	g/100g as rcvd	79		83	
Total Recoverable Cadmium	mg/kg dry wt	1.05		1.04	
Organochlorine Pesticides Screening in Soil					
Aldrin	mg/kg dry wt	< 0.013		< 0.012	
alpha-BHC	mg/kg dry wt	< 0.013		< 0.012	
beta-BHC	mg/kg dry wt	< 0.013		< 0.012	
delta-BHC	mg/kg dry wt	< 0.013		< 0.012	
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013		< 0.012	
cis-Chlordane	mg/kg dry wt	< 0.013		< 0.012	
trans-Chlordane	mg/kg dry wt	< 0.013		< 0.012	
2,4'-DDD	mg/kg dry wt	< 0.013		< 0.012	
4,4'-DDD	mg/kg dry wt	< 0.013		< 0.012	
2,4'-DDE	mg/kg dry wt	< 0.013		< 0.012	
4,4'-DDE	mg/kg dry wt	< 0.013		< 0.012	
2,4'-DDT	mg/kg dry wt	< 0.013		< 0.012	
4,4'-DDT	mg/kg dry wt	< 0.013		< 0.012	
Total DDT Isomers	mg/kg dry wt	< 0.08		< 0.08	
Dieldrin	mg/kg dry wt	< 0.013		< 0.012	
Endosulfan I	mg/kg dry wt	< 0.013		< 0.012	
Endosulfan II	mg/kg dry wt	< 0.013		< 0.012	
Endosulfan sulphate	mg/kg dry wt	< 0.013		< 0.012	
Endrin	mg/kg dry wt	< 0.013		< 0.012	
Endrin aldehyde	mg/kg dry wt	< 0.013		< 0.012	
Endrin ketone	mg/kg dry wt	< 0.013		< 0.012	
Heptachlor	mg/kg dry wt	< 0.013		< 0.012	
Heptachlor epoxide	mg/kg dry wt	< 0.013		< 0.012	

Sample Type: Soil			
Sample Name:		SB_SS10_0-0.02 15-May-2024	DUP1 15-May-2024
Lab Number:		3582667.15	3582667.16
Organochlorine Pesticides Screening in Soil			
Hexachlorobenzene	mg/kg dry wt	< 0.013	< 0.012
Methoxychlor	mg/kg dry wt	< 0.013	< 0.012

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1, 3, 5, 7, 9-16
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1, 3, 5, 7, 9-16
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1, 3, 5, 7, 9-16
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 3, 5, 7, 9-16
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 5, 7, 9-16
Total Recoverable Barium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	11
Total Recoverable Cadmium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.10 mg/kg dry wt	1, 3, 5, 7, 9-16
Total Recoverable Selenium	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	20 mg/kg dry wt	11

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 17-May-2024 and 22-May-2024. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.



Kim Harrison MSc
Client Services Manager - Environmental