

## Darfield Solar and Energy Storage Project

### Preliminary Site Investigation

for: Darfield Solar and Energy Storage Ltd



Job No: 67231#CIM

Version: Rev3

eTrack No: 200048456

Date of Issue: 26/08/2024

## EXECUTIVE SUMMARY

Babbage Consultants Limited (Babbage) has been engaged by Darfield Solar and Energy Storage Ltd (DSES) to undertake a Preliminary Site Investigation (PSI) at 1352 Homebush Road, Darfield, Selwyn District (the site). The findings of this investigation are summarised as follows:

- 1 The site has been used for as production land (combination of agricultural, pastoral, and forestry purposes) for at least 69 years. Forestry activity ceased around 2010.
- 2 Site history review indicates that the site has been subjected to an activity on the Hazardous Activities and Industry List (HAIL) Item A10.
- 3 The site has potential contaminants in particular organochlorine pesticides (OCPs), organophosphate pesticides (OPPs), and metals from historical agricultural activities.
- 4 The conceptual site model indicates that there is a potential source and pathway link to human/ecological receptors. The level of risk to human health or the environment is considered minor for Lot 2 and less than minor for Lot 1.
- 5 Pursuant to regulation 5(8)(b) of the NESCS<sup>1</sup>, the piece of land is to remain as production land (grazing) and the proposed soil disturbance activity is not related to residential or farmhouse activities, therefore the NESCS does not apply.
- 6 Notwithstanding the minor and less than minor risk assessment, an environmental soil assessment is recommended prior to soil disturbance works on site to assess the level of contamination and required controls during earthworks, if any.

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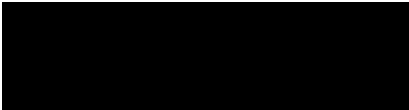
<sup>1</sup> Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

## ACKNOWLEDGEMENT OF SUBMISSION

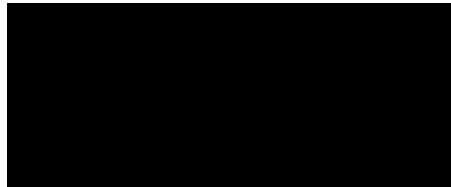
This report was prepared by Charlotte Lucas and reviewed by Hiram Garcia.

Respectfully submitted

Babbage Consultants Limited



Charlotte Lucas  
Environmental Consultant

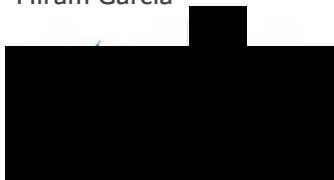


Hiram Garcia  
Principal Environmental Consultant

I have assessed the site in accordance with current New Zealand Regulations and guidance documents and reported in accordance with the current edition of Contaminated Land Management Guidelines No 1: Reporting of Contaminated Sites in New Zealand.

I am considered by Babbage Consultants Limited as a suitably qualified and experienced practitioner (SQEP) pursuant to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, based on the company's definition of a SQEP as given below.

Name: Hiram Garcia



Signed:

Date: 26/08/2024

### Babbage Consultants Limited: SQEP Definition

Babbage Consultants Limited requires that a SQEP has the following Qualifications/Experience:

- Tertiary education in environmental science, engineering, or other relevant field;
- Ten years of relevant post graduate environmental experience;
- A commitment to continuing professional development; and
- Full membership of an appropriate professional body requiring a commitment to operating in accordance with a professional code of ethics.

| Date       | Version | eTrack No. | Author(s)       | Reviewer(s)  |
|------------|---------|------------|-----------------|--------------|
| 22/05/2024 | Rev0    | 200047967  | Charlotte Lucas | Hiram Garcia |
| 05/07/2024 | Rev1    | 200048181  | Charlotte Lucas | Hiram Garcia |
| 07/08/2024 | Rev2    | 200048181  | Charlotte Lucas | Hiram Garcia |
| 26/08/2024 | Rev3    | 200048456  | Charlotte Lucas | Hiram Garcia |

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## 1 INTRODUCTION AND BACKGROUND

Babbage has been engaged by DSES to undertake a PSI at 1352 Homebush Road, Darfield, Selwyn District (the site) to support DSES's site development (See Figure 1).

The scope of work for the PSI was set out in our proposal dated 8 March 2024 which does not include a site visit. The key aims of the PSI were to determine:

- The site history based on historical aerals, Environment Canterbury Regional Council Listed Land Use Register (ECAN LLUR) and a landowner interview, whether historic use is likely to have resulted in ground contamination and verify whether activities detailed on the HAIL, issued by the Ministry for the Environment (MfE)<sup>2</sup>, apply to the site.
- Nature and source of potential contaminants if applicable.
- Known or potential human and ecological receptors that could be exposed to contaminants if applicable.
- Known or potential pathways by which identified receptors could be exposed to potential contaminants under current or known proposed future land use if applicable.

The site identification details are presented in Table 1.

**Table 1. Site identification.**

| Address            | Legal description       | Area (m <sup>2</sup> ) |
|--------------------|-------------------------|------------------------|
| 1352 Homebush Road | Lot 2 DP 60325 (Lot 2)  | 1,073,406              |
|                    | Lot 1 DP 434071 (Lot 1) | 469,240                |

**Note:** Source – Land Information New Zealand (LINZ) data service website<sup>3</sup>.

It is understood that DSES plans to develop the site as a solar power generation facility.

The PSI performed follows the general reporting and investigation methodology presented in the MfE Contaminated Land Management Guidelines (CLMG) No. 1<sup>4</sup>.

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<sup>2</sup> MfE 24 March 2021. Land – Guidance and guidelines on contaminated land. Retrieved from <https://www.mfe.govt.nz/land/hazardous-activities-and-industries-list-hail>

<sup>3</sup> LINZ data service 22 March 2024. Retrieved from <https://data.linz.govt.nz/layer/50772-nz-primary-parcels>

<sup>4</sup> MfE 2021. Contaminated Land Management Guidelines No. 1. Reporting on Contaminated Sites in New Zealand (Revised 2021)







## 2 SITE DESCRIPTION

The site is located north of Homebush Road, in the suburb of Darfield, within the Selwyn District of Canterbury. The site is currently used as pastoral and agricultural land.

The Canterbury Maps Viewer website<sup>5</sup> shows the site is sloping from northwest to southeast with a fall of approximately 20 meters (m). Stormwater surface runoff generated at the site appears to discharge straight to soakage onsite.

Published geological information<sup>6</sup> shows the site to be underlain by the Pakihi Supergroup consisting of un-weathered, brownish-grey, variable mix of gravels, sand, silt, and clay in low river terraces; locally up to 2m silt cap.

The current surrounding property use is presented in Table 2.

**Table 2. Surrounding property use.**

| Direction | Observation  |
|-----------|--|
| North     | To the north of the site is Auchenflower Road with agricultural and pastoral properties beyond.                            |
| South     | To the south of the site is Homebush Road and McHugh's Plantation Reserve with pastoral and residential properties beyond. |
| East      | To the east of the site are pastoral and agricultural properties with scattered residential dwellings.                     |
| West      | To the west of the site is Fonterra Darfield facility with agricultural properties and West Coast Road beyond.             |

**Note:** Source – Based on information from LINZ Database website and Canterbury Map Viewer.

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<sup>5</sup> Environment Canterbury Regional Council. 17 April 2024. Canterbury Map Viewer. Retrieved from <https://mapviewer.canterburymaps.govt.nz>

<sup>6</sup> Institute of Geological and Nuclear Sciences (GNS). 26 March 2024. Geology 2.0.0 Webmap NZ 1:250k Geological unit. Retrieved from <https://data.gns.cri.nz/geology/index.html?map=NZ%20Geology>.

### 3 HISTORICAL SITE USE

Babbage has reviewed historic aerial photographs dating back to 1941 held on the Retrolens website<sup>7</sup> and LINZ Database. A summary of selected historic aerial photography is presented in Table 3 and the historical aerial photographs are shown in Appendix A.

**Table 3. Summary of historical aerial photographs.**

| Year      | Site  | Surrounding land use   |
|-----------|---|--|
| 1941      | The site appears to be used for agricultural and pastoral (Lot 2) activities with forestry (Lot 1). | The site is surrounded by mostly pastoral and agricultural land use. Some residential properties are scattered to the south, east and west. West Coast Road and Homebush Road are established. |
| 1985      | No significant changes to site.   | Site surrounds still predominantly pastoral and agricultural.  |
| 2004-2010 | No significant changes to site.   | A dwelling has been established within 1352 Homebush Road along the southern boundary but is not part of the site.   |
| 2012      | The forestry activity on Lot 1 is no longer visible and appears to be used for pastoral land use.   | Directly west of the site appears to be an industrial facility under development.  |
| 2019      | No significant changes to site use.   | The industrial property is now established to the west of the site.  |

#### 3.1 List Land Use Register Enquiry

A property statement was obtained from ECAN LLUR<sup>8</sup> on 26<sup>th</sup> March 2024. The response is provided in Appendix B and the web entry summarised below:

*'The Listed Land Use Register does not currently have any information about a Hazardous Activities and Industries List on your selected site.'*

<sup>7</sup> Local Government Geospatial Alliance 26 March 2024. Retrolens Historic Image Resource. Retrieved from <http://retrolens.nz/>

<sup>8</sup> Environment Canterbury Regional Council 26 March 2024. Retrieved from <https://llur.ecan.govt.nz/home>



### 3.2 Landowner Interview

Babbage received a response from the landowner at the time of this report on 4 April 2024 about the site. The response is summarised below and can be found in Appendix C:

- Prior to the current landowner 104 hectare (ha) (Lot 2) was used for pastoral farming and 46ha (Lot 1) for forestry.
- On the site 20ha of kale has been planted for the last 20 years and rotated annually for winter greenfeed for sheep. Each paddock is in kale for 10 months every 7-8 years. Herbicides and pesticides are used on the kale however they are mixed and stored offsite. The following chemicals are presently used; Glyphosate, versatill, pyrinex (chlorpyrifos), carfentrazone, 2-methyl-4-chlorophenoxyacetic (MCPA) and 4-(2-methyl-4-chlorophenoxy)butyric acid (MCPB).
- Prior to 2017, the land was ploughed to a depth of 150-200 millimetres (mm). Post 2017 the land was directly drilled.
- It's noted at on Lot 1 there was a 15x15m hole. This hole has previously been excavated and contained old tree stumps. This was filled and covered with onsite topsoil.
- There is no dwellings or structures on the site.

## 4 POTENTIAL FOR CONTAMINATION

Based on review of historical aerial photographs, ECAN LLUR enquiry, and land landowner interview it is concluded that the site is likely to have an has been subjected to an activity on the HAIL. Activities and locations can be found in Table 4 and mapped on Figure 2.




***Table 4. HAIL Activities.***

| HAIL Item       | Description                               | Location   |
|-----------------|---|--|
| HAIL Item (A10) | Persistent pesticide bulk storage or use. | Lot 2, associated with agricultural activities since 1985. |





**Legend**

-  Site Boundary
-  Lot Boundary
-  HAIL ITEM (A10)

**NOTES**

Aerial Images: LINZ Basemap

**DISCLAIMER:**

This map/plan is not an engineering draft.  
This map/plan is illustrative only and  
all information should be  
independently verified on site before  
taking any action.

SCALE

**1:1 @ A3**

MAP NO.

**Figure 2**



## 5 RISK ASSESSMENT

A conceptual site model (CSM) for the site has been developed to assess risk. For a contaminant to present a risk to human health or the environment, the following components are required to be present and connected:

- Sources/Contaminants – the known and potential sources of contamination and contaminants of concern.
- Pathways – likely and complete exposure pathways by which the identified receptors could be exposed to the contaminants, under current or known proposed future land use.
- Receptors – human and ecological receptors.

Based on the data for the site, the potential source, pathway and receptor linkages are presented in Table 5.

**Table 5. Conceptual site model.**

| Source  | Exposure pathway   | Potential receptor  | Acceptable risk?  |
|---|--|---|---|
| Organochlorine pesticides (OCPs), Organophosphate pesticides (OPPs) and metals for agricultural land use. | Direct contact.<br>Ingestion of soil.<br>Inhalation of airborne dust.<br>Off-site discharge. | Site re-development workers.<br>Current site users.<br>Future site users.<br>Surrounding residents.<br>Receiving environment (in surrounds and at disposal facility). | <p><b>Lot 2:</b></p> <p><b>Minor</b></p> <p>Due to the area of application and the duration of the activity on the western portion of the site there may be a potential risk to human health or the environment. Soil sampling is recommended to determine actual risk.</p> |
|   |  |   | <p><b>Lot 1:</b></p> <p><b>Less than minor</b></p> <p>Due to the short application time since the removal of the forest area there is unlikely to be a risk to human health or the environment.</p>   |

Based on the source, pathway and receptor linkage, OCPs, OPPs, and metals are likely to have the potential to pose a risk to the health of future land users and/or the environment.

Pursuant to regulation 5(8)(b) of the NESCS, the piece of land is to remain as production land (grazing) and the proposed soil disturbance activity is not related to residential or farmhouse activities, therefore the NESCS does not apply.

## 6 CONCLUSIONS

Based on the PSI, Babbage concludes the following:

- 1 The site history review indicates that the site has been subjected to an activity on the HAIL.
  - HAIL Item (A10)- Persistent pesticide bulk storage or use.
- 2 The site has potential contaminants in particular OCPs, OPPs, and metals from historical agricultural activities.
- 3 The conceptual site model indicates that there is a potential source and pathway link to human/ecological receptors. The level of risk to human health or the environment is considered minor for Lot 2 and less than minor for Lot 1.
- 4 Pursuant to regulation 5(8)(b) of the NESCS, the piece of land is to remain as production land (grazing) and the proposed soil disturbance activity is not related to residential or farmhouse activities, therefore the NESCS does not apply.
- 5 Notwithstanding the minor and less than minor risk assessment, an environmental soil assessment is recommended prior to soil disturbance works on site to assess the level of contamination and required controls during earthworks, if any.



## APPLICABILITY AND LIMITATIONS

### Restrictions of Intended Purpose

This report has been prepared solely for the benefit of Darfield Solar and Energy Storage Ltd as our client with respect to the brief. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such party's sole risk.

### Legal Interpretation

Opinions and judgements expressed herein are based on our understanding and interpretation of current regulatory standards, and should not be construed as legal opinions. Where opinions or judgements are to be relied on, they should be independently verified with appropriate legal advice.

### Maps and Images

All maps, plans, and figures included in this report are indicative only and are not to be used or interpreted as engineering drafts. Do not scale any of the maps, plans or figures in this report. Any information shown here on maps, plans and figures should be independently verified on site before taking any action. Sources for map and plan compositions include LINZ Data and Map Services and local council GIS services. For further details regarding any maps, plans or figures in this report, please contact Babbage Consultants Limited.

### Reliability of Investigation

Babbage has performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for environmental site assessment. No guarantees are either expressed or implied.

Recommendations and opinions in this report are based on discrete sampling data. The nature and continuity of matrix sampled away from the sampling points are inferred and it must be appreciated that actual conditions could vary from the assumed model.

There is no investigation that is thorough enough to preclude the presence of materials at the site that presently, or in the future, may be considered hazardous. Because regulatory evaluation criteria are constantly changing, concentrations of contaminants present and considered to be acceptable may in the future become subject to different regulatory standards, which cause them to become unacceptable and require further remediation for this site to be suitable for the existing or proposed land use activities.

## **Appendix A**

### **Selected Historical Aerials**



12/9/21

12/9/21

0 250 500 750 1,000 m

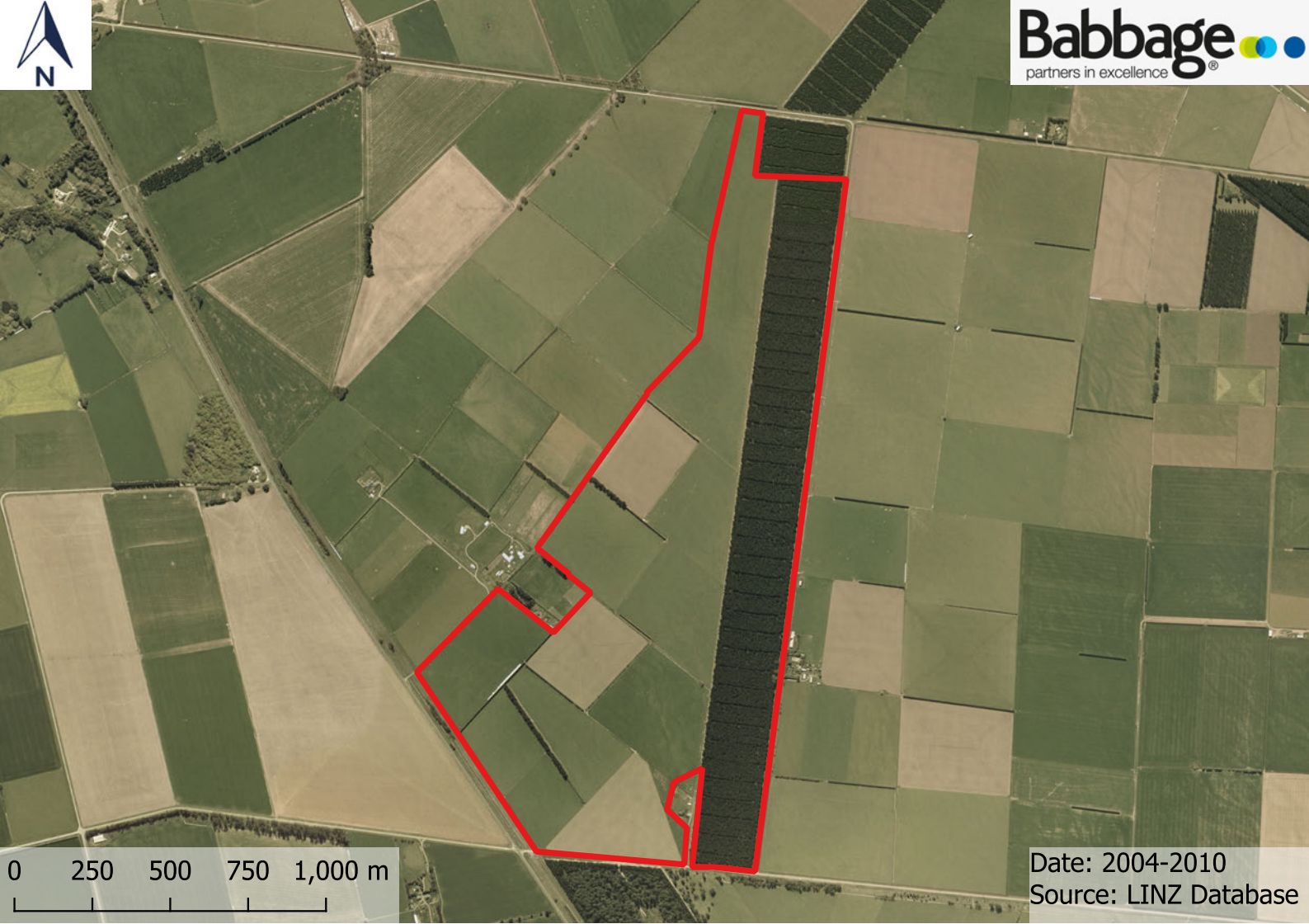
Date: 1941  
Source: Retrolens





0 250 500 750 1,000 m

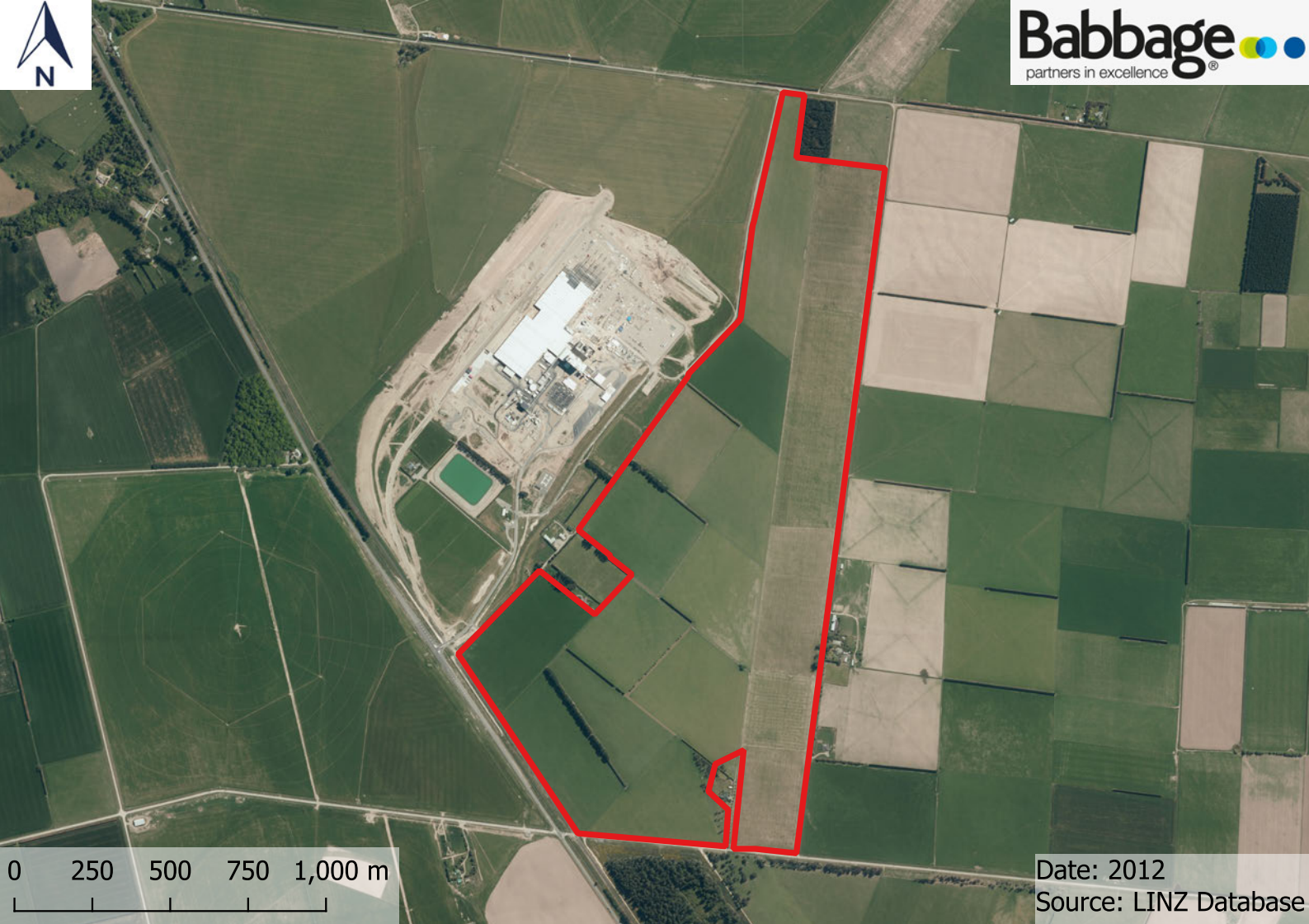
Date: 1985 Aerial  
Source: Retrolens



0 250 500 750 1,000 m

Date: 2004-2010  
Source: LINZ Database





0      250      500      750      1,000 m

Date: 2012  
Source: LINZ Database



0 250 500 750 1,000 m

Date: 2019  
Source: LINZ Database



## Appendix B

### Listed Land Use Register



Customer Services  
P. 03 353 9007 or 0800 324 636

PO Box 345  
Christchurch 8140

P. 03 365 3828  
F. 03 365 3194  
E. [ecinfo@ecan.govt.nz](mailto:ecinfo@ecan.govt.nz)

[www.ecan.govt.nz](http://www.ecan.govt.nz)

Dear Sir/Madam

Thank you for submitting your property enquiry from our Listed Land Use Register (LLUR). The LLUR holds information about sites that have been used or are currently used for activities which have the potential to cause contamination.

The LLUR statement shows the land parcel(s) you enquired about and provides information regarding any potential LLUR sites within a specified radius.

Please note that if a property is not currently registered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR database is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; additional relevant information may be held in other files (for example consent and enforcement files).

Please contact Environment Canterbury if you wish to discuss the contents of this property statement.

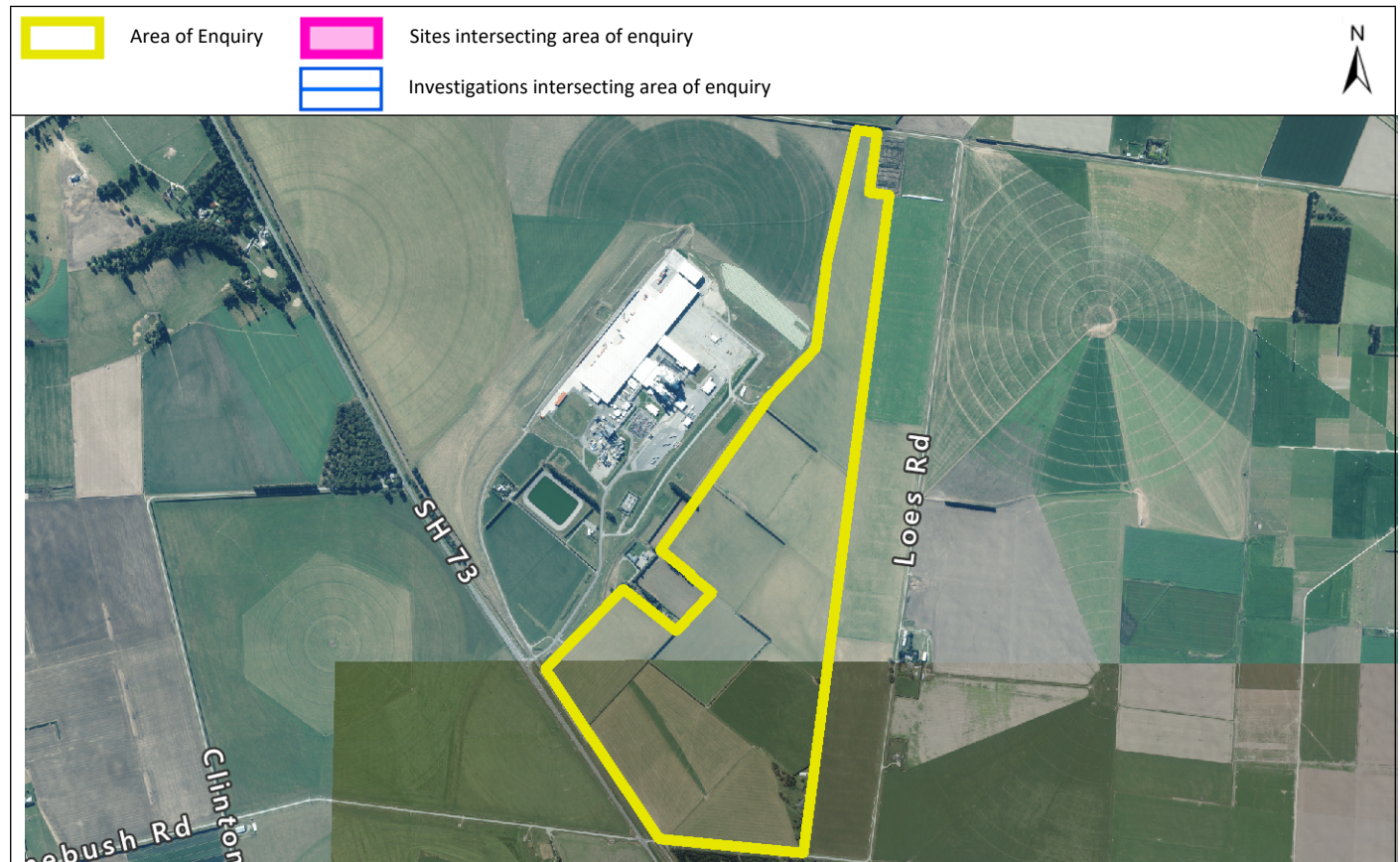
Yours sincerely

**Contaminated Sites Team**

# Property Statement from the Listed Land Use Register

Visit [ecan.govt.nz/HAIL](https://ecan.govt.nz/HAIL) for more information or  
contact Customer Services at [ecan.govt.nz/contact/](https://ecan.govt.nz/contact/) and quote ENQ373252

**Date generated:** 25 March 2024  
**Land parcels:** Lot 2 DP 60325



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

## Sites at a glance

Sites within enquiry area

There are no sites associated with the area of enquiry.

## More detail about the sites

There are no sites associated with the area of enquiry.

## Disclaimer

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987.

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the

accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.





**Customer Services**  
**P. 03 353 9007 or 0800 324 636**

PO Box 345  
Christchurch 8140

P. 03 365 3828  
F. 03 365 3194  
E. [ecinfo@ecan.govt.nz](mailto:ecinfo@ecan.govt.nz)

[www.ecan.govt.nz](http://www.ecan.govt.nz)

Dear Sir/Madam

Thank you for submitting your property enquiry from our Listed Land Use Register (LLUR). The LLUR holds information about sites that have been used or are currently used for activities which have the potential to cause contamination.

The LLUR statement shows the land parcel(s) you enquired about and provides information regarding any potential LLUR sites within a specified radius.

Please note that if a property is not currently registered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR database is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; additional relevant information may be held in other files (for example consent and enforcement files).

Please contact Environment Canterbury if you wish to discuss the contents of this property statement.

Yours sincerely

**Contaminated Sites Team**

# Property Statement from the Listed Land Use Register

Visit [ecan.govt.nz/HAIL](https://ecan.govt.nz/HAIL) for more information or  
contact Customer Services at [ecan.govt.nz/contact/](https://ecan.govt.nz/contact/) and quote ENQ373253

**Date generated:** 25 March 2024  
**Land parcels:** Lot 1 DP 434071



The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

## Sites at a glance

 Sites within enquiry area

There are no sites associated with the area of enquiry.

## More detail about the sites

There are no sites associated with the area of enquiry.

## Disclaimer

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987.

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Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

## Appendix C

### Landowner Interview



104 ha + 46 ha.

**General Questions for PSI/DSI**

Current Owner

What was the land used for before you bought it?

104 ha pastoral farming  
46 ha Forestry, converted to pasture

Do you know the contact details of the previous owner?

104 ha, deceased  
46 ha, Selwyn Plantation Board

Were there any buildings on the land when you bought it? (If have buildings, go to Q4; otherwise, go to Q7)

No

If so, are these still present? Or have they been demolished? (If demolished, go to Q5; otherwise, go to Q6)

If demolished, where were the demolition materials taken?

Did those buildings contain any asbestos?

During the Current Owner's Ownership

What are the types of buildings on the site? (If buildings already present; go to Q8; otherwise, go to Q9)

No buildings on site

When were they built?

What has been the main use of the land? (If used for agriculture; go to Q10; otherwise, go to Q11)

104 ha pastoral farming  
46 ha ex forestry

Were there any cattle, sheep dips or footrot troughs?

No

Were there any crops grown e.g. vegetables, fruits or others e.g. maize? (If crops grown, go to Q12; otherwise, go to Q13)

Winter greenfeed for sheep

Where were the crops planted and how long have they been there e.g. 19xx - 19xx? And were they the same crops grown i.e. year after year?

20 ha kale, rotated annually

Were there any greenhouses/shadehouses? (If there are greenhouses/shadehouses, go to Q14; otherwise go to Q15) **No**

What was grown in these and for how long? Are these still present? (If demolished, go to Q15; otherwise go to Q16) **—**

Where were the demolition materials taken? **—**

Any excavations or fill (fill = material brought onto site from elsewhere) that he knows of? **A small area on the 46 ha (approx 15m x 15m) was filled with on site material when land was converted from forestry to pasture.**  
Were there any fuels e.g. diesel and petrol stored on site (past/present)? (If have fuels stored, go to Q18; otherwise, go to Q19) **No**

Where were the fuels stored i.e. Above-ground Storage Tank (AST) and Under-ground Storage Tank (UST)? When were they removed? **—**

Were any chemicals used on site? E.g. DDT and copper spray. (If chemicals have been used, go to Q20; otherwise, go to Q24) **Common Herbicides and pesticides,**

for weeds in young grass and pests in Kale. 20 ha annually.  
What are the names of the chemicals? Where are they stored and for how long? How were they applied? **Glyphosate, Versalill, Pyrinex, Carfentrazone, MCPA MCPB. stored off site. Applied by registered chemical applicator.**

Have there been any chemical spills/leaks. (If there was spill/leak, go to Q22; otherwise, go to Q23) **No**

Where and when was the spill/leak? What chemicals were they? **—**

Where were any mixing places? E.g. tanks or containers or taps where sprays were mixed. **off site.**

Has the property been ploughed or cultivated? (If the property has been ploughed/cultivated go to Q25; otherwise, go to Q26) **All land ploughed (20 ha per year) prior to 2017, to a depth of 150-200mm. Direct drilled there after.**

If the property has been ploughed/cultivated. Where was this? When was it ploughed/cultivated and to what depth?

Any ideas of where there might be "hotspots" of land contamination? **No**

Have any forestry activities occurred on the land or near by? *yes 46 ha block.*



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**Auckland**

**Address |** Level 4, 68 Beach Road, Auckland 1010

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