

***Soil Contamination Risk  
Northern Overland Flow Channel  
Fill Risk Assessment***

***52 Kippenberger Avenue  
Rangiora***

*August 2021*



***Malloch Environmental Ltd***

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## **QUALITY CONTROL AND CERTIFICATION SHEET**

**Client:** Bellgrove Rangiora Ltd

**Date of issue:** 11 August 2021

### **Report reviewed by:**

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(5 years contaminated land experience)

**Signed:** 

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**Signed:**  

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## 1 Background

Preliminary and Detailed Site Investigations (PSI/DSI) were completed by Malloch Environmental Ltd (MEL) in July 2021 for the subject site, which involved seven rural lots with street addresses 52 Kippenberger Avenue and 100 Northbrook Road on the eastern outskirts of Rangiora. The site is proposed to be developed for residential use.

Those investigations found that there is a range of heavy metal contamination present on the subject site around the existing dwelling and within the farm working yard area. A Remediation Action Plan was also developed to outline the methodology for ensuring the site would be suitable for its future residential use.

The aerial photographs reviewed in the PSI showed that a northern flow channel had been progressively cleared and regraded between the 1960's and 1990's. Around the same time that the PSI/DSI work was being done, ECan's Listed Land Use Register (LLUR) was updated to include the entire northern overland flow channel as 'Hazardous Activities and Industries List (HAIL) G3 – Landfill sites'.

This current supplementary report provides further detailed desktop investigations specific to the northern flow channel.

## 2 Objectives of the Investigation

The objective of this investigation is to determine whether there is any likelihood of the northern flow channel having had landfilling activities occur.

## 3 Scope of Work Undertaken

The scope of the work undertaken has included:

- Detailed review of the relevant historic aerials along the northern flow channel
- Interview with current farmer and descendant of longstanding family owners of the affected land
- Site inspection of northern flow channel

## 4 Site Identification

The site covered by the original PSI is located at 52 Kippenberger Avenue (6 lots) and 100 Northbrook Road (1 lot) as shown on the plan in **Figure 1** below. Street addresses and legal descriptions of the lots included in the site are:

Street Address	Legal Description	Area (ha)
52 Kippenberger Ave.	Part Lot 2 DP 9976	20.4593
	Part RS 267	40.5924
	Lot 2 DP 24808	1.8640
	Lot 2 DP 394668	8.7889
	Lot 2 DP 12090	8.1999
	Lot 2 DP 452196	14.2120
100 Northbrook Rd.	Lot 4 DP 25508	4.5909
	<b>Total Area</b>	<b>98.7074</b>

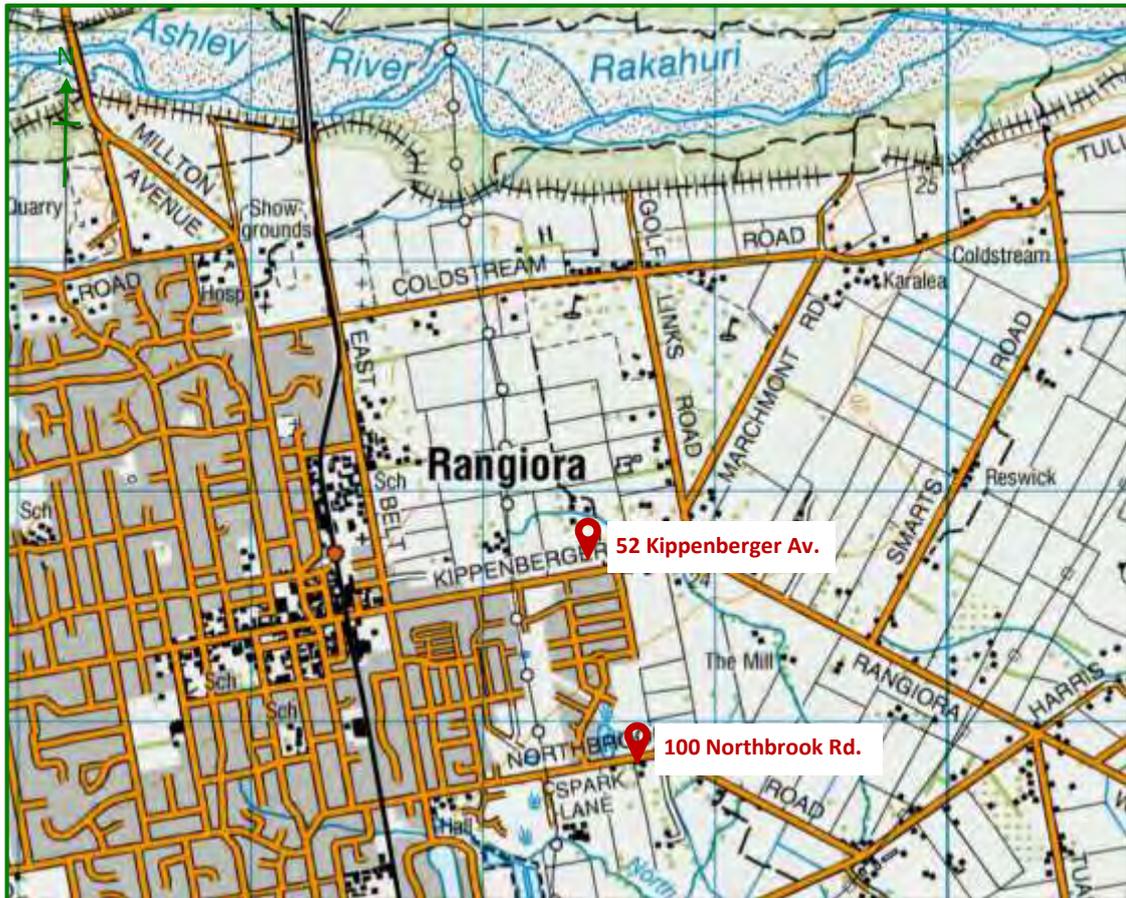


Figure 1 – Location Plan

The yellow outline is the risk area identified in the PSI, which includes the farm working yard area and the dwelling area. The northern flow channel which is the subject of this more detailed analysis crosses through Part RS 267 as indicated by the blue line on the location plan above.

## 5 Northern Overland Flow Channel

### 5.1 Channel Description

The current northern overland flow channel has two distinct profiles. The topographical plan excerpt in **Figure 2** below shows the northern flow channel with different widths and bank steepness. Generally the contour lines show that the invert of the channel through the central portion matches in with the upstream and downstream inverts, indicating that the works completed over the years have not ‘filled’ the overland flow channel.

In the middle section where the overland flow channel crosses at the rear of the farm working yard area, it has steeper grassed banks with some vegetation on the northern side and some intermittent vegetation on the southern side, the base of the flow path is approximately 8-10m wide. There is no low flow channel present and no physical evidence of it having had any flowing water in it. See **Photos 1 and 2** below.

Upstream and downstream of this section the flow path is part of the grazed paddock and has a wide shallow batter. See **Photo 3** below.

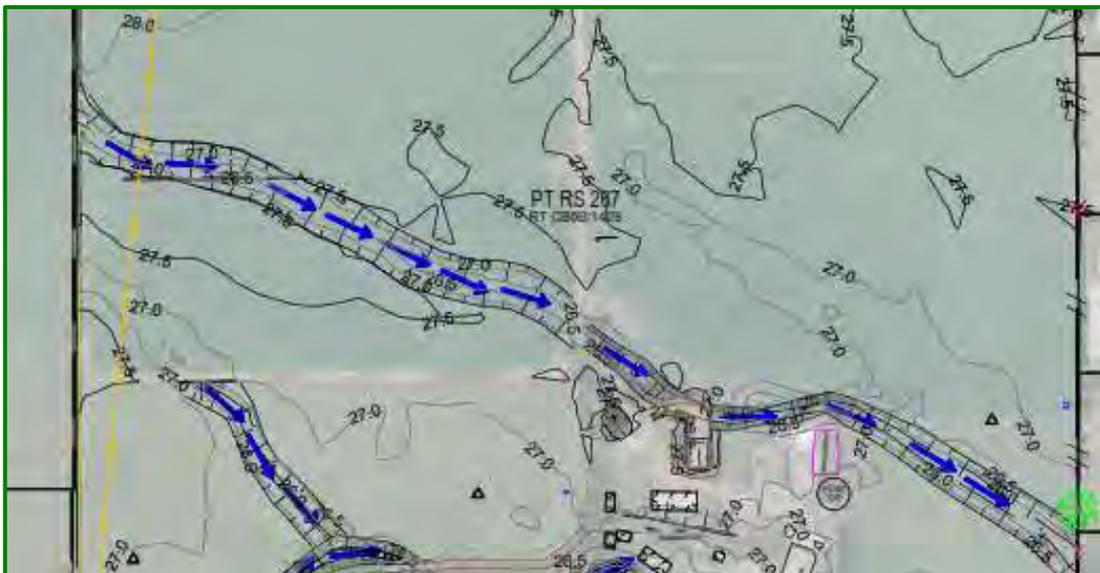


Figure 2 – Excerpt from Aurecon topographical site plans



Photo 1 - Looking upstream from the eastern end of the central portion



Photo 2 - Looking downstream at the central portion from the paddock



Photo 3 - Looking upstream from the central portion to the paddock

## 5.2 Interview

The current farmer, Randall Inch was interviewed specifically about the history of the northern flow channel. Randall has been involved in the farm all his life, with the Inch family ownership dating back to 1920. Randall advised that there has never been any fill material introduced to the flow channel. It was progressively cleared of trees starting in the 1960's by his grandfather. The flow channel has had some minor regrading of the banks on some parts where the banks were too steep for easy tractor access, however for the most part the regrading of the banks has happened naturally over the years through the normal ploughing and pasture rejuvenation practices.

## 5.3 Detailed Review of Relevant Historic Aerial Photographs

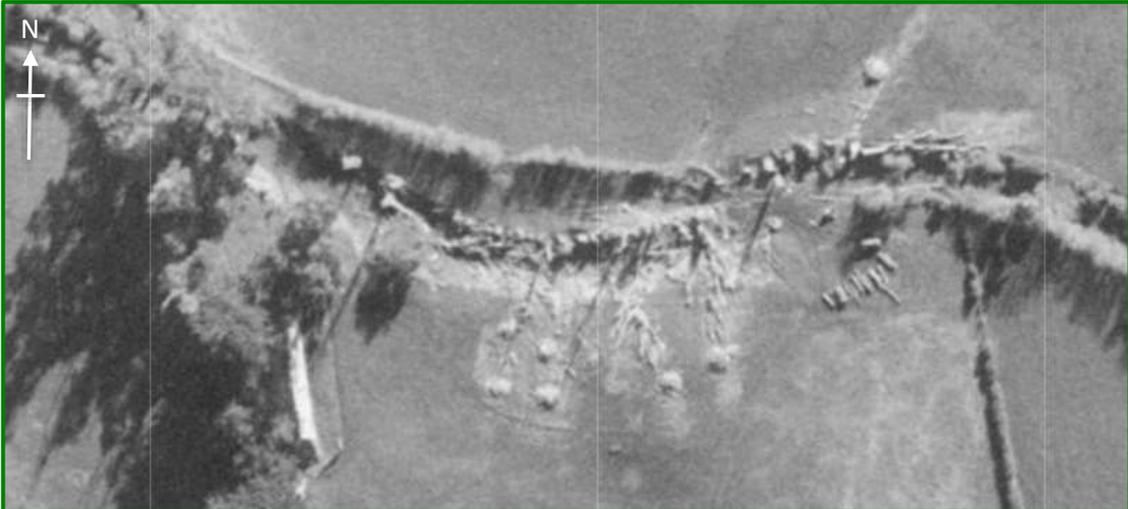
The following aerial photography has been sourced from ECan's GIS, unless otherwise stated:

### 1963 - overall



The northern overland flow channel appears to be in the process of having adjacent trees removed from the southern side of the central portion. Upstream of the subject site, the trees have been removed and the channel graded over into a grassed overland flow path. The channel has two distinct rows of trees, generally 9-11m apart, which appear to be well established, and some are quite large. There is also evidence of other overland flow paths to the north and south of the tree lined northern flow channel, as typical for a braided river flood break out area.

**1963 – close up of mid portion**

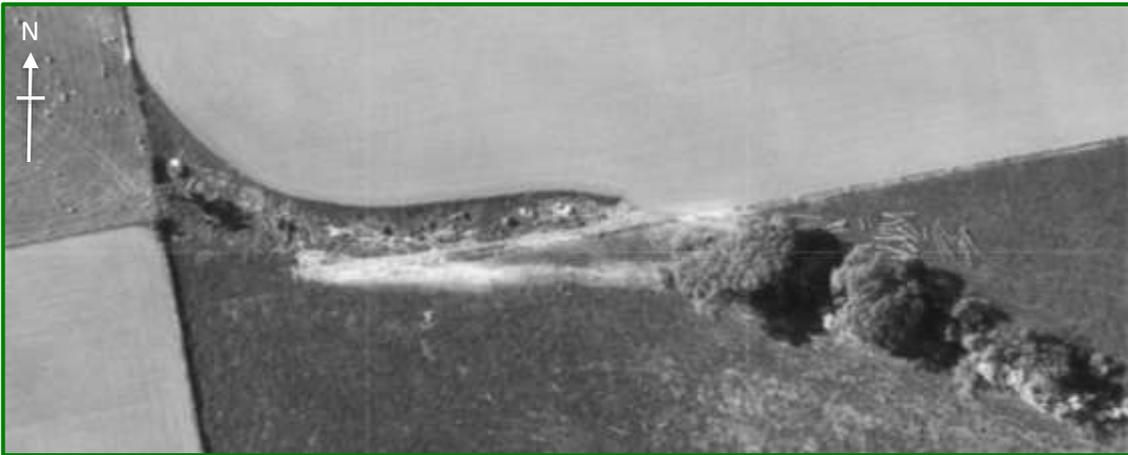


In the close-up view, piles of vegetation are evident, likely for burning, along with stacks of logs, indicating the size of the trees that had been removed.

**1965 - overall**



**1965 – close up of western portion**



The removal of trees has been completed with some large stumps evident, and some logs to the east of the cleared portion. With the tree canopy gone there does not appear to be a smaller defined low flow channel and the cross section is more that of an overland flow path than a drain. The white areas are likely to be soil/grass disturbance created by vehicle tracking.

**1965 – close up of mid portion**



There is evidence of vehicle tracking along the base of the flow channel. This is likely to be related to the transport of the logs and the work occurring at the western portion. This also matches in with the current day where the flow channel base has a wide flat profile which can double as a vehicle accessway if required.

**1973 - overall**



Within the western half, only a small section still has some trees along the flow channel. The flow channel appears to be wide and shallow and has been grassed to form part of the pastureland. At the eastern most quarter, the trees have been removed. Two lighter strips of vegetation can be seen along the banks of the flow path. This is likely where the steeper banks have been flattened off by ploughing and tractor movements and replanting of grass has occurred, but it is still establishing.

**1973 – close up of western portion**



**1973 – close up of eastern most portion**



The line of ploughing/tractor movements at right angles to the flow channel show how the steeper banks will have been flattened off over the decades of pastoral farm use. Dimensions are included on this photo to give the viewer an idea of scale.

**1976 - overall**



All trees are now removed within the western half. The channel is difficult to see, likely because the pasture has an even growth pattern.

Note: **1980's** aerial photos are of poor quality and do not show enough detail to add value.

**1994 - overall**



No physical changes are apparent. The channel in the western half is more visible in this aerial than 1976, perhaps because of a rainfall event which has caused better grass growth in the channel.

**1995 – overall**



As per 1994 aerial, western flow channel is more visible than 1976 due to better grass growth in the base.

**2000 - overall**



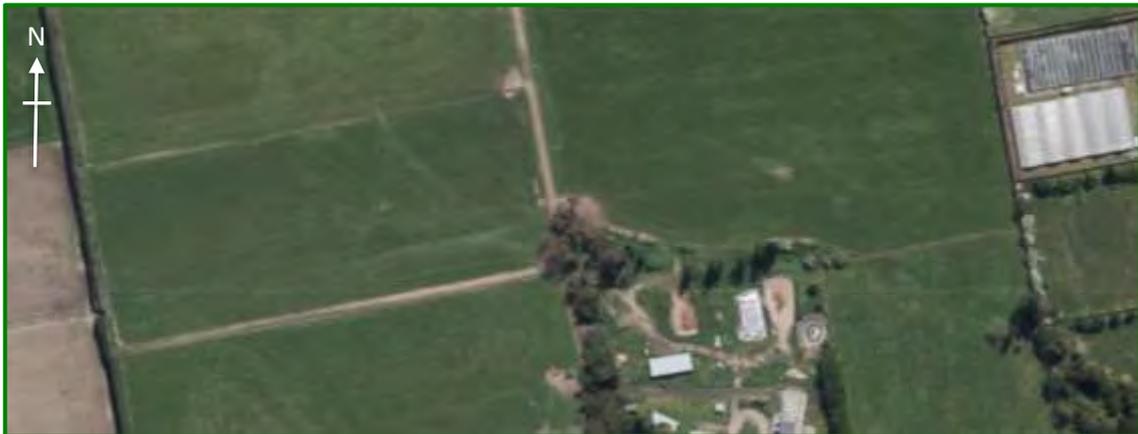
No physical changes are apparent.

**2004-2010 - overall**



Trees on the northern side of the channel in the mid-section have been removed, along with some more trees in the eastern section. The channel is difficult to discern as there is a consistent grass cover across it.

**2018 - overall**



No physical changes are apparent. The paddocks have a consistent and well-established grass cover resulting in the channel not being easily visible in this aerial.

**2019 - overall (Google Earth)**



One year on, and the channel is more visible in this aerial due to the inconsistent paddock treatments and different times of the year.

## **6 Discussion and Conclusion**

At first glance, a simple comparison of the 1963 aerial to the 2018 aerial indicates the overland flow channel may have been filled in. However, the current physical existence of the channel as evidenced by topographical survey and physical site inspection, shows otherwise. This is also evidenced by the current farmer, whose family have owned the property since 1920, who states that the overflow channel has never been intentionally filled. The banks have only ever been graded to flatten off in a few locations, and decades of ploughing across the channel has also softened the edges so that they are now barely discernible on aerial photography in some conditions.

The detailed review of aerials above has shown how aerial photography in different seasons and with different paddock treatments can give visually different impressions, where the channel can be easily seen on one aerial, not the next and then reappears in a subsequent aerial. The detailed review of close-ups has not shown any evidence of fill material having been placed in the channel.

Based on this review, it is highly unlikely that landfilling has occurred and 'HAIL G3 – Landfill sites' does not apply to the northern overflow channel.

## **7 Limitations**

Malloch Environmental Limited has performed services for this project in accordance with current professional standards for environmental site assessments, and in terms of the client's financial and technical brief for the work. Any reliance on this report by other parties shall be at such party's own risk. It does not purport to completely describe all the site characteristics and properties. Where data is supplied by the client or any third party, it has been assumed that the information is correct, unless otherwise stated. Malloch Environmental Limited accepts no responsibility for errors or omissions in the information provided. Should further information become available regarding the conditions at the site, Malloch Environmental Limited reserves the right to review the report in the context of the additional information.

Opinions and judgments expressed in this report are based on an understanding and interpretation of regulatory standards at the time of writing and should not be construed as legal opinions. As regulatory standards are constantly changing, conclusions and recommendations considered to be acceptable at the time of writing, may in the future become subject to different regulatory standards which cause them to become unacceptable. This may require further assessment and/or remediation of the site to be suitable for the existing or proposed land use activities. 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.

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