

11 June 2020

Landpro Reference: S15298
Council Reference: RM20.079

Charles Horrell
Otago Regional Council
70 Stafford St
Dunedin, 9054

Dear Charles,

Re: Further dam PIC information requested for Bendigo Pond

You have asked for additional information relating to determination of the potential impact classification (PIC) of Bendigo Pond. Module 2, Chapter 3 of the NZSOLD New Zealand Dam Safety Guidelines 2015 (NZSOLD Guidelines) outlines a methodology for determining the PIC of a given dam. A desktop review of this methodology as it relates to Bendigo Pond is provided below.

1. Assessed damage level

As no dambreak inundation mapping is available, an assessment of the potential damage to property and infrastructure has been developed based on survey information for the pond and publicly-available topographic mapping for the area surrounding the pond.

Figure 1, overleaf, shows the as built plan for Bendigo Pond, while Figure 2 shows the western shore of Bendigo Pond. As can be seen, stored water is largely below surrounding ground level, with the new pond generally conforming to the original layout of the former duck pond. Some minor in-filling has occurred around the outer embankments of the pond, however (see Figure 3).

Based on this information, it is difficult to foresee a scenario whereby any catastrophic loss of water from the pond could occur – particularly given much of the stored water is below original ground level. Were uncontrolled loss of water to occur, the assumed direction of flow has been shown in Figure 4. In the event of a failure, stored water would flow primarily via the existing spillway and overflow channel to Bendigo Creek, which utilises an existing dry gully. In the event that the Cherry Holdings Pond was to fail, water would most likely flow south and discharge into Bendigo Creek in approximately the same location as Bendigo Pond water.

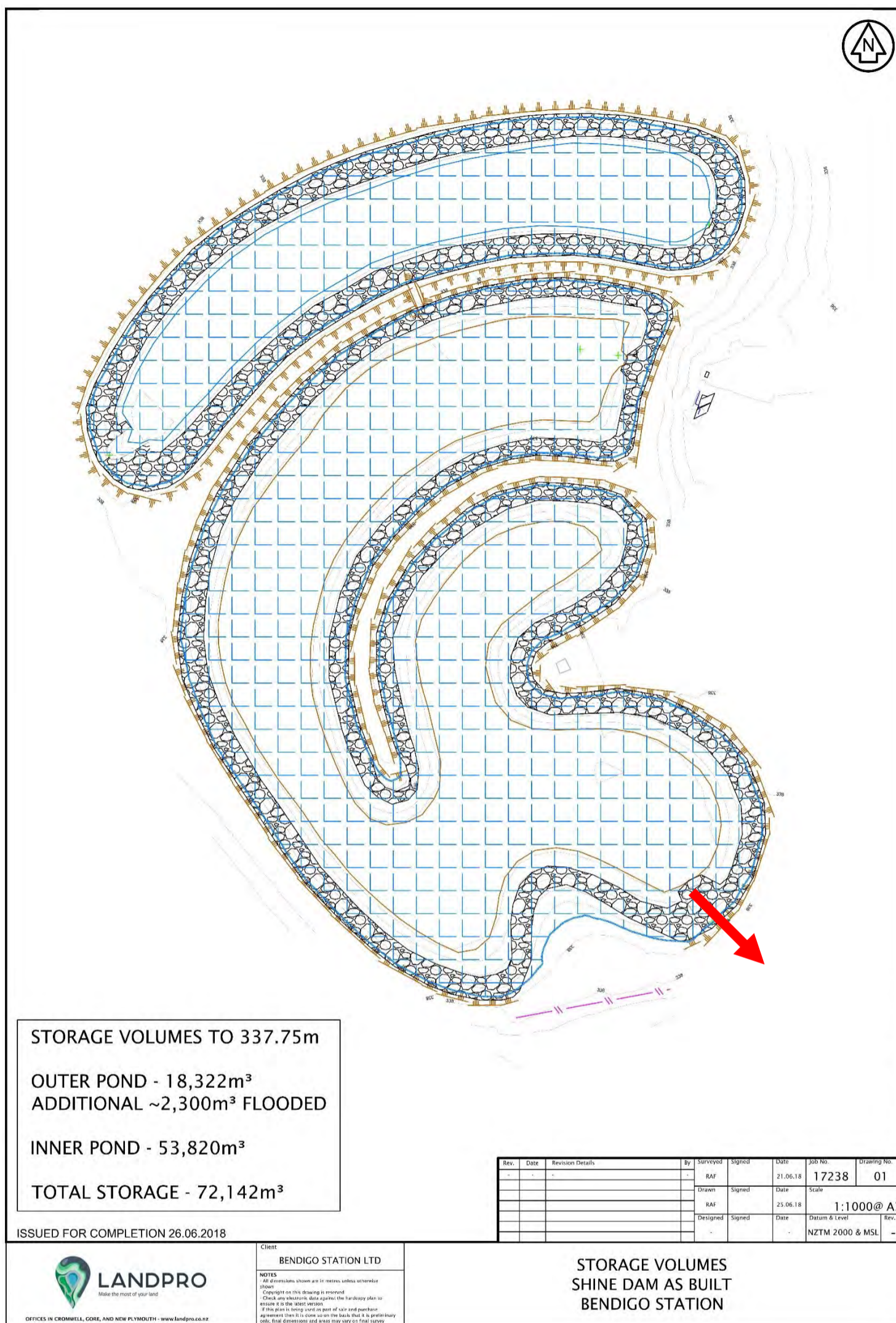
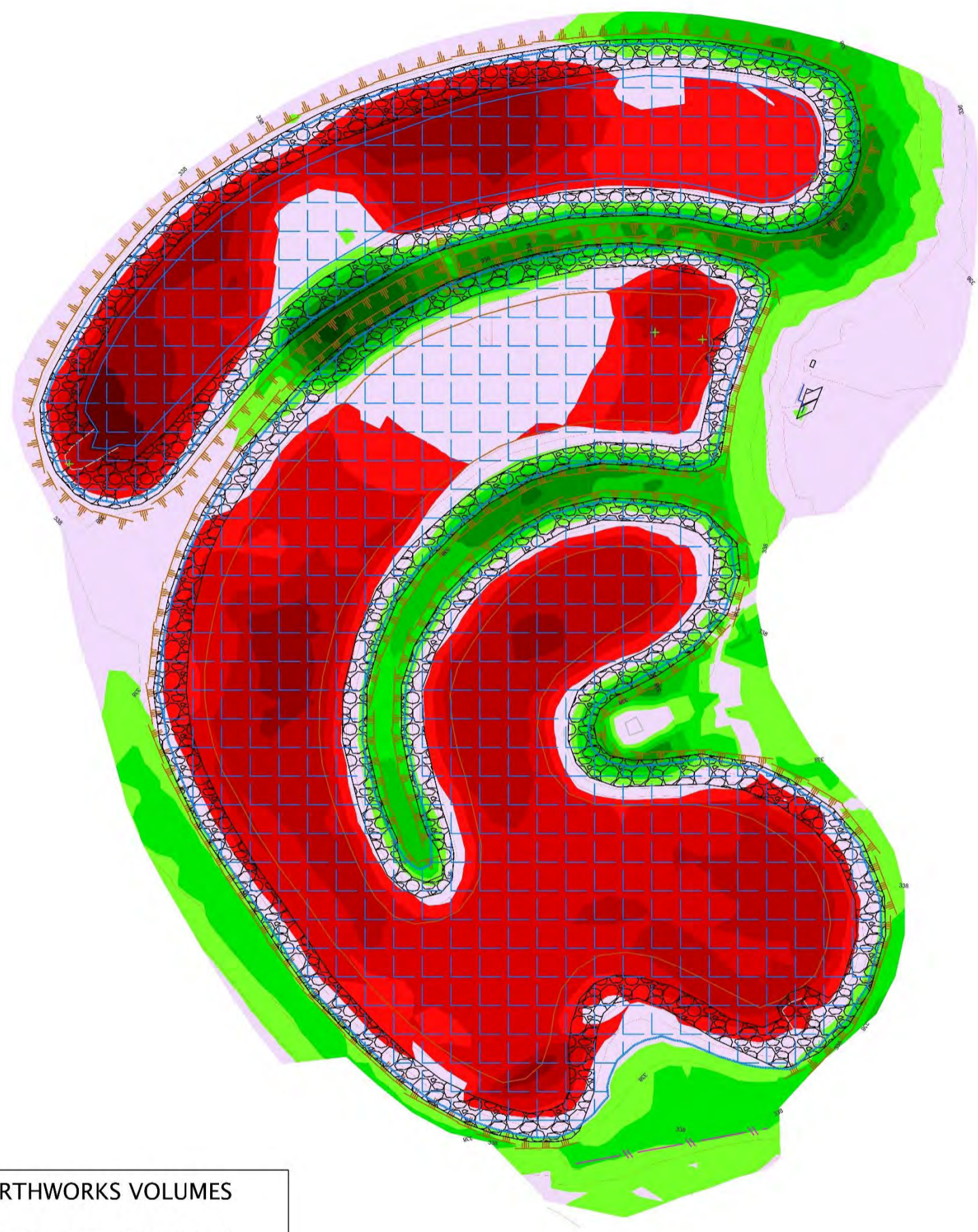


Figure 1 & Figure 2: Bendigo Pond asbuilt and looking west across Bendigo Pond towards crest



EARTHWORKS VOLUMES
 TOTAL CUT - 31,095m³
 TOTAL FILL - 18,495m³

Rev.	Date	Revision Details	By	Surveyed	Signed	Date	Job No.	Drawing No.
-	-	-	-	NKA		XX.XX.16	17238	01_EWK
				Drawn	Signed	Date	Scale	
				NKA		XX.XX.16	1:1000 @ A3	
				Designed	Signed	Date	Datum & Level	Rev.
				NKA		XX.XX.16	NZTM 2000 & MSL	-

ISSUED FOR COMPLETION 26.06.2018



Client
BENDIGO STATION LTD

NOTES
 - All dimensions shown are in metres unless otherwise shown
 - Copyright on this drawing is reserved
 - Check any electronic data against the hardcopy plan to ensure it is the latest version
 - If this plan is being used as part of sale and purchase agreement then it is done so on the basis that it is preliminary only. Final dimensions and areas may vary on final survey

**EARTHWORKS VOLUMES
 SHINE DAM AS BUILT
 BENDIGO STATION**

L:17238 - Shine Pivot Setout - Bendigo Station Ltd/CAD/17238_Dam_Asbuilt_01.dwg Plotted: 25.06.2018

Figure 3: Bendigo Pond cut and fill earthworks plan

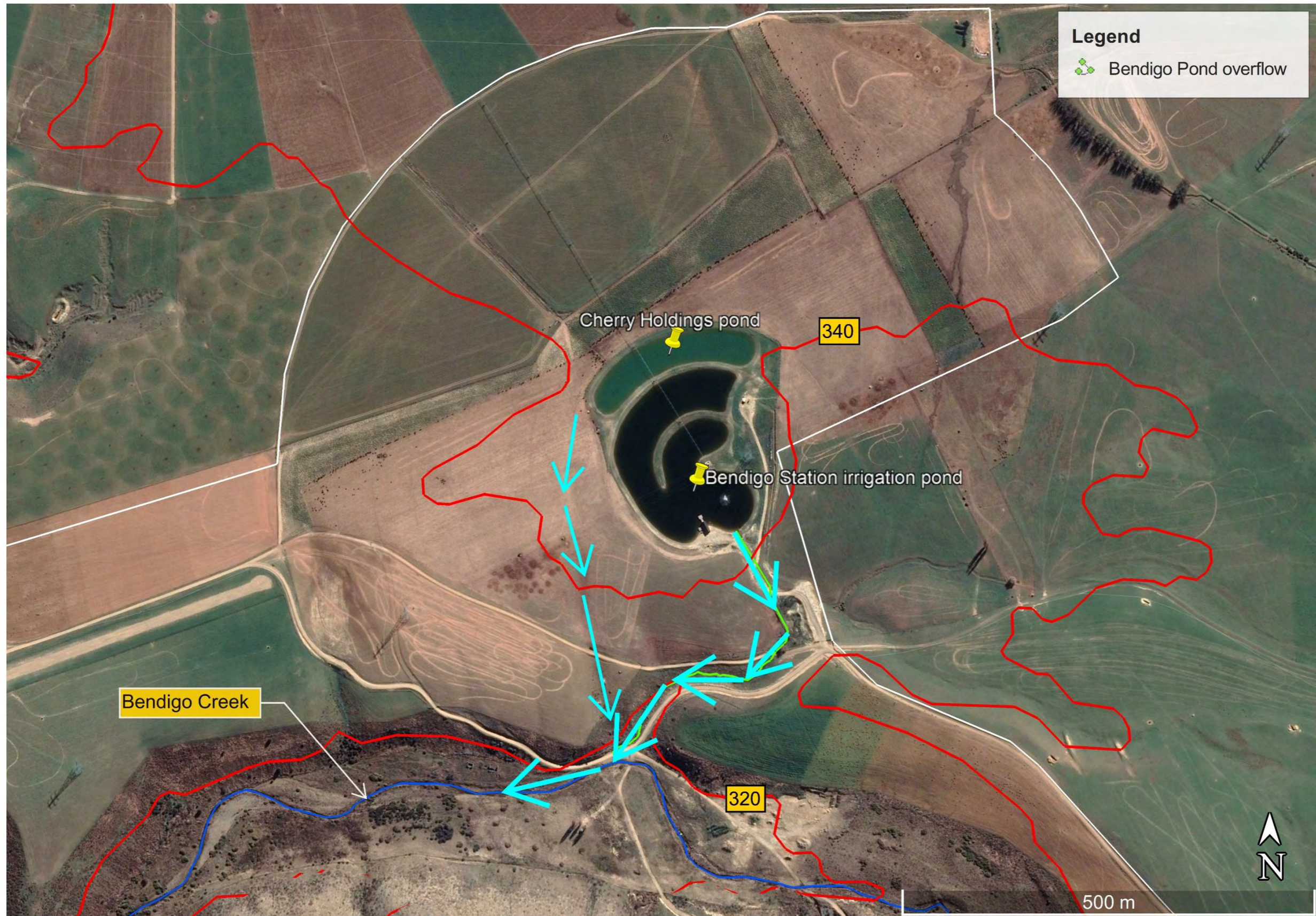


Figure 4: Bendigo Pond & Cherry Holdings Pond projected overland flow path in case of failure

Based on the assumed flow path, the holding capacity of the pond and information relating to the area, the damage level as per Table 2.2 of the NZSOLD Guidelines is considered to be Minimal. This conclusion has been drawn due to:

- Only minor damage to residential houses is expected. This would be limited to the lake house on the shores of the pond itself, which is rarely inhabited and which is on piles that elevate it above the maximum water level.
- No damage to major infrastructure is expected due to dam failure. There are transmission lines in the vicinity of the pond, however failure of the pond is not expected to have any significant effect on the pylons. Any damage that did occur would take less than 1 week to rectify.
- Only short-term damage to the environment would occur due to dam failure. This would likely be limited to localised erosion of the overflow channel below the pond, along with some erosion of the Bendigo Creek channel. Fish and invertebrate values in the potentially-affected section of the creek are limited, and no significant or lasting effects on aquatic ecology are expected.
- No effects on the local community are anticipated.

2. Population at Risk

The Population at Risk (PAR) is designated in the NZSOLD Guidelines as “the number of people likely to be affected by inundation greater than 0.5 m in depth if a dam failure occurred”. Given the assumed flow path in the event of a dam failure, the PAR for Bendigo Pond is expected to be nil. There are several dwellings located adjacent to or near Bendigo Creek approximately 2.5 km downstream of the assumed point of entry for dam failure water, however these are set well back from the creek and the morphology of the creek channel is likely to significantly dissipate flow velocities before the water approached these dwellings.

As the aforementioned lake house is on piles and raised well above the maximum water level, flooding of the house is not expected (and the house is rarely occupied).

3. Potential Loss of Life

No loss of life is likely to result from failure of Bendigo Pond, based on the reasons presented above.

4. Potential Impact Classification

Given that the assessed damage level is minimal and the PAR is 0, Bendigo Pond should have a low potential impact.

Kind Regards,

A handwritten signature in blue ink, appearing to read 'W. Nicolson', with a long horizontal flourish extending to the right.

Will Nicolson

Scientist/Resource Management Planner