

## **Annexure 8:**

Delineation of Streams in the Macraes Context –  
Technical Note - Ahika

# Technical Note



Solutions for  
sustainable  
futures

---

**Ahikā Consulting**

Rooms 6 & 7, Level 3,  
2 Dowling St, Dunedin 9016

PO Box 1320, Dunedin 9054

[info@ahika.co.nz](mailto:info@ahika.co.nz)

[www.ahika.co.nz](http://www.ahika.co.nz)

To: Dean Fergusson

OceanaGold

From: Mike Thorsen

Date: 31 May 2024

Subject: Delineation of Streams in the Macraes context

---

Hi Dean,

The following is the approach recommended for delineating the extent of streams/rivers within watercourses at Macraes.

This delineation approach is consistent with the definition of river in the RMA, NPS-FM, and ORC Regional Plan: Water.

This approach uses the results of the Babbage literature review<sup>1</sup> and developed through discussions with Greg Ryder. It is also consistent with feedback received during discussions with Rebecca Jackson and Shay McDonald of ORC and their technical advisor Richard Allibone of Waterways Consulting Limited during the site visit to the Back Road Waste Rock stack on 24 July.

This document updates the method used for delineating streams at the Back Road Waste Rock Stack by providing additional guidance on locating and identifying the banks and upper limit of a river and also identifying whether a river exists where wetlands are present. The approach can be used generally when defining the limits of an 'intermittently flowing rivers (ephemeral streams)' as intended by the ORC Regional Plan: Water.

---

<sup>1</sup> Memorandum to OceanaGold dated 20 July 2023.

## 1 Defining a stream (river)

A stream is classified in the RMA as a River which is defined as “a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).” The Otago Regional Plan: Water adopts the RMA meaning of river and has produced a factsheet<sup>2</sup> to help guide users in delineating a river. This factsheet refers to the RMA definition of river but discusses “intermittently flowing rivers (ephemeral streams)” in the context of the difficulties of determining where a river ‘begins’.

The bed of a river means (in this context), the space of land which the waters of the river cover at its fullest flow without overtopping its banks<sup>3</sup>.

To assist with applying the definition of river in the Otago Regional Plan: Water, Bioreserches undertook a literature review<sup>4</sup> of how regional councils have approached identification of streams. In this review they identified the stream definition of Greater Wellington Regional Council, Bay of Plenty Regional Council and Auckland Council as those with the most utility in providing additional guidance to that provided by ORC for identifying when a water course (or flow path) qualifies as an intermittent or permanent stream (and therefore a ‘River’ sensu RMA, 1991). The approach employed by the Auckland Council<sup>5</sup> is adopted in this document as this advice is widely used in a variety of situations and the multifactorial approach fits well with the types of watercourses encountered at Macraes where there are considerable sections with a flow that diminishes or ceases over summer. Of particular relevance in the Auckland Council approach is Table 1., which is duplicated below.

The only inconsistency with the Otago Regional Plan: Water is that the Auckland Council uses the term “ephemeral stream” as a separate entity. While the phrase “ephemeral stream” is not used in the Otago Regional Plan: Water, the terminology “intermittently flowing rivers (ephemeral streams)” is used in the ORC factsheet. In this document we have interpreted the inclusion of the term ‘ephemeral’ in brackets in the factsheet to mean that the parts of the watercourses that are intermittently flowing are also ephemeral. Therefore, sections of waterway that are classified as ‘intermittent’ using the Auckland Unitary Plan definition are considered to also qualify as ‘ephemeral’ in the Otago Regional Plan: Water.

---

<sup>2</sup> <https://www.orc.govt.nz/media/9861/orc-what-is-a-river-fact-sheet.pdf>

<sup>3</sup> Definition in the RMA which is adopted in the Otago Regional Plan: Water.

<sup>4</sup> Memorandum to OceanaGold dated 20 July 2023.

<sup>5</sup> <https://content.aucklanddesignmanual.co.nz/regulations/practice-notes/Documents/RC%203.3.17%20Stream%20Classification.pdf>

Table 1. Auckland Unitary Plan criteria for permanent, intermittent rivers and streams and ephemeral streams

Criterion	Definition
<b>Permanent river or stream</b>	
1	Evidence of continuous flow
<b>Intermittent river or stream, or ephemeral stream</b>	
Ceases to flow when bed is above water table. To be intermittent, a river must exhibit at least 3 of the following	
1	Evidence of natural pools
2	Well defined channel. Banks and bed can be distinguished
3	Surface water present (more than 48hrs after a rain event)
4	Rooted terrestrial vegetation not present across the entire cross-sectional width of channel
5	Organic debris present in floodplain
6	Evidence of substrate sorting processes, including scour and deposition
<b>Ephemeral stream</b>	
1	Stream bed above the water table at all times.
2	Water present only during and shortly after rain fall

## 1.1 Identifying the uppermost point of a river

For the purposes of identifying the top of a river (stream) as defined in the RMA, the Otago Regional Plan: Water, and in the Macraes context, the top (upstream limit) of a stream is identified as the point where the watercourse no longer meets the AUP guidelines for an intermittent stream (Table 1). In the Macraes context this usually means that upstream of this point there is no bed or channel with a substrate of silt or gravels (whether there is water present or not) and it is bounded by vegetation associated with streams (riparian vegetation). Identification of the top of a river in practice requires walking down the watercourse and noting when it meets three of the criteria in the intermittent river or ephemeral stream components. At Macraes, this is usually when there is a defined channel in the bottom of the watercourse (that can be bordered by rock or soils) with a bed of silt or gravel and that is bordered by riparian vegetation (plant species indicative of high soil moisture) such as *Carex secta*, soft rush *Juncus effusus* or the grass *Alopecurus geniculatus*.

In practice, there can be short sections of the watercourse within the river that do not meet this definition as they are areas without an obvious channel below the assumed top of the stream. This can result from the waterflow becoming subterranean (for example). Also, short sections of channel can be present above the assumed top of stream. This can be a result of storm scouring (for example). In both cases, these sections should not be extensive and are represented by single or widely separated short sections obviously distinct from the area that meets the criteria for an intermittent stream in Table 1.

Above the identified top of the river at Macraes there is usually either pasture and/or other terrestrial vegetation types (such as tussockland) or (in some instances) rushes or other vegetation that are part of a natural inland wetland as defined by the NPS-FM.

Farm ponds within a watercourse are a separate artificial waterbody.

## 1.2 Identifying the banks of a river

The lateral margin of the bed of a river is defined by the location of the banks that contain the river at its fullest flow<sup>6</sup>. Identifying the location of the banks of a river is described in the ORC factsheet. In the Macraes context, where the watercourses are mostly confined within shallow - to deep incised gullies there is often no bank as described in the ORC factsheet. In these cases, the bank is most adequately defined as the point where the flat watercourse base containing riparian vegetation meets the slope of the gully sides.

## 1.3 Identifying if a river is present within a wetland

Wetlands occur frequently in watercourses in the Macraes area and these are treated separately from rivers in the RMA, NPS-FM and Otago Regional Plan: Water with separate definitions. Wetlands need to be delineated separately from rivers and other waterbodies and there is guidance provided in the NPS-FM on wetland delineation for this purpose. However, sometimes wetlands contain areas of damp bare ground and channels and it can be unclear whether a river is present within a wetland. A channel within a wetland is considered to represent a river where there is evidence for noticeable flow of water within the channel (that is not a result of recent rainfall) and the channel follows the natural path of the watercourse. Often it is occupied by plant species with a 'trailing' growth form (plants where the stems and leaves trail downstream and are pressed together in the waterflow. It is unlikely that a river would dry within the naturally wet environment of a wetland and therefore seasonally inundated channels are considered to be more appropriately classified as part of the wetland.

---

<sup>6</sup> But not high flows when the river overtops its banks and floods into surrounding land.