

WATERCOURSE TYPES



How to determine whether a watercourse is a river, ephemeral watercourse, highly modified river or stream, or artificial watercourse

Guidance Note

MAY 2021

1. Introduction

The provisions of the Resource Management Act 1991 (RMA) and the Natural Resources Plan (NRP) mean that certain activities are subject to different restrictions when undertaken within different types of watercourses. When determining how the NRP policies and rules apply to a given watercourse, it must first be determined if the watercourse meets the RMA definition of a river, or if it is an artificial watercourse and therefore not subject to the restrictions of RMA Section 13. If a watercourse is a 'river', it then needs to be determined whether:

- It is an 'ephemeral watercourse' as defined by the NRP (ephemeral watercourses are excluded from the definition of a 'surface water body' and therefore certain rules do not apply); or
- It is a 'highly modified river or stream' under the NRP (only relevant when determining whether a watercourse can be managed under NRP Rules R121, R121A and R121B).

The purpose of this document is to describe a methodology that can be used to determine whether a watercourse is:

- A river, and therefore subject to relevant rules in the NRP
- A highly modified river or stream for the purposes of Rules R121, R121A and R121B
- An ephemeral watercourse that is specifically exempted from certain rules, or
- Artificial and therefore not subject to the rules the NRP.

While a legal review has been conducted, this document is not a legal opinion on how the rules and polices in the NRP should be interpreted. Accordingly, all recommendations made should be considered guidance, rather than strict protocols that must be followed in order to give effect to the NRP or RMA.

This guidance is based on a report prepared by Dr Michael Greer, Senior Scientist – Fresh water, Aquanet Consulting Ltd.

2. Process for identifying different types of watercourses

2.1 Relevant definitions

The following definitions from the RMA and NRP must be considered when categorising watercourses:

Water

- a. Means water in all its physical forms whether flowing or not and whether over or under the ground:
- b. Includes fresh water, coastal water, and geothermal water:
- c. Does not include water in any form while in any pipe, tank, or cistern.

Fresh water¹ means all water except coastal water and geothermal water.

River¹ means 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).

¹ Defined in the RMA.

Note

Greater Wellington interprets the term “intermittently flowing body of fresh water” to mean all watercourses that alternate between being dry and flowing. Thus, some ephemeral watercourses (defined below) are considered to be rivers.

Highly modified river or stream² For the purposes of Rules R121, R121A and R121B only, means a river or stream that has been modified and channelled for the purpose of land drainage of surface or sub-surface water and has the following characteristics:

- a. It has been channelled into a single flow, and
- b. The channel has been straightened, and
- c. The channel is mechanically formed with straight or steeply angled banks, and
- d. It exhibits these characteristics for at least its entire length through the property in which the activity is being carried out.

Note

To provide guidance for landowners, **highly modified rivers and streams** have been mapped in those parts of the region that have a high concentration of these watercourse types (see here - [GIS Mapping - Watercourses](#)).

Drain² means any artificial watercourse, designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes.

Note:

Many watercourses that are considered to be drains are natural watercourses that have been highly modified, often over many decades, and include channels dug to drain natural wetlands.

To provide guidance for landowners and plan users highly modified rivers and streams have been mapped in those parts of the region that have a high concentration of these watercourse types (see here - [GIS Mapping - Watercourses](#)).

Ephemeral watercourse² means a watercourse that:

- a. Has a bed that is predominantly vegetated, and
- b. Only conveys or temporarily retains water during or immediately following rainfall events, and
- c. Does not convey or retain water at other times, and
- d. Is not a wetland.

2.2 Factors to consider when identifying different types of watercourses

Based on the definitions presented in Section 2.1, the following hydrological and morphological factors must be assessed when determining whether a watercourse can be categorised as a river, a highly modified river or stream, an ephemeral watercourse, or an artificial watercourse:

² Defined in the NRP.

- Whether the watercourse is a flowing body of fresh water under the RMA;
- Whether the watercourse has a ‘natural’ or ‘constructed/modified’ form (morphology);
- Whether flow permanence in the watercourse is:
 - Not ephemeral – permanently flowing (perennial) or flowing predictably for weeks and months, but also drying for similar periods (intermittent);
 - Ephemeral – only flowing occasionally in response to rain.
- Whether the watercourse has a natural or artificial source of flow.

2.3 Determining whether a watercourse is a flowing body of fresh water

The steps for determining whether a watercourse conveys fresh water (as defined by the RMA) are:

1. Access the high-resolution aerial photographs on the Greater Wellington GIS server and confirm that the water is not within a pipe, tank, or cistern, and is in an open channel;
2. Access the “River Mouths & CMA Boundaries” layer on the Greater Wellington GIS server and confirm that the watercourse is outside of the coastal marine area, and therefore unlikely to be coastal water; and
3. If necessary, seek advice from Greater Wellington environmental science staff to confirm that the watercourse does not contain geothermal water.

If the watercourse does not contain coastal or geothermal water, and is an open channel, rather than a pipe, tank or cistern, it should be considered to be a flowing body of fresh water.

2.4 Determining whether a watercourse has a natural or constructed/modified form

The definition for highly modified rivers and streams in the NRP sets out what constitutes a watercourse with a constructed/modified form in the Wellington Region. Accordingly, if a watercourse has the following characteristics it should be considered to have a constructed/modified form, otherwise it has a natural form:

- Flow is constrained to a single path;
- The channel has been straightened (ie, no natural curves);
- The channel is mechanically formed with straight or steeply angled banks;
- The above characteristics persist at least its entire length through the property in which the watercourse is being assessed.

A watercourse’s form is best assessed on site. However, if this is not possible, an assessment can be made by accessing the high-resolution aerial photographs on the Greater Wellington GIS server and assessing whether it meets the aforementioned criteria.

As noted in the definition, to provide guidance for landowners, Greater Wellington has mapped **highly modified rivers and streams** in those parts of the region that have a high concentration of these watercourse types.

2.5 Determining the level of flow permanence in the watercourse

From a scientific perspective, there are three categorises of flow permanence:

- Permanent – permanently or near permanently flowing
- Intermittent – flowing predictably for weeks and months, but also drying for similar periods
- Ephemeral – only flowing occasionally in response to rain.

However, from a policy perspective there is no need to differentiate between watercourses that have perennial or intermittent flow; watercourses only need to be categorised as

- Ephemeral; or
- Not ephemeral.

The NRP clearly defines what constitutes an ephemeral watercourse in the Wellington Region, and this definition can be used to determine a watercourse's level of flow permanence. Accordingly, if a watercourse has all of the following characteristics it should be considered to be ephemeral, otherwise it is not ephemeral:

- A bed that is predominantly vegetated; and
- Only conveys or temporarily retains water during or immediately following heavy rainfall events; and
- Does not convey or retain water at other times; and
- Is not a wetland.

If a watercourse has the characteristics of an ephemeral flow path for its entire length upstream of the reach in question it is not considered to be a river under the NRP.

Flow permanence in a watercourse is best assessed on site following a period of at least two weeks without rain. However, if this is not possible, a less accurate assessment can be made by:

1. Accessing the high-resolution aerial photographs on the Greater Wellington GIS server;
2. Assessing whether it contained water at the time the photographs were taken; and
3. Determining whether the bed was predominately vegetated at the time the photographs were taken.

2.6 Determining whether a watercourse has a natural or artificial source of flow³

2.6.1 Scenario 1: The stream is not part of a stock water or irrigation race network

- If a watercourse has a natural form assume the source of flow is natural.
- If a watercourse has a constructed/modified form, determine if it was modified from a pre-existing water body. If so the source of flow can be considered natural, otherwise it is artificial.

Watercourses with a constructed/modified form, but a natural source of flow generally fall into one of two categories. The first are those that have been completely constructed (ie, they previously did not exist as a stream) to drain areas that were historically wetlands or lakes. While these waterways are man-made, they are, in fact, the modified form of the pre-existing water bodies (see **Figure 1** for an example). Thus, these systems are rivers under Section 13 of the RMA.

³ Source of flow is not mentioned in any of the definitions set out in Section 2.1. However, it is a good indicator of whether a watercourse is artificial or not.

Whether a watercourse with a modified/constructed form derives its flow from drained historic wetlands and lakes can be identified by:

1. Accessing the historical aerial photographs on the Greater Wellington GIS server;
2. Accessing the shapefile developed by Ausseil *et al.* (2008) which shows the predicted pre-human extent of wetlands in the region (to be uploaded to the Greater Wellington servers). Areas classified as swamp or marsh would have contained areas of open water (Ausseil *et al.*, 2008).

If these sources show that the watercourse is within an area that was once a wetland which contained open water or a lake, it should be considered to have a natural source of flow, unless:

- It is ephemeral for its entire length – constructed ephemeral watercourses effectively operate as stormwater channels.
- It is not connected to a natural stream network – sometimes constructed watercourses terminate on land without discharging to another water body or the CMA.

Note most of these watercourses have now been mapped and are available on the Greater Wellington GIS server.



Figure 1: A) Aerial photograph taken in 1961 depicting the historic (pre-drainage) extent of open water in the Te Opai Lagoon area near Lake Wairarapa. B) Aerial photograph of the Te Opai Lagoon area post drainage (2017). The blue lines represent the highly modified streams.

The second category of watercourses that have a constructed/modified form, but a natural source of flow, are those that have always existed as rivers, but have been channelised and/or diverted at some point. These watercourses are more difficult to identify than those that have been constructed to drain wetlands/lakes, as they often have a modified/constructed form for their entire length. However, the following steps can be used to determine if such a watercourse was modified from a pre-existing waterbody.

1. Assess the form of the entire watercourse, not just the reach of interest. If any upstream or downstream reaches exhibit a natural form it is likely that the watercourse is the modified form of a pre-existing river or stream;
2. If the entire watercourse is found to have a constructed/modified form, assess whether a stream would naturally have existed from:
 - a. The high-resolution aerial photographs on the Greater Wellington GIS server – occasionally reclaimed stream beds are visible on these photographs as depressions in the land. The presence of a reclaimed river or stream bed that follows a similar path to the watercourse would suggest it is the modified form of a pre-existing watercourse
 - b. The historic aerial photographs on the Greater Wellington GIS server – the presence of a stream that follows a similar path to the watercourse would suggest it is the modified form of a pre-existing watercourse.
 - c. The one-metre Digital Elevation Model of the Wellington Region of the Greater Wellington GIS servers (Hill-shade layer) – reclaimed stream beds are often visible on this model. The presence of a reclaimed river or stream bed that follows a similar path to the watercourse would suggest it is the modified form of a pre-existing watercourse;
 - d. The maps of the territorial authorities' stormwater networks on the Greater Wellington GIS servers – often these maps can be used to determine if isolated reaches of channel in the urban environment are part of a natural stream network that has been piped; and
 - e. Advice from Greater Wellington environmental science staff, who can consider the size of the watercourse and its location to determine whether it is likely to have been modified from a pre-existing water body.

If it is found that the watercourse is the modified form of a pre-existing water body, it should be considered to have a natural source of flow, unless:

- It is ephemeral for its entire length – constructed ephemeral watercourses effectively operate as stormwater channels.
- It is not connected to a natural stream network – sometimes constructed watercourses terminate on land without discharging to another water body or the CMA.

2.6.2 Scenario 2: The watercourse part of a stock water or irrigation race network

If the watercourse is part of a stock water or irrigation race network (ie, it is identified on the “Water Races” layer on the Greater Wellington GIS server) at least some of the flow will be artificially derived from a surface water diversion. In these cases, advice should be sought from Greater Wellington environmental science staff on whether the watercourse would have existed prior to the diversion. If so the source of flow should be considered natural, otherwise it is artificial.

2.7 Identifying different types of watercourses based on flow permanence, form and source of flow

Once the watercourses form, flow permanence and source of flow has been defined, the following flow chart (**Figure 2**) can be used to categorise it as either being:

- An artificial watercourse;
- A river;

- A river that is;
 - An ephemeral watercourse; and/or
 - A highly modified river or stream.
- An ephemeral watercourse that is not a river.

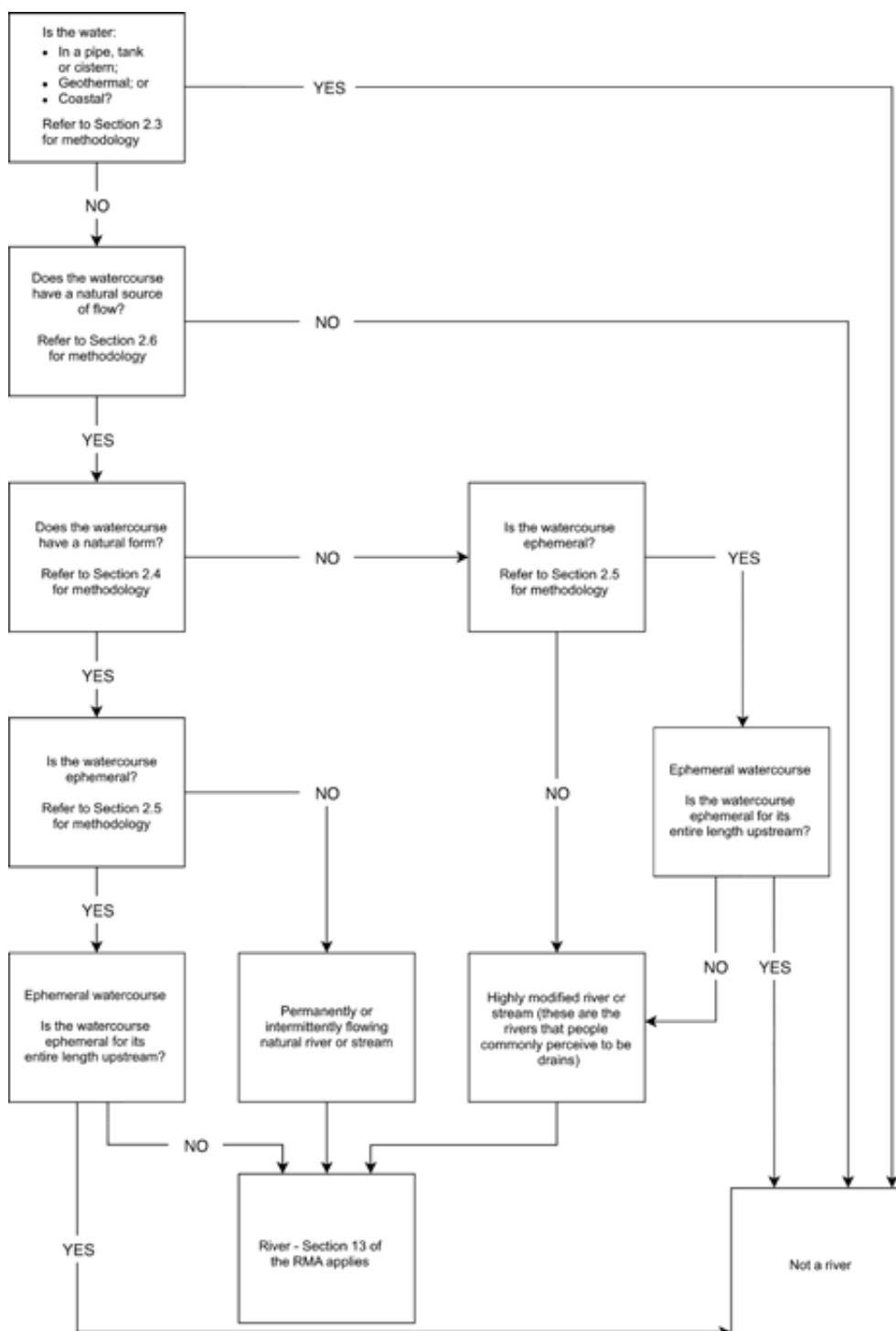


Figure 2: Flow chart for categorising watercourses. Important, always refer to the guidance provided in sections 2.2 to 2.6 when using this flow chart.

3. Worked examples of the categorisation process

3.1 Example 1: Channelised stretch of watercourse at Linden Station (Figure 3)



Figure 3: Watercourse at Linden Station

3.1.1 Step 1: Categorisation of water

High resolution aerial photographs and River Mouths and CMA Boundaries layer on the Greater Wellington GIS server show that water in the reach in question is not in a pipe, tank or cistern and is outside the CMA. There is also no reason to expect that the water is geothermal. **Hence the watercourse is a flowing body of fresh water.**

3.1.2 Step 2: Categorisation of form

Based on the high-resolution aerial photographs on the Greater Wellington GIS server, **the watercourse has a constructed/modified form** as it has all of the following characteristics (see **Figure 4**):

- Flow is constrained to a single path;
- The channel is straight with no ‘natural curves’;
- The channel is mechanically formed with straight or steeply angled banks;
- The above characteristics persist at least its entire length through the property in which the watercourse is being assessed.



Figure 4: Aerial photograph of the watercourse at Linden Station, clearly showing the water contained within, and its modified/constructed form

3.1.3 Step 3: Categorisation of flow permanence

The high-resolution aerial photographs on the Greater Wellington GIS server showed that the watercourse has all of the following characteristics (see **Figure 4**):

- Has a bed that is not predominately vegetated, and
- Has a baseflow (ie, does not only flow during or immediately following heavy rainfall events).

The site was also visited multiple times outside of rain events, and was found to be flowing. **Hence, the watercourse is not ephemeral.**

3.1.4 Step 4: Categorisation of source of flow

It was originally thought that the watercourse did not have a natural source of flow, as it appeared to be isolated from a natural stream network (ie, it did not derive its flow from a pre-existing waterbody and did not flow to the sea). However, site visits found that the watercourse received flow from a large pipe entering from its true-right bank. An assessment of the Wellington City Council's stormwater network maps (accessed from the Greater Wellington GIS servers) found that this pipe is the outfall of a piped stream network, with a catchment that extends up to an unmodified gully system to the east of State Highway 1 (**Figure 5**). It also showed that the watercourse discharges directly to the Porirua stream. As the watercourse still has unmodified reaches, and is connected to a natural stream network, it is the modified form of a pre-existing water body and **has a natural source of flow**.



Figure 5: Depiction of the gully system feeding the watercourse at Linden Station

3.1.5 Step 5: Final categorisation

Inputting the findings of Steps 1-4 into the flow chart depicted in **Figure 2**, it was determined that the watercourse **is a river under the RMA**, and for the purposes of Rule R121 is **a highly modified river or stream under the NRP (Figure 6)**.

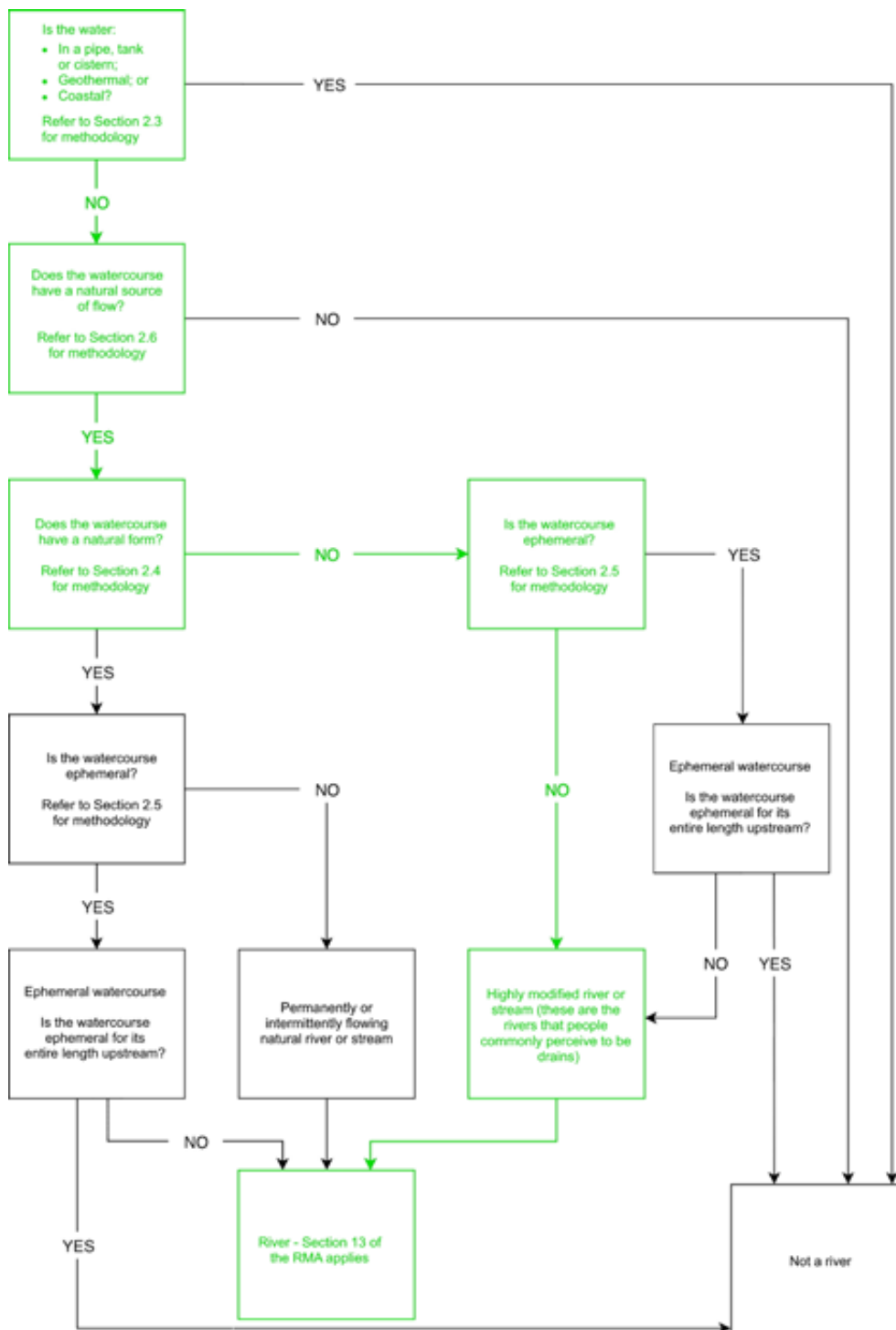


Figure 6: Worked flow chart for the watercourse at Linden Station

3.2 Example 2: Seemingly unmodified stretch of watercourse near Ngaumutawa Road, Masterton (Figure 7)



Figure 7: Watercourse near Ngaumutawa Road, Masterton

3.2.1 Step 1: Categorisation of water

High resolution aerial photographs and River Mouths and CMA Boundaries layer on the Greater Wellington GIS servers showed that water in the reach in question is not in a pipe, tank or cistern, and is outside the CMA. There is also no reason to expect that the water is geothermal. **Hence the watercourse is a flowing body of fresh water.**

3.2.2 Step 2: Categorisation of form

This watercourse has a number of bends, and it was originally thought that these might be natural curves (ie, the watercourse has natural form). However, historic aerial photographs show that the watercourse was constructed as a straight channel between 1963 and 1977 to drain a low point in the middle of the paddock. Between 1980 and 1985 it was deepened and realigned into a curved flow path. This diverted flow into a second watercourse that ran in a perpendicular direction, shortening the watercourse and freeing up land for development. Thus, the curved flow path which gives the watercourse its “natural look” is actually a constructed engineering feature. Consequently, **the watercourse has a constructed/modified form**, as it has all of the following characteristics (see **Figure 8**):

- Flow is constrained to a single path;
- The channel is straight with no ‘natural curves’;
- The channel is mechanically formed with straight or steeply angled banks;
- The above characteristics persist at least its entire length through the property in which the watercourse is being assessed.

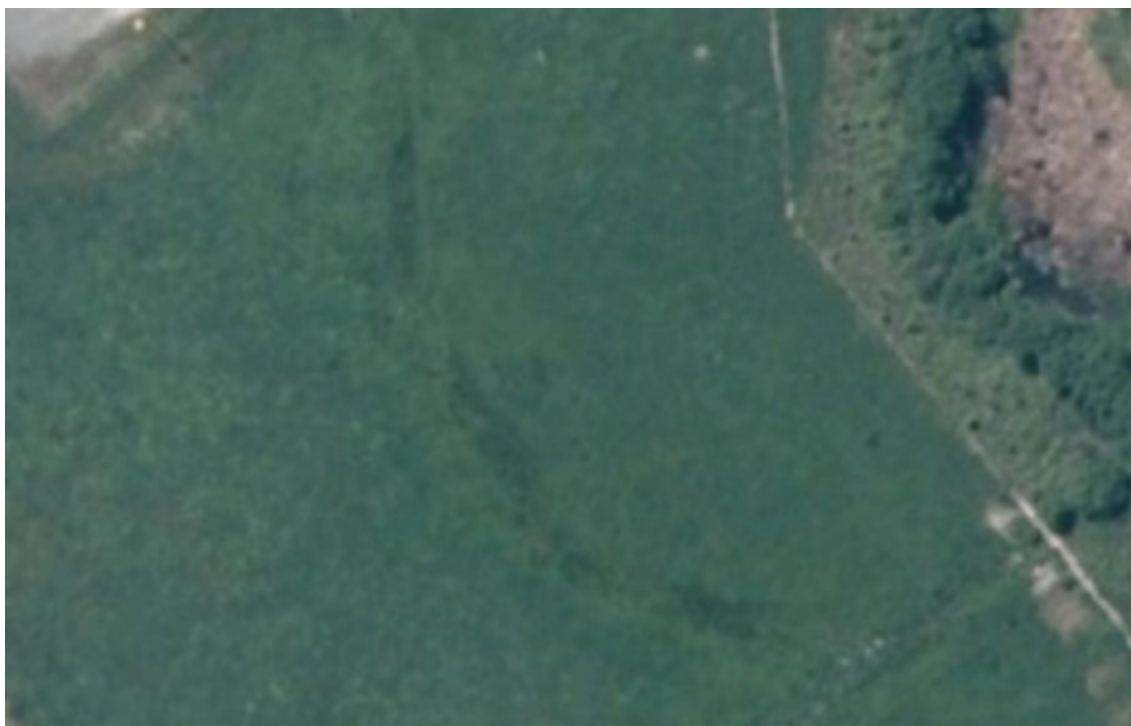


Figure 8: Aerial photograph of the watercourse near Ngaumutawa Road, Masterton, clearly showing its ephemeral nature and modified/constructed form

3.2.3 Step 3: Categorisation of flow permanence

Based on the high-resolution aerial photographs on the Greater Wellington GIS servers, **the watercourse is ephemeral** as it has all of the following characteristics (see **Figure 8**):

- A bed that is predominantly vegetated;
- Conveys water during or immediately following rainfall events;
- Does not convey or retain water at other times; and
- Is not a wetland.

3.2.4 Step 4: Categorisation of source of flow

Historic aerial photographs and the shape file showing the predicted pre-human extent of wetlands in the region indicates the watercourse is not the modified form of a pre-existing wetland, lake or stream. It is also ephemeral and has a modified/constructed form to its source. Hence, the watercourse effectively acts as a stormwater channel and thus **has an artificial source of flow**.

3.2.5 Step 5: Final categorisation

Inputting the findings of Steps 1-4 into the flow chart depicted in **Figure 2**, it was determined that the watercourse is not a river under the RMA (**Figure 9**).

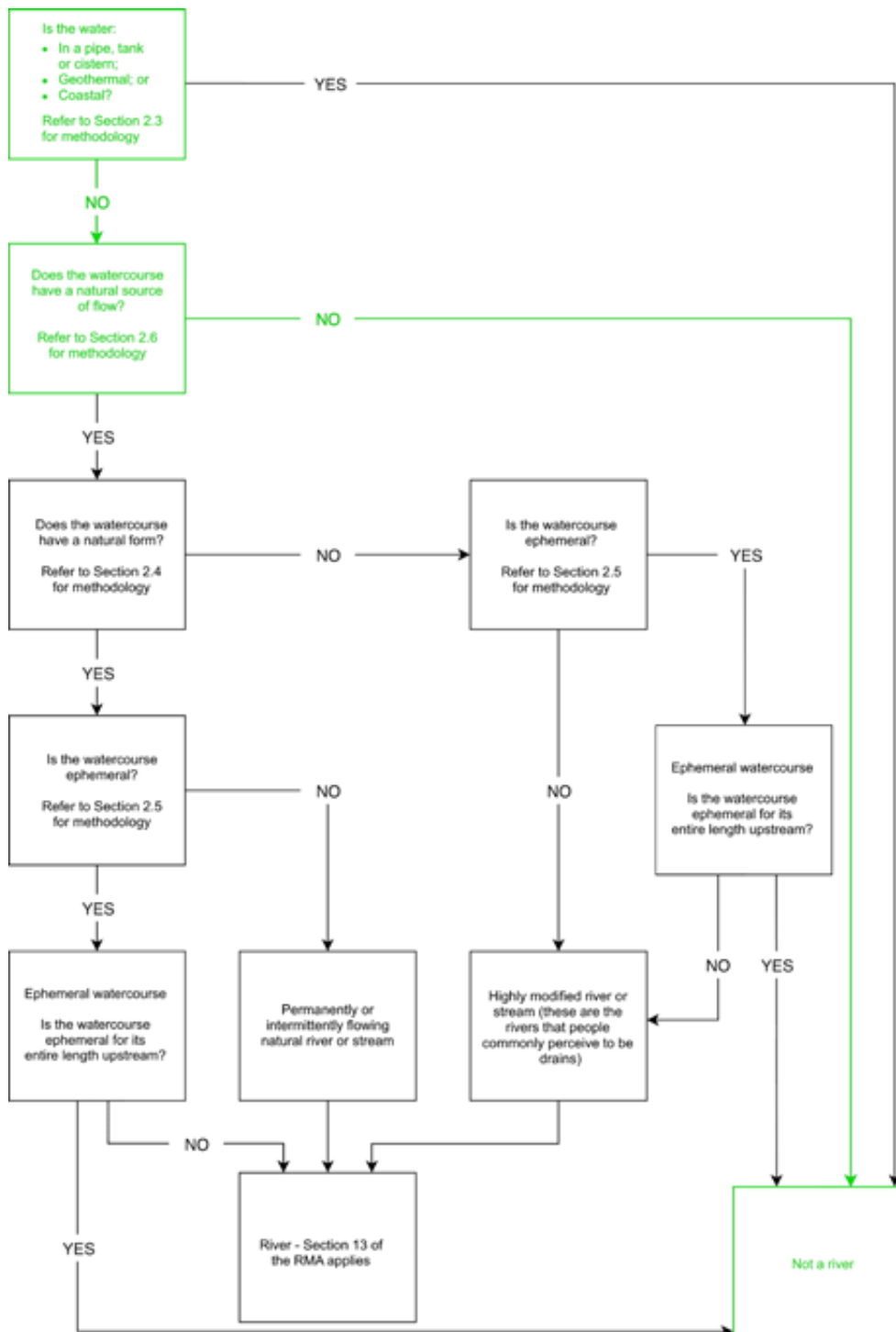


Figure 9: Worked flow chart for the watercourse near Ngaumutawa Road, Masterton

Note if this watercourse had been found to have had a natural source of flow it still would have been classified as ‘Not a river’ as it is ephemeral for its entire length upstream of the reach in question.

4. References

Ausseil, A-G.E., Gerbeaux, P., Chadderton, W.L., Stephens, T., Brown, D.J., and J. Leathwick. 2008. Wetland ecosystems of national importance for biodiversity: Criteria, methods and candidate list of nationally important inland wetlands. Landcare Research Contract Report LC0708/158 for the Department of Conservation.

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