

Hamilton City Council  
Private Bag 3010  
Hamilton 3240

Attention: Nathanael Savage

Dear Nathanael

## **Rotokauri North Development Area: Technical review of stream classifications**

This report presents our independent assessment of the classification of the watercourses present on the Proposed Rotokauri North Development area located off Te Kowhai Rd, Hamilton. The report has been prepared for Hamilton City Council (HCC) as our client<sup>1</sup> with the intention that it will be made available to Green Seed Consultants Limited (GSCL) to assist with the preparation of a sub-catchment ICMP.

### **1 Introduction**

We understand that GSCL is proposing to develop an area of land to the south of Te Kowhai Road, Hamilton as a Special Housing Area (SHA). The location of the site is shown on Figure 1 (Appendix A).

We understand that GSCL and HCC are seeking clarity on watercourse classifications under the Waikato Regional Plan (WRP) in order to progress stormwater and watercourse management options for the site. The purpose of this letter is to provide an assessment of site watercourse classification with respect to WRP definitions. The report does not assess the ecological values of site watercourses.

### **2 Methods**

The methodology for this assessment has comprised:

- A site visit and walkover inspection of the watercourses at the site by a Principal T+T ecologist accompanied by Nathanael Savage of HCC and Mark Tollemache of Tollemache Consultants Ltd (GSCL's consultant planners). The walkover inspection covered two main tributary systems on site, an unnamed tributary of the Te Otamanui Stream and an unnamed tributary of the Ohote Stream. The site visit was undertaken on the morning of Wednesday 24 October 2018. Weather conditions were fine at the time of the site visit and there had been no rainfall recorded at the Ruakura rain gauge in the preceding 10 days (data from NIWA's CLiFlo website). The nearest rainfall event to the site visit was 11 days earlier with 14 and 10.8 mm recorded on 12 and 13 October 2018 respectively.

---

<sup>1</sup> The report has been prepared in accordance with our Instruction for Service agreement with HCC dated 17 September 2018 (PSP 18104).

- A review of relevant data including available GIS maps on T+T files<sup>2</sup>, the historic aerial photographs available on the Retrolens website and the preliminary hydrogeological report for the site<sup>3</sup>.
- Consideration of the status of site watercourses based on the above and with respect to watercourse definitions in the WRP (see Appendix B).

### 3 Stream classification assessment

This section outlines our assessment of the status of the watercourses on site. We have provided brief overview information for site context, presented the key definitions relevant to the site and then addressed watercourse classifications separately for the unnamed tributaries of the Te Otamanui and Ohote Streams.

#### 3.1 General site context

The Rotokauri ICMP ecology report provides good background on historic land use, topography and geology of the general area<sup>2</sup>. The site has rolling hills around the southern and eastern edges but is largely flat. The unnamed tributaries of the Ohote Stream on site largely fall within an area of historic fen wetland and this broadly coincides with organic soils (Figures 26 and 23 respectively in Kessels Ecology, 2016). We have provided Landcare Research's historical wetland layer on Figure 1, which is an indicative extent of likely wetland habitat prior to human modification.

The unnamed tributaries of the Te Otamanui stream drain allophanic soils the tributaries and drains are largely located outside of the approximate extent of historic fen wetland (refer Figure 1).

We encountered the owner of 350 Exelby Road (Michael Vickers) during the site walkover. He commented that his family had been farming in the area for the past 60 years and could remember his father and neighbours constructing several of the tributary drainage channels within the site. Apart from the main channel he could not recall there being any notable natural channels. Prior to the drains being dug they had significant ponding issues.

#### 3.2 Key WRP definitions

WRP watercourse definitions relevant to stream classification in general are provided in Appendix B. The definitions for ephemeral streams, perennial streams, modified watercourse and artificial watercourse are most relevant to the site and this assessment. We note that based on WRP definitions "farm drain" is a type of artificial watercourse. We also note that wetlands have been historically present in the subject catchments but there is no guidance in the WRP on how to deal with modification to wetlands (i.e. if the drainage of wetlands with channels results in a modified or artificial watercourse). On the whole the drainage channels have been constructed for the purpose of draining the historic wetlands.

We understand from the preliminary hydrogeological report for the site that groundwater levels are generally near the ground surface and respond directly to rainfall. The site walkover for this assessment was in spring but followed a period of dry weather. There was a variable depth of water present in site watercourses, and for upper catchment zero order tributaries (watercourses not appearing on the 1:50,000 map series) this appeared to change with channel depth. Our view is that observed water levels in site watercourses at the time of the walkover reflected a combination of channel depth and groundwater levels.

<sup>2</sup> Figures supporting the Rotokauri ICMP Ecological Assessment, Kessels Ecology (2016). Consultancy project undertaken by Kessels Ecology for Hamilton City Council.

<sup>3</sup> Beca, 2018. RND A ICMP: Desktop Review of Hydrogeological Conditions Influencing Stormwater Design rev2. Letter from Roy Nutsford to Nathanael Savage Dated 8 September 2018.

Most of the watercourses on site would likely flow (or hold water) for at least three months of the year between March and September. However, it is highly likely that the bulk of the zero order watercourses (most of the watercourses on site) dry out for a period during summer and are therefore ephemeral in nature. However, we assume that the ephemeral and perennial stream definitions follow the definition of a river (see Appendix B) and apply to streams and modified watercourses but not artificial watercourses. Most of the watercourses on site are more consistent with the definition of artificial watercourse (see later), so the ephemeral / perennial definitions may be irrelevant.

None of the watercourses on site are completely unmodified. The most relevant watercourse definitions to this assessment are therefore “modified watercourse” vs “artificial watercourse”. The key difference between the two definitions is the presence of “natural portions” or “channels”. According to the definitions a modified watercourse has a “natural channel” at its headwaters whereas an artificial watercourse has “no natural portions” from its confluence with a river or stream to its headwaters. We address watercourse classifications for the unnamed tributary of Te Otamanui Stream and the unnamed tributary of the Ohote Stream in the following sections.

### 3.3 Unnamed tributary of Te Otamanui Stream

The unnamed tributary of Te Otamanui Stream comprises a network of managed channels within an agricultural setting and all of the watercourses on site are straightened. The watercourse network is shown on Figure 1, including the labels we have provided for each of the tributaries as referred to below. We have reviewed the historic aerial photography available on the Retrolens website to assist in determining which of the watercourses on site are artificial vs modified. Photographs date back to 1952 and are provided in Appendix C.

The aerial photograph from 1952 shows a straightened channel network is present, although with slightly different alignments to the present situation. At this time some channel locations appear to be consistent with the current network while others have since been filled or constructed. The main stem (TM) and tributaries T4, T5 and T6 appear to be present. A wetland area appears to be present in the uppermost headwaters but there is no obvious surface stream linking to the main stem. Photographs from 1963 show a similar drainage pattern but with the wetland area reduced in size, and subsequently completely gone by 1974. A similar pattern is shown in 1979. Tributaries T1, T2 and T3 appear to have been constructed post 1979.

In its current state the entire network is arguably “artificial watercourse” given there are no natural portions or channels from headwaters to the confluence with a river or stream. However, it is highly likely there would have been a stream drainage feature from this area prior development of the land for agriculture. Only the main stem is likely to be in the vicinity of any original watercourse alignment with any certainty and our view is that the lower portion of this would be appropriately classified as “modified watercourse”. This upstream extent of the section of “modified watercourse” is arbitrary other than it is the likely upstream extent of perennial flow. The remainder of the watercourses within the Te Otamanui Stream catchment within the site in our view are artificial. Our assessment of watercourse classifications is summarised in Table 3.1 and presented on Figure 1.

**Table 3.1: Classification of the unnamed tributaries of Te Otamanui Stream against WRP definitions**

Stream reach	Watercourse classification	Reasoning
TM (lower)	Modified watercourse	Likely to be in the vicinity of an original stream feature.
T1	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.

Stream reach	Watercourse classification	Reasoning
T2	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.
T3	Artificial watercourse	No natural portions or channel sections. Likely constructed post 1979.
T4	Artificial watercourse	No natural portions or channel sections.
T5	Artificial watercourse	No natural portions or channel sections.
T6	Artificial watercourse	No natural portions or channel sections.

### 3.4 Unnamed tributary of Ohote Stream

The unnamed tributary of Ohote Stream also comprises a network of managed channels within an agricultural setting. All of the watercourses are straightened other than a 200 m long reach of the main stem at the downstream end of the site, although this also appears to have a modified channel (deepened). The watercourse network is shown on Figure 1.

Aerial photographs for the site date back to 1952. Similar to the unnamed tributary of the Te Otamanui Stream, the aerial photograph from 1952 shows a straightened channel network is present with the most channels in the current alignment. An extensive wetland area is present in the uppermost headwaters in the vicinity of tributaries O5 and O6 (refer Figure 1). By 1963 the headwater wetland feature has been cleared and drains have been installed in the current alignment. Some changes to the minor channel network appear to have occurred, particularly with channels that appear to cross catchment boundaries.

In our view the lower reach of the main stem would be appropriately classified as “modified watercourse”. This is on the basis that the most downstream section follows the natural topography and that a stream would have been present historically in the vicinity of the main channel. The upstream extent of the section of “modified watercourse” is arbitrary other than it is the likely upstream extent of perennial flow. The remainder of the watercourses on site in our view are artificial and constructed for land drainage purposes. Our assessment of watercourse classifications is summarised in Table 3.2 and presented on Figure 1.

**Table 3.2: Classification of the unnamed tributaries of Ohote Stream against WRP definitions**

Stream reach	Our view on stream classification	Reasoning
OM (lower)	Modified watercourse	Alignment follows natural topography in lower reach with straightened reach likely in the vicinity of an original stream feature.
OM (upper)	Artificial watercourse	No natural portions or channel sections.
O1	Artificial watercourse	No natural portions or channel sections.
O2	Artificial watercourse	No natural portions or channel sections.
O3	Artificial watercourse	No natural portions or channel sections.
O4	Artificial watercourse	No natural portions or channel sections.
O5	Artificial watercourse	No natural portions or channel sections.
O6	Artificial watercourse	No natural portions or channel sections.

## 4 Conclusion

We have made an assessment of watercourse status for the Rotokauri North Development site on the basis of a desktop review, a site walkover and in regard to the definitions in the WRP. In our view

the majority of the watercourses on site are consistent with the WRP definition for an “artificial watercourse”. In our view the appropriate classification for the lower reaches of the unnamed tributaries of Te Otamanui and Ohote Streams on site is “modified watercourse” as shown on Figure 1.

## 5 Applicability

This report has been prepared for the exclusive use of our client Hamilton City Council, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Dean Miller

Peter Cochrane

Principal Freshwater Ecologist

Project Director

Technical review completed by Justine Quinn, Senior Freshwater Ecologist

DCM

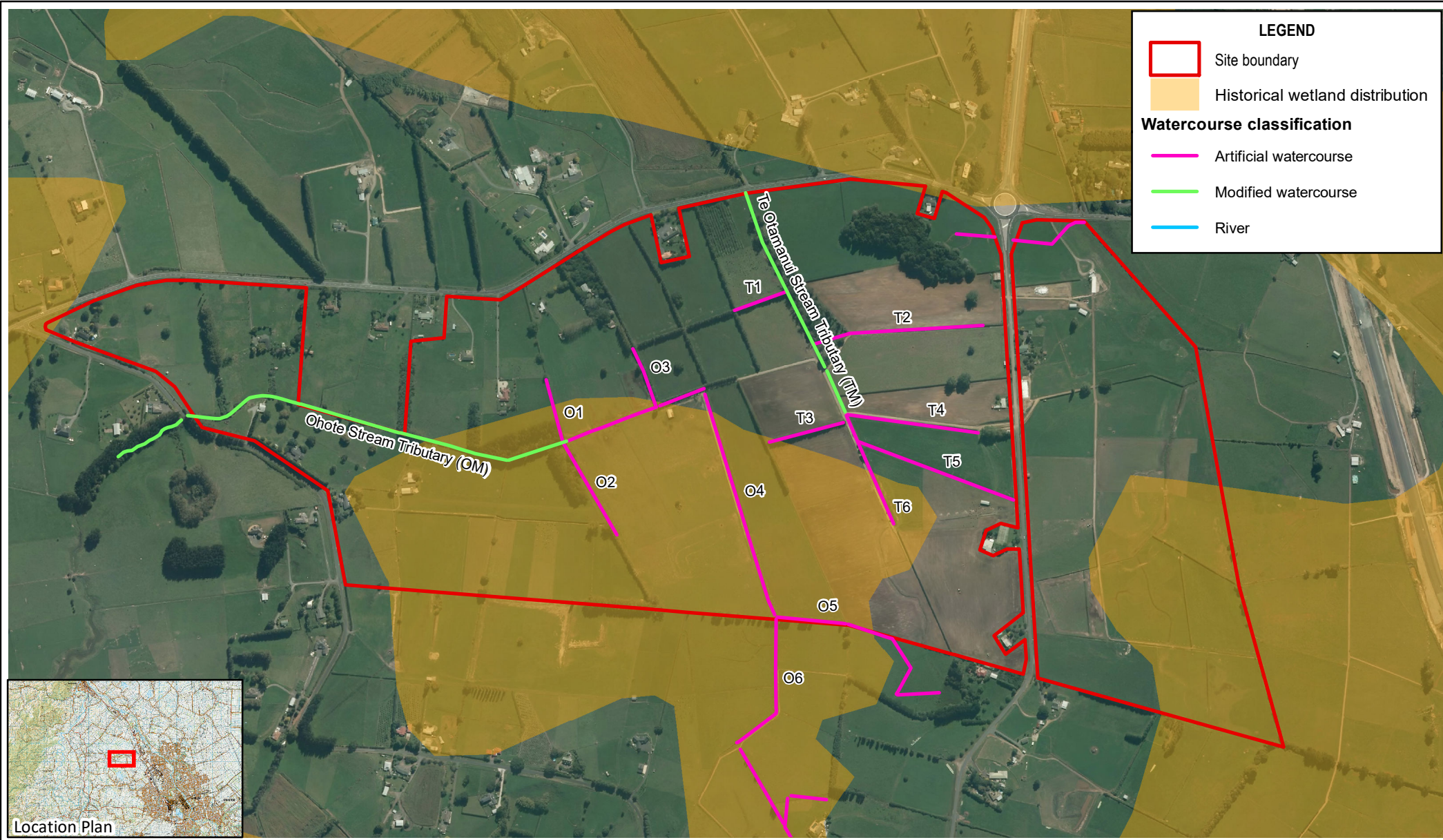
p:\1008263\issueddocuments\rotokauri north\20181207.dcm.ltr.rpt.docx

## Appendix A: Figure

---

- **Figure 1: Rotokauri North Streams Watercourse Classification**

Path: P:\1008263\WorkingMaterial\Rotokauri North Streams\GIS\Rotokauri north stream\_ADPU.mxd Date: 29/10/2018 Time: 4:05:21 PM



**LEGEND**

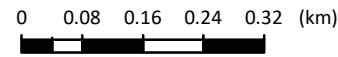
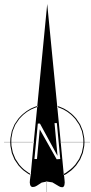
- Site boundary
- Historical wetland distribution

**Watercourse classification**

- Artificial watercourse
- Modified watercourse
- River



Notes: Aerial photography obtained from Waikato Regional Council (WRAPS 2012), Creative Commons BY 4.0  
 Coordinate Datum: New Zealand Transverse Mercator (NZTM)  
 Historical wetland distribution data obtained from Ministry for the Environment, Creative Commons 3.0



A4 SCALE 1:10,000



**Tonkin+Taylor**  
 105 Carlton Gore Rd, Newmarket, Auckland  
 www.tonkintaylor.co.nz

DRAWN	ADPU	Oct.18
CHECKED	DCM	Dec.18
APPROVED	PRC	Dec.18
ARCFIELD		
Rotokauri north stream_ADPU.mxd		
SCALE (AT A4 SIZE)		
1:10,000		
PROJECT No.		
1008263.3000		

**HAMILTON CITY COUNCIL**  
 Rotokauri North Streams  
 Watercourse Classification

FIGURE No.

Figure 1.

Rev.

1

## **Appendix B: Waikato Regional Plan Definitions**

---



## Waikato Regional Plan – Glossary of Terms

Term	Definition
Ephemeral streams	Streams that flow continuously for at least three months between March and September but do not flow all year.
Perennial streams	A stream that flows all year round assuming average annual rainfall.
River	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).
Modified watercourse	An artificial or modified channel that may or may not be on the original watercourse alignment and which has a natural channel at its headwaters.
Artificial watercourse	A watercourse that contains no natural portions from its confluence with a river or stream to its headwaters and includes irrigation canals, water supply races, canals for the supply of water for electricity power generation and farm drainage canals.
Farm drainage canal	An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters, and includes a farm drain or a farm canal.

## **Appendix C: Historic Aerial Photographs**

---



*Aerial photograph SN525 / 2, dated 26 September 1952. Sourced from Retrolens and licensed by LINZ*



*Aerial photograph 3280 / 16, dated 13 February 1963. Sourced from Retrolens and licensed by LINZ*



*Aerial photograph SN3730 / 7, dated 13 September 1974. Sourced from Retrolens and licensed by LINZ*



*Aerial photograph SN5479 / 17, dated 27 September 1979. Sourced from Retrolens and licensed by LINZ*