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# MEMORANDUM

**Date:** 21 August 2025 33097

**From:** Y Goh, S Finnigan

**Subject:** Former Tokanui Hospital – Evaluation of Fish Passage for Proposed Culvert 3 (V4)

**To:** Emily Buckingham (emily.buckingham@slrconsulting.com), Nicola Pyper (nicola.pyper@slrconsulting.com)

## 1.0 INTRODUCTION

This document evaluates the water velocity and depth within the proposed culvert 3 (C3) design and whether it satisfies the fish passage criteria according to the NIWA New Zealand Fish Passage Guidelines Version 2.0. This has been done for both normal (mean) and storm flows, using both spreadsheet and "stream simulation" culvert design software as the most appropriate solution for assessing movement of fish or other aquatic organisms through culverts.

This document summarises the analysis for:

- Section 2 - Proposed culvert details;
- Section 3 – Adopted maximum velocity and minimum depth thresholds;
- Section 4 - Fish passage under actual "mean stream" flows;
- Section 5 - Fish passage in accordance with the NIWA Fish Passage Guidelines

## 2.0 PROPOSED CULVERT 3 DETAILS

The existing culvert is 1200mm diameter, with an inlet IL of 29.5mRL and outlet IL of 29.44mRL (NZVD2016).

The proposed culvert 3 will be a 1350mm diameter pipe, with a gradient of 0.49% and 41m long. It will be embedded by 340mm (25%) within the stream bed to facilitate fish passage. The culvert itself will have an inlet IL of 29.86m and outlet IL of 29.66m (NZVD2016), while the invert with embedment will be 30.2mRL with outlet IL 30.0mRL.

The proposed culvert 3 has been sized to match the flow area of the existing culvert (1200dia, 1.13m$^2$) taking the embedment depth into account (1350dia, less 340mm deep embedded area = 1.15m$^2$) to match the existing situation as close as possible, so as to hold flood waters back for optimum flood relief benefits for the landfill. This has been done using the "stream simulation" culvert design as the most appropriate solution for assessing the movement of fish or other aquatic organisms through culverts.

## 3.0 MAXIMUM THRESHOLD VELOCITY AND MINIMUM THRESHOLD DEPTH FOR ĪNANGA (*GALAXIAS MACULATUS*)

In the New Zealand Fish Passage Guidelines (Version 2.0), īnanga (*Galaxias maculatus*) is used as a benchmark species for assessing fish passage. Although īnanga have not been recorded in the vicinity of Culvert 3, a conservative approach was adopted, and the culvert design was assessed using īnanga as the target species, as stated in SLR Consulting's "Former Tokanui Hospital Culvert Remediation Fish Passage Evaluation report" (August 2025). The report specifies a maximum velocity threshold based on the prolonged swimming speed of īnanga (0.44m/s). The NIWA guideline also specifies a minimum depth requirement of 150 mm for fish passage. Therefore, these thresholds – a maximum velocity of 0.44m/s and a minimum depth of 150mm were applied to assess the feasibility of fish passage through Culvert 3.

## 4.0 FISH PASSAGE UNDER ACTUAL "MEAN STREAM" FLOWS

### 4.1 Determination of Mean Flows

Three methods have been used to estimate the mean flow in the Wharekōrino Stream by the landfill at the Tokanui Hospital. These are briefly described below:

(a) **Catchment Analysis**: Average annual runoff analysis, based on catchment area and annual average rainfall data for the area (30 year average over period 1991-2020 inclusive) from the nearby Waikeria NIWA rainfall gauge site.

(b) **NZRiversMaps**: NIWA NZRiversMaps website, which includes various estimates of stream and river flows across the entire New Zealand river network (https://shiny.niwa.co.nz/nzrivermaps/). This website states that the mean flow was estimated using the Hydrology of Ungauged Catchments method (Ref: *Booker DJ, Woods RA. 2014. Comparing and combining physically-based and empirically-based approaches for estimating the hydrology of ungauged catchments*).

(c) **WRC Flow Gauging**: Waikato Regional Council actual flow gauge data on the Pūniu River at the Bartons Corner Rd bridge, approximately 4.9km NNW, downstream of the site. Mean flow data from this site was then applied to the Wharekōrino Stream on a pro rata catchment area basis.

### 4.2 Comparative Results

Mean flow comparative results are summarised below.

**Table 1: Mean Flow Comparative Results**

| Method | Wharekōrino Stream (by landfill) | Pūniu River (Bartons Corner Rd bridge) |
|---|---|---|
| Catchment Analysis | 62.4 L/s | 7.4 $m^3/s$ |
| NZRiversMaps | 105 L/s | 14.6 $m^3/s$ |
| WRC Flow Gauging | 121 L/s | 14.32 $m^3/s$ |

**Note:** Wharekōrino Stream catchment area at landfill = 0.44$km^2$; Pūniu River catchment area at Bartons Corner Rd bridge = 518.7$km^2$

The WRC Flow Gauging method is considered the most appropriate to use, as it is based on actual flow measurements. This gives a mean flow for Culvert 3 of 121L/s.

### 4.3 Depth and Velocity for Mean Flow

Using the adopted mean flow of 121L/s, the proposed culvert 3 was analysed for fish passage performance, starting with no tailwater and incrementally increasing tailwater until the culvert was nearly full. As the culvert is embedded by 340mm, tailwater depth was measured from the embedded level. These results are summarised in Table 2.

**Table 2: Velocity and depth at increasing tailwater depth.**

| Tailwater depth (m) | Outlet Velocity (m/s) | Depth (m) | Threshold met |
|---|---|---|---|
| 0.0 | 1.04 | 0.18 (inlet control) | No |
| 0.2 | 1.04 | 0.18 (inlet control) | No |
| 0.3 | 1.04 | 0.18 (inlet control) | No |
| 0.4 | 0.24 | 0.22 (outlet control) | Yes |
| 0.6 | 0.16 | 0.40 (outlet control) | Yes |
| 0.8 | 0.12 | 0.60 (outlet control) | Yes |
| 1.0 | 0.11 | 0.80 (outlet control) | Yes |

At tailwater depths below 0.4m, the culvert operates under inlet control and the velocity increases above the threshold required for īnanga passage (0.44m/s from SLR Fish Passage Evaluation Memo). At tailwater depths of 0.4m and greater, the culvert operates under outlet control and the thresholds for both depth and velocity are met.

This indicates that when the water level exceeds roughly half the culvert diameter (~0.4m tailwater depth) conditions become feasible for fish passage. This assumes that all water travels through the culvert with a uniform (constant) velocity profile both horizontally and vertically across the water profile. In reality, the velocity profile is non-uniform and increases with distance from the culvert wall (0m/s) to a maximum in the centre of the culvert at the water surface. Hence, fish passage is likely to be feasible over a greater depth and velocity range than summarised in Table 2 based on mean flow.

If the tailwater depth is 1.01m or greater, the 1.35m diameter culvert is in a fully submerged condition and the calculated average velocity is 0.11m/s (=0.121$m^3$/s/1.15$m^2$). Fish passage remains feasible under these conditions, as the velocity is below the maximum threshold for īnanga.

### 4.4 Expected Flow Depths in Culvert 3

Observations from multiple site visits are that Culvert 3 is typically either fully drowned or almost drowned, under both normal and storm flow conditions. This is shown in Figure 1 below, where the top of culvert 3 at the inlet end is just visible.

**Figure 1: Culvert 3 Inlet – 29 Feb 2024**

Based on an estimated conservative water depth in Culvert 3 of 1m, this gives a water level of 30.5m RL (29.5m IL +1.0m) (NZVD2016).

For the proposed culvert, the effective base of the culvert (at top of embedded material) will be 30.2mRL at the inlet and 30.0mRL at the outlet. Hence, based on a "normal" water level of 30.5m RL from site observations, this means the water depth in the proposed culvert will normally be 0.3m and 0.5m at the culvert inlet and outlet respectively. Under these conditions, the calculated flow velocities in Table 1 are less than 0.44m/s which is sufficient for īnanga. Hence, it is expected that the proposed culvert will provide adequate fish passage during normal flow conditions.

## 5.0 FISH PASSAGE IN ACCORDANCE WITH NIWA FISH PASSAGE GUIDELINES

According to the New Zealand Fish Passage Guidelines Version 2.0 (June 2024), section 4.5.3, the bank-full flow is defined as the upper flow threshold ($Q_H$) and ⅓ of the bank-full flow is defined as the lower flow threshold ($Q_L$) for verifying fish passage in the culvert. Survey data and site observations shows that the stream channel is about 3m wide and 1m deep at the top of bank at the culvert 3 inlet end.

Section 4 demonstrates that fish passage is feasible under actual mean stream flows, while this section assesses fish passage under bank-full flow. Culvert water velocities are typically calculated as mean cross-sectional water velocities, and these mean velocities, often exceed fish swimming velocities and endurance. The guideline states that the best practical way to account for the velocity distribution within the culvert is to look at depth-averaged vertical slices within the culvert at the fish passage design flow. Section 4.5.6 of these guidelines provides a systematic methodology for determining the depth-averaged velocity of vertical slices of the flow within the culvert (Figure 2).

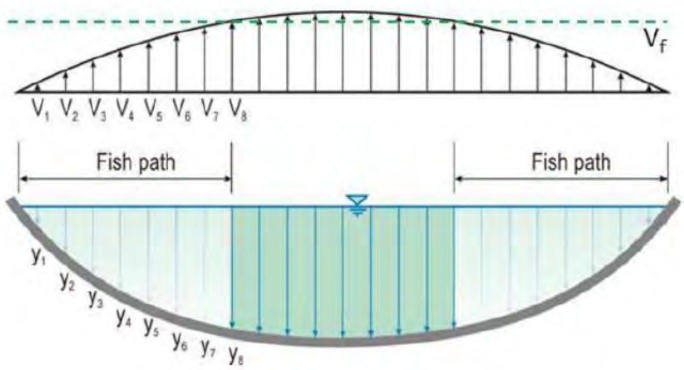



**Figure 2: Culvert water velocity distribution with depth averaged velocities in vertical slices.**

Figure 3 shows examples of vertical slices over a typical velocity distribution within a rectangular channel. The depth-averaged velocity within the vertical slice outlined in red would be much lower than the vertical slice in yellow. The vertical slice outlined in red would also have a significantly lower water velocity than the mean cross-sectional water velocity.

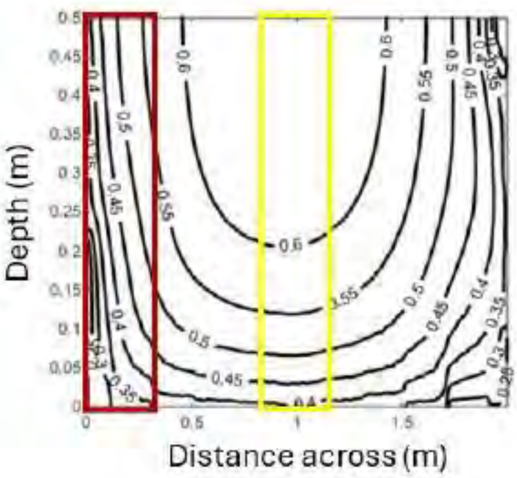



**Figure 3: Cross-sectional water velocity distribution within a rectangular channel with example vertical slices. Modified from Cassan et al. (2019).**

### 5.1 Scenario 1: Open channel/culvert not fully submerged - Depth-averaged water velocity analysis using HY8 low flow hydraulics

Based on the HECRAS 2D flood modelling results, the blue line below shows the 'bankfull' flow (Figure 4). At this water level, the bankfull flow is 1.35m$^3$/s. In this case, $Q_H$ = 1.35m$^3$/s and $Q_L$ = 0.45m$^3$/s (calculated from

1.35/3). For these conditions, $V_H$ = 1.39m/s and $V_L$ = 0.56m/s – these are estimated average velocities calculated from modelled flow depths in HY-8 software when the culvert is partially embedded and water is flowing freely and still behaves as an open channel.

It should be noted that the stream bed gradient through this area is relatively flat, with an estimated bed gradient of 0.3%, while water levels at culvert 3 are controlled by existing trees/vegetation within the stream itself below Te Mawhai Road and the Te Mawhai Rd culvert (C1). Removal of culvert C2 between C1 and C3 has been modelled to help reduce stream flood levels upstream of C2 but is unlikely to have an effect on normal stream water levels, due to the stream bed gradient, existing vegetation/trees and C1 all restricting flow, causing water to back up through this area. This is supported by FTL staff who have visited the Tokanui site regularly over the last two years, including during summer, only ever having seen the top of C3 once, with it just visible above the water level, meaning the water depth would have been around 1.-1.1m under low flow conditions, further supporting the above comments (refer photo in Figure 1).

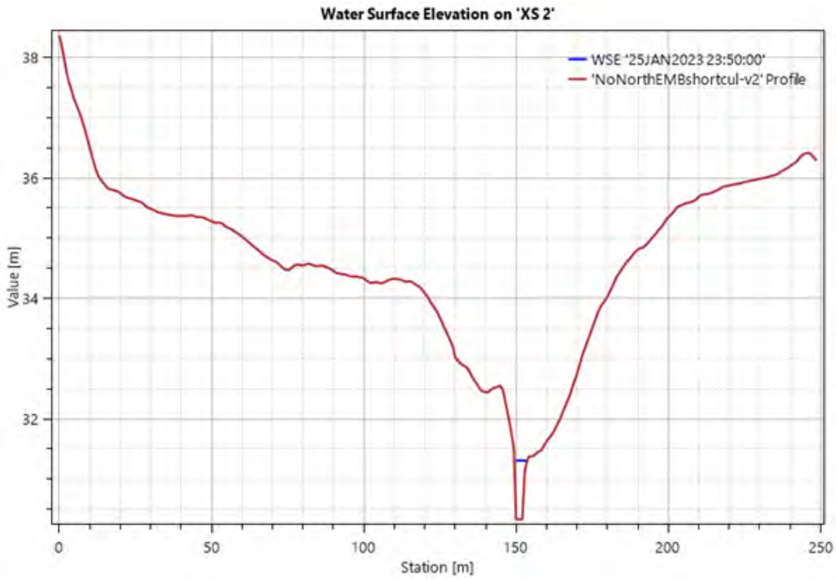



**Figure 4: Cross section of stream at culvert 3 and the water level during 'bankfull' flow.**

As stated above, C3 has been observed to be submerged under normal flow conditions. Hence, a tailwater depth of 800mm from the stream bed was included in the HY8 low flow hydraulics analysis. In this case, the culvert still behaves as an open channel as the culvert is not fully submerged yet. Figures 5 and 6 show culvert cross-section slices for half of the culvert span and would mirror the same way to the right. The NIWA guideline states that the minimum width of the fish passable vertical slice should be 150mm. About 200mm from both sides of the culvert during low flow and 170mm during high flow meet the threshold for īnanga. The velocity beyond that becomes too fast for īnanga as the slices approach the centre.

| Low Flow Results | | | |
|---|---|---|---|
| Distance from wall (m) | 0.00 - 0.20 | 0.20 - 0.41 | 0.41 - 0.61 |
| Slice Average Velocity (m/s) | 0.04 | 0.57 | 0.69 |
| Slice Depth (m) | 0.62 | 0.62 | 0.62 |
| Threshold | Threshod Met | Too Fast | Too Fast |

**Figure 5: Low flow results**

| High Flow Results | | | |
|---|---|---|---|
| Distance from wall (m) | 0.00 - 0.17 | 0.17 - 0.35 | 0.35 - 0.52 |
| Slice Average Velocity (m/s) | 0.09 | 1.42 | 1.71 |
| Slice Depth (m) | 0.76 | 0.76 | 0.76 |
| Threshold | Threshod Met | Too Fast | Too Fast |

**Figure 6: High flow results**

### 5.2 Scenario 2: culvert fully submerged – Average velocity analysis

Since the culvert was modelled to be embedded 340mm in the stream bed, the remaining height within the 1350mm culvert is 1010mm. Therefore, when a tailwater of 1010mm depth or more was incorporated, the culvert became fully submerged and behaved as a pipe flowing under pressure. Hence, HY8 low flow hydraulics is not applicable anymore.

In this case for the same peak flows as in section 5.1, the average velocities of turbulent flow within a fully submerged culvert, during low and high flow are $v_L$ (average) = 0.39m/s and $v_H$ (average) = 1.17m/s respectively – calculated from the continuity equation (Q=Av). These average velocities are lower than those calculated in section 5.1. The velocity on the wall of the pipe is zero and increases to maximum as it approaches the centre of the pipe (Figure 7). The HY-8 software is not able to analyse the pipe velocity distribution in this situation.  However, based on the calculated average velocities, it is expected that fish would be able to swim along the walls of the pipe during low flow but possibly not during high flow based on the typical velocity distribution shown in Figure 7.

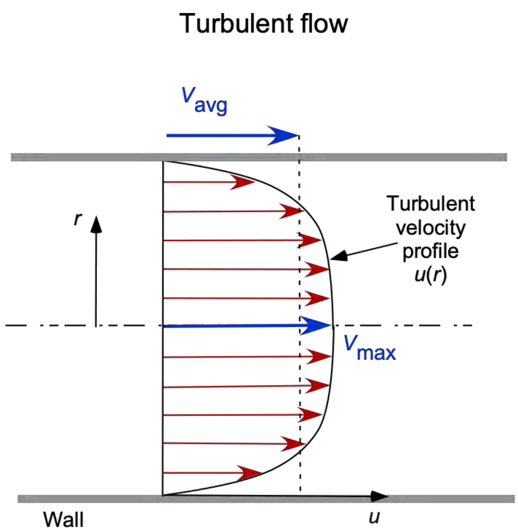



**Figure 7: Turbulent velocity profile.**

From observing the current permanent ponded/pool condition with slow flowing water at culvert 3, usual flows should be lower than the bankfull modelled flow that was used in this analysis. Therefore, the frequency of a potentially suitable fish passage condition should be higher. High flow conditions should be temporary and of short duration, and fish should be able to pass once the flow reduces.

### 5.3 Scenario 3: Culvert Fully Submerged and Under Inlet Control

This scenario is when the pipe is flowing full due to storm flows, irrespective of the downstream tailwater level and the analysis is based on a 1200mm culvert, presuming the culvert has the same flow area as the 1350mm diameter with 340mm embedded. Desktop calculations indicate that the culvert would be flowing full for peak flows in excess of 2m$^3$/s. At a peak flow of 2m$^3$/s, the average velocity through the culvert would increase to approximately 1.77m/s.

The Fish Passage guidelines (Section 4.5.4) refer to bankfull flow being approximately 50% of the year flood flow (approximately a 1.5 year storm).  Hence, on this basis, the 2-year storm would be 2.7m$^3$/s. Hence, the 2m$^3$/s criteria is estimated to around the 1.8 year storm or a storm that on average might occur once every 22 months. This means it is a relatively infrequent event and would be expected to be of relatively short duration.

## 6.0 FISH PASSAGE MITIGATION MEASURES

Design of Culvert 3 and new stream has incorporated several features to promote fish passage. These are summarised in this section:

(a) Embedment of proposed culvert by 340mm (25% of diameter);
(b) Stream alignment to follow a gentle meander and to be naturalised including regular 150-300mm deep pools, rocks and logs.
(c) Low flow channel.
(d) Riparian planting.
(e) Resting pools at the culvert inlet and outlet, with the outlet pool also functioning as an energy dissipation basin for storm events.

These features are shown on the landfill drawings (33097/LF300 series).

## 7.0 SUMMARY AND RECOMMENDATIONS

The culvert design allows for embedding the 1350mm diameter culvert by 340mm, which is an approved method of providing for fish passage, from the NIWA Fish Passage Guidelines. Fish passage has then been assessed for the embedded culvert for a range of flow conditions.

For mean flow conditions (121L/s), Culvert 3 is expected to be feasible for fish passage, based on both depth and velocity thresholds. This also applies even when the culvert is fully submerged. This is significantly lower than the modelled 2-year lower bank-full flow threshold (QL) of 450L/s (see section 5). This is to be expected as the mean flow represents average conditions, while the 2 year storm flow represents a storm event which has a 50% probability of occurring in any one year.

In the bank-full storm scenario, when culvert 3 behaves as an open channel, the “vertical slices” hydraulics analysis shows that it satisfies the minimum width of 150mm, maximum water velocity 0.44m/s and minimum water depth 150mm for īnanga to pass during low and high flow conditions. When the inlet and outlet of culvert 3 are fully submerged due to high tailwater conditions, the culvert behaves as a pressurised pipe with turbulent flow. In this case, the average pipe velocities calculated indicate that fish should be able to swim along the walls of the pipe during low flow, but possibly not during high flow. The culvert will also be fully submerged due to high flow conditions, for events equivalent to approximately a 1.8 year (22 month) storm or more extreme storm events. In this situation, average velocities through the culvert will increase, but for a relatively short duration and fish should be able to pass once the flow reduces.

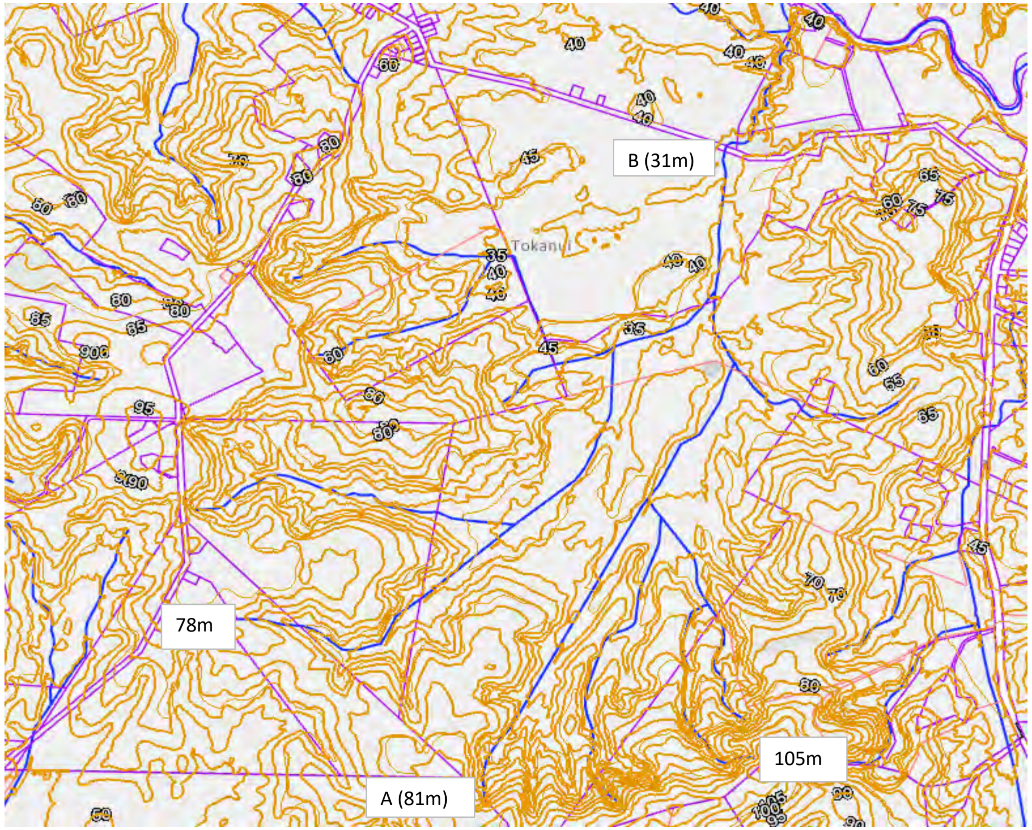
The culvert and new stream design also feature a number of other features to promote fish passage, including the stream alignment having a gentle meander, naturalisation using 150-300mm deep pools, rocks and logs; low flow channel; riparian planting; and resting pools at the culvert inlet and outlet, with the outlet pool also functioning as an energy dissipation basin for storm events. Collectively, these features together with the culvert embedment should ensure that fish passage along the new stream and culvert 3 is possible under most conditions, except during certain storm events, which will be of short duration.

**Stream Flow Assessment**

**Method 1 (Catchment Runoff Basis)**

| | Landfill | Bartons Br | |
|---|---|---|---|
| Catchment area | 440 | 51870 | ha |
| Catchment slope | Moderate | | |
| Land use | Mainly pasture | | |
| Runoff coefficient | 0.4 | 0.4 | heavy clay soil type, 5-10% gradient (measured off contour plans) |
| Annual rainfall | 1118.7 | 1118.7 | mm |
| Average annual runoff | 1968912 | 2.32E+08 | m3/yr |
| Average flow per day | 5394 | 635912 | m3/d |
| Average flow per day | 62.4 | 7360 | L/s |


https://waikatomaps.waikatoregion.govt.nz/Viewer/?map=8d6d6fda779b4e59951953ae97d0ec4a



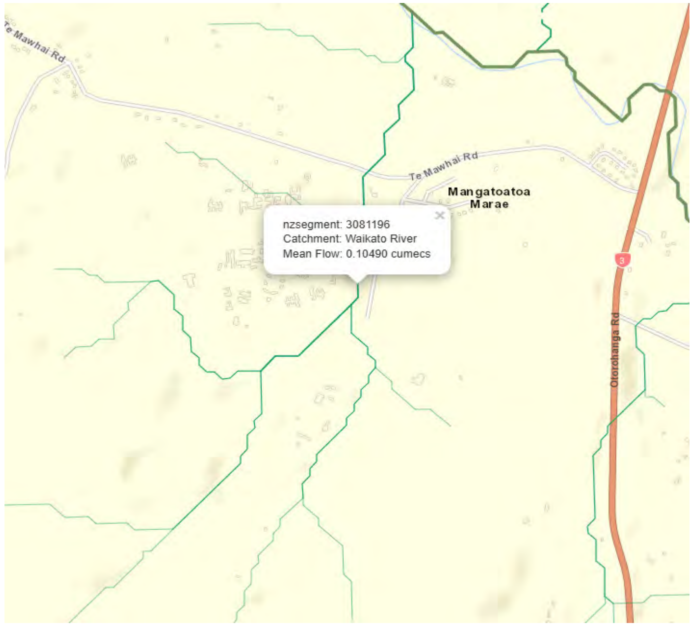

Distance AB = 2860m Gradient = 1.7% (along stream)

Measured overland flow gradients going anticlockwise: Generally in range 5-10%

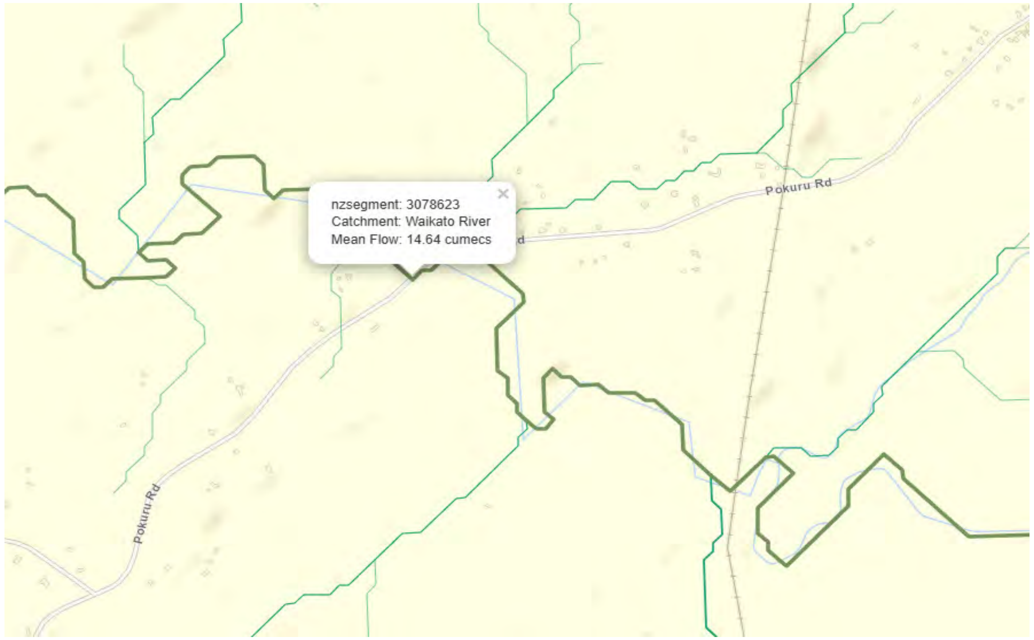
| | | | | | | |
|---|---|---|---|---|---|---|
| Line | 1 | 2 | 3 | 4 | 5 | 6 |
| % | 5.6 | 5.6 | 7.5 | 5.6 | 9.3 | 9.5 |

**Method 2 (NIWA River Maps)**

| Location | Mean Q | |
|---|---|---|
| Wharekorino at Te Mawhai Rd (includes hospital catchment) | 124.7 | L/s |
| Wharekorino at landfill | 104.9 | L/s |
| Puniu (at Bartons Bridge) | 14.64 | m3/s |

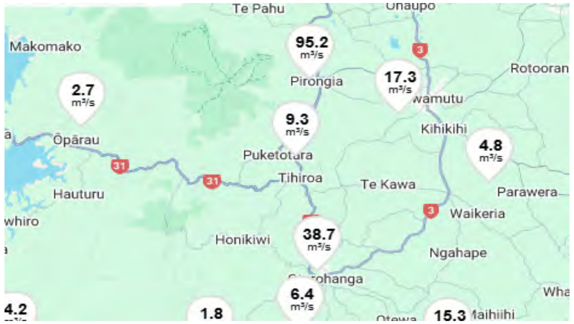




**Puniu River, Pokuru Road (Barton's Bridge)**



**Method 3 (from comparison with WRC flow gauges)**

| Location | Catch Area (km2) | Mean Q (m3/s) | Spec Q (m3/s/ km2) |
|---|---|---|---|
| Puniu (at Bartons Bridge) | 518.7 | 14.32 | 0.028 |
| Mangatutu Stream | 122 | 3.79 | 0.031 |
| Pro rata basis | | | |
| Wharekorino at Te Mawhai Rd | 6 | 0.166 | |
| Wharekorino at Landfill | 4.4 | 0.121 | |

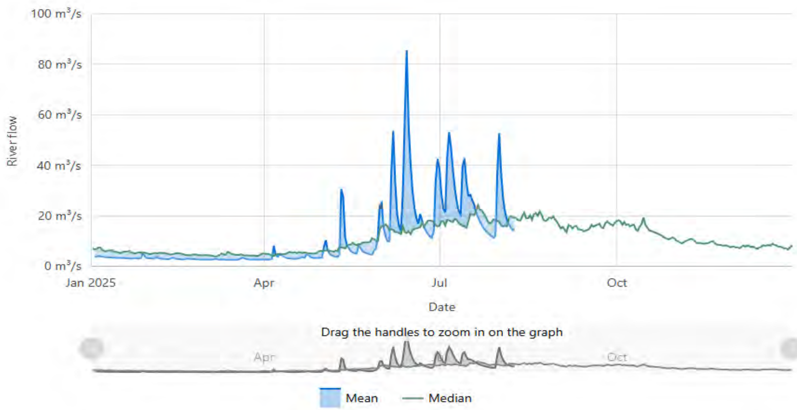



### Site information

| | |
|---|---|
| Site name: | Puniu River - Bartons Corner Rd Br |
| Site number | 818 |
| Station number | 2 |

### Additional Information

| | |
|---|---|
| Mean flow (m³/s) | 14.32 |
| Continuous data since | 06/05/1985 |
| Highest recorded flow (m³/s) | 322.19 on 16/10/1989 |
| Lowest recorded flow (m³/s) | 2.14 on 15/02/1992 |
| Data download restriction | No |
| Altitude (m) above mean sea level (amsl) | 30.95 |
| Catchment size (km²) | 518.70 |
| Map reference | NZTM:1801295 - 5788365 |

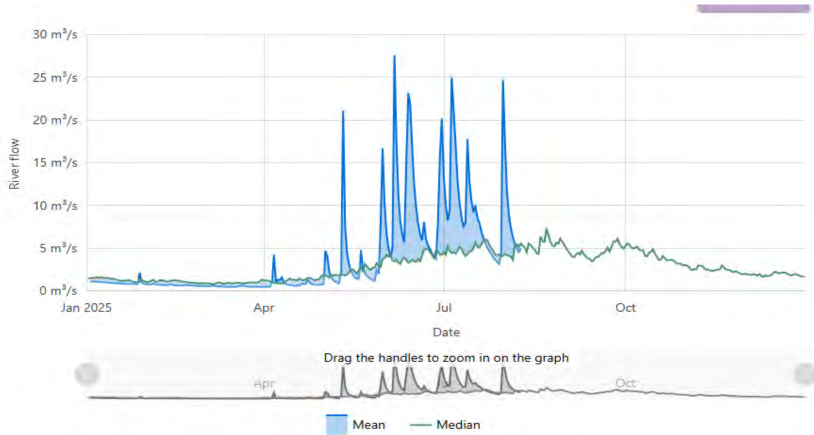



### Site information

| | |
|---|---|
| Site name: | Mangatutu Stm (Waikeria) - Walker Rd Br |
| Site number | 476 |
| Station number | 7 |

### Additional Information

| | |
|---|---|
| Mean flow (m³/s) | 3.79 |
| Continuous data since | 08/06/2004 |
| Highest recorded flow (m³/s) | 38.19 on 01/01/2024 |
| Lowest recorded flow (m³/s) | 0.48 on 27/03/2008 |
| Data download restriction | No |
| Altitude (m) above mean sea level (amsl) | 40 |
| Catchment size (km²) | 122.00 |
| Map reference | NZTM:1810109 - 5780575 |




**Comparison**

| Method | Mean Q (L/s) |
|---|---|
| Catchment | 62.4 |
| NIWA Rivers | 104.9 |
| WRC flow gauges | 121.5 |

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Average velocity – culvert not fully submerged

$$V_L = \frac{Q_L}{A_L} = \frac{0.45\ m^3/s}{0.81\ m^2} = 0.56\ m/s$$

$$V_H = \frac{Q_H}{A_H} = \frac{1.35\ m^3/s}{0.97\ m^2} = 1.39\ m/s$$

Average velocity – culvert fully submerged

$$V_L = \frac{Q_L}{A_L} = \frac{0.45\ m^3/s}{1.15\ m^2} = 0.39\ m/s$$

$$V_H = \frac{Q_H}{A_H} = \frac{1.35\ m^3/s}{1.15\ m^2} = 1.17\ m/s$$

# HY-8 Culvert Analysis Report

## Culvert Data: Culvert 3

### Culvert Data Summary - Culvert 3

Barrel Shape: Circular

Barrel Diameter: 1350.00 mm

Barrel Material: Concrete

Embedment: 340.00 mm

Barrel Manning's n: 0.0130 (top and sides)

Manning's n: 0.0130 (bottom)

Culvert Type: Straight

Inlet Configuration: Square Edge with Headwall (Ke=0.5)

Inlet Depression: None

## Low Flow Hydraulic Computations

### Low Flow Hydraulic Discharges

Low Flow 0.45 cms

High Flow 1.35 cms

Peak Flow 2.00 cms

### Threshold

Max Threshold Velocity 0.44 m/s

Min Threshold Depth 0.15 m

Threshold for both Flows Threshold is Met

### Model Parameters

Number of Divisions in Flow Top Width: 6

### Low Flow Threshold Results

Highest Average Velocity in Culvert 0.56 m/s

Depth in Culvert at Highest Average Velocity 0.62 m

Top Width in Culvert at Highest Average Velocity 1.22 m

Selected Velocity Adjustment Curve Curve 1: Culvert Embedment is greater than 20%

Width of Slice along Culvert Water Surface 0.20 m

Threshold at Low Flows Threshold is Met

## High Flow Threshold Results

Highest Average Velocity in Culvert 1.40 m/s

Depth in Culvert at Highest Average Velocity 0.76 m

Top Width in Culvert at Highest Average Velocity 1.04 m/s

Selected Velocity Adjustment Curve Curve 1: Culvert Embedment is greater than 20%

Width of Slice along Culvert Water Surface 0.17 m

Threshold at High Flows Threshold is Met

## Low Flow Results

| **Distance from Wall (m)** | **1.00** | **1.67** | **2.34** | **3.00** | **3.67** | **4.34** | **5.01** | **5.67** | **6.34** | **7.01** | **7.68** | **8.34** | **9.01** | **9.68** | **10.35** | **11.01** | **11.68** | **12.35** | **13.02** | **13.68** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Slice Velocity (m/s)** | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 |
| **Slice Depth (m)** | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 | 13.68 |
| **Threshold** | Threshod | TooF | TooF | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Met | ast | ast | | | | | | | | | | | | | | | | | |

## High Flow Results

| **Distance from Wall (m)** | **0.86** | **1.43** | **2.00** | **2.57** | **3.14** | **3.71** | **4.28** | **4.85** | **5.42** | **5.99** | **6.56** | **7.13** | **7.70** | **8.27** | **8.84** | **9.41** | **9.98** | **10.55** | **11.12** | **11.69** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Slice Velocity (m/s)** | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 |
| **Slice Depth (m)** | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 | 11.69 |
| **Threshold** | Threshod Met | Too Fast | Too Fast | | | | | | | | | | | | | | | | | |