

30<sup>th</sup> May 2016

To: Fiona Morton and Tabitha Manderson  
Opus International Consultants Ltd

**Pahiatua Wastewater Treatment Plant**  
**- Proposed Discharge Location and Monitoring options**

Dear Fiona and Tabitha,

**1 Background**

The Pahiatua Wastewater Treatment Plant (WWTP) currently discharges to Town Creek, a tributary of the Mangatainoka River. An application by Tararua District Council (TDC) to renew the Consent for this discharge includes a proposal to change the discharge location. The current discharge of treated effluent to Town Creek would be removed and instead, replaced by a direct discharge to the Mangatainoka River utilising an existing water take gallery structure (Figure 1). This new discharge location is approximately 1,200 m upstream of the confluence with Town Creek. It is believed that the change in location will result in less adverse effects on the Mangatainoka River through better mixing of the treated effluent with the larger flows of the Mangatainoka while at the same time benefitting Town Creek by complete removal of the discharge from here.

Current consent conditions require water quality (physico-chemical parameters), and biological (periphyton and macroinvertebrates) monitoring.

**2 Potential monitoring sites**

A site visit was undertaken on 2<sup>nd</sup> February 2015 by Horizons Regional Council (HRC) and Aquanet Consulting Ltd (Aquanet) staff to consider the change in discharge location and determine consequent changes in associated monitoring sites.

It was thought that a current HRC State of the Environment (SOE) monitoring site at the end of Tui Street, would be an appropriate upstream sampling location for both biological and physico-chemical monitoring (Figure 2).

However the downstream sampling location was not so easily determined. A level control weir (understood to have been put in place to maintain water flow into the water intake structure) spans the width of the Mangatainoka River just downstream of the new proposed discharge location. Below this is a large pool which leads into run/riffle habitat some 200 m further downstream. Mixing of the discharge with river water is likely to be reasonable by the time it reaches the riffle habitat. This run-riffle habitat would form the potentially suitable site for water quality, periphyton and macroinvertebrate sampling. However, a spring-

fed tributary (the Pukemiku Stream) flows into the Mangatainoka River on the true left bank immediately downstream of the level control weir, i.e. between the proposed discharge point and the first potential monitoring site after reasonable mixing. This stream receives stormwater from the Fonterra Pahiatua factory as well as groundwater and surface runoff (and associated contaminant loads) from the surrounding catchment. Given the intensively farmed landscape in its catchment and its source of flow (spring-fed), it is likely that the Pukemiku Stream will present relatively elevated nitrate-nitrogen concentrations.

Any differences in water quality, periphyton and macroinvertebrates measured between the potential upstream and downstream sites could, in addition to natural variability, be caused, individually or in combination, by inputs from the Pahiatua WWTP discharge and/or from the Pukemiku Stream catchment (and within these, the point source and non-point source discharges). It would be very difficult to dissociate the effects of the WWTP discharge from those of the Pukemiku catchment. In other words, if effects are measured as a change between upstream and downstream of the discharge, will these be caused by the Pahiatua WWTP discharge, or by inputs from the Pukemiku Stream?

Water quality sampling could be undertaken somewhere between the level control weir and the Pukemiku Stream confluence. However (1) mixing at that point is unknown and (2) safe access under a range of flow conditions would need to be confirmed.

Discussions between Maree Patterson, Senior Scientist- Water quality at Horizons and Olivier Ausseil and Fiona Death from Aquanet have led to the following options being considered.

**Option 1: No in-stream monitoring (rely on current level of effects)**

This would involve monitoring of effluent/discharge quality and quantity. However, no in-stream water quality or biological monitoring would be undertaken.

***Reasoning:***

- A recent review of existing data concluded that the discharge does not appear to be causing any significant adverse effects on aquatic life, or to be causing more than a low risk of toxic effect to aquatic life (Opus 2014, Aquanet, 2014).
- Proposed upgrades to the WWTP (installation of an inlet primary screen, lamella clarifier and drum filter, and UV disinfection unit) are aimed at improving future effluent quality prior to its discharge. It is thus anticipated that the effects on aquatic life will be less than now;
- However, the above ignores any attenuation (reduction) in the concentration of contaminants in the reach of Town Creek through which the discharge travels before reaching the Mangatainoka River itself (where the effects are measured). There is a possibility that the direct discharge to the Mangatainoka River could cause a localised increase in effects on water quality and/or ecology.
- Given the difficulties in interpreting any future monitoring data collected at the only available monitoring sites, it appears unlikely that any biological monitoring data would be able to be used in a direct consent compliance context. The value such data would add to the consent/compliance process is questionable, particularly given the elevated costs associated with this type of monitoring;

- Given this option relies on the baseline of current effects not being significant, , consent conditions requiring the effluent quantity and quality to be similar or better than currently would be advisable if this option was implemented, in order to ensure that the effects of the discharge in the future remain similar to, or less than, the current effects.

### **Option 2: In-stream monitoring of change/trends**

This option is similar to Option 1 above, and based on similar reasoning, but with the addition of in-stream water quality sampling. This is to address the uncertainties associated with the loss of any contaminant that may currently be occurring in Town Creek (last bullet point above).

The current upstream site becomes the downstream monitoring site and the old data for this site becomes the baseline. After 3 years an assessment of changes can be made in comparison with the baseline, changes between the new upstream monitoring site and the downstream compared to the current/historical situation and a comparison with the One Plan targets.

Should the effects of the discharge on water quality be, at that time, to have materially increased compared to the current/historical situation, then further investigation relative to the effects of the discharge on in-river ecology could be undertaken.

### **Option 3: Comprehensive in-stream monitoring and investigation and monitoring programme**

This option would involve, in addition to the discharge (option 1) and in-stream water quality (option 2) monitoring, in-stream biological sampling at the potential sites identified above (i.e. upstream and at the run/riffle located 200 m downstream), associated with baseline monitoring and investigations to allow future interpretation of the data.

HRC currently undertake biological sampling at three locations on the Mangatainoka River near Pahiatua as part of their SOE and point source discharges monitoring programme: upstream of the discharge at Tui Street, immediately upstream of the existing discharge point and downstream of the confluence with Town Creek (Figure 2, red triangles). It is proposed that HRC continue to monitor water quality, periphyton and macroinvertebrates at these sites as part of their own monitoring programme.

In addition, biological monitoring should also be undertaken at the new potential downstream point. Ideally this monitoring should be undertaken at least 2 years prior to the discharge location being shifted, to allow for the establishment of a baseline against which any future changes can be compared.

In addition, in-stream water quality would need to be undertaken at the following locations:

- The Mangatainoka River upstream of the discharge
- The Mangatainoka River downstream of the discharge but upstream of the Pukemiku Stream confluence;
- The Pukemiku Stream itself above the confluence with the Mangatainoka River;

- The Mangatainoka River downstream of the Pukemiku confluence (after mixing).

The exact locations of the above monitoring sites would need to be determined by a mixing study..

The above water quality programme would be aimed at understanding the relative contributions of the Mangatainoka River, the discharge and the Pukemiku Stream to the water quality measured at the proposed/potential downstream monitoring site (run/riffle 200 m downstream of the discharge). However, in order to provide a full quantitative assessment of the relative contributions from these different sources, flow data would be required. Flow data are available for the Mangatainoka River and the discharge itself, but not for the Pukemiku Stream. A flow monitoring station would need to be installed on the Pukemiku Stream.

It is noted that, even if the above investigations are successfully carried out, a relatively high level of uncertainty will remain with regards to the biological monitoring results, in particular:

- the role of inter annual variability will be difficult to assess against a necessarily short baseline;
- Although the relative contributions of the various sources of contaminants (e.g. nutrients) can be quantitatively assessed, their flow-on effects on biological indicators will be difficult to quantify with any accuracy.

### **3 Recommendations**

In the light of the above discussion of options, it is our opinion that:

1. The monitoring of discharge quality and quantity, as per option 1, should definitely be pursued as a minimum. However, Option 1 doesn't account for the attenuation within Town Creek d
2. Option 2 is the preferred option as it is relatively low cost but if there is a change detected a detailed investigation such as that of option 3 would be required;
3. With regards to the in-stream monitoring, as per option 3:
  - the proposed location of the discharge will cause a high degree of complexity and uncertainty in the interpretation of the results;
  - significant additional investigations and monitoring would be required to provide sufficient context for biological data.
  - Even with all the contextual information, the exact causes of any changes in biological communities would be difficult to identify with reasonable certainty, meaning that the biological data will not be able to be used in a direct compliance context;
  - If option 3 was pursued, then a comprehensive review of the data available would be required after 3-5 years to assess the degree of environmental effects;
  - Given that the current discharge does not result in significant adverse effects on in-stream biological indicators, and that the proposal includes improvements in the quality of the discharge, it appears reasonable that the future degree of effects will be less than currently;
  - Given the very significant costs associated with Option 3, the limited value this information would provide to consent compliance processes and the unlikely effects, we do not think that option 3 is warranted.



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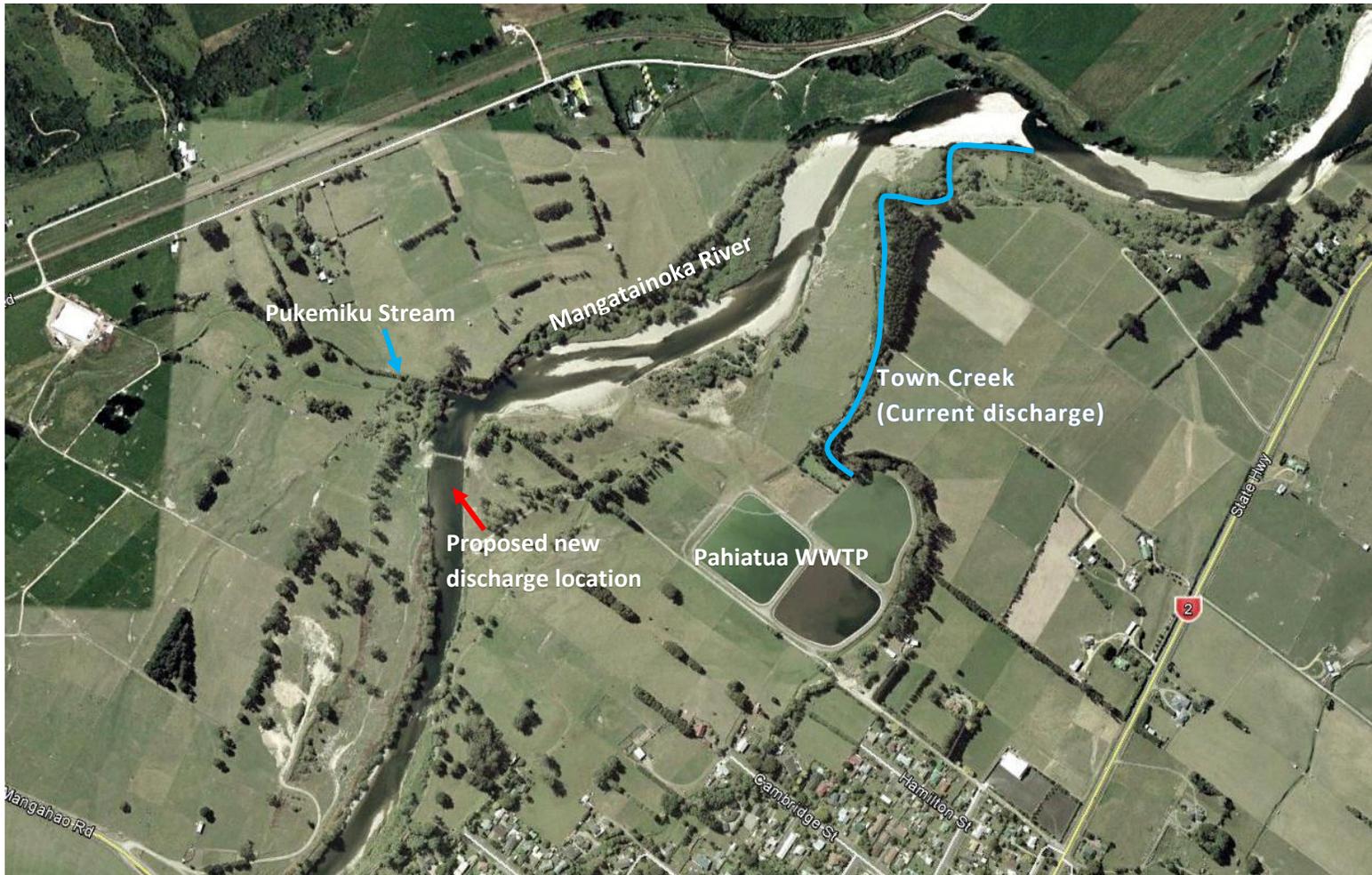


Figure 1: Map showing location of Pahiātua WWTP and discharge locations (current and proposed).

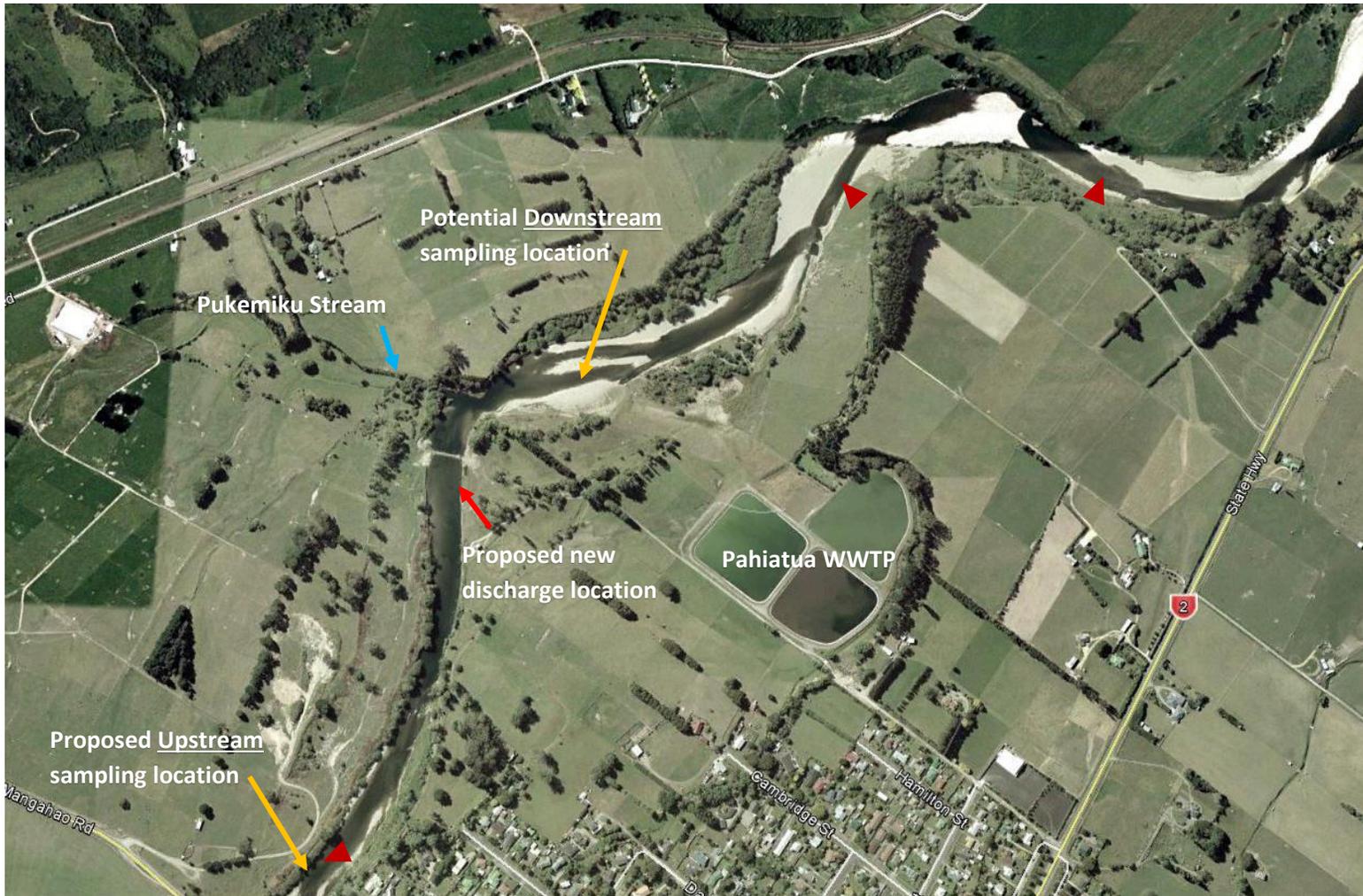


Figure 2: Current sampling (red triangles) and potential new (yellow arrows) sampling locations for monitoring the effects of the Pahiataua WWTP discharge on the Mangatainoka River, in relation to the proposed new discharge point.