



Memorandum

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| To | Matthew Smith |
| Copy | Eros Foschieri |
| From | Mark de Lange |
| Office | Christchurch |
| Date | 15 October 2020 |
| File/Ref | 1-14129.09 |
| Subject | Mangawhai wastewater collection system recommended flow monitoring locations |

Introduction

Kaipara District Council (KDC) is currently building a hydraulic model of the wastewater collection system for the community of Mangawhai. In order to collect the data necessary for model calibration a sewer flow monitoring program has been developed, consisting of 3 sewer flow monitors, 4 pumping station monitors and 3 rainfall gauges (one existing at the WWTP and two additional). The flow monitoring program will be 3 months in duration with data collected at 5-minute increments

Prior to recommending the sites detailed in this memorandum the suitability of each was assessed through a desktop analysis. Site investigations will be required to confirm the suitability of monitoring locations prior to equipment installation.

The monitoring locations recommended in this memorandum are preliminary based review of the existing network and considering anticipated growth areas. Some monitoring locations may be revised based on pumping station drawdown testing that are planned to be completed prior to commencement of monitoring.

Flow Monitoring Sites

Table 1 below presents details of the recommended monitoring locations and the rationale behind each. Figure 1 presents the catchment areas associated with each monitor and Figures 2-6 present the location of each. Note that on figures 2-6 gravity sewers are in red, rising mains in yellow, and pressure sewers are not shown



Table 1: Details of Recommended Flow Monitoring Locations

| Site ID | Monitor Type | Asset ID | Location | Pipe Size (mm) | Estimated Contributing Properties | Site Selection Rationale | Alternative Monitoring Location |
|---------|-------------------------|----------------|----------------------------------|----------------|-----------------------------------|--|---------------------------------------|
| FM01 | Flow monitor | 20120912115657 | On private laneway, east of PS-K | 125 | 197 | <p>This site will capture approximately two thirds of flows contributing to PS-K. The monitoring site is located one manhole upstream of the pumping station to the east of Jack Boyd Drive. This is a critical monitoring site as there is substantial growth anticipated in the north of Mangawhai Heads that may contribute to the PS-K catchment.</p> <p>The manhole directly upstream of PS-K was assessed as a potential monitoring location, however review of the pump operating levels indicated wet well levels could interfere with monitoring equipment.</p> | 20120912115621 (one manhole upstream) |
| PS01 | Pumping station monitor | PS-K | On lawn of 31 Jack Boyd Dr | N/A | 289 | <p>This site will capture all flows in the PS-K catchment, including the properties north on Jack Boyd Drive that do not contribute to FM01. This is a critical monitoring site as there is substantial growth anticipated within the PS-K catchment.</p> <p>There are an additional 48 grinder pump connections on Jack Boyd Drive south of PS-K that may contribute to this monitoring site. The connection of these will need to be confirmed.</p> | N/A |
| FM02 | Flow monitor | 20100701011233 | On Lawn of 12 Alamar Crescent | 300 | 296 | <p>This site will capture flows from the northern portion of Mangawhai Heads, including flows pumped through PS-J and PS-H. This is a critical monitoring site as there is substantial growth planned north of Mangawhai Heads that could be routed through this catchment.</p> | 20100701011234 (one manhole upstream) |

| | | | | | | | |
|------|-------------------------|--------------------|---|-----|--------------------------|---|-----------------|
| PS02 | Pumping station monitor | PS-F | Fagan Place <u>This site may be on private land</u> | N/A | 410 (706 total upstream) | This site will capture all contributing flows in the PS-F catchment, including central and north Mangawhai Heads (east of Molesworth Drive). Site FM02 contributes to this monitoring site. | N/A |
| FM03 | Flow monitor | 20100701 011438 | On lawn of 4 Seabreeze Road | 150 | 360 | This site will capture flows for the majority of the remaining Mangawhai Heads area, including the gravity catchment originating from Quail Way and PS-C catchment. It is noted that this site is downstream of PS-C which may affect the quality of data that is collected. If data quality is found to be poor, this site will be relocated to the main trunk sewer on Molesworth Drive. Investigations are currently underway to confirm the outlet location of PS-C and the Quail Way gravity catchment. Findings from this investigation may result in a revised recommendation for monitoring in this catchment. | To be confirmed |
| PS03 | Pumping station monitor | PS-VA | Te Araroa Trail at Longview Street | N/A | 316 | This monitoring site will capture all flows from the Mangawhai Village catchment. This catchment is primarily serviced by girder pumps with a small areas of gravity sewers contributing to PS-VB and PS-VC. There is substantial growth anticipated in the catchment area contributing to this site. | N/A |
| PS04 | Pumping station monitor | PS-VC | Opposite 2 Old Waipu Road | N/A | 134 | This monitoring site will capture the flows from the catchment area north of Longview Street and west of Te Araroa Trail. All properties in this catchment are serviced by gravity connections. There is substantial growth anticipated in the catchment area contributing to this site. | N/A |

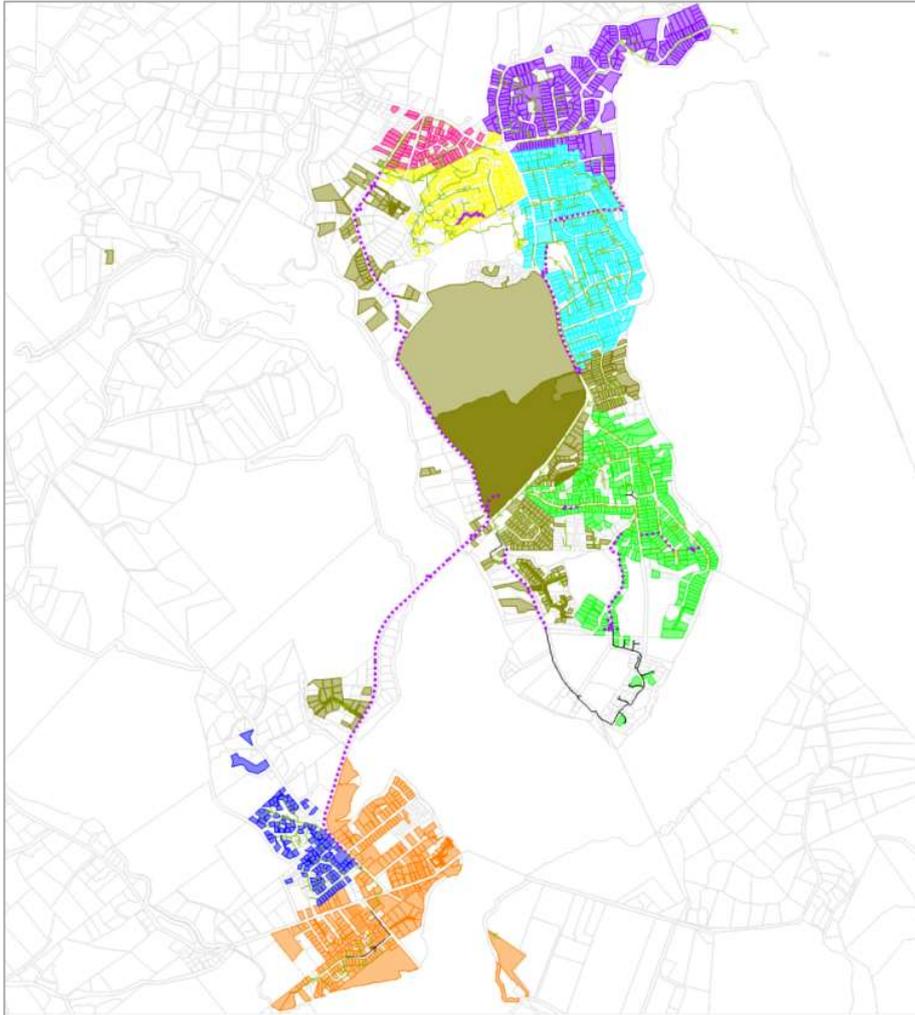


Figure 1: Mangawhai proposed sewer flow monitoring catchments (brown indicating unmonitored properties)



Figure 2: FM01 and PS01 site locations



Figure 3: FM02 site location



Figure 4: PS02 site location



Figure 5: FM03 site location

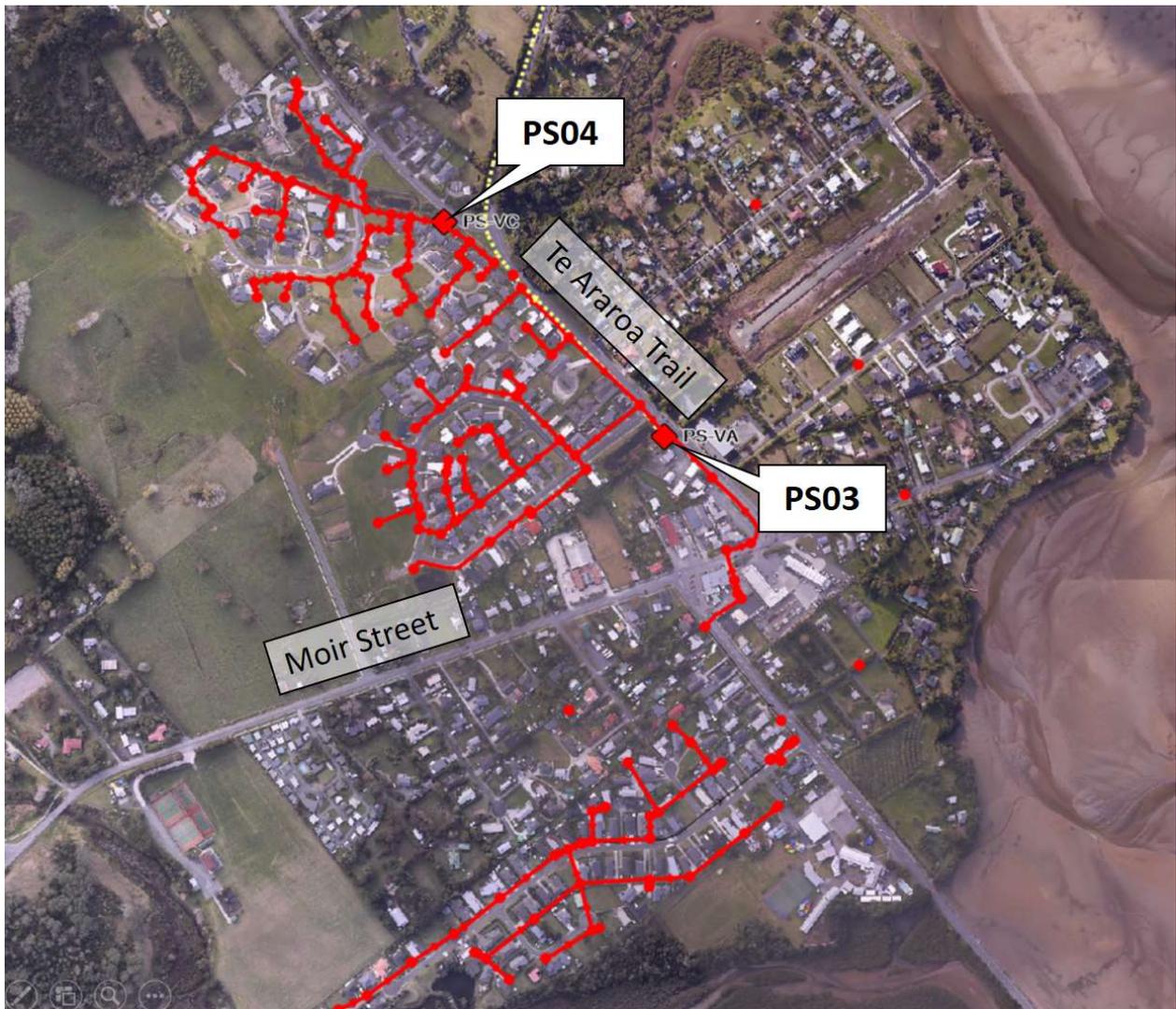


Figure 6: PS03 and PS04 site locations

Rainfall Gauge Locations

We recommend that 3 rainfall gauges be used to collect data for this study in order to ensure spatial variability of rainfall events is sufficiently captured, and for redundancy should a gauge fail.

We understand there is currently a rainfall gauge at the wastewater treatment plant recording rainfall depths at 15-minute increments. We recommend this site be reprogrammed to record at 5-minute increments.

In addition to this site, we recommend two additional gauges be installed: one in central Mangawhai Heads (close proximity to North Avenue) and one in central Mangawhai Village. We will consult with KDC staff to identify suitable locations for rainfall gauge installation. Ideal locations will be flat roofed buildings with easy access for maintenance and no interference from tree cover.

Recommendations

WSP has contacted Felid Services Limited to provide a quotation to complete the flow monitoring program detailed above. The total value of the program is **\$52,234.00** (level sensors not required) with an item breakdown shown below. It is recommended KDC engage Felid Services Limited to commence monitoring at the start of December.

It is noted that for pumping station sites the flow monitoring contractor will require a Council electrician on site during equipment installation. It is estimated this will take approximately 1 hour per site.

WSP OPUS

5/10/2020

Mangawhai Wastewater Flow Monitoring
12 Week Monitoring period

| Item | Unit | Qty | Rate | Total |
|--|------|-----|-------------|---------------------|
| Flow Monitoring | | | | |
| Management and establishment | LS | 1 | \$ 5,440.00 | \$ 5,440.00 |
| Traffic management for proposed sites (4 in road) | LS | 0 | | \$ - |
| Site investigations | | | | |
| Flow Monitor | ea | 3 | \$ 310.00 | \$ 930.00 |
| Level Sensor | ea | 4 | \$ 180.00 | \$ 720.00 |
| Pump Station (start/stop, Drawdowns and Asset Information) | ea | 4 | \$ 310.00 | \$ 1,240.00 |
| Rain gauge | ea | 2 | \$ 185.00 | \$ 370.00 |
| Installation | | | | |
| Flow Monitor | ea | 3 | \$ 689.00 | \$ 2,067.00 |
| Level Sensor | ea | 4 | \$ 520.00 | \$ 2,080.00 |
| Pump Station (start/stop, Drawdowns and Asset Information) | ea | 4 | \$ 520.00 | \$ 2,080.00 |
| Rain gauge | ea | 2 | \$ 320.00 | \$ 640.00 |
| Maintenance & data capture (fortnightly) | | | | |
| Flow Monitor | ea | 3 | \$ 4,200.00 | \$ 12,600.00 |
| Level Sensor | ea | 4 | \$ 1,800.00 | \$ 7,200.00 |
| Pump Station (start/stop, Drawdowns and Asset Information) | ea | 4 | \$ 3,200.00 | \$ 12,800.00 |
| Rain gauge | ea | 2 | \$ 1,320.00 | \$ 1,120.00 |
| Removal & re-instatement | | | | |
| Remove flow monitors | ea | 3 | \$ 689.00 | \$ 2,067.00 |
| Remove Level Sensor | ea | 4 | \$ 280.00 | \$ 1,120.00 |
| Pump Station (start/stop, Drawdowns and Asset Information) | ea | 4 | \$ 280.00 | \$ 1,120.00 |
| Remove rain gauge | ea | 2 | \$ 320.00 | \$ 640.00 |
| Deliverables | | | | |
| Installation report – for all sites | ea | 1 | \$ 1,620.00 | \$ 1,620.00 |
| Interim data reports | ea | 5 | \$ 810.00 | \$ 4,050.00 |
| Final report & data | ea | 1 | \$ 3,450.00 | \$ 3,450.00 |
| Provisional Items | | | | |
| Extension of flow monitoring | wk | 1 | \$ 3,890.00 | |
| Total including Level sensors | | | | \$ 63,354.00 |
| Total without level sensors | | | | \$ 52,234.00 |