

MEMORANDUM

To: Jamie Cox, Wairoa District Council

From: Angela Lane, Lowe Environmental Impact / Karen Akuhata (WDC)

Date: 11 September 2017

Subject: Task A2I2 Current Outfall Pipe Description

Background

The Wairoa wastewater treatment system requires a replacement consent by May 2019.

In order to assess any requirement to upgrade the Wairoa WWTP, the capabilities, limitations, and environmental effects of the current outfall piping system needs to be assessed.

Purpose

To provide a description of the current outfall system, its design, and recent inspections.

Also, to identify and assess the benefits and limitations of such a system to:

- Assess any risk to current discharge flow rates
- Effects of plumbing and obstruction of flow at the outfall

This memo has been produced as background information to consider the current ocean outfall system and the recent modifications made to this system only and is not intended to provide any recommendations to the future system at this stage.

Introduction

This memo describes the current outfall pipe of the Wairoa wastewater treatment plant and issues associated with its recent operation.

Greenfield Diving Services conducted a site investigation in April and May 2016 outlining the issues and recommendations associated with the backlog on the outlet and restrictions on the outflow (Appendix 1, Appendix 2).

Location

The outfall was constructed in 1981, concurrent to the Council Pilot Hill oxidation ponds. Effluent exits the final stage aerobic pond and is gravity fed to the outfall discharge port. The discharge port is located sub-tidally, approximately 150 m from the nearest shoreline.

Materials

The outfall is constructed of High Density Polyethylene (HDPE) with an internal Ø 300mm. Overtime this has become buried under up to 3 m of sediment.

A2I2 Current Outfall Pipe Description

Discharge Issues

Council has a consent to discharge domestic, commercial and industrial wastewater into the Lower Wairoa River Estuary (Consent Number CD940404W). The estuarine/riverine environment in the vicinity of the Wairoa outfall has been the subject of several studies over the last 20 years.

The most recent study was done in 2016 where dive crews were engaged to investigate the problems associated with a restricted discharge, and a surge chamber overflow. It was discovered that the shifting river channel had resulted in high riverbed sediment levels over the pipe. Divers were then engaged to suction dredge the outfall to stop any overflows of the onshore surge chamber (Appendix 2). Some time was taken to locate the outfall pipe.

The outfall was uncovered with dredging and debris removal, but this was seen as a short-term solution with recommendations to install a stand pipe with a T junction to the current riverbed level (Figure 1), or to extend the pipeline into a deeper area of the river.

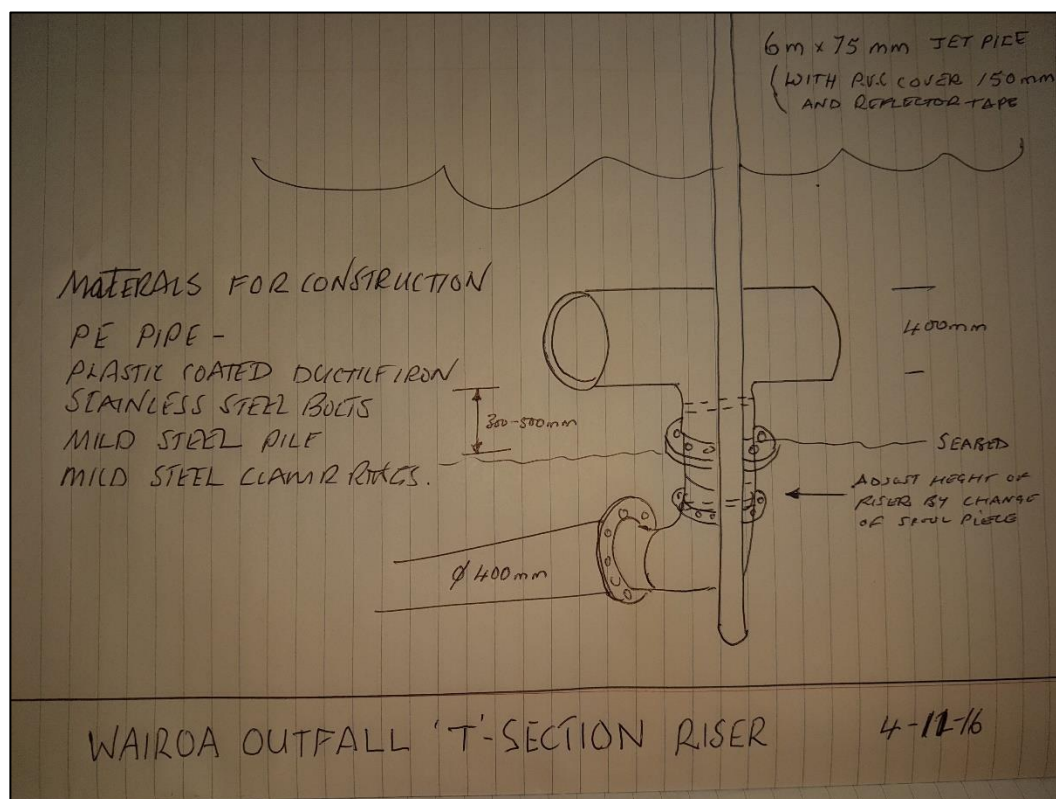


Figure 1: Description of the T-Section riser that was suggested to be installed to avoid overflows of the onshore surge chamber (source: WDC)

Summary and Recent Advances

On completion of the dive investigation in May 2016, the outfall had been exposed and its exact location confirmed. A large amount of debris including trees, mud and foreign matter were still present over top of the outfall diffuser. The outfall is located approximately 3.5 m below the seabed.



A2I2 Current Outfall Pipe Description

On 21 March 2017, a diffuser tee was installed, as per the recommendations and Figure 1 above, to prevent further issues with overflows and a backlog of discharging wastewater.

However, in April 2017 the diffuser T was removed as back pressure issues emerged. Although the diffuser T has been removed, further back pressure issues are still being experienced especially during high flows.

Opus Consultants have been approached by Wairoa District Council to investigate options to improve this system and minimise back pressure. This is currently a work in progress as of September 2017.

Appendices

- 1. Greenfield Diving Services Letter (18 April 2016) – Report for Wairoa Wastewater Treatment Outfall*
- 2. Greenfield Diving Services Letter (30 May 2016) – Report for locating and suction dredging outfall*



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18th April 2016

**Wairoa District Council,
P.O. Box 54,
Wairoa, 4160,
New Zealand.**

Email: quentin@wairoadc.govt.nz

Attention: Quentin Adams

Report for Wairoa Waste Water Treatment Outfall

G.P.S location: 39° 03.527', 177° 25.203'

The dive team located the outfall with the assistance of Wairoa Council staff, opening the valve to locate an effluent discharge plume. Diving commenced at the location using SSBA with the water depth of approximately 1.2m in the hole and 0.9m in the surrounding riverbed. The hole, approximately 3m x 3m, was lined with timber debris that was manually excavated to a water depth of approximately 2.9m. At this point the outfall pipe was not physically identified.

It is highly probable that the problems associated with the resistance of discharge is caused by a shift in the river channel resulting in high riverbed level over the pipe. This discharge has opened a scour hole in the riverbed, approximately 3m x 3m that is continually accumulating timber debris in the hole similar to a bird's nest.

Recommendations:

We do not believe that dredging and debris removal from the hole would be a suitable long term solution to the problem. Locating the pipe termination point and installing a stand pipe with a T junction to the current riverbed level would provide a permanent solution, as long as the riverbed does not raise further. The stand pipe would be secured to a small steel pile to ensure satisfactory strength.

Another option would be to extend the pipeline into a deeper area.

Abyss Ltd t/a Greenfield Diving Services

Please do not hesitate to call me if you have any queries regarding this report.

Regards,

Brendon Cappely
Managing Director
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30th May 2016

**Wairoa District Council,
P.O. Box 54,
Wairoa, 4160,
New Zealand.**

Email: jamie@wairoadc.govt.nz

Attention: Jamie Cox

Report of Locating and Suction dredging Outfall.

Objective:

Suction dredge outfall to expose diffuser and open discharge area to stop back pressure from overflowing surge chamber onshore.

Site Considerations:

This site is classed as a contaminated work environment and extra care to hygiene to be considered. SSBA diving used to not directly expose diver to contaminants. Entrapment due to zero visibility possible and therefore hard wired communication as well as a standby diver available to reduce risk of entrapment outcome.

Personnel and Equipment:

1 supervisor
3 man dive team
Underwater camera
4 inch Suction Dredging equipment
SSBA diving equipment
Lifting and safety recovery equipment.
Decontamination wash and fresh drinkable water.

Report

Physical works completed on the 16th of April and 19th – 20th May 2016

Day 1

Arrived on site at 8:00am.

All safety briefs and Work Method Statements completed 8:00 - 8:30.

Site setup started at 8:30 and all suction and diving equipment was setup and ready for diving at 9:30.

Travel to site via vessel (Lulu) and a circular search for the outfall was conducted and found ready for first dive at 11:40.

First dive was completed between 11:49 – 13:59.

The findings for the dive were as follow:

The outfall diffuser was not reached due to buildup of sticks tree trunks and mud/silt.

Dredging of the silt and removal of sticks conducted for the duration of the dive was unsuccessful as no pipe was found. A second dive was completed from 14:34 – 16:02 and still no sign of the outfall was achieved.

Recommendations were made to come back to do more suction dredging to expose the hole and find the outfall as this was buried under a large amount of debris and therefore blocked.

Day 2

Arrived on site at 7:30am on the 19th of May to conduct more suction dredging.

First dive completed at 9:29 – 11:29.

The discharge hole was exposed and still no sign of the outfall was achieved. Lots of sticks and mud was removed.

Second dive completed at 11:35 – 13:35.

More suction dredging was done and a hole of approximately 3m in depth was created.

Third dive completed at 13:42 – 14:45.

The 3m hole was widened to locate pipe in the perimeter surrounding the 3m hole.

Dredging towards the shore was achieved but still no visual on the outfall pipe.

Day 3

First dive completed at 8:46 – 10:46.

Proceedings with a continuation of exposing the surrounding area took place and an area of thick dark mud was exposed indicating the correct area dredged.

Second dive completed at 10:52 – 12:51.

The outfall was turned on and a lot of debris within the hole was present. Upon isolation of the outfall a large horizontal cavity was exposed to an approximate size of 2m wide 300mm high and the depth unknown. At this stage the cavity was exposed from the side.

Third dive completed at 13:02 – 15:00.

A continuation of the exposure of the cavity was completed and at 14:00 the outfall located within the cavity. A large tree above the outfall discharge was found and prepared for

removal. At the end of the day the tree was still in position with a large amount of debris above, but a clear discharge path was present although not direct to the surface. The outfall was clear and flowing.

Overview

The outfall is currently exposed and the location known. There is a large amount of debris including trees, sticks, mud and foreign matter still present over top of the outfall diffuser. A horizontal cavity at the same level as the pipe is present and discharge through the cavity is clear. The outfall is approximately 3.5m below the seabed and in future needs some attention.

A riser is recommended to be installed to reduce the possibility of the outfall being buried and therefore getting blocked. Removal of the cavity would be needed for this works to be completed.

Flange Specifications:

These are the actual measurements gathered on the day of the survey

ID = 360 mm

OD = 440 mm

Bolt spacing crs = 70 mm

Bolts across face crs = 400mm (PCD)

No of bolts = 16

This is the closest flange I could find to the specs above as the PCD is the same and the number of bolts and the outside diameter of the flange.

DN 300 (12 inch) JIS10K

445mm OD

400mm PCD

16 bolts

M24 bolts

25mm holes

Flange thickness -cast iron =32mm

- carbon steel= 24mm

Please do not hesitate to call me if you have any queries regarding this report.

Regards,

Martin Beukes

Abyss Ltd t/a Greenfield Diving Services