NAPIER OCEAN OUTFALL INSPECTION

REPORT NUMBER: N00101 010220

NAPIER CITY COUNCIL

25 JANUARY TO 1 FEBRUARY 2020

NAPIER, NEW ZEALAND

Reviewed

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Released

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1. INTRODUCTION

A New Zealand Diving and Salvage Ltd (NZDS) dive team lead by Dive Supervisor Mr. T. McKenzie was engaged by Napier City Council (NCC) to conduct an inspection on the Napier Outfall on the 25th day of January through to the 1st day of February 2020.

2. SCOPE OF WORK

Conduct an inspection on the Napier Outfall inclusive of the below items (within the Client approved allocated timeframe):

a. Inspection and document the existing leak around 700m offshore, including video footage, visibility permitting. The leak will not be uncovered during this attendance. *This is estimated to be completed within approximately one half day.*
b. Inspection and document (for NCC to maintain their records) of the all the ports, status, any fixes completed on the ports. *This is estimated to be completed within approximately two days.*
c. Assist with subsurface sampling existing leak around 700m offshore (similar to what was conducted in April 2019). *This is estimated to be completed within approximately one half day any day from Tuesday 28 January onwards.*
d. Airlifting and installation of the 'hockey stick':
    i. Airlift within the subsea caisson to expose the pipeline end flange *estimated timeframe 2 – 3 days.*
    ii. Air lance down the end of the pipeline to loosen sediment and coordinate a flush through NCC *estimated timeframe is unknown.*
    iii. Install the 'hockey stick' on the previously installed studs located on the end plate *estimated timeframe 1 day.*
    iv. Install an anode on the base of the hockey stick flange *estimated timeframe included within item 3 above.*

    Install four truck strops on the top of the caisson to the lifting points to create a crisscross to hold the 'hockey stick' in place – in time the sediment will fill this caisson with sediment to secure the 'hockey stick' *estimated timeframe included in item 3 above.*

3. RESULTS AND FINDINGS

The leaking join at 700m was located. Seabed levels were at the 11 o'clock to the 4 o'clock looking onshore. An inspection was conducted in consultation with Ian Goss (Consultant Beca). The leak was similar to the last inspection. The flow rate during the inspection was

approximately 425L per second. Leaking around the onshore and offshore flanges was prominent, as shown on the below drawing. The southern side of the joining flange (along the 9 o'clock) side was buried and not inspected. The northern joining flange was observed to be leaking some sections and the rubber seal appeared to be missing from the sealing faces.

All bolts on flanges that were accessible were tightened. The offshore flange bolts were all loose.

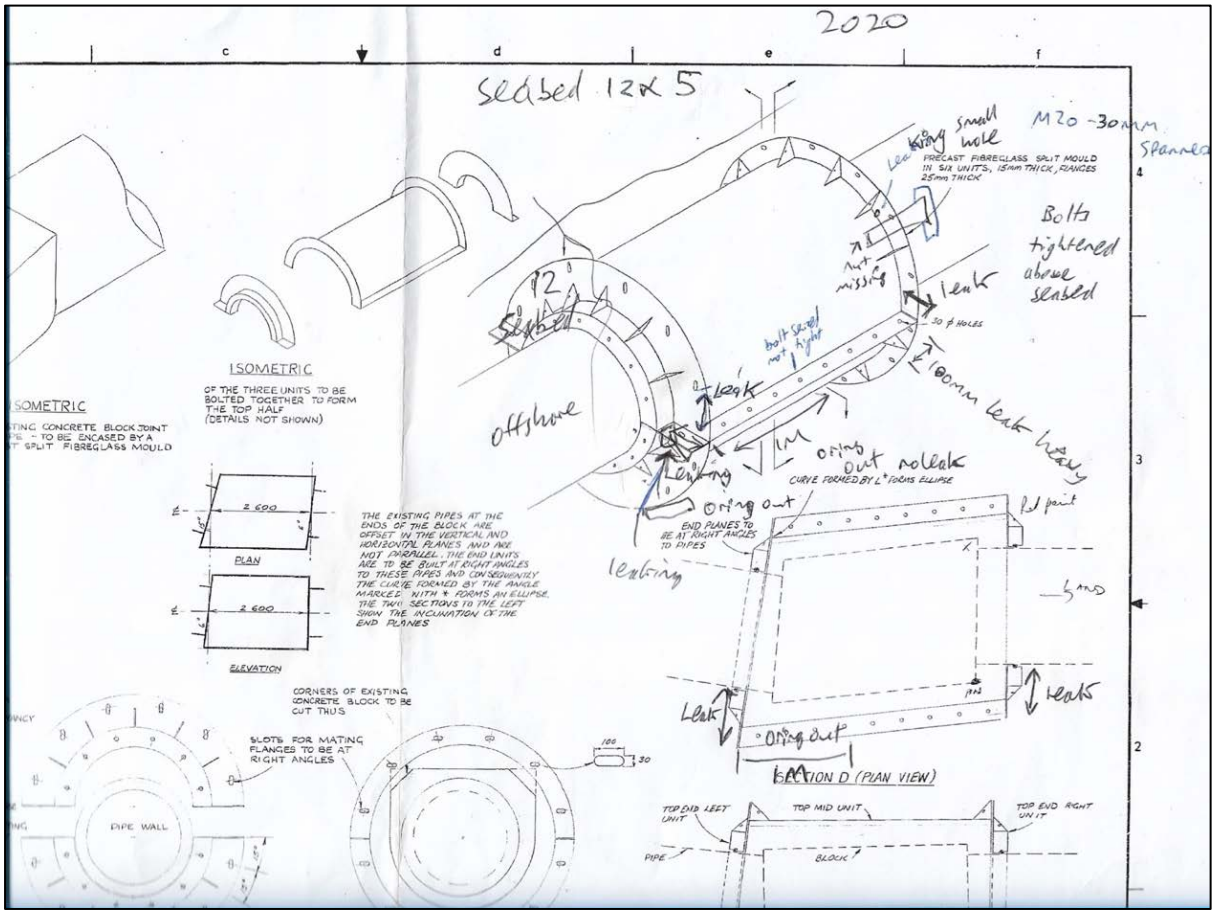

Image 1: Marked Up Drawing of the Findings

The onboard NCC representative supplied sample bottles. The divers collected water and sediment samples around the leak at different depths and distance from the centre. One (1) control sample was taken up current away from the leak.

Four (4) sediment samples were taken approximately 300 and 500 metres away from the centre of the diffusers, to the north and to the south.

An inspection of the diffuser section was completed. The majority of the diffuser section had seabed coverage above the crown of the pipe approximately 100 – 200mm. The seabed was airlifted along this section down to 9 and 3 o'clock to enable the pipeline to be accurately followed to conduct an inspection of the diffusers.

The first 32 diffusers were flowing steadily. Diffuser #33 to #40 appeared not be flowing due to blockage of sediment and sticks. The team air lanced these and flow commenced from diffuser #33 to #36.

Three (3) fishing nets were found wrapped around some diffusers. Three (3) diffusers, #29, #29.5 and #34, were observed to be damaged as they were bent and torn away from the pipe. They appeared to be still secured to the pipe and leaking from around the base. Heavy hard marine growth was sighted on most diffuser risers and duckbills that were present. Due to time constraints no damaged diffusers were repaired.

The table below displays the results of the inspection.

Diffuser #	Spacing Between Diffusers (mm)	Diffuser Height (mm)	Seabed Level from Pipeline Crown (o'clock)	Orientation of Diffuser (O'clock)	Internal Sediment (mm)	Flow	Additional Details
1		180	200mm above	12	0	Steady	Onshore pipe #52, no DB, S diffuser. 1 nut missing. Fishing net
2	200	450	200mm above	12	0	Steady	No DB, C diffuser
3	2,000	450	100mm above	12	0	Steady	DB, C diffuser
4	2,000	450	100mm above	10	0	Steady	DB, C diffuser
5	200	150	100mm above	10	0	Steady	No DB, S diffuser. 1 threaded rod missing
6	700	450	100mm above	2	0	Steady	DB, C diffuser
7	300	200	200mm above	2	0	Steady	No DB, S diffuser
8	6,500	450	200mm above	12	0	Steady	DB, C diffuser
9	7,000	350	200mm above	10	0	Steady	DB, S diffuser
10	200	300	200mm above	10	0	Steady	DB, C diffuser
11	1,500	150	200mm above	2	0	Steady	No DB, S diffuser
12	1,500	400	200mm above	10	0	Steady	DB, S diffuser
13	1,500	450	200mm above	10	0	Steady	No DB, S diffuser
14	1,000	450	200mm above	2	0	Steady	DB, C diffuser
15	5,000	200	200mm above	12	0	Steady	No DB, S diffuser
16	1,500	300	100mm above	12	0	Steady	DB, S diffuser
17	200	400	100mm above	12	0	Steady	DB, C diffuser
18	2,000	450	100mm above	12	100	Steady	DB, S diffuser
19	2,500	450	100mm above	12	100	Steady	DB, C diffuser
20	3,000	150	100mm above	10	200	Steady	No DB, C diffuser
21	3,000	150	50mm above	2	200	Steady	DB, S diffuser

22	5,000	500	100mm above	12	200	Steady	DB, C diffuser
22.5	100	150	100mm above	10	200	Steady	No DB, S diffuser
23	2,000	150	100mm above	10	200	Steady	No DB, S diffuser
24	1,000	150	11 – 1	10	200	Steady	No DB C diffuser
25	2,000	0	12	12	200	Steady	Hole in pipe
26	1,500	450	12	12	200	Steady	DB, C diffuser
27	3,500	450	100mm above	10	250	Steady	DB, C diffuser
28	1,500	200	200mm above	12	250	Steady	No DB, C diffuser
29	3,000	450	100mm above	10	250	Steady	DB, S diffuser, fishing net, damage
29.5	100	450	100mm above	1	300	Steady	DB, T diffuser, fishing net damage
30	2,000	450	150mm above	12	300 full	Steady	DB, T diffuser
31	2,000	300	150mm above	12	300 full	Steady	No DB, C diffuser
32	1,500	150	200mm above	12	500 full	Steady	DB, T diffuser
33	1,500	350	150mm above	1	700 full	Weak	DB, S diffuser
34	2,000	300	100mm above	12	780 full	None	DB, C diffuser, fishing net, damage
35	1,000	200	12	12	820 full	None	No DB, C diffuser
36	2,500	150	12	12	950 full	None	DB, T diffuser
37	800	200	11 – 1	2	950 full	None	No DB, C diffuser
38	1,500	450	80mm above	12	950 full	None	DB, C diffuser
39	3,500	450	12	1	950 full	None	DB, C diffuser
40	1,500	200	100mm above	10	950 full	None	No DB, C diffuser
41			This section of the pipeline is still blocked and buried				
42							
43							
44							

Reference	Description
DB	Duckbill
S Diffuser	Stud fixture to diffuser ports
C Diffuser	Camlock fixture to diffuser ports
T Diffuser	T-bar fixture to diffuser ports

The caisson was uncovered and airlifted out. The sediment inside appeared to be compact with sticks which proved difficult to clear. The end of the pipeline was uncovered and air lancing of sediment from inside of the pipe was conducted.

The hockey stick was installed onto the end of the pipe using studs previously ChemSet into the pipe. This was challenging as the caisson was on a lean to the north east as he caisson interfered with the alignment process. The HDPE stub flange was made with a very tight tolerance which made it difficult to fit inside the installed studs. The studs themselves were not all exactly straight and some studs were required to be removed to allow some of the studs to fit. Five (5) bolts were successfully installed however unable to to fully secure the stub flange to the concrete. There was a gap approximately 150mm at the bottom. Two (2) holes will need to be re-drilled at the bottom of the flange to enable this. The hockey stick top was secured to the caisson utilizing truck strops. The top of the hockey stick was approximately 500mm below the top of the caisson. An anode was installed at the 12 o'clock stud on the galvanised flange. A duckbill arrangement will need to be installed to the top of the hockey stick.

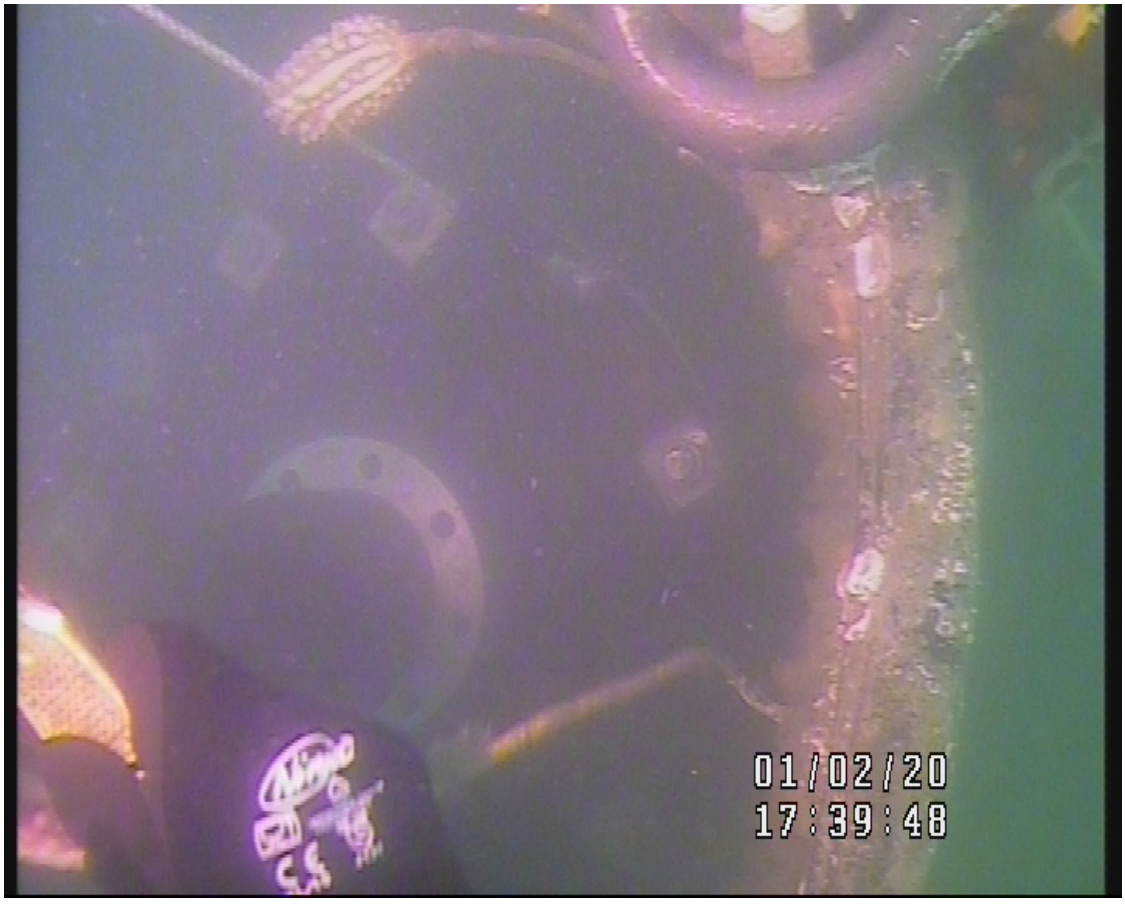

Image 2: Top of the Hockey Stick in Relation to the Top of the Caisson

4. VIDEO FOOTAGE

A USB containing the video footage and photographs obtained during this operation accompanies this report.

5. RECOMMENDATIONS

a. Fabricate new diffusers and replace the damaged ones
b. Installation of diffuser in the open hole
c. Clean mussel growth from the diffusers
d. Installation of new duckbills on diffusers
e. Repair leak at 700m
f. Installation of clamp around broken join close to end of pipe
g. Blank buried diffusers or installation of risers
h. Re-drill and installation of studs in hockey stick flange
i. Clear sediment out of pipe from onshore to offshore

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