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# **NEW PLYMOUTH** underwater

## **CLIENT REPORT**

Tararua District Council

Laws Road Reservoir - ROV / MS1000 Sonar Inspection

9<sup>th</sup> September 2024



Tararua District Council- Laws Road Reservoir ROV Reservoir Inspection



**AUTHORISATIONS**

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Road Reservoir ROV Reservoir  
Inspection



LIST OF ABBREVIATIONS	
DVR	Digital Video Recorder
kva	Kilovolt-ampere
m	Meter
mm	Millimeter
NPUW	New Plymouth Underwater Ltd
ROV	Remotely Operated Vehicle



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## 1 INTRODUCTION

New Plymouth Underwater Limited (NPUW) has been contracted by Taranua District Council (Client) to carry out remotely operated vehicle (ROV) services to inspect the reservoir in its entirety using the Fugro MS1000 sonar for navigation and identifying any further movement.

Taranua District Council issued New Plymouth Underwater a work brief on Monday 26<sup>th</sup> August outlining scope for the ROV inspection as well as the dive scope.

A decision was made to carry out ROV inspection prior to dive scope to determine if any repairs needed to be completed.

ROV scope objectives listed below.

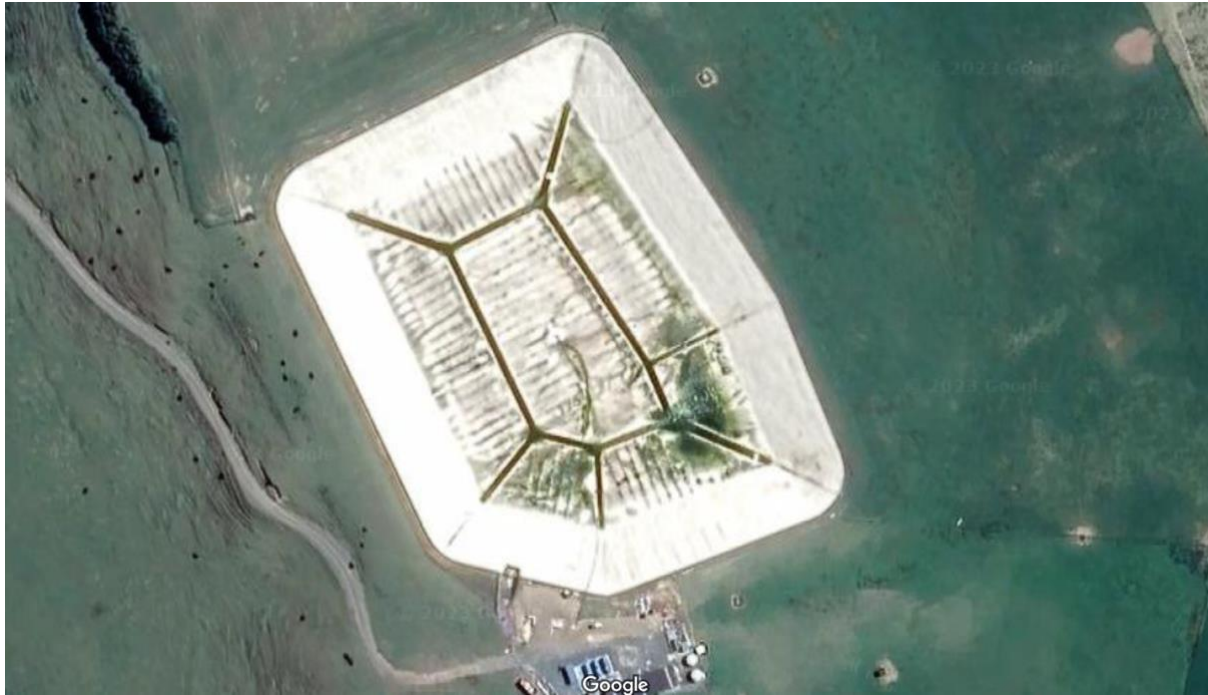


Figure 1: Laws Road Reservoir, Dannevirke

### 1.1 Survey Objectives

- Identifying what, if any deterioration has occurred in the floor of the dam since the inspection in May 23.

## 1.2 Methodology

On September 9th, a team consisting of two NPUW personnel, one Fugro representative, and an additional surveyor for training mobilised to the Laws Road site. The scope of work was successfully completed on September 11th.

### 1.2.1 Equipment Used:

- Blue ROV2 (Heavy Configuration)
- Digital Edge DVR System
- Oculus Multibeam Sonar
- 2.5kVA Generator
- Kongsberg MS1000 Sonar (provided by Fugro)
- Control Van for ROV operations

### 1.2.2 Operations Overview:

The ROV and sonar equipment were deployed through the central hatch, with the Kongsberg MS1000 Sonar suspended at a depth of approximately 5 meters to conduct 360-degree scans. These scans not only provided comprehensive coverage of the surrounding area but also assisted in guiding the Blue ROV to specific areas of interest

As the sonar performed its 360-degree sweeps, the ROV was piloted efficiently, ensuring precise navigation and allowing detailed inspections of critical areas.



## 2 INSPECTION

### 2.1 Inspection Summary

Following an initial inspection of the depressions and repairs, no further movement was visually detected in the areas where chalk lines are still visible. However, in depressions 5, 6, and 7, we were unable to detect movement due to faded lines, which hindered accurate monitoring in these sections.

A new method was used in taking measurements of the depressions with MS1000 sonar scanning the ROV on multiple locations around the depressions. It appeared to work well in giving us a more accurate measurement with the sonar.

A complete inspection of the reservoir was conducted, revealing no additional depressions.

The only notable irregularity observed was undulation listed below in the reservoir floor and batter face inspection.

#### 2.1.1 Depression two

No further movement was found on the diver repair. The eastern face slump remains 150mm x 800mm. The southeastern corner depression was re measured at 5.169 m<sup>2</sup>. The movement found in previous appeared to have ceased.

#### 2.1.2 Depression four

Stage two repair appeared to be in good condition. The southeastern corner was re-measured to 7.730m<sup>2</sup>. Pinhole five remains sealed with pinhole four exposed. No change in pinhole four was detected.

#### 2.1.3 Depression Five

ROV operator was unable to locate a consistent chalk line previously marked out by divers, making movement impossible to detect. All cardinal points were inspected followed by an internal inspection. No tears or leaks were identified. Depression was re-measured to 10.162 m<sup>2</sup>

#### 2.1.4 Depression six

No chalk lines visible on depression six. Depression was re measured to 2.732 m<sup>2</sup>

#### 2.1.5 Depression seven

Depression seven appeared to be consistent with the previous survey. Depression was re-measured to 17.187 m<sup>2</sup>

### 2.1.6 Reservoir floor and batter face inspection

The inspection of the reservoir floor and batter face was conducted using the MS1000 sonar system.

The sonar operator guided the ROV pilot along the subsoil drainage lines and in between them, ensuring comprehensive coverage of the area.

The survey revealed no additional depressions; however, it appeared natural undulations in the terrain were forming above sub soil drainage line nine.

### 3 DEPRESSION TWO

#### 3.1.1 Images

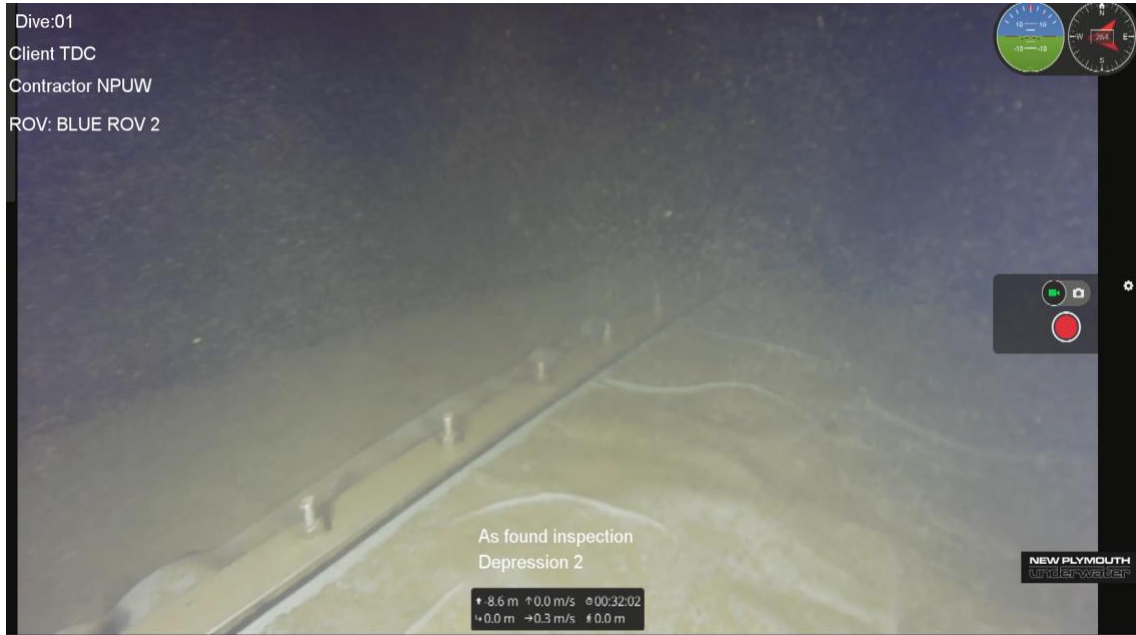


Image 1 Depression 2 west face



Image 2 Depression 2 South east corner

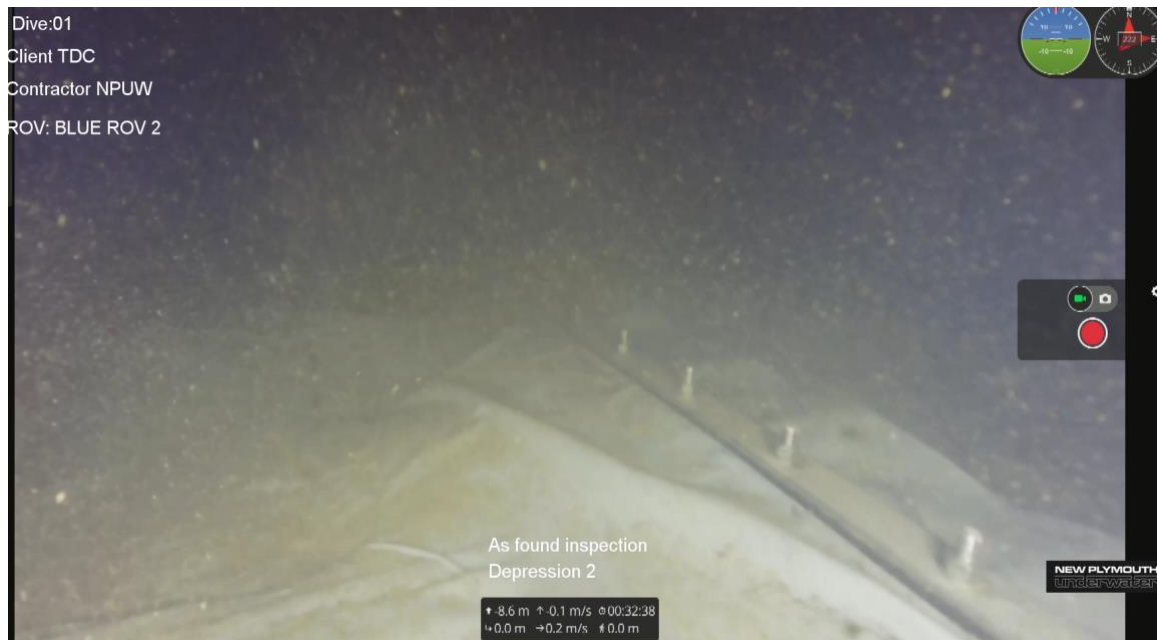


Image 3 Depression 2 north west corner

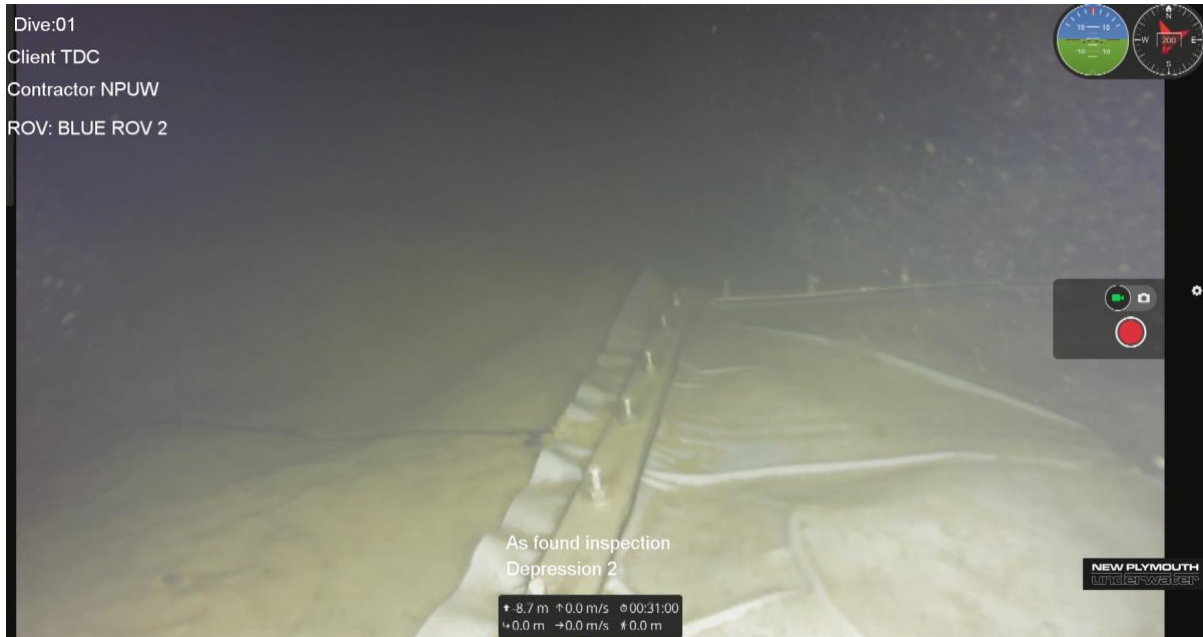


Image 4 Depression 2 East face

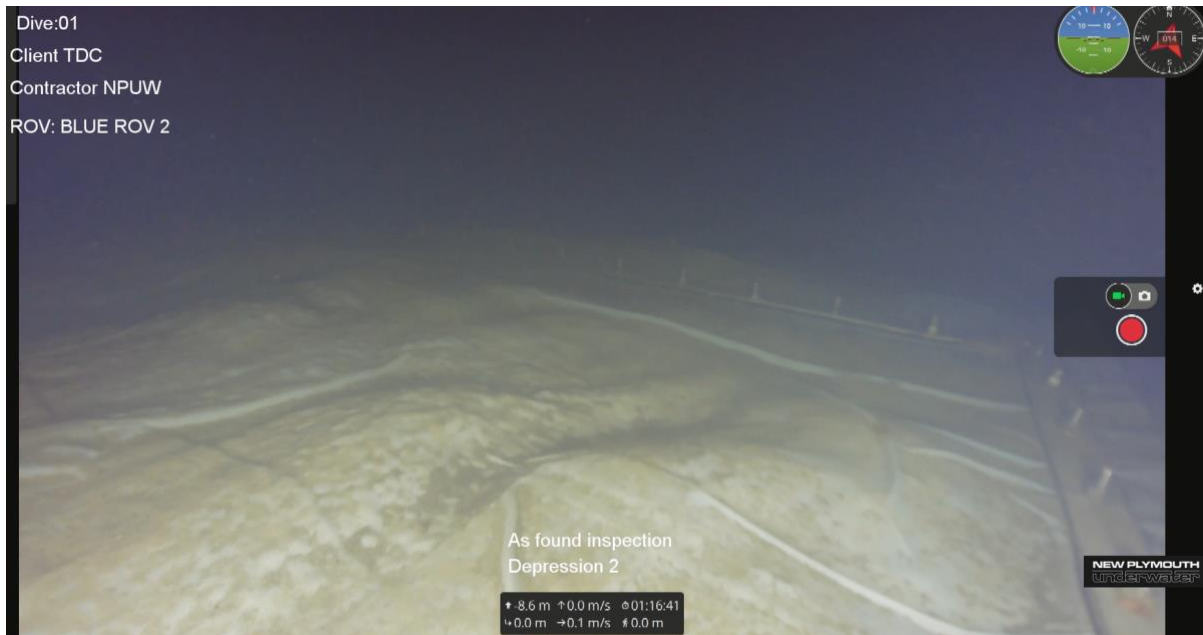


Image 5 Depression 2 Overview

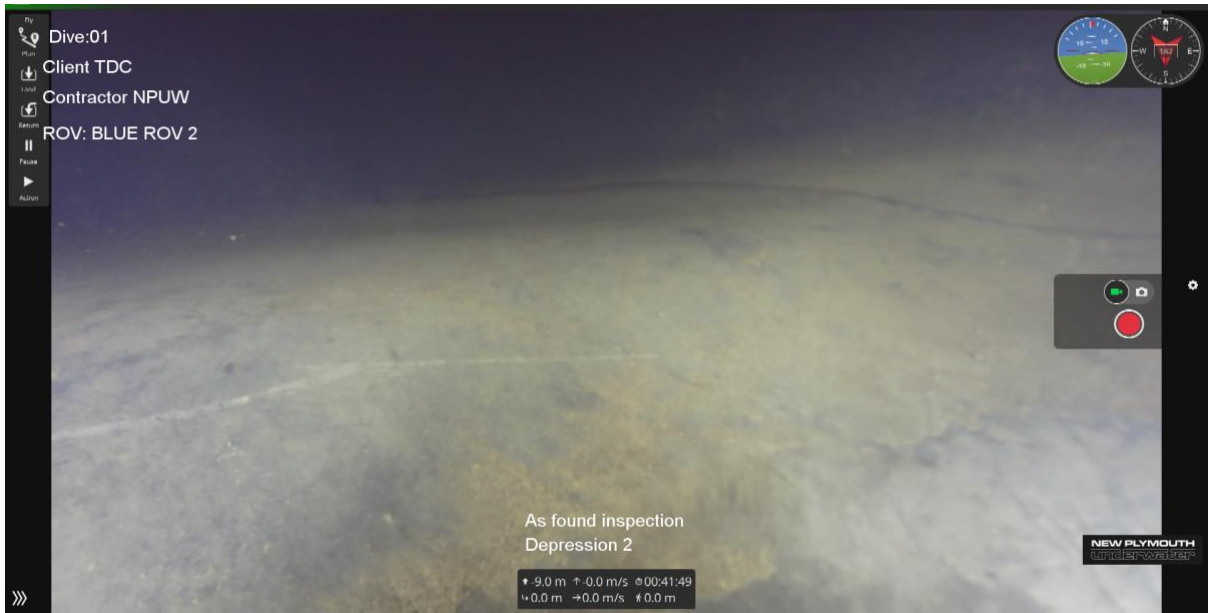


Image 6 Southeast depression 2 100mm movement

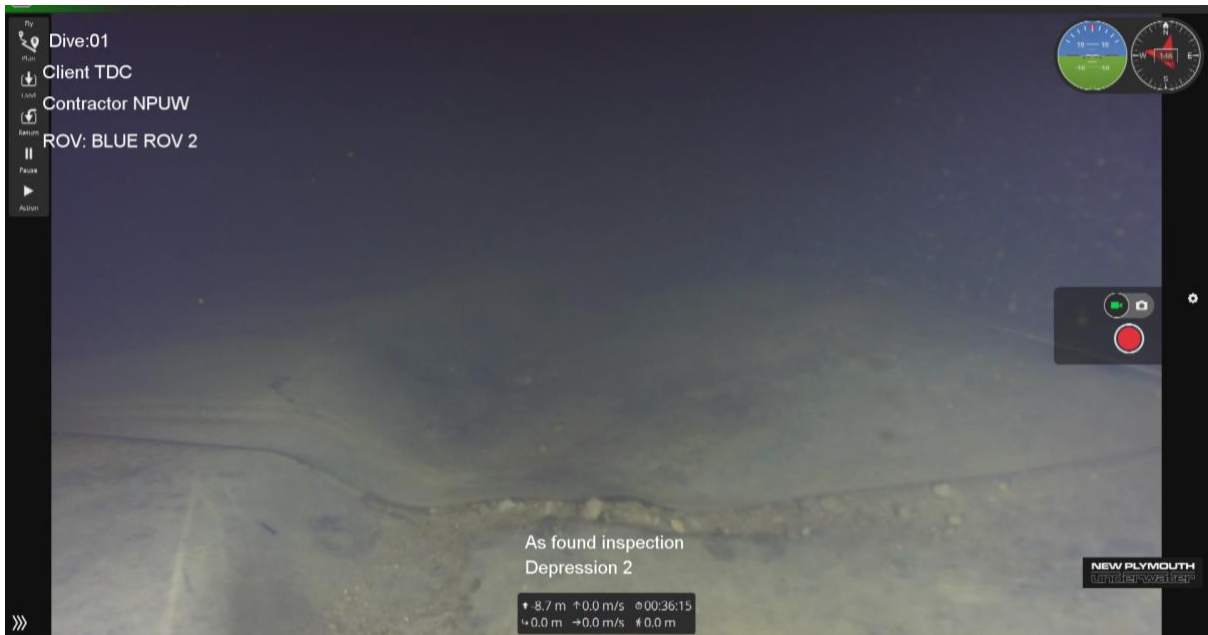


Image 7 East face slump



## 4 DEPRESSION FOUR

### 4.1.1 Images



Image 8 Depression 4 South west corner

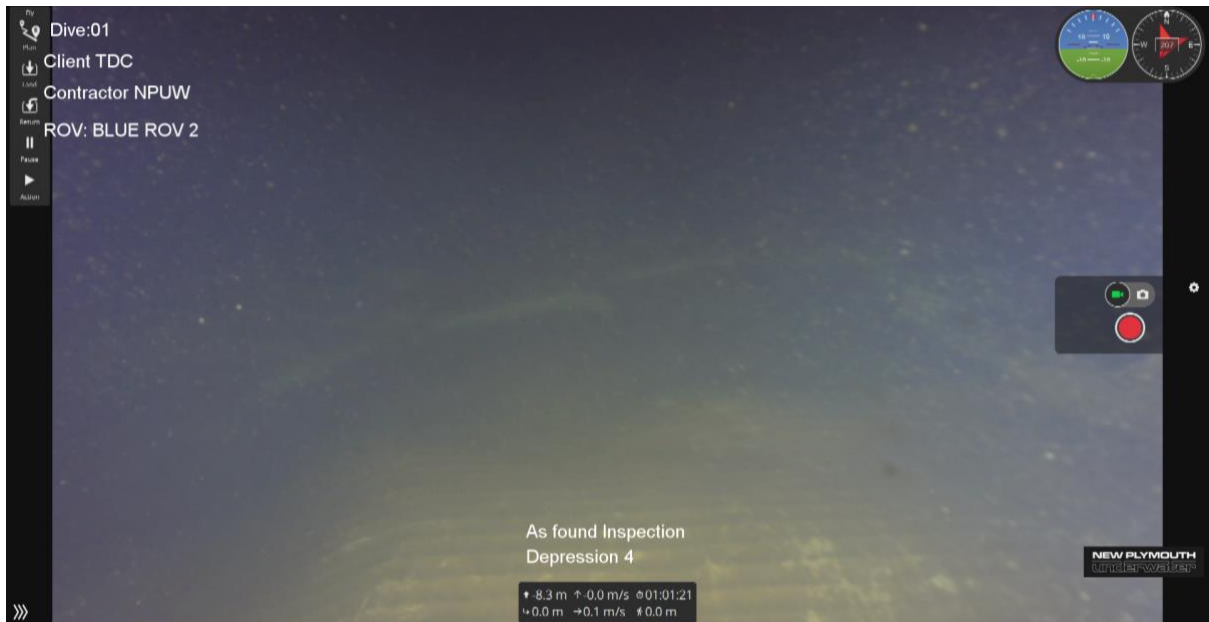


Image 9 Depression 4 overview



Image 10 Depression 4 Pinhole 5 Butyl tape covering pinhole



Image 11 Depression 4 Pinhole 4



## 5 DEPRESSION FIVE

### 5.1 Images

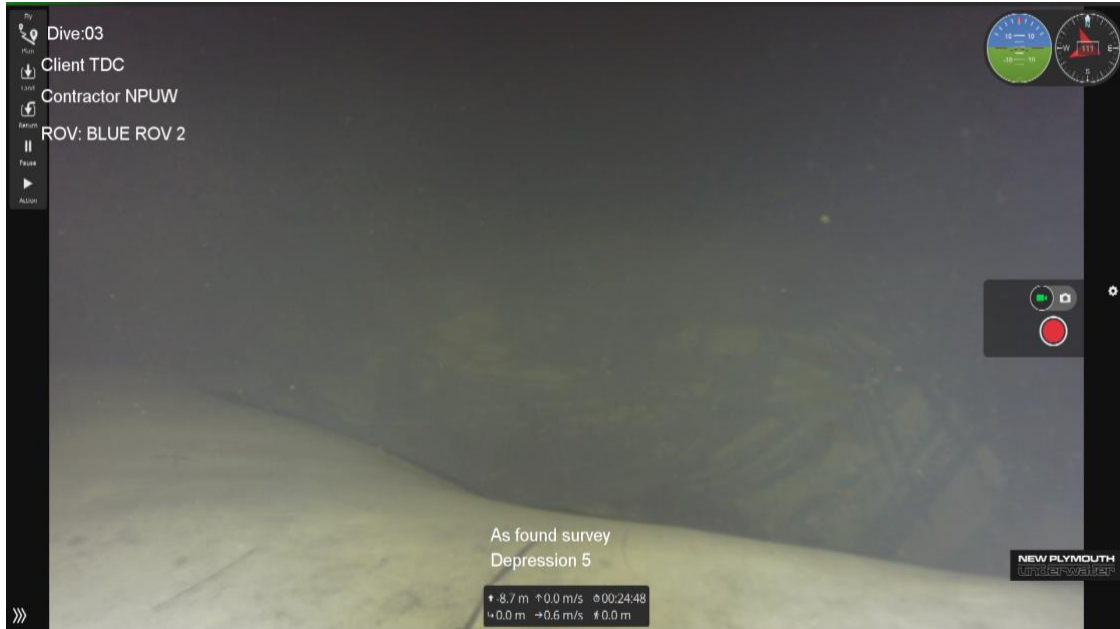


Image 12 Depression 5 main depression

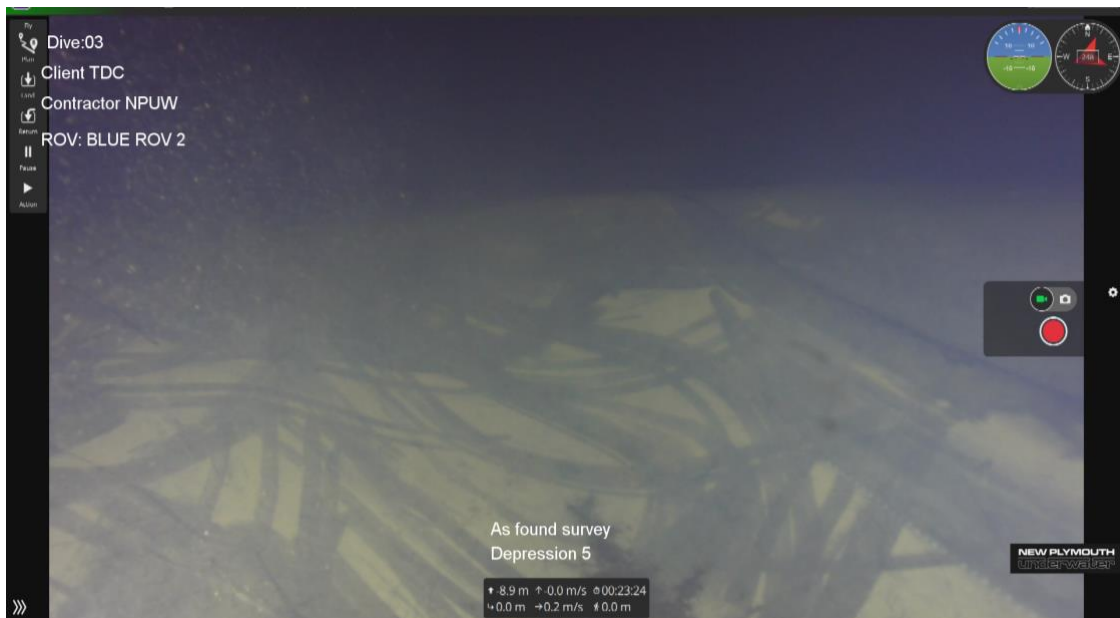


Image 13 Depression 5 internal

## 6 DEPRESSION SIX

### 6.1 Images

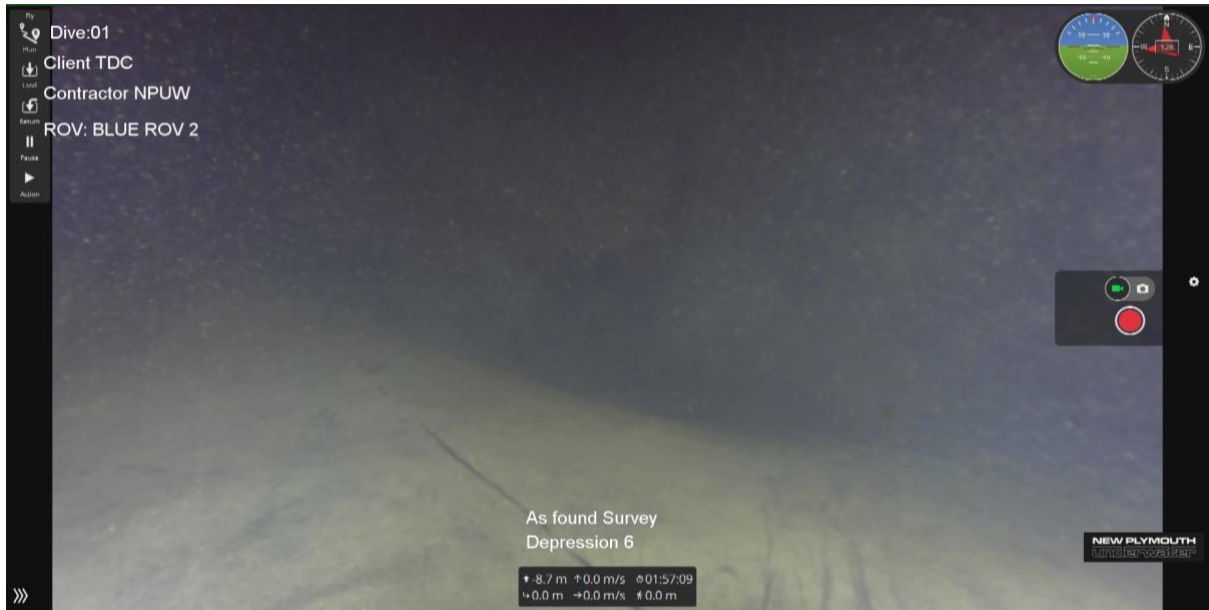


Image 14 Depression 6 South east view (no chalk lines)

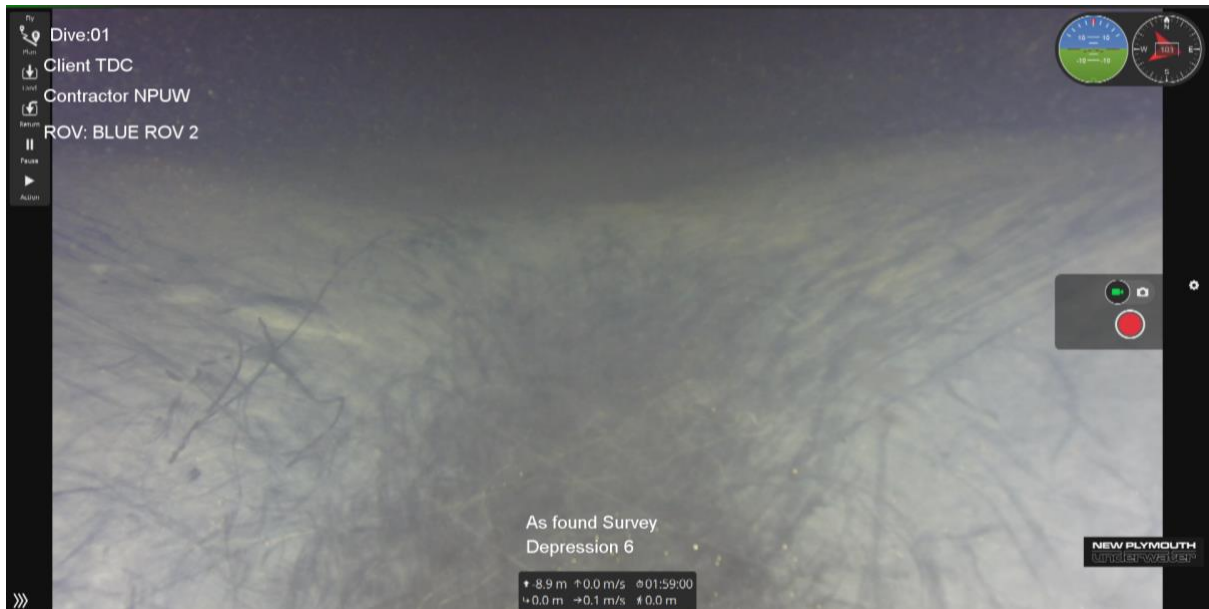


Image 15 Depression 6 internal

## 7 DEPRESSION SEVEN



Image 16 Depression 7 North east view

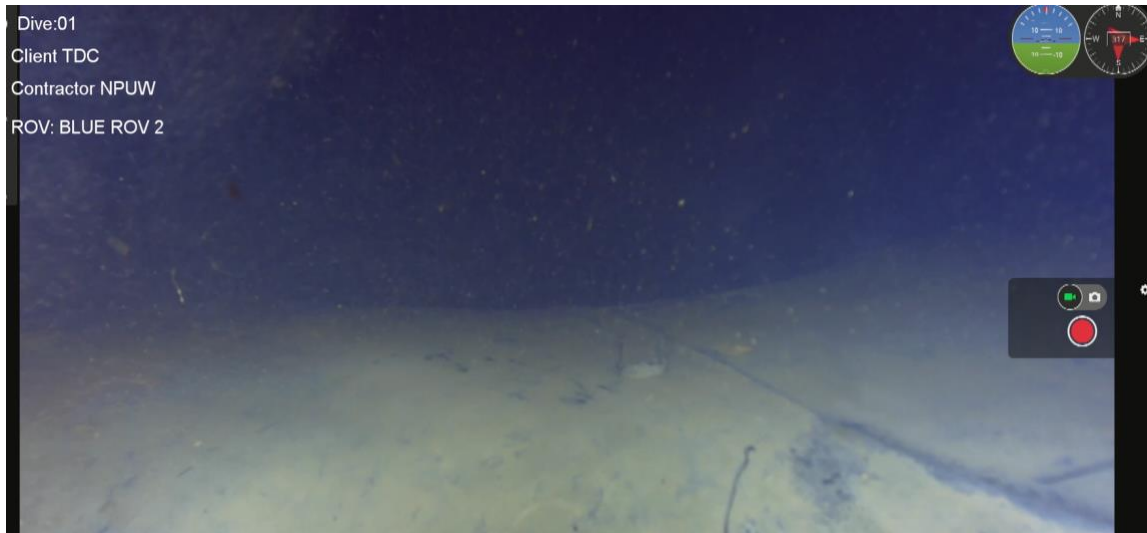


Image 17 Depression 7 north west view

## 8 RESERVOIR FLOOR AND BATTER FACE INSPECTION

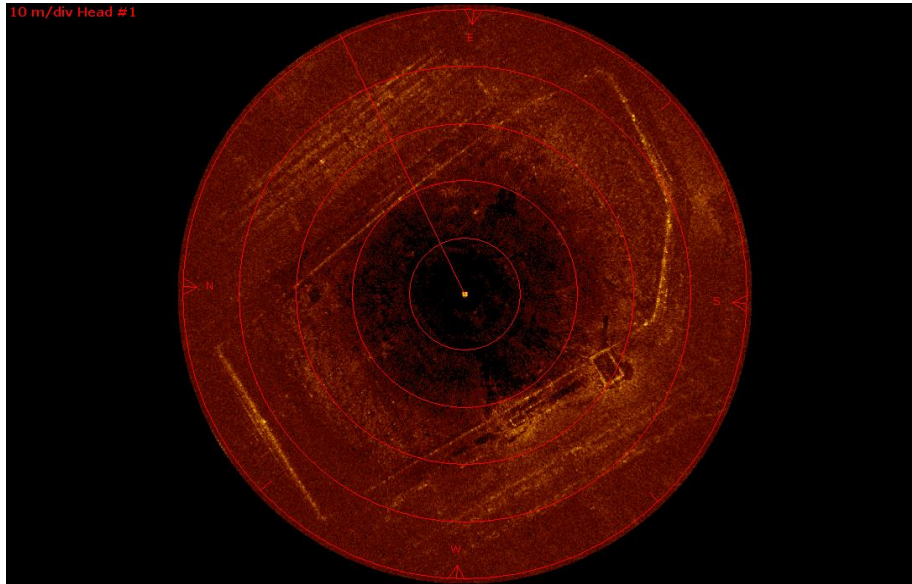


Image 18 360 Degree scan of reservoir floor and batter faces

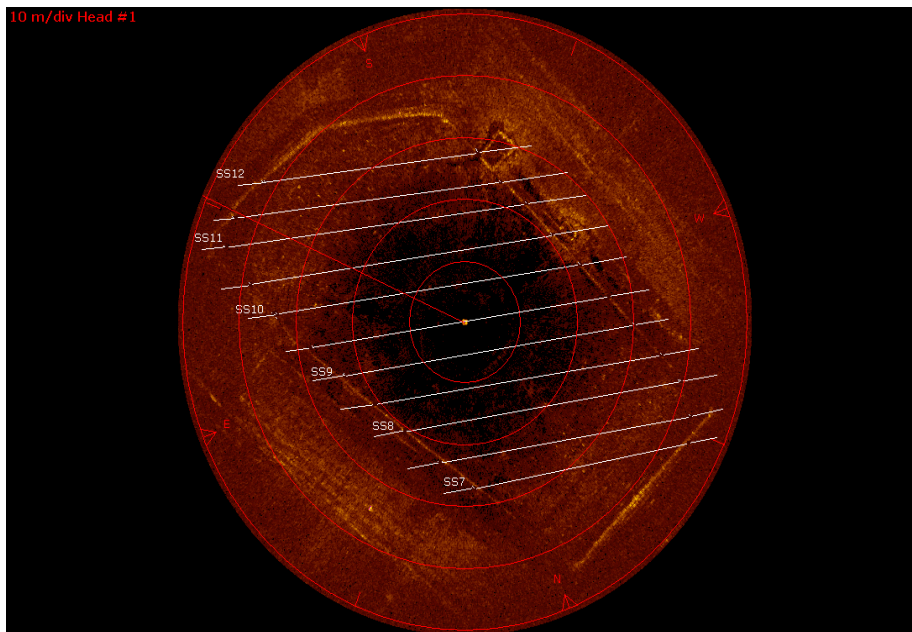


Image 19 Floor plan inspection sub soil drainage lines



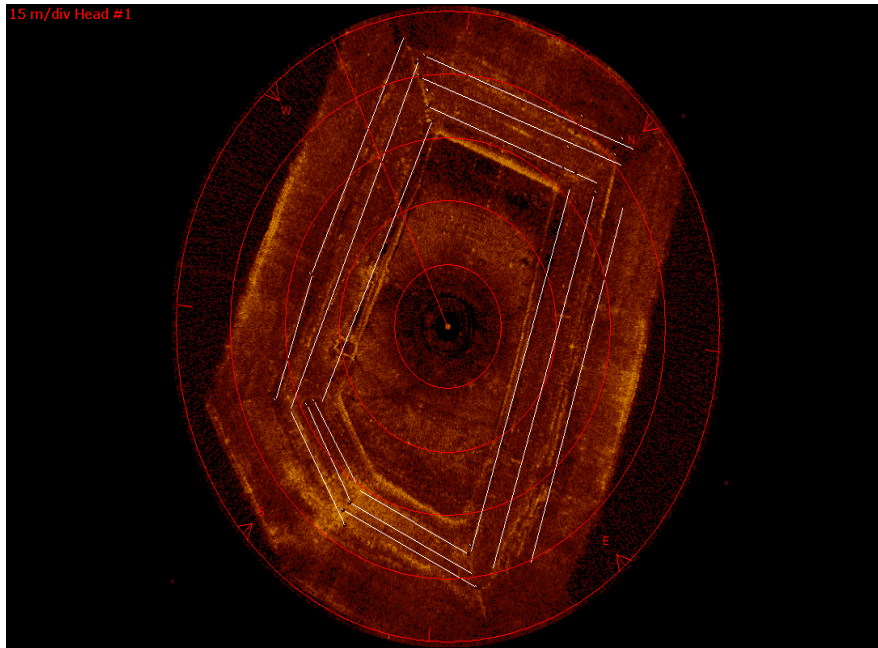


Image 20 Batter face inspection plan

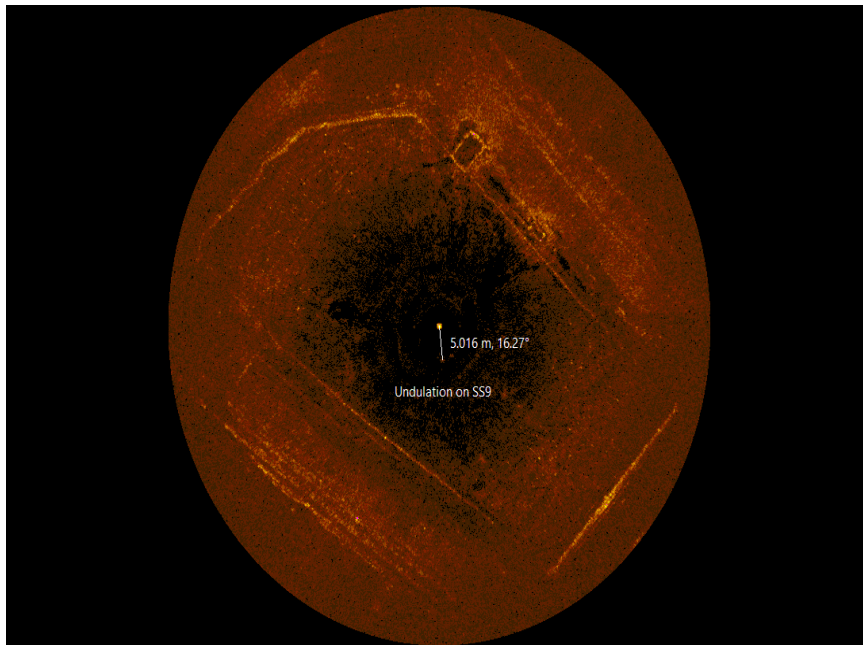


Image 21 Undulation location below subsoil drainage line 9

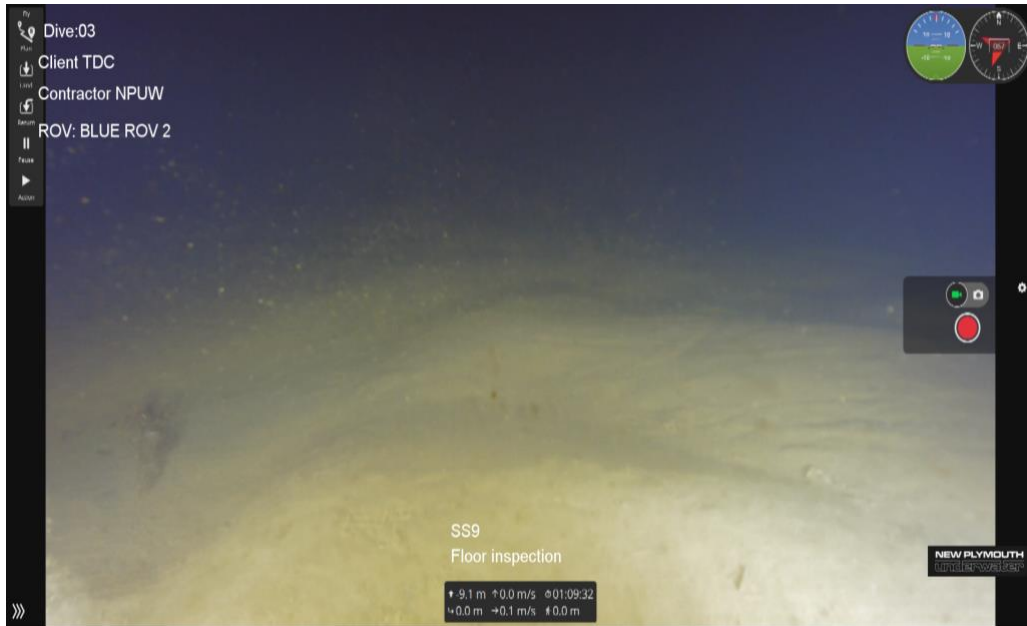


Image 22 Undulation above subsoil drainage line 9

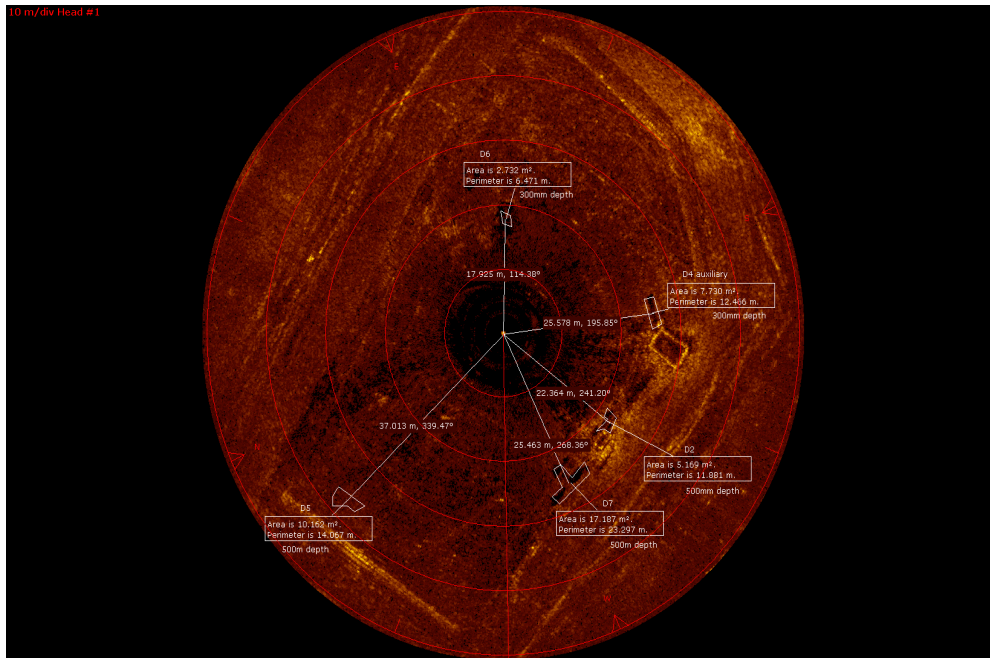


Image 23 Reservoir layout with compass bearings to points of interest

## 9 CONCLUSION

On the 9th of September, an ROV inspection was successfully conducted to assist the Tararua District Council in ongoing monitoring of the Laws Road Reservoir.

The inspection revealed that depressions 5, 6, and 7 require further attention, as these areas cannot be effectively monitored. New Plymouth Underwater (NPUW) has been contracted to remark these depressions with divers for future inspections. Additionally, NPUW has recommended that all depressions be re-inspected, with repairs required for pinholes 4 and 5.

Moving forward, the Tararua District Council plans to conduct internal monitoring of the reservoir and will contract NPUW to perform annual inspections to ensure the ongoing structural integrity of the reservoir.

Kind regards

Michael Woodward

*Project Lead*

### NEW PLYMOUTH UNDERWATER LTD

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## 10 APPENDIX

### WORK BRIEF TEMPLATE: NEW PLYMOUTH UNDERWATER

<p>● <u>SECTION A: TO BE COMPLETED BY COUNCIL</u></p>	
<u>Work Brief Name/Title</u>	Mapping and Marking of the Dannevirke Impounded Water Supply Reservoir (the Dam)
<u>Commencement Date (preferred)</u>	Late August / Early September
<u>Completion Date (preferred)</u>	TBC
<u>Services Required</u>	<p>Using sonar remap floor of the Dam. Compare this map with the map that was created in May 2023.</p> <p>Permanently remark the extremities of each depression on the floor of the Dam – as was done with chalk during the temporary repairs completed in June 2023.</p> <p>Complete minor repairs as required.</p> <p>Provide a report for TDC on the status of the Dam.</p>
<u>Objectives</u>	<p>Objectives of project are:</p> <ul style="list-style-type: none"> <li>• Identify what, if any deterioration has occurred in the floor of the Dam since the inspection in May 23.</li> <li>• Permanently mark the depressions in the dam so that TDC can commence its monitoring program with a known start state.</li> <li>• Complete any minor repairs as required.</li> <li>• Current status report of the dam floor.</li> </ul>
<u>Milestones</u>	NA
<u>Resources to be provided by the Buyer</u>	<p>TDC to:</p> <ul style="list-style-type: none"> <li>• Facilitate access to the Dam.</li> <li>• Conduct Health and safety Briefings.</li> </ul>





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	<ul style="list-style-type: none"> <li>Isolate the Dam during dive operations</li> <li>Assist NPUW as required.</li> </ul>
<u>Consents Required to be obtained and by Whom</u>	NA
<u>Critical Risks</u>	<ul style="list-style-type: none"> <li>Unplanned escape of chlorine gas</li> <li>Access to cover of the Dam</li> <li>Failure of Dam wall (unlikely)</li> <li>Earthquake</li> <li>Electrical hazards</li> <li>Trips and Slip</li> <li>Drowning</li> <li>Severe weather</li> <li>Water shortage</li> </ul>
<ul style="list-style-type: none"> <li><b><u>SECTION B: TO BE COMPLETED BY SUPPLIER</u></b></li> </ul>	
<u>Commencement Date (offered)</u>	
<u>Completion Date (offered)</u>	
<u>Price (offered)</u>	
<u>Payment Terms/Invoicing</u>	
<u>Proposed Amendments to any clauses in the Agreement</u>	
<u>Subcontractors Required to Perform Services on this Work Brief</u>	
<u>Confirmation of ability to meet Buyer's requirements</u>	

<b>SECTION C: AGREEMENT</b>	
<u>Purchase Order Number</u>	
<u>Buyer's Address</u>	Tararua District Council Gordon St Dannevirke
<u>Buyer Key Contact Person</u>	Roger Earp - <a href="mailto:roger.earp@tararuadc.govt.nz">roger.earp@tararuadc.govt.nz</a> , 027 253 2831
<u>Supplier's Address</u>	
<u>Supplier's Key Contact Person</u>	
<u>Commencement Date (agreed)</u>	
<u>Completion Date (agreed)</u>	
<u>Price (agreed)</u>	See attached quote
<u>Payment Terms/Invoicing (agreed)</u>	
<u>Subcontractors Approved to Perform Services on this Work Brief</u>	NIL
<p>This Work Brief is issued to Timber Tanks as an adjunct to the Master Services Agreement with Contract No. CT182.24 between the Buyer and NES Inspections. (Agreement). NES Inspections were commissioned to complete the repairs to the reservoir with Timber Tanks as a subcontractor. However, during the process additional specialist work was identified and Timber Tanks were engaged directly as the original supplier of the two tanks to deliver this work.</p>	

● **SECTION D: VARIATIONS**

Use this section only once the work brief has been signed and changes are required. Leave blank if this is the first time filling out this work brief.

<u>Date of Variation:</u>	
<u>Variation Description:</u>	
<u>Signed by the Buyer representative:</u>	
<u>Signed by the Supplier representative:</u>	

● **SECTION E - SIGNATORIES**

The Buyer and the Supplier agree as follows:

1. Except as specified in the work brief, the terms and conditions of the agreement apply to this work brief.
2. The Supplier warrants the signatory below has the authority to enter into this agreement.
3. The information set out in this work brief is true, correct and complete, and no information has been withheld by the Supplier that may affect the Buyer's decision to engage the Supplier to perform the Services set out in this work brief.
4. The Supplier has received a copy of, read and understood, this work brief and the agreement.

The Buyer agrees to engage the Supplier to perform, and the Supplier agrees to undertake, the services described in this Work Brief, on the terms and conditions set out in the agreement, as modified by any terms set out in this Work Brief.

<u>Parties</u>	<u>Name / Position</u>	<u>Signature</u>	<u>Date</u>
Approved by Buyer's Delegated Financial Authority:			
Signed by Supplier representative:			