OCEL - OFFSHORE & COASTAL ENGINEERING LIMITED

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19th April 2023,

Davis Ogilvie & Partners Ltd.,
24 Moorhouse Avenue,
CHRISTCHURCH 8140.

Attention: Mr. Gary Stevenson – Principal Civil Engineer.

Dear Sir,

MAPUA BOAT RAMP CURRENTS

OCEL undertook a tidal current survey at the location of the proposed Mapua boat launching ramp on the 21st of March during a Perigean spring tide event when the new moon was in between the sun and the earth and closest to the earth. The peak high tide was 4.4 m at 0931.

Methods - The tidal currents were measured using an Oceanics 3 current meter - figure no.1 - suspended from a moored boat at the end of the launching ramp. The current meter was connected to a computer onboard the boat to record the current speed during the tidal cycle. This is the Eulerian method of current measurement, measuring the current at a point. The boat streamed with the current but swung on its mooring moving inshore as low tide approached. A handheld current meter was also used to measure the currents along the launching ramp, the deployment was necessarily close to shore because of the speed of the tide.

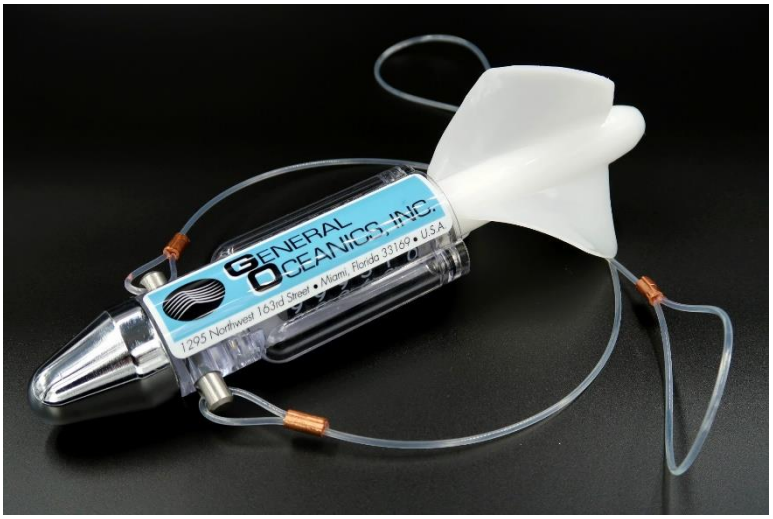


Figure no.1

The Lagrangian method of current measurement where the observer follows a water particle, represented in this case by a drogue, through space and time as it moves with the flow, was also used to pick up the flow circulation and flow streamlines. A number of drones, surface buoys with a bucket suspended from each, were released upstream of the launching ramp during the ebb tide and tracked using both a handheld Trimble DGPS unit and a drone as they were swept with the flow past the launching ramp location toward the wharf. Once out of the area of interest downstream of the wharf the drogues were picked up by the chase boat and taken back upstream.

Photograph no.1 shows an aerial view of the location on the incoming tide, the currents in the area of the ramp are low, the area gains some protection from the wharf and the shoreline downstream of the wharf, for the incoming flow, deflects the current away from the ramp area. The currents of concern are on the outgoing tide.

Results - Representative flow paths are shown in drawing nos. DR-230202-005 just after high tide and 006 at mid tide, drawings attached to this note. There is no evidence of an eddy in the vicinity of the launching ramp the drogues track straight towards the Mapua wharf, some passing under it and the offshore ones running along the berthing face. What is evident from the drogue tracks and from personal experience with launching the chase boat is that the current close to the waterline is relatively slow, of the order of 0.2 - 0.3 m/sec 5 m out from the water line, and manageable when launching a boat. 10 m out from the waterline the speed picks up to 0.5 – 0.6 m/sec, ≈ 1 – 1.2 knots. The slow flow area moves down the ramp with the tide so that it is possible to put a boat trailer in the water without being subject to really strong currents at all stages at the tide. The weaker currents in the shallow water close to the waterline as it drops down the ramp are the result of bottom friction effects at the shore. Drawing no. DR-230202-007 shows the variation of flow speed out from the waterline at high, mid and low tide. The current is slow < 0.2 m/sec within 5 m of waterlevel then rises close to 0.6 m/sec ≈ 1.2 knot, 10 m out. This reflects our own launching experience on site, startup then back out and in a short distance

the boat is being swept downstream. This in itself is not a problem unless there is an obstruction in the form of a moored vessel or buoy in the way and a potentially damaging collision or at worst overturning for a small boat hitting a substantial partially submerged buoy is a possibility.

The maximum flow speed recorded on the boat moored at the end of the launch ramp was 0.75 m/sec ≈ 1.5 knot however the boat swung on its mooring and moved inside the end of the ramp as the tide dropped. The current meter was suspended 1 m under the boat and not fully representative of the surface current. The current speed plot is shown in figure no.2. The current speeds confirm the figures picked up by the earlier ADCP survey. The figures for the OCEL survey are lower than the ADCP figures because they are averaged figures for the drogues rather than the instantaneous figures picked up by the ADCP.

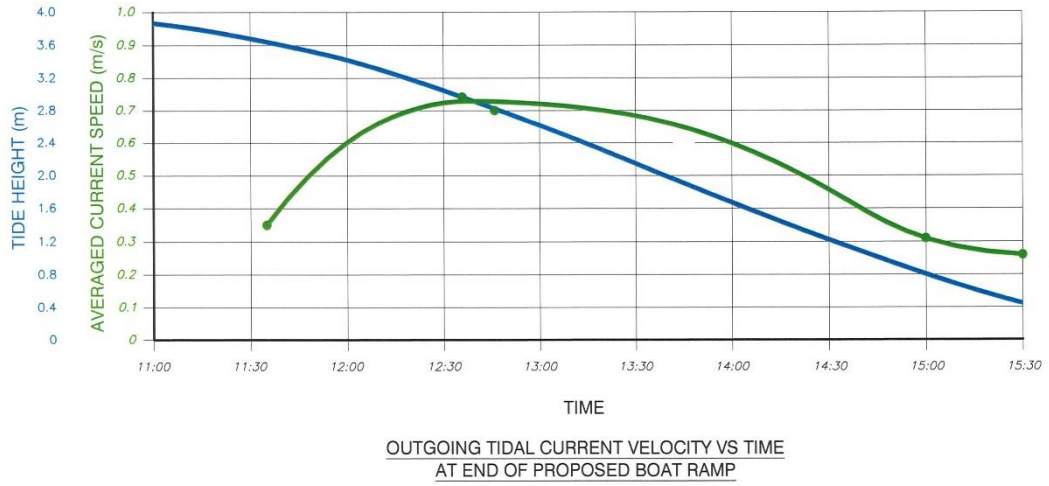
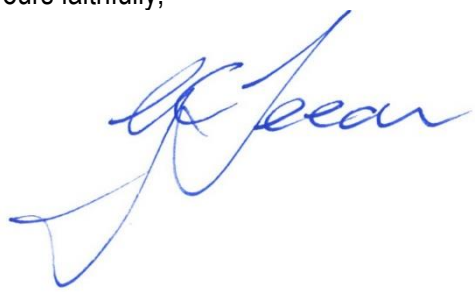


Figure no.2

Conclusions – Based on the flow measurements and the experience in operating on the location the proposed launching ramp can be used as an all tide launching ramp for experienced boat operators aware of the strong flow conditions once the boat is off the trailer. The skippers need to be situationally aware of how the flow is moving their boat, a situation can deteriorate rapidly in these conditions. Because of the strong flows across the ramp we do not recommend using plastic pontoons in this situation, boats can be pinned against the pontoons and find it difficult to get off and the pontoons represent an obstruction to the flow. From photographs we have seen there can be large accumulations of timber, logs and slash trapped against the Mapua wharf, these drifting elements would impact the pontoons and potentially damage them or at a minimum result in higher maintenance costs. At the time of the survey there was a large tree downstream of the wharf snagged on the seabed. The Anchorage plastic pontoons work very well in sheltered locations set back into the bank of the channel, or protected by a groyne that could deflect the logs and debris coming down the river. Setting the ramp back into the bank is not possible at Mapua because of the contaminated ground so it has to be groyne protection but just for the ebb tide. The flood tide currents are lower and manageable.

OCEL has engineered very successful Anchorage pontoon installations in Tauranga Harbour in channel locations where there are similarly strong flow conditions but the pontoons are not subject to these conditions the ramps being set back into the bank. In these cases there is normally a pontoon outside the protection set in line with the flow making it easy for a boat to come alongside and drop off passengers or the boat recovery driver. The boat launch and recovery operations are in sheltered water and easy to achieve.

Yours faithfully,



G.C.Teear – CPEng.

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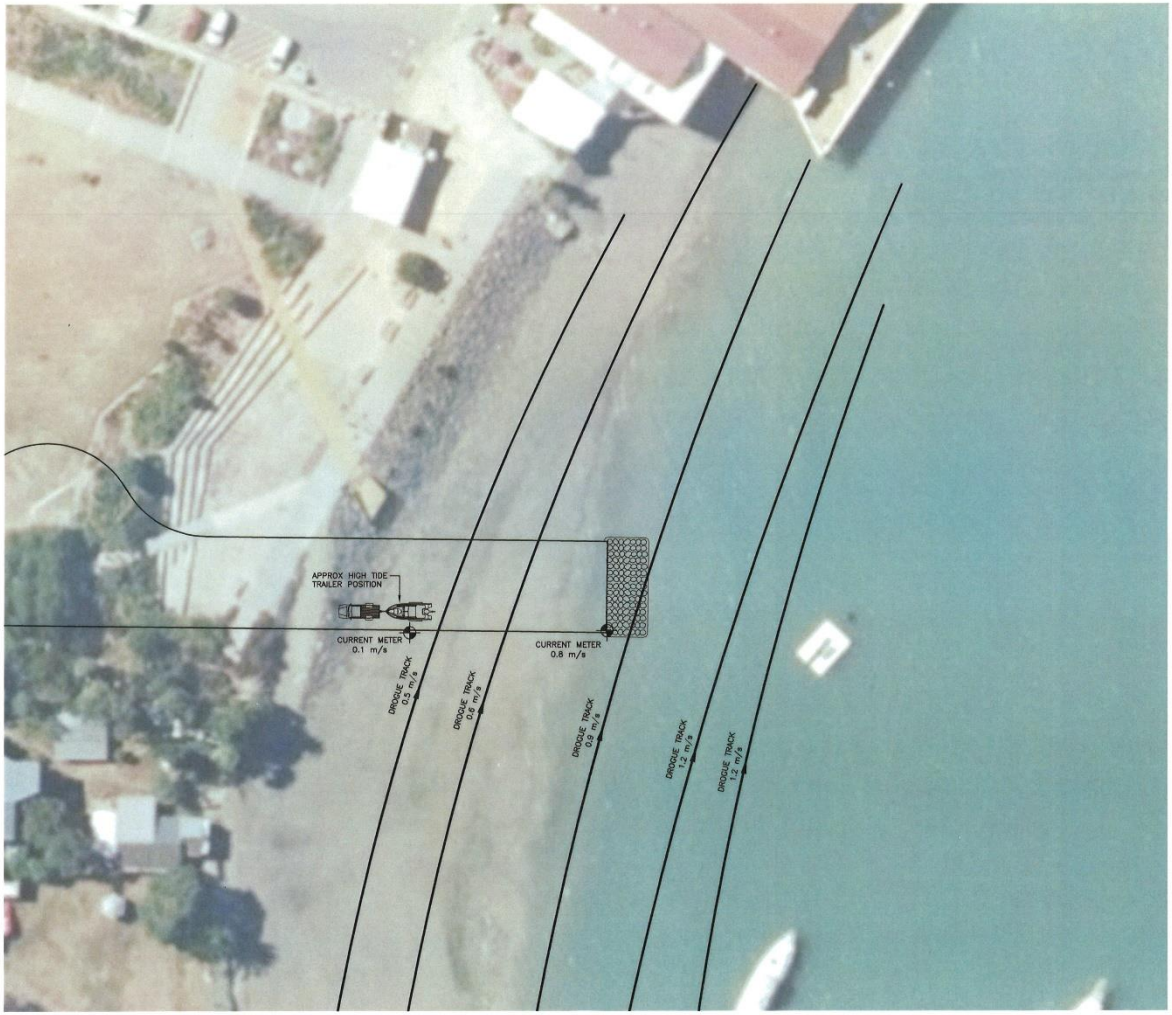

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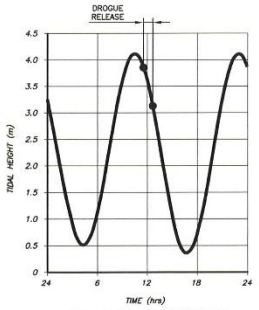

TIDAL CYCLE 21 MARCH 2023

0 10 20 30 40 50m

Scale 1:500

DO NOT SCALE FROM DRAWING

PLAN OF DROGUE TRACK ON OUTGOING TIDE AFTER HIGH TIDE

Scale 1:500

NOTE:

1. AERIAL PHOTOGRAPHY SOURCED FROM LINZ DATA SERVICE AND LICENSED FOR RE-USE UNDER THE CREATIVE COMMONS ATTRIBUTION 4.0 INTERNATIONAL LICENCE
2. RAMP DETAILS PROVIDED BY DAVIS OGILVIE
3. 1m/s = 1.94 KNOT

PRELIMINARY

Amendments	Rev'n	Date	Drawn	Issued for	Checked	Approved
PRELIMINARY ISSUE	1	04/04/2023	RVE	PRELIMINARY		

Drawn: RVE
Checked:
Traced:
Approved:
Date: 04/2023

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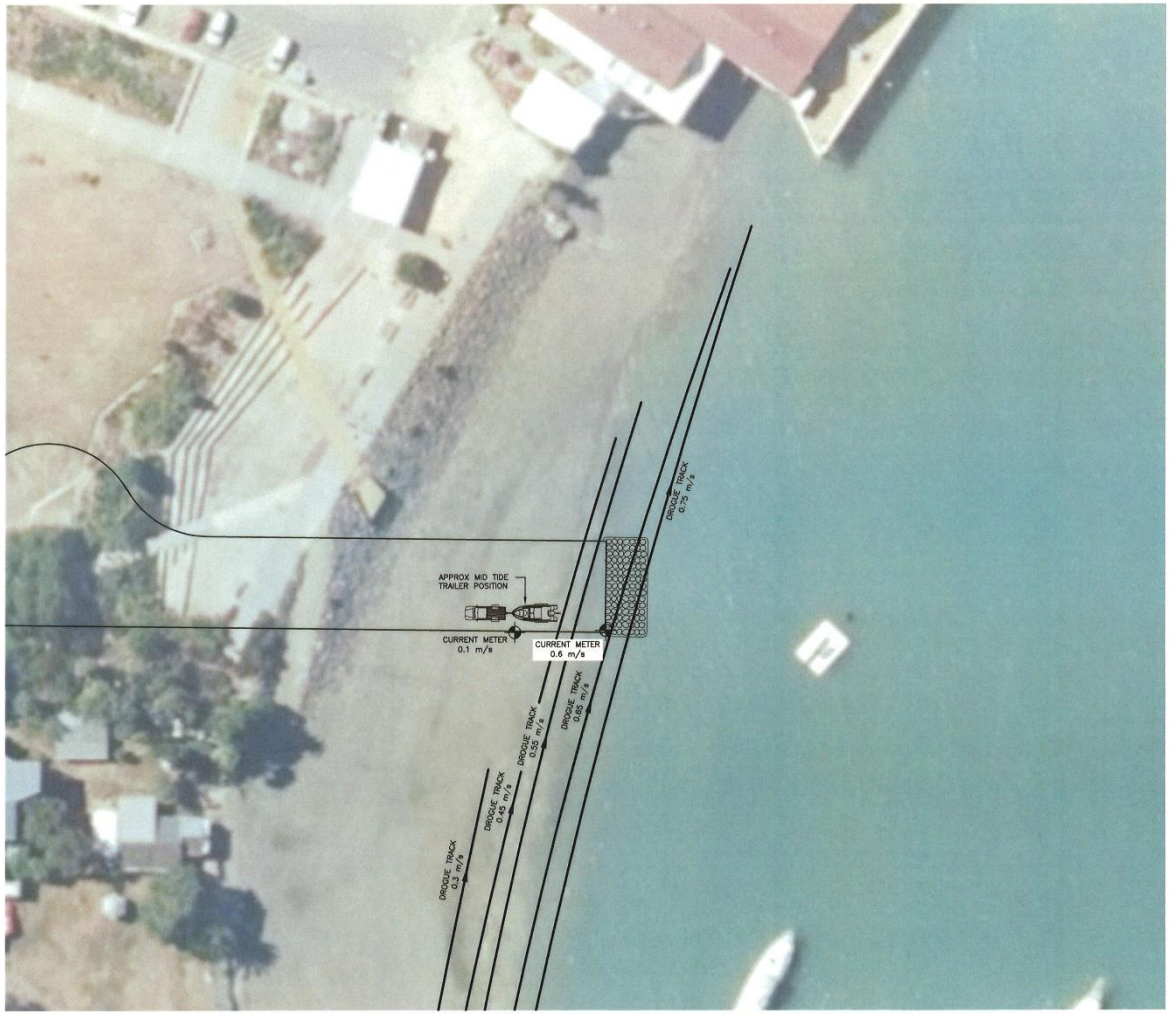
MAPUA BOAT RAMP COMMUNITY TRUST
MAPUA BOAT RAMP
CURRENT STUDY – HIGH TIDE OUTGOING

Scale (A3)	ACAD Filename
1:500	230202/DR-230202-005R1
Drawing No.	Rev.
DR-230202-005	1



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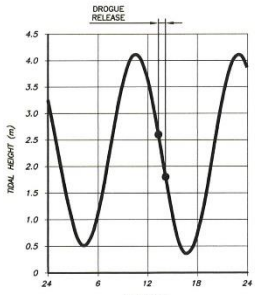
0 10 20 30 40 50m

Scale 1:500

DO NOT SCALE FROM DRAWING

PLAN OF DROGUE TRACK MID TIDE OUTGOING

Scale 1:500



TIDAL CYCLE 21 MARCH 2023

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CURRENT STUDY – MID TIDE OUTGOING

Scale (A3)	ACAD Filename
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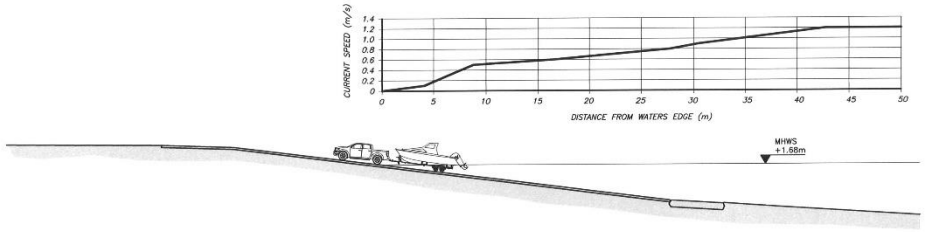
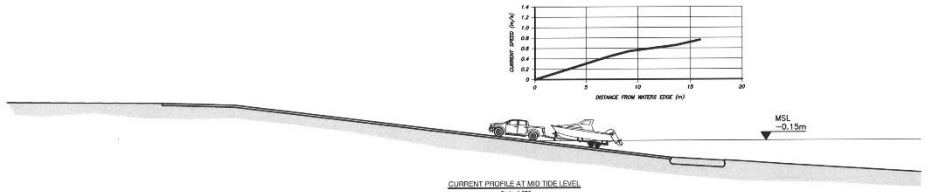
Drawing No.	Rev.
DR-230202-006	1



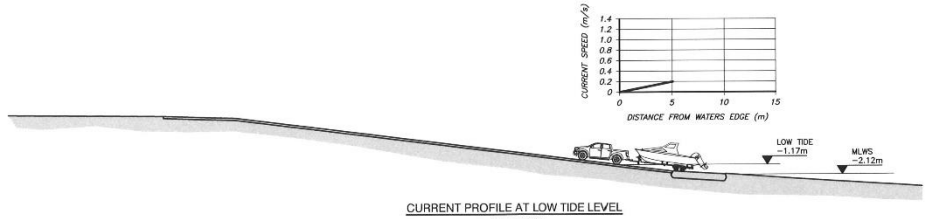
CURRENT PROFILE AT MEAN HIGH WATER SPRINGS

Scale 1:400



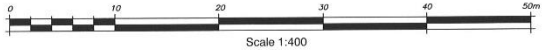
CURRENT PROFILE AT MID TIDE LEVEL

Scale 1:200



CURRENT PROFILE AT LOW TIDE LEVEL

Scale 1:400



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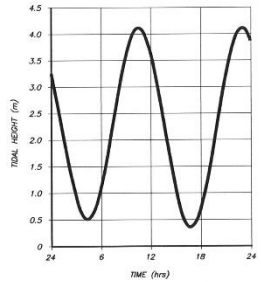

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MAPUA BOAT RAMP COMMUNITY TRUST

MAPUA BOAT RAMP

CURRENT STUDY – ELEVATION OF RAMP

Scale (A3)	ACAD Filename
1:400	230202/DR-230202-007R1
Drawing No.	Rev.
DR–230202–007	1