

Before the Independent Hearing Panel
Appointed by the Southland Regional Council

Under the Resource Management Act 1991 (**RMA**)

In the matter of an application by **South Port NZ Limited** to dredge parts of
the Bluff Harbour

Statement of evidence of Frank O'Boyle

29 March 2022

Applicant's solicitor:

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**anderson
lloyd.**

Qualifications and experience

- 1 My name is **Frank O'Boyle**.
- 2 I am currently employed as the Infrastructure and Environment Manager of South Port NZ Limited (South Port) and have held this position for 7 years.
- 3 I hold a Bachelor of Engineering (Civil) and a Diploma in Port Management. I have been a member of Engineering New Zealand since 2006 and a Chartered Professional Engineer since 2010.
- 4 I am a member of the executive leadership team at South Port responsible for providing and maintaining land, sea and wharf infrastructure associated with port operations as well as ensuring port operational practices comply with current safety and environmental standards.

Scope of evidence

- 5 I am providing this evidence on behalf of South Port, the Applicant for these consents.

Executive summary

- 6 In this evidence I outline the key parts of the capital dredging project, the history of dredging at South Port and the proposed equipment which will be used for dredging operations.

Scope of dredging works

- 7 The current 'draft' of the port is posted at 9.7m with the proposed dredging targeting a draft of 10.7m. During the hearing evidence, terms like 'draft' and 'chart datum' may be used when explaining the depth South Port want to achieve from this project.
- 8 Figure 1 below explains the relationship between 'draft' and 'chart datum'. 'Draft' refers to the vertical distance between the waterline and the bottom of the hull (keel). 'Chart datum' is the lowest level astronomical tide or the lowest level the tide is expected to fall.

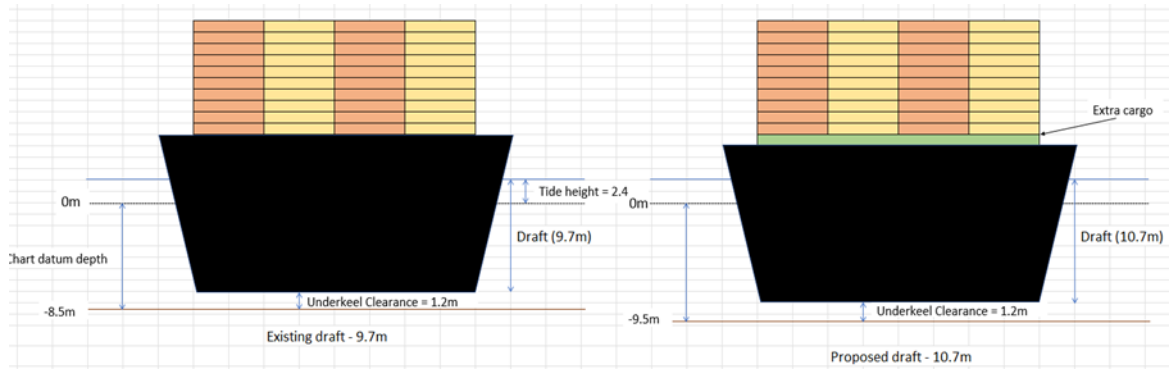


Figure 1: Relationship between draft and chart datum

- 9 The above illustration shows with an additional 1m of depth, the ship can sit deeper in the water by increasing the volume of cargo and therefore increasing the draft limit of the port.
- 10 Figure 2 below indicates the location in which the dredging will take place.



Figure 2: Scope of dredging

- 11 The red indicates where rock is likely to be encountered and where the drill and blast campaign will be focused to remove expected rock. The orange indicates where the trailer hopper suction dredge (THSD) will be used to remove softer sediments.
- 12 It is important to note that the not all areas shown above require 1m depth of material to be removed. The contour maps in Figures 3 and 4 below illustrate the different depths of material to be removed across the site.

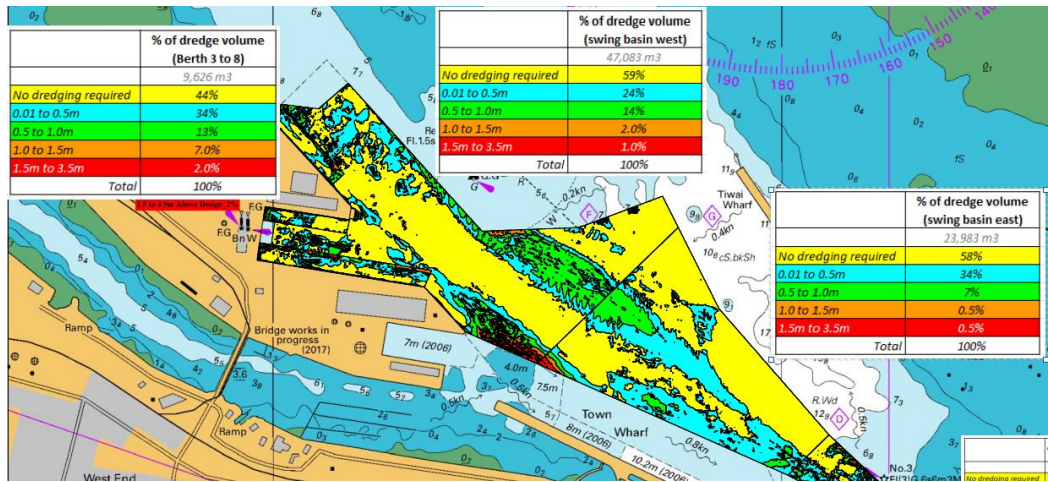


Figure 3: Area to dredge in swinging basin & berth pockets

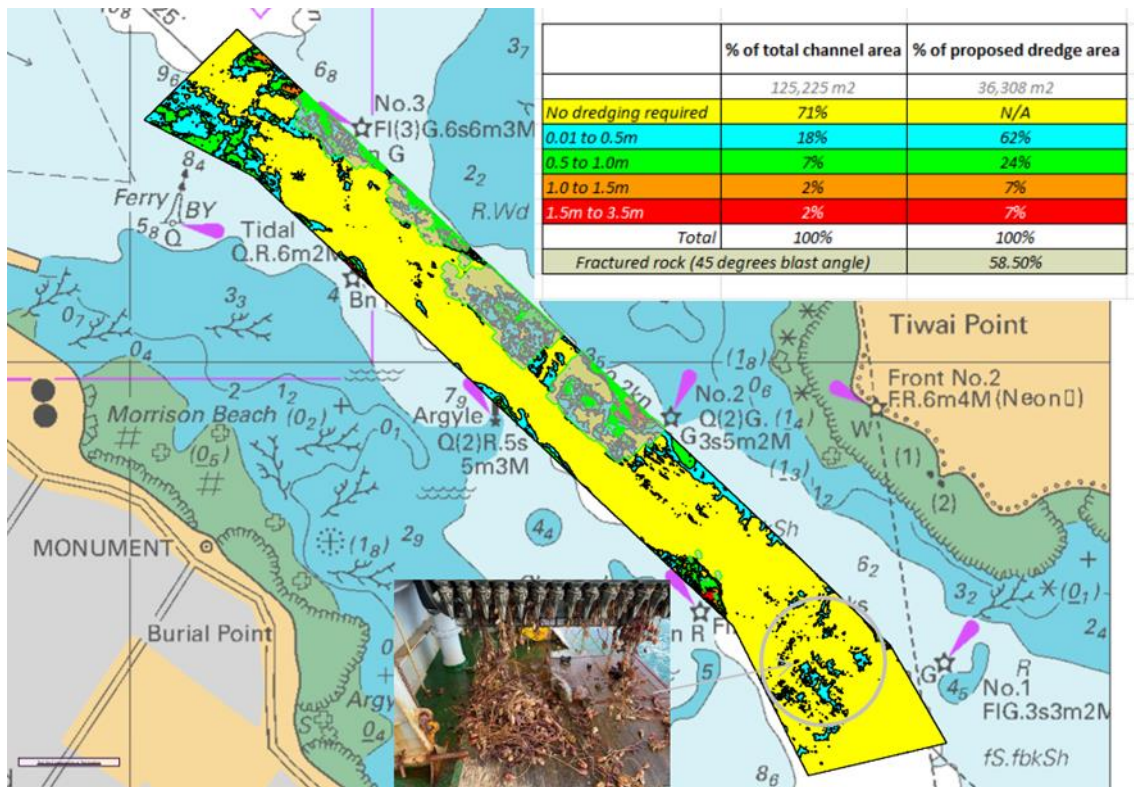


Figure 4: Area to dredge in Channel

13 Closer inspection of the 'high spots' recorded at the most eastern end of the entrance channel established the high spots are sea tulips (refer photograph in Figure 4). It is likely that when we start getting to depths of less than 0.3m in the channel, that this material is sediment sitting on top of a harder layer. The reason we make this assumption is because during several dive inspections, bedrock was only witnessed at Beacon No.2 and Channel Rock beacon, suggesting a layer of sediment sits on top of the rock in all other areas.

- 14 Another important thing to note is the area of the entrance channel is approximately 12.5 ha. The area which we will be drilling, and blasting is 3.3 ha, which indicates the majority of the channel is already deep enough and we are only looking to remove high spots. This is demonstrated in Figure 5 below.

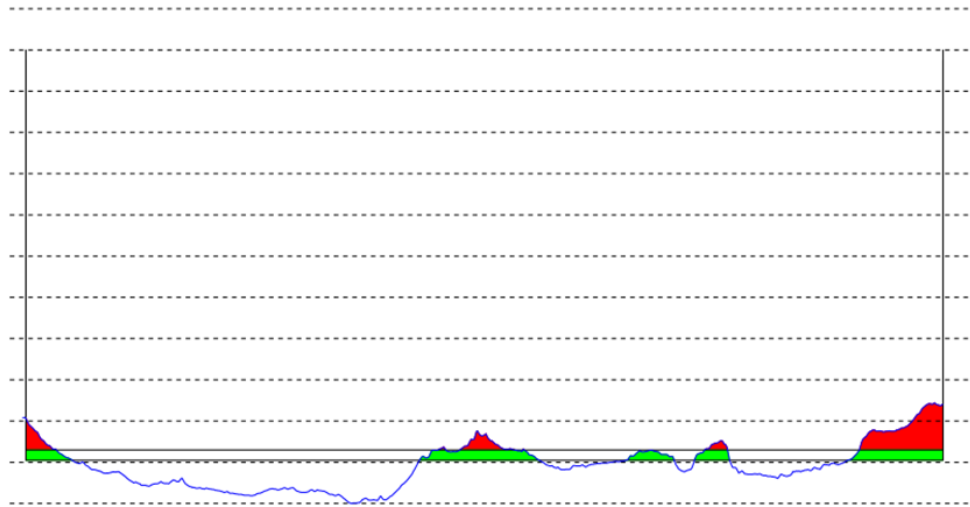


Figure 5: Typical cross section - removing high spots

Dredging at Bluff

Historic Timeline

- 15 The proposed location for dredging is a heavily modified environment having been dredged on multiple occasions in the past.
- 16 The following is a summary of the capital and maintenance dredging activities:

<u>When</u>	<u>Description</u>	<u>Type</u>
Pre 1960's	The then Southland Harbour Board operated its own bucket dredge and rock breaker	Capital
1960 - 1970	Island Harbour was built and commissioned over this period. This involved a significant amount of reclamation dredging	Capital
1968	In 1968 channel development and swinging basin capital dredging was established to assist Tiwai Aluminum Smelter	Capital
1979-80	McConnell Dowell engaged to increase channel depth to 9.7m draft Timaru Harbour Board Dredge engaged to clean up channel to complete project	Capital

1981-88	Southland Harbour Board continued drilling, blasting with its own equipment	Capital
1988-95	No records available	
1995-04	91,000m ³ of dredging by South Port owned equipment	Maintenance
2005	45,640m ³ of dredging by Port Otago owned equipment	Maintenance
2006-19	55,580m ³ of dredging by South Port owned equipment	Maintenance
2020	40,000m ³ of dredging by Trailer Hopper Suction Dredge	Maintenance

Highly modified area

17 The images below compare the maintenance dredging locations undertaken in 2020 by the Trailer Hopper Suction Dredge and the area proposed under our consent application. It reinforces the proposed area is already a highly modified area.

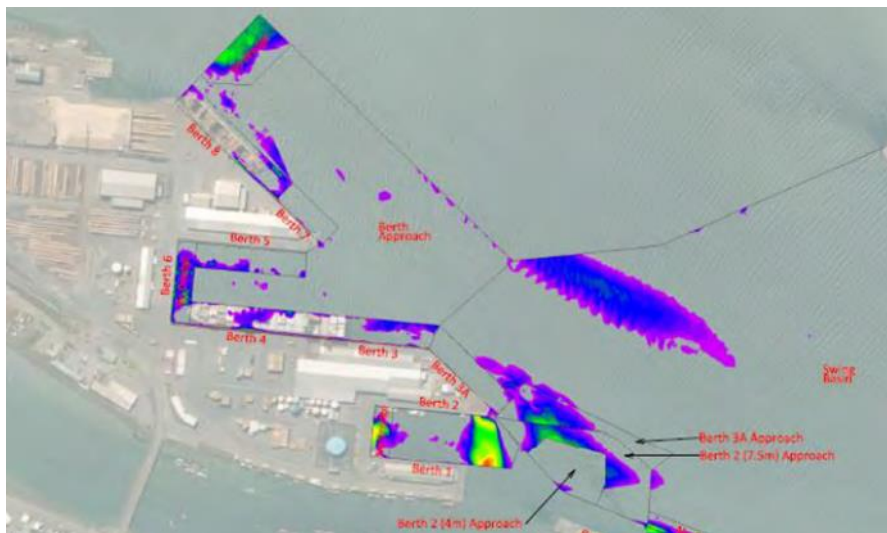


Figure 6: Areas dredged as part of 2020 maintenance programme

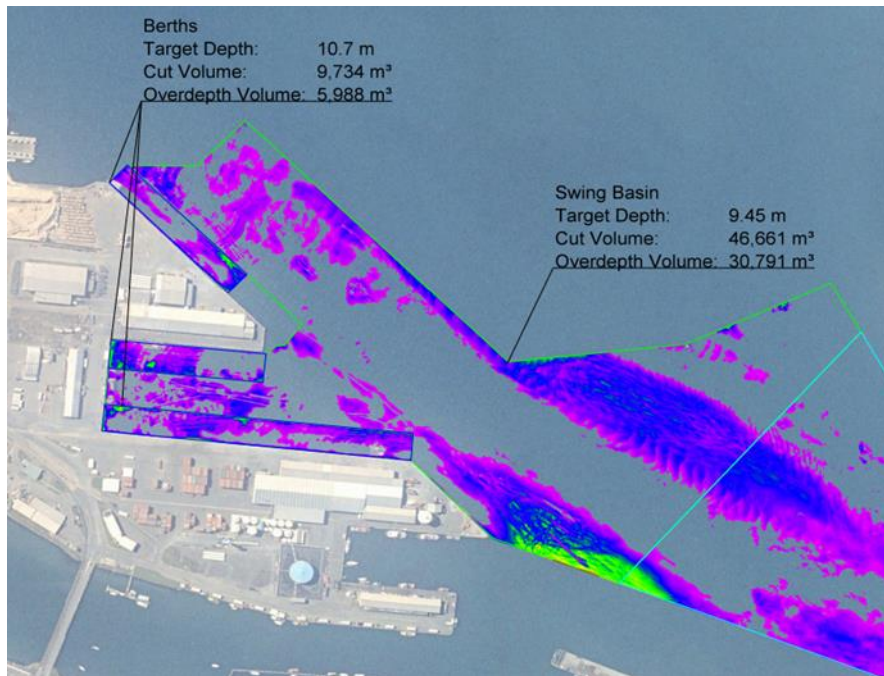


Figure 7: Proposed capital dredging

1979-80 Capital Dredging Campaign

(a) Drill & Blast Contract

- 18 This was the last major drill and blast campaign undertaken in the channel by South Port. McConnell Dowell were awarded the contract to fracture the rock. Their contract did not include dredging the fractured rock.
- 19 McConnell Dowell operated a barge with 3 drilling rigs.
- 20 The drilling of blast holes by McConnell Dowell was carried out with 3 x drilling rigs mounted on pontoon or barge. Initially, the required position of drilling was finalised using various positioning systems including laser beams from shore (where they intersected was where a hole was drilled). The drilling barge was brought to the drill site and held in position by anchoring.
- 21 The drilling towers were positioned over the specified drill hole location and drilling commenced. The drilling method used is called Over Burden Drilling (OD). In this method of drilling, a casing pipe is driven separately into the rock through the overburden for a distance sufficient to provide a seal to prevent small stones, sand, or silt from filling the drill hole. After the casing pipe is fixed, the inner drill rods are inserted through the casing pipe and the shot hole is drilled to the required depth. Upon reaching the required depth, drill rod is retrieved, and the hole is ready for charging with explosives. The explosives were placed into the hole just drilled. Once the

explosive is in place the casing is lifted to the surface and at the same time the detonating cord was pulled up to the surface with it.

- 22 Files show that each hole had approx. 5.6kg of charge but this varied depending on geological conditions.
- 23 McConnell Dowell were unable to drill and blast around the 'channel rock' beacon area because of the tide/current conditions. It was moving around too much. They could not stay steady long enough to complete drilling. The drill & blast contract closed soon after.

(b) Dredging Contract

- 24 As mentioned above the McConnell Dowell contract did not include dredging, so the Harbour Board were not able to determine immediately how successful the drill and blast campaign was. It was not until the Timaru Trailer Dredge (Orbel) was mobilized and completed their campaign that the Harbour Board could officially reset the Draft to 9.2m.
- 25 It is important to note that this dredge was a 'suction' dredge which means it could not pick up anything bigger than 150mm diameter. This means there was a lot of broken rock still left behind which was fractured by McConnell Dowell as part of their 1979/80 campaign.

(c) Harbour Board Dredging Campaign (1981-88)

- 26 The McConnell Dowell campaign in '79/80 left fractured rock on the seabed which was not picked up fully by the Timaru Trailer Dredge. Therefore, through the mid 1980's the Harbour Board was using their own plant to try and gain further draft. They had a clam shell bucket which they used to try and pick up fractured rock, but it was very difficult (equipment was not suitable). They engaged divers to roll small rocks into the clam shell bucket and then lift it up to the surface.
- 27 The harbour board also had a crane barge with a drill trying to knock off further high spots. This drill & blast process was slow and very inefficient and was subject to current/tidal constraints.
- 28 However, following this campaign, the Harbour Board reset their draft to 9.7m (8.5m CD) circa 1987 but just for 84m of the 107m wide channel. They were unable to remove rock at 'channel rock' and 'No.2' beacons, Refer Figure 8 below.



Image 8: Proposed capital dredging

Analysis of 1979-80 drill & blast campaign

- 29 South Port engaged Pro Dredging and Marine Consultants (“Pro Dredging”) in 2021 to undertake an analysis of the 1979-80 drill and blast campaign to determine what benefit this historic campaign would be to Project Kia Whakaū. Fortunately, South Port were able to provide the following information:
- (a) Horizontal position of each bore hole based on a bespoke reference grid created specifically for the drill & blast campaign (“D&B campaign”);
 - (b) Depth of bore hole relative to the sea bottom depth at each individual borehole location; and
 - (c) Amount of explosive used in each borehole.
- 30 Applying the digital data created from the D&B Campaign the analysis resulted in the following:
- (a) Conservative: 30 degrees blast angle:
 - (i) Expressed in area, 14,978 m² or 44.9% of the Channel’s total dredging area was fractured by the D&B Campaign.
 - (b) Realistic: 45 degrees blast angle:

- (i) Expressed in area, 20,743 m² or 62.2% of the Channel's total dredging area was fractured by the D&B Campaign.
- (c) Optimistic: 60 degrees blast angle
 - (i) Expressed in area, 23,519 m² or 70.5% of the Channel's total dredging area was fractured by the D&B Campaign.

31 'Blast angle' is explained below in Figure 9.

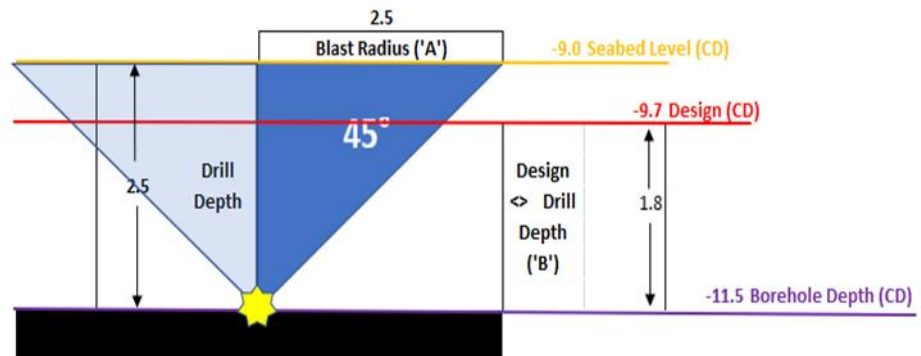


Figure 9: Blast angle explanation

32 The following images give an indication of the portion of rock in the channel which may already be fractured from the 1979-80 D&B campaign.

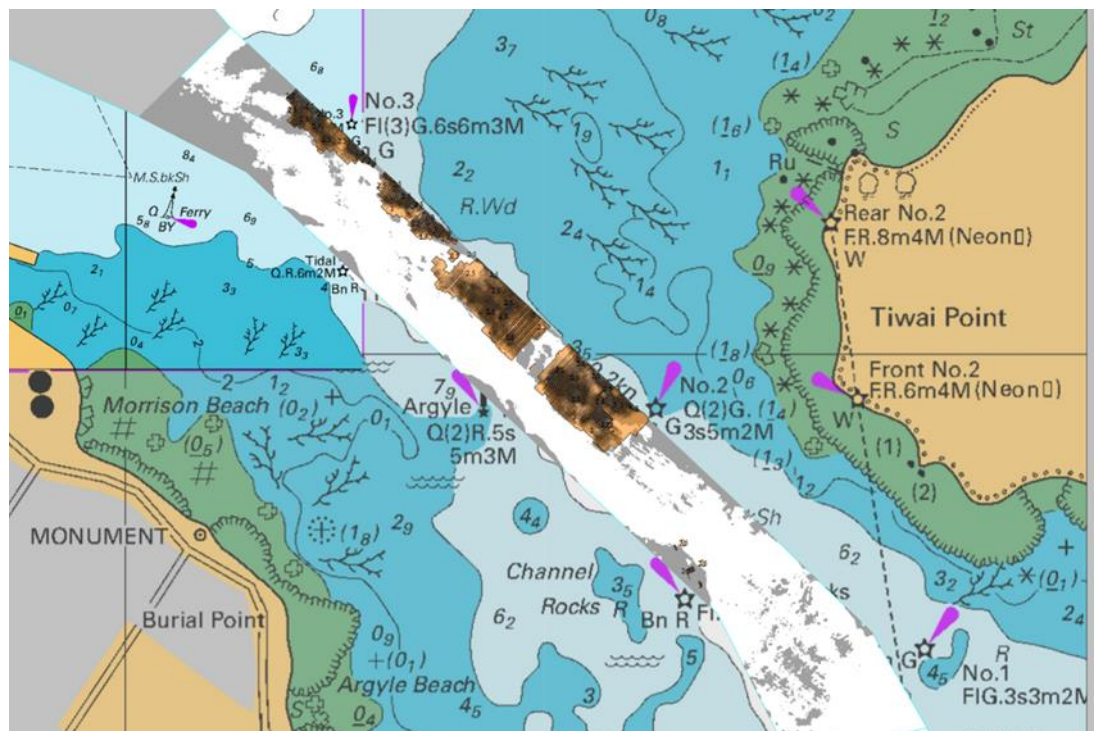


Figure 10: 30-degree blast

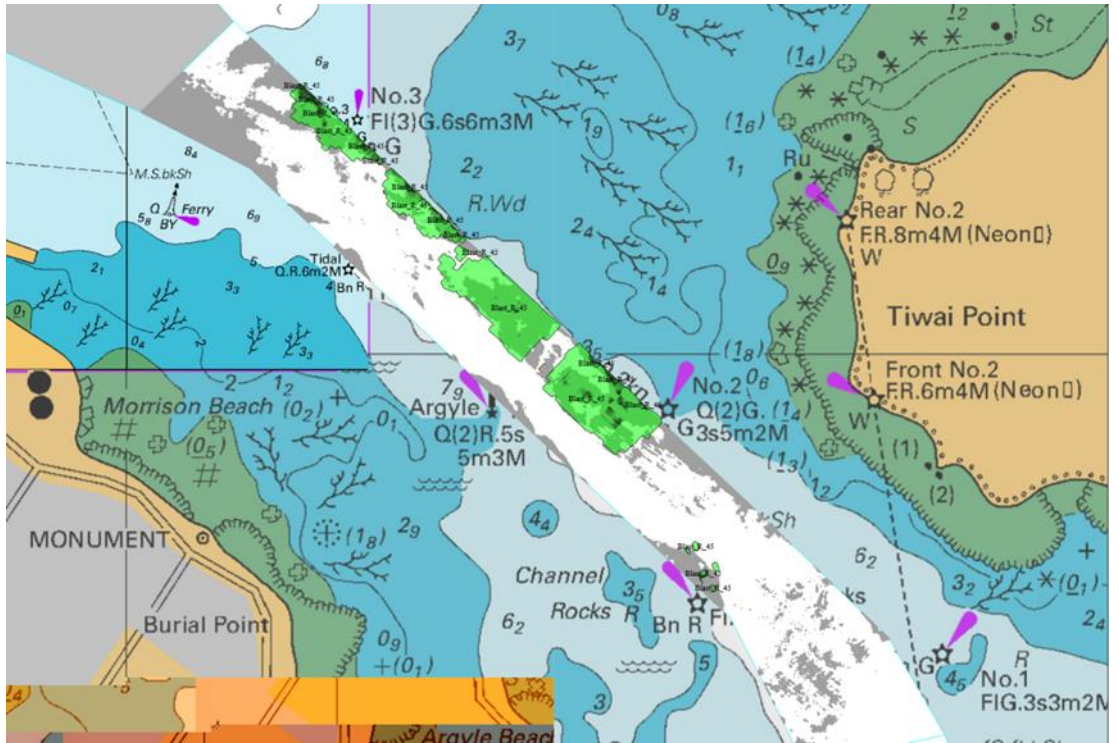


Figure 11: 45-degree blast

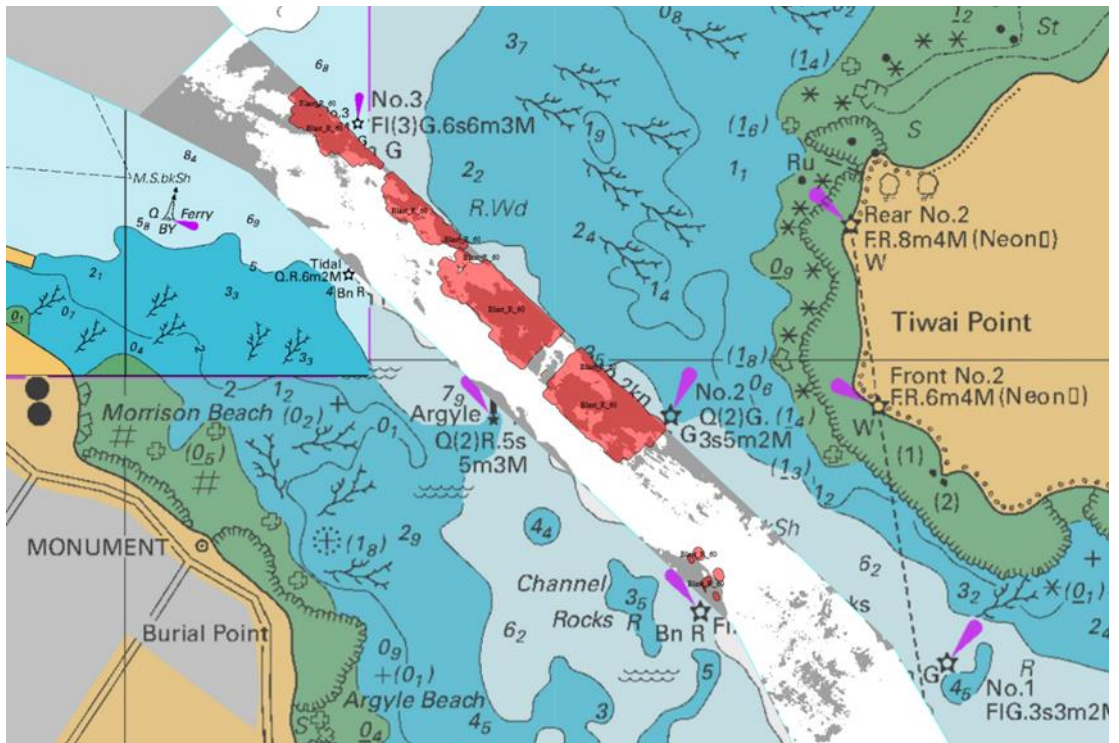


Figure 12: 60-degree blast

Geophysical survey

- 33 To complement the above analysis by Pro Dredging, South Port proposes to undertake a geophysical survey across the entire proposed dredging area including swinging basin and berth pockets.
- 34 In brief, this type of survey captures the electrical resistance of different type of materials. The data captured by this type of survey will not indicate what different materials exists of but rather that there is a change in materials. Similarly, it is expected that the electrical resistance test survey will differentiate between the fractured and non-fractured rock in the Channel.
- 35 At the time of writing, this survey has not taken place.

Deemed permit

- 36 As discussed above, the D&B Campaign of 1979-80 achieved a new draft of 9.7m. However, it should be noted that the target draft for the D&B Campaign was originally 10.24m (refer Figure 13) but for reasons described in Clauses 24 to 28 the Harbour Board was unable to achieve this target and settled at 9.7m draft in 1988.
- 37 Environment Southland has confirmed that the 1978 approval (Refer Figure 14) can be treated as a resource consent for the purposes of applying the maintenance dredging permitted activity status under rule 10.1.4 of the Southland Regional Coastal Plan. Hence, South Port is permitted to maintain the channel to 10.24m draft (0.54m deeper than currently posted draft).



Southland Harbour Board

Office 8159
Residence 8394

General Manager's Office

P.O. Box 1

Bluff

New Zealand

The Chief Executive Officer,
New Zealand Ports Authority,
P.O. Box 10-059,
WELLINGTON.

21 November 1977

Dear Sir,

Channel Widening & Deepening

It is now possible for the Board to make formal application to have the Authority examine the proposal to obtain authorisation to raise a loan of \$1,600,000 to complete the widening and deepening of No. 3 reach Entrance Channel of Bluff Harbour to obtain a depth of water of 12.04m at high water with a draught of at least 10.24m and so allow the major port users a greater utilisation of the larger bulk vessels now available in their respective trades. The Authority is aware the new high water draught will also produce a low water draught of 8.11m and allow of coastal wheat carriers and ships of similar type to use the low water draught for both entry and departure.

Ten copies of the application are therefore enclosed for your perusal.

Figure 13: 1977 Capital Dredging Application

51/2/11

29 May 1978

The General Manager
Southland Harbour Board
P.O. Box 1
BLUFF

Dear Sir

WIDENING AND DEEPENING ENTRANCE CHANNEL

I am pleased to advise that at its meeting on 24 May the Authority approved your Board's application dated 17 November 1977 to expend out of moneys to be borrowed by the Board the sum of \$1.6 million on channel widening and deepening.

The Authority however is of the opinion that the Board can finance these works without any recourse to a direct Government grant and will be advising the Minister accordingly so that the Deputy Prime Minister can be made aware of the position.

Figure 14: 1978 Capital Dredging Approval

Proposed methodology and equipment

Drill and Blast Contract

- 38 The material to be removed in the channel is expected to be high strength metamorphic rock with some high quality norite rock. This is dense and strong rock that must be blasted to fragment it so that the material can be dredged by an excavator.
- 39 Prior to the drill and blast campaign starting, we will dredge the channel with a specialist backhoe dredging barge fitted with spud piles. As discussed in Clauses 29 to 32, we expect there to be soft sediment and fractured rock in the channel which can be removed easily and as a result reduce the scope of drill and blast.
- 40 Once this 'maintenance' dredging is complete, and volume of rock known, we will then proceed to the drill and blast campaign.
- 41 The same backhoe dredge will also be used for the rock drilling operation. This involves employing a hydraulic rock drill mounted on the excavator dipper arm. The holes will be positioned in accordance with a predetermined drilling plan nominating each hole position in terms of Differential Global Positioning System (DGPS) coordinates.
- 42 A hydraulic rock breaker attached to the dipper arm of the backhoe excavator has also been proposed to supplement the drill and blast method.



Figure 15: Example of machinery being proposed

Trailer Hopper Suction Dredge Contract

- 43 The bulk of the material to be removed in the swinging basin area is silt and sand (refer orange area of Figure 2) and will be removed using a Trailer Hopper Suction Dredge. This dredging equipment was used successfully in

2020 when 40,000m³ of maintenance dredging in the berth pockets and swinging basin was completed.



Figure 16: Trailer Hopper Suction Dredge

Alternatives

Alternative locations for disposal of dredged material

- 44 SPNZ considered the disposal of soft sediment further offshore or inshore, however these options were ruled out as the former posed safety issues as a result of strong currents and prevailing winds, and the latter would not result in a stable beach environment; this is explained in the evidence of Gary Tear.
- 45 The disposal of rock to land was also considered initially, however this would have come at a much greater cost of an additional \$1.84M. Disposal of rock further offshore was also ruled out for the same safety concerns as above.

Alternatives to the proposal

- 46 SPNZ has considered whether the increase in freight task could be met by existing infrastructure such as by rail and / or road, utilising other ports, which was also raised in the submission by Forest and Bird.

47 As noted by Mr Gear in his evidence, the majority of cargo handled by South Port is located within 50km of the port. If this was not able to come to South Port, then it would need to be trucked to Dunedin. This would increase the volume of heavy traffic on our roads, increasing risk to safety, increased road maintenance and also creating a larger carbon footprint. The current quantities are equivalent to moving approximately 3,000,000 MT over an additional 200 km to Dunedin or 85,000 truck movements (160,000 including return trips) – for bulk cargo alone. Only a portion of container traffic could utilise existing rail and road options. SPNZ did not favour this option due to impracticalities.

Frank O'Boyle

29 March 2022