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 Simon Beale

29 March 2022

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Qualifications and experience

1 My name is Simon Herbert Beale.

2 I am a Director of Beale Consultants Limited, an independent ecology and planning consultancy.

3 I hold a Bachelor of Science in Zoology from the University of Otago and a Bachelor of Forestry Science from the University of Canterbury. I am a full member of the New Zealand Planning Institute and the Environment Institute of Australia and New Zealand (EIANZ). I am a Certified Environmental Practitioner.

4 In have been practicing as a planner and terrestrial ecologist for the last 28 years. During this time I have worked for a number of Government Departments and private sector firms including Stantec New Zealand (formerly MWH New Zealand Limited) where I was employed for a period of 22 years.

5 I have been responsible for the preparation in the resource consent application and in the co-ordination and critiquing of reports prepared in support of the application by a range of technical experts.

6 I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2014. This evidence has been prepared in accordance with it and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of evidence

7 I have been asked to prepare planning evidence in relation to the application by South Port to undertake capital dredging operations and associated activities in Bluff Harbour and outside of Bluff Harbour. The topics covered are:

(a) Background to the application;

(b) The proposal;

(c) The status of the application;

(d) Deemed coastal permit;

(e) Term of consent;

(f) The coastal environment;

(g) Effects of the proposal on the coastal environment;

(h) Stakeholder consultation;

(i) Policy alignment at national and regional levels;

(j) Part 2 RMA assessment;

(k) Submissions received;

(l) Section 42A Report; and

(m) Conclusions.

Executive summary

8 South Port is proposing to deepen Bluff Harbour in 2023 through a capital dredging campaign. The project has been given a Maori name Kia Whakaū which means strengthening, developing or refining an object or people.

9 The proposal will involve:

(a) dredging of soft sediment from the swinging basin and from the Island Harbour berth basins 5, 6 ,7 and 8;

(b) the rock breaking, drilling, blasting and dredging (removal) of rock material from rock outcrops within the harbour entrance channel and from the margins of the channel; and

(c) the deposition of dredged soft sediment and fragmented rock at two disposal sites located in Foveaux Strait offshore of Tiwai Peninsula.

10 The rock breaking, drilling and blasting, dredging and deposition activities associated with the capital dredging campaign are classified as discretionary activities in accordance with the relevant rules in the Southland Regional Coastal Plan (RCP).

11 South Port holds a deemed coastal permit under section 384(1)(c) of the RMA that allows for maintenance dredging of the harbour channel to a depth of 9.2 m CD. The permit allows South Port to remove any blasted or fragmented rock that remains in the channel from the previous capital dredging campaigns in the 1970's and 1980's. The permit will be utilised to remove any previously fragmented rock from the entrance channel in advance of the capital dredging works.

12 The coastal environment affected by the proposal encompasses Bluff Harbour, Awarua Bay, Tiwai Peninsula and Motūpohue and their

shorelines, the inshore waters of Foveaux Strait offshore of Tiwai Peninsula, South Port and adjacent port facilities and retail and residential areas of Bluff situated near the harbour.

13 The assessment of effects on the marine environment concludes that the effects of the proposed dredging and deposition of soft sediment will be low or minor. The dredging and deposition of the finer sediments or silts located at the berths will be undertaken on outgoing tides to avoid potential adverse effects on sensitive marine ecosystems in the upper harbour and around the Tiwai Rocks. Dredging and disposal of the finer sediments (silts) from the berth basins is expected to span no more than one week.

14 The assessment of effects on the marine environment, marine mammals and seabirds each conclude that the overall effects of the proposed rock breaking, drilling, blasting, dredging and disposal activities on marine fauna as minor or less than minor when implemented in conjunction with the following suite of avoidance and mitigation measures:

(a) Rock breaking, drilling and blasting will occur during the autumn, winter and early spring months to avoid marine species peak feeding and breeding times in the harbour, in recognition that some marine species migrate from the coastal zone to offshore or northern waters during the late autumn to winter months;

(b) Rock breaking, drilling and blasting will be restricted to daytime hours from 7.30 am to 6 pm to reduce disruptions to the amenity of the local community;

(c) Dredging at berth basins, in particular at berths 5 and 6, will occur during outgoing tides to avoid the migration of fine suspended sediment (silts) into the upper harbour and Awarua Bay;

(d) Sediment dredged from the berth 5 & 6 basins will not be deposited at the disposal site during slack tide where little or no wave action is evident;

(e) A ‘warning blast’ in open water of low peak pressure should be set off to remove mobile species from the area before each blasting operation commences. This blast would precede a ‘soft start’, whereby blasting effort begins at a slower timing building into the production shot;

(f) An acoustic harassment device situated on the backhoe dredge will transmit at all times whilst rock breaking, drilling or blasting is occurring to scare off mobile marine species; and

(g) Regular maintenance and up-keep of all rock breaking, drilling, dredging equipment and vessel (e.g., lubrication and repair of winches, generators) will be undertaken to lessen underwater noise production.

15 The coastal processes assessment concludes that changes to the channel entrance, swinging basin and berth basins as a result of dredging will have no noticeable effect on tidal current velocities and waves as the principal drivers of coastal processes.

16 The natural character, landscape and visual effects assessment concludes the effects on the natural character of the port area of Bluff Harbour and the Tiwai Point coastline will be low.

17 South Port has consulted widely with affected parties, including Te Ao Marama, Te Rūnanga o Awarua, the Department of Conservation, Forest and Bird, Bluff Community Board, local residents and recreational boating organisations.

18 The application has been assessed against the NZCPS, Southland RPS and Southland RCP and found to be consistent with the relevant objectives and policies.

19 The application aligns with Part 2 of the RMA.

20 Eleven submissions were received following public notification of the application on Saturday 11 December 2021. Two submissions from the Department of Conservation and Forest and Bird were in opposition and nine in support.

Background to the Application

21 South Port New Zealand Ltd (South Port) is a critical strategic asset for the southern region of New Zealand both as a lifeline utility and an international port.

22 Mr Gear in his evidence draws attention to the increasing size of vessels visiting the port, reflecting the response of the shipping community to meeting increasing freight volumes worldwide. This is presenting demands on port infrastructure such as South Port.

23 To cater for larger vessels to better service the supply chain the Board of South Port as noted by Mr Gear, made a strategic decision in 2019 to approve a port development master plan now known as Project Kia Whakaū. Project Kia Whakaū will entail the increasing of vessel draft or

seabed depth in the entrance channel by 1m through a capital dredging campaign.

24 The current depth of the entrance channel prevents ships from loading to their full capacity and therefore requiring a further NZ port visit before heading offshore. Increasing the channel depth by 1 m will enable ships to be fully loaded at Bluff enabling direct access to overseas ports, reducing costs to the Southland exporters and importers and increasing market competitiveness and supply chain efficiencies. Mr Gear also notes in his evidence that a deeper channel will lead to larger ships visiting the port on a less frequent basis which has a positive environmental outcome in reducing greenhouse emissions.

The Proposal

25 The proposal as described in the application involves dredging of the harbour entrance channel to a target depth of 9.7 m chart datum (CD) and also the dredging of the swinging basin to a target depth of 9.45 m CD and the Island Harbour berth basins to a target depth of 10.7 m CD.

26 Rock breaking, drilling, blasting and dredging of up to 40,000 m^3 of rock is proposed within the entrance channel. These activities will be undertaken using a backhoe dredger that will be secured to the seabed at various locations in the entrance channel using spud piles. Following each blasting operation the fragmented rock will be dredged and lifted into a split hopper barge and transported to a designated site offshore of Tiwai Peninsula for disposal.

27 The extent of rock breaking, drilling and dredging that will occur in the entrance channel as documented by Mr O'Boyle in his evidence is less than 30% of the total channel area. These activities will specifically target the high spots in the channel as illustrated on the coloured plans and cross section provided in Mr O'Boyle's evidence.

28 On most occasions the weight of explosive charge used to fragment the rock will be 10 kg owing to the shallow thickness of the rock requiring fracturing. On certain occasions a 25 kg charge will used to fracture thicker rock.

29 Blasting in the entrance channel will occur on one occasion per day between the hours of 7.30 am to 6 pm Monday to Saturday. Drilling will also be restricted to these hours while dredging will occur throughout the day and night on a 24/7 basis. Rock breaking would occur during the hours 7.30 am to 6 pm Monday to Saturday as and when required.

30 The dredging of up to 120,000 m^3 of soft sediment in the form of silts and sands is proposed in the swinging basin and Island Harbour berth basins. This activity will be performed using a trailer suction hopper dredge (TSHD). The TSHD is a multi-purpose vessel equipment designed to dredged fine sediment and the convey and discharge this material at an offshore disposal location. In this case this is a consented site offshore of Tiwai Peninsula used predominantly for the disposal of soft sediment during maintenance dredging operations in Bluff Harbour.

31 The TSHD will operate during the hours of 7.30 am to 6 pm Monday to Saturday.

32 The capital dredging of the harbour entrance, swinging basin and Island Harbour berths, including initial test drilling and blasting will span a period of 8 months, between 1 February and 30 September 2023. The timelines of the components of the proposed capital dredging campaign are set out in the programme provided as Attachment 2.

33 The dredging contractor has confirmed that blasting would occur on 120 days over the programmed 8 month duration of the project.

Status of the Application

34 The capital dredging of the seabed involving rock breaking, drilling and blasting of the seabed and disturbance of the seabed triggers Rules 10.1.3, 10.1.5 and 10.1.6 of the Regional Coastal Plan (RCP) respectively and are classified as discretionary activities.

35 The deposition of the dredged material on the seabed triggers Rule 10.2.5 of the RCP and is classified as a discretionary activity.

36 The discharge of water and contaminants (sediment) in the water to coastal waters triggers Rule 7.2.2.1 of the RCP and is classified as a restricted discretionary activity.

37 The overall status of the application is determined to be discretionary.

Deemed Coastal Permit

38 South Port holds a deemed coastal permit as confirmed by Environment Southland that provides for maintenance dredging of the entrance channel to a depth of 9.2 m CD. The permit allows South Port to remove any blasted or fragmented rocks that remains in the channel from the previous capital dredging campaigns in the 1970s and 1980s. South Port intends to utilise this permit to undertake maintenance dredging of the entrance channel in advance of the rock breaking, drilling and blasting operations. This is

programmed for January 2023, as shown on the programme. The permit expires on September 2026.

Term of Consent

39 A term of 10 years was sought in the application to cover any eventualities that arise beyond the control of South Port that could delay commencement of the project.

Coastal Environment

40 The coastal environment affected by the proposal encompasses the township of Bluff, Bluff Harbour, Awarua Bay, Motupōhue Mātaitai, Tiwai Peninsula and Foveaux Strait offshore of Tiwai Peninsula. The physical characteristics and natural, social and cultural values of the coastal environment are described in detail in the technical reports to the application and in the statements of evidence of Mr Teear, Ms Miller, Mr Childerhouse, Mr Stephenson and Mr Moore.

41 I have listed below the key attributes and values of the coastal environment identified by these experts.

42 The tidal flow patterns in the harbour provide for high tidal flushing that ensures high water quality for marine life.

43 The inshore coastal waters and productive intertidal sand flats at the head of Bluff Harbour and within Awarua Bay provide important feeding habitat for a variety of shoreline birds including migratory species, and support extensive seagrass beds that are important nursery grounds for fish.

44 The rocky shorelines and reefs at Tiwai Point and in the Motupōhue Mātaitai which contribute to habitat complexity provide abundant habitat for small invertebrates, fish and algal species and productive adjacent seabird feeding grounds in the Bluff Harbour entrance channel.

45 The nationally threatened Foveaux shag breeds on Rabbit Island at the head of the harbour and feeds in the channel waters of the harbour. The At Risk little penguin uses the rocky shoreline at the southern end of Bluff and at Tiwai Point for nesting and moulting.

46 Southern right whales, humpback whales and Hector's dolphins are occasional seasonal visitors to the coastal waters in and around the outer harbour and harbour entrance while killer whales, bottlenose and dusky dolphins, NZ fur seals and large fish such as sharks venture into the harbour in pursuit of schools of fish. The data collected from acoustic recorders deployed for over a year in and around the harbour entrance

showed that marine mammals have a low occurrence in the Bluff Port Area and are present for short periods.

47 The sandy seabed sediment in the swinging basin and most of the berths support resilient and common marine species with few infaunal and epifauna species recorded. The seabed at Berths 5 and 6 by comparison has high silt/clay percentages owing to the influence of minimal tidal flows.

48 The spoil disposal and rock disposal areas support low infaunal and epifauna abundance and diversity owing to the predominance of thick layers of dead shell hash across the sandy seabed.

49 The built environment of Bluff encompasses the port infrastructure operated by South Port at Island Harbour, wharfage facilities used by fishing and aquacultural industries and the Stewart Island ferry, warehouse and fuel storage facilities, recreational boating mooring facilities, retail and accommodation facilities and the residential areas of Bluff.

50 Awarua (Bluff Harbour) is of spiritual importance to Ngāi Tahu both historically and contemporarily. Important values include the spiritual value of the water, mahinga kai species and habitat and tauranga waka.

Effects of the proposal on the coastal environment

Positive Effects

51 The proposed capital dredging project will, as presented in the evidence of Mr Gear and in the background section to my evidence, yield significant benefits to South Port and the Southland economy by increasing the port's cargo handling capacity and turnover.

52 A deeper port as Mr Gear states will allow South Port to accommodate fully loaded vessels will benefit Southland’s expanding agricultural and forestry sectors and supporting industries through direct access to international shipping lanes resulting in reduced delivery timeframes and freight costs.

53 The proposed capital dredging project and in particular the deepening of the harbour entrance will improve navigational safety for vessels negotiating what is widely known to be one of the most challenging port entrance channels in New Zealand. This matter is raised by Mr Gear in his evidence and by an ex-harbour pilot who is one of the submitters in support of the application.

Effects on Geology of Entrance Channel

54 The evidence of Mr Stewart draws attention to the extent and orientation of defects in the rock either side of the channel which in Mr Stewart's opinion tend to weather out in distinct blocks or slabs. Mr Stewart expects this situation to occur during the blasting and dredging of bedrock within the channel, adding that blasting and excavation is more likely to break the rock out along preferential failure surfaces (foliation and joints) rather than through the rock mass. Mr Stewart adds that the potential for large scale instability or failure to arise along a consistent length of cut face is considered unlikely.

55 Mr Stewart also notes that the excavation of outcrops on the channel floor will not cause any notable slope stability issues as their removal will result in a planated or low relief surface on the sea floor.

56 On the basis of Mr Stewart's geotechnical assessment I conclude that the effects of proposed deepening of the entrance channel on the geology of the channel will be minor.

Effects on Coastal Processes

57 Mr Teear states in his evidence that the dredging of the entrance channel will cause a minor change in the channel cross-section resulting in a minor reduction to tidal flow current velocities and wave energy in the channel which he considers will be difficult to detect. Tidal current velocities and wave energy he notes are the principal drivers of coastal processes.

58 Mr Teear expects the deposition of sediment will have a minimal effect on tidal currents in the area while shallowing resulting from sediment deposition will increase the wave induced mobilisation rate of the deposited sand given that tidal currents and wave induced littoral drift are very efficient at dispersing the deposited sediment alongshore.

59 Mr Teear and Ms Miller recommend deposition of the dredged material on the outgoing tide to ensure the most readily suspended silt component will be moved in a west to southwest direction to the ebb tide delta and beyond to merge with the flow out of the harbour and then out into Foveaux Strait. In Mr Teaar's opinion the suspended material is unlikely to re-enter the harbour because the outgoing flow is concentrated in the south channel and would therefore be swept clear of the harbour entrance.

60 Mr Teear expects that a significant proportion of the sand component will be moved onshore by wave action owing to the shallowness of the disposal area and either be deposited on the beach or in the sand dunes backing

the beach, thereby protecting the hinterland which Mr Teear considers to be a form of beach nourishment.

61 Rock fragments deposited at the rock disposal site will according to Mr Teear, form a stable rock feature on the seabed up to a maximum height of 1 m. This will be achieved he states by the larger rock fragments sheltering the smaller rock fragments and being mutually supported by them, forming a permanent, low profile rock reef structure. Mr Teear considers the combination of the variability of the seabed, the proposed size of the rock deposits (0.5 m average) and the water depth avoids any significant wave refraction effects or any obvious shoaling or wave steepening over the rock fragments.

62 On the basis of Mr Teear's assessment I conclude that the effects of the proposed dredging and deposition activities on coastal processes will be less than minor.

Effects on Marine Ecosystems

Effects of Dredging of Fine Sediment

63 The effects of the project on marine ecosystems as presented by Ms Miller in her evidence arise from sediment mobilisation, deposition and pluming, removal of sandy seabed substrates, removal of rocky reef habitat, noise effects from rock breaking and drilling, blasting effects and effects of vessel biofouling.

64 Sediment with a moderate to high proportion of silts as occurs on the seabed in Berth 5 and 6, and 7 and 8, will result according to Ms Miller in sediment being mobilised into the water column and transported into areas of high ecological value within the upper Bluff Harbour and Awarua Bay, including the seagrass beds. Deposition of fine silts and reduced water clarity and visibility due to sediment pluming can have a detrimental effect on sensitive habitats and receptors such as seagrass beds, seabird feeding areas and rocky reef habitats according to Ms Miller. Ms Miller however considers the likelihood of suspended sediment being transported at concentrations that might be of ecological concern is small.

65 Areas of seabed proposed to be dredged beyond these berths are sandy and similar to the natural environments within the harbour and therefore expected by Ms Miller to result in a low level of effects on soft sediment habitats owing to their low diversity and low level of sediment mobilisation.

66 Ms Miller has estimated the time required to dredge the silts from Berths 5 & 6, and 7 & 8, is approximately 1 week.

67 Ms Miller however recommends limiting the timing of dredging of Berths 5 & 6, and 7 & 8, where the finer silts occur to slack and outgoing mid ebb tides to minimise the likelihood of deposition of silts in the upper harbour and Awarua Bay. Most importantly she recommends an adaptive and conservative receptor based approach to dredge management and sediment control to validate the findings as outlined above. This approach is detailed in the Adaptive Marine Management Plan and in Ms Miller's evidence. It will involve a system of triggers and management responses based on measurements from a turbidity meter deployed near sensitive ecosystem receptors. These triggers and management responses form condition 15 of the proposed consent conditions.

68 To further avoid any chance of suspended sediments causing an adverse effect on sensitive habitats, dredging of fine sediment is recommended by Ms Miller to occur outside of the flowering and most productive season for seagrass.

69 The implementation of these avoidance measures will ensure that any sedimentation and water clarity effects on sensitive habitats in the harbour are less than minor according to Ms Miller.

Effects of Rock Breaking, Drilling and Blasting

70 Ms Miller reports that underwater noise from rock breaking, drilling, blasting and dredging operations can cause adverse effects on mobile marine species such as fish, octopus, marine mammals, and seabirds. These effects potentially include mortality and internal damage including hearing loss and behavioural effects. She adds that constant noise from drilling, blasting, and dredging may affect marine species over an extended timeframe.

71 Ms Miller states in her evidence that the magnitude of effects on mobile species resulting from drilling and blasting is high to very high, depending on proximity of the individual animals to the drilling and blasting sites. Ms Miller however notes that dawn and dusk are the most productive times of the day for feeding which are outside of the times when drilling and blasting activities will occur.

72 The operation of a rock breaker as assessed by Mr Pine poses a risk of mortality or potential mortal injury in fishes with swim bladders involved in hearing. That risk is predicted to be within 10m of the operating rock breaker. No mortality or injury risk was found for fish without swim bladders, or those whose swim bladders are not involved in hearing.

73 Mr Pine advises that fish mortality associated with percussive rock drilling is not expected.

74 Mr Pine estimates the mortality threshold for fish subjected to peak pressure under the worst case blasting scenario ranges from 26 to 85 m.

75 In view of the scale of these potential effects Ms Miller recommends a range of mitigation measures to reduce the level of adverse effects from drilling and blasting. These are:

(a) Drilling and blasting should occur during the late autumn, winter and early spring months to avoid marine species peak feeding and breeding times in the harbour;

(b) Drilling and blasting should cease for a period of time at dawn and dusk each day which are peak feeding times for fish;

(c) A 'warning blast' in open water of low peak pressure should be set off to remove mobile species from the area before each blasting operation commences. This should be undertaken in conjunction with a 'soft start', whereby blasting effort begins at a lower rate and increases over the individual operation;

(d) An acoustic harassment device should be employed and be transmitting at all times while drilling or blasting is occurring; and

(e) Regular maintenance and up-keep of all dredging equipment and vessel (e.g., lubrication and repair of winches, generators) should be undertaken to lessen underwater noise production.

76 The warning blast, soft start to the blasting operation and use of an acoustic harassment device are designed to reduce the likelihood of mobile species venturing within the identified mortality blast zone of between 77 and 85 metres.

77 Ms Miller notes that the proposed timing of drilling and blasting aim to provide the year-round resident mobile species with respite from noise at their most active time periods each day whilst aiming to complete the works over the quickest timeframe manageable, so resident species do not suffer longer term behavioural effects where possible.

78 Through implementation of these proposed mitigation measures in addition to the mitigation measures proposed for marine mammals and seabirds, Ms Miller expects adverse effects of drilling and blasting on mobile marine species will be no more than minor.

Sediment Disposal Effects

79 Sediment analysis carried out by Ms Miller shows that the physical characteristics of much of the sediment to be dredged from within the harbour is similar to the sediment of the seabed within the disposal site. Ms Miller concludes the effects of disposal of dredged sediment on benthic fauna at the disposal site will be low because of the tolerance of the affected fauna to natural sedimentation processes, the mobile nature of the fauna present at the site and the similarity of the seabed sediments in the harbour, outside of the berth basins.

80 Sediment mapping undertaken by Ms Miller of the outer harbour area indicates that finer sediments deposited at the site will be readily re-distributed due to tidal currents and wave action. Mapping of tidal currents shows that any sediment that becomes suspended during disposal operations is highly unlikely to be deposited on the rocky reef habitats near the mātaitai or the Tiwai Rocks/harbour entrance during the majority of the tidal movements in this area. The sediment plumes generated during disposal of silts will be short in duration (up to one week) due to the small volume involved, as noted previously. Notwithstanding the short duration, Ms Miller recommends as a precautionary measure that the disposal of fine sediment should not occur during slack tide and when there is little or no wave action to avoid any possibility of mobilised sediment affecting shoreline areas in the harbour and around the mātaitai.

81 Ms Miller concludes that the effects of deposition of soft sediment at the disposal site on marine ecosystems will be no more than minor due to factors such as; the influence of the strong tidal currents and wave action, the tolerance of the infauna and epifauna communities to the effects of sedimentation and the recommended timing of the deposition of the finer sediments to outside a period of slack tide and when there is little or no wave action. In addition to this, the effects will be of a short duration.

Rock Spoil Disposal Effects

82 Seabed sampling undertaken by Ms Miller at the rock spoil disposal site shows that shell hash covers much of the seabed supporting a low diversity and low abundance of mobile infauna and epifauna species. While the deposition will result in the loss of soft benthic habitat and feeding grounds, the large size of the area, estimated at 130,000 m^2 by Ms Miller, ensures that large parts of the seabed habitat in the disposal site will remain unaffected by the deposition of rock fragments.

83 Given the low diversity and mobile nature of the infauna and epifauna, Ms Miller concludes that the effects of rock deposition on the soft sediment biota at this site will be no more than minor.

84 Disposal of rock offshore of Tiwai Peninsula as reported by Mr Teear and Ms Miller, will lead to the creation of a stable rocky reef habitat at this location. Ms Miller expects the reef to be colonised by a variety of seaweeds which in turn will provide habitat for sessile and mobile marine fauna and serve as a nursery area for certain fish species. This activity represents an ecological benefit at this location.

85 In order to confirm the effects of deposition of rock fragments on benthic biota are low and that mobilisation of the rock is not occurring in a shoreward direction, a monitoring regime of this site is recommended by Ms Miller. This will include dive quadrats for epifaunal and infaunal assessments.

Vessel Biofouling

86 Biofouling of the TSHD, backhoe dredger and split hopper barges will be undertaken as these vessels can potentially act as vectors for harmful or invasive organisms that exist in other ports around the country. Harmful species of seaweed for example have the propensity to rapidly colonise areas of seabed leading to a decline in the quality of habitat for resident marine biota and in extreme cases displacement of species. This issue was raised by DOC during a meeting with South Port, noting that any harmful organisms accidently introduced into Bluff Harbour could contaminate vessels used for research in ecologically sensitive areas such as Fiordland and the Subantarctic Islands.

87 As part of the risk management process designed to avoid the introduction of harmful organisms into Bluff Harbour, the TSHD and GPK vessel contractors will supply South Port in advance of the works with up to date vessel inspection reports.

Effects on Marine Mammals

88 The capital dredging activities that can potentially affect marine mammals as identified by Mr Childerhouse in his assessment and in his evidence, are underwater noise from rock breaking, rock drilling, blasting and dredging, lighting, increased vessel presence, sediment plumes, loose or slack lines and rubbish or marine debris.

89 These activities he states can cause physiological injury to hearing, behavioural disturbance, habitat exclusion and/or displacement,

entanglement, vessel strike, direct and indirect toxic effects and trophic effects.

Physiological Injury

90 Physiological injury from underwater noise as reported by Mr Childerhouse is generally considered to take two main forms: Temporary Threshold Shift (TTS), whereby hearing sensitivities return to pre-exposure thresholds after a period of time following noise exposure and Permanent Threshold Shift (PTS), where hearing sensitivities are permanently altered and do not return to normal following noise exposure. PTS can lead to a reduction in hearing threshold and reduced ability to communicate, echolocate and/or navigate. TTS could impact on an individual through reduced sensitivity and reduced effective communication or navigation.

91 Mr Childerhouse refers to the USA government standards developed by NOAA[1] (2018) that have become the international standard for assessment of TTS and PTS and have been applied in most RMA and Exclusive Economic Zone (EEZ) consent processes.

92 Mr Childerhouse reports that any assessment of TTS and PTS requires an understanding of the sonic footprint and frequency of underwater noise. Accordingly, the Styles Group was commissioned by South Port to undertake sound propagation modelling to understand the distance over which sound energy from rock drilling, rock breaking and blasting travels to assess exposure against TTS and PTS criteria. Mr Childerhouse adds that the underwater noise affects different groups of marine mammals given variations in hearing sensitivities. The modelling considered four groups of marine mammals that use the Bluff Port Area (BPA)[2]:

(a) LF – Low frequency cetaceans (e.g., most baleen whale species);

(b) MF – Medium frequency cetaceans (e.g., most dolphin species including killer whales);

(c) HF – High frequency cetaceans (e.g. Hector's dolphins); and

(d) OW – Otariiids (e.g. NZ fur seals and sea lions).

93 The results of the acoustic propagation modelling of three blasting scenarios undertaken by the Styles Group, as reported by Mr Childerhouse shows that any marine mammals within 17m to 841m, and 31m to 2001 m

[1] National Oceanic and Atmospheric Administration.
[2] The area within the Bluff Port Zone and areas used for sediment and rock disposal.

of the blast will receive PTS and TTS respectively depending on the species and blasting scenario considered.

94 A similar assessment of underwater noise from rock breaking operations was undertaken by Mr Pine of the Styles Group (Appendix 24) using the same NOAA standards and acoustic modelling approach. The modelling results show that any marine mammals within 11 to 181 m or 28 to 1,080 m of the rock breaking will be susceptible to PTS and TTS effects respectively, depending on the functional hearing groups concerned.

95 While the BPA appears to have no permanently residing marine mammals according to Mr Childerhouse, it is clear to him that any marine mammal passing through the BPA at the time of rock breaking and blasting would receive TTS and/or PTS effects depending on their exact location in relation to the activity and their sensitivity. Given the frequency of the blasting programme (up to 120 days over an eight-month period) Mr Childerhouse notes that there is a moderate to high likelihood that marine mammals will be within the TTS or PTS zones at some point during the rock breaking and blasting programmes. He has assessed the overall risk of rock breaking and blasting to marine mammals as significant in the absence of avoidance and mitigation measures.

96 Underwater drilling noise modelled by the Styles Group using the same NOAA standards shows that the thresholds for TTS or PTS is not reached under the modelling scenarios. Mr Childerhouse assesses the overall risk to marine mammals from drilling operations as less than minor.

97 Mr Childerhouse recommends a number of measures to ensure the physiological effects of rock breaking and blasting on marine mammals are either avoided or minimised to an extent that ensures these effects are less than minor.

98 An important component of the proposed avoidance strategy is the establishment of Marine Fauna Observation Zones (MFOZs) for four different marine faunal groups based on the spatial extent of the PTS and TTS for the three blasting scenarios. The MFOZs will be monitored by marine fauna observers (MFOs) engaged by South Port with the purpose of searching the MFOZs for presence of any marine mammals, little penguins, shags and large fish such as sharks. Any marine mammals, little penguins, shags and large fish observed in the MFOZs will result in a delay to charge detonation until the animal leaves the zone. Further details on the role of the MFOs and specific monitoring requirements are provided in the document titled “Marine Fauna Operational Plan”, attached as Attachment 8 to Mr Childerhouse’s evidence.

Behavioural Disturbance

99 Behavioural disturbance is defined as a change in “normal” behaviour of a marine mammal in response to an anthropogenic activity. Noise as reported by Mr Childerhouse has the potential to negatively affect marine mammals since they rely on underwater sounds for communication, orientation, predator avoidance and foraging as well as other acoustic clues such as nearby vessels. Examples of changes in behaviour includes reduced communication, feeding and/or social cohesion.

100 Mr Childerhouse expects that moderate or major behavioural changes would be expected of individual animals found within the immediate area during blasting with minor behavioural changes likely in those marine mammals transiting through the wider BPA area. Given these considerations, the potential for behavioural impacts from blasting has been assessed by Mr Childerhouse as having a moderate likelihood with an overall risk of minor to more than minor. The potential for behavioural impacts from rock breaking and drilling under these same considerations is assessed by Mr Childerhouse as less than minor and negligible respectively. Mr Childerhouse considers there to be no behavioural impacts from dredging and a less than minor risk from suction dredging.

101 Mr Childerhouse proposes the same avoidance approach for addressing the effects of blasting on behavioural disturbance, i.e., involving the monitoring of the MFOZs and delaying blasting when marine mammals are observed in the zone.

Habitat exclusion and/or displacement

102 Habitat exclusion and/or displacement is where marine mammals are unable to use an area due to direct impact from anthropogenic activities and is a form of behaviour disturbance. Mr Childerhouse considers habitat exclusion and /or displacement would occur over the duration of the dredging project, especially due to underwater noise generated from rock breaking and blasting where exclusion could extend for kilometres from the source.

103 Mr Childerhouse considers the duration of exclusion or displacement may be relatively short but highlights the degree of uncertainty around the actual impact area due to a lack of data. Accordingly, Mr Childerhouse also proposes an avoidance or precautionary approach to addressing habitat exclusion effects through monitoring of the MFOZs.

Entanglement and Vessel Strike

104 Mr Childerhouse assesses the risk to marine mammals from entanglement (e.g., from tow lines) and vessel strike as low for all species likely to visit the BPA but note that impact on any one individual animal could be major. This risk can be reduced through appropriate and strict operational procedures being adhered to over the duration of the project such as avoidance of loose ropes and ensuring proper waste management measures are in place at all times.

Direct and Indirect Toxic Effects

105 Direct and indirect toxic effects arise where an individual mammal is directly affected by a toxin or contaminant through ingestion, breathing or absorption or indirectly through ingesting prey that also carry contaminants.

106 Mr Childerhouse assesses these potential effects as being non-applicable given the low level of contaminants recorded in the soft sediments to be dredged, the short term exposure to any sediment plumes generated during sediment disposal and high dilution rate from mixing by currents and waves.

Trophic Effects[3]

107 In view of the large scale home ranges and generalist feeding strategies of most marine mammals Mr Childerhouse considers that any localised impacts to potential prey species such as from sediment disposal are unlikely to have any substantial flow-on effects to marine mammal populations. Mr Childerhouse concludes that the short time period that marine mammals spend in the BPA means that trophic effects are highly unlikely.

Effects on Seabirds

108 Mr Stephenson in his assessment identified five potential effects of the project on seabirds. These are:

(a) Disturbance of breeding, feeding or roosting birds from elevated levels of above water noise, from both drilling, rock breaking and blasting regime, and dredging;

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[3] Indirect ecosystem effects on marine mammals due to potential food-web alterations.

(b) Disturbance of breeding, feeding or roosting birds from elevated levels of below water noise, from both drilling, rock breaking and blasting regime, and dredging;

(c) Decreased food availability due to temporary sediment plumes in the berths in Bluff Harbour, and adjacent to the sediment disposal site;

(d) Temporary reduction in available feeding habitat due to removal of prey substrate and disturbance, changes in prey distribution and increased vessel activity in the area causing disturbance to foraging birds; and

(e) Direct impacts from the underwater blasting, including injury or death.

109 The key species of concern identified by Mr Stephenson is little penguin owing to the existence of suitable breeding habitat as well as suitable moulting areas in and around Bluff Harbour.

110 Breeding occurs from August through to February followed by a two-week post breeding moult. The most sensitive time for breeding pairs is during the chick provisioning period between October and December which is outside of the capital dredging work programme. Mr Stephenson notes that during the breeding season adult little penguins travel to and from their breeding burrows during sunrise and sunset hours. The restriction of drilling, rock breaking and blasting to between 7.30 am and 6 pm as proposed by South Port is therefore unlikely in the opinion of Mr Stephenson, to have a significant impact on penguins coming and going from their breeding sites as the proposed work hours will greatly reduce penguin interactions or exposure to these activities. Mr Stephenson adds that if penguins find the level of disturbance greater than what they are prepared to tolerate it is likely they will avoid breeding in the vicinity of the Port and find another location where there is less disturbance.

111 Mr Stephenson considers elevated noise levels from drilling, rock breaking and blasting is also unlikely to cause significant harm to moulting penguins particularly those moulting in burrows near the port where they are accustomed to noise related disturbances.

112 The effects of drilling, rock breaking and blasting as assessed by Mr Stephenson, will create noise at levels that will interfere with foraging at varying distances up to approximately 2 km depending on the activity and blasting scenarios. Mr Stephenson advises that the areas of noise impact from these activities represent relatively small proportions of the foraging range of little penguins which he states is mainly within 10 km of their breeding site.

113 Mr Stephenson recommends that the marine mammal observation programme as proposed by South Port includes little penguin and other diving birds. This would ensure cessation of blasting if little penguins and other diving birds are observed within the TTS marine mammal (OW) observation zone by the MFOs. Mr Stephenson also supports the proposed use of warning blasts and soft starts at the commencement of the blasting programmes to deter these birds from the blast zones where they are at risk from injury or mortality.

114 Shags, gulls and terns are also likely to be affected by the works according to Mr Stephenson due to effects outlined above. Mr Stephenson also recommends cessation of blasting if these birds are observed in the water by the MFOs.

115 The other seabird categories: waterfowl, albatross, petrels, shearwaters and their allies, herons and shorebirds are considered by Mr Stephenson as less at risk from drilling, rock breaking and blasting activities. This is due to their known distributions, habitat requirements, the low above surface modelled noise levels associated with dredge operations and avoidance measures proposed by South Port around timing of dredging of fine sediments to protect feeding habitat around the upper harbour and Awarua Bay.

116 Mr Stephenson notes that the sediment plumes generated during dredging of the berth basins and disposal represent a very small portion of the potential foraging range of the affected seabirds, including penguins.

Effects on Coastal Water Quality

117 The dredging and discharge of the finer sediment or silts from the berths 5 & 6 and 7 & 8 will generate a sediment plume around the TSHD vessel resulting in elevated turbidity levels in the water column. However the use of a ‘green valve” as proposed by the TSHD operator serves to reduce sediment mobilisation in the water column by preventing air being entrained in the overflow from the TSHD allowing the suspended material to settle on the seabed closer to the dredging site.

118 The discharge of dredged sediment from the swinging basin which comprises predominately sand, is expected to resettle to the seabed without resulting in the generation of a significant sediment plume or turbidity levels elevated beyond naturally occurring levels.

119 Sediment mobilisation and distribution mapping undertaken by e3s shows that the sediment plume arising from the dredging and disposal of the finer sediment will be rapidly dispersed on the ebb tide out into Foveaux Strait.

Based on this mapping exercise, turbidity levels are expected to decrease rapidly beyond the berth dredging and disposal sites due to rapid mixing caused by tidal currents and wave action.

120 Ms Miller has assessed the effects of dredging and disposal of soft sediment on coastal water quality as minor on the basis of the degree of mixing of the receiving waters especially at the disposal site, the low proportion of fine silts in the dredged sediment, the low concentration of measured contaminants in the dredged sediment and the lack of discernible effects on the composition of the benthic infaunal and epifaunal communities following previous dredging and disposal activities.

121 It is expected that the zone of reasonable mixing will be limited to an area of coastal water immediately surrounding the TSHD when discharging dredged soft sediment. Sediment with a high silt fraction is expected to be rapidly mixed in the water column beyond the TSHD as assessed by Ms Miller and Mr Teear.

Effects on Natural Character and Landscape Values

122 The effects of the dredging related activities (channel deepening, presence of dredges, the generation of water boils from blasting and sediment plumes generated during dredging and disposal of dredged sediment) on the natural character of Bluff Harbour and the Tiwai Point Open Coast have been assessed by Mr Moore as low. Mr Moore attributes this low score to:

(a) the highly modified environment of Bluff Harbour and its proximity to the work sites;

(b) the absence of any impacts on the shoreline or terrestrial environment;

(c) the short term and transient nature of the blasting and dredging activities;

(d) modifications by previous blasting and dredging operations;

(e) minimal impacts on tidal flows, as reported by OCEL (Appendix 5);

(f) the short duration of water boil effects; and,

(g) rapid dispersion of sediment plumes due to the nature of the local tidal currents and high energy wave climate beyond the harbour.

123 Mr Moore assessed adverse landscape character effects of the dredging activities in Bluff Harbour and disposal activities off the Tiwai Point Open Coast as very low to minimal respectively. Mr Moore attributes the low level of landscape character effect on:

(a) the capacity of the highly modified Bluff Harbour and wider Tiwai Point coastal environment setting to absorb change;

(b) the presence of dredge vessels in an area of significant shipping activity;

(c) the general lack of visibility of the sediment and rock disposal sites offshore from the Tiwai Peninsula Beach; and,

(d) minimal modification to the naturalness of the seabed at the disposal sites.

and in addition, the temporary nature of the effects associated with the dredging works, including temporary adverse effects of sediment plumes on water quality due to rapid dispersion.

124 Mr Moore has determined the proposed dredging works will have no long term visual effects owing to the transient nature of the works. MMLA add that the presence of dredge vessels, water boil effects and sediment plumes will not appear out of place, and nor are they inappropriate in the context of a working port environment.

Airborne Noise Effects

125 Noise levels generated from the operation of a rock breaker and drilling and dredging machinery and air-overpressure noise levels from underwater blasting that will be experienced by Bluff residents and other receivers have been predicted by the Styles Group (SG) using computer noise modelling software.

126 The dredging noise will consist of two elements, noise generated from the hydraulic system on the backhoe dredger and noise generated during the loading of fragmented rock into the split hopper barge. The hydraulic drilling noise experienced by the receivers will be similar to a pile driving sound.

127 The noise level predictions, including blast overpressure levels were assessed using the guideline limits for works of a long term duration prescribed under the construction noise standard NZS 6803. The primary focus of the noise assessment is the night time noise levels received by the nearest residential receivers on Marine Parade during dredging. Analysis

of wind data was undertaken as meteorological conditions influence the noise predictions.

128 Drilling noise levels are predicted by Mr Styles to range from 56 to 60 dB L_{Aeq} at the Marine Parade residents which achieve compliance with the noise standard during the day from 0730 to 1800 Monday to Saturday. On the basis of these predictions drilling and hence blasting activities are recommended to be restricted to these hours owing to the exceedance of the NZS 6803 night time noise limit of 45 dB L_{Aeq}. NZS 6803 provides for noise levels up to 70 dB L_{Aeq} at residential and rural receivers during the day time.

129 Mr Styles has assessed the "worst case" above water noise emissions from a rock breaker on land-based receivers. The highest noise level arising from the rock breaker on the receivers as predicted by Mr Styles is 58 dB L_{Aeq} when the rock breaker is operating continuously close to the Bluff receivers in meteorological conditions that enhance propagation of noise towards Bluff. Mr Styles notes this complies comfortably with the NSZ6803 standard of 70 dB L_{Aeq} during the daytime (0730 -1800). Mr Styles expects that noise generated from machinery operating underwater will be at least 10 dB lower than the same operation above water. Further details are provided in an advice note to South Port (Appendix 25) in the application.

130 Dredging noise levels are predicted to be 45 dB L_{Aeq} at three residences on Marine Parade when meteorological conditions impede noise propagation towards Bluff, i.e., when the wind blows from between 180 degrees and 315 degrees at speeds over 1 m/s. All other residences will receive noise levels no greater than 45 dB L_{Aeq}. When conditions assist propagation towards Bluff, the predicted noise levels received at 23 residences on Marine Parade range from 46 to 50 dB L_{Aeq} for various dredging positions in the entrance channel. These noise levels are predicted to occur on approximately 59% of the total number of nights that dredging may take place. Mr Styles recommends that a Project Noise Standard of 50 dB $L_{Aeq.}$ is accordingly applied to night time dredging activities.

131 With respect to the TSHD dredging activities, Mr Styles has assessed the noise levels from the vessel will be compliant with the project noise standard due to an operational separation distance of at least 300 metres from any noise sensitive receiver in Bluff.

132 Overall Mr Styles advises that daytime noise levels for all project activities, including rock breaker operations, drilling and dredging will comply with the guidelines noise limits set out in NZS 6803.

133 Above water blast overpressure levels were calculated by Mr Styles for the three blasting scenarios as described in Section 5.4.1 using the criteria in the Australian Standard AS2187:2 – 2006 Explosives - Storage and Use. These calculations showed that blast overpressure predictions are significantly below the recommended limit in NZS 6803 of 120dBC irrespective of the attenuating influence of the water column. Mr Styles concludes the airborne noise effects of blasting to be negligible.

134 In regards to the night time noise levels predicted during dredging that exceed 45 dB L_{Aeq} at some residential receivers in Bluff and the potential for sleep disturbance, Mr Styles recommends the following specific noise mitigation measures:

(a) The backhoe dredger must be fitted with a high quality muffler to reduce the overall excavator noise levels to no greater than 66 dB L_{Aeq} when measured at 50 m from the loudest side of the excavator;

(b) The hopper barge must be lined with timber or some other lining that prevents rocks from impacting on any steel;

(c) All drilling and dredging equipment should be regularly maintained (e.g. lubrication, and repair of winches, generators) to lessen above surface noise production; and

(d) When backhoe dredging work commences at night, the consent holder should communicate effectively with the residents, predominately along Marine Parade. The communication should ensure that residents know about the timing and duration of night work that will be audible in some meteorological conditions, and that closing bedroom windows will assist in reducing noise levels.

135 For the avoidance of doubt, Mr Styles notes the noise level predictions demonstrate that a reasonable internal noise level will be achieved, even with windows partially open for cooling and ventilation. Mr Styles adds that South Port is not relying on the occupants of dwellings to close their windows to achieve a reasonable internal noise level.

Vibration Effects

136 Calculations undertaken by Mr Teear involving a simple formula incorporating the weight of the explosive charges per delay and distance from the detonation point, indicate the likely peak particle velocity (PPV) of 0.53 mm/sec at the nearest house, approximately 350 m from the closest blasting location. The calculated PPV as reported by Mr Teear is well below the PPV limit set by the German Standard DIN 4150-3 (1999) for dwellings.

137 Mr Teear reports that while the predicted ground vibrations are well below the standard limit set for structural damage, the ground vibrations caused by blasting may be felt by Bluff residents especially those whose dwellings are situated closer to the harbour entrance channel.

Effects on Marine Farms

138 Effects on the crayfish holding pots that may be temporarily placed in the upper part of Bluff Harbour as mapped in Figure 3.5 in the application can be avoided by dredging of the 5 & 6 and 7 & 8 berth basins during outgoing ebb tides to ensure the mobilised fine sediments do not migrate towards any crayfish holding pots and are instead rapidly flushed from the harbour.

Effects on Navigation and Recreational Values

139 Feedback received during consultation with the Bluff Yacht Club and Greenpoint Yacht Club indicate that any potential effects of the blasting and dredging operations on regattas and informal boat movements can be managed appropriately through advance notices issued by South Port. The club members consulted suggest such notices could be provided via email, facebook posts, LED mounted signage at the ramps and other conspicuous locations and the Coastguard radio channel.

140 South Port propose to restrict navigation in the channel 30 minutes before and after each blast. In consideration of the feedback received from the yacht clubs, South Port will provide forward notice of each blast event to all vessel owners, both commercial and recreational, divers and other fisherman as well as the general public through posts on the South Port facebook page and website, on appropriate VHF Marine Channels and on electronic variable message signs (VMS) strategically placed around Bluff.

141 Public access to the foreshore areas including popular sections of shoreline along Marine Parade will not be restricted over the duration of the project.

Effects of Climate Change

142 Climate change has the potential to affect harbour operations in the future. Likely impacts of climate change include rising sea levels and more frequent extreme weather events[4]. The frequency of extremely windy days in Southland are likely to increase by between 2 and 7 percent with a

[4] MfE, 2019.

greater increase in the frequency of westerly winds along with an increase in storm intensity.[5]

143 Mr Teear reports that climate change and associated sea level rise and storm event frequency and intensity will increase the energy of the wave environment outside the harbour. He adds that this increase in the energy of the wave environment will further energise the wave driven coastal processes, increasing the strength of the littoral drift and beach erosion in storm events. The effects will only impact on the beaches to the east of the harbour entrance, whereas the rock shorelines to the west will be unaffected. He notes that the effects of climate change on the beaches will be compensated by the beach nourishment effect of disposing of the dredged material in the existing disposal site close to the shoreline of the Tiwai Peninsula and thus providing a buffer against coastal erosion. He considers the effect of beach nourishment will be positive and will assist in mitigating the effects of sea level rise and beach erosion.

144 In the absence of the proposed channel entrance deepening works, Mr O'Boyle expects vessel passage through the channel entrance could become more hazardous in the future due to a more energised wave environment in an already narrow channel where windage can be problematic. Deepening of the entrance channel is expected to improve vessel navigation and crew safety and is therefore likely to assist in offsetting the effects of increase in the frequency and intensity of storm events due to climate change.

Effects on Cultural Values

145 The cultural impact assessment (CIA) prepared by Te Ao Marama draws attention to the potential for dredging, blasting of soft and rocky habitat to significantly affect mana whenua values, rights and interests, including effects on the spiritual value of water and effects on mauri. Te Ao Marama note that the physical modification of the seabed which creates sediment plumes increases turbidity which in turn can have adverse effects on water quality and mahinga kai species. This includes the disposal of dredge spoil to sea which results in the loss of benthic habitat, which can also impact mahinga and other values as a result of increased sediment in the water and on the seabed.

146 In the CIA Te Ao Marama refer to previous development activities, mainly reclamation projects that has already significantly affected Ngāi Tahu rights, values and interests. Te Ao Marama add that Ngāi Tahu values,

[5] MfE, 2020

rights and interests need to be respected when dealing with any activity that poses risks. These values and beliefs are central to Ngāi Tahu existence. Any impact upon one value will impact upon all values including and inevitably putting the health and wellbeing of humans at risk.

147 In response to the CIA, South Port met with Te Rūnanga o Awarua to discuss the issues highlighted in the document. It was jointly agreed that a MOU will be developed to address effects of port operations, including the proposed capital dredging project on cultural values, rights and interests. The MOU will set out the means of achieving the following outcomes:

(a) Awarua (Bluff Harbour) can be a port and provide for mahinga kai and tauranga waka, and that there are shared obligations to improve harbour health in terms of cultural use;

(b) South Port Ltd supports Te Rūnanga o Awarua in creating a pathway to enhance the harbour in terms of cultural use;

(c) Te Rūnanga o Awarua is included in the development of monitoring programmes and reporting throughout the capital dredging project;

(d) Te Rūnanga o Awarua and South Port Ltd work collaboratively to ensure any scientific monitoring requirements support the abundance of mahinga kai species and habitat;

(e) Te Rūnanga o Awarua is involved with the development of any Management Plans for the project; and

(f) Giving whanau the opportunity to be trained as marine fauna observers.

148 Additionally, South Port propose to prepare an impact assessment within the Motupōhue mātaitai under the guidance of Te Rūnanga o Awarua in recognition of the cultural sensitivity of this area. This will include a baseline assessment and health status monitoring of paua beds and rocky reef habitat.

Stakeholder Consultation

149 South Port consulted widely with affected parties through a structured programme of face to face meetings and emails over the latter part of 2020, including pre-circulation of an information flyer.

150 Meetings were conducted with representativeness from Te Ao Marama, Te Rūnanga o Awarua, the Department of Conservation, Forest and Bird, Bluff Community Board, Bluff Yacht Club, Greenpoint Yacht Club and Awarua

Rowing Club. Feedback to the project was positive with a general desire expressed for early communication around blasting times to ensure the safety of all harbour user recreational groups and members of the public.

151 Other stakeholders consulted at this time via email and phone were the key fishing organisations; the CRA8 rock lobster industry association, Barnes Oysters and Ngai Tahu Seafoods.

152 South Port also held two walk in sessions at the Anchorage Café in Bluff on 13 October 2020. Information boards were erected in the café to assist the public in gaining an understanding about the project. A number of project team members were in attendance to answer questions. At these sessions a Q&A factsheet was provided to all attendees.

153 Based on the feedback received from the meetings, South Port prepared a Communication Plan which set outs various means that South Port will employ to manage communications with the stakeholders throughout the duration of the project such as notices informing the public in advance of each blasting event. These notices will include posts on South Port's facebook page, variable electronic messaging signs to be strategically placed around Bluff and notices and updates on VHF marine channels.

154 Meetings were conducted with Marine Parade residents in June 2021 to inform them of the project and discuss any concerns raised during the meetings. The residences generally were supportive of the project although some residences expressed concern about possible damage to their properties due to the effects of blasting; citing their experiences of the blasting campaigns conducted in the 1970's and 80's.

155 Meetings were conducted with Te Rūnanga o Awarua and Te Ao Marama regarding commissioning of a cultural impact assessment and in developing a memorandum of understanding (MOU) between the Rūnanga and South Port. The MOU sets out a number of agreed measures as outlined at paragraph 133.

Policy Alignment at National and Regional Level

156 The New Zealand Coastal Policy Statement (NZCPS) is a national policy statement which the Southland Regional Policy Statement (RPS) and Southland Regional Coastal Plan (RCP) must give effect to.

157 I have provided commentaries in the application on how the project aligns with the relevant objectives and policies of the NZCPS, RPS and the RCP.

158 The evidence of Mr Gear sets out clearly the rationale for the project and the benefits that will accrue to the Southland economy through improved efficiencies and improved safety margins of port operations arising from a deepened harbour. These outcomes are provided for in the objective 6 and policies 6 and 9 of the NZCPS, objective COAST.2 and policy COAST.4 of the RPS and objectives 5.3.6 and 10.1.2 and policy 10.1.1 of the RCP. These objectives and policies recognise the importance of the use and development of the coastal marine area involving port infrastructure of national importance while enabling social, economic and cultural well-being of communities.

159 The investigations undertaken for the project and recommended avoidance measures as detailed in the technical reports to the application have in my opinion addressed the requirements of Objective 1 and Policy 23 of the NZCPS, Objective COAST.3 and Policy COAST.2 of the RCP and Policy 10.2.2 of the RCP. These provisions serve to safeguard the integrity, form and functioning of the coastal environment and seek to avoid significant adverse effects on ecosystems from dredging and disposal activities.

160 The characterisation of the physical and chemical characteristics of the seabed sediments and their biota and assessments of sediment mobilisation and distribution as presented in the evidence of Ms Miller and Mr Teear informed South Port of the need for timing of the dredging of fine sediment from the harbour and deposition of this dredged material to periods of slack and/or outgoing tides. These measures are aimed at ensuring sediment plumes and sediment deposition does not the adversely affect the functioning and resilience of the coastal environment and the receiving ecosystems, especially the sensitive seagrass beds and rocky reef habitats and thus align with Objective 1 of the NZCPS.

161 Supporting mitigation measures include the use of a ‘Green Valve’ on the TSHD which serves to reduce sediment mobilisation in the water column. The valve stops air being entrained in the overflow from the TSHD allowing the suspended material to settle on the seabed closer to the dredging site.

162 The sediment control measures in combination with the measures proposed to avoid wherever possible the effects of rock breaking, drilling and blasting on marine fauna and marine ecosystems address policies 11(a) and 11(b), Policies COAST.5 and BIO.3 of the RPS and Policy 10.1.3 of the RCP. These policies require avoidance of adverse effects to threatened or at risk indigenous taxa and ecosystems and avoidance of significant adverse effects on areas of predominantly indigenous ecosystems in the coastal environment.

163 Measures that seek to avoid wherever possible adverse effects on marine fauna are set out in the management plans prepared by Ms Miller and Mr Childerhouse and summarised in their evidence.

164 In summary these measures are:

(a) avoiding blasting when marine fauna are observed with the marine fauna observation zones. The extent of the zones for each mammal and fauna group as identified by Mr Childerhouse and Ms Miller are based on the worst-case blasting scenario involving 25 kg explosive charges;

(b) the use of warning blasts;

(c) employing a soft start to each blasting operation;

(d) the use of an acoustic harassment device;

(e) the proposed timing of the works that avoid peak marine mammal, seabird and fish breeding seasons and the seagrass flowering and growing season; and

(f) restricting rock breaking, drilling and blasting operations to the hours 7.30 am to 6 pm.

165 Implementing these measures which form proposed conditions 7, 9 and 14 to 24, 25 to 28, 30 to 32 and 33, 34 and 35 to the application will in my opinion, align with these policies.

166 Mr Moore in his evidence states that the proposed works will have a low level of effect on the natural character of Bluff Harbour and the Tiwai Open Coast. He concludes that the natural character of the coastal environment will be preserved owing to its modified state, the low impacts of previous sediment disposal works and the avoidance and mitigation measures being proposed in the application. Based on Mr Moore's assessment I consider the proposed dredging works align with Objective 2 of the NZCPS, Objective COAST.4 and Policy COAST.3 of the RPS and Objective 5.1.1 of the RCP.

167 A proactive and collaborative approach has been embarked upon by South Port as outlined in the evidence of Mr O'Boyle, particularly in relation to consultation undertaken with Te Rūnanga o Awarua and the wider community. These include measures proposed to addresses concerns raised by the Rūnanga resulting in the drafting of an MOU with the Rūnanga and the drafting of a harbour user communication plan which sets out the channels of communication to be used in advance of programmed blast

events to ensure public safety. These measures are in my opinion consistent with the requirements of Objective 3 and policy 4 of the NZCPS, Policy COAST.2 of the RPS and Objectives 5.3.1 and 5.3.6 and Policies 5.3.6 and 5.3.12 of the RCP

168 Protection of amenity values in terms of the requirements of Policy COAST.2 of the RPS and Objective 5.3.1 and Polices 5.3.1 and 5.3.15 of the RCP will be achieved through a range of mitigation measures as recommended by Mr Styles in his noise assessment and in his evidence. These measures relate to noise generated during all drilling and dredging works including the operation of the backhoe dredger and split hopper barge. A key measure will involve compliance with the project noise and air overpressure standards set out in proposed conditions 42 to 44, based on acoustic noise modelling undertaken by Mr Styles and his team. Additional measures recommended by Mr Styles are lining the bottom of the hopper barge with timber to prevent rocks impacting on any steel surface and ensuring all drilling and dredging equipment is regularly maintained including hydraulic equipment, exhausts, generators and winches to minimise noise levels as far as practicable. These measures form proposed conditions 45 and 46 to the application.

169 Taking account of the Principles of the Treaty of Waitangi and recognising the role of tangata whenua as kaitiaki in accordance with Objective 3 and Policy 2 of the NZCPS is addressed in the evidence of Mr Gear. Mr Gear draws attention to the strengthening of the relationship between South Port and Te Rūnanga o Awarua noting that both parties share the same vision; the prosperity of Bluff and the wider Southland region. He adds that South Port regularly meets with Rūnanga representatives to update them on port projects.

170 South Port is currently liaising with the Rūnanga to confirm the methodology and scope for an Ecological Impact Assessment specific to the Motupōhue mātaitai. This will include a baseline assessment and health status monitoring of paua beds and rocky reef habitat during and following the project. Further details on the EIA are explained in the evidence of Ms Miller.

Part 2 RMA Assessment

171 Consideration of Part 2 of the RMA with respect to this application is valid as the Southland Regional Coastal Plan became fully operative on 16 March 2013 and is now out-of-step with current legislation and policy.

172 In my opinion the proposal accords with the purpose and principles set out under Section 5 of the Act for the following reasons:

(a) A deeper harbour will allow the communities (and businesses) of Southland to better provide for their social, economic and cultural well-being through increased transit of bulk cargo and other goods; and

(b) The life supporting capacity of the coastal waters and coastal ecosystems will be safeguarded through a suite of proposed consent conditions aimed at avoiding and mitigating adverse effects on the coastal environment.

173 The proposal is consistent with Section 6(a) of the Act in my opinion as the natural character assessment to the application concludes effects on the natural character of the project area will be low.

174 The proposal is consistent with Sections 6(e), 7(a) and (aa) and 8 of the Act as it involves a collaborative approach to enhancing the relationship between South Port and the Rūnanga through mechanisms such as a MOU addressing measures that enhance the cultural values of Awarua, as discussed earlier in my evidence.

175 In terms of Section 7(b) the proposal represents a more efficient use of a physical (port) resource by allowing for the handling of higher cargo volumes and ensuring direct access to overseas ports and markets.

176 In terms of Section 7(d) the intrinsic values of ecosystems valued by the community such as the rocky reef habitats and the diversity of life they support are recognised by South Port and will be protected through a suite of avoidance and mitigation measures recommended by the expert witnesses and which are set out in the proposed consent conditions.

Responses to any issues in section 42A report

177 I concur with Mr Peacock that the application overall is a discretionary activity.

178 I also concur with Mr Peacock that a Part 2 RMA assessment is valid to this application due to the dated provisions in the Regional Coastal Plan.

179 Mr Peacock questions whether South Port are being precautionary enough to meet Policy 3 of the NZCPS and be consistent with Objective 1 of the NZCPS. I consider the evidence of Ms Miller, Mr Childerhouse and Mr Stephenson upon which I rely places a heavy focus on avoidance measures and precautionary approaches that in my opinion meet the requirements of Policy 3 Objective 1 and additionally Policies 11(a) and (b) of the NZCPS.

180 The evidence of Mr Childerhouse and the Marine Fauna Observation Plan prepared jointly with Ms Miller and Mr Stephenson in my opinion further reinforces the precautionary approach to avoiding significant adverse effects not only on marine mammals but also little penguin and other diving birds and large fish.

181 The requirement for sediment modelling has been raised by Mr Peacock. However he appears to have not recognised the extensive investigations that have been undertaken in support of the application in relation to the tidal dynamics of the inner and outer harbour by Oceanum, and the physical characterisation of the sediment by Ms Miller and assessments of sediment movement undertaken jointly by Ms Miller and Gary Teear in the application and in their evidence. These investigations have informed the management of the dredging and deposition activities and soft sediment transport as presented in the evidence of Ms Miller and Mr Teear.

182 Mr Peacock states that blasting will occur over multiple years. By way of clarification South Port expects to be able to complete the capital dredging within a 8 month period but acknowledges there is a remote possibility this work may continue into the following year to complete due to delays beyond its control. The 24 month period stated in the s92 response reflects this precaution on the part of South Port.

183 Regarding the alternatives assessment under s. 105 RMA and policy 10.21 of the RCP, Mr Peacock states that little consideration has been given by the applicant to alternative offshore and onshore disposal sites. Quite to the contrary I consider careful consideration has been given to these matters as noted by Mr Teear in his evidence. He refers to the unfavourable current and wave conditions that exist in Foveaux Strait and the load line convention restrictions of Maritime NZ, i.e.; the draught to which a ship or barge may be safely loaded. I can also confirm that the onshore disposal of fragmented rocks was initially considered seriously by South Port with a temporary disposal/handling site identified on the landward side of Island Harbour. This option was ultimately discounted by South Port on the basis of significant costs, as Mr O'Boyle points out in his evidence.

Responses to the changes proposed by Mr Peacock to the proposed consent conditions, dated 9 December 2021

184 South Port agrees to reduce the term of consent from 10 years to 5 years as specified in condition 1.

185 The additions to condition 6 concerning provision of GPS grid references for the sites dredged and for the disposal of dredged spoil is accepted.

186 The provision of pre-blasting penguin nesting/moulting inspection and relocation of penguins as new conditions 7B and 7C is not accepted as such measures are considered detrimental to the nesting and moulting penguins as Mr Stephenson explains in his evidence.

187 The imposition of restrictions around actual daylight hours in Condition 9 as recommended by Mr Peacock is considered inappropriate as drilling will often commence at 7.30 am in advance of rock breaking and blasting. The duration of the drilling will be of a variable timeframe.

188 Mr Styles states in his evidence that noise effects during the morning and evening period are adequately controlled through proposed conditions 41 and 42. He adds that the NZS6803 noise limits in the early morning and evening period have been designed to protect the rural sensitivity and amenity of receivers. No amendment to Condition 9 is considered necessary by Mr Styles.

189 The addition of new conditions concerning trial blasting and the blast plan is accepted by South Port.

190 The addition of a new condition requiring an updated Marine Mammal Management Plan (MMMP) to be submitted to Environment Southland for certification is covered under condition 34.

191 The amendment sought to Conditions 8, 11 and 12 to limit dredging of all soft sediment to during slack or outgoing tides is not accepted, on the basis of the predominance of coarse sand and its high settling rate and larger impact on vulnerable habitats that would result, as explained by Ms Miller in her evidence.

192 The provision of a new condition requiring bathymetric surveys of the sediment disposal site is accepted by South Port with a minor amendment to the second bullet point which states "…. *until such time as the bathymetric surveys hows that the seabed in the disposal area has reverted back to the equilibrium baseline depths*."

193 Conditions 14 and 16 have been superseded as the MMOZ's have been replaced by marine fauna observation zones (MFOZs) which are described in the Marine Fauna Operational Plan prepared by Mr Childerhouse, Ms Miller and Mr Stephenson and as set out in conditions 20 to 27 .

194 The reporting and notification functions under proposed conditions 14A and 14B are accepted, noting though that the MFOZ observers will be stationed on shore not on vessels.

195 The amendment to condition 16 is accepted as it is the intention to update the MMMP to include the full year of acoustic monitoring results and the validation of the modelled underwater noise levels following the trial drilling and blasting programme.

196 The amendment to conditions 23 and 24 is unnecessary as this is covered in the Marine Fauna Operational Plan and reflected in the proposed conditions 20 to 27.

197 The addition to new condition 33A concerning the preparation and implementation of a biosecurity management plan is accepted by South Port.

198 The additional monitoring events sought to Condition 44 has no ecological rationale nor benefit and would be required to have been completed last month based on the programme start up date, as noted by Ms Miller in her evidence.

199 Ms Miller considers the recommended new condition 44B is not required owing to the clean rock surface that will exist following the completion of the capital dredging programme.

200 Conditions 45 and 46 have been updated to reflect the reporting function as sought by Mr Peacock.

201 The amendment sought by Mr Peacock to condition 49 to provide greater coverage to the Bluff community is considered unnecessary by Mr Styles. However Mr Styles agrees that Condition 49 should be amended with the provision to provide direct communication to the landowners highlighted in the figure provided in his evidence at page 18. Mr Styles states that the focus of the condition should be to ensure those receivers that are predicted to receive noise levels between 45 dB L_{Aeq} and 50 dB L_{Aeq} are provided with advance notice of the works. There is no evidence he notes to suggest that such effects could extend beyond the properties he has identified in the application.

202 Condition 50 concerning a complaints register has been amended in accordance with the recommended wording provided by Mr Peacock which Mr Styles agrees with.

203 With respect to Condition 51, South Port does not agree to reducing the lapse to 31 December 2026. The reasons for retaining the lapse date of 31 December 2031 are set in Mr Gear's evidence.

204 An updated set of proposed consent conditions are provided in Attachment 1. Amendments are shown as tracked changes.

Bond

205 With respect to the imposition of a bond as recommended by Mr Peacock it is not clear how these measures relate to compliance with the consent conditions which serve to ensure these situations do not arise and also ignores the suite of avoidance and mitigation measures recommended by South Port's experts.

Submissions Received

206 Eleven submissions were received following public notification of the application on Saturday 11 December 2021. Two submissions from the Department of Conservation and Forest and Bird were in opposition and nine in support.

207 The key issues of concern raised by the Department of Conservation centred on biosecurity matters, means of avoiding significant adverse effects on priority conservation values, the level of certainty that the risks the project poses to conservation values will be addressed and how more stringency can be incorporated in the management plans, the protocols proposed to protect marine mammals and proposed consent conditions.

208 A MS Team meeting held on 23 February 2022 with representatives from the Department assisted in addressing most of the Department concerns. Through discussions conducted at the meeting and subsequent correspondence, South Port confirmed it would prepare a protocol that clearly sets out the procedures that will be implemented by marine fauna observers that best ensure protection of marine mammals, seabirds, and large fish during blasting operations, as well as supplying more information on the test drilling and blasting programme and an updated set of proposed consent conditions.

209 The key issues of concern raised by the Forest and Bird centred on rationale for the project, means of avoiding significant adverse effects on nationally threatened bird species, managing sediment contaminants during dredging and the inconsistencies with a number of provisions in the NZCPS, RPS and RCP.

210 A MS Team meeting held on 9 March 2022 with a representative from Forest and Bird assisted in addressing most of its concerns. The key issues raised in the submission were narrowed down to how marine fauna would be protected during the blasting operations. South Port advised it was in

the process of preparing a protocol that clearly sets out the procedures that will be implemented by marine fauna observers that best ensures protection of marine mammals, seabirds and large fish during blasting operations. South Port has supplied Forest and Bird with more information on the test drilling and blasting programme and provided an updated set of proposed consent conditions.

Conclusions

211 The project will improve navigational safety, and will increase efficiency, allowing South Port to increase the depth and vessel draft in the harbour enabling vessels to be fully loaded and serve international ports directly from Bluff. This will have significant economic benefit for the Southland economy.

212 The assessment of effects on the marine environment concludes that the effects of the proposed dredging and deposition of soft sediment will be low or minor. The dredging and deposition of the finer sediments or silts located at the berths will be undertaken on outgoing tides to avoid potential adverse effects on sensitive marine ecosystems in the upper harbour and around the Tiwai Rocks. Dredging and disposal of the finer sediments (silts) from the berth basins is expected to span no more than one week.

213 The assessment of effects on the marine environment, marine mammals and seabirds each conclude that the overall effects of the proposed rock breaking, drilling, blasting, dredging and disposal activities on marine fauna as minor or less than minor when implemented in conjunction with a suite of avoidance and mitigation measures set out in the evidence of the expert witnesses and in the proposed consent conditions.

214 The data collected from acoustic recorders deployed for over a year in and around the harbour entrance buy South Port show that marine mammals have a low occurrence in the Bluff Port Area and are present for short periods.

215 The coastal processes assessment concludes that changes to the channel entrance, swinging basin and berth basins as a result of dredging will have no noticeable effect on tidal current velocities and waves as the principal drivers of coastal processes.

216 The natural character, landscape and visual effects assessment concludes the effects on the natural character of the port area of Bluff Harbour and the Tiwai Point coastline will be low.

217 The application has been assessed against the NZCPS, Southland RPS and Southland RCP and found to be consistent with the relevant objectives and policies.

218 The application aligns with Part 2 of the RMA.

Simon Beale

29 March 2022

Attachment 1 – Proposed Consent Conditions

Proposed Consent Conditions – Draft dated 29 March 2022

1. The term of this consent is 5 years.

2. This consent permits the drilling, rock breaking, blasting, capital dredging and deposition of the following quantities of spoil:

   i. Up to a maximum of 120,000 cubic metres of sand and silt material;
   ii up to a maximum of 40,000 cubic metres of rock.

3. The drilling, rock breaking, blasting, and dredging of rock shall be carried out in the areas of seabed in the harbour entrance channel shown in red on the attached plan entitled "Harbour and Channel Dredging Areas", and defined by a centre point at the following co-ordinates (NZTM 2000):

Easting	Northing
1244359	4828749

4. The dredging of soft sediment shall be carried out across areas of seabed in the harbour as shown in orange on the attached plan entitled "Harbour and Channel Dredging Areas", and defined by a centre point at the following co-ordinates (NZTM 2000):

Area	Easting	Northing
Swinging Basin	1243281	4829468
Berth 3 & 4	1242725	4829504
Berths 5 & 6	1242626 & 1242530	4829611 & 4829575
Berths 7& 8	1242615	4829800

5. The discharge of spoil to water and deposition of spoil into the seabed shall be carried out in the areas hatched on the attached plan entitled "Proposed capital dredging works areas within Bluff Harbour and Foveaux Strait/Tiwai Peninsula", and defined by the following NZTM 2000 co-ordinates:

Dredged Spoil	Easting	Northing
Sand and Silt	1246513.845 1246312.069 1245764.657 1245986.106	4829176.496 4829195.624 4828630.816 4828603.574
Fragmented Rock	1248753.667 1248607.001 1249288.851 1249427.794	4828317.608 4828124.632 4827661.488 4827864.757

6. The consent holder shall maintain a record of the quantity of soft sediment and rock dredged and discharged by means of hydrographic surveys and GPS grid references of the sites dredged and sites where discharges occurred and shall report to the Compliance Manager, Environment Southland on the last working day of each month when work is undertaken and a summary report at the conclusion of the works, and upon request.

Timing of Works

7. Drilling, rock breaking, blasting, dredging and deposition activities shall be limited to the period 1 February to 30 September to avoid the peak marine mammal migration season and peak seabird and fish breeding and coastal feeding seasons.

8. Soft sediment dredging shall be limited to the period 1 April to 31 July to avoid the seagrass (*Zostera muelleri*) flowering and growing season.

9. Drilling, rock breaking and blasting activities and actual dredging operations of the trailer suction hopper dredge (TSHD) shall be limited to the hours between 7.30 am and 6 pm when marine species are less active and to minimise disturbance to residential and rural receivers.

Trial Drilling and Blasting

10. The consent holder shall undertake a trial blast to determine the charge weights required for the rock fragmentation and validate the vibration attenuation.

Prior to the trial blast commencement, the consent holder shall survey, photograph and document the conditions of structures nearest each of the blast zones, defined in the Blast Plan (Condition 11).

Upon completion of the trial blast period, the consent holder shall document and report the findings to the Compliance Manager, Environment Southland, advising:

(a) Where the seismographs and hydrophones were placed and monitored during blasting trials, with a map and map reference to inform (b) and (c) of this condition;
(b) The vibration attenuation parameters in relation to the nearest structures, and
(c) The anticipated rock fragmentation and associated charges, graphed so as to determine the lowest charge necessary to obtain the desired outcomes of rock fragmentation, and avoidance of impacts on the nearest structures, thereby informing the Blast Plan.

11. The consent holder shall submit the Blast Plan (updated Figure 10 of Appendix 6 of the consent application) with details as to how the consent holder will collect drilling records, cross referenced to the Blast Plan and, photographic records of representative dredged material.

12. The consent holder shall provide the blast plan with references, drilling and photographic records and any analysis to the Compliance Manager, Environment Southland every four months upon commencement of blasting, and no less than twice during any 8 months period or blasting campaign.

Sediment Control

13. The consent holder shall ensure that dredging of the Berths 5 & 6 basin and Berths 7 & 8 occurs during slack or outgoing (ebb) tides without overflowing and the use of jets to avoid depositing fine silts in Awarua Bay and the upper harbour including seagrass beds.

14. The consent holder shall ensure that sediment dredged from the Berth 5 & 6 basin and Berths 7 & 8 is not to be deposited at the sediment disposal site during slack tide where little or no wave action is evident.

15. The consent holder shall implement adaptive receptor-based dredge management involving a three-tiered trigger threshold system based on water clarity and duration (days). This will be informed by turbidity meters that when exceeded, require sediment management responses, as set out in the Adaptive Marine Management Plan (AMMP). These triggers shall be:

- Tier 1 trigger – Warning, reduced water clarity: commence management actions.
- Tier 2 trigger – Water clarity reduced further, and daily duration exceeded: increase management actions.
- Tier 3 compliance level – Cease dredging in the vicinity of the monitoring station(s) showing the exceedance until water quality daily average returns to acceptable levels.

For Tier 1 and Tier 2 exceedances, the management responses will be:

- Alternating the dredging of 'lower risk' predominantly sand zones and 'higher risk' silted zones to assist with turbidity reductions and increase light availability until the Tier 1 level is no longer exceeded.
- Assessing tidal movements and velocities and altering dredging positions/timings further based on these, until the Tier 1 level is no longer exceeded.

The turbidity meters shall be placed near sensitive habitats such as seagrass beds and at the eastern end of the Motupōhue mātaitai with another "control" turbidity meter placed near seagrass beds outside of the predominant tidal flow pathway. The final placement of the turbidity meters shall be subject to consultation and confirmation from Te Rūnanga o Awarua.

Ongoing monitoring of the sensitive receptors using turbidity meters shall be carried out during the soft sediment dredging and disposal operations. This shall include daily monitoring of the meters during dredging in 'higher risk' sites (Zones B3/4, B5, A4, B7&8, A3) and weekly monitoring during the 'lower risk' zones (Zones B11, E, C and swinging basin).

Bathymetric Surveys

16. The consent holder shall undertake a baseline bathymetric survey of the soft sediment disposal ground no less than six months prior to the commencement of the capital dredging works.

17. The consent holder shall undertake repeat surveys post disposal activities at the same positions as undertaken during the baseline survey at period of every 6 months until such time as the bathymetric surveys show that the seabed in the disposal area has reverted back to the equilibrium baseline depths.

18. The consent holder shall report the survey findings within 10 working days of completion of the surveys to the Compliance Manager, Environment Southland.

Weight of Explosive Charge

19. The maximum weight of explosive placed in each drilled hole shall be no more than 25 kg.

Protection of Marine Fauna

20. Establishment of designated marine fauna observation zones (MFOZ) will follow and give effect to the guidelines in the Marine Mammal Management Plan (MMMP) and the Marine Fauna Observation Plan.

21. The consent holder shall establish a MFOZ around blasting and rock breaking activities. The aim is to avoid both permanent and temporary hearing injuries from blasting and rock breaking activities.

22. MMOZs will:
(i) have zones estimated and managed separately for each of the four marine fauna groups as specified in Condition 20;
(ii) have distances for zones based on the modelled extent of estimated permanent threshold shift (PTS) and temporary threshold shift (TTS) for each type of activity based on marine mammal acoustic technical guidance from the National Marine Fisheries Service of the U.S. Department of Commerce (NOAA 2018), including different blasting scenarios; and
(iii) if required, be modified following the measurement of *in situ* underwater noise data from each activity once operations begin to ensure that zones are based on measured rather than estimated noise levels.

23. The minimum size of MFOZs are provided in the tables below. These MFOZs will be applied until *in situ* underwater noise data is collected to confirm the actual size of MFOZs. Based on the outcomes of the validation of underwater noise levels, these zones may be increased or

decreased in reliance on a report by a suitably qualified and experienced marine mammal expert that certifies adjustments to these zones are appropriate, which is provided to Environment Southland before changes are implemented.

Estimated minimum size (metre) of MFOZs based on avoiding permanent hearing injuries for each fauna group.

Activity	**HF cetaceans**	**MF cetaceans**	**LF cetaceans**	**Seals, Seabirds, Sharks**
	Hector's dolphins	Bottlenose dolphins, Killer whales	Southern right whales	NZ sea lion, penguins, white shark
Blasting Scenario 1 (50x10kg)	790	263	427	67
Blasting Scenario 2 (60x15kg)	830	345	730	107
Blasting Scenario 3 (10x25kg)	841	286	639	80
Rockbreaking	175	19	181	11

Estimated minimum size (metre) of MFOZs based on avoiding temporary hearing injuries for each fauna group.

Activity	**HF cetaceans**	**MF cetaceans**	**LF cetaceans**	**Seals, Seabirds, Sharks**
	Hector's dolphins	Bottlenose dolphins, Killer whales	Southern right whales	NZ sea lion, penguins, white shark
Blasting Scenario 1 (50x10kg)	1405	1096	1632	467
Blasting Scenario 2 (60x15kg)	1449	1607	1704	711
Blasting Scenario 3 (10x25kg)	1470	1246	2001	599
Rockbreaking	1080	65	1050	28

24. The consent holder shall engage suitably trained and experienced Marine Fauna Observers (MFOs) who will be responsible for observing the MFOZ at least 60 minutes prior to (i) detonation of charges during blasting activities and (ii) commencement of rock breaking activities. Ideally, the MFO will maintain a watch of the MFOZ for at least 1 hour after operations have ceased. However, the full hour of observations may be reduced if there is less than an hour between the end of operations and when it becomes too dark to continue observations.

25. In the event that any marine mammal, little penguin, shag or shark is observed inside the MFOZ or is likely to enter the MFOZ, detonation of charges or rock breaking shall cease until either (i) the marine mammal(s), little penguins, shags or sharks have been observed to move out of the MFOZ or (ii) the marine mammal(s), little penguins, shags or sharks seen within the zone has not been seen to leave the MFOZ but has not been seen for more than 30 minutes.

26. The consent holder shall adhere to the standard operating procedures for the MFOZ set out in the Marine Fauna Operational Plan during blasting and rock breaking operations.

27. A marine fauna sighting log to record any marine mammal(s), little penguins, shags and sharks sighted (date and time), and actions taken, shall be prepared, and maintained. These records and a summary report shall be provided to the Council's Environmental Compliance Manager and the Department of Conservation at the conclusion of the project, and upon request.

28. The consent holder shall activate an initial open water blast of low peak pressure to remove mobile species from the harbour entrance channel and surrounding waters before blasting commences. This open water blast only occurs once the MFOs have assessed that no seabirds and shark species are present in the TTS and fish mortality zone. The consent holder shall ensure a period of 90 seconds passes before blasting commences to enable benthic fish and highly mobile mollusc species (squid and octopus) to exit the TTS and mortality zone.

29. In the event that the open water blast is causing mortality to marine fish species and is creating a feeding flock of gulls and terns, the consent holder shall revise this deterrence measure or discard completely.

30. The consent holder shall employ a soft start in which a lower explosive charge is set off prior to the commencement of each blast event to further assist in deterring seabirds and fish from the harbour entrance channel and surrounding waters.

31. The consent holder shall operate an acoustic harassment device at all times during drilling and blasting operations to deter seabirds and fish from the harbour entrance channel and surrounding waters.

32. The consent holder shall ensure ropes or lines used during the works are kept taut as far as is safely practicable to avoid the potential for marine mammals to become entangled in the lines.

33. The consent holder shall, in advance of the work, undertake inductions with vessel staff about appropriate behaviour around marine mammals, and vessel master's responsibilities under the Marine Mammals Protection Act 1992. These include speed limits to avoid the potential for marine mammal injury or mortality.

34. The MMMP shall be updated with the latest set of acoustic monitoring results and the results of validation of the acoustic propagation modelling within 2 weeks of the trial drilling and blasting programme. The updated MMMP shall be submitted to the Compliance Manager, Environment Southland within 20 working days prior to consented activities commencing.

Biosecurity

35. The consent holder shall inspect the dredge, barge, tug and split hopper barges for fouling organisms, including *Undaria pinnatifida* and other "exclusion species included in the Southland Regional Pest Management Plan (SRPMP), no more than one week prior to the vessels entering Bluff Harbour.

36. If such organisms are found, the consent holder shall ensure that the organisms are removed and disposed of to a designated refuse site on land, and any "exclusion" species identified in the SRPMP are reported to Biosecurity NZ and Environment Southland.

37. The consent holder shall provide Council's Environmental Compliance Manager with updated biofouling management plans from the dredge operators prior to commencement of the works.

38. The consent holder shall use MPI accredited operators to undertake inspections and cleaning of vessels.

39. An inspection report shall be submitted to Council's Environmental Compliance Manager prior to the dredge equipment entering Bluff Harbour detailing the timing, method, and findings of the inspection.

40. The consent holder shall monitor the fixed quadrat locations on the seabed within the blast zone (as per Condition 50) at 3 months, 12 months and annually for up to 3 years following completion of the works, for the presence of *Undaria pinnatifida,* and "exclusion" species identified in the SRPMP. Any pest marine organism detected during this period shall be removed from the zone and disposed of to a designated refuse site on land. This sighting will be reported to Biosecurity NZ and Environment Southland for management purposes.

41. If the consent holder deploys the dredged vessel directly from overseas than a BMP is required to be prepared and implemented in accordance with conditions 41.1 to 41.7.

41.1 At least two months prior to arrival of the dredge vessel in New Zealand, the consent holder shall provide a BMP to the Consent Authority. A copy of the BMP shall be provided at the same time to Tangata Whenua.

41.2. The purpose of the BMP shall be to reduce the risk of a biosecurity incursion to the greatest extent practicable.

41.3 The BMP shall include, but not be limited to, the following:

41.3.1 description of the dredge vessel and its attributes that affect risk, including key operational attributes (e.g. voyage speed, periods of time idle), maintenance history (including prior inspection and cleaning undertaken), and voyage history since last dry-docking and antifouling (e.g. countries visited and duration of stay);
41.3.2 description of the key source of potential marine biosecurity risk from ballast water, sediments and biofouling. This should cover the hull, niche areas, and associated equipment, and consider both submerged and above-water surfaces;
41.3.3 An assessment of the biosecurity risks to Authorised Marine Farming Activities from activities authorized by this consent and the methods to be sued to minimise those risk to the greatest extent practicable.
41.3.4 Findings from any previous inspections;
41.3.5 A description of the risk mitigation taken prior to arrival in New Zealand, including but not limited to:

41.3.5.1 Routine preventative treatment measures and their efficacy, including the age and condition of the anti-fouling coating, and marine growth prevention systems for sea chests and internal sea water systems;
41.3.5.2 Specific treatment for submerged and above-water surfaces that will be undertaken to address IHS and CRMA requirements prior to departure for New Zealand. These could include, for example, in-water removal of biofouling, or above-water cleaning to remove sediment;
41.3.5.3 Additional risk mitigation planned during transit to New Zealand, including expected procedures for ballast water management;
41.3.5.4 Expected desiccation period of above-water surfaces on arrival to New Zealand (i.e. period of air exposure since last dredging operations);
41.3.5.6 The nature and extent of pre-border inspections that will be undertaken (e.g. at the overseas port of departure) to verify compliance with IHS and CRMA requirements; and
41.3.5.7 Record keeping and documentation of all mitigation undertaken (i.e. prior to and during transit to New Zealand) to enable border verification if requested by the Ministry for Primary Industries or its successor, and to facilitate final clearance.

41.4. The BMP shall be prepared by a person who is suitably qualified in managing the risk of biosecurity incursions and shall be appointed by the consent holder following consultation with the ALG.

Certification of BMP

41.5. The BMP shall be approved in writing by the Consents Manager, Environment Southland acting in a technical certification capacity prior to the first commencement of dredging authorised by this consent and the consent holder shall undertake all activities by this consent in accordance with the approved BMP.

41.6. Any amendment of the BMP shall be approved in writing by the Consent Manager acting in a technical certification capacity and the consent holder shall undertake all activities by this consent in accordance with the amended BMP.

41.7. A copy of the BMP and all amended BMPs shall be provided to Tangata Whenua immediately following certification.

Noise Control

42. The consent holder shall ensure that the noise emissions arising from all drilling and dredging work complies with the Project Noise Standards set out in the following table:

Time of Week	Time Period	Noise limits					
		Residential/ Rural Receivers		At the ICB		Industrial 1 and Business 2	
		L_{eq} (dBA)	L_{max} (dBA)	L_{eq} (dBA)	L_{max} (dBA)	L_{eq} (dBA)	L_{max} (dBA)
Weekdays (to 0730 Saturday morning)	0630-0730	55	75	55	75	70	85
	0730-1800	70	85	70	85		
	1800-2000	65	80	65	80		
	2000-0730	50	75	55	75		
Saturdays (to 0730 Sunday morning)	0730-1800	70	85	70	85	70	85
	1800-0730	50	75	55	75		
Sundays and public holidays (to 0630 Monday morning)	0730-1800	55	85	55	85	70	85
	1800-0630	50	75	55	75		

43. Compliance with the Project Noise Standards is to be measured and assessed 1m from the façade of any building that is occupied when the noise is being generated. All measurements and assessments should be conducted in accordance with NZS6803:1999.

44. The air overpressure from blasting shall comply with a limit of 120dBC L_{peak} at any property containing a building with windows.

45. The Project Noise Standards and the noise limit in Condition 43 (blasting) do not apply at any property or building under the ownership or control of the consent holder or its entities or subsidiaries.

46. The consent holder shall ensure the hopper barge is lined with fixed timber or an alternative material that prevents rocks impacting on any steel surface of the barge.

47. The consent holder shall ensure that all drilling and dredging equipment is regularly maintained, including hydraulic equipment, exhausts, generators, and winches to minimise noise levels above and below water as far as practicable.

Monitoring and Reporting

48. The consent holder shall provide to Council's Environmental Compliance Manger a Monitoring and Reporting Management Plan prior to commencing work authorised by this consent. This plan must outline the methodology to be used to achieve compliance with conditions 48-53.

Soft Sediment Benthic Monitoring

49. The consent holder shall monitor the following soft sediment sites (NZTM 2000) within three months of completion of the works for heavy metals, polycyclic aromatic hydrocarbons, phosphorus, tributyltin, sulphate, and sediment particle size analysis.

- Harbour control site (Easting 1242608.133; Northing 4831600.781);
- Motupōhue mātaitai control site (subject to confirmation with Te Runanga a Awarua);
- Tiwai control site (Easting 1247131.851; Northing 4829218.48); and
- Sediment disposal site (Easting 1246000.422; Northing 4829265.766).

A report detailing the findings of this sediment monitoring shall be provided to the Council's Environmental Compliance Manager within three months of completion of analysis of the sediment samples.

Seagrass Monitoring

50. The consent holder shall undertake health status monitoring of three seagrass beds pre-, during and post soft sediment dredging works. This health status monitoring shall include particle size analysis, sediment chemistry analysis, percentage cover and water clarity measurements at fixed quadrat locations to allow for comparison. The monitoring sites are (NZTM 2000):

- Seagrass Control (Easting 1241561.286; Northing 4830051.256);
- Rabbit Island (Easting 1242832.631; Northing 4832323.527); and
- Tiwai Wharf (Easting 1244270.155; Northing 4829583.095).

Rocky Reef Benthic Monitoring

Bluff Harbour Entrance Channel

51. The consent holder shall undertake quantitative benthic monitoring of the seabed at fixed quadrat locations within the blasting zone for epifauna and algal cover. Photo quadrats will be taken of the site and assessed for changes in biomass and species assemblages. Monitoring shall be undertaken prior to the works to establish a baseline, then at 3 months, 12 months and 36 months.

Rock Disposal Site

52. The consent holder shall undertake quantitative benthic monitoring of the rock disposal site at fixed quadrat locations for infauna, epifauna and algal cover using transects and quadrats. Visual rock stability assessments shall also be completed. Monitoring shall be undertaken at 3 months, 12 months, 36 months and 60 months following completion of the works.

53. A benthic monitoring report covering conditions 48, 49, 50 and 51 will be provided to the Compliance Manager, Environment Southland within one month of the baseline monitoring and two months following each survey, with the exception of the initial 3-month survey results which will be included in the 12-month survey report.

Motupōhue Mātaitai Monitoring

54. The consent holder will undertake an Ecological Impact Assessment within the Motupōhue mātaitai. This shall be commenced at least 3 months prior to the works commencing. The methodology and specific site guidance is to be finalised by the consent holder following consultation with Te Rūnanga o Awarua.

This assessment will include a baseline assessment, health status monitoring of paua beds and rocky reef habitat within the proposed site during dredging and a post-dredging assessment.

The final assessment is to be submitted to the Council's Environmental Compliance Manager and Te Rūnanga o Awarua within 3 months of completion of the works.

Public Notification

55. The consent holder shall provide 24-hour advance notice to the public including commercial shipping and fishing companies and water based recreational user groups of scheduled blast events through the following communication channels:

- UHF Marine Channels 14, 16 and 61;
- Meri Leask – Bluff Fisherman's Radio;
- Coastguard Channel 2;
- Variable Message (LED) Signs – located at strategic locations in Bluff;
- Physical Project Information station on Port and in the community;
- Emails; and
- Posters.

56. The consent holder shall provide advance notice to the owners and occupiers of properties predominately on Marine Parade as to when nighttime dredging works is likely to occur. The communication should be designed to let the owners know about the timing and duration of nighttime works, that it will be audible in some meteorological conditions, and that closing bedroom windows will assist to reduce noise levels, particularly during certain meteorological conditions.

57. The consent holder shall maintain:

a record of complaints relating to any activity associated with dredging, blasting, rock breaking or the discharge of dredged spoil. Each record where practicable, shall include:

- The location of the reported nuisance or effects;
- The date and time of the complaint;
- A description of the weather conditions at the time of compliant, if relevant;
- Any possible cause of the nuisance or effect; and
- Any management actions undertaken to address the cause of the complaint; and the name of the complainant, if offered.

The record of complaints shall be provided to the Compliance Manager, Environment Southland every year or on request.

An aggregated summary of the complaints shall be incorporated into an annual monitoring report.

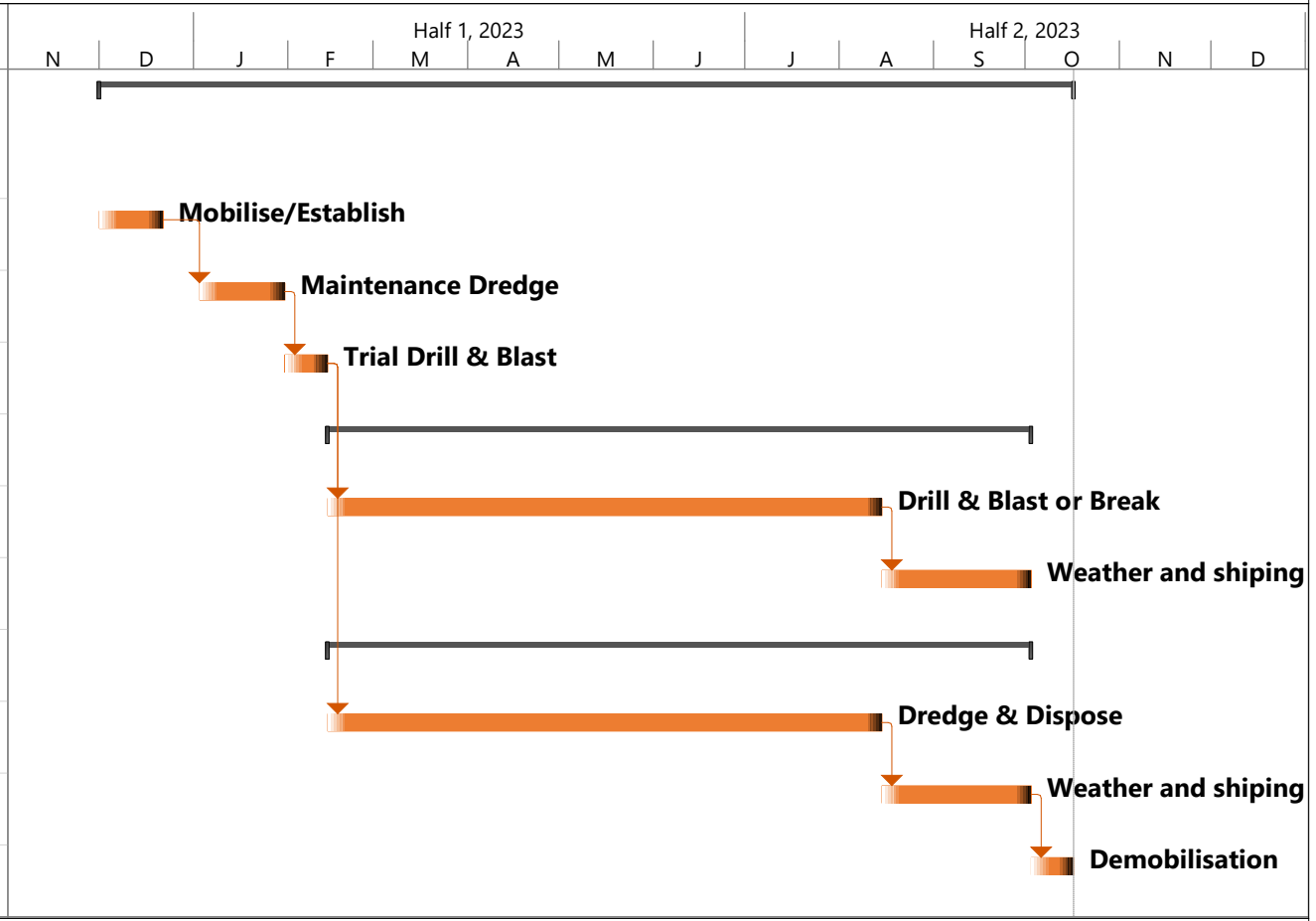
Lapse Date

58. The lapse date for the purposes of section 125 shall be 31 December 2031.

Attachment 2 – Proposed Capital Dredging Programme

Bluff Harbour Entrance Channel Dredging
Rev 05

ID	WBS	Task Name	Duration
1	**1**	**Bluff Harbour Entrance Channel Dredging**	**45.6 wks**
2	1.1	Mobilise/Establish	3 wks
3	1.2	Maintenance Dredge	4 wks
4	1.3	Trial Drill & Blast	2 wks
5	**1.4**	**Drill and Blast or Break**	**33 wks**
6	1.4.1	Drill & Blast or Break	26 wks
7	1.4.2	Weather and shiping delays	7 wks
8	**1.5**	**Dredge & Dispose**	**33 wks**
9	1.5.1	Dredge & Dispose	26 wks
10	1.5.2	Weather and shiping delays	7 wks
11	1.6	Demobilisation	2 wks



Project: Programme Rev 5
Date: Tue 19/10/21

Task	Inactive Summary	External Tasks
Split	Manual Task	External Milestone
Milestone	Duration-only	Deadline
Summary	Manual Summary Rollup	Progress
Project Summary	Manual Summary	Manual Progress
Inactive Task	Start-only	
Inactive Milestone	Finish-only	