REPORT

File No:	2010.193, 2000.472
Application No:	2010.193 -2010.200, 2010.202, 2010.203, RM10.193.01 and 2000.472_V1
Report No:	2011/0707
Prepared For:	Hearings Panel
Prepared By:	Peter Christophers, Principal Resource Officer Suzanne Watt, Senior Resource Officer
Date:	16 March 2011
Subject:	**Applications by Port Otago Limited to undertake various activities within the Lower Otago Harbour**

---

1. Purpose

1. To report and make recommendations on the determination of various resource consent applications under the notified provisions, Sections 95A(2)(a) and 95A(2)(c) and Section 127 of the Resource Management Act 1991 (the Act).

2. Introduction

2. Port Otago Limited (the applicant) has lodged a series of applications to ready itself for the next generational shift in shipping services, specifically the use of larger (6,000 to 8,000 Twenty-foot Equivalent Unit (TEU)) container vessels and/or increase in number, frequency and duration of all vessels using the Port Chalmers wharves due to growth in international trade.

3. The existing lower harbour channel, Port Chalmers berths, and swing area need to be both deepened and widened to accommodate the larger shipping vessels and the existing multipurpose wharf will need to be extended. The deepening of the berths at Port Chalmers will also result in the need for a rock revetment and buttress to be placed under the wharf for stability purposes. A public use fishing jetty at the end of Boiler Point joined to the end of the multipurpose wharf extension is also proposed.

4. The upgrading of the channel, berths and swinging area involves both the deepening and widening of these areas to a maximum depth of up to 17.5 metres (not including over dredge allowance) and will result in up to 7.2 million cubic metres (m^3) of material to be removed from the lower harbour and entrance channel. This largely comprises sands (62%) with the balance being silts (34%) and a small component of clays (3%) and rock (1%). The applicant notes there is no practical alternative to the disposal of this volume of dredged material at sea.

5. Resource consent has been sought for the following activities:

Otago Harbour Dredging

Proposal:	Upgrade (deepen and widen) the lower harbour channel, swinging area and Port Chalmers berths.
Location:	Harbour entrance channel from the landfall tower approximately 2.4 kilometres (km) north of Taiaroa Head to the Port Chalmers swinging basin.
Map Reference:	Between approximately NZTM 2000 1323150E 5031094N and NZTM 2000 1315751E 5023783N
Chart Reference:	Between approximately NZ661 & NZ6612 45º45.07'S 170º43.61'E and 45º48.82'S 170º37.87'E
Legal Description:	Crown Land Sea bed, Otago Harbour**,** Bed of Otago Harbour DP 3904**,** Sec 52 Blk I Lower Harbour West SD

Disposal of Dredge Spoil

Proposal:	Disposal of associated dredge material at new and existing disposal sites.
Location:	*New Disposal Site A0*: Pacific Ocean, approximately 6.3 km north east of Taiaroa Head *Existing Heywards Point disposal site*: Pacific Ocean, approximately 1.5 km northeast of Heyward Point *Existing Spit Beach disposal site:* Pacific Ocean, approximately 1 km to the north east of Spit Beach *Existing South Spit Beach disposal site*: western end of South Spit Beach
Map Reference:	*New Disposal Site A0:* Map reference: Approximate midpoint NZTM 2000 1328752E 5033100N *Existing Heywards Point disposal site:* approximate mid point NZTM 2000 1420987 E 4931872 N *Existing Spit Beach disposal site:* approximate mid point NZTM 2000 1421890 E 4929573 N *Existing South Spit Beach disposal site*: approximate mid point NZTM 2000 1422192 E 4927974 N
Chart Reference:	*New Disposal Site A0:* approximate mid point NZ661 & NZ6612 45º44.1'S 170º48.0E. *Existing Heywards Point disposal site:* approximate mid point NZ661 & NZ6612 45º44.7'S 170º41.95E. *Existing Spit Beach disposal site:* approximate mid point NZ661 & NZ6612 45º45.93'S 170º42.62E. *Existing South Spit Beach disposal site*: approximate mid point NZ661 & NZ6612 45º46.80'S 170º42.78E.
Legal description:	Crown Land sea bed

Port Chalmers Structures

Proposal:	Extend the multipurpose wharf and construct a public use fishing Jetty at Port Chalmers.
Location:	*Multipurpose wharf*: located between the Port Chalmers container wharf and Boiler Point approximately 750 m northeast of the intersection of Beach Street and George Street, Port Chalmers

	Fishing Jetty: located on Boiler Point, approximately 850 m northeast of the intersection of Beach Street and George Street, Port Chalmers
Map Reference:	*Multipurpose wharf*: approximate mid point NZTM 2000 1415698 E 4924365 N *Fishing Jetty*: approximate mid point NZTM 2000 1415698 E 4924465 N
Chart Reference	*Multipurpose wharf*: approximate mid point NZ661 & NZ6612 45º48.55'S, 170º37.68'E *Fishing Jetty*: approximate mid point NZ661 & NZ6612 45º48.49'S, 170º37.71'E
Legal description:	Crown Land Sea bed, Bed of Otago Harbour DP 3904

6. The works are proposed to occur in the coastal marine area (CMA) within the foreshore and seabed, and as such is on Crown owned land under the Foreshore and Seabed Act 2004, administered by the Department of Conservation.

7. The applicant holds Coastal Permit 2000.472 for the discharge into the sea of up to a maximum of 450,000 m^3 per year of dredging spoil for the purpose of disposal of dredging spoil derived from maintenance dredging and incremental improvements to the channel and berth areas in and about the Otago Harbour in accordance with the following specific maximum annual discharge quantities at each location:
-Heyward Point Spoil Relocation area (200,000 m^3)
-Aramoana Spit Relocation area (200,000 m^3)
-Shelly Beach Renourishment area (50,000 m^3)

8. Coastal Permit 2000.472 was granted for a duration of 10 years expiring on 1 December 2011.

9. The following reports were prepared on behalf of the applicant to assess the effects of the proposal and form part of this application.

Biological/Ecological Environment

- James *et al* 2009 Biological resources of Otago Harbour and offshore: assessment of effects of proposed dredging and disposal by Port Otago Ltd
- Willis *et al* 2008 Benthic offshore surveys of proposed dredge spoil disposal sites off Otago Peninsula
- Paavo, Probert & James 2008 Benthic Habitat Structures and Macrofauna of Lower Otago Harbour
- Paavo 2009 Observations of Rocky Shore Habitats in Lower Otago Harbour
- Paavo 2010 Benthic Habitat Structures and Macrofauna of Te Rauone Beach and Latham Bay, Otago Harbour
- Sagar 2008 Field study of bird foraging and roosting sites in lower Otago Harbour
- Boyd 2008 Fisheries resources in Otago Harbour and on the adjacent coast
- James *et al* 2007 Summary of existing Ecological Information and scoping of further Assessments for Port Otago Dredging Project

Physical Environment

- Single *et al* 2010 Physical coastal environment of Otago Harbour and offshore: assessment of effects of proposed dredging by Port Otago Ltd
- Bell *et al* 2009 Port of Otago Dredging Project: Harbour and Offshore Modelling
- Bell & Hart 2008 Offshore ADCP deployments (Otago Peninsula) for Port Otago dredging project
- Single & Benn 2007 Port Otago Project Next Generation Summary of existing physical coastal environment information and scoping for further studies
- Bell *et al* 2008 Port of Otago Dredging Project: Preliminary Hydrodynamic Modelling and Scoping Further Work
- Benn & Single 2007 Annotated bibliography: Coastal and continental shelf processes of Otago Harbour and Blueskin Bay. Report for Port Otago Ltd.

Dredging, Design & Other

- Davis 2009 Next Generation - Channel Development Short History of Otago Harbour Development and Dredging
- Opus 2008 Factual Report of Geotechnical Investigations
- Opus 2009 Geotechnical Advice "Next Generation" Project - Interpretation of Geotechnical Data and Quantity Survey
- Pullar & Hughes 2009 Project Next Generation Dredging Methodology and Disposal Alternatives
- Single & Pullar 2009 Vessel effects as a result of a deeper channel in the Lower Otago Harbour

General & Related Studies

- Butcher 2010 Development of lower Otago Harbour and channel at Port Chalmers for 6000 TEU Ships - Economic efficiency & Economic Impacts
- Traffic Design Group 2008 SH88 Transport Review
- Kiwirail 2009 Dunedin-Port Chalmers Rail Infrastructure and Future Volume Increase
- Port Otago 2009 Container Terminal Capacity Assessment
- Ballagh 2009 Assessment of Noise Effects from Project Next Generation - Dredging and Operation
- KTKO 2010 Cultural Impact Assessment - Project Next Generation, Otago Harbour
- James, Boyd & Probert 2010 Information on Key Species of Interest to Ngāi Tahu.

2.1 Peer Review

10. The applicant commissioned Tonkin and Taylor Environmental Limited (Tonkin and Taylor) to undertake its own independent review of the Harbour and Offshore Modelling report prepared by NIWA in conjunction with Met Ocean. Tonkin and Taylor, noted that "Overall, the study of effects on hydrodynamics, sediment transport and wave climate was comprehensive". The Tonkin and Taylor peer review also acknowledged that simulating seabed disturbance, sediment discharges and sediment transport is not a precise science, and noted that the authors have chosen to be conservative or bracket model parameters where in doubt.

11. Although the Tonkin and Taylor peer review suggested that alternative models and methodologies could have been used, it also stated that the final conclusions are likely to be similar to those given in the NIWA/MetOcean report. Finally, Tonkin and Taylor appraised the modelling results and conclusions drawn from them to be sound. Consequently, the modelling was assessed as being robust and fit-for-purpose, with no further or more detailed studies being necessary.

12. However, to ensure independence Otago Regional Council staff also commissioned Dr Ross Vennell of the Department of Marine Science, University of Otago to undertake a peer of the application. Dr Vennell stated that "The modelling approach used here is reasonable to address the aims of the work and has the elements you would expect for such a study. The work uses engineering standard software tools with a best practice application of these tools to estimate the extent of sediment dispersal and effects on tides within the Harbour. The models are used to simulate many scenarios for winds, waves etc., in a careful comprehensive approach to the modelling."

13. In summary both peer reviews concluded that the modelling undertaken by the applicant was appropriate for the proposal.

3. Background Information

14. This report should be read in conjunction with the main application document as it refers to a number of drawings provided by the applicant which describe and location the proposed activities.

15. Some drawings have been revised upon request by the council and new drawing titles and numbers may exist. These drawings are provided now by council.

3.1 Overview of the Proposed Works

3.1.1 The Lower Harbour Channel

16. The lower harbour channel up to and including the swinging area (or vessel turning basin) at Port Chalmers is shown in the application documents, particularly Drawing 11090, and extends over a distance of some 13 kilometres landward of the "Landfall Tower". Landfall Tower is located at Latitude 45 degrees 24.1 minutes South, Longitude 70 degrees 43.6 minutes East (chainage 0 m) and marks the start of the approach to the harbour entrance.

17. The existing lower harbour channel is currently at a minimum depth of 13.0 m below chart datum at the Port Chalmers Berth and swinging areas, increasing to a minimum of 14.5 m north of the Mole End which is situated at the end of Spit Beach. The Mole creates and protects the channel entrance to the lower harbour. There are sections along the entire length of the channel that exceed the depths above as a result of natural scouring action.

18. In order to minimise the volume of dredging required, thereby reducing and minimising cost and potential adverse environmental effects from the upgrading work, the applicant's primary philosophy in designing the upgraded channel was to keep the alignment of the new channel as close as possible to the alignment of the existing channel. The channel was also designed to avoid sites of significant ecological value such as the Aramoana sand-flats area.

19. To ensure the efficiency and safety of the channel for its primary purpose, the passage of 6000 – 8000 TEU ships, the proposed channel design alignment has been determined using internationally accepted design guidelines including ship simulation trials.

20. For the channel design process the ship simulator was used as an iterative channel design tool to determine and confirm the safe alignment and depth of the channel. The applicant's Senior Pilots undertook a large number of transits, making adjustments as they progressed in conjunction with senior engineering staff.

21. The upgrading proposed for the lower harbour is detailed in the application documents as drawing 11090, with the table in the top left corner showing the differences and variation in alignment and depth relative to the existing channel.

22. Typical cross sections at selected locations of the channel are also provided on drawing 11090/1 in the application.

23. The design drawings show the "declared depth" which is the depth that can be relied on for purposes of shipping movements. In order to achieve the declared depth, overdredging will occur of up to 0.5 m from Port Chalmers to the Mole and up to 1.0 m from the Mole to the landfall tower. The greater depth of overdredge allowance between the Mole and the landfall tower is due to the larger sea-swell in that area increasing the movements of the dredge, which makes accurate depth control of the drag-head more difficult.

24. The approach channel is to be increased to a minimum declared depth of 17.5 m (18.5 m including overdredge allowance) below chart datum from the landfall tower (0.00 m) to chainage 2,500 m (a point just north of the Mole End).

25. A slight realignment of the centreline of the direction of approach to the harbour entrance will require up to 65 m widening of the channel to be carried out on the western edge of the entrance channel.

26. From chainage 2,500 m the depth will be reduced to a declared depth 16.0 m below chart datum to chainage 5,600 m, being a point approximately two thirds of the way around Harington Bend.

27. Over the next 1,000 m to chainage 6,600 m the sea bed will gradually slope up to achieve a depth of 15.0 m and continue at that depth for the remainder of the channel up to and including the Port Chalmers basin.

28. The alignment of the new channel is centred predominantly on the existing centreline alignment. Widening and realignment along the inner edge of each of the bends at Harington Bend, Taylers Point, Pulling Point, and opposite Deborah Bay up to the Port Chalmers turning basin are required.

3.1.2 Rock Removal

29. The upgrading of the channel necessitates removal of rock at Acheron Head and Rocky Point at the positions shown on Drawing 11090 in the application.

This work cannot be carried out by a suction dredge and requires the use of explosives and a backhoe dredge or grab dredge.

3.1.3 The Swinging Area

30. The changes to the Swinging Area are shown in Drawing 11090 of the application. The width of the swinging area is to be increased by up to 115 m with a significant volume (approximately 710,000 m^3) of dredging to be carried out along the eastern edge.

31. The declared depth in the swinging basin area is to be increased to 15 m.

3.1.4 The Alterations to the Berths

32. The berths alongside the Container and Multipurpose Wharves at Port Chalmers s are to be deepened to 16 m and widened from 37 m to 50 m including the area alongside the proposed extension to the Multipurpose Wharf.

3.2 Channel Upgrading

33. The volume of material to be removed from the Lower Channel, Swinging area and Berths is up to 7.2 million m^3, this volume includes an allowance for overdredging to an average depth of 0.3 m over the whole of the dredged area.

34. Drawings 11112/1 and 11112/2 of the application documents shows the depth that will be dredged from the existing seabed level to achieve the proposed declared depths. They also show the extent of excavation away from the channel to enable widening of the channel to occur.

35. The channel upgrading will take place in the following three stages; extension of maintenance dredging (Incremental works), work requiring a backhoe or grab dredge (relating to the movement of rocks), major capital dredging.

3.2.1 Extension of Maintenance Dredging (Incremental works)

36. The applicant envisages that demand for the upgraded channel could occur anywhere between 2 and 15 years from now. Some work will begin immediately if consent is granted using the applicant's existing dredge plant, to allow the work to be carried out at a lower intensity over a longer duration. Once notification is received indicating that arrival of larger vessels is imminent, there will be a requirement to complete the upgrading work quickly using the larger contract dredge.

37. Upgrade work carried out to improve the channel at lower intensity will also benefit existing port operations, as it will improve the ability of existing vessels to leave the port fully laden at all stages of the tide.

38. The applicant's existing dredge plant will be used for this initial incremental work, being its trailing suction dredge "New Era" (used for maintenance dredging and authorised incremental improvements) along with, to a lesser extent, the "Vulcan" grab dredge. Alternatively plant of a similar size and scale of operation may be used.

39. It is proposed to make a start on the dredging using the New Era by extending its operation from 46 hours per week, to one which could operate up to 24 hours a

day 7 days a week. The dredge is crewed by full time staff and additional crews would be trained to enable these additional hours to be worked.

40. The work will be done in conjunction with maintenance dredging and is effectively an extension of the work currently being carried out. The New Era is quieter than a large contract dredge and its lesser size results in significantly lower generation of turbidity. The flexibility provided by the smaller scale of dredging using the New Era assists the management of environmental effects and the plant can be operated to ensure the noise from its operations does not exceed construction noise guidelines.

41. The limitation of using the New Era is its comparatively low capacity and hence the time taken for the work to be carried out. Each load of spoil taken by the New Era is 600 m^3 compared to a load of 11,000 m^3 for a large contract dredge. It would take up to ten years for New Era to solely complete the upgrading work of the channel that does not require the back-hoe or grab dredge.

42. While it is possible that the New Era may be utilised for parts of the dredging, its limited size makes it impractical that it undertake all works, the sizeable portion of which would be undertaken by a much larger trailing suction dredge.

3.2.2 Stage 2: Work requiring a backhoe dredge or grab dredge.

43. The work requiring a backhoe dredge or grab dredge comprises:
(a) The removal of rock from two areas within the lower channel.
(b) Extending and strengthening the container berth areas.
(c) Preliminary work on the extension to the Swinging Area and the bends of the channel to a depth of up to 9 m to allow the trailing suction dredge to operate in those areas.

44. The plant is proposed to be working 24 hours a day and 7 days a week with two exceptions:
(a) The use of explosives will only take place during daylight hours.
(b) The work that is underneath and adjacent to the Container and Multipurpose Wharves will be constrained by the tide.

3.2.2.1 Rock Removal

45. Rock in the Lower Channel at Acheron Head and Rocky Point will be removed from the areas at each end of Deborah Bay as is marked on Drawing 11090 of the application documents.

46. The rock from each area has to be removed using explosives to dislodge it into manageable sizes, which can then be removed by a backhoe dredge or grab dredge into dumb barges.

3.2.2.2 Increase of Depth and Width of Berth Areas and Rock Placement

47. The increase in depth of the berths at the Container and Multipurpose Wharves (including the proposed extension to the Multipurpose Wharf) and the associated placement of a rock buttress and revetment for stability of the wharves is described on Drawing 11130 in the application documents.

48. The rock is required be placed as described to prevent undercutting the existing piled wharf structure. The front and rear piles of the wharf support the loads generated by the gantry cranes during the vessel loading and unloading, with the remaining central piles of the wharf supporting the main wharf deck which carries straddle carriers and large forklifts. The reclaimed area behind the existing wharves forming the operational apron is protected from wave effects and is supported by a sloping rock revetment located beneath the wharves to a depth of approximately 5 m below chart datum. As a result of the deepening to 18 m below chart datum (including overdredge allowance), the support at the base of this revetment will effectively be removed. This has the potential, to result in a rotational failure within the reclaim.

49. To reduce the risk of this rotational failure, the sloping rock revetment is to be extended down to the newly dredged level and any silt or clay material beneath the wharves that is not currently protected by rock will be covered with a protective layer of rock. It is intended that this rock will be sourced from rock excavation at Rocky Point and/or Acheron Head, but rock may also be used from an approved land based quarry (such as Palmers Quarry). This would occur if the rock removed from the channel is unsuitable.

50. Further support is to be provided at the base of the revetment slope by forming a buttress or mattress of rock at the invert of the berth pocket. This buttress is a minimum of 2 m thick and 8 m wide for the full 600 m of both wharves. The lower excavated level of this buttress has been designed at 18 m below chart datum to allow for the 2 m of placed rock plus a 1 m siltation allowance, giving a final berth depth of 15 m.

51. Once the buttress is in place, rock can then be placed on the sloping revetment for added stability and protection of the wharves.

52. Drawing 11130 of the application documents outlines the details and sequence of the deepening works and slope protection. The following methodology is necessary to protect the integrity of the wharves structure while the work is being carried out:
    (i) Excavate "buttress" trench at base of slope to a depth of 18 m below chart datum utilising either grab dredge or backhoe.
    (ii) Excavate revetment trench between piles bents (or bays) to the profile shown using GPS guided long reach backhoe equipment.
    (iii) Buttress and revetment excavation will be limited to one consecutive pile bent open at any one time with excavation sequencing to follow a hit and miss pattern, 1 hit to 2 miss as set out in the construction sequence described in Table 1.

Table 1. Construction Sequence- Pile Bending

Pile Bent No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Construction Sequence No.	1	7	12	2	8	13	3	9	14	4	10	15	5	11	16	6

(iv) Once the design depth has been reached, rock (preferably sourced from either Rocky Point or Acheron Head) will be placed in the buttress excavation.
(v) The excavator will then move material up the revetment slope and place it in position.
(vi) Once the rock has reached the second pile row back from the seaward face of the wharf, further rock can be stacked or placed from the top. This will be achieved by a long reach excavator, conveyor or chute loaded either from a barge or back tipped off the wharf.
(vii) The final profile and extent of rock protection will be checked on completion to ensure compliance with the design.

53. As the work is complex and includes working in limited space due to tidal restrictions, it will need to be carried out over an extended period of time.

3.2.2.3 Preliminary work on Swinging Area and Channel

54. This work is a preliminary lowering of the swinging area and other areas where widening is to be undertaken (particularly at the bends) with the work being carried out using a backhoe dredge or grab dredge accompanied by dumb barges.

55. Lowering the seabed level in shallows and intertidal areas is required to enable the large trailing suction dredge to gain access. Although some advantage can be gained by working these areas at the higher stages of the tide, a water depth of at least 6 m below chart datum is required for the New Era and a depth of up to 9 m below chart datum may be necessary for a large contract dredge.

56. The shallow areas will be worked from floating plant moored or mounted on spuds (legs) directly alongside the area to be dredged. The backhoe dredge or grab dredge will remove the material and load this either into dumb barges or a self propelled hopper dredge/barge such as the New Era. Barges will be tied up directly alongside the backhoe or grab platform. Full barges will be towed to the disposal site and self propelled vessels will steam to the disposal site.

57. The preferred method is to lower the sea bed to approximately 6 m below chart datum and then use the New Era to continue to at least 9 m as the New Era draws considerably less water and can work in shallower depths than the large contract suction dredge. However, if there is insufficient time to allow the New Era to carry out this work then the backhoe or grab dredge may be used to lower the bed level below 6 m to approximately 9 m.

3.2.3 Major Capital Dredging

58. The most efficient method of completing the dredging to the required design depths is through the use of a large trailing suction dredge. This is likely to occur after the applicant has been notified of the arrival date of the larger vessels that require the increased channel dimensions. However, it is not possible to predict accurately when this will occur because this depends on the global economy and the commercial considerations the shipping lines need to make prior to committing the larger ships to New Zealand.

59. This capital dredging program will take several months (6-8) with the plant working 24 hours a day. The actual duration of this dredging will be dependent

on the size and specifications of the contractor's dredge used, whether the preliminary work has been completed and the amount of work that has been able to be carried out using the New Era before the large contract dredge commences work.

60. Total dredging time, vessel turnaround and the number of transits the vessel needs to make are directly related to hopper size and the dredge's pumping capacity. Dredging efficiency is further increased if the dredge is able to complete a number of longer runs without the need to turn around. Turning the vessel not only requires the dredge to slow, but also results in the draghead being raised from the surface of the seafloor. With dredging runs of between 2,000 and 3,000 m the hopper may be filled to capacity (subject to whether the claim is in sand or silt) in as little as two passes.

61. The applicant notes that detailed method of dredging will be determined during and following the tendering process, and will depend on the available plant and the experience of the international dredging contractor who is awarded the contract. The dredge may be required to work a number of areas concurrently as dredging times may require management in some areas to daytime hours where necessary to reduce the level of noise experienced by the community at night, or for other environmental reasons.

62. The selection of a suitable contractor will be based on a number of criteria including the condition of their plant, their environmental management procedures, the noise generated by its plant, the method of and ability to minimise adverse effects.

63. The applicant states that the dredging contractor will also be required to undertake the dredging in accordance with an Environmental Management Plan that they propose to develop. Furthermore the applicant notes that the contract will also ensure technical capability and competence of staff, attention to detail and that processes are in place to monitor environmental effects as a result of the works.

3.3 Maintenance of New Channel Depth after Completion of Capital Works

64. Once the incremental and major capital works are complete and the harbour channel, berthing and swinging areas have been deepened and widened to the required dimensions, it is intended that the New Era revert to its current maintenance dredging programme with its operation being essentially the same as that which occurs at the present time.

65. There are five main areas that currently require maintenance dredging in Otago Harbour: the Entrance Channel; the lower harbour channel; the Port Chalmers Inner Basin and Berths; Victoria Channel and the Dunedin Basin and Berths, however, the latter two are not part of this application and will not be mentioned further.

66. The maintenance dredging in all areas, other than the Port Chalmers basins and berths is able to be carried out with the trailer suction dredge New Era. This dredge has a large suction pump and trailing dredge pipe with a drag-head containing a rotating visor at its base. The operation is similar to that of a

vacuum cleaner. The drag-head is lowered to the sea floor and dragged along the bed as the dredge moves forward. A mixture of sand, silt and sea water is pumped up though the dredge pipe and this mixture is deposited into the dredge hopper. In the hopper the solids quickly settle out, and the water and some of the finer material such as silt that remains in suspension flows back overboard through the discharge chute, into the harbour channel. A full load of sand is firm enough to walk on in the hopper and is very close to the natural or in-situ density of undisturbed sand on the sea bed. The applicant also uses a barge mounted grab dredge Vulcan to dredge less accessible areas and for materials which tend to be more difficult to remove including clays and rock.

3.3.1 Entrance Channel

67. The entrance channel is bounded along its eastern edge by a large accumulation of sand forming a bar. The tidal currents on the ebb tide assist greatly in maintaining the position of this channel.

68. However, once seaward past the outer end of the Mole, the ebb tide strength decreases and sand is constantly being deposited along the eastern channel toeline. This accretion of sand is further exacerbated during easterly storms as the increased wave height and energy deposit large quantities of material over the bar.

69. The maintenance dredging of the entrance channel is a significant component of the dredging effort required to maintain the lower harbour with an estimated 60,000 m^3 per annum removed in order to maintain an existing channel toe line design depth of 14.5 m.

70. The material dredged from the entrance channel is generally clean fine to medium grained sand.

3.3.2 Lower Harbour Channel

71. The areas within the lower harbour channel where deposition occurs and which require regular maintenance are located along the inner edge of the bends. This is primarily as the result of the currents being considerably weaker in this region with the result being they are no longer able to transport the sediments either in suspension or as bed load.

72. The material dredged from the lower harbour channel comprises predominantly fine grained sand, although some areas contain a component of shell. The proportion of silt contained within the spoil increases with distance from the harbour entrance. Floating seaweed is at times collected by the dredge although this tends to be seasonal and is particularly prevalent following a period of strong winds. Sea tulips can become established in the areas that are less frequently dredged.

73. The areas within the channel that require maintenance dredging amounts to approximately 5% of the total area of the channel invert area, the remaining areas being deeper than the design depth of 13 m as a result of the natural scour of the tidal currents.

3.3.3 Port Chalmers Inner Basin and Berths

74. The material within the Port Chalmers inner basin and berths varies from clayey silt at the container berth to rock at the Beach Street berth on the eastern side of the basin.

75. The dredging of these areas is carried out using the heavy digging clamshell bucket suspended off a barge mounted crane. The suction dredge is unable to dredge the silt, clay and rocky bed and has difficulty manoeuvring within the confined areas of the basin.

76. Deepening adjacent to the Beach Street berth was carried out in the early 1990's. This required drilling and blasting to fracture and dislodge the rock. Some isolated areas that were not taken down to the design depth at that time continue to be worked on using the grab dredge progressively as the rock becomes more weathered.

3.4 Disposal of Dredged Material

3.4.1 Introduction

77. The applicant currently has consent to discharge dredge material at three locations: Heyward Point, Spit Beach and South Spit. These areas are shown in Figure 1.

78. Prior to 1985 all dredged material was placed at the Heyward Point site. This included material derived from both development and maintenance dredging. In 1985, the Spit disposal site was first used and this has become the preferred location in recent years because it is closer, resulting in the dredge spending less time going to and from the disposal site.

79. The applicant prefers to use the Heyward Pt site in rough weather, as it can often be calmer than the Spit site due to the greater depth of water available.

80. A third location, South Spit (Shelly) Beach was added as a further option in 1987. Sediment was placed here to assist in re-nourishing Shelly Beach which was suffering from erosion. The site has a limitation in that only sand from claims seaward of and including Tayler Bend is able to be disposed of to ensure that material moving onto the beach is of similar composition to the sand that already exists there. There is also a limit to the quantity of sand that is able to be disposed of in any one year. The applicant notes that Shelly Beach is a useful location when the weather is too rough to take the suction dredge out to sea.

81. The disposal of the sediment from this proposal requires the dredge or the dumb barges to steam or to be towed to within the boundaries of the disposal site. Once in position the vessel splits open along the entire length of the hopper using an onboard hydraulic system. As the vessel continues moving through the water, the dredged sediment falls from the hopper with any remaining material being washed from the hopper sides by wave action. All of the applicant's current dredging plant is the split hopper variety which generally discharges the entire load in less than 10 minutes.

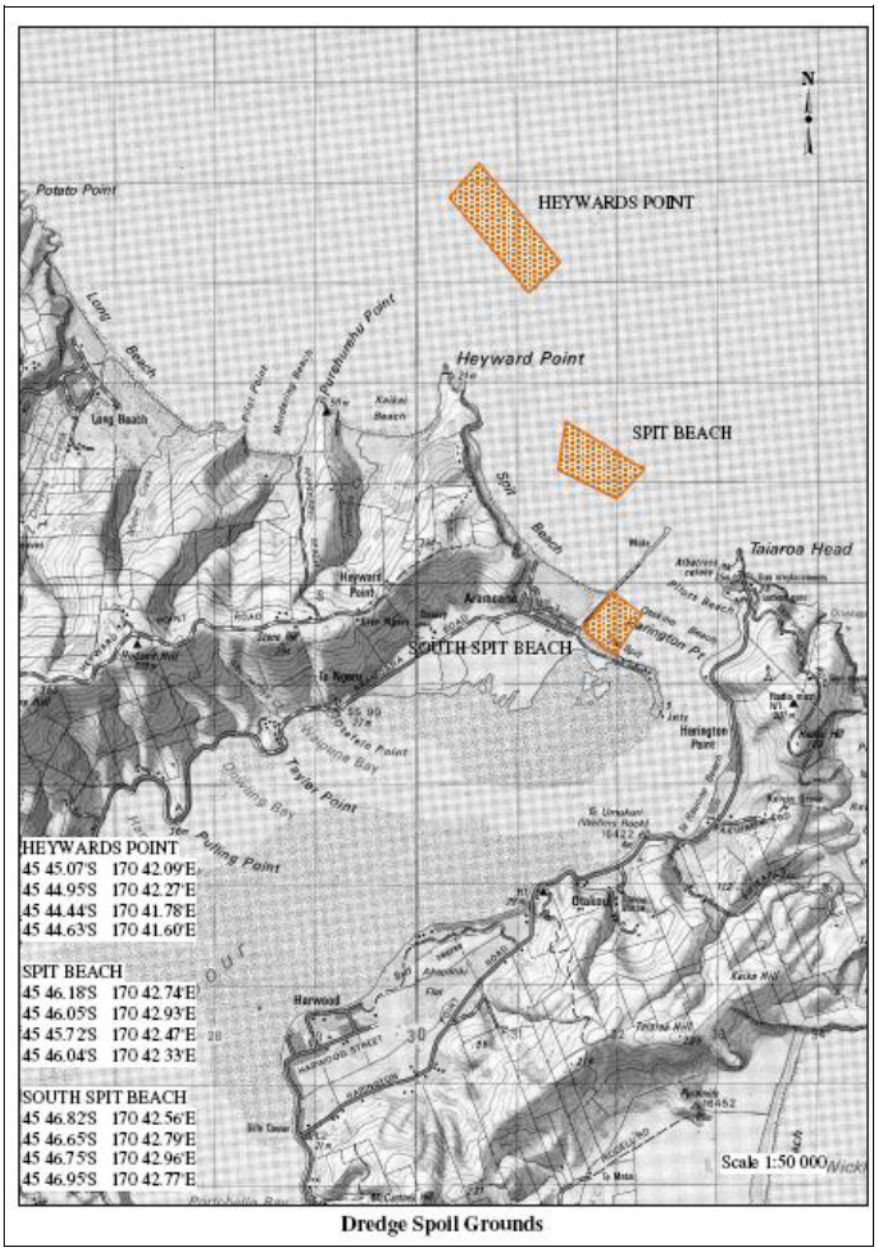

Figure 1: Schedule 5 from the ORC Coastal Plan showing the existing consented disposal grounds.

82. Both the trailer suction dredges and the tugs used for towing the dumb barges navigate using differential GPS to enable precise positioning within the disposal grounds

83. The main constraint for any beneficial practical use of the dredged material is the significant volume of material, up to 7.2 million m³. Most beneficial uses only require relatively small volumes of material at regular intervals over extended periods.

84. Therefore disposal in open water was considered by the applicant to be the only practical option to dispose of the dredged material. Disposal in open water is the most commonly used international practice especially when there are large volumes of material to dispose of. Offshore disposal has been the method historically used by the applicant and its predecessors, to dispose of about 17.5 million m³ of dredged material over the history of port channel development. The total volume already dredged is estimated to be approximately about 34 million m³ with the bulk of the balance being used in reclamations.

85. Environmental, social and economic factors were considered in determining the preferred method of dredging and dredging plant type. The principal environmental concern was minimising the turbidity generated by the operation. Social aspects included project duration, potential effects of turbidity on recreational fishing, noise and vessel safety.

86. Economic factors included project cost, interference with shipping operations and the impact on commercial fishing and aquaculture. The likelihood that a limited notice period will exist to issue the main dredging contract and mobilise the dredging plant were also important considerations.

87. After considering these aforementioned factors, and utilising both in house expertise and the knowledge of the applicant's technical advisors, as well as New Zealand and international dredging contractors, the applicant selected its dredging methodology.

3.4.2 Locating the Disposal Site

88. Determining the appropriate location for the new disposal site involved extensive consultation with potentially affected stakeholders to determine areas and effects of interest, as well as extensive and detailed scientific investigations.

89. The first stage in site selection involved the applicant identifying possible sites, after considering the following key matters:
    - Avoiding areas of conservation interest, protected marine areas and areas of significant ecological value.
    - Avoiding significant effects on fishing and aquaculture.
    - Avoiding effects on recreation including sailing, surfing and boating.
    - Avoidance of shipping routes.
    - Effects of disposal on currents and waves.
    - The likelihood of sediment being re-transported and causing effects on other areas such as beaches and estuaries.
    - Distance from dredging work and consequential travelling costs.
    - Siting of disposal in areas of similar natural material (i.e. disposing of ―like onto like) in order that re-colonisation of existing habitat will occur as quickly as possible following cessation of the disposal activity.

90. Following the identification of a suite of appropriate sites based on the above criteria, further detailed and iterative modelling was commissioned by the applicant on a number of sites. That modelling included assessments of the following:
    - Short term effects - Tracking sweep zones, concentrations and seabed deposition from suspended-sediment plumes.

- Potential changes to coastal shorelines and margins from differences in waves due to a disposal mound.
- Changes in wave height arising from the physical size and shape of the offshore disposal mound.
- Long term sediment transport from the disposal mound.
- How often, at what rate and where fine sand from the disposal mound moves in the long term.

91. This early constraints mapping and modelling suggested locations to the NE of Taiaroa Head would have the least impact on a range of activities and this was subsequently narrowed down to Site A0 (~6.5 km NE of Taiaroa Heads) where the potential for disposal material to impact on Blueskin Bay, northern coastline and Otago Peninsula, fisheries and areas with special or unique biological communities would be minimised.

92. After considering the above and balancing these factors the applicant determined that Site A0 was the optimal disposal site. The new disposal site is in approximately 27 m of water (below Chart Datum) at an offshore location on the "Peninsula Spit" sand feature, centred at or about Latitude 45.735 S, Longitude 170.80 E, or about 6.3 km to the northeast of Taiaroa Head as shown in Figure 2 or Drawing 11142 of the application.

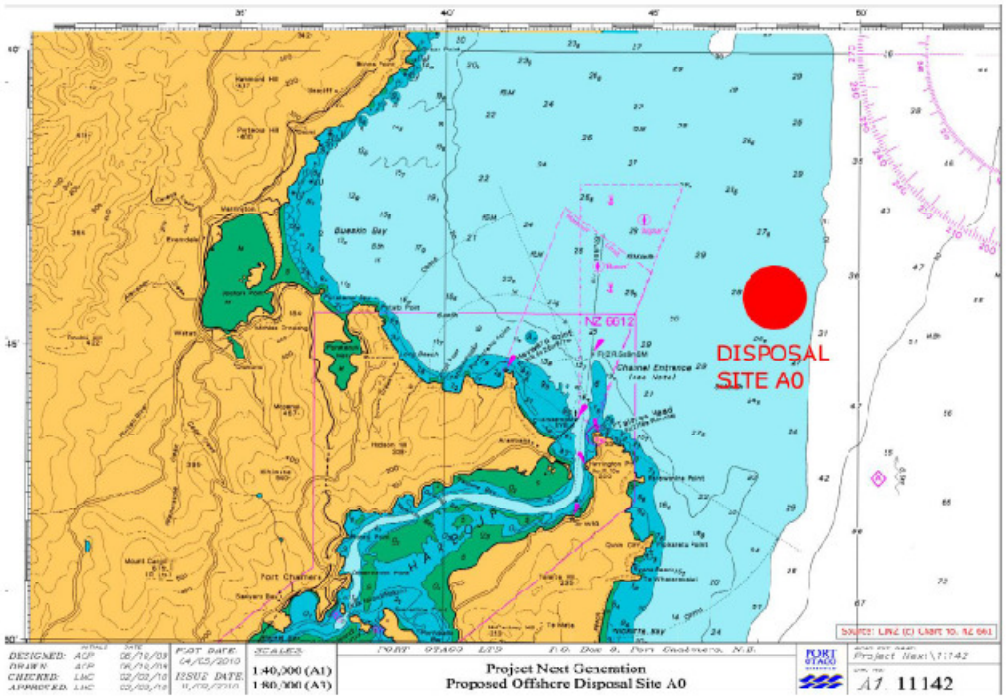

Figure 2: Location of Disposal Site A0

3.4.3 Sediment Disposal

93. There are three different aspects to dredge spoil disposal for these applications; disposal to existing disposal sites, rock disposal and disposal to Site A0.

3.4.3.1 Disposal to Existing Disposal Sites

94. Disposal from authorised dredging (capital and maintenance) will continue to be discharged to the existing disposal sites up to the volumes permitted under the

existing consent, including managing the disposal to ensure that 90% of the capital dredging material disposed over any 12 month period is sand.

95. The applicant currently utilises three separate sites disposal sites were discussed in section 3.4 above.

96. As mentioned in section 2 of this report, the resource consent for these disposal sites expires in December 2011 and a separate work program of study and assessment is being undertaken at the present time in order to be able to renew that consent. It is important to note that the disposal of sand and silt material from capital deepening and widening to the existing disposal grounds, is part of this application. This is achieved by applying to vary the existing conditions of Coastal Permit 2000.472.

97. The disposal will be managed between the existing sites and Site A0, and also managed to limit the amount of fine material disposed of at these existing disposal grounds. The total volume of material to the existing sites will be within the existing consented volume of 450,000 m^3 per annum. The only difference between the proposed disposal and that currently undertaken will be that material will be taken from slightly different depths or geographical locations (due to the deepening and widening of the channel, swinging area and berths) than is allowed under the existing consent.

3.4.3.2 Rock Disposal

98. The rock from Rocky Point and Acheron Head that is not required for the rock buttress and revetment under the container and multipurpose wharves will be disposed of at the Heyward Point site and will form part of the existing volume permitted to be deposited at that site. This activity is being consented as a variation to 2000.472 as part of this application.

3.4.3.3 Disposal to Disposal Site A0

99. The balance of the disposal from dredging is to go to Disposal Site A0, which will be used as follows:
    (a) Until a large contract dredge is used on the project, dredging spoil (other than rock from Acheron Head and Rocky Point) will be divided between the existing disposal grounds and the site A0. There could be up to 1 million m^3 a year disposed of to the new site but generally the disposal is likely to be less than 500,000 m^3 a year.
    (b) When the large contract dredge is used then the balance of the total volume of 7.2 million m^3 will be disposed of to this site in a period of less than 6-8 months with the actual volume depending on the progress that has been made by the *New Era* at the time of arrival of the large contract dredge.

100. Disposal site A0 would not be used for the disposal of spoil from maintenance dredging once the capital work on the channel is completed as its distance from shore both restricts access by the New Era when seas are rough and also increases the cost of disposal.

3.5 Multipurpose Wharf Extension

3.5.1 Overview

101. The existing multipurpose wharf is located adjacent to the existing container wharf as shown in Figure 3. The proposed extension to the Multipurpose Wharf is 135 m long and varies in width from 28 m to 37 m. The variation in this width is due to the change in alignment of the top of the rock slope of the existing reclamation. The proposed new public use fishing jetty is to be located at the end of the new multipurpose wharf extension. Construction information for the proposed multipurpose wharf extension and the new public use fishing jetty are on Drawing 11991 of the application.

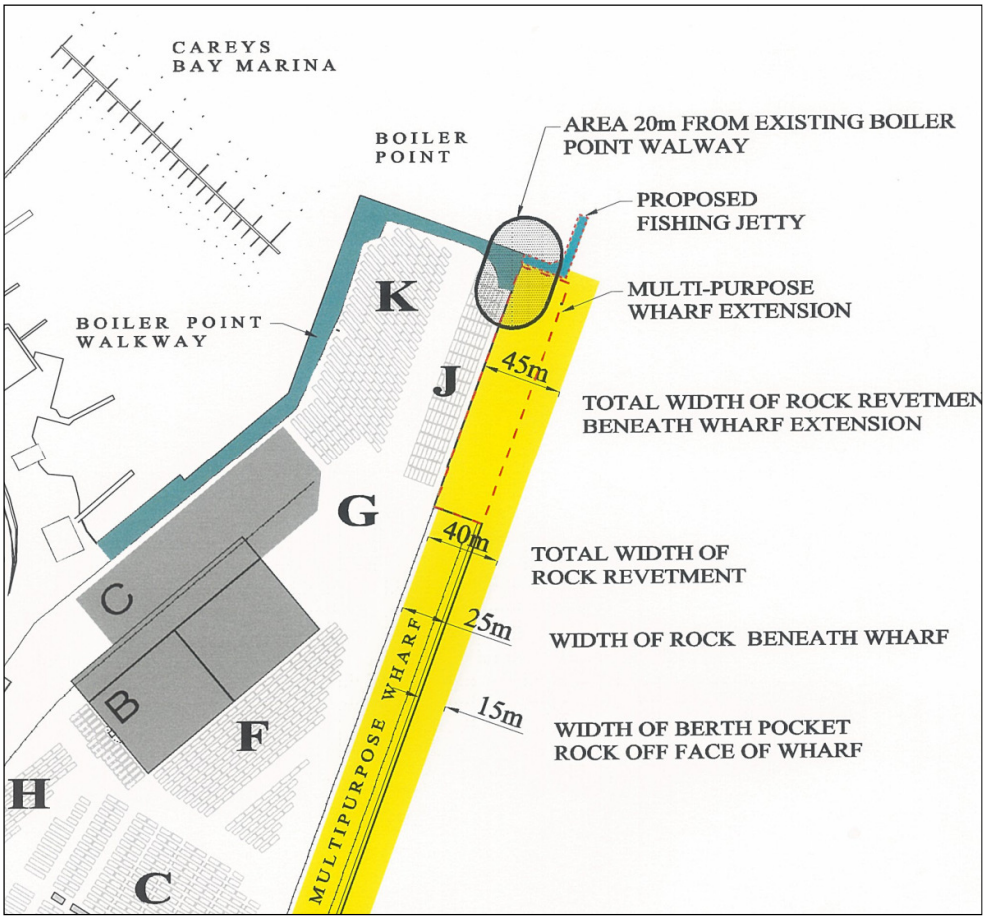

Figure 3 Exerpt from Drawing 11190 from Port Otago - Location of Multipurpose Wharf and public use fishing jetty

102. The proposed multipurpose wharf extension and the fishing jetty are within the area of the coastal marine area that Coastal Permit 2010.011 allows the applicant to occupy until 30 September 2026 in order to carry out its port related commercial undertakings. However, the proposed fishing jetty is for public use and not related to the ports commercial undertakings it is not covered by Coastal Permit 2010.011 to occupy the coastal marine area. Thus Coastal Permit RM10.193.01 has been added to the list of consents required.

103. Though the final design details and construction methodology for both the multipurpose wharf and the fishing jetty may be altered slightly as a result of the tendering process and the contractor‘s preferred plant and methodologies, it will be generally as described below.

104. The 135 m of extra (concrete) workable deck proposed for the multipurpose wharf will sit on approximately 165 new piles at centres varying between 3.05 and 6.1 m. The construction will allow all port equipment such as straddle carriers, forklifts and cranes to operate on the wharf.

3.5.2 Method of Construction – Multipurpose wharf

3.5.2.1 Seaward Piles – Preparation/Driving

105. The piles are similar to those used for the multipurpose wharf strengthening completed by the applicant in 2006. Unless there is compelling design or material supply economies, the applicant expects that steel H piles will be used to support the wharf deck. Alternatively tubular steel piles of 500 mm to 600 mm diameter could be used which are similar to those used in the original wharf construction.
106.
107. Based on the current wharf concept design, the applicant expects that approximately 165 piles will be required for the wharf. It is noted however that this figure may vary depending on the final selection and availability of the proposed H piles or tubular steel piles.

108. The piles will be driven either from a floating barge, from land or from the advancing wharf deck.

109. Piles will initially be welded either on a barge or on the wharf deck. The piles will be lifted plumb into the driving rig and a heavy weight ("dolly") will be used to drive them to their design depth.

110. Piles will be in the order of 30 m to 40 m in length with two to three welds required to achieve the fully driven depth. Once the first 10 m to 15 m section is in position then additional lengths will be welded to the top of the driven section of pile.

111. Each pile will be driven through largely marine silts until the pile reaches the underlying layer of volcanic rock.

112. The disturbance to the seabed from pile driving is minimal with only the area immediately adjacent to the pile itself affected by the operation.

3.5.2.2 Landward Piles – Preparation/Driving

113. For the 20 or so landward piles that are not in the coastal marine area, there will be a need to drive the piles through the existing rock rip–rap material. The pile driving rig will be set up on land. To enable pile driving the rock will be lifted away in the locality of the pile. Any large boulders or cobbles will be shifted by an excavator or crane and then returned to their position once the construction of the pile collar and pile cap has been completed.

114. Construction of the extension landward of the mean high water springs (and therefore outside of the coastal marine area), is within the Port 1 Zone in the Dunedin City District Plan. The applicant has noted that the construction and use of the berth extension will be undertaken in accordance with the permitted activity provisions of the District Plan.

3.5.2.3 Construction of Reinforced Pile Collar

115. In the intertidal zone there is a requirement to provide a reinforced concrete pile collar. This is to provide corrosion protection, buckling resistance and mechanical protection for the pile above and below the waterline. The length of the collar will be between 3 m and 11 m from the underside of the wharf deck with its diameter approximately 600 mm.

116. A precast pile cap will be placed on top of this collar to support the wharf deck. Below the pile cap the collar will have a tubular steel former with a base plate cut to the shape of the H pile. This is to allow the former tube to slide over the top of the H pile.

117. At this stage or just prior to the placement of the collar the piles will have temporary bracing to the adjacent structure and to each other. The bracing is either welded rods or a steel frame to lock the adjacent piles together.

118. The welding and fitting of the collar formwork and the bracing will either be completed off floating plant (most likely a small barge platform) or off an adjacent deck structure.

119. Once the collar formwork is braced into position a lean mix of concrete will be used to seal the base of the tube. The applicant states that once a reasonable seal has been achieved, a pre-fabricated reinforcing cage will be positioned inside the collar formwork. The collar will then be filled with 50 MPa concrete up to the level of the precast pile cap. The applicant notes that 50 MPa concrete is a very strong stiff mix and expects there to be minimal amount of float water reaching the seawater directly below. Once the concrete has reached sufficient strength the pre cast pile cap will be lifted into position and concreted to the collar's reinforcing steel.

120. While the applicant anticipates that the pile cap will be pre cast, the contractor may also choose to cast the collar in situ, which could result in the discharge of a small amount of concrete float water.

3.5.2.4 Wharf Deck Construction

121. The new multipurpose wharf deck will use 300 mm pre-cast slabs as the formwork with a 500 mm layer of concrete forming the top of the deck. Once the pile caps are concreted in position a crane will be used to lift the pre cast concrete slabs into position. The reinforcing steel will then be placed with formwork used to confine the extent of the concrete pour.

122. Prior to the placement of the pre cast deck slabs the rock rip rap material removed to enable driving of the landward piles will be placed back into position to provide the required level of wave protection.

123. The existing rock rip rap wall is not a straight line but is angled away from the western edge of the wharf. The wharf deck is designed to span across and bear on the existing edge of the reclamation embankment.

124. Once the wharf deck is sufficiently strong the fitting of the bollard, wharf fenders and other fixtures will be progressed. These items will be fitted using a crane from the wharf deck although use of floating plant may also be required.

125. The installation of the cathodic protection system will follow completion of the wharf deck. Cables will be run along the rear edge of the wharf and at each pile a cable will be connected to a preformed connection on the pile collar. This installation process is proposed to be completed from a small floating platform that is able to be manoeuvred between the piles.

126. The likely period of construction for the multipurpose wharf extension is in the order of 16 months, subject to the availability of contractors and plant.

3.6 Public Use Fishing Jetty

127. The fishing jetty will be constructed immediately adjacent to the northern end of the multipurpose wharf as indicated in Figure 3).

128. The fishing jetty extends 30 m into the Coastal Marine Area and will be separated both vertically and horizontally from the Multipurpose Wharf. In addition there will be a fence at the northern end of the Multipurpose Wharf to separate the structures and maintain the required level of port security.

129. The fishing jetty is proposed to be a wooden decking with railing over a concrete substructure that is light duty with no vehicle loadings designed for or expected.

130. The jetty will be similar in design to that reconstructed recently at Woody Point in Moreton Bay, Queensland which is shown in Figures 4 and 5.

Figure 4: Completed Moreton Bay Jetty – Substructure and Handrailing

131. The new fishing jetty structure will also be constructed on piles. The loads on this platform will be significantly less than the wharf extension therefore its structure will be of a smaller but appropriate scale of construction.

132. The substructure construction methodology is relatively simple being reinforced concrete beams and either concrete or steel piles. The decking currently on the Cross Wharf (between the Container wharf and Beach Street wharf) will be recycled and once dressed will be used as decking. An assessment of the suitability and condition of this timber will be required as not all will be suitable

for reuse as decking. Depending on the amount of timber available to be recycled from the Cross wharf, a section of deck may therefore need to be a different timber surfacing.

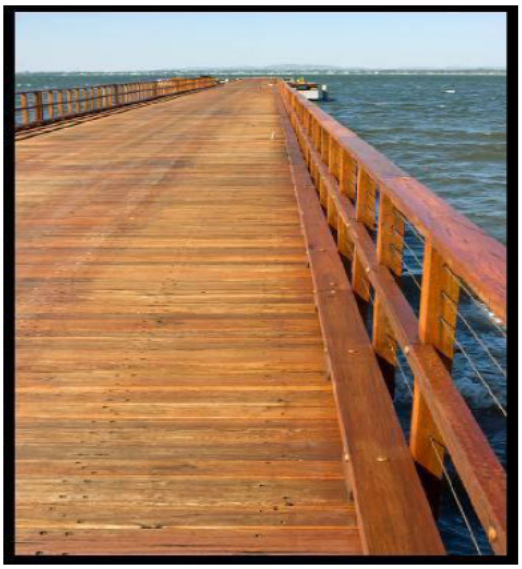

Figure 5 – Completed Moreton Bay Jetty – Deck and Handrailing

133. The likely period of construction for the fishing jetty is in the order of 16 months subject, to the availability of contractors and plant.

4 Applications Received

134. The Otago Regional Council has received the following applications for resource consent:
    - Deepen, widen and maintain the lower harbour channel, the swinging area and Port Chalmers berths, to allow the passage of larger ships to Port Chalmers,
    - Dispose the dredge spoil to sea, and
    - Extend the multipurpose wharf and to construct a new Fishing jetty at Port Chalmers.

4.1 Otago Harbour Dredging

4.1.1 Application No: 2010.193 – Coastal Permit – Restricted Coastal Activity

135. To disturb and remove up to 7.2 million m^3 of dredge material from the foreshore and seabed for the purpose of deepening and widening the lower harbour channel, Port Chalmers swinging and berthing areas to a maximum design depth of 17.5 m.

136. *Status:* To disturb and remove dredge material from the foreshore and seabed are **discretionary activities** and **restricted coastal activities** under rule 9.5.2.2. and 9.5.3.3 of the RPC.

137. *Comment:* The applicant has sought a 20 year consent term with a 2 year lapse period for this coastal permit, because if the project was completed at low intensity dredging with *New Era* size equipment, a duration of up to 20 years is possible.

4.1.2 Application No: 2010.194 – Coastal Permit – Restricted Coastal Activity

138. To disturb and remove natural material from the foreshore and seabed for the ongoing maintenance dredging of the lower harbour channel, Port Chalmers swinging and berthing areas to a maximum design depth of 17.5 m.

139. *Status:* To disturb and remove dredge material from the foreshore and seabed are **discretionary activities** and **restricted coastal activities** under rule 9.5.2.2. and 9.5.3.3 of the RPC.

140. *Comment:* The applicant has sought a 35 year consent term with a 2 year lapse period for this coastal permit, because maintenance works are for an ongoing period hence 35 years. This activity by itself is the same activity as the permitted activity the RPC at the present time, except allows for the increased channel dimensions (depth and width)

4.1.3 Application No: 2010.194 – Coastal Permit – Restricted Coastal Activity

141. To discharge decant water and all associated contaminants from the channel upgrading dredging operation.

142. *Status:* To discharge contaminants to the CMA is a **discretionary activity** under rule 10.5.6.2 of the RPC.

143. *Comment:* The applicant has sought a 20 year consent term with a 2 year lapse period for this coastal permit, because if the project was completed at low intensity dredging with *New Era* size equipment, a duration of up to 20 years is possible.

4.1.4 Application No: 2010.196 – Coastal Permit

144. To discharge decant water and all associated contaminants from the ongoing maintenance dredging operation.

145. *Status:* To discharge contaminants to the CMA is a **discretionary activity** under rule 10.5.6.2 of the RPC.

146. *Comment:* The applicant has sought a 35 year consent term with a 15 year lapse period for this coastal permit, because Maintenance works are for an ongoing period hence 35 years. This activity by itself is the same activity as the permitted activity the RPC at the present time, except allows for the increased channel dimensions (depth and width)

4.2 Disposal of Dredge Spoil

4.2.1 Application No: 2010.198 – Coastal Permit – Restricted Coastal Activity

147. To deposit up to 7.2 million m^3 of dredge material sourced from the channel upgrading works and maintenance dredging at the new off shore disposal site A0.

148. *Status:* To deposit dredge material is a **discretionary activity** and a **restricted coastal activity** under rule 9.5.4.2 of the RPC.

149. *Comment:* Restricted coastal activities are required to be heard by a committee which includes a representative appointed by the Minister of Conservation, in accordance with Section 117(5) of the Act.

150. The applicant has sought a 20 year consent term with a 2 year lapse period for this coastal permit, because If the project was completed at low intensity dredging with New Era size equipment, a duration of up to 20 years is possible.

4.2.2 Application No: 2000.472_V1 – Variation

151. To vary the purpose and conditions of existing resource consent 2000.472 to authorise the disposal of dredge material derived from the dredging of the shipping channel or within Otago Harbour from activities associated with the operation and maintenance of Port Chalmers facilities, in accordance with the following existing maximum annual discharge quantities at the following locations: Heywards Point disposal site (200,000 m^3), Spit Beach disposal site (200,000 m^3), South Spit Beach disposal site (50,000 m^3).

152. *Status:* This application is to vary consent conditions of an existing permit is pursuant to section 127 of the Act.

153. *Comment:* Section 127 (1) of the Act states that the holder of a resource consent may apply to a consent authority for a change or cancellation of a condition of the consent (other than any condition as to the duration of the consent). Section 127 (3) states that sections 88 to 121 shall apply, with all necessary modifications, as if:

    the application were an application for a resource consent for a discretionary activity; and

    the references to a resource consent and to the activity were references only to the change or cancellation of a condition and the effects of the change or cancellation respectively.

    The term of a consent cannot be varied.

4.3 Port Chalmers Structures

4.3.1 Application No: 2010.197 – Coastal Permit

154. To disturb and deposit up to 30,000 m^3 of rock rip rap to form a rock buttress under the container wharf and multipurpose wharf and their associated berths to improve foreshore and seabed stability.

155. *Status:* To disturb and deposit rock rip rap into the CMA is a **discretionary activity** under rules 9.5.3.6 and 9.5.4.3 of the RPC.

156. *Comment:* The applicant has sought a 10 year consent term with a 5 year lapse period for this coastal permit, because Works may not commence immediately as final completion of works is required only immediately prior to arrival of larger vessels, particularly if dredging is undertaken at low intensity over many years. Hence 5 year lapse period sought.

4.3.2 Application No: 2010.199 – Coastal Permit

157. To construct a new public use fishing jetty at Boiler Point.

158. *Status:* To erect the fishing jetty is a **discretionary activity** under rule 8.5.1.9 of the RPC.

159. *Comment:* The applicant has sought a 10 year consent term with a 5 year lapse period for this coastal permit, because Lapse period and consent term the same as the wharf extension 2010.200, as likely that works would be done at the same time by the same contractor.

4.3.3 Application No: 2010.200 – Coastal Permit

160. To extend the existing Port Chalmers multipurpose wharf by 135 m.

161. *Status:* To extend the Port Chalmers multipurpose wharf is a **discretionary activity** under rule 8.5.1.9 of the RPC.

162. *Comment:* The applicant has sought a 10 year consent term with a 5 year lapse period for this coastal permit, because Works may not commence immediately as final completion of works is required only immediately prior to arrival of larger vessels, particularly if dredging is undertaken at low intensity over many years. Hence 5 year lapse period sought.

4.3.4 Application No: 2010.202 – Coastal Permit

163. To disturb up to 4,500 m^2 of the CMA whilst erecting the fishing jetty and extending the Port Chalmers multipurpose wharf.

164. *Status:* To disturb the CMA whilst erecting structures is a **discretionary activity** under rule 9.5.3.6 of the RPC.

165. *Comment:* The applicant has sought a 10 year consent term with a 5 year lapse period for this coastal permit, because Works may not commence immediately as final completion of works is required only immediately prior to arrival of larger vessels, particularly if dredging is undertaken at low intensity over many years. Hence 5 year lapse period sought.

4.3.5 Application No: 2010.203 – Coastal Permit

166. To discharge contaminants to the CMA whilst depositing rock rip, constructing the fishing jetty and extending the Port Chalmers multipurpose wharf.

167. *Status:* To discharge contaminants to the CMA is a **discretionary activity** under rule 10.5.6.2 of the RPC.

168. *Comment:* The applicant has sought a 10 year consent term with a 5 year lapse period for this coastal permit, because Works may not commence immediately as final completion of works is required only immediately prior to arrival of larger vessels, particularly if dredging is undertaken at low intensity over many years. Hence 5 year lapse period sought.

169. The Panel may grant or decline these applications, and if granted may impose conditions under section 108 of the Act.

4.4 Applications no longer sought:

4.4.1 Application 2010.205

170. Since public notification of these applications was made, it has been determined that given the similarity in Coastal Permit applications 2010.203 (to discharge sediment whilst depositing rock rip rap) and 2010.205 (to discharge sediment whilst constructing the Fishing jetty and extending the Port Chalmers multipurpose wharf), it is more practical to combined these into one resource consent application 2010.203 rather than have two consents with similar activities and with similar conditions.

171. Consequently application 2010.205 is no longer required as it is incorporated in 2010.203. No amendment has been sought to the aforementioned consent term or lapse period.

4.5 New Application RM 10.193.01

4.5.1 Application RM.10.193.01

172. To occupy the CMA with the fishing jetty.

173. *Status*: To occupy the CMA is a **discretionary activity** under rule 7.5.1.5 of the RPC.

174. *Comment*:Since this proposal was notified it has been identified that the exclusive occupation of the coastal marine area by the fishing jetty will not be authorised by Coastal Permit 2010.011, which allows the applicant to occupy the coastal marine area for, for the purposes of operating and managing an existing port. Consequently a seperate occupation permit is required for the jetty.

175. However, as occupation of the CMA was implicit within the notified application and, if applied for separately, would likely be processed on a non-notified basis, then this coastal permit application (RM10.193.01) can be processed as part of the Project Next Generation applications, without having to be separately publicly notified.

4.6 Activities not requiring consent

176. Rules 13.5.1.1 – 13.5.1.3 of the RPC control the introduction of exotic or introduced plants within Otago's CMA. It is noted that the proposed activity have the potential to dredge and deposit these types of plants (including Undaria and sea tulip). However, as these species are already established within and adjacent to the dredging and disposal sites, no introduction of plants species will occur. Consequently, these rules do not apply to this activity.

177.

178. In particular it is noted that in May 2010, MAF released a revised policy for managing the commercial use of the exotic seaweed Undaria. As part of this MAF identified areas around New Zealand that are heavily infested with Undaria. MAF identified the area containing the proposed disposal site as being heavily infested with Undaria but that practical or regulatory restrictions are likely to limit Undaria farming opportunities.

5. Environmental Setting

5.1 Otago Harbour

179. Otago Harbour is a long and narrow inlet aligned SW-NE, 21 km long and generally about 2 km wide, with a mean surface area at high spring tides of 46 km^2.

180. Peninsulas at Port Chalmers and Portobello and their adjacent islands divide Otago Harbour into upper and lower basins. The Harbour is relatively shallow with an average depth of 3.3 m below mean sea level. Outside the main channels water depths are mostly less than 2 m and nearly 30% of Otago Harbour comprises exposed sediment flats at low spring tides. The main channel between Port Chalmers and Dunedin is maintained to a depth of 7.5 m below Chart Datum but from Port Chalmers to the entrance the channel depth is maintained at 13 m with a 14.5 m depth outside the Mole (depths relative to Chart Datum). The only other naturally deep areas (> 20 m) are several holes in the main navigation channel from Harington Bend to the Mole and between Quarantine and Goat Islands (up to 30 m depth). Otago Harbour is the only large non-estuarine inlet on the southeast coast of New Zealand and has a number of important sheltered water habitats that are not widely represented elsewhere in this bio-geographic region.

181. Otago Harbour is thought to be about 6,000 years old and was formed by volcanism and crustal folding of a syncline during the late Miocene period. Since its formation, the harbour has been subjected to infilling from sand swept in from the continental shelf, and from sediments eroded from the surrounding catchment.

182. Waitaha, Kati Mamoe and Kai Tahu made use of Otago Harbour as a food resource (mahika kai), as a means of travel and as a realm of Papa-tu-a-nuku to be respected.

183. Rangiriri (Goat Island) was the abode of Takaroa, the atua or guardian spirit of all that lives in the sea, in southern mythology.

184. The tupuna used numerous methods of catching fish in the harbour and the estuaries and creeks, including netting, trolling, spearing and line fishing. In addition, middens show the evidence of the gathering of kai moana, including pipi, cockle (Tuaki), mussel, paua, toheroa, oyster and kina (Sea Egg).

185. Ducks, other birdlife including weka, and Sea Lions, were also food sources. Whalebone was used for making weapons, tools, and ornaments.

186. Waka would travel from the kaik (villages) that were scattered around the harbour to various tauraka waka (canoe landing sites). Koputai (Port Chalmers) is where hunting parties would venture into the surrounding bush clad hills.

187. By the 19th Century settlement was focused on the Coast from Taieri Mouth to Moeraki, around the Lower Harbour and on Muaupoko (Otago Peninsula). There were tangata whenua settlements on the Taieri Plain (including Maitapapa at Henley) and at Taieri Mouth; along the western edge of the Otago Harbour from Koputai to Te Waiparapara on the Aramoana Spit; in the northern bays and inlets, including Whareakeake (Murdering Beach) and Purakaunui; around Puketeraki / Waikouaiti (now Karitane) area; and at Moeraki.

188. The villages on Muaupoko (Otago Peninsula) included Okia Flat, Takiharuru (Pilots Beach), Little Papanui, Te Rauone (Te Rauone Beach), Te Ruatitiko (Harington Point), Tahakopa (bottom of Pipikaretu Road), Omate (in front of the marae), Waipepeka (south end of the flat in front of marae), and a settlement at Harwood. In addition, Pukekura (Taiaroa Head) was an important fortified pa. Its position had been strategically important in times of political unrest.

189. Between 1846 and 1994, shoreline position and sediment transport at Aramoana was significantly altered by coastal engineering structures. Progradation of Aramoana Beach after the Mole construction (from 1884) indicates sediment has accumulated on the updrift side. The beach area between the Mole and Harington Point (Shelly Beach) retreated rapidly after the construction of the Mole, indicating the beach is on the downdrift side of the Mole and starved of sediment.

190. Maintenance and development dredging of the shipping channel in Otago Harbour has been carried out since 1865. About 34 million m^3 of sediment has been dredged from the harbour in that time. Disposal of dredged sediment has occurred off Heyward Point, the Spit and at Shelly Beach.

191. More recently, Otago Harbour has been substantially modified by human activity through reclamation, causeway and groyne construction, dredging and channel stabilisation, catchment modification and lining the harbour shoreline with seawalls. Reclamation has resulted in a reduction of the harbour tidal compartment. Most of the shoreline of the Upper Harbour has been modified, and is comprised of placed rock. Training walls and groynes also play an important role in determining the hydrodynamic flow of the harbour, stability of the position of the navigation channel and sediment movement on the shores and harbour bed.

192. Analysis of historical data shows that Aramoana Beach has been accreting since the construction of the Mole. Accumulation of sediment on the disposal site has also occurred during years when no dredged sediment has been placed there. Accordingly, it is likely that a combination of natural and human sediment inputs are occurring at Aramoana. At Shelly Beach, sediment placement has been carried out to provide sand as nourishment to the eroding beach. Retention of placed dredged sediment on Shelly Beach and in the nearshore south of the Mole has assisted in mitigating the erosion hazard to the beach.

193. Otago Harbour has a number of residential settlements located along its coastline, the most notable being Port Chalmers, though many other settlements including; Deborah Bay, Te Ngaru, Aramoana, Harington Point, Otakou, and Harwood are located adjacent to the lower harbour.

194. Inflows from modified urban and rural catchments have resulted in changes to the sediment supply and chemistry in parts of the harbour.

195. Sediment samples from along the lower harbour shipping channel have been tested for contaminants including Heavy Metals and Metalloids, Organic and Inorganic Compounds. Concentrations for all contaminants were found to be well below Australian and New Zealand guidelines for fresh and marine water quality.

196. Detailed investigations of the sediment composition of the lower harbour were carried out in 2008 to determine the nature of materials to be dredged under this proposal. Sand was found to be the dominant fraction of sediment in the entrance section of the lower harbour and towards Taylers Bend, with silts and some clay being present at depths greater than 12m up-harbour towards Port Chalmers.

197. Sediment analysis in the shipping channel areas of the lower harbour comprised of subsurface testing using bores and comparing findings with previous studies. From the analysis and interpretation undertaken the following is known about the sediment composition in the Lower harbour.
    a) Sediments in Otago Harbour range from silt to coarse sand containing shell fragments. Finer grained sediments including mud and silts can be found with the fine sand in the upper harbour, while coarser sand sizes are found with the fine sand in the lower harbour.
    b) Sand is most commonly encountered in the channel sections near the entrance to the harbour and beyond, namely from the Harington Bend to the entrance sections. Laboratory analysis found that sand was generally loosely packed in cores and had a water content of between 20 - 30%.
    c) Clayey silt is most prominent from the Swinging Basin to the Cross Channel sections. The behaviour of this material is dominated by the high silt content. These sediments were generally soft to very soft and non-plastic. Water content was between 30 - 40% and had a measured shear strength between 14. 24kPa.
    d) Silty clay was the least common sediment type encountered and is most prominent in the area around Acheron Head. The silty clay had a relatively high clay content and sediments were generally soft to very soft, had a high plasticity and water content of approximately 60%. The shear strength of these materials was measured to be between 12. 22kPa.
    e) Rock was only encountered at Rocky Point and Acheron Head, and consisted of completely weathered basalt (cobbles and boulders) near the seabed and moderately weathered basalt at depth. Rock strength ranged from extremely weak to weak within the upper 2 to 4m and became moderately strong to very strong below this.
    f) The sediment that is to be dredged is predominantly fine sand, with the secondary volume being clayey silt. There are areas and depths at which

the sediment types are relatively uniform and other areas where there are a mix of sediments.

g) Laboratory testing was completed to determine the mechanical and chemical properties of the sediments. The findings were compared to guideline values from the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000). With regard to chemical testing, none of the parameters analysed exceeded the guideline values used. It has been concluded that the materials to be dredged are not contaminated.

198. Drawings showing the variability in sediments from analysis was provided by the applicant in Drawing 11024.

199. The tidal compartment of the harbour (the amount of water flowing in during a tidal cycle) is between 6.9 x 10^7 m^3 and 7.5 x 10^7 m^3. The spring tidal range is 1.98 m at Port Chalmers and 2.08 m at Dunedin, while the neap tidal range is 1.25 m at Port Chalmers and 1.35 m at Dunedin.

200. High tide at Port Chalmers occurs around 10-15 minutes after high tide at the Spit, and there is a tendency for the time difference to be slightly smaller during spring tides and slightly larger during neap tides. The tidal time differences are explained by the tide wave travelling up the harbour faster with increased water depth. Therefore it travels faster during neap low tides than during spring low tides.

201. An ebb tide jet begins to form around 1 hour after high water, narrowing and strengthening to peak around 3 hours after high water. On the ebb tide, a peak flow velocity of 1.36 $m.s^{-1}$ occurs on the eastern side of the channel near the centre of Harington Bend. During flood tide, a peak flow of 1.59 $m.s^{-1}$ occurs at the southern end of the spit on the western side of the channel.

202. The flood tide period is shorter and its flow is stronger than the ebb tide, therefore the harbour is flood dominated and sediment will naturally move into the harbour and infill it rather than be removed from it.

203. Otago Harbour and the coastal environment are used for a number of water-based recreational activities, including: boating, fishing, diving and surfing.

204. Recreational boating activity within Otago Harbour includes sailing, motor boats, kayaking and rowing, all of which feature prominently at various locations within the Harbour, though in terms of the lower harbour these activities are more prevalent at Port Chalmers. Boats of sufficient size also venture outside of the harbour into the coastal environment more often for recreational fishing than any other activity. There are 7 yacht clubs within the harbour each of which undertake their own activities locally based around their respective club's location. However the main harbour channel areas and most secondary channel and bay areas with greater than 2 - 3m water depth are all commonly used for club events such as regatta and racing circuits as well as sailing in general. The facilities that support these recreational activities fall under jurisdiction of this Council and the Dunedin City Council. Potential project issues identified by representatives of these clubs related to shallowing up of harbour areas, effects

of the commercial use of the deepened cannel on recreational boating, as well as effects at moorings or on slips.

205. Fishing from boats occurs within the harbour, though the entrance channel is a particularly popular site for salmon and other species. Fishing from the Mole and Taiaroa Head near the entrance channel is also popular as is surfcasting from many beaches and rocky headlands.

206. Recreational diving is very popular at the Mole which is a voluntary marine reserve. The Mole is also used on a regular basis for people learning to scuba dive.

207. Surfing is a popular pastime at many locations along the Otago coastline including a number of beaches from Aramoana through to Karitane. Of particular note is Murdering Beach (Whareakeake) which is nationally renowned as one of the best and longest right-hand breaks in NZ, as well as Aramoana beach. Surfing takes place throughout the year when conditions suit, and swimming at many of the coastal beaches and sites within Otago Harbour also takes place during the summer months. Beaches as well as other coastal and harbour areas are popular general community resources which are enjoyed by many.

208. A number of commercial operations are evident within Otago Harbour and along the immediate coastline. These include: commercial shipping, fishing (including the harvesting of cockles for research purposes), and eco-tourism, which has its predominant focus at Taiaroa Head. Shipping operations are the most prominent of these commercial activities.

209. Offshore commercial fishing and cockle harvesting are recognised activities within the areas affected by and adjacent to this proposal.

210. Eco-tourism activity within the lower harbour focuses on wildlife activity at and in the vicinity of Taiaroa Head, but also includes other areas within the lower harbour. The Monarch has been taking tourists out to Taiaroa Head for over 10 years and in more recent times similar trips by sea kayak have become popular. The Royal Albatross Centre operated by the Otago Peninsula Trust is based at Taiaroa Head, while Natures Wonders is a smaller privately owned commercial operation based south of Taiaroa Head on open coast of the peninsula. Both are commercial operations based on eco-tourism.

5.2 Offshore

211. Very few studies before the work undertaken for this application had directly measured the wave climate of the offshore or nearshore environment of the Otago coastline. Hindcast modelling of the wave environment has also been used to determine the wave climate of the Otago nearshore area.

212. For the area offshore of Otago Peninsula and Blueskin Bay the most frequent wind directions are from the north / northeast, and south / southwest. As a result of the local geography, the direction of wave propagation into Blueskin Bay is modified such that waves approach predominantly from the northeast and southeast. With the beaches of Blueskin Bay being situated on the leeward side

of Otago Peninsula this section of coastline is also leeward from the dominant southerly swell.

213. The gradual shelf slope that characterises Blueskin Bay means that shorter period waves undergo little refraction until they are close to the shore. Consequently there is little loss of deepwater wave energy as the northeasterly waves move across the shelf. This results in most of the wave energy from this source being expended at the shore.

214. The wave climate of Blueskin Bay is 'quieter' than the outer Otago shelf and those beaches south of Otago Peninsula. Of the waves that do enter Blueskin Bay, the strongly refracted southerly swell dominates, but refraction lessens the intensity. The northeasterly waves are unimpeded within Blueskin Bay, although they are generally less powerful than the southerlies. Overall, the regime within Blueskin Bay can be described as a low energy coastal environment that experiences periodic high-energy storm waves propagating from the south. This is shown in Figure 6.

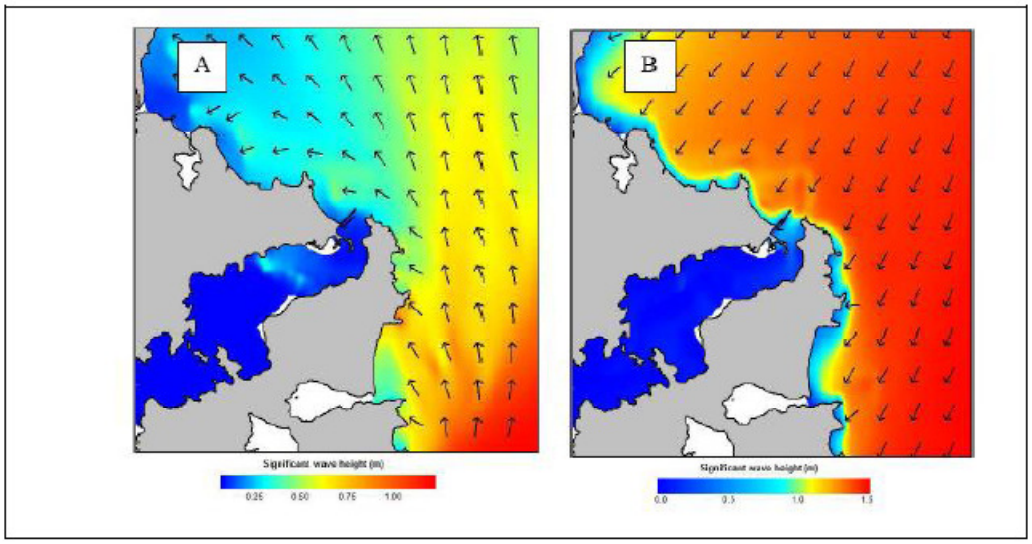

Figure 6: Typical wave height patterns for waves from the Southeast (A) and the northeast (B)

5.3 Ocean and Tidal Currents

215. The southern current that moves northwards up the east coast of the South Island is a well-recognised feature along the Otago coast. The Otago Peninsula causes a disruption to this northward current, by forcing an anti-clockwise gyre to form in its lee within Blueskin Bay. Recent measurements of currents in Blueskin Bay show variations in the direction and strength of the tidal currents depending on the state of the tide, wind direction and strength, and the strength of the Blueskin Bay gyre as shown in Figure 7.

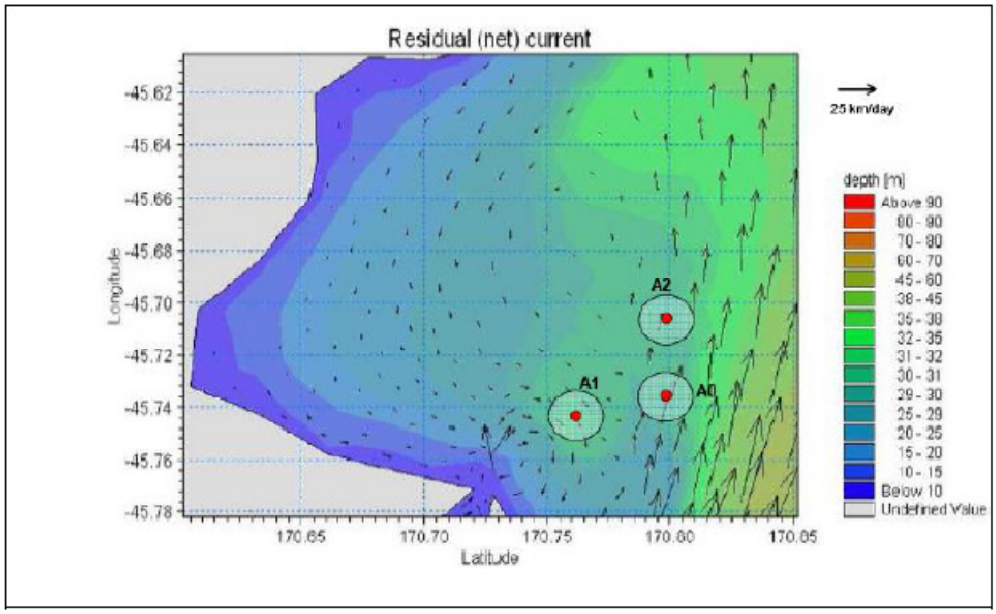

Figure 7: Location and extent of disposal site options investigated during the offshore plume modelling process, with a backdrop of the residual current pattern

216. There is a strong asymmetry between the ebb and flood flow structures. While the ebb flow extends beyond 2 km from the harbour entrance, the flood flow is limited to within 500 m of the coast. These tidal currents also have an important effect on the general current flows past the harbour entrance, and any resulting sediment transport. The asymmetry of the tidal flow and the flood dominance within the harbour entrance determine the sediment transport pathways across and within the harbour entrance. As a result, maintenance dredging in this area is, and will be, an ongoing activity.

5.3.1 Recent Current Metering

217. After reviewing Dr Vennell's peer review comments that no current measurements were undertaken at Disposal Site A0 and that direct measurements at this site would increase the confidence of the modelling, the applicant deployed a current meter within 50 m of this disposal site's centroid. A 47 day deployment at the proposed disposal site was undertaken from 19 October to 5 December 2010, set at approximately 4 m above the seabed.

218. The main results of this deployment were as follows:
- The mean current speed was 13.7 cm/s, with a maximum of 50 cm/s
- Strongest currents were to the NNE and SSE sectors.
- Tidal currents make up a relatively small percentage of total variance (energy) in the unmeasured currents0).
- a residual (net) current of the entire period was to the east.
- The directional distribution of currents for this period does not necessarily reflect the long-term distribution, and it is notable that the strongest currents were directed towards SSE and SE coinciding with persistent strong north easterly winds.

219. The applicant states that "the current regime at Disposal A0 appears to be predominantly influenced by regional scale wind-driven flows. However, it is likely that the combined effects of bathymetric steering and the impingement of oceanic –scale flows will also be influential at this location".

220. The applicant concludes that the key points that arise out of this investigation, when taken together with the modelling are:
    (a) Based on the 2010 measurements and the modelling with a zero Southland Current, the current at proposed Disposal Site A0 is very seldom directed onshore.
    (b) While it has been confirmed there will be periods of days and weeks when the residual current is more directed to the east (including brief periods of 1-3 days when the current is more to the SE), these residual currents will transport sediment plumes offshore, where after a short travel distance (particularly if the current is to the SE) they will quickly encounter the Southland Current and be transported in a general NNE or NE direction, depending on the strength of the Southland Current at the time.
    (c) The 2008 hydrodynamic model simulations prepared for this application, don't include this eastwards (offshore-directed) residual at Disposal Site A0, so these models results tend to show the plume closer to the coast and are more conservative for the Otago coastline, than if an easterly (offshore directed) residual is included.
    (d) At the very long timescales, the offshore submergent spit on which Disposal Site A0 has been placed shows a strikingly consistent North to NNE orientation, which will enhance topographic steering of currents to some degree but it is also indicative of a long term net residual current that has shaped this large sedimentary body.

5.4 Bathymetry

221. The width of the continental shelf out from Taiaroa Head is approximately 30 km. The seabed slopes gently to depths of 100-250 m at the edge of the shelf. A series of drowned Quaternary shorelines have been identified across the shelf. The seabed of Blueskin Bay slopes to a depth of 30 m at a distance of about 17 km from Warrington Spit. The contour at 30 m forms a near straight line from south to north starting from about 5.5 km offshore of Taiaroa Head. The Peninsula Spit is located landward of the 30 m contour. The crest of the spit slopes from a depth of about 20 m at the southern end to a depth of 30 m at the distal end. The depth inshore of the spit is about 30m in an area northeast of the dredged channel.

222. The current dredged sediment disposal grounds at Heyward Point and Aramoana form small sandhills on the general seabed topography. In 2004, the sandhills had an equivalent volume of approximately 44% of the total placed dredged sediment. The accumulation of sediment at these sites includes placed sediment and sediment passing through the area naturally due to nearshore sediment transport processes.

5.5 Sediments

223. Sediment characteristics are summarised as follows:
    a) The textural characteristics of the nearshore sediments (size, shape and arrangements) can be described as medium to fine sand, with a mean

diameter between 0.125mm. 0.14mm, well to very well sorted, and strongly positively (finely) skewed. The only exception to this textural trend is that of the ebb tide delta situated at the harbour entrance. This local area as being very coarsely skewed. The relatively homogenous nature is consistent with a single dominant source for the material.

b) The sediments of Blueskin Bay were generally well consolidated, although fine sands dominate the area, very fine sands and silts dominate the central region of the bay, with slightly coarser fine sand dominating sediments in shallower parts of the bay.
c) The sediment of the nearshore is predominantly very well sorted, although sorting values range from very well sorted to moderately sorted.
d) Sediments of the beaches and nearshore between Taiaroa Head and Karitane range from 0.15mm to 0.33mm, corresponding to descriptive classifications of fine sand to medium sand respectively. Large proportions (85% of all samples) of the sediments are fine sand size (0.17mm to 0.24mm).
e) The textural characteristics of the sediments compare well with historic studies meaning that the physical nature of the sediments of the coastal system between Taiaroa Head and Heyward Point have not changed significantly over a period of 44 years.

224. The above description of the textural characteristics of the beaches and seabed within Blueskin Bay provides a useful mechanism to aid in the understanding of the processes responsible for the deposition and transportation of sediments. This section of the Otago coastline possesses a relatively homogeneous size range of fine sand. This is likely to be a direct effect of two dominant factors. The first is that the main contemporary source of sediment to the coastal system is from one dominant source, the Clutha River. The second is that a relatively consistent and narrow range of energy is received in the nearshore and at the shore.

225. In terms of sediment transport paths, sources and sinks of sediment are identified to indicate where sediment is travelling from and to, respectively. The results of studies on sediment transportation off the Otago coast from 1980 through to 2008 are relatively consistent in that the main sources and sinks of sediment and major pathways remain the same. The main sediment source areas identified are the shelf south of Taiaroa Head, and areas around Mapoutahi Point, Warrington Spit and Potato Point. The main sink areas are the entrance channel to the harbour, a nearshore area off Aramoana Beach, and the distal end of the Peninsula Spit.

226. Sediment ‘sources’ dominate the nearshore between Heyward Point and Karitane Peninsula. Sediment ‘sinks’ dominate the coastal area south of Heyward Point to Taiaroa Head, including the entrance to Otago Harbour.

227. The applicant notes that the three dredged sediment receiving areas (Heyward Point, Aramoana and Shelly Beach) do not appear to supply sediment north into Blueskin Bay Estuary, nor do they appear to supply sediment back into the entrance channel.

5.6 Shoreline Features

228. The beaches between Taiaroa Head and Karitane are modern (in geologic time) depositional features made up of quartz sands sourced and deposited onshore directly from the Otago shelf.

229. There are three types of shoreline in Blueskin Bay: bay-head beaches, spit complexes and sea cliffs. Kaikai Beach, Murdering Beach, Long Beach, and Karitane Beach are all bayhead beaches. The morphology of all four of these beaches is very similar. Warrington Spit, Purakanui Beach, Aramoana and Shelly Beach at the entrance of Otago Harbour are all sand-spit complexes. Sea cliffs make up the Headlands of Taiaroa Head, the shore from Warrington to Green Point, and Karitane Peninsula.

230. Warrington Spit, Purakanui and Long Beach all show a long-term net advance in shoreline position, whilst Murdering and Kaikai beaches show a net decline. These measured rates of change indicate that differential supply of sediment to adjacent beaches is occurring and also different wave energies are spent on the beaches. Storm incidence and onshore winds result in short-term changes to the beach profiles in the form of erosion and accretion.

5.7 Biological Resources

5.7.1 Harbour Benthic Communities

231. Benthic habitats of the wider marine environment include sheltered rocky shores, intertidal sandbanks, and sub tidal soft sediment bottoms within Otago Harbour, and open ocean habitats immediately outside the Harbour.

232. Habitats/communities of particular interest that were identified by the applicant through consultation with various interest groups included seagrass distribution, cockle beds, the ecological areas around Aramoana and unmodified areas around Quarantine and Goat Islands.

233. The Lower Harbour is a mosaic of different benthic habitats. Based on surveys undertaken to date the Lower Harbour can be divided into 11 broad habitat types as follows (Figure 8):

    1) Relict shell on medium sand with sparse patches of algae.
    2) Shell hash.
    3) Mudstone or consolidated clay pavement with pockets of coarse sand or shell.
    4) Relict shell on medium sand with sparse patches of algae but with silty or flocculent layer, no sand ripples, recent bioturbation obvious.
    5) Medium sand with ripples.
    6) Thick algal mats.
    7) Seagrasses on medium sands.
    8) Macrofauna burrows/mounds (including ghost shrimp and lugworms), indications of burrowing bivalves minimal.
    9) Living cockle beds.
    10) Sediment surface dominated by closely packed macro faunal tubes.
    11) Deep habitat with cobble-sized stones and mollusc shells fused together, signs of high water flows, with sessile (attached) animals such as sponges, hydroids and tunicates.

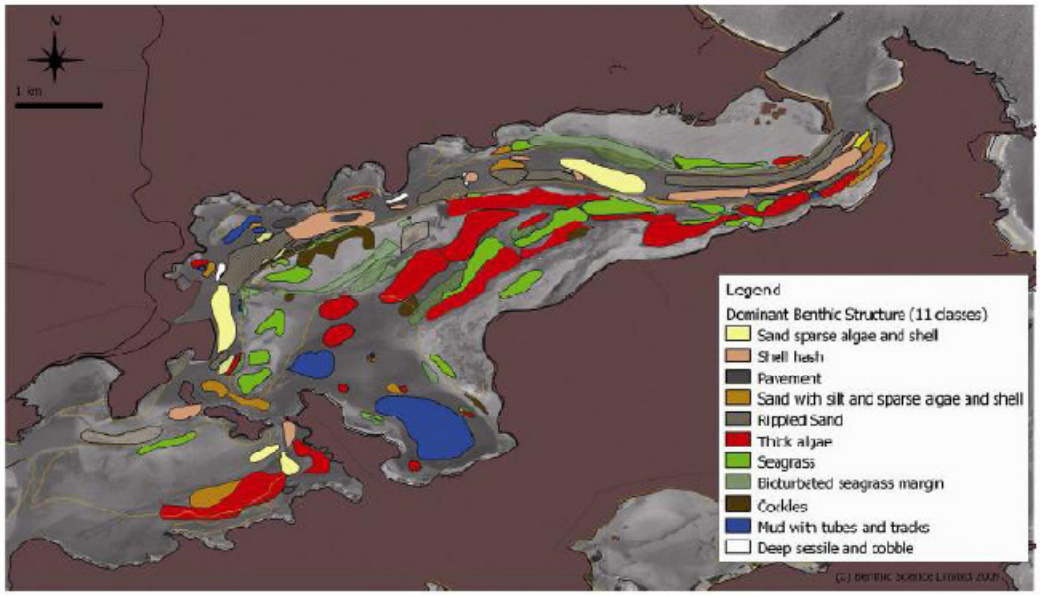

Figure 8: Interpolated map of dominant benthic structures (11 class scheme) from combined 2008 and 2009 photo survey data.

234. According to the habitat classification medium sands and relict shells make up 11% of the classified area, rippled sand 13%, extensive intertidal sandflats supporting algal mats 29%, inlet features with seagrasses and cockle beds 28%, macro faunal tube mats 10%, shell hash 8% and mudstone pavement 2 %.

235.

236. Sampling in the Lower Harbour including rocky shores found 190 benthic taxa. The macrofauna of soft-bottom habitats was dominated numerically by molluscs, annelid worm and arthropod species with larger conspicuous fauna including crabs and mantis shrimp. Also present, but less common were tunicates, sponges, several limpets, chitons, barnacles, serpulid polychaetes attached to shells, and seastars. The fauna was conspicuous for the lack of polychaetes.

237. The benthic habitat structure classifications do not appear to be a useful proxy for benthic communities, as most species were found across a range of habitats. In this regard, the harbour can essentially be treated as one system.

238. Additional sampling was undertaken by the applicant in areas identified as being of special significance by various stakeholders. These included Te Rauone Beach and cockle beds close to the swing basin in Port Chalmers. Four transects were also sampled at the Ecologically Protected Area of the Aramoana sandflats, which has special significance for birdlife.

239. Cockles were found at a number of sandflat sites in densities ranging from 15-625 m^{-2}. The highest densities recorded in these surveys were just south of Harwood and on the banks opposite Acheron Point. Densities on channel margins close to the swing basin were very low (<10 m^{-2}) and in the more populated margins opposite Acheron and Pulling Points, abundances were up to 300 m^{-2} and 625 m^{-2} off Harwood.

240. A small bivalve Perrierina harrisonae dominated the fauna on the Aramoana sandflats followed by several species representative of three amphipod families. Few polychaetes were identified in the samples from the sandflats.

241. A recent survey in the Te Rauone Beach area indicated that pavement-like seabed features extend from the Entrance Spit past Weller's Rock. A medium-sand bank on the southern side of the channel margin forms a retention structure for muddier sand, tube mats, and a sparse patch of horse mussel. Extensive sponge and tunicates communities, similar to those found in the deep sessile habitat in the main channel were found on the northern side of the Wellers Rock groyne.

242. The Upper Harbour is subject to more anthropogenic inputs and point source pollution from discharges. The fauna in the Upper Harbour is more characteristic of finer, muddier sediments and dominated by capitellid polychaete worms.

243. The earlier surveys for this application focussed largely on the soft-bottom habitats. Because of the importance of the few remaining naturally rocky shores, additional surveys/transects were carried out in March 2009 off Rocky Point, Acheron Point, Pulling Point and Quarantine Island. Small periwinkles were present at Rocky Point amongst the barnacles in the upper shoreline, but littorinids were not recorded at the other sites.

244. Barnacles were very abundant at Acheron Point along with snails and crabs in the upper 6m of transects. Schools of yellow-eyed mullet and triplefins were commonly observed.

245. The sites on Quarantine Island were more sheltered from prevailing winds than the other sites. Dense algal beds were found at 4m below chart datum along with Undaria and the bladder kelp which were attached to hard surfaces. The most numerous animals at this site were snails, limpets, chitons and tubeworms, found mostly in the upper shore or mid littoral.

246. All species identified in the latest survey of rocky shores by the applicant were species commonly found in shallow sheltered inlets of southern New Zealand estuaries and have been observed in Otago Harbour before. No rare or unusual species or communities were identified during these surveys.

5.7.2 Offshore Benthic Resources

247. The benthic fauna in the area surveyed by the applicant was numerically dominated by the gastropod snail Antisolarium egenum, followed by three polychaete worms and the ubiquitous bivalve Nucula nitidula. Depth and type of sediment appeared to be the main determinant of faunal groupings.

248. Total faunal densities were highest in the area just north of the Otago Harbour entrance, were lower in the middle of the bay and lowest in close to the coast in Blueskin Bay and offshore. The most species-rich area was also that which contained the highest densities (just north of the Harbour entrance), and the most species-poor area was right in Blueskin Bay and east of Taiaroa Head.

249. The coarser gravelly sediments of the middle and outer shelf provide habitat for attached epifauna, notably several species of bryozoans (lace corals). Surveys and mapping of their distribution have found that large colonies form reef-like thickets at depths of about 70-110 m. Also distinctive of the outermost shelf is the queen scallop, the basis of a local fishery, which were found well offshore and generally south of the proposed disposal grounds.

5.7.3 Planktonic Communities

250. The Upper and Lower Harbour support different zooplankton communities reflecting distance from the open ocean. Copepod species were the most abundant members of the permanent zooplankton community. Temporary larvae from a diverse range of benthic species are found in Otago Harbour, particularly in spring and summer. These include the euphausiid Nyctiphanes australis and the krill Munida gregaria which are an important source of food for birds when they reach high abundances in summer.

251. The hydrological regime off the Otago coast is complex and dynamic and includes three major water masses and associated plankton communities. Inshore waters have neritic characteristics with communities in the middle of Blueskin Bay comprising mainly meroplantonic larvae and a mixed fauna of oceanic and neritic species over the mid-shelf and north of Blueskin Bay. Physical processes rather than biological processes appear to determine the spatial structure of zooplankton in the region with the eddy systems acting as a recruitment and retention mechanism for coastal species.

5.7.4 Birds. Coastal and Harbour

252. The Lower Harbour and the adjacent offshore marine environment support a diverse array of bird life. These species, and other birds reported from the area, inhabit two major ecosystems within the area of interest to this proposal; coastal (including the lower Otago Harbour and the offshore area where dredged material may be disposed) and intertidal within Otago Harbour. The area around Taiaroa Head is nationally significant and is the only breeding site on the mainland for the northern royal albatross and Stewart Island shag. Thirty four species of seabirds are reported from, or are likely to occur frequently in Otago coastal waters. Thirteen of these species breed on the Otago coast and another six commonly frequent the intertidal zone in the Lower Harbour.

253. Those species present that have special conservation status include the following: Grey-headed mollymawk, Black-fronted tern, Black-billed gull, Banded dotterel, Caspian tern, White-fronted tern, Red-billed gull, Yellow-eyed penguin, Stewart Island shag, Hutton's shearwater, Flesh-footed shearwater, Sooty shearwater, Southern blue penguin, NZ pied oystercatcher, NZ Black-browed mollymawk, Northern royal albatross, Erect-crested penguin

254. A field study of bird foraging and roosting sites in lower Otago Harbour on 27 March 2008 by the applicant observed the following species at Aramoana: *Black shag, White-faced heron, Black swan, Paradise shell duck, Mallard, Grey teal, Pied oystercatcher, Pied stilt, Banded dotterel, Spur-wined plover, Bar-tailed godwit, Black-backed gull, Black-fronted tern, White-fronted tern,*

5.7.5 Marine Mammals

255. Four seal and six cetacean species have been reported from the Otago coast. All species spend time in the coastal waters off Otago, and several species of seal use sites on the Otago Peninsula as haul-out areas and breeding grounds. These mammals with special conservation status are listed as the southern elephant seal, Hector's dolphin, Southern Right whale, New Zealand sea lion and the Bottlenose dolphin.

5.7.6 Fish Resources

256. There is a diverse range of coastal fish and shellfish fauna in Otago Harbour and the waters adjacent to Otago Peninsula. Both the fish and shellfish fauna present in these waters are predominantly comprised of common species that are widely distributed throughout New Zealand coastal waters.

257. The extensive intertidal areas of Otago Harbour contain a significant population of cockles. Customary, recreational and commercial fishing and seafood gathering takes place in Otago Harbour and along the Otago coast. Recreational salmon fishing is a significant activity along the lower Otago Harbour channel and around the Harbour entrance during the summer months. The waters of Blueskin Bay and the adjacent coast are important to Otago commercial fishing vessels that fish for flatfishes, rock lobster and a range of other inshore fish species.

6. Notification and Submissions Received

258. As the proposed activities include restricted coastal activities the applications were notified publicly notified on 19 June with the submission period being doubled and closing on 13 August 2010, to recognise the scale and complexity of the activities.

259. One hundred and ninety eight submissions were received in the following categories (refer table 2)

Table 2 Submitter Category and number

Submitter Category	Request to be Heard	Request not to heard	Total
Support	13	19	32
Support with conditions	3		3
Neutral	7	6	13
Oppose	93	57	150
Total	**116**	**82**	**198**

6.1 Submissions in opposition.

260. The 150 submitters in opposition raised the following general issues; commercial, dredging and dumping, surfing/recreation, modelling/research, public amenity, hydrodynamics, wharf construction and use, role of the Council.

6.1.1 Commercial Issues

261. There was opposition to the dumping of material as the applicant has not considered the effect of dump site area on commercial trawling or local fishing boats. Submitters were also concerned with the effect on the local fishery and its impact upon crayfish migratory route. It was also identified that dumping of dredging materials will have an adverse effect on local commercial fishing supply shops.

262. Concerns were identified with the effect that the dumping of material will have on paua beds in the adjoining coastline, as well as the impact upon paua quota holders.

263. The potential adverse affect of the proposed dredging on the base resource of the Otago Peninsula visitor industry was also identified. Concerns were also raised regarding the effect on tourism and the lose of surfing affecting local surfing business Submitter also noted that the economic assessment fails to asses the economic impacts of the proposal completely.

264. Concerned were raised regarding having to pay additional Council rates to fund this proposal.

265. In summary, it has been identified that there has been no proper consultation with commercial fishermen and the fishing community at large. Not enough assessment has occurred on the potential effects on fish stocks, tidal movements and sand build up. Submitters also believe that the proposal should be declined because the natural world is being destroyed by this kind of development and the port should be downsized, not expanded.

6.1.2Dredging and dumping

266. Concerns were raised regarding the dredging of material from the foreshore, seabed and disposal of dredge material as its effects on cultural, spiritual, historic and traditional relationship within Otago Harbour. Concerns were also identified regarding sediment deposition within Kati Huirapa's takiwa and its ability to denigrate the mauri of Takaroa by making reef systems uninhabitable by all forms of kaimoana. Furthermore this sediment has the potential to significantly affect values provided by marine habitats within and surrounding the Taiapure.

267. Concerns were identified with the negative effects of blasting in the navigation harbour channel and also the effects on the marine ecology of the Quarantine Island/Kamau Taurua area. Also raised was the potential effect on the salt marsh adjacent to entrance of the harbour, as it is a bird habitat and needs specific protection. Concerns were raised regarding silting caused by dredging effecting the Aramoana saltmarsh ecosystem and consideration should also be given to Long Mack Wall as dredging to deepen and maintain channel will take place alongside this groyne.

268. The effect on the Aramoana Ecological Area caused by the deepening and widening of the channel and the shaving off of the Aramoana mud flats was identified, as well as the effect of noise on bird life in the area.

269. Submitters were concerned that the proposed dump site will have irreversible effects on the immediate environment, with the possible destruction of paua and kina in the surrounding area. Concerns were also identified with the effect on cockle beds and sea bird feeding.

270. The dumping of the dredgings at Taiaroa Heads/Aramoana and its effects on water clarity, destroying rock reef habitats, kelp and key marine species was identified. As the dredgings will have also be washed further up the coast, submitters want the sediment dumped further out to sea, or be used to reclaim areas within the harbour.

271. The dredging increases the disruption to breeding and fishing grounds, and will aid the spread of invasive and biofouling species Potential pollution from oil spills was also identified.

272. It was identified that the sand plume will impact negatively on coastal dunes ad have an effect on northern beaches including Warrington Beach. Submitters also identified that there will be a detrimental effect on ecosystems, fisheries and fish nursery habitats north of the marine dump site. There is also the potential to cause a build up of sediments in the Waikouaiti River Estuary, which will affect its habitats and the lifecycles of its flora and fauna. It is noted that there was also a lack of consultation with northern coastal communities.

6.1.3 Surfing/ recreation

273. The dumping of spoil at Hayward Point, Spit Beach and South Spit Beach dump sites will have a detrimental effect on the many surf breaks in the area, especially Aramoana. It was also identified that the dumping of contaminants not only affects water clarity making diving difficult, but also has the potential to affect the health of recreational users.

274. Concerns were raised regarding the effects of dumping the spoil on the surrounding beaches An option was also raised for the spoil to be transported to St Kilda Beach, where it would be an asset against the current erosion. Another option raised was to use the spoil rock and rip rap to create new surf spots.

6.1.4 Modelling Studies/Research

275. Concerns were raised regarding the applicant's model used for sediment dispersal and the large volume of sediment and sand on coastline. In particular, it was raised that not enough research has been done previously recording the outcome of dumping and its effects on aquatic communities. It was also identified that there was a lack of a peer review.

276. It was identified that the technical assessment doesn't recognise cumulative effects, the assessment of disposal alternatives and the proposals for monitoring are inadequate. It was noted that the proposal should have been modelled against a deeper channel where there is more pressure due to larger volumes of water entering and leaving Otago Harbour. It was also noted that no baseline monitoring has been done on the effects of dumping or noise levels.

277. The application doesn't acknowledge the existence of the London Protocol regarding dredge spoil assessment and the activity will impact upon teaching and

research by University of Otago, as well as on Southern Clams Limited research project into sustainable harvesting of cockles.

6.1.5 Public Amenity

278. Concerns were identified with the impact on the Careys Bay community, caused by the noise of the dredges, potential Dunedin City Council: District Plan breaches. Increased noise, lighting, loss of amenity and special character was also raised. Questions were also raised the proposal detrimentally affect local cafés and bars through a loss of income. Continuous dredging will also have a detrimental effect on the health and well being of family and visiting friends to Careys Bay. Concerns were also raised regarding the effect that the container cranes will have on the view and outlook from Careys Bay and its surrounds. It was noted that all of these factors may cause the devaluation of neighbouring properties.

279. Potential odour from the dredging in the harbour was also identified as a concern.

280. The stability of Rocky Point after blasting and sedimentation within Macandrew Bay was raised by submitters. Concerns were also raised with the loss of the character of harbour (including its shape) and how no real alternative or economic justification has been given for the proposal.

6.1.6 Hydrodynamics

281. Concerns were raised that proposal will affect the quality of waves along Dunedin's north coast.

282. Issues were also raised regarding the future impacts of shipping bow waves and associated erosion within Otago Harbour.

6.1.7 Wharf and Jetty

283. Submitters noted that the negative impacts of the extension of the wharf (noise, light spill and views) on residential dwellings. Concerns were also raised that the Fishing jetty may also become a berth or an area for further reclamation

284. Concerns were raised with the extension to the Multipurpose Wharf and how this incremental development affected current residential and recreational amenity at Careys Bay.

6.1.8 Role of the Council

285. An issue was raised regarding the Council having a conflict of interest with this application, given it is a shareholder of the applicant.

286. A concern was also raised with the lack of state of the environment monitoring being undertaken by the Council.

6.2 Neutral Submissions

287. The 13 neutral submitters raised the following general issues; surfing, dumping, dredging, monitoring plans and cross boundary effects.

6.2.1 Surfing

288. Concerns regarding the effects on the surf break at Aramoana were raised, as well as potential effects on local cultural and spiritual values.

6.2.2 Dredge Spoil Dumping

289. The potential of dredge spoil growing and moving offsite and its potential impacts on local fisheries was raised by submitters. In particular, with Site A0 being a commercial trawl ground (as it is a known breeding and feeding area for target fish), this will cause a loss of fishing income. Concerns were also raised regarding contaminants in the sediments being deposited, affecting human health and turbidity, as well as the impact on the northern beaches and paua beds.

6.2.3 Dredging

290. Concerns with silting caused by dredging were raised as it could effect ecosystems in the Aramoana salt marsh, particularly between mid September and late April. Potential effects on the Long Mack Wall and existing Spit Wharf because of their proximity and duration of the works were also raised along with concerns that the channel to Otakou wharf may become inaccessible.

6.2.4 Monitoring Plan

291. Concerns were raised regarding the lack of a detailed monitoring plan.

6.2.5 Cross boundary effects

292. Whilst the economic benefits of the proposal were acknowledged potential cross boundary effects such as construction noise and inundation of coastal roads were also raised. The noise created on the new Multipurpose Wharf by port operations affecting the Careys Bay Community was identified. A concern was also raised regarding insufficient wheel chair access on the wharf.

6.3 Submissions in support.

293. The 32 submitters in support raised the following general issues; economic benefits, economic and safety and amenity.

6.3.1 Economic

294. The majority of submissions in support identified the economic benefits of the proposal. It was noted that it was crucial for Port Otago to expand its facilities at Port Chalmers, so it can remain an export 'hub" for the South Island. It was also noted that this proposal has a significant positive impact on supply chain efficiency for exporters from South Canterbury to Southland and if larger ships cannot come to the port, exporters will send their cargo elsewhere, adding extra costs.

295. Submitters also noted that if the port's premier position as a key link in New Zealand's international supply chain is to be maintained, the port must be able to handle larger ships. If not, as well as having an economic impact on the port, there would also be implications for local job numbers.

296. Submitters noted that it was essential that the work covered by the applications be carried out in time for the introduction of the larger ships. If not it would be near disaster for Port Chalmers, damage the economy and well-being of Dunedin and Otago and result in high added costs to take cargo to Lyttelton.

297. It was identified that the channel has previously been dredged and any effects to Otago Harbour will be short term and no more than minor. It was also noted that sediment dumping in the Southland Current should quickly dilute and disperse.

6.3.2 Port Efficiency and Safety

298. It was identified by submitters that it is important for the cruise industry that Port Chalmers is able to accommodate the growth in cruise ship activity. Submitter's added that the proposal will avoid clashes with berthing by cruise ships and container ships, keeping tourist and industry separate between the inner wharf and outer multi-purpose wharf.

299. It was noted that it was essential that the multipurpose wharf be extended to meet the requirements of the new generation of containers ships. It was also noted that bigger ships should lower the overall carbon footprint.

300. Deepening and widening the channel will also assist with navigational safety and Otago Harbour has been heavily a modified environment through port activities for over 130 years. Submitters also noted that the harbour is in excellent condition and dredging and the port expansion over the last 30 years has not been detrimental to habitats on or around the harbour.

6.3.3 Amenity

301. Submitter's identified support for the construction of the Fishing jetty and that dredging work will improve the amenity values of the harbour. Submitter's also noted that their concerns have been addressed through the Project Consultation Group organised by the applicant.

6.3.4 Conditions of support

302. A number of submissions were received conditionally in support. These conditions include, wanting to ensure works carried out are done in an environmentally responsible manner that will protect the harbour mouth and surrounding beaches from degradation. It was also submitted that the Council should be carrying out the dredging.

303. The dumping of fine silts in Site A0 doesn't occur during weather conditions that drive the spoil plume into inshore areas and no fine silts deposited in the existing consented dump areas.

304. It was noted that the applicant should provide access to areas within the harbour for a 2-3 m draft vessel within 5 years, and that there should not be any ongoing effects of the dredging and associated sedimentation in Macandrew Bay

305. A number of submitters also had concerns with the level of monitoring for the proposal and requested that it be independent.

7. Assessment of Environmental Effects

306. This assessment comprises of five sections
    - 7.1 Channel Enhancement
    - 7.2 Sediment Disposal
    - 7.3 Multipurpose Wharf Extension
    - 7.4 Fishing jetty

7.1 Channel Enhancement

307. The channel enhancement will involve dredging of soft sediment and blasting of rock outcrops within the existing harbour channel alignment.

7.1.1 Blasting

308. There are small areas of rock on the edge of the channel that cannot be removed by dredging and therefore need to be broken up by blasting. This material will then be removed by either a backhoe dredge or grab dredge. The applicant has extensive experience with blasting of rock in Otago Harbour and noted that invertebrates are unlikely to be impacted by blasting, except those in immediate vicinity, as they do not have gas filled organs.

309. The applicant has noted that animals with swim bladders (many fish and marine mammals) and other sensitive organs will be impacted by sudden pressure waves as a result of explosives, causing rupture and mortality. However bottom dwelling fish species often do not have swim bladders, and consequently are less susceptible than others.

310. A Port of Auckland study provides an indication of the potential area affected by blasting and suggest an LR50 of 36 m for a charge of 50 kg and 50 m for 100 kg charge. Consequently, localised fish kills will be unavoidable with greatest impact within 30-50 m, depending on the type of charge used.

311. Similarly marine mammals within 100 m could be impacted. New Zealand sea lions can be found around some of the rocky areas in the harbour and the applicant has observed one or more at Acheron Point and the small kelp patches near Wellers Rock and Te Rauone Beach walls during recent surveys.

312. Many mammals rely on sound for navigation/feeding and have sensitive hearing apparatus. These animals are large enough to swim away from bothersome background dredging noises, but sudden high-decibel blasts could harm them if they were in close proximity.

313. Surveys before and after blasting by the applicant at the Beach Street Wharf, Port Chalmers were carried out in 1993. The presence and effects on marine mammals, shags, penguins, fish and shellfish were monitored over the three months of operation and the applicant concluded that the blasting appeared to have had little effect on the marine fauna and flora except in the immediate vicinity where small schooling fish and a small number of larger fish were affected. Marine bird life appeared to be totally unaffected and no marine mammals were seen in the vicinity during blasting.

314. However, to ensure adverse effects of blasting are minimised the applicant has proposed the following mitigation measures:
    - Removal of resident fish prior to blasting (i.e. crayfish).
    - Visual observations prior to detonation (i.e. mammal watch).
    - Undertaking blasting only during the daytime.
    - Where appropriate undertaking traffic control during the blast.
    - Use of best practice blast techniques (i.e. drilling and use of explosives).

7.1.2 Dredging

315. There are 3 sources of effects depending on the type of dredging equipment
    - The disturbance of the sea-bed itself whether from the draghead of a TSHD or from a grab or bucket of an excavator.
    - Loss of material from a grab or excavator bucket as the dipper arm is brought up through the water column to be loaded into a barge
    - The overflow water ("decant water') from either the hopper of TSHD or a dumb barge being loaded mechanically.

7.1.2.1Disturbance

316. The dredging operation in some locations will have unavoidable direct physical effects on the benthic habitat. Specific locations include: small areas of intertidal and inlet communities close to the port facilities, habitats and communities in the main channel as well as small areas of subtidal habitat at the port facilities, Harington Bend and close to Aramoana subject to widening.

317. Increases in turbidity, suspended sediments and settled sediments can impact on habitats and communities in the channel itself and some marginal and intertidal flat areas close to the main channel. Consequently, the applicant has proposed to identify and test specific sites of concern prior to commencement of dredging and on occasions during the dredging.

318. A number of sites have also been identified in the harbour and along the coastline as important to bird feeding, roosting and nesting (particularly Aramoana and Taiaroa Head). While birds can be very mobile, these sensitive areas should still be protected. However, given their mobility it would be very difficult to design a programme that would be meaningful and able to detect changes that could be attributed to the dredging operation.

319. To address this issue the applicant proposes that it shall not undertake Incremental Capital Works or Major Capital Works in the area adjacent to Taiaroa Head between 1 October to 30 November and 1 January and 14 February of each year to avoid effect on these areas, refer to Drawing 11325 of the application documents.

320. Furthermore if godwits are present and feeding in the immediate area of the Aramoana sand flats during the period 1 February to 31 March of each year then Incremental Capital Works or Major Capital Works in the vicinity of the Aramoana sand flats are to be undertaken only when the tidal height is above half-tide (>0.9m above Chart Datum), with the approval of the Department of Conservation. The applicant notes that godwits found outside this period are not considered to be migratory and therefore their short term disturbance is not critical.

321. Given that dredging of the harbour channel, which is a permitted activity in the Regional Plan Coast, has been occurring for many years, these proposed mitigation measures will ensure that the effects of dredging on bird life are no more than minor.

322. Direct impact on whales from dredging activities within Otago Harbour is unlikely, although increased avoidance of inner coastal areas close to centres of human and vessel activity is possible.

323. Concerns have also been raised regarding potential degradation of rock groynes, harbour structures and beaches including Shelly Beach, Te Rauone, and Aramoana Flat. The Environmental Management Plan prepared by the applicant shall outline proposed surveying of these features pre-dredging and post-dredging and at intervals following, to ascertain effects of the dredging.

324. Review conditions shall also ensure that any adverse effects on the sea bed have been caused by the dredging can identified and rectified.

7.1.2.2 Turbidity Management

325. An Environmental Management Plan shall be developed by the applicant which will contain a detailed monitoring program. This programme will not only ensure that resource consent conditions are being met, but also require adjustments to the Environmental Management Plan and dredging practices should unexpected effects be detected.

326. As discussed, increases in turbidity, suspended sediments and settled sediments can impact on habitats and communities in the channel itself and adjacent marginal and intertidal flat areas. Through the Environmental Management Plan, in consultation with appropriate parties (DOC, Kai Tahu etc.) the applicant shall select representative sites with key assets, plus control sites. These sites shall be monitored at appropriate frequencies before, during and post-dredging. The applicant has proposed that key indicators/sites could include:

- Seagrass – general mapping as well as mapping at specific sites. Measurements of light attenuation during the dredging undertaken at appropriate frequency and sites. The applicant proposes that a programme be designed so that significant areas of these sensitive communities are protected and to follow recovery of beds if they were to be impacted.
- Cockle beds – areas disturbed through widening would be assessed for the opportunity to remove cockles prior to dredging commencing. Areas identified to receive potentially high levels of suspended solids or deposition should be monitored before, during and post-dredging along with a few representative intertidal sites (including major beds opposite Acheron and Pulling Points).
- Monitoring of the general habitats and communities at representative locations (channel, deep sessile communities) and in sensitive areas, or specific areas of major concern to authorities (such as Aramoana, Te Rauone Bay).

327. Consequently, it shall be recommended that the applicant locate turbidity meters adjacent to key representative or sensitive receiving environments within Otago Harbour. These sites shall include Seagrass beds off Harwood; intertidal cockle beds opposite Acheron Head; Aramoana Ecological Area; Rocky shores around Quarantine and Pudding Island; vicinity of Wellers Rock/Omate Beach as well as a control site as indicated in Figure 9.

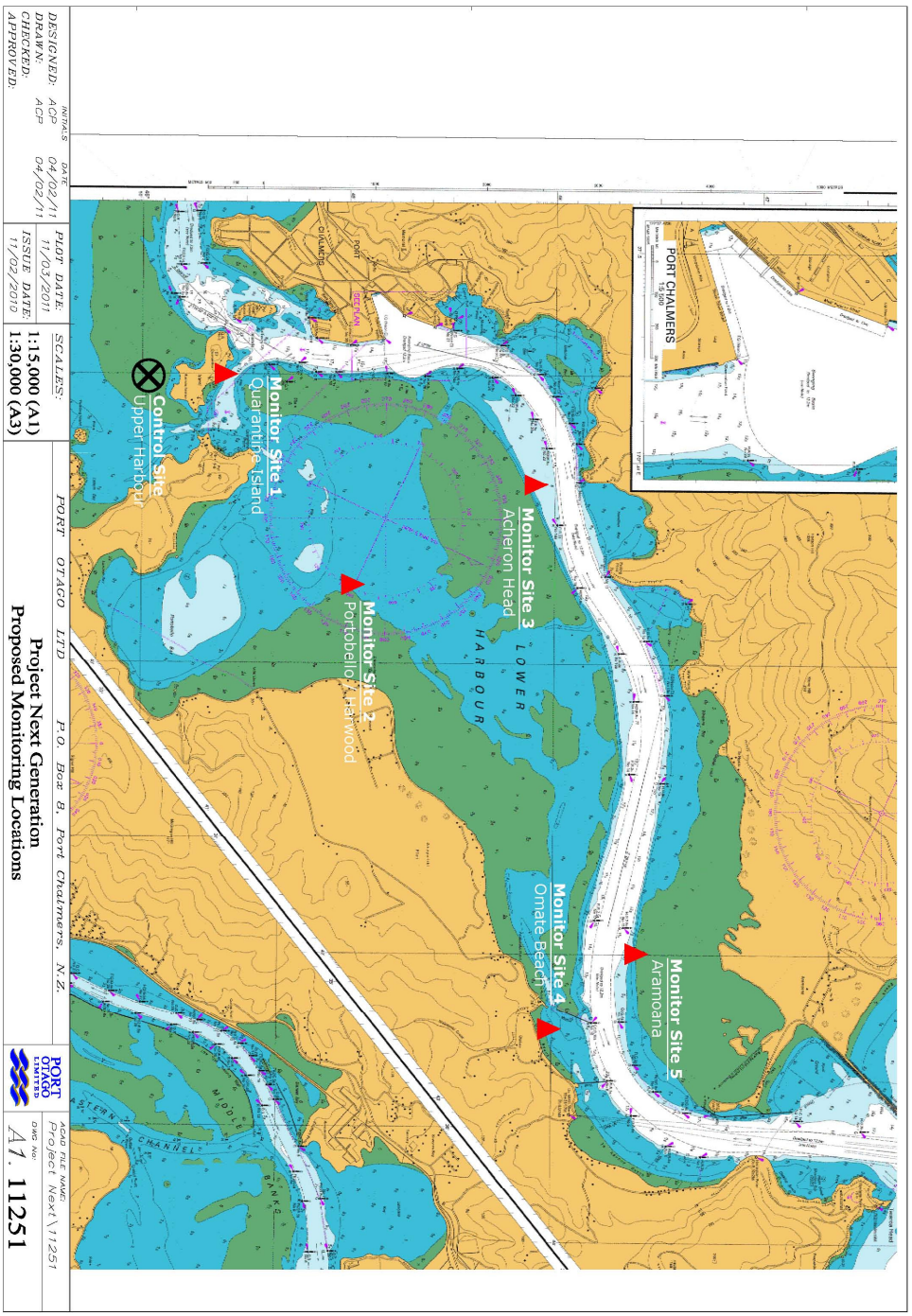

Figure 9 Turbidity Monitoring Locations

328. The applicant shall propose a robust monitoring programme that is consistent with internationally accepted practices (e.g. Port of Melbourne dredging programme) and scientific information from other NZ programmes.

329. However, as well as monitoring, it is also appropriate that maximum environmental limits be set on any discharge permit to ensure effects are no more

than minor. It is noted that environmental limits have also been placed on a number of dredging operations overseas, where in most cases there is a two stage approach to addressing exceedances. The first stage being an investigation of what caused the exceedance and the second being a mitigation stage, which could involve changes to the dredging operation as a last resort.

330. The applicant shall propose environmental limits that are generally based on a 2 week moving average with higher levels based on a 6 hourly average and where site specific, depending on the sensitivity of local communities as shown in Tables 3 and 4.

331. Where turbidity exceeds response limit 1 the applicant shall undertake a series of responses which include; notifying the Council within 24 hours of exceedance, checking equipment/data accuracy to verify exceedance, reviewing natural events and areas of dredging activity with an expert advisor, assessing the impact of ongoing dredging operation and assessing the need for additional monitoring (Table 3)

332. If turbidity levels increase to response level 2, the applicant shall as well as undertake all actions as set out when response limit 1 is reached; undertake management of dredging process to reduce turbidity and may include operating the dredge in non overflow mode (refer Table 3).

Table 3: Environmental Response Limits.

Monitoring Location	Asset	Response Limits	
		1	2
Turbidity meter placed in a location in the Harbour seagrass beds	Seagrass	12 NTU (6 hourly average)	17 NTU (6 hourly average)
Turbidity meter placed in a location within the Aramoana Ecological area	Benthic Biota	19 NTU (6 hourly average)	24 NTU (6 hourly average)
Turbidity meters placed in the following locations Quarantine or Pudding Island Wellers Rock/ Omate Beach	Rocky Shores	19 NTU (6 hourly average)	24 NTU (6 hourly average)
Turbidity meter placed in location within the intertidal cockle beds opposite Acheron Head.	Fish and shellfish	35 NTU (6 hourly average)	50 NTU (6 hourly average)

333. These measures should ensure that turbidity levels are not raised to a level whereby detrimental effects will be caused. However, to ensure these effects are not caused, the discharge of contaminants shall cease if the environmental limits contained within Table 4 are exceeded.

Table 4: Environmental Limits.

Monitoring Location	Asset	Environmental Limit
Turbidity meter placed in a location in the Harbour seagrass beds	Seagrass	25 NTU (6 hourly average) 15 NTU (2 week moving average) hourly average)
Turbidity meter placed in a location within the Aramoana Ecological area	Benthic Biota	35 NTU (6 hourly average)
Turbidity meters placed in the following locations • Quarantine or Pudding Island • Wellers Rock/ Omate Beach	Rocky shores	35 NTU (6 hourly average)
Turbidity meter placed in location within the intertidal cockle beds opposite Acheron Head.	Fish and Shellfish	70 NTU (6 hourly average)

334. The applicant states that in the context of recent work undertaken in New Zealand, including the Manakau Harbour, the proposed limits are at the lower end of the scale. Additionally, the proposed approach of responding with active management of activities to those low trigger levels is also a precautionary approach.

7.1.2.3 Cultural Effects

335. Concerns have been identified with the dredging of material from the seabed and its disposal having effects on cultural, spiritual and historic values, as well as on local iwi's traditional relationship with Otago Harbour.

336. Concerns were also raised regarding the offshore sediment disposal's ability to denigrate the mauri of Takaroa by making reef systems uninhabitable by all forms of kaimoana. If not managed properly the sediment has the potential to significantly affect values provided by marine habitats within and surrounding the East Otago Taiapure.

337. Following suggestions from local runanga the applicant prepared a Cultural Impact Assessment for this proposal, which involved setting up of a working party with these groups.

338. The Cultural Impact Assessment concluded that monitoring and a flexible dredging programme is required to ensure Otago Harbour and Te Tai o Arai Te Uru is healthy and will continue to support Kai Tahu ki Otago customs. Specifically, monitoring of the effects of dredging on key species and ecosystems of importance to Kai Tahu, including tuaki, flat fish, seagrass and kelp is a recommendation of this assessment. These recommendations have been

addressed through the requirement of the Environmental Management Plan to adaptively manage the actual or potential effects on aquatic communities.

7.1.2.4 Local Community Effects

339. A number of submissions raised concerns regarding the negative effect the proposal may have on quality of life including; noise, economic vitality and a decrease in property values.

340. To ensure noise effects are minimised the applicant shall measure and monitor the noise levels of the dredging equipment. The applicant has noted that if construction noise guidelines are exceeded, it shall consider the following noise mitigation measures to ensure compliance:
    - Reducing dredge noise as far as practicable by using mufflers and other related best practice techniques.
    - Taking advantage of weather conditions that either raises the background noise, or reduce sound propagation in particular directions.
    - Consultation with the local community to inform people of the extent and duration of the dredging activities as it might affect them.
    - Programming night-time dredging activity away from residential areas

341. Therefore to ensure effects of noise are minimised consent conditions have been recommended requiring construction noise standards to be complied with.

342. The proposal also has the potential to increase the volume of local transportation. However, the applicant has concluded that extra heavy vehicle transport could be accommodated on SH 88 without affecting the capacity or safety of the network for other road users. Likewise the existing rail capacity is underutilised.

343. Concerns have also been raised regarding the detrimental effects on local business as well as on local land/houses prices. However, the Butcher report prepared for this application states that "If Port Chalmers is the only South Island port which can accommodate 6,000 TEU ships, then the benefits of developing Port Chalmers are estimated to have a Net Present Value of 1,345 million just for cargo currently going through Port Chalmers. Even if Lyttelton is also developed, the commercial benefits from deepening Port Chalmers have a Net Present Value of 203 million". Hence developing Port Otago will have a positive effect on the regional economy, which includes the Careys bay and Port Chalmers communities. Also, if development did not take place then the regional economy will lose a significant amount of economic activity including more than 1,000 jobs within 20 years.

344. Hence, subject to the recommended consent conditions the effects on the local community of the proposal will be positive.

7.1.2.5 Recreational effects

345. The importance of the protecting surf breaks this is recognised by policy 16 of the New Zealand Coastal Policy Statement 2010, which states:

Policy 16: Surf breaks of national significance

Protect the surf breaks of national significance for surfing listed in Schedule 1, by:

(a) ensuring that activities in the coastal environment do not adversely affect the surf breaks; and
(b) avoiding adverse effects of other activities on access to, and use and enjoyment of the surf breaks.

346. Schedule 1 lists the Spit, Karitane and Whareakeake as being nationally significant surf breaks;. The applicant's studies have concluded that that the only effect will be a small reduction in wave height at Aramoana Beach (approximately 0.01 m), as a consequence of deepening the adjacent entrance channel to Otago Harbour. Consequently, the effects of the proposal on the offshore wave environment will be immeasurable at the shoreline.

347. This assessment was independently confirmed by Dr Ross Vennell of the University of Otago who stated that "dredging of a deeper channel outside the Harbour has a slight effect on the propagation of waves and swell across the channel. Locally it reduces typical 0.5m wave heights at Aramoana by around 0.01m and by 0.02-0.04m at Shelly Beach". Dr Vennell added that maximum wave heights are reduced by around 0.05 m for the 2.0 m maximum waves which occur near the inshore end of the Mole at the eastern end of Aramoana Beach. These reductions in wave heights occur before the waves grow and break at the shore, i.e. are reductions in wave heights outside the surf zone.

348. The applicant's studies have also concluded that patterns of beach response to the wave environment will remain unchanged, with no increase in erosion or accretion.

349. There may also be a sediment plume around the entrance to Otago Harbour as a result of tidal outflows from the harbour during or shortly after dredging. The applicant's studies have also shown that this plume is likely to be dispersed over a large area off the entrance to the harbour. Though water clarity will be reduced by the suspended sediments until they are sufficiently diluted through dispersion or settle out, the increased turbidity will still have short term adverse effects on visibility for recreational and commercial divers adjacent to the harbour entrance.

350. As diving is a popular summer recreational activity around the Mole and there is periodic commercial diving for paua in the area south of Taiaroa Head, it is appropriate that capital dredging be restricted from occurring during the peak summer holiday period in this area.

351. Paua diving also occurs in very shallow waters south and west of Disposal Site A0 along the coastal fringes. Along this exposed coastline wave activity would prevent any sediment from settling on the rocky habitat, if it was to reach this area. Though most rock lobster fishing along the Otago coast occurs north of Blueskin Bay and south of Brighton, some does occur locally. However, these areas of rocky habitat (from Pipikaretu Point to Te Whakarekaiwi, around Hydra Rock outside Wickliffe Bay and around Cape Saunders) are located well south of the proposed disposal area and should not be affected by the disposal.

352. Consequently, subject to recommended consent conditions the effects on recreation from giving effect to this proposal will be no more than minor.

7.2 Sediment Disposal

7.2.1 Alternatives

353. The applicant considered the dredge material being used as aggregate for construction purposes; land reclamation or beach renourishment as alternatives to ocean disposal.

354. The applicant deems the use of aggregate for construction is inappropriate due to the comparatively small amount of material required within the region, relative to that which would be produced by the capital dredging programme. The applicant also noted that recovery, unloading and transport costs would make the supply of sand or aggregate to areas outside Dunedin economically unviable.

355. The applicant is also unaware of any commercial, community or private plans for major reclamation works in the vicinity of Port Chalmers or along the margins of Otago Harbour that would benefit from receipt of significant portions of dredged sand material. Though there has been interest expressed for additional community land resources along the margin of the harbour in Careys Bay and Deborah Bay, the immediate requirement for reclamation fill is limited. Although such small reclamations may result in additional community resources, they would also result in associated environmental and economic costs, and disposal of the remaining majority of the dredged material by another means would still be required. Consequently, the use of dredged material from the proposed capital dredging project for reclamation purposes is not a viable option.

356. A number of sand beaches in the Dunedin area are subject to either long-term or short term erosion. At present the applicant places maintenance dredging material in the near shore off Shelley Beach to offset losses of sediment from the narrow dune system of the South Spit.

357. Commencing in July 2007, the Dunedin City Council also used sand from the maintenance dredging to nourish Middle Beach after a prolonged period of storm wave induced erosion of the Ocean Beach foreshore and dune system. Previously a number of small bays within Otago Harbour have also been replenished with sand to restore and protect local recreational resources and some property. Presently, the Te Rauone Beach community, in conjunction with the applicant and other agencies, is investigating the potential to nourish Te Rauone Beach as part of the management of its foreshore and dunes.

358. However, beach renourishment requires sand of an appropriate size, texture, colour and cleanliness to be effective and acceptable to beach users. In assessing the potential use of the capital dredging material for beach renourishment, these factors have been considered and areas of suitable sand identified. In addition, the total volume required for possible beach renourishment projects has been estimated. The applicant concluded that the results of these investigations show that the volumes of material that would require disposal during the capital dredging activities would also be substantially larger than that required for beach renourishment projects.

359. In summary, the main constraint for any beneficial use of the dredged material is the significant volume of material (up to 7.2 million m^3). Most beneficial uses

require relatively small volumes of material at regular intervals over extended periods. Should this material be required it could more effectively be provided by the applicant from its maintenance dredging programme.

360. Therefore disposal in open water is the only practical option to dispose of the dredged material. The applicant has also noted that disposal in open water is the most commonly used international practice especially when there are large volumes of material to dispose of. Offshore disposal has been the method used by the applicant, and its predecessors, to dispose of about 17.5 million m³ of dredged material over the history of port channel development. The total volume already dredged is estimated to be approximately about 34 million m³ with the bulk of the balance being used in reclamations.

7.2.2 Disposal Site Location

361. The main effects at the disposal site are predicted to be the direct effects of smothering of the benthic community, increased levels of suspended sediments and reduced water clarity.

362. The applicant has acknowledged that virtually all benthic plants and animals in the immediate disposal area would not survive smothering (1.4 m to 1.8 m depth on average). Recovery could take up to a year for some animals and longer for some larger animals, depending on the disposal operations. In selecting the site the applicant has given consideration to avoid important offshore biogenic sites (i.e. bryozoan community) and the potential for significant dispersal inshore to Blueskin Bay and the outer Otago peninsula. No unique or special communities were identified by the applicant within the footprint of the disposal site.

363. The applicant noted that determining the appropriate location for the new disposal site involved extensive consultation with potentially affected stakeholders to determine areas and effects of interest, as well as extensive and detailed scientific investigations.

364. The first stage in site selection involved the applicant identifying possible sites considering the following key matters:
- Avoiding areas of conservation interest, protected marine areas and areas of significant ecological value.
- Avoiding significant effects on fishing and aquaculture
- Avoiding effects on recreation including sailing, surfing and boating.
- Avoidance of shipping routes.
- Effects of disposal on currents and waves.
- The likelihood of sediment being re-transported and causing effects on other areas such as beaches and estuaries.
- Distance from dredging work and consequential travelling costs.
- Siting of disposal in areas of similar natural material (i.e. disposing of "like onto like") in order that re-colonisation of existing habitat will occur as quickly as possible following cessation of the disposal activity.

365. Following the identification of a suite of appropriate sites, further detailed and iterative modelling was commissioned for these sites. That modelling included assessments of the following:

- Short term effects - Tracking sweep zones, concentrations and seabed deposition from suspended-sediment plumes.
- Potential changes to coastal shorelines and margins from differences in waves due to a disposal mound.
- Changes in wave height arising from the physical size and shape of the offshore disposal mound.
- Long term sediment transport from the disposal mound.
- How often, at what rate and where fine sand from the disposal mound moves in the long term.

366. This modelling suggested locations to the NE of Taiaroa Head would have the least impact on a range of activities and this was subsequently narrowed down to Site A0 (~6.5 km NE of Taiaroa Heads) where the potential for disposal material to impact on Blueskin Bay, northern coastline and Otago Peninsula, fisheries and areas with special or unique biological communities would be minimised.

367. After considering the above and balancing these factors, site "AO" was determined to be the optimal disposal site.

7.2.3 Offshore Plume Dispersal

368. During the disposal operation, when the dredge hopper is emptied at the offshore disposal site, the following processes would occur as shown in Figure 10):
    - A major portion of the released sediment load descends rapidly en masse to the seabed and deposits itself there;
    - A minor portion of the sediment load goes directly into suspension (especially finer size fractions), increasing the concentration of suspended material in the water column and drifts off with the current, dispersing and gradually settling with time;
    - Finer material (e.g., silts) within the mass that falls directly to the seabed will spread out radially along the seabed away from the impact zone;
    - Deposited material can be subsequently re-suspended when wave conditions are sufficient strength to mobilise the seabed surface sediments and transported by currents before settling again when conditions allow.

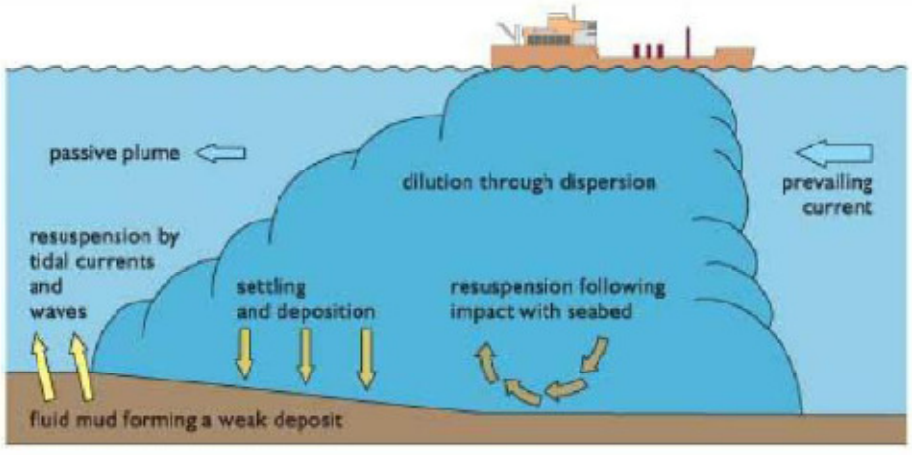

Figure 10: Schematic of a dynamic sediment plume discharged from a dredge hopper.

369. The applicant has summarised the sedimentation findings for a hopper load containing an average mix of dredgings from silt and sand sources in proportion to their respective volumes from all dredging claims.

370. Suspended-sediment concentrations (SSC) would be highest in the bottom near bed layer (bottom 20% of the water depth), due to the settling of sediment towards the bed and having commenced discharge from the hopper at 5 m below the water surface.

371. Medium silts cause the higher local elevations in SSC in the bottom layer within a few kilometres of the receiving ground, but the fine silts are more dispersive spreading over a wider area (due to their lower settling rate).

372. In the vicinity of the receiving ground, considering both fine and medium silts, moderate WSW winds are the most adverse wind conditions for the maximum bottom layer SSC, which would be up to 160 to 220 mg/L (excluding coarse silts and sands). The highest maximum surface-layer concentrations reached in the vicinity of the disposal site would be in the range 30–60 mg/L for each of the size classes and across all six wind scenarios, with the higher surface-layer values occurring during light NNE winds when combining all size classes, the maximum total surface-layer SSC would be around 185 mg/L.

373. Average SSC would be substantially lower than the maximum values, because the 2 hour gap between discharges from the dredging vessel would allow the concentrations to reduce from settling and dispersion.

374. The dilute edge of the near-bed plume could occasionally reach coastal areas between Taiaroa Head and Wickliffe Bay, but not under stronger winds from the WSW or NNE. SSC would be elevated above background surface SSC by up to only 0.7–1.5 mg/L, for fine and medium silts (with a total SSC increase of only 2.2 mg/L) under light NNE winds. In the bottom layer, maximum total SSC increase would be somewhat higher at around 2.8 mg/L above background concentrations for the same wind conditions.

375. The dilute edge of the plume could reach areas of the coast north of Karitane but would elevate the total surface SSC by only about 0.02 mg/L in the Karitane area, and up to only 0.9 mg/L further north towards Stony Creek and Shag Rock under light NNE winds. In the bottom layer, maximum increase in total SSC north of Cornish Head would only reach 0.41 mg/L above background concentrations under strong WSW winds.

376. In the bottom layer, the highest excess concentrations occur at the receiving ground where the fine sand concentrations would reach around 1,600–1,700 mg/L for light wind conditions, and less for stronger wind events. Of the silt size classes, medium and coarse silts would contribute similar maximum excess concentrations in the bottom layer of up 200–230 mg/L “downstream” in the vicinity of the receiving ground, with the higher values occurring during a moderate WSW wind. For this moderate WSW wind scenario, the total maximum SSC in the bottom layer combining all size classes would be around 2,100 mg/L in the vicinity of the receiving ground.

377. For comparison, background levels at Disposal Site A0 and in the middle of Blueskin Bay varied from 0.3 to 4.1 mg/l and the human eye has been shown to detect increases above ~15 mg/l.

378. Suspension and filter-feeding zooplankton can be affected by clogging of feeding apparatus. Surface concentrations of suspended sediments are predicted to reach a maximum of 185 mg/l, even close to the site, which is well below the level that is known to have a significant impact on zooplankton communities, fish eggs and larvae (>500 mg/l). If any impact was to occur, it would be short-term as zooplankton are short-lived (days to months) so recovery would be relatively rapid through recruitment, depending on the time of year, as well as advection from other areas. Consequently, the impacts on planktonic communities are expected to be moderate right at the disposal site but low away from the site, and short-term.

379. For coastal areas likely to be reached occasionally by the dilute plume, excess surface SSC would be highest for light NNE winds, which are conducive to wider spreading (dispersion) of the plume and less vertical shear in the water column (which occurs in stronger winds). In terms of the bottom layer, light NNE winds would cause the highest SSC off Otago Heads, but strong WSW winds would cause the highest SSC off the northern coast. In all coastal cases, the maximum SSC would remain quite small and occur periodically depending on the winds.

380. In the vicinity of the receiving ground, the highest excess concentrations in the surface water would most likely occur on light NNE winds, with the highest concentrations in the bottom layer for sands also likely to occur during light winds (any direction), while for silts, it would be reached during moderate WSW winds.

381. Overall, winds don't appear to substantially affect the plume characteristics and movement from Disposal Site A0 as it is located on the inner edge of the periphery of the Southland Current, which drives a persistent residual current to the north and tends to dominate the flow regime.

382. The applicant also considered the effects of a predominantly silt hopper load. The applicant found that maximum bottom-layer concentrations in the vicinity of the receiving ground are considerably higher for the predominantly-silt hopper discharge compared with the average sand/silt hopper loads. For fine silts, the increase would be 130% and 145% for light WSW and light NNE winds respectively, with equivalent increases of 140% and 150% for medium silts and 150% higher in both cases for coarse silts. Combining all the "silt" size classes, the maximum silt-derived SSC in the bottom layer in the vicinity of the receiving ground, for the worst wind scenario (a moderate WSW wind), would increase from around 620 mg/L for an average sand/silt hopper load to around 910 mg/L for a smaller, but predominantly-silt hopper load—an increase of around 145%.

383. The total maximum SSC in the bottom layer in the vicinity of the receiving ground, for a moderate WSW wind, would actually decrease from around 2,100 mg/L for an average sand/silt hopper load to around 1,150 mg/L for a smaller,

but predominantly silt hopper load—because of the much smaller sand volume in the latter.

384. For shoreline areas (e.g., Otago Heads, north of Cornish Head) when the edge of the dilute edge of the plume makes contact, the maximum increase in SSC for each silt size class in the bottom layer is unlikely to be any higher for the predominantly silt hopper discharge for light WSW or NNE wind conditions, but the area over which the silts disperse at very low concentrations is somewhat more widespread. Both these findings are indicative of the highly dispersive processes for suspended silt that operate on the Otago shelf, once they leave the receiving area.

7.2.4 Seabed Sediment Deposition

385. The applicant commissioned a harbour and offshore modelling report for this proposal. The applicant summarised the key results from the deposition distributions as follows:
    - For Disposal Site A0 receiving ground option, the deposition is predominantly on the site and to the north of it, arising from the persistent northerly residual current.
    - The small degree of deposition to the south-east mainly occurs at times during light NNE breezes.
    - Fine silt deposition occurs over the widest area in a highly dispersive environment with slowly settling sediments. This contrasts with sand, where deposition is much more confined, occurring well offshore and to the north and northeast of the receiving ground.
    - Deposition is low along coastal areas where the diluted suspended-sediment plume edge comes in occasional contact with the shoreline, such as Otago Heads (north of Wickliffe Bay) and the northern coast from Cornish Head north. Where deposition is predicted to occur, it would be <0.5 mm thick over the dredging programme. This is an upper-bound estimate, but in reality these "deposited" sediments, being fine and medium silts, will be mobilised by wave activity in shallow coastal waters and continue to be dispersed over a wide area. The modelling also shows that no deposition of silts or sands would occur in Blueskin Bay or at Karitane within 48 hours of disposal.
    - All silt sizes would be dispersed further north than the northern boundary in the hydrodynamic model at Shag Rock, but deposition would be very small at <0.1 mm.
    - The area influenced by various deposition rates is shown in Figure 11. The area where a deposition rate of more than 0.08 mm per day would occur (as an upper bound) extends approximately 18 km in N-S direction (mainly to the north) and 5 km in width covering 77 km^2. The area in which the deposition rate would be 0.4 mm per day would extend only to the northern terminus of the Peninsula Spit (–45.655°N) covering up to 29 km^2 while smaller areas where accumulated deposition rates would exceed 0.8 and 1.7 mm/day could cover 18 km^2 and 11 km^2 respectively (including the disposal mound). This deposition pattern is closely aligned with the results from the sand transport modelling.

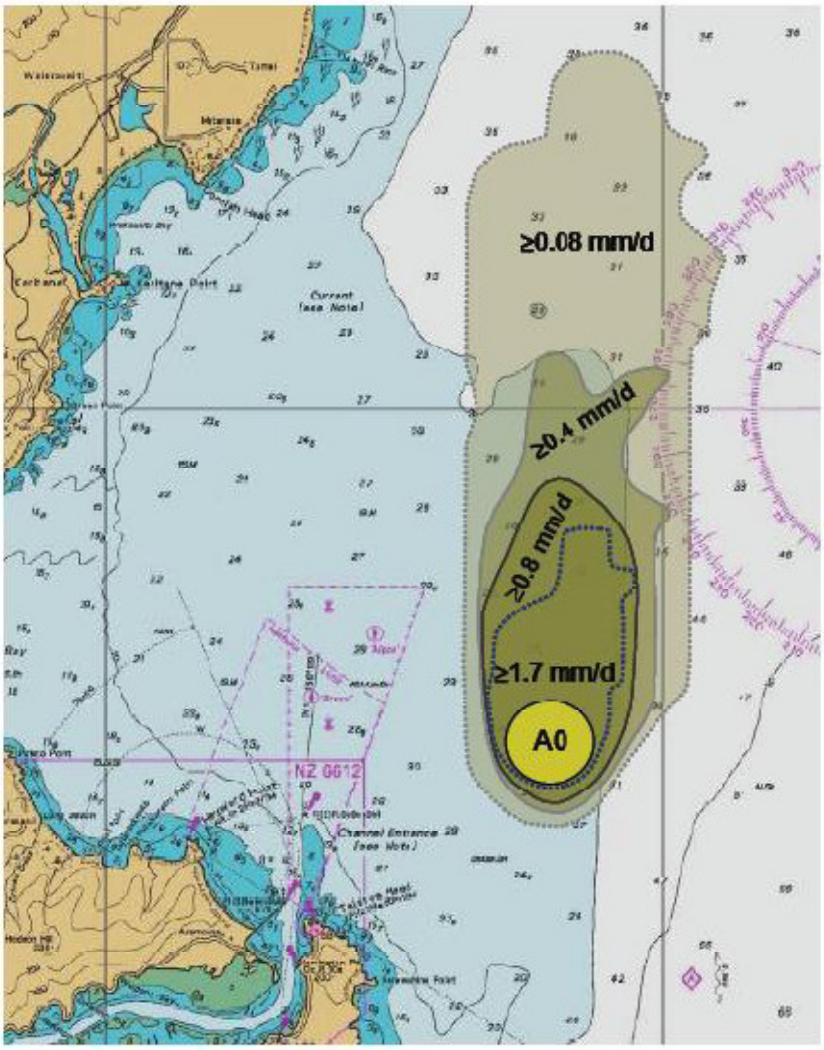

Figure 11: Zones within which various average deposition rates (mm per day) are exceeded for all sand/silt fractions over the entire dredging programme.

386. The applicant also notes that the deposition rates are conservative, being applicable to a mid-size TSHD of 10,800 m^3 capacity where the dredging extends for 120 days continuously. The inner zones out to the 0.5 mm/d zone boundary are indicative of the transport pathway and extent of sand transported through the disposal mound at Disposal Site A0. The transport pathway also matches closely with the alignment of the Peninsula Spit, providing confidence that the modelled net sediment transport direction is reliable.

7.2.5 Offshore Benthic Community

387. Though sensitive or rare species or communities were identified in the surveys around Disposal Site A0, the applicant would expect that this site would have large numbers of tube worms and other epifauna. However, other than a few bivalves, few species would be likely to survive smothering by sediment of over 10-20 cm.

388. Based on the predictions of deposition these levels could impact on an area up to ~5-6 km to the north/northeast of the disposal site and the area receiving over 1.7

mm/d on average (20 cm accumulated over the disposal period) would be ~11 km^2. The material that is dispersed to the north is likely to be fine sand and silt which could change, at least in the short-term, the present sandy community by potentially reducing grain size, altering water clarity for benthic algae, and affecting suspension feeders.

389. However, the impact in this area is likely to be short to medium term, as the dispersive processes will continue to remobilise the finer sediments to deeper waters and canyons offshore.

390. In terms of recovery at the site and further north the likes of polychaete worms and amphipods can recover on a time scale of a few months to a year but for longer-lived species recovery could be in the medium term (up to several years). Constant remobilisation for a few years at least could keep some communities in more of an early successional stage although there would be constant migration and recruitment into the area.

391. The applicant adds that as deposition is likely to be gradual, the area to the north of the disposal site receiving 20 cm would average less than 1.7 mm/day, which many animals could tolerate and manage to burrow through as the deposited sediment gradually builds up during disposal. The high impact area is likely to be confined to the site itself or within a km or so where sedimentation could average over 10 mm/d, with larger amounts depending on the disposal methods.

392. Consequently, as the offshore deposition of dredged material will affect offshore benthic communities, the applicant will undertake bathymetric surveys in conjunction with the Environmental Management Plan to ensure that the material is not mounding or accumulating in areas outside the disposal area which may contain areas of sensitive biota.

393. Physical changes to the seabed will occur as disposal of dredged material continues, and the currents and waves transport material away from the disposal sites. Consequently the applicant has proposed to undertake regular bathymetric surveys to monitor the changes in depth. It shall also be recommended that pre-dredge, during dredging and then post-dredging surveys to confirm sediment movement away from the disposal site will also be undertaken.

394. Concerns have also been raised regarding the potential for the spread of pest species such as Undaria. However Undaria has been present in this locality since at least 1990 and it is highly unlikely that species like Undaria would become established at Disposal Site A0 because of the lack of hard substrate, depth and exposure.

395. Regarding the potential effects on the shoreline and biota to the north of Disposal Site A0 (including paua beds, the Waikouaiti Estuary, off shore reef systems and the beaches and sand dunes), the applicant's modelling predicts the suspended solids levels that would be experienced in these environments will be very low. However, as effects on key sensitive coastal areas must be avoided, the applicant proposes and it is recommended that suspended solids and sedimentation levels experienced in sensitive coastal areas be monitored prior to, during and after the dredging operation.

7.2.6 Commercial Effects

396. It is noted that commercial trawling, set-net, line and cod pot fishing occurs throughout inner and outer Blueskin Bay with fishing effort widely distributed depending on species, season and method

397. The applicant notes that commercial fishing that occurs at or near the proposed disposal site may be impacted by the disposal of dredge material, but the impacts are likely to be temporary and localised. It is also probable that the dredge material will also attract some fish that will forage on benthic organisms exposed in the dredge material at the time of each release.

398. As queen scallop communities are found well offshore and generally south of the proposed disposal grounds, they will not be impacted by the proposed dredging and disposal.

399. As such effects on commercial fishing will be no more than minor.

7.2.7 Effects on recreation

400. The vast majority of sediment will disperse from Disposal Site A0 to the north as a result of the Southland current which travels up the eastern side of the South Island. Any sediment that reaches the Otago coastline will not be discernible to beach users. Accordingly, the surfing and swimming environment along the Otago coast will remain unchanged as a result of the sediment disposal.

7.2.8 Monitoring

401. Monitoring of the offshore region should be done in conjunction with, and complimentary to the monitoring being undertaken for the applicant's current sediment disposal sites.

402. Review conditions are also recommended to ensure that any adverse effects on the sea bed caused by the dumping can be promptly rectified.

7.2.9 Deposition Summary

403. Because of the low levels of major contaminants at the dredging sites, the effect from release of contaminants is likely to be less than minor.

404. A sediment plume will develop in the water column as each load of dredged material is released into the disposal site. The sediment in this plume will be dispersed away from the site by the prevailing water currents at the time of the disposal and may cause a short term reduction of water clarity. Modelling indicates this effect is likely to be restricted to a plume extending to the north of the disposal site and would be insignificant by the time it reaches the coastline. Any turbidity effects from the plume would be limited to the duration of dredging and disposal and a short time after, and its concentration of suspended sediments would be well below levels likely to impact directly on fish or shellfish eggs, larvae or adults.

405. Some of the sediments that initially settle at the disposal site are likely to be dispersed away from the site over time. The long term fate of the sediment at the disposal site will depend on the volume and particle size of the dredged material

that is deposited and the direction and velocity of the currents along this part of the coast. The existing seabed types along this part of the coast are the best indication of where any sediment transported from the disposal site is most likely to permanently settle. Offshore from Disposal Site A0 the Southland Current moves northward along the coast indicating that transported sediments should generally move from the disposal site in et same direction. This is consistent with the modelling results.

406. Monitoring of the offshore region should be done in conjunction with, and complimentary to the monitoring being undertaken and in accordance with the Environmental Management Plan that shall be prepared by the applicant. Review conditions will ensure that adverse effects on the sea bed have been caused by the dumping can identified and rectified.

7.3 Multipurpose Wharf Extension

407. The design of the wharf extension allows flexible operational requirements to be achieved, while making best use of the existing wharf infrastructure and reclamation areas.

408. There are no other practical alternatives to extending the multipurpose wharf. This is because:
    - Cruise vessels can not be safely berthed at the multipurpose wharf as the large numbers of passengers and traffic associated with that activity can not be accommodated safely on the wharf and land areas adjacent to the multipurpose wharf.
    - Large container vessels can not work at Beach St wharf due to the lack of water depth alongside this berth, as well as there being no cranes present on the wharf. The other reason is the significantly increased distance to take cargo from the Beach St wharf around to the main container stacking areas.
    - The Container Wharf can not be practically extended to the south by more than approximately 15 m as a longer extension would impact on the incoming rail line to the port area, as well making access around to Beach St more difficult and congested. This relatively small increase in length of the Container Wharf would also result in little operational benefit to berthing and loading of the larger vessels.

409. On this basis the only practical option is to extend the multipurpose wharf.

410. However, as marine biota such as crustaceans including rock lobster may be present at the construction site is appropriate that a foreshore and seabed biota inspection be undertaken and where practicable biota by relocated to a similar habitat prior to any works occurring.

411. It is also appropriate that the applicant prepares an Environmental Management Plan for the works which as a minimum contains as a description of the expected construction and development methodology. The plan should also outline what actions will be taken to adaptively manage the actual or potential effects of consented activities (including relating to noise, contamination, water quality, aquatic communities) to satisfy consent conditions.

412. As the final design and construction methodology of the multi purpose wharf extension depends on a number of factors, the Environmental Management Plan should contain a description of the works (including a staging plan) which will identify each specific activity and proposed duration of each stage.

413. Furthermore within three weeks of completion of the wharf extension, the consent holder shall submit colour photographs, as well as 'as-built' plans and diagrams of the structure to the Council, to ensure what has been consented has been constructed.

414. It is also appropriate that to ensure safety, the consent holder shall submit a copy of the Code of Compliance Certificate (issued by the Dunedin City Council) upon completion of the construction of the wharf extension to the Council within one month of the certificate being issued.

415. Long term, the extension of the existing multipurpose wharf will not be visibility noticeable, given its location with the port.

7.4 Fishing Jetty

416. The applicant has in recent years discussed with the Port Environment Liaison Committee the possibility of constructing a fishing platform at Port Chalmers to improve public access to the harbour. This option was discussed in more depth as part of this process, and a decision was made to include the platform as part of the work programme for this proposal.

417. To ensure safety within three months of the completion of jetty construction, the consent holder shall submit to the Consent Authority 'as-built' plans and diagrams of the structure. Furthermore the consent holder shall submit a copy of the Code of Compliance Certificate (issued by the Dunedin City Council) upon completion of the construction of the wharf extension to the Consent Authority within one month of the certificate being issued.

418. It is also appropriate that the applicant prepares an Environmental Management Plan for the works, which as a minimum contains a description of the expected construction and development methodology. The plan should also outline what actions will be taken to adaptively manage the actual or potential effects of consented activities (including relating to noise, contamination, water quality, aquatic communities) to satisfy consent conditions.

419. As the final design and construction methodology of the jetty construction depends on a number of factors, the Environmental Management Plan should contain a description of the proposed works.

420. Furthermore within three weeks of completion of the jetty construction, the consent holder shall submit colour photographs as well as 'as-built' plans and diagrams of the structure to the Council, to ensure what has been consented has been constructed.

421. It is also appropriate that to ensure safety the consent holder shall submit a copy of the Code of Compliance Certificate (issued by the Dunedin City Council)

upon completion of the construction of the jetty to the Council within one month of the certificate being issued.

422. As it will be a public structure, within one month of the fifth anniversary date of the issue of the Code of Compliance Certificate and every five years thereafter, the consent holder shall also submit a structural integrity assessment report for the jetty from an independent and suitably qualified person such as a building inspector or structural engineer. Within three months of this assessment, any necessary recommended repairs shall be completed and confirmed in writing with supporting evidence that these repairs are completed and now result in the jetty being structurally sound.

423. The creation of the Fishing jetty will cause a local visual effect, by placing a jetty on an exiting rocky point. However, as the jetty will be located adjacent to a shipping container storage area and existing large scale wharf structures, its visual effects are considered to be minor.

7.5 Variation of Coastal Permit 2000.472

424. The applicant has applied to vary Coastal Permit. 2000.472 to allow disposal of spoil sourced from all dredging to be deposited at the existing disposal sites, not just spoil sourced form maintenance and incremental dredging. However, as there will be no increase in the volume or change in the character of sediment being deposited, the granting of this variation will cause no environmental effect.

8 Statutory considerations

425. Section 104 of the Act sets out the matters to be considered when assessing an application for a resource consent.

8.1 Part 2 Matters

426. These matters are subject to Part 2, the purpose and principles, which are set out in Sections 5 to 8 of the Act. Those matters which should be considered for these applications are as follows.

427. The proposal is consistent with the purpose and principles of the Act, as outlined in Section 5. Section 5 states that the purpose of the Act is to "to promote the sustainable management of natural and physical resources". Sustainable management has two facets. The first aspect is "managing the use, development and protection of natural and physical resources in a way, or at a rate which enables people and communities to provide for their social, economic and cultural well being and for their health and safety". In this respect, the concept of sustainable management is permissive. The purpose of the Act is achieved by allowing activities that benefit people. In this case the applicant is upgrading the port's facilities to enable it to meet the expected future demand in coastal shipping.

428. However, there is another aspect to sustainable management. The use, development and protection of resources are only allowed while:

(a) *"sustaining the potential of natural and physical resources, (excluding minerals) to meet the reasonably foreseeable needs of future generations; and*
(b) *safeguarding the life-supporting capacity of air, water, soil and ecosystems; and*
(c) *avoiding, remedying, or mitigating any adverse effects of activities on the environment."*

429. The granting of these applications with the conditions imposed and including the requirement for monitoring the dredging and discharge of dredge material to ensure adverse effects are avoided is consistent with the ethic of sustainable management of resources.

430. Section 6 of the Act requires that in assessing the applications, the following matters of national importance are recognised and provided for:
a) The preservation of the natural character of the coastal marine area), wetlands, and lakes and rivers and from inappropriate subdivision, use, and development:
b) The protection of outstanding natural features and use, and development:
c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:
d) The maintenance and enhancement of public access lakes, and rivers:
e) The relationship of Maori and their culture and traditions sites, waahi tapu, and other taonga.
f) The protection of historic heritage from inappropriate subdivision, use and development.
g) The protection of recognised customary activities.

431. Section 6 of the Act sets out those matters of national importance that are to be recognised and provided for in achieving the purpose of the Act.

432. The applications are not contrary to Section 6(a) of the Act, in that the location of the dredging and sediment disposal are not inconsistent with the protection of the tidal flats and natural character of the lower harbour, as the navigation channel is already subject to maintenance dredging. Consequently, subject to recommended consent conditions the remaining natural character of these areas will be preserved.

433. The applications are not contrary to Section 6(b) of the Act, in that the Regional Plan: Coast identifies Otago Peninsula as an area of outstanding natural features and landscapes (ONFL9). However, the dredging will occur within the navigation channel, which is currently subject to maintenance dredging and is identified in the Regional Plan Coast as a Coastal Development Area. Furthermore, as the spoil will be deposited approximately 6 km north east of Taiaroa Head, or within existing spoil disposal areas, the landscape values and natural character of the coastal environment will be preserved.

434. Regarding Section 6 (c) recommended consent conditions will ensure that areas of significant indigenous vegetation and significant habitats of indigenous fauna outside of the dredging area will be protected.

435. Regarding Section 6 (e) the cultural values and relationships are important in the coastal environment. The applicant has undertaken consultation with Te Runanga Otakou Inc, which has culminated in the Cultural Impact Assessment Report, where agreement has been reached between the applicant and iwi on a number of matters.

436. Section 7 of the Act sets out those matters that have particular regard attributed to them in achieving the purpose of the Act. Matters relevant to the proposal under consideration are as follows:
(a) kaitiakitanga and
(aa) the ethic of stewardship;
(b) the efficient use and development of natural and physical resources;
(c) maintenance and enhancement of amenity values;
(d) intrinsic values of ecosystems;
(f) maintenance and enhancement of the quality of the environment; and
(g) any finite characteristics of natural and physical resources;

437. In contrast to section 6, the matters set out in section 7 are not declared to be matters of national importance.

438. The proposed activities will affect ecosystems located within the proposed dredging channel. However, as the navigation channel is located within a Coastal Development Area, maintenance dredging of the channel is permitted by the Regional Plan Coast, subject to a number of conditions. Furthermore, due to proposed consent conditions, the adjacent ecosystems are not expected to suffer any long term adverse effects caused by the proposed maintenance dredging.

439. At disposal site A0 benthic biota will be impacted upon given the proposed rate of dumping. However, as consent conditions will require the dredge material to be disposed evenly over the whole disposal site, biota is expected to recover rapidly and as such natural values of the area will also be maintained. Furthermore, the amenity values and quality of the environment will also not be affected in the long term.

440. In respect of Kaitiakitanga, Iwi authorities were provided with the opportunity to exercise guardianship in regard to the natural and physical resources in the area. This resulted in a Cultural Impact Assessment being prepared to cover these issues.

441. Section 8 requires all persons acting under the Act to take into account the principles of the Treaty of Waitangi**.** The Cultural Impact Assessment recommendations noted that the proposal offers an opportunity for Manawhenua to work in partnership with the applicant in managing the effect of port activities on the cultural and spiritual values of Otago Harbour. Consequently the principals of the Treaty of Waitangi (te Tiriti o Waitangi) have been taken into account.

442. Overall, these applications are consistent with Part 2 of the Act.

8.2 Section 104 Matters

443. The remaining matters of Section 104(1) to be considered when assessing an application for resource consent are as follows:

(a) any actual and potential effects on the environment of allowing the activity; and

(b) any relevant provisions of

(i) a national policy statement;

(ii) a New Zealand coastal policy statement;

(iii) a regional policy statement or proposed regional policy statement;

(iv) a plan or proposed plan; and

(c) any other matter the consent authority considers relevant and reasonably necessary to determine the application.

444. These matters are discussed in the following sections.

8.2.1 Environmental Effects

445. The actual and potential effects of the proposed activities were discussed in Section 7 of this report. It is considered that there are positive effects to be gained by granting this proposal and recommended conditions of consent will ensure that any actual or potential effects are avoided, remedied or mitigated.

8.2.2 New Zealand Coastal Policy Statement

446. The purpose of the New Zealand Coastal Policy Statement (NZCPS) is to state policies in order to achieve the purpose of the Resource Management Act in relation to the coastal environment of New Zealand.

447. Though the application was received by the Council on 26 May 2010 and the NZCPS 2010 did not take effect until 3 December 2010, as it is now the operative NZCPS consideration will be given to it.

448. In particular, the following policies state:

Policy 1: Extent and characteristics of the coastal environment

Recognise that the extent and characteristics of the coastal environment vary from region to region and locality to locality; and the issues that arise may have different effects in different localities.

Recognise that the coastal environment includes: .....
(e) coastal vegetation and the habitat of indigenous coastal species including migratory birds;
(f) elements and features that contribute to the natural character, landscape, visual qualities or amenity values;
(g) items of cultural and historic heritage in the coastal marine area or on the coast;
(h) inter-related coastal marine and terrestrial systems, including the intertidal zone; and
(i) physical resources and built facilities, including infrastructure, that have modified the coastal environment.

449. The characteristics contained within the Otago Harbour and northern coastlines and have been recognised and consent conditions have been recommended to ensure effects on these values are minimised.

Policy 2: The Treaty of Waitangi, tangata whenua and Māori

450. In taking account of the principles of the Treaty of Waitangi (Te Tiriti o Waitangi), and kaitiakitanga, in relation to the coastal environment:

> *(a) recognise that tangata whenua have traditional and continuing cultural relationships with areas of the coastal environment, including places where they have lived and fished for generations;*
>
> *(b)involve iwi authorities or hapū on behalf of tangata whenua in the preparation of regional policy statements, and plans, by undertaking effective consultation with tangata whenua; with such consultation to be early, meaningful, and as far as practicable in accordance with tikanga Māori; .....*

451. The applicant has recognised the iwi's relationship with the Otago Harbour and has accordingly commissioned a Cultural Impact Assessment for this proposal.

Policy 3: Precautionary approach

452. Adopt a precautionary approach towards proposed activities whose effects on the coastal environment are uncertain, unknown, or little understood, but potentially significantly adverse.

453. Given the potentially significant adverse effects that could be caused by this proposal, the applicant has produced a comprehensive application which included extensive modelling undertaken by NIWA. Further precautions have been taken through the recommendation of extensive monitoring and review conditions.

Policy 6: Activities in the coastal environment

In relation to the coastal environment:

> *(a) recognise that the provision of infrastructure, the supply and transport of energy including the generation and transmission of electricity, and the extraction of minerals are activities important to the social, economic and cultural well-being of people and communities; and*
>
> *(j) where appropriate, buffer areas and sites of significant indigenous biological diversity, or historic heritage value.*

Additionally, in relation to the coastal marine area:

> *(a) recognise potential contributions to the social, economic and cultural wellbeing of people and communities from use and development of the coastal marine area, including the potential for renewable marine energy to contribute to meeting the energy needs of future generations;*
>
> *(b) recognise the need to maintain and enhance the public open space and recreation qualities and values of the coastal marine area;*
>
> *(c) recognise that there are activities that have a functional need to be located in the coastal marine area, and provide for those activities in appropriate places;*

454. It is accepted that the operation is critical to the economic well being of the Otago Region. Furthermore, the commercial benefits from deepening Port Chalmers are estimated to have a net present value of 203 million.

455. It is also noted that the creation of the Fishing jetty will allow greater public access to Otago Harbour by enhancing access to an already popular fishing spot.

Policy 9: Ports

456. Recognise that a sustainable national transport system requires an efficient national network of safe ports, servicing national and international shipping, with efficient connections with other transport modes, including by:
(a) ensuring that development in the coastal environment does not adversely affect the efficient and safe operation of these ports, or their connections with other transport modes; …

457. The proposed development will enable the port to safely handle the larger container vessels it expects to receive in the future.

Policy 11: Indigenous biological diversity (biodiversity)

To protect indigenous biological diversity in the coastal environment:

(a) avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on:

- *a. areas of predominantly indigenous vegetation in the coastal environment;*
- *b. habitats in the coastal environment that are important during the vulnerable life stages of indigenous species;*
- *c. indigenous ecosystems and habitats that are only found in the coastal environment and are particularly vulnerable to modification, including estuaries, lagoons, coastal wetlands, dunelands, intertidal zones, rocky reef systems, eelgrass and saltmarsh;*
- *d. habitats of indigenous species in the coastal environment that are important for recreational, commercial, traditional or cultural purposes;*
- *e. habitats, including areas and routes, important to migratory species; and*
- *f. ecological corridors, and areas important for linking or maintaining biological values identified under this policy.*

458. The proposed consent conditions will ensure significant effects are avoided on indigenous biological diversity

Policy 13: Preservation of natural character

(1)To preserve the natural character of the coastal environment and to protect it from inappropriate subdivision, use, and development:

(a)avoid adverse effects of activities on natural character in areas of the coastal environment with outstanding natural character; and

(b)avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on natural character in all other areas of the coastal environment; including by:.....

459. As discussed in section 7 of this report, subject to recommended consent conditions the proposal will not impact upon any areas of outstanding natural character. Furthermore proposed consent conditions will avoid significant effects on the natural character of the existing coastal environment.

Policy 16: Surf breaks of national significance

Protect the surf breaks of national significance for surfing listed in Schedule 1, by:

(a) ensuring that activities in the coastal environment do not adversely affect the surf breaks; and

(b) avoiding adverse effects of other activities on access to, and use and enjoyment of the surf breaks.

460. The applicant's assessment is that, based on a maximum wave height change of approximately 0.01 m, the enlargement of the channel will have a no more than minor effect on the surf break at Aramoana. This assessment has been confirmed by the independent peer review undertaken on behalf of the Council.

Policy 22: Sedimentation

(1) Assess and monitor sedimentation levels and impacts on the coastal environment.

(2) Require that subdivision, use, or development will not result in a significant increase in sedimentation in the coastal marine area, or other coastal water.

461. Bathymetric surveys have been proposed by the applicant to assess the effects of the dredge spoil deposition at the dumping sites. This requirement has been recommended as a condition of consent.

Policy 23: Discharge of contaminants

(1)In managing discharges to water in the coastal environment, have particular regard to:

a) the sensitivity of the receiving environment;

b) the nature of the contaminants to be discharged, the particular concentration of contaminants needed to achieve the required water quality in the receiving environment, and the risks if that concentration of contaminants is exceeded; and

c) the capacity of the receiving environment to assimilate the contaminants; and:

d) avoid significant adverse effects on ecosystems and habitats after reasonable mixing;

462. The applicant has considered a number of options regarding the location of the spoil disposal site, which gave regard to the aforementioned factors.

463. In summary, the proposal is consistent with the New Zealand Coastal Policy Statement 2010.

8.2.3 Regional Policy Statement for Otago

464. The Regional Policy Statement for Otago (RPS) provides an overview of Otago's resource management issues, and ways of achieving integrated

management of natural and physical resources. The provisions of Chapter 4 (Manawhenua Perspective), Coast (Section 8) and Built Environment (Section 9) are relevant to this application.

Section 4 - Manawhenua

465. The objectives in this chapter requires that the Principles of the Treaty of Waitangi be taken into account in sustainable management of natural and physical resources, and in doing so, recognise the role of kaitiakitanga and provide for the relationship of Kai Tahu with ancestral lands, waahi tapu, water, sites and other taonga.

466. As already noted in this report, the applicant has consulted with iwi who then prepared a Cultural Impact Assessment Report. As a result of the report and other consultation undertaken by the applicant, the application is not contrary to the provisions in the RPS.

Section 8 - Coast

467. Objective 8.4.2 of the RPS seeks to maintain and enhance the health and diversity of Otago's existing coastal ecology. Objective 8.4.4 seeks to maintain water quality within Otago's coastal waters and where water quality is degraded, to seek to achieve water quality suitable for contact recreation and the eating of shellfish. Policy 8.5.2 seeks to recognise existing uses within the coastal environment. Policy 8.5.6(c) requires that all discharges into Otago's coastal waters maintain the standard for the receiving waters after reasonable mixing. Policy 8.5.6 (d) of the RPS promotes the disposal of discharges to land where practicable, where there are no significant adverse effects on ground or surface water, taking into account financial and technical constraints.

468. Recommended consent conditions will ensure that adverse effects on the local coastal ecology will be minimised. Though the existing water quality will be degraded by the deposition of the dredge spoil and the increased dredging within the harbor limits the effect will be short term and water quality will not be degraded to below contact recreation standards or impact upon the consumption of shellfish. The port facilities have been an established part of Otago Harbour for approximately 150 years with dredging of the harbor channel first being carried out in 1866. Regarding the disposal of the sediment to land, the applicant has undertaken studies which have concluded that the sediment will be adequately mixed so that no measureable affects on the shoreline will occur.

469. The applicant has also considered the disposal of dredge material to land, but concluded that given the large volume of material required to be disposed (7.2 million m^3); disposal in open water is considered to be the only practical disposal option.

Section 9 - Built Environment

470. Objective 9.4.2 relates to promotion of the sustainable management of infrastructure.

471. Port Otago is critical to the economic wellbeing of the Otago region. The proposed upgrade of the harbor facilities is to ready itself for the next generational shift in shipping services.

8.2.4 Regional Plan: Coast for Otago

472. The RPC contains issues, objectives and policies that address coastal management (Chapter 5) public access and occupation of space (Chapter 7), structures (Chapter 8), disturbance (Chapter 9), discharges (Chapter 10), noise (Chapter 12) and exotic plants (Chapter 13). The following objectives and policies are relevant to these applications.

Chapter 5 - Coastal Management

Objective 5.3.1 *To provide for the use and development of Otago's coastal marine area while maintaining or enhancing its natural character, outstanding natural features and landscapes, and its ecosystem, amenity, cultural and historical values.*

Policy 5.4.1 *To recognise the following areas, as identified in Schedule 2.1, as coastal protection areas within Otago's coastal marine area:*

- *CPA 7 Hawksbury Inlet*
- *CPA 8 Waikouaiti River Estuary*
- *CPA 9 Karitane Headland*
- *CPA 10 Puketeraki*
- *CPA 11 Blueskin Bay*
- *CPA 12 Orokonui Inlet*
- *CPA 13 Mapoutahi*
- *CPA 14 Purakanui Inlet*
- *CPA 15 Aramoana*
- *CPA 16 Historic Otago Harbour walls.*
- *CPA 17 Otakou & Taiaroa Head*
- *CPA 18 Pipikaretu Point*
- *CPA 19 Te Whakarekaiwi*
- *CPA 20 Papanui Inlet*
- *CPA 21 Hoopers Inlet*

Policy 5.4.2 *Priority will be given to avoiding adverse effects on:*

(a) The values identified in Schedule 2.1, associated with any coastal protection area; and

(b) The habitat and movement of marine mammals and birds in the coastal marine area adjacent to any marine mammal and bird site identified in Schedule 3.1;

when considering the use, development and protection of Otago's coastal marine area.

473. The applicant has noted the avoidance of movement of disposed material into Coastal Protection Areas and local marine mammal sites (MMB 9 Potato Point and Long Beach and MMB10 Otago Peninsular). The applicant also designed the channel to avoid adverse effects on the physical process affecting CPA15 and CPA17, whilst the dredging method and machinery avoids effects on the ecological values of these Coastal Protection Areas by reducing the release of turbidity.

Policy 5.4.3 To recognise the following areas, as identified in Schedule 2.2, as Coastal Development Areas within Otago's coastal marine area:
CDA 3 Karitane
CDA 4 Otago Harbour

474. Policy 5.4.4 Regard will be given to the need to provide for the values associated with any coastal development area when considering the use, development and protection of Otago's coastal marine area.

475. These areas are characterised by having a mixture of structures, facilities and associated infrastructure required by the recreational and commercial activities occurring in those areas. This policy recognises the importance of the facilities, services, and infrastructure associated with the developed areas for the social, cultural and economic well being of Otago's communities.

476. The port facilities were developed approximately 150 years ago, with the first dredging occurring in the 1860's. Its continued use is important for the social, economic and cultural well being of the people of Otago. It is noted that the applicant's modelling shows that the proposal will not detrimentally affect the operation of Karitane harbour.

Policy 5.4.5 To recognise the following areas, as identified in Schedule 2.3, as Coastal Recreation Areas:
CRA 4 Waikouaiti Beach
CRA 5 Warrington Beach
CRA 6 Purakanui Inlet
CRA 7 Potato Point & Long Beach
CRA 8 Spit Beach
CRA 9 Otago Harbour
CRA 10 Careys Bay

477. Policy 5.4.6 Priority will be given to the need to provide for and protect the values associated with the coastal recreation areas when considering the use, development and protection of Otago's coastal marine area.

478. It is important that any adverse or beneficial effect on recreational values is taken account of when considering a proposed use of the CMA. The recreational values of the aforementioned areas identified in policy 5.4.5 have been considered and subject to recommended consent conditions, recreational use of these areas will not be significantly affected.

Policy 5.4.10 To recognise and provide for the following elements which contribute to the natural character of Otago's coastal marine area:
(a) Natural coastal processes;
(b) Water quality;
(c) Landforms, seascapes; and
(d) Coastal ecosystems.

Policy 5.4.11 To have particular regard to the:
(a) Amenity values;

(b) Cultural values;
(c) Scenic values;
(d) Ecological values; and
(e) Historical values, including those identified in Schedule 8; associated with Otago's coastal marine area when considering its subdivision, use or development.

479. When selecting its methodology the applicant considered the aforementioned elements and values which contribute to Otago's coastal marine area. It is considered that subject to recommended consent conditions the proposal will have minimal effect on the coastal marine area's existing values.

Chapter 7 – Public Access and Occupation of Space

Objective 7.3.2 *To provide for activities requiring the occupation of the coastal marine area.*

Policy 7.4.2 *For activities seeking the right to occupy land of the Crown, consideration will be given to the reasons for seeking that occupation, whether or not a coastal location is required, and to any other available practicable alternatives.*

Policy 7.43 *Public access to and along the margins of the coastal marine will only restricted where necessary:*
- *(a) To protect areas of significant indigenous vegetation and/or significant habitats of indigenous fauna; or*
- *(b) To protect Maori cultural values; or*
- *(c) To protect public health or safety; or*
- *(d) To ensure a level of security consistent with the purposes of a resource consents; or*
- *(e) In other exceptional circumstances sufficient to justify the restriction*

480. The Environment Court has held that the preservation of public access to the CMA is of paramount importance when considering the occupation of the CMA, it is important to consider the need for the occupation and any practical alternatives. The applicant has not considered any alternative locations as the harbour channel exists and the wharfs have been located in their current location for many years. Construction of the new wharf facilities and capital dredging will temporarily restrict people's access to the harbour. However, these activities will be occurring within a coastal developmental area where commercial port facilities are an identified value, and where public restriction for operational reasons has periodically been occurring in the past.

481. The proposed Fishing jetty will enhance recreational fishers access to the harbour within an area identified within the Regional Plan Coast as a Coastal Development Area and adjacent to an area identified as a Coastal Recreation Area, both of which contain fishing as an indentified value.

Chapter 8 - Structures and Signs

Policy 8.4.3 To recognise and have regard for the values and uses associated with coastal development areas and coastal harbourside areas when considering

activities involving structures in and adjacent to coastal development areas and coastal harbourside areas.

482. The continued use and development where appropriate of areas already developed within Otago's coastal marine area is important for the social, economic, and cultural well being of the people of Otago. As discussed, the location of the proposed Fishing jetty and extension of the Multipurpose wharf will be occurring within an identified coastal development area, adjacent to a number of other long established structures.

Policy 8.4.4 New structures will be avoided, as far as is practicable, in areas of open space, and in areas of little or no development, in order that the amenity values associated with those areas are maintained or enhanced.

483. The Multipurpose Wharf extension and Fishing jetty will be located in a highly developed section of Otago Harbour.

Policy 8.4.5 New and existing structures will be required to be maintained in a structurally sound and tidy state, and should blend in as far as practicable with the adjoining landscape to minimise the visual impact of that structure on the character of the area.

484. As the wharf extension and new Fishing jetty will be located within an operational section of Port Otago's harbour facilities, the structures will not have any negative effect on the amenity values of Otago Harbour.

Policy 8.4.9 Structures should only be allowed to locate in the coastal marine area where there are no practicable alternatives elsewhere.

485. The applicant has carried out an assessment of alternatives and stated that the location of the Fishing jetty was an initiative raised by the 'Port Environment Liaison Committee". As the Multipurpose Wharf exists there are no alternatives to the location of the extension.

Chapter 9 – Alteration of the Foreshore and Seabed

Objective 9.3.1To recognise and provide for values associated with:
(a) Areas of cultural significance; and
(b) Areas of conservation value; and
(c) Areas of public amenity;
when considering any alteration of the foreshore or seabed within the coastal marine area.

Objective 9.3.2 To preserve the natural character of Otago's coastal marine area as far as practicable from the adverse effects associated with any alteration of the foreshore or seabed.

Objective 9.3.3 To take into account the effects of natural physical coastal processes when considering activities which alter the foreshore or seabed in the coastal marine area.

Objective 9.3.4 To restrict the disturbance of the foreshore and seabed to those activities which require a coastal location.

486. Regarding objectives 9.3.1 – 9.3.4 the applicant has identified and provided for areas of cultural significance, conservation value; and areas of public amenity through its location of Disposal Site A0 and the proposed construction of a public Fishing jetty. The proposal will not significantly impact upon the existing natural character of the Lower Otago Harbour. Furthermore the applicant has undertaken extensive study of the natural coastal processes when developing its proposal; and the disturbance is required to occur within the coastal marine area.

Policy 9.4.1 In order that any proposed alteration of the foreshore or seabed that will, or is likely to, have an adverse effect on cultural values, can be identified by kaitiaki runanga, Kai Tahu will be:
(a) Treated as an affected party for non-notified resource consent applications to alter the foreshore or seabed within areas, or adjacent to such areas, identified in Schedules 2 and 3 of this Plan as having cultural or spiritual values to Kai Tahu; and be
(b) Notified about notified resource consent applications to alter the foreshore or seabed within the coastal marine area.

487. The application was publicly notified and a submission was received from local runanga.

Policy 9.4.2 For activities involving the alteration of the foreshore or seabed, priority will be given to avoiding adverse effects on values associated with any area identified in Schedules 2 and 3 of this Plan as being a coastal protection area, a coastal recreation area, an area of outstanding natural features and landscapes or an area important to marine mammals or birds.

488. The applicant has identified coastal management areas and noted that and designed the proposal to ensure effects on these areas are either avoided or no more than minor.

Policy 9.4.3 To recognise and have regard for the values associated with coastal development areas when considering activities involving alterations of the foreshore and seabed in and adjacent to coastal development areas.

489. The dredging, extension of the cross wharf and construction of the Fishing jetty will occur within Coastal Development Area 4 Otago Harbour. As this area contains values which include commercial port facilities and fishing facilities, it is entirely appropriate that this work occurs within this area.

Policy 9.4.5 The area to be disturbed during any operation altering the foreshore or seabed will be limited as far as practicable to the area necessary to carry out that operation.

490. The area of disturbance will be limited to that required to upgrade the navigation channel and extend the Multipurpose Wharf and construct the Fishing jetty.

Policy 9.4.6 The integrity of natural features such as beaches, sand dunes, salt marshes, wetlands, and barrier islands, and their ability to protect areas above the line of mean high water springs from natural physical coastal processes will be maintained and enhanced wherever practicable.

491. The applicant's studies have concluded that the effects of the dredging and disposal on physical coastal processes are mostly negligible and of magnitudes within the variability of the natural environment.

Policy 9.4.8 For the following activities, consideration will be given to the reasons for undertaking the activity in the coastal marine area, the public benefit to be derived and to any other available alternatives:
(a) Any reclamation; or
(b) The removal of sand, shingle, shell or other natural materials for commercial purposes; or
(c) Any deposition of material.

492. The proposal will create significant economic benefits for the Otago community and there are no other practicable options for the disposal of the dredge spoil material.

Policy 9.4.10 Alterations of the foreshore and seabed should blend as far as is practicable with the adjoining landscape to minimise the visual impact of the alteration on the character of the area.

493. The proposed alteration to the seabed by the dredging, deposition and extension of the wharf and construction of the Fishing jetty will not cause any visual effects that are more than minor.

Chapter 10 - Discharges

Objective 10.3.2 To take into account community, cultural and biological values associated with Otago's coastal marine area when considering the discharge of contaminants into Otago's coastal waters.

494. The applicant will use modern best practice technologies on the large dredge to ensure discharges during dredging are minimised. The applicant's studies have also shown that levels of turbidity caused by the dredging and associated decant water will be predominately confined to the channel and similar to the levels currently caused by the maintenance dredging. Subject to recommended consent conditions the turbidity levels themselves should cause no more than minor effects on benthic communities, birds, fish and mammals as well as surfing and swimming along the Otago coast.

Policy 10.4.2 For activities involving the discharge of water or contaminants, priority will be given to avoiding adverse effects on values associated with any area identified in Schedules 2 and 3 of this Plan as being a coastal protection area, a coastal recreation area, an area of outstanding natural features and landscapes or an area important to marine mammals or birds.

495. As discussed, the applicant has identified coastal management areas and as the discharge of sediment will be predominately confined to the channel and similar to the levels currently caused by the maintenance dredging, effects on these areas will be no more than minor.

Policy 10.4.7 The discharge of a contaminant (either by itself or in combination with other discharges) into the coastal marine area will only be allowed where:

(a) It can be shown that the adverse effects of the discharge to any area, other than the coastal marine area, would create greater adverse effect than the discharge to the coastal marine area; or

(b) There are no practicable alternatives to the discharge occurring to the coastal marine area; and

(c) The discharge is of a standard which will achieve a water quality suitable for contact recreation and shellfish gathering within ten years of approving this Plan.

496. The discharge of dredge decant water and dredging material as well as minor quantities of contaminants caused during the extension of the Multipurpose Wharf and construction of the Fishing jetty cannot be practicability avoided. However these discharges will not reduce water quality so that long term contact recreation or shellfish gathering is affected.

Chapter 12 - Noise

Policy 12.4.1In managing and controlling noise levels within the coastal marine area:

(a) Particular regard will be had to ensuring consistency with any noise control provisions or standards in any district plan for adjacent land; and

(b) Regard will be had to the New Zealand Standards NZS 6801 (1991), NZS 6802 (1991), NZS 6803P (1984) and NZS 6807 (1994); and

(c) Regard will be had to any other relevant information relating to the emission and effects of noise, and the measures which may be taken to avoid, remedy or mitigate those effects; and

(d) Regard will be had to the duration and nature of noise produced.

497. Noise generated in the coastal marine area can adversely affect values in the coastal marine area and on the adjacent land. The applicant has proposed a series of noise mitigation measures, where the effect of noise from this proposal will not exceed the construction noise guidelines. Noise mitigation has been recommended as consent conditions.

Chapter 13 – Exotic Plants

Policy 13.4.1 In order that any proposed introduction of exotic or introduced plants that will, or is likely to, have an adverse effect on cultural values, can be identified by kaitiaki runanga, Kai Tahu will be:

(a) Treated as an affected party for non-notified resource consent applications to introduce any exotic or introduced plants into areas, or adjacent to such areas, identified in Schedules 2 and 3 of this Plan as having cultural or spiritual values to Kai Tahu; and be

(b) Notified about notified resource consent applications to introduce any exotic or introduced plants into the coastal marine area.

498. As discussed, Kai Tahu was notified of this application.

Policy 13.4.3 *To consider potential adverse effects of, and the need for, any proposed introduction or planting of any exotic or introduced plant into Otago's coastal marine area.*

499. As the navigation channel has been dredged for many years, the potential for further impacts within the harbour is considered to be low. It is only at site A0 where new dredge material will be deposited and the applicant has noted that it is highly unlikely any species would become established at this disposal site due to its lack of hard substrate, depth and exposure.

500. As discussed, MAF in May 2010, released a revised policy which identified this area as being heavily infested with Undaria.

Chapter 14 – Natural Hazards

Policy 14.4.2 *The potential effect of activities on natural physical coastal processes operating within the coastal marine area, and the potential for those effects to result in adverse effects within other areas of the coastal marine area will be recognised and taken into account.*

501. The proposal will have no persistent effects at the shoreline. In particular the applicant states that there will be no increase in erosion or inundation hazards at the shore.

502. In summary, the proposal is consistent with the above objectives and policies of the RPC.

8.2.5 Kai Tahu Ki Otago Natural Resource Management Plan 2005

503. The Kai Tahu ki Otago Natural Resource Management Plan 2005 outlines natural resources of importance to Kai Tahu. The CMA is one of the areas Kai Tahu seeks to preserve and protect.

504. The following Wai Maori and Wai Tai policies in the Kai Tahu ki Otago Natural Resource Management Plan 2005 are particularly relevant to this application:

(a) To encourage the dumping of all dredging material beyond the continental shelf.

(b) Dredging activity should not impact on tuaki and other marine life.

505. The following Wai Tapu policies in the Kai Tahu ki Otago Natural Resource Management Plan 2005 are particularly relevant to this application:

(a) To protect the abode of Takaroa at Rangiriri from inappropriate development and/or impacts.

506. The width of the continental shelf out from Taiaroa Head is approximately 30km. The applicant proposes to locate capital dredging Disposal Site A0 around the distal end of the 'Peninsula Spit'. Though this location is not beyond the continental shelf modelling has concluded that there is very little sediment transport that would occur in any other direction apart from towards True North., which is away from Otago Harbour and Blueskin Bay. The proposal will also have little if any impact on Rangiriri (Goat Island)

507. Consequently, the proposal is not inconsistent with the policies contained within this plan.

8.3 Other Matters

8.3.1 London Convention and NZGSDW Guidelines

508. Concerns were raised by a submitter regarding compliance with the London Convention.

509. It is noted that New Zealand is a signatory to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972. (London Convention).

510. The main objective of the London Convention is to prevent indiscriminate disposal at sea of wastes that could be liable for creating hazards to human health; harming living resources and marine life; damaging amenities; or interfering with other legitimate uses of the sea.

511. It is also noted that The New Zealand Guidelines for Sea Disposal of Waste ("NZGSDW Guidelines") have been jointly prepared by the Maritime Safety Authority of New Zealand and the Ministry for the Environment. The NZGSDW Guidelines are New Zealand's way to give effect to the London Convention (1972) ("the London Convention") and the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter (1996) ("the 1996 Protocol"). The NZGSDW Guidelines provide guideline concentrations for contaminants that may be present in wastes proposed for dumping at sea (referred to as the 'Action List'). The Action List is largely based on the ANZECC 1998 Guidelines for Fresh and Marine Water Quality ("the ANZECC Guidelines"). The ANZECC Guidelines are primarily based on biological effects guidelines developed overseas, with modifications to reflect New Zealand conditions.

512. The dumping of dredge spoil is consistent with these guidelines as it will not impact upon the aforementioned values, and as discussed, the proposal is consistent with the New Zealand Coastal Policy Statement 2010.

513. There are no other matters that the Consent Authority considers relevant and reasonably necessary to determine the application.

9. Conclusion

514. In preparing its assessment of effects the applicant has commissioned reports from organisations such as NIWA which are recognised for providing leading scientific assessments. The proposal was also subject to two independent peers, which concluded that the modelling used by the applicant is acceptable.

515. The reports that have been prepared for this application have concluded that the effects of the activity, based on the modelling information will be short term and in the long term no more than minor.

516. An environmental management plan shall be developed to the satisfaction of the Consent Authority outlining methods and mitigation to control the dredging programme. Capital dredging adjacent to Taiaroa Head should also occur outside the peak summer holiday period when the mole area is popular with divers.

517. Excess noise and the presence of dredging machinery could have an effect on birdlife, but this unlikely to be significant or more than a temporary effect as birds are already acclimatised to such activity. However, monitoring and management of dredging adjacent to the Aramoana area just prior to migration would help mitigate any potential impacts on godwits.

518. Noise associated with blasting of rock areas and dredging operations could potentially impact upon a range of species. As such monitoring for the presence of mammals during blasting will be essential. Having visual monitoring means blasting can only occur during daylight hours. The use of warning charges will also allow the mammals to leave the area of blasting before rock blasting occurs.

519. Localised fish kills will be unavoidable, but impacts can be mitigated by minimising charges and carrying out these activities outside fish breeding, recruitment and migration periods. Blasting should also be timed to reduce potential impact on fish breeding/recruitment or migrations and to avoid nesting time or other key periods in the life cycle of birds (October/November being the most critical time).

520. The applicant has a coastal permit to continue deposit dredge material at the three inshore locations until 1 December 2011. The applicant proposes to continue depositing maintenance dredge spoil at these locations in accordance with its consent conditions (up to 450,000 m^3 per annum), and excess dredge material will be deposited at Site A0.

521. The fishery off the Otago coast is predominately made up of common species that are distributed throughout New Zealand water. Disposal of dredge material will have some potential short and medium term effects on fish and shellfish resources at or near the disposal site. Impacts of loss of benthic fauna during disposal is expected to be up to a few years, but minor in the wider context of available habitat at similar depths.

522. The applicant has selected the site to avoid impacts on Blueskin Bay and the adjacent shoreline. The sediment plume that will develop at the disposal site will disperse to the north and create a turbid plume which will be sufficiently diluted

within a few km to have minimal effects on fish recruitment and foraging and would be limited to the disposal period and a short time afterwards.

523. As mammals generally feed over very large areas they could avoid the short-term disruption associated with the disposal. Furthermore because of the low levels of contaminants at the dredging sites the effects from release of contaminants at the disposal site is likely to be low and very short-term. Negligible amounts of sediment may reach the coastline from Disposal Site A0, but this will be rapidly remobilised and moved off shore.

524. To ensure that the effects of mounding are minimised, it is appropriate that the sediment be disposed of in a systematic manner spreading the material over the whole of the disposal site and not just concentrating it at one specific location. This will help spread the material, aiding in the benthic recovery of the site.

525. Fishes are widespread and mobile and will avoid the effects of high suspended sediment levels during the dredging and disposal activity itself. While there will be some short to medium term loss of benthic organisms on which fish feed at the dredging and disposal sites, these benthic organisms are widespread both within Otago Harbour and on the open coast. The benthos will re-establish relatively quickly on the disposed sediments which are similar to those currently at the disposal site. Once the benthos is re-established, the fisheries habitat is expected to be similar to that now present.

526. Within Otago Harbour, cockles are the main shellfish resource and there will be some loss of habitat and cockles along the margins of the channel and turning basin. However the area affected is very small relative to the size of this resource. Some minor effects on cockles in small localised areas are possible due to the higher levels of sedimentation and suspended sediment levels from dredging immediately adjacent to the Port Chalmers swinging basin. Though cockles are well adapted to both, and losses are expected to be minor relative to the overall distribution and abundance of this resource. However to ensure effects are no more than minor, consent conditions requiring dredging to cease if turbidity becomes detrimental to shellfish have been recommended as consent conditions.

527. There are no shellfish resources with fishery potential at or near Disposal Site A0. Modelling of sediment dispersal from the disposal site indicates that rock lobster and paua that occur on the rocky coastline will be exposed to very low levels of suspended sediments and sedimentation.

528. Recreational fishing is likely to be affected only in areas near where the dredger is operating or very shortly after. Commercial fishing effort is dispersed relatively thinly throughout the coastal area in Blueskin Bay and around the area of the disposal site. The short-term loss of benthic biota at and near the disposal site is likely to affect the opportunity for fish to feed in the short to medium term, but as the benthic biota rebuilds, fish and fishing should return to pre-disposal conditions.

529. The dredging within Otago Harbour will elevate the levels of turbidity adjacent to the dredging operation, a number of species such as sea grass off Harwood

within Otago Harbour are sensitive to the increased turbidity to be caused by the capital dredging, it is therefore appropriate that during the capital dredging programme that a biota monitoring programme be implemented to ensure there are no long term effects.

530. To ensure consistency and comparison of results, monitoring of the offshore region should also be done in conjunction with, and complimentary to the monitoring being undertaken for the applicant's existing inshore disposal sites.

531. The proposal will result in changes to the physical process environment of Otago Harbour and the Blueskin Bay area. Though the off shore location of Site A0 and the requirement for only sand grain sized particles to be deposited at this site should ensure the material becomes entrained by the Southland current, thereby avoiding the possibility of dredge material mounding at the site, which could potentially impact upon offshore currents. However, to ensure this does not occur recommended conditions state a maximum depth of material that can be deposited at the site. Bathymetric monitoring of the site has also been recommended.

532. It is acknowledged that modification of the shape and depth of the channel and the construction of the deposition of sediment will physically change the seabed topography.

533. The requirements of the applicant's current maintenance dredging consent include seabed surveying of the channel and the disposal grounds off Heyward Point, Aramoana and Spit Beach. This type of monitoring is useful in that it provides information on the dredging demand and on the retention of sediment at the disposal sites.

534. However, any monitoring for the proposal will need to confirm the accuracy of the modelling predictions, and further management of the disposal activity may be required if monitoring indicates a significant adverse effect on the resource.

535. The applicant has proposed mitigation and monitoring conditions in accordance with the technical reports prepared for this proposal. The implementation of these conditions in conjunction with an Environmental Management Plan will ensure that the effects of the activity will be no than minor in the long term.

536. Effects of the continued deposition of dredge material at the inshore sites can be considered when the applicant applies for new coastal permit upon expiry of the current consent.

537. The applicant has outlined the reasons and methodologies used to undertake the dredging and has also considered other disposal methods.

538. The applicant has provided rational as to why the dredging is required and the benefits that this will bring to the Otago Region.

539. As global shipping lines are moving towards the use of larger ships, the proposal will enable the applicant to remain competitive by being able to provide shipping lines with their desired level of service.

540. Project Next Generation will enable the applicant to continue to provide for the continued economic well being of the Otago Region. If the development did not take place then the regional economy will lose a significant amount of economic activity including more than 1,000 jobs within 20 years.

9. Recommendation

541. That the Panel grants applications 2010.193 -2010.200, 2010.202, 2010.203, 2000.472_V1 and RM10.193.01, subject to the terms and conditions as set out in the attached draft consents.

9.1 Reasons for recommendation

a) That it is expected that the adverse effects on the environment will be minor, and can be adequately addressed through the recommended consent conditions.

b) That the proposed activity is consistent with the requirements of the Act and Council Policies.

9.2 Term

Applications 2010.193, 2010.195 and 2010.198

542. The applicant has sought a 20 year consent term to enable the upgrading of the harbour channel with low intensity plant. This term is considered appropriate.

Applications 2010.194 and 2010.196

543. The applicant has sought a 35 year consent term to enable the ongoing maintenance of the upgraded the harbour channel. As the maintenance dredging of the current channel is provided for in the Regional Plan Coast as a permitted activity, it is appropriate that these consents be granted for a 35 year term.

Applications 2010.197,2010.199,2010.200,2010.220 and, 2010.203

544. The applicant has sought a 10 year term for the extension of the Multipurpose Wharf, because completion of the work is not required until immediately prior to the arrival of larger vessels. The applicant has also stated that as construction of the Fishing jetty will likely be undertaken by the same construction company, its construction should have the same time restrictions. As such a 10 year consent term is also appropriate.

Application 2000.472_V1

545. As discussed the tem of Coastal Permit 2000.472 cannot be varied and therefore remains unchanged.

Application RM10.193.01

546. No consent term has been applied for the occupation of the coastal marine area by the Fishing jetty. However, given the permanency of the structure, it is appropriate that a long consent term be granted. The longest term of consent that can be granted pursuant to Section 123 of the Act is 35 years. A 35 year term is therefore proposed.

Selva Selvarajah
Director Resource Management