

Submission Form 13

File No: 2010.193

This is a Submission on publicly notified resource consent applications pursuant to the Resource Management Act 1991.

Applicant Details:

Name of Applicant: **Port Otago Limited**
Application Numbers: }
Type and Description of Applications: }
Locations: } See Appendix One
Legal Descriptions: }
NZMS 260 Map References: }

Submitter Details:

(please print clearly)

Full Name/s The New Zealand Marine Sciences Society
(President: Associate Professor Colin L. McLay)
For a full list of council members (18), please visit
<http://nzms.org/contacts>

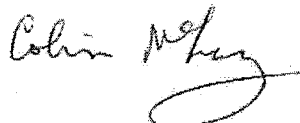
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School of Biological Sciences,
University of Canterbury,
Private Bag 4800,
Christchurch, New Zealand

(please tick your preferred Daytime contact number)

- Work Ph:** Provide secretary's number 03 364 2500
 Home Ph: _____
 Mobile Ph: _____

Signature/s of submitter/s *(or person authorised to sign on behalf of submitter/s)*

13th August 2010
(Date) August 13, 2010



Please tick one of the following submission types regarding the applications,
Do you:

- Support
 Neutral

Oppose

Do you:

Wish to be heard

Not wish to be heard
in support of my/our submission.

If others make a similar submission, I/we will consider presenting a joint case with them at a hearing.

Yes

No

The specific parts of the applications that my submission relates to are: *(Give details)*

Application No: 2010.193 – Coastal Permit – Restricted Coastal Activity

To disturb and remove up to 7.2 million cubic metres of dredge material from the foreshore and seabed for the upgrading of the Lower Harbour Channel, Port Chalmers swinging and berthing areas to a maximum design depth of 17.5 m.

Application No: 2010.198 – Coastal Permit – Restricted Coastal Activity

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

Application No: 2000.472_V1 – Variation – Coastal Permit

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 cubic metres), Spit Beach disposal site (200,000 cubic metres), South Spit Beach disposal site (50,000 cubic metres)

My/Our submission is *(the reasons for your views, use a separate sheet if necessary)*

The New Zealand Marine Sciences Society (NZMSS), representing over 260 members, opposes the proposed activities based on the following issues.

- 1. The application and statement of environmental impacts does not acknowledge the existence of nor follow the guidelines established for informed and responsible dredge spoil assessment and disposal as agreed upon by the New Zealand government with 85 other nation-states (London Protocol, ratified by New Zealand in 1975).**
- 2. All proposed disposal grounds are dispersive with respect to the bulk of the proposed spoil (sand and mud-sized sediments) in contrast with the accepted practice of utilising containment sites where bulk spoil texture is matched with that of the receiving area(s).**
- 3. The hydrodynamic modelling is unable to adequately account for silt or clay particles and resuspension events known to occur frequently on the continental shelf in the vicinity of proposed disposal site A0. Empirical validation is required prior to planning of full-scale operations.**

4. **Insufficient information has been provided about the nature and levels of contaminants occurring in harbour sediments.**
5. **Very little consideration has been given to the potential impacts of the proposed activities on higher trophic level species including marine mammals and seabirds, which frequent the vicinity of the proposed disposal site, the harbour, and the wider Blueskin Bay area.**
6. **There is insufficient information regarding the likelihood and potential impact of sediment spoil dispersion on the sensitive coastal marine environments and communities in the wider Blueskin Bay area.**
7. **The projected impacts of sedimentation on flora and fauna in the harbour are substantial and may impact on teaching programmes and research run by the University of Otago.**

We have expanded upon each of these points below:

The New Zealand Marine Sciences Society (NZMSS) is a scientific society affiliated to the Royal Society of New Zealand. It comprises over 260 scientists, managers, policymakers, and students working in all aspects of marine science in New Zealand and overseas. Society members work for universities, Crown Research Institutes, and other research providers, as well as for various central and local government departments, agencies and non-governmental organizations. Our members, therefore, have a wide range of views and experiences on most issues confronting the management of New Zealand's marine environment. Our elected Council has the task of providing comments on marine science issues in the public realm, including government policy and marine conservation. This submission represents a consensus view of the NZMSS Council concerning the scientific issues relating to the proposed capital works dredging and coastal dredge spoil disposal operations as described in the above named applications.

Our overall concerns are in relation to gaps in the science presented in the Assessment of Environmental Effects (AEE) and substantial departure from the most widely accepted best-practice assessment and planning guidelines developed over 23 years of similar operations conducted domestically and internationally. While the applicant has provided several informative reports about the proposed operation, no synthetic analyses has been presented by an independent body. We are particularly concerned about the use of dispersive disposal sites, the model limitations of post-disposal dredge spoil transport, the potential for downstream effects on sensitive coastal habitats, the lack of information regarding potential effects on local biota including seabirds and marine mammals, inadequate physico-chemical characterisation of spoil particulates as modified by the various dredging operations proposed, and sedimentation effects on harbour organisms. We address each of these concerns in more detail below.

1) The proposed activities do not follow the London Convention (1972)

The London Convention 1972 (LC-72) was ratified by New Zealand in 1975 and is the most widely applicable international regulatory instrument in the world. The 1995 Dredged Material Assessment Framework (DMAF) and the 1996 Protocol on the Prevention of Marine Pollution by Dredging of Wastes and Other Matter collectively provide a widely reviewed and accepted scientific approach to assessment of the suitability of dredged material for disposal at sea. The 1996 Protocol substantially updated portions of the convention and is designed to replace the original convention. New Zealand became a signatory to the 1996 London Protocol in 2001 (now among 38 nation-states to do so). More information is available at www.londonconvention.org.

The 1996 Protocol and DMAF provide general guidelines and specific step-by-step procedures for evaluating the physical, chemical, and biological suitability of dredge spoil for disposal at sea, disposal site selection criteria, pre-and post-disposal monitoring programmes, and effective mitigation methods. Beyond international agreements there are domestic precedents for the theoretical structure of a comprehensive action plan with regards to dredge spoil disposal such as that included in the Northland Regional Council's Coastal Plan. In practice, Ports of Auckland followed the London Convention framework to produce a dredging and disposal plan supported by adequate empirical and theoretical data. While several of the reports provided by Port Otago Limited address individual items included in the 1996 Protocol, the AEE lacks a cohesive framework, clearly defined impact hypotheses, evidence of support (e.g. adequate replication), and many key parameters (e.g. bioavailability, contaminant mobility, etc.).

2) The dispersive nature of the proposed spoil disposal method

The London Convention 1972 explicitly defines containment sites as the preferred option for any marine disposal operation. Where dispersive sites are permitted, special precautions and conditions must be met with regards to spoil character, dispersion rates, effects of dispersion on local biota, and a well-defined dilution area. No evidence or justification has been presented which supports the dumping of all spoil types (clay, silt, sand, gravel, and rock) at the proposed disposal sites. A cornerstone of studies that report limited impacts and rapid recovery from dredge-spoil disposal is the concept of depositing like-spoil on like-sediments (e.g. Simonini 2005).

3) Modelling the fate of dredge spoil

Port Otago has provided physical models in an effort to predict the fate of dredge spoil dumped ~6 km off the Tairoa Heads at a depth of ~28 m (site A0) resulting in a settled mound measuring between 1.4 and 1.8 m in height. Whilst we recognise and value the iterative process of choosing locations to limit seashore impacts within economic limits, we believe that the model lacks the appropriate data to provide robust predictions of the fate of dredge spoil, particularly fine sediments that are most lethal to benthic biota that typically inhabit the coarser native substrata (Maurer *et al.* 1986).

First, we are not convinced that the behaviour of the model has been comprehensively assessed, as no empirical evidence has been presented to validate the sediment transport model under the range of oceanographic conditions that occur in the receiving area. Whilst the theoretical sediment fate model appears to be sound for larger grain sizes, fundamental limitations of present knowledge (acknowledged by Bell *et al.* 2009) limit the value of the model for realistic dispersion of silt/clay particles through resuspension events that are most likely to be frequently occurring in the disposal areas (based on the ~28 m water depth of the proposed disposal site and average wave heights in the area).

Second, the model presents average depositional values, yet it is expected that patches will form on the seafloor from various hydrodynamic forces rather than a uniform layer. The diameter and thicknesses of these patches will determine the availability of oxygen to infauna through lateral diffusion processes. The sedimentary structure of the benthos is a consequence of infaunal and microbial activity, which relies on existing diffusion and permeability values. Without adequate data on deposition area patch size, aggregation, and resuspension frequency (Jonker 2003 estimated at least 20 days per annum), the impacts of post-disposal spoil transport cannot be adequately predicted.

Third, we hold concerns about the fundamental spatial scale of the model. It appears that the model is based on water movement data from three discrete points, all

in close proximity to the proposed disposal site. It is therefore considered inappropriate to extrapolate the model predictions to the wider Blueskin Bay area.

In conclusion, without empirical validation of the model, the AEE does not demonstrate robust predictive capacity about the wider impacts of the dredging and disposal activities on the marine ecosystems within Blueskin Bay.

4) Insufficient information provided about the nature and fate of sediment contaminants, and the potential of bioaccumulation.

The six unreplicated borehole-derived contaminant samples described by Single et al. (2010) are inadequate to represent sediments from dredging operations extending several kilometers with discrete hydrogeographic characteristics. The contaminant parameters measured are a small subset of contaminants routinely tested from harbour sediments, and no evidence has been presented for the inclusion or exclusion of particular chemical species. In contrast the Ports of Auckland (KMA 1991) examined 26 chemical parameters at 4-5 sites within each dredging area. Each dredging area was approximately 400 x 400 m. Acute sediment bioassays were also conducted with larval polychaetes (*Neanthes* sp.), newly fertilised oysters (*Crassostrea gigas*), and a benthic amphipod (*Rhepoxinius abronius*) and bioavailability to other species were evaluated based on these trials and literature values. Given the tens of thousands of chemical species expected to be found in harbour sediments, a rational approach is to establish which compounds are most relevant to local impacts through biomarker investigations.

Biological assimilation of chemical contaminants including heavy metals, organic and inorganic compounds by marine fauna is a well known phenomenon, with accumulation of contaminants by high trophic level species known to negatively affect the health and in some cases longevity of top predators that suffer high contaminant accumulation (Ross et al. 1996). Due to the (in our view, premature) conclusion in that contaminant concentrations in the harbour sediments are below levels of environmental concern, the AEE fails to address the potential impacts of contaminants on local food webs. Contaminant assimilation experiments using key invertebrate and fish species (with contaminants relevant to Otago Harbour sediments) would provide a means to evaluate the likely effects of contaminant release from sediments due to the proposed activities.

5) Lack of information in the AEE regarding potential effects on seabirds and marine mammals

The Otago coastline is an important area for marine mammals and seabirds, including local populations of Hector's dolphins and New Zealand sealions. Both of these species are endemic and threatened. The local Hector's dolphin population has declined over the last 30-40 years to less than a quarter of its original population size (Slooten and Dawson 2010). Protection measures implemented in 2008 are expected to lead to a very slow recovery. Any additional environmental impacts in the area are likely to reduce the effectiveness of these protection measures. New Zealand sealions were once found all around New Zealand. Currently, the only sizeable breeding colonies are in the subantarctic islands. A very small number of pups born each year on Otago Peninsula represents the very first signs of sealion recovery to the mainland. Sealions are frequently seen inside Otago Harbour. Other marine mammals regularly seen off the Otago coast include right whales, humpback whales, common dolphins, dusky dolphins and bottlenose dolphins. Right whales, bottlenose dolphins and dusky dolphins are seen from time to time inside Otago Harbour. Right whales and humpback whales are at a fraction of their original population sizes and very slowly recovering in New Zealand waters. In addition, some 27 species of seabirds are found in the area of which all but 4 are threatened.

Potential threats to marine mammals and seabirds, from the proposed dredging and dumping of dredge spoils, include:

- increased levels of disturbance through vessel movements
- underwater noise
- destruction of seafloor habitat at the A0 dumpsite caused by dredging the harbour channel and the area just outside the harbour
- redistribution of prey species away from dredged areas as well as the A0 dumpsite, because of increased levels of noise, suspended silt, etc.
- alteration of habitats 'downstream' from A0 through transport of fine-grained sediments, potentially affecting biomass and distribution of fish and other prey of seabirds and marine mammals
- remobilisation of contaminants (e.g. from the existing port area), which can have significant health impacts on marine mammals, seabirds and their prey

The application for resource consent fails to provide quantitative estimates of the likely impact of the activity on marine mammals, seabirds and their prey.

6) Potential for downstream effects on sensitive coastal environments

The concerns we raised above (item 3) regarding data gaps in the modelling of dredge spoil dispersal have potentially serious consequences for sensitive coastal features in throughout Blueskin Bay. This area incorporates a variety of habitats including multiple estuaries, sandy and rocky beaches, rocky reefs, demersal and surf fish habitats, biogenic habitats (including extensive kelp forests and *Atrina Zealandica* beds), and is significant for seabird and marine mammal feeding and breeding activities, in addition to productive commercial and recreational fishing grounds (including flatfish, rig, blue cod and rock lobster). Further, a large proportion of the immediate coastal area comprises the East Otago Taiāpure, which has a mandate to maintain and enhance fisheries and habitats for future generations.

Scientific research both in New Zealand and worldwide has shown that many of these habitat types are sensitive to sedimentation. For example, increased sedimentation in estuaries can lead to widespread mortality of benthic invertebrates such as filter-feeding clams (Norkko et al. 2002, Thrush et al. 2003), with the intensity of such effects increasing over longer periods of exposure (Norkko et al. 2006). Commercial, recreational and customary harvest of the littleneck clam (*Austrovenus stutchburyi*) in Waitati Estuary, and recreational and customary harvest of *A. stutchburyi* in many of the other estuaries in Blueskin Bay could potentially be threatened were sedimentation to increase in these environments due to spoil being dispersed from the proposed dumping site. Sessile marine invertebrates on hard substrata are also sensitive to sedimentation (Airoldi 2003). High levels of suspended sediment in the water column has the potential to reduce primary productivity due to decreased availability of light for photosynthesis (Jerlov 1976, Kirk 1994). Whilst macro- and microalgae are able to survive periods of low light, extended periods under such conditions has the effect of decreased primary productivity (Luning 1990, Markager and Sand-Jensen 1992), and may lead to mortality of key habitat-forming macroalgal species as giant kelp (*Macrocystis pyrifera*) (Deysher and Dean, Foster and Schiel 2010). Such a decrease in primary production and the loss of habitat-forming species would have potential flow-on effects to coastal foodwebs .

To avoid widespread negative impacts of sedimentation on the coastal habitats it is essential that the suspended sediment concentration in Blueskin Bay is monitored throughout the period of spoil dumping with a system allowing rapid feedback to control dumping location and/or frequency, particularly in the vicinity of the plume predicted to form around the dump sites. Unfortunately, no amount of monitoring post-dredging will be effective in mitigating environmental damage, hence the importance of

adequate risk assessment. It is imperative that clear management criteria are established to respond to identified changes in the suspended sediment concentration. For example, during the dredging operation, all activity should cease or be reduced in extent or intensity once significant increases in suspended sediment levels are detected. Objective risk assessment would benefit from proof-of-risk and proof-of-safety equivalence testing (Cole and McBride 2004) or Bayesian analyses (e.g. Germano 1999).

7) Sedimentation effects on harbour organisms

The proposed dredging operations in the Otago Harbour will create almost continuous production of large volumes of fine sediment (silts and clays) over an extended period. The greatest effects of the proposed dredging activities are likely to occur in the areas closest to Port Chalmers where the benthic sediments are mostly fine silts and clays. There are significant data gaps in the AEE pertaining to temporal variations in background suspended sediment levels that occur at present within the harbour. Without such baseline knowledge it will be impossible to distinguish any increases that result from the proposed dredging operations. This appears to be a serious omission in the proposal.

As stated in the previous section, increased suspended sediment concentrations are likely to negatively impact flora and fauna, particularly filter feeding fauna (bivalves including *Austrovenus stutchburyi*, tubeworms, sponges etc.) and key primary producers that form habitat for diverse species assemblages (e.g. seagrass beds, turfing macroalgae, and giant kelp). The effects of this sedimentation in the harbour are acknowledged in the AEE. The more or less continuous nature of the proposed dredging program will allow fauna no time to recover from sedimentation effects. The proposed harbour monitoring programme described on P143-145 of the AEE lacks detail. For example on P144 under Turbidity and Sedimentation it is stated that “monitoring of sedimentation levels at representative and key sites before during and post dredging”, but the timetable and sites to be monitored are not identified. Resuspension by waves of fine sediment in the shallow environment of the harbour is likely to continue for a significant period of time post-dredging, and it is therefore highly likely that organisms inhabiting the harbour will be subjected to a high sedimentation environment for a period of time extending well beyond the completion of the proposed dredging activity. Unfortunately, no amount of monitoring post-dredging will be effective in mitigating any such environmental damage, so it is imperative that during the dredging operation, all activity should cease or be reduced in extent or intensity once significant increases in suspended sediment levels are detected.

The Otago Harbour functions as a training ground for thousands of budding marine scientists (at primary, secondary and tertiary levels) through programmes run at the New Zealand Marine Studies Centre (University of Otago) at Portobello. Further, the Portobello Marine Laboratory (University of Otago) provides a base for an extensive amount of marine research that is carried out by postgraduate students and research staff in laboratory facilities (supplied with seawater from the harbour), and in the harbour and Blueskin Bay. As a scientific society, we are concerned that the proposed dredging and spoil-dumping activities pose a threat to the ecosystems that support this research and education.

In conclusion,

1) the opinion of the NZMSS is that Otago Harbour and Blueskin Bay have significant environmental values and provide important ecosystem services, and

2) the AEE submitted by Port Otago has many data gaps and and therefore fails to ensure that these values will not be significantly degraded by the proposed dredging activity and disposal of dredge spoil.

I/We seek the following decision from the consent authority (give precise details, including the general nature of any conditions sought)

We firmly believe that the resource consents to dredge Otago Harbour and dispose of dredge spoil in Blueskin Bay should not be granted until the following conditions have been met:

1. The proposed activities are extensively modified to comply with the London Convention 1972 (ratified by New Zealand in 1975).
2. An analysis of alternative options for disposal of dredge spoil is undertaken. This analysis should include alternative dredge spoil dump sites (i.e. on land or further offshore/in deeper water than the currently proposed sites), including models of the fate of spoil at alternative marine sites (as outlined in the previous statement).
3. Empirical validation of the modelling of the fate of dredge spoil in Blueskin Bay is undertaken, including scenarios under varied wind/swell directions, and incorporating a larger spatial scale (i.e. Blueskin Bay).
4. The nature, concentrations and (biological) fate of sediment-bound contaminants is determined in accordance with the London Convention 1972.
5. Scientifically robust surveys of marine mammal and seabird populations in the area have been carried out, and the potential direct and indirect impacts of dredging and disposing of dredge spoil has been evaluated.
6. A scientifically robust monitoring strategy is developed for sedimentation in Otago Harbour and around the disposal site, which is closely coordinated with dredging activity (extent and intensity) with clearly defined thresholds at which dredging would cease (suspended load and settlement).

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Date submissions close: 5pm on Friday 13 August 2010

A copy of your submission must be served on the applicant as soon as reasonably practicable after the service of your submission on the Otago Regional Council

Address for Otago Regional Council:

Otago Regional Council, Private Bag 1954, Dunedin, 9054

Address for Applicant:

Port Otago Limited, PO Box 8, Port Chalmers 9050. Attention: Lincoln Coe

Appendix One

Application No: 2010.193 – Coastal Permit – Restricted Coastal Activity

To disturb and remove up to 7.2 million cubic metres of dredge material from the foreshore and seabed for the upgrading of the Lower Harbour Channel, Port Chalmers swinging and berthing areas to a maximum design depth of 17.5 m.

Application No: 2010.194 – Coastal Permit – Restricted Coastal Activity

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.

Application No: 2010.195 – Coastal Permit

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

Application No: 2010.196 – Coastal Permit

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

	<i>Otago Harbour Dredging</i>
<i>Purpose:</i>	Upgrade the lower harbour channel, swinging area and Port Chalmers berths.
<i>Location:</i>	Harbour entrance channel from the landfall tower approximately 2.4 kilometres north of Taiaroa Head to the Port Chalmers swinging basin.
<i>Map Reference:</i>	Between approximately NZMS 260 J44:331- 928 and I44:257-855
<i>Chart Reference:</i>	Between approximately NZ661 & NZ6612 45°45.07'S 170°43.61'E and 45°48.82'S 170°37.87'E
<i>Legal description:</i>	Crown Land Sea bed

Otago Harbour
Bed of Otago Harbour DP 3904
Sec 52 Blk I Lower Harbour West SD

Application No: 2010.198 – Coastal Permit – Restricted Coastal Activity

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

Application No: 2000.472_V1 – Variation – Coastal Permit

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 cubic metres), Spit Beach disposal site (200,000 cubic metres), South Spit Beach disposal site (50,000 cubic metres)

- Purpose:** *Disposal of Dredge Spoil*
Disposal of associated dredge material at new and existing disposal sites.
- Location:**
New Disposal Site A0: Pacific Ocean, approximately 6.3 kilometres northeast of Tairaroa Head
Existing Heywards Point disposal site: Pacific Ocean, approximately 1.5 kilometres northeast of Heyward Point
Existing Spit Beach disposal site: Pacific Ocean, approximately 1 kilometre to the northeast of Spit Beach
Existing South Spit Beach disposal site: western end of South Spit Beach
- Map Reference:**
New Disposal Site A0: approximate mid point J44:387-948
Existing Heywards Point disposal site: approximate mid point J44:308-935
Existing Spit Beach disposal site: approximate mid point J44:317-912
Existing South Spit Beach disposal site: approximate mid point J44:320-896
- Chart Reference:**
New Disposal Site A0: approximate mid point NZ661 & NZ6612 45°44.1'S 170°48.0E.
Existing Heywards Point disposal site: approximate mid point NZ661 & NZ6612 45°44.7'S 170°41.95E.
Existing Spit Beach disposal site: approximate mid point NZ661 & NZ6612 45°45.93'S 170°42.62E.
Existing South Spit Beach disposal site: approximate mid point NZ661 & NZ6612 45°46.80'S 170°42.78E.
- Legal description:** Crown Land sea bed

Application No: 2010.197 – Coastal Permit

To disturb and deposit up to 30,000 cubic metres 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.

Application No: 2010.199 – Coastal Permit

To construct a new public use fisherman's wharf at Boiler Point.

Application No: 2010.200 – Coastal Permit

To extend the existing Port Chalmers multipurpose wharf by 135 metres.

Application No: 2010.202 – Coastal Permit

To disturb up to 1,000 cubic metres of the coastal marine area whilst erecting the fisherman's wharf and extending the Port Chalmers multipurpose wharf.

Application No: 2010.203 – Coastal Permit

To discharge contaminants to the coastal marine area whilst depositing rock rip.

Application No: 2010.205 – Coastal Permit

To discharge contaminants to the CMA whilst constructing the fisherman's wharf and extending the Port Chalmers multipurpose wharf.

Port Chalmers Structures

Purpose:

Extend the multipurpose wharf and construct a fisherman's wharf at Port Chalmers.

Location:

Multipurpose wharf: located between the Port Chalmers container wharf and Boiler Point approximately 750 metres northeast of the intersection of Beach Street and George Street, Port Chalmers

Fisherman's wharf: located on Boiler Point, approximately 850 metres northeast of the intersection of Beach Street and George Street, Port Chalmers

Map Reference:

Multipurpose wharf: approximate mid point I44: 255-860

Fisherman's wharf: approximate mid point I44:255-861

Chart Reference

Multipurpose wharf: approximate mid point NZ661 & NZ6612
45°48.55'S, 170°37.68'E

Fisherman's wharf: approximate mid point NZ661 & NZ6612
45°48.49'S, 170°37.71'E

Legal description:

Crown Land Sea bed
Bed of Otago Harbour DP 3904