

PROPOSED CONDITIONS OF CONSENT (POST-EXPERT CONFERENCING COPY)

Last Updated: 3/12/2018

Note: Black text where agreed by all experts (or the experts have no opinion)

Red text where proposed by Catherine Clarke

Blue text where proposed by David Hay and Craig Shearer

Green text where proposed by Andrew Riddell

Definitions:

Appropriately Trained Crew Member means a crew member who has completed specific training related to the estimation of distances, description of observation conditions and the detection and identification of marine mammals which may be expected in the Hauraki Gulf.

Bottom Dump Barge means a barge (either self-propelled or towed by tugs) with an opening barge floor in the hull for the dumping of dredged material.

Consent Holder has the meaning given in section 4 of the EEZ Act.

Dumping Point means the point where the dredged material is dumped within the NDA.

EEZ Act means the Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012.

EPA means the Environmental Protection Authority as defined in section 4 of the EEZ Act.

MPI means the Ministry for Primary Industries.

NDA means Northern Disposal Area, which is a 1500 metre radius circle centred on the coordinates 36° 12.3403'S and 175° 48.002"E.

NDA Centre means 36° 12.3403'S and 175° 48.002"E.

Sampling Site means any location from which samples are collected for the purposes of the consent conditions.

Source Site means a site from which dredged material is intended to be sourced for dumping.

Submarine Exercise Area means that area by the same name identified on chart NZ531 and the associated New Zealand Notices to Mariners.

Working Day has the same meaning as defined in section 4 of the EEZ Act.

1. Subject to compliance with these consent conditions, the activities authorised by this consent shall be undertaken in **general** accordance with the operational descriptions contained in the documents detailed below:

- Report entitled “Marine Consent to Dump Application and Supporting Impact Assessment, Applicant: Coastal Resources Limited, Site: Northern Area including Appendices One to Ten (inclusive)”, Authored by Osbornehay, Dated May 2018;
- Correspondence entitled “Response to Request for Information under Section 54(1)”, Authored by Osbornehay, Dated October 25, 2018;
- Report entitled “Dredged Material Disposal Study”, Authored by Beca Limited, Dated 25 October 2018;
- The expert and supplementary evidence presented by the experts for the Consent Holder to the Decision Making Committee.

Where operational descriptions contained in these documents are contrary to the conditions of this consent then the conditions will prevail.

- 1A The Consent Holder shall not dump more than **250,000** cubic metres of dredged material at the NDA per annum, based on a two year rolling average.
2. This consent expires on **{35 years from the grant of consent}**.
- 2A The Consent Holder shall ensure that:
- (i) a copy of this consent is held at all times on any motorised vessel it has authorised to dump dredged material in the NDA; and
 - (ii) personnel directly involved in the exercise of this consent are informed of their obligations and responsibilities in exercising this consent.
3. The lapse date for this consent, shall be five (5) years after the date of commencement of this consent unless it has been given effect to prior to that date.
4. Immediately upon giving effect to this consent the Consent Holder shall surrender the existing deemed Marine Dumping Consent (EEZ900012).

5. The activities authorised by this consent shall not result in at the NDA:
 - a) Exceedance of any low values in Schedule 7 for any of the metals or compounds specified in Schedule 2 of any of the Sampling Sites (except the control sites) specified in Table 1 in Schedule 1.
 - b) A statistically significant difference ($p = 0.05$) between any of the sampling sites on the NDA boundary and the average of all control sites (as specified in Table 1 of Schedule 1), in:
 - i Sediment size class (as defined in Schedule 5) by volume (t-test);
 - ii Overall abundance of benthic biota (t-test); or
 - iii Overall abundance in number of taxa of benthic biota (t-test); or
 - iv Community structure (PERMANOV test).
 - c) The disposal mound footprint traversing the NDA site boundary. The extent of the disposal mound footprint will be determined by the monitoring results in Condition 8(a) and (d).
 - d) The suspended sediment concentrations at any depth in the water column (from the surface to the seabed) at the NDA boundary increasing by more than 0.2mg/l relative to background reference concentrations.
- 5A If the Consent Holder becomes aware of any breach of Condition 5, the Consent Holder is to notify the EPA within 48 hours and provide any monitoring data and/or assessment identifying the breach.
6. In order to determine the sediment size classes and contaminant concentrations in the dredged material to be dumped at the NDA, the Consent Holder shall provide to the EPA sediment characterisation of each Source Site, undertaken in accordance with Schedule 3, prior to the dumping of dredged material from that Site. Any Sampling Results previously approved by the EPA in relation to a Source Site under deemed Marine Dumping Consent EEZ900012 shall be deemed to satisfy this condition until 3 years have passed since that approval.
7. The Consent Holder shall provide to the EPA and MPI biosecurity characterisation of each Source Site, undertaken in accordance with Schedule 4, prior to the dumping of dredged material from that Site. Any Sampling Results previously approved by the EPA in relation to a Source Site under deemed Marine Dumping Consent EEZ900012 shall be deemed to satisfy this condition until 3 years have passed since that approval.

7A. No dumping of dredged material from a source site shall occur until the EPA has certified that the sediment and biosecurity characterisation for that Source Site has been completed in accordance with conditions 6 and 7. If within 20 Working Days the EPA has not certified or rejected the sediment and biosecurity characterisation, it will be deemed to be certified.

7AA Dredged material from a source site can only be dumped at the NDA if the average concentration at the source site (as calculated by concentration per volume) of each of the contaminants listed in Schedule 2 is below the relevant low value specified in Schedule 7.

7B. If the Consent Holder becomes aware of an incident which could result in a change to the sediment and/or biosecurity characterisation at the Source Site, the Consent Holder will notify the EPA immediately of the incident and its intended course of action.

8. The Consent Holder shall undertake at the NDA the following monitoring every spring (October, November, December) after the grant of consent except where dumping of dredged material has not exceeded 50,000m³ since the previous monitoring but in any case such monitoring events shall be no more than 2 years apart:

- a) Core sample monitoring to determine the disposal mound footprint. A single core sample from each site listed in Table 2 in Schedule 1 radiating out from the NDA centre until no dumped material is observed will be collected, photographed and measured, including the depth of any dumped material visible in the sample.
- b) Monitoring for bathymetric changes to the sea floor will be undertaken with equipment capable of achieving LINZ MB-2 accuracy or better and will cover the area of dumping to identify the extent of the disposal mound footprint.
- c) Contaminant analysis (as listed in Schedule 2) of sediments from the Sampling Sites listed in Table 1 in Schedule 1. Such analysis will be undertaken in accordance with Schedule 6 and:
 - i Be undertaken on the top five centimetres of sediment in each core using standardised methods and compared to the low values in Schedule 7.
 - ii Be conducted by an IANZ accredited laboratory.
- d) Sediment grain size analysis from the sampling sites listed in Table 1 in Schedule 1, using methods to classify grain sizes as specified in Schedule 5.

8A The Consent Holder shall undertake at the NDA benthic and faunal monitoring every spring (October, November, December) after the grant of consent except where dumping of

dredged material has not exceeded 50,000m³ since the previous monitoring but in any case such monitoring events shall be no more than 2 years apart. The monitoring at each site specified in Table 1 in Schedule 1 will be undertaken using the methods specified in Schedule 6C. This will include:

(i) a minimum of six replicates consisting of at least one 100mm diameter core for each site except the control sites, where there shall be a minimum of two replicates at locations A to F (as specified in Schedule 1, Table 1); and

(ii) a single, 200m long, scaled video transect, perpendicular to the sampling axis and centred on the monitoring site at each site specified in Table 1 in Schedule 1. This will be enumerated for the presence of seabed epifauna and macrofauna.

8B The Consent Holder shall undertake at the NDA within a year of the consent being given effect to, and then every five years, Suspended sediment plume monitoring in the water column (i.e. multiple layers from the surface to the seabed). This monitoring shall be undertaken at up-current and multiple down-current Sampling Sites immediately after at least xx cubic metres of dredged material has been dumped at the NDA. This monitoring shall be undertaken in accordance with Schedule XX.

9. The Consent Holder shall provide all monitoring results in a written scientific report to the EPA, to certify it for completeness, and to members of the NDA Liaison Group and the NDA Iwi Liaison Group (established under Conditions 25 and 24A) within four months of the completion of monitoring field work required under Condition 8. Results for monitoring under Conditions 8(b), (c) and (d) and 8A(i) shall include statistical analysis and/or a comparison of the results that assess and report on compliance with the Condition 5. The Consent Holder, upon request from the EPA, provide within 20 working days any specific monitoring data supporting the scientific report.

9AA If the Consent Holder becomes aware of the presence of an invasive species at the NDA the Consent Holder shall notify the MPI (Biosecurity New Zealand), Auckland Council and Waikato Regional Council within 48 hours.

9A Dumping in the five-month period after the event that triggered the monitoring required by conditions 8, 8A or 8B above (or to the date the monitoring report is certified by the EPA to be complete in accordance with conditions 8, 8A and/or 8B (as relevant) if this is prior to the end of the five-month period) shall not exceed 80,000 cubic metres.

10. The consent holder shall only dispose of dredged material which has been dredged by mechanical excavation.

No dredged material that has been:

(i) removed from the Source Site by the method of suction dredging; or

(ii) subsequently mixed with water to produce a slurry

shall be dumped within the boundaries of the NDA.

11. The Consent Holder shall only dump dredged material by a Bottom Dump Barge within the NDA.
12. There is to be a maximum of two dumpings of dredged material of no more than 1200m³ per dumping over a 24-hour period with a minimum of 1 hour between each dumping event.
13. The location of the dumping point will vary following dumping of up to 250,000 ± 1,000 cubic metres. The Consent Holder must ensure dredged material is dumped within 100 metres of the dumping points as follows (with dumping commencing again at (a) once dumping is completed at (m)):
 - a) 0 – 250,000 ± 1,000 cubic metres, dumping point, being 36° 12.3403' S, 175° 48.002' E (WGS 84)
 - b) 250,000 – 500,000 ± 1,000 cubic metres, dumping point (W200), being 36° 12.388' S, 175° 47.880' E (WGS 84)
 - c) 500,000 – 750,000 ± 1,000 cubic metres, dumping point (N200), being 36° 12.244' S, 175° 47.945' E (WGS 84)
 - d) 750,000 – 1,000,000 ± 1,000 cubic metres, dumping point (E200), being 36° 12.299' S, 175° 48.123' E (WGS 84)
 - e) 1,000,000 – 1,250,000 ± 1,000 cubic metres, dumping point (S200), being 36° 12.441' S, 175° 48.055' E (WGS 84)
 - f) 1,250,000 – 1,500,000 ± 1,000 cubic metres, dumping point (W400), being 36° 12.432' S, 175° 47.759' E (WGS 84)
 - g) 1,500,000 – 1,750,000 ± 1,000 cubic metres, dumping point (NW400), being 36° 12.271' S, 175° 47.750' E (WGS 84)
 - h) 1,750,000 – 2,000,000 ± 1,000 cubic metres, dumping point (N400), being 36° 12.146' S, 175° 47.890' E (WGS 84)
 - i) 2,000,000 – 2,250,000 ± 1,000 cubic metres, dumping point (NE400), being 36° 12.148' S, 175° 48.091' E (WGS 84)
 - j) 2,250,000 – 2,500,000 ± 1,000 cubic metres, dumping point (E400), being 36° 12.253' S, 175° 48.246' E (WGS 84)

- k) 2,500,000 – 2,750,000 ± 1,000 cubic metres, dumping point (SE400), being 36° 12.423' S, 175° 48.249' E (WGS 84)
 - l) 2,750,000 – 3,000,000 ± 1,000 cubic metres, dumping point (S400), being 36° 12.539' S, 175° 48.109' E (WGS 84)
 - m) 3,000,000 – 3,250,000 ± 1,000 cubic metres, dumping point (SW400), being 36° 12.553' S, 175° 47.904' E (WGS 84)
- 14 Visual detection for marine mammals is to be undertaken by an appropriately trained crew-member immediately prior to dumping. In the event a marine mammal is sighted within 300 metres of the vessel(s) immediately prior to dumping, then dumping shall not commence until all marine mammals are seen to move out of the 300 metre area or have not been sighted for 30 minutes.
- 14A A written record of the period in which marine mammal detection was undertaken, identity and number of marine mammals detected, method of detection, any actions taken, personnel undertaking detection, confirmation that the personnel has the required training, and general weather conditions will be summarised in the monthly written record required under Condition 18.
- 14B The Consent Holder shall make available to all crew members undertaking dumping activity at the NDA, a New Zealand marine mammal species identification guide to assist in the accurate identification of species.
15. Upon the EPA's request, the Consent Holder shall allow the EPA (or their representative or delegate) to attend in an observer status during the Consent Holder's monitoring surveys and dumping activity at the NDA. The Consent Holder shall bear the reasonable costs of the EPA's attendance.
16. At least ten days prior to any scheduled periods of dumping activity, the Consent Holder must notify the New Zealand Defence Force of the scheduled periods of dumping activity to ensure there is no conflict with military use of the Submarine Exercise Area. Should any such conflict arise, the New Zealand Defence Force's current or intended military use of the Submarine Exercise Area shall take precedence.
17. The Consent Holder shall supply to the EPA, on request, proof in writing that the requirements of Condition 16 have been met.
18. The Consent Holder shall provide a written record detailing the following matters for each individual load of dredged material dumped at the NDA in the preceding month, to the EPA:

- a) The Source Site,
 - b) The quantity of dredged material dumped,
 - c) The exact location of the dumping determined by GPS (and including reference to the relevant Dumping Point in condition 13),
 - d) The date, time and duration of any dumping activity, and
 - e) Details of any detections of marine mammals present in the NDA, including the information detailed in Condition 14A.
19. At the time of providing to the EPA the written record detailed by Condition 18, the Consent Holder must also provide the EPA with GPS evidence supporting the information required in Condition 18(c) and (d).
20. If no dumping at the NDA occurs during a calendar month, the Consent Holder must provide to the EPA a written record stating the same.
21. The written record, referred to in Conditions 18, 19 and 20, must be provided to the EPA by the 15th day of the following month. If the written record includes a report on marine mammal sighting, a copy of that written marine mammal detection record is to be sent to the Department of Conservation in the same period.
22. In the event that dumping activity occurs outside the NDA for any reason, emergency or otherwise, the Consent Holder must notify the EPA within 24 hours.

Such notification must include:

- (i) The quantity of dredged material dumped,
 - (ii) The exact location of the dumping activity determined by GPS,
 - (iii) The date, time and duration of the dumping event,
 - (iv) An explanation of the reasons for the dumping, and
 - (v) A description of any mitigation measures adopted.
23. For all vessels, including barges, associated with the dumping of dredged material at the NDA to avoid adverse effects on sea birds, lighting is to be inward and downward facing and minimised as far as practicable while still complying with any relevant regulations and safety requirements.

24. The Consent Holder is to establish and run a “NDA Liaison Group” to consider and discuss the operations and effect of the dumping activity at the NDA, subject to the invitees’ willingness to participate. This Group shall comprise the representatives of the parties listed below (“the invitees”) and any subsequent parties invited by the Group. The Group shall be convened at least annually (from the date the consent is given effect to) by the Consent Holder, who shall meet the administrative meeting costs only. The purpose of the Group shall be to disseminate information (including monitoring results), to hear concerns of invitees and to discuss ways of addressing any concerns or risks arising. The Consent Holder shall keep the minutes of all meetings. At least 15 working days prior to each meeting the following information shall be distributed to all invitees:

- A copy of the last meeting minutes,
- Summary of source and volume of disposed material for the last 12-month period,
- Summary of any NDA site monitoring results from the last 12-month period, and
- Summary of known disposal volumes, sources and periods for the next 12-month period.

Invitees:

- A representative of each of the dredging operators undertaking dumping activities at the NDA,
- A representative of the Department of Conservation,
- A representative of Sanford Limited,
- A representative of North Island Mussells Limited,
- A representative of Inshore Fisheries New Zealand Limited, and
- Representatives of Coastal Resources Limited (including any specialist consultants involved in the administration and monitoring of the NDA).

24A The Consent Holder is to establish and run a “NDA Iwi Liaison Group” to consider and discuss the operations and effect of the dumping activity at the NDA, subject to the invitees’ willingness to participate. This Group shall comprise the representatives of the parties listed below (“the invitees”) and any subsequent parties invited by the Group. The Group shall be convened at least annually (from the date the consent is given effect to) by the Consent Holder, who shall meet the administrative meeting costs only. The purpose of the Group shall be to disseminate information (including monitoring results), to hear concerns of invitees and to discuss ways of addressing any concerns or risks

arising. The Consent Holder shall keep the minutes of all meetings. At least 15 working days prior to each meeting the following information shall be distributed to all invitees:

- A copy of the last meeting minutes,
- Summary of source and volume of disposed material for the last 12-month period,
- Summary of any NDA site monitoring results from the last 12-month period, and
- Summary of known disposal volumes, sources and periods for the next 12-month period.

Invitees:

- Two representatives of Ngati Rehua; and
- Representatives of Coastal Resources Limited (including any specialist consultants involved in the administration and monitoring of the NDA).

25 The EPA may initiate a review by serving a notice on the Consent Holder during the month of June of any year for the purpose of updating the list of Primary Contaminants, and the values in Schedule 7, and the Schedules 2 to 7 of this consent. (Wording to be refined).

Schedule 1: Northern Disposal Area Monitoring Sites

Table 1 NDA Sediment Quality and Benthic Biota Monitoring Sites

Site Name	Latitude (WGS 84)	Longitude (WGS 84)	
Disposal Centre	36 12.34030 S	175 48.00200 E	
North 500	36 12.09404 S	175 47.86445 E	
East 500	36 12.22881 S	175 48.30585 E	
South 500	36 12.58656 S	175 48.13957 E	
West 500	36 12.45178 S	175 47.69813 E	
North 1000	36 11.84778 S	175 47.72691 E	
East 1000	36 12.11731 S	175 48.60968 E	
South 1000	36 12.83281 S	175 48.27715 E	
West 1000	36 12.56324 S	175 47.39425 E	
North 1500	36 11.60151 S	175 47.58939 E	
North East 1500	36 11.58770 S	175 48.35138 E	
East 1500	36 12.00580 S	175 48.91351 E	
South East 1500	36 12.63229 S	175 48.93734 E	
South 1500	36 13.07906 S	175 48.41475 E	
South West 1500	36 13.10263 S	175 47.65465 E	
West 1500	36 12.67469 S	175 47.09036 E	
North West 1500	36 12.05748 S	175 47.06402 E	
Control S	A	36 13.69292 S	175 47.98765 E
	B	36 13.69122 S	175 48.05434 E
	C	36 13.68953 S	175 48.12104 E
Control N	D	36 10.42261 S	175 47.99521 E
	E	36 10.42170 S	175 48.06316 E
	F	36 10.42105 S	175 48.12969 E

Table 2 NDA Disposal Mound Monitoring Sites

Site Name	Latitude (WGS 84)	Longitude (WGS 84)
Disposal Centre	36 12.34030 S	175 48.00200 E
North 100	36 12.29250 S	175 47.97646 E
East 100	36 12.31943 S	175 48.06475 E
South 100	36 12.39099 S	175 48.03153 E

Site Name	Latitude (WGS 84)	Longitude (WGS 84)
West 100	36 12.36406 S	175 47.94323 E
North 200	36 12.24326 S	175 47.94892 E
East 200	36 12.29712 S	175 48.12551 E
South 200	36 12.44023 S	175 48.05906 E
West 200	36 12.38638 S	175 47.88247 E
North 300	36 12.19402 S	175 47.92139 E
East 300	36 12.27480 S	175 48.18627 E
South 300	36 12.48948 S	175 48.08660 E
West 300	36 12.40869 S	175 47.82170 E
North 400	36 12.14477 S	175 47.89386 E
East 400	36 12.25248 S	175 48.24703 E
South 400	36 12.53872 S	175 48.11413 E
West 400	36 12.43100 S	175 47.76094 E
North 500	36 12.09404 S	175 47.86445 E
North East 500	36 12.08875 S	175 48.12146 E
East 500	36 12.22881 S	175 48.30585 E
South East 500	36 12.43695 S	175 48.31617 E
South 500	36 12.58656 S	175 48.13957 E
South West 500	36 12.59474 S	175 47.88651 E
West 500	36 12.45178 S	175 47.69813 E
North West 500	36 12.24653 S	175 47.69183 E
North 600	36 12.04628 S	175 47.83880 E
North East 600	36 12.03815 S	175 48.14495 E
East 600	36 12.20785 S	175 48.36855 E
South East 600	36 12.45598 S	175 48.37861 E
South 600	36 12.63720 S	175 48.16921 E
South West 600	36 12.64534 S	175 47.86301 E

Site Name	Latitude (WGS 84)	Longitude (WGS 84)
West 600	36 12.47563 S	175 47.63941 E
North West 600	36 12.22749 S	175 47.62939 E
North 700	36 11.99704 S	175 47.81127 E
North East 700	36 11.98755 S	175 48.16844 E
East 700	36 12.18553 S	175 48.42931 E
South East 700	36 12.47502 S	175 48.44105 E
South 700	36 12.68645 S	175 48.19675 E
South West 700	36 12.69594 S	175 47.83951 E
West 700	36 12.49794 S	175 47.57865 E
North West 700	36 12.20844 S	175 47.56696 E
North 800	36 11.94780 S	175 47.78374 E
North East 800	36 11.93695 S	175 48.19194 E
East 800	36 12.16321 S	175 48.49006 E
South East 800	36 12.49406 S	175 48.50348 E
South 800	36 12.73569 S	175 48.22428 E
South West 800	36 12.74654 S	175 47.81601 E
West 800	36 12.52025 S	175 47.51788 E
North West 800	36 12.18940 S	175 47.50453 E
North 900	36 11.89855 S	175 47.75621 E
North East 900	36 11.88635 S	175 48.21543 E
East 900	36 12.14089 S	175 48.55082 E
South East 900	36 12.51310 S	175 48.56592 E
South 900	36 12.78493 S	175 48.25182 E
South West 900	36 12.79714 S	175 47.79251 E
West 900	36 12.54256 S	175 47.45711 E
North West 900	36 12.17035 S	175 47.44210 E
North 1000	36 11.84778 S	175 47.72691 E

Site Name	Latitude (WGS 84)	Longitude (WGS 84)
North East 1000	36 11.83575 S	175 48.23892 E
East 1000	36 12.11731 S	175 48.60968 E
South East 1000	36 12.53213 S	175 48.62836 E
South 1000	36 12.83281 S	175 48.27715 E
South West 1000	36 12.84774 S	175 47.76902 E
West 1000	36 12.56324 S	175 47.39425 E
North West 1000	36 12.15130 S	175 47.37967 E
North 1100	36 11.80006 S	175 47.70115 E
North East 1100	36 11.78515 S	175 48.26241 E
East 1100	36 12.09625 S	175 48.67233 E
South East 1100	36 12.55117 S	175 48.69080 E
South 1100	36 12.88342 S	175 48.30690 E
South West 1100	36 12.89833 S	175 47.74552 E
West 1100	36 12.58718 S	175 47.33558 E
North West 1100	36 12.13226 S	175 47.31724 E
North 1200	36 11.75082 S	175 47.67362 E
North East 1200	36 11.73455 S	175 48.28590 E
East 1200	36 12.07393 S	175 48.73308 E
South East 1200	36 12.57020 S	175 48.75324 E
South 1200	36 12.93266 S	175 48.33445 E
South West 1200	36 12.94893 S	175 47.72201 E
West 1200	36 12.60949 S	175 47.27481 E
North West 1200	36 12.11321 S	175 47.25481 E
North 1300	36 11.70157 S	175 47.64609 E
North East 1300	36 11.68395 S	175 48.30938 E
East 1300	36 12.05161 S	175 48.79384 E
South East 1300	36 12.58924 S	175 48.81568 E

Site Name	Latitude (WGS 84)	Longitude (WGS 84)
South 1300	36 12.98190 S	175 48.36199 E
South West 1300	36 12.99953 S	175 47.69851 E
West 1300	36 12.63179 S	175 47.21404 E
North West 1300	36 12.09416 S	175 47.19239 E
North 1400	36 11.65233 S	175 47.61857 E
North East 1400	36 11.63335 S	175 48.33287 E
East 1400	36 12.02929 S	175 48.85459 E
South East 1400	36 12.60827 S	175 48.87812 E
South 1400	36 13.03114 S	175 48.38953 E
South West 1400	36 13.05013 S	175 47.67501 E
West 1400	36 12.65410 S	175 47.15327 E
North West 1400	36 12.07511 S	175 47.12996 E
North 1500	36 11.60151 S	175 47.58939 E
North East 1500	36 11.58770 S	175 48.35138 E
East 1500	36 12.00580 S	175 48.91351 E
South East 1500	36 12.63229 S	175 48.93734 E
South 1500	36 13.07906 S	175 48.41475 E
South West 1500	36 13.10263 S	175 47.65465 E
West 1500	36 12.67469 S	175 47.09036 E
North West 1500	36 12.05748 S	175 47.06402 E

Schedule 2: Metals, metalloids, organometallic and organic compounds to be Tested

Parameter	Units
Dry Matter	g/100g
Total Organic Carbon	g/100g dry wt
Total Recoverable Arsenic	mg/kg dry wt
Total Recoverable Cadmium	mg/kg dry wt
Total Recoverable Chromium	mg/kg dry wt
Total Recoverable Copper	mg/kg dry wt
Total Recoverable Lead	mg/kg dry wt
Total Recoverable Mercury	mg/kg dry wt
Total Recoverable Nickel	mg/kg dry wt
Total Recoverable Zinc	mg/kg dry wt
Tributyltin	µg/kg dry wt
Total Petroleum hydrocarbons (C7 - C36)	mg/kg dry wt

Schedule 3: Chemical Characterisation Methodology

This methodology sets out a procedure to characterise the concentration of the substances specified in Schedule 2 (“the Primary Contaminants”) in any material to be dredged for disposal at the NDA. Dredged material from a source site will only be acceptable for disposal at the NDA if the average concentration at the source site (as calculated by concentration per volume) of each of the Primary Contaminants is below the relevant low value in Schedule 7.

In addition, this methodology requires the material to be dredged to be characterised in relation to potential contaminants other than the Primary Contaminants (“Other Contaminants”) in accordance with international best practice.

The methodology is tailored to material to be dredged from shallow seabed locations either as capital or maintenance operations.

Characterisation of each source site must be undertaken at intervals of not greater than 3 years, and must be undertaken if events occur at a source site that are likely to change contaminant concentrations present at that site.

The characterisation methodology follows a three-level procedure:

A **level 1** investigation reviews the existing information on the material to be dredged.

A **level 2** investigation is concerned with the physical and chemical characterisation of the material.

In relation to the Primary Contaminants levels 1 and 2 are mandatory and will establish whether the average concentration of any of the Primary Contaminants is below the relevant low Values specified in schedule 7.

If the level 1 investigation identifies potential Other Contaminants that may be present in the material to be dredged, then those contaminants will also be subject to a level 2 investigation.

A **level 3** investigation involves elutriation testing of any Other Contaminants identified in a level 2 investigation at concentrations between the low and high Values specified in Schedule 7.

Level 1 investigation

The review needs to determine:

- i) what the contaminants of concern are based on the site history review and pre-existing data on the sediments, if any; and
- ii) whether or not the geometric mean levels of the identified contaminants of concern in the waste are below the low Values in Schedule 7.

The review should include information on the volume, location and depths of sediment to be dredged. The historical uses of the excavation site and catchment should be evaluated with particular attention to any usage that could have resulted in contamination, such as horticulture, farming, mining, industrial and residential uses, and should pay particular attention to potential point sources of pollution adjacent or upstream, the location of effluent or stormwater discharges etc., and previous dredging, dumping, or landfilling. The sediments in major ports and established marinas are very likely to have been studied previously.

The review of existing information should identify all potential contaminants particularly those with values specified in Schedule 7. In addition to chemical contaminants in the marine sediments an assessment of particle sizes and a detailed review of their potential to release floating material or contaminants should be investigated.

Level 2 investigation

A level 2 investigation requires a comprehensive physical and chemical characterisation based on samples of the material to be dredged. Sampling will be representative of the geographic extent of the area to be dredged and the entire depth of sediment to be dredged.

The number of samples or cores required is dependent on the variability of the sediments and their pollutant content, which may depend on a large number of factors. Table 1 contains a guide to the number of cores to be collected based on volume dredged. Within marinas it is expected that 1 sample per 10,000m² is sufficient. Whichever number of cores (based on volume or area) is greater should be adopted, and additional cores should be added to target known point source locations.

Table 1 Guide to Number of Core Samples Required by Volume Dredged

Volume to be Dredged (cubic metres)	Number of Cores
0–5,000	3
5,000–15,000	4
15,000–100,000	10
Each additional 100,000	3 additional

The USEPA approach of stratifying the site into arbitrarily sized blocks and randomly sampling in each block is to be adopted. The size of blocks can be varied, but should not be greater than 10,000m². For large or complex sites the use of an initial pilot sampling programme should be considered.

The level of contamination is expected to decrease with increased depth of sediment. The thinnest layer that can be reliably dredged and selectively handled is between 30 and 50 cm so sampling at smaller intervals is of no value. Cores are to be sampled as follows:

- The top 50 cm of the core (or to the depth of dredging if less than 50 cm) is to be composited as a single sample for analysis.
- A second sample is to be taken from the 50–100 cm interval.
- Below 1 m, cores should be composited in 1 m lengths for analysis.

Sample handling techniques must ensure that changes in the composition of the samples as a result of chemical, physical or biological action are minimised, that cross contamination of samples does not occur during sub-sampling and subsequent handling, and that samples are not lost or mixed up between sampling and arrival at the analysing laboratories. Sampling should occur in a manner that avoids or minimises contamination and effective use of field and equipment blanks should be utilised. Appropriate decontamination procedures must be followed when sub-sampling from cores and between sites to avoid cross-contamination of samples.

Samples for chemical analysis should be frozen, the sample container should be filled to two thirds of its volume and immediately chilled; the sample should be frozen as soon as possible after sampling. Samples for grain size analysis should be chilled but not frozen. Waterproof labels and ink should be used, preferably pre-printed. The labels should be placed outside the sample bag inside a second bag facing out clearly visible. The label information should include site, date, depth, analysis, and handling required.

The approximate mass of material necessary for particular analyses is set out in Table 2 below.

Table 2 Amount of sediment required for various analyses

Analytical Parameter	Amount required (g, wet weight)
Organic compounds	100–250
Metals	10–100
Miscellaneous analyses	50–100
Grainsize	50–200
Total organic carbon	10–50
Moisture content	10–50

All field procedures must be documented using the standard procedures routinely used in New

Zealand in contaminated site investigations as follows:

- Written standard operating procedures (SOPs) are to be included in the sampling and analysis plan and variations from SOPs, and the reasons for such variations, noted.
- Field conditions (weather, tides, currents), station locations, sampling methods and handling and storage methods, field numbers, date, time, identity of sampler should be noted in ink in the field log and field descriptions of sediments recorded as collected.
- A sample inventory log and a sample tracking log must be maintained.
- Chain-of-custody forms that list all sample numbers and locations and the analyses and detection limits required of each sample are to accompany each sample to the laboratory. At each stage of handling, the samples are to be checked against the chain-of-custody forms and after receipt by the laboratory, a checked form sent back to the sampling organisation.
- Laboratories must be IANZ and must be experienced in the analysis of marine sediments and solid wastes.

For all core samples and depth subsamples the basic physical characteristics to be determined are volume, basic sediment grain size (by volume), and moisture content data. The proportion of litter and other anthropogenic items in the waste should also be assessed.

In respect of the Primary Contaminants the following sampling program should be applied:

- The top 50 cm of each core should be analysed for Sediment grain size, Moisture content, Heavy metals (cadmium, chromium, copper, lead, mercury, nickel, zinc), metalloid (arsenic), total organic carbon, total petroleum hydrocarbons, polynuclear aromatic hydrocarbons and tributyl tin.
- 50 – 100cm interval of each core, should be analysed for Sediment grain size, Moisture content, Heavy metals (cadmium, chromium, copper, lead, mercury, nickel, zinc), metalloid (arsenic).
- A composite sample of equal volumes from each 50 – 100cm interval of each core should be analysed for total organic carbon, total petroleum hydrocarbons, polynuclear aromatic hydrocarbons and tributyl tin.
- Each further 1m interval of each core, should be analysed for Sediment grain size, Moisture content, Heavy metals (cadmium, chromium, copper, lead, mercury, nickel, zinc), metalloid (arsenic).
- A composite sample of equal volumes from each 1m interval of the same depth, of each core should be analysed for total organic carbon, total petroleum hydrocarbons, and tributyl tin.

If the level 1 investigation has identified the potential for site-specific Other Contaminants

(examples could include polynuclear aromatic hydrocarbons, organochlorine pesticides, polychlorinated biphenyls and pentachlorophenol), the sampling program shall include appropriate provision for those Contaminants.

Detection limits should be sufficient to allow comparison with the low Values in Schedule 7.

If the mean concentrations by volume for each Primary Contaminant detected is at levels above low values specified in Schedule 7, then the material is unsuitable for disposal at the NDA.

If the level 2 investigation reports any detections of arsenic, cadmium, chromium, copper, lead, mercury, nickel or zinc in one or more samples above low values in Schedule 7 then a level 3 investigation is required in relation to those contaminants.

Level 3 investigation

Elutriate testing determines whether contaminants present in the dredge material are mobile and will transfer to the water once dredged or dumped. The results of elutriate testing are to be compared to the ANZECC marine water quality criteria (for cadmium, chromium, copper, lead, mercury, nickel or zinc) or USEPA criteria (for arsenic) as presented in Table 3 after the application of an appropriate dilution factor. If the elutriate test results exceed the 99% criteria or ccc criteria after initial dilution (initial mixing is defined as that which occurs within four hours after dumping), then the material is unsuitable for disposal at the NDA.

Table 3 Water Quality Guideline Values

Contaminant	ANZECC Trigger values for marine water				USEPA	
	Level of protection (% species)				CMC	CCC
	99%	95%	90%	80%		
Total Arsenic	-	-	-	-	69	36
Total Cadmium	0.7	5.5	14	36	33	7.9
Total Chromium	7.7	27.4	48.6	90.6		
Total Copper	0.3	1.3	3	8	2.0	1.3
Total Lead	2.2	4.4	6.6	12	210	8.1
Total Mercury	0.1	0.4	0.7	1.4		
Total Nickel	7	70	200	560	74	8.2
Total Zinc	7	15	23	43	90	81

Schedule 4: Biosecurity Characterisation Methodology

In addition to the characterisation of quality of dredge material as outlined in Schedule 3, a characterisation of marine biosecurity risks associated with a dredging area is required.

Because different non-indigenous species (NIS) have different habitat preferences, sampling methodologies are required to assess the different habitats that NIS are likely to occur in. The number and type of samples required to assess a dredge area will vary from area to area. The area to be dredged will consist of soft marine sediments, which support infaunal biota and larger epifaunal biota. Where the dredge area is adjacent to vertical structures, such as wharf piles, or shoreline that could lead to NIS being entrained in the dredge material, then these areas should also be assessed.

The number of samples required is determined from the area to be dredged, its complexity and history. At sites where there is a history of NIS, a stratified approach of dividing the site into arbitrarily sized blocks, with the average size no greater than 10,000m² and randomly sampling in each block is to be adopted. Within each block different sampling techniques should be used depending on the habitats present within and adjacent. The size of blocks can be varied so that the sampling density is greater in locations where the probability of NIS being present is greatest. At sites where there is a history of no NIS and no reasons to believe otherwise, then the number of samples required can be reduced. However a stratified random, sample approach should still be used.

Biota present within the sea floor soft sediment to be dredged should be sampled either by diver operated core sampler or by surface operated grab sampler. While it is preferable to collect quantitative samples this is not always possible and qualitative samples will still provide a presence or absence of NIS. Each sample should be a minimum of 2L volume and be washed through a 1.0mm (or smaller) mesh sieve and animals retained on the sieve collected, preserved and returned to the field laboratory for sorting and identification. Sieving and samples preservation should occur within 6 hours of sample collection. A suitably qualified and experienced person should conduct sample species identification.

Larger benthic organisms are likely to be under represented in grab samples therefore these should be sampled using an Ocklemann sled or similar device. The sled should be towed for a standard distance, typically 100 m, along the seabed such that the mouth of the sled partially digs into the sediment and collects organisms in the surface layers to a depth of a few centimetres, before being retrieved. The mesh size used in the sled should be sufficiently small as to retain species of interest, typically in the order of 10mm square mesh. The entire contents should be sorted and either identified in the field or bagged, labelled and persevered for later identification. A suitably qualified and experienced person should conduct sample species identification.

Some epibenthos species such as benthic scavengers and fishes are more mobile and thus require different sampling methods. The use of baited Opera house fish traps, Fukui-designed box traps, Starfish traps and Shrimp traps should be considered, if mobile NIS are identified as being present within the dredge area and potentially able to be included in the dredge material.

While dredging is of soft sediment from the sea floor, adjacent habitats could be disturbed by the dredge or barges, during dredging, thus the wharf piles and step rocky break waters are also required to be assessed. The outer face of wharf piles are to be assessed at different depths from low tide to seabed. Sampling can include continuous video recording of the wharf pile face, high resolution still images of selected depths and diver collected scraping samples from a quadrat at selected depths. The piles assessed should have been present within the marina for at least 12 months. Rocky breakwater walls adjacent to dredging operation will be sampled at low tide in areas. Samples can include still images of quadrats and or hand sorted, enumerated counts of species present within quadrats.

All samples should be clearly labelled with site number, sampling method, time and date. Field conditions (weather, tides, currents), station locations, sampling methods and handling and storage methods, field numbers, date, time, identity of sampler should be noted in ink in the field log and field descriptions of sediments recorded as collected. A sample inventory log and a sample tracking log must be maintained.

Schedule 5: Sediment Size Classification

Grain size to be reported		Grain size Class grouping to be tested for change
(mm)	Class	
> 3.35	Gravel	Gravel
3.35 - 2.00	Granules	
2.00 - 1.18	Very Coarse Sand	Sand
1.18 - 0.600	Coarse Sand	
0.600 - 0.300	Medium Sand	
0.300 - 0.150	Fine Sand	
0.150 - 0.063	Very Fine Sand	
0.063 - 0.0313	Coarse Silt	Silt
0.0313 - 0.0156	Medium Silt	
0.0156 - 0.0078	Fine Silt	
0.0078 - 0.0039	Very Fine Silt	
< 0.0039	Clay	Clay

Schedule 6: Sediment Chemistry Sampling and Testing Methods

At each sampling site listed in Schedule 1 Table 1 at least two 70mm diameter clear barrel cores are to be taken using a gravity corer with sufficient mass to achieve at least 15cm penetration. The gravity corer will be lower to the seafloor in a controlled manner only allow it to free fall once 5 m above the seafloor.

On retrieval of the core barrels the bottom will be immediately sealed and the cores photographed with a site label and numerical scale. The core barrels will be handled in a vertical orientation in a manner to limit disturbance to the sediment. Failure to exceed 150mm in core length will be deemed a failure and the core will be discarded and recollected.

The top 5cm of sediment from each core will be carefully removed, by removing the bottom cap, inserting a plunger and gently pushing the sediment core up through the core barrel, slowly removing the surface water. The top 5cm of the sediment core will then be carefully extruded vertically and collected in a clean container. The top 5cm of sediment from both cores will be combined, homogenised, with a 50g sub-sampled for grain size and remainder used for sediment chemistry. All samples are to be clearly labelled with date, site and testing parameters. Sediment samples for grain size are to be stored refrigerated while sediment samples for chemistry are to be frozen.

Sediment samples will be tested at an accredited laboratory using the following analytical methods.

Test	Method Description	Detection Limit
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry), gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd
Total Organic Carbon	Acid pretreatment to remove carbonates present followed by Catalytic Combustion (900°C, O ₂), separation, Thermal Conductivity Detector [Elementar Analyser].	0.05 g/100g dry wt
Total Recoverable Heavy metals, trace	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2., ICP-MS, trace level.	0.010 - 0.4 mg/kg dry wt
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	8 - 60 mg/kg dry wt
Tributyl Tin Trace in Soil samples by GCMS	Solvent extraction, ethylation, SPE cleanup, GC-MS SIM analysis. Tested on dried sample	0.003 - 0.007 mg/kg dry wt
Particle size analysis	Malvern Laser Sizer particle size analysis.	

Schedule 6B Sediment Core Sampling Methods

Sampling will occur at each site listed in Schedule 1 Table 2 radiating out from the Northern Disposal Area centre until no disposal material is observed.

At each site sampled one 70mm diameter clear barrel core will be taken using a gravity corer with sufficient mass to achieve at least 15cm penetration. The gravity corer will be lower to the seafloor in a controlled manor only allow it to free fall once 5 m above the seafloor.

On retrieval of the core barrel the bottom will be immediately sealed and the core photographed with a site label and numerical scale. The core barrels will be handled in a vertical orientation in a manor to limit disturbance to the sediment. Failure to exceed 150mm in core length will be deemed a failure and the core will be discarded and recollected.

The photographed scale will be used to obtain accurate measurements. The length of the core will be recorded. The thickness of any observed layers within the core will be measured from the sediment surface. Layers will be determined by obvious defined visual changes in the sediment either visual changes in texture or colour. Descriptive comments with regard to layers and core sediments will be recorded.

For those sites sampled listed in Schedule 1 Table 1 both cores collected will be measured and average values calculated.

Schedule 6C Benthic Biota Infauna Sampling Methods

At each sampling site listed in Schedule 1 Table 1 at least six replicate samples of one 100mm diameter Stainless steel barrel cores are to be taken using a gravity corer with sufficient mass to achieve at least 15cm penetration. The gravity corer will be lower to the seafloor in a controlled manor only allow it to free fall once 5 m above the seafloor. Note the two control areas have individual sites listed for each replicate sample.

On retrieval of the core barrels the core sediment will be immediately transferred to a clean container, the lengths of each core will be measured to ensure they are greater than 150 mm in length. Failure to exceed 150mm in length will be deemed a failure and the core will be discarded and recollected.

Once two cores of sufficient length have been obtained per replicate they will be combined, labelled (site, date and testing parameters) and then sieved as soon as practicable by gently washing each whole sample through 0.5mm mesh sieves with seawater. All samples will be stored in a cool shaded location until sieving, which will occur within three hours of collection. The material retained on the sieve, including label, will be transferred to a polyethylene 'zip lock'-type bag, and preserved with a 10% glyoxal, 70% ethanol sea water solution, sealed, placed in a second polyethylene 'zip lock'-type bag and packed into a labelled plastic container, for transportation to the laboratory.

Prior to sorting, the samples will be rinsed with freshwater and placed in a white sorting tray. All organisms will be picked out of the samples and placed in a labelled vial of 70% isopropyl alcohol solution prior to taxonomic identification and counting.

Biota will be identified to the lowest taxonomic level practical and enumerated, naming to be compatible with [W.O.R.M.S_web](#) site. A reference collection will be maintained by the taxonomist.

**Schedule Seven: ANZECC (2000) Interim Sediment Quality Guideline (ISQG) Trigger
Values with updates by Simpson *et al.* 2013**

Contaminant	ANZECC ISQG	
	Low	High
Total Recoverable Heavy metals and metalloids (mg/kg dry wt)		
Antimony	2	25
Arsenic	20	70
Cadmium	1.5	10
Chromium	80	370
Copper	65	270
Lead	50	220
Mercury	0.15	1
Nickel	21	52
Silver	1	4 [#]
Zinc	200	410
Tributyl Tin (1% TOC) (ug Sn/kg dry wt)		
Tributyltin	9.0 [#]	70.0 [#]
Polycyclic Aromatic Hydrocarbons (1% TOC) (ug/kg dry wt)		
Acenaphthene *	16	500
Acenaphthylene *	44	640
Anthracene *	85	1100
Fluorene *	19	540
Naphthalene *	160	2100
Phenanthrene *	240	1500
Low Molecular Weight PAHs *	552	3160
Benzo[a]anthracene *	261	1600
Benzo[a]pyrene (BAP) *	430	1600
Chrysene *	384	2800
Dibenzo[a,h]anthracene *	63	260
Fluoranthene *	600	5100
Pyrene *	665	2600
High Molecular Weight PAHs *	1700	9600
Total PAHs *	10000[#]	50000[#]
Total Petroleum Hydrocarbons (mg/kg dry wt)		
Total hydrocarbons (C7 - C36)	280 [#]	550 [#]
Organics (1% TOC) (ug/kg dry wt)		
Total DDT *	1.2 [#]	5 [#]
p,p'-DDE *	1.4 [#]	7 [#]
o,p'- + p,p'-DDD *	3.5 [#]	9 [#]
Chlordane *	4.5 [#]	9 [#]
Dieldrin *	2.8 [#]	7 [#]
Endrin *	2.7 [#]	60 [#]
Lindane *	0.9 [#]	1.4 [#]
Total PCB *	34 [#]	280 [#]

* = normalised to 1 % total organic carbon, # = revised guideline as per Simpson, et al. (2013)