BEFORE THE NORTHLAND REGIONAL COUNCIL HEARINGS COMMISSIONER

IN THE MATTER of an application under section 88 of the Resource Management Act 1991 (Act)

AND an application by Doug's Opua Boatyard for resource consents relating to the redevelopment of the boatyard located at 1 Richardson Street, Opua.

STATEMENT OF EVIDENCE OF DR PETER STANLEY WILSON ON BEHALF OF DOUG'S OPUA BOATYARD (DOBY)

Dated this 20th day of July 2020

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INTRODUCTION

1. My name is Dr Peter Stanley Wilson. I am a Senior Coastal Scientist at 4Sight Consulting, a position I started on 18 February 2019. Before this role, I held the position of Coastal Water Quality Scientist at the Waikato Regional Council for four years. In these roles, my responsibilities have been based on marine science, research, and resource management with a focus on sediment and water quality.

2. I hold a Bachelor of Science degree in chemistry and a Master of Science with Honours degree in chemistry, both from the University of Waikato. I also hold a PhD in marine biogeochemistry from Auckland University of Technology.

3. I have developed my expertise in assessing coastal sediment and water quality over the past ten years. My previous work experience includes assessing environmental effects of aquaculture; tracking the source of faecal contaminants in estuarine environments; and designing, implementing, and reporting on regional state of the environment sediment and water quality monitoring programmes. I have provided technical advice to resource consent staff on a range of marine activities and discharges including marine farms, wastewater treatment plants, and marinas. I have routinely assessed activities against the requirements of the Resource Management Act 1991, New Zealand Coastal Policy Statement 2010 (NZCPS), National Environmental Standards, and regional coastal plans. I have also prepared and presented ecological evidence previously for council hearings and the Environment Court.

CODE OF CONDUCT

4. I have been asked by the Applicant to offer my professional opinion on the potential ecological effects from the proposed works on the coastal and marine area (CMA).

5. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2014 and that I have complied with it when preparing my evidence. Other than when I state I am relying on the advice of another person, this evidence is entirely within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

SCOPE OF EVIDENCE

6. In this statement of evidence, I:

   a. Briefly describe the background to my involvement;

b. Briefly describe the water discharges from DOBY to the CMA;
c. Assess the quality of the discharges from DOBY and any potential effects on the CMA;
d. Assess the sediment quality in the receiving environment, which is potentially influenced by the water discharges from DOBY;
e. Assess the potential effects on the CMA from:
    i. Capital and maintenance dredging works;
    ii. Wharf demolition and construction;
    iii. Reconstruction of the slipway; and
    iv. Marina berths.
f. Briefly comment on relevant matters in the s 42A report.

BACKGROUND TO MY INVOLVEMENT

7. I visited Doug's Opua Boatyard (DOBY) once during dry weather on 19 February 2019. At this time, I was shown around the yard and general locality by Mr Doug Schmuck. Mr John Papesch, an engineer with Haigh Workman consultants, was also present during this inspection. I had sought his participation so that I could fully understand the existing stormwater design and management and could be made aware of any proposed design upgrades. I was particularly interested in any limitations in the stormwater system, including any areas of uncertainty as regards to its present or future performance.

8. My observations from this visit confirmed that:

    a. Mr Schmuck had decommissioned and removed three of the four slipway rails and cradles that were used for boat cleaning and maintenance. This reduced the potential working area to one lane, which runs from the slipway up to the boatshed.

    b. Drains, bunds, and weirs were set up so that all wash water and stormwater from working surfaces were captured into sumps that are pumped into treatment tanks before being discharged to the Opua sewerage network.

    c. There is one discharge pipe from the property into the upper CMA on the northern side of the jetty. The pipe captures an intermittently flowing watercourse entering the property and stormwater runoff from non-working surfaces. There was no discharge during the time I visited.

9. I have not visited the site since this occasion, but I am aware that remediation work has been completed at DOBY, including the removal of the upper layer of soil from the remaining site working areas. I understand that modifications to the boatyard and slipway are underway, including the removal of the turntable. As a result of these works, the entire working surfaces of slipway and boatyard will be further reconstructed and concreted in accordance with the conditions of the Far North District Council (FNDC) land use consent and the conditions associated with the 2010 abatement notices issued by the Northland Regional Council (NRC). These works had been on hold with the agreement of the NRC until the easements were beyond challenge and confirmed by the Supreme Court.

10. I met with the NRC Coastal and Water Quality Field Operations Manager, Mr Ricky Eyre, on 22 February 2019. This was to discuss details about the consent monitoring NRC have carried out. I wanted to form an opinion as to the reliability, comprehensiveness, and limitations of the monitoring data to clarify past and present water quality effects in the receiving environment from DOBY.

11. I have presented evidence on behalf of Mr Schmuck for DOBY in the Environment Court, which was primarily focussed on the potential effects of discharges on the CMA.[1] I have reused relevant parts of such evidence in this EIC.

12. I did not conduct any of the fieldwork used in my assessment of DOBY. I did, however, author an assessment of ecological effects report based on the following information sources (herein referred to as the "4Sight Ecology Report", which is attached to the resource consent application in Appendix 14)[2]:

    a. Consent monitoring results sent to me in Excel spreadsheet format by Ricky Eyre, Northland Regional Council on 21 February 2019;

    b. A report by Dr Stephen Brown of 4Sight Consulting titled "Ecological Assessment: Doug's Opua Boatyard", dated July 2018;

    c. Laboratory results from marine sediment sampling conducted by Mr Schmuck and reported by Hill Laboratories in August 1998;

    d. Laboratory results from marine sediment sampling conducted by Haigh Workman and reported by Hill Laboratories in January 2019; and

[1] *D G Schmuck v Northland Regional Council*, [2019] NZEnvC 125.

[2] Wilson, P., 2019. Doug's Opua Boatyard: Ecology and sediment and water quality assessment. 4Sight Consulting technical report. 22 p.

e. Laboratory results from intertidal sediment sampling collected south of the slipway by 4Sight staff and reported by Hill Laboratories in May 2019.

13. The sediment analysis results from 1998 were provided to 4Sight Consulting by Mr Schmuck who also provided an indicative plan as to where the samples were collected in 1998. I have accepted at face value that sediments were sampled by Mr Schmuck from the locations stated. I have no information on sampling methods or protocols relating to that data. I have taken it simply as sampling data that is likely to reflect sediment contaminant concentration close to the slipway some 20 years ago.

14. The Haigh Workman results were provided to me by Mr Edward Collings, Senior Geotechnical Engineer at Haigh Workman via email on 22 February 2019. These were provided as raw results from Hill Laboratories for a report that has since been completed.[3] I determined which samples were relevant for my assessment and the locations from which they were sampled from based on discussions with Mr Collings.

15. I have also read the s 42A planning report and respond to relevant sections in my evidence.

BRIEF DESCRIPTION OF THE COASTAL AND MARINE ENVIRONMENT

16. DOBY and the slipway are at the northern end of Walls Bay. This is a relatively sheltered embayment approximately 300 m west of the main wharf in Opua. The Veronica Channel is to the north.

17. The beach in Walls Bay is approximately 60 m long. It is described in the 4Sight Ecology Report as follows:[4]

> "The substratum in the upper 1–2 m of shore [i.e., high shore] comprises mostly sand and gravel with a high proportion of whole dead shell (mostly pipis [*Paphies australis*] and some Pacific oyster shell [*Crassostrea gigas*]). The substratum in the mid intertidal zone comprises sand, gravel and shell gravel. The gravel component of the sediment increases in the mid and lower intertidal and the low intertidal comprises coarser gravel and sand overlaying muddy sand."

18. Figures 2 and 3 in the 4Sight Ecology Report clearly show these characteristics in Walls Bay.[5]

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[3] Collings, E., 2019. Geoenvironmental Appraisal 1 Richard Street, Opua for Doug's Opua Boat Yard Limited. Haigh Workman Technical Report 17 115.
[4] 4Sight Ecology Report, at 7.
[5] 4Sight Ecology Report, at 3.

19. In my opinion, the aspect and slope of the beach render it as likely to be well flushed and a relatively dispersive environment in terms of intermittent stormwater discharges.

20. The 4Sight Ecology Report describes that the sediments and rocky zones in Walls Bay supported a typical range of organisms, including pipis (*Paphies australis*), cockles (*Austrovenus stutchburyi*), and Pacific oysters (*Crassostrea gigas*). I note that the 2018 survey conducted by 4Sight Consulting focused on edible shellfish (in particular, pipi) and sediment quality and was not directed at a comprehensive inventory of benthic intertidal invertebrates.

21. The density of pipi in 2018 was high enough to be classed a ‘bed’ and there were enough larger, harvestable pipi to class the bed as harvestable. In my opinion, the relatively high density and the broad range of pipi sizes indicate that this is a viable and healthy shellfish population.

22. To assess the suitability of the shellfish for consumption, the 2018 survey collected pipis from the boatyard slipway, the middle of the pipi bed in Walls Bay, and from a reference/control site 2.2 km northwest of DOBY in Te Haumi. Te Haumi was considered to be a suitable reference site because it is not close to any slipway or potentially contaminating point sources. The shellfish flesh from each site was analysed for metal concentrations.

23. The metal concentrations measured in the pipi flesh were similar in samples collected from each of the three locations. The 4Sight Ecology Report notes that:[6]

> “There are no published guidelines for acceptable concentrations of chromium, copper, nickel, or zinc in shellfish tissue; however, the previous food standards (New Zealand Food Regulations 1984, revoked in December 2002) prescribed a copper guideline of 30 mg kg^{-1} wet weight in any food except animal offal and tea. The metal concentrations in the pipis collected at all sites did not exceed levels stipulated in the New Zealand Food Standards and copper was well below that cited in the previous regulations.”

24. In summary, relative to the Te Haumi reference site, there was no evidence of local contamination of pipi flesh from Walls Bay. In my opinion, the survey indicates that the pipi population in Walls Bay is viable and healthy.

[6] 4Sight Ecology Report, at 16.

WATER DISCHARGE TO THE CMA

Data sources and water quality guidelines

25. Water quality monitoring at DOBY has been conducted by NRC since 2003 at varying frequency but no greater than annually. The following assessment includes data collected up to June 2018. These data are attached to this evidence as Appendix PSW1. The data is limited to results from nine sampling occasions; however, the monitoring locations differ among occasions. I have used these results in my assessment of the environmental effects of the discharge on the receiving marine environment.

26. I have limited my assessment to results from NRC monitoring locations with repeated measurements and that specifically relate to the stormwater discharge. These locations are presented in my evidence attached as Appendix PSW2. I have also limited my assessment to results for total copper, total zinc, and total lead as these are the main contaminants of concern from boatyard activities that have been measured by NRC.

27. To place water quality results in context, I compare them to the ANZG (2018) toxicant default guideline values for water quality in aquatic ecosystems, more specifically, for marine waters.[7] These guidelines values are hereafter referred to as Default Guideline Values (DGVs).

28. For each metal, I use the recommended guideline for "slightly to moderately disturbed systems", which has been derived for 95% species protection. These are the same values that are used in the most recent consents for discharges from DOBY to the CMA when measured at a location 10m from the discharge point. I understand that NRC uses a dye tracer when carrying out their monitoring to identify the boundary of the 10m mixing zone and sampling is typically conducted around high tide while there is a discharging event.

Application of DGVs

29. There are three aspects of this type of monitoring and in the application of DGVs that are inherently highly conservative, and one aspect that is not.

30. First, natural stormwater discharges are typically highly intermittent and are relatively short term. There can be many weeks, and perhaps months, of no discharge. Thus,

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[7] ANZG 2018. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Governments and Australian state and territory governments, Canberra ACT, Australia. Available at www.waterquality.gov.au/anz-guidelines

biota or sediments within a discharge field are not exposed to stormwater on a continuous basis. In the case of DOBY, this infrequent exposure can be much more strongly emphasised because the majority of site water is captured and directed to storage tanks before being fed into the sewer as a trade waste stream. Based on this, I have assumed that discharge events from DOBY are relatively infrequent, that is, dependent on heavy rainfall.

31. Second, DGVs are intended to provide trigger values for continuous exposure in receiving waters after reasonable mixing. Clearly, continuous exposure of the receiving waters to discharges from DOBY does not occur. Thus, looking at a monitoring result and comparing it to a DGV takes no account of the short-term nature of the discharge. Measuring a metal concentration that exceeds the DGV periodically does not imply that there are adverse ecological effects. It should be seen more like an 'amber light' to direct the discharger to improve discharge quality and, if warranted, conduct further investigation into whether there are adverse effects taking place.

32. Third, the ANZG (2018) guideline values for ecosystem health were developed to be trigger levels for the dissolved fraction of contaminants rather than the total fraction. The dissolved fraction, which excludes metals that have adsorbed to the surface of particles or formed complexes with other organic compounds, is generally considered to be bioavailable. This fraction is readily available to interact with living organisms and thus have potential adverse effects.

33. I am advised that the laboratory method used for NRC consent monitoring analyses total metals.[8] Total metal concentrations in water are not the same as dissolved metal concentrations. Total metals will overestimate the exposure of biota to bioavailable (i.e., dissolved) metals and, therefore, overestimate the risk to the biota. Comparing the results from this method to the DGVs provides a conservative estimate of potential adverse environmental effects but will overestimate any potential toxicity issues. In my opinion, the dissolved metal fraction should be analysed in addition to the total fraction to get a more accurate assessment of discharge concentration after mixing relative to DGVs. This would be more useful in assessing potential metal toxicity in the discharge.

34. The aspect that is not conservative in the 10m mixing zone approach is that at low tide, the stormwater discharge from the pipe will travel across intertidal habitat and

[8] Meeting with Ricky Eyre, Coastal and Water Quality Field Operations Manager at Northland Regional Council, 22 February 2019.

not be mixed until it meets the receiving waters; a variable distance away depending on the state of the tide. At low tide, for example, there may be a zone of intertidal habitat that is exposed to contaminants in the discharge. These may be typically elevated because they have not had the opportunity to be mixed or diluted. For this reason, it is important that contaminants generated on the DOBY site are not only intercepted, collected, and transferred to the trade waste, but also that no significant quantities of residual contaminants are left in the collection system (sump), potentially to be lost during high rainfall events. I understand this is achieved with the present-day operational water and stormwater on site; for example, as described in sections 4(b) and 4(c) of the Reviewed DOBY Operational Management Plan, signed 20 February 2019. Further, the upgrade of the stormwater treatment device to a Stormwater 360 should further improve the quality of the discharge.

Water quality results

35. I have been advised by Mr Schmuck, Mr Papesch, and Mr Eyre that the wash water and stormwater infrastructure at DOBY has been improved incrementally over its years of operation. The frequency of discharge must have decreased over time because of the diversion to trade waste, and the quality of any residual intermittent discharges should also have improved.

36. Regarding discharges to the CMA, the most significant change to date was made in 2012 when all wash water was diverted to the Opua sewerage network. The wash water is most likely to contain the majority of contaminants generated on site. A reduction in contaminants discharged to the CMA as an outcome of this diversion to the sewer can be seen in the results attached as Appendix PSW3 to my evidence; and more specifically, in the plots titled "Discharge to watercourse (prior to mixing)" and "Discharge to CMA". The first point (upper-left corner) in each plot shows high concentrations of each contaminant that were discharged into the CMA during the 2003 monitoring occasion, prior to wash water being diverted to the sewer. The subsequent points show reduced levels of contaminants being discharged from 2015 onwards. These values are much closer to the guideline value and some may be below the DGV if dissolved metals had been measured. The current resource consent application proposes installing a Stormwater 360 treatment system that should further improve the quality of water discharges to the CMA.

37. Monitoring by NRC since 2015 has shown that the watercourse entering the property on the north-western property boundary typically has copper levels that are an order of magnitude higher than the DGV, and zinc levels that are about 33% higher than the

DGV (Appendix PSW3 Figures 1 to 3; plots titled "Watercourse upstream"). The quality of the water at this location is not influenced by activities being undertaken at DOBY.

38. When NRC carried out their monitoring in 2018, stormwater from working, and non-working surfaces of DOBY were added to this watercourse before being discharged to the CMA when a boat was not being washed down. Results from this monitoring occasion show that copper concentrations at the discharge point were two orders of magnitude higher than the DGV. A notable contribution to the contaminant level is the water flowing onto the property, mentioned in the previous paragraph, which had copper concentrations one order of magnitude higher than the DGV as it entered the property. Metal concentrations over and above those that are explainable by the metals in the watercourse are likely attributable to contaminant runoff from DOBY into the discharge at the time of sampling.

39. NRC monitoring data suggests zinc and lead at the 10m mixing zone have been below the DGVs (and the consent conditions) since the infrastructure improvements in 2012. Although, the most recent copper measurement was an order of magnitude greater than the DGV at the 10m mixing zone boundary, this was still slightly lower than the concentration of copper in the watercourse entering the property.

40. My Figure 1 in Appendix PSW3 also indicates that copper concentrations were below the DGV at the jetty location, as would be expected with increased distance from the discharge point and, therefore, a greater mixing volume.

Infrastructure improvements since NRC 2018 monitoring

41. I am advised by Mr Schmuck, Mr Papesch, and Mr Eyre that DOBY wash water and stormwater infrastructure has changed since NRC carried out its 2018 consent monitoring. Prior to October 2018, all wash down water and stormwater falling on the slipway was collected and transferred to the treatment system but, at other times, stormwater from work and non-working surfaces was discharged to the CMA. From August 2018 onwards, all stormwater running over work surfaces is discharged to the treatment system and then to trade waste.

42. To the best of my knowledge, under normal weather conditions, the only water discharged to the CMA with the present-day arrangement is stormwater runoff during and following rainfall from non-working surfaces, including an intermittently flowing watercourse entering the property, the boatshed roof, the vegetated northern area of the site, and some walkways.

43. In my opinion, this modification will further improve the quality of any discharge from DOBY to the CMA. I anticipate that the levels of contaminants in the discharge should be lower than when they were measured by NRC in 2018.

44. In my opinion, given the present-day management of wash water and stormwater on the DOBY site, any discharge from DOBY to the CMA will have a less than minor effect on the receiving environment water quality or sediment quality.

45. I am aware that this application proposes the installation of a Stormwater 360 or similar device to treat stormwater from the site. From the published information on the system, I understand that it is designed to achieve high removal rates of fine sediment, heavy metals (including dissolved metals), and nutrients.[9] The system meets Auckland Council stormwater design guidelines (TP10) for removal of >75% of total suspended solids (TSS). On this basis, I expect the quality of the water being discharged to the CMA to be at least the same, but likely better, than what is currently being discharged. That is, I expect the water quality requirements at the boundary of the 10m mixing zone to be readily met if a Stormwater 360 or similar device is installed.

Uncontrolled discharge to the CMA

46. The most likely discharge scenario with the DOBY infrastructure currently in place is during extreme weather events and/or power outage. This has been noted in the Reviewed Operational Management Plan, approved by NRC and FNDC on 20 February 2019:[10]

> "There is only one unforeseeable discharge emergency that would result in an uncontrolled discharge at this particular operational site. That is extreme weather events overpowering the (CSW) and (CTS) and/or total power outage that would [affect] both systems and the entire receiving environment..."

47. During such a situation, if the pumps were inactive or overwhelmed by the volume of stormwater, there would be flow into the CMA.

48. There are three main factors that reduce the level of risk to the environment during such circumstances:

    a. In the case of an extreme weather event or power outage, it is highly unlikely that boat-washing or other contaminant-producing activities would be taking

[9] https://www.stormwater360.co.nz/products/stormwater-management/filtration/prod/stormfilter

[10] Doug Schmuck Reviewed Operational Management Plan for Doug's Opua Boatyard (signed 20 February 2019) at 4(i).

place. This minimises the potential levels of contaminants on site that may be discharged into the CMA.

b. The level of contaminants remaining in water traps or pits should be relatively low as most of the contaminated water (the first flush) would have been pumped into the treatment system during the washing process or in the early stages of the extreme weather event before the pumps are overwhelmed.

c. In an extreme weather event, any remaining water in traps or pits will be diluted by the volume of rain and would discharge into the receiving environment in which the prevailing water quality would have already been impacted by catchment runoff and which, therefore, be less sensitive to small scale stormwater inputs from the DOBY. This further minimises potential adverse environmental effects on the receiving environment.

49. I understand that the proposed Stormwater 360 design will be gravity fed and have greater capacity to store water in the event of a power failure. As such, the likelihood of an uncontrolled discharge after the installation of the Stormwater 360 device should be much less.

50. In my opinion, the risk of adverse environmental effects from an uncontrolled discharge to the CMA in this situation would be very low and probably negligible.

SEDIMENT QUALITY IN THE RECEIVING ENVIRONMENT

Data sources and sediment guidelines

51. I have considered sediment quality because it changes much slower than that of water quality. Sediments integrate and reflect multiple sources of contaminants. They also provide information about how the environment has been affected over longer time scales (months to years).

52. Typically, the upper 2 cm of marine sediments is analysed, which broadly represents the cumulative effects from approximately the past 10 years. The actual period is determined by mediating processes including bioturbation, tides and wave action, and other physical and chemical disturbances.

53. To put the sediment quality results in context, I compare them to the ANZG (2018) DGVs for toxicants in sediment.[11] The DGV and GV-high thresholds indicate 10% and 50% chance, respectively, of adverse effects on marine organisms.

[11] https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/sediment-quality-toxicants

54. My assessment is made based on the results from four sampling occasions:

a. 1998 (Doug Schmuck) – Intertidal sediment along a transect between the slipway and the jetty;[12]

b. 2018 (4Sight Consulting) – Intertidal and subtidal sediments distributed around Walls Bay;[13]

c. 2019 (Haigh Workman) – Intertidal sediment from a 3 × 3 grid centred on the slipway;[14] and

d. 2019 (4Sight Consulting) – Intertidal sediment sampling collected south of the slipway.[15]

Sediment quality results

55. Results from sediment sampling in 1998 show elevated levels of copper, zinc, and lead that are above the GV-high in the upper-intertidal (high shore) area.[16] The concentration of all metals decreases with increasing distance from the shore. Copper concentrations exceed the GV-high by the greatest amount of the three metals, however, they decrease below the GV-high trigger level approximately 10 m from the shore, which is the distance of the mixing zone from the discharge point define in the existing consent. A similar pattern is also seen for zinc and lead.

56. In my opinion, the high metal concentrations recorded in 1998 are likely a result of accepted practices at and prior to that time and uncontrolled activities from the boatyard that occurred before consents were required and granted.

57. Sampling conducted during 2018–19 showed a marked decrease in sediment metal concentrations since 1998. For example, the concentration of copper closest to the shore, north of the slipway decreased from 1,860 mg/kg in 1998 to 480 mg/kg in 2019. The results also indicate that metal contamination is relatively localised to the slipway. Metal concentrations are notably higher along the slipway but decrease by at least half at a distance 5 m north or south of the slipway. The results show that subtidal

[12] Sampling locations presented in the 4Sight Ecology Report, Appendix B. Results presented in Appendix PSW4 of this EIC.

[13] Sampling locations presented in the 4Sight Ecology Report, Appendix B. Results presented in 4Sight Ecology Report, Appendix E.

[14] Sampling locations presented in the 4Sight Ecology Report, Appendix B. Results presented in 4Sight Ecology Report, Appendix E.

[15] Sampling locations presented in the 4Sight Ecology Report, Appendix B. Results presented in 4Sight Ecology Report, Appendix E.

[16] Attached to this EIC as PSW4.

sediments are all below the DGV for each metal, indicating that metal contamination is localised and restricted to intertidal sediments.

58. In my opinion, intertidal sediments in Walls Bay near to the slipway and the discharge point show signs of metal contamination that is most likely a consequence of historic, uncontrolled activities. Based on the available data, metal concentrations have decreased markedly from 1998 to 2019, indicating an improvement in sediment quality.

59. In my opinion, the sediment quality is likely to continue improving as a result of the improved wash water and stormwater infrastructure. Consequently, there will be a reduction in the load and concentration of contaminants discharged into the CMA.

DREDGING

Capital dredging

60. Capital dredging has been proposed to allow all-tide access to the proposed reconstructed jetty and marina berths from the Veronica Channel. The proposed dredging depth is up CD-1.5m in the approach to the wharf from the Veronica Channel and up to CD-2m around the two proposed marina berths. The total capital dredge volume is expected to be 4,329 m^3.[17]

61. The Resource Consent Application states that dredging will be conducted using a "barge mounted hydraulic excavator" and that "[a] silt curtain will be deployed around the dredging plant for the duration of the dredging operation to minimise the spread of suspended sediment in the water column."[18]

62. There are two potential adverse effects from this activity that I will address in my evidence: 1) effects on the benthic habitat and biota in the dredging footprint; and 2) effects of sedimentation resulting from the dredging on nearby habitats and biota, primarily that of the shellfish bed in Walls Bay.

63. The ecological features in the dredging footprint (i.e., benthic habitat and biota) that were identified in the 4Sight Ecology Report are "all common and widespread in the Bay of Islands and Northland."[19] These ecological features that are within the dredging footprint are likely to be highly disturbed or destroyed as a result of the dredging. In my opinion, the ecological features would be likely to return to a pre-dredging state within some months to a year. The pre-dredging state is stated in the 4Sight Ecology Report to refer to the sediment type returning to a "similar sandy/mud

[17] See detailed plans in the Resource Consent Application, Appendix 11.
[18] Resource Consent Application, at 38.
[19] 4Sight Ecology Report, at 17.

gravel substratum [and being] inhabited by the same or similar assemblage of biota."[20] Because of the common and widespread nature of the benthic habitats and biota that may be affected and that the habitat and biota will recover in time, I consider the effects of capital dredging on the benthic habitats and biota within the dredging footprint to be minor.

64. Substantial quantities of sediment will be resuspended during the dredging works. Although a silt curtain will be used to minimise the spread of suspended sediment in the water, there will still be some fraction of sediment dispersed into the surrounding environment. Sampling of the subtidal sediment by 4Sight has shown that the levels of heavy metals are low[21] and, therefore, there is little risk to nearby areas from the metal concentrations in this sediment. One of the most important ecological features identified in the 4Sight Ecology Report is the pipi bed in Walls Bay. Pipi are known to be potentially vulnerable to the effects of excessive sedimentation.[22] The potential effect of the dredging on the pipi bed, and similarly on other nearby benthic habitats and biota such as those on the rocky intertidal shoreline at either end of the bay, is likely to be limited due to the intermittent and short-term nature of the works and the low amount of suspended sediment due to the use of a silt curtain. Furthermore, these habitats and biota would likely be exposed to similar elevated levels of suspended sediment at times during high winds and heavy rainfall, which will resuspend fine sediments already present in Walls Bay. Due to the above factors, I consider the effects of capital dredging on nearby benthic habitats and biota likely to be minor to less than minor.

65. The 4Sight Ecology Report also notes that, at the previous hearing on the proposed activity, NRC provided further recommendations regarding temporal restrictions on dredging activities.[23] The restricted period considers cockle and pipi spawning (October to January) and higher expectations from recreational users of the area during the summer months (generally, November to March). Based on this, the 4Sight Ecology Report recommends that dredging activities are only conducted during April to September (inclusive), which I agree with.

Maintenance dredging

66. Ongoing maintenance dredging is proposed to ensure the all-tidal access from the Veronica Channel to the wharf and marina berths. The potential effects from this

[20] 4Sight Ecology Report, at 17.
[21] 4Sight Ecology Report, Appendix E.
[22] 4Sight Ecology Report, at 17.
[23] 4Sight Ecology Report, at 18.

activity are similar to but less than those of the capital dredging. The 4Sight Ecology Report notes that dredging has not been required at DOBY within the past 10 years.[24] This may be attributed, in part, to relatively low sediment transport due to low-energy hydrodynamic conditions in Walls Bay. It is, therefore, likely that maintenance dredging will only be required infrequently and at volumes much smaller than the initial capital dredging. This indicates that the potential effects on benthic habitats and biota will occur infrequently and on smaller scales that the capital dredging. In a similar manner to capital dredging discussed above, the benthic habitats and biota removed during maintenance dredging are likely to recover to a pre-dredging state within months to a year. A silt curtain will be used to minimise the dispersal of suspended sediment as it will be for capital dredging. Based on these factors, I consider the effects of maintenance dredging to be less than minor.

WHARF DEMOLITION AND CONSTRUCTION

67. I understand that the wharf demolition and construction will likely be carried out at a similar time to the capital dredging. I also understand that the existing piles will be removed by a barge and 30 timber piles and 4 sleeved steel piles will be installed for the new wharf.[25]

68. The potential adverse effects from sediment resuspension and dispersal during the upgrade is likely to be much smaller than that from the capital dredging. Furthermore, the area of seafloor that may be disturbed during the installation of piles is very small in the context of Walls Bay. Because of these factors, I consider the effects from the wharf demolition and construction to be less than minor.

RECONSTRUCTION OF THE SLIPWAY

69. Reconstruction of the slipway is proposed to lessen the gradient of the slipway so that it finishes at a level approximately 2m below the existing boatshed floor level. The resource consent application states that "[t]he intertidal and subtidal section of the slipway will be reconstructed in a similar manner to the existing slipway. The rails will be set amongst the sediment of the beach, supported by sleepers buried beneath the sand surface."[26]

[24] 4Sight Ecology Report, at 18.
[25] Resource Consent Application, at 32.
[26] Resource Consent Application, at 35.

70. I understand that substantial removal of intertidal sediment will not be required like it is on the land; however, some sediment near the rails will be removed to reconstruct this section of the slipway. As I have discussed above, there is localised contamination of the sediment up to 5 m either side of the slipway.[27] Appropriate management of the removal of this sediment will be necessary to ensure that the contaminated material is not dispersed into the surrounding environment.

71. I have discussed this issue with Ed Collings[28] and Mr Schmuck and I understand that sediments from the slipway that have highly elevated metal concentrations will be removed prior to dredging. They will be deposited on site at DOBY and be treated with lime in the same manner that the contaminated soil from the site works is being remediated. This approach is detailed in Mr Collings report. [29] The remainder of the intertidal and subtidal sediment will be removed as described by Mr Andrew Johnson in his statement. The remaining sediment is anticipated to have sufficiently low metal concentrations so they can be disposed of at an appropriate clean fill facility or similar.

72. Sampling by 4Sight confirmed that there is very limited biota in the sediment on the slipway.[30] Consequently, there is limited potential to have adverse effects on biota during the removal of the slipway rails and nearby sediment.

73. So long as appropriate sediment control measures are in place, I anticipate that there would be limited resuspension and dispersal of the contaminated material into the CMA during the work. I consider the effect of removing the contaminated sediment along the slipway to be minor or less than minor and, overall, the removal of contaminated sediment to have a positive effect.

RESPONSE TO S42A REPORT

74. In general, I agree with the findings of the s42A report and respond to some specific points below.

75. With regard to the proposed dredging and removal of contaminated sediment, Mr. Hartstone notes in paragraph 62 that:

> "It would be expected that the dredging activity required to remove contaminated sediment will need to be done separately from the balance of the dredging activity

[27] This EIC, para 56.
[28] Senior Geotechnical Engineer, GWE, 30 June 2020. Previously worked for Haigh Workman.
[29] Collings, E., 2019. Geoenvironmental Appraisal 1 Richard Street, Opua for Doug's Opua Boat Yard Limited. Haigh Workman Technical Report 17 115.
[30] 4Sight Ecology Report, at 19.

for the berths and channel. Some clarity about the sequence of these two activities should be provided prior to or at the hearing."

76. Sediment in Walls Bay can be generally placed in one of three categories depending on the concentrations of heavy metals (copper, lead, and zinc):

a. Sediment up to 5 m either side of the slipway extending down the shore from DOBY – these sediments have the highest concentrations of heavy metals that exceed the DGV and, at some sites, the GV-high;

b. Intertidal sediment in the remainder of Walls Bay – these sediments have concentrations of heavy metals that exceed the DGV but are at much lower concentrations than those near the slipway; and

c. Subtidal sediment – these sediments have heavy metal concentrations that are below their respective DGVs.

77. Based on discussions with Mr. Collings and Mr. Schmuck, I understand that a staged approach will be taken for sediment removal as I have briefly mentioned above in paragraph 71. That is, sediment along the slipway that has the highest concentrations of metals will be removed prior to dredging. This will be treated with lime on site at DOBY in the same manner that the contaminated soil from the site work is being remediated. The remaining intertidal and subtidal sediment from Walls Bay will be removed in the manner described by Mr Andrew Johnson in his statement. The remaining sediment is anticipated to have metal concentrations that meet requirements for disposal in a clean fill facility or other suitable disposal location.

78. In paragraph 116, Mr. Hartstone comments on the low concentrations of heavy metals that were measured in the pipi flesh and concludes that "*It may be inferred that the operation of the boatyard has not resulted in contamination of the shellfish bed, although the* [4Sight Ecology] *report does not specifically state this.*"

79. Pipi are filter feeders and will accumulate various contaminants during this process. As a result, pipi can act as biological indicators of the level of contaminants in the environment. Since the heavy metal concentrations measured in the flesh of pipi from Walls Bay were low, it is correct to infer that potential sources of heavy metals in the surrounding environment (i.e., DOBY, Walls Bay, and likely influences from the Opua Wharf) are similarly low. DOBY is the closest potential source of heavy metals in Walls Bay and so this suggests that the level of heavy metals discharged by DOBY are not high enough to cause significant accumulation in pipi flesh.

CONCLUSION

80. Based on the evidence I have presented, I consider the potential effects from the dredging to be minor; overall, I consider it to be an improvement to the environment as sediments with elevated levels of heavy metals will be removed. I also consider the potential effects from the present-day water discharge from DOBY into the CMA to be less than minor and upgrading the stormwater treatment system is anticipated to further improve the quality of the discharge.

81. I acknowledge there is relatively little water quality monitoring data but, in my opinion, it is sufficient to draw these conclusions. The other information that is relevant to the discharge, such as the intermittent nature of the discharge, the effective controls on site for conveying contaminated water to the trade waste, and the conservative aspects of applying the DGVs[31] and the potential uncontrolled discharge scenarios[32], support my conclusion.

Dr Peter Wilson

[31] This EIC, paragraphs 29 to 34

[32] This EIC, paragraph 48.

Appendix PSW2

NRC consent monitoring data supplied by NRC

Table 1: Water quality results from NRC consent monitoring of location in and nearby DOBY.

Site Name	Time	Sample Parameters	Copper Total	Dissolved Oxygen Percent Saturation	Dissolved Oxygen [Dissolved Oxygen (Field)]	Dissolved Oxygen [Dissolved Oxygen (Lab)]	Lead Total	Salinity	Salinity (Field)	Temperature	Total Suspended Solids	Turbidity [Turbidity (X)]	Zinc Total	pH [pH (Discrete)]
		Cost Centre	(g/m3)	(% Sat)	(mg/L)	(g/m3)	(g/m3)	(ppt)	(ppt)	(degC)	(g/m3)	(NTU)	(g/m3)	(pH)
107318	07-Nov-2003 09:27:00	0791401	3.83	8.50			<0.002000	32.60		17.00			0.05	
107318	07-Nov-2003 09:27:01	0791401	0.02				0.26						12.50	
107318	28-Jan-2004 13:09:00	0791401	1.84	0.50			0.16	0.80		21.40	25.00		3.94	6.80
107318	28-Jan-2004 13:20:00	0791401	0.02	6.90			0.00	36.20		21.90	13.00		0.04	8.80
107318	02-Feb-2006 12:58:00	0791401	2.10	5.60			0.21			22.90	19.00		5.82	
107318	02-Feb-2006 13:40:00	0791401	0.01	34.00			<0.001000			23.00	8.00		<0.004000	
107318	04-Mar-2010 11:35:00	0791401	12.00				0.71				498.00		25.00	6.70
107318	04-Mar-2010 11:45:00	0791401	0.01	91.70	6.60		<0.001100			22.60	14.00		0.05	8.00
107318	17-May-2010 11:10:00	0791401	4.20				0.16				57.00		3.80	6.90
107318	17-May-2010 11:47:00	0791401	<0.06000	91.30	7.20		<0.01100			17.90	12.00		<0.1100	8.10
107319	07-Nov-2003 10:03:00	0791401	<0.01000	7.40			<0.002000	32.30		16.70			<0.02000	
107319	28-Jan-2004 13:23:00	0791401	<0.01000		6.80		<0.002000	36.30		22.20			0.03	8.90
107319	30-Jan-2004 12:50:00	0791401	<0.01000	89.90	6.40		<0.002000	32.60		22.60			<0.02000	
107319	02-Feb-2006 13:37:00	0791401	0.01	73.80			<0.001000			22.90	6.00		0.01	
107319	04-Mar-2010 12:10:00	0791401	<0.001100	107.60	7.60		<0.001100			23.50	7.00		<0.004200	8.10
107319	17-May-2010 11:21:00	0791401	<0.01100	93.70	7.40		<0.003000			17.90	12.00		<0.03000	8.00
107319	31-Aug-2015 09:10:00	0791410	<0.002000				<0.001000				37.00		<0.01000	

107319	05-Apr-2017 08:20:00	0791410	<0.002000				<0.001000				39.00		<0.01000	
107732	30-Jan-2004 12:34:00	0791401	0.07	86.70	8.40		0.00	0.10		17.80			0.05	
107733	30-Jan-2004 12:40:00	0791401	13.60	87.30	8.00		0.68	0.10		19.60			5.16	
107733	31-Aug-2015 09:00:00	0791410	0.02				<0.001000				27.00		0.02	
107733	05-Apr-2017 08:00:00	0791410	0.00				0.00				9.00		0.02	
107734	30-Jan-2004 12:37:00	0791401	18.50				1.20						8.01	
107734	31-Aug-2015 09:05:00	0791410	0.62				0.03				10.00		0.88	
107734	05-Apr-2017 08:10:00	0791410	0.00				0.00				10.00		0.01	
107735	30-Jan-2004 12:45:00	0791401	0.01	90.50	6.50		<0.002000	31.90		22.40			0.04	
107735	31-Aug-2015 09:25:00	0791410	0.00				<0.001000				29.00		<0.01000	
107735	20-Jun-2018 12:50:00	0791410	0.02	94.80		8.40	0.00		21.30	14.70	39.00	20.00	<0.01000	
310388	31-Aug-2015 09:15:00	0791410	0.84				0.01				4.00		0.86	
310388	05-Apr-2017 08:30:00	0791410	0.46				0.02				5.00		0.62	
310389	31-Aug-2015 09:20:00	0791410	0.01				0.00				20.00		0.02	
310389	05-Apr-2017 08:40:00	0791410	0.02				0.00				62.00		0.02	
310389	20-Jun-2018 12:45:00	0791410	0.02	94.70		9.70	0.00		0.00	14.30	36.00	120.00	0.02	
319833	20-Jun-2018 13:05:00	0791410	2.10	96.80		10.10	0.07		0.00	13.30	38.00	33.00	1.20	
319834	20-Jun-2018 13:00:00	0791410	0.03	93.00		8.00	0.01		25.80	14.80	83.00	50.00	0.03	
319836	20-Jun-2018 12:55:00	0791410	0.24	92.30		8.30	0.02		18.90	14.70	78.00	60.00	0.11	

Appendix PSW3

Northland Regional Council consent compliance water quality monitoring locations

Figure: Aerial image of Doug's Opua Boatyard and the nearby CMA. Yellow circles show locations where Northland Regional Council have collected water samples over multiple years for consent compliance monitoring relating to the stormwater discharge from Doug's Opua Boatyard into the CMA.

Appendix PSW4

Summary of Northland Regional Council consent compliance monitoring water quality results

Figure 1: Total copper concentrations in samples collected by Northland Regional Council for consent compliance monitoring relating to the stormwater discharge from Doug's Opua Boatyard into the CMA. The dashed, horizontal line denotes the ANZECC water quality guideline value (0.0013 g/m^3), which is also the consent requirement at the 10m mixing boundary. Note the difference scale on the y-axis for each plot.

Figure 2: Total zinc concentrations in samples collected by Northland Regional Council for consent compliance monitoring relating to the stormwater discharge from Doug's Opua Boatyard into the CMA. The dashed, horizontal line denotes the ANZECC water quality guideline value (0.015 g/m^3), which is also the consent requirement at the 10m mixing boundary. Note the difference scale on the y-axis for each plot.

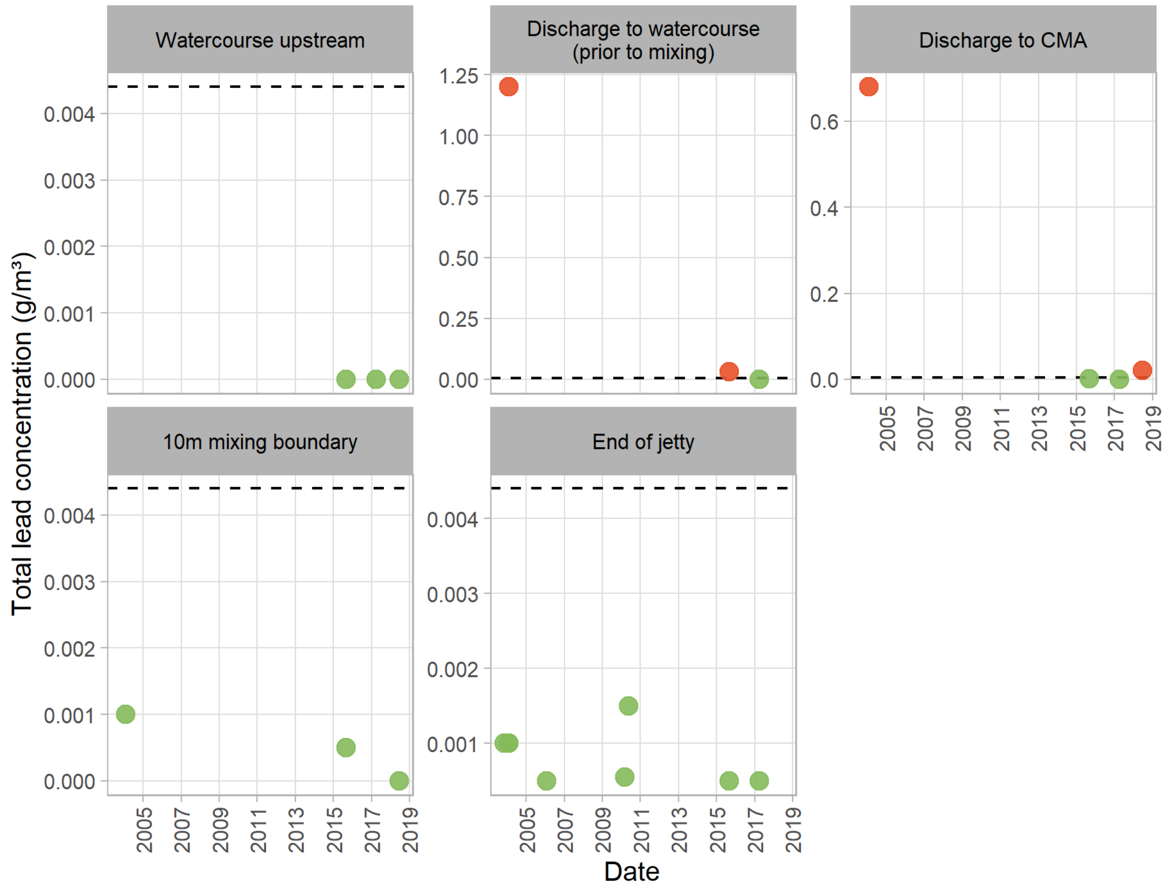

Figure 3: Total lead concentrations in samples collected by Northland Regional Council for consent compliance monitoring relating to the stormwater discharge from Doug's Opua Boatyard into the CMA. The dashed, horizontal line denotes the ANZECC water quality guideline value (0.0044 g/m^3), which is also the consent requirement at the 10m mixing boundary. Note the difference scale on the y-axis for each plot.

Appendix PSW5

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1 : 300 @A3

0 6 12 m

AA3213 — Doug's Opua Boatyard

Sediment metal concentrations near slipway (1998)

Prepared for Doug's Opua Boatyard by 4Sight Consulting

Default Guideline Value (DGV)

- Concentration < DGV
- DGV < Concentration < DGV-high
- Concentration > DGV-high

Concentrations in mg/kg dry weight

Date: 13/07/2020
Version: 1.1
Author: PW
Checked: MP
Approved: ML

4SIGHT CONSULTING