5. Assessment of Effects

5.1 Introduction

This section is an assessment of the actual and potential effects on the environment of the proposal. The assessment is supported by a full range of technical reports prepared by suitably qualified and experienced experts included as appendices to the AEE.

5.2 Cultural effects

5.2.1 General

This section presents the current understanding of cultural values and issues of significance to mana whenua in respect of the Project. It draws from engagement with mana whenua, specifically Patuharakeke, Te Parawhau, and Te iwi o Ngātiwai.[51]

Relevant source documents that have assisted the assessment below are:

- Patuharakeke Hapu Environmental Management Plan (2016).
- Patuharakeke Cultural Values Assessment Report (January 2019)
- Patuharakeke 'Interim Cultural Effects Assessment' (2021).
- Te Parawhau Hapu Iwi 'Mana Whenua Cultural Report' (2021) (incomplete draft).
- Te Iwi o Ngatiwai Iwi Environmental Policy Document 2007, and
- Te Uriroroi Hapu Environmental Management Plan Whatitiri Hapu Environmental Plan 2016.

5.2.2 Existing environment

It is recognised that Māori have a different perspective of what constitutes the "existing environment" to that established through caselaw under the RMA.[52] More specifically, rather than assessing the effects on the environment as it exists today, the environment for Māori extends back to the environment that existed prior to Pākehā settlement and port and other developments at Poupouwhenua. This fundamentally different approach results in fundamentally different conclusions on the scale of effects.

5.2.3 Sustainable management

Patuharakeke have, in the CEA (2021), considered and expressed the potential effects of the project in terms of the following pillars of sustainable management under the RMA:

- Environment
- Culture

[51] See Section 7 of this AEE for a summary of the engagement with mana whenua.
[52] *Queenstown Lakes District Council v Hawthorn Ltd* [2006] NZRMA 424.

- Economic
- Social

The following assessment adopts the same approach and summarises the impacts and/or issues under each of these pillars.

5.2.4 Environmental effects

The Patuharakeke CEA (see **Appendix 24**) addresses the potential environmental effects of the proposal under the following topics:

- Marine ecology
- Avifauna
- Marine mammals
- Air discharges
- Climate change
- Coastal processes

The CEA raises concerns over the actual and potential effects of the proposed reclamation, dredging, and future port operations on marine ecology, taonga species and their habitats in the context of the Māori view of the existing environment (past, present, and future). It is noted that the concerns were raised prior to many of the proposed avoidance, mitigation, and enhancement measures being finalised, particularly in relation to avifauna and marine mammals.

Regarding marine mammals, there is a general concern about the cumulative impacts on marine mammal taonga. As suggested in the report, the role of kaitiaki in protecting this taonga requires further refinement.

The impacts of climate change are raised in the CEA, including risks to ecosystems, and threats to Māori culture and well-being. The concerns do not appear to be specific to Northport activities, except in relation to emissions from combustion engines.

The CEA also refers to the 'Patuharakeke Draft Hapu Strategic Plan' and questions whether the proposed port expansion aligns with the goals and measures of that document.

5.2.5 Cultural effects

The Patuharakeke CEA addresses cultural effects under the following sub-topics:

- Cultural landscapes and seascapes
- Loss of Takutai Moana
- Mauri

- Mana
- Kaitiakitanga

The CEA raises concerns over the impacts of the expansion in terms of cultural landscapes, seascapes, and customary access and rights to the Takutai Moana. Other potential impacts raised in the report include:

- Effects on Patuharakeketanga, ahurea as the port development will not provide for te reo Māori me ōna tikanga, and cultural and spiritual wellbeing.
- Erosion of the mauri of the harbour resulting from the proposed dredging, and subsequent effects on kaitiakitanga, mātauranga Māori, and mana.

Consistent with the Māori view of the existing environment, these effects span the past, present, and future.

Additional concerns have been raised in respect to the impacts on applications for CMT under the MACA. It is noted in this respect that all applicant groups seeking grant of CMT in the area likely to be impacted by the proposal have been notified and their views sought.

5.2.6 Economic effects

While acknowledging the potential benefits of the port expansion to the local and regional economy, the Patuharakeke CEA expresses concern over past negative economic impacts on hapū through the loss of land, loss of resources, and impacts on low-income families (e.g. inability to supplement weekly kai budget with kaimoana). While this concern is acknowledged, it is extremely difficult to quantify these impacts in the context of a proposed port expansion. However, they provide the backdrop for further discussion and potential mitigation.

The CEA expresses concern over the boom-and-bust nature of past employment generating industry in the area. This is interpreted as a likely reference to the recently decommissioned Marsden Point Oil Refinery. Conversely, ports are not typically boom/bust type developments, and have much greater longevity given their more sustainable role in facilitating long-term inter-regional and international trade.

Citing the 'Patuharakeke Draft Hapu Strategic Plan' the CEA questions whether the proposed port expansion aligns with the goals and measures of that document.

Northport reiterates its commitment to working with mana whenua to explore pathways for training, education, and employment in response to the issues raised in the CEA.

5.2.7 Social hauora/health effects

Patuharakeke have expressed concern over the growth that has occurred in their rohe without holistic infrastructure planning and future proofing. They see the construction of Northport and SH15 as having enabled growth which has increased pressure on natural resources, without improving the social, economic, and cultural well-being of Patuharakeke. Specific concerns include:

- There is a general feeling that development has alienated the local people from the harbour and its resources.
- Air and noise emissions have impacted on the experiential qualities of the cultural landscape at Poupouwhenua.
- The inability of the Ruakaka Wastewater Treatment Plant to cope with the growth has resulted in a resource consent for an ocean outfall.
- Local roads and the highway are less safe for the community.

The general view expressed in the Patuharakeke CEA is that the expansion of Northport will exacerbate these impacts.

Referring to the Draft Hapu Strategic Plan, and in particular Pou Hauora (Whānau health pillar), Pou Mātauranga (Education), and Pou Tai Tamariki-tanga (Succession), the CEA considers these are all affected by the social impacts of the proposal.

5.2.8 Measures to address cultural effects

Consultation with mana whenua to date has raised a number of issues. Some of these remain unresolved the time of lodgement. However, Northport is committed to continuing to directly and meaningfully engage with mana whenua to understand, and where possible address, these issues post -lodgement.

Measures to address some of the effects identified in the Patuharakeke CEA are summarised in **Table 12** below.

Table 12: *Summary of project measures relevant to cultural effects*

Effect	Response
Marine mammals	Construction ▪ Potential involvement of mana whenua in effects management, particularly during construction. Construction and operation ▪ Approval and implementation of a Marine Mammal Management Plan (MMMP), including measures to minimise underwater noise and ship strike.
Avifauna	Construction ▪ Approval and implementation of avifauna effects management measures contained in the CEMP. Construction and operation ▪ Provision of additional roosting area for VOC.

Traffic	Construction ▪ Approval and implementation of a construction management plan. Operation ▪ Monitoring of port traffic and potential future upgrades of SH15/local road intersections.
Coastal access	▪ Public park/reserve development and associated access.
Stormwater discharges/water quality	Construction & dredging ▪ Approval and implementation of a dredge management plan(s). ▪ Sedimentation avoidance measures during construction. Operation ▪ Compliance with water quality discharge conditions of consent designed to maintain water quality in the harbour receiving waters. ▪ On-port mitigation.
Noise (construction and operation)	Construction ▪ Approval and implementation of a construction management plan addressing inter alia potential construction noise. Port operations ▪ Port Noise Management Plan. ▪ Mechanical ventilation for affected properties.
Air quality	Construction ▪ Compliance with conditions of consent, including management plan(s). Operation ▪ General commitment to reducing emissions from combustion engines where practicable.
Archaeology	▪ Adherence to accidental discovery protocol.

It is expected that there will be conditions to mitigate cultural effects in addition to those identified in **Table 12** above. However, this will require further consultation and collaboration between Northport and iwi/hapū post lodgement.

5.3 Coastal processes

5.3.1 General

Potential effects (including cumulative effects) on coastal processes from the construction of the expanded port have been assessed by T+T with technical support from MO. The conclusions from this assessment are summarised below. Further detail is provided in the T+T report in **Appendix 10.**

5.3.2 Reclamation and seawalls

The reclamation and seawalls will be built using a combination of land-based equipment and barge mounted equipment. The potential effects of construction will be the diversion of tidal currents and waves due to the location of the completed structures, the occupation of the seabed, and the increase in suspended sediment plumes during the construction of the seawalls. Provided the rocks used are relatively free from dirt and contaminants, the likelihood of any significant sediment plume extending beyond the port development boundary is low**.** Accordingly, T+T concludes that construction effects on physical coastal processes outside the port area for the reclamation and seawalls will be **negligible.**

5.3.3 Dredging

The sediment to be dredged is fine silty sand, similar to the general seabed morphology in the inlet and lower harbour areas. Based on an analysis of sediment chemistry from previous investigations, dredged sediment is clean with most potential contaminant levels either below detection or within the lower range of acceptable guidance criteria.

Modelling by MOS (2022c) shows that mean total sediment concentrations will follow the main channel. There is more sediment concentration evident with the TSHD than either the cutter suction dredge or backhoe dredge. From a coastal process perspective, the main impact of these sediment concentrations is the accretion that may occur in these areas.

The release of sediment during dredging is largely limited to the dredge footprint and along the main channel immediately to the west of the dredging areas. Deposition within the dredging footprint will be addressed by the dredging plant in achieving the required dredge levels. T+T predicts that any sedimentation to the west is likely to return to the dredged area over time, to be recovered during maintenance dredging campaigns.

Observations from previous dredging campaigns, including the original port construction and maintenance dredging carried out in 2018 shows significantly lower values of suspended solids than predicted by the numerical modelling.

Overall, T+T conclude that dredging effects on physical coastal processes outside the port area will be **minor.**

5.3.4 Waves

Northport is sheltered from the larger waves in Bream Bay. However, the proposed reclamation extends seaward to be closer to the inlet entrance and is likely to slightly increase wave turbulence during extreme events due to the more reflective surface of the port reclamation.

T+T state that while the predicted changes in wave heights during high energy events have the potential to locally increase erosion and scour of the beach and inter tidal area between the port and the CINZL jetty, the related effects will be **minor.**

5.3.5 Currents and sediment transport

MO modelling (see **Figure 66** below) shows a reduction in tidal currents along the intertidal and side channel extents between the port and the CINZL jetty of 0.6m/s immediately east of the reclamation, reducing towards the east along the port frontage. The modelling also shows some slight increases of around 0.2m/s within the base of the channel adjacent to the seaward edge of the reclamation, a small increase in currents towards Marsden Bay, but no significant change to the east of the CINZL jetty. Within the port basin area changes in peak currents are less than 0.5m/s.

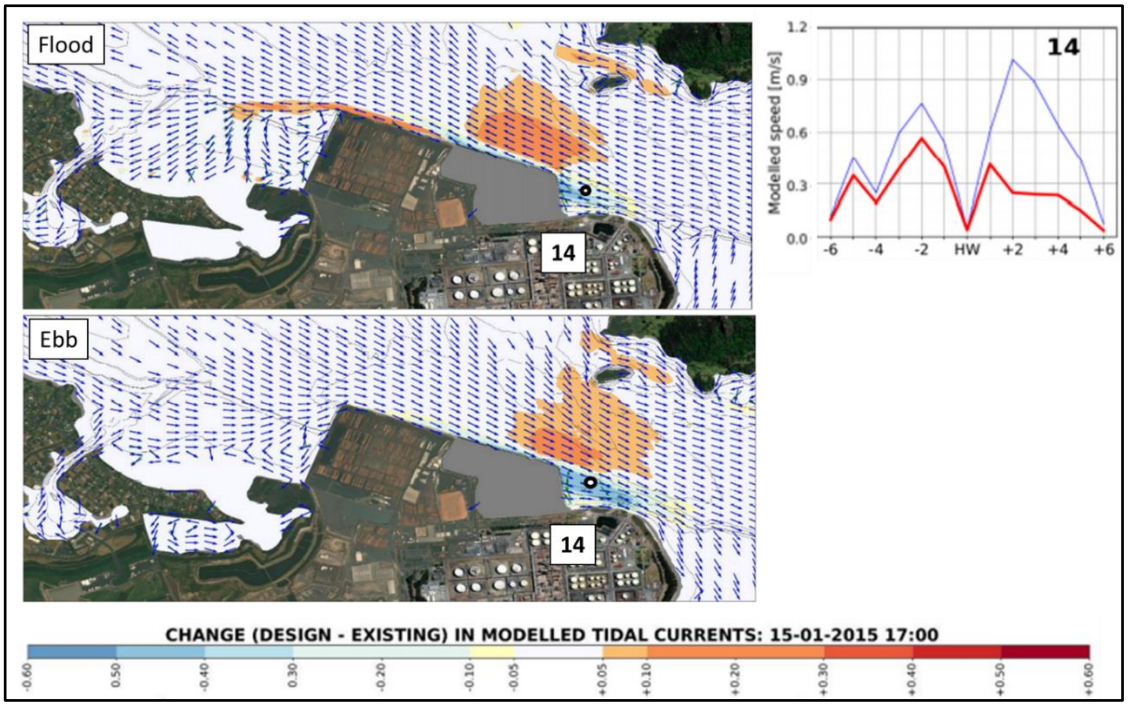

***Figure 66**: Difference in peak tidal currents (flood and ebb)*

The reduction in currents to the immediate east of the reclamation is predicted to affect sediment transport patterns in this area as the reduced currents are likely to support sedimentation. Specifically, the MO modelling shows an area of slight accretion at the eastern edge of the reclamation and along the edge of the main channel, but no significant morphological change.

Based on the predicted morphological response, T+T concludes that the reduction in current velocity that extends towards the CINZL jetty may enable accumulation on the upper banks of the channel, in the port mooring area, and in other areas between Northport and the CINZL jetty. No significant sediment transport change is observed further to the east of the CINZL jetty. Northport will continue to engage with CINZL to ensure that sedimentation is appropriately managed, including by undertaking maintenance dredging as required.

5.3.6 Water level

Based on MO studies and the relatively small area of reclamation relative to the harbour area, there will be no measurable change to the water levels within the harbour and the effects will therefore be **negligible.**

5.3.7 Expected changes to the inner harbour

MO modelling indicates that there will be no morphodynamic change to the inner harbour west of Marsden Bay. T+T conclude that the associated effects will be **negligible.**

5.3.8 Expected changes along the entrance channel

The entrance channel area[53] is relatively sheltered from waves generated in Bream Bay. This, together with the small fetches in this area, means that the potential for locally wind generated waves is low. MO modelling shows some changes to tidal currents, with reductions along the southern edge of the channel. T+T concludes that while this could result in accretion along the southern edge of the channel, the overall effects are expected to be **minor.**

5.3.9 Expected changes to the ebb tide shoal and Mair Bank

The ebb tide shoal is a large, stable, medium to fine sandy feature formed by tidal currents and waves. Mair Bank is a coarse sand and shelly/gravel feature within the intertidal and sub-aerial part of the shoal that has a large biological component (pipi and mussels). The upper parts of the shoal and Mair Bank are more dynamic features that can vary in horizontal elevation by ± 0.5 m and vertical position by ± 2.0 m from year to year responding to higher energy wave events.

The MO velocity and morphodynamic studies shows small changes in tidal currents, with reduced currents along the southern edge of the channel. T+T considers that while this could result in accretion along the southern edge of the channel, it may occur as a small one-off adjustment, with a new equilibrium restored after conditions stabilise. Accordingly, T+T conclude that the overall effects are expected to be **minor.**

[53] This area includes the small bays along the rocky coast from Mount Aubrey to Home Point including Calliope Bank, Urquarts Bay and Taurikura.

5.3.10 Expected changes to the open coast shoreline

The results of the MO velocity and morphodynamic studies suggest no change in the physical processes to the east of the CINZL jetty. Therefore, T+T concludes that the expected effects of the proposed expansion on the open coastline will be **negligible.**

5.3.11 Expected effects on existing and future coastal hazards

The sandy shoreline along the northern part of Bream Bay and within the Whangarei Harbour are susceptible to coastal erosion and are likely to experience greater erosion pressure as a result of sea level rise and climate change effects. The main driver for change will be increased sea levels that allow higher waves to reach the nearshore environment for all wave conditions.

Increased sea level will reduce the effect of the proposed dredging on wave processes as the greater water depth will reduce nearshore processes. The potential for increased tidal flow from the harbour will not be affected by the proposal as the throat of the inlet will not be modified and it is this area that controls the tidal flows.

The proposal is expected to have a minor effect on tidal flows in the present day, and T+T concludes that the effects on existing and future coastal hazards are expected to remain **minor**.

5.3.12 Tsunami

The existing harbour area is vulnerable both to distant and local tsunami sources. The high velocities resulting from the tsunami are likely to result in large scale movements within the sandy systems of the nearshore, ebbtide delta, coastline, and inner harbour.

No tsunami wave modelling has been carried out as the narrowest part of the inlet throat will not be modified by the proposal. Accordingly, T+T concludes that the proposed expansion is unlikely to change the large-scale effects of tsunami on the wider environment.

5.3.13 Effects of proposed bird roost

Short term

The construction activity associated with the proposed bird roost will have negligible effects on coastal processes.

Long term

The inclusion of sand and the ongoing top-ups will have a beneficial effect on coastal processes by increasing the sediment budget within Marsden Bay. This offsets, to some degree, sea level rise effects, and potentially reduces the overwash and landward retreat of the existing barrier beach. The sheltering provided by the roost is also likely to enable the renewal of the mangrove stand that has currently eroded due to the landward migration of the barrier beach.

The sheltering effect may also result in some shoreline adjustment of the existing barrier beach, but these changes are likely to be negligible.

Overall, T+ T consider that the effects of the proposed bird roost on coastal processes will be **beneficial** due to the re-introduction of sediment to the western end of Marsden Bay and the sheltering of the existing barrier beach, reducing the observed landward migration of this feature.

5.3.14 Long term monitoring

T+T recommends monitoring of the areas within Marsden Bay and along the shoreline from the port to the CINZL jetty and Mair Bank. Much of these areas are already subject to hydrographic survey (including beach profiling), and this should continue in order to provide a comprehensive topographic and bathymetric dataset. Surveys should be carried out after completion of each stage of the development and at least annually for a period of not less than five years.

T+T advise that monitoring elevation changes (if any) in seabed and shoreline in these areas is the most useful form of long-term monitoring combined with ongoing measurement of waves and water level at the Wave Rider Buoy so that changes in shoreline and seabed elevations can be assessed together with changes in wave energy and water level fluctuations. Sediment sampling and analysis of surficial sediments within the eastern end of Marsden Bank could also be carried out to confirm any change in sediment properties that may potentially affect ecology in this area.

T+T notes that while it is anticipated that the turning area will need to be infrequently dredged as part of the port operations, this area is already subject to annual survey.

T+T recommends that pre and post dredging surveys should be retained by the consent holder in a compatible format to augment this dataset and information on the volumes and locations of deposition of both the capital and maintenance dredging recorded.

5.3.15 Overall effects conclusions

T+T concludes that effects on coastal processes for the eastern reclamation will be moderate, largely due to the occupation of the seabed within the reclamation footprint affecting coastal processes within this footprint as well as changes to currents, waves, and sediment transport patterns along the eastern side of the inlet channel. Excluding the effect of the occupation of the eastern reclamation, the remaining effects on coastal processes are **minor**.

5.4 Landscape values

5.4.1 General

Potential effects (including cumulative effects) on landscape values from the construction, maintenance and operation of the expanded port have been assessed by BNZL. The conclusions from this assessment are summarised below. Further detail is provided in the BNZL report in **Appendix 15.**

5.4.2 Impact ratings scale

The impact ratings used in the BNZL assessment (and in the AEE) are based on NZILA guidelines (described in **Table 13** below). These descriptors do not use RMA terminology, but they can be converted where this is needed to address key provisions of the RMA and associated planning documents.

Table 13: *Impact ratings scale*

Impact (effect)	Description
Very low	The proposed wharf extension(s) would be largely screened from view or 'lost' within its wider coastal landscape setting, and would have little or no impact on its character and values.
Low	A small part of the wharf extension(s)and/or some dredging activity would be discernible, but it / they would remain a minor, to very minor, component of the Whangarei Harbour landscape and environment. It / they would have a very limited impact on the character and related values of that wider setting.
Low-moderate	The proposed wharf extension(s) and/or dredging would constitute a discernible component of the harbour landscape and would change the profile of the existing port, but such awareness would not have a marked effect on the overall character and values of the landscape and coastal environment of Whangarei Harbour.
Moderate	The wharf extension (s) would be a clearly discernible component of the harbour landscape, resulting in changes to its composition and character. However, the harbour's values and identity would remain substantially intact.
Moderate-High	The wharf extension(s) and/or dredging would result in significant changes to the harbour landscape and environment, affecting its character / composition and values to an appreciable degree.
High	The wharf extension(s) and/or dredging would become a dominant feature within outer Whangarei Harbour, adversely affecting its character and values to a significant degree.
Very High	The wharf extension(s) / and /or dredging would be so dominant that it / they fundamentally change the nature of the landscape and coastal environment near Marsden Point, seriously degrading both the values and identity of the wider harbour.

Given the importance of the RMA effects terminology for interpreting some of the provisions in the PRP, the RMA terminology is shown in bold and brackets alongside the NZILA terminology in the assessment below.

5.4.3 Landscape effects on Marsden Point Beach

The beach to the immediate east of Northport, including its dune fringe and inter-tidal area, are large enough to register as a landscape within the wider Marsden Point coastline. Despite adjoining industrial development on three sides, it remains distinctive, different, and largely intact. It also has a clear sense of association with both Whangarei Harbour and the Whangarei Heads, and it is of significance to Patuharakeke.

The beach will be substantially diminished by the proposed expansion. The landscape effects associated with the loss of approximately two-thirds of the 'beach' are considered to be high **(significant)** albeit localised to the area within and immediately around the beach.

5.4.4 Landscape effects experienced from Reotahi

Reotahi will be the residential area most impacted by the proposed expansion. Specifically, the expansion will infill most of Marsden Point Bay, while the associated Ship to Shore (STS) Cranes, container stacks and other elevated structures will significantly change the visual profile of the port.

The proposed changes will be fully exposed to much of the suburban and beachside development at Reotahi. The STS Cranes will become signature features of the Marsden Point skyline when viewed from this area. Together with realignment of the shoreline in front of Marsden Point Beach and the extended lines of ship berths, the proposed expansion would therefore bring the Port perceptibly closer to Reotahi.

Notwithstanding the relative exposure to the proposed expansion, Reotahi is already exposed to the largely industrial nature of the Marsden Point landscape. This limits the degree to which the proposal will modify the fundamental character and values of the harbour. Despite Berth 4 and the proposed expansion being clearly visible from a range of vantage points around Reotahi, increasing the profile and heightening the skyline of the current industrial landscape will not greatly alter the nature of most views across the harbour to Marsden Point.

Considering the existing landscape context described above, the cumulative landscape effects of the proposed expansion (together with Berth 4) from Reotahi viewpoints have been assessed as moderate-high **(more than minor).**

5.4.5 Landscape effects experienced from the Harbour

When viewed from the Whangarei Harbour, the proposed expansion would largely merge with the existing Northport berths and associated shipping, and the CINZL facility (including its own jetty, berths, and shipping).

When viewed from near the harbour entrance the proposed expansion will be clearly visible, displacing most of Marsden Point Beach and its bay area.

Notwithstanding the above, the overall context for views of Marsden Point Beach from the harbour is against a coastal landscape that is already dominated by shipping, jetties, berths, oil tanks,

CINZL facility stacks, log piles, other industrial paraphernalia, and a range of maritime activities. Although boaties and those working on vessels that pass close to the current port would clearly see more of the proposed reclamation, the loss of most of Marsden Point Beach and bay will do little to change the perception of this highly developed and, for the most part, industrialised, part of Whangarei Harbour's coastline.

On balance, the landscape effects associated with mid-harbour views towards Marsden Point Beach have been assessed as moderate **(more than minor)**.

5.4.6 Landscape effects from elsewhere

When viewed from elsewhere, the effects of the proposed expansion will be limited. The main effect of the expansion will be to heighten the skyline profile of the port, with the introduction of the STS and Gantry Cranes, taller container stacks and the reefer towers. This will be exacerbated at night-time by lighting on the STS Cranes as well as on the new light towers. These effects will typically be secondary to those associated with the current port, but still discernible, including for:

- Parts of SH15
- The Albany Road Beachfront
- The Marsden Cove Canal Entrance
- Taurikura Bay

The landscape effects on the majority of locations (other than Reotahi) will be low to very low **(less than minor).**

5.4.7 Effects on ONLAs & ONFs

The expanded port will remain some distance from most of the ONLAs ONFs at Whangarei Heads. Although the proposed expansion would affect perceptions of these key landscapes and features when viewed from south of the harbour (primarily around Marsden Bay and One Tree Point), the expanded port is expected to have only a limited effect on public perception of the ONLAs and ONFs. They would continue to frame the harbour, whilst remaining quite separate from those coastal margins more directly associated with the existing port and CINZL facility on the near side of the harbour. As a result, the effects on the ONLAs and ONFs of the proposed expansion, including cumulative with Berth, will be low **(minor or less)**, and consistent with Policy 15(a) and (b) of the NZCPS.

5.4.8 Overall effects conclusions

The BNZL conclusions in respect to landscape effects are summarised in **Table 14** below.

***Table 14**: Summary of potential landscape effects*

Viewpoints/areas	Magnitude of effects
Marsden Point Beach	High (but localised to the area within and immediately around the beach) (significant)
Reotahi	Moderate (more than minor)
Whangarei Harbour	Moderate-High (more than minor)
Elsewhere	Low to very low (less than minor)
ONLAs & ONFs	Low (minor or less than minor)

5.5 Natural character

5.5.1 General

Potential effects (including cumulative effects) on natural character from the construction, maintenance and operation of the expanded port have been assessed by BNZL. The conclusions from this assessment are summarised below. Further detail is provided in the BNZL report in **Appendix 15.**

5.5.2 Impact ratings scale

The impact rating scale used for describing the magnitude of effects on natural character is the same as for landscape effects (see **Table 13** in Section 5.4.2).

5.5.3 Effects on natural character

Unlike the more remote coastline from Busby Head through to Bream Head, nearly every view towards Marsden Point and Northport is contextualised by human activities and developments.

While the proposed expansion will exacerbate the existing interplay between the more developed and natural parts of the harbour, it will not fundamentally alter the nature or extent of this interplay. The expansion will concentrate new maritime development where natural character has already been significantly impacted, and natural character values have been eroded.

Although the character and values of Marsden Point Beach would be appreciably changed by the proposed expansion, this will not alter the natural character values of the wider Marsden Point coastline to a commensurate degree.

While locations such as Marsden Bay and Reotahi will be exposed to the new extensions to a greater degree than most other harbour-side settlement and public vantage points, the related level of change to the natural character values of the harbour for those viewing areas will remain limited, at or below a moderate level **(more than minor),** and not 'significant' with reference to Policy 13(1)(b) of the NZCPS.

5.5.4 Effects on High and Outstanding Natural Character Areas

There are Outstanding and High Natural Character areas near the proposed expansion, including McDonald, Calliope and Mair Banks, the inshore area west of One Tree Point, the coastal margins of Mt Aubrey, and the intertidal area of Blacksmiths Creek. However, the proposed expansion will avoid all these areas, instead being located within a part of the Whangarei Harbour that is already strongly linked to both the current Port and the CINZL facilities.

5.5.5 Overall effects conclusions

While locations such as Marsden Bay and Reotahi will be exposed to the proposed expansion to a greater degree than most other harbour-side settlement and public vantage points, BNZL consider that the related level of change to the natural character values of the harbour for these viewing areas will remain at or below a **moderate** level **(more than minor)** and not 'significant' with reference to NZCPS Policy 13(1)(b). This reflects the existing nature of Marsden Point, the way in which existing development (housing, roading, etc) frames views towards the existing port, and the wider balance between natural and cultural elements apparent within and around the Whangarei Harbour as a whole.

5.6 Amenity values

5.6.1 General

Potential effects (including cumulative effects) on amenity values from the construction, maintenance and operation of the expanded port have been assessed by BNZL. The conclusions from this assessment are summarised below. Further detail is provided in the BNZL report in **Appendix 15.**

5.6.2 Impact ratings scale

The impact rating scale used for describing the magnitude of effects on amenity values is the same as for landscape and amenity effects (see **Table 13** in Section 5.4.2).

5.6.3 Effects on amenity values at Marsden Point Beach

The extent of development on Marsden Point Beach will appreciably diminish the recreational utility and appeal of the beach and bay. Furthermore, Patuharakeke will lose a key component of the ceremonial way and access to *Poupouwhenua Mataitai* at the distal end of the Marsden Point spit.

Overall, the effects of the proposed expansion on the amenity values of the eastern beach are assessed as moderate-high (**significant**).

5.6.4 Effects on amenity values at Reotahi

Reotahi will be exposed to the eastern reclamation, including new berths and shipping, new cranes, container and cargo areas, lighting, and other port activities. The port will appear more visually imposing than at present, while lighting on the STS cranes, gantry cranes and new light towers will change/expand the port profile at night-time.

Potential effects on amenity values at Reotahi and Taurikura will be contextualised by both the current port and CINZL facility, as well as by the coastal settlements and residential areas that frame most views across, and up and down, the harbour. More specifically, the CINZL facility is an industrial backdrop to the proposed expansion area, while related port activities are already part the current landscape.

Overall, the effects of the proposed expansion on the amenity values for Reotahi will be moderate-high (**more than minor**).

5.6.5 Effects on amenity values of the wider harbour

Given the existing context of port and other industrial activities, the proposed expansion, together with Berth 4) is expected to make little difference to the wider character and amenity values of the Whangarei Harbour or the identity of nearby parts of the harbour, including the various settlements of Whangarei Heads and Marsden Bay.

Overall, the effects of the proposed expansion on the amenity values of the wider harbour range between low and very low (**less than minor**).

5.6.6 Overall effects conclusions

Marsden Bay, Reotahi, and Marsden Point Beach will be subject to the highest levels of effects on amenity values. Overall, BNZL consider that the amenity effects of the proposed expansion on these areas will be moderate-high **(more than minor)** but contextualised by both the current Port and CINZL facility, and coastal settlements in residential areas that frame most views across, and up and down the harbour. The effects on amenity values for other areas range between very low **(less than minor)** and low-moderate **(minor).**

5.7 Marine ecology

5.7.1 General

Potential effects (including cumulative effects) on marine ecology from the construction, maintenance and operation of the expanded port have been assessed by Coast and Catchment (C+C). The conclusions from this assessment are summarised below. Further detail is provided in the C+C report in **Appendix 11.**

The C+C report has been peer reviewed by Cawthron Institute, who have confirmed that the C+C report covers a suitable range of ecological receptors; that the spatial scale is appropriate; and that the assessment is founded upon a suitable coverage of historical and recent survey data. A letter from Cawthron Institute summarising the recommendations from the peer review is attached as **Appendix 12**.

5.7.2 Assessment context

Policy D.2.18 of the PRP directs that when assessing the potential adverse effects of activities on identified values of indigenous biodiversity a system-wide approach to large areas of indigenous biodiversity should be employed, recognising that the scale of the effect of an activity is proportional to the size and sensitivity of the area of indigenous biodiversity. In essence, this approach avoids micro-level assessment of effects with no cognisance of relevant scale and magnitude.

Marine ecology is complex, inter-related, and multi-faceted. Therefore, there is no single system or scale that is appropriate for all aspects. Therefore, in terms of achieving sustainable management and in the context of Policy D.2.18, C+C consider the appropriate scales for assessment of effects on different aspects of marine ecology to be as set out in **Table 15** below.

Table 15: *Relevant system for assessing effects on components of marine ecology*

Potential effects	Relevant system
Benthic habitats and macrofauna	Harbour
Kaimoana shellfish	Harbour
Subtidal habitat and benthic macrofauna (Reclamation)	OHEZ (Outer Harbour Ecological Zone)
Subtidal habitat and benthic macrofauna (Dredging)	OHEZ
Seagrass (dredging)	Harbour
Macroalgae (seaweeds)	OHEZ

Fish	Harbour
Reef habitat and biota	Harbour
Stormwater discharges	Beyond the mixing zone

Notwithstanding this, C+C have considered the effects of the proposal on marine ecology at three scales, being the footprint, OHEZ and harbour-wide scales for completeness.

5.7.3 Actual and potential effects identification

The actual and potential effects of the proposed reclamation, dredging and stormwater discharges are identified broadly as follows:

- Loss of marine habitat and biota living within the reclamation footprints, with associated effects on related values, including ecological biodiversity, productivity, and other environmental services.
- Indirect effects arising from alteration to currents, wave and/or sedimentation patterns.
- The effects of sediment suspension, dispersal, and deposition beyond dredged areas.
- Displacement of species that utilise the reclamation areas, but do not permanently live within it.
- Effects associated with hardening the shoreline around reclamations (the proposed reclamation will result in the loss of approximately 375 m of natural shoreline).
- Construction-related effects, associated with establishing temporary staging areas, or having machinery working in the CMA beyond the reclamation footprint.

The C+C report has adopted the EIANZ guideline terminology for assessing the magnitude of marine effects in this report (see **Table 16** below). The report notes that a “Low” EIANZ effect is considered to be a “minor” or “less than minor” effect under the applicable RMA planning/legal framework; and a “Moderate” EIANZ effect is considered to straddle a “minor” and “more than minor” range.

***Table16**: Ranking systems developed by EIANZ for assessing adverse environmental effects*

EIANZ guidelines	
Magnitude	**Description**
Negligible	Very slight change from the existing baseline condition. Change barely distinguishable, approximating to the ‘no change’ situation; AND/OR Having negligible effect on the known population or range of the element/feature.
Low	Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR Having a minor effect on the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature.
High	Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Very high	Total loss of, or very major alteration to, key elements/features/ of the existing baseline conditions, such that the post-development character, composition and/or attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature.

Given the importance of RMA effects terminology for interpreting the indigenous biodiversity policies in the PRP, C+C have confirmed the equivalent RMA terminology in their report for key flora and fauna, and this is also shown in bold and brackets alongside the EIANZ terminology in the assessment below.

5.7.4 Dredging effects

Existing environment

The existing environment within the dredge area can be broadly grouped into three zones based on past dredging activity:

- A shallow area towards the west, that is yet to be dredged, where a mix of sand and shell gravel, scattered red algae, and a variety of species including occasional starfish, sponges, anemones, and infrequent scallops and octopus were observed in the November 2021 video survey.
- The batter slope between that area and the adjoining, previously dredged area, which consisted of bare sand that gave way to a dredged seafloor completely covered with a variety of sessile organisms such as sponges, bryozoans, hydroids and macroalgae.
- Other parts of the previously dredged area which contained a mix of sand, scattered and dense shell, and biogenic species such as red algae and sponges.

Northport holds capital and maintenance dredging consents associated with Berths 1-4.[54] These consents enable dredging to a depth ranging between 13m and 14.5m across the area denoted by the purple pecked line in **Figure 67**. The proposed dredging extent as shown with a red line.

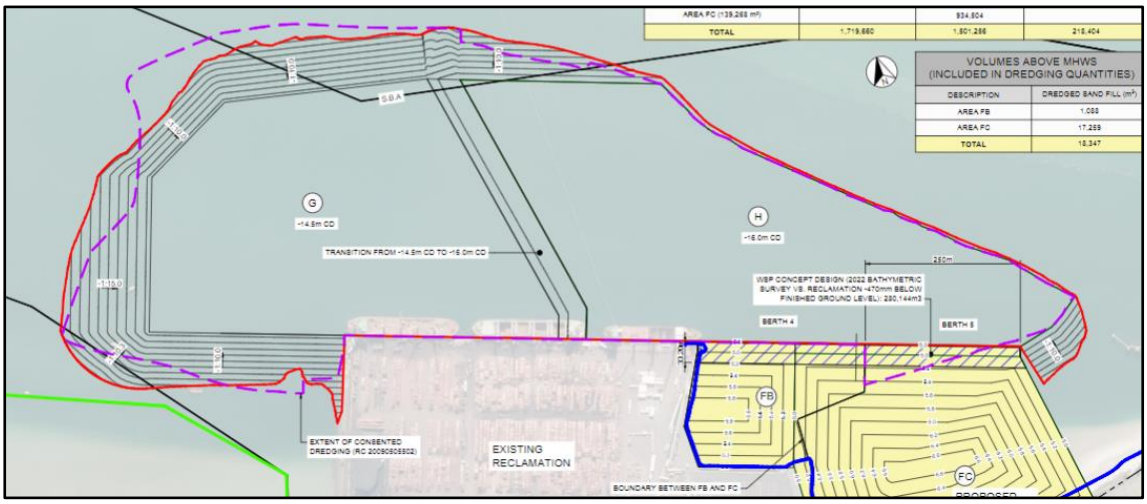

***Figure 67**: Existing consented dredging extent*

[54] CON19960505511 (Berths 1 & 2), CON20030505529 (Berths 3 & 4).

The relevant water quality standards in these consents are as follows:

Berths 1 and 2 – CON20090505502 (capital)

21. Dredging shall be carried out using the appropriate design of cutter head and operation to minimise suspension of sediment into the water column to the extent that:

(i) The visual clarity (as measured using a black disk or Secchi disk) of harbour water shall not be reduced by more than 20% of the median background visual clarity at the time of measurement; and

(ii) There shall be no conspicuous scums or foams, floatable or suspended material in harbour water, as a result of dredging immediately outside of a 400 m radius of the point of dredging.

Berths 1and 2 – CON19960505511 (maintenance)

11. All maintenance dredging, including any operations consequent upon the excavation and transportation of dredged material, shall be carried out in a manner that minimises the suspension of sediment into the water column so that the following standards are met immediately outside of an 800 m radius of the point of dredging:

(i) The visual clarity (as measured using a black disc or Secchi this) of harbour water shall not be reduced by more than 20% of the median background visual clarity at the time of measurement.

(ii) The hue shall not be changed by more than 10 Munsell units of the median background hue at the time of measurement.

(iii) Where Z_{eu} is the euphotic depth, defined as the depth at which photosynthetically available radiation [PAR] is reduced to 1% of the level of surface water, the light penetration in the harbour water deeper than 0.5 Z_{eu} shall not be changed by more than 10% of the median background euphotic depth at the time of measurement. The light penetration in harbour water shallower than 0.5 Z_{eu} shall not be reduced by more than 20% of the median background euphotic depth at the sediment bid, at the time of measurement.

(iv) There shall be no conspicuous scums or foams, floatable or suspended material in the harbour waters.

Berths 3 and 4 – CON20030505522 (capital)

19. Dredging shall be carried out using the appropriate design of cutter head and operation to minimise suspension of sediment into the water column to the extent that:

(i) The visual clarity (as measured using a black disk or Secchi disk) of harbour water shall not be reduced by more than 20% of the median background visual clarity at the time of measurement; and

(ii) There shall be no conspicuous scums or foams, floatable or suspended material in harbour water, as a result of dredging immediately outside of a 400 metre radius of the point of dredging.

Berths 3 and 4 – CON20030505529 (maintenance)

12. All maintenance dredging, including any operations consequent upon the excavation and transportation of dredged material, should be carried out in a manner that minimises the suspension of sediment into the water column so that the following standards are met immediately outside of a 400 m radius of the point of dredging:

(i) The visual clarity (as measured using a black disc or Secchi disc) of harbour water shall not be reduced by more than 20% of the median background visual clarity at the time of measurement.

(ii) There shall be no conspicuous scums or foams, floatable or suspended material in the harbour waters.

The capital dredging consent for Berths 1 and 2 has an area of 9ha that is yet to be dredged. This equates to 641,800m^3 of material (around a third of the proposed dredge volume under the current proposal).

Dredging effects relative to the existing environment

As shown in **Figure 67,** the proposed dredging will largely be limited to an area where dredging has already occurred or is currently consented under CON19960505511 (Berths 1 & 2), and CON20030505529 (Berths 3 & 4). In addition to the slight increase in the dredge footprint, the depth will be increased from 13-14.5m to 14.5 – 16m.

The removal of existing macroalgae and disturbance or removal of substrates they attach to (shell gravel) within the dredging footprint are largely provided for under the existing capital and maintenance dredging consent.

The proposed dredging effects over and above those provided for under the existing consents are as follows:

(1) Minor changes to dredge extent (see **Figure 67**) – on balance, the effects are similar.

(2) Increase in dredge depth (1.5m) potentially changing sediment composition in the swing basin).

(3) Slightly reduced current velocities due to increased depth.

(4) The dredge duration for the proposal (estimated to be approximately 200 days depending on the dredge method) is likely to be longer than the duration of consented capital and maintenance dredging (estimated to be approximately 70 days depending on the dredge method).

The proposed dredging will also include more robust and modern consent conditions (positive effect).

Deepening of the swing basin

If the characteristics of the seabed substrates at the proposed dredging depth are similar to those existing at the currently consented depth, C+C predict that a similar community of benthic macroinvertebrates will reform once the dredging is complete. However, macrofaunal diversity would likely be lower if areas of dense shell were permanently lost.

Sediment plumes

Modelling of sediment dispersal plumes was done for three potential dredging methods: trailing suction hopper dredger (TSHD), cutter suction dredger (CSD), and backhoe dredger (BHD). The models were run for dredges operating continuously from a fixed position for 24 hours a day, 7

days a week, over a 1-month period (Cussioli *et al.*, 2022). That, together with comparisons between previous modelling results and observations from actual dredging campaigns, suggests the modelling was conservative and indicative of the upper bound of potential effects (Reinen-Hamill, 2022).

In addition, the modelling of predicted sediment depositional depths did not account for any resuspension and redispersal of the sediment. As indicated by MO, the cumulative deposition footprints obtained from the simulations assume that sediments stay in place once they settled on the seabed when in reality, some sediment resuspension is possible, the extent of which depends on the sediment type (percentage of fines etc.).

Consequently, the models are generally expected to over-predict TSS concentrations and deposition depths. However, in the absence of alternative predictions, the following assessments of ecological effects are based on the modelling results.

Key findings of ecological relevance from the dispersal plume modelling are:

- Sediment plumes generated by BHD are likely to be very localised and of little, if any, ecological consequence.
- Sediment plumes generated by CSD are likely to disperse in a narrow band beyond the dredging area. Mean concentrations are predicted to rapidly decline with distance, to levels that are likely to be of little ecological consequence.
- Sediment plumes generated by TSHD are predicted to produce the largest sediment plume and the highest sediment concentrations, with the modelling predicting that a large plume of sandy-silt will extend in a band along the southern, subtidal portion of the main channel, with mean concentrations predicted to rapidly decline with distance from the TSHD. A silty-sand plume was predicted to have a similar form but was more limited in extent.
- Model predictions showed near-bed concentrations of sandy-silt exceeding 20 mg/l for <30% of the time beyond the dredging footprint, with the percentage of time declining with distance. The predictions also showed that concentrations in a smaller area exceeded 160 mg/l for <30% of the time, and comparisons between the existing and proposed scenarios showed that the plume footprint reduced in size as dredging progressed and depth increased.
- At the proposed depth, near-bed sandy-silt concentrations of >160 mg/l will be largely contained with the dredged area.

5.7.5 Effects on intertidal sediment habitats and macrofauna

While the proposed reclamation will eliminate 6.6 ha of intertidal habitat, the overall abundance of common infauna will only be slightly reduced within the harbour and OHEZ, and changes to the diversity of macrofauna at those scales are not expected.

The proposed bird roost is in an area of moderate taxa diversity and abundance. The 2022 survey indicates that benthic communities around the feature are typical of those found in the upper to mid intertidal zone and associated with sand ridges in Marsden Bay. Based on the small area

affected, the effects of the proposed roost on intertidal habitats and macrofaunal diversity are expected to be low.

Reclamation effects on coastal processes such as currents and sediment transport are expected to be moderate within the area bounded by the eastern extent of the port and the CINZL wharf (Reinen-Hamill, 2022). The proposed reclamation is predicted to cause a reduction in currents that may cause sediment accretion on the channel banks between Northport and the Channel Infrastructure wharf and around the margin of the development. C+C predict that the corresponding ecological effects associated with the predicted sediment changes will be low to negligible.

Dredging is not proposed in intertidal areas, and sediment plumes and deposition associated with the dredging are predicted to be largely confined to subtidal channels. Accordingly, C+C concludes that the intertidal ecological effects from dredging are there expected to be **negligible**.

Overall, effects at the harbour and OHEZ scales on the extent of sandy intertidal habitat, the abundance and diversity of benthic macrofauna are assessed to be moderate, primarily based on the permanent loss of 6.6 ha of intertidal habitat.

5.7.6 Effects on subtidal habitat and benthic communities

Reclamation

Surveys indicate that infaunal benthic macrofauna values around the port are very high. The proposed reclamation site contained similar assemblages to sites on the western side of Northport, and although 14 taxa obtained from the proposed reclamation area were not found in the other areas sampled, all were common taxa.

While subtidal habitats within the reclamation footprint appear healthy and contribute to the broader diversity and ecological values of the harbour, C+C concludes that the proposed reclamation site does not contain unique or special ecological qualities and that the proposal is unlikely to reduce overall biodiversity values or compromise ecological functions and processes. That, together with the small scale of reclamation area relative to the overall amount of subtidal habitat within the Whangārei Harbour (at the OHEZ scale, reclamation will lead to the loss of a small proportion (0.26%) of natural subtidal habitat), leads C+C to conclude that the effects of reclamation on subtidal macrofauna will be **moderate** at the harbour and OHEZ scales.

Dredging

Modelling predicts that sediment plumes generated during dredging will affect the surrounding habitat. Subtidal areas predominantly to the west of the port are predicted to be periodically subjected to elevated suspended sediment concentrations, which if sustained for extended periods, could adversely affect sensitive macrofaunal species by reducing their physiological condition, growth, and survival. The scale, magnitude and duration of effect will depend on the type of dredging, length of time taken, and interactions between dredge operations and plume generation, tides, and the vagaries of winds and waves.

Model predictions indicate that if a TSHD is used, a relatively large area of the channel between Marsden Bay and Snake Bank may experience suspended sediment concentrations that approach levels and durations where adverse effects on subtidal habitats and communities occur. Those effects would be compounded by the impacts of sediment deposition which smothers seabed communities and habitats (particularly shell gravel). Modelling predicts that the effects of suspended and deposited sediment likely to be much more localised for CSD and BHD operations. In all cases, the effects of suspended sediment would cease at the conclusion of dredging and over time T+T predict that sediment deposited west of the dredged area will return to the dredge basin.

Key points to note are:

- The percentage of time that near-bed TSS concentrations exceed 80 mg/l is predicted to dissipate with distance from the dredging site.
- Sediment will be gradually dispersed and deposited, rather than depositing as one-off dumps.
- The models exclude real-world dynamics that will affect dispersal and deposition. For instance, the modelling does not account for any resuspension and redispersal of the sediment, and a static dredging position was used continuously for a month in the model.
- The sediments are of marine origin, which is likely to reduce their capacity to adversely affect benthic species.
- Multiple assessments have shown that effects of sediment disposal in subtidal sites tend to be relatively minor and short-lived. However, as noted earlier, this area contains extensive biogenic habitat, that includes large sessile filter feeders, macroalgae meadows and shell, which is likely to be particularly sensitive to smothering.
- The area has been previously dredged, but still retains high benthic ecological values.
- The modelling is conservative in several respects, including that it assumes the dredge operates continuously for the one month model period, which is not reflective of reality.
- Assuming that shell gravel habitat re-establishes, ecological recovery is expected to occur over a period of 5 or more years.

C+C concludes that while some uncertainty remains about the scale and magnitude of dredging effects, the impacts of dredging in subtidal areas are likely to vary depending on the method of dredging and range from:

- **High** at the OHEZ and Harbour scales if a TSHD is used; and,
- **Moderate** at those scales for CSD and BHD operations.

Based on the high ecological values observed in and around previously dredged areas, and assuming that shell gravel habitat re-establishes, ecological recovery is expected to occur over a period of 5 or more years.

5.7.7 Effects on kaimoana shellfish

The proposed reclamation will permanently eliminate existing shellfish (cockles) from the intertidal areas within the expansion footprint, noting that cockle densities within the proposed reclamation footprint were representative of densities found throughout Marsden Bay, and generally not of harvestable size.

No pipi or scallops were found to the east of Northport.

Given the widespread distribution of cockles around the harbour, and the lack of pipi or scallops to the east of Northport, the direct effects on kaimoana shellfish are assessed as low at the harbour and OHEZ scales.

5.7.8 Effects on seagrass and macroalgae

Reclamation

Patches of intertidal seagrass (approximately 0.33ha) are present in the area that will be covered by the proposed reclamation. Based on that, C+C concludes that the broader and local scale effects of seagrass being lost from within the proposed reclamation areas are **low** at all scales. This equates to a **less than minor** level of effect. In addition, based on the above analysis, C+C concludes that reclamation effects on any macroalgae classified as threatened or at risk are likely to be **low** or **negligible** at all scales. This equates to a **less than minor** level of effect.

Dredging

Seagrass

Seagrass is not present within the dredging footprint and so will not be directly affected by the proposed dredging. While sediment plumes have the potential to adversely affect seagrass in the surrounding area, modelling of the sediment dispersal plumes predicts that there will be little, if any, overlap between dredging related sediment plumes or sediment deposition, and subtidal seagrass.

In light of the above and given the ability of seagrass to tolerate short-term reductions in light, C+C concludes that the effect of sediment mobilisation on seagrass will be **low** at all scales (equating to a **less than minor** effect).

Macroalgae

Dredging could affect macroalgae through:

- Direct physical removal;
- Physically removing substrates that macroalgae attach to, particularly shell gravel.
- Deepening, which permanently reduces the amount of light reaching the seabed;
- Smothering macroalgae beneath mobilised sediment;

- Smothering substrates that macroalgae attach to, particularly shell gravel;
- Temporarily reducing the amount of light reaching the seabed through the suspension and dispersal of sediments.

Current velocities and the associated flux of nutrients will also be reduced, but those changes are not expected to have a tangible effect on macroalgae.

For the most part, the proposed dredging will be limited to an area where dredging has already occurred or is already consented, and so the effects are largely part of the existing environment.

If shell gravel is still present at the dredged depths, or reaccumulates after dredging ceases, then recolonisation by macroalgae is expected to occur in the dredged basin. However, changes to light conditions may alter the composition of the macroalgae community within that area. Recolonisation is expected to take around five or more years depending on whether attachment substrates remain after dredging or reaccumulate after dredging.

Fewer macroalgae are likely to recolonise the dredged area if shell gravel is not present at the dredged depths or does not reaccumulate after dredging ceases. Macroalgae are still likely to attach to other substrates such as living shellfish (e.g., horse mussels) and other material that accumulates on the seabed.

While some uncertainty remains about the scale and magnitude of indirect dredging effects, the C+C assessment indicates that impacts of dredging in subtidal areas on macroalgae are likely to vary depending on the method of dredging and range from:

- **High** at the OHEZ and Harbour scales if a TSHD is used; and,
- **Moderate** at those scales for CSD and BHD operations.

Based on the presence of macroalgae in and around previously dredged areas, and assuming that gravel-shell lag habitat re-establishes, C+C predict that ecological recovery will occur over a period of 5 or more years.

C+C note their conclusions with respect to levels of effects are conservative (for the reasons outlined in Section 5.7.4), and because risks will be reduced through monitoring and management processes proposed through conditions of consent.

Note that potential effects on macroalgae species assessed as threatened or at risk are assessed separately above.

5.7.9 Effects on reefs

While reef habitat is a relatively minor component of the Whangārei Harbour ecosystem, it makes an important contribution to the biodiversity values of the harbour.

The revetments along the western and eastern margins of Northport are narrow artificial reefs, with similar habitat and community values to naturally occurring reefs in the harbour. They contain a variety of macroalgae, sponges, echinoderms, crustaceans, and other marine

invertebrates typical of north-eastern New Zealand reefs, and support a relatively diverse assemblage of fish, including obligate reef dwellers.

The proposed reclamation will remove around 155m of existing rock revetment and create around 483m of rock revetment. All biota living in and around the eastern revetment that cannot, or does not, move from the existing structure prior to the reclamation commencing will be lost. In the medium term (5–10 years), those effects will be offset by the colonisation of a new revetment by a similar assemblage, along the margin of the proposed eastern reclamation.

Because the revetment is an artificial construction, more revetment will be created than lost, there are other natural reefs in the harbour, any adverse effects on reef species that are threatened or at risk will be low at worst (equating to a **less than minor effect**), dredging is unlikely to affect existing reefs, and recovery will occur over a period of around 5 years, the overall effect of reclamation on reef habitat and biota will be **low** immediately, and positive in the medium to long term. The overall effect of dredging on reef habitat and biota is considered to be **negligible** at all scales.

5.7.10 Effects on fish

The Whangārei Habour has relatively diverse fish assemblages, with multiple species that forage on benthic macroinvertebrates, such as small crustaceans, polychaete worms, molluscs, and anemones.

For the most part the proposed dredging is located in an area that is already subject to capital and maintenance dredging consents associated with the existing port (see **Figure 67**).

Modelling indicates that sediment plumes generated during dredging and the resulting sediment deposition may affect surrounding habitat and benthic communities. The scale, mnagnitude and duration of the effects will depend on a range of factors inlcuding the type of dredging , the duration, and environmental conditions at the time of the dredging.

As outlined above, C+C predicts that the combined effects of dredging on benthic communities that are important to fish, including macroalgae will range between high at the OHEZ and Harbour scales if a TSHD is used, and moderate at the OHEZ and Harbour scales for CSD amnd BHD operations.

Ecological recovery is expected to be around 5 years.

However, impacts on fish are expected to be lower and temporary, because:

- The species potentially affected are able to move to other areas.
- Fish stock sizes are managed through fishing controls set under the Fisheries Management Act.
- Fish populations are unlikely to be limited by habitat or resource availability because fishing (carried out under the Fisheries Act) has reduced the populations of targeted species to levels well below those historically occurring.
- None of the fish potentially affected are Threatened or At-Risk species.

Overall, C+C concludes that the effect of disturbing or losing fish habitat within the dredging and reclamation footprints is assessed as **low** at all scales.

5.7.11 Stormwater discharges

Overall, the available information suggests that the current discharge poses little ecological risk. This conclusion is supported by toxicity testing (WETT)[55] carried out by NIWA in 2003 and 2005 and more recently in 2017, which showed no significant toxicity at 200 times dilution, and even under the highest concentrations tested (32% and 63.5% for marine algae and the wedge shell *M. liliana*, respectively), there were no adverse effects on the test organisms relative to the control.

The existing stormwater system will be upgraded to accommodate runoff from the proposed reclamation areas. Importantly, no logs or other bulk freight will be stored on the proposed reclamation areas. Consequently, stormwater contaminant loads from the proposed reclamation are expected to be relatively low. Discharge water quality is therefore expected to be similar to, or better than, that provided by the existing system (due to inputs of cleaner stormwater), but discharge loads may increase slightly. Overall, the proposed reclamation is expected to have a low effect on sediment and water quality based on:

- Past monitoring and assessments that indicate key contaminant concentrations are well below toxicity guidelines after reasonable mixing;
- The outfall discharges to a high flushing area;
- Contaminants are unlikely to permanently settle and accumulate in the local receiving environment.

Assuming that past monitoring results are representative of existing discharge quality, and that a similar discharge quality will be maintained, the addition of the proposed reclamation area is **not expected to cause any additional adverse ecological effects**. However, C+C recommends that stormwater monitoring requirements be reviewed to ensure:

- They remain aligned with port operations (e.g. the addition of total organic carbon is recommended); and,
- They provide a timely warning for management intervention if unanticipated changes in the discharge occur.

[55] Whole Effluent Toxicity Testing.

5.7.12 Proposed avoidance and/or mitigation measures

The following avoidance and/or mitigation measures are proposed:

Minimising sediment plumes

- Adherence to a dredge management plan(s), and associated conditions of consent, including:
  - Dredging methodology.
  - Monitoring of turbidity.
  - Potentially removing key species from affected sites prior to reclamation/capital dredging where practicable

Stormwater

- Compliance with conditions of consent relating to stormwater discharge quality.

5.7.13 Overall effects conclusions (excluding cumulative effects)

A summary of the potential effects (excluding cumulative effects) in accordance with EIANZ guidelines (at all scales) is provided in **Table 17** below:

Table 17: *Summary of ecological effects (excluding cumulative effects) at the harbour, OHEZ and footprint scales (the most relevant system for each effect is unshaded)*

Potential effects	System		
	Harbour	OHEZ	Footprint
Intertidal sediment habitats and macrofauna	**Moderate**	Moderate	Very high
Effects on kaimoana shellfish	**Low**	Low	High
Direct effects on subtidal benthic macrofaunal diversity from reclamation.	Moderate	**Moderate**	Very High
Direct effects on subtidal benthic macrofaunal diversity from dredging.	Moderate to High	**Moderate to high**	Moderate to High
Effects on seagrass	**Low**	Low	Very High
Effects on macroalgae	Moderate to High	**Moderate to high**	Moderate to High
Effects on fish	**Low**	Low	Low

Effects on reef habitat	**Positive in the medium term to long term**	Positive in the medium to long term	Positive in the medium to long term
Effects of stormwater discharges.	**Low**	**Low**	**Low**

C+C concludes that the ecological effects of the proposal (including cumulative effects) with respect to; threatened or at-risk species; and identified SEAs will either be **negligible** to **less than minor** at worst (and in some cases **temporary**).

The C+C report also concludes that if best practice methods for managing dredging effects are applied, then the ecological effects on any other potential areas of significant indigenous vegetation and habitats of indigenous fauna under Appendix 5 of the Regional Policy Statement (RPS) could also be kept within **minor** and/or **transitory** levels.

As outlined in the C+C report, the conclusions with respect to effects associated with the proposal are conservative in several important respects, including because:

- The sediment plume modelling informing the assessment of dredge effects includes conservative assumptions;
- The assessments do not take into account the range of effects already authorised by Northport's existing consents (see below) and
- Effects will be reduced through management regimes imposed via conditions (as detailed in Section 5.7.12).

5.7.14 Existing environment/cumulative effects

Existing environment

As identified in Section 5.7.5 of this AEE, Northport has consents to capital dredge and then maintain the water depth in front of the existing port. It also has consent for an additional 4.08ha reclamation associated with the construction of Berth 4, although that consent is not yet fully implemented. In addition to the Northport consents, CINZL holds consents to deepen and realign the commercial shipping channel. The CINZL consents have also not yet been implemented. All these consents are located within the OHEZ.

As outlined above, many of the effects associated with the current proposal are already provided for under the existing capital and maintenance dredging consents held by Northport.[56] However, C+C has stated that it is difficult to be precise regarding the difference in adverse effects as between the effects of the existing Northport consents and the effects of the current proposal. The

[56] The only changes are related to the slight difference between the currently consented and proposed dredging footprints and the different dredge depths involved.

C+C assessment does not take into account the effects that are already authorised by the existing Northport consents and so the assessment is highly conservative.

Potential cumulative effects

The potential effects of the proposed reclamation, dredging and stormwater discharges outlined above are:

- Loss of marine habitat and biota living within the dredging and reclamation footprints;
- Displacement of species that utilise the reclamation area, but do not permanently live within it;
- Effects of sediment suspension, dispersal and deposition beyond the dredging zone;
- Indirect effects arising from alteration to currents, wave and/or sedimentation patterns;
- Effects on reef habitat;
- Ecological effects associated with potential changes to water quality from stormwater discharges.

Cumulative loss of marine habitat

A breakdown of the areas affected by consented intertidal and subtidal reclamation and dredging areas is provided in **Table 18** below.

***Table 18**: Cumulative reclamation and dredging areas*

	Intertidal	Subtidal	
Development area	**Reclamation footprint (ha)**	**Reclamation footprint (ha)**	**Dredging footprint (ha)**
This project	6.56	5.13	61
Northport (consented)	0.14	4.35	60
CINZL	0	0	40
Total	6.33	9.86	101

Overall, consents have been obtained or sought for around 70 ha of dredging and reclamation in the OHEZ. An additional 0.54ha of intertidal area will be lost through the construction of the bird roost.

Reclamation will result in a permanent reduction in the extent of physical and biological features that support diversity values and important ecosystem services. Dredging will physically alter (deepen) habitats and disturb such features. However, in the case of dredging, observations from around Northport and around the world indicate that similar, high value habitats and ecological features will reform once dredging ceases.

The significance of ecological effects associated with reclamation and dredging have been individually assessed for the proposed reclamation and for combinations of those developments and other dredging and reclamation projects that have already been consented (specifically the Berth 4 reclamation and the CINZL dredging).

Key results from the assessment are contained in the following **Table 19.**

***Table 19**: Cumulative effects summary*

Potential effects	Relevant system	Level of effect
Benthic habitats and macrofauna	Harbour	Moderate
Kaimoana shellfish	Harbour	Low
Subtidal habitat and benthic macrofauna (Reclamation)	OHEZ	Moderate
Subtidal habitat and benthic macrofauna (Dredging)	OHEZ	Moderate to High
Seagrass (dredging)	Harbour	Low
Macroalgae (seaweeds)	OHEZ	Moderate to High
Fish	Harbour	Low
Reef habitat and biota	Harbour	Positive (medium to long term)
Stormwater discharges	Beyond the mixing zone	Low

5.8 Avifauna

5.8.1 General

Potential effects (including cumulative effects) on avifauna from the construction, maintenance, and operation of the expanded port have been assessed by BML. The conclusions from this assessment are summarised below. Further detail is provided in the BML report in **Appendix 13.**

5.8.2 Assessment context

Policy D.2.18 of the PRP[57] directs that when assessing the potential adverse effects of activities on identified values of indigenous biodiversity a system-wide approach to large areas of indigenous

[57] This policy is operative under Section 86F of the RMA.

biodiversity be employed, recognising that the scale of the effect of an activity is proportional to the size and sensitivity of the area of indigenous biodiversity.

The assessment of avifauna effects carried out by BML considers the effects of the proposed port expansion on avifauna at the scale of the wider Whangarei Harbour (i.e. the coastline and harbour waters to the west of a line drawn from Busby Head in the north to Ruakaka Estuary to the south), being the area shown on **Figure 68** below.

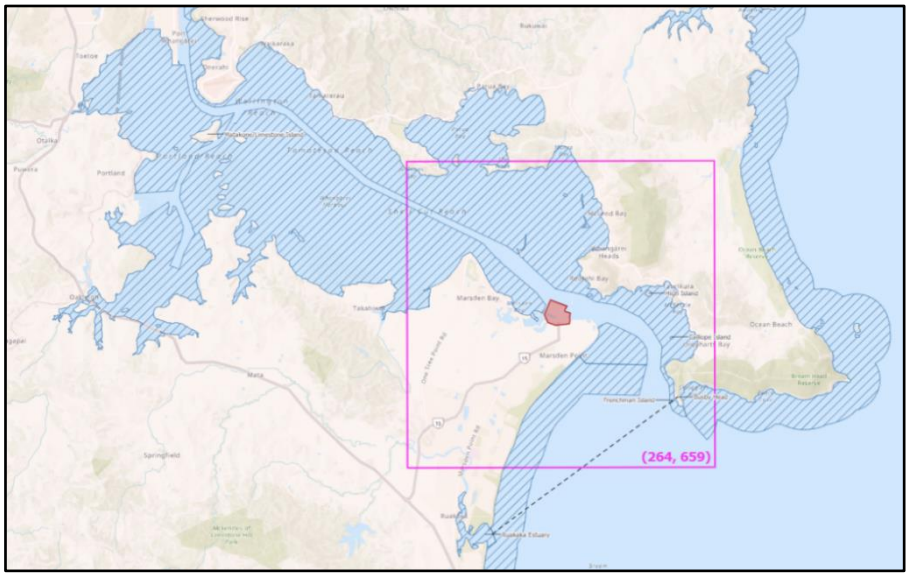

***Figure 68**: Outer Whangarei Harbour Scale for assessment of effects on avifauna*

This scale is deemed appropriate based on the habitat types within this area and the way the species being assessed use those habitats.

5.8.3 Actual and potential effects identification

The actual and potential effects on avifauna from the proposed expansion are broadly described as:

- Direct/permanent loss of habitat.
- Injuries and/or mortalities.
- Disturbance and displacement (effective habitat loss).
- Food supply and foraging ability.
- Artificial lighting.
- Pollution.
- Re-creation of high tide roost habitat.

The assessment is species focussed and takes into account the avoidance and mitigation measures detailed in Section 5.8.8 of this report.

Given the importance of the RMA effects terminology for interpreting the indigenous biodiversity policies in the PRP, this AEE expresses the equivalent RMA terminology in bold and brackets alongside the EIANZ terminology used in the BML assessment.

5.8.4 Effects of permanent loss of habitat

Loss of foraging and roosting habitat

The proposed 13.7ha expansion footprint contains a combination of dune, intertidal and subtidal areas. 6.2ha of this is inter-tidal habitat which represents less than 1% of the soft shore sandy habitat in the outer harbour area, and 0.11% of the intertidal area in the outer harbour and entrance zone.

The inter-tidal and high-tide areas within the footprint are used for foraging and roosting by a variety of bird species, including eleven *Threatened* or *At-Risk* species.

Fourteen bird species were recorded foraging in the inter-tidal area within the proposed footprint during the surveys carried out for the assessment. The four most abundant species recorded relative to the local harbour population was as follows:

- Caspian tern: 0.38%
- NZ Dotterel: 3.4%
- Red-billed gull: 5.86%
- Variable oystercatcher: 7.86%

Thirteen species were recorded roosting in the high tide area within the proposed footprint. The four most abundant species recorded relative to the local harbour population were as follows:

- White fronted tern: 0.13%
- South Island pied oystercatcher: 3.6%
- Red-billed gull: 4.1%
- Variable oystercatcher: 14.36%

The proposal will permanently remove the foraging and roosting habitat located within the expansion footprint.

<u>Foraging</u>

The benthic macroinvertebrate survey data reported lower taxa diversity and abundance on the eastern side of the Northport relative to the western side. Therefore, the availability of a more diverse and abundant food source on the western side of Northport means that the loss of the intertidal habitat on the eastern side will not detrimentally impact the foraging ability and food supply of the New Zealand dotterel or VOC. Accordingly, BML considers that the effects in relation to the loss of foraging habitat are **low (less than minor).**

Roosting

Due to the proportion of New Zealand dotterel and VOC that utilise the high-tide area for roosting, the potential effects, as detailed in Section 3.11 of this AEE, additional high tide roosting habitat is proposed to the west of Northport to avoid the effects associated with the loss of habitat within the proposed reclamation footprint. This will involve the reconstruction of an historic sandbank. This habitat will be created prior to the reclamation commencing so that it is available for use prior to the loss of habitat.

Taking into account the additional roost habitat on the western side of Northport prior to construction and its ongoing maintenance, the potential effects of the loss of roosting habitat associated with the eastern reclamation will be low **(less than minor)** for New Zealand dotterel and VOC.

Other species

Due to the low numbers of other species known to utilise the habitat within the expansion footprint, the effects of the loss of foraging and roosting on other avifauna species ranges from low to very low **(less than minor).**

5.8.5 Injuries and/or mortalities

Construction effects

The mobile nature of most avifauna species means that the potential for direct mortalities associated with construction activities are likely to be confined to birds that may be nesting or with young chicks or, in the case of little penguins (kororā), moulting at which time they are unable to swim.

There is only one known instance of birds nesting in the expansion footprint, being a pair of VOC successfully nesting and raising two chicks in the eastern revetment in 2019. While the revetment around the Northport site provides potential nesting habitat for kororā, they have not been detected during the surveys conducted to date. However, for the purpose of the assessment and associated effects management, it has been assumed that they are present.

Subject to implementation of the measures contained in the CEMP the adverse effects on nesting and moulting species are predicted to be **negligible** and short-term (i.e. limited to the period of construction). The overall effects on both species (kororā and VOC are predicted to be **very low (less than minor)**.

Operational effects

As is the case with potential construction effects, the mobile nature of most avifauna species means that the potential for direct mortalities associated with operational activities is likely to be confined to birds that may be nesting or with young chicks. To date, VOC, pied stilt, and Northern NZ dotterel have all been recorded breeding on the existing and operational Northport site.

Due to the relatively low number of birds recorded nesting on the existing Northport site, and the proven ability of those birds to raise chicks in this environment, the potential for mortalities during the operational phase is expected to be **low (less than minor)** for NZ dotterel and very low **(less than minor)** for pied stilt and VOC.

5.8.6 Disturbance and displacement

Construction effects

Indirect disturbance to foraging and roosting may occur as a result of construction activities such as noise, vibration, and plant movement.

While the potential adverse effects of disturbance to foraging and roosting birds during construction cannot be avoided, there are other nearby areas of habitat to undertake these activities beyond the area of disturbance.

The magnitude of effect in relation to construction disturbance to foraging New Zealand dotterel is predicted to be negligible based on the availability of a more diverse and abundant food source nearby on the western side of Northport. Accordingly, any birds that are disturbed by construction will not have to expend significant amounts of energy to locate food. Furthermore, based on the re-creation of the sandbank on the western side of Northport prior to construction commencing, the potential effect of the loss of roosting habitat associated with the proposal will be low **(less than minor)** for New Zealand dotterel and variable oystercatcher.

With respect to underwater noise disturbance associated with piling activities, foraging little penguins will be exposed to the greatest disturbance due to the amount of time they spend underwater, especially when a hydraulic impact hammer is used.

BML consider that there will be an overall **Moderate** level of effect from underwater noise disturbance associated with the use of hydraulic impact hammer. In order to reduce this potential effect, measures such as bubble curtains may be employed during piling activities that involve a hydraulic impact hammer. Based on the likely location of breeding birds relative to the piling works, the overall effect of piling activities on little penguin will be **Low.**

Operational effects

Based on a 45 m disturbance zone around the project footprint, disturbance from the operation of the proposed expansion could result in an additional effective loss of 3.73 ha of intertidal foraging habitat. In addition, there may also be effects due to displacement by other birds and increased recreational pressure at the eastern end of the reclamation.

Due to the small number of birds recorded as utilising the area to the east of Northport relative to the wider Whangarei populations, the potential effects of operational disturbance and displacement on species recorded foraging or roosting within the 45 m operational disturbance zone are predicted to range between **low to very low (less than minor)** for all species.

5.8.7 Effects of construction sediment suspension on food supply and foraging

The reclamation construction and dredging may result in the release of sediment into the marine environment. This could result in adverse effects on avifauna prey species and reduce the visibility of prey species for species such as penguin, shags, terns, and herons.

Experience from previous dredging activities at Northport provides a level of confidence that turbidity effects can be minimised through good plume management/monitoring (in real time) including potentially the use of silt curtains in the shallower high-risk areas. This, combined with the depth and duration of the dredge activity, result in the predicted effects of construction activities on food supply and foraging ranging between low and very low **(less than minor).**

5.8.8 Artificial lighting

An increase in artificial lighting is not expected to adversely affect the nocturnal foraging of waders. Other potential effects of artificial lighting are:

- Attraction and subsequent collision with structures.
- Increased vulnerability to predation.
- Diversion towards the lights and away from breeding colonies.

There is already a level of artificial lighting present in the existing environment associated with existing Northport, CINZL and residential development. The proposed lighting for the expanded port will not significantly increase the existing ambient levels or the range of species that might be affected. However, there will be a small cumulative increase in lighting on the coastal margin.

Measures to minimise construction and operational lighting will be employed, including:

- Lighting will be kept to the minimum required for safe operation; and
- Wherever practicable lighting will be directed downwards and shielded to reduce light projecting horizontally towards coastal waters and avoid light projecting vertically to passing birds.

Based on the above measures, the potential adverse effects of lighting causing fatalities or impacting foraging of local (wider Whangarei Harbour) populations of coastal avifauna species is predicted to range from low to very low **(less than minor)**.

5.8.9 Pollution

The location of seabirds at or near the top of the marine food web makes them particularly sensitive to marine contaminants such as hydrocarbons, heavy metals, hydrophobic persistent organic contaminants, and small plastic debris.

Construction effects

Dredging operations can result in the release of toxins through the remobilisation of contaminated sediments.

The 2021 analysis of intertidal sediment to the east and west of Northport showed that heavy metals and PAHs are not elevated and are not occurring in concentrations that can adversely affect habitats or biota. Also, a review of water quality measures associated with previous capital and maintenance dredging by Northport reported that metals and PAHs in the decant discharge were at levels below analytical detection. Accordingly, the C+C marine ecology assessment for the eastern reclamation proposal determined that the adverse effects of remobilised contaminants on the marine habitat and biota would be negligible for all potentially affected species.

Based on the C+C conclusions and the related supporting information, the effects of pollution from construction activities on coastal avifauna will be **low** to **very low** (**less than minor**) for all species.

Operational effects

Stormwater run-off from the operational port facility could result in contaminants entering the marine environment. However, based on actual water quality data for present day discharges, the additional stormwater from the expanded port is not expected to adversely affect water quality. Therefore, the predicted operational effects of stormwater discharges from the expanded port range between low and very low **(less than minor).**

5.8.10 Effects of proposed high-tide roost habitat

The location of the proposed high tide roost within the intertidal zone will result in the removal of a confined area of foraging habitat.

A total of 97 birds were recorded over the course of all the shorebird surveys under the footprint of the proposed high tide roost comprising of the following species:

- Northern NZ dotterel
- Lesser knot
- Pied stilt
- White-faced heron
- Caspian tern

Assuming that these birds were utilising this area to forage, the proposed high tide roost will result in the loss of approximately 4,573 m^2 of foraging habitat for these species.

BML have concluded that the effects of the loss of foraging habitat on those species will be low to very low (**less than minor**) for all species. This conclusion is based on the benthic macroinvertebrate data which identified a more diverse and abundant prey source further to the west of the proposed high tide roost. Also, with respect to Caspian tern, this species primarily

feeds on small surface-swimming fish, and forages much less frequently in the soft mud and shallow water.

5.8.11 Cumulative effects

BML have considered the cumulative effects of the proposal with other consented but not yet constructed projects[58] in the Whangarei Harbour.

Based on the effects identified by the other consented projects, there will be no cumulative effects on coastal avifauna in relation to discharges into the marine environment or increased lighting on the coastal margin.

None of the projects identified the permanent loss of habitat for variable oystercatcher or Northern NZ dotterel. Therefore, there will be no cumulative effects on coastal avifauna in relation to permanent habitat loss.

While the Port Nikau marina assessment noted the potential for disturbance to foraging wading birds, the species and level of effect was not identified. Thus, based on the information provided in the Port Nikau marina assessment, BML concludes that there will be no cumulative effects on coastal avifauna in relation to construction related disturbance associated with the proposal.

5.8.12 Mitigation and/or avoidance measures

The following measures are proposed to avoid or otherwise minimise effects on avifauna:

Avifauna section of the CEMP

Potential injuries/mortalities can be avoided through adherence to the measures included in the avifauna section of the CEMP, which will include measures to avoid direct impacts and manage nesting kororā and variable oystercatcher. These measures will include:

- For kororā:

- Pre-construction (including rock removal) surveys by a suitably qualified and experienced coastal ornithologist to determine the presence of kororā within the western boundary riprap revetment;
- Establishment of exclusion zones around nesting and / or moulting birds[59];
- Rock removal works to occur under the guidance of a suitably qualified and experienced coastal ornithologist;
- Measures to ensure that kororā are not trapped by construction works.

[58] Northport Berth 4, CINZL channel optimisation, Port Nikau marina expansion, Whangarei Marina Trust new marina.

[59] Under no circumstances should nesting birds, nest contents or moulting penguins be moved. Furthermore, a DOC Wildlife Act permit is required to handle species listed in the Wildlife Act (1954).

- Measures to minimise underwater noise during piling activities, to be informed by underwater noise modelling.

▪ For variable oystercatcher:

- If construction works are to occur within 20m of an area identified as potential variable oystercatcher nesting habitat during the breeding season, a suitably qualified and experienced coastal ornithologist should check for the presence of active nests.
- If an active nest is detected, a 20m exclusion zone should be established around the nest to ensure machinery and personnel do not come within 20m of the nesting bird.

Loss of roosting habitat

▪ Construction of additional roosting habitat for VOC and NZ Dotterel, to be completed prior to reclamation construction works commencing.

Sedimentation

▪ Adherence to the measures in the dredging/construction management plans and associated conditions of consent.

Lighting

Measures to minimise construction and operational lighting will be employed, including:

▪ Lighting will be kept to the minimum required for safe operation; and

▪ Wherever practicable lighting will be directed downwards and shielded to reduce light projecting horizontally towards coastal waters and avoid light projecting vertically to passing birds.

5.8.13 Overall effects conclusions

BML concludes that (subject to the measures outlined in Section 5.8.12 above) the cumulative (overall) effects of the proposed expansion low to very low (**less than minor**) for all avifauna species.

5.9 Marine mammals

5.9.1 General

Potential effects (including cumulative effects) on marine ecology from the construction, maintenance and operation of the expanded port have been assessed by CI. The CI assessment interprets and relies in part on the technical modelling from Styles Group (SG) in respect to underwater noise. The conclusions from this assessment are summarised below. Further detail is provided in the CI report in **Appendix 14.**

5.9.2 General construction noise

Underwater noise can affect marine mammals as they rely heavily on underwater sounds for communication, orientation, predator avoidance, and foraging. It can elicit three types of responses in marine mammals being:

- Behavioural (e.g. changes in surfacing or diving patterns),
- Acoustic (e.g. changes in type or timing of vocalisations)
- Physiological injury (e.g. auditory threshold shifts and stress).

Construction of the reclamation and associated seawalls will involve the movement and disposal of rocks, sand, and gravel material. The level of disturbance and underwater noise that these construction activities will produce are expected to be several orders of magnitude less than those associated with pile driving and dredging activities.

The potential underwater noise effects on marine mammals resulting from construction activities will be temporary only due to the localised scale, intermittent (hours), and short-term duration. Underwater noise produced by general construction activities has the potential to disturb individual animals visiting the immediate port facility, with responses to this disturbance potentially being temporary avoidance of the Whangarei Harbour entrance waters while the activities are occurring, but more likely, directed movement away from the immediate vicinity until the activities have stopped. This conclusion is based on:

- The proposed reclamation site is not unique or rare habitat for any marine mammal species in terms of feeding, resting and / or breeding activities;
- Most underwater noises generated from these activities are expected to be within the lower frequency ranges and intermittent in duration, similar to the underwater noise produced by existing commercial vessels visiting the port;
- Relevant environmental factors of the site (e.g. intertidal / shallow depths and soft mud) may, to some degree, naturally dampen any underwater noise production.

5.9.3 Pile driving noise

Background

Pile driving is one of the noisiest of all construction sounds and will be the most intense of the underwater noises produced during construction of the proposed reclamation. Pile driving generates a very high source level as broadband impulses (i.e. sound pulses across a wide range of frequencies). This has the potential to disrupt marine mammal hearing and behaviour up to many kilometres away. When in proximity, these impulses could induce acute stress and cause hearing impairment.

Potential physical effects

An underwater noise propagation model has been developed by SG to estimate the potential noise levels generated by the various construction works. The model incorporates data on local bathymetry, water temperature, tidal flow, and sediment type, all of which affect how noise travels through water. Acoustic models were then built for the largest proposed steel piles (i.e. 914 mm) with the most potential impact on marine life in order to predict the 'worst-case' distance ranges of piling generated noise. The model is explained in detail in the SG report attached in **Appendix 25.**

There are currently no national or standard guidelines for pile-driving activities within New Zealand waters. Therefore, to determine the distance that predicted noise levels could cause physical impairment or injury to local species, SG used previously established functional hearing groups to distinguish between different marine mammal species and the relevant underwater acoustic thresholds defined by the NOAA[60] *Revision to Technical Guidance for Assessing the Effects of Anthropogenic Sound on Marine Mammal Hearing (Version 2.0-* 2018).

The acoustic thresholds are based on the species most likely to visit the wider Whangarei and Bream Bay area. These thresholds are weighted, meaning they are based on the functional hearing ranges over which the hearing of individual species is most sensitive, and then considers the frequencies over which the majority of sound energy might be concentrated for a particular sound source (in this case pile driving strikes).

Given the estimated distance ranges for pile driving noise, pile-driving is expected to physically disturb dolphins, orca, and fur seals only when they are within the immediate vicinity of the construction site (100-200 m). Any visiting baleen whales or leopard seals will experience adverse effects at greater distances, either when they enter the harbour and/or move towards the entrance from inner harbour regions (if already in the harbour). For baleen whale species, this level of noise may result in a general avoidance of harbour waters while pile driving is underway.

Potential displacement or behavioural effects

Based on recent overseas studies, behavioural responses to impulse noise can occur at sound levels as low as 140 re 1µPa rms with more moderate responses at sound levels of 160 re 1µPa rms. Based on these thresholds, the distance ranges for potential low and moderate level behavioural effects were estimated for all species.

It is predicted that behavioural responses will be contextual and situation dependent. Animals are expected to respond more adversely to intermittent and unexpected noise than more consistent or regular intervals of noise, regardless of the energy level. Therefore, management measures such as soft start or ramping up are used by operators to avoid sudden or unexpected full-force piling noise.

The potential behavioural responses from impact driving are predicted to be confined (spatially) to within the inner Whangarei Harbour waters and the entrance, and any animal attempting to

[60] USA National Oceanic and Atmospheric Administration.

enter the Harbour underwater will likely exhibit at least lower-level behavioural responses while piling is underway.

Owha, the visiting leopard seal, is expected to continue to utilise any existing haul-out sites in the harbour and/or nearby marinas throughout the proposed construction period as in-air piling sound levels are expected to be much lower than in-water levels and seals often swim with their heads out of water when near human activity.

Overall, the sound modelling carried out by SG suggests that for most species (with the exception of visiting baleen whales), pile-driving noise without appropriate management has the potential to cause temporary hearing impairment only within close proximity of the piling source. While the potential is greater for visiting baleen whales and leopard seals, very few individuals visit these waters in any one year (1-3 animals) and these species tend to have a stronger seasonal presence (winter migrations for whales). Therefore, the likelihood of any adverse displacement or behavioural effects occurring is low and any hearing injury effects will be managed such that they are nil to negligible.

Pile driving noise, with management measures in place, will most likely elicit varying levels of non-detrimental behavioural responses with potential momentary masking of some acoustic signals[61] at variable distances of a few 100m up to 2km from the source, depending on the species and individual animals.

Subject to the recommended management measures, including the establishment of marine mammal observation zones (MMOZ) and soft start/ramping up procedures, any residual effects are expected to be **nil** to **less than minor.**

5.9.4 Dredging noise

The act of breaking and/or removing bottom substrate (of itself) is not expected to directly affect any marine mammals known to frequent Whangarei Harbour. However, the associated increase in the production of underwater sound and physical disturbance within the harbour is more likely to adversely affect marine mammals. Noise produced from dredging activities differs from pile driving in that it is a continuous rather than impulse noise occurring at frequencies mostly below 1 kHz.

No permanent hearing injuries are predicted for any marine mammals with the onset of any hearing impairment estimated to occur only when an animal is within 1m of the operating dredge.

The probability of a behavioural response occurring (either low or moderate) will increase as an individual animal gets closer to the dredge vessel. However, the estimated initial onset distance for any low-level behavioral responses is 1.6km or less (depending on both the type of dredge vessel and species). These predicted distance ranges decrease for any potential moderate level behavioral responses to within 600m or less from the dredger. Any short-term auditory masking

[61] For example, members of the same species may find it more difficult to communicate across particular frequencies/levels while in proximity to piling activity).

effects between two individuals of the same species are predicted to occur within a similar distance or less.

Based on the SG modelling, any effects from dredging generated underwater noise will likely be transitory and non-injurious. Effects will be predominantly limited to the momentary masking of some noise signals and a range of potential behavioural responses if animals approach to within a kilometre or less of the dredging location (depending on the type of dredge vessel and species). There is no likelihood of any hearing injury effects occurring.

5.9.5 Vessel strike

General

While the potential for any boat strike of local marine mammals from the proposed dredge platforms is nil to **negligible, i**ncreasing the port capabilities and/or capacity means that additional large commercial ships will be expected to visit the port, Whangarei Harbour and the wider area each year. This increases the potential for collision risks with local marine mammals.

The likelihood of vessel strike depends on several operational factors including vessel type, speed, and location. Although all types and sizes of vessels have hit whales, the most severe collisions (e.g. fatal injury or mortality) typically occur with large (> 80 m) ships travelling at speeds over 11 knots.

It is expected that additional commercial ship traffic will be from other New Zealand destinations (i.e. Ports of Auckland) rather than any new or additional container ships coming from overseas. Currently most south-bound container ships pass around the Hen and Chicken Islands and transit towards the Ports of Auckland via the Jellicoe Channel. The expansion of Northport would simply result in a proportion of these movements turning and entering the Whangarei Harbour rather than continuing south, and north-bound ships either transiting through the Hauraki Gulf or around Great Barrier Island before heading towards the Whangarei Harbour and Northport.

The species considered most vulnerable to any potential vessel collisions include Bryde's, humpback, and southern right whales and to a lesser extent, bottlenose dolphins and orca (given their current endangered species status rather than proneness for vessel strike).

Despite the potential increase in vessel traffic due to the proposed port expansion, the likelihood of a vessel strike (injury or mortality) is assessed as low for migrating baleen whales, odontocete and pinniped species. This is based on the following factors:

(a) Spatial and temporal factors

- Low probability of port-related commercial ships encountering a migrating whale within the Whangarei Harbour and the wider Bream Bay region as currently only 1–3 individual whales are sighted within these waters each year.
- The majority of migrating whales currently pass by Hen (Taranga) and Chicken Islands in deeper, more offshore waters (e.g. further than 5 to 10 nm) where they are likely encountering

the same south-bound ships currently travelling to Ports of Auckland and that may be diverted into Northport in the future.

- Most whales occur in the area for a limited period each year, mainly in the winter months and some spring months, and most only remain for a day up to a week.
- Most odontocete and pinniped species known to frequent Whangarei waters are in regular contact with all types and speeds of commercial and recreational vessels throughout their entire distributional range with few to no reported ship strikes.

(b) Known collision factors

- Vessel traffic is expected to increase mainly from the south as more commercial ships may be diverted further north and likely travelling through Mangawhai / Bream Bay coastal waters;
- Any expansion of the Hauraki Gulf Transit Protocol[62] into and behind Whangarei waters provides the best chance of significantly reducing fatal injuries and mortalities of baleen whales due to vessel collisions in this region. Implementation of the protocol (i.e. reducing average speed to 10 knots) has been estimated to reduce the probability of a lethal ship strike from 51% to 16% (Riekkola 2013) in the Hauraki Gulf.
- Most dolphin species have a general attraction to boats and safely approach and / or bowride with numerous vessels. Fur seals often respond neutrally to boats when in the water (although they may bowride occasionally).
- With the exception of Bryde's whales, whale species do not usually feed while migrating past New Zealand's north-eastern coastline to and from their northern tropical breeding and southern sub-Antarctic / Antarctic feeding sites.
- Whangarei Harbour and Bream Bay are not considered unique or important feeding, resting or nursery habitats for any visiting species, hence individuals are less likely to be 'distracted' by such activities, and are thus less vulnerable to collision risk.

5.9.6 Marine debris and possible entanglements

The major hazard associated with marine debris for marine mammals is the possibility of entanglement. Whales, dolphins, and pinnipeds are often attracted to floating debris with a potential risk of becoming entangled in floating lines and netting. Loose, thin lines and nets pose the greatest entanglement risk and especially lost nets, ropes, and lines.

Marine debris generation is generally non-existent in well-maintained coastal projects with proper waste management programmes in place (including secure onboard storage of lines, nets, and waste). In such cases, any effects to marine mammals are expected to be **nil** to **negligible.**

[62] Northport is currently supporting an initiative to extend the Hauraki Gulf Transit Protocol for Commercial Shipping up to the Poor Knights (Sea Change – The Hauraki Gulf Marine Spatial Plan). This protocol was instigated in 2013 to protect the endangered Bryde's whales by voluntarily limiting speed for all commercial ships travelling within the Gulf to 10 knots and designating a crew member to watch for any signs of whales during daylight hours.

5.9.7 Ecological effects of habitats and prey species

The potential ecological effects from any loss of existing intertidal, subtidal, and benthic biota and loss or alteration of the habitats within the immediate region of the proposed activities are discussed in detail in the ecological assessment.

Due to the limited effect (both spatially and temporally) that the proposed construction activities are expected to have on local habitats and associated prey resources, there are unlikely to be any long-term flow-on effects to local marine mammals. This is based on the following factors:

- A relatively small percent of habitat loss to reclamation within the Port area relative to similar intertidal and subtidal habitats found in the wider lower harbour.
- Dredged habitat is expected to recover (or new habitat colonised) relatively rapidly after construction is complete.
- Dredged sediments are expected to be relatively clean and unpolluted while any turbidity effects from dredging are predicted to be confined to a limited region around construction sites. Any affected fauna is expected to fully recover as demonstrated by the results of previous dredge monitoring.
- A large proportion of subtidal areas within the proposed construction area are already modified environments due to previous dredging campaigns.
- Short-term displacement of individual prey resources as a result of the small spatial scale of disturbance with no effect on species recruitment.
- Home ranges of local marine mammal species are large and overlap with similar types of habitats in other parts of the harbour and along most other coastal bay regions.

5.9.8 Cumulative effects

Those marine mammals passing through Whangarei and the wider Bream Bay region are exposed to a variety of other anthropogenic activities that generate underwater noise, including large-scale commercial shipping, recreational boating, and commercial fishing vessels.

The underwater noise model prepared by SG is based on actual measurements of the current ambient noise that incorporates all underwater noise in the existing harbour environment. It is important to note that additional underwater noise is not often cumulative. The louder source merely covers up the other sources, as opposed to all sources combining to make the environment noisier than the baseline position.

If pile driving and dredging are taking place in the vicinity of the proposal site at the same time, the louder pulses of piling will be heard over the top of the more constant low frequency noise of the dredger each time the hammer falls. The overall effect will not necessarily result in louder source noises but may instead mean that noise thresholds are reached over a shorter exposure period (less than 24 hours).

Other consented but not yet implemented marine development projects within the lower harbour (most notably the CINZL channel deepening project and the construction of Berth 4) are relevant to the consideration of potential cumulative effects. Specifically, if the proposed expansion was implemented consecutively with these two consented projects, underwater noise levels would have the potential to be elevated for up to 6 years.[63]

Notwithstanding the potential cumulative effects, it is highly unlikely that all projects will occur immediately following each other, and it is looking increasingly unlikely that the CINZL channel deepening and widening consent will be implemented (at least fully). It is more likely that any increases in underwater noise levels will be variable and intermittent, and undertaken over weeks or months rather than constant.

From a noise management perspective, it would be better if the dredging and piling aspects of the proposal are completed together, so that effects occur over a shorter overall duration.

5.9.9 Mitigation measures

Overall, the residual effects of the proposal on marine mammals are assessed as **less than minor** to **nil** subject to the implementation of effects management measures recommended in the CI report. These measures will avoid adverse effects on threatened or at-risk taxa, and avoid, remedy, or mitigate any other adverse effects.

To ensure that the most appropriate effects management measures are in place, a MMMP will be developed by marine mammal and underwater acoustic experts in consultation with others, including the Department of Conservation, before commencing construction operations. The MMMP will outline the procedures necessary to reduce or manage the effects of underwater noise, and other effects. It will include appropriate reviewing and reporting timelines for management actions and any implemented effects management procedures to ensure their effectiveness during operations. A draft MMMP is attached in **Appendix 5.**

The MMMP will follow accepted best practices to minimise the adverse effects of underwater noise. Consistent with the draft MMMP, the key management measures and actions are as follows:

- Verification of the *in-situ* noise levels produced from pile-driving activities by measuring the associated underwater noises of these activities as soon as practicable once the project has begun. Results will be reviewed against the same parameters used for acoustic modelling by SG and any necessary adjustments made to effects management actions (e.g. revised MMOZ).
- Reduction of noise levels at the source, including:
  - The use of vibro driving whenever possible, due to a continuous and generally lower level of sound generated using this technique compared to intense, discrete pulses of impact driving. Further consideration should also be given to other environmental factors such as substrate type and duration implications.

[63] CINZL (6 months to 1 year), Berth 4 (2.5 years), eastern expansion (2.5 years).

- Considering any recent developments in reducing noise at the source including bottom-driven piles, air balloons inflated within open piles to reduce ringing and / or bubble curtain technology.
- The smallest possible pile size should be used that meets the specific operational need (the smaller the pile, generally the lower the noise level, subject to different piling methodologies).
- The use of 'soft start' or 'ramping up' procedures, where pile-driving energy is gradually increased to normal operating levels to give nearby animals (close to or just outside the MMOZ) an opportunity to move away from the area before sound levels increase to an extent that may cause discomfort or injury. This process is also expected to help mediate more moderate and some low behavioural responses from nearby animals, giving them a chance to habituate to the pulses of sound over time before increasing the noise level.
- The use of a sacrificial, non-metallic hammer cushion cap (or dolly) for impact piling.[64]
- Modifying the pile strike by changing the contact time of the hammer should theoretically reduce the noise generated by the impact through a reduction in the amplitude of the pile vibration.

- Establishment of shut down zones around the construction area to minimise any risk of hearing impairment to marine mammals from pile-driving activities only[65]. The presence of any marine mammals within these zones would require the cessation of pile driving, with commencement or continuation not to occur until the animal leaves the pre-determined zone. The final size of these zone(s) will be determined once *in-situ* sound levels are verified.
- A central contact point should be established with DOC to obtain up-to-date regional sighting information for the duration of the project, particularly in regard to visiting baleen whales.
- A similar contact should be established with Marsden Cove marina staff in order to receive sightings updates of the leopard seal Owha in the marina throughout the duration of the project.

[64] This is made of wood, nylon, or polymer plastic and sits between the hammer and the top of the pile where it is used to reduce wear. Appreciable reductions in both underwater noise and airborne noise levels have been achieved with this method.

[65] Shut down zones for dredging activities are not considered necessary based on predicted noise levels and relative to other similar and relevant dredging consents, i.e. Refining New Zealand's deepening and realignment of Whangarei Harbour channel entrance. Any significant differences in actual dredging noise levels may necessitate reconsideration of a shutdown zone option.

- If practical, the various piling stages of the project should be timed so that most of the piling work does not occur over successive seasons, e.g. back to back winters. The use of the area of interest is seasonal for some marine mammal species (e.g. baleen whales) and successive interactions of this type may affect an animal's decision to return to these waters in the near future.

5.9.10 Monitoring

The continued presence (or absence) of the relevant marine mammal species within the harbour and/or near the construction site by MMOs can be used to test the effectiveness of the proposed management measures.

In addition to the MMO monitoring, it is suggested that underwater acoustic monitoring continues at the established baseline stations across the Whangarei Harbour while pile-driving and dredging activities are underway. This informative monitoring can help assist in both verifying actual sound levels while determining the potential presence of any behavioural effect(s) and at what sound level(s) they may be occurring. These results will assist in determining the efficacy of implemented management actions for further monitoring throughout the proposed reclamation project.

5.9.11 Overall effects conclusions

A comprehensive assessment of all relevant effects of dredging and construction activities was undertaken by CI. That assessment identified pile driving as the main activity associated with the proposed port expansion that could adversely affect marine mammals through high underwater noise levels.

Underwater acoustic modelling work undertaken within the proposed reclamation sites suggests pile-driving noise is expected to be detectable within the entrance and lower harbour waters, depending on the piling location. Given the potential for temporary hearing impairment near the piling source for endangered species, such as bottlenose dolphins and orca, and at further distances for visiting baleen whale species, actions are necessary to avoid these effects. With appropriate actions in place, as set out in the draft MMMP provided as part of this application, piling and dredging activities are expected to only elicit short-term, non-injurious behavioural responses with the potential for momentary masking of some acoustic signals from visiting marine mammals while in close proximity to construction activities.

The completion and certification of the draft MMMP by marine mammal and underwater acoustic experts in consultation with NRC and DOC is recommended to ensure that the most appropriate measures are in place to minimise any potential adverse effects prior to commencing operations. Informative monitoring is recommended and based around a combination of recording visual sightings of marine mammals (from dedicated marine mammal observers) and the continuation of simultaneous passive underwater acoustic monitoring.

5.10 Channel and navigation safety

5.10.1 General

Northport commissioned a Navigation Safety Report for the proposed expansion, both with and without the CINZL channel dredging (attached in **Appendix 26**). The report includes the results of ship simulations completed for the proposed expansion using the Northport in-house simulator,[66] and considers the impact of the proposed expansion on navigation safety in the Whangarei Harbour. The results of the report are summarised below.

5.10.2 Navigation safety

Northport has a safety management system which manages navigation safety through a series of risk control mechanisms, including:

- Dynamic Under Keel Clearance (DUKC).
- Environmental limitations.
- Ship simulations.
- Turning basin size/dimensions.
- Pilotage and towage.
- Navigation Aids.
- Local Port Service.

The Navigation Safety report considers the proposed port expansion (including additional shipping movements and the consented Berth 4) and how the risk control mechanisms above will be used to maintain navigation safety. It also considers the possibility that the CINZL consented channel deepening and realignment will be carried out.

The report reaches the following conclusions:

- The reduction in the size of the Northport turning basin (resulting from the proposed reclamation) will not significantly impact ships with a length of 300m or less.
- Channel navigation to and from the Northport berths (including the proposed tug berthing facility) will not be significantly impacted. The existing CINZL jetties already impose a speed

[66] The simulator mimics the environment in which ships safely operate. By imposing high winds, strong tides and large waves, the marine pilot and tug master can trial environmental conditions not often experienced in normal operations. This can be used to set realistic environmental limitations on the movement of ships to ensure they can be controlled at all times.

restriction on Northport traffic and project further north into the harbour than the proposed new Northport berths.

- Recreational boating will not be significantly restricted by the proposed expansion. Recreational traffic moving to and from Whangarei Heads is already restricted to the northern part of the shipping channel due to the presence of both the existing Northport berths and CINZL jetties. The proposed expansion will impact an area not often used by recreational craft, as the CINZL jetties already prevent recreational boating use.
- Any deepening and/or realignment of the channel by CINZL will not materially affect the above conclusions.

In addition, it is also relevant that the management of vessel traffic in the harbour has been improved since 2016 for a range of reasons including:

- Implementation of a Local Port Service.
- Establishment of a ship handling simulator for conducting risk assessments and training of marine service staff.
- Ongoing and continuous risk assessments using risk assessment tools (Hazman2).
- Presence of a local Deputy Harbourmaster in the Lower Whangarei Harbour.

Overall, it is concluded that the proposed port expansion will not negatively impact on navigation safety for both commercial and recreational vessels.

5.10.3 Marine spill risk

The existing oil spill response plans are considered to be robust, and will be regularly reviewed in accordance with s297 of the Maritime Transport Act 1994.

5.11 Biosecurity

5.11.1 Biosecurity risks at Northport

There are potential biosecurity risks associated with the proposed port expansion. Broadly, these risks arise through:

- Specialised vessel movements during the construction phase.
- Additional submerged port infrastructure (additional surface area for marine pests).
- Potential changes in the frequency and geographic origin of shipping.

5.11.2 Construction phase biosecurity risks

Increased abundance of pest species from dredging

The relevant biosecurity risk during dredging is the alteration and disturbance of the seabed by dredging and spoil disposal, which may increase the susceptibility of seabed habitats to colonisation by NIS. [67]

Increased abundance of pest species from overseas specialised vessels and equipment

It is possible that specialised construction vessels (such as dredges, barges) and equipment will be sourced from overseas, and this could pose a marine biosecurity risk. Such vessels are likely to operate around Northport for a considerable period of time (weeks to months). Barges and dredge vessels are typically slow-moving and their travel history is characterised by long residency periods at previous destination ports. Because of this operational profile, they tend to accumulate higher levels of fouling biomass compared with faster moving vessels (e.g. container ships) that tend to stay in port for shorter periods (hours to days, usually < 1 week). Biofouling on slow-moving and towed vessels often contains marine NIS.

Other transport mechanisms (e.g. ballast water, residual dredge spoil) associated with specialised vessels can also pose a biosecurity risk.

5.11.3 Operational phase biosecurity risks

Increased abundance of pest species on new structures

It is likely that new submerged structures installed within Northport will provide a settlement habitat for NIS. Artificial substrates such as pilings, pontoons and seawalls are known to provide good habitats for biofouling assemblages and often have an over-proportional representation of NIS. Conversely, rip-rap walls are usually more impoverished and support less diverse assemblages, but in some cases, they are also known to feature extensive populations of fouling pests.

Increased abundance of pest species from changed vessel patterns

The proposed port expansion is likely to increase the frequency of vessel movements to and from Northport. While speculative, it is reasonable to assume that an increase in the vessel traffic (and possibly different types of vessel), as well as a change in the geographical origin of vessels arriving in the port, has the potential to pose a biosecurity risk to the region.

[67] Non-indigenous marine species.

5.11.4 Mitigation measures

Construction risk mitigation

A CEMP will be prepared as a condition of consent. As part of this plan, a biosecurity management plan will be prepared to manage the risk of biosecurity incursions. This plan will include the following:

(a) A description of the vessel and its attributes that affect risk, including key operational attributes (e.g. voyage speed, periods of time idle), maintenance history (including prior inspection and cleaning undertaken), and voyage history since last dry-docking and antifouling (e.g. countries visited and duration of stay);

(b) A description of the key sources of potential marine biosecurity risk from ballast water, sediments, and biofouling. This should cover the hull, niche areas, and associated equipment, and consider both submerged and above-water surfaces;

(c) Findings from previous inspections;

(d) If Northport is the first New Zealand destination, a description of the risk mitigation taken prior to arrival in New Zealand, including but not limited to:

   i. Routine preventative treatment measures and their efficacy, including the age and condition of the antifouling coating, and marine growth prevention systems for sea chests and internal sea water systems;

   ii. Specific treatments for submerged and above-water surfaces that will be undertaken to address the Import Health Standard (IHS) and Craft Risk Management Standard (CRMS) requirements prior to departure for New Zealand. These could include, for example, in-water removal of biofouling, or above-water cleaning to remove sediment;

   iii. Additional risk mitigation planned during transit to New Zealand, including expected procedures for ballast water management;

   iv. Expected desiccation period of above-water surfaces on arrival to New Zealand (i.e. period of air exposure since last dredging operations);

(e) If Northport is the first New Zealand destination, the nature and extent of pre-border inspection that will be undertaken (e.g. at the overseas port of departure) to verify compliance with IHS and CRMS requirements; and

(f) If Northport is the first New Zealand destination, record keeping and documentation of all mitigation undertaken (i.e. prior to and during transit to New Zealand) to enable border verification if requested by Ministry for Primary Industries or its successor, and to facilitate final clearance.

Operational risk mitigation

Mitigation of marine biosecurity risks associated with increased shipping operations will continue to be in accordance with the requirements of the IHS administered by MPI, the Marine Pathways Plan, and Proposed Regional Plan rules administered by the Northland Regional Council.

5.12 Noise & vibration (terrestrial)

5.12.1 General

Potential effects (including cumulative effects) of terrestrial noise and vibration from the construction, maintenance and operation of the expanded port have been assessed by MDL. The conclusions from this assessment are summarised below. Further detail is provided in the MDL report in **Appendix 4.**

5.12.2 Vibration

Construction vibration is predicted to be imperceptible at the closest sensitive receivers due to the very large setback distances.

5.12.3 Construction noise

Permitted baseline

Section 6.2 of the NAV section in the WDP requires noise from demolition/construction activities to be measured and assessed in accordance with New Zealand Standard NZS 6803: 1999 *"Acoustics - Construction Noise"*.

The permitted daytime construction noise limits in the WDP are:

- 70 dB L_{Aeq} and 85 dB L_{Amax} (7:30am-6pm), Monday to Saturday
- 45 dB L_{Aeq} (6pm-7:30am) Monday to Sunday
- Transitional shoulder periods apply in the morning, evenings and on Sunday.

Predicted construction noise levels

Predicted construction noise levels are shown in **Table 20** below.

***Table 20**: Predicted construction noise levels*

Activity	Equipment	Sound power level (dB L_{WA})	Required setback to comply with 70 dB L_{Aeq} daytime limit	Required setback to comply with 45 dB L_{Aeq} night-time limit
Reclamation	Medium excavator (up to 40T) Large excavator (up to 180T) Pumps (for slurry) Backhoe dredge Trailing suction hopper/cutter dredge (TSHD/TSCD)	105 113 93 111 107	30m 65m <10m 50m 36m	300m 630m 100m 525m 365m
	Mobile crane (placing rocks)	98	15m	160m
Piling	Vibro piling Impact piling (with dolly and casing mitigation) Bored piling Large crane	116 114 111 108	85m 70m 50m 40m	*Not proposed* *Not proposed* *Not proposed* 400m
General	Truck movements Concrete truck and pump	105 103	30m 25m	300m 250m

Given that the closest receivers (being the dwellings at Reotahi) are approximately 900m from the closest construction works, predicted construction noise levels for key activities will comply with the permitted WDP construction noise limits.

Construction noise effects

During the daytime, the predicted levels would be comparable to the ambient environment but may be noticeable due to the different character (e.g. the piling works). However, the levels are very low for construction, and will readily comply with the WDP day-to-day noise limit of 55 dB L_{day}.

All potential night-time activities are predicted to comply with the permitted night-time noise limits and would be largely indistinguishable from normal port activities, including excavation, dredging, equipment/material deliveries and concrete pours.

5.12.4 Operational Noise

Permitted baseline

The permitted noise levels for the Port Zone as set out in the NAV chapter of the District Plan are as follows:

- Daytime (0700-2200): 55 dB L_{Aeq}
- Night-time (2200-0700): 45 dB L_{Aeq} 75 dB L_{AFmax}

These are the same limits for activities in the CMA as contained in the PRP.

Predicted future peak period noise levels

Current predicted peak period port activities comply with the WDP 55 dB L_{day} daytime noise limit, and are at, or near, the 45 dB $L_{Aeq\ (15min)}$ night-time limit.

Predicted future peak period port activities on the expanded port are predicted to remain within the WDP 55 dB L_{day} daytime limit but would exceed the 45 dB $L_{Aeq\ (15min)}$ night-time limit in both Marsden Bay and Reotahi. The predicted exceedance is up to 7 decibels at the most exposed dwellings and controlled by the proposed expanded container operations.

L_{AFmax} noise levels are associated with discrete events (e.g. log or container placement). Representative events are expected to occur more frequently with increasing activity intensity but continue to comply with the 75 dB L_{AFmax} NAV limit.

Effects of a change in noise levels

While it is acknowledged that people may subjectively have an annoyance reaction to a greater or lesser degree, these individual and subjective variances are not used as a basis for assessing and controlling noise effects – instead an objective approach based on population level sensitivities is used.

The subjective impression of changes in noise can generally be correlated with the numerical change in noise level. While every person reacts differently to noise level changes, research shows a general correlation between noise level changes and subjective responses. Indicative subjective responses to explain the noise level changes discussed in the assessment below are provided in **Table 21.**

***Table 21**: Noise level change compared with general subjective perception*

Noise level	Effect description	Effect level under RMA
1-2 decibels	Insignificant/imperceptible change	Negligible
3-4 decibels	Just perceptible change	Slight
5-8 decibels	Appreciable to clearly noticeable change	Moderate
9-11 decibels	Halving/doubling of loudness	Significant
>11 decibels	More than halving/doubling of loudness	Substantial

It is relevant to note that noise is measured on a logarithmic scale. For example, a doubling in port activity intensity would result in a noise level increase of 3 decibels (a just-perceptible change). A tenfold increase would result in a noise level increase of 10 decibels, which would sound twice as loud.

Effects assessment

Port noise consists of two distinct components:

- The general 'hum' of port operations.
- Intermittent events such as 'banging' from log or container handling.

Detailed and technical modelling undertaken by MDL predicts the increased port noise levels associated with the proposal. Modelled noise levels are described below. For a detailed explanation of the modelling inputs and assumptions, refer the MDL report in **Appendix 4**.

Daytime 'hum' (Outdoor Areas)

Daytime noise effects are primarily associated with outdoor amenity.

The dwellings most exposed to port noise currently receive peak period levels of 42 – 46 dB L_{day} in Marsden and Reotahi respectively. These levels would not influence conversation voice level or general amenity in outdoor spaces.

Future peak period external noise levels are predicted to increase noticeably by about 5 decibels in both Marsden and Reotahi. The dwellings most exposed to port noise are predicted to receive peak period levels of 48 – 51 dB L_{day}. These levels are still well below the 55 dB L_{day} permitted level in the WDP. They are appropriate for residential amenity and would still not influence conversation voice level or general amenity in outdoor spaces, but general annoyance would likely increase.

Night-time 'hum' (Outdoor Areas)

Residential communities are more noise sensitive at night, primarily during sleeping.

Currently the dwellings most exposed to port noise receive external noise levels of up to 41 – 46 dB L_{night}. Inside bedrooms with the windows open, levels are predicted to be approximately 26 – 31 dB L_{night}.

There are typical noise level reductions from predicted external levels to those received inside a typical bedroom of 15 decibels with open windows[68] and 20 – 25 decibels with shut windows[69]. Further detail of design level ranges for evaluation of internal noise levels is set out in AS/NZS 2107: 2016, as discussed in the MDL report.

In general, port noise is expected to be audible inside bedrooms at times but generally acceptable for most of the population.

Future peak period external noise levels are predicted to increase noticeably to 47 – 51 dB L_{night} for the most exposed dwellings. The corresponding noise level received inside bedrooms with the windows open is predicted to increase proportionally to 32 – 36 dB L_{night}. Port noise levels would be clearly audible inside bedrooms on busy nights and intrusive at times with open windows. Some residents may choose to shut windows to improve sound insulation performance during these busy times.

Intermittent noise events (L_{Amax})

There is no change to predicted representative L_{Amax} noise event levels (e.g. container and log placement). An increase in the number of noise events is predicted to be proportional to the increase in intensity of future port activities.

Port noise complaints are often aligned with outlier noise events, such as closing ship hatches 'hard' or inadvertently dropping a log or logs into the bottom of the ship's hold. These events are not regular, repeatable, or predictable, but the number of outlier events should reduce further as port noise management measures continue to evolve as the Port Noise Management Plan is updated and implemented.

5.12.5 Mitigation Measures

The proposed port noise limits detailed in Section 3.4 of this report are part of a package of provisions, collectively designed to manage the effects of port noise on sensitive (primarily residential) activities. These provisions include a requirement that, for dwellings that are modelled to be exposed to noise levels above the specified limit (55 dB $L_{dn\ (5\text{-}day)}$), the port offer to pay for mechanical ventilation to enable windows to be closed at night, as a means to managing the night-time hum in habitable rooms. Regardless of noise level, they also require the implementation of a Port Noise Management Plan (PNMP) to manage (amongst other things) intermittent noise events in accordance with best practice.

The overarching objectives of the PNMP are:

- *Ensure the port complies with the relevant noise performance standards*
- *Provide a framework for the measurement, monitoring, assessment, and management of noise*
- *Identify and adopt the BPO for the management of noise effects*

[68] Assumes a typical window open on security stays for ventilation purposes (e.g. 100mm opening width).
[69] Assumes 20 decibels for lightweight older style dwellings with timber joinery and 25 decibels for modern lightweight dwellings with aluminium joinery.

- *Require engagement with the community and timely management of complaints*

A draft PNMP is included in the MDL report in **Appendix 4**.

Specific mitigation measures are as follows:

Night-time hum – mechanical ventilation

NZS 6809:1999 *"Acoustics – Port Noise Management and Land Use Planning"* recommends a maximum of 45 dB $L_{dn\ (5\text{-}day)}$ in habitable indoor spaces. While the Northport modelling predicts that this can be achieved with no mitigation, Northport proposes to offer mechanical ventilation to enable windows to be closed at night to achieve a spatial average indoor design sound level of 40 dB $L_{dn\ (5\text{-}day)}$.

The implementation of the above requirement will be primarily informed by the annual review of the port noise contours required under the PNMP. Therefore, a requirement for the port to offer noise mitigation for existing dwellings will be triggered when the noise effects materialise (i.e. when predicted or measured noise exceeds 55 dB $L_{dn\ (5\text{-}day)}$).

Intermittent noise events – best practice

Intermittent noise effects (bangs and crashes) will be managed by the adoption of best practice under the Port Noise Management Plan.

5.12.6 Cumulative effects

The current peak period port night operations period was measured in 2018 at 14 The Heights, Reotahi in a joint monitoring project between Northport and Refining NZ. This site was chosen due to:

- **Availability/security**: There was an existing relationship between the refinery representative and the site owners.
- **Exposure**: Excellent line of sight to both the refinery and the port.
- **Position**: Elevated away from busy roads and the water's edge.

The long term monitoring data was supplemented with attended measurements in the Reotahi and Marsden communities and near the water's edge.

The cumulative noise level (47 dB $L_{Aeq\ (15min)}$) was a mix of Northport (43 dB $L_{Aeq\ (15min)}$), Refinery (44 dB $L_{Aeq\ (15min)}$), and other environmental and community components (39 dB $L_{Aeq\ (15min)}$).

The Refinery stopped its refining activities in June 2022. Residual storage and logistic activities are yet to be quantified through measurements in isolation, but noise contributions received in Reotahi are expected to be reduce appreciably. It is assumed that the Refinery contribution to overall noise will reduce by 10 decibels at 14 The Heights, Reotahi from that measured in 2018.

A noticeable increase in port noise levels is predicted as a result of the proposed expansion, but a negligible to just-perceptible increase in cumulative noise levels (relative to measured levels prior to the Refinery shut down in June 2022).

It is important to note that these predictions focus only on the peak 5 days of the year, and the peak 15-minute night-time period in the year. The annual median noise level for a fully developed New Zealand

port is typically 3 decibels below the peak operating period based on long-term measurement results from other similar sized ports in New Zealand (e.g. Napier). Overall, the changes would be less noticeable outside the peak operations periods.

5.12.7 Overall effects conclusions

Overall, provided that compliance with the proposed noise limits (based on modelled results) is achieved, coupled with the proposed mitigation measures, port noise effects will be **no more than minor**.

MDL's effects conclusions are as follows:

- **<50 dB Ldn (5 day): Less than minor** (Marsden and Reotahi generally)
  - Port may be audible at times but continues to be generally complaint with the operative WDP port noise limits.
  - Negligible increase in cumulative noise level (i.e. inclusive of port, refinery and other environmental and community noise contributions) by 2035 compared with the measured noise environment prior to the refinery shut down in 2022.
- **50 - 55 dB Ldn (5 day): Minor** (14 existing dwellings in Marsden and 14 in Reotahi, rising to 49 in Marsden and 60 in Reotahi by 2035)
  - Negligible to just perceptible increase in port noise enabled above the operative WDP night-time port noise limit of 45 dB LAeq (but remains compliant with other noise limits).
  - Negligible to just perceptible increase in cumulative noise level by 2035.
  - Northport propose a Noise Management Plan to minimise port noise effects (but no façade mitigation eligibility in this band).
- **55 – 58 dB Ldn (5 day): Moderate** (no existing dwellings, but 16 in Reotahi by 2035)
  - Noticeable increase in port noise enabled above the operative WDP night-time noise limit of 45 dB LAeq.
  - Just perceptible increase in cumulative noise level by 2035.
  - Northport propose port funded mitigation for dwellings (reviewed annually for eligibility) – then effects will be **minor.**

5.13 Archaeology

5.13.1 General

Potential effects on archaeology from the construction of the expanded port have been assessed by C+A. The conclusions from this assessment are summarised below. Further detail is provided in the C+A report in **Appendix 16.**

5.13.2 Effects

No archaeological deposits were encountered during the survey by C+A. The potential for undetected subsurface remains within the project area is 'very low'.[70]

5.13.3 Mitigation measures

The accidental discovery protocol will be adhered to being:

- If subsurface archaeological evidence should be unearthed during construction (e.g. intact shell midden, hangi, storage pits relating to Māori occupation, or cobbled floors, brick or stone foundation, and rubbish pits relating to 19th century European occupation), work should cease in the immediate vicinity of the remains and Heritage NZ and the Council should be notified.
- If modification of an archaeological site does become necessary, an Authority must be applied for under Section 44(a) of the HNZPTA[71] and granted prior to any further work being carried out that will affect the site. (Note that this is a legal requirement).
- In the event of koiwi tangata (human remains) being uncovered, work should cease immediately in the vicinity of the remains and the tangata whenua, Heritage NZ, NZ Police and Council should be contacted so that appropriate arrangements can be made.
- Since archaeological survey cannot always detect sites of traditional significance to Māori, such as wahi tapu, the tangata whenua should be consulted regarding the possible existence of such sites within the project area.

5.14 Recreation effects

5.14.1 General

Potential effects (including cumulative effects) on recreation values from the construction and operation of the expanded port have been assessed by RGA. The conclusions from this assessment are summarised below. Further detail is provided in the RGA report in **Appendix 19.**

[70] Clough and Associates Archaeological Assessment (2021), Page 23
[71] Heritage New Zealand Pouhere Taonga Act 2014.

5.14.2 Assessment context

The assessment of recreation effects carried out by RGA is based on the matrix contained in Table 17 of the RGA report (reproduced below).

Table 17: Scale of impact on recreation values considering magnitude of effect

		Recreation value			
		Very High	**High**	**Moderate**	**Low**
Magnitude of effect	**High or severe**	Significant	Significant	Moderate	Minor
	Moderate or medium	Significant	Moderate	Minor	Minor
	Low or minor	Moderate	Moderate	Minor	Minor
	Negligible	Negligible	Negligible	Negligible	Negligible

In respect to this matrix, the report describes a 'significant' adverse effect as one that is likely to force many or most people to recreate in other settings, at different times, or not at all, but not necessarily for all activities which occur there, and where amenity will be degraded. It describes a 'minor' adverse effect as one that will displace a small number of users for short periods, but amenity will almost always be preserved for the majority of activities and users. It also states that the scale of effect may be reduced if the area affected is confined and there are ample suitable alternative opportunities for relevant activities.

5.14.3 Potential effects

The following are potential adverse effects of the proposed expansion:

Construction and maintenance

- Turbidity effects on recreation settings (particularly swimming and diving areas) and visual amenity at and near the Harbour entrance.
- Mobilisation of contaminants and potential effects on shellfish and other seafood, and for water-contact recreation,
- Effects on marine ecology and the quality, abundance, and catchability of marine species, during the dredging period/s,
- Occupation of marine settings by dredges working or in transit and the creation of hazards for (especially) boat users.

Operation

- Changes to tides, currents and wave patterns resulting from altered bathymetry.
- Loss of a section of the beach to the east of Northport.

- Loss of access to the eastern ferry pontoon for fishing and transferring walkers on the Te Araroa Trail.
- Changes to navigation patterns of recreational boats due to larger scale of the wharf structures.

5.14.4 Effects related to construction and maintenance activities

Turbidity and contaminants

Based on the conclusions in the MO and T+T coastal processes reports, and research undertaken for the CINZL harbour deepening proposal, the temporary effects from turbidity and contaminants from dredging and reclamation construction activities are unlikely to be significant due to the clean nature of sand at the harbour entrance.

Effects of dredging activity on recreational boating

Because most of the proposed dredging area is already subject to maintenance dredging and navigation restrictions when ships are in port, the effects of dredging activity associated with the proposed expansion on recreational boating will be **minor.**

Changes to tides and currents

The harbour entrance is a naturally high-current speed setting, with depth changes and coastal rocks directing flows and creating natural variations in flow speed and direction. The modelled changes in current speed are unlikely to be recognised by recreational boaters in such a dynamic setting, and where a reasonable level of competence is expected of skippers.

Access closures to Marsden Bay Beach during construction

There will be periods of approximately 6 to 12 months where access to the beach to the east of Northport will be limited while the revetment is constructed, and public facilities are built. Alternative access to the beach will be available via Mair Road south of the CINZL terminal – a distance of 2km. There are many alternative fishing and swimming sites in the harbour and around the Harbour entrance area, including the local fishing platform on the western side of Northport. Effects from temporary closures at the regional level will be minor, but locals who regularly visit the beach are likely to be more inconvenienced. Effects will, however, be temporary. Alternative boat access to Marsden Cove will be available for the Te Araroa Trail ferry.

5.14.5 Operational effects

Changes to currents and wave patterns resulting from altered bathymetry

Hydrodynamic modelling indicates a minor increase in current speed in Marsden Bay and a minor decrease in current speed on the northern side of the harbour entrance opposite the wharf. The modelled speed changes in current are unlikely to be recognised by recreational boaters in such a dynamic setting, and where a reasonable level of competence is expected of skippers.

Loss of part of beach & fishing pontoon

The proposed expansion will remove just over half of the beach located to the east of Northport. This will affect the ability of beach users to disperse themselves along the beach and result in a reduced sense of scale.

As detailed in Section 3.9 of this report, Northport has committed to retaining the key recreation opportunities to the east of the port including:

- Creation of a public park/reserve area at the eastern end of the expanded port.
- A relocated carpark and toilets to allow easy access to the beach.
- A new pontoon for fishing, swimming, and socialising, and to operate as a terminal for the Te Araroa Trail ferry.
- Beach and water access points suited to socialising and swimming, developed to attract such users to the western end of the beach away from one of the preferred fishing areas near the CINZL wharf, and to reduce disturbance of roosting birds along the beach.

Notwithstanding the mitigation measures described above, adverse recreation effects on the beach to the east of Northport will remain due to the loss of beach area and diminution of the scale of the setting. RGA concludes that adverse recreation effects on the beach will remain due to the loss of beach area and diminution of the scale of the setting, which are likely to be significant locally and more than minor regionally.

Te Araroa Trail

The delivery or uplift of walkers on the Te Araroa Trail could be either via the new fishing pontoon, via the Marsden Cove marina facilities, or directly onto the Marsden Bay Beach.

Navigation by recreational craft

Navigation by recreation craft around the new port facilities is likely to continue as it does now, but with more caution required by skippers as they navigate a busier port setting (noting the port exclusion zone as established in the Navigation Safety Bylaw). Considering the continued large-scale recreational boating in areas such as Auckland and Tauranga Harbours, with their substantial port services and large recreational fleets, there is no indication that recreation navigation will be disrupted.

Recreational fishing and shell fishing

Fishing was the dominant activity recorded at Marsden Bay Beach. The marine ecology assessment found that effects on fish are likely to be negligible because of their mobility, the relatively small scale of habitat permanently lost, and likely recovery of habitats of importance to fish in existing wharf areas. The existing rock revetment at the wharf (a length of 155m) which provides marine reef habitat, will be replaced with 483m of revetment, which, once recolonised, presents a net benefit to local reef habitat.

While a 'very high' number of cockles were identified within the proposed reclamation footprint by the marine ecology assessment, very few were of harvestable size, and no pipi of harvestable size were found. Very little shell-fishing was observed as a recreational activity on Marsden Bay Beach during the two user surveys. At the regional level, effects on recreational shell fishing are likely to be minor considering the scale of alternatives and low level of activity at Marsden Bay Beach.

The marine ecology assessment also concluded 'less than minor' adverse effects on water quality from the discharge of stormwater from the reclamation area once operational.

5.14.6 Mitigation measures

Park/reserve

A public park/reserve area is to be developed at the eastern end of the expanded port, above the residual beach area (see details in **Section 3.9** of this report).

Fishing/water taxi pontoon

While the existing eastern pontoon was not specifically established for fishing or swimming, the use of the wharf by the public for these activities is recognised. It is therefore proposed to incorporate a public pontoon and associated public access on the eastern side of the port with access provided via the public park/reserve.

5.14.7 Overall effects conclusions

The effects on recreation values and activities are as follows:

- Effects relating to construction and maintenance activities will be **minor**, although there will be temporary displacement of most use of the beach to the east of Northport for at least 6 to 12 months of the construction period.
- Notwithstanding the mitigation measures described above, adverse recreation effects on the beach to the east of Northport will remain due to the loss of beach area and diminution of the scale of the setting. RGA concludes that adverse recreation effects on the beach are likely to be **significant** locally and **more than minor** regionally.
- There will be no change to the Te Araroa trail harbour connection.
- Effects on navigation due to changes in currents and large vessel activity will be **minor or less.**
- There will be some **minor** temporary effects on recreational fishing post dredging and construction until recovery.

RGA concludes that the cumulative effects of the proposal, together with completion of Berth 4 and the CINZL dredging consents will not be appreciably different from the effects of the proposal on its own, those being **significant** locally and **more than minor** regionally according to the matrix in Section 5.14.2 of this report.

5.15 Stormwater discharges

5.15.1 General

The potential effects of stormwater discharges from the proposed port expansion have been considered by C+C with technical support from HGL. The key conclusions are summarised below. Further detail is provided in the technical report in **Appendix 20**.

5.15.2 Potential effects

Logs are likely to have the greatest influence on the quality stormwater from the Northport site. Other sources of contaminants include bulk cargoes transferred through the port, including phosphate rock, palm kernel, grain, coal, gypsum, sulphur, and refined fertiliser. Special provisions are made for potentially hazardous products or processes, which are bunded and or self-contained so that they are effectively isolated from the stormwater system.

5.15.3 Assessment

Stormwater will continue to be managed via the existing pond and canal-based stormwater containment system described in Section 4.16.2 of this report, potentially augmented by proprietary devices depending on the final port design.

System capacity

Stormwater from the expanded port footprint will exceed the dead storage volume currently available in the existing pond by 510m^3. However, calculations carried out by HGL have confirmed that this additional volume can be provided within the base of the lengthened canal network.

Water quality

Container operations on the expanded port are not high-risk activities in respect to stormwater. Therefore, the same treatment methodology employed for the existing port will be retained for the expanded port.

Results from the monitoring indicate that Northport has displayed a high level of compliance with the terms of the NRC discharge consent, and that the quality of discharged stormwater is high. These same requirements are to be included as conditions of the new consent being sought for the expanded port.

Based on monitoring data and state of the environment reporting, the current discharge poses little ecological risk.

5.15.4 Mitigation measures

- Compliance with conditions of consent relating to stormwater discharge quality.
- Removal of bark and wood debris to off-site landscape suppliers.
- Routine sweeping.
- Dust suppression measures.
- Regular cleaning of catchpits and treatment devices.

5.15.5 Overall effects conclusions

Discharge water quality is expected to be similar to discharges from the existing system, notwithstanding that there will be a slight increase in total discharge volume.

Overall, the proposed expansion is expected to have a **negligible** effect on water quality and ecological values, based on the following:

- Past monitoring and assessments indicate that key contaminant concentrations are well below toxicity guidelines after reasonable mixing.
- The outfall discharges to a high flushing area.
- Due to the containment and management prior to discharge, contaminants are unlikely to permanently settle and accumulate in the local receiving environment.

5.16 Air quality

5.16.1 General

Potential effects (including cumulative effects) on air quality from fugitive dust emissions during the construction and operation of the expanded port have been assessed by PDP. The conclusions from this assessment are summarised below. Further detail is provided in the PDP report in **Appendix 21.**

5.16.2 Nuisance dust emissions during construction

Assessment methodology

PDP undertook a FIDOL[72] assessment to assess the potential nuisance dust effects from the construction and reclamation process. The assessment considered the following matters:

- Frequency - noting that only winds above 5 m/s have the potential to cause dust nuisance effects on the nearest sensitive receptors.

[72] Frequency, Intensity, Duration, Offensiveness and Location.

- Intensity – potential for intense dust effects on the beach.
- Duration – Period in which effects may be experienced at any one time.
- Offensiveness – contingent on quantity of dust present at any one time.
- Location – Distance from the nearest dwelling, and proximity to beach and public carpark.

Frequency

In dry windy conditions, particularly if disturbed, the marine sediments can be lifted by winds greater than 5 m/s at ground level. Based on wind speed data, the frequency of winds above 5 m/s from the west to the northwest (which have the potential to carry dust from the new port area to the beach) is between 1.3 and 2.2 percent of the time. Likewise, winds from the north to the northeast have the potential to transport dust towards the carpark at Ralph Trimmer Road with the frequency of winds (greater than 5 m/s) from this direction between 0.9 and 3.4 percent of the time. These percentage of winds are classified as infrequent, and the associated effects will be **low**. This in combination with the proposed mitigation and monitoring, means that that the frequency of any effects associated with the reclamation will be **low**. Furthermore, people are less likely to go to the beach during strong winds, therefore further reducing the frequency in which people may be exposed to elevated dust conditions.

Intensity

Without mitigation, there is potential for reasonably intense dust effects on the beach, beach access, and the carpark once material is placed near the perimeter of the reclamation and is above the high tide level. The potential intensity of any effects will reduce as the reclamation moves north. Subject to the mitigation measures outlined below, the intensity will be **low.**

Duration

Based on the visual monitoring, and subject to the mitigation measures outlined below, if a fugitive dust event was to occur, at worst the duration would be limited to a period of no more than one hour at any one time.

Offensiveness

Dust emissions associated with the reclamation/construction process are unlikely to be present in such quantities that they result in any off-site offensive or objectionable effects. This is based on the limited frequency of suitable meteorological conditions, the activities undertaken, and mitigation measures that will be implemented.

Location

The reclamation is located approximately 1,000 metres from the nearest residence. This is well beyond the distance that any dust associated with the construction process would travel.

In terms of the beach and the carpark, while the construction will generally move away from these locations, it will initially be very close.

5.16.3 Fugitive dust emissions during operation

Based on the current container operations at the port, once the new port area becomes operational there will be very little potential for dust emissions from this location.

5.16.4 Emissions from combustion engines during operation

Emission-producing activities for ports can be grouped into the following three sources:

Port Direct Sources - These sources are directly under the control and operation of the port administration entity and include port-owned fleet vehicles, port administration owned or leased vehicles, buildings (e.g., boilers, furnaces, etc.), port-owned and operated cargo handling equipment, and any other emissions sources that are owned and operated by the port administrative authority.

Port Indirect Sources - These sources include port purchased electricity for port administration owned buildings and operations.

Other Indirect Sources - These sources are typically associated with tenant operations and include ships, trucks, cargo handling equipment, rail locomotives, harbour craft, tenant buildings, tenant purchased electricity, and port and tenant employee commuting (train, personal car, public transportation, etc.).

Once the newly reclaimed land becomes operational, the area will be used for container operations which will result in very little air emissions. Given that there will only be a small amount of additional combustion emissions from this area and the current background air quality, the low levels of discharges from vehicles operating in on the port, combined with existing emissions from nearby industry (and noting the reduced level of emissions from CINZL subsequent to the cessation of refining operations), will have less than minor cumulative effects.

Northport has been actively reducing its carbon footprint for some time now as part of its 2050 emissions reduction initiative. Examples include the replacement of fleet vehicles with electric vehicles, and changes to the procurement process whereby new equipment is preferred over older equipment that does not meet modern emission standards.

5.16.5 Mitigation measures

Construction

The proposed mitigation measures for air emissions during the construction phase will be included in an air quality management plan which is to be included as part of the CEMP.

Key components of this plan are as follows:

- Measures to minimise fugitive dust emissions during the movement and placement of material.
- Guidelines for the removal and stockpiling of material during windy conditions.
- Measures to minimise emissions from combustion engines.

Operation

Once the expanded port area becomes operational it will be used for container operations. From an air quality perspective there are very little air emissions from this type of operation other than the emissions from the vehicles used to move the containers.

While not proposed as a condition of consent, Northport is committed to reducing its carbon footprint, and specifically emissions from combustion engines operating on the port.

To minimise emissions from these vehicles Northport will continue to implement management measures which include the following:

- Not leaving vehicles idling while unattended.
- Purchasing new, more efficient machinery where practicable – including machinery that is electrified, or capable of electrification.
- Maintaining vehicles regularly.
- Where practicable, electrification of port plant and equipment when replacement or upgrades are required.
- Consider the use of carbon efficient machinery during construction where practicable.

5.16.6 Overall effects conclusions

Based on the FIDOL assessment, there is very limited potential to be affected by dust (even without mitigation) due to distance, but there may be some adverse effects on users of the beach. However, given the limited period in which members of the public will use the beach and carpark, and subject to the employment of the dust mitigation measures outlined in Section 5.16.5 of this report, it is unlikely that these users will experience offensive or objectionable dust effects during construction of the proposed port expansion.

5.17 Traffic effects

5.17.1 General

Potential effects (including cumulative effects) on traffic safety and efficiency during the construction and operation of the expanded port have been assessed by WSP. The conclusions from the WSP assessment are summarised below. Further detail is provided in the WSP report in **Appendix 27.**

5.17.2 Assessment context/assumptions

The assessment of traffic effects carried out by WSP is based on the full development of Northport (including cruise ships). Key assumptions for the full development traffic are as follows:

- Cruise ships will make use of the facility from year 5 reaching a maximum number in year 10.
- Staff numbers to increase from 300 to 400.
- Total additional port traffic on SH15 will be 806 trips per day, of which 142 trips can be attributed to the 100 additional staff numbers.
- In 2018, the total average daily port traffic was approximately 64% (2,802/4,363) of total SH15 traffic. This ratio is expected to reduce significantly in the future following the planned residential development surrounding SH15. It is estimated that the ratio of total port traffic to total SH15 traffic will be approximately 30% in year 2033 (3,290/10944) and 26% in year 2040 (3,608/13,666).
- The logging related traffic is a large contributor to overall port traffic and is subject to seasonal and cyclical peaks and troughs. According to the Northport wood availability forecast (2018) there is likely to be a reduction in the availability of logs, followed by a longer-term increase in supply.

5.17.3 Affected road network and existing intersection safety

The intersections primarily affected by the proposed port development are as follows:

- SH1/SH15 roundabout.
- SH15/Salle Road intersection.
- SH15/One Tree Point/McCathie Road intersection.
- SH 15/Marsden Point Road Intersection.
- SH15/Marsden Bay Drive/Rama Road Intersection.
- SH15/Mair Road Intersection.

There are no identified immediate visibility or sightline concerns at these intersections. They have adequate shoulder width to allow through traffic to bypass any turning traffic.

5.17.4 Potential injury crashes

An assessment of the crash rate for the six key intersections without the port expansion was conservatively calculated to be 0.6 injury crashes per year. The injury crash rate for these intersections after the proposed port expansion is conservatively calculated to increase injury crashes by 0.01 per year (less than 1 injury crash over a 20 year period).

5.17.5 Carparking

Northport will provide enough parking within the port to ensure that additional port expansion traffic parking does not adversely affect traffic operations on SH15.

5.17.6 Cruise ship tourists

Tourists are expected to begin traveling through the port within the next five years as cruise ships begin to use Whangārei as a destination location. Despite some short-term disruption from COVID, the number of cruise ships is expected to reach a consistent 30 ships per annum within the next 20 years, averaging 1,500 people per ship. It is assumed that most cruise ship visitors will be transported by bus to their respective destinations.

5.17.7 Recreation and access around Northport

Traffic accessing the remaining beach area and the proposed public reserve area to the east of Northport is expected to typically occur outside of peak periods and on weekends. This traffic is not expected to materially affect SH15 traffic.

5.17.8 Impact of full port development on the existing and future road network

Assumptions

The Whangarei Tracks Network Model was used to confirm the future expected traffic volumes with planned land growth both with and without port expansion. Key intersections were modelled in SIDRA to assess the future performance of the network at an intersection level along SH15. The analysis assumed a worst-case scenario, where port traffic occurs at the same peak periods as normal traffic (8.00am to 9.00am for the morning peak and 4.00pm to 5.00pm for the afternoon peak). However, peak port traffic typically occurs outside the normal peak traffic periods and so the model results are conservative.

The model was run with the following four scenarios:

- Scenario 1: 2033 Base Model – Residential growth without additional port traffic.
- Scenario 2: 2040 Base Model – Residential growth without additional port traffic.
- Scenario 3: 2033 Future Model – Residential growth with additional port traffic.
- Scenario 4: 2040 Future Model – Residential growth with additional port traffic.

Comparisons have been made to these scenarios to determine the traffic effects generated from the Northport development at the six key intersections. It has been assumed that full port expansion has occurred by 2033.

SH15 Mid-Block capacity

An assessment was carried out to check if the port expansion traffic would cause mid-block capacity issues on SH15. The predicted daily traffic volume at 2033 (with the uniform growth rate) is 10,456. Adding the estimated additional daily port traffic at 2033 of 806, results in a total SH15 traffic count of 10,944 vehicles per day. With increased residential growth the total SH15 traffic increases to 13.666 vehicles per day in 2040.

The anticipated traffic on SH15 in 2040 means that the single lane highway (urban regional arterial) will still operate within its daily expected capacity.

SH15/SH1 intersection

The modelling results for the SH1/SH15 roundabout for 2040 show that the intersection will operate beyond capacity without the port expansion during the morning peak, and almost at capacity during the afternoon peak, on some approaches. With full port expansion, the roundabout intersection in 2040 is expected to function better compared to the without-port expansion scenario. This is because, by that date, more people will be attracted to live locally in Marsden/Ruakaka due to additional work opportunities, leading to less trips from outside the area.

The 2033 model for the intersection shows that it operates without any issues with and without port traffic in 2033 for morning and afternoon peak results.

SH15/Salle Road intersection

The modelled results confirm that there are no issues during both peaks at the SH15/Salle Road intersection with additional port traffic in 2033 and 2040.

SH15/One Tree Point/McCathie Road intersection

The modelling results show that the intersection will have no issues following the full port expansion in 2033. However, the One Tree Point approach to the intersection will experience long delays and perform beyond capacity with LOS F[73] in 2040. Beyond 2033, it is predicted that the intersection will need to be upgraded to prioritise the movement of additional traffic expected on One Tree Point Road from locally generated residential traffic.

SH15/Marsden Point Road intersection

The modelling results confirm that this intersection will have no issues in 2033 with full port expansion. However, during the morning peak the Marsden Point Road approach of the SH15/Marsden Point Road intersection will operate over capacity (LOS F) in 2040 with the port expansion due to the large volume of right turning traffic (343 vehicles per hour) during the

[73] **Level of Service (LOS)** involves a qualitative assessment of the quantitative effect of factors such as speed, volume of traffic, geometric features, traffic interruptions, delays, and freedom to manoeuvre. There are six levels of service, with 'A' representing the top level as a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream and 'F' representing the bottom level.

morning peak. Beyond 2033 it is predicted that the intersection will need to be upgraded to provide for the additional right turning traffic expected on Marsden Point Road during the morning peak.

SH15/Marsden Bay Drive/Rama Road Intersection

The modelling results show that during both morning and afternoon peaks, the Marsden Bay Drive approach of the SH15/Marsden Bay Drive intersection will operate over capacity (LOS F) in 2040 with full port expansion. The modelling also shows that in 2033 with full port expansion, the approach of this intersection will perform at LOS E in the morning peak. This confirms that at completion of the port expansion, the intersection will be approaching capacity.

SH15/Mair Road intersection

Mair Road provides secondary access to the CINZL terminal. Due to the short right turn bay (60m) on SH15, the critical delay at this intersection will be for the right turning movements from SH15 to Mair Road, to ensure the queue does not extend to the through lane.

Northport has advised that there are very few trucks accessing the Mair Road intersection - an estimated maximum of six to eight trucks during the peak hours. This equates to a peak arrival rate of one truck arriving every 7.5 minutes which would allow ample time for a truck to find a gap in traffic for the right turn movement before the next truck arrives. The impact of the port traffic is expected to be minimal at this intersection.

The recent cessation of refinery functions at the CINZL site, and the change to a dedicated import terminal is expected to have minimal impact on this assessment. If anything, the number, and frequency of truck movements associated with terminal operations is anticipated to be less than during previous refining operations, and so the above assessment is conservative.

Key intersections capacity analysis

Following sensitivity testing it was estimated that some of the critical intersections are likely to reach capacity in 2035 for morning peak hour. This occurs when the intersection volume reaches approximately 1,100 vehicles per hour for SH15/Marsden Point Road, 1,250 vehicles per hour for SH15/One Tree Point Road and 1,300 vehicles per hour at the SH15/Marsden Bay Drive intersection.

Peak spreading sensitivity analysis – all intersections

A sensitivity analysis has confirmed that a 20% reduction of through port traffic during both the morning and afternoon peaks would ensure that the key intersections perform at an acceptable LOS D in 2040. This reduction could be achieved through the mitigation measures identified in Section 5.17.10 below. Accordingly, the proposed mitigations include management methods to reduce port-related traffic movements during those peak times.

5.17.9 Traffic distribution on SH15

Following the anticipated residential development in the Marsden Point area the percentage contribution of heavy vehicles on the SH15 is expected to reduce after the port expansion. This is mostly due to local residential traffic growth contributing to a significant increase in small vehicles on SH15. At present, the percentage of heavy vehicles on SH15 is approximately 20%. This is expected to reduce to 14% heavy vehicles and 1.33% buses, giving a total HV percentage of 15.33% after full port expansion.

5.17.10 Mitigation measures

Port construction

Much of the port construction will utilise on/in water methods. However, there will be some temporary impacts associated with land-based works, which will include minor increases in truck traffic carting construction supplies to and from site.

Any traffic effects arising during the construction period can be suitably mitigated through measures included in a construction traffic management plan, including:

- Methods to manage the effects of temporary traffic management activities on general traffic;
- Measures to manage the safety of all transport users;
- The estimated numbers, frequencies, routes and timing of construction traffic movements, including any specific non-working or non-movement hours to manage vehicular traffic or to manage traffic congestion;
- Site access routes and access points for heavy vehicles, the size and location of parking areas for plant, construction vehicles and the vehicles of workers and visitors;
- Identification of detour routes and other methods for the safe management and maintenance of traffic flows, including cyclists, on existing roads;
- Methods to maintain vehicle access to property where practicable, or to provide alternative access arrangements when it will not be;
- The management approach to loads on heavy vehicles, including covering loads of fine material, the use of wheel-wash facilities at site exit points and the timely removal of any material deposited or spilled on public roads;
- Methods to communicate traffic management measures to affected road users such as residents/public/emergency services.

Port operation

To minimise the impact of the port related traffic on SH15 for the worst-case scenario, Northport would need to implement traffic management and mitigation measures during peak times. The sensitivity analysis of the peak hour traffic has shown that a 20% reduction of port through traffic

is needed on SH15 to ensure the critical intersections perform at an acceptable LOS "D" in Year 2040.

It is recommended by WSP that Northport should only review the port traffic trigger volumes against the trigger volumes on SH15 when the total volumes at the critical intersections[74] are approaching capacity (1,350 vehicles per hour). If, at the time of this review, the port traffic trigger volumes for each intersection are not exceeded, no upgrading of the respective intersection will be necessary. The port traffic trigger volumes are contained in **Table 22** below.

***Table 22**: Port traffic trigger volumes*

Critical intersections	Northport Inbound AM Peak Hour Trigger Volumes	Northport Outbound AM Peak Hour Trigger Volumes
SH15/Marsden Bay Drive	700	200
SH15/Marsden Point Road	700	200
SH15/One Tree Point Road	300	200

Measures that could be employed by Northport to ensure that the trigger volumes are not exceeded include:

- Avoiding the port peak coinciding with the network peak by:
  - Implementing a vehicle booking system for container trucks to distribute the traffic load over the Port's operating hours (24 hours a day) as much as possible.
  - Encouraging the supply chain to operate 7 days a week to reduce truck movements during the weekdays when the network is busy.
- Reducing traffic volumes to and from the port by:
  - Encouraging mode sharing for staff transport to and from work.
  - Moving freight to rail when available.
  - Transporting cruise ship passengers by buses and disembarking outside peak periods only.

It is only in the situation that total traffic volumes at the critical intersections are approaching capacity, *and* port traffic trigger volumes for the respective intersection are exceeded, that WSP recommends Northport should be responsible for contributing to the upgrade of the relevant intersection(s). This is viewed as an appropriate recognition of the increased traffic demand placed on those critical intersections from a variety of sources.

[74] SH15/One Tree Point, SH15/Marsden Point Road, SH15/Marsden Bay Drive.

5.17.11 Overall effects conclusions

The potential traffic effects of the proposed port expansion are summarised as follows:

- The supporting road network accessing the port currently operates within its traffic carrying capacity for both intersections and mid-blocks, with intersections performing with good levels of service.
- SH15 is a regional arterial road with one lane each way. The capacity of this road network is between 15,000 to 18,000 vehicles per day.
- With full port expansion SH15 has adequate capacity at midblock sections with SH15 volumes reaching 13,666 vehicles in 2040.
- The safety and sightline assessment of the key side road intersections with SH15 has identified no existing safety issues.
- The crash risk assessment has shown that port expansion induced traffic will increase total injury crash rate for the SH15 corridor by only 0.01 reported injury crashes per year, which equates to one additional injury crash over the next 20 years on SH15.
- Should total and port related traffic reach pre-determined trigger levels at the SH15 intersections, the critical intersections will need to be upgraded to avoid adverse effects.

5.18 Economic effects

5.18.1 General

The potential economic effects of the expanded port have been assessed by ME. The conclusions from this assessment are summarised below. Further detail is provided in the ME report in **Appendix 22.**

National role of ports

The port and freight sectors are key enablers of the supply chain, which in turn impacts on the performance of the economy and therefore the standard of living in New Zealand.

Ports are vital for the New Zealand economy with over 99% of New Zealand exports and imports going through ports. They also enable the movement of coastal container products and bulk goods such as cement and fuel.

Ports form a part of the national transport system which also includes, road, rail, and air. Road and rail provide the bulk of the domestic system (particularly for freight movement) while sea and air are the links to global markets.

The efficiency and free movement of goods across the transport network is needed to ensure that New Zealand remains internationally competitive.

The national importance of ports is recognised in the NZCPS.[75]

Regional role of ports

Ports are an enabling asset in a regional context. They support business productivity and activity, and act as a hub for economic activity, facilitating the movement of goods produced within the region, but also across the hinterland. Examples of goods currently being handled by Northport are:

- Logs.
- Woodchip.
- Other wood product exports.
- Coal.
- Agricultural imports.
- Containers.

An effective port can keep logistics costs competitive and broaden access to markets. An effective port can also act to retain or attract export-based industries that benefit from close proximity to a port. ME project a significant increase in the number of containers handled by Northport as outlined in **Table 23** below. However, the growth in container freight is reliant on an effective port, facilitating the export flows projected in Table 23.

***Table 23**: Predicted Northport container TEU – 2020 to 2050*

Containers (TEU)							
TEU	*2020*	2025	2030	2035	2040	2045	2050
BAU	*12,310*	*47,000*	62,000	77,000	92,000	102,000	112,000
NAI	*12,310*	*47,000*	125,000	199,000	271,000	341,000	411,000
UNIPC	*12,310*	*47,000*	154,000	262,000	370,000	478,000	586,000
NAG	*12,310*	*47,000*	96,000	142,000	185,000	226,000	268,000

As identified in the ME report, Northport will reach capacity constraints in the medium-long term, across all of the projected future scenarios. In those economic growth scenarios, existing container capacity would not be sufficient to enable the Port to maintain its existing regional role or an expanded role beyond the region. Without the ability to expand, there is a risk that Northport's role could be restrained, which would be a loss to the regional economy, and would potentially compromise the efficient operation of the national port network.

[75] Policy 9, New Zealand Coastal Policy Statement.

5.18.2 Economic impacts

The economic impacts associated with Northport are mainly a result of the trade tasks that the port handles and the flow-on economic activity generated in other businesses that supply the trading businesses. There are a range of positive impacts resulting from Northport's operational expenditure in the local, regional, and national economies, and through investment in infrastructure: all of which provide for the social and economic well-being of people and communities in the district and region.

Research carried out by ME considered the potential economic impacts of four plausible growth scenarios for the existing port being:

- **Business-as-usual Scenario (BAU)** - presents a future which assumes that Northport's role continues to be focused on regional trade.
- **North Auckland Growth (NAG)** – a low future which assumes that Northport captures a share of the growth in container trade from the area north of the Auckland isthmus.
- **North Auckland Imports Scenario (NAI)** - a future with the Port expanding its role to include both regional and national trade.
- **Upper North Island Ports Constrained (UNIPC)** - a high future which assumes that other ports in the Upper North Island become constrained, which results in a larger proportion of trade in Auckland Region being handled at Northport.

The ME research indicates that Northport's role in the Northland economy is expected to range from:

- **BAU** scenario which reaches $1,094 million GDP and 14,800 jobs by 2050.
- **NAI** scenario which reaches $1,201 million GDP and 16,200 jobs by 2050.

Its role in the *national* economy could also range from:

- **BAU** scenario which reaches $2.26 billion GDP and 26,300 jobs by 2050.
- **NAI** scenario which reaches $5.6 billion GDP and 60,900 jobs by 2050.

The report does not quantify the economic role under the low growth future (NAG) or high growth future (UNIPC), as both of these scenarios will also show a positive economic role which ranges around the NAI and will add little to the understanding of the proposed expansion.

Northport's current role in the regional and national economy is:

- *Northland* - $438 million GDP and the equivalent of 6,300 jobs.
- *National* - $907 million GDP and 10,700 jobs.

While robustly prepared by independent experts, it is acknowledged that the above figures are projections that define a range within which the actual figure is likely to sit. Whichever scenario plays out in future, it is likely that Northport will be making a significant contribution to the regional and national economies.

5.18.3 Port capacity – ability to realise economic benefits

The container handling assumptions for each growth scenario are as follows:

- **BAU** scenario assumes a container trade volume of 92,000 TEU by 2040.
- **NAG** scenario assumes a container trade volume of 185,000 TEU by 2040.
- **NAI** scenario assumes a container trade volume of 271,000 TEU by 2040.
- **UNIPC** scenario assumes a container trade volume of 370,000 TEU by 2040.

With planning for the construction of Berth 4 underway, Northport's ability to expand to handle containerised regional trade will be sufficient in the short-medium term. The containerised trade in the BAU scenario (92,000 TEU) will be just within the capacity of Northport's current (i.e. consented) container facilities (estimated at approximately 100,000 TEU).

However, assuming Northport's role expands beyond the region as per the NAG, UNIPC and NAI scenarios, capacity constraints will arise in the short-medium term. If any of these additional demand forecasts eventuate, which are considered likely, Northport will need to expand to provide additional berth space and container handling area in order to keep up with that demand. Without this expansion, Northport's potential role would be constrained, which would be a loss to the national and regional economy with associated effects on the national port network.

Because of the long 'lead time' necessary to design and construct regionally significant infrastructure such as ports, it is considered prudent and necessary (from an economic perspective) to progress the applications for Berth 5 to secure the ability to expand the port area. This would enable the future unconstrained operation of Northport, and ensure that the upper North Island ports, collectively, can meet the needs of the fast-growing Upper North Island and New Zealand economy. It will be able to cater for projected needs and will also ensure that Northport is not subject to a "just in time" approach to its future development. This will, in turn, help enable the significant regional and national economic benefits which flow from an efficient unconstrained port network to be realised.

5.19 Positive effects

There is a range of positive effects associated with the proposal. These are summarised below.

5.19.1 Economic and social benefits

The proposal will result in significant direct and downstream economic and social benefits to the region.

The benefits have been comprehensively assessed, and quantified where possible, by ME. The potential economic benefits (detailed in Section 5.18 of this report) range depending on the future scenario adopted, as summarised below:

- **BAU** scenario which reaches $1,094 million GDP and 14,800 jobs by 2050.
- **NAI** scenario which reaches $1,201 million GDP and 16,200 jobs by 2050.

Its role in the *national* economy could also range from:

- **BAU** scenario which reaches $2.26 billion GDP and 26,300 jobs by 2050.
- **NAI** scenario which reaches $5.6 billion GDP and 60,900 jobs by 2050.

These projected future benefits can be compared with Northport's current role in the regional and national economy which is:

- *Northland* - $438 million GDP and the equivalent of 6,300 jobs.
- *National* - $907 million GDP and 10,700 jobs.

The proposal will also enable wider economic, social and wellbeing benefits for Northland and the nation, for example by improving the efficiency and resilience of the national port network (including by providing improved services for Northland exporters) and acting as a catalyst for a range of supporting business activity in Marsden Point and the region.

As referenced in the ME report, a report by Polis (July 2022) estimated the expansion could bring an additional $160m annual GDP to Northland by 2060, supporting an additional ~1,500 jobs (medium scenario). This assumes container annual volumes reaching 400,000 TEU by 2060. Based on the graphics in the report[76], the estimated additional annual GDP by 2050, is around $117m, supporting ~1,100 jobs. This assumes container volumes of around 300,000 in 2050.

5.19.2 Avifauna roost

The proposed avifauna roost on the intertidal area to the west of Northport has been determined to have positive effects on both coastal processes and avifauna by the Northport coastal processes and avifauna experts respectively.

In respect to coastal processes, T+T concludes that the long term the inclusion of sand and the ongoing top-ups will have a beneficial effect on coastal processes by increasing the sediment budget within Marsden Bay, offsetting to some degree sea level rise effects and potentially reducing the overwash and landward retreat of the existing barrier beach. The sheltering provided by the roost is also likely to enable the renewal of the mangrove stand that has currently eroded due to the landward migration of the barrier beach.

In respect to avifauna, BML concludes that that the location of the proposed roost site is better than other high tide roost sites due to its separation from the coast at high tide which minimises the ability for recreational users (and dogs) to access roosting birds.

[76] GDP growth by decade average (p.34).

5.19.3 Recreation/public access

Careful design of the proposal will ensure a range of recreational benefits available to the public. These include the proposed pocket park, and associated access and amenities (including swimming steps, carpark, toilet and refuse facilities). In addition, he proposed fishing and water taxi pontoon will have positive effects on recreation values in the vicinity of Northport.

5.19.4 Ecological

The proposal will also result in several positive ecological outcomes. These include additional habitat for key species, including as provided for by the proposed sandbank renourishment to the west of the existing port (which will provide additional roosting habitat for key avifauna species) and the additional rock revetment surrounding the reclamation (which will provide suitable artificial rocky reef habitat for a range of flora and fauna).

5.20 Overall summary of effects

The effects of the project are summarised in **Table 24** below.

Table 24: *Summary of effects*

Effects	Avoidance and/or mitigation measures	Magnitude
Cultural effects		
▪ **Environmental effects** General deterioration of: - Marine ecology. - Avifauna. - Marine mammals. - Water quality. - Air discharges. - Climate change. - Coastal processes.	**Marine mammals** <u>Construction</u> ▪ Potential involvement of mana whenua in effects management, particularly during construction. <u>Construction and operation</u> ▪ Approval and implementation of a Marine Mammal Management Plan (MMMP), including measures to minimise underwater noise and ship strike.	Minor or less (based on expert advice)

	Avifauna <u>Construction</u> ▪ Approval and implementation of effects management measures contained in the CEMP. <u>Construction and operation</u> Provision of additional roosting area for VOC.	Minor or less (based on expert advice)
	Stormwater <u>Construction & dredging</u> ▪ Approval and implementation of a dredge management plan (s). ▪ Sedimentation avoidance measures during construction. <u>Operation</u> ▪ Compliance with water quality discharge conditions of consent designed to maintain water quality in the harbour receiving waters. ▪ On-port mitigation.	Minor or less (based on expert advice)
▪ **Cultural effects** Specifically: - Cultural landscapes and seascapes. - Loss of Takutai Moana. - Loss of Mauri. - Loss of Mana. - Reduction in ability to exercise Kaitiakatanga. -	**Archaeology** ▪ Adherence to accidental discovery protocol.	TBC
▪ **Economic effects** - Loss of land. - Loss of resources. - Impacts on low impact families to		Positive

self-sustain (living off the land and sea). - Benefits not accruing to Maori.		
▪ **Social effects** - Alienation of people from resources and the harbour. - Air and noise emissions affecting the quality of the environment at Poupouwhenua. - Additional pressure to build the wastewater ocean outfall. - Exacerbation of safety issues on local roads and the highway.	**Coastal access** ▪ Park/reserve development and associated access. **Traffic** <u>Construction</u> ▪ Approval and implementation of a construction traffic management plan. <u>Operation</u> Monitoring of port traffic and potential future upgrades of SH15/local road intersections. **Noise (terrestrial)** <u>Construction</u> ▪ Approval and implementation of a construction management plan addressing inter alia potential construction noise. <u>Port operations</u> ▪ Port Noise Management Plan. Mechanical ventilation for affected properties. **Air quality** <u>Construction</u> ▪ Compliance with conditions of consent, including management plan(s). <u>Operation</u> General commitment to reducing emissions from combustion engines where practicable.	TBC

Coastal processes		
Waves	N/A	Minor
Currents and sediment transport	N/A	Moderate (between Northport and CINZL jetty)
Water level	N/A	Negligible
Changes to the inner harbour	N/A	Nil
Changes to the entrance channel	N/A	Minor
Changes to the ebb tide shoal and Mair Bank	N/A	Minor
Changes to the open coast shoreline	N/A	Nil
Changes to recreational surfing	N/A	Nil
Effects on existing and future coastal hazards	N/A	Negligible
Tsunami	N/A	Negligible
Landscape effects		
Landscape effects on Marsden Point Beach	N/A	Significant
Landscape effects experienced from Reotahi	N/A	More than minor
Landscape effects experienced from the Harbour	N/A	More than minor
Landscape effects from elsewhere	N/A	Less than minor

Effects on ONLAs ONCAs & ONFs	N/A			Minor or less
Natural character				
Level of change to natural character values of the harbour for most exposed viewing areas	N/A			More than minor
High and Outstanding Natural Character Areas				Negligible
Amenity values				
Effects on amenity values for users of the beach to the east of Northport	N/A			Significant
Effects on amenity values at Reotahi	N/A			More than minor
Effects on amenity values of the wider harbour	N/A			Less than minor
Marine ecology (excluding cumulative effects)				
		System (appropriate system/scale unshaded)		
		Harbour	**OHEZ**	**Footprint**
Intertidal habitats and macrofauna	N/A	**Moderate**	Moderate	Very high
Loss of kaimoana shellfish from reclamation	N/A	**Low**	Low	High
Direct effects on subtidal benthic macrofaunal diversity from reclamation	N/A	Moderate	**Moderate**	Very High
Effects on seagrass	N/A	Moderate to High	**Moderate to high**	Moderate to High

Effects on macroalgae	N/A	Moderate to High	**Moderate to high**	Moderate to High
Loss of important fish habitat	N/A	**Low**	Low	Low
Loss of existing artificial reef habitat and biota and replacement with new artificial reef habitat	N/A	**Positive in the medium term to long term**	Positive in the medium to long term	Positive in the medium to long term
Effects of stormwater discharges	▪ Compliance with conditions of consent relating to stormwater discharge quality.	**Low**	**Low**	**Low**
Avifauna				
Permanent loss of habitat	**CEMP** Potential injuries/mortalities can be avoided through adherence to mitigation measures included in the avifauna section of the CEMP, which will include measures to avoid direct impacts and manage nesting kororā and variable oystercatcher. These measures will include: ▪ For kororā: - Pre-construction (including rock removal) surveys by a suitably qualified and experienced coastal ornithologist to determine the presence of kororā within the western boundary riprap revetment; - Establishment of exclusion zones around nesting and / or moulting birds[77];		Minor or less	
Injuries and/or mortalities			<u>Construction</u> Less than minor <u>Operation</u> Minor of less (Dotterel) Less than minor (Pied Stilt and VOC)	
Disturbance and displacement			<u>Construction</u> Minor or less for NZ dotterel and variable oystercatcher <u>Operation</u> Minor or less for all species	

[77] Under no circumstances should nesting birds, nest contents or moulting penguins be moved. Furthermore, a DOC Wildlife Act permit is required to handle species listed in the Wildlife Act (1954).

Construction sediment suspension effects	- Rock removal works to be occur in the presence of a suitably qualified and experienced coastal ornithologist; - Measures to ensure that kororā are not trapped by construction works. ▪ For variable oystercatcher: - If construction works are to occur within 20 m of an area identified as potential variable oystercatcher nesting habitat during the breeding season, a suitably qualified and experienced coastal ornithologist should check for the presence of active nests. - If an active nest is detected, a 20 m exclusion zone should be established around the nest to ensure machinery and personnel do not come within 20 m of the nesting bird. **Loss of habitat** ▪ Construction of additional roosting habitat for VOC and NZ Dotterel. Dredging/construction sedimentation ▪ Adherence to the measures in the dredging/construction management plan and associated conditions of consent. **Lighting** Measures to minimise construction and operational lighting will be employed, including: ▪ Lighting will be kept to the minimum required for safe operation; and ▪ Wherever practicable lighting will be directed downwards and shielded to reduce light projecting horizontally towards coastal waters and avoid light projecting vertically to passing birds.	Minor or less
Artificial lighting		Less than minor
Pollution		Less than minor

Marine mammals		
General construction noise	▪ Marine Mammal Management Plan	Temporary (not specified)
Pile driving noise (displacement or behavioural effect)		Less than minor
Dredging noise		Less than minor
Vessel strike		Low (for Baleen whales) – most vulnerable
Entanglements		Negligible
Cumulative effects		Minor or less.
Overall effects		Less than minor to nil.
Channel navigation and safety		
Reclamation, structures, dredging **(Navigation and spill risk)**	▪ Dynamic Under Keel Clearance (DUKC). ▪ Environmental limitations. ▪ Ship simulations. ▪ Turning basin size/dimensions. ▪ Pilotage and towage. ▪ Navigation Aids.	No adverse impacts on existing Northport and CINZL berthage (navigation). Slight increase in marine spill risk based on vessel size (not appreciable).
Biosecurity		
Potential introduction of pest species on construction vessels and additional shipping	▪ CEMP and associated biosecurity management measures.	Potential increase in biosecurity risks for the region due to additional ships. Mitigation required to minimise the risks.
Noise and vibration (terrestrial)		
Construction noise	▪ Construction management plan.	Will comply with permitted activity limits.

Additional port noise	▪ Compliance with specified noise limits. ▪ Implementation of measures in the Port noise management plan. ▪ Offer to install mechanical ventilation at specified noise threshold.	▪ Dwellings that are not eligible to receive mitigation: Ranging between minor and less than minor. ▪ Dwellings that will receive mitigation: Minor
Archaeology		
Potential discovery of archaeological sites	▪ Accidental discovery protocol.	Negligible.
Recreation effects		
Construction and maintenance effects (effects of turbidity, effects of dredging on recreational boating, changes to tides and currents)	▪ Dredge/construction management plan (s)	Minor or less.
Loss of beach and pontoon	**Park/reserve** ▪ A public park/reserve area is to be developed at the eastern end of the expanded port, above the residual beach area (see details in Section 3.9 of this report). **Replacement fishing wharf** ▪ While the existing eastern pontoon was not specifically established for fishing, the use of the wharf by the public for this purpose is recognised. It is therefore proposed to incorporate a public fishing area and associated public access on the eastern side of the port with access provided via the public park/reserve.	▪ Significant effect for recreational beach users. ▪ Minor effects (district-wide) ▪ Less than minor effects (region-wide) ▪ Temporary effects on recreational fishing post dredging until recovery.

Economic effects		
Economic benefits and/or lost opportunities	N/A	Northport role in the regional economy could range from: ▪ **BAU** scenario which reaches $1,094 million GDP and 14,800 jobs by 2050. ▪ **NAI** scenario which reaches $1,201 million GDP and 16,200 jobs by 2050. Northport role in the *national* economy could range from: ▪ **BAU** scenario which reaches $2.26 billion GDP and 26,300 jobs by 2050. ▪ **NAI** scenario which reaches $5.6 billion GDP and 60,900 jobs by 2050.
Stormwater discharges		
Additional stormwater discharge to the CMA via pond system	▪ Compliance with conditions of consent relating to stormwater discharge quality. On port mitigation will include: ▪ Removal of bark and wood debris to off-site landscape suppliers ▪ Routine sweeping ▪ Dust suppression measures. ▪ Regular cleaning of catchpits.	▪ Negligible.

Air Quality		
Construction	▪ Compliance with conditions of consent, including management plan(s).	Minor.
Operations	▪ Commitment to emissions reductions.	Negligible.
Traffic effects		
Construction	▪ Compliance with construction traffic management plan.	Minor.
Operations	▪ Upgrading intersections if trigger volumes exceeded.	Minor.

The effects summarised in **Table 24** above are integral to the statutory planning assessment in Section 6 of this report, particularly in respect to marine ecology, avifauna, marine mammals, landscape, and natural character.