



# Glenbrook Steel Mill Discharge to Water

Indicative Draft - Coastal Bird  
Management Plan

Prepared for  
New Zealand Steel  
Prepared by  
Tonkin & Taylor Ltd

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## Glossary

Term	Meaning / description
Benthic	Of, relating to, or occurring at the bottom of a body of water or the depths of the ocean.
Biodiversity compensation	Means a conservation outcome that meets the requirements in Appendix 4 of the NPSIB and results from actions that are intended to compensate for any more than minor residual adverse effects on indigenous biodiversity after all appropriate avoidance, minimisation, remediation, and biodiversity offsetting measures have been sequentially applied.
Biodiversity Compensation Model (BCM)	A decision support tool to provide guidance on the type and amount of compensation required to achieve positive effects on specified biodiversity values that outweigh residual adverse effects associated with project activities.
Biodiversity offset	Means a measurable conservation outcome that meets the requirements in Appendix 3 of the NPSIB and results from actions that are intended to: <ul style="list-style-type: none"> <li>• redress any more than minor residual adverse effects on indigenous biodiversity after all appropriate avoidance, minimisation, and remediation measures have been sequentially applied; and</li> <li>• achieve a net gain in type, amount, and condition of indigenous biodiversity compared to that lost.</li> </ul>
Coastal Bird Management Plan (CBMP)	This document. A plan to describe the management and monitoring practices and procedures to be implemented to compensate for residual ecological effects on coastal birds
Coastal Marine Area (CMA)	Defined in section 2(1) of the RMA, as: <i>“the foreshore, seabed, and coastal water, and the air space above the water—</i> <i>(a) of which the seaward boundary is the outer limits of the territorial sea;</i> <i>(b) of which the landward boundary is the line of mean high water springs, except that where that line crosses a river, the landward boundary at that point shall be whichever is the lesser of—</i> <i>(i) 1 kilometre upstream from the mouth of the river; or</i> <i>(ii) the point upstream that is calculated by multiplying the width of the river mouth by 5”.</i>
Consented mixing zone	The mixing zone defined in the existing Northside and Southside Outfall discharge permits (Permits 21575 and 21576).
Council	Auckland Council.
Mean High Water Springs	The average of each pair of successive high waters during that period of about 24 hours in each semi-lunation (approximately every 14 days), when the range of the tide is greatest.
Modelled mixing extent	The area as modelled in the DHI (2020) report (included as Appendix E to the marine ecological assessment) beyond which metals, temperature, and changes in salinity driven by discharges from the Northside and Southside Outfalls can no longer be differentiated from background levels. Refer also to “zone of reasonable mixing”.
NZ Steel	New Zealand Steel Limited
Outer Zone	An Outer Zone (OZ) is an estuarine area beyond the Settling Zone (SZ) (i.e., beyond where the majority of the sediment and associated contaminants settle onto the seabed).

<b>Term</b>	<b>Meaning / description</b>
Positive effects	Positive effect(s) associated with compensation action(s) for specified biodiversity values that are expected to outweigh residual adverse effects from project activities.
Residual effect	Effects on biodiversity or ecological values that cannot be avoided, remedied or mitigated.
Site	Includes all NZ Steel landholdings in relation to the Steel Mill at Glenbrook, which includes the Steel Mill, industrial landfills and farming activities as well as the adjoining coastal esplanade strip owned by Auckland Council.
Steel Mill/Glenbrook Steel Mill	The integrated steel making facility in Glenbrook and ancillary activities on the Site.
Stormwater	Rainfall runoff from land, including constructed impervious areas such as roads, pavement, roofs and urban areas which may contain dissolved or entrained contaminants, and which is diverted and discharged to land and water.
Substrate	The material that rests at the bottom of a body of water.
Taihiki Estuary	An estuarine side arm adjoining the lower Waiuku Estuary.
Waiuku Estuary	The Steel Mill is located on the eastern bank of the Waiuku River which, despite its name, is a long and relatively narrow tidal arm (estuary) of the Manukau Harbour. For the avoidance of confusion, the term "Waiuku Estuary" is therefore used in this report to describe this area.
Water column	Column of water from the surface of a sea, river or lake to the bottom sediment.
Zone of Influence (ZOI)	The areas/resources that may be affected by the biophysical changes caused by the Proposal and associated activities.
Zone of reasonable mixing	The area within which 'reasonable mixing' of contaminants from discharges occurs in receiving waters and within which the relevant water quality standards do not apply. Refer also to "modelled mixing zone".

# 1 Introduction

## 1.1 Background

[Drafting note: This document is a draft only and is provided as part of the consent application as an indication of the approach to be taken with respect to coastal bird management in the final Coastal Bird Management Plan, which will be prepared in accordance with the consent conditions of the consent for which application is sought.]

This (draft) Coastal Birds Management Plan (CBMP) describes the management and monitoring programme that will be implemented by New Zealand Steel (NZ Steel) to compensate for residual effects on coastal birds associated with the operations of NZ Steel's Steel Mill, located at Glenbrook, Auckland (Site).

In June 2021, NZ Steel applied for Resource Consents to replace the discharge permits that authorise the stormwater and process water discharges from the Steel Mill to freshwater and the CMA. In [insert date] those consents were granted subject to the following conditions with respect to coastal birds: [Insert appropriate cross reference to the final granted consent conditions as they relate to coastal birds.]

## 1.2 Purpose and scope

[Drafting Note While NZ Steel's consent application is being processed, this CBMP is a working draft which is intended to set out the programme that will be implemented by NZ Steel as required by anticipated consent conditions, in particular [proposed condition 20]. It is expected to be updated following consultation with Auckland Council and other relevant stakeholders and finalised following the grant of permits in the future and the finalisation of consent conditions].

The Resource Consent contains conditions [x] that set out the requirements in relation to this management plan as follows:

[text of final resource consent conditions to be inserted]

The purpose of the CMBP is therefore to describe the management and monitoring practices and procedures to be implemented to compensate for residual effects on coastal birds.

The scope of this CBMP is to outline:

- The importance and ecological significance of the coastal bird habitat impacted by NZ Steel's discharges to water authorised by the Consents (Section 2);
- The potential adverse ecological effects on coastal birds that may arise from NZ Steel's discharges to water authorised by the Consents water (Section 3);
- The proposed biodiversity compensation actions to address adverse residual effects on coastal birds, including a map showing the locations. This includes reference to the outputs described in the Biodiversity Compensation Model Report – Coastal Birds (T+T, 2024b), which is provided in Appendix G of the Marine Ecological Effects Assessment (T+T, 2024a) (Section 4);
- The implementation and maintenance approach for proposed compensation actions, including methodology and timing and monitoring and reporting requirement (Section 5); and
- The roles and responsibilities in relation to the management, monitoring and reporting requirements set out in the CBMP (Section 6).

A preliminary Biodiversity Compensation Model (BCM) has been applied to guide the type and quantum of proposed compensation measures that are proposed to be implemented address residual effects on coastal birds.

The rationale and approach for biodiversity compensation modelling, as well as the BCM inputs and outputs in relation to coastal bird biodiversity compensation, are provided in Appendix G of the Marine Ecological Effects Assessment (T+T, 2024b). It is advised that the BCM report be read in conjunction with this CBMP for a fuller understanding of the context.

## 2 Coastal bird values

The modelled mixing extent (8 ha) which is situated within a wider Zone of Influence (ZOI) of 2,500 ha<sup>1</sup> (including the Waiuku and Taihiki Estuaries) is considered to have **‘Very High’** coastal bird values, due to the presence of 24 different species, including two species that are classified as nationally ‘Threatened’ and twelve species that are ‘At Risk’ (Robertson *et al.*, 2021).

Of particular note, the ZOI supports high abundances of bar-tailed godwit, lesser knot<sup>2</sup>, pied stilt, South Island pied oystercatchers and white-faced heron. This is likely due to the combination of intertidal sand/mudflats for foraging, and the presence of important high-tide roosting habitats in relatively close proximity to foraging habitat<sup>3</sup>.

A full list of coastal bird species either observed or potentially present in the ZOI is included in Appendix C of the Marine Ecological Effects Assessment (T+T, 2024a) and the Bioresarches Environmental Monitoring Report (Bioresarches, 2022).

The following section outlines why coastal bird habitat enhancement is proposed.

## 3 Potential adverse effects on coastal birds

The assessment of effects on coastal birds is provided in the Marine Ecological Effects Assessment (T+T, 2024a) and is summarised below.

The discharges from the Steel Mill to the CMA have an impact on benthic ecology and shellfish, primarily from: elevated metal concentrations in the water column and in sediment, increased sedimentation rates, and increased water temperature and decreased salinity. These effects are considerably more pronounced in the immediate vicinity of the Northside and Southside Outfalls (i.e., within the approximately 3.75 ha zone of reasonable mixing), with effects progressively lessening towards the subtidal channels and across the wider ZOI. However, the DHI (2022) modelling shows that proposed discharges do have a small and measurable effect on sedimentation rates and sediment metal levels across a relatively large area of intertidal habitat in the ZOI outside the zone of reasonable mixing. The identified sediment load coming from proposed discharges contributes to this effect as one, albeit relatively minor, source of sediment to the Waiuku Estuary. Approximately 1.3 % of the total annual average sediment load and 6.4 % of the very fine sediment load to the Waiuku Estuary is derived from the proposed discharges.

These effects can result in reduced diversity and condition of benthic invertebrate prey for foraging coastal birds. In addition, within the modelled mixing extent, the proposed discharges have resulted in elevated zinc and copper concentrations in oysters, a food resource for coastal bird species. The greatest effect is for zinc at site N6a, closest to the Northside Outfall.

<sup>1</sup> The Environmental Institute of Australia and New Zealand (EIANZ) Ecological Impact Assessment Guidelines (EciAG) define the Zone of Influence as the area that may be affected by the biophysical changes caused by the proposed project and associated activities.

<sup>2</sup> Also referred to as red knot.

<sup>3</sup> Shorebirds will prefer to roost as close to their foraging areas as possible to minimise energy costs during non-foraging periods around high tide (Jackson, 2017)

Other potential effects on coastal birds as a result of the Steel Mill discharges include suspended sediment in the water column (impacting the visual foraging ability of birds) and potential impacts on saline vegetation (such as mangroves, and saltmarsh) that provide habitat for cryptic coastal wetland birds such as banded rail and marsh crane as well as nesting / roosting coastal birds. These potential effects were assessed as **low or very low**.

NZ Steel's existing water management systems are already effective at removing the majority of contaminants and sediment from the existing Northside and Southside Outfall discharges. In addition, the quality of the discharges can be expected to improve over the term of the consent due to NZ Steel's continual improvement programme which is embedded in its Environmental Management System.

Despite the adverse effects of the existing and proposed discharges being managed to the greatest practicable extent, the proposed ongoing discharges will have residual adverse effects on coastal birds. Specifically, the proposed discharges are expected to result in a **moderate** level of residual adverse effects on coastal bird biodiversity values.

Subsequent to the initial assessment of effects on marine ecological values, NZ Steel secured co-funding from the New Zealand Government for the installation of an electric arc furnace (EAF) at the Site. The EAF is anticipated to reduce the effects of the Steel Mill on the marine receiving environment (by comparison to the applications which sought to continue existing operation) as a result of reduced process water discharges and reduced contaminant discharges. Further information regarding the implications of the operation of the EAF system are detailed in the ITA Report (T+T 2024c, Appendix G of the AEE). For conservatism, the reduced effects of the Steel Mill with an operating EAF have not been relied on to reduce the overall effects assessment.

## 4 Proposed coastal bird biodiversity compensation

The proposed management and monitoring practices and procedures to be implemented by NZ Steel to compensate for residual effects on coastal birds are outlined in section 4.1 - 4.3 below and shown in Figure 4.1. An assessment of the proposed coastal bird compensation measures against the biodiversity compensation principles outlined in the National Policy Statement for Indigenous Biodiversity (NPSIB) is included in Section 8 of the Marine Ecological Effects Assessment (T+T, 2024a).

The proposed compensation type and area/quantum of each measure has been sense checked through the application of the BCM, as outlined in the Biodiversity Compensation Model Report – Coastal Birds (T+T, 2024b). Biodiversity modelling predicts that the proposed type and quantum of coastal bird compensation measures set out below will achieve positive effects with respect to coastal birds that outweigh the adverse effects (herein referred to as 'positive effects') within 10 years of implementation.

[Drafting note: The below are **indicative** compensation actions that may be pro-offered in the final management plan. They are included in this draft management plan as a guide to illustrate the nature and type of compensation measures that NZ Steel is likely to propose in the final management plan but alternative proposals may also be considered as part of the consultation process]

### 4.1 Kahawai roost complex habitat enhancement

The proposed compensation action includes the enhancement of roost sites in the vicinity of the Kahawai Stream discharge to the CMA (referred to as the Kahawai roost complex) and along the coastal margin.



Mangroves are encroaching on these locally important roost sites and immediate surrounds, compromising the line of sight (to predators) rendering roost sites less favourable for roosting. Mangrove encroachment on intertidal foraging habitat and roost sites appears to be accelerating due to increased sediment and nutrient runoff from surrounding catchments (Lundquist et al., 2017). Refer to historical aerials in Appendix A: which demonstrate mangrove encroachment in the area between 1961 and the present day. Furthermore, exotic pine trees dominate the raised coastal margin adjacent to sites suffering from mangrove encroachment.

The Waiuku Estuary contains a number of significant high tide roost sites; the carrying capacity of intertidal areas for shorebirds is linked to the proximity of good high tide roosts. If roosts are degraded or lost, the number of shorebirds using the adjacent intertidal feeding areas may decline (pers obs, Dr Tim Lovegrove (Lee, 2019)). Photograph 4.1 to Photograph 4.3 demonstrate coastal birds roosting on sites free of mangroves, pest weed species and with good line of sight, as observed in other parts of the Manukau and Waitematā Harbours.

0.25 ha of mangrove removal and management is proposed for the Kahawai roost complex to restore the roosts and increase available space for roosting birds. Pest plant control along the landward edge of the Kahawai Roost complex is also proposed to improve line of sight and enhance the site for roosting bird species. Proposed pest plant control would require periodic ongoing maintenance.

In addition to the roost-site enhancement proposed above, an elevated sheltered area of approximately 0.15 ha sits immediately above a rock platform on the coastal margin offers potential as a king tide roost site (located above mean high water springs (MHWS)). However, this location is currently covered in mature pine trees and unsuitable for roosting in its current form. It is proposed to restore this site to a functioning high value king tide roost site through the removal of pine trees, levelling of the elevated coastal margin and deposition of shell materials. Photograph 4.4 to 4.5 demonstrate the elevated coastal margin where pine trees could be removed, and an elevated king tide roost site established.

## **4.2 Enhancement and maintenance of inter-tidal foraging habitat**

All coastal wading birds, with the notable exception of banded rail, forage within open inter-tidal mud/sand flats. However, mangrove encroachment into these areas adversely affects the quality of foraging resource for coastal wading birds and impedes line of sight, ultimately rendering such areas unusable.

Where recent historical aerials show intertidal foraging areas to be mangrove-free in the vicinity of the Kahawai roost (between the Lower North Stream and Kahawai Stream mouths), selective removal (enhancement) of approximately 6 ha of low stature mangrove trees, and ongoing mangrove seedling removal (maintenance) over a wider area of ~60 ha is proposed.

Refer to Figure 4.1 for the proposed mangrove removal and maintenance zone and Appendix A: for historical mangroves extents.

## **4.3 Expansion of mangrove management at the Waipipi Roost**

The Waipipi roost was formerly a significant high tide roosting site for coastal birds and is located approx. 1 km West of the Glenbrook Steel Mill site.

Historical aerials in Appendix A show the encroachment of mangroves onto Waipipi Roost and the surrounding intertidal flats over a period of 20-30 years. Photograph 4.1 provides an example of a mangrove-free, high value high tide roost at Ambury Foreshore, which is similar to the outcome sought for the Waipipi Roost.

Auckland Council has obtained a resource consent to undertake initial mangrove clearance on Waipipi Roost (2.88 ha), as shown in Figure 4.1, the purpose of which is to improve the quality of this high tide roost through maintenance of line of sight for roosting birds. Mangrove clearance proposed as part of this compensation package (4.8 ha) is additional to what is currently proposed by Auckland Council (i.e. this is not considered to be ‘additionality’ under biodiversity offsetting guidance).

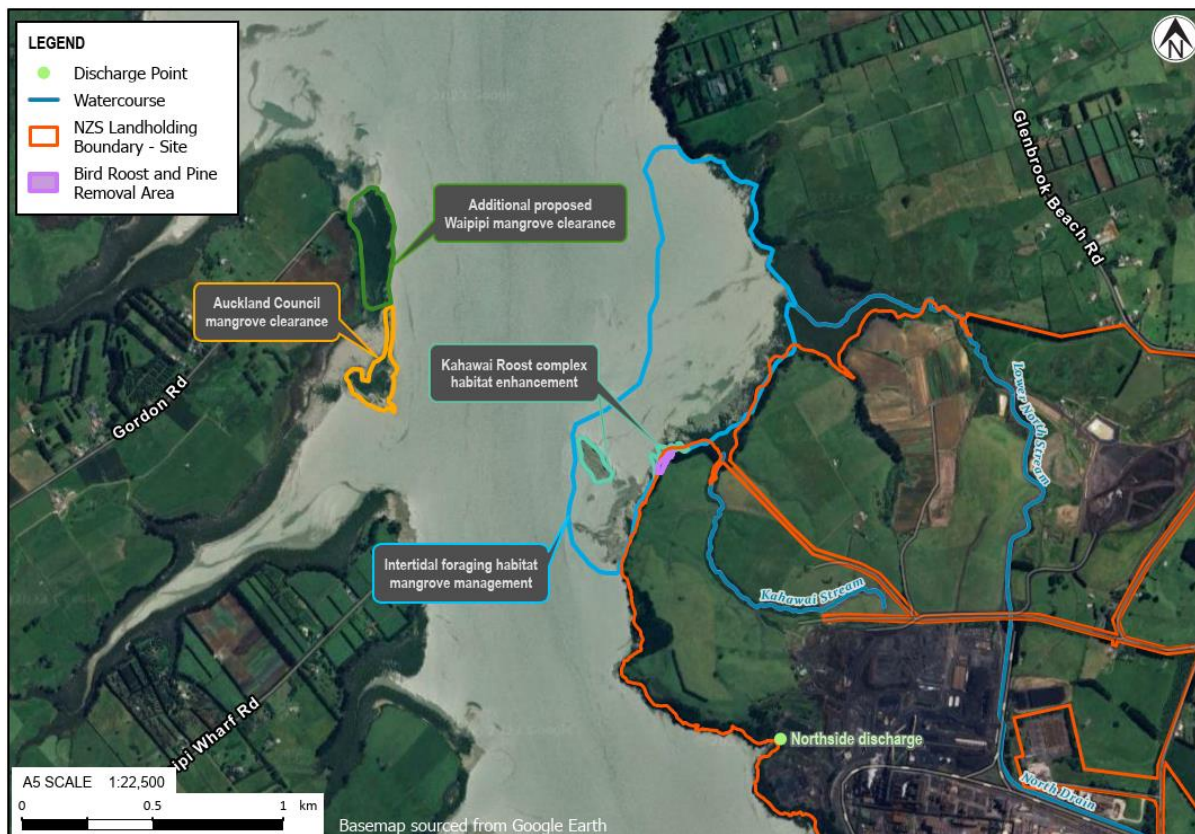


Figure 4.1: Proposed biodiversity compensation actions to manage residual effects on coastal birds.



*Photograph 4.1: High tide roost at Ambury Foreshore, which is subject to periodic vegetation management to maintain line of sight for roosting birds.*



*Photograph 4.2: Waiata Roost, Manukau Harbour, at high tide. Note the close proximity of the Roost Site to the land. The number of birds in this photograph approaches 600. Photograph provided by Max Bryne and taken in March 2013 from property of Max and Sandra Brynes at 60 Keywella Drive.*



*Photograph 4.3: Small-scale Waitematā Harbour roost at high tide supporting variable and South Island pied oystercatchers and Caspian terns*



*Photograph 4.4: Kahawai roost complex with pine trees occurring on the elevated coastal margin. Removal of pine trees, associated with levelling and shell deposition could render this area an effective king tide roost site.*



*Photograph 4.5: Kahawai Roost complex front-on aspect showing the sheltered elevated potential king tide roost area above the rock platform that could be enhanced through the removal of pine trees and deposition of shell..*



*Photograph 4.6: Kahawai Roost complex mid-tide roost within the coastal marine area (approx 200m from Glenbrook Steel Mill coastal margin).*

## 5 Proposed compensation actions and management

Proposed compensation actions 1-3 described in Section 4 above require varying degrees of mangrove clearance, maintenance and potential pest control. Implementation and maintenance methods for these actions are described in Sections 5.1.1 to 5.2 below.

### 5.1 Implementation

#### 5.1.1 Mangrove removal

NZ Steel shall engage contractors to undertake mangrove removal as soon as resource consent is approved, subject to seasonal restrictions (i.e. preference to clear mangroves outside of bird breeding season (September to January inclusive)).

Mangrove removal shall be undertaken in the following locations, with associated area for removal:

- Kahawai Roost complex: 0.25 ha.
- Kahawai intertidal foraging grounds: ~60 ha is the total area to maintain as mangrove free, noting that the actual mangrove removal required is a small fraction of this total area (~6 ha) and will not include the removal of large mature mangrove trees.
- Waipipi Roost: 4.8 ha.

When undertaking mangrove removal, the following principles will be adhered to:

- As few points of access as possible to the CMA to minimise disturbance.
- All mangroves should be cut at the base, bundled and removed from the CMA to be transferred off-site to green waste.
- Hand-held machinery should be used, with all refuelling or cleaning of equipment to take place on land.
- All mangrove clearance to be undertaken within the period 1 February to 31 August to avoid peak bird breeding season. If mangrove clearance cannot be undertaken within this period, a suitably qualified ecologist shall determine whether any Threatened or At-Risk nesting birds are likely to be displaced by the removal of mangroves at that time and in that location.

A separate resource consent application will be lodged with Council (anticipated before mid-2024) for the mangrove removal activities associated with the compensation package, therefore further actions may be required over and above what is already described here. The CBMP will therefore be updated at the time a new consent is issued and as required.

#### 5.1.2 Pine removal

Pine removal is proposed at the land-based Kahawai Roost complex comprising approximately 0.15 ha. To this end, NZ Steel shall engage contractors to remove pine trees as soon as resource consent is approved. Proposed environmental management procedures include:

- Limiting access points to minimise potential disturbance in proximity the CMA. It is expected that all pine trees should be able to be accessed from the land.
- All pine trees will be cleared at the base, with stumps remaining in the ground to mitigate potential erosion.
- An Erosion and Sediment Control Plan will be prepared prior to the removal of pine trees and the levelling of the elevated site.
- To manage the risk of harm to indigenous forest birds, nest checks will be undertaken by an experienced ornithologist to confirm that no birds are nesting within the felled pines. If a bird

nest or nests are detected, then the associated pine trees will remain standing until an ornithologist has confirmed that chicks have fledged, and the nest is inactive.

- To manage potential effects on long-tailed bats (*Chalinolobus tuberculatus*; Threatened – Nationally Critical<sup>4</sup>), a suitably qualified bat ecologist will undertake a bat survey (a combination of acoustic bat monitoring and roost tree assessment) prior to any felling works to identify potential bat roosts. If potential bat roosts are identified, tree removal will follow DOC best practice protocols (2021)<sup>5</sup> as outlined in a Bat Management Plan (BMP). Industry-standard best-practice protocols include felling bat trees only during active bat months (October to April inclusive) and monitoring for bats over a minimum of two consecutive nights (with suitable environmental conditions) prior to tree felling.

## 5.2 Maintenance

### 5.2.1 Mangrove management

NZ Steel shall engage contractors to undertake mangrove management measures on an annual or bi-annual basis.

Growth of mangroves will be managed so that there is good all-round visibility for roosting birds. Mangrove clearance areas shall be maintained/controlled to provide a suitable distance of clearance around roosts to allow unobstructed flight paths and maintain good visibility for roosting birds (refer to Figure 4.1 which outlines the proposed area for mangrove management).

This will include seeding removal and mangrove tree removal as required within the proposed area to maintain as mangrove free.

### 5.2.2 Pest control: plants and mammalian predators

NZ Steel shall engage contractors to undertake the below pest control measure on an annual or bi-annual basis.

Waipipi Roost and part of the Kahawai Roost complex will be naturally separated from the shore by an area that is inundated at high tide that will limit the impact of introduced mammalian predators. However, feral cats and mustelids are expected to be an issue at the land-based Kahawai roost, particularly if coastal birds establish nests. Only Caspian tern or variable oyster catcher would be expected to nest in this location following commencement of restoration actions<sup>6</sup>

If the proposed biodiversity outcome monitoring programme indicates that coastal birds are nesting, then a proposed that a predator control programme be developed and implemented in accordance with best practice. This plan will include detail on the predatory species targeted, reduction targets for each species and the methodology, frequency and duration of operations, monitoring and reporting.

It is proposed that vegetation management be undertaken within the coastal fringe vegetation adjacent to the land-based Kahawai Roost site to maintain enhanced line of site (to predators) for coastal birds. Vegetation management may include removal of vegetation, spraying and trimming as required to maintain line of sight.

<sup>4</sup> O'Donnell, C.F.G., Borkin, K.M., Christie, B. L., Parsons, S., Hitchmough, R. A. (2017). Conservation status of New Zealand bats. New Zealand Threat Classification Series 21. 4 p.

<sup>5</sup> Department of Conservation Bat Recovery Group (2021). Protocols for minimising the risk of felling bat roosts. (Bat Roost Protocols (BRP)).

<sup>6</sup> It is unlikely that any other coastal bird species will establish nests in this location, e.g. most species do not breed in this area or require different types of breeding habitat.

## 5.3 Monitoring

Monitoring will be undertaken by a suitably qualified ornithologist to quantify the changes in coastal bird populations in response to the proposed compensation measures.

Monitoring will be undertaken at the following sites:

- Kahawai roost complex (the land-based roost site and mid-tide roost site).
- Kahawai inter-tidal foraging management site.
- Waipipi Roost.
- Waipipi inter-tidal foraging reference site: to benchmark the benefits of the proposed mangrove management for coastal birds in the kahawai foraging site.

Monitoring will be undertaken prior to the commencement of compensation measures (baseline monitoring) and on an ongoing basis for the life of consent (35 years). The 35 years of monitoring will include annual monitoring from year one to five following commencement of compensation measures, and then five-yearly thereafter. This monitoring frequency is designed to be consistent with biodiversity outcome reporting described in Section 5.4 below. Monitoring will involve:

- Inspection monitoring of mangroves in managed sites to confirm that managed areas remain free of mangroves or to inform management needs if required.
- Inspection monitoring of vegetation management within the land-based Kahawai roost site to ensure line of site is maintained for birds and to inform management needs if required.
- Measurement of mangrove colonisation and growth in the Waipipi inter-tidal foraging reference site.
- Seasonal (spring, summer, autumn, winter) bird counts, including high tide roost counts and inter-tidal habitat foraging counts, in line with current coastal bird monitoring for the Glenbrook Steel Mill discharge consent application.

Monitoring may indicate that management measures need to be amended to ensure that positive effects to indigenous biodiversity are achieved. This is explained in Section 5.4.2 below.

## 5.4 Reporting

### 5.4.1 Biodiversity outcomes reporting

Biodiversity outcomes reporting is required to verify positive effects from proposed compensation actions. Reporting will be done annually from year one to five following commencement of compensation measures and then five-yearly thereafter for the duration of the proposed discharge consent.

The biodiversity outcomes reporting shall be supplied to Auckland Council within three months following one year of outcome monitoring. The report will be prepared by a suitably qualified ornithologist, and include the following:

- A full year of seasonal baseline monitoring prior to commencement of compensation actions.
- Confirmation of aerial extent and location of mangrove removal in intertidal foraging areas.
- Confirmation of the aerial extent and location of pine removal and king tide roost site establishment at the Kahawai Roost complex.
- Details of ongoing mangrove maintenance for the Kahawai Roost complex and intertidal foraging grounds, and mangrove maintenance for the Waipipi Roost if applicable.
- Outputs from ongoing monitoring, including coastal bird seasonal counts at roost sites and within inter-tidal foraging sites (management and reference sites).



- Monitoring of mangrove encroachment and reference sites.
- Further changes to the management regime will be considered if monitoring indicates that the proposed management regime is not achieving intended positive outcomes for coastal birds.

#### **5.4.2 CBMP review**

To achieve the desired outcome from the proposed compensation, changes may need to be made to the CBMP throughout the duration of the consent. For example, changes to frequency or timing of the proposed mangrove management of roost sites or at intertidal foraging habitat.

Prior to implementing this CBMP, if material changes are required, NZ Steel will advise Auckland Council in writing (email or letter) and provide an updated CBMP for certification for any material changes. The rationale behind any material changes made must be consistent with the conditions of the Consents, best practice management techniques, and compensation philosophies identified in this plan.

If monitoring indicates that birds are not responding positively to the proposed compensation actions and that this is due to factors that sit outside project related impacts, no contingency measures are proposed. Conversely, if monitoring indicates that expected positive outcomes do not eventuate due to issues with the proposed compensation, then a suitably qualified ornithologist will propose contingency recommendations and actions to be included in an updated CBMP for review by Auckland Council.

## **6 Roles and responsibilities**

NZ Steel is responsible for the management of all required implementation, monitoring and reporting requirements set out in the CBMP.

NZ Steel will engage a suitably qualified ornithologist to oversee the implementation works associated with compensation measures and lead the monitoring and reporting to NZ Steel and Auckland Council on these compliance aspects.

## 7 Applicability

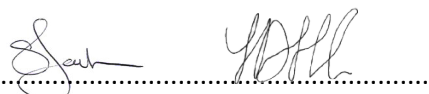
This report has been prepared for the exclusive use of our client New Zealand Steel, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that Auckland Council as the consenting authority will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

Report prepared by:

Authorised for Tonkin & Taylor Ltd by:



Susan Jackson  
Senior Ecologist



Jenny Simpson  
Project Director

Sam Heggie-Gracie  
Ecologist

Technical review by Dr Matt Baber, Consultant Ecologist

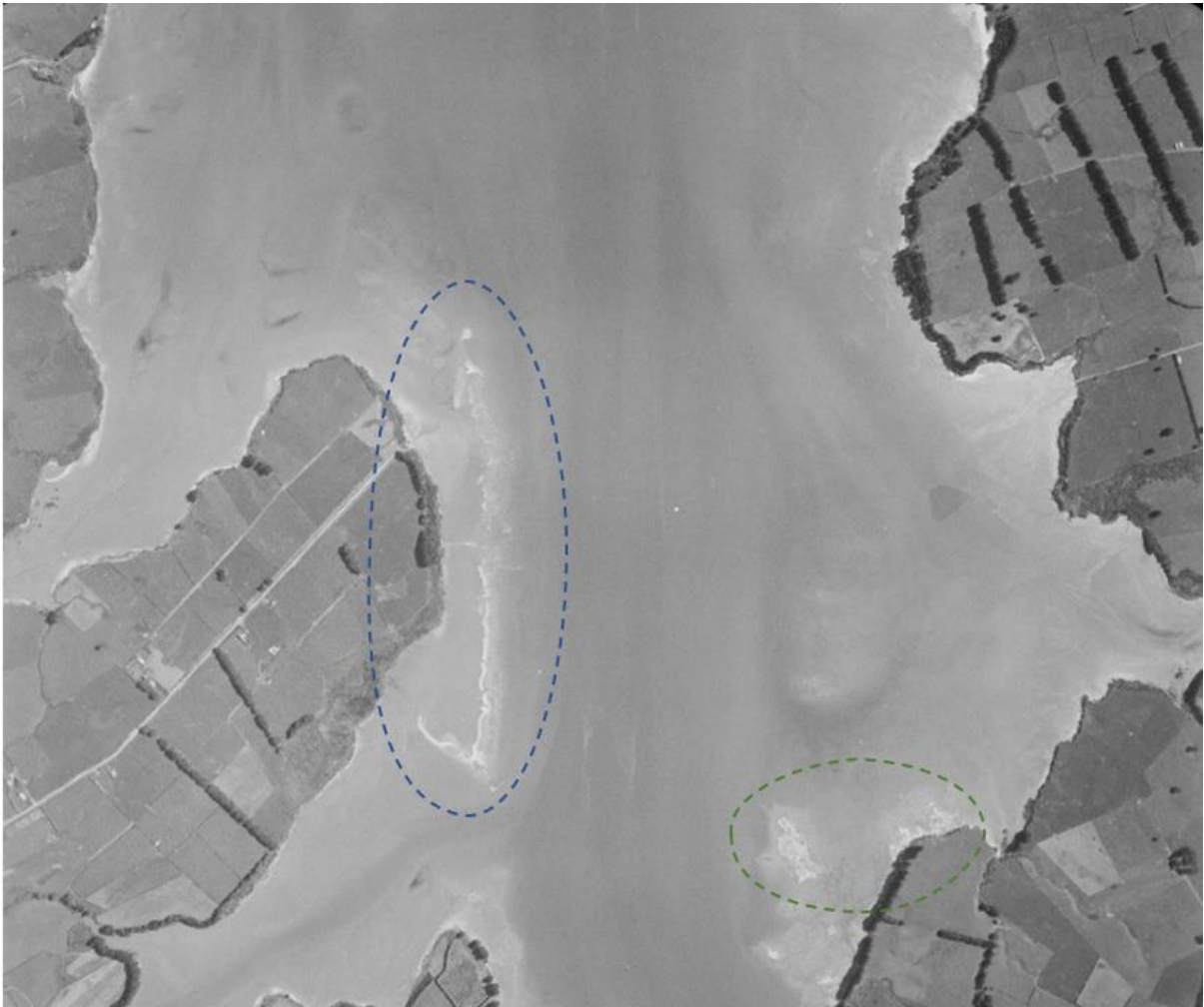
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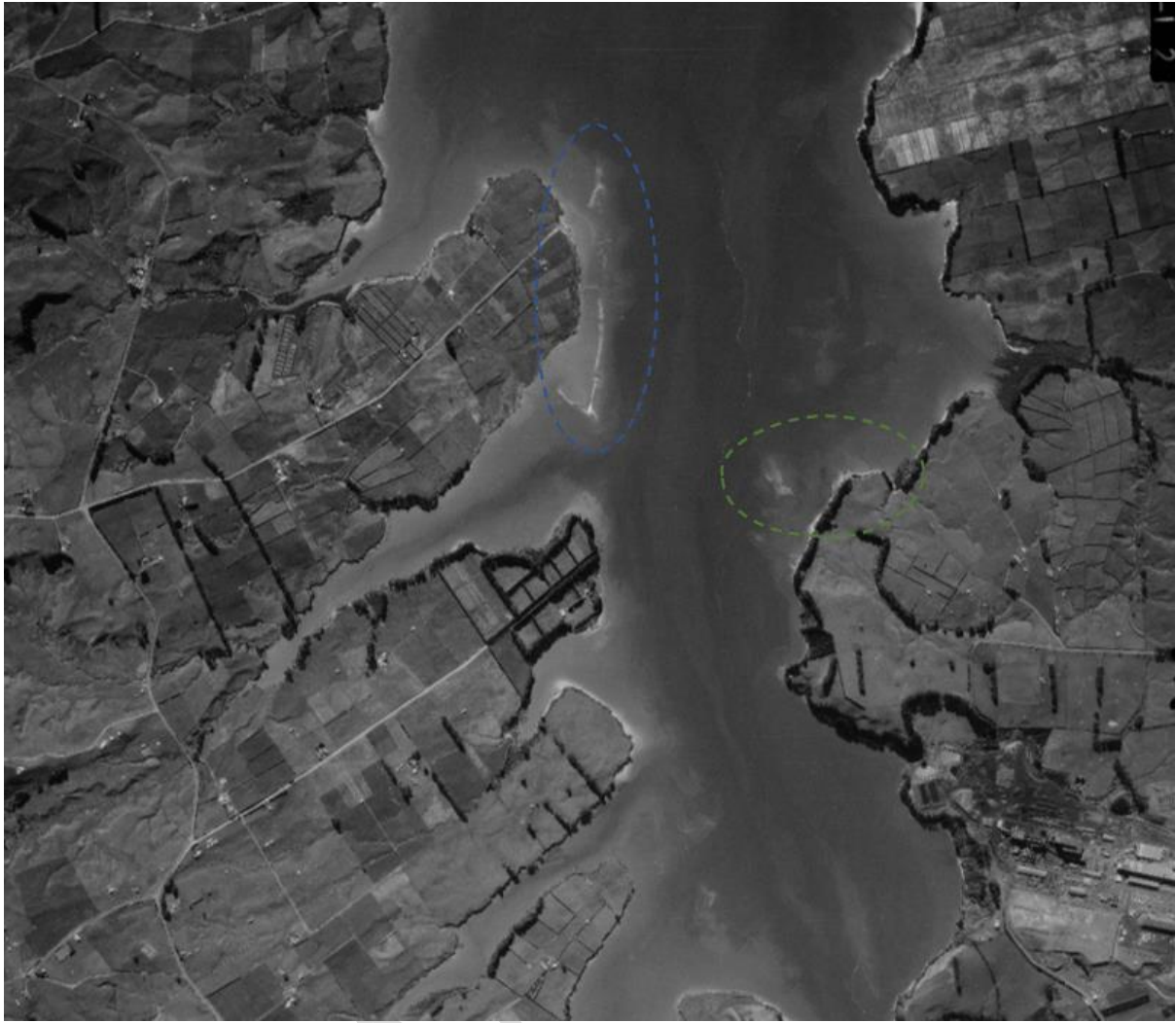
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## Appendix A: Historical aerals

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*Photograph Appendix A:1: Kahawai (circled in green) and Waipipi (circled in blue) roosts, 1961 in which the roosts (Kahawai complex and Waipipi) are completely devoid of mangroves.*



*Photograph Appendix A.:2: Kahawai (circled in green) and Waipipi (circled in blue) roosts, 1981 again the areas appear devoid of mangroves.*

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*Photograph Appendix A.:3: Kahawai (circled in green) and Waipipi (circled in blue) roosts, 1988. Again, the areas appear devoid of mangroves.*



*Photograph Appendix A:4: Kahawai (circled in green) and Waipipi (circled in blue) roosts, circa 2003-2004 showing more advanced mangrove encroachment of Waipipi roost sites and in the intertidal area.*



*Photograph Appendix A.:5: Kahawai (circled in green) and Waipipi (circled in blue) roosts, circa 2010-2011 showing moderate encroachment of the Waipipi Roost site and increased areal extent of mangrove encroachment into what was previously intertidal foraging habitat for coastal birds.*





*Photograph Appendix A.:6: Kahawai (circled in green) and Waipipi (circled in blue) roosts, most recent aerals taken circa 2-3 years ago showing almost complete encroachment of the Waipipi roost site and initial encroachment of the Kahawai Roost.*

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