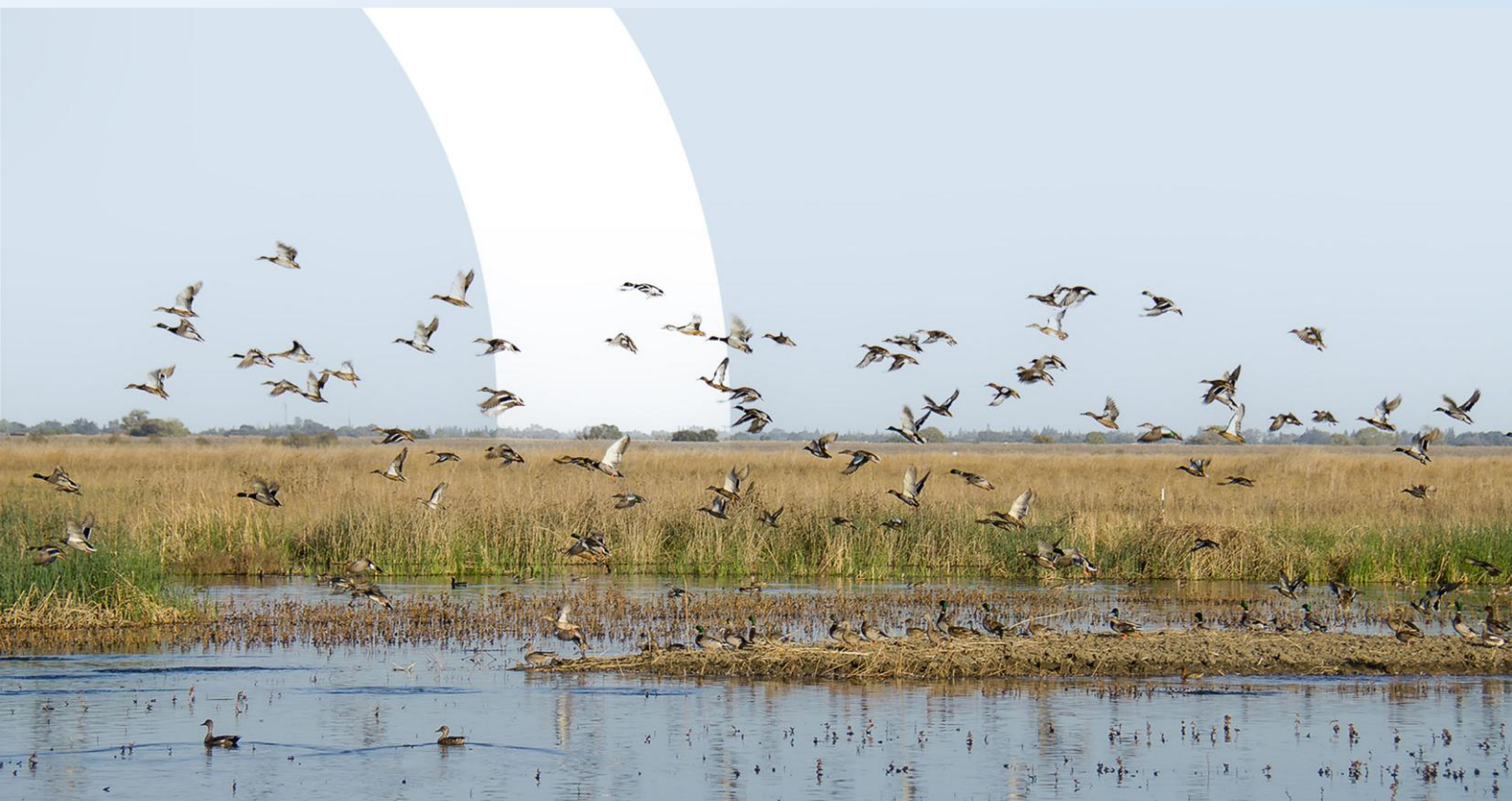




Transnet Ports Authority (TNPA)

Berth 605 Biodiversity Compensation Plan

Development of New Berth 605 and Associated Infrastructure





Transnet Ports Authority (TNPA)

BERTH 605 BIODIVERSITY COMPENSATION PLAN

Development of New Berth 605 and Associated
Infrastructure

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EXECUTIVE SUMMARY

Transnet National Ports Authority (TNPA) proposes the development of Berth 605 and associated container handling infrastructure within the Port of Richards Bay, KwaZulu-Natal. The proposed Berth 605 development footprint falls within the footprint of the PoRB masterplan. Given the location of the project within a highly sensitive biodiversity landscape, this Biodiversity Compensation Plan (BCP) was prepared by WSP in support of the Environmental Impact Assessment (EIA) and Environmental Authorisation (EA) process. The EIA for the proposed Berth 605 development includes development of Berth 605, the associated berth basin, development of the footprint for the proposed container handling facility (but not the actual development and operation of the container facility itself) and development of immediate supporting infrastructure including road and rail access.

A BCP has been prepared as the project is largely situated within a marine and estuarine environment, where South Africa's 2023 National Biodiversity Offset Guidelines for terrestrial environments are not applicable. The BCP has been prepared, to the extent possible, in alignment with the National Biodiversity Offset Guideline (2023) and relevant provincial guidance.

Project Context and Biodiversity Sensitivity

The Berth 605 development footprint lies predominantly within an area identified as a Critical Biodiversity Area (CBA 1 Irreplaceable) as defined by the KwaZulu-Natal Biodiversity Sector Plan (2016). The site also falls within a Key Biodiversity Area (Richards Bay Coast) of international significance and overlaps with Priority Areas for Protected Area Expansion. Importantly, these categorisations cover much of the PoRB area and adjacent estuary. The affected landscape supports Endangered and Near Threatened ecosystems, including:

- Mangrove Forests (Endangered),
- Maputaland Coastal Grassland (Endangered),
- Coastal Forest (Near Threatened),
- Estuarine and intertidal habitats of high ecological value.

Field surveys and specialist assessments confirmed the presence of numerous species of conservation concern (SCC), including protected tree species, threatened flora, mammals, reptiles, amphibians, birds, and invertebrates. Of particular importance is a tidally influenced pool within the project footprint that has developed into a highly productive estuarine habitat supporting nursery functions for fish and crustaceans. This tidally influenced pool is on the site of previous disturbance but has re-established over time.

Application of the Mitigation Hierarchy

The mitigation hierarchy of avoidance, minimisation, rehabilitation, and compensation (through applying offset principles) were rigorously applied. While project design has sought to avoid the most sensitive “no-go” areas where feasible and to minimise disturbance through construction controls and rehabilitation measures, residual impacts to biodiversity remain unavoidable due to the nature and location of the development which is an extension to the existing Berth 6 series. Residual impacts include:

- Permanent loss of high-value terrestrial habitats,
- Loss of mangrove and intertidal habitats, including the tidal pool,
- Fragmentation and loss of habitat for fauna SCC,

- Direct and indirect impacts on estuarine and marine ecological functioning.

As a result, biodiversity compensation is required to address residual impacts and seek to achieve no net loss of biodiversity.

Residual Impacts and Compensation Requirements

The habitat loss requiring compensation amounts to approximately 11.9 hectares in total, comprising mangrove forest (2.06 ha), coastal forest (5.17 ha) and coastal grassland (3.78 ha).

For estuarine impacts, particularly the loss of the tidally influenced pool, the report strongly recommends on-site habitat creation through the excavation and tidal connection of new shallow estuarine areas, designed to replicate the ecological structure and function of the lost habitat.

Candidate Compensation Site and Feasibility

Development within the PoRB is guided by the National Ports Act which informs the port masterplan. The long-term masterplan (2052) sets the strategic development objectives for the port environment, a National Key Point. This includes future development on the coastal side of the existing 600 series berth which constrains availability of land for biodiversity compensation. Setting aside land within this area directly influences and limits the long-term strategic port masterplan. Any discussion around the long-term biodiversity requirements associated with the strategic masterplan cannot be addressed as part of the current expansion project.

Notwithstanding the constraints placed on the masterplan through setting aside land for biodiversity protection, an area immediately adjacent to Berth 605 was identified as a compensation area within which the estuarine habitat component on site could be replicated as part of the project design. The initial area that could be secured was less than the proposed footprint of loss (7 ha vs 11 ha). Following input from EKZNW and DFFE the compensation proposal was revised to include a larger area (approximately 42 ha); however, this area could not be secured given the significant impact of the proposed compensation area footprint on the 2052 Port Masterplan.

Consequently, this compensation plan has been finalised on the basis of the area initially identified which has been expanded to a total footprint of 11 ha.

Compensation Implementation and Management

The report recommends a “like-for-like” compensation approach, supported by long-term management, rehabilitation of modified areas, alien invasive plant control, and ecological monitoring. Compensation sites must be secured through formal legal mechanisms (e.g. protected area declaration or conservation servitudes) and managed for a minimum of 30 years, or for the life of the project, whichever is longer. A Biodiversity Management Plan and binding implementation agreements are required as conditions of Environmental Authorisation.

Conclusion

The Berth 605 development is located within an area of high biodiversity value, and despite mitigation, will result in residual biodiversity impacts largely attributable to the loss of habitat during excavation of the Berth 605 basin. Biodiversity compensation is therefore essential and must be carefully designed, legally secured, and effectively managed to ensure compliance with national policy and to maintain the ecological integrity of the Port of Richards Bay. The findings and recommendations of this Biodiversity Compensation Plan provide a robust framework to inform regulatory decision-making and the finalisation of Environmental Authorisation conditions.

1 INTRODUCTION

WSP Group Africa (Pty) Ltd (WSP) has been appointed by TNPA to undertake the environmental authorisation process for the proposed Berth 605 Container Handling Facility and associated infrastructure, located within the PoRB, Kwa-Zulu Natal Province (Figure 1-1). As part of the EIA process, a suite of specialist ecological studies has been completed on the proposed development area. There are residual biodiversity impacts which will result from the proposed Berth 605 development which are evaluated further through this Biodiversity Compensation Plan (BCP) in which the requirements for compensation and suitability of a compensation site are evaluated.

The TNPA functions in terms of the National Ports Act (No.12 of 2005) in which TNPA is responsible for the provision of port services and facilities within all ports of South Africa. In its role as the master planner, the TNPA plans to improve, develop and maintain port infrastructure. Various development opportunities were identified by TNPA across three precincts namely South Dunes, Newark and Bayvue and are reflected in the Port Development Framework Plan (PDFP) and the Port of Richards Bay Master Plan 2021 – 2035. The Berth 605 project is reflected in the Port Development Framework Plan (PDFP) and the PoRB Master Plan, 2021-2035 and forms part of the Bayvue Precinct. The physical extent of the PoRB makes it the largest port in South Africa. Given the location of the port and the proposed expansion, the environmental sensitivities at the site and surrounding the port must be considered.

South Africa's National Biodiversity Offset Guideline was gazetted in 2023. It sets out the requirements for Biodiversity Offsets in support of an application for environmental authorisation (EA). As the Local Study Area (LSA) is situated within a maritime and estuarine environment, the National Biodiversity Offset Guideline does not explicitly require the implementation of biodiversity offsets. However, in accordance with best-practice principles for the management of residual biodiversity impacts, compensation measures are considered appropriate. Accordingly, this Biodiversity Compensation Plan (BCP) has been developed with reference to, and guided by, the principles of the National Biodiversity Offset Guideline.

The proposed Berth 605 is considered highly likely to require a biodiversity compensation, effectively because of its location in an area that supports areas of Estuarine, natural Coastal grassland, Coastal Forest and Mangroves Forests, all of which coincides with areas defined as Critical Biodiversity Areas (CBAs) in the KZN Biodiversity Sector Plan (2016) (KZNBSP). Several plant and animal species of conservation concern (SCC) are also present, ten (10) plant SCC were confirmed to be present with thirteen (13) SCC faunal species confirmed present. Although avoidance where possible has been demonstrated and extensive mitigation measures proposed, the anticipated Project interaction with these factors (habitat loss, mortality of plant and animal SCC are expected to result in residual impacts, which would then require compensation.

1.1 TERMS OF REFERENCE

South Africa's National Biodiversity Offset Guideline was gazetted on 23 June 2023. The guideline sets out the requirements for offset in support of an application for environmental authorisation (EA). The guideline is not applicable to estuarine environments, although the principles in relation to offset remain applicable. Following discussion with the Richards Bay Biodiversity Offset Group including EKZNW it was agreed that development of a biodiversity compensation plan would be more

appropriate. Consequently, this report has been compiled taking account of the guidance set out in the guideline, as follows:

- That the mitigation hierarchy, including due consideration of project alternatives to avoid or minimise impacts, has been appropriately applied before considering biodiversity compensation or offsetting.
- The degree of risk that negative residual impacts cannot be compensated (i.e. negative residual impacts on irreplaceable biodiversity and/or major constraints on finding suitable biodiversity compensation sites to meet the requirements) and how the risk is to be addressed or mitigated.
- Any other considerations which are relevant to determining the size and characteristics of the biodiversity compensation (for example, impacts on species of conservation concern with specific habitat requirements, impacts on ecological corridors and connectivity in the landscape, and impacts on important ecological infrastructure), and how the size of compensation is to be adjusted to take these considerations into account.
- An explicit statement on the required size of the biodiversity compensation to remedy the residual negative biodiversity impacts,
- The portfolio of candidate biodiversity compensation sites and alternative options, including the likelihood of each site's availability and feasibility, and
- The management measures that would need to be employed as part of the biodiversity compensation for a defined period, for which the applicant would be responsible. Typically, this period is not less than 30 years, and is longer if the impacting activity, or activities, will last beyond 30 years.

1.2 PROJECT ASSUMPTIONS AND LIMITATIONS

The compensation requirement is motivated by the guideline's provisions regarding residual impacts on irreplaceable biodiversity. The proposed project is situated within a CBA1, where development could result in irreversible loss of ecosystems or species. Such impacts are deemed unacceptable and may render the project fatally flawed. However, under specific circumstances, biodiversity compensation is considered a viable mitigation measure. This report proceeds on the basis that compensation is appropriate in this instance.

As part of the compensation project, infield assessments of the proposed compensation area from a terrestrial habitat perspective as well as a herpetofauna perspective was completed, and the results are incorporated into this report.

1.3 PROJECT LOCATION AND EXTENT

Berth 605 is located within the PoRB, King Cetshwayo District Municipality and Umhlathuze Local Municipality within the KwaZulu-Natal (KZN) Province.

The approximate centre point co-ordinates for the Berth 605 project area are 28°47'23.82"S 32°1'34.43"E (Figure 1-1).

The project area is bounded by a rail line to the North, the current development for Berth 606 and 607 to the East, The Seafarers Club to the West and the basin for the 600 Series berths to the South.

1.4 STUDY AREA

The study area for the Project was defined as follows:

- **Local Study Area (LSA):** The proposed development footprint (specifically the dredging and temporary stockpile areas) plus all areas encompassed by the project site boundary, within which direct and indirect impacts on terrestrial and aquatic biodiversity receptors (i.e. direct habitat loss, fauna mortality) could occur;
- **Regional Study Area (RSA):** The PoRB within which the proposed development is situated which is considered to be an ecologically appropriate area of analysis, within which indirect and/or induced impacts on biodiversity receptors (e.g. dust deposition, sensory disturbance, hydrological changes) could occur.

The project location is indicated in Figure 1-1, where the Berth 605 development footprint is indicated. The land-based development footprint has previously been disturbed by past construction activity. This includes the footprint of the proposed container terminal and the footprint that will be excavated for the new berth basin. In Section 3, there is a description of the ecological character of the project development footprint, and the history of the site over time is described later in the report in Chapter 4.

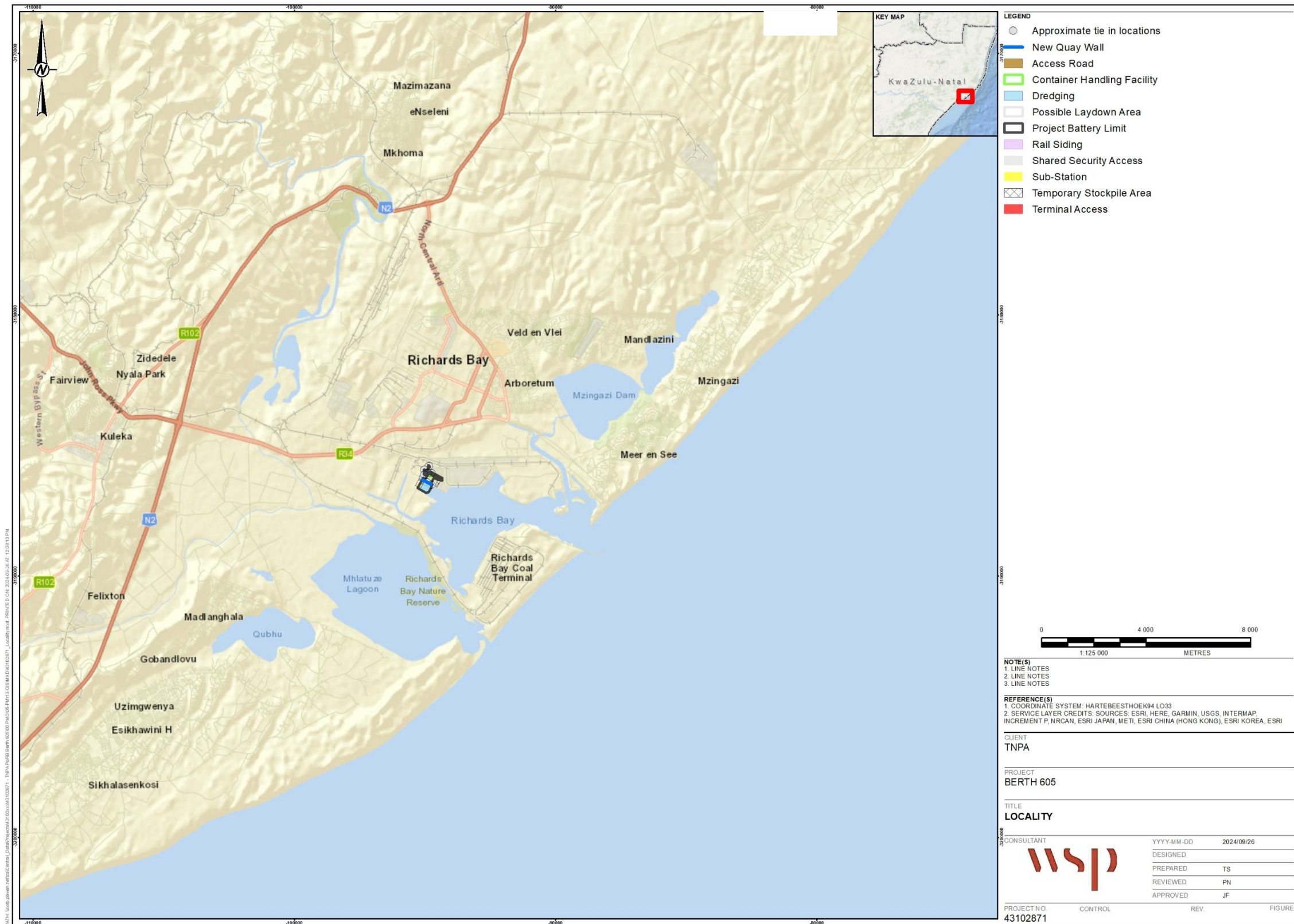


Figure 1-1 - Locality Map of the Proposed Berth 605

2 APPLICABLE LEGISLATION, POLICY AND STANDARDS

Applicable national and provincial legislation, associated regulations and policies that are pertinent to biodiversity, which were used to guide the EIA, include:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998) including Section 24, concerning Procedures for the assessment and minimum criteria for reporting on identified themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for environmental authorisation;
 - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on terrestrial biodiversity; and
 - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity;
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA), specifically:
 - Threatened or Protected Species (ToPS) – National lists of critically endangered, endangered, vulnerable and protected species (2007);
 - National list of threatened terrestrial ecosystems for South Africa (2011) (NEMBA Threatened Ecosystems, 2011);
 - National list of alien and invasive species (2016);
- Environment Conservation Act (Act No. 73 of 1989), specifically the Lists of declared weeds and invader plants (CARA, 1983);
- National Water Act (Act No. 36 of 1998);
- KZN Conservation Ordinance 15 of 1974 Restrictions and requirements with regards to activities relating to the species listed is outlined in Sections 34 – 58 of the Ordinance;
- KZN Nature Conservation Management Amendment Act, 1999 (No. 5 of 1999);
- KwaZulu-Natal Environmental, Biodiversity and Protected Areas Management Bill (Draft - 2014);
- KwaZulu-Natal Systematic Conservation Plan (EKZNW 2012).
- National Protected Area Expansion Strategy (2016).

Recent, relevant South African national policies and guidance were also taken into consideration, in the development of the baseline description and impact assessment process, including:

- Draft National Biodiversity Offset Policy (2017);
- National Biodiversity Offset Guideline (2023): Per communication with EKZN, both terrestrial and estuarine features triggered the CBA 1 irreplaceable designation by the DFFE screening tool. Bearing this in mind, a Biodiversity Offset Report (BOR) is required to address the loss of high value terrestrial habitat and the associated terrestrial species off concern. This requirement is therefore applicable unless written confirmation by provincial (Ezemvelo KZN Wildlife) and national (DFFE) authorities is acquired;



- Species Environmental Assessment Guideline (SANBI, 2020); and
- Wetland offsets: a best-practice guideline for South Africa (Macfarlane et al., 2014).

3 TERRESTRIAL BIODIVERSITY OVERVIEW

The local study area is situated in a landscape that is characterised by coastal grassland, woodlands and forest with mangroves present in the intertidal areas. The areas that will physically be lost to the proposed development have previously been disturbed through past port development and form part of the logical progression of the 600 series berths. During previous construction periods effort has been made to confine as much of the construction footprint to those areas that would be disturbed in future, in order to minimise the impact on greenfield areas beyond the strategic port development footprint. Notwithstanding this, the favourable growth environment in the PoRB, has seen these areas of past disturbance recover a measure of ecological function, which includes the presence and establishment of species of conservation concern. The proposed project areas are located within a controlled port environment and consequently there has been little to no disturbance to the site over the last 20 years which has further accelerated the ecological recovery of the area.

3.1 CONSERVATION CONTEXT

3.1.1 TERRESTRIAL CRITICAL BIODIVERSITY AREAS (CBA'S) AND ECOLOGICAL SUPPORT AREAS (ESA'S)

The RSA was compared to relevant available spatial biodiversity planning datasets, i.e. the uMhlathuze Local Municipality Integrated Development Plan (2022) (IDP) and KZN Biodiversity Sector Plan (2016) to assess the local and regional biodiversity context of the Project area (Figure 3-6).

The KZN Biodiversity Sector Plan outlines the following as critical for conservation targets:

- **Critical Biodiversity Areas (CBAs):** These are areas that are crucial for conserving biodiversity and maintaining ecosystem functioning. They include habitats for threatened species and ecosystems that are not well-represented in protected areas.
- **Ecological Support Areas (ESAs):** These areas are essential for supporting the ecological functioning of CBAs. They help maintain ecological processes and provide connectivity between different habitats.
- **Other Natural Areas (ONAs):** These are areas that are not classified as CBAs or ESAs but still contain natural habitats that contribute to overall biodiversity and ecosystem health.
- **Protected Areas (PAs):** These are legally designated areas managed for long-term conservation of nature, including national parks, nature reserves, and other conservation areas.

In addition, the uMhlathuze Local Municipality's IDP outlines the following as critical for conservation targets:

Nature Reserves (Level 1):

- Areas of high biodiversity and environmental significance that require a high level of legal protection. Included are unique habitats or areas that are considered important at International, National or Provincial level; estuaries, lakes, major wetlands, natural forests, coastal buffers and critically endangered habitats that are protected in terms of international or national legislation and/or treaties. It is recommended that these areas be proclaimed as nature reserves in terms of relevant legislation such as the National Environmental Management Protected Areas Act.

Conservation Zone (Level 2):

- Areas of biodiversity / environmental significance, which are not viable for proclamation as nature reserves, but that require some form of legal protection. Included are unique or regionally important natural habitats; wetland and forest areas that are protected in terms of national legislation; and all areas that fall within the 1:100-year flood line. No transformation of the natural assets or the development of land for purposes other than conservation should be permitted in this zone. Sustainable use of renewable resources is permitted.

Open Space Linkage Zone (Level 3):

- Areas that provide a natural buffer for Level 1 and 2 Zones, areas that provide a natural link between Level 1 and 2 Zones and areas that supply, or ensure the supply of, significant environmental services. Transformation of natural assets and the development of land in these zones should only be permitted under controlled conditions.

Development Zone (Level 4):

- Areas that are not included in Level 1, 2 and 3 zones. Areas in this zone are either already developed or transformed and contain land and natural assets that are not critical for environmental service supply. However, it is recognized that the development of these zones can impact on environmental services supply. As such, they should be developed in a manner that supports, or at least does not adversely impact on, the sustainability of environmental service supply in Level 1, 2 and 3 zones.

The LSA and most of the RSA is located within a CBA 1, irreplaceable (Figure 3-1) in accordance with the KZN Biodiversity Sector Plan (2016). CBAs are areas of high biodiversity value which are at risk of being lost and identified as important in meeting provincial and national biodiversity targets. These areas align with wetlands, forested land and grasslands as presented in the national landcover dataset (GTI, 2020) (Figure 3-2). The motivation for the CBA 1 designation is crucial and according to communication with EKZNW (2025) was specifically due to the presence of Maputaland Coastal Grassland (Endangered) and Mangrove forests (Endangered) according to the Biodiversity Offset in KwaZulu Natal (EKZNW, 2013) which will be used for compensation target setting.

The continued integrity and protection of these CBA's is crucial to meet conservation targets. The presence of CBA 1 land in the LSA is therefore a concern with respects to terrestrial biodiversity management.

3.1.2 PRIORITY AREAS FOR PROTECTED AREA EXPANSION

Priority Focus Areas for protected area expansion are large, intact and unfragmented areas of high biodiversity importance, that are suitable for the creation/expansion of protected areas (Driver, et al., 2012). Land-use planning and decision making should avoid fragmenting Priority Focus Areas, to prevent such areas from being excluded from future protected area expansion. (Driver, et al., 2012).

According to the National Protected Area Expansion Strategy (2018), the entirety of the LSA coincides with Priority Focus Areas which form as part of the National Protected Area Expansion Strategy (2018) (Figure 3-3). This does create conflict with the port development plans given that the majority of the port environment, the secondary habitat units created through past port construction or land reclamation and its strategic development footprint now fall within this designation.

3.1.3 PROTECTED AREAS

The Richard Bay Game Reserve is listed on the National Protected Areas Register (DFFE, 2022) and is located approximately 1.48 km South of the project area, across the road and rail access to the coal terminal and providing protection to the Umhlatuze Estuary.

This separation occurred at the time that the port was initially developed when the original estuary was divided into two parts to yield a Port development basin in its northern extent which was separated from the natural Mhlatuze estuary in its southern extent. This is clearly visible when one looks at past aerial photographs (see Figure 4-1 in which the 1960 image shows the original estuary before port development).

3.1.4 INDIGENOUS FORESTS

No indigenous forests occur in the LSA. Indigenous forests are therefore not included as receptor for the impacts or considered further in this report.

3.1.5 KEY BIODIVERSITY AREAS

Key Biodiversity Areas (KBA's) are sites that contribute significantly to the global persistence of biodiversity,' which means they are the most important places in the world for species and their habitats, whether these be in terrestrial, freshwater, estuarine or marine ecosystem (SANBI, 2024).

The Global Standard for the Identification of KBAs, published in 2016, sets out internationally agreed scientific criteria for the identification of KBAs worldwide. Sites qualify as global KBAs if they meet the specific standardised criteria and quantitative thresholds focused on one or more of five trigger aspects:

- Threatened biodiversity.
- Geographically restricted biodiversity.
- Ecological integrity.
- Biological processes; and
- Irreplaceability through quantitative analysis.

The entirety of the LSA occurs within a KBA namely 'Richards Bay Coast (100896).' Richards Bay Coast is a terrestrial site found in KZN, South Africa. The site includes a large estuarine lake ecosystem, industrial port, and other smaller predominantly open estuaries to the south. The shore component of the site is mostly sandy. There are species-rich, tall/medium-height subtropical coastal forests occurring on stabilised coastal dunes. These forests have well-developed tree, shrub, and herb layers. *Mimusops caffra*, *Sideroxylon inerme*, *Dovyalis longispina*, *Acacia kosiensis* and *Psydrax obovata subsp. obovata* are the most common constituents of the tree layer. Herbaceous vines and woody climbers are important structural determinants in these forests. Includes a flat coastal plain originally densely forested in places with a wide range of interspersed no forest plant communities including dry grasslands (which include palm veld where special conditions prevail), hygrophilous grasslands and thicket groups.

The Global Standard for the Identification of KBAs is a framework developed by the International Union for Conservation of Nature (IUCN) to identify sites that are critical for the global persistence of biodiversity.

- Criterion A1: Sites that hold significant numbers of one or more globally threatened species.
- Criterion B1: Sites that hold a significant proportion of the global population of one or more species.

- Criterion B2: Sites that support an assemblage of co-occurring range-restricted species.
- Criterion E: Sites that are irreplaceable for the global persistence of species based on quantitative analysis.
- Criterion B4: Sites that hold significant proportions of the global extent of geographically restricted ecosystems

This study area qualifies as a Key Biodiversity Area of international significance that meets the thresholds for 3 criteria described in the Global Standard for the Identification of KBAs.

Five species meet one or more KBA criteria, inclusive of amphibians, fish, and plants. The LSA meets criterion A1 due to the presence of significant proportions of the global populations of 4 threatened species. The project area regularly holds 1 individual geographically restricted species, therefore meeting criterion B1. An assemblage of co-occurring range-restricted species in the Amphibia taxonomic group regularly present within the site meets criterion B2. A quantitative analysis of irreplaceability indicates that the site is 100% irreplaceable for the global persistence of 2 species, therefore meeting criterion E. The site holds significant proportions of the global extent of 2 geographically restricted ecosystems (meeting criterion B4) (IUCN, 2024).

The following terrestrial species trigger the KBA criteria:

- Forest thread snake (*Leptotyphlops sylvicolus*)- Least Concern (Not recorded).
- Spotted snout-burrower (*Hemisus guttatus*)- Near Threatened (Not recorded).; and
- Pickersgill's reed frog (*Hyperolius pickersgilli*)- Endangered (Not recorded).

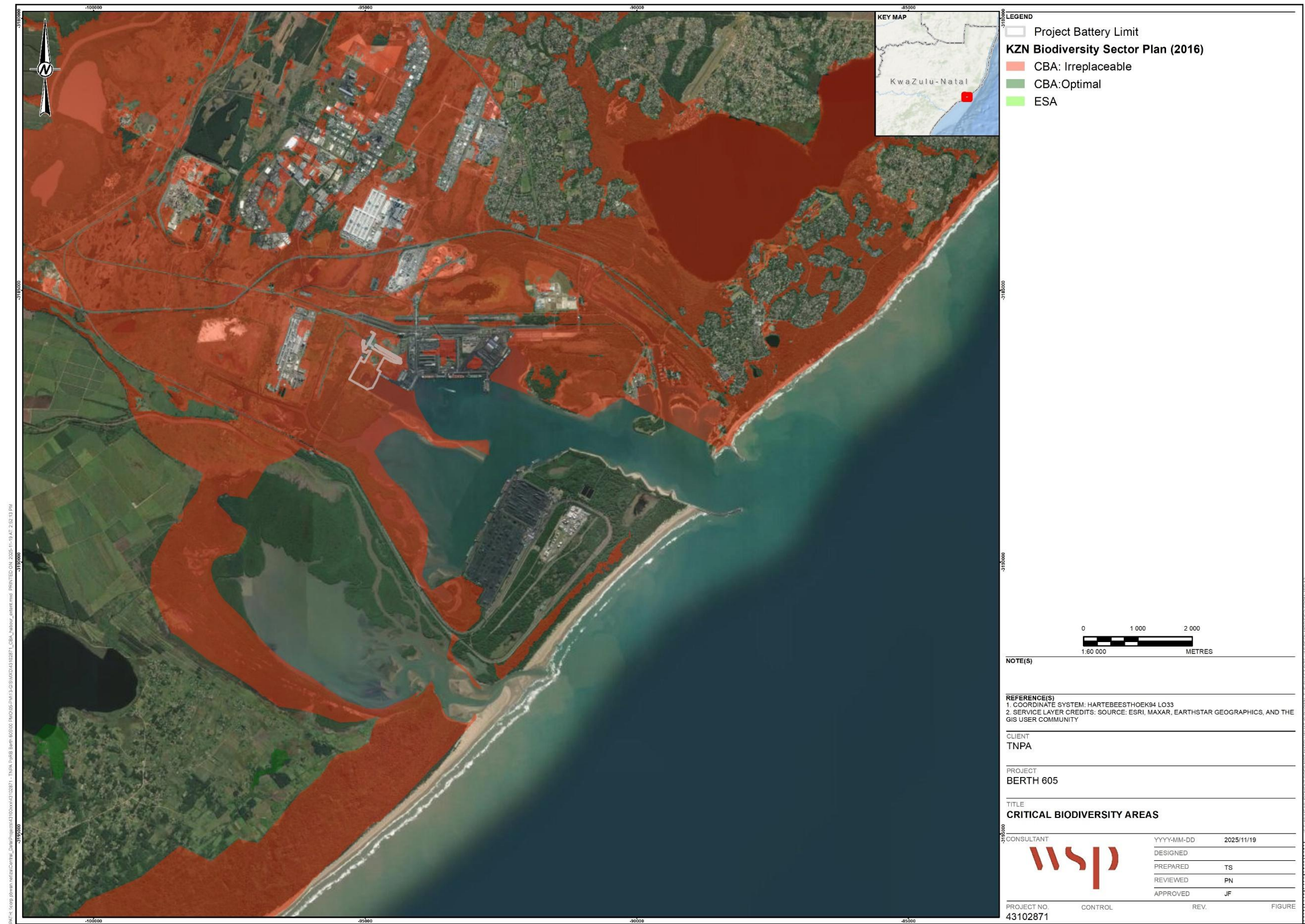


Figure 3-1 – EKZNW Sector Plan (2016)

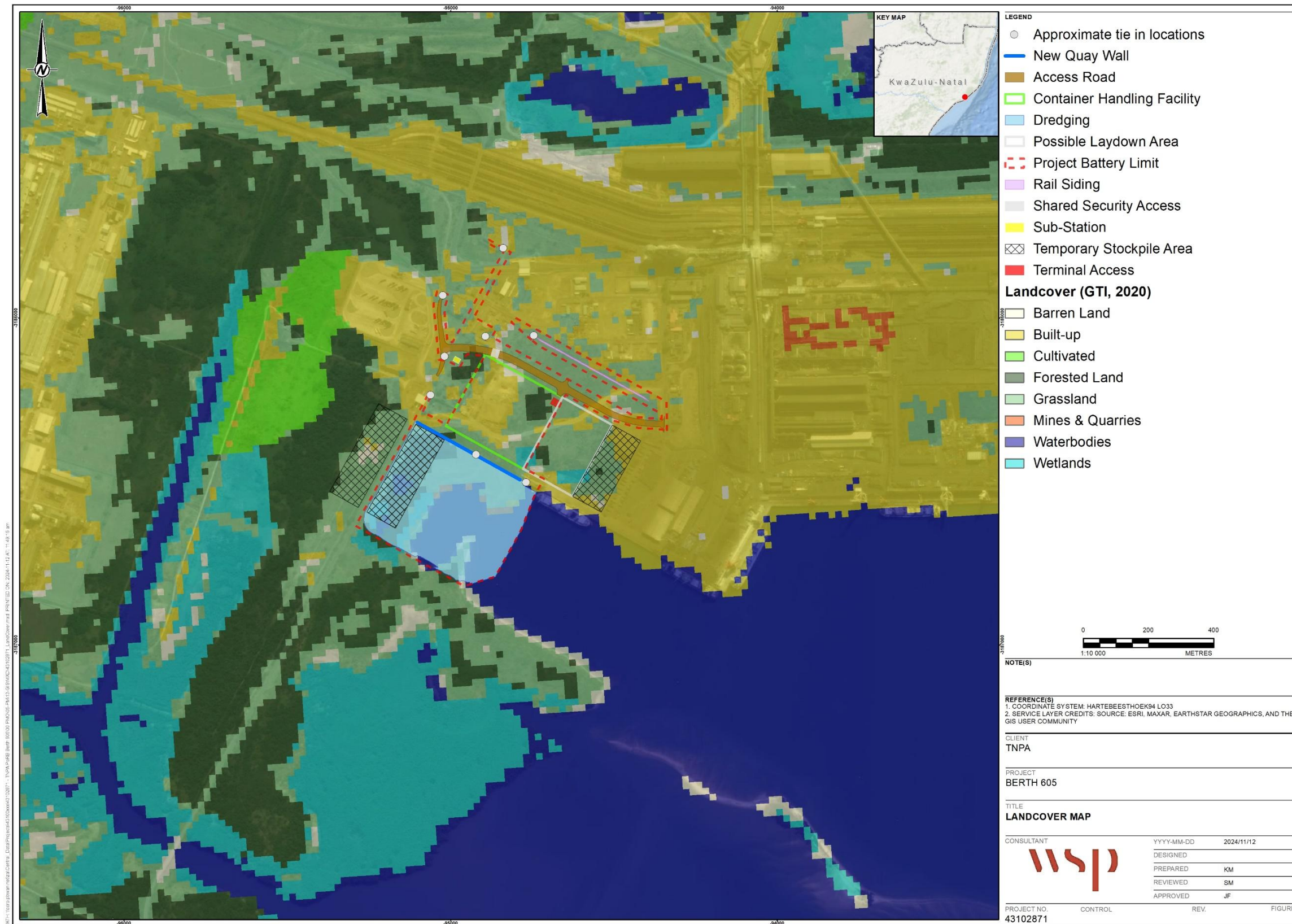


Figure 3-2 - Land Cover Dataset for LSA (GTI, 2020)



Figure 3-3 - RSA in Relation to National Protected Area Expansion Strategy

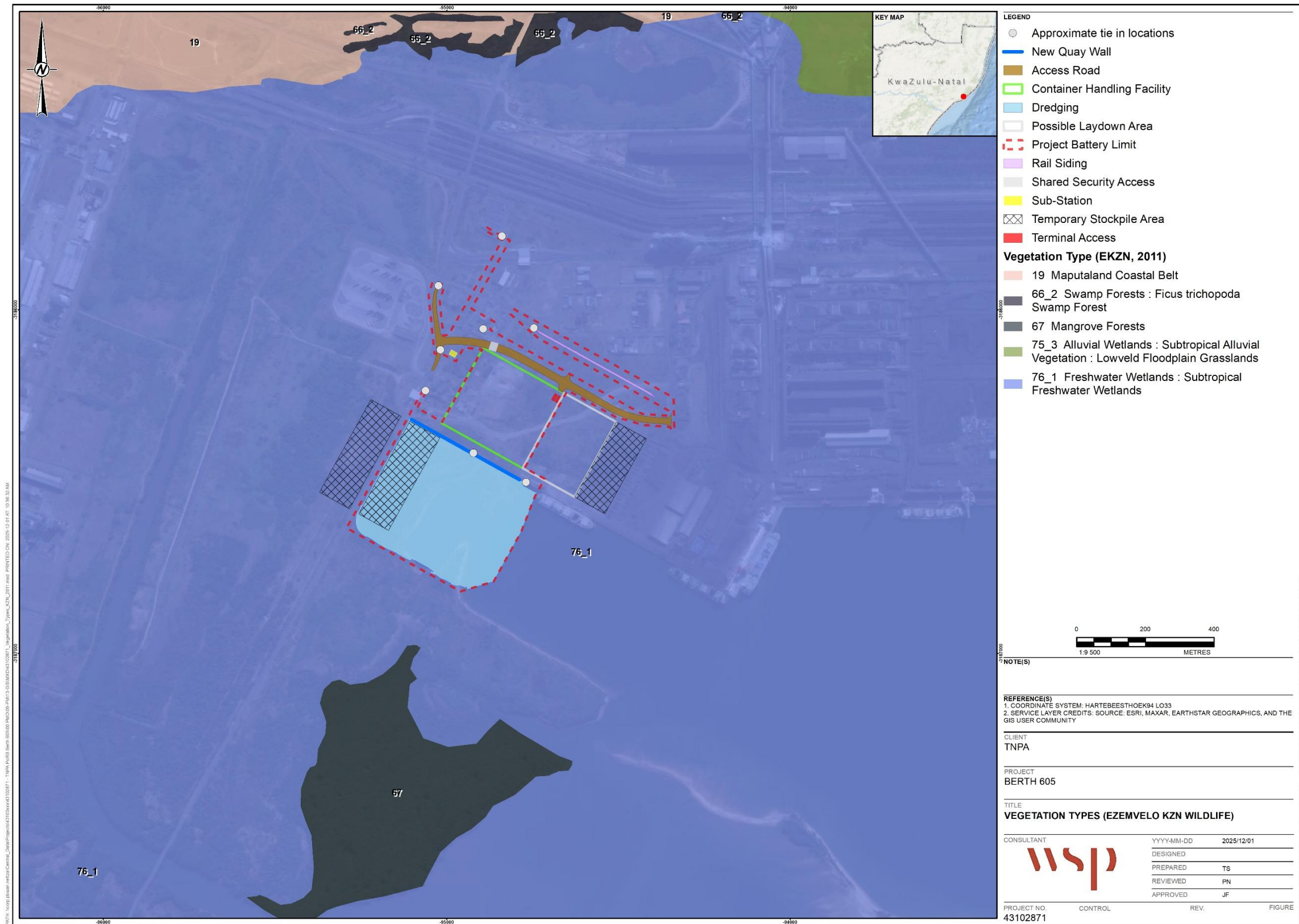


Figure 3-4 - Vegetation Types (EKZNW 2011)

3.2 VEGETATION AND FLORA

3.2.1 MAPUTALAND-PONDOLAND-ALBANY BIODIVERSITY

The LSA (Figure 3-5) falls within the Maputaland-Pondoland-Albany Biodiversity hotspot which is recognized as the second richest floristic region in Africa: containing approximately 80% of the of South Africa's remaining forests, rich birdlife and many other significant flora and fauna species. The uMhlathuze Municipal Area supports a total of 170 Red Data species, which has been reported as amongst the highest in the country for an area of its size. This remarkable concentration of Red Data Species is one of the main reasons that the remaining percentage of its surface area under indigenous cover is considered largely irreplaceable by KZN Wildlife for meeting its conservation objectives in the province (uMhlathuze Local Municipality, 2022).

3.2.2 OTHER NOTEWORTHY ENVIRONMENTAL FEATURES

Richards Bay Game Reserve (IBA) occurs 1.48km from the Project area as is a Key Biodiversity Area (KBA) (Figure 5-6) as well as Important Bird Area (IBA) (Figure 5-5) of international significance. These key features are further discussed in the sections that follow.

Mangroves also occur in the LSA. Mangroves in South Africa are among the rarest and most threatened forest types, occurring in 38 estuaries (Ward & Steinke, 1982). Approximately 74% of South Africa's mangrove area is in KwaZulu-Natal (KZN), with significant threats documented since before 1990 (Breen & Hill, 1969; Moll et al., 1971; Begg, 1984; Bruton, 1980). The mangrove forests at Richards Bay, Mlalazi, Durban Bay, Sipingo, and Beachwood are classified as threatened (Moll et al., 1971). The Revised National List of Ecosystems that are Threatened and in Need of Protection, published in Government Gazette No. 47526, Notice No. 2747 on 18 November 2022, confirms that mangrove ecosystems in KwaZulu-Natal are classified as threatened. Specifically, the gazette lists the KwaZulu Natal Mangrove Forest under the Indian Ocean Coastal Belt biome with a threat status of "Endangered". This classification is based on criteria including habitat loss and degradation over the past decades.

Mangroves provide numerous ecological and economic benefits, including carbon sequestration, protection against cyclones, sediment trapping, and supporting fish and wildlife populations (Kathiresan & Bingham, 2001). Despite efforts at rehabilitation, mangrove coverage in Richards Bay has declined rapidly due to anthropogenic disturbances. The Richards Bay and uMhlathuze Estuaries are crucial for bird diversity and abundance, providing varied habitats for waterbirds. However, bird populations have declined due to port development, pollution, industrial and recreational activities, and habitat loss (Begg, 1978, 1984; Ward & Steinke, 1982). In the PoRB, Mangroves have the propensity to become invasive and to establish quickly in areas where disturbance has taken place, as was the case within the proposed development footprint where areas that were completely transformed during construction approximately 20 years ago now reflect well established ecological communities. This is discussed further in Section 5.0 in this report.

3.2.3 ECOLOGICAL IMPORTANCE OF VEGETATION COMMUNITIES IN THE LSA

The ecological importance of identified vegetation communities mapped in the LSA during baseline studies is summarised in Table 3-1, in which species of conservation concern that were encountered on site are indicated in bold text. Natural vegetation communities mapped within the LSA are considered sensitive to development, and where these coincide with CBAs, and project infrastructure, compensation will be required when administering the biodiversity offset guideline.

Table 3-1 - Ecological Sensitive Aspects of Mapped Vegetation Communities in LSA

Habitat Unit	Description and SEI	Expected SCC
<p>1- Completely Transformed Area (28°47'12.59"S, 32°1'46.55"E)</p> 	<p>Previously disturbed areas in the LSA, with little/no ecological value. Incapable of providing suitable habitat for any SCC.</p> <p>SEI: VERY LOW</p>	<p>None.</p>
<p>2- Secondary Woodlands and Grasslands</p>	<p>A substantial proportion has already been transformed following historical</p>	<p>Plant SCC</p>

Habitat Unit	Description and SEI	Expected SCC
<p>There is a habitat gradient present in this unit, with woodlands occurring south-east (28°47'26.19"S, 32° 1'50.57"E) and grasslands occurring north-west (28°47'19.92"S, 32° 1'44.25"E).</p> 	<p>disturbance or previous transformation.</p> <p>Remanent woodland habitat includes <i>Vachellia kosiensis</i> secondary woodlands, <i>Cassuarina equisetifolia</i> secondary woodlands and Sub-community <i>Lantana camara</i>–<i>Schinus terebinthifolius</i> secondary shrublands.</p> <p>Remanent grassland habitat includes <i>Schinus terebinthifolius</i>, <i>Washingtonia robusta</i>, <i>Chromolaena odorata</i>, <i>Casuarina equisetifolia</i>, and artificial changes in the drainage of the landscape.</p> <p>SEI: MEDIUM</p>	<ul style="list-style-type: none"> ■ <i>Dioscorea sylvatica</i> – Can persist in disturbed forest margins and secondary woodland. ■ <i>Bonatea lamprophylla</i> – Found in grasslands and forest edges; moderately disturbance-tolerant. ■ <i>Mimusops caffra</i> – Coastal forest species that can survive in secondary thickets and disturbed areas. ■ <i>Sideroxylon inerme</i> – Hardy species; often found in degraded coastal forest and woodland edges. <p>Mammal SCC</p> <ul style="list-style-type: none"> ■ Blue Duiker – Can adapt to secondary forests and thickets. ■ Red Duiker – Shows some tolerance to fragmented and secondary forest habitats. ■ Common Dasymys – Found in moist grasslands and tolerant of agricultural and disturbed wetland edges. ■ Least Dwarf Shrew – Occurs in grassy and shrubby areas, including disturbed zones. ■ African Clawless Otter – Uses human-modified wetlands and riverbanks. ■ Anchieta's Pipistrelle, Light-winged Lesser House Bat, Butterfly Bat – Roost in buildings and forage in disturbed woodland and grassland mosaics. <p>Herpetofauna SCC</p> <ul style="list-style-type: none"> ■ Spotted Shovel-nosed Frog – Found in disturbed grasslands and temporary wetlands.

Habitat Unit	Description and SEI	Expected SCC
		<ul style="list-style-type: none"> ▪ Pickersgill's Reed Frog – Occurs in degraded coastal grasslands and reedbeds. ▪ Large-scaled Grass Lizard – Prefers open grasslands and tolerates grazing and light disturbance. <p>Avifauna SCC</p> <ul style="list-style-type: none"> ▪ Southern Banded Snake Eagle – Hunts in secondary woodland and forest edges. ▪ Spotted Ground Thrush – Can use regenerating forest patches and disturbed undergrowth.

Habitat Unit	Description and SEI	Expected SCC
 <p>3- Moist Grasslands (28°47'24.58"S, 32° 1'28.21"E)</p>	<p>There is limited anthropogenic disturbance in this habitat unit. Wetland and grassland ecosystem functioning still occurs. Faunal and floral species are present. In addition, the area provides habitat connectivity and ecosystem corridors.</p> <p>Moist grasslands in South Africa are typically found in high-altitude or coastal lowland regions with moderate to high rainfall, supporting a rich diversity of grasses, forbs, and geophytes</p> <p>These ecosystems are characterized by deep, fertile soils, seasonal waterlogging, and a dense herbaceous layer dominated by C4 grasses. Moist grasslands often occur in valley bottoms, floodplains, and gentle slopes, where water retention is higher, and are interspersed with wetlands, seeps, and occasional woody vegetation. They provide critical habitat for a range of specialist fauna, including amphibians, small mammals, and grassland-dependent birds.</p> <p>SEI: MEDIUM</p>	<p>Herpetofauna SCC</p> <ul style="list-style-type: none"> ■ Gaboon Adder (<i>Bitis gabonica</i>) – Prefers moist, forested grasslands and thickets; known from northern KwaZulu-Natal. ■ Spotted Shovel-nosed Frog (<i>Hemisus guttatus</i>) – Associated with moist grasslands and wetlands; often found in interdune depressions. ■ Pickersgill's Reed Frog (<i>Hyperolius pickersgilli</i>) – Critically Endangered; endemic to coastal moist grasslands and reed beds in KwaZulu-Natal. <p>Avifauna SCC</p> <ul style="list-style-type: none"> ■ Southern Banded Snake Eagle (<i>Circaetus fasciolatus</i>) – Utilizes Forest edges and moist grasslands for hunting. ■ Spotted Ground Thrush (<i>Geokichla guttata</i>) – Prefers dense, moist forest undergrowth and adjacent grasslands; vulnerable due to habitat fragmentation. <p>Plant SCC</p> <ul style="list-style-type: none"> ■ <i>Dioscorea sylvatica</i> – Occurs in moist forest margins and grasslands; vulnerable due to harvesting and habitat loss. ■ <i>Bonatea lamprophylla</i> – Found in moist grasslands and forest margins; rare and localized. ■ <i>Ficus trichopoda</i> – Associated with swamp forests and moist lowland areas. ■ <i>Barringtonia racemosa</i> – Found in swampy areas and estuarine margins; overlaps with moist grassland ecotones.

Habitat Unit	Description and SEI	Expected SCC
		<ul style="list-style-type: none"> ▪ <i>Bruguiera gymnorhiza</i> – Mangrove species, but may occur near moist grassland-estuarine transitions. ▪ <i>Avicennia marina</i> – Similar to <i>Bruguiera</i>; overlaps with estuarine moist zones.

Habitat Unit	Description and SEI	Expected SCC
<p>4- <i>Bruguiera gymnorhiza</i> mangrove forests (28°47'28.39"S, 32° 1'31.93"E)</p> 	<p><i>Bruguiera gymnorhiza</i> is a mangrove species found in the intertidal zones of estuaries and sheltered coastal areas throughout tropical and subtropical regions. It typically occupies the landward margins of mangrove forests, where tidal inundation is less frequent but soils remain brackish, muddy, and oxygen poor.</p> <p>This species thrives in fine alluvial sediments, often forming dense stands along estuarine banks and creek edges. It is adapted to daily tidal flooding, and its knee roots (a form of aerial root) facilitate gas exchange in anaerobic soils while stabilizing the substrate. <i>Bruguiera gymnorhiza</i> is often found in association with other mangrove species such as <i>Rhizophora mucronata</i> and <i>Avicennia marina</i>, contributing to the structural complexity and ecological resilience of mangrove ecosystems.</p> <p>Its tolerance to salinity and sedimentation makes it a key species in coastal protection, carbon sequestration, and nursery habitat provision for estuarine fauna.</p> <p>SEI: VERY HIGH</p>	<p>Plant SCC</p> <ul style="list-style-type: none"> ■ <i>Bruguiera gymnorhiza</i> (Black Mangrove) – Core mangrove species; thrives in intertidal mudflats and estuarine zones ■ <i>Avicennia marina</i> (White Mangrove) – Found in seaward mangrove zones; tolerant of salinity and tidal fluctuations. ■ <i>Rhizophora mucronata</i> (Red Mangrove) – Common in sheltered estuarine areas; forms dense mangrove stands. ■ <i>Barringtonia racemosa</i> – Occurs in swamp forests and estuarine margins; transitional between mangrove and freshwater systems. ■ <i>Ficus trichopoda</i> – Found in swampy, estuarine environments; overlaps with mangrove ecotones. ■ <i>Zostera capensis</i> (Cape Eelgrass) – Found in shallow estuarine waters near mangrove zones; recorded (28° 47' 31.39" S, 32° 01' 29.99") <p>Mammal SCC</p> <ul style="list-style-type: none"> ■ African Clawless Otter – Uses mangrove creeks and estuarine channels for foraging. ■ Common Hippopotamus – May utilize estuarine floodplains adjacent to mangroves. ■ Sundevall's Leaf-nosed Bat, Geoffroy's Horseshoe Bat, Schreibers's Long-fingered Bat, Butterfly Bat – Roost in forested areas near mangroves; forage over wetlands. ■ Swynnerton's Horseshoe Bat, Anchieta's Pipistrelle, Light-winged Lesser House Bat

Habitat Unit	Description and SEI	Expected SCC
		<p>– Likely to use mangrove-adjacent habitats for roosting and feeding.</p> <p>Herpetofauna SCC</p> <ul style="list-style-type: none"> ■ Green Mamba – Found in coastal forests and mangrove edges. ■ Gaboon Adder – May occur in swamp forests adjacent to mangroves. ■ Pickersgill's Reed Frog – Critically Endangered; known from estuarine reed beds and moist coastal grasslands near mangroves. <p>Avifauna SCC</p> <ul style="list-style-type: none"> ■ Mangrove Kingfisher – Endangered; strictly confined to mangrove habitats in KwaZulu-Natal. ■ African Finfoot – Prefers slow-moving water in mangrove creeks and estuarine channels. ■ Caspian Tern, Pink-backed Pelican, Great White Pelican – Use mangrove estuaries for feeding and roosting. ■ Southern Banded Snake Eagle – Hunts in mangrove and swamp forest areas. ■ Yellow-billed Stork, Saddle-billed Stork, African Pygmy Goose, Lesser Jacana – Frequent mangrove wetlands and adjacent floodplains.
5- Coastal Forest (28°47'30.57"S 32°, 1°33.00"E)	South Africa's coastal forests are found along the eastern seaboard, primarily in KwaZulu-Natal and the Eastern Cape, where warm, moist climatic conditions support a rich	<p>Plant SCC</p> <ul style="list-style-type: none"> ■ <i>Adenia gummifera</i> var. <i>gummifera</i> – Found in forest margins and coastal thickets.



diversity of evergreen and semi-deciduous tree species. These forests typically occur on dune systems, low-lying coastal plains, and riverine floodplains, often forming part of a mosaic with mangroves, swamp forests, and grasslands. The vegetation is structurally complex, with a closed canopy, dense understorey, and high species richness, including many endemics and species of conservation concern.

Coastal forests provide critical habitat for forest-dependent fauna, including primates, small antelope, forest birds, and a variety of invertebrates. They are also important for ecosystem services such as carbon storage, erosion control, and water regulation.

Despite their ecological importance, coastal forests are highly vulnerable to urban expansion, agriculture, and invasive species, with significant portions already lost or fragmented. Restoration and protection efforts are essential to maintain their biodiversity and ecological function.

SEI: VERY HIGH

- *Dioscorea sylvatica* – Occurs in forested areas and moist forest margins.
- *Bonatea lamprophylla* – Grows in forest margins and moist grasslands.
- *Ficus trichopoda* – Found in swamp forests and estuarine forest zones.
- *Barringtonia racemosa* – Occurs in swamp forests and estuarine margins.
- *Mimusops caffra* – Coastal forest and dune thicket species.
- *Sideroxylon inerme* – Common in coastal forests and dune vegetation.

Mammal SCC

- **Samango Monkey** – Forest-dependent; found in coastal and montane forests.
- Red Duiker – Prefers dense coastal and swamp forests.
- Blue Duiker – Inhabits coastal and lowland forests.
- Swinny's Horseshoe Bat, Anchieta's Pipistrelle, Schreibers's Long-fingered Bat, Light-winged Lesser House Bat, Geoffroy's Horseshoe Bat, Sundevall's Leaf-nosed Bat – Roost in forested areas, including coastal forests.
- Sclater's Mouse Shrew, Common Dasymys, Least Dwarf Shrew – Found in moist forest undergrowth and swampy forest margins.
- Butterfly Bat – Forages over forested wetlands.
- **African Clawless Otter** – Uses forested riverbanks and estuarine forest edges.

Herpetofauna SCC

- Gaboon Adder – Found in dense forest and swamp forest habitats.

Habitat Unit	Description and SEI	Expected SCC
		<ul style="list-style-type: none"> ■ Green Mamba – Prefers coastal forests and thickets. ■ Serato's Dwarf Chameleon – Inhabits forested coastal areas. ■ Pickersgill's Reed Frog – Occurs in moist coastal grasslands and reed beds near forest margins. <p>Avifauna SCC</p> <ul style="list-style-type: none"> ■ Spotted Ground Thrush – Vulnerable; prefers dense coastal forest undergrowth. ■ Southern Banded Snake Eagle – Hunts in forested areas and forest edges. ■ Mangrove Kingfisher – Uses coastal forest and mangrove habitats. ■ Crowned Eagle – Found in large tracts of coastal and montane forest. ■ African Finfoot – Frequents forested riverbanks and estuarine channels. ■ Tawny Eagle, Yellow-billed Stork, Pink-backed Pelican, Caspian Tern, African Pygmy Goose, Lesser Jacana, Saddle-billed Stork – While not strictly forest-dependent, many use adjacent forested wetlands and estuarine zones.

*Species in Bold were recorded on site

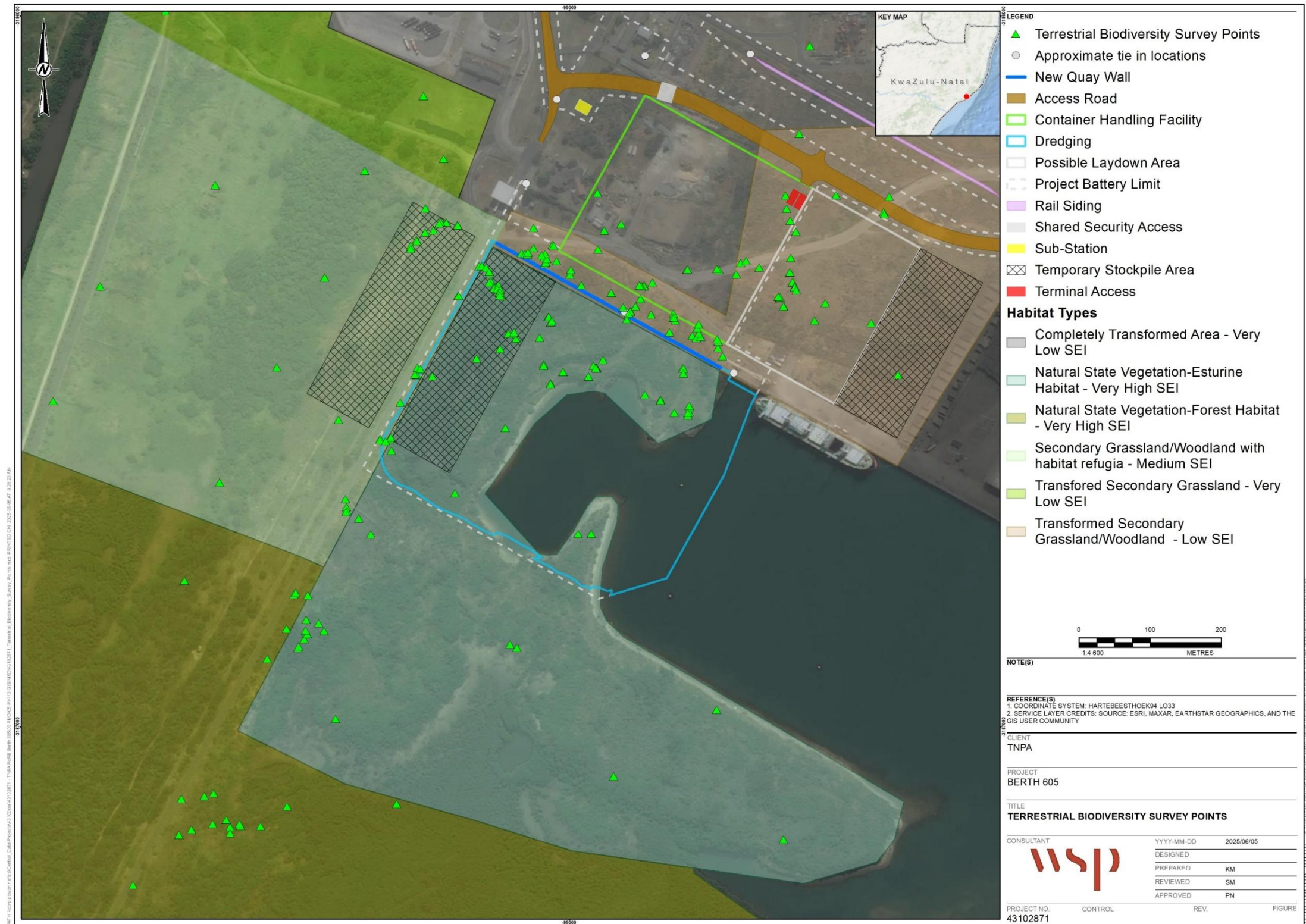


Figure 3-5 - LSA Mapped Vegetation Communities and Survey Points

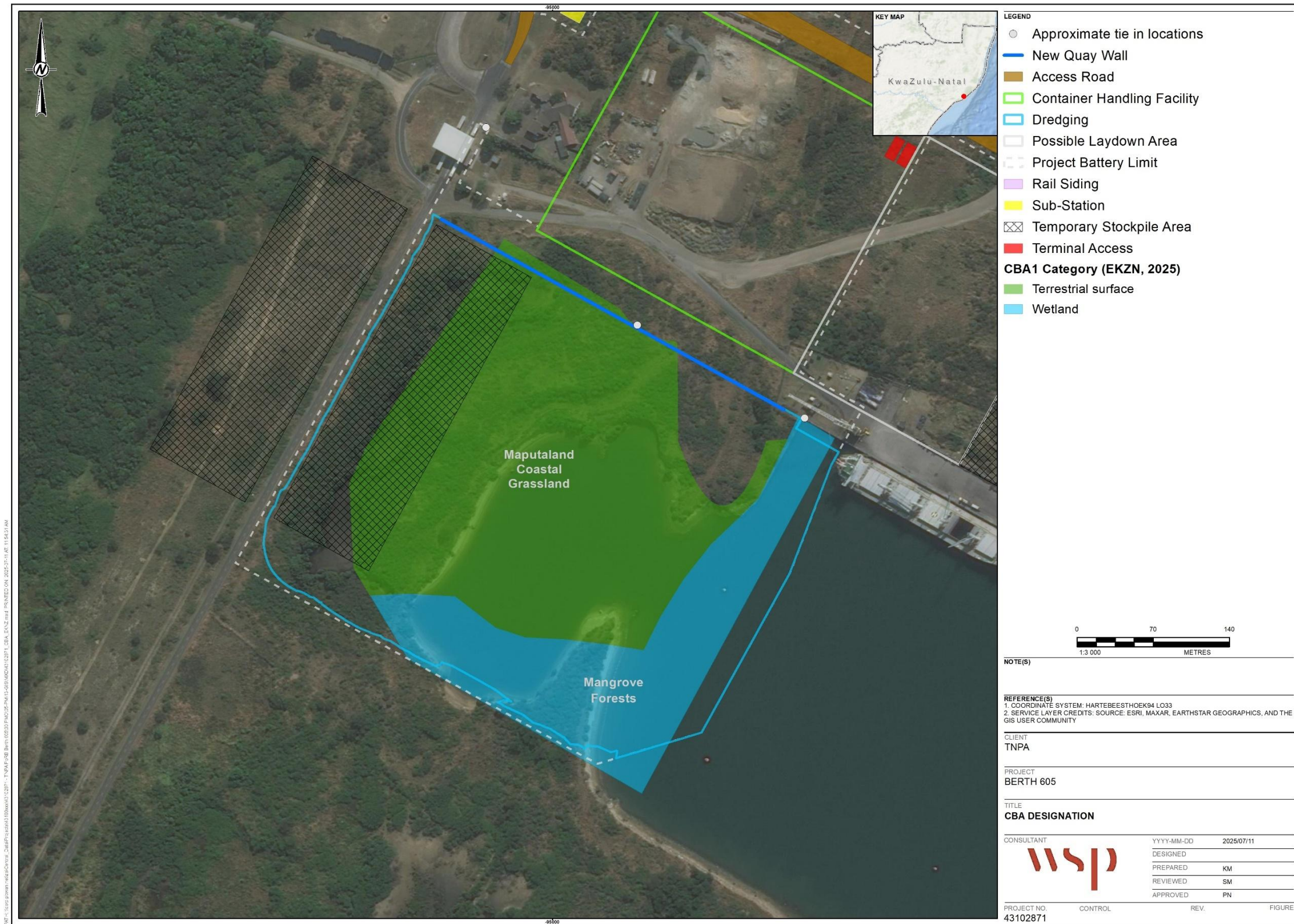


Figure 3-6 – CBA 1 Mapped Vegetation Communities

3.2.4 FLORA SPECIES OF CONSERVATION CONCERN

This section presents a summary discussion on flora SCC obtained from the Terrestrial Biodiversity Impact Assessment Report (Including Plants and Animals) (WSP 2025), supporting detail is presented in Table 3-1 above. The site surveys completed during 22nd to the 25th of October 2024 and again from the 20th to the 23rd of February 2025 and December 2025 confirmed that two declining plant species are present, and eight protected tree species and two declining species were flagged as likely to occur in the LSA, based on habitat suitability and their known species distributions. The list of all confirmed plant species, as well as the likelihood of occurrence of additional SCC plants is detailed in Table 3-2.

Cape Eelgrass (*Zostera capensis*) was recorded in the LSA during previous studies. Further information regarding this species and its occurrence is addressed in the Estuarine Ecology specialist study (Allan, 2024).

Table 3-2 – Threatened and Protected flora species that occur or potentially occur on-site

Occurrence	Scientific Name	Common Name	SA National Red-List
Present	<i>Adenia gummifera</i> var. <i>gummifera</i>	-	Declining
Present	<i>Adenia gummifera</i>	Monkey Rope	Declining
Present	<i>Ficus trichopoda</i>	Swamp fig	Protected Tree
Present	<i>Barrintonia racemosa</i>	Powder-puff tree	Protected Tree
Present	<i>Bruguiera gymnorhiza</i>	Black mangrove	Protected Tree
Present	<i>Mimusops caffra</i>	Coastal Red Milkwood	Protected Tree
Present	<i>Rhizophora mucronata</i>	Red Mangrove	Protected Tree
Present	<i>Sideroxylon inerme</i>	White Milkwood	Protected Tree
<i>Present</i>	<i>Avicennia marina</i>	Grey Mangrove	Protected Tree
<i>Present</i>	<i>Bruguiera gymnorhiza</i>	Orange Mangrove	Protected Tree
Likely. Ideal habitat conditions present.	<i>Bonatea lamprophylla</i>	Green Wood Orchid	Vulnerable
Likely. Ideal habitat conditions present.	<i>Dioscorea sylvatica</i>	Forest Elephant's Foot	Vulnerable
Present in RSA.	<i>Zostera capensis</i>	Cape Eelgrass	Vulnerable

3.3 FAUNA

Two mammal SCC species were recorded in the LSA during the field surveys completed during 22nd to the 25th of October 2024 and again from the 20th to the 23rd of February 2025 and December 2025 for the Berth605 container handling project (Terrestrial Biodiversity Impact Assessment Report (Including Plants and Animals) (WSP 2025). These include African Clawless Otter (*Aonyx capensis*) - Near Threatened, and Samango Monkey (*Cercopithecus mitis labiatus*) - Vulnerable. An additional 12 SCC were identified as likely to occur in the LSA, with a further eight possibly occurring. Species specific details are presented in the table that follows (Table 3-3).

Table 3-3 – Threatened and Protected fauna species that occur or potentially occur on-site

Occurrence	Common Name	Species Name	Conservation Status
Present	African Clawless Otter	<i>Aonyx capensis</i>	Near Threatened
Present	Samango Monkey	<i>Cercopithecus mitis labiatus</i>	Vulnerable
Likely	Red Duiker	<i>Cephalophus natalensis</i>	Near Threatened
Likely	Blue Duiker	<i>Philantomba monticola</i>	Vulnerable
Possible	Leopard	<i>Panthera pardus</i>	Vulnerable
Likely	Common Dasymys	<i>Dasymys incomtus</i>	Near Threatened
Likely	Four-toed Elephant Shrew	<i>Petrodromus tetradactylus</i>	Near Threatened
Likely	African Striped Weasel	<i>Poecilogale albinucha</i>	Near Threatened
Likely	Swinny's Horseshoe Bat	<i>Rhinolophus swinnyi</i>	Vulnerable
Likely	Red Bush Squirrel	<i>Paraxerus palliatus</i>	Near Threatened
Likely	Dark-footed Mouse Shrew	<i>Myosorex cafer</i>	Vulnerable
Likely	Anchieta's Pipistrelle	<i>Hypsugo anchietae</i>	Near Threatened
Likely	Schreibers's Long-fingered Bat	<i>Miniopterus schreibersii</i>	Near Threatened
Likely	Light-winged Lesser House Bat	<i>Scotoecus albobfuscus</i>	Near Threatened
Likely	Common Hippopotamus	<i>Hippopotamus amphibius</i>	Vulnerable
Possible	Sclater's Mouse Shrew	<i>Myosorex sclateri</i>	Endangered

Possible	Common Dasymys	<i>Dasymys incommutus</i>	Near Threatened
Possible	Least Dwarf Shrew	<i>Suncus infinitesimus</i>	Data Deficient
Possible	Hottentot Golden Mole	<i>Amblysomus hottentotus</i>	Data Deficient
Possible	Butterfly Bat	<i>Glauconycteris variegata</i>	Near Threatened
Possible	Geoffroy's Horseshoe Bat	<i>Rhinolophus clivosus</i>	Near Threatened
Possible	Sundevall's Leaf-nosed Bat	<i>Hipposideros caffer</i>	Rare

3.3.1 HERPETOFAUNA

The national screening tool flags two herpetofauna species: Nile Crocodile (*Crocodylus niloticus*) - Vulnerable, and Mashona Hinged Terrapin (*Pelusios rhodesianus*), Vulnerable, as potentially occurring. An additional six SCC with potential to occur have been identified from the desktop assessment. The Richards Bay area hosts exceedingly high frog species diversity with over 40 species occurring.

Two vulnerable reptile species, the Eastern Hinged Tortoise (*Kinixys zombensis*) and Green Mamba (*Dendroaspis angusticeps*) were recorded in the LSA (Terrestrial Biodiversity Impact Assessment Report (Including Plants and Animals) (WSP 2025). It is likely that a further six SCC are present, and one could possibly occur in the habitat present. An additional 11 species of Least Concern were also recorded, further illustrating the extent of species diversity in the study area. Species specific details are presented in the table that follows.

The data collected during the desktop assessment and field surveys has highlighted that the Endangered Pickersgill's Reed Frog (*Hyperolius pickersgilli*) is likely to occur in certain freshwater wetland habitats within the Local Study Area (LSA), hence more detailed studies by Enviro Insight, along with the confirmed presence of the Near Threatened Setaro's Dwarf Chameleon (*Bradypodion setaroi*), Vulnerable Green Mamba (*Dendroaspis angusticeps*), Protected- Southern African Python (*Python natalensis*), and Vulnerable Eastern Hinged Tortoise (*Kinixys zombensis*).

The detailed herpetofauna assessment that was completed during December 2025 by Enviro Insight, provided the following conclusion:

The proposed Berth 605 is situated on a historically disturbed site and sizeable mangrove waterbody. The herpetofauna study concludes that there is a very low likelihood for a breeding population of the Endangered Pickersgill's Reed Frog within the project area. For other threatened herpetofauna species only the Eastern Hinged Tortoise is confirmed to be present, and the Nile Crocodile has been observed in the estuary nearby. The presence of Green Mambas and Gaboon Vipers is considered unlikely but possible, with the habitat and high levels of disturbance being suboptimal. Other threatened herpetofauna species are not expected to be present in the project area. In addition, the Near Threatened Setaro's Dwarf Chameleon has been confirmed (Enviro Insight 2025).

It is the opinion of the specialist (Enviro Insight 2025), that the proposed development is not fatally flawed in terms of the presence of herpetofauna species of conservation concern (SCC) likely to be present and there are other areas nearby that may have very high suitability for threatened herpetofauna. However, there are mitigation measures that should be considered to minimise and reduce impacts on the herpetofauna SCC confirmed or likely to be present. It is therefore concluded that Pickersgill's Reed Frog was not recorded in the LSA.

3.3.2 INVERTEBRATES

The national screening tool flags four potential SCC invertebrate species. The East African Fiddler Crab (*Austruca occidentalis*), although not SCC, is an important ecosystem indicator species. They frequented the LSA estuarine habitat and can be used to infer the healthy functioning of the ecological system (Nehemia and Kochzius, 2017).

A total of four species is indicated as Vulnerable, Flat-necked Shieldback (*Arytropteris basalis*), East Coast Katydid (*Pomatonota dregii*), Gossamer-winged Butterfly (*Teriomima zuluana*), Millar's buff (*Deloneura millari*), (Terrestrial Biodiversity Impact Assessment Report (Including Plants and Animals) (WSP 2025).

3.3.3 BIRDS

The DFFE screening tool has identified 16 avifaunal SCC as potentially occurring within the LSA. The Avifauna specialist report presents both the species recorded during on-site surveys and those considered likely to occur, based on field survey findings and supplementary data from previously conducted specialist studies. This avifaunal assessment of the Berth 605 project, conducted on 29 November and 3 December 2024 as well as on 22 and 30 January 2025 identifies five areas of potential concern relevant to avifauna

- The impact on the terrestrial avifauna, is not considered of high significance and is not thought to require any mitigation.
- Two others, the potential impact on the Sand-spit Island and the Kabeljou Flats, are considered of high significance but are also considered unlikely to manifest due to the distance between these two areas and the project footprint and thus also do not call for any mitigation measures.
- The final two aspects, the impact on the mangrove patch and on the 960 m stretch of semi-natural shoreline, both in the project footprint, are considered of high significance and to require mitigation. The appropriate mitigation measures in both instances would appear to be compensation as there and would appear to be no mitigation measures in the form of avoidance, minimisation of magnitude, or rehabilitation/restoration that would be effective in the face of this habitat transformation by stockpiling/dredging, i.e. the residual impact would large. Such compensation may be possible directly adjacent to the project footprint, which would likely facilitate the implementation of these measures. Otherwise, the compensation will have to be located elsewhere, preferably still in the Port of Richards Bay but if necessary, at another location. In the case of semi-natural shoreline, there may be the potential for rehabilitating shoreline in the Port area that has been transformed to a totally unnatural state, rather than creating new semi-natural shoreline.

Provided the recommended mitigation measures (compensation) are implemented, there would appear no justification from an avifaunal perspective to deny the Berth 605 project authorization (Allan, 2024).

4 CHARACTER OF THE SITE

The change in vegetation and habitat units in proximity to and within the project footprint are indicated in Figure 4-1. A series of images are presented starting in 1960 before construction commenced for the Port of Richards Bay. The image series progresses to 1975, when early land stabilisation was underway to separate the Port basin from the remaining natural estuary. Thereafter images are presented which show the progression of disturbance at the site, at time series which are linked to available imagery, through to current date.

The level of active disturbance visible at each time interval is indicated in Figure 4-2, while the composite footprint of disturbance across the combined container facility footprint, the Berth 605 berth basin and the proposed compensation area is indicated in Figure 4-3.

Historic character of the site is important. Not to detract at all from the ecological value of habitat units and species of conservation concern which do occur within the site, the site remains largely a disturbed site. Moreover, the site has progressed ecologically from a position of large-scale disturbance to a transitional vegetation community which is continuing to change. This is important in interpreting both the value of the areas to be lost and the proposal to compensate for habitat types lost rather than offsetting the biodiversity loss.

Key points worth noting include:

- Prior to development of the port (1960 images) the project area was a grassland community, in all likelihood Maputaland Coastal Grassland. There was no evidence of woody vegetation at all within the site footprint at that time.
- The Richards Bay Port development commenced in the early 1970s. One of the first activities to be undertaken was to divide the Mhlathuze estuary to yield the current south-western “natural estuary” and the north-eastern port environment. In so doing the mouth of the Mhlathuze River was diverted to discharge into the reshaped natural estuary. The separation of the two systems occurred through significant sand infill under what is now the access road to the coal terminal. At the same time significant land reclamation took place, using dredge material from deepening of the Port basin to create future development platform areas, by sand deposition.
- The entire footprints of the container facility and berth basin have previously been disturbed. The age of this disturbance dates to 1975 (51 years) in some instances, when primary land reclamation was taking place as part of port development. However, during the development of the 600 Berth series considerable additional disturbance within the Berth 605 basin area took place. This footprint was largely cleared again in the early 2000’s. The current “mangrove tidal pool” was a local borrow pit area that was reshaped approximately 20 years ago. The site has progressed to now include both grassland, mangrove and woody dominated habitat units.
- Similarly, there has been ongoing disturbance to the footprint of the container facility, which is reflected in the low ecological condition of this area. The regularity of disturbance within the container facility footprint may account for the failure of this area to transition beyond a lower quality grassland community.
- The proposed compensation area has itself been extensively disturbed in the past. This includes disturbance during the initial land stabilisation period (the 1970s) and subsequently during the period that the 600 series berth basin was excavated, when much of the excavated material was used for further land reclamation to the east of the proposed compensation area to build up the southern seaward bank of the 600 series berth basin. During this period the mangroves present in

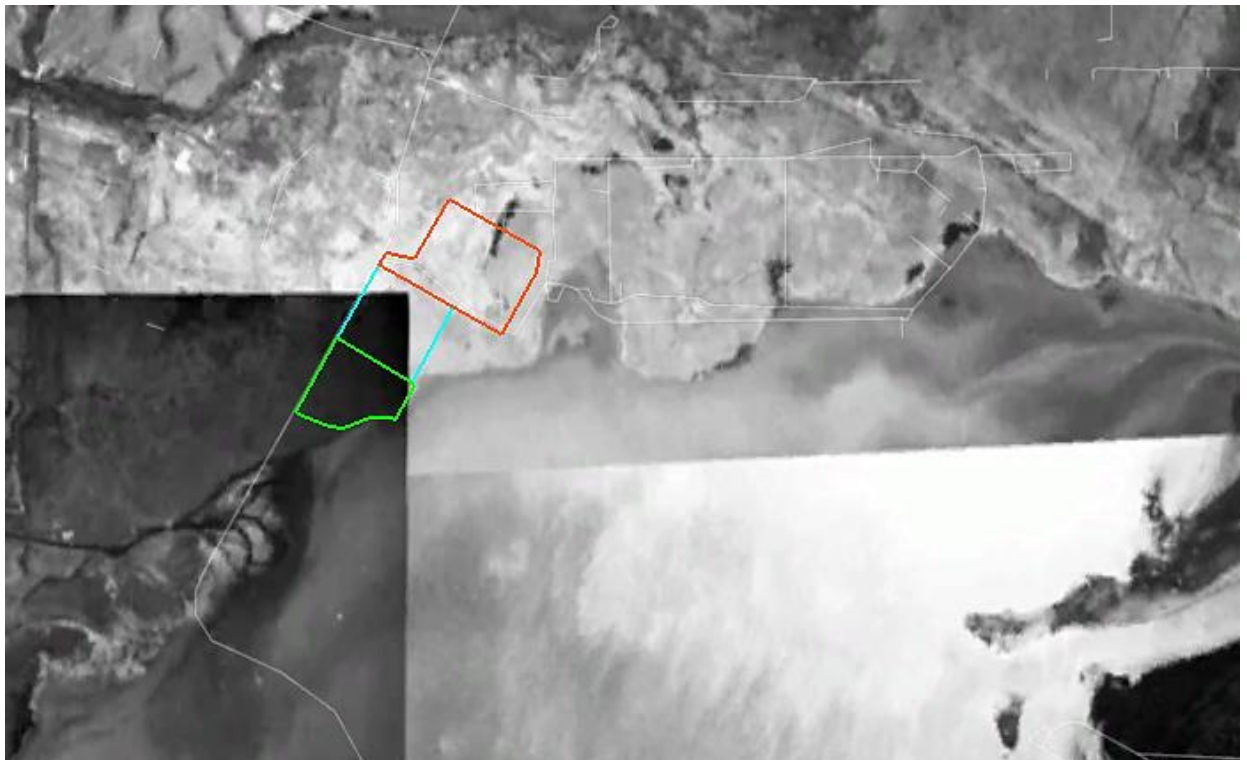
the area were cut back (1997 image) and excavated material from the berth basin was used as fill, as evidenced in the photographic record, and lastly,

- It is evident that following disturbance within the compensation area and the Berth 605 berth basin, and in the absence of any controlling intervention (fire, grazing et cetera) the disturbed areas have transitioned through a temporary grassland phase towards a woody dominated community. It is likely that these transitioning woody communities would mature to reflect tree species typical of coastal forest, as evident on site in the species which are already beginning to establish after 20 years. This natural vegetation reestablishment is taking place in isolation as the entire project area falls inside the controlled port security perimeter and consequently there is no access to this area.

These points have bearing on the consideration to recommend habitat recreation through a compensation proposal. The proposal recognises that these communities are protected from perturbation, that they are maturing and transitioning through early stages of stabilisation, progressing to grassland and in all likelihood will progress further to coastal forest dominated species assemblages.

Stated differently, while there are grassland elements reflected within the community to be lost and within the compensation area, these grassland communities are not expected to remain as they are likely to transition towards woody species dominated communities over time, in the absence of grazing and/or fire.

The compensation plan does not seek to intervene in this successional transition and consequently it is expected that, over an extended period of time, the areas identified as grassland will ultimately become coastal forest.



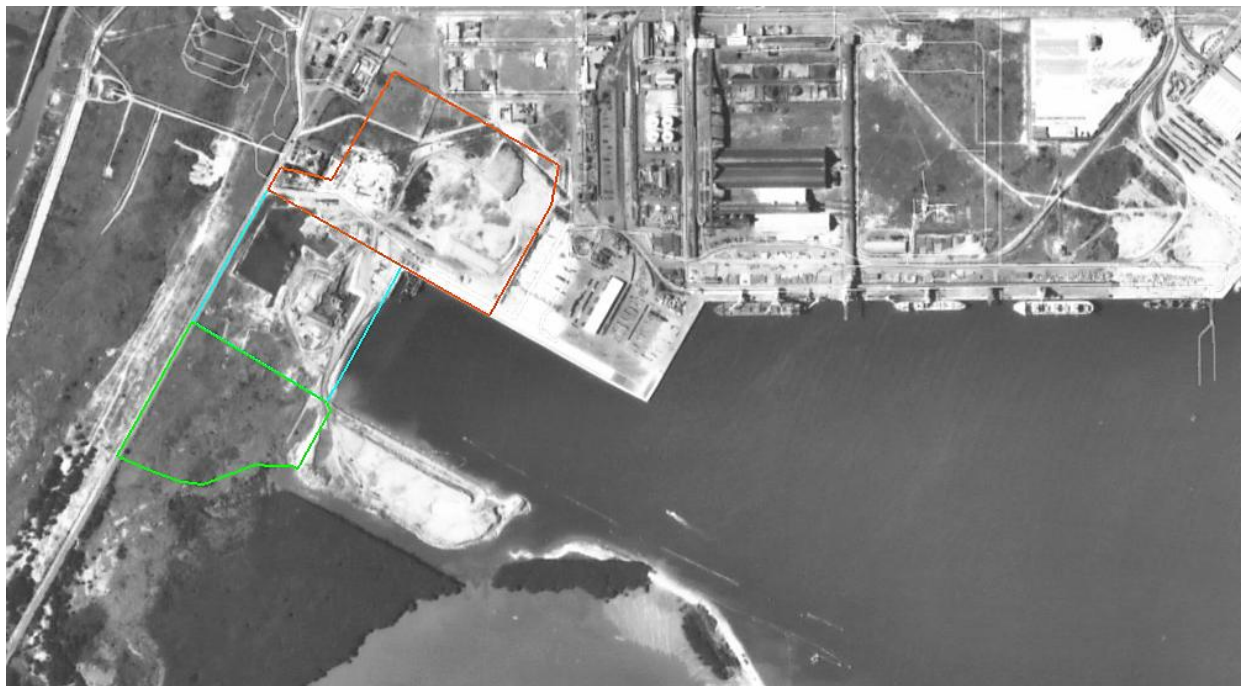
1960 The project and compensation area footprint in relation to the original Umhlatuze Estuary prior to port development. Note the original position of the Umhlatuze River entering the estuary. No woody vegetation present in the project footprint



1975 The project and compensation areas in relation to initial sand backfill and stabilisation as part of early port development earthworks. Note the redirected river mouth south of Harbour road and the development of a sand barrier north of which the initial Port basin was deepened.



1984 Grass re-establishment evident on disturbed areas within the project footprint. Note the original estuary edge to the south of the compensation area. No woody vegetation present. The original sand barrier was the precursor to the current sand spit and still connected to land



1997 Extensive disturbance associated with the 600 series berth excavation. Note the land reclamation using excavated materials to the south of the berth basin. Similarly, note the mangrove cut line and that the sand barrier has been cut off from land by dredging of the 600 series berth basin



2004 Note the extent to which excavated materials from the 600 series berth basin have settled / sloughed into the mangroves. Note also the extent to which disturbance has pushed into the compensation area



2006 Reshaping in the Berth 605 basin to create what has become the mangrove tidal pool. Note the commencement of natural establishment of woody vegetation in the compensation area and on the adjacent eastern rock terrace. Note the limited vegetation development on material sloughed into the mangrove zone



2015 Compensation area and berth basin (green and blue) show signs of recovery while there is ongoing materials storage and handling within the container footprint. Note start of mangrove development within the tidal pool and woody vegetation developing within compensation area



2026 Nominal disturbance at the site other than road traffic passing through the container facility footprint. Berth basin and compensation areas progressing towards coastal forest. Sand spit continues to erode

Figure 4-1 - Aerial views of the project development area (container handling facility footprint in orange, berth basin in blue) and compensation area (in green) over time, to provide an indication of the transformation of the site from prior to development of the port through to current. Time periods shown are 1960, 1975, 1984, 1997, 2004, 2006, 2015 and 2026.

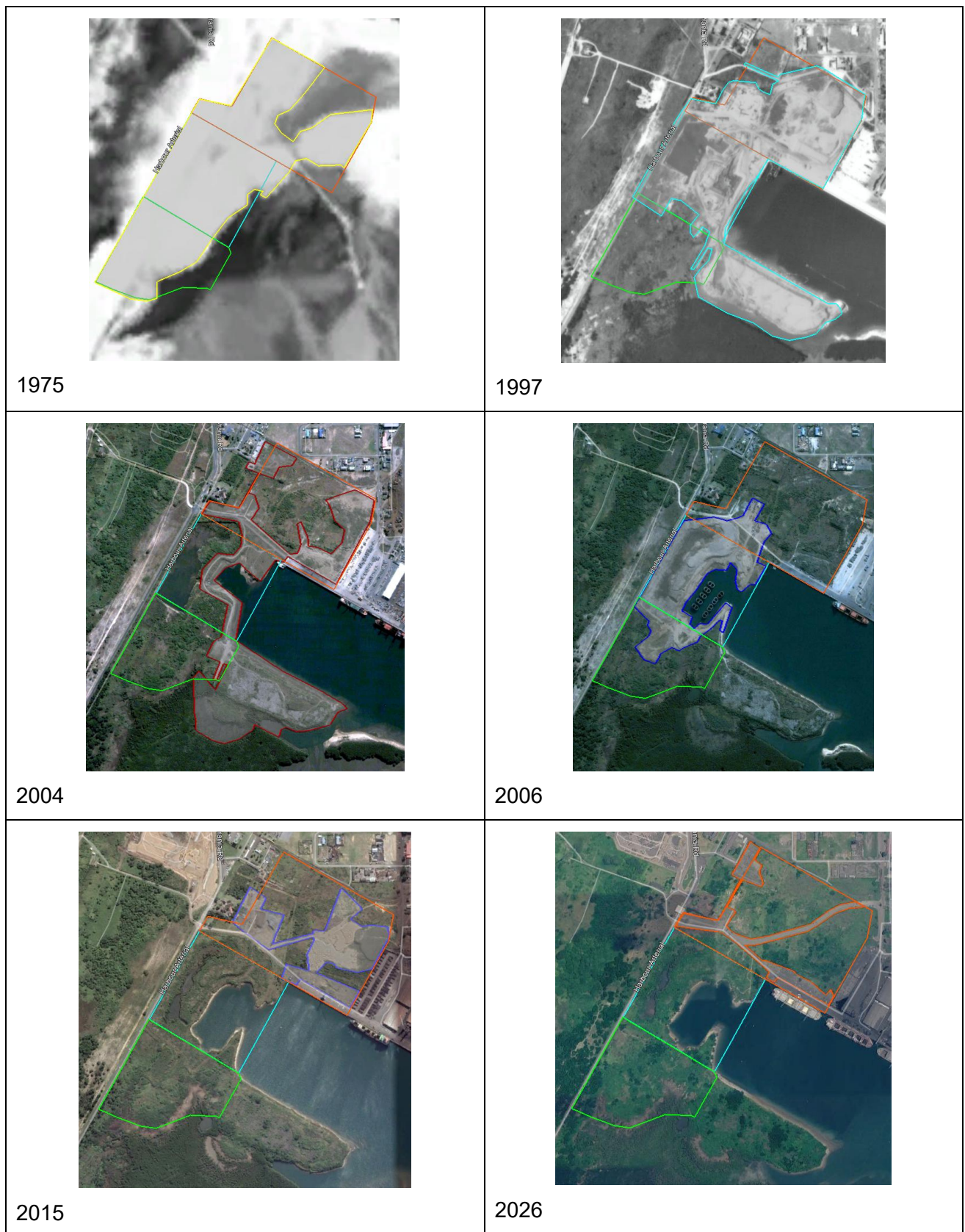


Figure 4-2 - The level of active disturbance visible within the project and compensation area over time



Figure 4-3 - Combined footprint of disturbance within the project and compensation areas, reflecting all disturbance evident since development of the Port commenced in 1975 to date

5 ESTUARINE AND MARINE BIODIVERSITY OVERVIEW

The 600 Berth Basin in the Port of Richards Bay encompasses four habitats identified by CSIR (2005) as ecologically important: sandbanks, mangrove swamps, marine embayment, and deepwater sediment (Figure 5-1). Additionally, a small tidally influenced pool inland of the Assembly Basin represents mangrove swamp and possibly mudflat habitat. This pool is the most sensitive and ecologically significant area within the Berth 605 Project footprint. It is fringed by mangrove trees, including the protected Black Mangrove, and supports a high diversity of fish and invertebrates. Studies by Cyrus and Vivier (2014a,b) recorded nine fish species, with catches exceeding those in nearby estuaries. Most fish were juveniles, comprising estuarine breeders (56%), euryhaline marine species (33%), and marine species independent of estuaries (11%). Larger fish, particularly Category II species, congregate in deeper sections near a pipeline connection during low tide, highlighting the pool's role as a feeding and nursery habitat.

A 2024 CSIR survey confirmed abundant fish, prawns, fiddler crabs, sesarmid crabs, sandprawns, mud crabs, and the Giant Mangrove Whelk, a species whose distribution has declined nationally. Its presence underscores the port's ecological value, despite its absence in earlier surveys. The pool also attracts large fishes at high tide, as evidenced by a ray observed during the survey. Although a seagrass bed recorded in 2014 was absent in 2024, the pool remains highly productive relative to its size, likely the most productive habitat in the basin.

The pool will be lost during Berth 605 construction. Given its ecological importance and anticipated habitat losses from future developments, TNPA has considered creating similar habitats during construction, ideally larger than the existing pool, by excavating and connecting new areas to the basin along its south-southwestern section.

If the proposed excavated area is sufficiently deep to retain water at low tide and maintains a permanent tidal connection to the 600 Berth Basin, it is expected to be naturally colonized over time by mangroves and associated biological communities, thereby contributing ecologically on a per-unit-area basis similarly to the existing tidally influenced pool. This habitat creation would also provide partial compensation for ecological losses associated with future infrastructure developments in the port, particularly the loss of mangrove and shallow subtidal sediment habitats.

The Kabeljous Flats, including their fringing mangroves, the Bhizolo/Manzanyama Canal complex, and the Sandspit, are widely recognized as the most ecologically sensitive and important habitats within the port. Disturbance or loss of these areas would have severe consequences for port ecological functioning and adjacent marine ecosystems. Although the Sandspit is tidally inundated and connected to deepwater basins via a narrow channel, it acts as an effective barrier, reducing erosion and limiting contaminant movement between the Kabeljous Flats and the 600 and 700/800 Berth Basins. Evidence of this barrier effect is seen in the generally higher turbidity over the flats compared to the basins, although differences are not always pronounced. Any disturbance to the Kabeljous Flats or Sandspit would constitute a fatal flaw, as fragmented habitats cannot replicate their ecological value. Importantly, the Berth 605 Project footprint does not encroach upon these critical areas.

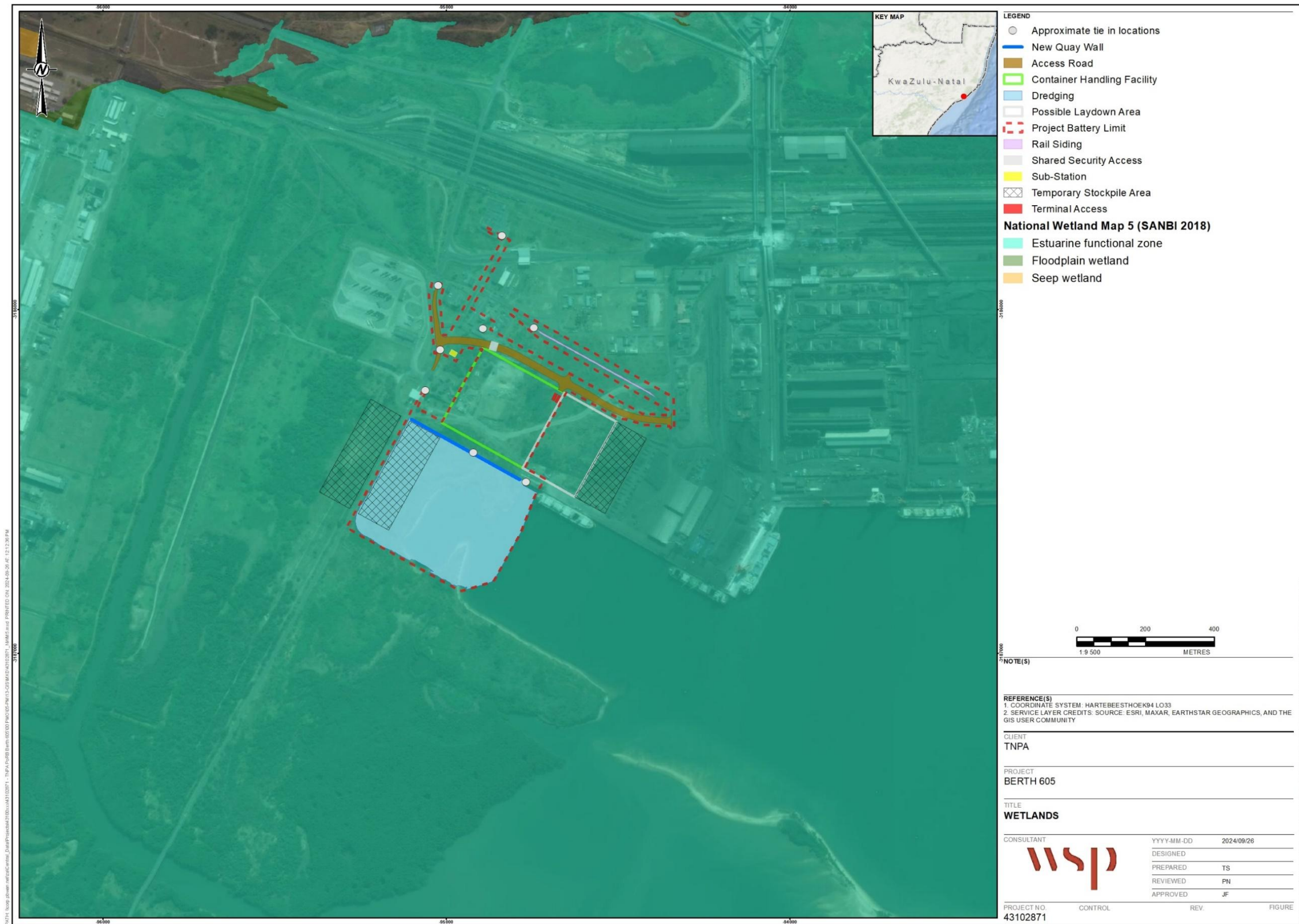


Figure 5-1 – NFEPA Wetlands

6 APPLICATION OF THE MITIGATION HIERARCHY

Biodiversity compensation (and finally offsets) are the final option in the mitigation hierarchy (Figure 6-1), once all other foregoing steps have been considered to their full extent. Mitigation measures that have been prescribed in each of the biodiversity specialist report are summarised in Section 6.1.

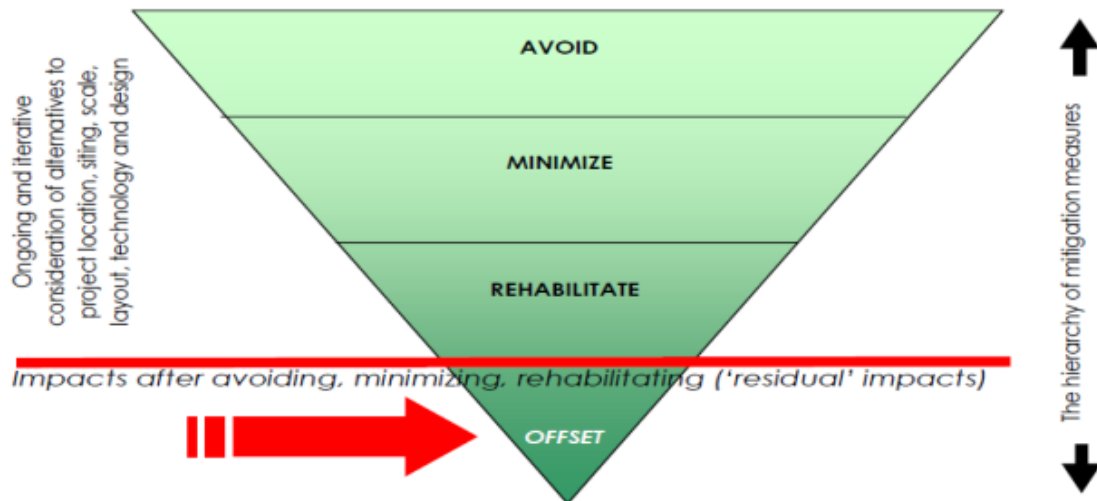


Figure 6-1 - The Mitigation Hierarchy (DFFE, 2022)

6.1 BIODIVERSITY MITIGATION MEASURES

The mitigation measures to minimise project impacts on species and ecosystem receptors and rehabilitate impacted areas that have been prescribed in the various biodiversity specialist assessments are summarised as follow. Where these could not be completed, the resulting residual impacts are addressed through this report' application of the biodiversity offset guidelines.

6.1.1 ALL RECEPTORS

- Avoidance of the sensitive (No-Go) areas identified in the terrestrial and avifauna biodiversity specialist assessments should be adhered to as far as possible;
- All temporary construction footprints, including, but not limited to, laydown areas, portable toilets, cement batching plants, wind tower factory etc., should only be located in areas of modified habitat;
- All human activities associated with construction, operation and decommissioning should be strictly managed according to generally accepted environmental best practice standards, so as to avoid any unnecessary impact on the receiving environment.
- Project access roads should be aligned with existing roads and tracks to the extent possible.
- All staff, vehicle and machinery activities should be strictly controlled at all times so as to ensure that the absolute minimum of surface area is impacted.
- Care should be taken not to introduce or propagate alien plant species/weeds during construction.

6.1.1.1 Avifauna

Transformation of the terrestrial avifaunal habitat

- As is discussed in the Avifauna specialist report, the large number of planned initiatives in the Port of Richards Bay likely makes the need for appropriate mitigation, i.e. compensation in this instance, even more pressing. Where critical avifaunal habitat is to be lost to the Berth 605 development, this will contribute to any cumulative impact upon the Port of Richards Bay as a whole. This means that there is likely to be even greater pressure to compensate for such losses through measures such as compensation.

Transformation of mangrove patch and associated intertidal mudflat

- The appropriate mitigation measure in these circumstances are compensation, especially given that this area formally lies within an irreplaceable Critical Biodiversity Area and within an estuarine functional zone. This means that an area, presumably equally to or larger than the 1.5 ha extent of this mangrove patch, would have to be created, preferably in the existing Port of Richards Bay area, to compensate for the loss of this habitat patch to the Berth 605 development, this is a current option being investigated.
- The proposal is to create such habitat areas by modifying the southern edge of the Berth 605 project footprint. Such a modification would extend into the secondary terrestrial habitats that are not considered of significant avifaunal concern and hence potentially appropriate for such compensation.

Transformation of the semi natural shoreline

- A very similar position as to that discussed above relevant to the mangrove patch pertains to the 960 m stretch of semi-natural shoreline present in the Berth 605 project area. It seems unavoidable that this shoreline will be transformed by the development through dredging and the construction of concrete quaysides and rock revetment. As such, the loss of this critical habitat is to be compensated for in the form of compensation.
- The simplest method of compensating for the lost shoreline as demonstrated, is to modify the southern edge of the development area during the construction phase to create the necessary length of semi-natural shoreline, similar to the suggestion above related to compensation relevant to the mangrove patch.

6.1.1.2 Terrestrial Plant Species and Natural Habitats

Clearance of indigenous vegetation (Forest and Estuarine Habitat) which can lead to the direct loss and disturbance of natural habitats and SCC

- The surrounding area must be surveyed prior to construction/laydown area establishment to determine the presence of nesting birds and sensitive fauna, and these must be cordoned off;
- In this case avoidance is not feasible given the project design requirements therefore this Biodiversity Compensation Plan report (BCP) is required. This report is implemented after all mitigation measures have been investigated and deemed ineffective at lowering the impact on terrestrial biodiversity receptors.
- This BCP aims to compensate for the loss of habitat within a CBA 1 confirmed terrestrial environment and to ensure no net loss in biodiversity. As the proposed compensation plan is being

developed within an estuarine environment for which an offset guideline does not exist, the BCP seeks to attain a like for like composition outcome in terms of quality and size.

- The initial compensation proposal sought to recreate the tidal pool habitat and associated shoreline. The identified area was approximately 7 ha in extent, thus slightly less than the development footprint of 11 ha. This approach was not supported by EKZN (Ezemvelo KZN Wildlife). The plan has been revised. Key to the proposed plan remains the development of replacement habitat to allow the tidal pool habitat to be replicated. This requires land immediately abutting onto the berth basin. The project team subsequently evaluated extending the area of the proposed compensation site. An area of approximately 42 ha was identified immediately south of the 600 series berth basin. However, this land could not be secured from the Port of Richards Bay because it impacts significantly on the 2052 strategic port masterplan. Consequently, the only available area that has been secured allows for a 1: 1 compensation ratio, slightly expanding the originally identified area. There are no alternatives to this that allow direct habitat recreation as part of the proposed berth expansion.
- A search and rescue survey for all flora SCC should then be conducted within these marked footprints prior to the commencement of construction to determine the number of potentially impacted plant species of conservation concern. This will form part of a protected plant walkdown undertaken by a specialist ECO. Based on the findings of the survey, clearing and/or relocation permits should be obtained from the relevant authority to clear or rescue and relocate potentially impacted plant SCC to adjacent areas of natural habitat.
- It is recommended that no large plant specimens should be translocated prior to developing the project area, unless previously proven success is confirmed. As an alternative mitigation measure, the budget that would have been allocated to translocation of large plant specimens should instead be allocated to the purchase of more conservation land as part of the compensation so that these species can be conserved in-situ.
- Speed limits should be expanded to construction areas via appropriate signage and enforced on all access roads to proposed new infrastructure locations. Dust suppression activities should also be expanded to include additional road at new infrastructure areas.
- A search and rescue survey for herpetofauna species should be done immediately in advance of site clearance activities. Any observed individuals should be relocated to nearby areas of natural habitats. Where snakes require relocation, this should be done by a certified snake handler for health and safety reasons;
- No animals (birds, reptiles, and mammals) are to be disturbed unnecessarily, and no animals are allowed to be shot, trapped or caught/hunted for any reason.

Establishment and spread of AIP

- Strictly adhere to the PoRB's existing and approved alien and invasive species management plan. This includes details of strategies and procedures that must be implemented on site to control the spread of alien and invasive species. A combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is recommended. It is critical that (Alien Invasive Plants (AIP) species that are removed are not dropped on indigenous species and large stands area assessed before removal, to diminish the possible loss of habitat corridors used by fauna SCC in the project area.

General

- All temporary construction footprints, (e.g., construction camps, laydown areas), should only be located in areas of modified habitat;
- All vegetation clearing for the Project should be restricted to the proposed Project footprints only, with no clearing permitted outside of these footprints, apart from maintenance clearing, as per PoRB Maintenance Management Plan;
- The footprints to be cleared of vegetation should be clearly demarcated, prior to construction, to prevent unnecessary clearing outside of these areas;
- Heavy vehicles should travel within existing roads or within the construction area work zones as far as is practical;
- Project related removed topsoil should be stockpiled and used to rehabilitate all project disturbed areas.
- A rehabilitation/ landscaping protocol should be developed and implemented to stabilise and revegetate all non-operational sites that have been disturbed by construction activities. The protocol should include:
 - The correct stockpiling of topsoil that was cleared from development footprints during site preparation;
 - The correct contouring of the post-construction landform to limit potential erosion;
 - Compacted soils should be ripped and loosened to facilitate vegetation establishment;
 - Topsoil removed during construction should be applied to all non-operational sites that were disturbed during construction and require revegetation; and
 - Active revegetation should be conducted using plant species that are indigenous, locally occurring and perennial.

6.1.1.3 Terrestrial Animal Species

Injury and mortality of reptile fauna SCC

- Search and rescue surveys for all fauna SCC should also be conducted within these marked footprints prior to the commencement of construction to determine the number of potentially impacted animal SCC. The specialist herpetofauna study confirmed the presence of only the Eastern Hinged Tortoise, other threatened herpetofauna species are not expected to be present in the project area;
- A search and rescue survey for herpetofauna species should be done immediately in advance of site clearance activities. Any observed individuals should be relocated to nearby areas of natural habitats. Where snakes require relocation, this should be done by a certified snake handler for health and safety reasons.

Loss and fragmentation of faunal habitat

- A search and rescue survey for all fauna SCC should also be conducted within these marked footprints prior to the commencement of construction to determine the number of potentially impacted animal SCC;
- There is no practical way to reduce the loss of this ecosystem given the envisioned layout. In line with the mitigation hierarchy, compensation is the only remaining option as even with all mitigations applied the loss of terrestrial biodiversity has a residual impact.

General Fauna SSC:

- Active revegetation should be conducted using plant species that are indigenous, locally occurring and perennial.
- An Environmental Control Officer (ECO) should be on-site during vegetation clearing to monitor and manage any wildlife-human interactions;
- As appropriate, temporary barriers should be erected around construction trenches and excavations to prevent fauna becoming trapped;
- Any fauna species trapped in construction areas, should be safely and correctly relocated to an adjacent area of natural habitat;
- A low-speed limit (recommended 20-40 km/h) should be enforced on site to reduce wildlife collisions;
- No fauna may be intentionally killed or injured by on-site contractors and workers. Handling, poisoning, snaring and killing of on-site fauna by contractors and workers must be strictly prohibited;
- General noise abatement equipment should be fitted to construction machinery and construction vehicles;
- Dust suppression using water bowzers should be undertaken on unsurfaced roads and other project sites where dust entrainment occurs;
- The rules and regulations concerning fauna should be communicated to contractors through on-site signage and awareness training; and
- An incidence register should be maintained throughout all phases of the Project detailing any fauna mortalities/injuries caused by on-site activities. The register should be used to identify additional biodiversity management requirements.
- During the pre-construction walkdown of the development footprints, additional surveying should be conducted to identifying any Sensitive species.

REHABILITATION MEASURES

- A rehabilitation/landscaping protocol should be developed and implemented on-site. The protocol should include the following provisions:
 - Stockpiling of topsoil from development footprints during site preparation;

- Post-construction, the land form should be correctly contoured to limit potential erosion and compacted soils should be ripped and loosened to facilitate vegetation establishment;
 - Topsoil removed during construction should be applied to all non-operational sites that were disturbed during construction and require revegetation;
 - The location of sites requiring erosion prevention and rehabilitation should be identified through regular field inspections;
 - Locally-occurring indigenous plant species should be used to revegetate all areas disturbed during construction; and
 - The re-vegetation programme when implemented, shall take cognisance of the climatic and seasonal conditions and should be completed in spring and early summer.
- Active alien invasive species control should continue throughout the operational and decommissioning phase, as per the PoRB's approved AIS Control and Eradication Plan.
 - The implementation of the approved AIS control and eradication plan which focusses on controlling and eradicating AIS occurring at sites disturbed by proposed Project activities. The plan must include:
 - Identification of AIS management units
 - Prioritisation of sites and species requiring control;
 - Targets and indicators of success;
 - Scheduling of AIS control;
 - Species-specific control methods, using a combined approach of both chemical and mechanical control methods; and
 - Provision for follow-up treatments, as informed by regular AIS monitoring.
 - Construction- and maintenance workers should be trained on the dangers of wildfire and the need to actively prevent unplanned/accidental fires.

7 RESIDUAL IMPACTS REQUIRING COMPENSATION

The LSA inclusive of project infrastructure are situated in a high biodiversity value landscape, interacting with areas of natural habitats, areas mapped as terrestrial CBA's according to the KZN Biodiversity Sector Plan (2016). As a result, a number of residual impacts of moderate to high significance on species and ecosystem receptors have been identified in the various terrestrial and maritime biodiversity specialist assessment reports. The full list of residual impacts is provided in Appendix B; significant residual impacts are summarised in Table 7-1.

Table 7-1 - Significant Residual Impact Summary

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Marine/Estuarine	Loss in aquatic ecological function and productivity due to the physical disturbance, injury, and displacement of benthic biological resources by dredging	C	Negative	Moderate	Moderate
Marine/Estuarine	Loss in aquatic ecological function and productivity due to a deterioration in water quality related to increased suspended sediment concentrations and related turbidity during dredging	C	Negative	Moderate	Moderate
Marine/Estuarine	Loss in aquatic ecological function and productivity in subtidal habitats due to the deposition of sediment resuspended by dredging	C	Negative	Moderate	Moderate
Marine/Estuarine	Ecological impacts due to a deterioration in water quality related to increased suspended sediment concentrations during dredged material disposal	C	Negative	Moderate	Moderate
Marine/Estuarine	Smothering and disturbance of benthic biological resources by disposed dredged material	C	Negative	Moderate	Moderate
Marine/Estuarine	Change in hydrodynamic conditions due to accumulation of dredged material at dredged spoil disposal site	C	Negative	Moderate	Moderate
Marine/Estuarine	Loss of tidally influenced pool and related ecological value and productivity (without creating a similar environment south of the existing pool)	O	Negative	High	High

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Marine/Estuarine	Increased load of contaminants introduced into the port by surface runoff	O	Negative	Moderate	Moderate
Terrestrial Biodiversity	Direct Loss and disturbance of natural habitat and associated flora SCC	C	Negative	Very High	High
	Establishment and spread of AIPs	C	Negative	High	Moderate
	Injury and mortality of reptile fauna SCC	C	Negative	High	High
	Loss and fragmentation of faunal habitat	C	Negative	Very High	High
Avifauna	Transformation of the terrestrial avifaunal habitat	C/O	Negative	Moderate	Moderate
	Transformation of mangrove patch and associated intertidal mudflat (tidal pool)	C/O	Negative	High	Moderate
	Transformation of the semi natural shoreline	C/O	Negative	High	Moderate
Cumulative Impacts					
Avifauna	Transformation of terrestrial avifauna habitat	N/A	Negative	Moderate	Moderate
	Transformation of mangrove patch and associated intertidal mudflat	N/A	Negative	High	Moderate
	Transformation of the semi-natural shoreline	N/A	Negative	High	Moderate

8 TARGETS FOR COMPENSATION

Since direct loss of estuarine and maritime habitats cannot be mitigated, these losses must be compensated for. The guidance provided in the Biodiversity Offset Guidelines (DFFE, 2023) and Ezemvelo KZN Wildlife Offset guidelines, (EKZNW Offset guidelines, 2013) are presented in the following sections.

The guidelines indicate that residual impacts on Irreplaceable biodiversity cannot be fully counterbalanced by compensation because of the high threat status or irreplaceability of affected biodiversity or ecosystem services. Impacts in this category would generally be unacceptable (and the development thus fatally flawed). A detailed discussion is presented in the following sections in this regard. The CBA1 designation of the natural areas within the LSA is as a result of the overlap with two Endangered vegetation types, Maputaland Coastal Grassland (Endangered, 19% protected) and Mangrove forests (Endangered, 73% protected).

8.1 ESTUARINE HABITAT

Several possible biodiversity compensation areas were primarily identified within the Port of Richards Bay. However, TNPA indicated that future port development plans and potential biodiversity offset/compensation requirements for these developments means that only the immediate area near the 600 Berth Basin can be considered for biodiversity compensation/offsetting of Berth 605 and Associated Infrastructure Development project related estuarine, terrestrial, and freshwater biodiversity losses.

Three estuarine biodiversity compensation options were identified. First, a tidal pool to replace the existing tidal pool that will be lost. Second, an option to increase the length of the shoreline within the existing 600 Berth Basin and in the extended part of the basin, to compensate for the loss of shoreline habitat in the Assembly Basin. This, the placement of dredged sediment in the southeastern most part 600 Berth Basin, to create shoreline and shallow water habitat. However, this option was not considered further as it would lead the loss of existing shallow water habitat, including a narrow channel that runs between the 600 Berth Basin and Kabeljous Flats.

A detailed conceptual design for the estuarine biodiversity compensation areas cannot be formulated at this stage since this will require the involvement of engineering experts and geotechnical information for the land where estuarine habitat can be created, to determine, for example, the ease of constructability (excavation). However, this is beyond the scope of this phase of the biodiversity compensation process, which is aimed largely at securing consent for the compensation concept as it relates to the Berth 605 and Associated Infrastructure Development project. Furthermore, terrestrial and freshwater biodiversity offsetting demands for the project will compete for the same available space and may involve requirements that influence the estuarine biodiversity compensation area design. However, there are two key components for the estuarine biodiversity compensation.

First, newly created tidal pool habitat should be functionally equivalent to the existing tidal pool connected to the Assembly Basin, including surface area. Extension of the 600 Berth Basin and the need for a tidal connection to the main port waterbody means that compensatory habitat can only realistically be created on land to the south-southwest of the existing Assembly Basin and proposed basin extension area. Potential areas and for tidal pool creation are illustrated in Figure 7. A similar layout for the compensatory tidal pool as that for existing tidal pool might not be possible considering a fairly long area of land would need to be excavated. This could potentially be challenging as there

might be overburden on the finger-like projection of land between the 600 Berth Basin and mangrove area fringing the Kabeljous Flats, placed there during historical projects. The created habitat can also not follow the same approximately northeast-southwest alignment as the existing tidal pool since it would then encroach on existing estuarine habitat fringing the Kabeljous Flats. A simpler design, such as an essentially square outline, would be acceptable if it facilitates habitat creation from an engineering and constructability perspective. That said, non-linear shorelines would promote habitat value and functionality.

Critical requirements are that the compensatory tidal pool must have a relatively shallow water depth, most of the bottom should not be exposed (drained dry) on the lowest tide, and there must be a permanent connection to the main port waterbody to allow tidal water exchange. The connection could be through an excavated channel or a pipe, as is the case for existing tidal pool. The benefit of a pipe connection is that it would likely be easier to seal in the event a major pollution incident affects the 600 Berth Basin area of the port and would probably be easier to maintain than a channel.

As discussed below, there is an opportunity of ‘trading-up’ if seagrass beds can be established in the compensation tidal pool. The physiological requirements for seagrass, including adequate exposure to sunlight, will dictate the compensation tidal pool design.

Second, the transformation of the Assembly Basin will result in the loss of sandy shoreline habitat. The south–southwestern shoreline of the 600 Berth Basin should therefore be reconfigured to ensure that the total length of sandy shoreline within the expanded basin is equivalent to that currently present within the combined 600 Berth and Assembly Basins. This could be achieved by introducing indentations along the shoreline, including in the extended part of the 600 Berth Basin. The feasibility of concurrently increasing the width of the intertidal sandy habitat and adjacent shallow-water areas should be explored to enhance habitat availability for invertebrates, fish, and wading birds. Rock and rubble along the shoreline should also be removed, as rocky shore habitat is uncommon in South African estuaries and most estuarine fauna are not specifically adapted to utilise this substrate.

As noted above, there is an opportunity of ‘trading-up’ the compensation tidal pool, if a viable *Zostera capensis* seagrass bed could be established in the pool. *Zostera* habitat is highly threatened in KwaZulu-Natal. *Zostera* historically occurred in several open mouth estuaries in the province, including Richards Bay and Durban Bay (Begg 1978), but has since disappeared from these systems, probably largely due to water-quality degradation and habitat loss linked to port development and the urbanisation of surrounding catchments. Prolonged drought, mouth closure, and hyper-salinity have also contributed to the loss of *Zostera* from the St Lucia system in recent years. In 2014, a very small *Zostera* bed was recorded in the uMlalazi Estuary south of Richards Bay (Kelbe and Taylor, 2019), but its current status is uncertain. Historically, *Zostera* was common in this estuary. Similarly, *Zostera* has been reported from the Amatikulu Estuary (Smit et al., 2023) further south than the uMlalazi Estuary, but the current status of this population is also unknown. For all practical purposes, *Zostera* is now confined to the Mhlathuze Estuary, but even this population has experienced losses due to the tidal entrainment of suspended sediment associated with the disposal of dredged material from the Port of Richards Bay (Cyrus et al., 2008).

In 2014, *Zostera* bed was recorded in the tidal pool connected to the Assembly Basin (Mostert, 2014). Cyrus and Vivier (2014 a,b) estimated that bed covered about 40% of the shallow water habitat in the pool. However, the bed has since disappeared (CSIR, 2025), for reasons unknown. The important point is that, given the right conditions, *Zostera* will establish in artificially created estuarine habitat in the port and should be considered as an outcome for the compensation tidal pool design.

Zostera is widely recognised as important nursery habitat for the juveniles of many fish and swimming prawn species in South Africa (Beckley, 1983; Whitfield et al., 1989; Weerts and Cyrus, 2002; Wasserman et al., 2020), and the absence of this habitat from KwaZulu-Natal estuaries is a limiting factor to fish and swimming prawn diversity. The successful re-establishment of *Zostera* in the Port of Richards Bay would be a significant ecological benefit and vastly increase the value of the habitat.

In the Western Cape, transplants of this species were found to be excluded by bioturbation by the burrowing sandprawn *Kraussillichirus kraussi* (Siebert and Branch, 2007), a species that occurs in high abundances in the Port of Richards Bay, including in the tidal pool. However, bioturbation seems unlikely to have been the cause of the *Zostera* loss given it managed to establish in the pool at a time when sandprawns would certainly have been present. It is possible the growth of mangroves around the pool, which is narrow, since 2014 has resulted in a shading effect, to a degree insufficient sunlight reaches the water surface to support *Zostera* growth. Elsewhere in the port, fine-grained sediment suspended by wind action (e.g. Kabeljous Flats) might reduce light penetration, with the same effect. Suspended sediment might also possibly be deposited on and smother potential *Zostera* growth. Wind driven wave chop breaking up leaf fronds could also be a factor limiting the establishment of this seagrass in the port. However, these conditions also occur in the Mhlathuze Estuary, where *Zostera* has established.

Given the above, there is no certainty that *Zostera* beds could be established through the proposed estuarine habitat creation. A recreated tidal pool nevertheless provides good potential for its establishment and should be explored. *Zostera* for translocation could be sourced from the Mhlathuze Estuary, but the presence of sufficient quantities of seagrass in this system to support translocation needs to be confirmed. Plants from this environment will be adapted to similar subtropical conditions as the proposed estuarine habitat creation area in the port and will, therefore, be better suited than plants from warm- or cool-temperate estuaries in the Cape (where it is more common).

Long-term development plans for the Port of Richards Bay will result in ongoing and substantial losses of high-ecological-value estuarine habitat and associated biodiversity. There appears to be insufficient space within the port footprint to adequately compensate for these losses. TNPA, in consultation with Ezemvelo KZN Wildlife, other relevant stakeholders, and environmental specialists, therefore, needs to strategically consider an appropriate long-term approach to addressing estuarine biodiversity loss. A potential short-term intervention could involve considering whether the compensatory tidal pool assessed in this Biodiversity Compensation Report could be increased in size to offset some near-future losses. The challenge, however, is that such an expansion would need to occur at the expense of terrestrial habitat currently proposed as compensation for biodiversity losses associated with the Berth 605 and Associated Infrastructure Development project.

8.2 TERRESTRIAL HABITAT

Residual impacts on terrestrial habitat were defined as the extent of natural habitats supporting plant/fauna SCC that will be lost because of the proposed Berth 605 development.

The national offset guidelines specify that offsets are not applicable within estuarine and maritime environments, within which the LSA is situated. A 1:1 compensation ratio is suggested for all vegetation and habitat types within the LSA by taking into consideration the following:

8.2.1 THE CONDITION OF THE AFFECTED TERRESTRIAL HABITAT

Data obtained during detailed in-field investigations indicate that the habitats to be removed comprise Mangrove Forest with a Very High Sensitivity Ecological Index (SEI), Coastal Forest with a High SEI, and Grasslands with a Medium SEI. The Medium SEI rating for Grasslands, based on their current ecological condition, requires a compensation ratio of 1:1.

Mangrove Forest, although classified as having Very High ecological sensitivity, occurs extensively throughout the Port and, in certain areas, forms dense stands. The PoRB's Mangrove Management Plan allows the periodic removal of encroaching mangroves. A compensation ratio of 1:1 is proposed for this vegetation type. Even though this species establishes easily within the Port of Richards Bay, it is under threat elsewhere along the Kwa-Zulu Natal coast and the mangrove populations within the Richards Bay Port environment are a significant proportion of the remaining viable population within the province and remain important from a conservation perspective.

Re-establishing areas of Coastal Forest were recorded in an isolated section of the Local Study Area (LSA). A compensation ratio of 1:1 is proposed, on account that this vegetation type is re-establishing on previously disturbed land.

All habitat units that are to be lost are secondary systems which are re-establishing since previous disturbance events linked to past construction events. Previous construction disturbance was largely confined to the future development footprint of the 600 series berth basin to minimise impact on other adjacent greenfield habitats. Now, 20 years later the logical progression of the 600 series berth expansion necessitates development into this area. These habitat units (secondary in nature) will now be lost. This is a key motivator to why the compensation plan seeks to include habitat reconstruction within the engineering design to ensure that the estuarine and mangrove habitat lost can be recreated. The specialist team have confidence in the restoration trajectory of the proposed area given the favourable ecological performance on the site following past disturbance over the last 20 years.

This is a specific compensation proposal to secure the continuation of similar habitat. Larger considerations in relation to biodiversity offset associated with implementation of the 2052 port masterplan cannot be addressed through the current project. That does require a separate conversation between TNPA and EKZNW.

8.2.2 THE PRESENCE OF THREATENED SPECIES

Threatened and protected species were recorded on site, as discussed in detail in the Terrestrial Biodiversity report, with a total of Ten (10) plant SCC that were confirmed to be present see Table 3-2, and thirteen (13) SCC faunal species (Table 3-3) were confirmed to be present. This result does raise concern over the impact of the project on these species, and this has led to best practice mitigation measures being employed for the risk rating to be lowered where possible.

8.2.3 THE PRESENCE OF SPECIAL HABITATS

The habitats that can be described as special include the Mangrove Forest Coastal Grassland and the Coastal Forest areas, each discussed in detail under heading 4. The conclusion reached is that despite various factors negatively impacting biodiversity the habitats still represent sensitive areas that needs to be considered, with compensation being the favoured method.

8.2.4 THE BIODIVERSITY PROCESS VALUE OF THE AFFECTED HABITAT

Process value is linked to the following three patterns and processes, the LSA is compared to each to evaluate the presence of them, and thereby inferring the impact the project will have on them:

Connectivity: The LSA is isolated from a terrestrial perspective and borders on development and estuarine habitats, there are no natural habitat corridors present.

Ecosystem Services: The LSA, though relatively small, does form part of a larger system which contributes to water purification, soil stabilization, and carbon sequestration.

Landscape Role: The LSA does form part of the broader ecological network of Critical Biodiversity Areas, the isolated nature of the LSA is however a limiting factor.

8.2.5 THE IMPORTANCE OF BIODIVERSITY UNDERPINNING VALUED ECOSYSTEM SERVICES

The LSA is part of a larger system that could provide Ecosystems Services, however the LSA in isolation does not specifically contribute to these Ecosystem Services as discussed below:

- **Provisioning services:** The LSA does not provide food, water, timber, medicinal resources.
- **Regulating services:** The LSA does provide climate regulation, water purification, flood control, pollination.
- **Supporting services:** The LSA does provide soil formation, nutrient cycling, habitat provision.
- **Cultural services:** The LSA does not contribute to recreation, spiritual values, aesthetic benefits.

8.2.6 THE CONDITION OF THE POTENTIAL COMPENSATION AREA

Based on correspondence with TNPA regarding the strategic development footprint for expansion of the PoRB in future, the area to the immediate south southwest of the Berth 600 series harbour extension (Figure 9-1) has been identified as the sole feasible site for implementing the biodiversity compensation. The following project constraints exist:

The habitat within the proposed compensation area needs to ensure Like for Like in terms of habitat types and size present (Coastal Forest, Mangrove Forest and Grasslands are required (Table 8-1), including habitat suitability and ecological condition. After considering the available habitat area it was ascertained that the possible biodiversity compensation hectares required in Table 8-1, would not be accommodated within the spatial confines of the designated area.

Compensation must deliver conservation gains beyond what would be achieved by ongoing or planned activities and must be equivalent and permanent relative to the biodiversity lost. If the affected habitat is highly irreplaceable or supports threatened species/ecosystems, a higher a higher level of compensation is typically required. Conversely, if the area is less sensitive or alternatives exist, the compensation requirements may be lowered. The final areas to be compensated for are presented in Figure 3-5 and must be discussed and agreed upon by authority's stakeholder engagement, ensuring that the compensation plan remains both feasible and compliant with national guidelines and regulatory requirements.

Table 8-1 indicates the preliminary compensation calculations; these include the entire project area that requires compensation including the disturbance footprint of the Container Handling Facility and the recreated Tidal Pool, to the extent of 11.0 ha. It must be noted that the mangroves were still

considered for this calculation despite verbal communication between TNPA and EKZNWL which implies that mangroves do not require offset due to its flourishing presence at the PoRB

Table 8-1 – Habitat lost per vegetation/SEI type

Vegetation Type Name	SEI: Ha	Infrastructure	Area Ha
Mangrove Forests: Very High SEI	Very High total: 2.06	Port Basin expansion, Dredging	0.430538
Mangrove Forests: Very High SEI		Temporary Stockpile Area	1.630604
Coastal Forest: High SEI	High total: 5.17	Container Handling Facility	0.286707
Coastal Forest: High SEI		Recreated Tidal Pool	0.120
Coastal Forest: High SEI		Temporary Stockpile Area	0.941427
Coastal Forest: High SEI		Port basin expansion, Dredging	3.825374
Grassland: Medium SEI	Medium total 3.78	Port basin expansion, Dredging	0.193537
Grassland: Medium SEI		Temporary Stockpile Area	0.50817
Grassland: Medium SEI		Temporary Stockpile Area	3.080214
Total			11.01

The proposed compensation area can be characterised as consisting of broadly similar habitat types as what is expected to be lost and can compensate for Mangrove forests (add 3.3 ha/ratio of 1.8:1), Coastal Forest (2.47 shortfall) and Grassland (add 5.9 ha/ratio of 0.8/1).

Table 8-2 - Gains per Options

Vegetation Type Lost	SEI: Ha lost	Gain	Difference	Ratio
Mangrove forests	Very High total: 2.06	3.9	1.84	1.8/1
Coastal forest	High total: 5.17	2.7	-2.47	0
Grassland	Medium total 3.78	3.3	-0.48	0.8/1
Total		9.9	-1.11	

It is important to evaluate the restoration/recovery trajectory of the area to be lost. This area was cleared of all vegetation approximately 20 years ago. In the complete absence of access to that area (this is inside the controlled port environment) the area has progressed through natural colonisation from a bare footprint to reflect the habitat units characterised on site. It is equally important to

understand that there is an ecological transition that is taking place through Grassland towards Forest dominated communities and that this will progress within the compensation area. Consequently, the compensation plan that is proposed recognises that while there is a shortfall in the coastal forest habitat unit, the areas identified as Grassland will transition into coastal forest over time. This is favourable to the site given the disturbed nature of both the area to be lost and the recovering nature of the identified compensation area (it has also been disturbed in the past). Ecological trajectory towards coastal forest can be accelerated further should that be the desired outcome, through judicious planting of targeted indigenous species into this area to accelerate forest transition.

Consequently, we remain of the view that the compensation area, managed in isolation and in the absence of any form of controlling intervention (burning, grazing et cetera) will transition through grassland to coastal forest. This trend is evident in the area to be lost. It is also evident in the areas of land reclaimed during primary port development elsewhere in the port environment which have transitioned from bare reclaimed dredge sand piles to a combination of mangrove grassland and ultimately coastal forest.

9 COMPENSATION OPTIONS

9.1 DETERMINING THE COMPENSATION TYPE

The proposed project development falls within an estuarine area. Consequently, a biodiversity compensation plan has been developed. In determining the compensation type consideration has been given to terrestrial biodiversity guidelines inclusive of Biodiversity Offset in KwaZulu Natal (EKZNW, 2013), which highlights three main types of offsets which can be considered. For purpose of the current compensation plan, these have been broadly evaluated.

- **Like for like** or 'in kind' habitats which comprise the same habitat structure, species composition and ecological function(s) as the proposed area that will be disturbed. These areas could be on the same property or at a distance from the development area.
- **Trading up**, which entails seeking to identify and provide protection to habitats of greater threat status than those at risk in the proposed project area, and.
- **Monetary compensation** which may be considered where land of appropriate type cannot be obtained, or the areas of biodiversity loss are either too small to be offset individually or may be too large to be feasible. In these instances, monetary compensation in support of existing approved biodiversity initiatives, conservation funds et cetera may be agreed in the quantum of compensation is determined taking account of the cost of managing a stand-alone offset.

Currently and after TNPA consultation, a **'like-for-like' biodiversity compensation is preferred**, this type of compensation aims to appropriately compensate for the residual negative impacts on affected biodiversity features and if implemented successfully aims to ensure no net loss of that feature on a local or regional scale.

The National Biodiversity Offset guideline (DFFE, 2023) requires that the below-listed principles - which are widely recognised in standard offset guidance (e.g. BBOP, 2009) - guide the selection of suitable candidate offset sites; these principles were also applied when identifying potentially suitable areas and required actions for compensation:

- *Biodiversity offset sites should be selected for ecological equivalence (the "like-for-like" principle) or, where appropriate, there could be "trading-up" to select an area of relatively high or more urgent conservation priority.*
- *Selection should be guided as far as possible by existing biodiversity priority areas in the landscape (for example, the CBA and ESA network, Freshwater Ecosystem Priority Areas, and focus areas for protected area expansion) and/or areas identified as strategic from an ecological infrastructure perspective (such as Strategic Water Source Areas).*
- *Biodiversity offsets should strive to secure the best examples of the features which have been impacted and to improve connectivity in the landscape between protected and priority areas for biodiversity.*
- *The final selection can be influenced by the reasonable consideration of factors other than the biodiversity value of the different candidate sites, such as: ease of the management of the site by a relevant management authority; and threats to conservation due to conflicting land use rights, claims or land use classification.*

For biodiversity compensation in terrestrial ecosystems, rehabilitation and preferably restoration of areas in modified condition (i.e. no longer natural or near-natural) is seen as an integral part of the required management of the site. The guidelines on offset, but applied here, state it is optimal for candidate biodiversity compensation sites to be in a good ecological condition (natural or near-natural)

state), to minimise the additional burden of having to rehabilitate or restore an area (DFFE, 2023); however, some level of rehabilitation of natural habitats with a low level of disturbance is normally anticipated.

9.2 COMPENSATION SITE

Based on correspondence with TNPA regarding the future strategic development footprint for expansion of the PoRB, the combined areas indicated in green, yellow and red on Figure 9-1 have been identified as a feasible site for biodiversity compensation. This area provides an opportunity to retain the compensation response within the broader port planning framework, while also securing habitat that is spatially linked to the affected area and broadly comparable to the habitat that will be lost.

The initial compensation proposal sought to recreate the tidal pool habitat and associated shoreline. The identified area was approximately 7 ha in extent, thus slightly less than the development footprint of 11 ha. This approach was not supported by EKZN (Ezemvelo KZN Wildlife). In response, the project team investigated opportunities to enlarge the compensation footprint, with particular emphasis on securing land adjoining the berth basin so that replacement tidal habitat could be created and directly connected to the estuarine system. An additional area of approximately 42 ha immediately south of the 600-series berth basin was evaluated. However, this land could not be secured because its allocation to biodiversity compensation would constrain and sterilise land required for implementation of the Port of Richards Bay 2052 Strategic Masterplan. No other practicable area is available that would enable direct recreation of the affected tidal and associated terrestrial habitats as part of the proposed berth expansion. Consequently, the only secured and implementable option is a 1:1 compensation ratio within the originally identified 11 ha compensation area.

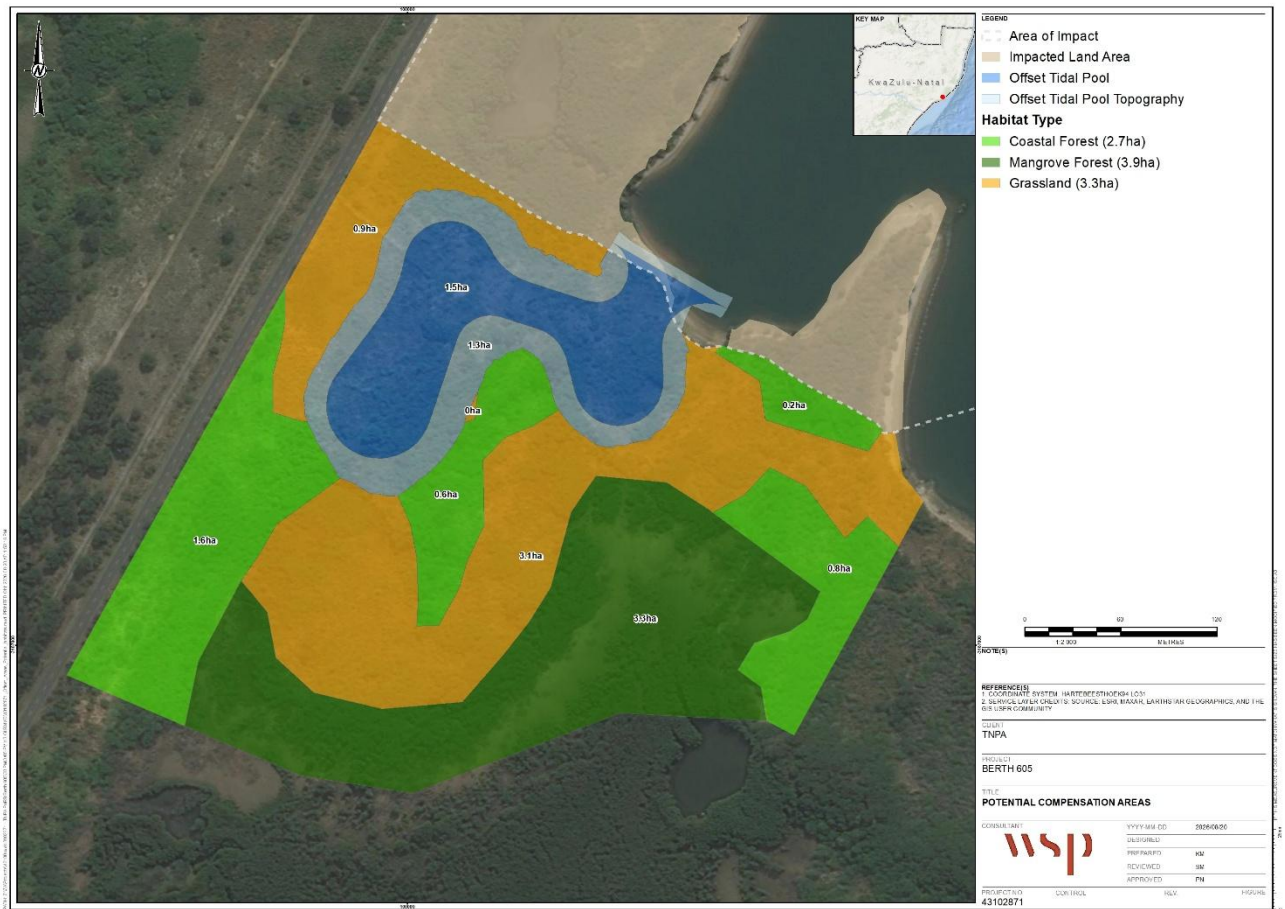


Figure 9-1 - Candidate Offset Areas in relation to project infrastructure

Figure 9-1 illustrates the area of comparable habitat proposed for inclusion in the compensation site in order to achieve an overall compensation ratio of approximately 1:1.

9.3 ESTABLISHMENT AND MANAGEMENT OF COMPENSATION SITE

The establishment of the compensation site will need to be undertaken as a planned and phased process, rather than as a once-off allocation of land. This section sets out the practical requirements for converting the identified compensation area into a functioning biodiversity compensation site, including site demarcation, baseline confirmation, rehabilitation and habitat creation requirements, legal securing of the area, and early implementation actions required before construction-related impacts occur. The intention is to ensure that the compensation site is not only spatially adequate, but is also ecologically viable to the conservation authority, and capable of delivering measurable biodiversity outcomes over the long term.

Recommended enhancement and restoration measures:

Create a functional tidal habitat mosaic

This should be the flagship intervention because the principal objective is to replace the loss of the tidally influenced pool and its associated nursery function.

- Excavate shallow, gently graded tidal basins connected to the harbour through controlled tidal channels.
- Include a range of elevations: permanently inundated shallow water, low intertidal mudflat, upper intertidal benches and supratidal transition areas.
- Use irregular shorelines, shallow embayments and small creek networks rather than a uniform engineered pond.
- Design water residence time, tidal exchange, salinity range and bed levels using hydrodynamic modelling.
- Provide soft sediment suitable for benthic invertebrate colonisation and fish and crustacean feeding.
- Avoid deep, steep-sided basins, which provide water area but limited intertidal ecological function.

This approach aligns with the ecological importance of estuarine macrophytes and shallow habitats as nursery, refugia, nutrient-cycling and food-production areas.

Restore coastal grassland rather than allowing general revegetation

The terrestrial portion should target a recognisable **Maputaland Coastal Grassland** trajectory, not merely achieve vegetation cover.

- Clear woody invasive alien plants in phases to avoid leaving large bare areas.
- Remove invasive palms, casuarinas and aggressive shrub species before they produce further seed.
- Retain indigenous grassland remnants as seed and reference areas.
- Undertake assisted natural regeneration where the native seed bank remains viable.
- Introduce locally sourced seed or plugs of characteristic grassland species where recovery is poor.

- Establish microhabitat patches for threatened grassland flora where suitable soil, moisture and disturbance conditions can be replicated.
- Prohibit routine landscaping, fertiliser application and generic commercial grass mixes.

Reconstruct coastal forest and forest-edge habitat

Forest restoration should focus on **structural development and connectivity**, rather than dense planting of a few hardy trees.

- Retain existing indigenous trees and regeneration start points.
- Establish mixed-species clusters using locally indigenous pioneer, mid-successional and canopy species.
- Include fruiting species that support birds and small mammals.
- Develop graded forest edges with shrubs, climbers and ground-layer species.
- Connect forest patches to existing woodland or coastal forest remnants.
- Maintain coarse woody debris and leaf litter where this does not create operational or fire risks.
- Control invasive plants for several years after planting, as follow-up control will determine success.

Improve terrestrial–estuarine connectivity

A strong benefit would be the creation of a continuous ecological gradient from coastal grassland and forest edge into mangrove and tidal habitat.

Practical measures include:

- removing unnecessary fences, rubble, hardstand and redundant service tracks;
- creating vegetated movement strips between habitat patches;
- replacing abrupt engineered edges with soft ecological transitions where port safety permits;
- providing fauna-permeable fencing outside operationally sensitive areas; and
- avoiding lighting spill into restored habitat through shielding, directional lighting and low-glare fittings.

This would improve the site's value beyond its small size by increasing functional connectivity and reducing edge effects.

Create SCC-specific habitat features

These should only be introduced where supported by the confirmed species assemblage and reference habitat conditions.

Potential measures include:

- shallow seasonal depressions and sedge-dominated wet areas for amphibians;
- dense indigenous ground cover and litter refuges for reptiles and small mammals;
- partially embedded logs, root masses and rock clusters for shelter;

- undisturbed moist grassland patches;
- structurally complex forest understorey;
- fish refuge areas and shallow feeding margins within the tidal system; and
- rescue and translocation of suitable plant SCC into prepared receptor microsites, subject to permits and an approved translocation protocol.

Restore natural drainage and water-quality buffering

The receiving area should be designed to improve the quality of runoff entering the restored estuarine habitat.

- Divert clean stormwater through vegetated swales and sediment forebays.
- Install litter and gross-pollutant traps upstream of sensitive habitat.
- Stabilise erosion-prone flow paths using vegetation and bioengineering.
- Avoid direct discharge of untreated operational runoff into tidal habitat.
- Use wetland or grassed treatment cells where land availability allows.
- Monitor salinity, dissolved oxygen, turbidity, nutrients, hydrocarbons and sediment quality.

The local estuarine management planning framework identifies habitat loss and declining water quality among the principal pressures requiring coordinated management.

Implement intensive invasive alien species control

Alien control is likely to provide one of the most defensible short-term biodiversity gains.

The programme should include:

- baseline mapping by species and density class;
- phased initial clearing;
- herbicide protocols suitable for estuarine margins;
- disposal measures that prevent regrowth or spread;
- quarterly follow-up during the establishment period;
- rapid-response treatment of new incursions; and
- measurable targets for declining alien cover and increasing indigenous cover.

Secure the area and remove recurring pressures

Regulators will place limited value on restoration if the causes of degradation remain.

The proposal should therefore include:

- permanent exclusion of future development from the compensation footprint;
- formal legal protection or a binding conservation mechanism;
- access control and prohibition of dumping, harvesting and unauthorised vehicle use;
- defined institutional responsibility and ring-fenced funding;

- maintenance for at least 30 years or the project life, whichever is longer; and
- financial provision for corrective works if performance targets are not achieved.

Use performance-based success criteria

Suggested indicators include:

- hectares of each habitat type created or restored;
- proportion of the area subject to functional tidal inundation;
- mangrove natural recruitment density and survival;
- indigenous vegetation cover and species richness relative to reference sites;
- invasive alien plant cover;
- forest structural diversity;
- extent of bare or eroding ground;
- benthic invertebrate richness and abundance;
- juvenile fish and crustacean use of the created habitat;
- amphibian occupancy of seasonal wet areas;
- survival and recruitment of translocated SCC;
- water and sediment quality; and
- evidence of ecological connectivity.

The monitoring programme should combine fixed-point photography, vegetation plots, elevation surveys, water-level logging, water-quality monitoring, benthic sampling and fish-community surveys. South Africa's estuarine monitoring framework already recognises tiered monitoring of abiotic and biological condition for detecting long-term change.

Creation of the Estuarine and Coastal Habitat Restoration Area

"Berth 605 Integrated Estuarine and Coastal Habitat Restoration Area", with the following core commitments:

1. Creation of a new tidally connected shallow-water and intertidal habitat complex.
2. Expansion of mangrove habitat through hydrological restoration and natural recruitment.
3. Restoration of degraded coastal grassland and coastal forest communities.
4. Establishment of a continuous terrestrial-to-estuarine ecological corridor.
5. Removal and long-term suppression of invasive alien plants.
6. SCC rescue, translocation and habitat enhancement where technically feasible.
7. Formal legal protection, secured funding and long-term management.
8. Independent monitoring against quantified ecological performance standards.

9.3.1 LONG-TERM MANAGEMENT

The long-term ongoing management of on-site offset sites (after initial 30 year period) will need to be discussed and agreed to with the provincial authority, the principles established during site establishment will serve as basis for long term management and monitoring.

9.4 CONCEPTUAL MANAGEMENT MEASURES AND PROGRAMME

The conceptual management measures that would need to be employed as part of the biodiversity offset, and programme for implementation, for which the Project developer would be responsible, are summarised in Table 9-1.

Table 9-1 - Conceptual Compensation Management Measures and Programme for Implementation

Management Actions	Pre-construction	Construction	Operation
Agree extent and location of compensation site with authorities			
Secure legal processes to register conservation servitudes			
Legal mechanism(s), in terms of which the biodiversity compensation site would be secured			
Draft Biodiversity compensation Management Plan			
Public Participation			
Final Biodiversity Compensation Report			
Compensation management activities, including alternatives			
Biodiversity monitoring (fauna, operation phase avifauna monitoring, terrestrial and marine) in operational area, and of compensation activities, incl site			
Adaptive management			

10 RECOMMENDED CONDITIONS FOR ENVIRONMENTAL AUTHORISATION

The environmental management system provided for by NEMA and the EIA Regulations provide for a Competent Authority to grant Environmental Authorisations subject to conditions. In appropriate circumstances a CA may grant an EA subject to the condition that a measurable biodiversity offset or compensation is implemented by the EA.

Environmental Authorisation (EA) can, and in the case of compensation contain conditions, these conditions stipulate the compensation requirement in detail. The conditions will also stipulate that the EA holder to enter into a Compensation Implementation Agreement with an implementing party. Thus, showing that an agreement may not always be required for and EA to be issued, but will be a binding condition.

The below-listed conditions are proposed for inclusion in the environmental authorisation, should the Project be authorised, based on the guidance provided in the National Biodiversity Offset Guideline:

- The Environmental Authorisation (EA) holder must select biodiversity compensation from a range of compensation options including non-hectare-based compensation, that is sufficient to meet the targets for compensation (as described in this report and agreed with stakeholders including the Biodiversity Offset Group).
- A Biodiversity Compensation Implementation Management Plan must be prepared for the biodiversity compensation site and incorporated into the EMP or a Biodiversity Compensation Implementation Agreement.
- The duration of the liability period is at least 30 years or as long as the duration of the authorised activity, whichever is longer. The applicant is fully responsible for meeting compensation targets including the financing of all compensation actions to ensure that designated compensation site is secured and managed for a minimum of 30 years, including the financial contribution to achieve this.

10.1 LEGAL AGREEMENTS

To reduce the risks of offset failure, compensation need to be underpinned by binding contracts or agreements. Once the implementation framework for establishing a conservation bank has been formalized, it will therefore be important to firm up the contents of various legal agreements that will need to be prepared to allow the model to function effectively. It is anticipated that initial legal requirements for meeting conservation targets would be clearly defined as conditions of authorization for different phases of the development that need to be complied with (e.g., regarding compensation targets, management actions, monitoring, reporting, financial aspects).

10.1.1 SECURING LEGAL PROTECTION OF COMPENSATION SITES

Targeted compensation sites are expected to contribute towards provincial and national conservation targets and as such, must be secured in perpetuity through an appropriate legal mechanism. The appropriate mechanism to achieve formal protection of the compensation sites will need to be agreed upon by TNPA and the BOG in consultation with the EKZNW.

An initial step towards securing formal protection of compensation sites is the preparation of proclamation diagrams. Additional activities necessary to secure legal protection of each site includes:

- Preparation of management plans for the site
- Technical support to ensure legal protection of compensation areas;
- Preparation and submission of rezoning applications;
- Submission of relevant documentation to the deed's office;
- Public Participation processes necessary for formal declaration (as relevant); and
- Inclusion of appropriate signage for each site.

11 MONITORING EVALUATION AND REPORTING

A structured biodiversity monitoring, evaluation, and reporting programme shall be implemented to verify the effectiveness of all biodiversity compensation measures associated with the Berth 605 development, based and building on recommendations within section 9.3. A biodiversity compensation management plan will need to be managed through a formal Biodiversity Compensation Management Plan. The management plan will guide TNPA's responsibilities in the context of the compensation areas over their lifetime. Given the nature of the compensation areas proposed and the management interventions required to ensure they are successful, it must be recognised that a comprehensive Biodiversity Compensation Management Plan cannot be finalised at this stage. Monitoring must be designed to demonstrate progress toward achieving the stated compensation objectives and the overarching goal of no net loss of biodiversity, and to confirm compliance with the Environmental Authorisation and TNPA Environmental Management System requirements.

Monitoring shall focus on measurable indicators directly linked to the biodiversity features and ecosystem functions being compensated and shall assess changes in ecological condition over time rather than solely confirming implementation of actions. Baseline conditions shall be established prior to the commencement of compensation interventions, with follow-up monitoring conducted at defined intervals during construction and throughout the operational phase, or as specified in approval conditions. Monitoring shall be undertaken by suitably qualified specialists, with results submitted to TNPA for review.

Performance shall be evaluated against predefined success criteria and thresholds. Where monitoring results indicate that compensation measures are not achieving the intended outcomes, corrective actions shall be implemented in accordance with the adaptive management provisions of this EMP. All monitoring results, corrective actions, and proposed adjustments shall be documented in periodic compliance and performance reports aligned with TNPA and regulatory reporting cycles. Monitoring and reporting shall continue for the duration required to demonstrate the long-term effectiveness and durability of the compensation measures.

11.1 BIODIVERSITY COMPENSATION MONITORING INDICATORS

The following indicators must be applied, as relevant, depending on the specific compensation measures implemented.

- Marine Habitat Compensation (Subtidal / Nearshore), monitoring indicators may include:
 - Extent and stability of compensated marine habitat (e.g. seabed integrity, absence of excessive scouring or sedimentation)
 - Benthic community composition and diversity (e.g. presence/absence and relative abundance of key taxa)
 - Recovery or maintenance of benthic habitat structure
 - Turbidity and sediment deposition trends relative to baseline
 - Evidence of recolonisation or sustained use by marine fauna

Success criteria should demonstrate stable or improving habitat condition and benthic community structure over time.

- Estuarine Habitat Compensation, monitoring indicators may include:
 - Habitat extent and condition of rehabilitated or enhanced estuarine areas
 - Vegetation cover, structure, and species composition (where applicable)
 - Sediment stability and erosion rates along estuarine margins
 - Indicators of ecological function, such as suitability of nursery habitat
 - Presence and activity of indicator species or species assemblages

Success criteria should demonstrate improved or maintained estuarine functionality and ecological condition relative to baseline.

- Mangrove Compensation (if applicable), monitoring indicators may include:
 - Mangrove area (ha) secured, restored, or enhanced
 - Seedling survival rates and recruitment
 - Tree density, canopy cover, and structural development
 - Species composition and absence of invasive species
 - Evidence of natural regeneration and long-term stability

Success criteria should demonstrate successful establishment, growth, and persistence of mangrove habitat, with increasing ecological function over time.

- Cross-Cutting Indicators (All Compensation Measures)

Additional indicators applicable across all compensation types include:

- Legal security status of compensation sites (where applicable)
- Effectiveness of management interventions (e.g. alien control success)
- Compliance with agreed management and maintenance actions
- Evidence of reduced risk to biodiversity over the long term

Adaptive Management

Should monitoring indicate that success criteria are not being met, adaptive management actions shall be implemented, which may include modification of management practices, supplementary rehabilitation measures, or additional compensation where necessary. All adaptive actions shall be recorded and reported to TNPA.

12 REVIEWING AND UPDATING OF THIS PLAN

Whilst this Biodiversity Compensation Plan Report provides clarity on recommended offset obligations, actions and associated EA Conditions, it is still subject to stakeholder review as part of the EIA process. It is understood that this is expected to include specific comments from the EKZNW and the Biodiversity Offset Group (BOG), that will need to be considered in finalizing the compensation report. Should substantive changes be required in response to comments received, the report will be updated and be re-submitted to the Regulating Authority for approval. Once approved, it is envisaged that key implementation requirements will be tracked by the ECO as part of auditing the compliance against the EMPr prior to development commencing.

13 CONCLUSION

The proposed Berth 605 development will result in unavoidable residual biodiversity impacts within a sensitive estuarine and terrestrial environment in the Port of Richards Bay. Although avoidance, minimisation and rehabilitation measures have been applied through the EIA process, the permanent loss of mangrove forest, coastal forest, coastal grassland and tidally influenced estuarine habitat requires biodiversity compensation.

The initial compensation proposal sought to recreate the tidal pool habitat and associated shoreline. The identified area was approximately 7 ha in extent, thus slightly less than the development footprint of 11 ha. This approach was not supported by EKZN (Ezemvelo KZN Wildlife). In response, the project team investigated opportunities to enlarge the compensation footprint, with particular emphasis on securing land adjoining the berth basin so that replacement tidal habitat could be created and directly connected to the estuarine system. An additional area of approximately 42 ha immediately south of the 600-series berth basin was evaluated. However, this land could not be secured because its allocation to biodiversity compensation would constrain and sterilise land required for implementation of the Port of Richards Bay 2052 Strategic Masterplan. No other practicable area is available that would enable direct recreation of the affected tidal area and associated terrestrial habitats as part of the proposed berth expansion. The area secured is 11 ha in extent and no larger area could be secured without significantly impacting upon the 2052 masterplan.

The proposed approach is based on direct habitat creation rather than reliance solely on hectare-based equivalence. Confidence in its technical feasibility is supported by the successful establishment and ecological functioning of the existing man-made tidal pool within the project area, which demonstrates that suitable estuarine habitat can develop where the required tidal connectivity, bathymetry and substrate conditions are created.

The success of the proposed compensation plan will nevertheless depend on the site being legally secured, implemented before or in parallel with construction impacts, and managed through a detailed Biodiversity Management Plan with clear performance criteria, monitoring, reporting, adaptive management and long-term funding commitments.

Subject to confirmation by the relevant authorities and implementation of the commitments set out in this plan, the proposed 1:1 compensation approach for this project is considered the only practicable direct habitat-recreation option and is capable of delivering a meaningful biodiversity outcome within the Port of Richards Bay.

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Appendix A

FLORA SPECIES OF CONCERN

Occurrence	Scientific Name	Common Name	National Red-List
Present	<i>Genus Commelina</i>	Dayflowers	Least Concern
Present	<i>Microsorium scolopendria</i>	Monarch Fern	Least Concern
Present	<i>Carpobrotus dimidiatus</i>	Eastern Sourfig	Least Concern
Present	<i>Salicornia natalensis</i>	Common Glasswort	Least Concern
Present	<i>Vachellia kosiensis</i>	Kosie Thorn	Least Concern
Present	<i>Apodytes dimidiata</i>	White Pear	Least Concern
Present	<i>Brachylaena discolor</i>	Coast Silver-Oak	Least Concern
Present	<i>Bridelia micrantha</i>	Coastal Goldenleaf	Least Concern
Present	<i>Casuarina equisetifolia</i>	Beach Sheoak	Least Concern

Present	<i>Chrysanthemoides monilifera</i>	Chryanthemum necklace	Least Concern
Present	<i>Clerodendrum glabrum</i>	Cat's-Whiskers	Least Concern
Present	<i>Ficus natalensis</i>	Common Wild Fig	Least Concern
Present	<i>Bridelia micrantha</i>	Coastal Golden Leaf	Least Concern
Present	<i>Hibiscus tiliaceus</i>	Sea Hibiscus	Least Concern
Present	<i>Rhoicissus digitata</i>	Baboon Grape	Least Concern
Present	<i>Searsia nebulosa</i>	Coasta Curranthus	Least Concern
Present	<i>Tecoma stans</i>	Yellow Trumpet Flower	Least Concern
Present	<i>Trema orientalis</i>	Oriental Trema	Least Concern
Present	<i>Gomphocarpus physocarpus</i>	Balloonplant	Least Concern
Present	<i>Gymnosporia senegalensis</i>	confetti spikethorn	Least Concern
Present	<i>Jasminum multipartitum</i>	starry wild jasmine	Least Concern
Present	<i>Vachellia kosiensis</i>	broadpod robust thorn	Least Concern
Present	<i>Cyclosorus interruptus</i>	Marsh Fern	Least Concern
Present	<i>Imperata cylindrica</i>	Bedding grass	Least Concern
Present	<i>Scutia myrtina</i>	Heath phylica	Least Concern
Present	<i>Strelitzia nicolai</i>	Natal Wild Banana	Least Concern
Present	<i>Achrostichum aureum</i>	Golden Leather fern	Least Concern
Present	<i>Vepris lanceolata</i>	White ironwood	Least Concern
Present	<i>Abrus precatorius</i>	Bead vine	Least Concern
Present	<i>Passiflora subpeltata</i>	White Passionflower	Least Concern
Present	<i>Sesbania sesban</i>	Egyptian Riverhemp	Least Concern
Present	<i>Asparagus multiflorus</i>	Manyflower Asparagus	Least Concern
Present	<i>Catharanthus roseus</i>	Madagascar Periwinkle	Least Concern
Present	<i>Cheilanthes viridis</i>	Green Cliff Brake	Least Concern
Present	<i>Sarcostemma viminale</i>	Caustic Vine	Least Concern
Present	<i>Panicum maximum</i>	Guinea Grass	Least Concern
Present	<i>Chrysanthemoides monilifera</i>	Bush tick-berry	Least Concern
Present	<i>Canavalia rosea</i>	Bay Bean	Least Concern
Present	<i>Carpobrotus dimidiatus</i>	Eastern Sourfig	Least Concern
Present	<i>Adenia gummiifera</i> var. <i>gummiifera</i>	-	Declining

Present	<i>Adenia gummifera</i>	Monkey Rope	Declining
Present	<i>Ficus trichopoda</i>	Swamp fig	Protected Tree
Present	<i>Barrintonia racemosa</i>	Powder-puff tree	Protected Tree
Present	<i>Bruguiera gymnorhiza</i>	Black mangrove	Protected Tree
Present	<i>Mimusops caffra</i>	Coastal red milkwood	Protected Tree
Present	<i>Rhizophora mucronata</i>	Red mangrove	Protected Tree
Present	<i>Sideroxylon inerme</i>	White milkwood	Protected Tree
<i>Present</i>	<i>Avicennia marina</i>	Grey Mangrove	Protected Tree
<i>Present</i>	<i>Bruguiera gymnorhiza</i>	Orange Mangrove	Protected Tree
Likely. Ideal habitat conditions present.	<i>Bonatea lamprophylla</i>	Green wood orchid	Vulnerable
Likely. Ideal habitat conditions present.	<i>Dioscorea sylvatica</i>	Forest elephant's foot	Vulnerable
Present in RSA.	<i>Zostera capensis</i>	Cape Eelgrass	Vulnerable

Appendix B

RESIDUAL IMPACTS



Table B-1 – Residual Impacts

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Marine/Estuarine	Loss in aquatic ecological function and productivity due to the physical disturbance, injury, and displacement of benthic biological resources by dredging	Construction	Negative	Moderate	Moderate
Marine/Estuarine	Loss in aquatic ecological function and productivity due to a deterioration in water quality related to increased suspended sediment concentrations and related turbidity during dredging	C	Negative	Moderate	Moderate
Marine/Estuarine	Loss in aquatic ecological function and productivity in subtidal habitats due to the deposition of sediment resuspended by dredging	C	Negative	Moderate	Moderate
Marine/Estuarine	Loss in aquatic ecological function and productivity in intertidal habitats due to the deposition of sediment resuspended by dredging	C	Negative	Moderate	Low
Marine/Estuarine	Remobilisation of oxygen depleting substances from sediment/soil during dredging	C	Negative	Low	Low
Marine/Estuarine	Nutrient remobilisation from	C	Negative	Very Low	Very Low

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
	sediment/soil during dredging				
Marine/Estuarine	Remobilisation of noxious substances from sediment/soil during dredging	C	Negative	Very Low	Very Low
Marine/Estuarine	Bioaccumulation and biomagnification of noxious chemicals remobilised from sediment by biological resources	C	Negative	Very Low	Very Low
Marine/Estuarine	Ecological impacts due to a deterioration in water quality related to increased suspended sediment concentrations during dredged material disposal	C	Negative	Moderate	Moderate
Marine/Estuarine	Remobilisation of oxygen depleting substances from sediment during dredged material disposal	C	Negative	Very Low	Very Low
Marine/Estuarine	Remobilisation of nutrients from sediment during dredged material disposal	C	Negative	Very Low	Very Low
Marine/Estuarine	Remobilisation of noxious substances from sediment during dredged material disposal	C	Negative	Very Low	Very Low
Marine/Estuarine	Deterioration in sediment quality on the dredged spoil disposal site due to the disposal of contaminated dredged material	C	Negative	Very Low	Very Low
Marine/Estuarine	Smothering and disturbance of benthic biological resources by	C	Negative	Moderate	Moderate

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
	disposed dredged material				
Marine/Estuarine	Change in hydrodynamic conditions due to accumulation of dredged material at dredged spoil disposal site	C	Negative	Moderate	Moderate
Marine/Estuarine	Bioaccumulation and biomagnification of noxious chemicals in disposed dredged material by biological resources	C	Negative	Very Low	Very Low
Marine/Estuarine	Loss of tidally influenced pool and related ecological value and productivity (without creating a similar environment south of the existing pool)	Operational	Negative	High	High
Marine/Estuarine	Loss of tidally influenced pool and related ecological value and productivity (with creating a similar environment south of the existing pool)	O	Negative	Very Low	Very Low
Marine/Estuarine	Ecological effects of a change in hydrodynamic functioning in the port	O	Negative	Very Low	Very Low
Marine/Estuarine	Ecological effects of increased need for maintenance dredging and dredged sediment disposal	O	Negative	Low	Low
Marine/Estuarine	Gain in intertidal and subtidal sediment habitat	O	Positive	Low	Low

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Marine/Estuarine	Gain in hard substrate habitat	O	Positive	Low	Low
Marine/Estuarine	Gain in open water habitat	O	Positive	Low	Low
Marine/Estuarine	Increased load of contaminants introduced into the port by surface runoff	O	Negative	Moderate	Moderate
Marine/Estuarine	Introduction of artificial light to port aquatic environment	C	Negative	Moderate	Low
Wave climate and shoreline change	Impacts of dredge spoil disposal on the central areas of the Southern Beach (Mhlathuze estuary mouth to the south breakwater)	C/O	Negative	Moderate	Low
Wetlands and rivers	Impacts on wetlands outside of the Berth 605 project footprint	C/O	Negative	Moderate	Low
Terrestrial Biodiversity	Direct Loss and disturbance of natural habitat and associated flora SCC	C	Negative	Very High	High
	Establishment and spread of AIPs	C	Negative	High	Moderate
	Injury and mortality of reptile fauna SCC	C	Negative	High	High
	Loss and fragmentation of faunal habitat	C	Negative	Very High	High
	Indirect loss and disturbance of natural habitat and associated flora SCC	C	Negative	Moderate	Low
	Injury and mortality of fauna SCC due to traffic	O	Negative	Moderate	Low

Aspect	Impact Description	Phase	Character	Without Mitigation	With Mitigation
Avifauna	Transformation of the terrestrial avifaunal habitat	C/O	Negative	Moderate	Moderate
	Transformation of mangrove patch and associated intertidal mudflat (tidal pool)	C/O	Negative	High	Moderate
	Transformation of the semi natural shoreline	C/O	Negative	High	Moderate
	Disturbance to the sandspit island	C/O	Negative	Very Low	Very Low
	Disturbance to the Kabeljou Flats	C/O	Negative	Very Low	Very Low
Cumulative Impacts					
Avifauna	Transformation of terrestrial avifauna habitat	N/A	Negative	Moderate	Moderate
	Transformation of mangrove patch and associated intertidal mudflat	N/A	Negative	High	Moderate
	Transformation of the semi-natural shoreline	N/A	Negative	High	Moderate
	Disturbance to the sand spit island	N/A	Negative	Low	Low
	Disturbance to the Kabeljou Flats	N/A	Negative	Low	Low

APPENDIX TITLE



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