

## A10.0 Coastal and terrestrial ecology

### A10.1 Methodology

The understanding of the baseline environment with regard to coastal and terrestrial ecology has been informed by a combination of desk-based review of existing information and site-specific survey work. Data reviewed as part of the desk-based assessment includes information from ecological survey work undertaken in 2013 associated with the TDF (located to the east of FIPASS), as well as existing bird survey data covering the entire coastline of Stanley Harbour recovered during March 2020 and December 2020.

The methodology adopted for the various ecological surveys applicable to this section of the EIS is summarised below.

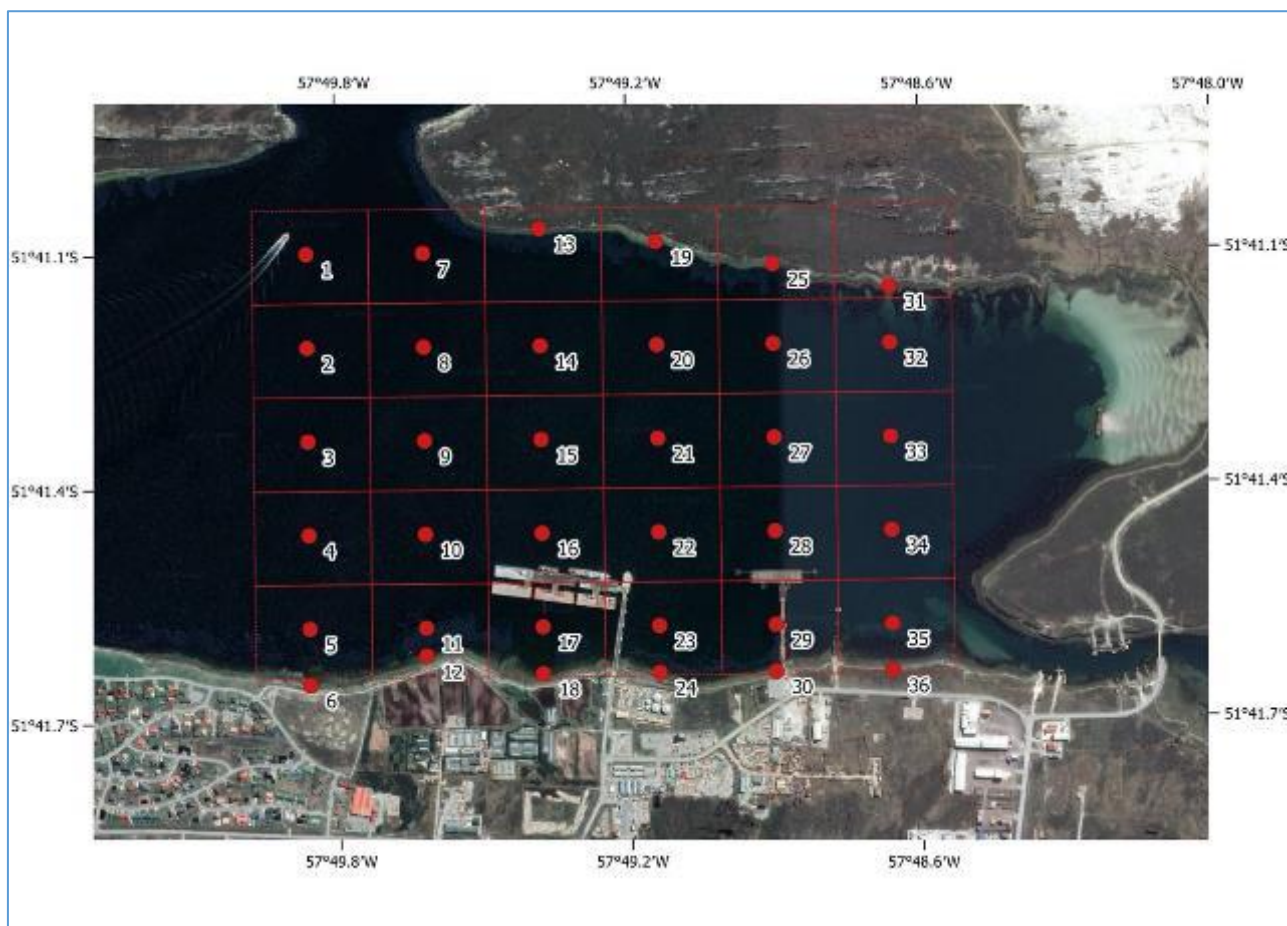
#### A10.1.1 Coastal ecological surveys

Coastal habitats are defined here as areas located between low water and the splash zone (intertidal zone).

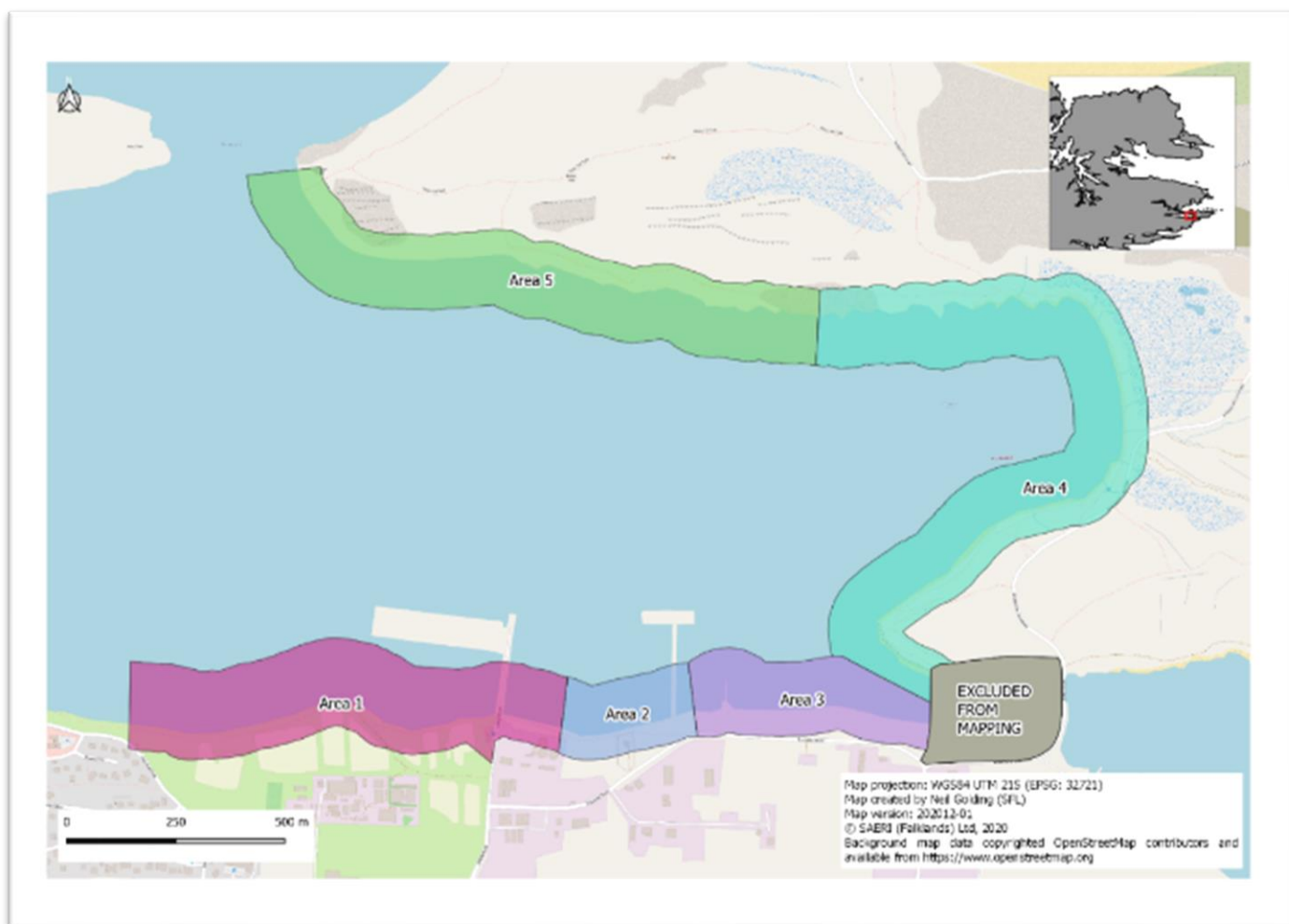
Intertidal benthic habitats have been quantitatively surveyed at sites shown in **Figure 10.1** through transect surveys and photo quadrats (0.25m<sup>2</sup>) undertaken by SFL during November and December 2020. Data have been analysed using PhotoQuad (v 1.4) software for measuring percent area cover of encrusting species, seaweeds and primary substrate, as well as density of mobile species. These data have been analysed using PCA for a first order analysis of species groupings and spatial patterns.

The intertidal has been further described using the outputs from high-resolution drone surveys as well as site-specific walkover surveys. Drone surveys were conducted for the purpose of habitat classification of the coastal zone extending from 120m out to sea from the shoreline to 50m inland from the shoreline. The coastline was divided into five areas (shown on **Figure 10.2**) for the drone survey work.

The data from the above surveys were used to classify intertidal habitats into broadscale and fine scale habitat types based on vegetation and other features. Detailed survey methods for each of the surveys referred to above can be found in **Ref. 9**, **Ref. 10** and **Ref. 11**.



**Figure 10.1** Intertidal benthic habitat survey area, with transect surveys conducted at Stations 6, 12, 13, 18, 19, 24, 25, 30, 31, and 36



**Figure 10.2** Overview showing areas mapped for habitat classification using drone imagery (the proposed scheme is located within Area 1)

### A10.1.2 Terrestrial ecological surveys

Terrestrial habitats surveyed extend from the splash zone to approximately 200m inland. An understanding of the terrestrial ecology within and adjacent to the footprint of the proposed scheme has been informed by a review of high-resolution drone surveys extending 50m inland from the coastline and site-specific rare plant surveys undertaken from the high-tide line up to 200m inland (focussing on the area to the west of the link road to FIPASS). The rare plant survey was undertaken in December 2020 which is optimal for detecting native species within the Falkland Islands. The areas which have been subject to survey are shown in **Figure 10.3**.

Terrestrial habitats have been classified into 22 broadscale and 138 fine scale habitat types based on vegetation and other features. Detailed survey methods for each of the surveys referred to above can be found in **Ref. 9**, **Ref. 10** and **Ref. 11**.

As instructed by F.I.G., the areas of land required for the proposed scheme which are outside of the surveyed areas detailed above (i.e. the accommodation block, laydown and storage area, concrete bathing plant and pre-cast storage area, all shown on **Figure 4.1**) were not subject to ecological survey. In addition, although the proposed geotube area was included within the survey area for habitat classification (drone survey), it was not subject to a detailed rare plant survey. It is understood that all temporary works areas are to be stoned-up by PWD in advance of construction works commencing.



**Figure 10.3** Footprint of rare plant survey undertaken in December 2020

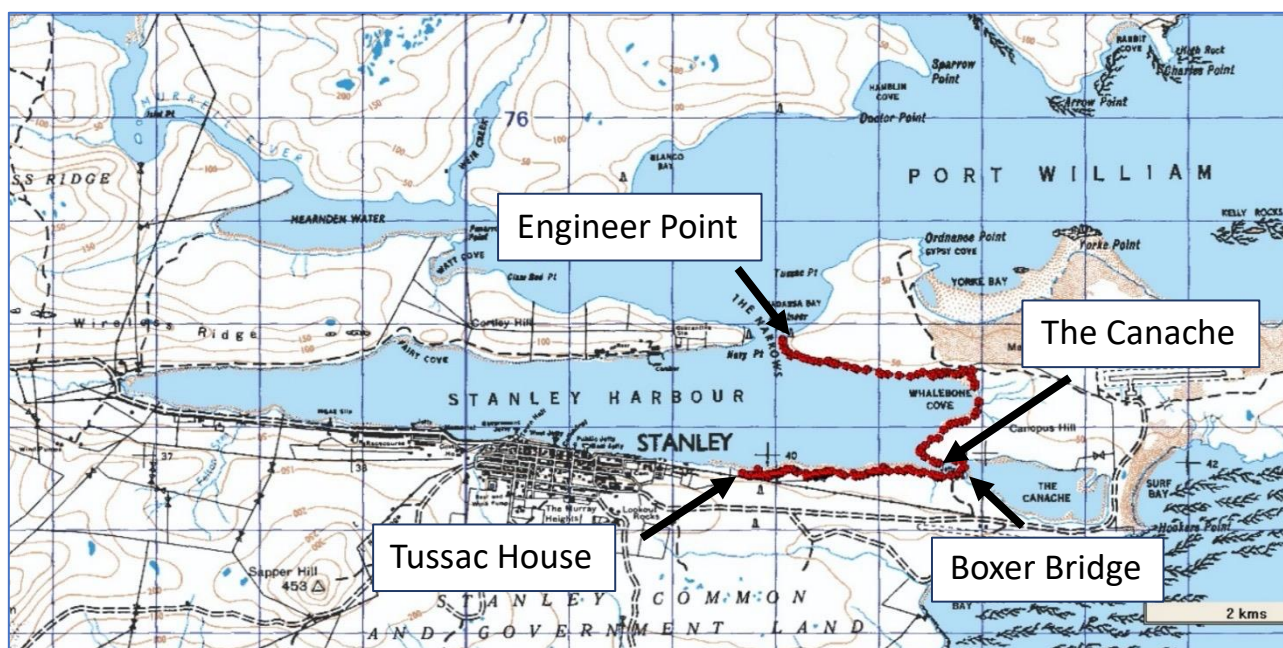
### **A10.1.3 Bird surveys**

Three coastal and three terrestrial bird surveys have been undertaken within and adjacent to the footprint of the proposed scheme. The bird surveys were undertaken on 7 October 2020, 30 November – 1 December 2020 and 16-17 February 2021; these dates cover the breeding season for most species that have potential to be impacted by the proposed scheme.

The survey area covered the eastern end of Stanley Harbour, extending from Tussac House to Engineer Point (**Figure 10.4**). The survey of coastal areas covered a strip of coastline extending 100m offshore and 20m inland from the high tide mark. The terrestrial bird surveys covered land up to 50m inland from the shoreline between Tussac House and Boxer Bridge. Species counts and distribution were recorded as well as presence of eggs and young.

The results from these site-specific bird surveys were supplemented with existing bird survey data covering the entire coastline of Stanley Harbour (Island LandCare, undated) (18.5 km between Navy Point and Engineer Point); such data was recovered between 27 March and 1 December 2020. Data from March, May, and December 2020 has been reviewed for context.





**Figure 10.4** Extent of the site specific bird surveys undertaken between October 2020 and February 2021. Place names referred to in the text are highlighted.

FIPASS was not systematically surveyed for presence of breeding birds and the information and proposed mitigation in **Section A10.2.4.4** is based on SAERI's experience and observations of FIPASS made by SAERI during the benthic marine surveys.

## A10.2 Baseline conditions

### A10.2.1 Designations

Although the area in the vicinity of FIPASS has been impacted by historic and contemporary commercial use, it is situated adjacent to Stanley Common, of which its entirety is designated as National Nature Reserve (NNR) (Wild Animals and Birds Protection (Stanley Common and Cape Pembroke Peninsula) Order 1973; Conservation of Wildlife and Nature Ordinance 1999).

The area is valued recreationally and is within close proximity to Cape Pembroke which is within the NNR, and which was designated an Important Plant Area (IPA) in 2012, under international PlantLife criteria (Upson 2012) for recognition of the 86 vascular species recorded from this IPA, with 66 of these being native (38% of the national total) including numerous endemic, endangered, and very rare species.

### A10.2.2 Intertidal benthic zone

The coastline in the eastern areas of Stanley Harbour broadly consists of a mix of sand/mud sediments with overlaying gravel, cobble and small boulders along shallow sloping shorelines.

The coastline shows signs of long-term impacts due to a history of development and use, primarily due to shipping, but also close proximity to land-based industrial estates, roads and drainage. Of relevance to the stretch of intertidal within which the proposed scheme is located, the intertidal zone between the site of Tussac House and the Canache is a shallow sloping shore compared to the north coastline of Stanley Harbour, which is typically slightly steeper with a shorter distance between low tide and high tide levels.

A list of species and substrates found during transect surveys is shown in **Appendix 8**. Gathering a comprehensive species inventory of the intertidal zone through photographic transect surveys was limited by the extensive cover of seaweeds. High seaweed abundance was not found previously in 2013 during intertidal surveys undertaken in relation to the TDF (Premier Oil, 2013). This difference is likely due to seasonal effects; the 2013 surveys were undertaken in winter (June/July) whilst the surveys undertaken specifically for the proposed scheme were undertaken during summer (November / December), when growth rates for subtidal marine flora and fauna are at their peak.

A total of nine macrofaunal species and 17 seaweed species (or putative species) were identified from quadrat images. Due to the abundance of seaweeds on the intertidal, intertidal species which were recorded during surveys in 2013 were less evident, making overall diversity of fauna appear relatively low.

Highly abundant species observed - but not quantified - were crustaceans such as the abundant sand hoppers (Amphipoda) and other smaller macrofauna. Other fauna observed in 2013 but not in the 2020 survey were shore crabs (flat backed crab *Halicarcinus planatus*) and *Acanthocyclus albatrossis*, small bivalve (*Gaimardia* sp), chitons (*Plaxiphora aurata*), occasional anemones (*Bunodactis* sp.) and small fish (*Patagonotothen* spp.) on the lower shore, and polychaetes typically found in crevasses and under rocks. At the extreme high tide mark in the splash zone, there were generally medium-large rocks and boulders encrusted with sea lichens - mostly orange sea lichens (*Caloplaca* spp.), doily lichens (*Verrucaria* spp.) and some honeycomb lichens (*Verrucaria durietzii*).

The lower shores were characterised by seaweeds: brown filamentous algae, *Ulva* sp., *Cladophora* sp., and, to a lesser extent, red filamentous algae, *Prophyra* sp., Deadmans's fingers (*Codium fragile*) and Cusion algae (*Codium* sp.) (**Appendix 8**).

Mid-shore areas were characterised by the rough barnacle (*Notochthamalus scabrosus*), the purple shore mussel (*Perumytilus purpuratus*) and Lesson's false limpets (*Siphonaria lessonii*).

Upper shores generally lacked visible flora or fauna, as noted from the PCA, and were characterised by bare substrates (e.g. pebbles, cobble, gravel). The PCA (**Appendix 8**) indicated good separation of habitat types; however, despite this, the data indicate that there is a high degree of variation within and between sites, where variation is likely explained by other factors.

Exploratory analyses did not reveal any patterns relating to northern or southern shorelines. The intertidal habitats in east Stanley Harbour could be considered highly impacted, but are also typical of other shores in the area. The species observed are common among other assemblages of enclosed, sheltered coastlines. Nevertheless, the intertidal shore in east Stanley Harbour supports many of the bird species observed (see **Section 10.2.4**), as well as the inshore margin supporting fish and crustaceans preyed on by shags and Commerson's dolphins.

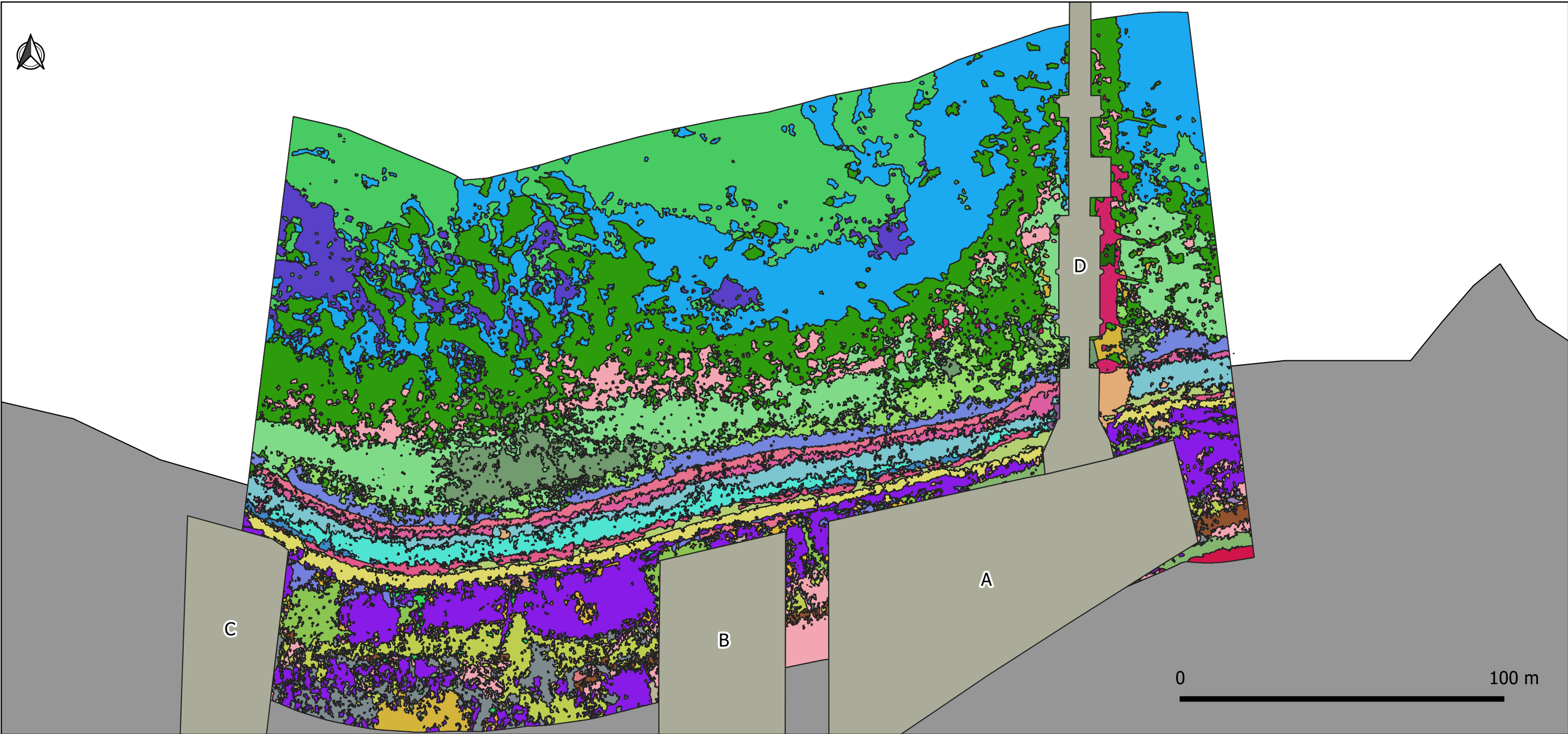
### **A10.2.3 Coastal habitat mapping**

As noted in **Section A10.1**, a drone was used to support with the development of coastal habitat mapping (covering intertidal and terrestrial areas). The outputs from the habitat mapping study are provided in **Ref. 11**, and summarised below. An example of model output is shown in **Figure 10.5**, with images from all surveys presented in the habitat classification field report (**Ref. 11**).

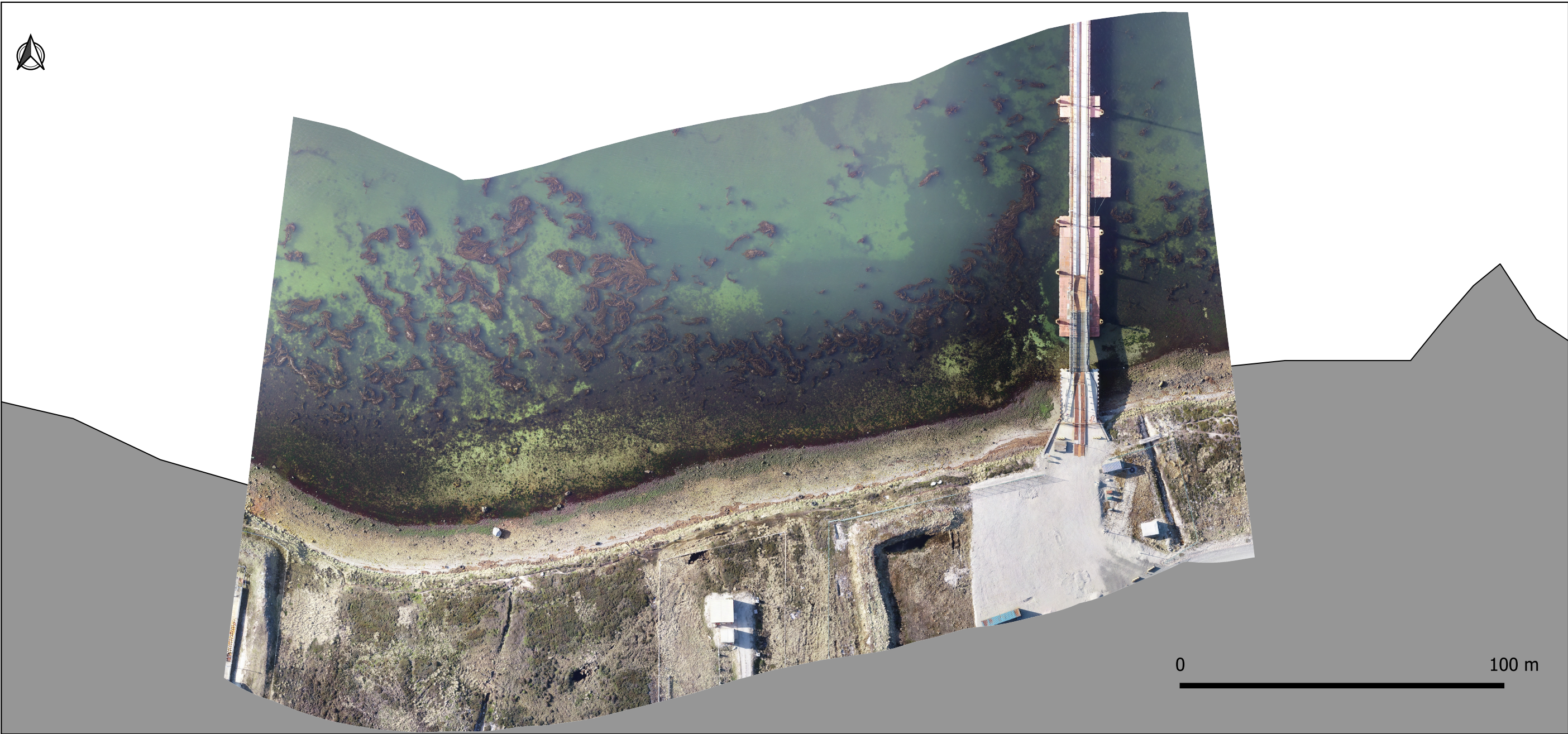
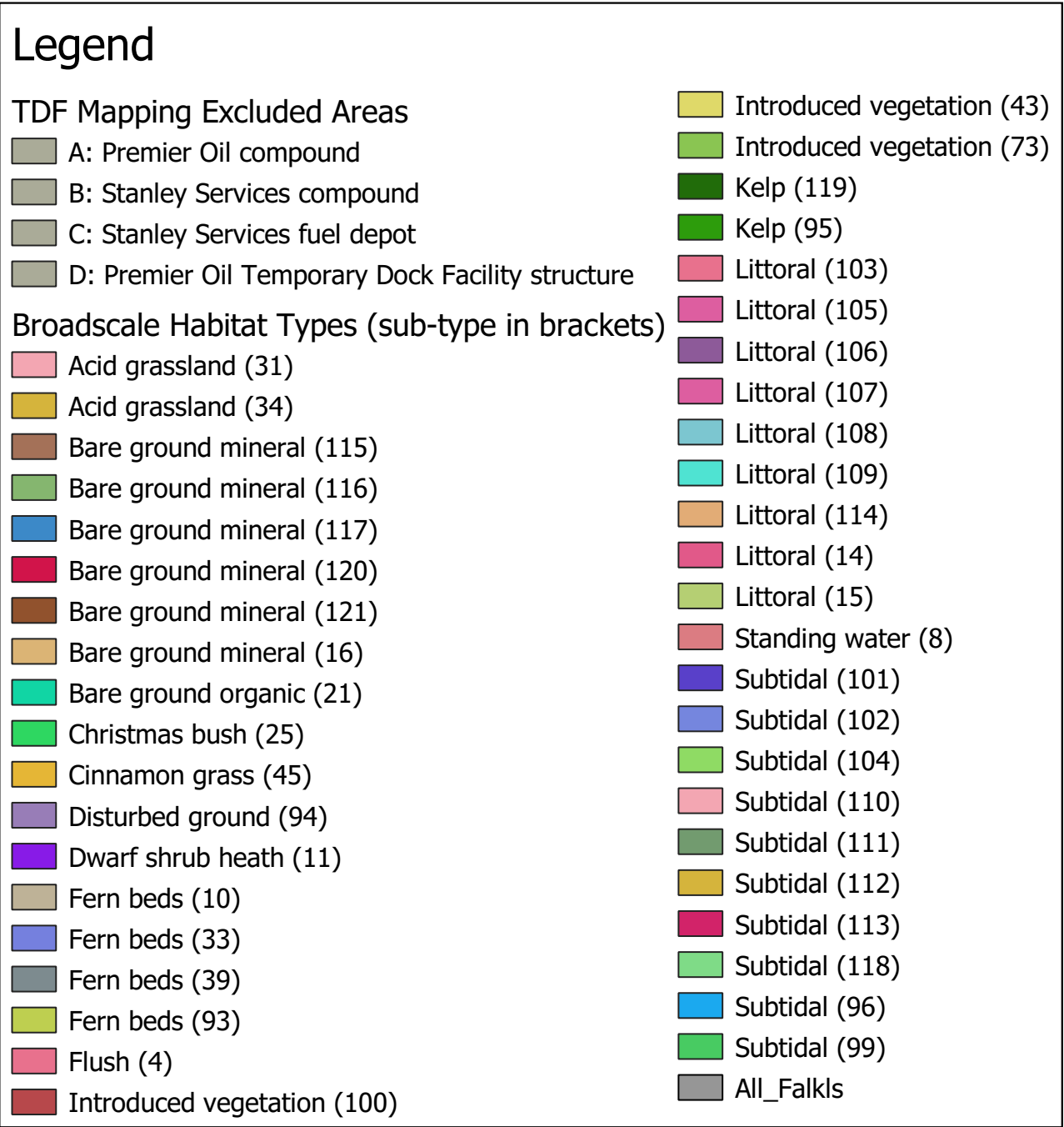
Results of habitat classifications are shown visually in **Figure 10.6**. The habitat classes "Littoral" and "Subtidal" are very large compared to other classes and were removed from **Figure 10.6** to improve clarity.



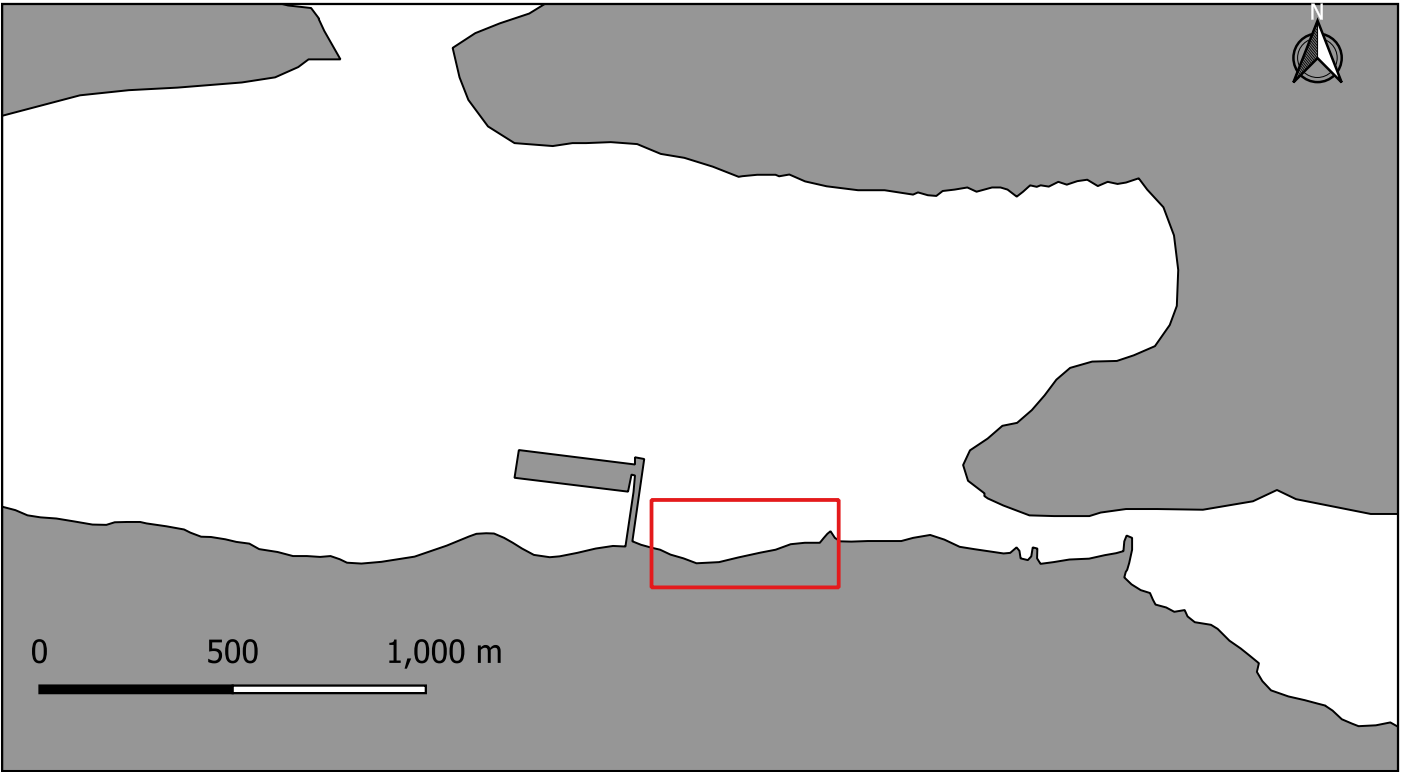
Figure 10.5: Stanley Harbour Area



Coastal habitat map created from UAS aerial imagery flown at 70 Above Ground Level (AGL) and additional metrics



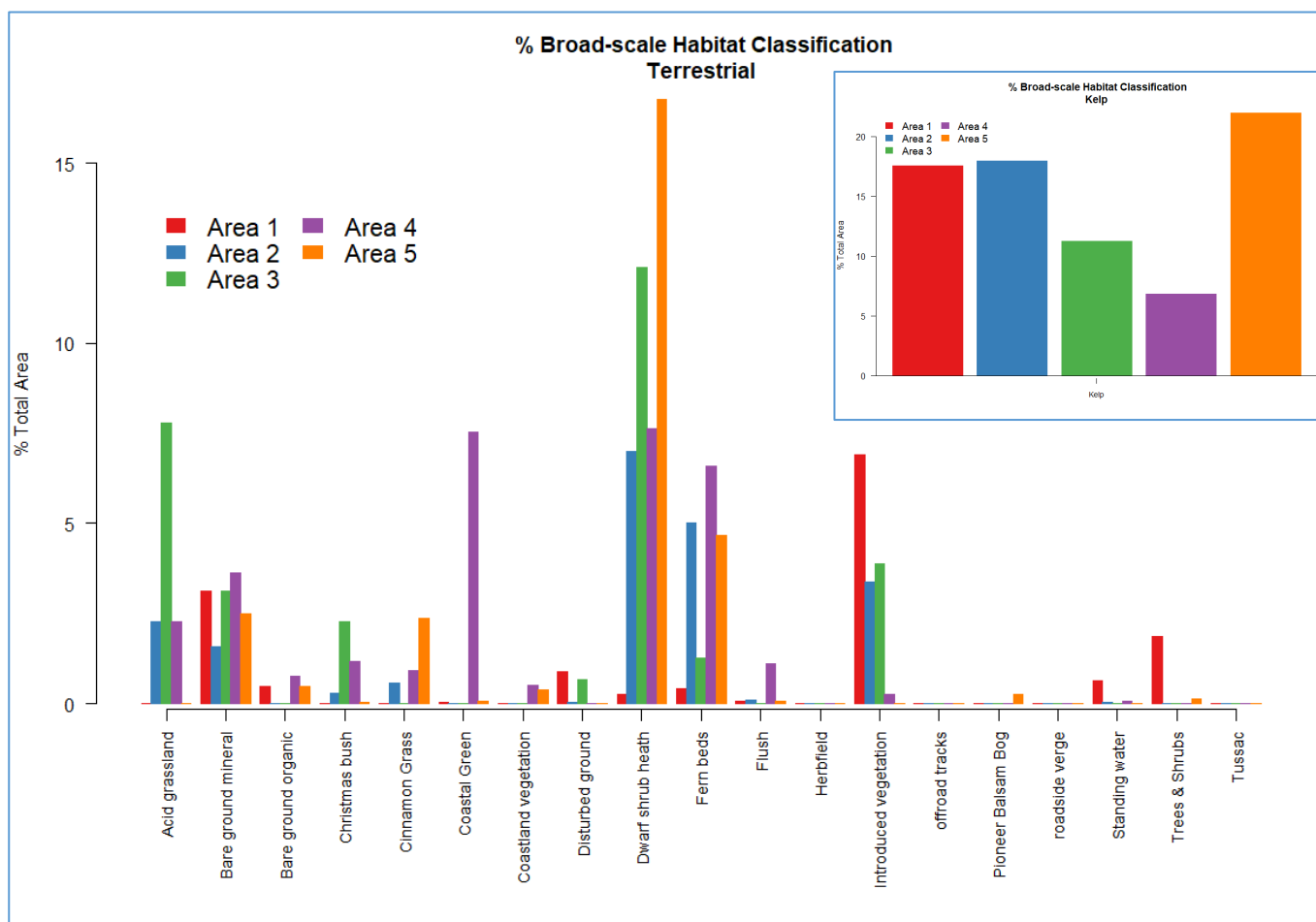
SFL Unmanned Aircraft System (UAS) original aerial imagery (2 cm Ground Sampling Distance - GSD)



Map projection: WGS84 UTM 21S (EPSG: 32721)  
Map created by Neil Golding (SFL)  
Map version: 202012-01  
© SAERI (Falklands) Ltd, 2020







**Figure 10.6** Percentage area of terrestrial habitat types (main plot) within the survey area, and percentage area of kelp beds (inset), east Stanley Harbour

The survey work has illustrated that the dominant habitat type for the eastern Stanley Harbour coastline is 'Dwarf shrub heath', although this habitat type is relatively absent in Area 1 (i.e. that within which the proposed scheme is located), which is highly modified through industrial and agricultural activity. This Dwarf scrub heath habitat is notable for its diddle-dee (*Empetrum rubrum*), mixed with some mountainberry (*Gaultheria sp*), Christmas-bush (*Baccharis magellanica*). It may include *Leptinella*, whitegrass, small ferns, and *Juncus* (**Appendix 8**). In contrast, Area 1 is dominated by 'introduced vegetation', 'bare ground', and 'tree and shrub' habitats.

Area 3 is dominated by 'acid grassland' habitat, unlike other areas. This is the coastal strip between the Coastel Road and the coastline in the area of the TDF. This habitat is mainly whitegrass (*Cortaderia pilosa*) and fern, and is characterised by acidic soils. Notably, Areas 2 and 3 consist of appreciably different habitat classifications, despite being positioned along the same stretch of coastline, with difference seen in most habitat classes. Both are relatively high in 'introduced vegetation', possibly reflecting its recent history of human modification compared to Areas 3-5.



Area 4 is dominated by 'coastal greens' habitat type, characterised by the fern *Leptinella*, and rushes (*Juncus* and *Rostkovia*). This area is adjacent to Whalebone Cove, which is a wide sand/gravel beach with an extensive tidal flat. This area is known for frequent winter grazing by horses owned by owners local to Stanley.

A sparse, narrow band of coastal algae, predominantly comprising kelp, is present along the north shore of Stanley Harbour from Whalebone Cove to Engineer Point. Coastal algae are also present to the east of FIPASS at the entrance to the Canache (identified during the site visit undertaken by Royal HaskoningDHV during January 2013). Kelp is however known to be present at high density in the area to the south of FIPASS. The extent of kelp is not considered significant from an ecological perspective on either a local or regional scale, given the extensive, more pristine examples of this habitat within Port William and around Cape Pembroke.

Percentage areas of kelp (*Macrosystis pyrifera*) bed varied between areas. Area 5 (north shore of Stanley Harbour) has the highest abundance of kelp, potentially reflecting the current lack of industrial activity. Area 4 showed the lowest kelp abundance; this area of Whalebone Cove has extensive low tide flats and is not suitable habitat for kelps. Area 3 showed lower kelp bed area. This may be due to the proximity to shore of the deeper channel that enters the Canache such that there is reduced habitat for kelp holdfast attachment on the seabed. Areas 1 and 2 have presumably suitable and extensive subtidal habitat, with hard substrates or possibly refuse structural material on the seabed for kelp holdfast attachment. Growth of kelp in these areas may be somewhat constrained by water column properties of silt and reduced light penetration, and also at least in part, by small vessel activity in the area.

The habitat classes of 'Littoral' and 'Subtidal' are not well resolved in this analysis. In the case of 'Littoral' classed habitats, the criteria are based on physical attributes of the seabed, e.g. rock attributes (e.g. shingle, pebble, etc), drift material such as dead kelp and colouration of sediments and rock. Similarly, 'Subtidal' classification criteria are based on what can be seen through overlaying water (green or red algae) or apparent sediment type (gravels, sand, etc).

## **A10.2.4 Coastal birds**

### **A10.2.4.1 Overview of birds in the Falkland Islands**

A total of 227 bird species have been recorded in the Falkland Islands, comprising 21 resident land species, 18 resident water species, 22 breeding seabird species, 18 annual non-breeding migrants and at least 143 species recorded as occasional visitors (Woods and Woods, 2006). The close proximity of the Falkland Islands to the South America mainland results in many southern South American species being occasionally identified in the Falkland Islands.

The Falkland Islands are particularly important for their bird life, supporting globally significant populations of some species. Only two species of bird are endemic to the Falkland Islands, namely the Falklands flightless steamer duck, which is widespread around all coasts, and the Cobb's wren that is limited to rat-free offshore tussac islands.

#### **A10.2.4.2      *Overview of birds at Stanley Harbour from 2013 surveys***

A coastal bird survey of Stanley Harbour was carried out in 2013. This recorded the Falklands steamer duck, kelp goose, passerines and wader species, with the Falklands steamer duck being most abundant (Poncet, 2014).

#### **A10.2.4.3      *Overview of birds at Stanley Harbour from 2020/2021 surveys***

The sublittoral, littoral and terrestrial habitats of the shorelines of Stanley Harbour and adjacent land support a range of relatively common and widespread waterbirds and land birds, in addition to some non-breeding migrants and foraging seabirds. However, no large breeding colonies are present within the immediate area of the proposed scheme (on land). Rock cormorant is known to breed on the FIPASS structures, and it is possible that other smaller passerine species may also breed on the FIPASS structures.

The results from bird surveys represent a snap-shot of the distribution and abundance of coastal birds in Stanley Harbour. Recent studies (Island LandCare unpublished data 2013-2020) have shown that the distribution of birds along the shoreline of Stanley Harbour and the relative abundance of each species encountered are influenced by a number of temporal and environmental variables, among them state of tide, time of year and detectability. This variability is greatest for non-breeding birds, while breeding populations are remarkably stable and show little variation in breeding pair abundance and distribution (Island LandCare undated).

There is favourable habitat for nesting and foraging birds inland of, and adjacent to, the proposed scheme footprint, specifically on the arable fields and shelter belts of Stanley Growers' land between Tussac House and FIPASS. The hedgerows of conifers and deciduous trees, and freshwater seeps and ditches also provide habitat that favour passerines.

The snap-shot surveys carried out in October 2020, November-December 2020 and February 2021 are considered to be reliable indicators of the breeding bird population of this section of the Stanley Harbour shoreline, and are adequately representative indicators of non-breeding bird populations (S. Poncet, pers. comm., 2021) .

#### ***General overview***

The most consistently abundant and widely distributed families of birds recorded during the surveys were ducks, geese and shags. No species of penguin (Magellanic, Gentoo and Rockhopper), albatross (Black-browed Albatross), burrowing petrel or the endemic passerines Tussac bird and Cobb's Wren were recorded.

Magellanic penguins breed approximately 500m north of Engineer Point in Hadassah Bay (Pt William). The closest Gentoo Penguin colony is at Yorke Point on the Cape Pembroke Peninsula, and there is a Sooty Shearwater colony near Tussac Point at the north end of Hadassah Bay. Individuals of these three species are occasionally seen in Stanley Harbour, but none were seen during the 2020/2021 surveys. Most recently, a pair of King Penguins were anecdotally reported on a local wildlife Facebook page; King Penguin observations in the Stanley area have been increasing in recent years, with regular anecdotal observations in Yorke Bay adjacent to Gypsy Cove.

### ***Survey data***

Of the 35 bird species that are regularly present (year-round and/or seasonally) within Stanley Harbour, the number of individuals sighted during the October, November/December 2020 and February 2021 surveys and the number of pairs of each species that were breeding during the 2020/21 season are presented in **Table 10.1**.

Table 10.1      Total number of birds counted during the 2020/2021 surveys for each bird species known from Stanley Harbour

Common Name	Latin Name	Total no. of adult and subadult birds (site-specific results)			Estimated total no. of breeding pairs (site-specific results)	Total no. of adult and subadult birds (site-specific results)			Estimated total no. of breeding pairs (site-specific results)	Total no. of adult and subadult birds		Total no. of adult and subadult birds		Total no. of adult and subadult birds	
		Tussac House to Canache (2.7km south shore)			Tussac House to Canache (2.7km south shore)	Canache to Engineer Pt (3km north shore)			Canache to Engineer Pt (3 km north shore)	Stanley to Navy Point (12.8km)		Tussac House to Canache (2.7 km south shore)		Canache to Engineer Pt (3 km north shore)	
		07/10/20	30/11/20	17/02/21	2020/21	07/10/20	01/12/20	16/02/21	2020/21	27/03/20	01/12/20	27/03/20	25 May	27/03/20	25 May
South American Tern	<i>Sterna hirundinacea</i>	0	1	0	0	0	2	0	0	0	0	0	0	0	0
Black-throated Finch	<i>Melanodera melanodera</i>	0	2	0	1	3	2	3	1	1	0	3	0	0	1
Blackish Oystercatcher	<i>Haematopus ater</i>	1	0	0	0	0	0	6	0	3	6	0	2	0	0
Black-chinned Siskin	<i>Carduelis barbata</i>	6	0	0	1	0	0	0	0	0	0	100	7	4	0
Crested Caracara	<i>Caracara plancus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crested Duck	<i>Lophonetta specularioides</i>	32	26	20	2	17	14	17	0	45	22	7	3	14	20
Dolphin Gull	<i>Leucophaeus scoresbii</i>	5	2	0	0	1	0	1	0	4	11	0	3	0	0
Falkland Pipit	<i>Anthus correndera grayi</i>	1	0	0	1	1	2	1	1	1	9	0	0	0	0
Falkland Skua	<i>Catharacta antarctica</i>	0	0	0	0	0	0	0	0	2	1	0	0	0	0
Falkland Thrush	<i>Turdus falcklandii</i>	6	1	0	2	0	2	3	2	4	5	1	3	0	3
Southern Giant Petrel	<i>Macronectes giganteus</i>	0	1	0	0	1	0	0	0	4	8	0	0	1	0
Dark-faced Ground-tyrant	<i>Muscisaxicola maclovianus</i>	1	2	1	1	2	1	10	0	8	4	4	3	4	6
Grass Wren	<i>Cistothorus platensis</i>	1	0	0	1	0	0	0	0	1	1	0	0	0	0
House sparrow	<i>Passer domesticus</i>	52	11	20	3	0	0	0	0	9	113	3	3	0	0
Kelp Gull	<i>Larus dominicanus</i>	16	6	12	0	5	0	28	0	37	31	2	6	13	10
Kelp Goose	<i>Chloephaga hybrida</i>	18	7	30	0	30	6	9	0	54	29	24	18	11	21
King Shag	<i>Phalacrocorax atriceps</i>	0	0	0	0	0	0	0	0	1	0	0	1	0	0
Magellanic Penguin	<i>Spheniscus magellanicus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Long-tailed Meadowlark	<i>Sturnella loyca</i>	5	0	6	2	0	3	0	0	3	8	20	3	0	0
Magellanic Snipe	<i>Gallinago paraguaiae</i>	0	0	0	0	0	1	0	1	0	0	0	0	3	0
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	4	1	0	0	0	0	7	0	18	4	3	2	0	0

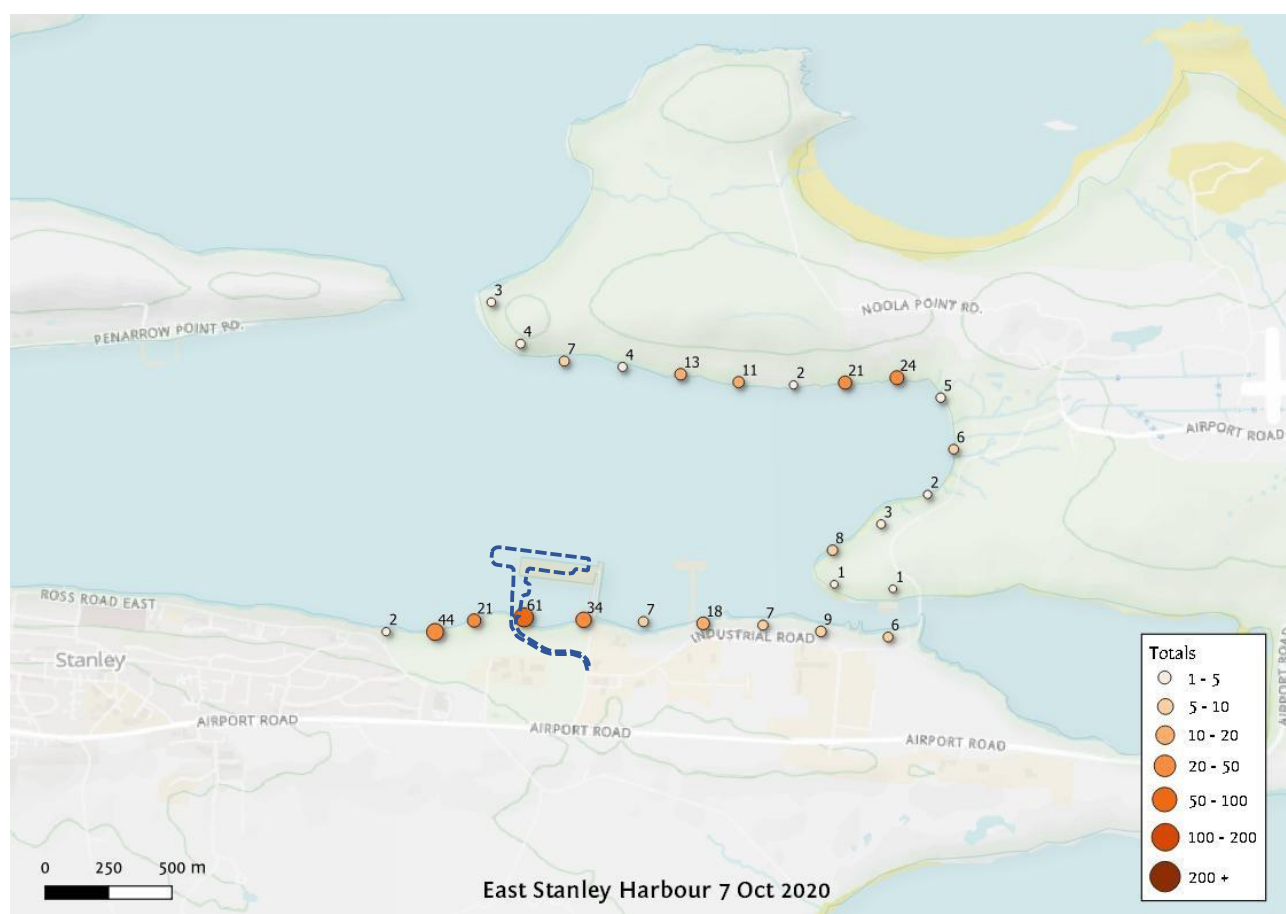


Common Name	Latin Name	Total no. of adult and subadult birds (site-specific results)				Estimated total no. of breeding pairs (site-specific results)	Total no. of adult and subadult birds (site-specific results)			Estimated total no. of breeding pairs (site-specific results)	Total no. of adult and subadult birds		Total no. of adult and subadult birds		Total no. of adult and subadult birds	
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		07/10/20	30/11/20	17/02/21	2020/21	07/10/20	01/12/20	16/02/21	2020/21	27/03/20	01/12/20	27/03/20	25 May	27/03/20	25 May	
Magellanic Oystercatcher	<i>Haematopus leucopodus</i>	1	4	0	1	0	1	5	0	4	16	0	4	3	18	
Red-backed Hawk	<i>Buteo polyosoma</i>	0	0	0	0	0	0	0	0	0	0	0	1	0	0	
Rufous-chested Dotterel	<i>Charadrius modestus</i>	0	0	0	0	0	0	0	0	5	0	0	0	0	10	
Ruddy-headed Goose	<i>Chloephaga rubidiceps</i>	0	0	0	0	0	0	0	0	2	4	2	0	3	0	
Rock Shag	<i>Phalacrocorax magellanicus</i>	12	4	47	0	18	19	17	9	102	57	16	19	9	27	
Snowy Sheathbill	<i>Chionus albus</i>	5	0	0	0	0	0	0	0	0	0	0	3	0	0	
Falkland Steamer Duck	<i>Tachyeres brachypterus</i>	14	16	8	3	30	35	40	3	94	138	21	17	14	23	
Sooty Shearwater	<i>Puffinus griseus</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Speckled Teal	<i>Anas flavirostris</i>	6	0	0	1	0	0	0	0	2	2	6	5	0	2	
White-tufted Grebe	<i>Rollandia rolland</i>	0	0	0	0	0	0	0	0	2	2	0	0	0	0	
Two-banded Plover	<i>Charadrius falklandicus</i>	2	0	0	0	0	0	0	0	0	4	0	0	0	1	
Turkey Vulture	<i>Cathartes aura</i>	0	4	2	0	1	1	0	0	3	7	0	6	0	4	
Upland Goose	<i>Chloephaga picta</i>	27	31	10	2	6	9	14	3	64	122	19	10	5	6	
White-rumped Sandpiper	<i>Calidris fuscicollis</i>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
All Species combined		215	115	156		115	98	161		473	604	231	119	84	152	
Coastline length (km)		2.7	2.7	2.7		3	3	3		12.8	12.8	2.7	2.7	3	3	
Birds per km		79.6	42.6	57.8		38.3	32.7	53.7		37.0	47.2	85.6	44.1	28.0	50.7	

Twenty-five of the 35 species were present along the coastline between Tussac House and Engineer Point on the three survey dates in October, November/December and February. Of the 10 species not sighted on these dates (King Shag, Red-backed Hawk, Ruddy-headed Goose, Rufous-chested Dotterel, Magellanic Penguin, Sooty Shearwater, Crested Caracara, White-tufted Grebe, White-rumped Sandpiper and Falkland Skua), the majority are occasional and irregular visitors to Stanley Harbour so their absence on these dates is not unexpected. The first four of these species were recorded during earlier surveys in March and May 2020; historically, all 10 have been recorded in Stanley Harbour (ILC data).

The data recovered from 2020/2021 surveys are consistent with those recovered during 2013.

**Figures 10.7, 10.8 and 10.9** show the distribution of all bird records (for all species combined) on 7 October 2020, 30 November/1 December 2020 and 16 /17 February 2021 for the 5.7km of coastline surveyed at the eastern end of Stanley Harbour between Tussac House and Engineer Point, and including the area that may potentially be impacted by the proposed scheme.



**Figure 10.7** Total bird counts, East Stanley Harbour 7<sup>th</sup> Oct 2020. An approximate location of the proposed scheme footprint is shown (dashed lines).



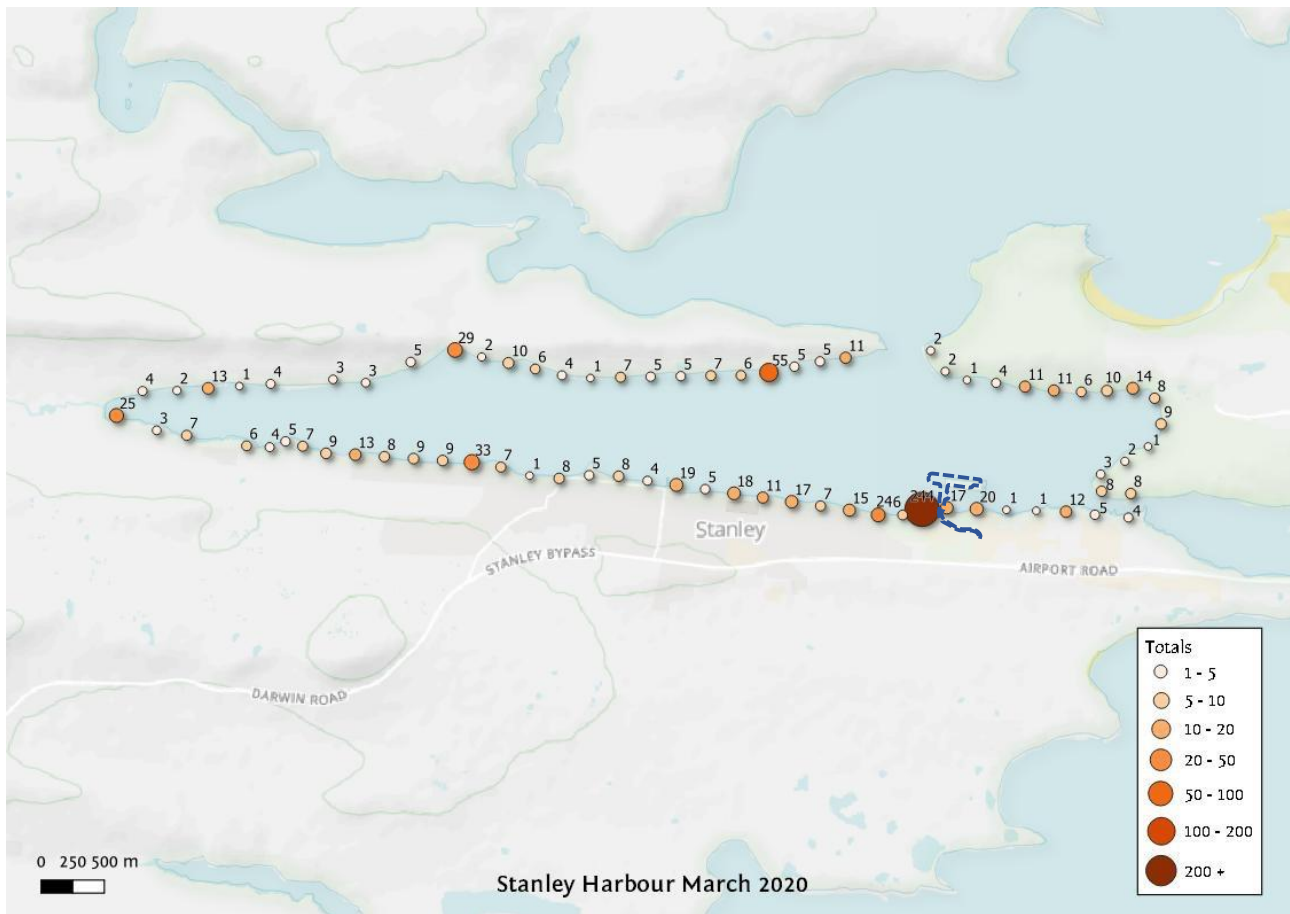
**Figure 10.8** Total bird counts, East Stanley Harbour 30<sup>th</sup> November /1<sup>st</sup> December 2020. An approximate location of the proposed scheme footprint is shown (dashed lines).



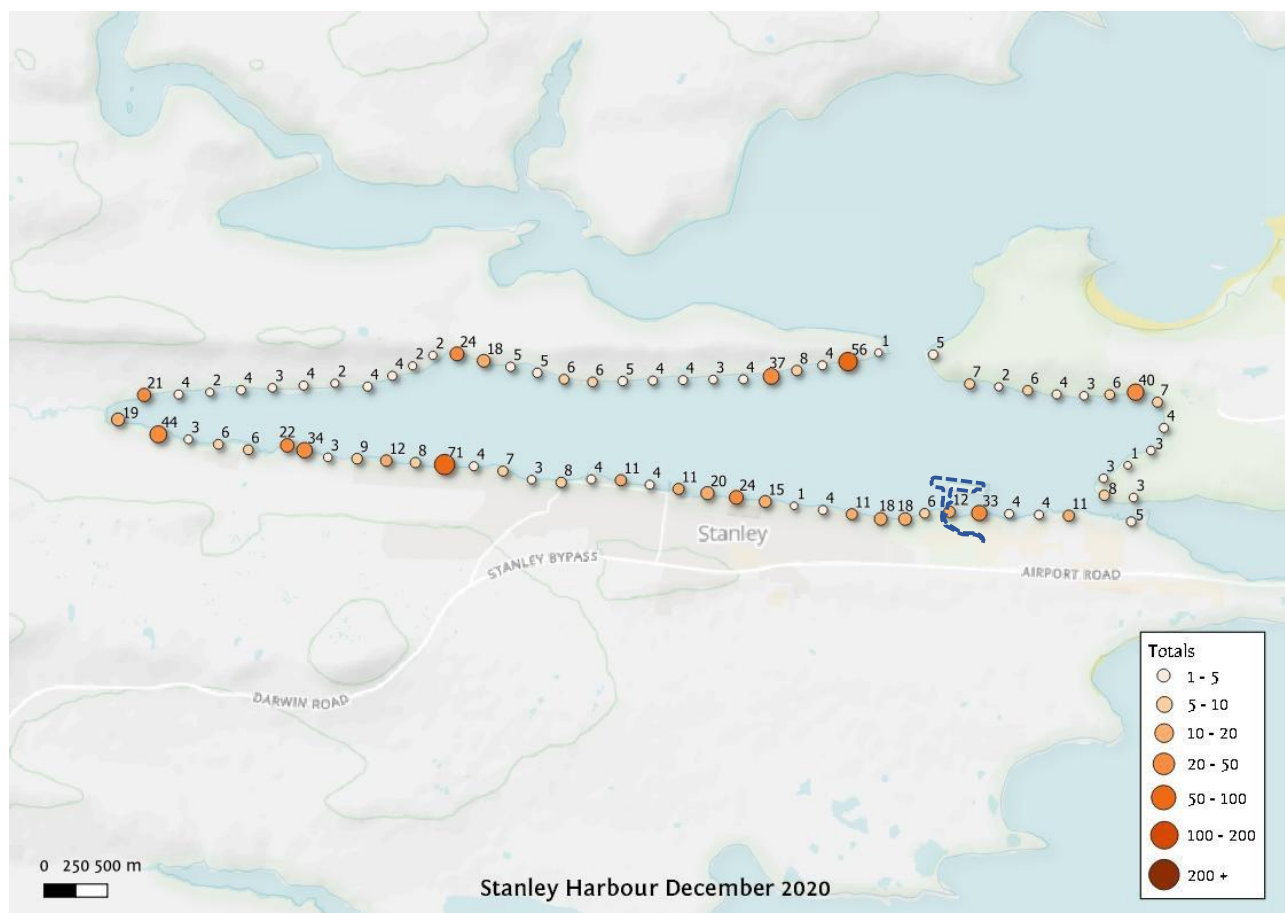
**Figure 10.9** Total bird counts, East Stanley Harbour February 2021. An approximate location of the proposed scheme footprint is shown (dashed lines).

**Figures 10.10** and **10.11** present data for the entirety of the Stanley Harbour coastline (18.5 km), showing bird distribution and abundance data for surveys carried out on 27 March 2020 and 30 November / 1 December 2020, in order to present the site-specific survey data in context with the remainder of Stanley Harbour coastal bird populations.





**Figure 10.10** Total bird counts, Stanley Harbour March 2020. An approximate location of the proposed scheme footprint is shown (dashed lines).



**Figure 10.11** Total bird counts, Stanley Harbour November-December 2020. An approximate location of the proposed scheme footprint is shown (dashed lines).

The site-specific October 2020, November/December 2020 and February 2021 survey results indicate that, overall, bird abundance is higher along the south shore coastline between Tussac House and the Canache (the section of coastline which contains the proposed scheme footprint) (60 birds per km) than along the north shore between the Canache and Engineer Point (41.5 birds per km) and also higher than the remainder of the Stanley Harbour coastline (42 birds per km). Species diversity is also slightly higher on the south shore (24 species) compared with 19 species on the north.

The difference is undoubtedly due to the exceptionally favourable nesting and foraging habitats created by the establishment of arable fields and shelter belts on Stanley Growers' land between Tussac House and FIPASS. Hedgerows of conifers and deciduous trees, an abundance of freshwater seeps and damp ditches flowing to the shoreline from the fields and an irrigation pond less than 50m from the coast form distinctive and unusual habitats that favour passerines, ducks and geese in particular. The Market Garden fields also provide nesting habitat for a pair of Magellanic Oystercatcher (shown on **Figure 10.12**), one of two pairs that nest in Stanley Harbour. The oystercatchers are likely nesting in the area due to its modified nature (they prefer open spaces to tall grass for nesting) (Paul Brewin, SAERI, pers. comms, 2021). The nesting site is in close proximity (approximately 50m) to the proposed access track shown as area 8 on **Figure 4.1** and **Plate 10.1**. Survey data from previous seasons show that Stanley Growers' trees and hedgerows provide shelter for occasional

vagrant species such as the Fire-eyed Duicon, Southern House Wren (ILC data, Tim and Jan Miller, *pers. comm.*).



**Plate 10.1**      **Magellanic oystercatcher nesting in the Market Garden fields**





Key

Proposed scheme footprint

Construction phase site layout

Location of breeding Magellanic oystercatchers

P02	01.12.21	SECOND ISSUE	GC	SC	MS
P01	18.06.21	FIRST ISSUE	JT	SC	MS
REV	DATE	DESCRIPTION	BY	CHK	APP

CLIENT





PROJECT

New Port Facility at the Falkland Islands

TITLE

Location of breeding Magellanic oystercatchers



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DRAWN	CHECKED	APPROVED
JT	SC	MS
DATE	SCALE	REF.
01.12.21	1:8,000	
FIGURE No.	SUITABILITY	REVISION
10.12	S2	P02

Basemap: © OpenStreetMap (and) contributors, CC-BY-SA.



There were also notable seasonal differences illustrated by the survey results. Bird numbers on the south shore were substantially higher in the early spring (October) due mostly to large numbers of House Sparrow feeding in the Stanley Growers' fields; this is a non-native species that does not occur on the north shore. In late summer (February-March), flocks of Black-chinned Siskin and House Sparrow often feed on the seeds of the non-native annuals such as groundsel that have colonised the disturbed ground around the arable fields and along the shoreline.

Coastal bird numbers appeared to be lower during the peak of breeding (November/December) due to birds being at breeding sites and territories that, for the majority of species present, were located more than 20m inland from the coastline.

**Table 10.2** and **Table 10.3** shows species ranked on a seasonal basis for relative abundance expressed as birds per km of survey track. The highlights in shades of blue indicate high (10 or more birds per km), medium (2 to <10 birds per km) and low abundance (<2 birds per km). The months of March, April and May are considered to be autumn; June, July and August are winter; September, October and November are spring and December, January and February are summer. Kelp Goose, Upland Goose, Crested Duck, Kelp Goose and Falkland Steamer Duck were the four most consistently abundant species throughout the survey period. Reference should be made to **Appendix 8** for the species codes.

Table 10.2 Relative seasonal abundance of coastal bird species in 2020 – Tussac House to Canache (2.7km of coastline, including that to be impacted by the proposed scheme) (refer to Appendix 8 for species codes)

	Tussac House to Canache 2.7 km																	
	3 March 2020			25 May 2020			7 October 2020			31 October 2020			1 December 2020			17 February 2021		
Rank	Species Code	number of adults and subadults	birds / km	Species Code	number of adults and subadults	birds / km	Species Code	number of adults and subadults	birds / km	Species Code	number of adults and subadults	birds / km	Species Code	number of adults and subadults	birds / km	Species Code	number of adults and subadults	birds / km
1	BS	100	37.04	RS	19	7.04	HS	52	19.26	HS	36	13.33	UG	31	11.48	RS	47	17.41
2	KP	24	8.89	KP	18	6.67	CD	32	11.85	CD	28	10.37	CD	26	9.63	UG	30	11.11
3	SD	21	7.78	SD	17	6.30	UG	27	10.00	UG	21	7.78	SD	16	5.93	HS	20	7.41
4	ML	20	7.41	UG	10	3.70	KP	18	6.67	WS	20	7.41	HS	11	4.07	CD	16	5.93
5	UG	19	7.04	KG	6	2.22	KG	16	5.93	SD	12	4.44	KP	7	2.59	KG	12	4.44
6	RS	16	5.93	TV	6	2.22	SD	14	5.19	RS	5	1.85	KG	6	2.22	KP	10	3.70
7	ST	6	2.22	ST	5	1.85	RS	12	4.44	KP	5	1.85	RS	4	1.48	SD	8	2.96
8	GT	4	1.48	PO	4	1.48	ST	6	2.22	NH	4	1.48	TV	4	1.48	ML	6	2.22
9	BF	3	1.11	CD	3	1.11	FT	6	2.22	ML	4	1.48	PO	4	1.48	TV	2	0.74
10	HS	3	1.11	DG	3	1.11	BS	6	2.22	PO	2	0.74	DG	2	0.74	GT	1	0.37
11	NH	3	1.11	FT	3	1.11	SB	5	1.85	FT	2	0.74	GT	2	0.74	AT	0	0
12	KG	2	0.74	GT	3	1.11	DG	5	1.85	BF	2	0.74	BF	2	0.74	BF	0	0
13	RG	2	0.74	HS	3	1.11	ML	5	1.85	BS	2	0.74	GP	1	0.37	BO	0	0
14	CD	1	0.37	ML	3	1.11	NH	4	1.48	BO	1	0.37	NH	1	0.37	BS	0	0
15	FT	1	0.37	SB	3	1.11	TP	2	0.74	TP	1	0.37	AT	1	0.37	CC	0	0
16	AT	0	0	BO	2	0.74	PO	1	0.37	AT	1	0.37	FT	1	0.37	DG	0	0
17	BO	0	0	NH	2	0.74	BO	1	0.37	CC	0	0	BO	0	0	FP	0	0
18	CC	0	0	BS	1	0.37	GT	1	0.37	DG	0	0	BS	0	0	FS	0	0
19	DG	0	0	KS	1	0.37	FP	1	0.37	FP	0	0	CC	0	0	FT	0	0
20	FP	0	0	RB	1	0.37	GW	1	0.37	FS	0	0	FP	0	0	GP	0	0
21	FS	0	0	AT	0	0	AT	0	0	GP	0	0	FS	0	0	GW	0	0
22	GP	0	0	BF	0	0	BF	0	0	GT	0	0	GW	0	0	KS	0	0
23	GW	0	0	CC	0	0	CC	0	0	GW	0	0	KS	0	0	MGP	0	0
24	KS	0	0	FP	0	0	FS	0	0	KG	0	0	MGP	0	0	MS	0	0
25	MGP	0	0	FS	0	0	GP	0	0	KS	0	0	ML	0	0	NH	0	0
26	MS	0	0	GP	0	0	KS	0	0	MGP	0	0	MS	0	0	PO	0	0
27	PO	0	0	GW	0	0	MGP	0	0	MS	0	0	RB	0	0	RB	0	0
28	RB	0	0	MGP	0	0	MS	0	0	RB	0	0	RD	0	0	RD	0	0
29	RD	0	0	MS	0	0	RB	0	0	RD	0	0	RG	0	0	RG	0	0
30	SB	0	0	RD	0	0	RD	0	0	RG	0	0	SB	0	0	SB	0	0
31	SS	0	0	RG	0	0	RG	0	0	SB	0	0	SS	0	0	SS	0	0
32	TG	0	0	SS	0	0	SS	0	0	SS	0	0	ST	0	0	ST	0	0
33	TP	0	0	TG	0	0	TG	0	0	ST	0	0	TG	0	0	TG	0	0
34	TV	0	0	TP	0	0	TV	0	0	TG	0	0	TP	0	0	TP	0	0
35	WS	0	0	WS	0	0	WS	0	0	TV	0	0	WS	0	0	WS	0	0
No. of sp	15			20			20			16			16					
No. of indi		225			113			215			146			119			152	
Birds / km			83.33			41.85			79.63			54.07			44.07			56.30

Table 10.3      Relative seasonal abundance of coastal bird species in 2020 – Canache to Engineer Pt (3km of coastline)

	Canache to Engineer Point 3 km																							
	3 March 2020				25 May 2020			7 October 2020			31 October 2020			1 December 2020			16 February 2021							
Rank	Species Code	number of adults and subadults		birds / km	Species Code	number of adults and subadults		birds / km	Species Code	number of adults and subadults		birds / km	Species Code	number of adults and subadults		birds / km	Species Code	number of adults and subadults		birds / km				
1	CD	14		4.67	RS	27		9.00	KP	30		10.00	SD	44		14.67	SD	35		11.67	SD	40		13.33
2	SD	14		4.67	SD	23		7.67	SD	30		10.00	RS	27		9.00	RS	19		6.33	KG	28		9.33
3	KG	13		4.33	KP	21		7.00	RS	18		6.00	CD	15		5.00	CD	14		4.67	CD	17		5.67
4	KP	11		3.67	CD	20		6.67	CD	17		5.67	KP	10		3.33	UG	9		3.00	RS	17		5.67
5	RS	9		3.00	PO	18		6.00	UG	6		2.00	WS	10		3.33	KP	6		2.00	UG	14		4.67
6	UG	5		1.67	KG	10		3.33	KG	5		1.67	KG	6		2.00	ML	3		1.00	GT	10		3.33
7	BS	4		1.33	RD	10		3.33	BF	3		1.00	PO	4		1.33	AT	2		0.67	KP	9		3.00
8	GT	4		1.33	GT	6		2.00	GT	2		0.67	UG	3		1.00	FP	2		0.67	NH	7		2.33
9	MS	3		1.00	UG	6		2.00	GP	1		0.33	BO	3		1.00	FT	2		0.67	BO	6		2.00
10	PO	3		1.00	TV	4		1.33	TV	1		0.33	AT	3		1.00	BF	2		0.67	PO	5		1.67
11	RG	3		1.00	FT	3		1.00	DG	1		0.33	RG	2		0.67	TV	1		0.33	BF	3		1.00
12	GP	1		0.33	ST	2		0.67	FP	1		0.33	FP	2		0.67	PO	1		0.33	FT	3		1.00
13	AT	0		0	TP	1		0.33	AT	0		0	KS	1		0.33	MS	1		0.33	DG	1		0.33
14	BF	0		0	BF	1		0.33	BO	0		0	TV	1		0.33	GT	1		0.33	FP	1		0.33
15	BO	0		0	AT	0		0	BS	0		0	GT	1		0.33	BO	0		0	AT	0		0
16	CC	0		0	BO	0		0	CC	0		0	BF	0		0	BS	0		0	BS	0		0
17	DG	0		0	BS	0		0	FS	0		0	BS	0		0	CC	0		0	CC	0		0
18	FP	0		0	CC	0		0	FT	0		0	CC	0		0	DG	0		0	FS	0		0
19	FS	0		0	DG	0		0	GW	0		0	DG	0		0	FS	0		0	GP	0		0
20	FT	0		0	FP	0		0	HS	0		0	FS	0		0	GP	0		0	GW	0		0
21	GW	0		0	FS	0		0	KS	0		0	FT	0		0	GW	0		0	HS	0		0
22	HS	0		0	GP	0		0	MGP	0		0	GP	0		0	HS	0		0	KS	0		0
23	KS	0		0	GW	0		0	ML	0		0	GW	0		0	KG	0		0	MGP	0		0
24	MGP	0		0	HS	0		0	MS	0		0	HS	0		0	KS	0		0	ML	0		0
25	ML	0		0	KS	0		0	NH	0		0	MGP	0		0	MGP	0		0	MS	0		0
26	NH	0		0	MGP	0		0	PO	0		0	ML	0		0	NH	0		0	RB	0		0
27	RB	0		0	ML	0		0	RB	0		0	MS	0		0	RB	0		0	RD	0		0
28	RD	0		0	NH	0		0	RD	0		0	NH	0		0	RD	0		0	RG	0		0
29	SB	0		0	RB	0		0	RG	0		0	RB	0		0	RG	0		0	SB	0		0
30	SS	0		0	RG	0		0	SB	0		0	RD	0		0	SB	0		0	SS	0		0
31	ST	0		0	MS	0		0	SS	0		0	SB	0		0	SS	0		0	ST	0		0
32	TG	0		0	SB	0		0	ST	0		0	SS	0		0	ST	0		0	TG	0		0
33	TP	0		0	SS	0		0	TG	0		0	ST	0		0	TG	0		0	TP	0		0
34	TV	0		0	TG	0		0	TP	0		0	TG	0		0	TP	0		0	TV	0		0
35	WS	0		0	WS	0		0	WS	0		0	TP	0		0	WS	0		0	WS	0		0
No. of sp	12				14				12				15				14				14			
No. of indi		84				152				115				132				98				161		
Birds / km			28.00			50.67						38.33			44.00				32.67				53.67	

Thirteen bird species were confirmed breeding or probably breeding along the coastal margin between Tussac House and Engineer Point (**Table 10.2, Table 10.3**). They are Falkland Steamer Duck, Patagonian Crested Duck, Upland Goose, Speckled Teal, Dark-faced Ground-tyrant, Black-throated Finch, Falkland Thrush, Long-tailed Meadow-lark, Grass Wren, Magellanic Snipe, Rock Shag (nine pairs nesting on the low cliffs of Engineer Point), Falkland Pipit, Black-chinned Siskin and Magellanic Oystercatcher (one pair). The Falkland Steamer Duck is one of two endemic Falkland species, and one of the most widely distributed native bird species.

Three of the seven pairs of Falkland Steamer Ducks holding territory on the south shore between Tussac House and the Canache successfully raised young, as did two pairs of Crested Duck, one pair of Magellanic Oystercatcher and one of Upland Goose. Along the north shore, there were also seven pairs of Falkland Steamer Duck, of which three raised young, three pairs of Upland Goose with young all in Whalebone Cove, but no nesting Crested Duck or Magellanic Oystercatcher.

The highest numbers of Upland Goose were recorded in the Market Garden fields which provide abundant grazing and nesting habitat, followed by the grasslands and fachine scrub areas at Whalebone Cove (**Figure 10.4**). Speckled Teal were most commonly seen on the shoreline between Tussac House and FIPASS, feeding in association with Kelp Geese and Crested Ducks. A pair hatched six ducklings at a shallow pond at the southern boundary of the surveyed area near the junction of the FIPASS Link Rd and the Bypass Rd; individuals were occasionally seen on the Market Garden pond.

Other coastal species recorded during the surveys were Kelp Goose, seen in flocks of up to 20 birds, and small numbers of Dark-crowned Night Heron and Blackish Oystercatcher. The Kelp Goose does not breed in Stanley Harbour; the nearest nest sites are on the Port William coastline in the vicinity of Navy Point and Gypsy Cove. The Dark-crowned Night Heron breeds in a small colony near Gypsy Cove, and the Blackish Oystercatcher (two pairs) on the Camber jetty in Stanley Harbour.

Seasonally occurring species include the Snowy Sheathbill, which is present throughout the winter months between March and mid-October, and most commonly on the shoreline below the Market Garden. White-rumped Sandpiper (a regular summer visitor recorded between October and May), and small flocks of Rufous-chested Dotterel and Two-banded Plover feed in the intertidal areas, mostly towards the end of the breeding season when birds are dispersing from their breeding grounds around the Islands.

South American Tern, Kelp Gull, Dolphin Gull, Southern Giant Petrel and Turkey Vulture were present in small numbers on most survey days; they were usually seen in flight, although occasionally would alight on the water or beach if food was available. Kelp Gulls were usually seen association with foraging Rock Shags and Falkland Steamer Ducks. Although the King Shag is one of the most abundant birds recorded in nearby Port William and Berkeley Sound (Premier Oil, 2018), only two individuals were seen in Stanley Harbour during the entire survey.

Sites used by flocks of non-breeding Falkland Steamer Duck, Crested Duck and Kelp Goose for resting and roosting were the north entrance point to the Canache and the north end of Whalebone Cove. These species forage in Whalebone Cove and along the coastline between Tussac House and FIPASS; both these sites have permanent sources of freshwater in the form of seeps and drainage ditches which flow on to the beach, where the majority of birds obtain water for drinking.

Passerine species were very sparsely distributed and in low numbers (less than one bird per km), with the exception of Black-chinned Siskin and House Sparrow which were seasonally abundant in the area of the Stanley Grower's Market Garden fields. The former nest in the Market Garden hedgerows and trees; several pairs of House Sparrow nested in the eaves of the Lighthouse Seafarers' Centre, and in various buildings between Stanley Growers and the Canache. Falkland Thrush was less common, with one pair at the Canache, another two on the north side of the harbour and the majority nesting in the trees and hedges at Stanley Growers.

A pair of Grass Wren, two pairs of Black-throated Finch, one pair of Dark-faced Ground-tyrant and one pair of Falkland Pipit were seen on territory between the TDF and the Canache and are likely to nest in this area. Two pairs

of Falkland Pipit and a single Magellanic Snipe holding territory were observed in the grassland and fachine area at Whalebone Cove.

The endemic Tussacbird and Cobb's Wren were not recorded in the survey area. These species require a predator-free environment to survive; occasional sightings near the Cape Pembroke lighthouse are of birds visiting from the nearby predator-free tussac islands Top and Bottom Islands. However, the presence of rats, mice and cats in the Stanley area makes sightings of these birds in Stanley Harbour very unlikely.

Endemic Steamer Ducks were found throughout the survey area (**Plate 10.2**). The area is used for nesting, with nests and eggs found in the survey area (**Plate 10.3**). Steamer duck families were found at various locations in the survey area.



**Plate 10.2** Steamer duck family at Seafarers Centre Stanley Harbour 7 October 2020



**Plate 10.3** Steamer duck nest and egg (bottom right) at Canache found in the December 2020 survey

The Falklands steamer duck breeds around much of the Stanley Harbour coastline, except for the coastline along the Stanley waterfront and the Canache, where this species was recorded to be relatively scarce. Kelp geese more commonly feed within Stanley Harbour, and their numbers within the area are relatively low. Waders are typically present all year round, specifically using the Canache for feeding. Their numbers are typically higher during the winter months than the summer.



All native wild birds are protected under the Conservation of Wildlife and Nature Ordinance 1999, which covers the territorial waters of the Falkland Islands up to 12 nautical miles offshore, except for the following:

- Upland goose (*Chloephaga picta*) and feral domestic goose – these species may be killed or captured by authorised persons at any time of the year; and
- Patagonian crested duck (*Lophonetta specularoides*) and yellow-billed (speckled) teal (*Anas flavirostris*) - both of these species may be killed or captured by authorised persons at any time outside of the close season (the close season is 1<sup>st</sup> July to 31<sup>st</sup> March).

#### **A10.2.4.4 Coastal birds on FIPASS**

A small number (less than 50) of rock shags (*Phalacrocorax magellanicus*) breed on the western barges of FIPASS and can also be seen roosting around the outsides of the structure. Rock shags are also known to be present underneath the causeway onto FIPASS by the ballast tanks. A small number (less than 10) of night herons (*Nycticorax falklandicus*) also breed on the fringes of the FIPASS structures.

A number of species are frequently seen on FIPASS for roosting or foraging opportunities and these include the kelp gull (*Larus dominicanus*), dolphin gull (*Larus scoresbii*) and, in the winter, snowy sheathbill (*Chionis albus*).

A number of passerine species are occasionally observed. The Falkland steamer duck (*Tachyeres brachypterus*) is often seen utilising the concrete base near and on the causeway. Turkey vultures (*Cathartes aura*) also known to roost on the causeway and on the top of the FIPASS structure throughout the year.

#### **A10.2.5 Rare plants**

A rare plant survey was undertaken on land immediately behind FIPASS, covering approximately 1km of coastline and extending approximately 200m inland. No rare plants were recorded during the survey. A full list of native and non-native plant species encountered is found in **Appendix 8**.

A general ecological overview of the area covered by the survey is provided below.

The survey area (**Figure 10.2**) has been vastly modified by urban development over the past 35 years, during which time the original acid grassland and dwarf shrub heath habitats have been cleared to make way for arable fields, a hydroponics garden, off-road tracks, warehouses, houses and a concrete pathway along the coast. Very few native plants remain.

The northern boundary of the area surveyed is the Stanley Harbour coastline between the west end of Stanley Growers' land (where it borders with the Tussac House site) and the Seafarers Mission at the eastern end. The southern boundary, 200m inland from the coast, runs east-west across the gardens, fields, windbreaks and polytunnels of Stanley Growers from FIPASS road to the western boundary of Stanley Grower's land.

The area surveyed consists mainly of several fields used for growing potatoes and brassicas and a network of polytunnels, storage sheds and access tracks for agricultural traffic, which together are classed as 'arable and horticultural' habitat. This is interspersed with 'woodland' habitat in the form of windbreaks and woodlands of introduced evergreen and deciduous trees such as lodgepole pine, Monterey cypress, macrocarpa, willows and poplars. There is a significant area of 'standing water' habitat in the form of a large pond used for irrigation (**Plate 10.4**), and several drainage ditches which flow to the shoreline across the fields.

The Seaman's Mission on FIPASS Road is classed as 'built up and garden' habitat, and consists of an accommodation and amenities complex, well-maintained gardens and macrocarpa hedges.

The intertidal shoreline in the area is mostly boulder and rock, with evidence of vehicle tracks and under-cutting of the bank by coastal erosion. The coastal strip of vegetation has been vastly modified by the construction of a concrete path from Ross Road East to FIPASS, and although there are pockets of remnant strandline native species (Fuegian



couch, wild celery, nodding club-rush, native stonecrop and thrift), the habitat type is predominantly 'introduced vegetation' consisting of introduced grasses such as lyme-grass, Yorkshire fog, annual meadow and common bent, and broadleaf species such as groundsel, prickly sow-thistle, nettles, dock and other 'weeds'.

There are two areas of remnant native habitat within the area surveyed. One is a 10m wide and 20m long strip of dwarf shrub heath running north-south between FIPASS Road and the field margin along the eastern boundary of the Stanley Grower's land. It has not been grazed in decades and contains large, tall fachine bushes amongst a deep cover of Christmas-bush, small-fern, diddle-dee and scattered whitegrass bogs, interspersed with introduced grasses (**Plate 10.5**). The second area is also ungrazed dwarf shrub heath dominated by tall-fern, small-fern, diddle-dee and white-grass and located at the southwest boundary of Stanley Growers land between two stands of conifer woodland and bordering the Tussac House site.



**Plate 10.4** Pond at the Market Garden, used for irrigation, forming notable habitat for birds and plants



**Plate 10.5** Remnant dwarf shrub heath with emerald bog and fachine



Although the area to the east of FIPASS Road was not subject to a detailed rare plant survey, it was subject to a drone survey which allowed the various habitat types to be mapped in detail. Although not picked up by the drone survey within the footprint of the proposed geotube area, it is understood that the proposed geotube area to the east of the TDF (**Figure 4.1**) supports the pale maiden flower (the national flower of the Falkland Islands). This is listed as a protected plant under Schedule 3 of the Conservation of Wildlife and Nature Ordinance 1999. Part II Section 7 of the Ordinance provides specific protection to wild plants, stating that:

- (1) it is an offence to deliberately pick, collect, cut, uproot or destroy a protected wild plant or for any person other than an authorised person deliberately to uproot any protected wild plant.

Subsection 5 of Section 7 states:

- (5) A person does not commit an offence under subsection (1) -
  - (a) If he is the owner or occupier of the land in question or an authorised person and shows that the act which would otherwise have been unlawful by virtue of subsection (1) was an incidental result of a lawful operation carried out by him and could not reasonably have been avoided.

#### **A10.2.6 Coastal rubbish and discharges**

Drain pipes were observed only along the south coastline (**Figure 10.13**). A total of 14 pipes were observed of various sizes, and presumably different purposes. Since the Premier Oil 2013 survey, there has been an increase in drain pipes primarily the coastline west of FIPASS, which are likely to have been recently installed due to the need to drain water from adjacent fields (occupied by the Market Garden) across the footpath into the harbour. The drain observed in 2013 that had stained discharge was observed again in the present survey.



**Figure 10.13** Location of drainage pipes in eastern Stanley Harbour

Waste observed around the coastline consisted of old, deteriorating heavy materials and objects, and relatively recently accumulated plastic. Heavy objects were made up of relatively old pieces of infrastructure, tyres (likely lost fenders from FIPASS), rusted steel, cables, and wooden objects such as pallets and other broken material. Plastics included smaller items such as bottles, domestic items, blue industrial wrapping, nylon ropes and plastic banding. A China-certified 'KN95' Covid-19 personal mask was also found. These observations suggest multiple origins of waste that have accumulated recently and over long timescales. Examples of objects can be found in **Appendix 8**.

Community beach cleans frequently occur in the areas of FIPASS and Whalebone Cove as these are used regularly by the public for walking, running, etc. The most recent organised beach clean was approximately one month prior to the survey; however, members of the public are known to frequently pick up rubbish on daily walks.

Density of rubbish are shown in **Figure 10.14**. Density of plastics were relatively low in the FIPASS and Whalebone Cove, with patches of higher density near Tussac House site and on the north coast. Density of total rubbish (inclusive of industrial materials) was somewhat more even distributed around the coast.







**Figure 10.14** Distribution of observed plastic objects (top plot) and total waste around east Stanley Harbour coastline.

#### **A10.2.7 Future evolution of the baseline in the absence of the proposed scheme**

In the absence of the proposed scheme, there is no reason to believe that the coastal and terrestrial environment within and adjacent to Stanley Harbour is likely to materially change from the present-day conditions.

### **A10.3 Potential impacts during construction**

#### **A10.3.1 Direct loss of coastal and terrestrial habitat**

In terms of the intertidal, the coastline in the eastern areas of Stanley Harbour broadly consists of a mix of sand/mud sediments with overlaying gravel, cobble and small boulders along shallow sloping shorelines. The coastline shows signs of long-term impacts due to a history of development and use, primarily due to shipping, but also close proximity to land-based industrial estates, roads and drainage.

The intertidal zone between the site of Tussac House and the Canache (which contains the area of intertidal to be impacted as a result of the proposed scheme) is a shallow sloping shore, compared to the north coastline which is typically slightly steeper with a shorter distance between low tide and high tide levels. A total of nine macrofaunal species and 17 seaweed species (or putative species) were identified from quadrat images. Due to the abundance of seaweeds on the intertidal, intertidal species which were recorded during surveys in 2013 were less evident, making over-all diversity of fauna appear relatively low.

The survey work has illustrated that the dominant habitat type for the eastern Stanley Harbour coastline is 'Dwarf shrub heath', although this habitat type is relatively absent in Area 1 (i.e. that within which the proposed scheme is located), which is highly modified through industrial and agricultural activity. This Dwarf scrub heath habitat is notable for its diddle-dee (*Empetrum rubrum*), mixed with some mountainberry (*Gaultheria* sp), Christmas-bush (*Baccharis*

*magellanica*). It may include *Leptinella*, whitegrass, small ferns, and *Juncus* (**Appendix 8**). In contrast, Area 1 is dominated by 'introduced vegetation', 'bare ground', and 'tree & shrub' habitats.

During the construction phase of the proposed scheme there will be the need for establishment of a site compound, laydown areas, an accommodation area and an area for geotubes (amongst others) (see **Figure 4.1**). A number of these areas of land are currently occupied by hardstanding; however, some are currently vegetated (with the known presence of the protected pale maiden flower in the proposed geotube area). It is proposed that any vegetation present within the various parcels of land which are not currently hardstanding will be stripped to allow formation of hardstanding in advance of construction commencing.

A new access road is proposed to connect the quay to the existing highway network. The access road will be typically 9m in width, with a surfaced carriageway. Where required, cut slope and fill embankments will be provided at 1:3 slopes; it is proposed that approximately 500m<sup>3</sup> of fill material will need to be transported to site to balance the cut/fill volumes. Construction of the access road will require localised removal of polytunnels at the Stanley Growers site, as well as the loss of agricultural land.

Following disconnection of services, the barges would be winched (individually and in sequence) on land for dismantlement (see **Figure 4.1**). It will be necessary to undertake construction works at the proposed dismantling location to support with the removal process of the barges from the harbour. Specifically, a new slipway and winch will be required.

Interception trenches will be installed to avoid run-off of any materials / contamination into Stanley Harbour during the dismantling process. Periodically, the trenches will be cleaned out using land based plant with waste materials loaded onto a lorry and transported to one of the laydown areas for storage.

The proposed construction works have the potential to directly impact on terrestrial and coastal fauna and flora and to result in the physical loss / degradation of terrestrial and coastal habitat (as well as loss of the pale maiden flower in the proposed geotube area).

The area which has been subject to survey (**Figure 10.2** and **Figure 10.3**) has been vastly modified by urban development over the past 35 years, during which time the original acid grassland and dwarf shrub heath habitats have been cleared to make way for arable fields, a hydroponics garden, off-road tracks, warehouses, houses and a concrete pathway along the coast. Very few native plants remain. The construction works for the proposed scheme will directly and indirectly remove / modify habitats in these areas.

Habitat types (intertidal and terrestrial) present within the proposed scheme footprint are considered to be common in the area and are not listed as protected. In the area of the proposed scheme, surveys indicated that the habitats and species are representative of the wider Stanley Harbour and Port William area and that no protected or threatened habitat types or species are present (with the exception of the pale maiden flower in the geotube area). In general, the proposed scheme footprint on land (i.e. the proposed access route, slipway, permanent diversion of the coastal footpath and access track) and the areas of land required for construction (i.e. those shown on **Figure 4.1**) are considered to be modified.

The most consistently abundant and widely distributed families of birds recorded during the surveys were ducks, geese and shags. However, the disturbance and loss of habitat in the region around the proposed scheme footprint will be limited and coastal birds in the areas affected will find alternative habitat outside of this area.

There will be direct loss of coastal and terrestrial habitats resulting from construction of the proposed access road and support sites through groundworks and construction. As noted in **Section A4.3.1.6**, if it is possible to do so, the removal of structures that have the potential to support breeding birds, clearance of any vegetated areas at any locations to be used during construction will be undertaken outside of the breeding season. This is the preferred means of mitigation. However, because the timing of works is dependent on timing of receipt of planning permission, this cannot be guaranteed.

If it is clear that the construction phasing would require works to be undertaken in areas or on structures that can potentially support breeding birds, advance measures would be carried out to deter breeding within areas that would be affected by construction works during the next breeding season. These measures could include advance clearance of vegetation and surfacing of working areas by PWD, blocking access to nest sites (including the Magellanic oystercatchers nesting in the open areas in the Market Garden) (e.g. by use of netting) and using visual and/or auditory deterrents. In advance of any works, a pre-construction survey will be undertaken to ensure that there is no potential for disturbance to breeding birds.

With regards to the pale maiden flower which is understood to grow within the proposed geotube area, it is understood that appropriate mitigation will be developed through discussion with F.I.G. and set out in a Construction Environmental Management Plan; it is possible that a programme of translocation may be carried out to relocate the plants outside of the construction area, through agreement with F.I.G.

The area and zone of influence is small relative to the Stanley Harbour area. The sensitivity of the receptor to habitat loss is considered low and the magnitude of the effect is also considered low. Therefore, the overall significance of potential impact is considered to be **negligible**.

#### **A10.3.1.1 Mitigation and residual impact**

No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.

### **A10.3.2 Noise and visual disturbance due to construction-related airborne noise**

The construction phase of the proposed scheme has the potential to cause acoustic and visual disturbance to bird populations within, or in close proximity to, the proposed development. Displacement from the site would effectively represent permanent or temporary loss of habitat while construction works progress.

With regard to noise impact assessment, a distinction is made between 'continuous' noise levels ( $L_{Aeq}$ ) and maximum (impulsive) noise levels ( $L_{Amax}$ ). During the construction phase, the greatest noise disturbance to birds is likely to arise from impulsive sources, such as impact piling works, rock armour placement and movement of vehicles. The piling works for quay construction are proposed to be undertaken over a period of approximately 22 weeks for Phase 1, and 30 weeks for Phase 2 and 3 (however the overall construction works are predicted to last approximately 2.5 years).

Wright *et al.* (2010) investigated the effects to waterbirds of impulsive noise and identified ranges in noise which cause behavioural responses (based on a measured  $L_{Aeq}$ ). These are:

- No observable behavioural response: 54.9 to 71.5 dB(A).
- Non-flight behavioural response: 62.4 to 79.1 dB(A).
- Flight with return: 62.4 to 73.9 dB(A).
- Flight with all birds abandoning the site: 67.9 to 81.1 dB(A).

Similarly, Cutts *et al.* (2009; 2013) compiled classifications for construction noise disturbance to wintering waterbirds as follows:

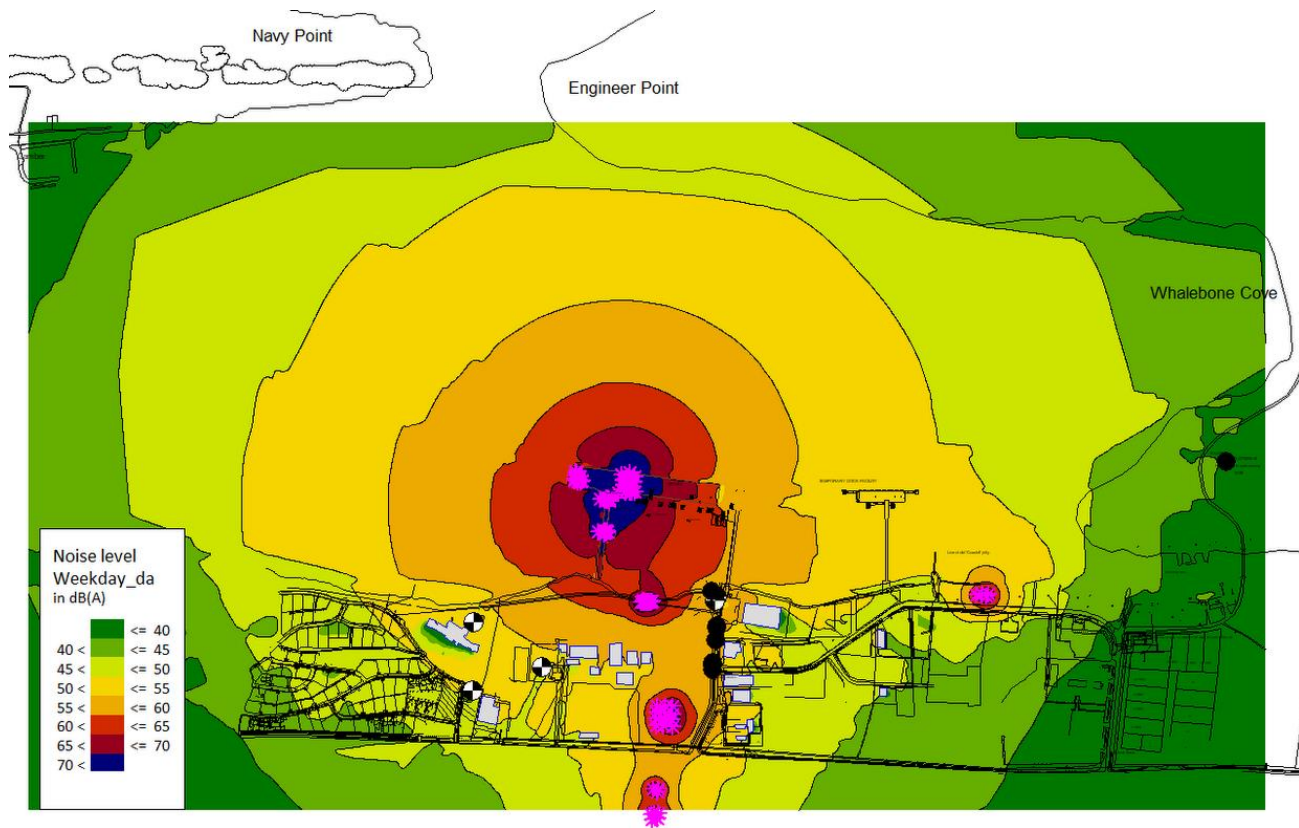
- Noise below 50 dB(A): low.
- Regular noise 50-70 dB(A): moderate to low.
- Irregular noise 50-70 dB(A): moderate.
- Noise above 70 dB(A): high.

In this classification, low response was defined as 'no effect', moderate response was defined as 'head turning, scanning, reduced feeding or movement to nearby areas' and high response was defined as 'preparing to fly, flight or abandonment on the area'.



No studies into the behavioural responses (based on a measured LAeq) of Falkland Island native coastal bird species have been undertaken and, therefore, the impact assessment is based on the studies of Wright et al. (2010) and Cutts et al. (2009; 2013).

**Figure 10.15** illustrates the predicted construction noise levels (LAeq).



**Figure 10.15** Predicted construction phase noise (LAeq)

During the construction phase, the removal of FIPASS, piling and rock armour placement and vehicle noise are likely to cause significant elevations in noise in localised areas, such that it will elicit the flight of birds from the vicinity. This effect is expected over the construction area for the proposed scheme, the site of the existing FIPASS, the locations where FIPASS would be dismantled on the coast and within the site compound, laydown and batching plant areas (shown on **Figure 4.1**).

Areas beyond the immediate construction site will experience lower noise levels, likely to elicit non-flight behavioural and flight with return behavioural responses. This effect is likely to continue throughout the construction phase and is expected to impact breeding sites and the utilisation of habitat in the area by birds. Given the duration of the proposed construction phase, it is not possible to undertake the works outside of the sensitive period for breeding birds and therefore temporary disturbance is an unavoidable consequence of the proposed scheme.

The zone of visual impact is considered likely to coincide with that described above for noise.

The area that is predicted to experience noise levels and visual effect that could result in disturbance to birds is predicted to be relatively localised and comprises modified landscapes and habitat. It is likely that some birds will be disturbed and there will be a loss of feeding and breeding habitat. However, displaced avifauna will likely find alternative sites away from the proposed scheme and no negative effect on overall populations levels is expected. Therefore, the sensitivity of the receptor to noise during construction is considered low and the magnitude of the effect is also considered low. Therefore, the overall significance of potential impacts is considered to be **negligible**.

#### **A10.3.2.1 Mitigation and residual impact**

No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.

### A10.3.3 Potential impact of dust, emissions and particulate matter deposition

The Stanley Common NNR, located inland of the proposed laydown / stockpile area, precast storage area and the batching plant area (shown on **Figure 4.1**), is nationally designated and contains important plant species which are assumed to be sensitive to dust deposition. In addition, the Cape Pembroke IPA is located to the east of the proposed construction area.

As a result, the proposed scheme has potential to influence these designated sites due to deposition of dust and release of particulates from plant; these potential impacts have been considered in **Section A13.3.2**. As reported in **Section A13.3.2**, impacts on ecological receptors were described as 'medium risk' for earthworks and construction and 'low risk' for trackout.

The Stanley Common NNR is located adjacent to the laydown / stockpile area, precast storage area and the batching plant area to be used during the construction phase (shown on **Figure 4.1**). Within the precast storage and batching plant areas, there would be a small number of plant items used to move construction materials, which are not anticipated to be a significant source of pollutant emissions. In addition, the prevailing wind direction would disperse emissions towards the east, and therefore it is unlikely that a significant area of the NNR would be affected, and the high wind speeds typically experienced in the area would ensure that pollutants are well dispersed.

The most intensive activities within the laydown and stockpile area are predicted to occur during construction of the causeway, which is estimated to occur over a period of approximately one year. As such, emissions from these activities would be short-term in nature.

The Cape Pembroke IPA is located to the east of the proposed remediation area (see **Figure 4.1**). As detailed in **Section A4.2.6.8**, the surficial silt pumped into the geotubes to be located within the remediation area is to remain within the bags until it has dried out. As detailed in **Section A4.2.6.8**, the capture rate of compounds within the geotubes can be summarised as follows:

- Suspended solids – 99.6%
- Phosphorous – 98.2%
- Nitrogen – 82.3%
- *E.coli* - 99.9%

The above illustrates the geotubes are very effective at capturing both suspended solids and compounds which generate odour and therefore very minimal odour generation and dust generation is expected. This significantly reduces the potential for dust to be generated as a result of pumping surficial silt into geotubes. A significant amount of plant and machinery is not required within the remediation area. Appropriate controls on emissions from NRMM are therefore expected to be sufficient to prevent significant impacts from occurring. Based on the above, impacts on the Cape Pembroke IPA are considered to be **not-significant**.

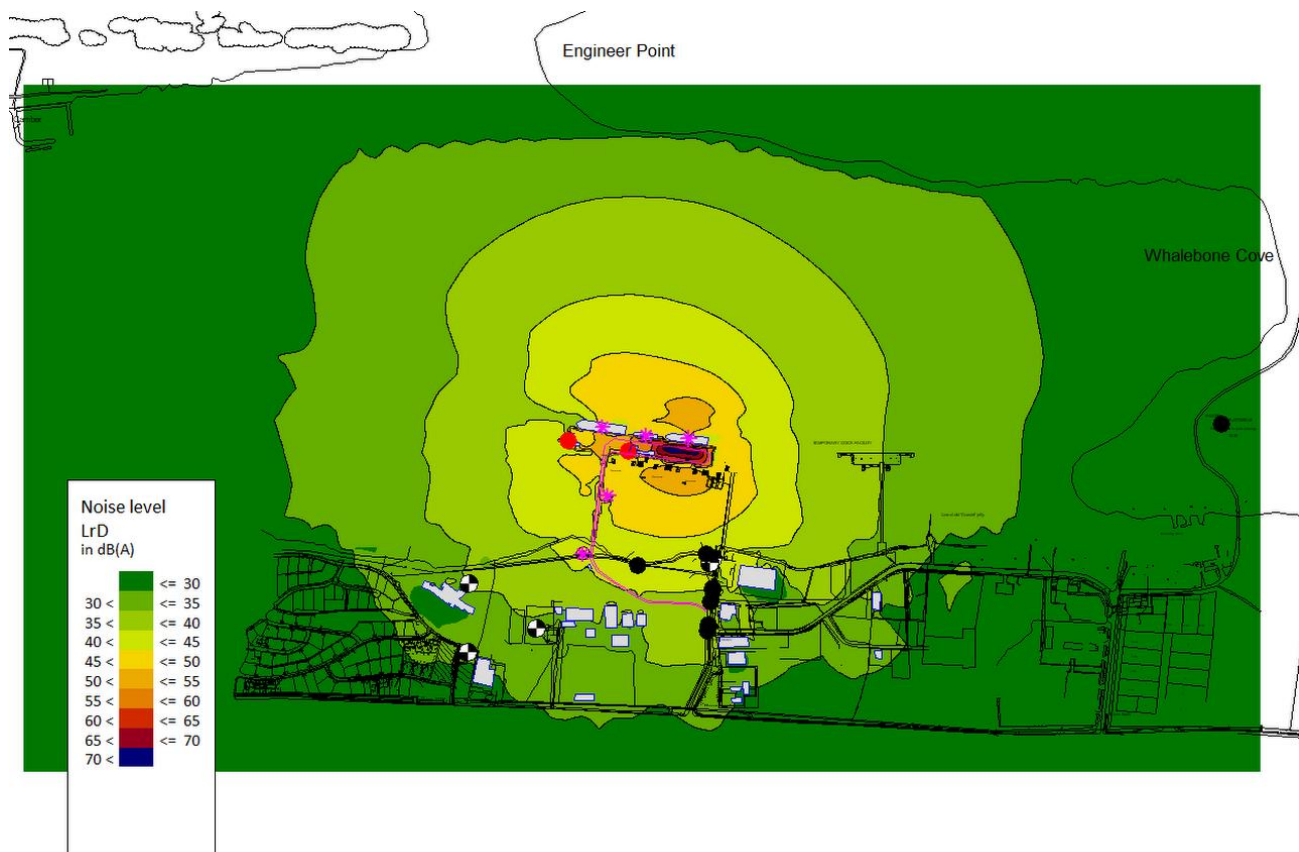
It is anticipated that, as air quality in the area is expected to be good due to there being few pollution sources in the vicinity, baseline pollutant concentrations and deposition rates within the NNR are likely to be sufficiently below the thresholds at which adverse effects may occur, and the Management Plan for Stanley Common (Falkland Islands Government, 2019) does not identify air emissions as an issue or threat to the NNR. Appropriate controls on emissions from NRMM are therefore expected to be sufficient to prevent significant impacts from occurring. In addition, the dominant wind direction is due west, which further reduces the potential for adverse effects on the Stanley Common NNR. As such, impacts on designated ecological sites are considered to be **not significant**.

The proposed mitigation measures detailed in **Section A13.3.2.1** are considered to be sufficient to manage the risk of dust and particulate matter deposition to the NNR and IPA. As a result, impacts are considered to be **not significant**.

### A10.4 Potential impacts during operation

#### A10.4.1 Noise and visual disturbance during operation

During the operational phase, the berths (ship activity) on the proposed quay, the pump house and the proposed substation are predicted to result in noise levels of up to 60 dB(A) beyond the boundary of the quay itself (see **Figure 10.16**). At this predicted noise level, it is unlikely that there would be any discernible effect on birds beyond the immediate vicinity of the proposed scheme. The visual effect of operational activities at the proposed scheme are unlikely to extend beyond those predicted for noise disturbance. It should also be noted that the existing FIPASS will also be having some effect under current conditions and, therefore, the change from baseline conditions due to the operation of the proposed scheme is unlikely to be substantive.



**Figure 10.16** Predicted operational phase noise (LAeq)

The sensitivity of the receptor to noise and visual disturbance during operation is considered low and the magnitude of the effect is also considered low. Therefore, the overall significance of potential impacts is considered to be **negligible**.

##### A10.4.1.1 Mitigation measures and residual impact

No mitigation measures are required. The residual impact is predicted to be of **negligible** significance.

#### A10.4.2 Direct loss of coastal bird habitat due to removal of FIPASS and the causeway

The removal of FIPASS and the causeway will result in the loss of structures used by coastal birds as a breeding, roosting and foraging habitat. However, the construction of the proposed scheme will offer new habitat for potential use by coastal birds as a breeding and roosting habitat, albeit that the structural nature of the proposed scheme will be different to FIPASS and will not offer equivalent potential habitat as it will not consist of an open structure as is currently the case at FIPASS.

There is a low diversity of avifauna that currently utilise FIPASS and the causeway for breeding, roosting and foraging habitat. The removal of the structures will have minimal effect on local populations and the proposed scheme will offer new potential habitat for birds.

The sensitivity of the receptor is considered to be low and the magnitude of the effect is considered low. The overall significance of potential impact with regard to removal of habitat due to removal of FIPASS and the causeway is, therefore, considered to be **negligible**.

#### **A10.4.2.1      *Mitigation measures and residual impact***

No mitigation measures are required and the residual impact is predicted to be of **negligible** significance.

Embedded mitigation measures to avoid disturbance to breeding birds are described in **Section A4.3.1.6**.

#### **A10.4.3      *Provision of new areas of artificial habitat***

The proposed new port facility will provide additional areas of artificial habitat which could be utilised by a range of coastal and marine species during the operational phase. This particularly relates to the presence of rock along the causeway and locally around the quay. The rock could provide benefit to a range of coastal and marine species. Overall, the provision of areas of artificial habitat along the causeway and around the quay is predicted to result in a **minor beneficial** impact to the coastal habitat within Stanley Harbour.

#### **A10.4.3.1      *Mitigation measures and residual impact***

No mitigation measures are required and the residual impact is predicted to be of **minor beneficial** significance.