CRUZ ENVIRONMENTAL

Report No. 13

Bird Fauna of Priority Habitats in Transnet Capital Projects Richards Bay Port Expansion Project

A report prepared for AECOM SA (Pty) Ltd, Westville, Durban

by

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TABLE OF CONTENTS

Figure 1.1 Little Bee-eater present in the Open *Acacia* woodland habitat of Site A.

1. INTRODUCTION

1.1 BACKGROUND TO THE STUDY

The Final Scoping Report (AECOM 2014) for the developments proposed by Transnet Capital Projects (TCP) for the Richards Bay Port Expansion project (Option 3A) identified that several specialist studies needed to be undertaken as part of the Environmental Impact Assessment for the proposed developments. These included elements of both Terrestrial and Aquatic Ecosystems present on the sites to be developed. In terms of the brief provided to CRUZ Environmental three areas required Specialist Studies as part of the Richards Bay Port Expansion project, the localities of these are shown on Figure 1.2 below. This report provides an assessment of the Bird fauna associated with these sites.

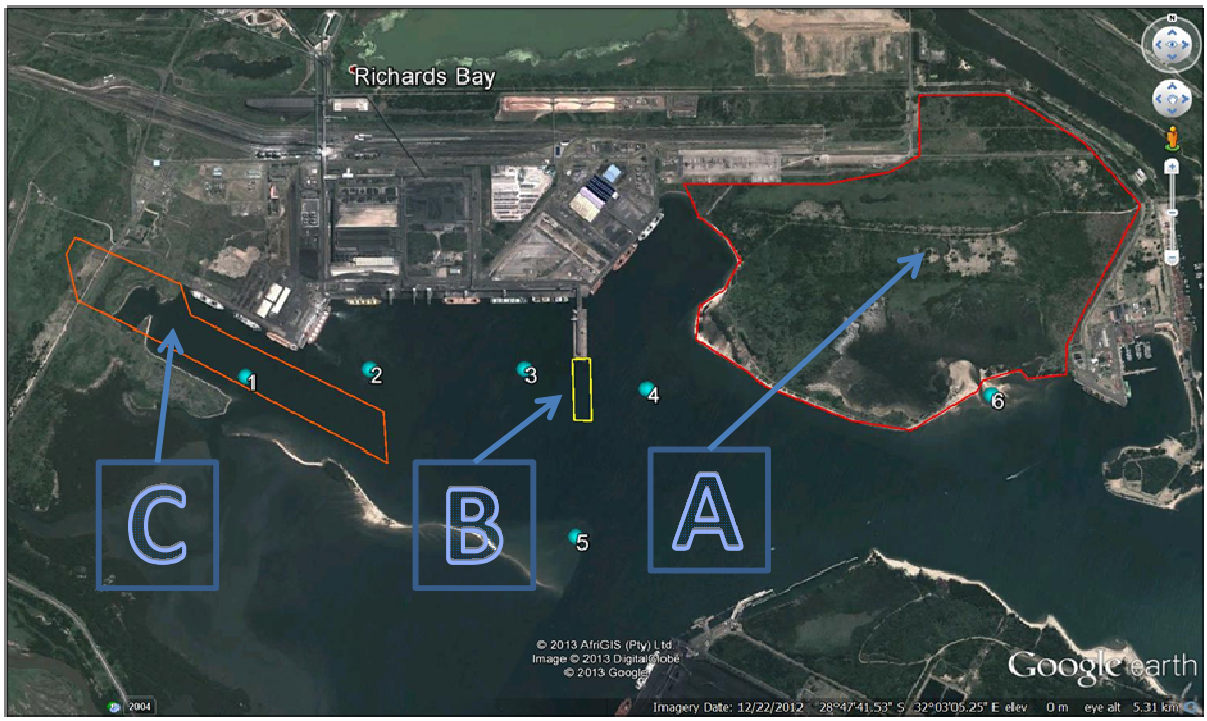

Figure 1.2 Sites associated with TCP Richards Bay Port Expansion Project (Option 3A), A = Rail Balloon, B = Finger Jetty Extension and C = Berth 600 Series Expansion.

1.2 TERMS OF REFERENCE

Birds were identified as a potentially important faunal component associated with some of the habitats that would be lost through development of the Richards Bay Port Expansion project (AECOM 2014). Of the three sites that would be affected by this development, the Rail Balloon was considered to potentially have an important bird fauna. The status of this faunal group in the Berth 600 Series Expansion site was unknown whilst the Finger Jetty Expansion site, due to only being directly associated with the deep harbour waters was considered to have no importance from a bird perspective.

The brief of the present study was to undertake a once-off assessment of the bird fauna of two of the sites to be impacted by the Richards Bay Port Expansion project, these were Sites A & C (see Figure 1.1).

Figure 1.3 Whimbrel in flight over the Intertidal Sandflats in Site A.

1.3 AIMS

The study was aimed at providing, through a once-off sampling in Spring 2014, an assessment of the status and ecological importance of the bird fauna of two of the sites proposed for development as part of the TCP Richards Bay Port Expansion project.

2. STUDY AREA

2.1 INTRODUCTION

Whilst both study sites have in the past been impacted, mainly by dredge spoil disposal as a result of harbour development activities, much of the area has been relatively undisturbed for almost 10 years, except for regular beach-type visits by TNPA in the rail balloon area (*pers comm.*, TNPA, 2014). This can be seen by examining the time series of air photos on Google Earth.

2.2 HABITATS PRESENT IN THE STUDY AREA

Whilst the Vegetation and Wetlands Delineation Study (Mostert 2014) has provided substantial detail on the plant communities present at each of the sites this amount of detail was not needed for a once-off bird fauna survey.

2.2.1 Rail Balloon Area (Figure 1.2 - Site A)

For the present study, following an initial field assessment, the site was divided into three broad habitat types as follows.

2.2.1.1 Secondary Woodland (Habitat 1 on Figure 2.1)

This habitat consists mainly of open to fairly dense Secondary *Acacia* Woodland interspersed with Open Grassland and covers approximately 54% of the site.

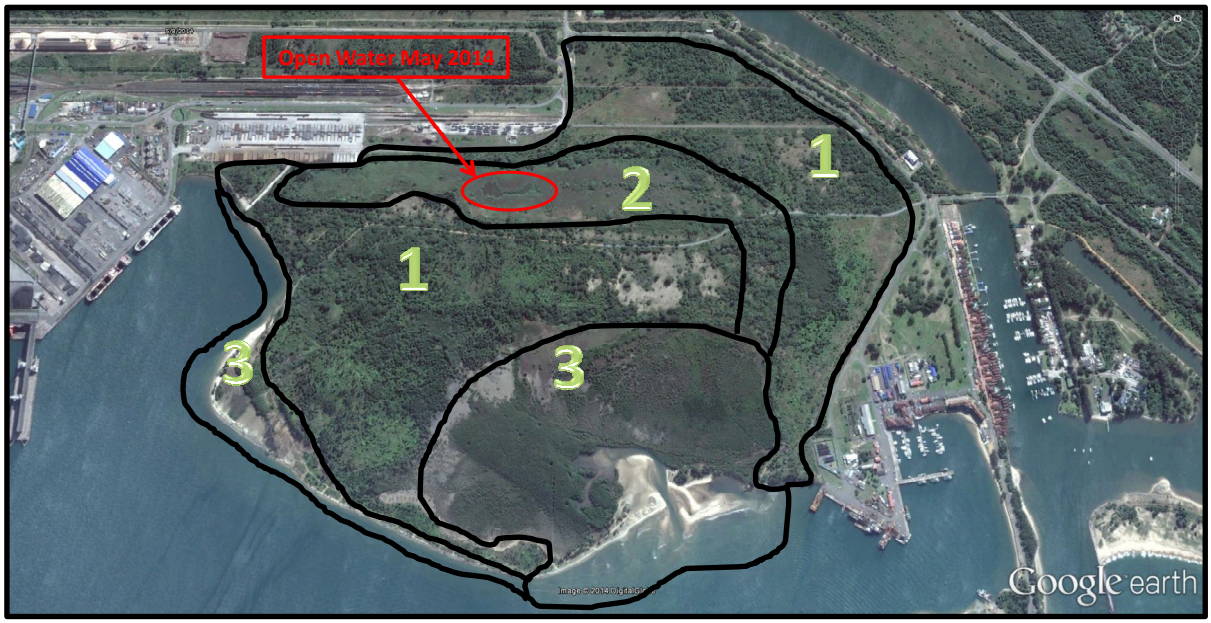

Figure 2.1 Broad based Bird Fauna Habitats in Site A Rail Balloon (1 = Secondary Woodland, mainly *Acacia* interspersed with Open Grassland; 2 = Freshwater Wetland & Riverine & 3 = Intertidal Mangrove & Sandflats and Coastal Shoreline, Source Google Earth 2014-05-08).

2.2.1.2 Freshwater Wetland (Habitat 2 on Figure 2.1)

About 12% of the Rail Balloon Area is covered by this habitat type which according to Mostert (2014) includes five different wetland types making up a complex Wetland mix. The main wetland covers the east/west area of Habitat 2 which drains from the extreme South East corner southwards via a Riverine zone entering the Intertidal Mangroves at the North East corner of Habitat 3 (Figure 2.1).

It should be noted at the time of the once-off survey the whole Richards Bay area was experiencing an exceptionally dry spell. Lake Mzingazi, which has a localised catchment, was reported to be at its lowest level in 50 year (Zululand Observer, October 2014). As a result most of the Wetlands in the study site were dry with only a small patch of open water present (see Figure 2.1). The contraction of open water can be seen by comparing that present in May 2014 (Figure 2.1) with the extent of open water in October 2004 (Figure 2.2, Zone I). The implications of this are discussed below in the Results (Section 4).

Figure 2.2 Google Earth Photo October 2004 showing; I) the extent of Open Water present in the main Wetland and II) the extent of the Intertidal Sandflats at low tide.

2.2.1.3 Intertidal Mangroves & Sandflats, Coastal Shoreline (Habitat 3 on Figure 2.1)

This habitat covers about 34% of the Rail Balloon Area and consists of three sub-habitats; the Intertidal Mangroves and Intertidal Sandflats situated in the South East corner of Site A, and the shoreline along the southern margin of the site (Figure 2.1). As the term implies, the Intertidal areas are covered to a varying depth on the high tide and are by and large exposed during low tides. The photo in Figure 2.1 appears to have been taken when the tide was near to high as very little of the intertidal areas are exposed, it also shows the sea water that has pushed through the inlet and into the mangroves. On the other hand the photo in Figure 2.2 (Zone II) was taken at low tide in October 2004 and clearly shows the extent of the Intertidal Zone.

2.2.2 Berth 600 Series Expansion

Four broad habitat types were identified in Site C these were;

2.2.2.1 Intertidal Mangroves (Habitat 1 on Figure 2.3)

Intertidal Mangroves are present in three separate locations within this site, the large patch to the South is just outside the proposed development zone and forms part of the extensive Mangrove habitat on the western edge of the Kabeljous Flats (Figure 2.4). The second is on the eastern side of the site and lies between two sections of Intertidal Sandflats which is also outside the designated study area. Together these two contribute to what is referred to as the Sand Spit which forms the northern border of the Kabeljous Flats (Figure 2.4). The Kabeljous Flats has been identified as an extremely important ecological area within the harbour (Vivier & Cyrus 2009). The third area lies to the West of the 600 Berth Series access channel and is within the designated study area.

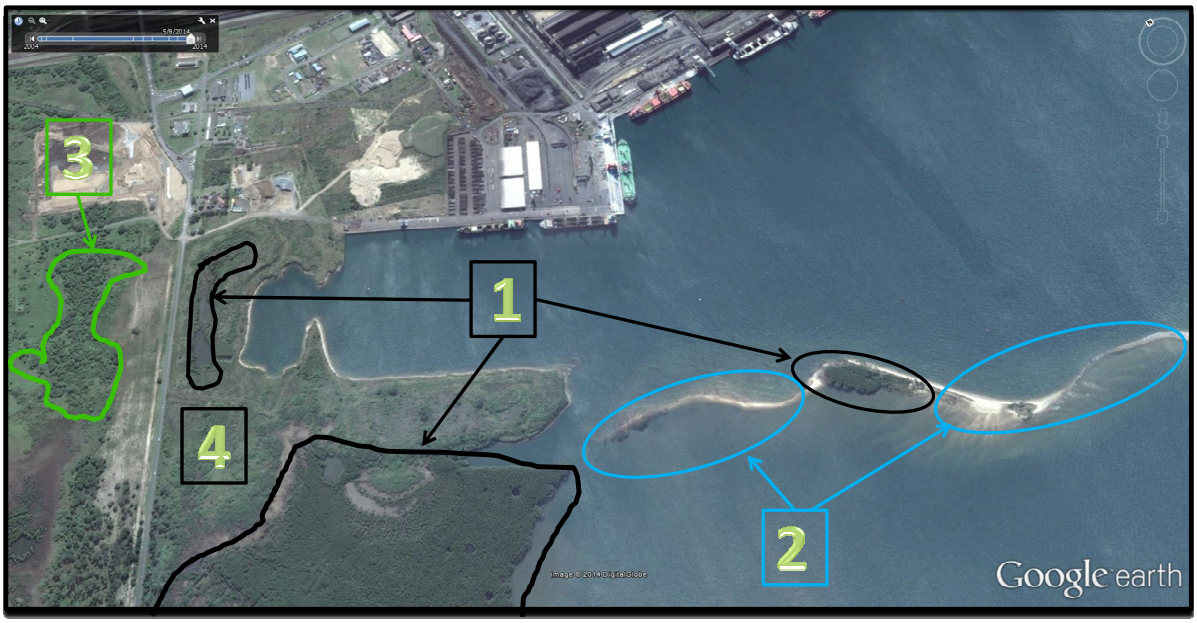

Figure 2.3 Broad based Bird Fauna Habitats in Site C, Berth 600 Series Extension (1 = Intertidal Mangroves; 2 = Intertidal Sandflats, 3 = Swamp Forest & 4 = Secondary Scrub Woodland & Grassland. Source Google Earth 2014-05-08).

2.2.2.2 Intertidal Sandflats (Habitat 2 on Figure 2.3)

The two narrow sections of Intertidal Sandflats lying on either side of the eastern section of Mangroves together comprise what is known as the Sand Spit which forms the boundary between the deep harbour channel to the North and the shallow Kabeljous Flats to the South and extends towards the 300 Series Coal Berths (Figure 2.4). These were however outside the designated study area.

Figure 2.4 Position of the Kabeljous Flats, associated structures and habitat types in the Port of Richards Bay. Blue stippled line indicates the boundary of the flats.

2.2.2.3 Swamp Forest (Habitat 3 on Figure 2.3)

This section, on the extreme western side of the site, comprises a fairly large and well developed Swamp Forest which according to Mostert (2014) also holds a small Freshwater Wetland.

2.2.2.4 Secondary Woodland & Grassland (Habitat 4 on Figure 2.3)

The remainder of the site for the proposed development consists of secondary growth much of which is Grassland and some of which is Scrub Woodland. The area has been subjected to much disturbance in the past.

3. METHODS

3.1 INTRODUCTION

CRUZ Environmental recommended that this once-off study of the bird fauna of Sites 1 and 2 be undertaken as late as possible in October as this would be well into Spring when breeding activity would have started. In addition Palearctic migrants should have started to arrive after completion of breeding in the northern Hemisphere.

3.2 METHODS

Fieldwork for this investigation was undertaken during three days over the period 29th September to 22nd October. Due to the fact that the time allocated for the survey was limited it was decided, after reviewing a Google Earth photo of the sites, that for the Rail Balloon area strip counts using the tracks present in the area would be used to obtain a list of species and maximum numbers present in the Secondary Woodland (Habitat 1 on Figure 2.1). For the Freshwater Wetlands (Habitat 2 on Figure 2.1) selected points on the edge of the habitat would be accessed and records collected from there, while for the Intertidal Mangroves and Sandflats (Habitat 3 on Figure 2.1) the area would be walked and counts of birds present recorded. Species recorded in flight over the area were noted in a separate column as Aerial. Random transects were walked in the Berth 600 Series Extension, covering the four broad habitat types.

Figure 1.3 Purple-banded Sunbird which was found to be common in the Intertidal Mangrove stands and also present in the Secondary Woodland at Site A.

4. RESULTS

A total of 84 species were recorded in the two study sites during the survey (Table 4.1).

4.1 SITE A – RAIL BALLOON AREA

A total of 77 species were recorded within the Rail Balloon Site (Table 4.1), the occurrence of species in each of the broad habitat types is detailed below. Only one Red Data species was recorded on the site, this was the Caspian Tern a species considered by Barnes (2000) to be Near-threatened. This species is regular in small numbers within the harbour particularly during the winter months (D.P.Cyrus *pers obs.*). The second Red Data species, a Mangrove Kingfisher which is considered Vulnerable, may occur in the Mangroves during the winter months.

4.1.1 Secondary Woodland (Habitat 1 on Figure 2.1)

Despite the fact that the area was very dry with limited rain having fallen, observation indicated the presence of a very well established woodland fauna with 53 species having been recorded (Table 4.1). Several species were noted as being involved in breeding activities and a few nests were also found. No Red Data species were recorded but the presences of African Golden Weaver (five birds seen) is noteworthy as this species, whose distribution is restricted to the Zululand Coastal Plain and occurs northwards into Mozambique, is uncommon in the area.

4.1.2 Freshwater Wetland (Habitat 2 on Figure 2.1)

At the time of the study water in the wetland had almost dried up completely, the Riverine area was completely dry and only six species were recorded. This is a very unusual situation for a habitat type that is known for its species diversity as well as density.

4.1.3 Intertidal Mangroves & Sandflats, Coastal Shoreline (Habitat 3 on Figure 2.1)

A total of 34 species were recorded in this habitat, the bulk of which were exclusively associated with the Intertidal Sandflats and the sandflats associated with the Intertidal Mangrove Zone. The bulk of these were migrant Palearctic waders from the northern Hemisphere which spend the non-breeding season in Africa. A maximum count of 40 Whimbril was recorded which adds importance to the site as a source of food for these birds. In addition to the waders using the intertidal areas for feeding, a gull and three terns species were recorded using the area as a roosting site when not feeding over the open water. The maximum count for this group was >60.

Table 4.1 Species count and maximum number of individuals recorded, over the fieldwork period, for Berth 600 Series Extension and four habitats associated with the Rail Balloon Site.

Site 1 - Rail Balloon				Site 2 - Berth 600 Series Extension	++= >20 +++ = >40 ++++ = >100		
Secondary Woodland & Scatterred Grassland	Beach, Intertidal & Mangroves	Freshwater Wetlands	Aerial	All Habitats	Common Name	Scientific Name	
3					Natal Spurfowl	*Pternistis*	*natalensis*
				1	Egyptian Goose	*Alopochen*	*aegyptiaca*
8	2				Woolly-necked Stork	*Ciconia*	*episcopus*
++					Hadeda Ibis	*Bostrychia*	*hagedash*
	1				Reed Cormorant	*Microcarbo*	*africanus*
				1	Long-crested Eagle	*Lophaetus*	*occipitalis*
	2				Western Osprey	*Pandion*	*haliaetus*
2	1			1	Yellow-billed Kite	*Milvus*	*aegyptius*
	2		1	2	African Fish Eagle	*Haliaeetus*	*vocifer*
	5				Grey Plover	*Pluvialis*	*squatarola*
	3				White-fronted Plover	*Charadrius*	*marginatus*
	40				Whimbrel	*Numenius*	*phaeopus*
	3			1	Common Greenshank	*Tringa*	*nebularia*
	3			4	Common Sandpiper	*Actitis*	*hypoleucos*
	1				Ruddy Turnstone	*Arenaria*	*interpres*
					Sanderling	*Calidris*	*alba*
	1				Curlew Sandpiper	*Calidris*	*ferruginea*
	6				Grey-headed Gull	*Chroicocephalu*	*cirrocephalus*
	1				Caspian Tern	*Hydroprogne*	*caspia*
	+++				Swift Tern	*Thalasseus*	*bergii*
	1				Common Tern	*Sterna*	*hirundo*
3				4	Red-eyed Dove	*Streptopelia*	*semitorquata*
3					Purple-crested Turaco	*Tauraco*	*porphyreolophus*
4	1	1			Burchell's Coucal	*Centropus*	*burchelli*
				1	Diederik Cuckoo	*Chrysococcyx*	*caprius*
			2		African Palm Swift	*Cypsiurus*	*parvus*
			++		Little Swift	*Apus*	*affinis*
			++		White-rumped Swift	*Apus*	*caffer*
4	3				Speckled Mousebird	*Colius*	*striatus*
4					Red-faced Mousebird	*Urocolius*	*indicus*
3					Brown-hooded Kingfisher	*Halcyon*	*albiventris*
		1			Malachite Kingfisher	*Corythornis*	*cristata*
	1				Giant Kingfisher	*Megaceryle*	*maxima*
	2				Pied Kingfisher	*Ceryle*	*rudis*
6	2				Little Bee-eater	*Merops*	*pusillus*
6		2			White-eared Barbet	*Stactolaema*	*leucotis*
2					Yellow-rumped Tinkerbird	*Pogoniulus*	*bilineatus*
3					Red-fronted Tinkerbird	*Pogoniulus*	*pusillus*
++					Black-collared Barbet	*Lybius*	*torquatus*
2					Crested Barbet	*Trachyphonus*	*vaillantii*
1					Lesser Honeyguide	*Indicator*	*minor*
1					Golden-tailed Woodpecker	*Campethera*	*abingoni*
1					Cardinal Woodpecker	*Dendropicos*	*fuscescens*
4					Chinspot Batis	*Batis*	*molitor*
2					Gorgeous Bushshrike	*Telophorus*	*viridis*
1					Southern Fiscal	*Lanius*	*collaris*
				1	Black-headed Oriole	*Oriolus*	*larvatus*
1					Fork-tailed Drongo	*Dicrurus*	*adsimilis*
2					Rufous-naped Lark	*Mirafra*	*africana*
++	3	4		12	Dark-capped Bulbul	*Pycnonotus*	*tricolor*
10	2			2	Sombre Greenbul	*Andropadus*	*importunus*
11					Yellow-bellied Greenbul	*Chlorocichla*	*flaviventris*
	1			2	Brown-throated Martin	*Riparia*	*paludicola*
4					Wire-tailed Swallow	*Hirundo*	*smithii*
7				1	Lesser Striped Swallow	*Cecropis*	*abyssinica*
+++	7			18	Rattling Cisticola	*Cisticola*	*chiniana*
	1				Zitting Cisticola	*Cisticola*	*juncidis*
11	4			10	Tawny-flanked Prinia	*Prinia*	*subflava*

Table 4.1 Continued.

Site 1 - Rail Balloon				Site 2 - Berth 600 Series Extension	++= >20 +++ = >40 ++++ = >100		
Secondary Woodland & Scatterred Grassland	Beach, Intertidal & Mangroves	Freshwater Wetlands	Aerial	All Habitats	Common Name	Scientific Name	
15					Yellow-breasted Apalis	*Apalis*	*flavida*
4					Green-backed Camaroptera	*Camaroptera*	*brachyura*
+++				3	Cape White-eye	*Zosterops*	*capensis*
++++				2	Black-bellied Starling	*Notopholia*	*corruscus*
5					Red-capped Robin-Chat	*Cossypha*	*natalensis*
++	2				White-browed Scrub Robin	*Erythropygia*	*leucophrys*
1					Fiscal Flycatcher	*Sigelus*	*silens*
2					Collared Sunbird	*Hedydipna*	*collaris*
				2	Scarlet-chested Sunbird	*Chalcomitra*	*senegalensis*
13	++				Purple-banded Sunbird	*Cinnyris*	*bifasciatus*
				1	White-bellied Sunbird	*Cinnyris*	*talatala*
4	1	3			Thick-billed Weaver	*Amblyospiza*	*albifrons*
10		1			Spectacled Weaver	*Ploceus*	*ocularis*
1				7	Yellow Weaver	*Ploceus*	*subaureus*
5					African Golden Weaver	*Ploceus*	*xanthops*
+++					Southern Brown-throated Weaver	*Ploceus*	*xanthopterus*
				++	Village Weaver	*Ploceus*	*cucullatus*
18				17	Southern Red Bishop	*Euplectes*	*orix*
1	4				Fan-tailed Widowbird	*Euplectes*	*axillaris*
1	+++				Common Waxbill	*Estrilda*	*astrild*
6					Bronze Mannikin	*Lonchura*	*cucullata*
4					Pin-tailed Whydah	*Vidua*	*macroura*
	1				Cape Wagtail	*Motacilla*	*capensis*
1	2			1	African Pied Wagtail	*Motacilla*	*aguimp*
++	4			2	Yellow-fronted Canary	*Crithagra*	*mozambica*
2				2	Brimstone Canary	*Crithagra*	*sulphurata*
53	**34**	**6**	**4**	**25**	**Total Species Count = 84**		

4.1.4 Aerial

The utilization of the 'air space' above the study site by swifts and swallows was noted, this indicates that the habitats at the ground level are generating a food source. During the data collection phase three species of swift were recorded flying over the area with a maximum count of >100 individuals. In addition two species of swallow were present. They were allocated to the Secondary Woodland habitat as they were observed perching and considered to be potentially breeding in the area, they are however aerial feeders.

4.2 SITE C – BERTH 600 SERIES EXTENSION

The two site visits to this site revealed that the bulk of the Grassland and Scrub Woodland had been extensively damaged as a result of a fire that had recently swept through the area. This had totally burnt out all the land lying to the East of the main access road to the Coal Terminal. The road is clearly visible in the left half of Figure 2.3 heading in a North/South direction. The Mangroves in the area of the fire were unaffected and it was clear that the fire did not jump the road as the western side the Grasslands and Swamp Forest were unaffected.

A total of only 25 species were recorded within the Berth 600 Series Extension Site. Due to the low species diversity this section is not dealt with separately in terms of habitats. This low count was mainly due to the recent fire, extensive habitat disturbance in the area and the fact that water levels in the Swamp Forest were extremely low with most sections being entirely dry.

4.3 HABITAT DISTURBANCE AT SITE A – RAIL BALLOON AREA

Details of habitat disturbance are provided by Mostert (2014), the extent to which this has affected the bird fauna is unknown. However, given that 80 species were recorded during this brief once-off survey indicates that the fauna is well established and sustainable. The illegal driving of Quad Bikes in the Intertidal areas of the Mangroves and Sandflats as well as on the Beach is currently impacting on these habitats (Photos 1 to 4).

4.4 HABITAT DISTURBANCE AT SITE C – BERTH 600 SERIES EXTENSION AREA

Details of habitat disturbance are provided by Mostert (2014), the extent to which this has affected the bird fauna is unknown. Given that only 25 species were recorded during this brief once-off survey indicates that the fauna has been severely affected by habitat disturbance. However the impacts occurred many years ago and with the bulk of the area covered Secondary Scrub which has recently been burnt out it does not provide prime habitat for birds. The impact of the fire on the habitat can clearly be seen on Photos 5 & 6, the latter of which also shows that the Intertidal Mangroves were not impacted by the fire.

Figure 4.1 Giant Kingfisher on the lookout for fish in the Intertidal Mangroves at Site A.

Photo 1: Quad Bike damage to the Intertidal Mangrove Zone (Site A: Rail Balloon).

Photo 2: Quad Bike damage to the Intertidal Mangrove Zone (Site A: Rail Balloon).

Photo 3: Quad Bike damage to the Intertidal Beach Zone (Site A: Rail Balloon).

Photo 4: Quad Bike damage to the Intetidal Beach Zone (Site A: Rail Balloon).

Photo 5: Fire damage to the Secondary Scrub Zone (Site C: Berth 600 Series Extension).

Photo 6: Fire damage to the Secondary Scrub zone. Note: The Intertidal Mangroves were not affected by the fire (Site C: Berth 600 Series Extension).

Photo 7: Secondary Open Grassland West of the RBCT access road.

Photo 8: Exotic Scrub (foreground) and Swamp Forest (background) on the western edge of Site C.

5. DISCUSSION & CONCLUSIONS

5.1 SITE A – RAIL BALLOON AREA

5.1.1 Secondary Woodland (Habitat 1 on Figure 2.1)

Whist the species diversity and abundance is fairly high within this habitat, the habitat itself has been severely disturbed in the past and now consists effectively of Secondary Woodland interspersed with Grassland. Suitable habitat housing this avifaunal composition is fairly wide spread within the uMhlathuze City area and the loss of this in the Rail Balloon Area would not have any significant consequences.

5.1.2 Freshwater Wetlands (Habitat 2 on Figure 2.1)

It is unfortunate that this study was carried out when the Wetland was at its driest for many years as it is considered that it may have been found to hold an important species composition. The nearby Thulazihleka Pan which lies less than a kilometre away has been recorded as holding an extremely diverse wetland bird fauna. Of the 193 species recorded at the pan, 107 are water associated. This includes a number of Red Data Species (D.P.Cyrus *pers obs*). Regular counts of 79 water bird species were undertaken as part of the Coordinated Waterbird Counts (Taylor *et al.* 1999) and revealed a mean count of 1,941 individuals over 10 counts with a maximum count of 4,415 from one summer count. While Thulazihleka is some three to four times larger than the Wetland in the study area it's

avifauna does give some indication as to the diversity and density of species that may be present under normal rainfall conditions.

5.1.3 Intertidal Mangroves & Sandflats, Coastal Shoreline (Habitat 3 on Figure 2.1)

Only one Red Data species was recorded in this habitat, this was the Caspian Tern a species considered by Barnes (2000) to be Near-threatened. Whilst this limited once-off study has indicated that the bird fauna is limited, it should be noted that it was not possible to gain access to the interior of the Mangroves. Added to this, is the fact that this habitat is not known for its high species diversity or density. However it is an important habitat for particularly the Mangrove Kingfisher which is a winter visitor to the Mangrove stands on the Zululand Coastal Plain. This Red Data Species is listed as Vulnerable by Barnes (2000) and may well occur in the study area during the winter months.

Further indications of the importance of this habitat are clearly shown by the wader, tern and gull community that utilizes the area. Whilst this study was conducted as far into the summer as time constraints would allow it was clear from observations that the Palearctic waders had only just started to arrive in the area as those present were still showing some signs of breeding plumage. These birds moult into their winter plumage shortly after their arrival in southern Africa. In addition only one Common Tern was present in the area which at times supports 30 to 50 birds (D.P.Cyrus *pers obs.*), indicating that they had not yet arrived from the northern Hemisphere.

The loss of this habitat from a bird perspective would probably be significant given that intertidal areas within the harbour and the Mhlathuze Estuary have already been lost. In the former case it has been due to harbour development and in the latter due to Mangrove expansion resulting from the creation of the 'new' mouth for the Mhlathuze at the start of harbour development in 1976. This matter is discussed further in the Overall Findings and Assessment Report (Cyrus & Vivier 2014).

5.2 SITE C – BERTH 600 SERIES EXTENSION

It was found that the bird fauna in general was depauperate and the habitat severely disturbed, in the past and recently due to a fire.

The focus as per the brief was to investigate the bird fauna of the areas designated on Figure 1.2. However, the boundaries of this site only encompass the new quays and the

area to be dredged to a depth of -15.5m CD. It did not cover the area to the South of the channel indicated on Figure 5.1 (from AECOM 2014) also to be dredged to -15.5m CD or else to form the angled slope from the dredge channel to the shore. As can be seen on Figure 5.1, this activity, be it channel or channel slope will impact directly on the Sand Spit that forms the northern border of the Kabeljous Flats. Furthermore it did not include the area around the western end of the new quay that will presumably form part of the infrastructure of the new facility or the area to be affected by the re-routing of the access road from the entrance gate to the Coal Terminal at the Berth 300 Series which will be severed due to the westwards extension of the Berth 600 Series. An extension of the impact of the development further to the west than the boundary indicated for Area C on Figure 1.2 would have a far greater impact on Swamp Forest (Habitat 3 on Figure 2.3).

The exclusion of these areas from the study and particularly the area of the sand spit to be dredged raises a potential Red Flag from a bird point of view as it is known that this area is also used by waders, terns and gull as a feeding and roosting area. In addition the cutting of the Sand Spit could have serious repercussions for the ecological sustainability of the Kabeljous Flats. This matter is discussed further in the Overall Findings and Assessment Report (Cyrus & Vivier 2014).

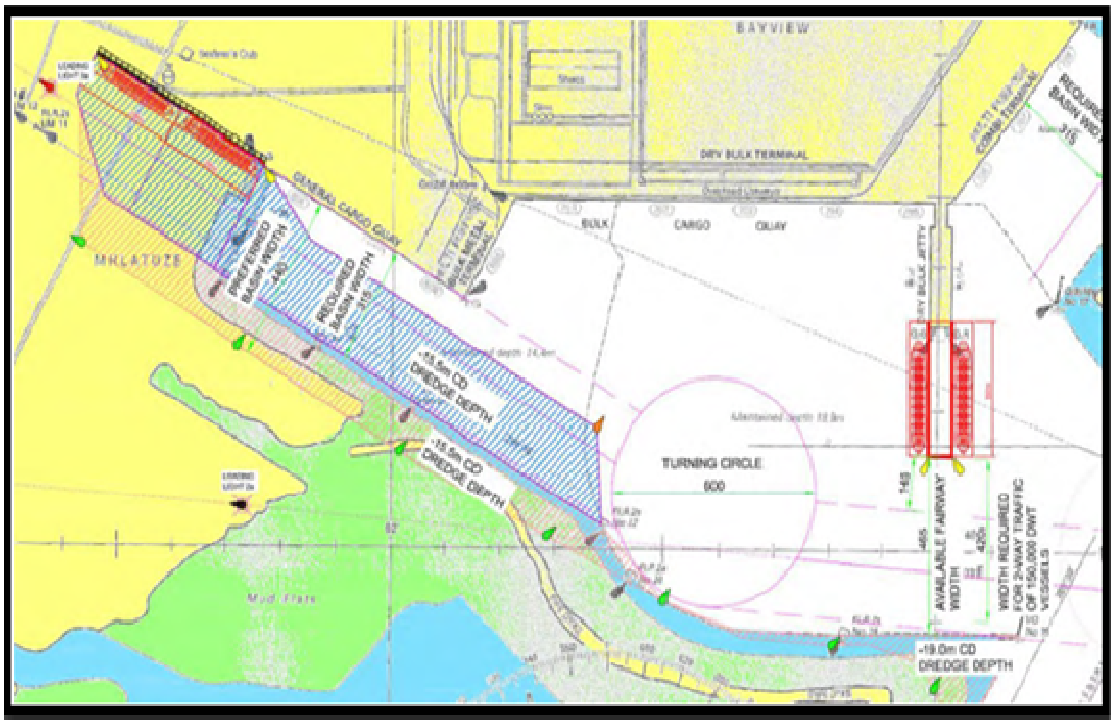

Figure 5.1 Layout of two new 600 Series Berths and two new 800 Series Berths, showing the channel and turning circle.

5.3 OVERALL CONCLUSIONS

In terms of the bird fauna present in the three broad based habitats identified in the Rail Balloon Area (Site A – Figure 2.1) it is concluded as follows;

1. Despite the Secondary Woodland habitat having a well-established bird fauna the loss of this area to development would have no major effects on the fauna of the greater uMhlathuze area.
2. Due to the current low water levels in the area no data of any substance was obtained from the Freshwater Wetland habitat. However this type of habitat is ecologically important and declining across KwaZulu-Natal. It is considered that the implementation of some form of Offset related to the nearby Thulazihleka Pan might be an option for the loss of this area to development.
3. The Intertidal Mangrove and Sandflats was the only area where Red Data were present or considered to potentially occur. The intertidal areas are of importance to waders, terns and gulls and the loss of this habitat could be of some significance from a bird perspective.

In terms of the bird fauna present in the Berth 600 Series Extension (Site C – Figure 2.1) it is concluded as follows;

1. The loss of the habitat within the designated area of Site C – Figure 2.1 would have no significant effect on the bird fauna of the greater uMhlathuze area.
2. Two Red Flags are raised in relation to the area surrounding the designated study site.
3. Red Flag 1: No assessment has been done on the potential impact of the development on the bird fauna associated with the Swamp Forest to the West of the designated site. However it is considered that infrastructure development and road re-routing will impact on the habitat.
4. Red Flag 2: No assessment has been done on the potential impact of the dredging required for the development on the bird fauna associated with the Sand Spit or the Kabejous Flats. The Final Scoping Report for the project (AECOM 2014) indicates that dredging associate with the extension of the Berth 600 Series Extension will impact on this area which is utilized by waders, terns and gulls.

The importance of Richards Bay Harbour as a functioning ecosystem has been highlighted on several occasions in the past (Cyrus & Forbes 1994 & 1996; Forbes et al. 1997) and more recently by Cyrus & Vivier (2009), Vivier & Cyrus (2009) and MER (2013). As a result

all the issues raised in this report are discussed in more detail and assessed, in conjunction with results from the other components investigated in this study, in the Overall Findings and Assessment Report for the project (Cyrus & Vivier 2014).

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ABRIDGED CURRICULUM VITAE

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Occupation:	Senior Academic & Estuarine Ecologist		
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Place of Birth:	Pretoria, South Africa - South African Citizen		

Qualifications & Courses:	**BSc** (Zoology, Entomology)	**1977**
	BSc Hons (Hydrobiology)	**1978**
	MSc (*cum laude)* (Estuarine Ecology)	**1980**
	PhD (Estuarine Ecology)	**1984**
	Integrated Environmental Management - Theory & Practice	**1991**
	Offshore Marine Pollution	**1997**
	ISO 14001 Environmental Management Systems	**1998**
	Public Participation in EIA's – Theory & Practice	**2002**
Awards	**Southern African Society of Aquatic Scientists – Gold Medal**	**2011**

Academic Experience: Thirty three years' experience lecturing a wide range of Zoology related subjects as well a supervising numerous MSc and PhD students.

Research Experience: Forty years covering Estuarine, River, near-shore Marine and Coastal Lake environments. Have participated in numerous contract research projects such as the determination of the Environmental Reserve for Coastal Lakes and Estuaries, the effects of intrabasin transfer schemes in the area, A Strategic Environmental Scan with reference to Biotic components of the Richards Bay area and Instream Flow Requirements for Rivers. Involved with Freshwater Flow Requirements for Estuaries. Was part of the Scientific team that formulated the biological requirements for the South African Resource Directed Measures Legislation to determine Flow Allocations for Environmental Purposes for Estuaries & Rivers and the monitoring thereof.

Specialisations: Estuarine, River and Coastal Lakes Ecology. Flow Allocations for Environmental Purposes for Estuaries and Rivers based on Biotic component requirements. Fish Specialist. Also specialist in ornithological issues related to association of birds with Estuaries, Rivers and Coastal Lakes.

Environmentally Related Activities:	Have been involved in over 130 research projects concerned with Environmental Impact Assessments on the ecology of nearshore marine, estuarine and freshwater systems and project leader/senior author on some 90 of these. Fields include specialist biological surveys, ecological assessments, biomonitoring, specialist review consulting, Estuarine Flow Requirements and numerous studies on impacts of developments on aquatic environments. Have been involved with Reserve determinations for the Mkomaas, Mhlathuze, St Lucia, Siyaya and Nhlabane Systems as well as with the revision of the estuarine RDM Protocols, Thukela Intermediate EFR study and development of Estuarine Base line and long term Monitoring Protocols for RDM of Estuaries. Assessment of the Environmental Impacts of the development of the Port of Richards Bay over the next 40 years.
Presentation of Research Findings:	**Publications:** 146 Scientific Journal Publications (124 on Estuaries) 142 Environmental Project Reports
	Conference Presentations: 76 National Conferences 67 International Conferences
Co-operative and Collaborative Research:	Current and past involvement with the Universities of Natal (Durban & Pietermaritzburg) and Port Elizabeth, the SA Institute for Aquatic Biochemistry, KZN Wildlife, World Wildlife Fund - Conservation Division, National Ports Authority, Mondi Forests, Sappi Stanger Environmental Liaison Committee, CSIR, Institute for Natural Resources, Oceanographic Research Institute as well as three overseas based projects (University of Hull, UK & CSIRO, Australia).
Membership of Scientific Societies:	Southern African Society of Aquatic Scientists (SASAqS), Estuarine and Coastal Shelf Sciences Society (ECSA), Consortium for Estuarine Research and Management (CERM), Zoological Society of South Africa & Ornithological Society of South Africa (Bird Life SA).

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