



**A preliminary Ecological Impact Assessment of the impacts of a proposed 40-villa hotel and ancillary developments on the bird fauna of Assomption Island, Seychelles**

<b>Date of report</b>	March 2024 (FINAL)
<b>Date of surveys</b>	6 - 9 February 2024
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## Summary

This report was commissioned to provide a preliminary assessment of the potential impacts of a 40-villa hotel and ancillary development on the bird fauna of Assomption Island, Seychelles. Recommendations for avoidance and mitigation of predicted impacts have been identified along with opportunities for enhancement to deliver a net benefit to biodiversity over and above requirements for avoidance, mitigation or compensation. Additional survey requirements to more accurately predict the impacts of the proposed development have also been recommended.

Time on Assomption was limited to 2.5 days of which 2 days were available for fieldwork. A 'look-see' methodology was used to document the bird species recorded and to gain an impression of the distribution and habitat preferences of the species present. This was combined with data from an island-wide survey of breeding landbirds carried out in 2012, a 2023 vegetation map of the island and the experience of other observers with fieldwork experience on Assomption to carry out a preliminary assessment of the potential impacts of the hotel development on the bird fauna of Assomption.

During the construction phase, without avoidance or mitigation, a Moderate - Major Adverse Impact was predicted for Souimanga sunbird and Major Adverse impacts for Malagasy white-eye and the breeding seabird assemblage. The main potential impacts were identified as habitat destruction, disturbance during construction and the accidental introduction of invasive non-native species. With avoidance and mitigation, construction impacts could be reduced to Minor Adverse - Negligible for Souimanga sunbird and Malagasy white-eye and to Negligible for the breeding seabird assemblage.

During the operational phase, without avoidance or mitigation, Moderate - Major Adverse Impacts were predicted for all target features. The main impacts were identified as indiscriminate use of pesticides, human disturbance and the (re)introduction of invasive non-native species. With avoidance and mitigation, these impacts could be reduced to Negligible and if investment was made in using native species for landscaping around the villas and other buildings, a Moderate Positive Impact is predicted for Souimanga sunbird and Malagasy white-eye.

There are significant opportunities for biodiversity enhancement through large-scale habitat restoration and the eradication of invasive mammalian predators. This would pave the way for the recolonisation of a substantial seabird population on Assomption as well as the re-introduction through translocation of a number of endemic species and subspecies currently found only on Aldabra but highly likely to have occurred on Assomption historically. This could result in a Major Positive impact on the bird fauna of Assomption.

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## 1. Introduction

- 1.1 This report has been compiled by Rob Lucking BSc, CIEEM, an experienced ecologist and ornithologist with a particular interest in the birds of the Seychelles. The author has considerable experience of the Seychelles avifauna having worked in the islands for extended periods of time over his career.
- 1.2 The assessment was commissioned by the Island Conservation Society Seychelles as part of the scoping exercise for an Environmental Impact Assessment (EIA) of a proposed hotel development on Assomption Island. ICS Seychelles is the consultant undertaking the EIA on behalf of International Design Consultant Corporation (IDCC), the proponents of the development.
- 1.3 The purpose of the report is to provide an overview of the avifauna of Assomption Island, make a preliminary assessment of the likely impacts of the proposed development of a 40 villa hotel plus ancillaries, suggest suitable avoidance & mitigation measures and recommend any further survey work required to fully assess the impacts of the development on the island's avifauna.
- 1.4 In addition, some suggestions are made on how the development could be used to deliver a net gain to the island's avian biodiversity through habitat restoration, removal of non-native species and potential species reintroductions.

## 2. Relevant Legislation & Designations

- 2.1 This report has been produced to help with the scoping of the Environmental Impact Assessment for the proposed hotel development on Assomption.
- 2.2 The relevant planning legislation in Seychelles is the Town and Country Planning Act 1972 and the Environment Protection (Impact Assessment) Regulations 1996. Hotel developments fall within the scope of the 1996 Regulations and require an environmental impact assessment to be carried out.
- 2.3 Assomption does not have any statutory protection under Seychelles environmental legislation. Nor has it been identified as an Endemic Bird Area (EBA) by BirdLife International or a Seychelles Important Bird Area (IBA).
- 2.4 Assomption is within the candidate Aldabra Atoll/Cosmoldeo Atoll Marine IBA on the basis of its globally important populations of red-tailed tropicbird *Phaethon rubricauda*, white-tailed tropicbird *Phaethon lepturus*, great frigatebird *Fregata minor* and lesser frigatebird *Fregata ariel* (viewed on <https://maps.birdlife.org/marineibas/> on 14 February 2024).
- 2.5 Assomption is within Zone 1 (High Biodiversity Protection Zone) of the Seychelles Marine Spatial Plan. Whilst the management regulations for Zone 1 are still in draft form, the objective for Zone 1 is 'To allocate 15% of the EEZ and Territorial Sea for high marine conservation and biodiversity goals, for representative habitats and species' (Seychelles Marine Spatial Plan, 12 October 2017, version 4.0, accessed 9 March 2024)

## 3. Methods

- 3.1 Existing published information on the bird fauna of Assomption was reviewed. This is summarised in section 4 below.
- 3.2 RL visited Assomption for 2.5 days in February 2024 arriving at midday on 6 February and departing at 09h00 on 9 February. The availability of flights to and from Assomption dictated the amount of time spent on the island.

- 3.3 Insufficient time was available for a systematic bird survey of the island and so a simple 'look-see' methodology was adopted where as much as the island as feasible was visited on foot and all bird species recorded were noted along with any subjective impressions on abundance and distribution. Particular focus was given to areas of the island identified in the Assomption Master Plan for built development ie villas, restaurants, leisure facilities and back of house.
- 3.4 Effort was made to map the distribution of the newly (re)colonised Malagasy white-eye and estimate the number of territories present. As the white-eyes only sang at dawn and in the late afternoon, survey effort was focussed on these times. GPS co-ordinates (WGS84) were taken at each location birds were recorded singing and plotted to estimate a minimum number of territories.
4. Desk Study
- 4.1 The published information on the avifauna of Assomption has been reviewed and is summarised below.
- 4.2 Assomption Island is ca. 1170ha in size and lies 1140km to the SW of Mahe, the capital island of the Seychelles. Aldabra Atoll World Heritage Site is ca 30km to the NW. Geographically, Assomption is closer to Madagascar than it is to the granitic Seychelles islands and its avifauna, both past and present, is more closely related to the Malagasy region than elsewhere in the Seychelles.
- 4.3 The natural vegetation of Assomption has been heavily modified since the extraction of guano from the early 1900s until around 1970 (Stoddart *et al* 1970) and along with the introduction of non-native predatory mammals (rats *Rattus* spp. house mice *Mus musculus* and domestic cats *Felis catus*) and human persecution, significant changes have occurred to the island's bird fauna.
- 4.4 Historical information on Assomption's bird fauna prior to the commencement of guano extraction is scarce. The most comprehensive is Ridgway's account of an extended collecting trip carried out by Dr W L Abbott to the Aldabra group of islands (including Assomption), the Amirantes, Ile Glorieuse and other islands NW of Madagascar between July 1892 and January 1893 (Ridgway 1895). The account is limited in so far as Abbott tended to only record the specimens he collected and provided little information on their abundance, distribution or ecology.
- 4.5 Abbott mentions three species of booby on the island - red-footed booby *Sula sula*, masked booby *Sula dactylatra* and also collected the type specimen of Abbott's booby *Papasula abbotti*. Little is documented on the distribution of the three booby species other than 'a few' masked booby nested on Assomption 'laying a single egg on bare ground in sand dunes' and of Abbott's booby only that 'a few breed on Assomption' and that they weren't found on any other island in the region. It is likely that the red-footed booby was the most abundant of the three species nesting in *Pemphis* scrub habitats on the island. The breeding assemblage of boobies on Assomption was likely the main source of the valuable guano deposits. The only other seabirds mentioned by Abbott are lesser frigatebird, white tern *Gygis alba* and red-tailed tropicbird, the latter noted as breeding 'on the ground in dense thickets or under a bush'.
- 4.6 Abbott also collected the white-throated rail *Dryolimnas cuvieri* which he described as an endemic species based on plumage and biometric differences from those found on Aldabra. He also recorded Malagasy turtle dove *Streptopelia picturata*, Malagasy coucal *Centropus toulou* which was described as an endemic subspecies *assumptionis*, Souimanga sunbird *Nectarinia souimanga* (also named *Cinnyris sovimanga* by some authorities), also an endemic subspecies *abbotti* and pied crow *Corvus albus*.

- 4.7 Abbott's visit was pre-dated by that of an F. Rivers in 1878 who whilst not a bird specialist also recorded a 'merle' (bulbul) and a 'cardinal' (fody). These are assumed to have been the Malagasy bulbul *Hypsipites madagascariensis* and Aldabra fody *Foudia aldabrana* (Prys-Jones et al 1981). Other species that are now largely confined to Aldabra but have been recorded previously on Assomption include Malagasy kestrel *Falco newtoni* recorded in 1977 (Prys-Jones et al 1981) and Comoros Blue Pigeon *Alectroenas sganzini* recorded by Chris Feare in 2011 (pers. comm).
- 4.8 Most bird species that formerly nested on Assomption appear to have disappeared rapidly following human settlement and the commencement of guano extraction. Red-footed and masked boobies were found to be still nesting in 1906 (Nicoll 1906) with masked boobies persisting in small numbers until 1937 (Vesey-Fitzgerald 1941). Dimorphic egret became extinct by 1906 (Nicoll 1909). White-throated rail was still found to be abundant in 1906 but had disappeared by 1937. An estimated population of 15-20 pied crows were present in 1978 (Prys-Jones et al 1981) but the population may fluctuate naturally due to food availability, and they have also been persecuted on the island in the past.
- 4.9 White-tailed tropicbird was first recorded breeding on Assomption in 1977 when an adult with a small chick was found at the northern end of the island. In 1978, another adult was seen entering a potential nest site in cliffs on the south-west coast (Prys-Jones et al 1981). More recently white-tailed tropicbird nest was found in 2023 [WHERE] (Greg Berke pers. comm.). Fairy terns were recorded potentially breeding on crevices in solution holes in 1977 (Prys-Jones et al 1981) and in 2011 (Chris Feare pers. comm.)
- 4.10 By the late 1970s, a number of non-native species had been introduced onto Assomption - red-whiskered bulbul *Pycnonotus jocosus*, barred ground doves *Geopelia striata*, Madagascar fody *Foudia madagascariensis* and yellow-fronted serin *Serinus mozambicus* (Prys-Jones et al 1981). Bared ground doves and yellow-fronted series appear to have died out naturally and none were recorded in 2011 (Feare & Fries-Linnebjerg 2012). Madagascar fodies and red-whiskered bulbuls however established successfully and were finally eradicated by 2015 due to the threat posed to the endemic land birds of Aldabra (transmission of novel diseases, hybridisation and food competition) should these introduced species colonise Aldabra from Assomption.
- 4.11 As part of the preparation work carried for the eradication programme, the first systematic census of the endemic race of Souimanga sunbird was carried out on Assomption in 2011. An estimated 15,000 Souimanga sunbirds were estimated to be present on the island. They were found to be widely distributed across the island and particularly numerous in the lee of the sand dunes on the south-east coast and in the woodland and dune vegetation dominated by *Thespesia populnoides*, *Scaevola sericea* and *Tournefortia argentia* along the west coast of the island (Feare & Fries-Linnebjerg 2012). No island-wide survey of Souimanga sunbird has been carried out following the eradication of red-whiskered bulbul and Madagascar fody but the population is thought to have increased (Mahoune 2016).
- 4.12 The Souimanga sunbird is represented on Assomption by the endemic subspecies *Nectarinia souimanga abotti*. It has been suggested that Assomption birds are a species in their own right based on plumage characteristics but molecular analysis does not currently support this (Cheke & Mann 2020).
- 4.13 The first records of the Malagasy white-eye *Zosterops maderaspanatus* for Assomption were documented in January 2020 (Gouraud et al 2023). The species was not recorded in 2011 by Feare & Fries-Linnebjerg (2012) nor by the SIF eradication team operating on the island between 2012 and 2016. It is suspected that this is a natural (re)colonisation from Aldabra with the first colonists arriving between October 2016 (the date of the last eradication programme follow-up visit by SIF) and January 2020. It is also assumed that the Assomption birds are of the subspecies *Z. m. aldabrensis* given the proximity of Assomption to Aldabra but molecular testing is required to confirm this theory.

- 4.14 It is considered likely that many of the landbirds that are now found only on Aldabra were previously present on Assomption and have the potential to naturally recolonise if habitat conditions were suitable. White-throated rail is an obvious exception being flightless.
- 4.15 Similarly, Aldabra which lies just 30km to the north-west of Assomption still holds significant populations of breeding red-footed boobies, red-tailed and white-tailed tropicbirds, greater and lesser frigatebirds and tropical shearwaters *Puffinus bailloni* which again could naturally recolonise Assomption.
5. Field Surveys
- 5.1 The field survey timetable is presented in Table 1.
- 5.2 All surveys were carried out in suitable weather conditions. The weather was sunny, hot (ca. 34 degrees C) and humid throughout with a light NW breeze. There was a light shower on the morning of 7 February 2024, otherwise no rain was recorded.
- 5.3 White-eye surveys were focussed on dawn and dusk when birds were more active. No survey work was carried out during the hottest period of the day between 12h00 and 15h00 when bird activity was least.

Table 1: Fieldwork timetable

Date	Dawn	AM	PM
06 February 2024		Flight to Assomption	Vehicle tour of key development sites with developer representatives & key consultees
07 February 2024	Familiarisation with songs of Malagasy white-eye and Souimanga sunbird.	Surveyed Casuarina forest at northern tip of island and walked south along west coast through proposed villa development sites.	Malagasy white-eye surveys from settlement south- west to location of proposed Chinese restaurant in SW of island.  Opportunistic measurements of giant tortoises.
08 February 2024	Malagasy white-eye surveys from settlement along track to runway	Walk from dunes at south-east end of runway along east coast to inland sinkhole mangrove then west via proposed organic restaurant to west coast	Malagasy white-eye surveys from settlement north along west coast.  Opportunistic measurements of giant tortoises.
09 February 2024	Malagasy white-eye surveys & photography around settlement.	Flight to Mahe	

## 6. Constraints

- 6.1 The biggest constraint to the surveys carried out was the lack of time to carry out a systematic survey of bird distribution on the island. Fortunately comprehensive landbird surveys had been carried out in 2011 to inform the project to eradicate red-whiskered bulbul and Madagascar fody and so there is a relatively recent estimate of Souimanga sunbird population size and distribution.

## 7. Results

### *Souimanga sunbird*

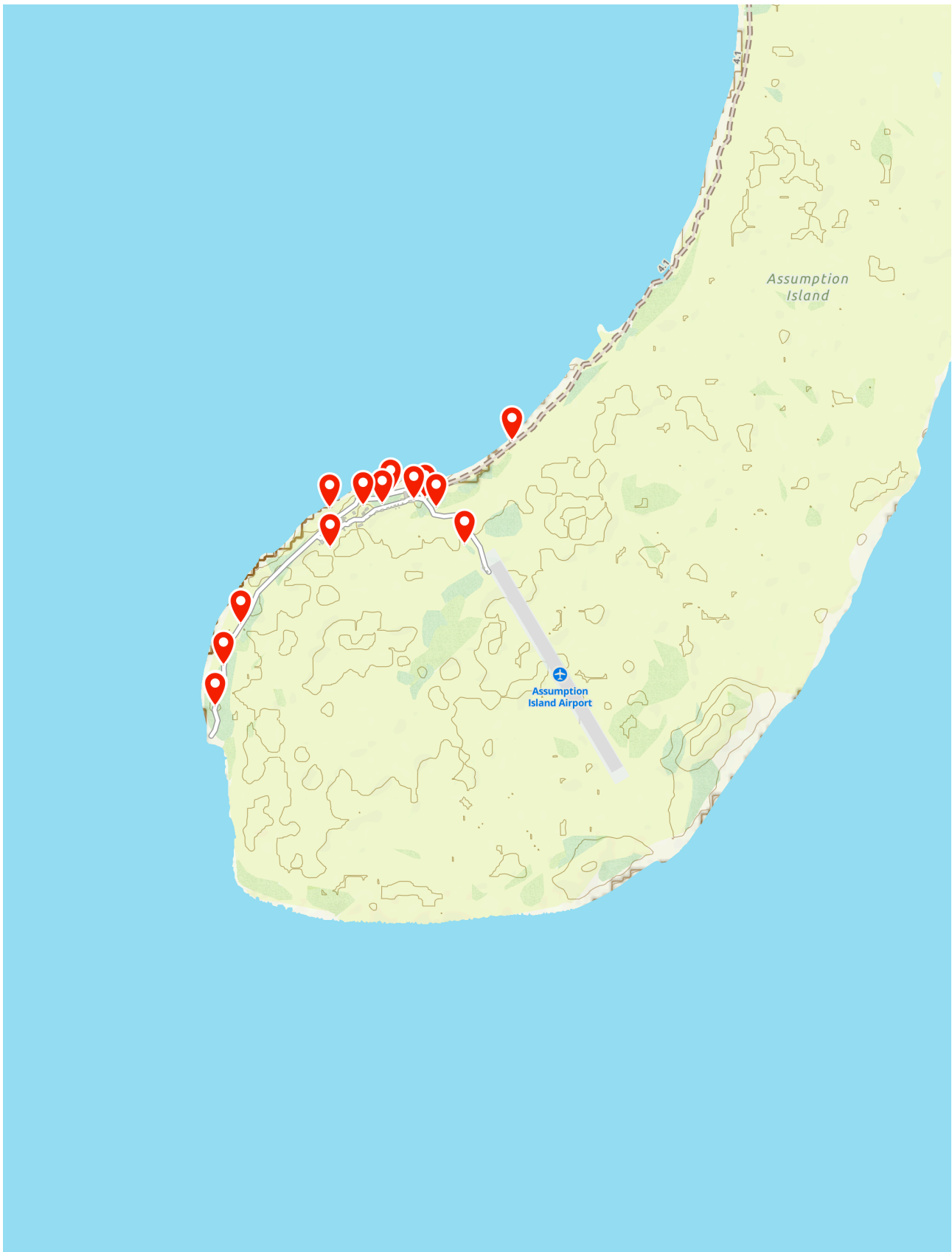
- 7.1 Souimanga sunbird was the commonest and most widespread of the passerine bird species recorded on Assomption. Subjective impressions from visiting all the major habitats present on the island were that whilst sunbirds were recorded across the island, they were most numerous in the dwarf forest habitats along the western coast of the island, in the lee (west-facing) slopes of the dunes in the south-east of the island and in the planted and ornamental trees and shrubs planted in and around the settlement area. They were also recorded in *Scaevola* shrubs along the beachcrest, one of the few plants flowering at the time of the visit.
- 7.2 Few sunbirds were recorded in the coastal turf meadows prevalent behind the pioneer dunes along the east coast and in the north of the island. These areas held very sparse shrub cover and were largely unsuitable for sunbirds.
- 7.3 The dominant habitat type in the middle of the island was inland mixed scrub, punctuated by clumps of *Ficus lutea* growing out of solution holes in the karst substrate. Sunbirds were recorded throughout these habitats but at an apparent lower density than in the more forested habitats.
- 7.4 Many fledged young were noted and at least two active nests were recorded in the settlement. Nests have also been recorded in the root systems of *Ficus lutea* and *Plumbago aphyllum* trees growing within solution holes (Feare & Fries-Linnebjerg 2012).

### *Malagasy white-eye*

- 7.5 This species appears to be establishing itself on Assomption naturally since the first birds arrived on the island somewhere between 2016 and 2020. There are no confirmed historical records of white-eyes on Assomption and so it is not known whether this is a recolonisation or a first colonisation. Given white-eyes as a family are extremely good colonists, it would be surprising if they weren't historically present on Assomption. It is possible that the presence of the introduced red-whiskered bulbul, a known nest predator, has inhibited the recolonisation of Assomption by Malagasy white-eyes in the past.
- 7.6 The first Malagasy white-eyes recorded on Assomption were in the vicinity of the settlement and close to the airstrip and this area remains the stronghold of the species on Assomption.
- 7.7 On Assomption, territorial Malagasy white-eyes appear to be strongly associated with planted *Casuarina* trees which are used as song posts and for foraging. Most of the white-eyes observed on Assomption were foraging high in the branches at heights of 4m+. Only occasionally were they recorded lower down in *Scaevola*, *Pemphis* and on one occasion Frangipani *Plumeria obtusa*. These observations are consistent with observations made on Aldabra (Frith 1979).
- 7.8 The current range of Malagasy white-eye is presented in Figure 1 and a minimum of 16 territories were recorded. It is assumed that the breeding season on Assomption is the same as on Aldabra - mid-September to

March (Safford 2013) - and that singing birds were still defending territories at the time of the survey. Aggressive encounters were recorded on Assumption in February 2024 suggesting that territories were being defended.

Figure 1: Territory distribution and range of Malagasy white-eye on Assumption, Feb 2024



- 7.9 During the dry season, small groups of up to fifteen white-eyes have been recorded on Assomption (Greg Berke pers. comm.) suggesting that during the non-breeding season, white-eyes become less territorial and feed in small flocks. Flocking behaviour has also been recorded on Aldabra but throughout the year.
- 7.10 It is estimated that the total population of Malagasy white-eyes on Assomption is in the order of 50 - 100 individuals.

#### *Other bird species*

- 7.11 A comprehensive list of other bird species recorded on Assomption between 6 - 9 February 2024 is presented in Appendix A. The most significant are detailed below:
- 7.12 Fairy tern. Although common and widespread across the Seychelles, fairy tern is one of the few remaining species of seabird breeding on Assomption. They have been recorded previously nesting on ledges within solution holes on the island but a maximum of 42 were recorded in Casuarinas on the northern tip of the island where they are thought also to be breeding.
- 7.13 Red-footed booby. The commonest seabird with large numbers seen offshore and small groups flying over Assomption. This species formerly nested on Assomption but became extinct during the period of time when guano was extracted, presumably due to a combination of habitat loss, human consumption & persecution and predation by introduced mammalian predators. An estimated 9,000 - 11,000 pairs nest on Aldabra 30km to north west of Assomption and could potentially recolonise Assomption if suitable conditions could be restored.
- 7.14 Madagascar pond-heron. A single Madagascar pond-heron was recorded to the west of the Settlement where it was apparently utilising seasonal fresh water ponds in the karst. Madagascar pond heron breeds in small numbers on Aldabra where it nests communally with cattle egrets and dimorphic egrets on Ile aux Aigrettes (Skerrett et al 2001).
- 7.15 Green-backed heron. This is the only heron species confirmed to be breeding on Assomption with nests found in vegetation within the many solution holes on the island. On other islands it is typically a coastal species but on Assomption it is also widely distributed across the island where it was recorded feeding on Orthoptera in inland scrub habitats.
- 7.16 Pied crow. A single adult bird was recorded on several occasions in the Settlement area. Pied crow is widespread across sub-saharan Africa and Madagascar but is only present in Seychelles on Aldabra and the associated islands of Cosmoledo, Assomption and Astove (Skerrett *et al* 2001). Pied crow has allegedly been controlled on Assomption in the past to protect green turtle hatchlings and consequently there is no longer a functional population on Assomption. Pied crows are very capable of making the short sea crossing from Aldabra and may well recolonise in the future in the absence of persecution.

#### 8. Assessment Methodology

- 8.1 The approach to ecological assessment follows the approach described by the Chartered Institute of Ecology and Environmental Management (CIEEM) in their publication *Guidelines for Ecological Impact Assessment in the UK and Ireland* (2018). Whilst the guidelines were produced for use in the UK, the general principles apply for ecological assessment anywhere in the world and have been adapted here for use on Assomption.

8.2 The approach to the assessment of impacts on flora and fauna can be summarised as follows:

- Identification of the Resource (Baseline Conditions)
- Evaluation of the Resource
- Identification of Impact Types
- Assessment of Impact Magnitude
- Assessment of Impact Significance on the Resource

Avoidance	Seek options that avoid harm to ecological features (for example, by locating on an alternative site)
Mitigation	Negative effects should be avoided or minimised through mitigation measures, either through the design of the project or subsequent measures that can be guaranteed – for example, through a legal agreement.
Compensation	Where there are significant residual negative ecological effects despite the mitigation proposed, these should be offset by appropriate compensatory measures.
Enhancement	Seek to provide net benefits for biodiversity over and above requirements for avoidance, mitigation or compensation.

8.3 The principles of the mitigation hierarchy have been used to underpin this provisional assessment of impacts of the proposed development on the bird fauna of Assomption. These are as follows:

8.4 The value of the avian features of Assomption have been assessed against the criteria set out in Table 2.

Table 2: Valuation Criteria

Value	Examples of Valuation Criteria
International	<ul style="list-style-type: none"> <li>• World Heritage Sites, Biosphere Reserves, Wetlands of International Importance (Ramsar Sites)</li> <li>• A site identified as an Endemic Bird Area or Marine IBA by BirdLife International</li> <li>• Bird species that are qualifying features of an Endemic Bird Area, or Marine IBA</li> <li>• Unique habitats or geological formations</li> </ul>
National	<ul style="list-style-type: none"> <li>• A site designated as a Protected Area under Seychelles legislation.</li> <li>• A site identified as an Important Bird Area in Seychelles by Rocamora &amp; Skerrett (2001)</li> <li>• Sites supporting nationally important habitats or populations of species eg qualifying species of a Seychelles Important Bird Area, endemic sub-species or assemblages of breeding seabirds</li> </ul>
Local	<ul style="list-style-type: none"> <li>• Populations of species or areas of habitat that are important within an island context</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>• Sites or areas which support few or no habitats, communities or species populations of nature conservation interest.</li> </ul>

8.5 Impacts are quantified where possible and the change from baseline conditions assessed as being either adverse or beneficial. The significance of all impacts identified are evaluated as 'major', 'moderate', 'minor' or 'negligible'. These terms are defined as follows:

Table 3: Definition of impact significance

Significance of Impact	Definition
Major Adverse	<ul style="list-style-type: none"> <li>Impact is large scale giving rise to substantial concern.</li> <li>The change is likely to cause a permanent adverse effect on the receptor.</li> <li>It may be considered unacceptable</li> </ul>
Moderate Adverse	<ul style="list-style-type: none"> <li>The impact gives rise to some concern but is likely to be tolerable in the short-term. In some cases it may warrant further investigation</li> </ul>
Minor Adverse	<ul style="list-style-type: none"> <li>The impact is small and of little concern, being undesirable but acceptable</li> </ul>
Negligible	<ul style="list-style-type: none"> <li>The impact is sufficiently small as to be indeterminable</li> </ul>
Minor Positive	<ul style="list-style-type: none"> <li>The impact is sufficiently small and of slight significance providing some benefit to the environment</li> </ul>
Moderate Positive	<ul style="list-style-type: none"> <li>The impact provides a positive environmental gain</li> </ul>
Major Positive	<ul style="list-style-type: none"> <li>The benefit is large scale providing a significant positive environmental gain</li> <li>The change is likely to cause a permanent beneficial effect on the receptor.</li> </ul>

8.6 Effects may be either permanent or temporary. The following terms are used to describe the timescale of temporary effects in the context of impacts on ecological receptors:

Short-term:	<12 months
Medium-term:	1-5 years
Long-term:	>5 years

8.7 Where potential adverse impacts have been identified, opportunities to mitigate this impacts have been identified.

8.8 In addition, avoidance measures have been identified to avoid adverse impacts (for example, redesign/ relocation of the development layout and timing of works).

8.9 Compensation can also be provided where mitigation is unsuitable. Compensatory measures are those that would redress but not remove residual harm within the development site. These are often outside the boundaries of the development site and consist of habitat re-creation or restoration / management, to compensate for that habitat being lost.

9 Preliminary Assessment of the impacts of the proposed hotel development on the bird fauna of Assomption and suggested mitigation.

*Current ecological value of avian features*

- 9.1 Despite the depleted nature of the current bird fauna of Assomption compared to that which was likely present on the island prior to guano extraction, what remains is still of importance.
- 9.2 The Souimanga sunbird, whilst common on the island and throughout its range, is represented on Assomption by an endemic subspecies found nowhere else in the world. Levels of genetic distinctiveness between subspecies on islands are greater than those between continental subspecies (Phillimore & Owens 2006) and due to their isolation, island populations diverge faster than their continental counterparts. Endemic subspecies on islands therefore have the potential to become endemic species in the future. This is of intrinsic ecological value in its own right and therefore the population of Souimanga sunbirds on Assomption is assessed as being of **National Importance**.
- 9.3 The population of Malagasy white-eye on Assomption has only become established between 2016 and 2020 and is therefore still in the early stages of colonisation. It is assumed that due to the proximity of Assomption to Aldabra that the source population is from Aldabra and is of the subspecies *aldabransis* but this would require molecular determination. The current range of Malagasy white-eye is small and the population size is estimated to be between 50 and 100 individuals. The embryonic population is therefore potentially vulnerable to stochastic impacts (eg adverse weather), biological impacts (eg disease or the introduction of non-native species) or development-led impacts (eg habitat destruction) prior to a viable population becoming established. Given that there is a large population of Malagasy white-eye on Aldabra, the population on Assomption is assessed as being of **Local Importance**.
- 9.4 Other than the two populations of land birds, the remainder of the breeding bird fauna on Assomption is confined to a small population of white-tailed tropicbird (not recorded on this visit), fairy tern and green-backed heron. Both are common and widespread species within the Aldabra group and throughout the outer islands, however as these are presumed to be the only other breeding landbirds on Assomption, their populations are assessed as being of **Local Importance**.

*Assessment of the impacts of the proposed hotel development on avian features*

- 9.5 The proposed development is for the construction of forty villas and a private residence, three restaurants, stables, a resort village and a cinema along the western coast of Assomption. A fourth restaurant is proposed in the centre of the island at its highest point and staff accommodation/back of house facilities will be located on the east coast of the island to the north of the runway. A 'wellness centre' is proposed on the inland side of the sand dune complex at the eastern end of the airstrip.
- 9.6 As a separate project, the airstrip is currently being extended and strengthened in order to receive private jets. An EIA for this project has not been carried out however the cumulative impacts of the runway development, especially on the important plant communities found in the dunes, should be included within the EIA for the wider project.

9.7 The key potential impacts of the proposed hotel development upon the bird fauna of Assomption are identified below and summarised in Table 4:

Table 4: Summary of impacts of proposed hotel development on the bird fauna of Assomption Island

Feature & Importance	Impacts	Characterisation of unmitigated impact on the feature	Effect without mitigation	Timescale Short-term Medium-term Long-term	Mitigation	Significance of effects of residual impact after mitigation	Opportunity for enhancement
Construction Impacts - site clearance & construction							
Souimanga sunbird  <b>National Importance</b>	Direct habitat loss	Loss of a key habitat through the clearance of dwarf coastal forest for villas and associated landscaping. Possible reduction in population size.	<b>Moderate Adverse</b>	Long-term	Option 1. Move villas and associated landscaping inland onto less valuable habitat for Souimanga sunbird.  Option 2. Reduce the number of villas and associated land-take.  Option 3. Planting schemes around and between villas to use native tree species that are known to be favoured by Souimanga sunbirds.  Option 4. Avoid any development on the sand dunes that could negatively impact important dune dwarf forest habitats.	<b>Minor Adverse</b>  <b>Minor Adverse</b>  <b>Minor Adverse/ Negligible</b> (if combined with Options 1 and/or 2)  <b>Negligible</b>	Restoration of areas of degraded dwarf coastal forest could result in a <b>Moderate Positive</b> impact.
	Disturbance	Physical disturbance of nesting birds during construction	<b>Minor Adverse</b>	Medium-term	Option 1. Avoid construction during the core breeding season, although this might not be a feasible option and lead to a longer period of disturbance overall.  Option 2. Clearly demarcate and fence-off construction sites to avoid unnecessary disturbance to habitats outside development envelope.	<b>Minor Adverse/ Negligible</b>  <b>Minor Adverse/ Negligible</b>	

	Introduction of Invasive Non-native Species eg yellow crazy ant with construction materials	Direct predation of young birds & fledglings leading to a possible reduction in population size.	<b>Moderate to Major Adverse</b>	Long-term	Implement thorough biosecurity measures on all craft bringing construction materials and construction staff to island.	<b>Negligible</b>	Eradication of existing Invasive Non-native Species from the island (eg house mice, black rats, brown rats)
Malagasy white-eye  <b>Local Importance</b>	Direct habitat loss	Loss of habitat through the construction of the resort village, plant compound, stables, restaurants & cinema within the white-eye core range. Possible reduction in population size compromising successful colonisation.	<b>Major Adverse</b>	Long-term	Option 1. Relocate resort village, plant compound, stables, restaurant & villa away from the core range of Malagasy white-eye  Option2. Ensure that <i>Casuarina</i> trees within the core range are protected	<b>Negligible</b>  <b>Negligible</b>	Restoration of areas of degraded dwarf coastal forest could result in a <b>Moderate Positive</b> impact.
Malagasy white-eye  <b>Local Importance</b>	Introduction of Invasive Non-native Species eg yellow crazy ant with construction materials	Direct predation of young birds & fledglings could lead to a possible reduction in population size, potentially extinction if predation losses impact recolonisation process	<b>Major Adverse</b>	Long-term	Option 1. Implement thorough biosecurity measures on all craft bringing construction materials and construction staff to island.	<b>Negligible</b>	Eradication of existing Invasive Non-native Species from the island (eg house mice, black rats, brown rats)
Breeding seabird assemblage  <b>Local Importance</b>	Direct habitat loss	Loss of only nesting habitat in north end of island could reduce fairy tern population significantly.	<b>Major Adverse</b>	Long-term	Ensure <i>Casuarina</i> woodland on northern tip of island is protected.	<b>Negligible</b>	Eradication of existing Invasive Non-native Species from the island (eg house mice, black rats, brown rats) could bring about a <b>Major Positive</b> effect.
Operational Impacts							
Souimanga sunbird  <b>National Importance</b>	Widespread use of insecticides to suppress populations of biting insects	Potential loss of invertebrate prey leading to food scarcity and potential additional mortality of adults & young	<b>Moderate to Major Adverse</b>	Long-term	Option1. Minimise use of insecticides to immediate environment of villas, restaurants & staff accommodation.  Option 2. Use physical barriers (eg mesh) to prevent biting insects entering buildings	<b>Minor Adverse</b>  <b>Negligible</b>	

	Introduction of Invasive Non-native Species eg yellow crazy ant with hotel supplies & guests.	Direct predation of young birds & fledglings leading to a possible reduction in population size.	<b>Moderate to Major Adverse</b>	Long-term	Option 1. Implement a thorough biosecurity protocol at both embarkation and disembarkation points to minimise chance of INNS being transported to the island.	<b>Negligible</b>	
Malagasy white-eye  <b>Local Importance</b>	Widespread use of insecticides to suppress populations of biting insects	Potential loss of invertebrate prey leading to food scarcity and potential additional mortality of adults & young	<b>Moderate to Major Adverse</b>	Long-term	Option 1. Minimise use of insecticides to immediate environment of villas, restaurants & staff accommodation.  Option 2. Use physical barriers (eg mesh) to prevent biting insects entering buildings  Option 3. Use non-toxic insect repellents/ electronic insect killers.  Option 4. Implement preventative control measures eg reduce sources of standing water near hotel infrastructure that could be colonised by mosquito larvae	<b>Minor Adverse</b>  <b>Negligible</b>  <b>Negligible</b>  <b>Negligible</b>	
Breeding seabird assemblage  <b>Local Importance</b>	Disturbance	Disturbance of breeding seabirds leading to reduced settlement, poor productivity,	<b>Moderate to Major Adverse</b>	Long-term	Option 1. Restrict access to important seabird breeding areas. This will be particularly important if seabirds start to naturally recolonise the island following rodent and cat eradication.	<b>Major Positive</b>	

	Introduction of Invasive Non-native Species eg yellow crazy ant with hotel supplies & guests.  Re-introduction of non-native mammalian predators following eradication.	Predation of seabird eggs and chicks	<b>Major Adverse</b>	Long-term	Option 1. Implement a thorough biosecurity protocol at both embarkation and disembarkation points to minimise chance of INNS being transported to the island.	<b>Negligible</b>	Eradication of existing Invasive Non-native Species from the island (eg house mice, black rats, brown rats) could bring about a <b>Major Positive</b> impact on the breeding seabird assemblage.
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### Construction Impacts

- 9.8 Habitat destruction. The dwarf coastal forest along the western coast and the inland dune dwarf forest both appear to be of particular importance to Souimanga sunbird and are rare habitats in their own right on the island. The area of backshore beach dwarf forest occupies just 8.5ha and is judged to be the best preserved examples of the habitat in Seychelles (Senterre 2023). The inland dune dwarf forest occupies just 1.2ha and is unique to Assomption. Whilst of low botanical interest, the *Casuarina* stands around the settlement and extending to the NE and SW, appear to be the favoured habitat of the establishing population of Malagasy white-eye. The proposed hotel development has the potential to disproportionately impact these important habitats as the majority of the villas and resort facilities are currently planned be constructed within these habitats. Furthermore additional extraction of sand from the dunes for construction use could threaten the important inland dune dwarf forest habitat. These will be long term impacts.
- 9.9 Disturbance during construction. Increased human activities during the construction phase will inevitably introduce additional disturbance to bird populations on the island, potentially having an adverse impact on breeding productivity. During the construction phase, disturbance is likely to increase significantly against current baseline levels but will be a medium term impact.
- 9.10 Accidental introduction of new Invasive Non-native Species (INNS). The threat of introducing additional Invasive Non-native Species through the transport of construction materials and construction staff is significant and could have a major adverse impact on the bird fauna of the island. Of particular concern is the introduction of the yellow crazy ant *Anoplolepis gracilipes*, one of the worst invasive species identified by the IUCN. Yellow crazy ants can directly predate young birds and nestlings, impede foraging activity and deplete invertebrate communities making them unavailable for birds (Davis *et al* 2008). The accidental introduction of new Invasive Non-native Species is likely to have long term impact by virtue of the fact that eradication programmes tend to lengthy to plan and deliver.
- 9.11 Eradication of INNS. One of the most significant contributions the proposed hotel development could make to the ecology of Assomption is the eradication of the existing INNS on the island, in particular rats, house mice and feral cats. This has been included as a construction impact as it would be most sensible to undertake any eradication after construction has been completed and before the hotel opens for business. Any commitment to undertake an eradication should not be seen as reason to weaken biosecurity measures required during the construction phase. The beneficial impacts of the eradication of INNS will be long term.

### Summary of potential impacts of construction phase

- 9.12 The potential impacts of the proposed development in its construction phase on bird receptors have been assessed as follows:

Receptor	Impact Assessment (no mitigation)	Impact Assessment (with mitigation)
Souimanga sunbird	Moderate - Major Adverse	Minor adverse - Negligible
Malagasy white-eye	Major Adverse	Minor adverse - Negligible
Breeding seabird assemblage	Major Adverse	Negligible

### Suggested mitigation

- 9.13 The first step in the mitigation hierarchy is to avoid negative impacts where possible. With respect to impacts on the beach dwarf forest, it is recommended that the locations of the villas are pushed back to beyond the coastal strip onto less valuable inland open mixed scrub, the most extensive habitat type on Assomption and of moderate conservation value to the landbird population. An additional option would be to reduce the number of villas and associated infrastructure and build a more modest resort commensurate with the ecological sensitivity of the island. Any development with the potential to impact the important dwarf forest habitats on the dunes should be relocated.
- 9.14 To protect the embryonic Malagasy white-eye population and the remnant seabird assemblage, the *Casuarina* plantings around and radiating from the settlement should be protected, as should the the *Casuarina* woodland in the far northern tip of the island which is important for the small population of fairy terns on the island.
- 9.15 Any residual habitat impacts could be mitigated against through using native species favoured by Souimanga sunbirds and Malagasy white-eye in all planting schemes and enhancement could be delivered through restoring degraded areas of dwarf forest habitats outside the development envelope.
- 9.16 Disturbance of breeding landbirds could be mitigated against by not carrying out any construction during the breeding season however this would be disruptive to the construction timetable and may be considered disproportionate to address an impact that has been assessed as medium-term and Minor-Adverse. A more proportionate mitigation measure would be to clearly demarcate and fence off construction sites to avoid unnecessary disturbance to habitats outside development envelope.
- 9.17 The introduction of additional INNS to Assomption is a major risk and introduction via infested cargo and/or cargo vessels is one of the most likely transmission routes. The introduction of a thorough biosecurity regime is an absolute necessity should the proposed development proceed. The exact detail of the biosecurity regime is beyond the scope of this report but should include measures taken at the port of departure, onboard all vessels bringing materials & staff to the island and quarantine upon arrival on Assomption.
- 9.18 Adopting the mitigation measures outlined above could reduce the impacts of the construction phase to the landbird population to Minor-Adverse or Negligible.
- 9.19 The eradication of the non-native mammal species on the island following the completion of construction but before the hotel is operational could bring about long-term Major-Positive benefits to the bird fauna of Assomption.

## *Operational Impacts*

- 9.20 Indiscriminate use of pesticides. The presence of biting insects, particularly during the wet season, can have a negative impact on visitor experience and comfort as well as being potential vectors of disease. Measures to control populations of biting insects are often adopted in such situations but can have negative impacts on non-target species if they are applied across wide areas and not targeted at the problem species. The overuse of DDT in Mauritius in the 1950s and 60s to control malaria-carrying mosquitos is widely considered to have caused population declines and local extinction of several species of endemic bird (Safford & Jones 1997). Indiscriminate use of pesticides is likely to have a long-term adverse impact.
- 9.21 Human disturbance. An increase in human disturbance caused by hotel guests and hotel employees has the potential to have a long-term adverse impact on some bird populations, in particular populations of seabirds that may start to recolonise Assumption following restoration.
- 9.22 Re-introduction of INNS following eradication. There is a risk of the re-introduction of eradicated INNS and the introduction of new non-native species during the operational phase through guests & their luggage (especially if arriving on Assumption from outside the Seychelles) and with supplies for the hotel and IDC operations on the island. This is likely to have a long-term, adverse impact.
- 9.23 Habitat enhancement. An additional contribution the hotel development could make to the ecology of Assumption is through supporting the restoration of habitats on the island through using native species in landscaping and screening of the hotel development. This will have a long-term, positive impact.

## *Summary of potential impacts of operational phase*

<b>Receptor</b>	<b>Impact Assessment (no mitigation)</b>	<b>Impact Assessment (with mitigation)</b>
Souimanga sunbird	Moderate - Major Adverse	Negligible - Moderate Positive
Malagasy white-eye	Moderate - Major Adverse	Negligible - Moderate Positive
Breeding seabird assemblage	Moderate - Major Adverse	Negligible - Major Positive

## *Suggested mitigation*

- 9.24 The use of insecticides should be targeted at the immediate environs of the villas, restaurants and staff accommodation and physical barriers used where possible to prevent biting insects entering buildings. Measures should be taken where possible to remove sources of standing water close to buildings which could otherwise be colonised by mosquito larvae. Non-toxic means of insect control should also be deployed eg electric insect killers.
- 9.25 The risk of (re)introduction of INNS should be minimised through the implementation of a strict biosecurity protocol as outlined in 9.17.
- 9.26 Disturbance to re-colonising breeding seabirds following the eradication of mammalian predators should be minimised by implementing a zoning plan minimising human access to important breeding sites. It may be possible to install viewing facilities so that guests can observe seabirds from a safe distance.
- 9.27 By implementing the suggested mitigation measures, the operational impacts of the hotel upon Assumption's avifauna could be reduced from Moderate to Major Adverse to Negligible - Moderate Positive at worst to Major Positive at best.

### *Future potential for enhancement of avian features*

- 9.28 Under the principles of the mitigation hierarchy, development should aim to deliver a net gain for biodiversity over and above the requirements for avoidance, mitigation and compensation. This principle has been embedded in other hotel developments in Seychelles, particularly on islands managed by the Islands Development Company, where the hotel operators fund a conservation programme on the island to conserve and enhance the species and habitats on those islands and their surrounding waters.
- 9.29 There is considerable opportunity on Assomption for the restoration and rehabilitation of the island to create suitable conditions for either natural recolonisation or translocation of some of the seabird and landbird species that have been lost.
- 9.30 An essential component of restoring Assomption will be the removal of invasive alien mammalian predators from the island, namely rats, house mice and feral cats and then implementing a strict biosecurity protocol to ensure re-colonisation does not occur. It is known that the black rat *Rattus rattus* is already present on Assomption (Feare 2012) as well as house mouse (N. Bunbury pers. com) but brown or Norway rat *Rattus norvegicus* is now also thought to be present on the island following the observation of a large brown rat with a thick tail in February 2024 (pers. obs.). Removal of mice and rats will also benefit the visitor experience on the island and reduce the risk of disease transmission to hotel guests and island residents.
- 9.31 It would be most logical to undertake an eradication programme on Assomption between the end of construction and the commencement of hotel operations. SIF are currently undertaking feasibility studies for the eradication of rats and cats from Aldabra World Heritage Site which supports similar habitat types and topography to Assomption. The results of these feasibility studies may inform the appropriate eradication approach to take on Assomption.
- 9.32 There is a small remnant seabird population already on the island comprising just two species - fairy tern and white-tailed tropicbird. However Aldabra supports significant populations of breeding seabirds including both great and lesser frigate bird, red-tailed and white-tailed tropicbird, red-footed booby, brown noddy and tropical shearwater. With the eradication of mammalian predators it is possible that some or all of these species would naturally recolonise Assomption. Recolonisation could be assisted through the deployment of decoy birds or acoustic vocalisation playback, both techniques that have been used successfully elsewhere (Jones & Kress 2012). It is unlikely that Abbott's booby could ever be attracted back to Assomption as the species is now confined to Christmas Island some 6,400km to the east and nests in tall trees up to 40m in height, a feature no longer present on Assomption.
- 9.33 Historical evidence suggests that Assomption once held an assemblage of landbirds not dissimilar to that currently found on Aldabra. The native vegetation on Assomption has recovered significantly since the cessation of guano extraction and the island could become an important refuge site for a number of endemic species and subspecies currently restricted to Aldabra. It is likely that physical translocations would be required to establish populations of most Aldabra landbirds on Assomption and these would require feasibility studies beyond the scope of this preliminary EIA.
- 9.34 There is also the potential to undertake restoration of some of the most important habitats on the island. There are opportunities for the restoration of some of the degraded areas of backshore beach dwarf forest along the west coast and around the settlement (Senterre 2023) as well as removing the invasive sisal *Agave sisalana* which is dominant in some parts of the island and allowing the native vegetation to recover. This would benefit the existing, and potential future, landbird assemblage.

- 9.35 Notwithstanding the need for further feasibility studies, if a programme of rodent and cat eradication were to be undertaken along with significant habitat restoration, a long-term **Major Positive** impact for the bird fauna on Assomption could be secured.

#### *Impacts on other protected sites*

- 9.36 There is also the potential for negative impacts on the bird fauna of Aldabra World Heritage Site. Given the international importance of Aldabra, this a material consideration which should be examined further in the full EIA.

- 9.37 Possible impacts to the avifauna of the Aldabra World Heritage Site include:

1. Accidental introduction of INNS from Assomption to Aldabra
2. Increased human disturbance from Assomption hotel guests visiting Aldabra
3. Impacts of helicopter access to Aldabra
4. Impacts of increased aircraft disturbance

#### 10. Further bird survey work required to inform the EIA

- 10.1 The last island-wide bird survey of Assomption was carried out by SIF in 2011 in preparation for the eradication of red-whiskered bulbuls and Madagascar fodies. A point count methodology was used in order to calculate the population sizes of both introduced species plus Souimanga sunbird. Subsequent follow-up surveys have been carried out by SIF to specifically determine the presence or absence of red-whiskered bulbul but no further quantitative surveys of sunbirds, or the naturally recolonising Malagasy white-eyes have been undertaken.

- 10.2 It is recommended that in order to more accurately predict the impacts of the proposed hotel development on the native landbird population, another point count survey be commissioned and the results overlain on the vegetation map created by Senterre (2023). This will allow the identification of the most important habitat types for Souimanga sunbird, the likely impacts of habitat destruction in the construction phase of the hotel development and information to support habitat restoration to benefit the Souimanga sunbird population.

- 10.3 A more detailed survey of the Malagasy white-eye population should also be carried out to more accurately determine population size, range and habitat use. Attempts should also be made to collect genetic samples from as many birds as possible to determine their origin and to detect any founder effects developing from a small founder population.

- 10.4 Due to time constraints, little attention was paid to seabirds other than a brief visit to the the northern tip of the island where a small number of fairy terns appeared to be breeding in a small stand of *Casuarina*. White-tailed tropicbirds have been recorded breeding in recent years but no systematic survey has taken place to estimate the population size. It is also possible that small numbers of tropical shearwaters nest on Assomption but have gone undetected due to their nocturnal habits.

#### 11. Ecological Clerk of Works & Post-construction monitoring requirements

- 11.1 Given the sensitivity of Assomption's ecology, a dedicated Ecological Clerk of Works (ECoW) should be appointed throughout the construction process to ensure that all control and mitigation measures identified in the ecological chapters of the Environmental Impact Assessment are implemented and adhered to.

- 11.2 It is also recommended that a permanent conservation centre be set up on Assomption, funded by developer contributions, to monitor the operational impacts of the hotel on Assomption's ecology and to oversee a programme of ecological monitoring, habitat rehabilitation and species recovery.

12. Acknowledgements

Thanks to Nancy Bunbury (Seychelles Islands Foundation) and Chris Feare (Wildwings Bird Management) for additional information on the bird fauna of Aldabra. The Islands Development Company provided flights to and accommodation on Assumption.

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**APPENDIX 1 - Full list of bird species recorded on Assomption 6 - 9 February 2024**

Red-footed booby <i>Sula sula</i>	common offshore and several small flocks recorded flying over the island. Former breeding species, still breeds on Aldabra.
Lesser frigatebird <i>Fregata minor</i>	singles recorded offshore and flying over the island. Former breeding species, still breeds on Aldabra.
Grey heron <i>Area cinerea</i>	singles seen daily feeding along the shoreline. Breeds on Aldabra, no evidence of breeding on Assomption
Cattle egret <i>Bubulcus ibis</i>	a large flock of around 80 birds was seen twice on the island. The flock seemed quite mobile and was recorded once in the SE of the island and again along the western coast. No evidence of breeding was recorded.
Green-backed heron <i>Butorides striatus</i>	Common throughout the island. Just as likely to be encountered inland as around the coast. Disused nest found in inland sinkhole mangrove on 6 February. Breeds on Assomption.
Madagascar pond heron <i>Ardeola idae</i>	Single bird seen just to the east of the settlement on 8 & 9 February. An <i>Ardeola</i> heron had also been recorded in August in the same area.
Sooty falcon <i>Falco concolor</i>	Male at settlement 6 - 9 February - a vagrant to Seychelles
Greater sandplover <i>Charadrius leschenaultii</i>	Two on airstrip 8 February. A regular migrant.
Grey plover <i>Pluvialis squatarola</i>	Singles seen around coastline. A regular migrant.
Whimbrel <i>Numenius phaeopus</i>	Small numbers throughout, primarily coastal but occasionally recorded under coconut palms near the Settlement. A regular migrant.
Common sandpiper <i>Actitis hypoleucos</i>	Single under coconut palms near settlement on 6 and 7 February. A regular migrant.
Ruddy turnstone <i>Arenaria interpres</i>	Small numbers seen throughout. A regular migrant.
Crested tern <i>Thalasseus bergii</i>	One seen by the jetty 8 February. Breeds on Aldabra.
Fairy tern <i>Gygis alba</i>	Maximum of 42 in Casuarinas on the northern tip of the island. Likely to have been breeding.
Tree pipit <i>Anthus trivialis</i>	One under coconut palms near settlement 7 February - an annual migrant to Seychelles.
Madagascar white-eye <i>Zosterops maderaspatana</i> presumed ssp <i>aldabrensis</i>	Confined to the settlement and immediate environs. Appeared to favour <i>Casuarina</i> .
Souimanga sunbird <i>Nectarinia sovimanga</i>	Common across the island. Appeared most numerous in the coastal backshore dwarf forest along the west coast and least numerous in the coastal hyper saline meadows along the east coast. Active nest in the manager's house and young birds seen across the island.
Pied crow <i>Corvus albus</i>	Single bird in Settlement on 6 and 7 February. Apparently roams across island. Species has been actively controlled in the past.

