



Appendix 6: Study on avifauna

PROJECT DESCRIPTION STATEMENT
Related to the planned extension to the existing
Heliport Airstrip at Xewkija, Gozo

**A STUDY OF POSSIBLE IMPACTS ON AVIFAUNA AS A RESULT OF A PROPOSED EXTENSION
TO THE EXISTING HELIPORT AIRSTRIP AT XEWKIJA, GOZO:**

Proposed upgrading of existing airfield including the extension of the runway, construction of a concrete-surfaced apron, three grass-reinforced aprons and perimetral retaining walls, shifting of security fence and new landscaping.

Disclaimer

This report has been drawn up to form part of the Project Description Statement for the proposed extension to the existing Heliport Airstrip at Xewkija. Except where stated to the contrary, the text, graphics and information contained in this report may not be used without prior permission.

Dr Natalino Fenech PhD

15 January 2022



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EXECUTIVE NON-TECHNICAL SUMMARY

1.1 At the Gozo heliport currently there is a landing strip that measures 174 by 20 metres. This report deals with the extension of the existing airstrip by 271 metres, bringing it to a total of 445 metres. The width will remain the same, 20 metres. There will also be ancillary Aprons with the total area of the site being some 75,000 sq. m. The area where the project is planned to take place is shown in Fig. 1. The project is envisaged to be completed by 2023, but there are no clear timeframes for works yet.

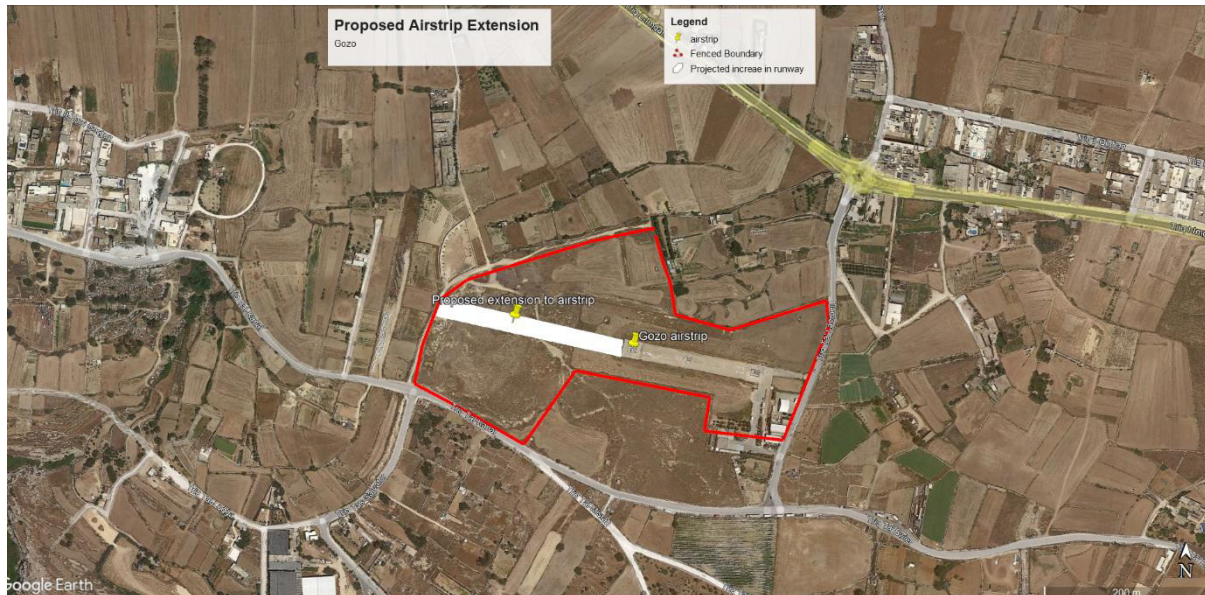


Figure 1 The area at Xewkija where the proposed works are meant to take place

1.2 This ornithological report is based both on desk research and drawing on the author's wealth of experience as an ornithologist as well as fieldwork carried out specifically for the report between 16 December 2021 and 9 January 2022. The fieldwork was done more to assess habitat type, as from existing habitat, with knowledge and experience one can conclude what species are likely to use the area both on migration as well as for breeding. Birds noted in the immediate area around the proposed site during the fieldwork were common wintering species such as Black Redstart *Phoenicurus ochruros*, Robin *Erithacus rubecula*, Dunnock *Prunella modularis*, Starling *Sturnus vulgaris*, White Wagtail *Motacilla alba*, Meadow Pipit *Anthus pratensis*, Blackcap *Sylvia atricapilla* and Stonechat *Saxicola rubicola* while the only resident and breeding species noted were Sardinian Warbler *Sylvia melanocephala*, Zitting Cisticola *Cisticola juncidis* and Spanish Sparrow *Passer hispaniolensis*.

1.3 This report describes the avifauna within the Study area which comprises of the immediate surroundings, extending to beyond the cliffs where an important seabird colony exists. The report looks also beyond the cliffs in a bid to assess impacts there may be on rafting areas of shearwaters. This study looked at the areas within the confines of where the Gozo airport would be, the immediate surroundings, and to the cliffs hosting sea bird colonies as well as beyond as the sea in front of the cliffs is a known rafting area for the breeding seabirds.

1.4 For this report, reference was made to published and unpublished field notes of bird observations by the author. Reference was also made to published data, both online as well as in print, which can be found in the reference list attached to this report.

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1.5 The main impacts from the proposed project could be:

- i. Disturbance to breeding, wintering and migratory birds due to increased ambient noise and activity in the area resulting from the works while the project is being carried out.
- ii. Disturbance to breeding and migratory birds resulting from the activities generated by the runway when it is operational

1.6 A total of 16 species of birds have been confirmed breeding in the study area (Table 1 p. 6). This amounts to a third of the species of birds that have been confirmed breeding in the Maltese Islands in 2018 and more than half the regular breeding species (Breeding Bird Atlas 2018). All the breeding species in the study area as well as possible impacts are discussed. The study concludes that it is highly unlikely that the proposed project would have any impact on these populations of breeding birds, and even though the closest distance from the airstrip to part of the breeding colony of Yelkouan Shearwaters *Puffinus Yelkouan* lies 1.6 km, precautionary mitigation measures are suggested.

Figure 2 The Island of Gozo with the yellow pins indicating the current and proposed position of the airstrip and the location of the seabird colony along the cliffs on the southern coast. Source of the map: Google Earth Pro

1.7 A total of 468 species of birds have been recorded in the Maltese Islands to date (Fenech and Sammut 2020). Of these, less than half are observed annually. Analysis of the species occurring or potentially occurring in the surrounding areas shows there are 12 species of Global Conservation concern, of which 10 occur regularly (Table 4 p.31). The status of bird species in Europe and their population size are also given in this report.

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Table 1				
List of species breeding in the area of study, their status and estimated numbers				
English name	Scientific name	Status	Number of pairs	Population Trend
Scopoli's Shearwater	<i>Calonectris diomedea</i>	Localised	ca 500	Decreasing
Yelkouan Shearwater	<i>Puffinus yelkouan</i>	Localised	ca 300	Increasing
European Storm Petrel	<i>Hydrobates pelagicus</i>	Localised	ca 100	Stable
Peregrine	<i>Falco peregrinus</i>	Localised	1	Fluctuating
Kestrel	<i>Falco tinnunculus</i>	Localised	1	Increasing
Yellow legged Gull	<i>Larus michahellis</i>	Localised	ca 150	Increasing
Collared Dove	<i>Streptopelia decaocto</i>	Frequent	ca 15	Increasing
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	Common	over 100	Increasing
Barn Swallow	<i>Hirundo rustica</i>	Scarce	ca 10	Increasing
Blue Rock Thrush	<i>Monticola solitarius</i>	Frequent	ca 50	Stable
Sardinian Warbler	<i>Curruca melanocephala</i>	Common	ca 100	Decreasing
Spectacled Warbler	<i>Curruca conspicillata</i>	Frequent	ca 30	Decreasing
Zitting Cisticola	<i>Cisticola juncidis</i>	Abundant	ca 100	Stable
Cetti's Warbler	<i>Cettia cetti</i>	Frequent	ca 5	Decreasing
Spanish Sparrow	<i>Passer hispaniolensis</i>	Abundant	100 +	Stable
Feral Pigeon	<i>Columba livia</i>	Abundant	ca 100	Stable

Table 1 List of species breeding in the study area, their status and estimated breeding numbers in the area

1.8 The study also looks at possible impacts of light pollution and draws on information from foreign studies but suggests caution when extrapolating to the Maltese context because of various factors, including the extent of and the intensity of light. The study however recommends the use of the precautionary principle and to assume that impacts can be negative and suggests mitigation measures.

1.9 Impacts as due to noise, both during the stage when works are being carried out, as well as when the airstrip is planned to be operational, were also looked at. An amount of noise is expected to be generated by machinery while dumped material is being removed and land is being levelled and asphalted, but as such noise levels are only expected to be temporary, it is not expected that there will be any significant impacts on breeding or migratory birds. As the site is quite far from the breeding cliff sites, it is not expected that there will be any effect on cliff-nesting species due to the distance from the site. However, monitoring of noise levels is recommended if works will be carried out while shearwaters would be returning to their breeding grounds before egg-laying, between late February and May, and precautionary noise abatement mitigation measures could be taken.

TERMS OF REFERENCE, PROJECT DESCRIPTION & KEY ISSUES

2.1 The Terms of Reference for the bird-related studies for this PDS were:

- a) to assess impacts on avifauna in the surrounding area of the existing airstrip and suggest appropriate mitigation measures

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METHODOLOGY

3.1 The author was commissioned by the Ministry for Gozo to draw up an ornithological report that will form part of the PDS for the proposed extension to the existing Heliport Airstrip at Xewkija, Gozo.

3.2 The report gives details on the avifauna that occurs within the study area. For breeding species that are most likely to be potentially affected by the proposed works, the study gives the population size and distribution. It also gives due importance to those migratory birds that are most likely to occur within the area and discusses possible impacts and mitigation measures where appropriate.

3.3 The report also analysed possible impacts on important areas which support rafting, roosting, foraging nesting and roosting areas for bird species that are likely to occur. The study focused on four main aspects, two related to habitats and birds in the area and two related to impacts and mitigation measures. For this report, the following methodology was used:

- Fieldwork through site visits and a desk-top study of the areas of interest from the ornithological point of view and analysis of species recorded/likely to occur as well as the breeding birds in the study area.
- Discussion of all breeding species and of species of conservation concern that occur in the area.
- An assessment of possible impacts and the significance of these impacts on birds because of the proposed works.
- A discussion of mitigation measures that can help minimise any negative impacts on birds.

3.4 The desk-top study was based on a wide range of published and unpublished data related to ornithology, including the author's notes and observations which go back to 1978, sightings, short notes and papers published online and in local and foreign ornithological journals, the latest and some historic books about birds in the Maltese Islands and several other sources listed in the bibliography.

3.5 The study was split in two: the first part looked at the breeding birds to see their status in the study area and whether the proposed works will have any impact on the birds that breed in the area. The second part looked at migratory birds recorded in the area or regularly recorded in Malta and likely to be recorded, and again, looked at potential impacts. Mitigation measures were proposed in cases where impacts were envisaged.

The two main key issues that can arise from the project are:

- i. Disturbance to breeding, wintering and migratory birds because of increased ambient noise and activity in the area resulting from the works while the project is being carried out.
- ii. Disturbance to breeding and migratory birds resulting from the activities generated by the runway when it is operational.

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GEOGRAPHICAL AREA COVERED BY THE STUDY

4.1 This study covers well beyond the immediate area of the proposed airstrip extension, and this was made to try to capture as much as possible any effects the airstrip may have on avifauna. The area covers the entire Mġarr ix-Xini Valley as well all the coastal cliffs which are known to host seabird colonies, as well as the offshore area as shown in Fig. 3.

4.2 The site is a former dumping ground that is seasonally covered with vegetation, predominantly Tree Mallow *Lavatera arborea*, Smooth Sow Thistle *Sonchus oleraceus*, Fennel *Foeniculum vulgare*, Crown Daisy *Glebionis coronaria*, Oat *Avena Sativa* and Bermuda Buttercup *Oxalis pes caprae*. These are common plants found in disturbed habitats, fields, waste ground, soil dumps as well as roadsides. The area is surrounded by several parcels of tilled agricultural land of different sizes, some of which are tilled. Further away to the south there is a large civic amenity site, farms, Mġarr ix-Xini Valley with its inland cliffs and bay, more fields and garigue habitat and finally sea cliffs.



Figure 3 The area of study, shaded in red, that goes beyond the actual immediate area of the proposed airfield extension. Source of the map: Google Earth Pro.

AREAS OF ORNITHOLOGICAL IMPORTANCE

5.1 Ta' Ċenċ Cliffs, Mġarr ix-Xini Valley / Wied Sabbara are listed as areas of conservation value in the Maltese Islands (Schembri *et. al.* 1987). Ta' Ċenċ Cliffs are listed as Special Areas of Conservation of International Importance and Special Protection Areas (G.N. 1379 of 2016, G.N. 1522 of 2019), the cliff and coastal area at sea from Il-Ponta tal-Ħotba to Tal-Fessej is designated as a special area of conservation (G.N. 682 of 2018), and part of this is covered by the study area.

5.2 None of these sites is expected to be impacted by the extension works on the runway, or by aircraft that may be flying over these areas, but as these areas are important for birds, they have been included in the study area. Mġarr ix-Xini is the place where the last known pair of Barn Owls *Tyto alba* used to breed in the Maltese Islands while Kestrel *Falco tinnunculus*, a small type of falcon, breeds practically annually there.

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5.3 The coastal cliffs that stretch from Xlendi to Mgarr ix-Xini as well as the inland cliffs, hold several pairs of the National Bird, the Blue Rock Thrush *Monticola solitarius* all year round, while the cliffs on the seaward side host several pairs of Yelkouan Shearwaters *Puffinus yelkouan* between January and July and Scopoli's Shearwater *Calonectris diomedea*, between April and October. A few Storm Petrel *Hydrobates pelagicus* are also present from the end of February to mid-October. A pair of Peregrine Falcons *Falco peregrinus*, also breeds in this area and the adults may be present all year round. Feral pigeons *Columba livia* and Yellow-legged Gull *Larus, michahellis* are also present in these cliffs all year round and breed in late spring and summer.

5.4 The plateau above the cliffs is a relatively important area for several birds during both spring and autumn migration, particularly warblers, flycatchers, thrushes, larks and other passerines. The site is however prone to a wide degree of disturbance from a range of anthropogenic activities practically throughout the year. The regular breeding species on the different habitats on the plateau include Collared Dove *Streptopelia decaocto*, Greater Short-toed Lark *Calandrella brachydactyla*, Sardinian Warbler *Sylvia melanocephala*, Zitting Cisticola *Cisticola juncidis*, Spanish Sparrow *Passer hispaniolensis* and Eurasian Tree Sparrow *Passer montanus* and Spectacled Warbler *Sylvia conspicillata*. 5.5 The study also looks at the offshore area both because of its protected status as well as because it is known that seabirds, particularly shearwaters, gather in rafts in the late afternoons and start to get closer to land in the evenings to go to their nests at night.

ORNITHOLOGICAL DATA - RESIDENT AND BREEDING SPECIES

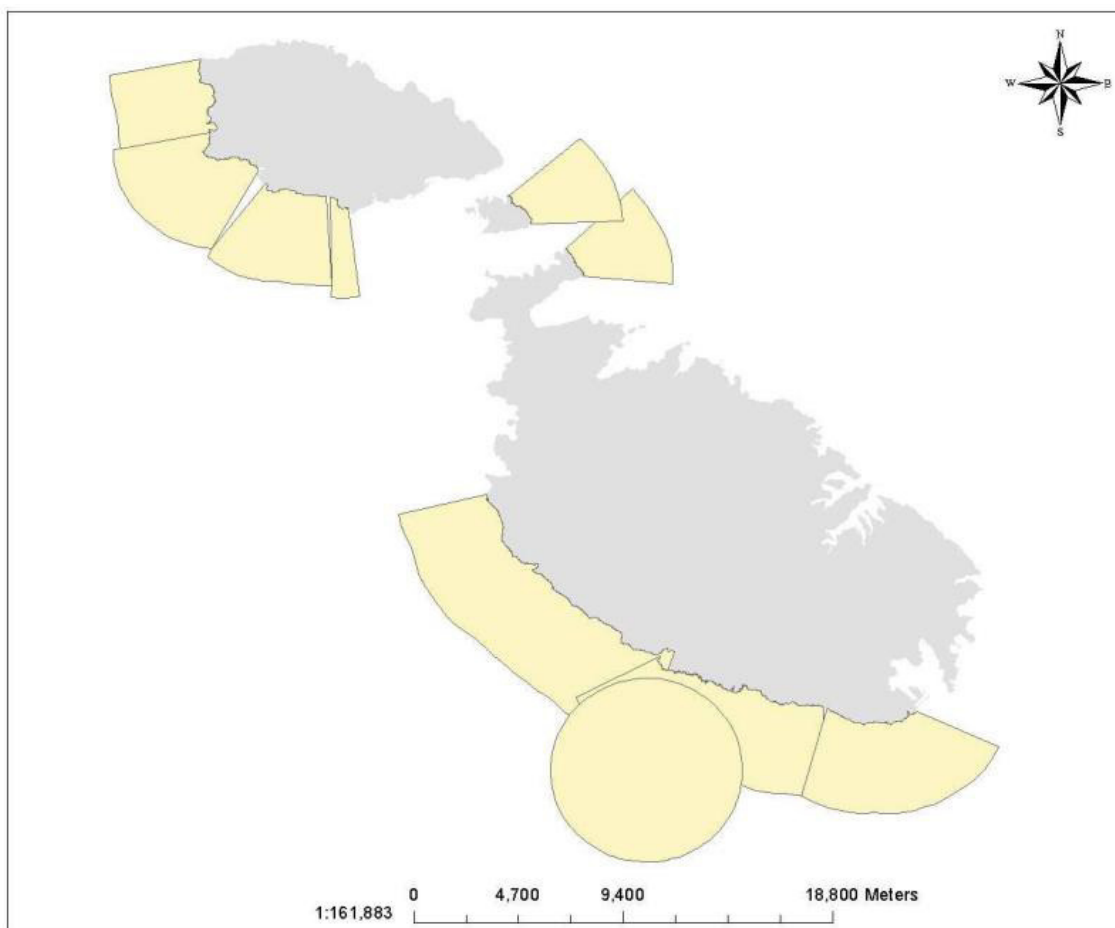


Figure 4 Rafting areas of Scopoli's Shearwaters as indicated by Borg and Sultana (2004)

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6.1 A total of birds 59 species of birds have been confirmed breeding in the Maltese Islands (Table 5 p.35), 16 of these breed in the study area (Table 2). Of these, only two species breed within the confines of the site where the heliport is or in the area where it will be extended. These are Spanish Sparrow and Sardinian Warbler. Short-toed Lark breeds in the area and may be potentially breeding within the airport confines too. As the proposed project may have an impact on the birds breeding in the study area, these will be discussed in more depth.

Table 2						
List of species breeding in the area of study, their status and estimated numbers						
English name	Scientific name	Resident	Spring Migrant	Summer visitor	Autumn Migrant	Winter Visitor
Scopoli's Shearwater	<i>Calonectris diomedea</i>		■	■	■	
Yelkouan Shearwater	<i>Puffinus yelkouan</i>		■	■	■	
European Storm Petrel	<i>Hydrobates pelagicus</i>		■	■	■	
Peregrine	<i>Falco peregrinus</i>	■	■	■	■	■
Kestrel	<i>Falco tinnunculus</i>		■	■	■	■
Yellow legged Gull	<i>Larus michahellis</i>	■			■	■
Collared Dove	<i>Streptopelia decaocto</i>	■				
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>		■	■		
Barn Swallow	<i>Hirundo rustica</i>		■	■		
Blue Rock Thrush	<i>Monticola solitarius</i>	■				
Sardinian Warbler	<i>Curruca melanocephala</i>	■	■			
Spectacled Warbler	<i>Curruca conspicillata</i>	■				
Zitting Cisticola	<i>Cisticola juncidis</i>	■				
Cetti's Warbler	<i>Cettia cetti</i>	■				
Spanish Sparrow	<i>Passer hispaniolensis</i>	■	■		■	
Feral Pigeon	<i>Columba livia</i>	■				

Table 2 Birds breeding in the area of study at the Xewkija Airport and beyond, and when they occur throughout the year

6.2 Several species of birds that migrate in spring also breed, but for some species (such as Collared Dove *Streptopelia decaocto*, Sardinian Warbler *Sylvia melanocephala*, Spanish Sparrow *Passer hispaniolensis*, it is very difficult to determine whether some of the migrating birds breed in Malta. The Greater Short-toed Lark *Calandrella brachydactyla* is a spring migrant and remains to breed, with the birds then leaving Malta by migrating between September and October.

DESCRIPTION OF BREEDING SPECIES IN THE STUDY AREA

7.1 In this section, all the species known to have bred or be breeding in the study area are discussed, giving their international status, their status on a national level as well as the size of the breeding population in the area.

7.2 Scopoli's Shearwater *Calonectris diomedea*

The species is listed as 'Least Concern' in the IUCN Red List Category, with population trends as 'decreasing'. The Red Data Book for the Maltese Islands status for this species is Vulnerable and states that "the two largest colonies are rather vulnerable and threatened by development. This species suffers immensely from bird shooting at sea from boats and dinghies." Both these statements are rather outdated.

Formerly known as Cory's Shearwater, these large seabirds breed in colonies in suitable sea cliffs in Malta, Gozo and Filfla. The name Cory's Shearwater has been given to another species (*Calonectris borealis*). The biggest colony of Scopoli's Shearwater in Gozo is at Ta' Ċenċ Cliffs while in Malta, the cliffs on the southwest coast from Wied Moqbol to Dingli house the biggest colonies. The 2018 Breeding Bird Atlas gives population estimates as 2,665 – 3,605, with the population in

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Gozo given as 1,840 and 2,495 pairs. Most are located in the eastern cliffs from San Lawrenz to Dwejra and the rest from Ta' Ċenċ to Xlendi.

Large numbers of birds can be seen in rafts (or gatherings) offshore in late afternoons and evenings from mid-February to late November (Fig 4. p. 12). Such rafts can contain anywhere from a few hundred to a thousand birds or more. Some of the birds in these rafts, especially when seen months ahead of the breeding season, may contain migratory birds, as otherwise such large rafts would be seen more regularly. But large rafts seen in summer suggest a rather healthy population. To cite a few figures, in 2005, over 2,000 were seen off Għallis on 23 August; over 6,000 were seen off Marsascala on 24 August; at a time when birds are still feeding their solitary young chick in the burrow.

Scopoli's Shearwaters start to visit the colonies at dusk towards the end of February, but breeding activity is much later as they lay their solitary egg in the last week of May, with peak laying taking place on 27 and 28 May. Incubation is carried out by both partners and lasts 55 days. One of the parents broods the newly hatched chick for the first three to five days. The chick is then left alone and is visited only at night. The young are fed Mediterranean Horse-Mackerel *Trachurus mediterraneus*, Squid *Loligo vulgaris*, Cuttlefish *Sepia officinalis*, Anchovies *Engraulis encrasicolus* and Flying-fish, amongst others. Fledging takes place in the first two weeks of October

Cachia Zammit and Borg (1986) stated that shearwaters were faithful to the breeding site as well as to their partner. In Malta, 71 per cent of the birds returned to the same sites. A single bird was noted to use the same site for 11 consecutive seasons and a pair stayed together for at least 6 years. In a later study, Borg and Sultana (2000) said that shearwaters showed a degree of site tenacity, with some birds retaining their nesting site for up to 16 years. Males showed stronger site tenacity than females, with 19.4 per cent of 194 breeding males nesting in the same nest for ten to sixteen consecutive years, while 12.3 percent of 154 breeding females occupied the same nest site for the same period (Borg and Sultana 2000).

Scopoli's Shearwaters occur offshore practically all year round. Birds are common offshore from late February. Birds usually get closer to their colonies in late evening and dusk and only come to land during the night to breed between May and October. Individual birds can also be seen in December and January. Shearwaters are protected by law. The populations closest to the project are those breeding at Ta' Ċenċ to Ras in-Newwiela, which is about 2 km at the closest distance from where the works would be taking place and from where the airstrip will eventually be.

As aircraft would be flying at over 600 feet when over this area, it is not perceived that aircraft would pose any threat to these birds, neither at the breeding colony, nor when they are rafting at sea. When rafting at sea these birds encounter a lot of boats of different sizes and moving past at different speeds as well as generating different levels of noise and these are not mentioned as having any particular negative impact on them.

This PDS already refers to the timing of operation of the airport and that lights on the airfield, which are anyway not visible from below the cliff edge situated 2 km away and more, would be pilot operated and would switch off when not in use. As a precautionary mitigation measure, one should keep lights down to a minimum if works will be taking place at night during the breeding season from February to October and try to use noise abatement measures as much as possible in the late evening and night, particularly on days with northerly winds when sounds may be carried out over the sea to the areas where they raft.

7.3 Yelkouan Shearwater *Puffinus Yelkouan*

The species is listed as 'vulnerable' and its status as 'decreasing' in the IUCN Red List Category. It is listed as Vulnerable in the Red Data Book for the Maltese Islands.

The Yelkouan Shearwater occurs in Maltese waters between November and August. Adults arrive at breeding sites in late November (Cachia Zammit and Borg 1986). In recent years some have been observed arriving even as early as October. But Egg-laying takes place between February and April. The Yelkouan Shearwater is a pelagic bird making lengthy trips at sea and is mostly coastal, staying more than 20 km from the shore. During the breeding period, it travels on average 428 km before returning to the colony to feed its chick (Péron et al. 2013). Birds feed exclusively on small pelagic prey such as Anchovy *Engraulis encrasicolus*, Sardine *Sardina pilchardus* and Sprat *Sprattus sprattus*, although it also makes extensive use of throw-outs and other marine prey such as planktonic crustaceans.

The Yelkouan Shearwater breeds in small numbers at I-Irdum tal-Madonna in Mellieħa and in the sea cliffs in the south and southwest of Malta. In Gozo it nests considerable numbers in sea cliffs from Xlendi to Wied il-Mielaħ. It also breeds in cliffs on Comino and Cominotto. These birds breed in crevices; brooding takes around 50 days and the young leave the colonies by mid-July. After the breeding season, they head eastwards to the Aegean Sea and the Sea of Marmara, near the mouth of the Bosphorus Strait, and move into the Black Sea. Some go south to the coast of Egypt. The latest estimates of the breeding population of the Maltese Islands are between 1,370–2,000 pairs (Garcia Robles et al. 2016) while the Breeding Bird Atlas 2018 gives their population at 1,770 and 2,580, with between 670 and 930 in Gozo, where most are in the same areas of Scopoli's Shearwaters.

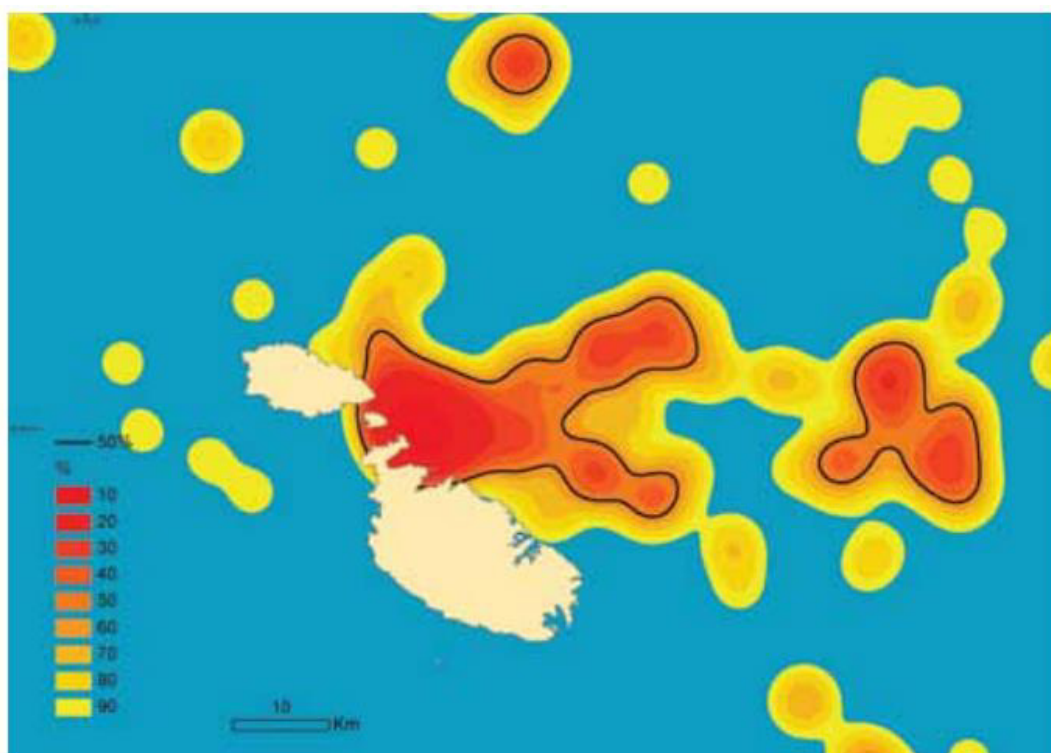


Figure 5 Distribution of Yelkouan Shearwaters feeding or rafting areas. Source: Borg et al. 2010

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Yelkouan Shearwaters are protected by law. The populations closest to the project are those breeding at Ta' Ċenċ to Ras in-Newwiela, which is about 2 km at the closest distance from where the works would be taking place and from where the airstrip will eventually be.

The rafting areas of locally nesting Yelkouan Shearwaters can be seen in Fig 5 (p.15). Breeding birds at raft between 19.00 and 4 am at sites that are distant from the colony. As one can clearly see, these rafting areas are well beyond the site where the proposed works are to be carried out and thus the works are not expected to have any impact on the rafting areas of these birds.

As birds return to their burrows when it is dark, it is not expected that works would have much influence on the birds' behaviour either. As a precautionary measure, the same recommendations made for Scopoli's Shearwater apply. One should keep lights down to a minimum if works will be taking place at night and try to use noise abatement measures as much as possible in the late evening and night, particularly on days with northerly winds when sounds may be carried out over the sea to the areas where they raft.

7.4 Storm Petrel *Hydrobates pelagicus*

The species is listed as is listed as 'Least Concern' and population trend is given as 'unknown' in the IUCN Red List Category. In Malta it is listed as 'stable' with increasing short term breeding range in the 2018 Breeding Birds Atlas.

The Storm Petrel breeds in large numbers on Filfla but the Gozitan historian Gann Piet Frangisk Agius De Soldanis had described these birds breeding at Għar Ilma in Gozo in the mid-1700s. A few pairs have been found breeding in a cave at Ta' Ċenċ, Gozo (Borg and Sultana 1992). Singles were sighted at Għarb, Gozo, in February 1992 and at Għar Lapsi in June 1992. Its population in Gozo is estimated to be between 90 and 130 pairs, while Filfla holds up to 8,000 pairs. These birds breed between mid-April and mid-October.

Being strictly pelagic, that is living entirely at sea, and landing in sea cliffs only at night, it is not envisaged that works or airport operations will have any impact on this species. In any case, it would benefit from the mitigation measures suggested for shearwaters.

7.5 Peregrine *Falco peregrinus*

The species is listed as is listed as 'Least Concern' and population trend is given as 'increasing' in the IUCN Red List Category. The 2018 Breeding Birds Atlas gives its local breeding status as increasing in the short term while its population trend is fluctuating.

The Peregrine was a regular breeding bird up to the early 1970s but only started breeding regularly again since 2009 and up to 5 pairs now breed in the Maltese Islands, a pair of which breeds in Ta' Ċenċ Cliffs, San Lawrenz or the San Blas area in Gozo. Although Peregrines usually use the same nesting area year after year, over the past five years birds have not held the same site at Ta' Ċenċ. This could be due to several factors but may be a result of persecution.

Birds start laying eggs as early as February and can have two broods in a year. If the birds decide to breed at Ta' Ċenċ, they usually breed at the Sanap area, which could be 3 to 4 km away from the runway. The birds usually hunt near the breeding site on the seaward side of the cliffs, where Feral Pigeons constitute 53 % of their diet (Fenech and Sammut 2017). Adult birds hunt mostly at sea while juvenile birds tend to hunt inland soon after fledging. Due to their behaviour and hunting methods, it is not envisaged that works or airport operations will have an impact on breeding Peregrines.

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7.6 Kestrel *Falco tinnunculus*

The species is listed as 'Least Concern' and its population status as 'decreasing' in the IUCN Red List Category. The 2018 Breeding Birds Atlas says that its short-term population and breeding range are both increasing locally. Up to five pairs may breed annually, 2 – 3 of them in Gozo.

The Kestrel is the most common falcon that can be seen flying or hovering in the Maltese countryside. Kestrels have been recorded in all months of the year, but most occur in spring and autumn and a few also winter. Between 5 to 8 pairs have been breeding over the past few years, a pair of which breeds regularly in the inland cliffs at Mġarr ix-Xini Valley. Kestrels breed between the end of February and late summer.

The area around the airport is an ideal hunting ground for these birds, which hover in the air in search of prey, which usually consists of insects or small rodents, but it can take birds as well. Kestrels are the most common of all birds of prey to be involved in bird strikes, because it is frequently found in airports. The low volume of air traffic at the airport in Gozo is unlikely to raise concerns about bird strikes, also because there is plenty of suitable hunting habitat for kestrels and other birds of prey in Gozo. Hence it is not expected that works at the Gozo airport would have an impact on breeding Kestrels in Gozo.

7.7 Yellow legged Gull *Larus michahellis*

The species is listed as 'Least Concern' and its status as 'increasing' in the IUCN Red List Category. The 2018 Breeding Birds Atlas says that its short-term population trend is increasing while the breeding range trend is stable.

The Yellow legged Gull is one of Malta's largest breeding birds with the largest population (up to 240 pairs) breeding on Filfla, while up to 80 pairs breed on Malta and a similar number in Gozo, mostly in Ta' Ċenċ and San Lawrenz areas. These gulls occupy their breeding colony as early as November and eggs are laid in March, with most birds fledging in May and June, and colonies are then usually deserted.

The birds tend to hang around the cliffs and while many birds feed at sea, many congregate at the Mġatab landfill to feed on dumped household waste. It is not known whether gulls from Gozo also go to the landfill to eat.

It is not expected that works at the airport would have an impact on these birds.

7.8 Eurasian Collared Dove *Streptopelia decaocto*

The species is listed as 'Least Concern' in the IUCN Red List Category, with population trends as 'increasing'.

Up to 1999, the Collared Dove was considered a vagrant, of which single birds were recorded and not even annually. Up to 1994, there were only 8 known records but after 1999 it started being recorded annually and the number of sightings increased. The increased number of sightings in Malta correspond with the range expansion of the Collared Dove (Snow & Perrins 1998). In the early 1900s, the Collared Dove started breeding in Turkey and in a span of 40 years it spread over an area of 2.5 million km² to reach every corner of Europe and North Africa, including the Mediterranean Islands. The changing status of this bird in the Maltese Islands is part of this expansion (Fenech 2010).

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It is now a common breeding resident in localised areas in Malta, Gozo as well as Comino, from where it was absent in 2008 (Raine *et al* 2009). It is mostly found in areas where Aleppo Pine groves or Acacia plantations are present. It is also a very scarce but annual visitor in spring.

The first pair was confirmed breeding in Malta in August 2003 at Mellieħa (Galea & Galea 2010). Other birds were seen at Mizieħ and in other areas at Mellieħa, but breeding could not be confirmed. Several birds bred again in summer 2004 at Għarb and Għasri in Gozo and at Mellieħa in Malta. Birds bred again at Mellieħa in 2005, and up to 17 birds were noticed at Għajn Żejtuna in mid-June and about 20 in mid-July.

Up to two pairs bred at Xewkija Gozo in 2008 and 2009. Two pairs have bred at Ta' Braxia Cemetery in April 2009 and three pairs were seen displaying in March 2010. A roost count at Għajn Żejtuna on 26 December 2008 resulted in 310 birds (Fenech 2010). There are now several areas that hold a significant number of over 25 pairs such as Marsa, Pembroke, Qormi, Attard, Foresta 2000, Għajn Żejtuna amongst others.

Għajn Żejtuna, where the first birds were discovered breeding in August 2003, remains a stronghold but several pairs (estimated at over 15 pairs) now breed at Għadira nature Reserve itself, mostly in the eucalyptus / acacia trees in the sand dune) as well as at Foresta 2000 (where over 30 pairs are estimated breeding). The breeding population may fluctuate because there are years when several birds die suddenly and at the same time as several emaciated birds are often found when this happens. The cause of death has not yet been determined (N. Fenech pers. obs.).

The bird is rather tolerant of human activity, and it is highly unlikely that the proposed project would have any impact on these populations. The species is protected by law but is not of any particular conservation concern at the moment.

It is highly unlikely that the proposed project would have any impact on the populations of Collared Doves in Gozo. The species is protected by law but is not of any particular conservation concern at the moment.

7.9 Greater Short-toed Lark *Calandrella brachydactyla*

The species is listed as 'Least Concern' and its population trend as 'unknown' in the IUCN Red List Category. It is listed as 'vulnerable' in the Red Data Book for the Maltese Islands. But the 2018 Breeding Bird Atlas gloves their status as common, the short-term population trend and breeding range as increasing.

The Greater Short-toed Lark is the only lark that breeds in the Maltese Islands. It is a migrant, arriving in early March. Breeding starts in mid-April and continues until the end of July. A small number of migrants appear from mid-August to late September. It is occasionally recorded in October.

Short-toed Larks breed in garrigue areas as well as cultivated fields. Their nest is constructed in a shallow depression. In 1916, Despott said that it was the most common breeder after the Spanish Sparrow. But the breeding population has decreased greatly. It was estimated that the population in 2008 amounted to between 2,039 to 5,728 pairs (Raine *et al.* 2009). The latest breeding bird Atlas (2018) estimates the population at between 2,151 and 6,434 pairs.

The nominate race as well as the races *Calandrella brachydactyla hermonensis* and *Calandrella brachydactyla longipennis* (Eastern Short-toed Lark) have been listed as occurring in Malta. The nominate race occurs in Europe and on the Mediterranean coast of northwest Africa. The race

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Calandrella brachydactyla hermonensis occurs in the Middle East and *C. b. Longipennis* is found on the plains north of Caucasus and Ukraine, east to northern Mongolia, and China.

The Short-toed Lark is a European Species of Conservation Concern as it is declining throughout its range. Changes in agricultural practices, urbanisation, and human disturbance as well as natural predation by snakes are factors contributing to its decline.

In the study area, the Short Toed-Lark breeds in the Ta' Lambert Area as well as at the Ta' Ċenċ plateau. In Malta it is a rather common breeder at the Malta International Airport, which shows that this bird is unlikely to be disturbed by noise and airport activities, which, in any case, in Gozo will be nowhere near the scale they are in Malta.

The only impact can be on breeding birds within the confines of the airport if works are carried out between March and July. As the fieldwork was not carried out during the breeding season, it cannot be ascertained if Short-Toed Larks breed within the airport confines. The area can easily be holding five pairs as the habitat is suitable.

As a mitigation measure, it would be best if any land modification and engineering works would be carried out between October and February so that arriving migrants which are potential breeders would not be disturbed. Works during this period are also likely to cause the least disturbance possible for any other breeding birds, including seabirds.

7.10 Barn Swallow *Hirundo Rustica*

The Barn Swallow is a very common spring and autumn migrant, appearing from the end of February to mid-June and from late August to mid-November. Occasionally some individual birds are seen in December and January. Thousands of birds can be seen on some days, especially as they congregate at roosting places. Flocks of over 5,000 birds have been recorded.

In 1843, Antonio Schembri said that "odd pairs breed here." The number of breeding pairs has increased over the past few years, especially since persecution in the form of illegal shooting has virtually stopped. The 2018 Breeding Bird Atlas states 40-62 pairs breed in the Maltese Islands, all but one of them, breed in Gozo.

Swallows in the Maltese islands breed between May and August. Up to 15 pairs could breed in the areas surrounding the airport, as most of these birds usually breed in farms, where they feed on flying insects.

An issue that has to be borne in mind at the Gozo airport is the timing of grass cutting, as it has been noted that large quantities of Swallows and similar species were attracted to the Malta International Airport when grass was cut during the day during the peak migration season. Grass cutting disturbs insects in the grass, which in turn attracts insect feeding birds. This was even resulting in an increased number of bird strikes. Such bird strikes kill birds and cause insignificant damage to aircraft but still cause unnecessary delays because of necessary inspections to aircraft.

It is not anticipated that works at the airport will cause any disturbance or have any impact on breeding birds, but one has to be careful in the management of grass at the airport to avoid the possibility of attracting birds by cutting grass at times of migration. If the grass needs to be cut during migration, it should be cut at night.

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7.11 Blue Rock Thrush *Monticola solitarius*

The species is listed as 'Least Concern' and its population trend as 'stable' in the IUCN Red List Category. It is listed as 'vulnerable' in the Red Data Book, but its status has improved since that time. The Breeding Bird Atlas (2008) listed it as 'Frequent' while the 2018 Breeding Bird Atlas listed its population trend and breeding range as stable.

The Blue Rock Thrush is a resident breeding bird and the National bird of Malta and is protected by law. It breeds in crags in cliff faces, inland valleys, stone walls and old disused buildings. Over the past few years, some pairs have started breeding in inhabited areas. Breeding starts in late February and eggs are laid in March. The female incubates the eggs for 15 days and both adults feed the young with insects of various sizes and reptiles, particularly lizards and geckos. The young fledge after about a fortnight but are still fed by the adults for some more days. Up to two broods are raised in a season. In autumn and winter, some birds disperse inland. It is not yet known if local birds migrate, but observations indicate that there may be a few migrants in autumn each year.

It is listed as 'vulnerable' in the Red Data Book, but its status has improved since that time. The Breeding Bird Atlas (2008) listed it as 'Frequent' while the 2018 Breeding Bird Atlas listed its population trend and breeding range as 'Stable', estimating its population to between 694 to 1,204 pairs, almost half of which are in Gozo. The known populations closest to the project are those breeding in the cliffs and at Mgarr ix-Xini inland valley. The impact of the works on such a species is expected to be of no significance.

7.12 Sardinian Warbler *Sylvia melanocephala*

The species is listed as 'Least Concern' and its population trend as 'increasing' in the IUCN Red List Category. The 2018 Breeding Bird Atlas shows its short-term population trends as decreasing and the breeding range as stable.

The Sardinian Warbler is now the most common breeding warbler, even though it has only been breeding for just under 150 years. Captain Henry W. Feilden was one of the first to conclude that they had started to breed in Malta and in 1874 Dr David Bruce, also found breeding Sardinian Warblers. Henry Eeles Dresser, who was working on The Birds of Europe, wrote that Dr Bruce had informed him he had found two nests and that he had shot a female off the nest to make sure what the species was (Fenech 2010).

Several Sardinian Warblers migrate through Malta between late October and mid-December and between late February and early March. There is no fixed migration pattern, and their migration seems irregular. It is not known if any of these migrants stay to breed.

Sardinian Warblers breed between February and August, with the peak being between March and May. Most nests have a clutch of four eggs, but clutches of three and five are also common. Both sexes share in nest building, incubation, brooding and feeding the young. Incubation takes around 12 to 13 days and birds take another 13 days to fledge. The fledged young stay in the company of their parents for up to three weeks. Birds nesting by early March may raise up to three broods, but most pairs raise two broods, and the success rate is about 45%. In 2008, the Breeding Bird Atlas estimated the total breeding population in the Maltese Islands between 12,736 and 16,998 breeding pairs (Raine et al, 2009). The 2018 Breeding Bird Atlas estimated the population at 8,504 to 13,727, close to 2,000 to 3,000 of which are in Gozo. Sardinian Warblers breeds in a variety of habitats around the Ta' Lambert area, but the breeding populations present in the area are unlikely to be impacted by any of the envisaged works.

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7.13 Spectacled Warbler *Sylvia conspicillata*

The species is listed as 'Least Concern' and its population trend as 'unknown' in the IUCN Red List Category. It is listed as 'endangered' in the Red Data Book for the Maltese Islands. The 2018 Breeding Bird Atlas shows its short-term population trends and its breeding range trends as decreasing.

The Spectacled Warbler is a breeding bird that has become a very scarce and localised breeder over the past 35 years. It used to be more common than the Sardinian Warbler, which started to breed in Malta a mere 140 years ago. In 1945, John Gibb, a British officer and ornithologist stationed in Malta, noted that at Wied il-Kbir there were more pairs of Spectacled Warblers than Sardinian Warblers (Fenech 2010).

Spectacled Warblers establish territories between January and February and nest building starts between mid-February and mid-March, with both adult birds bringing material and weaving fine grasses to build the nest. Incubation takes between 12 and 13 days and is carried out by both birds. The young are also fed by both parents and fledge after 10 to 12 days and continue to be fed for some more days. A pair can raise two or three broods a year. The birds stay around their territories throughout the year.

The Spectacled Warbler is listed as 'endangered' in the *Red Data Book for the Maltese Islands*, a status that still holds because there is a decrease in its population. The Breeding Bird Atlas in 2008 estimated the total population to be between 691 and 1,823 breeding pairs (Raine *et al.* 2009). The 2018 Breeding Bird Atlas gave its population estimates between 716 to 1,162 pairs.

Fieldwork in December 2021 indicated up to 5 adult males in the area south of the present and proposed airfield. However, the proposed works are unlikely to have any impacts on this species.

7.14 Zitting Cisticola *Cisticola juncidis*

The species is listed as 'Least Concern' and its population trend as 'increasing' in the IUCN Red List Category. The 2018 Breeding Bird Atlas shows its short-term population trends and the breeding range as stable.

The Zitting Cisticola, formerly known as Fan-tailed Warbler, is a widespread breeding bird whose population fluctuates. Usually, there are fewer birds following cold and wet winters. Nest building starts in mid-February and the breeding season lasts until August, sometimes until November. Males are polygamous and a female may have up to three broods in a year.

The species was first listed by Nicolo Ardoino, who said it was scarce and appeared in early September. It was later recorded at Salina by Carmelo de Lucca in June 1967. The first nest was found in 1973 at Simar. It has since spread all over the Maltese Islands. According to the 2018 Breeding Bird Atlas, there was a total breeding population of between 12,600 and 18,614 breeding pairs. A slight drop from the 13,702 and 19,544 breeding pairs estimated ten years earlier (Raine *et al.*, 2009). Several pairs undoubtedly breed in the area around the heliport and several birds were noted in fieldwork carried out in December 2021.

The Zitting Cisticola is protected by law. The projected works are not expected to have any impact on this species.

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7.15 Cetti's Warbler *Cettia cetti*

The species is listed as 'Least Concern' and its population trend as 'increasing' in the IUCN Red List Category. It is listed as 'vulnerable' in the Red Data Book for the Maltese Islands, but the local status is outdated as the bird has spread considerably since then.

The Cetti's Warbler is now a fairly common breeding bird found in places with dense vegetation or ample cover. Cetti's Warblers were very rare a hundred years ago and Giuseppe Despott said he had listed it as he had seen a specimen taken in 1901. The species was probably breeding at Girgenti in the 1950s, as farmers recall hearing its distinctive call. It was confirmed breeding in 1970.

The Cetti's Warbler is more easily heard than seen. It breeds between April and July. Two broods can be reared in a season. Males can be polygamous. The Red Data Book for the Maltese Islands lists the status as 'vulnerable' in the, but the local status is outdated as the bird has spread considerably since then. The bird is now breeding in areas where cover is very sparse, and it is often found breeding in maquis areas as well as in very small reed beds. The Breeding Bird Atlas 2008 estimated the total population of Cetti's Warbler in the Maltese Islands at between 978 and 2,281 breeding pairs (Raine *et al.*, 2009). The 2018 Breeding Bird Atlas gave its population estimates as between 909 to 1,745 pairs, up to 300 of which are found in Gozo.

The Cetti's Warbler is protected by law. The populations closest to the project are those breeding in Mgarr ix-Xini Valley, where up to 5 pairs could be breeding. The proposed works are unlikely to have any impacts on this species.

7.16 Spanish Sparrow *Passer hispaniolensis*

The species is listed as 'Least Concern' and its population trend as 'decreasing' in the IUCN Red List Category. The Breeding Bird Atlas (2008) listed it as 'Abundant' while the 2018 Atlas listed it as stable.

The Spanish Sparrow is the most common bird that can be seen on the Maltese Islands. They build their nests both in urban areas as well as in the countryside and can be very tolerant of human presence and activity. Nest building can start as early as late January, but birds can be seen maintaining their nests even in November and December. Sparrows can rear from two to three broods, occasionally four. Breeding has been recorded even in November and December.

Spanish Sparrows are mainly sedentary, but some populations are known to be migratory. In Malta, Spanish Sparrows move between Malta and Gozo, but there is no evidence of migration of local birds yet. Flocks of sparrows are often noted on migration in both spring and autumn, but it is unknown whether there is any interaction between migrants and local populations.

Thousands of sparrows gather to sleep in communal roosts both in urban areas as well as in the countryside. Some of these roosts are also used by Common Starlings *Sturnus Vulgaris*, White Wagtails *Motacilla alba* and finches. The Breeding Bird Atlas estimated the total population of Spanish Sparrows for the Maltese Islands at between 110,910 and 306,170 pairs in 2008 (Raine *et al.* 2009). The 2018 Breeding Bird Atlas estimated their maximum breeding population as 28,528 breeding pairs.

The Spanish Sparrow is protected by law. The bird can be extremely tolerant of human activity. The proposed works at the heliport are not expected to have any negative impact on Spanish Sparrows.

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7.17 Feral Pigeon *Columba livia*

The species is listed as 'Least Concern' in the IUCN Red List Category, with population trends as 'decreasing'. The 2018 Breeding Birds Atlas lists it as frequent.

The Feral Pigeon is a resident bird that breeds in cliffs and is a descendant of the Rock Dove but one can hardly say that the pure form of the Rock Dove still exists because of interbreeding with domestic pigeons. Their largest populations of such species are found in the inner harbour area. Feral Pigeon can be found breeding in cliffs in Malta, Gozo and Comino. The largest population in the wild is that on Comino, where one can see several specimens with typical plumage of the wild form.

But even on Comino, lost racing pigeons can often be seen and these breed with feral birds, hence continuing to degenerate any trace of the wild stock. Certain populations of Feral Pigeon living in the vicinity of breeding sites of Peregrine Falcons form the staple diet of the Peregrine. A total of 53 per cent of the prey of Peregrines consists of such wild pigeons (Sammut & Fenech 2017). The Peregrines that breed on Comino and the ones at Ta' Ċenċ have been observed taking pigeons over I-Aħrax and id-Dahar areas respectively.

Up to 50 pairs are estimated to be breeding in the cliffs around Ta' Ċenċ. The species is not protected by law and is often considered a pest. It is not a species of any conservation concern at the moment and the proposed project poses no threat to Feral Pigeon / Rock Dove.

MIGRANT BIRDS

8.1 A total of 468 species of birds have been recorded in the Maltese Islands to date (Fenech 2010, Fenech and Sammut 2020). However, only around 300 are recorded annually. Most of the birds recorded annually have the potential of occurring at or around the site or to fly over the proposed development, as they do in all other areas of the Maltese and Gozitan countryside. However, realistically speaking, under 200 species are expected to have the potential of occurring regularly. The European status of the bird species that are most likely to occur at or around the site can be found in Table 4 (p. 31). The list is being given for the sake of completeness, not because it is envisaged that the works or airport operations will have a direct or regular impact on all of these species. The potential impacts and mitigation measures are listed in Table 6 (p.36) in the Appendix.

8.2 Analysis of the species potentially occurring at the site itself and in the surrounding areas, including the marine conservation areas shows there are 12 species of Global Conservation concern (SPEC 1), that occur annually. These are listed in Table 3 (p. 21). All of these 12 species that occur annually are migrants that can be seen in spring or autumn or during both migrations and some also winter. Some, such as Saker Falcon *Falco cherrug*, are very rare but individual birds occur. Others, such as Meadow Pipits *Anthus pratensis*, are very common, and thousands appear on migration and many winter in the Maltese islands. The seasons when these birds can be encountered as well as their status locally is given in the table. Some of the species are locally protected while two are not and can be hunted. This is also indicated in the same table.

8.3 Most of the birds that occur in the Maltese Islands are migrants. Migration in Europe can be defined as a seasonal movement from breeding areas to resting grounds, which often are also wintering quarters, and back. One usually refers to the migration to the breeding grounds as 'spring migration' and the journey to the 'wintering grounds' as 'autumn migration'. The terms 'spring

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migration', 'autumn migration' and 'wintering grounds' are, strictly speaking, incorrect as many migrants, such as larks and thrushes, leave in the middle of summer and reach continental Europe before the spring equinox in March while it is still winter. Some bird species such as Swift, reach their 'wintering quarters' during the summer, while the majority of species reach them in the autumn at the latest. New terms have been introduced and one speaks of 'outward migration' for movements away from the breeding grounds and 'return migration' for movements back to the breeding grounds. The term 'resting grounds' is now often used instead of 'wintering areas'.

Table 3											
Birds of GobaI Conservation Concern (SPEC 1) recorded or are likely to occur in the study area and the times of the year when they occur											
English Name	Scientific Name	Protected in Malta (Yes / No)	Status	Recorded				SPEC Category	Population Size	Breeding	
				Spring	Summer	Autumn	Winter			Units	Trend
European Turtle Dove	<i>Streptopelia turtur</i>	No	Common	■	■	■		1	3,150,000-5,940,000	Pairs	Decreasing
Yelkouan Shearwater	<i>Puffinus yelkouan</i>	Yes	Frequent	■	■		■	1	19,400-31,200	Pairs	Uncertain
Northern Lapwing	<i>Vanellus vanellus</i>	No	Scarce				■	1	1,590,000-2,580,000	Pairs	Decreasing
Great Snipe	<i>Gallinago media</i>	Yes	Fairly common	■		■		1	62,500-145,000	Males	Decreasing
Egyptian Vulture	<i>Neophron percnopterus</i>	Yes	Rare	■		■		1	3,000-4,700	Pairs	Decreasing
Pallid Harrier	<i>Circus macrourus</i>	Yes	Scarce	■		■		1	300-1,140	Females	Unknown
Red Kite	<i>Milvus milvus</i>	Yes	Very rare	■		■		1	25,200-33,400	Pairs	Decreasing
Red-footed Falcon	<i>Falco vespertinus</i>	Yes	Common	■		■		1	30,300-63,400	Pairs	Decreasing
Saker Falcon	<i>Falco cherrug</i>	Yes	Very rare	■		■	■	1	350-500	Pairs	Increasing
Dartford Warbler	<i>Sylvia undata</i>	Yes	Very rare	■		■	■	1	646,000-1,480,000	Pairs	Decreasing
Redwing	<i>Turdus iliacus</i>	Yes	Frequent			■	■	1	13,200,000-20,100,000	Pairs	Decreasing
Meadow Pipit	<i>Anthus pratensis</i>	Yes	Very common	■		■	■	1	9,670,000-15,000,000	Pairs	Decreasing

Table 3 Birds of Global Conservation Concern likely to occur in the study area and the times of the year when they occur

8.4 Birds migrate from south to north in late winter and early spring. Birds leave their resting and winter quarters to reach the breeding grounds further north, where the day is longer, the temperature milder and food availability is at its peak. This enables the young to be fed, and feed, more easily.

8.5 Weather plays an important factor on migration and although irrespective of the number of birds crossing the Mediterranean, there is usually a consistent number of birds on the Maltese Islands during both migrations, large numbers of birds are usually seen in Malta when "a period of adverse weather follows suddenly on a period of fine, settled weather and more favourable winds" (Sultana and Gauci 1982). This is because birds that would have otherwise continued to migrate would become grounded. And this is where the Maltese Islands usually have a more important role to play. The proposed works are however unlikely to have any tangible impact on migrating birds, even if works are carried out during migration periods.

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ASSESSMENT OF ENVIRONMENTAL IMPACTS & RISKS FROM PROPOSED WORKS

9.1 To be able to assess the significance of a potential negative impact that can be attributed to the proposed work, the following terms will be used:

- Not significant: No material change to the species
- Minor significance: Small-scale loss or disturbance to that is unlikely to affect the species population
- Major significance: Large-scale change in habitat or loss of habitat or disturbance that is likely to affect the species populations' viability.

9.2 This study evaluated the impacts the proposed works related to the airstrip project could have on the avifauna, both during the period when works are being carried out as well as when the works are completed, and the runway starts to operate. This assessment went into a degree of detail as to why there needs to be precautionary rather than mitigating measures because the proposed work is highly unlikely to generate any significant impact on birds in the area.

9.3 Light is often said to be detrimental to birds. The birds most likely to be affected by light are shearwaters. However, in this case, as the birds would be moving towards the breeding sites in the cliffs from the sea, the lights at the airport will not be visible. There are already stronger light sources in Gozo and the airstrip is not projected to be operational at night.

9.4 Impacts because of noise were also looked at. An amount of noise is expected to be generated by machinery. Such noise levels are only expected to be temporary while the project is being implemented. And take-off and landing aircraft will not generate constant amounts of noise. Hence it is not expected that there will be any lasting significant impacts on birds, whether breeding or migratory.

LIGHT POLLUTION

10.1 As stated elsewhere in this PDS, the airfield will be open to General aviation single-engine light aircraft from 30 minutes past sunrise to 30 minutes before sunset. There will be no taxiway lights and any Apron or Runway lights will be switched on only when in use.

10.2 As lights will be switched on demand, such lights are not bound to have any detrimental effect on nocturnal migrants. There are other light sources constantly switched on in the surrounding areas for any of these lights to have an effect. Because of the distance from the cliff edge, these lights will not be visible from the cliffs where the seabirds breed.

10.3 Nevertheless, in impact assessments one is bound to err on the side of caution and the precautionary principle should be applied and mitigation measures are being suggested for breeding birds.

10.4 If works are to be carried out at night, the precautionary principle should be applied, and the amount of light used should be the bare minimum necessary to carry out the works in a safe manner.

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NOISE POLLUTION

11.1 There may be two sources of noise, the first is due to the proposed works and the second is the operational noise that results from operating the airfield, mostly take-off and landing aircraft. As the number of flights will be limited, one would not expect a significant increase in noise due to vehicular traffic.

11.2 The site has been used for helicopters quite recently. The Mil Mi-8 helicopters in use generated 90 dbA noise levels at 50 meters. As stated elsewhere in this PDS, all general aircraft operating at Gozo fall within the lower limit of the Noise classification with engines certified at less than 70dB (Farve 2007).

11.3 When speaking about noise pollution in relation to birds, one has to point out two important issues. Avian hearing is less sensitive than human hearing (Beason 2004). Secondly, birds are usually disturbed by intermittent noise to the point that they are constrained to go away from it and not to return, by constant, not intermittent or temporary noise (Cironi 2014). Experience with work at Malta's International Airport, which is very busy compared to the Gozo one, shows that birds are not deterred at all by aircraft and other noise, so much so that bird scaring measures have to be implemented to avoid bird strikes. Some birds can be very tolerant of sounds and noise. Starlings, several species of waders, larks and pipits, Kestrels, harriers and several other species often spend very long periods of time (some winter and some even breed) at airports, where noise levels from aircraft engines are very high.

11.4 An amount of noise is expected to be generated by machinery involved in the construction works, laying of asphalt of the runway. Such noise levels are only expected to be temporary, while the project is being implemented. Hence it is not expected that there will be any significant impacts on migratory birds.

11.5 Operational noise levels are also not expected to have any significant impact neither on migratory birds nor on breeding colonies. While aircraft taking off and landing do generate an amount of noise, one must consider that sound levels drop by half with every doubling in distance from a point source (Blickley and Patricelli 2010). This is illustrated in Fig 6 (p.24), which shows sound levels in G. Marconi Airport in Bologna, Italy, which has a 2.8 km by 45 metre runway and handles 9 million passengers, which is much larger both physically as well as from the operational point of view.

11.6 Several studies abroad state that traffic and other noise could affect bird populations in a number of ways. Forman *et al.* (2002) studied the impact of traffic on five species of grassland bird populations in grasslands at different distances from roads in and around Boston. The authors argue that there is an effect on the density of species studied by road noise, but that the extent of the effect, in terms of decreased populations at different distances, varied depending upon the level of activity of the road. They found that low traffic (less than 8,000 vehicles/day) did not affect grassland bird populations. In areas with from 8,000-15,000 vehicles per day, there was no effect on population levels *per se*, but there were fewer breeding birds up to 400 m from the road. Bird presence and breeding were decreased at up to 700 metres from the roadway when there were from 15,000-30,000 vehicles per day, whereas this distance increased to 1,200 m for more than 30,000 vehicles per day (a multilane highway). The results from Forman *et al.* (2002) may not apply to all species, or in all situations. Traffic in the area at Xewkija is still below the first bracket studied by Forman, and if it increases to the second bracket, the distance of the road from the breeding birds is still significant.

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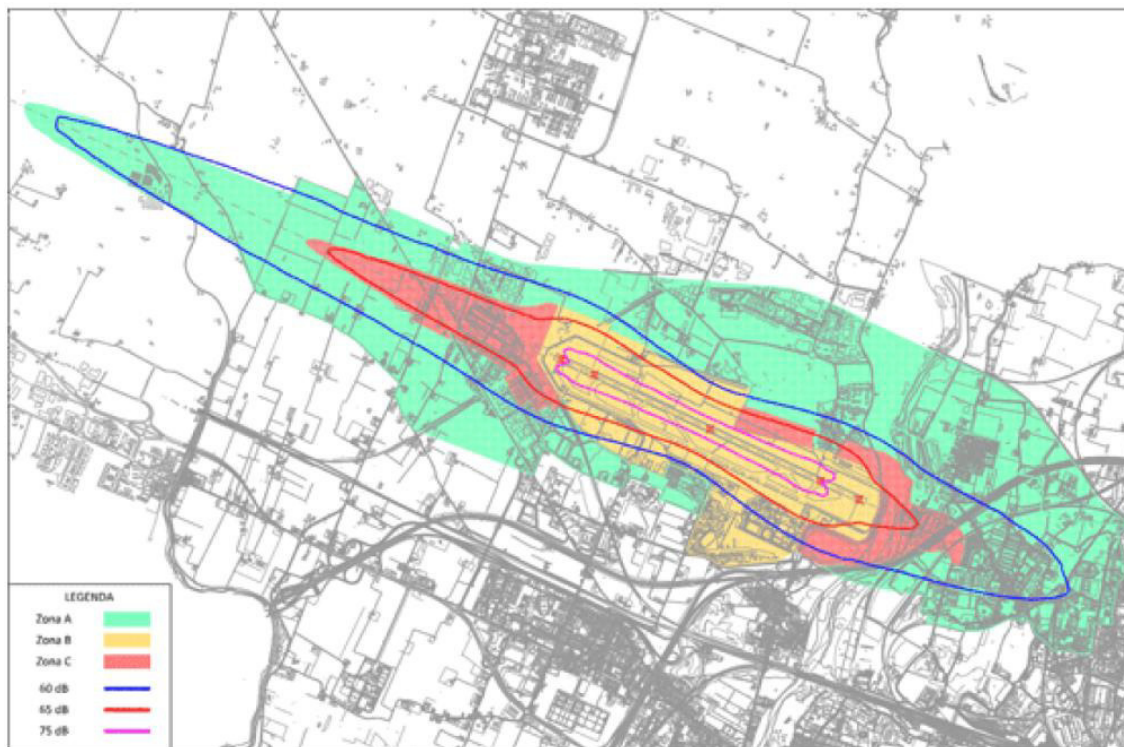


Figure 6 Sound levels in G. Marconi Airport in Bologna, Italy. Source Cironi 2014

11.7 Local studies often tend to draw on foreign published sources due to the lack of local specific studies into several issues. However, care must be made when trying to extrapolate or infer impacts from what may appear to be a similar situation abroad because the local context or scale is often entirely different. One can come across generic statements such as “Studies have shown that traffic noise from road systems can have a serious ecological impact”. The source for this statement is a valuable piece of pioneering research into the impacts of roads carried out by Forman and Alexander (1998). The report cites extensively from studies on species richness in the Netherlands that showed that in both woodland and grasslands adjacent to roads, 60% of the bird species present had a lower density near a highway. Bird density was approximately one third lower and species richness was reduced as species progressively disappeared with proximity to the road. (Reijnen *et al.* 1995, Reijnen *et al.* 1996). But when using such examples, one needs to consider that the biodiversity in the airport area is significantly different, much poorer, and the study by Forman and Alexander (1998) dealt with highways.

11.8 Different scholars who studied the impacts of noise on birds agree on several concepts. Blickley and Patricelli (2010) argue that “environmental noise is not an entirely new problem for animals, nor is human activity the exclusive cause of it. Natural environments have numerous sources of ambient noise, such as wind, moving water and sounds produced by other animals. There is also evidence that animals living in naturally noisy areas have made adaptations through the use of signals and signalling behaviours to overcome the masking impacts of noise.”

OPERATIONAL ISSUES

12.1 The final aspect that needs to be looked at are the impacts as a result of operational issues and to assess their impacts on avifauna. Airports around the world usually attract birds because

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they usually involve stretches of land devoid of human presence. Birds are mostly deterred by the presence of humans, and airports usually have large areas devoid of human presence. This is also true of Malta's International Airport but the Gozo airport is very small and surrounded by open spaces, so it is not expected to attract birds as such.

12.2 However activities such as grass cutting, can attract birds that feed on flying insects, particularly hirundines (Swallows and martins) and Swifts. Grass cutting disturbs insects in the grass and renders them airborne, thus attracting aerial feeding birds. Hence grass cutting during the peak migration of such species, March to May, and September to mid-October, should be carried out at night to reduce the risk of bird strikes.

12.3 The impact of taking off and landing have also been considered. The approximate flight paths, based on information supplied by Transport Malta, are represented in Fig 7. The airfield elevation is approximately 300 ft (100 m) above sea level. Aircraft would approach at about 1,000 ft (300 m), and circuit to touchdown. Take off is similar, with aircraft reaching over 500 ft (150 m) before turning and continuing to climb to 300 m. Noise levels would be higher to take off but, as discussed in the section dealing with noise, the noise is temporary and not expected to exceed 70 dB, as all general aircraft operating at Gozo fall within lower limit of the Noise Classification.



Figure 7 Flight paths of aircraft taking off and landing . Source of the map: Google Earth Pro

12.4 Flight Paths are at a level where they are not expected to interfere with shearwaters, which, as their name implies, fly close to the surface of the water. Noise from aircraft should not be an issue for such species, especially considering the amount of noise and disturbance they are subjected to during the peak breeding season by boats and pleasure craft, which transect their rafting areas at all times of the day in summer.

12.5 As aircraft activity will not be taking place at night, noise pollution as well as light pollution should not be of any particular concern on avifauna.

12.6 There can be, however, an increased risk of bird strikes from increased flights. A study of migration over the straits of Messina has shown that several species that commonly migrate over the Maltese Islands such as herons, fly at any altitude up to 1,850 m, Swifts at up to 1,400 m, falcons

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at up to 1,450 m, harriers at up to 1,290 m, with mean altitudes of 800 m (Mateos-Rodríguez & Liechti 2012). However, the probability of such strikes is hard to assess. As most inbound aircraft for Runway 13 fly over Gozo, with no reported incidents in this region over the past 15 years, it is unlikely that bird strikes will occur.

MITIGATION MEASURES

13.1 Although the proposed works do not pose any foreseeable risk on birds as such, a number of mitigation measures are being suggested more as a precaution than because the works or the operation of the airstrip itself is envisaged to have any tangible impact as long as the scale remains at the proposed level.

- Although current and past noise levels did not appear to have been detrimental to birds in the area, contractors responsible for works should ensure noise emissions should be minimised when works are in progress, particularly at night.
- Noise levels at the site should be measured and compared to noise levels at the cliff edge. If noise levels are deemed to be high, (over 30 dB during the night), noise abatement measures should be used, especially when works are carried out late in the evening and at night. These measures should be particularly implemented on days with southerly winds when sounds may be carried out over the sea to the areas where shearwaters may be coming to land. This measure should be implemented from the middle of February to October, which is the breeding period of shearwaters.
- Lights at night should be kept down to a minimum and illumination used should as much as possible be localised and used only where necessary.
- The street and any other lighting used should be the type to create the least amount of light pollution possible. Cats' eyes and other types of reflectors should be installed to help motorists while lighting that is automatically activated and that switches off on its own by the use of sensors should be ideally used, at least in the stretch of road leading to the airport area.
- Grass cutting during the peak migration of aerial feeding birds, March to May, and September to mid-October, should be carried out at night to reduce the risk of bird strikes.
- Although remote, the possibility of bird strikes on approach or take off, should not be discarded.

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APPENDIX 1: TABLE 4 BIRDS LIKELY TO OCCUR IN THE STUDY AREA

Table 4 Birds recorded in the Maltese Islands which are likely to occur in the Study Area					
English Name	Scientific Name	SPEC Category	World Population	Breeding	
				Units	Trend
Rock Dove	<i>Columba livia</i>		11,000,000-22,600,000	Pairs	Unknown
Stock Dove	<i>Columba oenas</i>		561,000-1,040,000	Pairs	Increasing
Common Wood Pigeon	<i>Columba palumbus</i>		51,000,000 - 73,000,000	Individuals	Stable
European Turtle Dove	<i>Streptopelia turtur</i>	1	3,150,000-5,940,000	Pairs	Decreasing
Eurasian Collared Dove	<i>Streptopelia decaocto</i>		7,910,000-14,400,000	Pairs	Increasing
European Nightjar	<i>Caprimulgus europaeus</i>	3	614,000-1,100,000	Males	Stable
Alpine Swift	<i>Apus melba</i>		151,000-333,000	Pairs	Stable
Pallid Swift	<i>Apus pallidus</i>		63,200-106,000	Pairs	Stable
Common Swift	<i>Apus apus</i>	3	19,100,000-32,500,000	Pairs	Decreasing
Great Spotted Cuckoo	<i>Clamator glandarius</i>		84,100-252,000	Pairs	Increasing
Common Cuckoo	<i>Cuculus canorus</i>		5,960,000-10,800,000	Males	Stable
Water Rail	<i>Rallus aquaticus</i>		157,000-346,000	Pairs	Uncertain
Spotted Crake	<i>Porzana porzana</i>		161,000-251,000	Males	Unknown
Little Crake	<i>Zapornia parva</i>		55,000-82,900	Males	Stable
Baillon's Crake	<i>Zapornia pusilla</i>	3	980-1,400	Males	Uncertain
Common Moorhen	<i>Gallinula chloropus</i>		909,000-1,440,000	Pairs	Stable
Eurasian Coot	<i>Fulica atra</i>	3	945,000-1,550,000	Pairs	Decreasing
Common Crane	<i>Grus grus grus</i>		113,000-185,000	Pairs	Increasing
Mediterranean Storm Petrel	<i>Hydrobates melitensis</i>		438,000-514,000	Pairs	Unknown
Scooli's Shearwater	<i>Calonectris diomedea</i>		30,500-48,100	Pairs	Decreasing
Yelkouan Shearwater	<i>Puffinus yelkouan</i>	1	19,400-31,200	Pairs	Uncertain
Black Stork	<i>Ciconia nigra</i>		9,800-13,900	Pairs	Increasing
White Stork	<i>Ciconia ciconia</i>		224,000-247,000	Pairs	Increasing
Eurasian Bittern	<i>Botaurus stellaris</i>	3	37,600-66,400	Males	Stable
Little Bittern	<i>Ixobrychus minutus</i>	3	63,100-111,000	Pairs	Stable
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	3	60,000-86,100	Pairs	Decreasing
Squacco Heron	<i>Ardeola ralloides</i>		15,000-25,900	Pairs	Stable
Western Cattle Egret	<i>Bubulcus ibis</i>		76,100-92,300	Pairs	Decreasing
Grey Heron	<i>Ardea cinerea</i>		223,000-391,000	Pairs	Decreasing
Purple Heron	<i>Ardea purpurea</i>		31,600-46,000	Pairs	Decreasing
Little Egret	<i>Egretta garzetta</i>		66,700-84,800	Pairs	Decreasing
Eurasian Spoonbill	<i>Platalea leucorodia</i>		10,200-15,200	Pairs	Increasing
Glossy Ibis	<i>Plegadis falcinellus</i>		28,300-37,700	Pairs	Increasing
Northern Gannet	<i>Morus bassanus</i>		323000	Pairs	Increasing
Great Cormorant	<i>Phalacrocorax carbo</i>		401,000-512,000	Pairs	Increasing
Eurasian Stone-curlew	<i>Burhinus oedicnemus</i>	3	53,400-88,200	Pairs	Increasing
European Golden Plover	<i>Pluvialis apricaria</i>		630,000-860,000	Pairs	Increasing
Eurasian Dotterel	<i>Charadrius morinellus</i>		12,800-48,400	Males	Decreasing
Northern Lapwing	<i>Vanellus vanellus</i>	1	1,590,000-2,580,000	Pairs	Decreasing
Kentish Plover	<i>Anarhynchus alexandrinus</i>	3	21,500-34,800	Pairs	Decreasing
Ruff	<i>Calidris pugnax</i>	2	265,000-1,650,000	Males	Decreasing
Jack Snipe	<i>Lymnocyrtus minimus</i>		19,600-44,100	Pairs	Stable
Eurasian Woodcock	<i>Scolopax rusticola</i>		6,890,000-8,710,000	Males	Stable
Common Snipe	<i>Gallinago gallinago</i>	3	2,670,000-5,060,000	Pairs	Decreasing
Great Snipe	<i>Gallinago media</i>	1	62,500-145,000	Males	Decreasing

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Collared Pratincole	<i>Glareola pratincola</i>	3	7,800-14,900	Pairs	Decreasing
Cream-colored Courser	<i>Cursorius cursor</i>	3	450-2,800	Individuals	Unknown
Black-headed Gull	<i>Chroicocephalus ridibundus</i>		1,340,000-1,990,000	Pairs	Fluctuating
Little Gull	<i>Hydrocoloeus minutus</i>	3	23,700-45,200	Pairs	Decreasing
Mediterranean Gull	<i>Larus melanocephalus</i>		118,000-328,000	Pairs	Decreasing
Audouin's Gull	<i>Larus audouinii</i>		21,800-22,000	Pairs	Fluctuating
Yellow-legged Gull	<i>Larus michahellis</i>		409,000-534,000	Pairs	Increasing
Caspian Gull	<i>Larus cachinnans</i>		54,100-87,500	Pairs	Increasing
Great Black-backed Gull	<i>Larus marinus</i>		118,000-133,000	Pairs	Decreasing
Western Osprey	<i>Pandion haliaetus haliaetus</i>		8,400-12,300	Pairs	Increasing
European Honey Buzzard	<i>Pernis apivorus</i>		118,000-171,000	Pairs	Decreasing
Egyptian Vulture	<i>Neophron percnopterus</i>	1	3,000-4,700	Pairs	Decreasing
Short-toed Snake Eagle	<i>Circaetus gallicus</i>		17,600-20,900	Pairs	Stable
Lesser Spotted Eagle	<i>Aquila pomarina</i>		16,400-22,100	Pairs	Stable
Booted Eagle	<i>Aquila pennata</i>		23,100-29,100	Pairs	Fluctuating
Western Marsh Harrier	<i>Circus aeruginosus</i>		99,300-184,000	Females	Increasing
Hen Harrier	<i>Circus cyaneus</i>	3	30,000-54,400	Females	Decreasing
Pallid Harrier	<i>Circus macrourus</i>	1	300-1,140	Females	Unknown
Montagu's Harrier	<i>Circus pygargus</i>		54,500-92,200	Females	Unknown
Eurasian Sparrowhawk	<i>Accipiter nisus</i>		403,000-582,000	Pairs	Stable
Red Kite	<i>Milvus milvus</i>	1	25,200-33,400	Pairs	Decreasing
Black Kite	<i>Milvus migrans</i>	3	81,200-109,000	Pairs	Uncertain
Common Buzzard	<i>Buteo buteo buteo</i>		814,000-1,390,000	Pairs	Stable
Common Barn Owl	<i>Tyto alba</i>	3	111,000-230,000	Pairs	Fluctuating
Eurasian Scops Owl	<i>Otus scops</i>	2	232,000-393,000	Pairs	Uncertain
Long-eared Owl	<i>Asio otus</i>		304,000-776,000	Pairs	Unknown
Short-eared Owl	<i>Asio flammeus</i>	3	54,700-186,000	Pairs	Fluctuating
Eurasian Hoopoe	<i>Upupa epops</i>		1,300,000-2,760,000	Pairs	Stable
European Bee-eater	<i>Merops apiaster</i>		2,800,000-5,050,000	Pairs	Stable
European Roller	<i>Coracias garrulus</i>	2	37,700-79,200	Pairs	Decreasing
Common Kingfisher	<i>Alcedo atthis</i>	3	97,500-167,000	Pairs	Decreasing
Eurasian Wren	<i>Jynx torquilla</i>	3	674,000-1,600,000	Pairs	Increasing
Lesser Kestrel	<i>Falco naumanni</i>	3	30,500-38,000	Pairs	Increasing
Common Kestrel	<i>Falco tinnunculus</i>	3	409,000-803,000	Pairs	Decreasing
Red-footed Falcon	<i>Falco vespertinus</i>	1	30,300-83,400	Pairs	Decreasing
Eleonora's Falcon	<i>Falco eleonorae</i>		14,300-14,500	Pairs	Increasing
Merlin	<i>Falco columbarius</i>		32,000-51,600	Pairs	Unknown
Eurasian Hobby	<i>Falco subbuteo</i>		92,100-147,000	Pairs	Stable
Lanner Falcon	<i>Falco biarmicus</i>	3	430-840	Pairs	Decreasing
Saker Falcon	<i>Falco cherrug</i>	1	350-500	Pairs	Increasing
Peregrine Falcon	<i>Falco peregrinus</i>		14,900-28,800	Pairs	Increasing
Eurasian Golden Oriole	<i>Oriolus oriolus</i>		4,370,000-8,020,000	Pairs	Uncertain
Red-backed Shrike	<i>Lanius collurio</i>	2	7,440,000-14,300,000	Pairs	Stable
Lesser Grey Shrike	<i>Lanius minor</i>	2	331,000-896,000	Pairs	Decreasing
Great Grey Shrike	<i>Lanius excubitor</i>	3	68,000-176,000	Pairs	Stable
Woodchat Shrike	<i>Lanius senator</i>	2	1,930,000-3,110,000	Pairs	Decreasing
Goldcrest	<i>Regulus regulus</i>	2	20,000,000-37,000,000	Pairs	Decreasing
Common Firecrest	<i>Regulus ignicapilla</i>		4,180,000-7,110,000	Pairs	Stable
Bar-tailed Lark	<i>Ammomanes cinctura</i>	3	30-120	Pairs	Decreasing
Woodlark	<i>Lullula arborea</i>	2	1,890,000-3,890,000	Pairs	Increasing

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Eurasian Skylark	<i>Alauda arvensis</i>	3	44,300,000-78,800,000	Pairs	Decreasing
Greater Short-toed Lark	<i>Calandrella brachydactyla</i>	3	4,730,000-9,050,000	Pairs	Unknown
Calandra Lark	<i>Melanocorypha calandra</i>	3	10,300,000-21,900,000	Pairs	Decreasing
Lesser Short-toed Lark	<i>Alaudala rufescens</i>				
Sand Martin	<i>Riparia riparia</i>	3	3,640,000-8,000,000	Pairs	Uncertain
Eurasian Crag Martin	<i>Ptyonoprogne rupestris</i>		182,000-342,000	Pairs	Stable
Barn Swallow	<i>Hirundo rustica</i>	3	29,000,000-48,700,000	Pairs	Decreasing
Common House Martin	<i>Delichon urbicum</i>	2	11,200,000-23,600,000	Pairs	Decreasing
Red-rumped Swallow	<i>Cecropis daurica rufula</i>		1,450,000-3,340,000	Pairs	Stable
Cetti's Warbler	<i>Cettia cetti</i>		2,020,000-3,190,000	Pairs	Stable
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>		5,000-20,000	Pairs	Unknown
Western Bonelli's Warbler	<i>Phylloscopus bonelli</i>		2,103,000-2,924,000	Pairs	Increasing
Eastern Bonelli's Warbler	<i>Phylloscopus orientalis</i>		27,000-96,000		Uncertain
Wood Warbler	<i>Phylloscopus sibilatrix</i>		7,060,000-11,100,000	Pairs	Stable
Common Chiffchaff	<i>Phylloscopus collybita</i>		41,000,000-59,500,000	Pairs	Stable
Willow Warbler	<i>Phylloscopus trochilus</i>	3	62,200,000-97,100,000	Pairs	Decreasing
Eurasian Blackcap	<i>Sylvia atricapilla</i>		40,500,000-64,500,000	Pairs	Increasing
Garden Warbler	<i>Sylvia borin</i>		16,700,000-26,900,000	Pairs	Uncertain
Lesser Whitethroat	<i>Sylvia curruca</i>		4,800,000-7,990,000	Pairs	Stable
Western Orphean Warbler	<i>Sylvia hortensis</i>		119,000-239,000	Pairs	Increasing
Eastern Orphean Warbler	<i>Sylvia crassirostris</i>		155,000-353,000	Pairs	Unknown
Sardinian Warbler	<i>Sylvia melanocephala</i>		7,650,000-16,100,000	Pairs	Stable
Moltoni's Warbler	<i>Sylvia subalpina</i>		51,000-132,000	Pairs	Increasing
Eastern Subalpine Warbler	<i>Sylvia cantillans</i>		3,340,000-5,230,000	Pairs	Increasing
Common Whitethroat	<i>Sylvia communis</i>		17,300,000-27,800,000	Pairs	Stable
Spectacled Warbler	<i>Sylvia conspicillata</i>		168,000-450,000	Pairs	Uncertain
Dartford Warbler	<i>Sylvia undata</i>	1	646,000-1,480,000	Pairs	Decreasing
Savi's Warbler	<i>Locustella luscinioides</i>		281,000-474,000	Pairs	Unknown
Western Olivaceous Warbler	<i>Iduna opaca</i>		3,260,000-6,560,000	Pairs	Stable
Icterine Warbler	<i>Hippolais icterina</i>		3,720,000-6,500,000	Pairs	Increasing
Melodious Warbler	<i>Hippolais polyglotta</i>		2,330,000-3,750,000	Pairs	Increasing
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>		2,600,000-4,680,000	Pairs	Unknown
Marsh Warbler	<i>Acrocephalus palustris</i>		4,170,000-7,590,000	Pairs	Unknown
Eurasian Reed Warbler	<i>Acrocephalus scirpaceus</i>		2,120,000-3,880,000	Pairs	Stable
Sedge Warbler	<i>Acrocephalus schoenobaenus</i>		3,830,000-6,440,000	Pairs	Stable
Moustached Warbler	<i>Acrocephalus melanopogon</i>		76,100-124,000	Pairs	Unknown
Zitting Cisticola	<i>Cisticola juncidis</i>		922,000-2,140,000	Pairs	Stable
Eurasian Wren	<i>Troglodytes troglodytes</i>		32,700,000-56,500,000	Pairs	Stable
Common Starling	<i>Sturnus vulgaris</i>	3	28,800,000-52,400,000	Pairs	Decreasing
Ring Ouzel	<i>Turdus torquatus torquatus</i>		299,000-598,000	Pairs	Uncertain
Common Blackbird	<i>Turdus merula</i>		54,800,000-87,100,000	Pairs	Increasing
Fieldfare	<i>Turdus pilaris</i>		14,200,000-28,600,000	Pairs	Decreasing
Song Thrush	<i>Turdus philomelos</i>		24,400,000-38,400,000	Pairs	Increasing
Redwing	<i>Turdus iliacus</i>	1	13,200,000-20,100,000	Pairs	Decreasing
Mistle Thrush	<i>Turdus viscivorus</i>		4,120,000-8,960,000	Pairs	Stable
Rufous-tailed Scrub Robin	<i>Cercotrichas galactotes</i>	3	230,000-623,000	Pairs	Decreasing
Spotted Flycatcher	<i>Muscicapa striata</i>	2	14,900,000-22,700,000	Pairs	Stable
European Robin	<i>Erithacus rubecula</i>		58,700,000-90,500,000	Pairs	Increasing
Thrush Nightingale	<i>Luscinia luscinia</i>		3,780,000-6,360,000	Pairs	Stable
Common Nightingale	<i>Luscinia megarhynchos</i>		10,700,000-20,300,000	Pairs	Increasing

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Bluethroat	<i>Luscinia svecica</i>		4,460,000-7,760,000	Pairs	Stable
Red-breasted Flycatcher	<i>Ficedula parva</i>		3,290,000-5,090,000	Pairs	Increasing
Semicollared Flycatcher	<i>Ficedula semitorquata</i>	2	21,400-87,300	Pairs	Unknown
Collared Flycatcher	<i>Ficedula albicollis</i>		1,530,000-3,090,000	Pairs	Increasing
European Pied Flycatcher	<i>Ficedula hypoleuca hypoleuca</i>		12,500,000-19,400,000	Pairs	Unknown
Black Redstart	<i>Phoenicurus ochruros</i>		5,760,000-10,000,000	Pairs	Increasing
Common Redstart	<i>Phoenicurus phoenicurus</i>		9,630,000-15,000,000	Pairs	Increasing
Common Rock Thrush	<i>Monticola saxatilis</i>	3	88,900-283,000	Pairs	Decreasing
Blue Rock Thrush	<i>Monticola solitarius</i>		110,000-237,000	Pairs	Unknown
Whinchat	<i>Saxicola rubetra</i>	2	6,470,000-10,700,000	Pairs	Decreasing
European Stonechat	<i>Saxicola rubicola</i>		5,790,000-9,310,000	Pairs	Decreasing
Northern Wheatear	<i>Oenanthe oenanthe</i>	3	5,280,000-15,800,000	Pairs	Stable
Isabelline Wheatear	<i>Oenanthe isabellina</i>		2,060,000-6,230,000	Pairs	Stable
Desert Wheatear	<i>Oenanthe deserti</i>		110-1,100	Pairs	Unknown
Western Black-eared Wheatear	<i>Oenanthe hispanica</i>		1,280,000-3,680,000	Pairs	Stable
Black Wheatear	<i>Oenanthe leucura</i>	3	6,500-6,900	Pairs	Decreasing
Alpine Accentor	<i>Prunella collaris</i>		77,900-149,000	Pairs	Uncertain
Dunnock	<i>Prunella modularis</i>		12,700,000-21,800,000	Pairs	Stable
Spanish Sparrow	<i>Passer hispaniolensis</i>		3,937,000-9,571,000	Pairs	Stable
Eurasian Tree Sparrow	<i>Passer montanus</i>	3	24,000,000-38,200,000	Pairs	Stable
Yellow Wagtail	<i>Motacilla flavissima</i>	3	9,630,000-16,000,000	Pairs	Decreasing
Citrine Wagtail	<i>Motacilla citreola</i>		162,000-373,000	Pairs	Increasing
Grey Wagtail	<i>Motacilla cinerea</i>		689,000-1,980,000	Pairs	Uncertain
White Wagtail	<i>Motacilla alba</i>		16,900,000-27,600,000	Pairs	Uncertain
Tawny Pipit	<i>Anthus campestris</i>	3	909,000-1,720,000	Pairs	Unknown
Olive-backed Pipit	<i>Anthus hodgsoni</i>		45,000-60,000	Pairs	Unknown
Tree Pipit	<i>Anthus trivialis</i>	3	26,900,000-38,100,000	Pairs	Decreasing
Meadow Pipit	<i>Anthus pratensis</i>	1	9,670,000-15,000,000	Pairs	Decreasing
Red-throated Pipit	<i>Anthus cervinus</i>		1,010,000-3,020,000	Pairs	Unknown
Eurasian Rock Pipit	<i>Anthus petrosus</i>		164,000-281,000	Pairs	Unknown
Water Pipit	<i>Anthus spinoletta</i>		1,620,000-3,160,000	Pairs	Stable
Brambling	<i>Fringilla montifringilla</i>	3	15,200,000-24,000,000	Pairs	Decreasing
Common Chaffinch	<i>Fringilla coelebs</i>		185,000,000-269,000,000	Pairs	Stable
Hawfinch	<i>Coccothraustes coccothraustes</i>		2,600,000-5,070,000	Pairs	Stable
Common Rosefinch	<i>Erythrura erythrura</i>	3	7,810,000-14,100,000	Pairs	Decreasing
Eurasian Bullfinch	<i>Pyrrhula pyrrhula</i>		7,650,000-13,000,000	Pairs	Stable
Trumpeter Finch	<i>Bucanetes githagineus</i>		10,500-21,400	Pairs	Decreasing
European Greenfinch	<i>Chloris chloris</i>		21,600,000-33,100,000	Pairs	Stable
Common Linnet	<i>Linaria cannabina</i>	2	17,600,000-31,900,000	Pairs	Decreasing
European Goldfinch	<i>Carduelis carduelis</i>		27,800,000-42,700,000	Pairs	Stable
European Serin	<i>Serinus serinus</i>	2	20,900,000-31,500,000	Pairs	Decreasing
Eurasian Siskin	<i>Spinus spinus</i>		13,600,000-21,100,000	Pairs	Fluctuating
Corn Bunting	<i>Emberiza calandra</i>	2	18,300,000-31,300,000	Pairs	Stable
Ortolan Bunting	<i>Emberiza hortulana</i>	2	3,330,000-7,070,000	Pairs	Decreasing
Common Reed Bunting	<i>Emberiza schoeniclus</i>		4,060,000-7,020,000	Pairs	Decreasing
Little Bunting	<i>Emberiza pusilla</i>		3,010,000-5,540,000	Pairs	Unknown

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APPENDIX 2: TABLE 5 BIRDS BREEDING ANNUALLY IN THE MALTESE ISLANDS

Table 5 Birds breeding annually in Malta (Grey shading indicates confirmed breeding in the area of study)		
<i>Anas platyrhynchos</i>	Mallard	Kuluvert
<i>Colinus virginianus</i>	Northern Bobwhite	Summiena Amerikana
<i>Alectoris chukar</i>	Chukar Partridge	Ċukar
<i>Phasianus colchicus</i>	Common Pheasant	Faġan
<i>Chrysolophus pictus</i>	Golden Pheasant	Faġan Dehbi
<i>Tachybaptus ruficollis</i>	Little Grebe	Blongun Żgħir
<i>Columba livia</i>	Feral Pigeon / Rock Dove	Tudun tal-Ġebel
<i>Streptopelia turtur</i>	European Turtle Dove	Gamiema
<i>Streptopelia decaocto</i>	Eurasian Collared Dove	Gamiema tal-Kullar
<i>Apus pallidus</i>	Pallid Swift	Rundun Kannelli
<i>Apus apus</i>	Common Swift	Rundun
<i>Cuculus canorus</i>	Common Cuckoo	Daqquqa Kaħla
<i>Zapornia parva</i>	Little Crake	Gallozz Żgħir
<i>Porphyrio alleni</i>	Allen's Gallinule	Faġan tal-Baħar Afrikan
<i>Gallinula chloropus</i>	Common Moorhen	Gallozz Iswed
<i>Fulica atra</i>	Eurasian Coot	Tiġieġa tal-Baħar
<i>Hydrobates pelagicus</i>	European Storm Petrel	Kanġu ta' Filfla
<i>Calonectris diomedea</i>	Scopoli's Shearwater	Ċiefa
<i>Puffinus yelkouan</i>	Yelkouan Shearwater	Gamiġja tal-Mediterran
<i>Ixobrychus minutus</i>	Little Bittern	Russett tas-Siġar
<i>Nycticorax nycticorax</i>	Black-crowned Night Heron	Kwakka
<i>Bubulcus ibis</i>	Western Cattle Egret	Agrett tal-Bhejjem
<i>Egretta garzetta</i>	Little Egret	Agrett Abjad
<i>Himantopus himantopus</i>	Black-winged Stilt	Fras-servjent
<i>Charadrius dubius</i>	Little Ringed Plover	Monakella
<i>Larus michahellis</i>	Yellow-legged Gull	Gawwiġa Prima
<i>Tyto alba</i>	Common Barn Owl	Barbaġann
<i>Asio otus</i>	Long-eared Owl	Qattus
<i>Asio flammeus</i>	Short-eared Owl	Kokka tax-Xagħri
<i>Merops apiaster</i>	European Bee-eater	Qerd in-Naħal
<i>Falco tinnunculus</i>	Common Kestrel	Spanjulett
<i>Falco peregrinus</i>	Peregrine Falcon	Bies
<i>Lanius senator</i>	Woodchat Shrike	Kaċċamendula
<i>Calandrella brachydactyla</i>	Greater Short-toed Lark	Bilbla
<i>Hirundo rustica</i>	Barn Swallow	Huttafa
<i>Delichon urbicum</i>	Common House Martin	Hawwiefa
<i>Cettia cetti</i>	Cetti's Warbler	Bagħal tal-Għolliq
<i>Sylvia atricapilla</i>	Eurasian Blackcap	Kapinera
<i>Sylvia melanocephala</i>	Sardinian Warbler	Bufula Sewda
<i>Sylvia conspicillata</i>	Spectacled Warbler	Bufula Hamra
<i>Acrocephalus arundinaceus</i>	Great Reed Warbler	Bagħal Prim
<i>Acrocephalus scirpaceus</i>	Eurasian Reed Warbler	Bagħal tal-Qasab
<i>Cisticola juncidis</i>	Zitting Cisticola	Bagħal tal-Imrewħa
<i>Sturnus vulgaris</i>	Common Starling	Sturmell
<i>Muscicapa striata</i>	Spotted Flycatcher	Żanzarell tat-Tikki
<i>Erithacus rubecula</i>	European Robin	Pitimoss
<i>Luscinia megarhynchos</i>	Common Nightingale	Rożinjol
<i>Monticola solitarius</i>	Blue Rock Thrush	Merill
<i>Oenanthe melanoleuca</i>	Eastern Black-eared Wheatear	Kuda Dumnikana
<i>Passer hispaniolensis</i>	Spanish Sparrow	Għasfur tal-Bejt
<i>Passer montanus</i>	Eurasian Tree Sparrow	Ġaħġaħ
<i>Motacilla cinerea</i>	Grey Wagtail	Zakak tad-Dell
<i>Anthus campestris</i>	Tawny Pipit	Bilblun
<i>Fringilla coelebs</i>	Common Chaffinch	Sponsun
<i>Chloris chloris</i>	European Greenfinch	Verdun
<i>Linaria cannabina</i>	Common Linnet	Gojġin
<i>Carduelis carduelis</i>	European Goldfinch	Gardell
<i>Serinus serinus</i>	European Serin	Apparell
<i>Emberiza calandra</i>	Corn Bunting	Durrajsa

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Appendix 3: Table 6 IMPACTS, THEIR EXTENT, PROBABILITY OF OCCURRING AND PROPOSED MITIGATION MEASURES

Table 6 IMPACTS, THEIR EXTENT, PROBABILITY OF OCCURRING AND PROPOSED MITIGATION MEASURES															
Impact Type and Source			Impact Receptor		Effect and Scale							Probability of Impact occurring (Inevitable, Likely, unlikely, Remote, Uncertain)	Overall Impact Significance	Proposed Mitigation Measures	Residual Impact Significance
Impact Type	Specific intervention leading to impact	Project Phase (construction/post construction)	Receptor type	Sensitivity & reliance towards impact	Direct / indirect / Cumulative	Beneficial / adverse	Severity	Physical / geographical extent of impact	Short- / medium- / long-term	Temporary (indicate duration) While project is taking place	Reversible (indicate ease of reversibility) Irreversible				
Light Pollution	Works during the night	Construction	Avifauna	Presumed moderate as a precaution	Direct / indirect	Presumed adverse	Low	Localised	short term	Temporary, while project is taking place	Reversible. Presumed impact stops when lights not used anymore	Remote	Low	Lights at night should be kept down to a minimum and illumination used should as much as possible be localised and used only where necessary.	Low
Light Pollution	Light when runway is operational	Post Construction	Avifauna	Presumed moderate as a precaution	Direct / indirect	Presumed adverse	Low	Localised	long term	Permanent	Irreversible as the lights will be there, some already exist. No tangible impact on species.	Remote	Low	The airstrip, lights in and around the airstrip and the facilities, and any other lighting used should be the type to create the least light pollution possible. Cats eyes and other types of reflectors should be installed along the roads leading to the airstrip. Lighting that is automatically activated and that switches off on its own by the use of sensors should be ideally used, at least in the stretch of road leading to the airfield. Lights on the airfield should be activated by landing aircraft and should be automatically switched off with timers or other timer technology.	Low
Noise Pollution	During airport operations, day and night	Post construction	Avifauna	Presumed very low simply as a precaution	Direct	Low	Low	Localised	short term	Temporary. While project is taking place	Reversible. Presumed impact stops when works operations stop	Unlikely	Low	Noise abatement measures should be used, especially when works are carried out late in the evening and at night. These measures should be particularly on days with northerly or north easterly winds, when sounds may be carried out over the sea to the areas where shearwaters may be coming to land at T4 Cent area.	Low
Anthropogenic activities	People using the airfield	Construction	Avifauna	Insignificant	Direct	Insignificant	Low	Localised	Long-term	Mostly in summer	Reversible. Noise generated by human activity is unlikely to impact birds because it will not involve crowds of people.	Unlikely	Low		Low



Appendix 7: Photomontage of the Proposal





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