



Appropriate Assessment for a new Thermal Treatment Facility (TTF)

As per ERA requirements for EA/00020/22

Report



APPROPRIATE ASSESSMENT
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1 EXECUTIVE NON-TECHNICAL SUMMARY

An Appropriate Assessment (AA) report is hereby being presented in relation to EA/00020/22. This application is entitled “Proposed Thermal Treatment Facility in the ECOHIVE Complex, including plant building, storage building, administration building, waste water treatment, tank farm and cisterns.”

The scope of the AA is to determine whether the Scheme or any part thereof will have a significant impact on the integrity of various protected sites and any relevant ecosystems, habitats and species covered by the provisions of the FLORA, FAUNA AND NATURAL HABITATS REGULATIONS (SL 549.44).

Most of the envisaged ecological impacts will take place on land during the excavation and construction processes. The scheme site is surrounded by the following Natura 2000 sites which were studied in further detail:

Žona fil-Baħar bejn il-Ponta ta’ San Dimitri (Għawdex) u Il-Qaliet (MT 0000105) designated as an SCI (Site of Community Interest of international importance) and SAC (Special Area of Conservation) via GN No. 682 of 2018, in accordance with the FLORA, FAUNA AND NATURAL HABITATS PROTECTION REGULATIONS, 2016 (S.L. 549.44);

Is-Salini (MT 0000007) designated as an SAC (Special Area of Conservation) via GN No. 1379 of 2016, in accordance with the FLORA, FAUNA AND NATURAL HABITATS PROTECTION REGULATIONS, 2016 (S.L. 549.44);

L-Għadira s-Safra u I-Iskolla tal-Għallis (MT 0000008) designated as an SAC via GN No. 1373 of 2016, in accordance with the FLORA, FAUNA AND NATURAL HABITATS PROTECTION REGULATIONS, 2016 (S.L. 549.44).

Žona fil-Baħar madwar Għawdex (MT0000112) designated as a marine SPA (Special Protection Area) via GN No. 1311 of 2016, in accordance with the FLORA, FAUNA AND NATURAL HABITATS PROTECTION REGULATIONS, 2016 (S.L. 549.44), and

MT0000107 Žona fil-Baħar fil-Grigal, designated as a Special Area of Conservation via Government Notice No. 1311 of 2016

The Terms of Reference (ToRs) for this AA were issued by the Environment and Resources Authority (ERA) in June 2024 (refer to Appendix I). In accordance to these ToRs, the screening process of the scheme determined that an AA is required as per Article 19(1) of SL 549.44, given that the scheme may cause significant impacts on the abovementioned Natura 2000 sites. Furthermore, the report assesses the terrestrial, marine and ecology impacts within the site and immediate surroundings.

2 PROJECT DESCRIPTION

This scheme is being proposed to establish a new hazardous waste incineration plant (TTF) and centralise all the major waste operations carried out by Wasteserv Malta. The project entails the preparation of a new hazardous waste incineration plant with two independent lines, and space for a potential third independent line in the future. The proposed development will form part of the ECOHIVE Complex and will operate in conjunction with the other waste management facilities at Maghtab.

The site is situated in the Eastern region of the ECOHIVE complex, across the road from the Żwejra landfill and adjacent to the existing Anaerobic Digester (AD) Plant. The proposed site is directly adjacent to the proposed Material Recovery Facility, which is assessed through a separate EIA.

The footprint of the entire TTF site is around 18,185m². The site currently comprises agricultural land cleared of its topsoil layer, dense patches of low-lying indigenous trees, scattered agricultural trees and remnants of local maquis/advanced garigue community.

The area surrounding the site is mostly rural in character, aside of the engineered landfills and waste management operations conducted by Wasteserv Malta. The ecological features nearest to the site area small pockets of afforested areas, coastal garigue, other natural communities reminiscent of garigue and steppe, and degraded areas.

While the scheme site and buffer do not directly encroach any protected areas, several terrestrial and marine Natura 2000 sites are present within walking distance of the proposed development. The potential impacts on the habitats and species within these areas have also been considered within the assessment.



FIGURE 1: PROPOSED SITE FOR THE NEW THERMAL TREATMENT FACILITY

3 METHODOLOGY

The Appropriate Assessment followed the Terms of Reference (ToRs) issued by the ERA in June 2024, enclosed in this report within the Appendix. On the basis of the ToRs, AIS Environment prepared a Method Statement outlining the approach and methodology to be followed as part of this survey, which was approved by the ERA.

3.1 AREA OF STUDY

3.1.1 Terrestrial and Marine AOI

The area mapped in Figure 9 shows the Natura 2000 sites which lie in close proximity to the site and considered relevant to the study.

A 100m buffer zone (AoI) around the site was set up to observe the ecological features in the area. The sites of concern were assessed through a literature review of existing biological data, supported by a dedicated broad-brush terrestrial field survey.

The following figures describe the AOI implemented for the terrestrial field survey (Figure 2), the terrestrial protected areas (Figure 3) and marine protected areas Figure 4) considered within the ecological study.

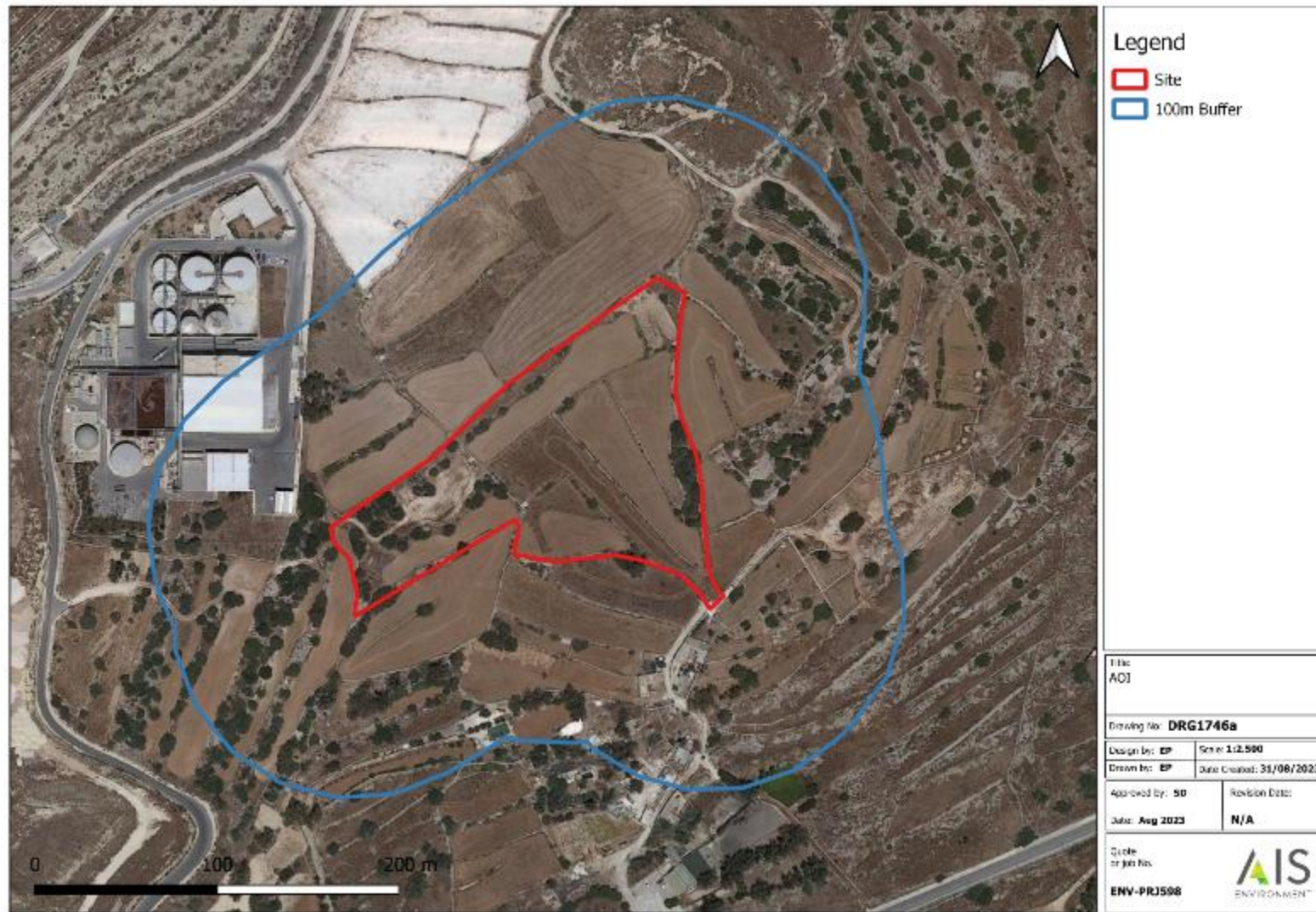


FIGURE 2: AREA OF INFLUENCE FOR THE TERRESTRIAL ECOLOGY STUDY



FIGURE 3: TERRESTRIAL PROTECTED AREAS RELEVANT TO THE STUDY

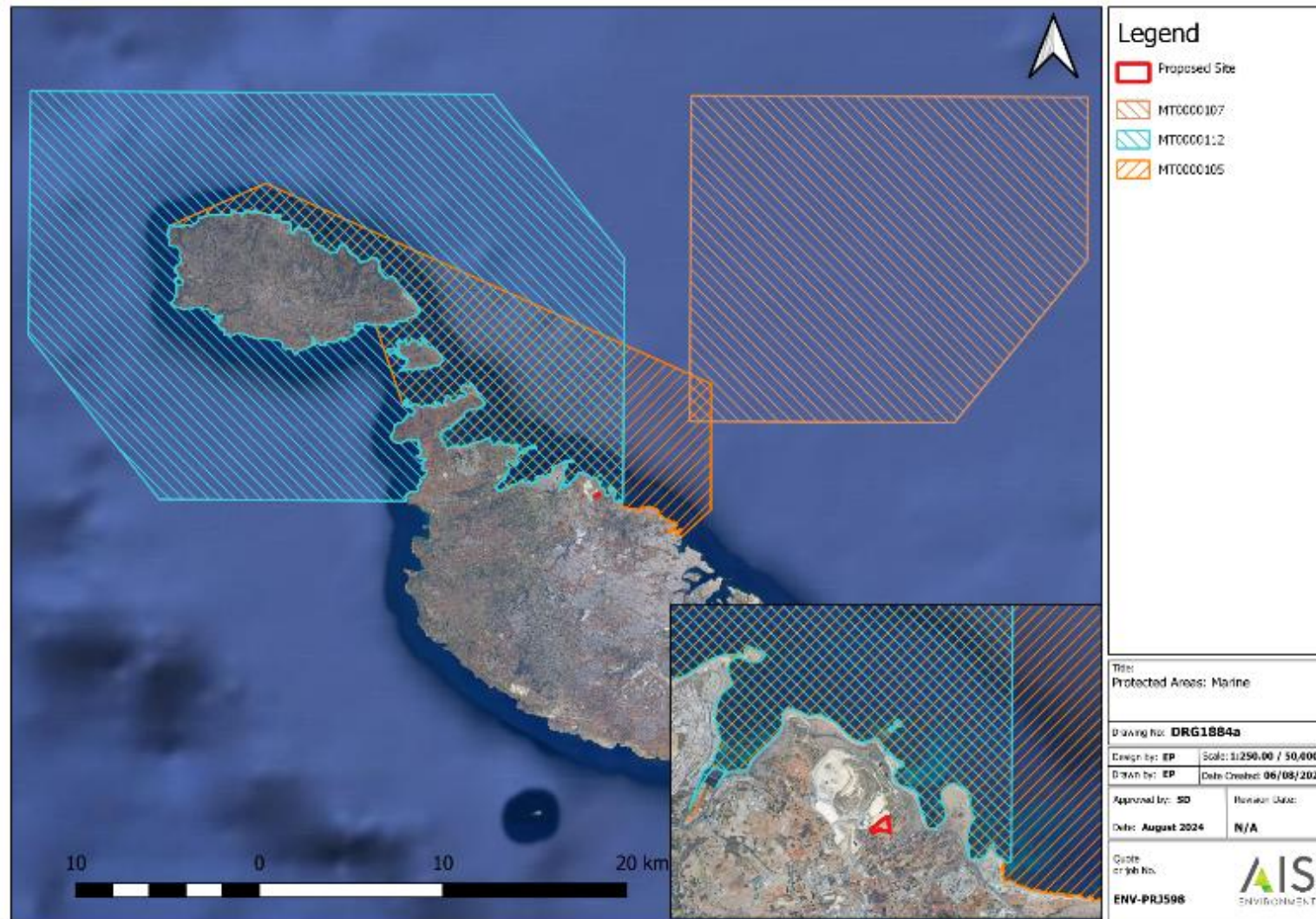


FIGURE 4: MARINE PROTECTED AREAS RELEVANT TO THE STUDY

The Scheme is about 630m away from the nearest terrestrial Natura 2000 site, also known as I-Għadira is-Safra u l-iskoll tal-Għallis (MT0000008) which is designated as a Special Area of Conservation (SAC) via Government Notice 1522 of 2019. Other marine and bird protection areas are present within or in close proximity to the proposed TTF, chiefly:

Terrestrial Environment

MT0000007- Is-Salini designated as a Special Area of Conservation via Government Notice 1379 of 2016; and

Marine Environment

- MT0000105 Żona fil-Baħar bejn il-Ponta ta' San Dimitri (Għawdex) u Il-Qaliet designated as a Special Area of Conservation of International Importance via Government Notice 682 of 2018;
- MT0000107 Żona fil-Baħar fil-Grigal, designated as a Special Area of Conservation via Government Notice No. 1311 of 2016, and
- MT0000112 Żona fil-Baħar ta' madwar Għawdex – Special Protected Area via Government Notice 1311 of 2016.

3.1.2 Avifauna AOI

The avian aspect of the study considers populations of wild birds, in particular populations of protected species and of species of conservation concern as relevant sensitive receptors.

The potential impact of the proposed development on avifauna receptors in the wider area (e.g. caused by light pollution, pollutants in the stack plume etc.), is assessed in a secondary Area of Influence. It consists of a 5.0 km buffer around the site area of the proposed development, referred to as AoI-2 from here onward (See Figure 5 below).

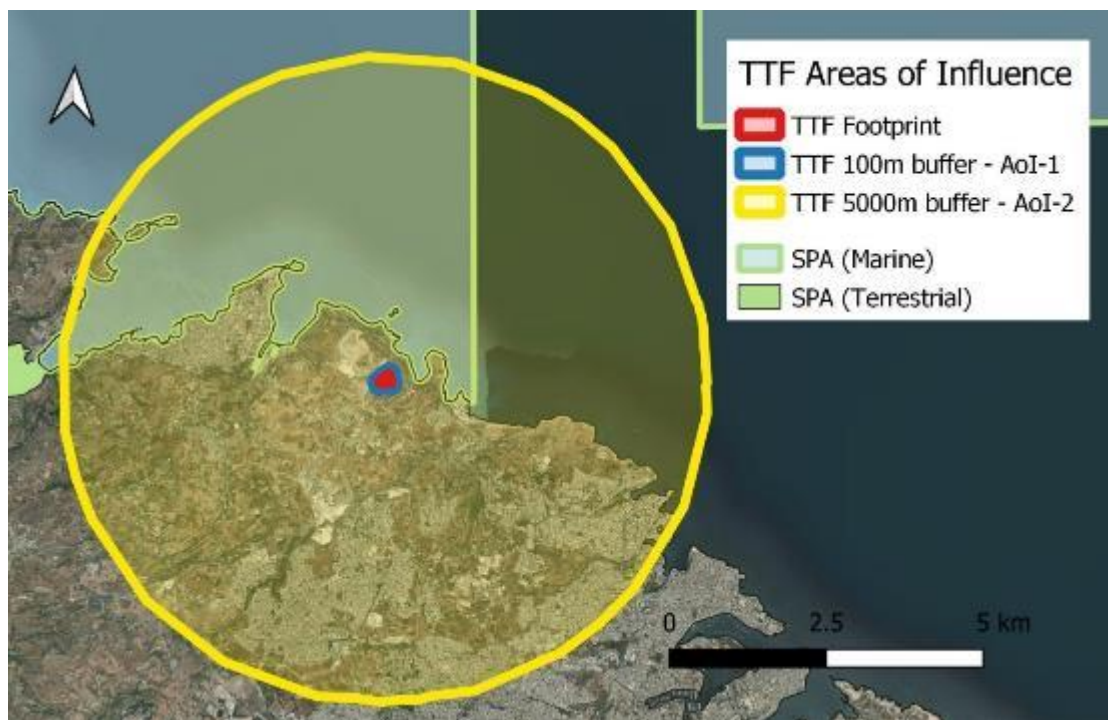


FIGURE 5: AREAS OF INTEREST FOR AVIFAUNA STUDY: AOI-2

3.2 LITERATURE REVIEW

3.2.1 Terrestrial and Marine study

A thorough literature review of readily available data and previous studies in the AOI. This included a review of the following sources:

- Central Malta Local Plan (2006)
- The Strategic Plan for the Environment and Development (SPED, 2015)
- S.L. 549.44 (repealing the Flora, Fauna and Natural Habitats Protection Regulations, 2006 [LN 311 of 2006])

3.2.2 Avifauna study

The assessment of potential impacts on avifauna receptors in the identified AoIs was performed through a literature review. The main references considered were:

- Malta Breeding Bird Atlas 2008 (BirdLife Malta, 2009)
- Malta Breeding Bird Atlas 2018 (Epsilon, 2019)
- The Breeding Birds of Malta (Sultana et al., 2011)
- European Breeding Bird Atlas 2: Distribution, Abundance and Change (Keller, Herrando, Vorisek, et al., 2020)
- Malta Marine IBA Inventory Report (BirdLife Malta, 2015)
- Marine Strategy Framework Directive second assessment report (ERA, 2020)
- BirdLife International (2020) IUCN Red List for birds (<http://www.birdlife.org>)
- Bird species of Annex I of the Birds Directive (Last updated: 14/09/2020)
- Draft Guidelines for the Reduction of Light Pollution in the Maltese Islands (Environment and Resources Authority, 2020)

- Project Description Statement, AIS Ref. no: PRJ-ENV598, Client Ref. no: ENV333102/A/20, version 8 (21 February 2024)

The Natura 2000 sites that are either situated within or partially overlapping with the AoI-2 are the Special Area of Conservation (SAC) L-Għadira s-Safra (MT0000008), the SAC Is-Salini (MT0000007), the SAC Il-Gżejjer ta' San Pawl (Selmunett, MT0000022), as well as the marine Special Protection Area (SPA) Żona fil-Baħar madwar Għawdex (MT0000112).

The report details the conservation status of the relevant bird species within the AoIs and in the above-mentioned Natura 2000 sites.

3.3 IMPACT ASSESSMENT

The methodology outlined below was performed to determine the impact assessment of the project on the AoIs which include a number of surrounding Natura 2000 sites. When an impact could not be determined with certainty, the worst-case scenario was taken. The impact assessment will be conducted in line with EC guidance documents.¹

The impacts section of the Appropriate Assessment covered the following aspects:

- a) a description of the impact of the project on conservation objectives for the area and protected species and habitats it harbours, and on other indicators, including impacts on key species, extent of fragmentation, etc.
- b) a description of proposed measures to eliminate, mitigate or compensate anticipated adverse effects on protected species and habitats. The following aspects related to the proposed mitigation measures will be considered and assessed:
 - i. A reasonably detailed identification of the measures to be introduced for all relevant phases of the project;
 - ii. An explanation of how the measures will eliminate and/or mitigate adverse effects;
 - iii. Evidence of how the mitigation measures will be tangibly implemented and by whom;
 - iv. Evidence of the degree of confidence in their likely success;
 - v. A timescale, relative to the project, when they will be implemented;
 - vi. Explanation of how any mitigation failure will be addressed; and
 - vii. Proposals for decommissioning as appropriate.
- c) a description of any anticipated residual adverse effects arising from the proposed development on protected species and habitats.

¹ European Communities (2001). Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC.
https://ec.europa.eu/environment/nature/natura2000/management/docs/art6/natura_2000_assess_en.pdf.

- d) a proposal of a feasible ecological monitoring programme, for the pre-, during and post-construction phases, to include details such as the frequency of the proposed monitoring scheme.
- e) a comprehensive evaluation of all possible project alternatives/scenarios (including the zero option) and their impacts on protected species and habitats. Potential alternative schemes might include alternative technologies, alternative layouts, and relocation or downsizing of the project.

For each of the identified impacts, the following information is provided in a table format:

- Impact type and specific intervention leading to impact
- Project phase (construction/operation/decommissioning)
- Sensitivity & resilience toward impact (high/medium/low)
- Impact pathway (direct/indirect/cumulative)
- Impact type (beneficial/adverse)
- Impact severity (high/medium/low)
- Extent (in relation to site coverage and surroundings and associated features)
- Duration (temporary/permanent and short-/medium-/long-term)
- Effect of the impact (reversible/irreversible)
- Probability of impact occurring (inevitable/likely/unlikely/remote/uncertain)
- Impact significance (significant/not significant)
- Scope of mitigation
- Residual impacts (significant/not significant)

4 SITE DESCRIPTION

4.1 TERRESTRIAL AND MARINE CONDITIONS

4.1.1 Local Plans

The area of influence and its surroundings were assessed through a desktop review of the relevant local plans, legislations and any applicable policy documents. Sites of ecological and environmental importance have been identified in the immediate surroundings.

The Central Malta Local Plan (Malta Environment and Planning Authority, 2006) shows that the scheme site is located within an Ecological Area (CG22) as indicated in Figure 6. The surrounding areas are classified as 'Agricultural Area' (CG24) awaiting classification of agricultural value (see Figure 6). A large-scale version of this map can be found in the Appendix.

Two areas are marked as Sites of Scientific Importance (CG22), within the vicinity of the scheme site. One lies to the North of the facility well outside of the Area of Influence of the scheme, while the second is positioned further South and in close proximity to the ECOHIVE complex South entrance. The area to the South of the site will be considered in further detail due to potential ecological impacts arising from the transportation of material to and from the site via the adjacent access roads. Both are marked in a light purple outline in Figure 6.

The entire coastal stretch of Qalet San Marku is also protected through the provisions of the CENTRAL MALTA LOCAL PLAN as this part of the coast is designated as a "Protected Natural Coast with public access" (NA04). This area is however considered sufficiently detached from the scheme and will not be considered within the assessment.

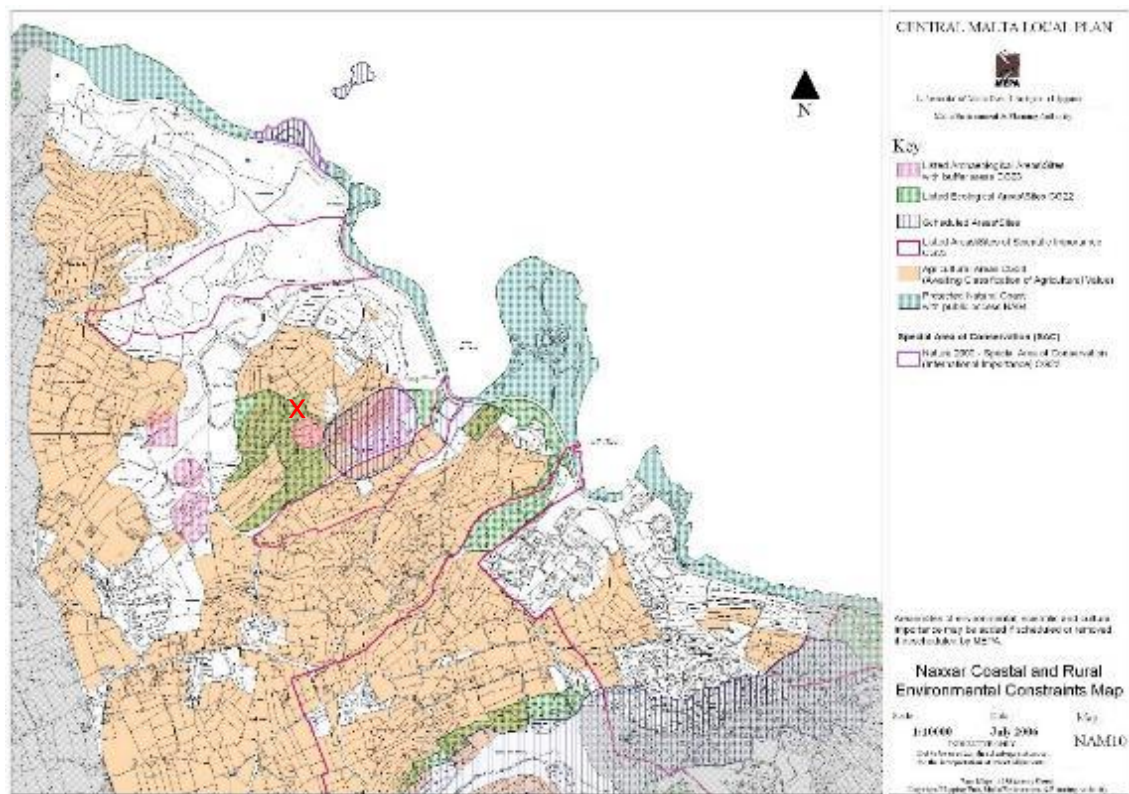


FIGURE 6: NAXXAR COASTAL AND RURAL ENVIRONMENTAL CONSTRAINTS MAP (CENTRAL MALTA LOCAL PLAN, 2006) SITE MARKED WITH RED

Seven Areas of Ecological Importance (AEI) surrounding the scheme and AOI are marked as A to G. These AEIs were identified through the NHLP survey in 1996 and have been used to designate protected areas in the Local Plans of 2006.

Site A is granted a level 4 degree of environmental protection due to its dense vegetation of maquis-like shrubs and trees intermingled with agricultural land. Both the scheme site and the majority of the AOI fall within the boundaries of Site A. The remaining 6 areas are found in the near vicinity of the scheme site. Due to the considerable distance from the scheme and/or access roads to and from the scheme, it is considered unlikely that impacts from the scheme affect the other 6 designated sites.



FIGURE 7: AREAS OF ECOLOGICAL IMPORTANCE (A-G) AROUND THE SITE ARE MARKED WITH A GREEN OUTLINE (PA GEOSERVER) SITE MARKED WITH A RED X

4.1.2 Previous Studies

Ecology study in relation to EA 0057/18 - Marine environment

A broad-brush benthic habitat survey was carried out in relation to the Environmental Impact Assessment related to the then proposed Waste to Energy Facility, now developed within the ECOHIVE complex adjacent to the proposal covered by this EIA.

The study comprised an area of 275,000m², which was made up of a buffer of 100m flanking each side of the envisaged trajectory of the plant's cooling water system pipes.

Study findings

The benthic habitats surveyed were classified into nine assemblages using the EUNIS benthic habitat terminology, adapted for Maltese waters by Borg et al. (2013). One unique assemblage, characterised as "Low-density exposed bedrock outcrops colonised by turfing species interspersed with extensive unvegetated sandy seabed stretches," did not fit any EUNIS category. Benthic biocoenoses were grouped into 'complexes' based on their proximity within the surveyed area.

- Shallow water assemblages

The shallowest areas (up to 3-4 meters deep) featured coralline limestone outcrops with turfing species and low growths of Phaeophyceae (e.g., *Padina pavonica*) and Chlorophyceae (e.g., *Acetabularia acetabulum*). These outcrops transitioned to flatter rocky platforms dominated by photophilic communities, particularly *Dictyopteris polypodioides* and *Stypocaulon scoparium*. Seaward of these communities, a narrow belt of *Posidonia oceanica* meadows was observed, leading to unvegetated infralittoral coarse sediment seabeds with occasional Chlorophyceae and *Rhodophyceae* species.

- Deeper waters

At depths greater than 15 meters, unvegetated sandy seabeds supported low- to medium-density *Cymodocea nodosa* meadows characterized by bioturbation features. The outer margins of the transects varied, with dense *Posidonia oceanica* meadows present at Transect 1 and reticulate meadows in the others.

- Pipeline areas

The discharge and extraction points for two submarine pipelines were located within sandy seabeds featuring sparse *C. nodosa* meadows. The nearest *P. oceanica* meadows were approximately 30-40 meters from the pipeline infrastructure, with dense meadows located about 100 meters away.

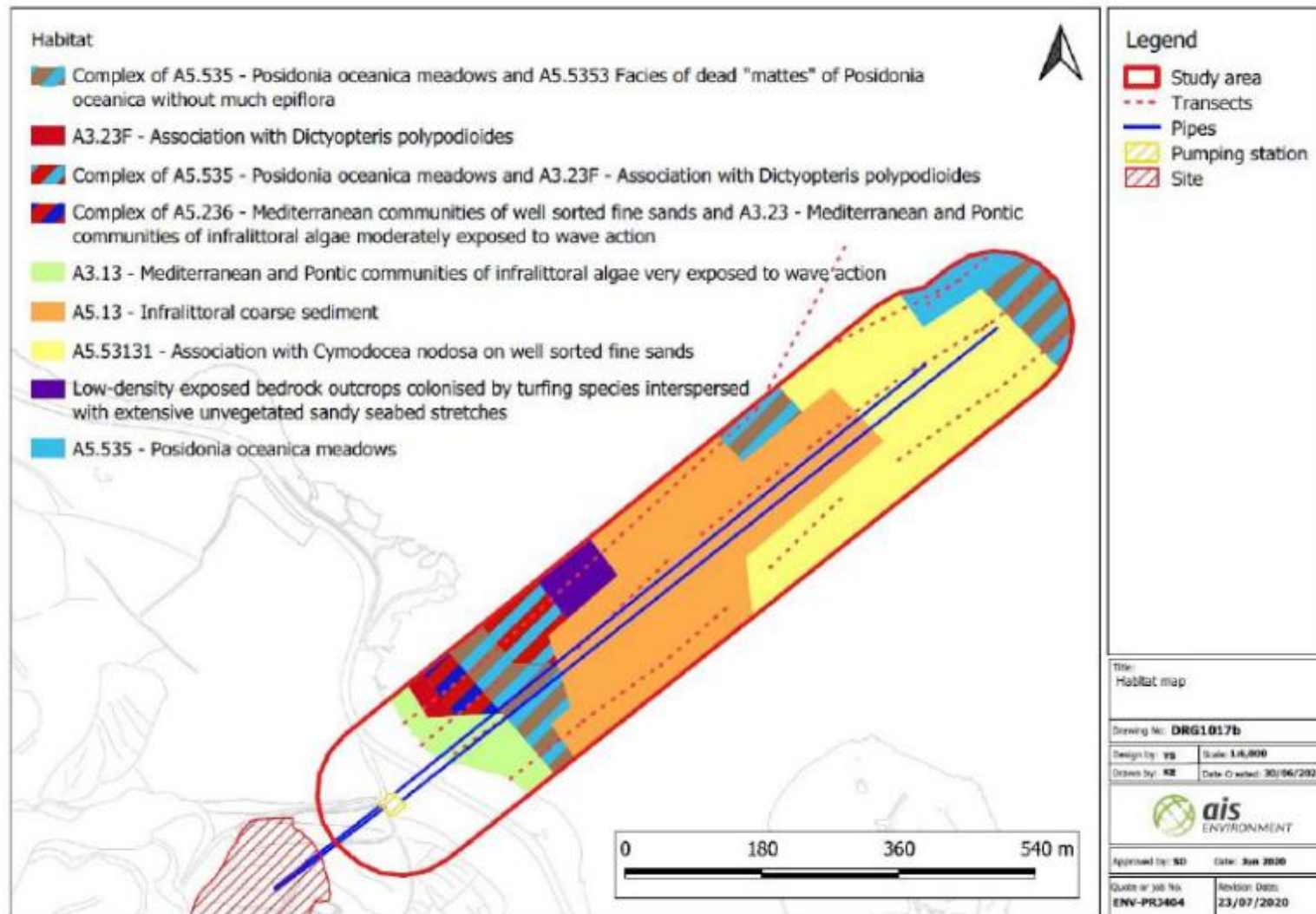


FIGURE 8: BENTHIC HABITAT MAP FOR THE AREA SURVEYED IN RELATION TO EA 0057/18

4.1.3 Protected Areas and Species

S.L. 549.44 (repealing the Flora, Fauna and Natural Habitats Protection Regulations, 2006 [LN 311 of 2006])

This legislation establishes a National Ecological Network of special areas of conservation having National or International Importance. The Legal Notice transposes the obligations of the HABITATS DIRECTIVE which call for the establishment of a European Network of Special Areas of Conservation (Natura 2000) composed of sites having the natural habitat types and species listed in Annexes I and II to the Directive (listed under Schedule I and II of the same Legal Notice). Schedule III lists animal and plant species of community importance whose conservation requires the designation of Special Areas of Conservation, whilst Schedule IV lists the criteria for selecting sites eligible for identification as Sites of National Importance and of International Importance and Designation as Special Areas of Conservation. Schedule V lists animal and plant species of community interest in need of strict protection, whilst Schedule VI lists animal and plant species of national interest in need of strict protection.

Schedule VII lists animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures, whilst Schedule VIII lists animal and plant species of national interest whose taking in the wild and exploitation may be subject to management measures. Schedule IX includes provisions for identification and monitoring, whilst Schedule X lists endemic species not covered by Regulation 26 of the same Legal Notice.

There are no Special Areas of Conservation overlapping the scheme site area. The closest protected areas under the Natura 2000 framework, which happen to be marine or coastal, are replicated in Figure 9. The area covered by these sites is considered as the Area of Interest (AOI) for the Appropriate Assessment.

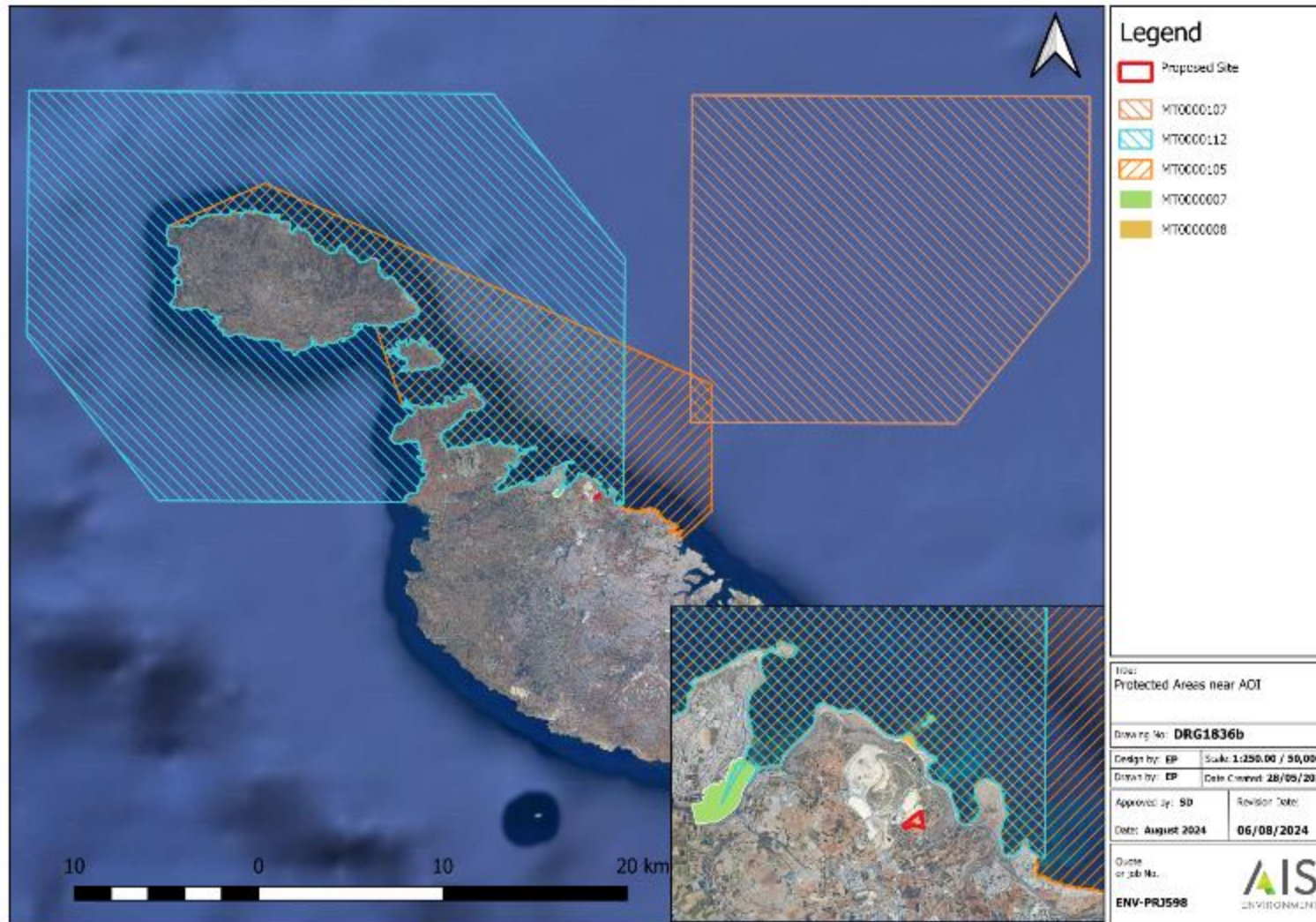


FIGURE 9: NEARBY SITES PROTECTED WITHIN THE NATURA 2000 FRAMEWORK CONSIDERED IN THE STUDY

4.1.3.1 MT0000107 - Żona fil-Baħar fil-Grigal

Żona fil-Baħar fil-Grigal (MT0000107) was designated as a Special Protected Area (SPA) through Government Notice No. 1311 of 2016, and comprises an area of 351.65km².

The site was identified in the Maltese marine IBA inventory as result of the EU LIFE+ Malta Seabird Project (LIFE10 NAT/MT/090) due to its importance for *Hydrobates pelagicus* and *Puffinus yelkouan*. This site is considered further in the Avifauna chapter.

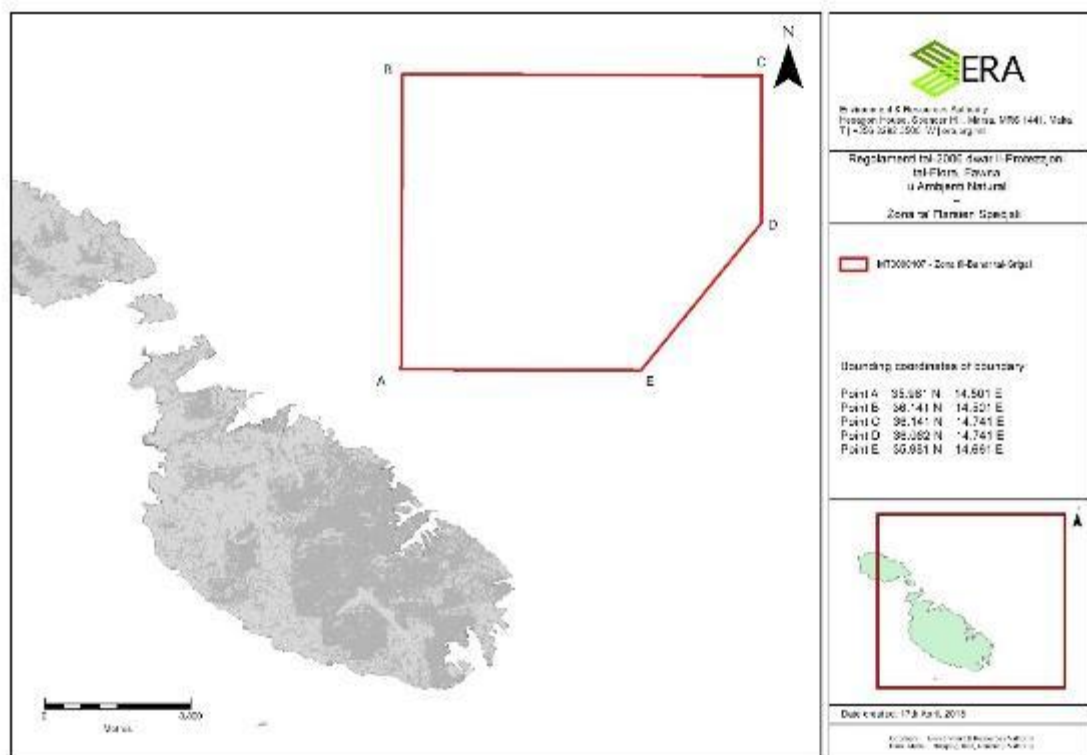


FIGURE 10: BOUNDARY OF THE ŻONA FIL-BAħAR FIL-GRIGAL SPA

4.1.3.2 MT0000112 - Żona fil-Baħar Madwar Għawdex

The Żona fil-Baħar Madwar Għawdex (MT0000112) was designated as a Special Protection Area via Government Notice No. 1311 of 2016, and comprises an area of 556.33km².

The site was identified in the Maltese marine IBA inventory as result of the Eu LIFE+ Malta Seabird Project (LIFE10NAT/MT090) due to its importance for *Calonectris diomedea*, and *Puffinus yelkouan* during the breeding season. This site is considered further in the Avifauna chapter.

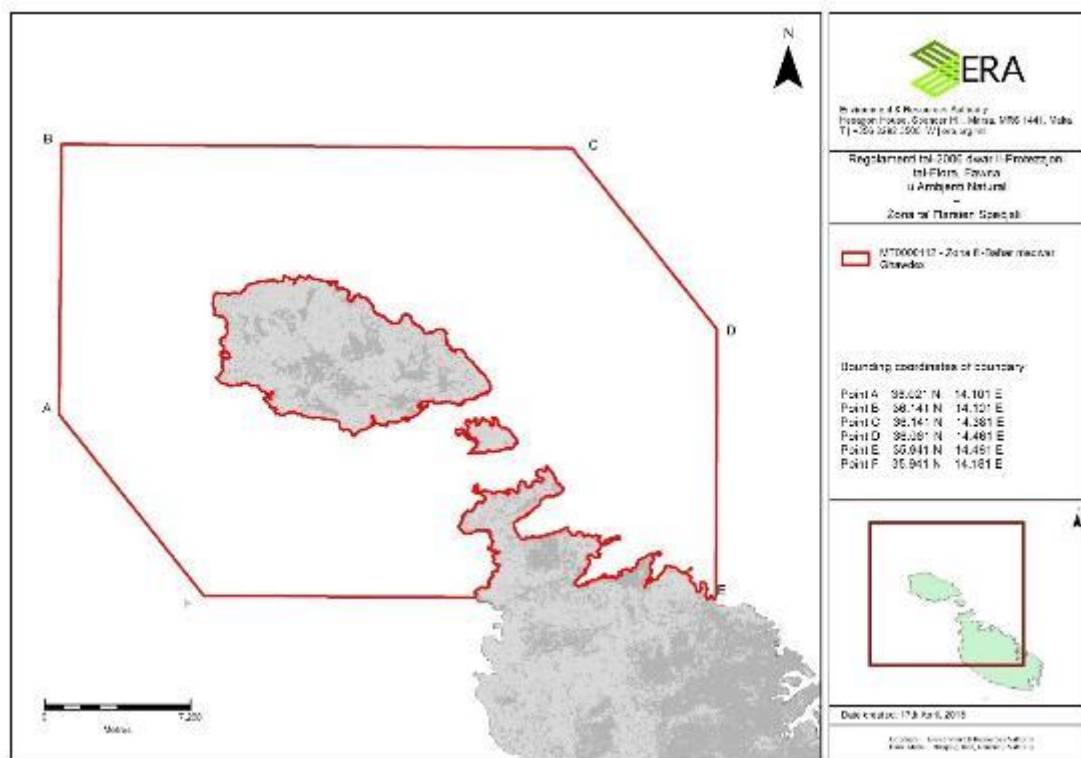


FIGURE 11: BOUNDARY OF THE ŻONA FIL-BAħAR MADWAR GħAWDEX

4.1.3.3 MT0000105 - Żona fil-Baħar bejn il-Ponta ta' San Dimitri (Għawdex) u il-Qaliet

This protected area hosts the largest variety of *Posidonia* sub-types among marine sites selected to be part of the Natura 2000 Network, with the representativity of each subtype considered superior to comparable European sites. The site boundary covers an area of 158.8km².

The subtypes present in this site include:

- *Posidonia* settled on matte (Habitat Code: 1120): These meadows are typically continuous and exhibit a high density.
- *Posidonia* settled on rock (Habitat Code: 1170): This subtype shows a reticulate distribution of dense strands.
- *Posidonia* settled on sand (Habitat Code: 1110): Characterized by continuous beds that generally display low densities and variable percentage cover.
- Mosaic morphology: An intermixed structure of *Posidonia oceanica*, *Cymodocea nodosa*, and coarse sand, showing a reticulate pattern.
- Ecomorphosis of 'barrier reef' *Posidonia* meadows.

The *Posidonia* meadows within this site are also recognised for their high degree of connectivity and percentage coverage. It is evident that these meadows are abundant and healthy, particularly in White Tower Bay, which likely hosts the highest

shoot density in the Mediterranean. Additionally, sandbanks formed by associations of *Cymodocea nodosa* (Habitat Code: 1110) are present within this site, including:

- Sandbanks with associations of *Cymodocea nodosa* on well-sorted fine sands.
- Sandbanks with associations of *Cymodocea nodosa* on superficially muddy sands in sheltered waters.
- Facies with *Cymodocea nodosa* occurring within coarse sands and gravels with varying amounts of mud.

Reefs (Habitat Code: 1170) have also been identified within this site, occurring on hard beds and rocks. The following subtypes are present:

- Reefs with associations of *Dictyopteris polypodioides*.
- Reefs with associations of *Halopteris scoparis* and *Padina pavonica*.
- Reefs with associations of *Flabellia petiolata* and *Peyssonellia squamaria*.
- Reefs with associations of *Cystoseira* spp.

Partially submerged caves are also located along the coast of Comino, although no quantitative data is available for this habitat type. Among the important species within this site is *Lithothamnion minervae*, which has been included in national legislation as a plant species of national interest, necessitating its conservation through the designation of Special Areas of Conservation. This site was proposed as a Site of Community Importance (SCI) in 2010, confirmed as an SCI in 2012, and was subsequently extended in 2018.

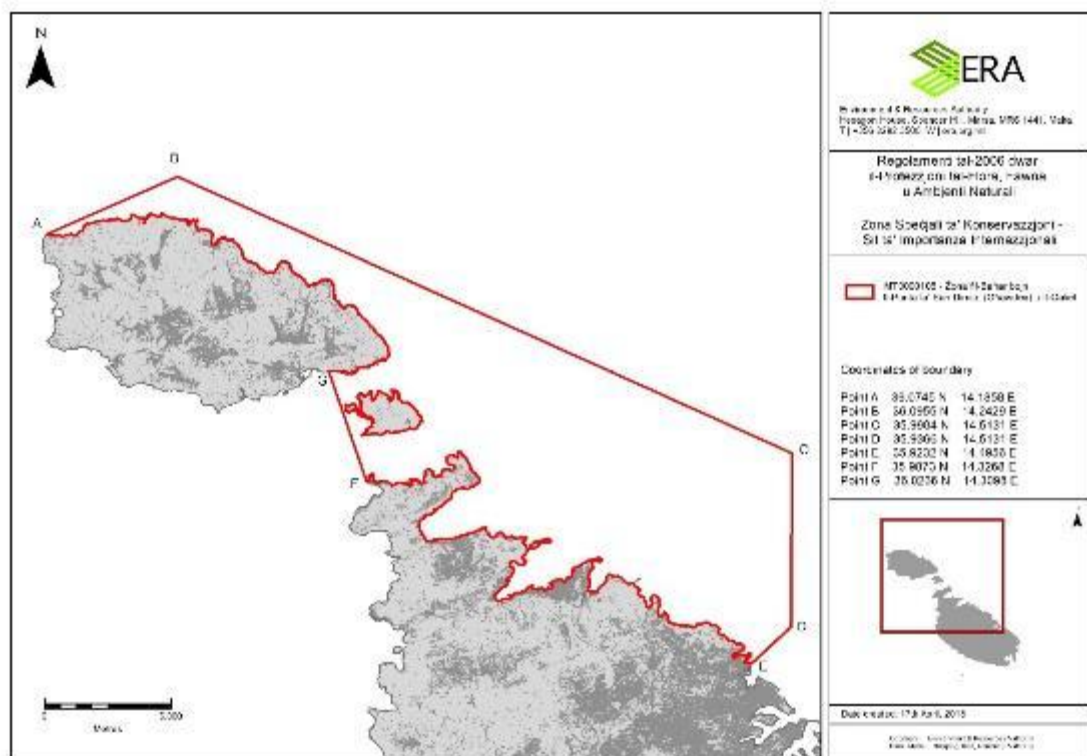


FIGURE 12: BOUNDARY OF THE ŻONA FIL-BAħAR BEJN IL-PONTA TA' SAN DIMITRI (Għawdex) U IL-QALIET SCI

4.1.3.4 MT0000007 – is-Salini

Is-Salini (MT0000007) is recognized as a Special Area of Conservation (SAC) of international significance, encompassing several key habitats listed in the Flora and Natural Habitats Protection Regulations. These include:

- Habitat 1150: Coastal lagoons
- Habitat 1310: Salicornia and other annuals colonizing mud and sand
- Habitat 1410: Mediterranean salt meadows
- Habitat 1420: Mediterranean and thermo-Atlantic halophilous scrubs
- Habitat 92D0: Southern riparian galleries and thickets

Covering an area of 236,700m², Is-Salini is one of the last remaining salt marshes in Malta, characterized by an estuary where seawater mixes with freshwater from nearby valleys. This unique hydrology distinguishes it from other marshlands in the region, which are typically more saline. The site also includes agricultural land and an afforested area known as Kennedy Grove, featuring various tree plantations. The marshland supports a diverse range of flora and fauna, including notable species such as:

- Common plants: *Limbarda crithmoides*, *Suaeda vera*, *Salsola soda*, *Arthrocnemum macrostachyum*, *Phragmites australis*.
- Rare plant species: *Elymus flaccidifolius*, *Ruppia maritima*, *Calystegia sepium*, *Parapholis filiformis*, *Orobanche cernua*.
- Annex II species: *Acrocephalus scirpaceus* (Eurasian reed warbler) and *Aphanius fasciatus* (Mediterranean Killifish).

Additionally, Is-Salini hosts a variety of endemic species including *Trochoidea spratti* (Maltese top snail) and *Muticaria macrostoma* (Maltese door snail). The management plan for the site emphasises the importance of maintaining its ecological integrity while promoting sustainable use and conservation efforts.

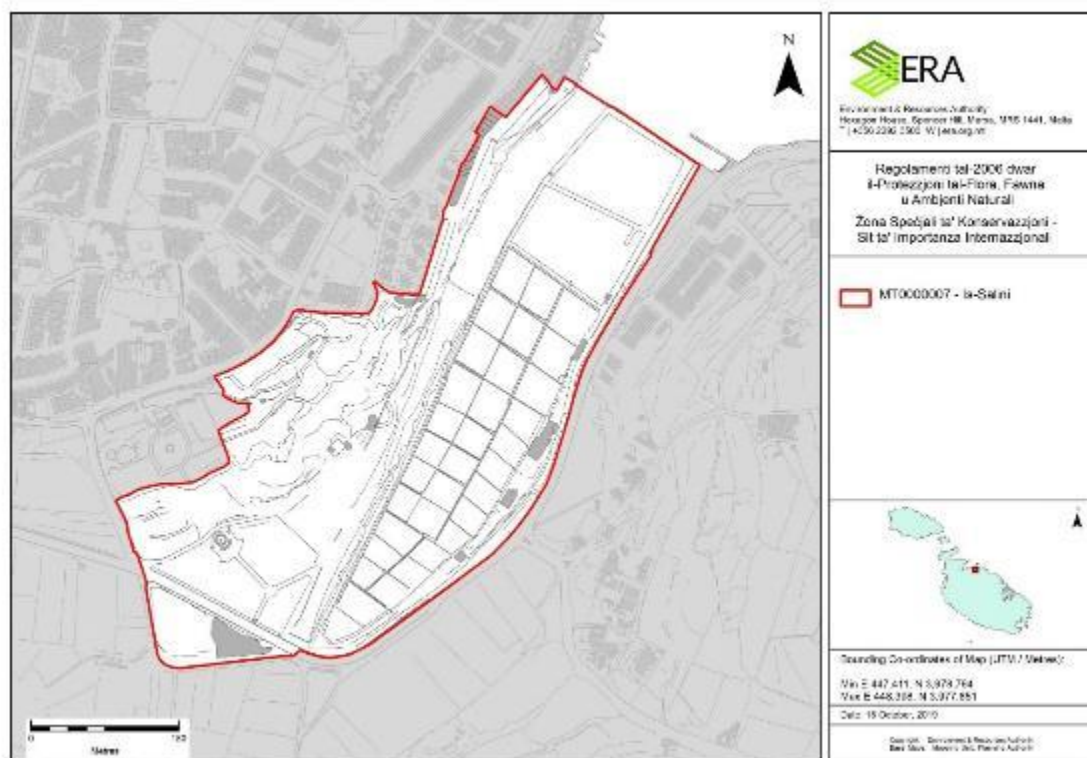


FIGURE 13: BOUNDARY OF THE SALINI SAC

4.1.3.5 MT0000008 - L-Għadira s-Safra u l-Iskol ta l-Għallis

L-Għadira s-Safra is a 15,400 m² transitional coastal wetland in Malta, designated as a Special Area of Conservation under G.N. 1379 of 2016. This site is notable for its brackish water ecosystem, which is rare in the predominantly dry Mediterranean region. It features rockpools that receive rainwater and seawater, creating a unique environment that supports different species depending on the season.

Initially proposed as a Site of Community Importance (SCI) in 1995, L-Għadira s-Safra includes two Annex I habitat types: Mediterranean halophilous scrubs and temporary ponds. The area is home to several endangered and rare species, including prickly grass, tadpole shrimp, and fairy shrimp, along with other unique flora like *Cressa cretica* and *Polygonum maritimum*.

The dominant vegetation consists of coastal species such as plantago spp., sea fennel, and golden samphire. Conservation efforts aim to limit public access to sensitive areas, enhance natural buffers, and promote awareness of the site's ecological significance. However, the site faces threats from littering, trampling, invasive species, and nearby urban activities due to its small size and proximity to roads. Future redevelopment plans include expanding the site to improve its ecological integrity.

L-Iskoll tal-Ghallis is a group of rock formations with characteristics of rocky shoals as the sea inundates them for a significant part of the year and consequently, they neither support terrestrial vegetation nor a real supralittoral zone. However, this shoal is a significant resident bird resting and foraging site, and also important for migratory birds.

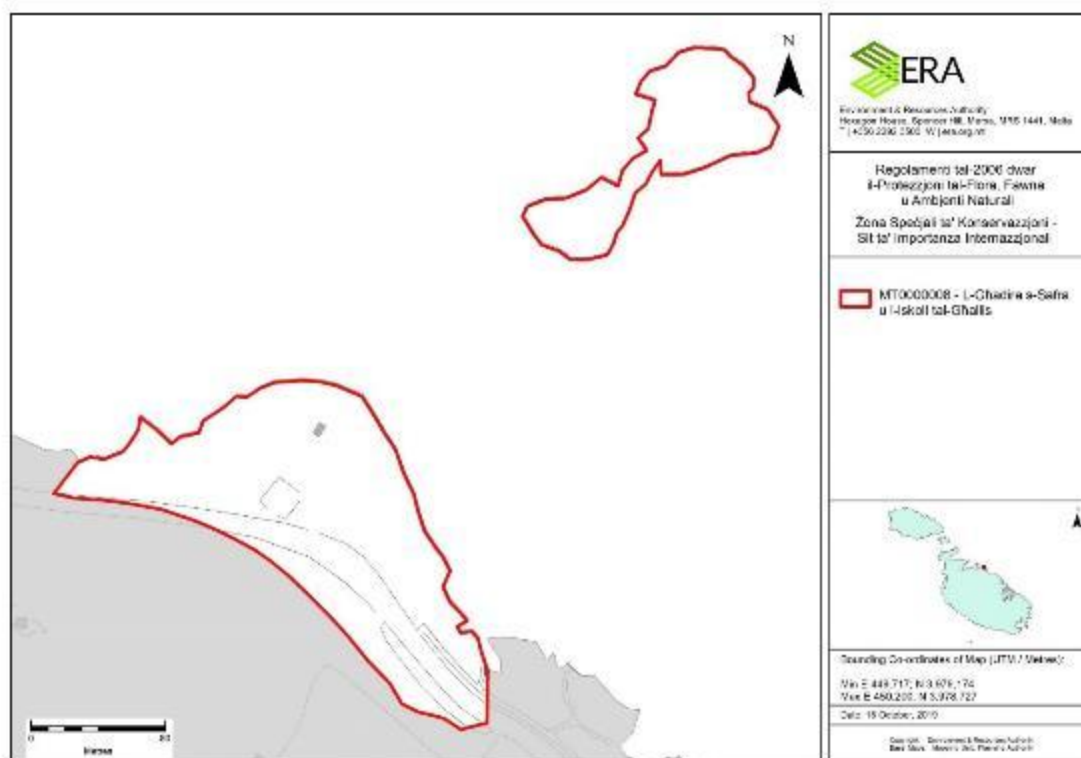


FIGURE 14: BOUNDARY OF THE L-GHADIRA S-SAFRA U L-ISKOL TA L-GHALLIS SCI/SPA

4.1.4 Site Survey

Since the site is not classified as a protected Natura 2000 site, there was no need to survey its ecological features.

4.2 AVIFAUNA CONDITIONS

Approximately 400 bird species have been documented in the Maltese Islands and its Fisheries Management Zone (FMZ), which extends 25 nautical miles. Just over half of these species are regularly observed in the Maltese Islands³. Nearly 50 species are known to breed there, with 23 of these being regular breeders from wild populations⁴. Three pelagic seabird species maintain significant breeding populations in the

³ Bonavia et al. (2005): Systematic list 1996-1999, Il-Merill 31, 1-34 and 32, 55-109

⁴ Epsilon Malta Ltd, Nature Conservation Consultants (2019). Malta Breeding Bird Atlas 2018. Malta: Wild Birds Regulation Unit, Ministry for the Environment, Sustainable Development and climate Change

Maltese Islands, recognized as important from EU, European, and global perspectives. These species are included in Annex I of the EU Birds Directive. The conservation status, population numbers, trends, and distribution data provided below are sourced from BirdLife International's Data Zone⁵ and the European Breeding Bird Atlas-2⁶. Information on species listed in Annex I of the EU Birds Directive was obtained from the Environment, Nature and Biodiversity section of the European Commission⁷.

The baseline study aims to identify which bird species have been recorded or are likely to be found in Areas of Interest 1 and 2, including the protected Natura 2000 sites, indicating that these species are expected to be sensitive receptors for the proposed TTF project.

4.2.1 Breeding seabirds utilising the AOI-2

Three pelagic seabird species from the order Procellariiformes – the Yelkouan Shearwater *Puffinus yelkouan*, Scopoli's Shearwater *Calonectris diomedea*, and Mediterranean Storm-petrel *Hydrobates pelagicus melitensis* – nest on the Maltese Islands and inhabit Maltese waters in significant population numbers from a global and European population perspective. All three species are listed in Annex I of the EU Birds Directive. The Yelkouan Shearwater, is listed as Vulnerable on the IUCN's Redlist. In addition to these, Malta hosts a breeding population of Yellow-legged Gulls *Larus michahellis*, not listed in Annex I of the EU Birds Directive. The designation of the marine SPA Żona fil-baħar madwar Għawdex (MT0000112), partially overlapping with the AoI-2, was triggered by the presence of the Yelkouan Shearwater and the Scopoli's Shearwater.

Scopoli's Shearwater *Calonectris diomedea* – Least Concern, Annex I

The Scopoli's Shearwater is currently listed as Least Concern by the IUCN. It is listed under Annex I of the EU-Birds Directive. The species is endemic (breeding) to the Mediterranean basin, with major colonies in the Central Mediterranean. The global population size was last estimated in 2013 at 28,500 – 446,000 mature individuals equating to 142,478 – 222,886 breeding pairs, showing a decreasing trend. For the Maltese islands, the total population estimate in 2018 was 2670 – 3605 breeding pairs according to Malta's second assessment report for the MSFD, roughly equating to around 1.6 – 1.9 % of the global breeding population. Previous figures reported in 2013 had estimated the total Maltese population to be 3,046 – 3,962 breeding pairs. The available data suggests a decreasing population trend. Birds only approach land to breed, entering and leaving the colonies under the cover of darkness. Adults in and

⁵ BirdLife International (2020) IUCN Red List for birds. Downloaded from <http://www.birdlife.org> on 17/07/2024

⁶ Keller, Herrando, Vorisek, et al. (2020): European Breeding Bird Atlas 2: Distribution, Abundance and Change

⁷ Accessible at the link:
https://ec.europa.eu/environment/nature/conservation/wildbirds/threatened/index_en.htm

near the colonies and fledglings are sensitive to light pollution⁸. The closest breeding colony to the proposed development is Irdum tal-Madonna (SPA MT0000009) – this is not expected to be impacted directly by noise and sound pollution from the development.

The Scopoli's Shearwater inhabits Maltese waters from February to November, with the highest activity at and in front of the colonies mainly from March to October. The species is strictly pelagic, foraging frequently together in large numbers on shoaling fish and squid by plunge-diving and pursue-diving, up to 15m deep. During the breeding period, Scopoli's Shearwaters congregate in large flocks, sitting on the water's surface exhibiting 'rafting' behaviour within a 4 km radius in front of the colonies in the evenings⁹, as described by Sultana et al. 2011. GPS-tracking of individuals from Maltese colonies during the chick-rearing period (July - October) shows that Scopoli's Shearwaters utilise at-sea areas relatively close to shore, also within the AoI-2. The partially coastal distribution of foraging Scopoli's Shearwaters has furthermore been confirmed by shore- and boat-based counts. Up to 7300 individuals of the species make regular use of the SPA MT0000112, Żona fil-Baħar madwar Ghawdex during the reproductive season as foraging ground and rafting areas in front the colonies. Frequent passage occurs through the SPA by birds commuting between breeding grounds and foraging areas. While Scopoli's Shearwaters have not been reported breeding inside the AoI-2, they make regular use of the marine part of the AoI-2.

Yelkouan Shearwater *Puffinus yelkouan* – Vulnerable, Annex I

The IUCN lists the Yelkouan Shearwater as Vulnerable. It is furthermore listed under Annex I of the EU-Birds Directive. The Yelkouan Shearwater is endemic to the Mediterranean basin. The global population size, estimated in 2011, is 15337 – 30519 pairs, roughly equating to 46000 – 92000 individuals, although the quality of this estimate is moderate due to data gaps. According to the IUCN the global population trend is decreasing. The latest total population estimates of Yelkouan Shearwaters for the Maltese Islands (2016 - 2018) is 1795 – 2635 breeding pairs, roughly equating to 10 % of the global breeding population. While previous figures reported in 2013 in the initial MSFD report suggest a short-term increase for Maltese population, the report stresses the fact that the apparent short-term increase of the Maltese Yelkouan Shearwater population is rather a result of intense research in recent years with the result of higher monitoring capacity rather than an actual increase in population numbers¹⁰. The long-term trend indicates a stable population. By-catch is

⁸Rodríguez et al. (2017). Seabird mortality induced by land-based artificial lights. *Conservation Biology*, 31(5), 986-1001 and Crymble et al. (2020): Identifying light-induced grounding hotspots for Maltese seabirds. *Il-Merill* 34, 23-43.

⁹BirdLife International (2010). *Marine Important Bird Areas toolkit: standardised techniques for identifying priority sites for the conservation of seabirds at sea*. BirdLife International, Cambridge UK. Version 1.2: February 2011.

¹⁰Maltese Environment and Resources Authority - ERA (2020): Update of Articles 8, 9 and 10 of the Marine Strategy Framework Directive (2008/56/EC) in Malta's Marine Waters. Second Assessment Report, pp.321-344.

likely to be responsible for low adult survival rates¹¹ as shown for Maltese Yelkouan Shearwaters. Birds only approach land to breed, entering and leaving the colonies under cover of darkness. Adults and fledglings are sensitive to light pollution¹². The largest Yelkouan Shearwater colony in Malta is situated at Irdum tal-Madonna (MT0000009), well outside the AoI-2. The colony closest to the planned development is situated on Selmunett (MT0000022), within the 5 km radius of the AoI-2. This colony is currently estimated at 45 to 70 breeding pairs.

The Yelkouan Shearwater inhabits Maltese waters, including the SPA MT0000112. It can be found in the colonies from October to July. Outside the breeding season, the birds disperse more widely across the Central Mediterranean and a significant part of the population migrates East to the Aegean and into the Black Sea¹³. Yelkouan Shearwaters are strictly pelagic, foraging frequently together in flocks of shoaling fish and squid mainly by pursuit-diving, up to 50m deep. Like Scopoli's Shearwaters, Yelkouan Shearwaters congregate in flocks exhibiting rafting behaviour within a 7 km radius in front of the colonies in the evenings, according to GPS-tracking data. The individual rafts tend to be further out at sea than those of the Scopoli's Shearwaters and made up of fewer individuals.

GPS-tracking of individuals during chick-rearing from the two main Maltese colonies (2012 - 2014)¹⁴ suggests that Yelkouan Shearwaters forage predominantly in waters further offshore and partially outside Maltese waters. Like other shearwater species, Yelkouan Shearwaters avoid crossing over land. The Yelkouan Shearwater is one of the trigger species for the designation of the marine SPA at hand (MT0000112). 3270 - 4650 individuals of the species make regular use of this SPA during the reproductive season as foraging ground and rafting areas in front of the colonies. Frequent passage occurs through the SPA by birds commuting between breeding grounds and foraging areas. To summarise, Yelkouan Shearwaters are breeding inside the AoI-2, are expected to be passing through the marine part of this area regularly and can be expected to also forage and rest/ raft there.

Mediterranean Storm-petrel *Hydrobates pelagicus melitensis* – Least Concern, Annex I

¹¹Oppel et al. (2011): Is the Yelkouan shearwater *Puffinus yelkouan* threatened by low adult survival probabilities? *Biological Conservation*, 144(9), 2255-2263.

¹²Crymble et al. (2020): Identifying light-induced grounding hotspots for Maltese seabirds. *II-Merill* 34, 23-43.

¹³Raine, A. F., Borg, J. J., Raine, H., & Phillips, R. A. (2013): Migration strategies of the Yelkouan Shearwater *Puffinus yelkouan*. *Journal of Ornithology*, 154(2), 411-422.

¹⁴ Metzger, B., Oppel, S., Carroll, M., Meirinho, A., Dias, M. P., Barbara, N., & Lago, P. (2015). Malta Marine IBA Inventory Report. https://birdlifemalta.org/wp-content/uploads/2018/03/LIFE10NATMT090-MSP-A8_mIBA_Report_final.pdf

The Mediterranean Storm-petrel *Hydrobates pelagicus melitensis* is a Mediterranean subspecies, clearly separated both genetically¹⁵ and morphologically¹⁶ from the Atlantic breeding population of the European Storm-petrel. Neither IUCN/BirdLife International nor the EU-Birds Directive has assessed this taxonomic unit separately. The IUCN lists the species overall as Least Concern. It is listed under Annex I of the EU-Birds Directive. The Mediterranean subspecies *H. pelagicus melitensis* is endemic to the Mediterranean basin and therefore has a relatively restricted distribution range. The global estimated population size of the entire species is 430,000 – 519,999 mature individuals. However, the data quality is poor (estimated in 2015). The most recent population size estimates for the Mediterranean sub-species are 8,500 – 15,200 pairs, roughly 2 – 3 % of the global population. While the global population trend is unknown, the population trend of Mediterranean sub-species is decreasing according to EU Birds Directive. The closest breeding colony to the proposed development is Irdum tal-Madonna (MT0000009) – this is not expected to be impacted by noise and light pollution from the planned development.

This most recent population assessment through capture mark recapture led to an overall population size estimate of 8575 breeding pairs, around 7 % of the estimated global population of the species and at least 56 % of the entire population of the Mediterranean subspecies. The short-term trend (2008 - 2018) and the long-term trend (1980 - 2018) for the Maltese population (2008 - 2018) are both reported to be stable¹⁷.

The species is found in the Maltese FMZ year-round and in the colonies from February to October. It is by far more commonly seen in Maltese waters during the breeding season, and more frequently and in higher numbers southeast and south of Malta. Adults and fledglings are sensitive to light pollution¹⁸.

The 70 % KDE of seven Storm-petrels from the Filfla colony GLS-tracked during the breeding season indicate that the birds make use of the entire Maltese FMZ, but also of areas further offshore between Malta and Libya.

Despite not being a trigger species for the designation of the marine SPA MT0000112, Storm-petrels are commonly making use of this area year-round, and more so during the breeding season. During the day, the species is mainly found far offshore, but especially with high wind velocities directed towards the shore, birds can be observed passing relatively close to the coast. Furthermore, Storm-petrels are known to forage

¹⁵Cagnon et al. (2004): Phylogeographic differentiation of storm petrels (*Hydrobates pelagicus*) based on cytochrome b mitochondrial DNA variation. *Marine Biol.* 145(6): 1257–1264.

¹⁶Lalanne et al. (2001): Morphological differentiation between European Storm-petrel subspecies: new results regarding two Mediterranean populations. *Alauda* 69(4): 475–482.

¹⁷Maltese Environment and Resources Authority - ERA (2020): Update of Articles 8, 9 and 10 of the Marine Strategy Framework Directive (2008/56/EC) in Malta's Marine Waters. Second Assessment Report, pp.321-344.

¹⁸Crymble et al. (2020): Identifying light-induced grounding hotspots for Maltese seabirds. *Il-Merill* 34, 23-43.

close to coast during the night¹⁹. While Storm-petrels have been observed in the AoI-2, foraging in and travelling through MT0000112 and prospecting potential breeding sites on Selmunett (MT0000022) at night (B. Metzger, pers. observations), they have not been confirmed breeding inside the AoI-2.

Yellow-legged Gull *Larus michahellis* – Least Concern

The IUCN lists the Yellow-legged Gull as Least Concern with an increasing population trend. The Global population numbers are unknown. The European population is estimated at 409000 – 534000 pairs equating to 819000 – 1070000 mature individuals, with an increasing trend. The latest assessment of the Maltese YLG population for Malta's Article 12 reporting to the EU²⁰ lists 250 breeding pairs for the Maltese islands with an increasing trend. The largest colony, approximately 202 ± 24 apparently occupied nests (5-year mean) is located on Filfla. Similar numbers have been reported from Filfla before. Smaller colonies at Ta' Ċenċ, Dingli and Wardija might have expanded in the last years and the species has established new breeding locations such as Comino, Għarb and Selmunett (MT0000022) recently²¹.

Western to Central Mediterranean populations are mainly sedentary and dispersive but some populations are partially migratory. In the Maltese Islands a large number of non-breeders are present year-round. Ring recoveries show that birds ringed on Filfla as chicks utilise other locations in Malta and abroad, mainly Sicily and Southern Italy²². Yellow-legged Gulls are highly opportunistic feeders and benefit from human activities, such as fishing, discard from fisheries and other vessels, food-waste, landfills, aquaculture and agriculture. In the Maltese islands, they occur in their highest densities and largest abundances in the harbour areas, around the largest colony (Filfla), around areas with large aquaculture facilities, especially tuna pens such as in the vicinity of St Paul's Island and the wider area off Selmun. In the AoI-2 up to a couple of thousands can be observed feeding at the Magħtab landfill. Large numbers regularly make use of the adjacent land and sea areas in the AoI-2 for feeding, resting, roosting, preening etc. including the SACs MT0000002 (L-inħawi ta' Pembroke), MT0000007 (Is-Salini), MT0000008 (L-Għadira s-Safra u l-Iskoll tal-Għallis), MT0000022 (Il-Gzejjer ta' San Pawl - Selmunett) and the SPA MT0000112 (Żona fil-Baħar ta' madwar Għawdex).

4.2.2 Other avian species expected to occur in the AOI

Many other avian species make use of the AoI-1 and/or AoI-2. A list of all the species that have been recorded or can be expected to occur regularly in the AoI-1 and AoI-2, including their status is included in the Appendix. It is not expected that

¹⁹ D'Elbee, J. & Hemery, G. (1998) Diet and foraging behaviour of the British Storm Petrel *Hydrobates pelagicus* in the Bay of Biscay during summer. *Ardea* 86:1-10

²⁰https://circabc.europa.eu/sd/a/4e807e1b-8aa1-4ede-ac48-a13cdd32889f/MT_A12NatSum_20141031.pdf

²¹Crymble et al. (2020): New breeding sites of Yellow-legged Gull around the Maltese Islands. *Il-Merill* 34, 72-80.

²² Sultana et al. (2011): The Breeding Birds of Malta. Birdlife Malta. Malta.

any of these species listed in Appendix will reach threshold levels of the population sizes being impacted by the proposed development.

5 IMPACT ASSESSMENT

5.1 CONSTRUCTION PHASE

5.1.1 Impacts on terrestrial environment

The site footprint does not overlap or border either of the terrestrial Natura 2000 sites, therefore no direct impacts to protected sites are expected to arise from the scheme. The potential of indirect impacts on Natura 2000 sites arising from the construction phase are considered.

Spillover effects

Excavation and construction activities can lead to significant indirect environmental impacts on the surrounding protected areas, particularly through the generation of fine particulate matter (PM). This particulate matter has the potential to disperse beyond the boundaries of the construction site due to wind action and stormwater runoff. Wind-borne dust can adversely affect adjacent trees and vegetation by obstructing and damaging their respiratory and photosynthetic surfaces. Such interference may compromise physiological processes, resulting in diminished plant health and alterations in community structure, which are contingent upon the varying susceptibility of different species. Consequently, the dispersal of wind-borne particulates is anticipated to exert a temporary yet substantial negative impact on vegetation within the study area.

The nearest terrestrial Natura 2000 site, I-Ghadira s-Safra, is situated at a considerable distance from the construction site, thereby mitigating concerns regarding significant impacts from wind-borne dust dispersal on these protected areas. This assertion is further corroborated by prevailing North-westerly wind patterns, which would transport airborne particulates even further from these designated sites.

Particulate matter may also settle on the ground and be transported away from the site via rainwater runoff into adjacent protected areas. While predicting the extent of this impact presents challenges, it is acknowledged that water-borne particles can degrade substrate quality, adversely affecting low-lying species and inhibiting the germination of primary colonising species. Such outcomes may promote the proliferation of opportunistic and non-native species that are atypical of the habitat, potentially leading to competitive interactions with indigenous species if not managed appropriately. The considerable distance between the site and the nearest Natura 2000 site limit the likelihood of such instances.

To ensure that these impacts do not spread further than the site area, it is recommended to implement site hoarding around the perimeter of the planned excavation area, along with the use of wheel-washing facilities and wetting down of any exposed stockpiles as a few examples of mitigating measures.

Noise and vibration impacts

The construction phase will inevitably increase noise levels in the area particularly during the excavation phase. Excessive noise generation can be a deterrent for faunal species, particularly if carried out during periods which are generally quiet. Long-term increased noise and vibration generation may cause certain species to leave the site's surrounding area temporarily or even permanently. The species of bats and other mobile terrestrial fauna expected to inhabit the nearby Natura 2000 sites are not restricted to these sites, and may regularly use the site area for their foraging, resting and other life cycle stages. Therefore, while this impact will not directly impact the nearby Natura 2000 sites, protected species of fauna which make use of both is-Salina and I-Għadira s-Safra, could be deterred from the site area.

The dedicated study on noise impacts on ecosystems during the construction phase resulted in a 'minor' rating, which indicates insignificant noise impacts. The provisions of LEGAL NOTICE 340 OF 2022 - CONSTRUCTION MANAGEMENT SITE REGULATIONS, 2022 should be followed throughout all the construction activities to minimise impacts in this regard.

Light impacts

The construction phase does not envisage that works are scheduled within the dark period, aside from emergency works or short-term interventions which require 24/7 activity at the site. The site may be illuminated during the night in some areas for security reasons. In these cases, the previously dark area of maquis will be temporarily illuminated, causing a deterrent to nocturnal species such as bats and hedgehogs which frequent the area. The impact should be mitigated by the use of down-turned lighting, and avoidance of night-time activities unless absolutely necessary. As with the other impacts generated during this phase, the impacts on Natura 2000 sites are considered indirect, as the lighting will not illuminate protected areas, but may affect the protected species which use both sites regularly for their life processes.

5.1.2 Impacts on marine environment

No significant impacts are envisaged to be caused by the proposed development to the marine environment during the construction phase. Standard site containment measures would be adequate to control the impact from potential contamination of seawater from rainwater runoff.

5.1.3 Impacts on avifauna

Light pollution due to night-time lighting (AoI-2)

Artificial light at night (ALAN) is well documented to negatively affect birds, including seabirds. Adults from all three procellariiform species nesting on the Maltese Islands actively avoid approaching breeding areas under high levels of illumination and may desert colonies as a result of exposure to ALAN. That seabirds are negatively affected even by temporary light pollution in front of their colonies has been recently

proven for *P. yelkouan* in Malta²³. Furthermore, ALAN causes the stranding of seabird fledglings on their first flight out of the colony. These may be injured or killed by collisions with manmade structures such as street light poles, or they might get grounded. Unless grounded individuals are found and released, they are likely to die²⁴. In general, light pollution from ALAN is additive and light trespass that creates skyglow adds to light pollution in areas that are otherwise dark.

While the site of the proposed development is not situated within the immediate line of sight of any seabird nest sites, shearwater fledglings are known to strand at light polluted sites across the Maltese Islands²⁵. However, a *P. yelkouan* colony holding a significant number of breeding pairs is located on St Paul's Island (MT0000022) within the 5.0 km buffer zone AoI-2, in which additional sky glow from ALAN from the construction site can have significant impacts, including on adult attendance. This is relevant if night-time construction activities are carried out during the reproductive season (February to July). The negative impact will potentially act on 45-70 breeding pairs. Including their offspring and prospecting birds, this equates to 225-350 individuals.

Additionally, ALAN is known to have negative consequences on nocturnally migrating birds in general. Bright lights are known to attract, disorient, and ground birds in active migration during the night²⁶ if construction work or operations are carried out at night during spring or autumn migration with no mitigation measures in place. The lit-up construction site during night-time operation is highly likely to have above-mentioned impacts on nocturnally migrating birds passing within the AoI-2 (5.0 km buffer). However, it is extremely unlikely that the additional ALAN from the construction site will impact threshold numbers of significance of birds of any species during their nocturnal migration.

The most sensitive periods to migrating land birds are March to May and September to November. The most sensitive periods for fledging seabirds are during their respective fledging periods: June/July for Yelkouan Shearwaters and September/October for Scopoli's Shearwaters. Mediterranean Storm-petrels have an asynchronous breeding season, with fledglings expected between June and October.

²³ Austad, M., Oppel, S., Crymble, J., Greetham, H., Sahin, D., Lago, P. & Metzger, B. (2023). The effects of temporally distinct light pollution from ships on nocturnal colony attendance in a threatened seabird. *J Ornithol* 164, 527–536. <https://doi.org/10.1007/s10336-023-02045-z>

²⁴ Rodríguez, A., Holmes, N. D., Ryan, P. G., Wilson, K. J., Faulquier, L., Murillo, Y., Raine, A. F., Penniman, J. F., Neves, V., Rodríguez, B., Negro, J. J., Chiaradia, A., Dann, P., Anderson, T., Metzger, B., Shirai, M., Deppe, L., Wheeler, J., Hodum, P., ... Corre, M. Le. (2017). Seabird mortality induced by land-based artificial lights. *Conservation Biology*, 31(5), 986–1001. <https://doi.org/10.1111/cobi.12900>

²⁵ Crymble et al. (2020): Identifying light-induced grounding hotspots for Maltese seabirds. *Il-Merill* 34, 23-43.

²⁶ Evans Ogden, L. J. (2002). Summary report on the bird friendly building program: Effect of light reduction on collision of migratory birds. In *Fatal Light Awareness Program* (Vol. 1).

5.2 OPERATIONAL PHASE

5.2.1 Impacts on terrestrial environment

The operational phase are expected to cause the following main impacts on site the surrounding areas:

- a) increasing vehicular traffic and associated impacts,
- b) increasing lighting in the currently dark areas,
- c) minor increases in emissions to air from the TTF chimney stack, and
- d) minor increases in noise impacts

These impacts will persist throughout the lifetime of the facility. While the nearest Natura 2000 sites, ie. is-Salini and L- Ghadira s-Safra u l-Iskol ta l-Għallis are at a substantial distance away from the site, to the extent where direct impacts are not expected, some indirect impacts may occur on the mobile protected species which inhabit and make use of these protected areas, and also the habitats at the site and its surroundings.

Increased vehicular traffic

Due to the expansion of the ECOHIVE facility, the proposal is expected to induce an increase in vehicular traffic flow to and from the site. Such traffic may choose to utilise the coastroad, which runs parallel to two terrestrial protected sites relevant to the proposed development. This will inevitably increase the deposition of particulate matter and gases related to combustion onto the surrounding land. However, the envisaged frequencies will be comparable to the current traffic present in the wider ECOHIVE complex and do not constitute a substantial increase. The effects should be considered in the wider context of the ECOHIVE complex expansion, where various developments are redirecting traffic to the Magħtab area which previously was spread out in different areas of the islands (namely the Material Recovery and Biodigester developments).

Lighting

The proposed development will introduce lighting in an area that is currently in darkness and likely frequented by nocturnal species, which may be deterred following the proposed development. These species are mobile and are not confined to the site, and therefore their deterrence constitutes an indirect impact on the residents/visitors of the surrounding protected areas. Species such as bats are misconstrued to be attracted to lit areas, as these attract their prey species and present easier targets for predation. However, studies show that overall, lighting is a deterrent to these species and may influence and skew their natural processes. Attracting these species to areas where traffic may occur also increases their chance of being subjected to accidental deaths through impact with vehicles.

Mitigation measures such as sensor-operated lights, down-turned light fixtures and other measures as indicated in the GUIDELINES FOR ECOLOGICALLY RESPONSIBLE LIGHTING

should be implemented to the extent possible to minimise the potential light spillover into the adjacent agricultural areas and impacts on protected species.

Emissions

The potential risks associated with atmospheric emissions from various pollutants produced by waste incineration are anticipated. The effects of incinerated waste on wildlife remain largely ambiguous due to the diverse range of potential sources and receptor types involved. However, this assessment operates under the premise that the primary health impacts observed in human populations may similarly affect animal populations.

The release of heavy metals, dioxins, polycyclic aromatic hydrocarbons (PAHs), and other volatile organic compounds (VOCs) can result in detrimental health effects, particularly on the respiratory system, renal function, dermal integrity, urinary systems, gastrointestinal tracts, and may provoke allergic reactions when ingested in significant quantities over prolonged periods. To mitigate these adverse health effects in humans, the European Commission has established the Best Available Technology (BAT) document for Waste Incineration in alignment with the Industrial Emissions Directive 2010/75/EU. The proposed facility is designed to comply with the most stringent standards delineated in these guidelines and policies.

The Air Dispersion Model report presents results in three modelled scenarios. The models are based on baseline PM_{2.5}, PM₁₀ and NO₂ data collected over six weeks within the AOI. These demonstrate a 'not significant' adverse impact caused by minimal increases of air emissions caused by the operations of the TTF within the three scenarios. The AOI considered for the ADM comprises a six-kilometre radius around the plant, which encroaches onto MT0000008 – L-Ghadira s-Safra u l-Iskol ta l-Ghallis and the terrestrial areas within MT0000007 – is-Salini.

A minor adverse impact is expected at one of the sensitive receptors identified within the study (R27, agricultural land in Maghtab), caused by cumulative emissions arising from the operations of the TTF and the nearby Waste to Energy plant. One should note that this sensitive receptor is not located within either of the terrestrial Natura 2000 sites.

Therefore, no significant effects on Natura 2000 terrestrial sites are expected to be caused by the negligible increase in emissions caused by the site or cumulative effects in the area.

Noise

The site operations will inevitably cause an increase in noise levels of the area, due to increased vehicular traffic to the proposed site and the site operations themselves. However, the dedicated noise study for operational impacts concluded no significant impacts resulting from noise on the surrounding ecosystems.

5.2.2 Impacts on marine environment

Runoff

The permanent loss of agricultural land to accommodate the proposed Scheme is expected to give rise to increased rainwater runoff towards the sea. Such runoff may carry particulate matter and other forms of anthropogenic debris in the area towards the sea. This could contribute to a deterioration of seawater quality, however the impact is not significant on the adjacent protected marine ecosystems.

Emissions

The potential impacts from the scheme's operations on the marine environment are primarily associated with the potential decrease in local air quality, caused by particulate matter and pollutants generated by the site operations. These pollutants could potentially deposit into the coastal and marine area during rainfall events and/or through wind dispersal.

The Air Dispersal Model (ADM) considered a 6km radius around the plant as the area of influence (AOI) for the study. The AOI overlaps with the marine Natura 2000 site MT0000105 - Żona fil-Baħar bejn il-Ponta ta' San Dimitri (Għawdex) u il-Qaliet, designated to protect a number of marine habitats which support the species *Posidonia oceanica* and *Cymodocea nodosa*.

The results of the ADM demonstrate a 'not significant' adverse impact caused by minimal increases of air emissions caused by the operations of the TTF within the three scenarios. An assessment of the cumulative impacts of the TTF and the Waste to Energy plant emissions did not result in any significant impacts expected in the marine area.

Therefore, no significant impacts related to emissions are expected to affect the marine Natura 2000 site, both through direct and cumulative impacts.

5.2.3 Impacts on avifauna

Light pollution during night-time operation

The impacts of ALAN on seabirds are laid out in the section related to construction impacts. The proposed development site is not situated within the immediate line of sight of any seabird nest sites. However, a *P. yelkouan* colony holding a significant number of breeding pairs is located on Saint Paul's Island (MT0000022) within the 5.0 km buffer zone AoI-2, in which additional sky glow from ALAN emitted by the TTF during operation can have significant impacts. This is relevant when operations are carried out during night-time or if the TTF including the ancillary facilities remain illuminated during the night outside working hours. The negative impact will be permanent and potentially act on 45-70 breeding pairs. Including their offspring and prospecting birds, this equates to 225-350 individuals. Additional to the up to 70 young *P. yelkouan*, fledging from Saint Paul's Island annually, seabird fledglings from

other colonies might also get attracted and grounded by ALAN originating from the planned development.

As mentioned above ALAN is known to have negative consequences on nocturnally migrating birds in general. Bright lights are known to attract, disorient, and ground birds in active migration during the night²⁷ if the TTF carries out night-time operations (or remains lit-up in general) during the spring or autumn migration period with no mitigation measures in place. The lit-up TTF is highly likely to have above-mentioned impacts on nocturnally migrating birds passing within the AoI-2 (5.0 km buffer). However, it is extremely unlikely that the additional ALAN from the TTF will impact threshold numbers of significance of birds of any bird species passing through the wider area (AoI-2) during their nocturnal migration.

While light pollution during the operational phase has the same effects on the receptors as during the construction phase (outlined above), the impact during the operational phase is expected to act permanently (long-term).

Chemical pollution from the stack plume, fly ash residues, slag and bottom ash

A large variety of pollutants such as heavy metals, dioxins, furans and other pollutants are expected to end up in the TTF's stack plume when thermally treating some of the waste items listed in the PDS of the proposed project. Additionally, as the TTF is proposed to be fuelled by diesel, the plume can be expected to contain diesel particulate matter (DPM), unburned partially polycyclic hydrocarbons (HC), benzene, formaldehyde, acetaldehyde, acrolein, 1,3-butadiene, carbon monoxide (CO) and nitrogen oxides (NOx).

Diesel use is only envisaged during start-ups, shutdowns or when temperatures drop below the required incineration temperature, therefore any relevant impacts would be occasional and short-lived. The proposed process is designed specifically to handle hazardous waste incineration at very high incineration temperatures (800 °C or 1100 °C for a minimum of 2 seconds in SCC, and is followed by a robust flue gas treatment system. The proposed development as a whole implements the use of Best Available Technology (BAT), adhering to the most stringent environmental standard. Therefore, it is expected that the use of diesel and other pollutants will result in minimal emissions restricted to a small area around the site.

Apart from the implications for human health, there is substantial research into the negative effects such chemical pollutants pose on wildlife including birds, such as neurological and nervous deficiencies, impaired reproductive ability, physiological and behavioural abnormalities, mutagenic effects, and mortality²⁸. Even relatively

²⁷ Evans Ogden, L. J. (2002). Summary report on the bird friendly building program: Effect of light reduction on collision of migratory birds. In Fatal Light Awareness Program (Vol. 1).

²⁸ Fry, D. M. (1995). Reproductive effects in birds exposed to pesticides and industrial chemicals. *Environmental Health Perspectives*, 103(SUPPL. 7), 165-171.
<https://doi.org/10.1289/ehp.95103s7165>

low emission concentrations may result in higher contaminant burdens in receptors that are top predators and long-lived species, such as seabirds, as a result of bioaccumulation²⁹ and biomagnification³⁰.

A detailed Air Quality Study for the TTF (AIS Ref. No: PRJ-ENV598; Client Ref. No: PA/06096/23, 2nd version published on Jan 8, 2025) has modelled the impact of the stack plume on sensitive receptors in the wider area under three different simulation scenarios. With the FGT in place, the impact assessment for the three scenarios, corresponding to three different plant operations, all achieved a not significant adverse impact when evaluating the TTF in isolation.

When considering cumulative effects in combination with the proposed WtE plant in the vicinity, the results obtained show that the cumulative impact of the project and the Waste to Energy facility is assessed as not significant, except for PM10 regarding sensitive receptor R27 (assessed as minor). Receptor R27 refers to agricultural land at Maghtab, 0.43km from the proposed development. With the mitigation measures in place (FGT), the overall adverse cumulative impact of reduced air quality on avian receptors can be assessed as not significant.

The fly ash residues that arise from the thermal treatment operation are considered hazardous waste. Additionally, the slag and bottom ash can have hazardous components as well. Fly ash residues would be temporarily stored before being exported, since there are no facilities for the treatment of such waste in Malta. Leakage or spillage of fly ash residues into the environment during storage or transport is expected to result in severe environmental impacts, including contamination, bioaccumulation and biomagnification of toxic substances with expected severe consequences for wild bird populations (see above). Slag and bottom ash need to be tested for hazardous content vigorously, to make sure their contamination content falls below threshold levels, before disposing of them in a local landfill or being put to use for road building etc. All necessary precautions and appropriate management must be taken to avoid any hazardous residues ending up in the environment. The facility is designed to prevent any such spillages with the

Péan, S., Daouk, T., Vignet, C., Lyphout, L., Leguay, D., Loizeau, V., Bégout, M. L., & Cousin, X. (2013). Long-term dietary-exposure to non-coplanar PCBs induces behavioral disruptions in adult zebrafish and their offspring. *Neurotoxicology and Teratology*, 39, 45–56. <https://doi.org/10.1016/j.ntt.2013.07.001>

²⁹ Bryan, G. W., Waldichuk, M., Pentreath, R. J., & Darracott, A. (1979). Bioaccumulation of marine pollutants. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 286(1015), 483–505. <https://doi.org/10.2307/2418066>

³⁰ Bearhop, S., Waldron, S., Thompson, D. R., & Furness, R. (2000). Bioamplification of mercury in great skua *Catharacta skua* chicks: The influence of trophic status as determined by stable isotope signatures of blood and feathers. *Marine Pollution Bulletin*, 40(2), 181–185. [https://doi.org/10.1016/S0025-326X\(99\)00205-2](https://doi.org/10.1016/S0025-326X(99)00205-2)

Blanco, G., Frías, O., Jiménez, B., & Gómez, G. (2003). Factors influencing variability and potential uptake routes of heavy metals in black kites exposed to emissions from a solid-waste incinerator. *Environmental Toxicology and Chemistry*, 22(11), 2711–2718. <https://doi.org/10.1897/02-519>

inclusion of stringent waterproofing and cleaning strategies, which will effectively prohibit any residues from the site to spread into the adjacent permeable areas.

Biohazardous waste and infectious zoonoses

The transport, storage and processing of dead animals including livestock that died of diseases as well as of biomedical waste from hospitals and other medical facility pose a risk of leakage, accidental spills, bio-contamination (salmonella sp., botulism, and others) and outbreaks of zoonoses (e.g. avian flu H5N1) and other diseases. Due to the close-by landfill, the wider area in which the development is proposed holds large populations (up to thousands) of gulls, mainly *L. michahellis* year-round and *C. ridibundus* during the non-breeding period. The gulls forage on the landfill, but also use the retention reservoirs and any other freshwater source in the area to drink, wash and preen. As scavengers, gulls can be expected to be highly attracted to the TTF if any organic waste, including dead livestock, is accessible to them. Gulls will be equally attracted to any open sources of freshwater, including run-off of biologically contaminated water (e.g. from cleaning the bring-in facilities, ramps, etc.), open retention reservoirs and sedimentation tanks. Even if the gulls might not be directly impacted by the zoonoses themselves, and although they might not be of conservation concern, they can get infected and then act as reservoirs and carriers of zoonoses, infecting individuals of more susceptible protected species in the Natura 2000 sites. In recent years, there is evidence that outbreaks of zoonoses are further exacerbated by climate change³¹. The proposed design effectively mitigates from this risk, as the storage of carcasses and other potential attractants will be in closed containers stored in closed cold storage or directly unloaded into the shredder, therefore these materials should not be accessible to gulls and other birds.

Incidental fires

The transport, manipulation, and storage of flammable and potentially hazardous and toxic material in large quantities, as well as the operational activities of the TTF, impose a recognised high risk of a fire at the TTF. In such an event the plume of the blaze as well as the run-off from firefighting water will release toxins into the environment, with detrimental short- to long-term effects on living organisms including avifauna in the protected terrestrial and marine Natura 2000 sites in the AoI-2 and potentially beyond. The project design includes a complex system of fire detection, prevention and fire-fighting systems, including a dedicated water tank storage, to effectively prevent and mitigate such issues in the shortest period possible.

Cumulative effects of overdevelopment and climate change

The TTF is one of several waste management facilities proposed as part of the ECOHIVE complex, which to date include the groundwork for the Waste to Energy

³¹ R. Rupasinghe, B. B. Chomel & B Martínez-López (2002): Climate change and zoonoses: A review of the current status, knowledge gaps, and future trends, Acta Tropica, V. 226,

facility, a proposed Material Recovery Facility, an Organic Processing Plant and an Anaerobic Digestion Plant, as well as the potential for an extended road network to service these facilities³². The TTF site will undergo a change in use from non-intensive agriculture to accommodate the facility. The proposed project within the entire ECOHIVE project presents another instance of open green space being sealed and developed in an already overdeveloped nation^{33, 34}. The associated effects of habitat loss, rainwater run-off, greenhouse gas emissions, and the urban heat island effect in the place of habitat restoration, water percolation, carbon sequestration, and climate change adaptation measures will have indirect, permanent, and adverse long-term negative effects on local avian biodiversity³⁵.

5.3 DECOMMISSIONING PHASE

It is presumed that the decommissioning phase will result in impacts similar to those inflicted during the construction phase as a result of disturbance, noise and light pollution.

5.4 SUMMARY OF IMPACTS

The following table summarises the impacts on ecological aspects expected to affect the integrity of the nearby protected sites and species. The impacts were identified for each project development phase.

³² Ministry for the Environment, Climate Change and Planning (2021). Long Term Waste Management Plan for Malta 2021-2030. Environment and Resources Authority, Malta

³³ Portelli, M., Conrad, E., & Galdies, C. (2020). Developing an Environmental Justice Index for Small Island States: The Case of Malta. Sustainability, 12, 9519. <https://doi.org/doi:10.3390/su12229519>

³⁴ Environment and Resources Authority. State of the Environment Report (SoER) 2018; Environment and Resources Authority: Marsa, Malta, 2018; Available online: <https://era.org.mt/topic/soer/>

³⁵ BirdLife International. (2018). State of the world's birds: taking the pulse of the planet. BirdLife International.

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	OTHER REQUIREMENTS
IMPACT TYPE	SPECIFIC INTERVENTION LEADING TO IMPACT	PROJECT PHASE	RECEPTOR TYPE	SENSITIVITY & RESILIENCE TOWARDS IMPACT	DIRECT / INDIRECT / CUMULATIVE	BENEFICIAL / ADVERSE	SEVERITY	PHYSICAL / GEOGRAPHIC EXTENT OF IMPACT	SHORT / MEDIUM / LONG TERM	TEMPORARY / PERMANENT	REVERSIBLE / IRREVERSIBLE					
Dust generation from the construction site	Excavation, backfilling, building construction	Construction	Protected Terrestrial Flora and Fauna in adjacent Natura 2000 site	Moderate	Direct	Adverse	Moderate	Local	Short-term	Temporary	Reversible	Unlikely (to impact protected areas)	Not significant	Dust suppression techniques, regular clearing of affected areas, construction monitoring	Not significant	N/A
Contaminated and/or increased rainwater runoff from the site	Excavation, backfilling, building construction, increased urbanisation	Construction & Operation	Protected Terrestrial and Marine Flora & Fauna in adjacent Natura 2000 sites	Moderate	Direct	Adverse	Moderate	Localised	Short-term	Temporary	Reversible	Unlikely	Not significant	Wheel washing facilities available at site entrance/exits, collection facilities of all liquid runoff from the site	Not significant	N/A

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	OTHER REQUIREMENTS
IMPACT TYPE	SPECIFIC INTERVENTION LEADING TO IMPACT	PROJECT PHASE	RECEPTOR TYPE	SENSITIVITY & RESILIENCE TOWARDS IMPACT	DIRECT / INDIRECT / CUMULATIVE	BENEFICIAL / ADVERSE	SEVERITY	PHYSICAL / GEOGRAPHIC EXTENT OF IMPACT	SHORT / MEDIUM / LONG TERM	TEMPORARY / PERMANENT	REVERSIBLE / IRREVERSIBLE					
Increased Light, Vibration & Noise generation	Excavation, backfilling, building construction	Construction	Protected habitats and species within the adjacent Natura 2000 sites	High	Direct	Adverse	Moderate	Local and near vicinity	Short-term	Temporary	Reversible	Likely	Not significant	Works limited to daylight hours. Use of lighting for safety reasons limited to downward facing, shielded and low-frequency lights. Equipment well maintained to avoid excessive noise. Reduce duration to the extent possible	Not significant†	N/A

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	OTHER REQUIREMENTS
IMPACT TYPE	SPECIFIC INTERVENTION LEADING TO IMPACT	PROJECT PHASE	RECEPTOR TYPE	SENSITIVITY & RESILIENCE TOWARDS IMPACT	DIRECT / INDIRECT / CUMULATIVE	BENEFICIAL / ADVERSE	SEVERITY	PHYSICAL / GEOGRAPHIC EXTENT OF IMPACT	SHORT / MEDIUM / LONG TERM	TEMPORARY / PERMANENT	REVERSIBLE / IRREVERSIBLE					
Increased Light, Air Pollution & Noise generation	Operation of the TTF	Operations	Coastal habitats and species in the adjacent terrestrial Natura 2000 site	High	Direct	Adverse	Moderate	Local and near vicinity	Long-term	Permanent	Irreversible	Likely	Not significant	Minimising noise spillover by using BAT. Ensure equipment is well-maintained and within national emission limits via regular monitoring. Limit night-time lighting and use of down-facing lights. BAT implemented in Flue Gas Treatment	Not significant	N/A

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	OTHER REQUIREMENTS
IMPACT TYPE	SPECIFIC INTERVENTION LEADING TO IMPACT	PROJECT PHASE	RECEPTOR TYPE	SENSITIVITY & RESILIENCE TOWARDS IMPACT	DIRECT / INDIRECT / CUMULATIVE	BENEFICIAL / ADVERSE	SEVERITY	PHYSICAL / GEOGRAPHIC EXTENT OF IMPACT	SHORT / MEDIUM / LONG TERM	TEMPORARY / PERMANENT	REVERSIBLE / IRREVERSIBLE					
Light pollution negatively impacting nocturnally migrating birds	Lighting during construction	Construction	Nocturnally migrating birds in the adjacent Natura 2000 sites	Moderate & Moderate	Direct	Adverse	Low	Broad	Short-term	Temporary	Reversible	High	Significant	Limit night-time activities, reduce light pollution in accordance with published guidelines, avoid (if possible) sensitive periods	Not significant	N/A
Colony disturbance grounding of seabird fledglings, associated induced mortality caused by ALAN	Lighting during construction and operation	Construction, Operation	Procellariiform seabirds, specifically P. yelkouan in the adjacent Natura 2000 sites	High & Low	Direct	Adverse	High	Broad	Short-term, potentially long-term	Temporary, potentially permanent	Reversible	High	Significant	Limit night-time activities, reduce light pollution in accordance with published guidelines, avoid (if possible) sensitive periods	Not significant	Strictly follow guidelines for the reduction of light pollution

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	OTHER REQUIREMENTS
IMPACT TYPE	SPECIFIC INTERVENTION LEADING TO IMPACT	PROJECT PHASE	RECEPTOR TYPE	SENSITIVITY & RESILIENCE TOWARDS IMPACT	DIRECT / INDIRECT / CUMULATIVE	BENEFICIAL / ADVERSE	SEVERITY	PHYSICAL / GEOGRAPHIC EXTENT OF IMPACT	SHORT / MEDIUM / LONG TERM	TEMPORARY / PERMANENT	REVERSIBLE / IRREVERSIBLE					
Exposure of (marine) avifauna to harmful substances, including biohazardous material (pathogens etc.), reducing life expectancy, physiological health state, reproductive success, disease outbreaks	Pollutants from stack plume, spills of flyash and bottom ash, spills, of contaminated water during standard operation, transport or during accidents, bioaccumulation	Operation	Marine avian species in the adjacent Natura 2000 sites	High & Low	Direct	Adverse	High	Broad	Long-term	Permanent	Reversible	Inevitable	Significant [†]	Infrastructure (FGS, CEMS) & protocols in place to minimise release and spills of any harmful substances, including biohazardous material into the environment	Not significant [†]	N/A
Cumulative effects impacting biodiversity	Habitat loss, rainwater run-off, greenhouse gas emissions, Increase in CO2 due to use of diesel, release of thermal energy, heat-island effect from built-up footprint	Operation	Biotic and abiotic environment of the adjacent Natura 2000 sites and species	Moderate & Moderate	Indirect / Cumulative	Adverse	Moderate	Very broad	Long-term	Permanent	Reversible, with difficulty	Low to Inevitable	Not significant	Use of carbon-neutral alternative to diesel fuel, reduce footprint, mitigate soil-sealing effects by naturalising an equivalent area elsewhere.	Not significant [†]	N/A

6 MITIGATION MEASURES

6.1 CONSTRUCTION PHASE

6.1.1 Mitigation for terrestrial environment

The LEGAL NOTICE 340 OF 2022 - CONSTRUCTION MANAGEMENT SITE REGULATIONS, 2022 should be enforced to avoid the impacts from being generated in the first place and to ensure that environmental degradation is kept as low as possible. These regulations provide details on the containment and transportation measures for loose construction material on site and in transit, and other measures to prevent carrying out and/or depositing particulate matter.

The proposed development is not situated within any terrestrial or marine Natura 2000 site, and it does not have any direct impacts on such sites. Therefore, no mitigation measures are being suggested within the boundaries of the neighbouring Natura 2000 sites. However, several measures are suggested to prevent the spread of any impacts into the surrounding ecologically significant areas and to minimise impacts of spillover and indirect effects on protected species inhabiting the nearby protected areas which may frequent the site and its surroundings.

Mitigation measures related to protected fauna species present either directly within the scheme site or known to inhabit the surrounding areas are highlighted in the following text:

- Works should not be carried out during the night-time due to the recorded presence of nocturnal species in the area
- Although rodent control is encouraged when setting up a construction site, care must be taken not to negatively influence any resident fauna in the immediate surroundings
- If night-time lighting is required, downward facing luminaires should be installed within the facility to reduce light pollution.
- Wastewater generated during the construction phase should be directed towards spill trays and/or other collection methods as deemed necessary by the authorities, ensuring all contaminated waters are collected to minimise risks of run-off from the site.
- The building structure should include a sub-structure waterproofing system to prevent leaching of contaminants to groundwater and/or surrounding natural areas.
- Bunding is required for tanks and silos for fuels or liquid chemicals used on site
- Trucks delivering materials to the site should be required to make use of a designated wheel washing area to prevent the spread of dust and mud outside of the site.

6.1.2 Mitigation for marine environment

Standard good construction practices are required to ensure that potentially contaminated runoff from the construction site is contained and does not end up being discharged at sea.

6.1.3 Mitigation for avifauna

The recommended mitigation measures to reduce this project's impact on avifauna are largely related to foreseen light pollution impacts on breeding birds, seabirds in particular, and nocturnally migratory land birds:

- All lighting should follow the Guidelines for the Reduction of Light Pollution in the Maltese Islands (2020) published by ERA/PA, specifically:
 - Lighting should not be directed towards the sea, upwards towards the sky, or onto adjacent peripheral habitat.
 - The use of bright “cold” white lights during the night is discouraged and warm light (<3000K) should be used instead.
 - In the event that bright lights at night must be used, it is recommended to avoid the most sensitive period for seabirds, which would experience the most significant impact from such disturbance
 - Specifically, night-time security lighting should follow the above-mentioned guidelines, particularly in that the site should not be permanently illuminated but triggered by motion sensors
- It is recommended that the development does not take up a footprint larger than necessary, particularly when considering the access roads, to decrease the disturbance and destruction of terrestrial habitat used by birds
- Appropriate flue gas treatment technology keeping the emission levels well below threshold levels, as proposed, should be ensured.
- Appropriate protection measures against fires and waste spillage, as well as rapid response plans, must be in place to limit and reduce the potential effects of environmentally hazardous incidents.

6.2 OPERATIONAL PHASE

6.2.1 Mitigation for terrestrial environment

The following are mitigation measures proposed to safeguard the terrestrial environment during the operational phase:

- Treatment and regular monitoring of emissions of gas flue from the proposed stack are required to minimise and monitor the deposition of pollutants onto the surrounding vegetation respectively. Strategies for the control of emissions include:
 - Ammonia or urea used in Selective Non-Catalytic Reduction (SNCR) to reduce nitrogen oxide (NOx) emissions

- Operating the combustion chamber at either 800°C or 1100°C, depending on the chlorine content, with a 2-second residence time to ensure complete combustion and minimise harmful emissions.
- Inclusion of a dry reactor within the flue gas treatment system using calcium hydroxide, calcium oxide, or sodium bicarbonate to neutralise acidic gases.
- The use of activated carbon to capture dioxins, furans, and heavy metals
- The use of sodium hydroxide (NaOH) in the scrubber system when high emission levels are detected, ensuring that remaining pollutants are effectively removed.

One should note that the proposed facility already proposed the implementation of Best Available Technology in this regard.

- If lighting is required, downward facing luminaires should be installed within the facility to reduce light pollution during the operational phase
- Increased vehicle emissions may be mitigated with the inclusion of electric vehicles within the fleet used for the site operations, and measures such as group transport for the employees of the facility.
- Limiting road speeds to the minimum possible is recommended to reduce potential impacts on hedgehogs and other mobile terrestrial protected species which may cross any access roads.
- All wastewater generated during the operational phase is to be directed to a piped collector system and processed within the Water Treatment Plant before reuse.
- Trucks delivering waste to the site should be required to make use of the designated wheel washing area included in the design to prevent the spread of contaminants outside of the site.

6.2.2 Mitigation for marine environment

Both the operational and construction phases are not expected to exert any significant impacts on the marine protected areas considered within the study. Therefore, no further mitigation methods are required.

6.2.3 Mitigation for avifauna

The following are the proposed mitigation measures to safeguard avifauna during the operational phase:

- All lighting should follow the Guidelines for the Reduction of Light Pollution in the Maltese Islands (2020) published by ERA/PA.
- Lighting should not be directed towards the sea, upwards towards the sky, or onto adjacent peripheral habitat.
- The use of bright “cold” white lights during the night is discouraged and warm light (<3000K) should be used instead.
- In the event that bright lights at night must be used, it is recommended to avoid the most sensitive period for seabirds, which would experience the most significant impact from such disturbance.

- The building should not be fully lit at night during the operational phase, with the stack being lit using intermittent red light, in alignment with the Guidelines for the Reduction of Light Pollution in the Maltese Islands (2020).
- Appropriate protection measures against fires and waste spillage, as well as rapid response plans, must be in place to limit and reduce the potential effects of environmentally hazardous incidents.
- Reducing the overall footprint of the proposed development by reducing the number of parking spaces for private vehicles would reduce the direct impact of habitat loss on local avifauna. By further implementing alternative modes of transport for the staff to the site (e.g. a shuttle service) would bring additional benefits by reducing the carbon footprint.
- Regarding the risk of pollutants from the stack plume and from leakages and accidental spillages, both during standard operations and in case of accidents such as fires, it is of utmost important that highest standards regarding infrastructure and protocols are implemented and adhered to, in order to keep the risk that relevant avifaunal receptors get exposed to any harmful substances, including biohazardous material, at a minimum.

7 RESIDUAL IMPACTS AND MONITORING PROGRAMME

7.1 RESIDUAL IMPACTS

7.1.1 Terrestrial residual impacts

Residual impacts are those impacts which are bound to remain after taking into consideration the proposed mitigation measures. Despite the comprehensive adoption of the recommended mitigation measures, a number of unavoidable residual impacts are still expected to arise, namely:

- Permanent impacts on ecologically sensitive terrestrial ecosystems and assemblages falling directly within the footprint of the site, reducing the connectivity of the surrounding terrestrial protected areas.
- Increase in night-time light in previously dark agricultural areas in the surroundings, which may be frequented by protected species
- Increase in disturbance of previously undisturbed agricultural land by vehicle traffic, which may be frequented by protected species
- Increase in pollutant deposition on the vegetation within protected sites through vehicular and stack emissions

7.1.2 Marine residual impacts

The Air Dispersion Model concluded that all modelled pollutant emissions are well below legal limits, and are not expected to cause significant impacts to surrounding coastal and marine area. Therefore, there are no envisaged residual impacts for the marine protected areas considered within this study.

7.1.3 Avifauna residual impacts

The most significant impacts of this project relate to light pollution, which threatens the integrity of the marine SPA MT0000112 due to disturbance and grounding risk to breeding seabirds utilising the area. This marine SPA does not have a dedicated management plan in place. However, following the recommendations of this assessment, with particular attention to the published Guidelines for the Reduction of Light Pollution in the Maltese Islands (Environment and Resources Authority 2020), the residual impact should be insignificant.

As for other Natura 2000 sites within the wider AoI, where protection is afforded to migratory and staging birds, specifically SAC Is-Salini (MT0000007), the recommendations of this document align with the management objective of conserving and improving species populations and their habitats, including species listed in the Birds Directive.

7.2 MONITORING PROGRAMME

7.2.1 Terrestrial monitoring programme

Should the Scheme be permitted to be developed, a monitoring programme should be set up and implemented during the construction phases of development. The construction management plan prepared at project planning phase will be updated by the chosen contractor in order to ascertain that the best practicable environmental options available are followed through.

During the construction phase, periodic monitoring is being recommended to ensure that mitigation measures are in place and working as they should. This would ensure that no unwarranted impacts on the surrounding protected areas arise due to deviations from proposed working practices. Such deviations could have additional impacts over and above those originally predicted. All monitoring data should be presented to the relevant authorities at pre-agreed frequencies.

During the site operations, Continuous Emissions Monitoring System will be in place to monitor the stack emissions, to ensure that national emissions limits are respected and no significant adverse impacts occur in the surrounding vegetated and protected areas.

7.2.2 Marine monitoring programme

There are no monitoring measures required to be implemented within marine protected areas since the proposed development is not expected to cause any significant impacts to these sites.

7.2.3 Avifauna monitoring programme

The avifauna species referenced in this report are regularly monitored by BirdLife Malta in terms of their population dynamics. Should any disturbance be recorded in the nearby populations that are linked to the site operations, these will be communicated to the applicant who may be required to implement further mitigation measures.

8 ALTERNATIVE SOLUTIONS

The following table assesses the ecological impact of different hypothetical alternatives which could be adopted during the implementation of the project.

TABLE 1: ALTERNATIVE SCENARIO ASSESSMENT FOR THE SCHEME

ALTERNATIVE TYPE	POSSIBLE ALTERNATIVE SOLUTIONS	EVIDENCE OF HOW THE ALTERNATIVE SOLUTIONS WERE ASSESSED	DESCRIBE THE RELATIVE EFFECTS ON THE CONSERVATION OF THE SITE/HABITAT TYPE/SPECIES
Zero option	Retaining operations at the existing waste incinerator at Marsa.	The applicant considered the feasibility of retaining the existing site. The Marsa site will be retained as a cold backup for the proposed new site. However, there were several limitations identified which make it unfeasible to retain the Marsa site as the main operating waste incinerator for Malta's waste demands.	The current TTF is located very close to the Grand Harbour area, which sites a number of industrial, maritime, tourism and residential land uses. The existing site is subject to regular odour complaints from the nearby businesses and residents. The current site will be retained but only as a backup to the new site operations to ensure business continuity in the event of an emergency. The proposed site is within a much less populated area, near land uses which are primarily industrial and will centralise waste treatment facilities in Malta, reducing transportation impacts. The new TTF will also be equipped with the best available technology and practices for reducing impacts on the surrounding area. Additionally, the use of BAT will lead to a larger variety of waste types being processed in Malta instead of exported for processing abroad, thus contributing to Malta's waste targets.
Downsizing	Reducing the footprint of the proposed TTF	Several alternative sites and configurations for the	The applicant identified the minimum requirements for internal transport and manoeuvring, waste storage, supporting facilities,

ALTERNATIVE TYPE	POSSIBLE ALTERNATIVE SOLUTIONS	EVIDENCE OF HOW THE ALTERNATIVE SOLUTIONS WERE ASSESSED	DESCRIBE THE RELATIVE EFFECTS ON THE CONSERVATION OF THE SITE/HABITAT TYPE/SPECIES
	building, housing further levels underground to compensate for limited lateral sprawl.	proposed development were assessed by the applicant and the authorities before determining the current proposed site and footprint area. The proposed development presents the minimum required footprint for the planned activities envisaged for the nation's current and future waste incineration needs.	tanks, and equipment required at the site. These requirements dictate the minimum footprint which will ensure a well-functioning site. A considerable area is dedicated to vehicle manoeuvring at ground level, since the waste will be delivered to the site by a large number of vehicles. Therefore, the ground level site footprint cannot be compressed further unless additional levels are constructed underground. Further excavation will result in a larger volume of excavated materials, which is a significant pressure on local waste management. Additional land take up would also be needed for the construction of access points such as ramps, therefore the benefits of underground levels are considered to be outweighed by the impacts.
Alternative Site	Locating the new TTF plant at the existing plant's site or any industrial area which is not in the vicinity of Natura 2000 sites	Alternative site assessment for the TTF has considered the existing site as a potential alternative site or other areas within the ECOHIVE complex.	Locating the TTF project to an alternative site which is positioned at a considerable distance from Natura 2000 sites may reduce the potential ecological impacts on these sites during construction and operation. However, the EIA and AA conclude that the Scheme site as proposed is unlikely to generate any significant impacts on the adjacent Natura 2000 sites, since these are located at a sufficient distance from the site.

ALTERNATIVE TYPE	POSSIBLE ALTERNATIVE SOLUTIONS	EVIDENCE OF HOW THE ALTERNATIVE SOLUTIONS WERE ASSESSED	DESCRIBE THE RELATIVE EFFECTS ON THE CONSERVATION OF THE SITE/HABITAT TYPE/SPECIES
			Additionally, the centralisation of WSM's waste management facilities at the ECOHIVE complex helps to compartmentalise their operational impacts and improve their operational efficiencies leading to environmental benefits such as reduced transportation impacts and an improvement of the visual amenity of the area.
Alternative Energy Use	Use of alternatives instead of fossil fuel combustion	Following an assessment of the market availability and best available technology for incinerator services, the applicant concluded that rotary kiln technology was adequate for the project due to its ability to handle high-temperature combustion. This system ensures the complete destruction of solid organic particles. This will enable the TTF to handle a variety of waste streams with varying properties. Rotary kiln technology also facilitates the continuous feeding of solid and liquid wastes,	The proposed development will be connected to the local grid, and therefore will utilise a component of electricity generated by gas from the Enemalta power station. Following the planned development of the second interconnector, the energy mix could also comprise a component of electricity derived from alternative energies generated in Italy. The proposed development currently envisages that diesel use will be required (amount yet to be defined). Diesel will be required to power the burners during start-up, shut down, and auxiliary burning when the temperature falls below the target range (800 °C or 1100 °C). Diesel will be used to power a generator in case of power cut but only for safe shut down and only for critical equipment of the facility. Where alternative, cleaner technologies can be used, these will be implemented to the extent possible to minimise the impacts of

ALTERNATIVE TYPE	POSSIBLE ALTERNATIVE SOLUTIONS	EVIDENCE OF HOW THE ALTERNATIVE SOLUTIONS WERE ASSESSED	DESCRIBE THE RELATIVE EFFECTS ON THE CONSERVATION OF THE SITE/HABITAT TYPE/SPECIES
		making it robust to unexpected changes in demand. Each of the two processing lines will have an incinerator/boiler and Flue Gas Treatment (FGT) with independent operation. The operations will be connected to the local grid, consuming electricity, and additional power will be obtained from diesel fuel in emergency cases.	diesel combustion on air quality and reduce CO ₂ emissions of the project.

9 CONCLUDING REMARKS

The construction and operational impacts from the proposed Scheme are located at a considerable distance away from the nearest terrestrial, marine and avifauna Natura 2000 sites. These sites include:

- MT0000008 L-Għadira s-Safra u l-Iskoll tal-Għallis, SAC
- MT0000007 Is-Salini, SAC
- MT0000105 Żona fil-Baħar bejn il-Ponta ta' San Dimitri (Għawdex) u Il-Qaliet, SAC
- MT0000107 Żona fil-Baħar fil-Grigal, SAC
- MT0000112 Żona fil-Baħar ta' madwar Għawdex, SPA

The expected impacts associated with the proposed development are related to spillover effects, namely increased light and noise pollution, generation of particulate matter during construction, increased emissions from construction and transportation vehicles, and the emissions from the incinerator plant itself.

The most significant impacts are related to the light pollution arising from the operation of the proposed facility. This may threaten the integrity of the marine SPA MT0000112 due to disturbance and grounding risk to breeding seabirds utilising the area. Following the recommendations of this assessment, with particular attention to the published Guidelines for the Reduction of Light Pollution in the Maltese Islands (Environment and Resources Authority 2020), the residual impact should become insignificant.

As for other Natura 2000 sites within the wider AoI, where protection is afforded to migratory and staging birds, specifically SAC Is-Salini (MT0000007), the recommendations of this document align with the management objective of conserving and improving species populations and their habitats, including species listed in the Birds Directive.

Construction works will likely affect the species associated with the nearby agricultural land and protected areas, indirectly affecting the integrity of protected sites. Impacts related to particulate matter and operational emissions are considered to be suitably mitigated and are not expected to extend to the protected sites and/or cause significant impacts on the integrity of the protected sites or species. The atmospheric emissions from the chimney plume are expected to yield the deposition of pollutants in the surrounding Natura 2000 sites. However, the application of BAT that mitigates against such emissions, reduces the impact on the nearby sites and protected species to insignificant.

With adequate mitigation measures in place, the impact magnitude and extent of the proposed development on the SACs and SPAs and on the relevant protected species populations within them are expected to be not significant in relation to Article 6(3) of the EU Habitats Directive. The overall dynamics and conservation status of relevant species will not be impacted significantly. The Site Specific Objectives for the

potentially affected Natura 2000 sites and the species within them are expected to remain intact as long as the proposed mitigation measures are adopted.

APPENDIX I

TERMS OF REFERENCE

The proposal requires the submission of an Appropriate Assessment (AA) as per Regulation 19(1) of the Flora, Fauna and Natural Habitats Protection Regulations, (S.L. 549.44), given that the project may cause significant impacts on protected sites:

- MT0000007- Is-Salini designated as a Special Area of Conservation via Government Notice 1379 of 2016; and
 - MT0000008 - L-Għadira s-Safra u l-Iskoll tal-Għallis designated as Special Area of Conservation via Government Notice 1522 of 2019
- Marine environment:
- MT0000105 Żona fil-Baħar bejn il-Ponta ta' San Dimitri (Għawdex) u Il-Qaliet designated as a Special Area of Conservation of International Importance via Government Notice 682 of 2018; and
 - MT0000112 Żona fil-Baħar ta' madwar Għawdex – Special Protected Area via Government Notice 1311 of 2016.

as declared through the provisions of the Flora, Fauna and Natural Habitats Regulations (S.L. 549.44).

Note: It should be noted that the AA shall not be restricted to the above-mentioned protected sites only, which have been identified through screening to determine whether the proposal requires the submission of an AA. It is the consultants' responsibility to adopt and justify the appropriate area of influence, based on the available information, which takes into consideration any relevant protected site, ecosystems, habitats and species covered by the provisions of the Flora, Fauna and Natural Habitats Regulations (S.L. 549.44).

The Appropriate Assessment report should follow the following format:

1. Executive Non-Technical Summary

A description of the salient points of the AA study including surveys, impacts and their significance, proposed mitigations measures, and any residual impacts.

2. Project Description

A description of the proposed project, with particular emphasis on those elements that are likely to give rise to potentially significant effects on the on the integrity of the protected site, or on its habitats, species and ecosystems. The description shall also address any foreseeable consequential requirements or implications of the proposal (e.g. need for new or altered access or infrastructure).

3. Site Description

A general description of the site environment within the area of influence, with particular emphasis on the salient features of the site and its species, habitats and ecosystems. Any other aspects of the physical environment and its processes that may in any way interact with the development or its impacts shall also be described.

The description shall also address any other constraints relevant to the site, including statutory legal protection, any relevant management plan framework.

4. Impact Assessment vis-à-vis the integrity of the site and its species, habitats and ecosystems.

An evaluation of the way in which the integrity of the site and its species, habitats and ecosystems are likely to be affected by the project.

Impact assessment should clearly indicate all foreseeable direct and indirect impacts, and their expected timeframes (short/long-term, etc.). Any impact interactions (e.g. accumulation, synergy, interaction with natural forces) shall also be identified and assessed. The significance of all AA-relevant impacts must also be discussed.

Impact assessment shall also take into account practical implications (e.g. conflicts with site protection or management plan implementation, any foreseeable constraints on future management plan formulation, etc.)

5. Mitigation Measures

Where possible, measures should be identified to eliminate and/or mitigate adverse effects on the integrity of the site as well as on the relevant habitats and species.

In this regard, the AA should include:

- A reasonably detailed identification of the measures to be introduced for all relevant phases of the project;
- An explanation of how the measures will eliminate and/or mitigate adverse effects;
- Evidence of how the mitigation measures will be tangibly implemented and by whom;
- Evidence of the degree of confidence in their likely success;
- A timescale, relative to the project, when they will be implemented;
- An explanation of any proposed monitoring scheme and how any mitigation failure will be addressed; and
- Proposals for decommissioning as may be appropriate.

6. Residual Impacts

The report should include a prediction of residual impacts and implications of the proposal on the site and its species, habitats and ecosystems, following the implementation of the mitigation measures. The report shall also evaluate the significance of such residual impacts and implications. Residual impacts are to be evaluated individually as well as holistically. The latter should indicate whether the proposal will or will not adversely affect the integrity of the site(s) concerned.

7. Alternative solutions

A list of alternatives to the proposal is to be submitted. Examples of alternatives may include, but not necessarily limited to, alternative technologies, alternative layouts, and relocation or downsizing of the project. The zero-option (do-nothing scenario) should also be considered. Each alternative is to be thoroughly assessed by comparing it with the original proposal and clearly indicating the relative effects on the site's listed habitats and species.

APPENDIX 2

LARGE-SCALE FIGURES

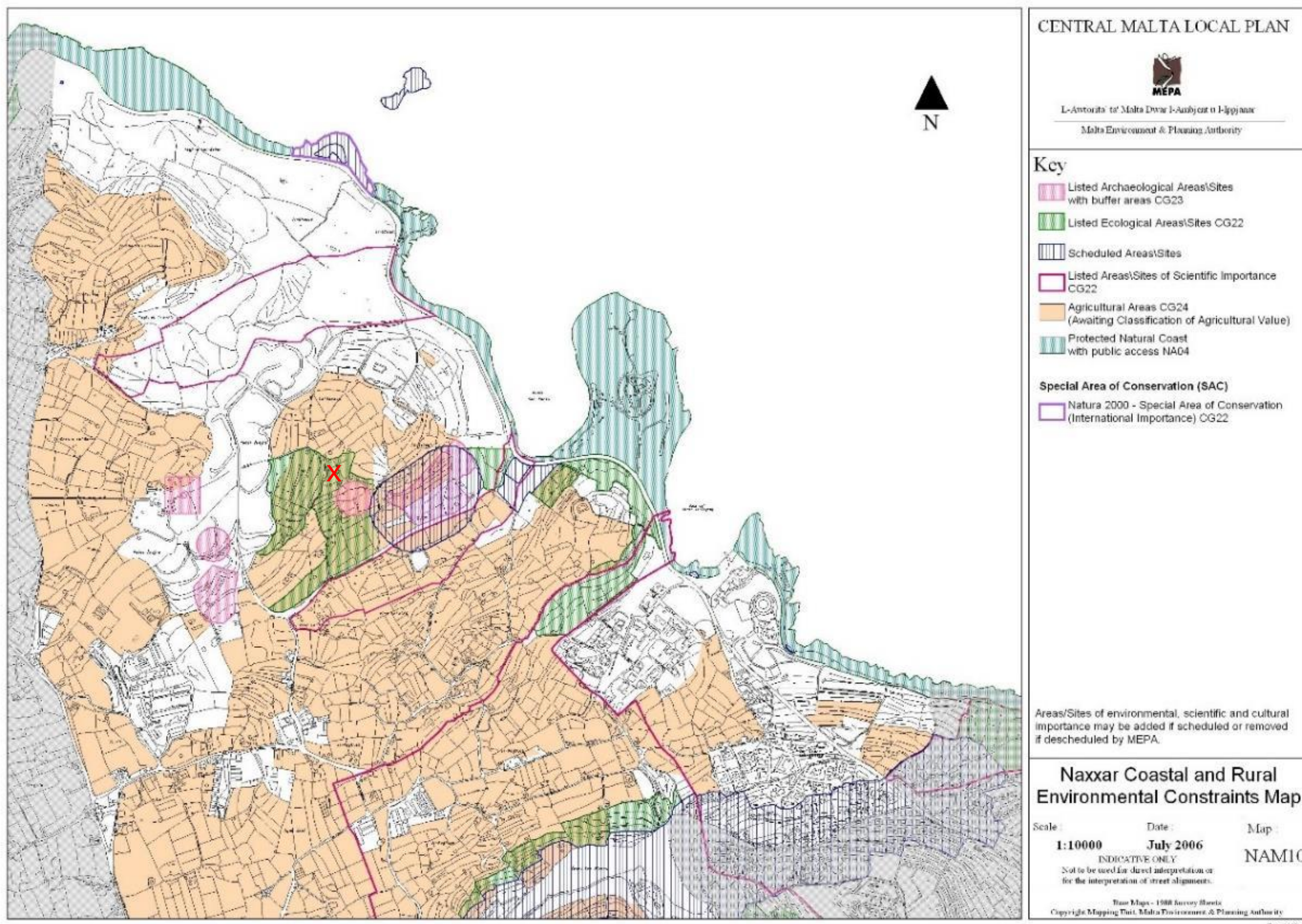


FIGURE 15: NAXXAR COASTAL AND RURAL ENVIRONMENTAL CONSTRAINTS MAP (CENTRAL MALTA LOCAL PLAN, 2006) SITE MARKED WITH RED X

APPENDIX 3

LIST OF BIRD SPECIES IN THE AOI-1 AND AOI-2

7.0 Annex A: List of bird species in the Aol-1 and 2

The following species are expected to make use of the Aol-2 including Natura 2000 sites, identified as a 5km buffer area around the planned TTF development:

Seabirds *sensu lato*

Ferruginous Duck *Aythya nyroca* – Near Threatened, Annex I, population trend decreasing. A significant proportion of the European Ferruginous Duck population and more than 1% of the global population funnels through Gozo Channel situated in the mSPA (MT0000112) annually, mainly during spring migration. The birds often pass in larger flocks, also alighting on the water to rest. Occasionally observed in Is-Salini (MT0000007). However, no significant numbers of the species have been recorded in the Aol-2.

Greater Flamingo *Phoenicopterus roseus* – Least Concern, Annex I, overall population trend increasing. Flamingos migrate through the Maltese Islands, including the mSPA MT0000112 annually often gathering in larger flocks. In recent years they have been recorded in increasing numbers, mainly in autumn. Expected to pass through the Aol-2 regularly on migration, but it is unlikely that this happens in significant numbers. Reported stopping over in Is-Salini (MT0000007).

Slender-billed Gull *Chroicocephalus genei* – Least Concern, Annex I, European population size decreasing. In Malta Slender-billed Gulls are recorded annually on migration mainly from (July) August to March (April) in single to low double figures of daily observations. Slender-billed Gulls are considered a coastal species. The species can be expected to occur regularly in the Aol-2, including foraging at Magħtab landfill and foraging, roosting and passing over the marine part of the Aol-2 that is situated in the SPA MT0000112. Furthermore, it has been reported making use of the reserves, Is-Salini (MT0000007) and L-Għadira s-Safra (MT0000008) for foraging and roosting. However, it is very unlikely that numbers in the areas reach significant levels from a global or European population perspective at any point.

Mediterranean Gull *Larus melanocephalus* – Least Concern, Annex I, European population trend decreasing. In the Maltese islands the species is mainly recorded from October to April with numbers in the lower hundreds reported in the period from November to March. Regularly makes use of the SPA MT0000112, including the marine part of the Aol-2. Birds will also make use of the adjacent land areas for roosting as well as foraging at the landfill. SPA MT0000112. Also recorded regularly in the reserves Is-Salini (MT0000007), L-Għadira s-Safra (MT0000008) and Selmunett (MT0000022). It is not expected that Mediterranean Gulls reach relevant numbers in the Aol-2 as compared with the European population which is equivalent to the global population.

Audouin's Gull *Ichthyaeetus audouinii* – Least Concern, Annex I, the European breeding population has increased and is currently stable. Audouin's Gulls are mainly found in marine habitats year-round, very frequently following trawlers to feed discarded fish. The species is migratory and dispersive. Before 2000 the Audouin's Gull was considered a very rare bird species to the Maltese islands. The species' status has changed significantly since. From 2000 to 2009 there were 311 records of 535 individuals, with a maximum of 184 sightings in 2007.

During stopover on migration the species can be expected regularly in the Aol-2, foraging at Magħtab landfill and roosting, foraging and passing through SPA MT0000112, including the Aol and the area of the water inlet and discharge. It has also been recorded regularly from Is-Salini (MT0000007), L-Għadira s-Safra (MT0000008) and Selmunett (MT0000022). However, it is very unlikely that numbers in any of the aforementioned areas reach significant levels from a global or European population perspective at any point.

Little Tern *Sternula albifrons* – Least Concern, Annex I, overall population trend is decreasing, the European population size trend is unknown. In Malta Little Terns are recorded annually in small numbers, mainly in spring (April-May). The species is at least partially migratory and dispersal in the region. Little Terns regularly frequent coastal areas, including lagoons and salt pans when foraging, including the marine part of the Aol-2 inside SPA MT0000112. They also have been reported from Is-Salini (MT0000007). However, it is highly unlikely that significant numbers regarding the global, European or EU population are reached inside the Aol-2 at any time.

Common Gull-billed Tern *Gelochelidon nilotica* – Least Concern, Annex I, the global population is suspected to be in decline, while the European population is estimated to be increasing. The species is recorded in Malta annually in single to double digit numbers on migration, both in spring and autumn. It is likely that Gull-billed terns occur in the SPA MT0000112 and in the marine part of the Aol-2 annually during passage on migration and make use of the area for foraging. However, it is highly unlikely that significant numbers regarding the European population are reached at any time.

Caspian Tern *Hydroprogne caspia* – Least Concern, Annex I, the global as well as the European population trends of this species are increasing. It is recorded in Malta annually in double digit numbers on migration, both in spring and autumn. It is likely that Caspian Terns occur in the SPA MT0000112, including the Aol-2 and in the relevant reserves annually during passage on migration and that they make use of it as foraging areas, plunge-diving for fish while feeding on the wing. However, it is highly unlikely that significant numbers regarding the European population are reached at any time. Ringed Caspian Terns that have been recorded in Malta were ringed in Finland (e.g. 9 until 1996), confirming that birds of the European population are passing through Malta regularly.

Black Tern *Chlidonias niger* – Least Concern, Annex I, the global population trend of the species is declining, while the European population trend is unknown. Black terns occur in Maltese waters annually and in large numbers mainly during autumn migration, peaking in the second half of August to the beginning of September with few scattered records from spring migration. The species passes through the Maltese islands mainly in offshore areas, frequently foraging on the wing for small prey items at or close to the sea surface. The birds are often attracted to the net cages of the Maltese Tuna aquaculture industry where they feed from next to the cages but also rest on the rails of the cages. Black Terns can also be frequently observed offshore resting on the floats of FAGs of the Dolphin-fish (*Lampuka, Coryphaena hippurus*) fisheries, but also on sun-bathing turtles (*Caretta caretta*), buoys and floating debris (all own observations). During vessel-based surveys and trips to tuna-cages in the Maltese FMZ at the end of August, numbers of up to 2000 individuals were counted during a single trip. On migration, Black Terns are very likely to pass through the SPA MT0000112 including the Aol-2 and use it to forage and rest during migration and stop-over. They also have been

recorded from the relevant reserves. Nevertheless, it is not likely that significant threshold values are reached in the Aol-2 as compared to the global, European and EU populations.

Sandwich Tern *Thalasseus sandvicensis* - Least Concern, Annex I, the overall and European population trends are fluctuating. In Malta Sandwich Terns occur on passage and - to a lower extent - wintering from (August) September to March (April). They are reported annually in double figures. As other tern species, Sandwich Terns forage in coastal waters. Sandwich Terns occur in the SPA MT0000112, including the marine part of the Aol, annually during passage on migration and make use of it as foraging area. Furthermore, they are recorded or can be expected regularly in the reserves Is-Salini (MT0000007), L-Għadira s-Safra (MT0000008) and Selmunett (MT0000022). However, it is very unlikely that significant numbers regarding the global European or EU population are reached inside the Aol-2 at any time.

Red-breasted Merganser *Mergus serrator* – Least Concern, expected to pass through the marine part of the Aol-2 (within MT0000112) in small numbers on migration; also observed in singles on stopover in the shallow coastal waters of L-Għadira s-Safra (MT0000008).

Common Shelduck *Tadorna tadorna* – Least Concern, recorded regularly in small numbers from Is-Salini (MT0000007) and L-Għadira s-Safra (MT0000008), as well as on passage in the SPA MT0000112.

Garganey *Spatula querquedula* – Least Concern, recorded in small numbers on stop-over from Is-Salini (MT0000007)

Northern Shoveler *Spatula clypeata* – Least Concern, recorded in small numbers on stop-over from Is-Salini (MT0000007).

Mallard *Anas platyrhynchos* – Least Concern, feral individuals recorded in high numbers from Is-Salini (MT0000007).

Pintail *Anas acuta* – Least Concern, recorded in small numbers from Is-Salini (MT0000007).

Common Teal *Anas crecca* – Least Concern, regularly recorded in small numbers on stop-over from Is-Salini (MT0000007).

Little Grebe *Tachybaptus ruficollis* – Least Concern, regular winter visitor to the reserve Is-Salini (MT0000007).

Great-crested Grebe *Podiceps cristatus* – Least Concern, scarce winter visitor and passage migrants, recorded from Is-Salini (MT0000007) and mSPA MT0000112.

Black-necked Grebe *Podiceps nigricollis* – Least Concern, regular winter visitor and passage migrant in small numbers in Is-Salini (MT0000007).

Common Moorhen *Gallinula chloropus* – Least Concern, year-round, recent breeding attempt from Is-Salini (MT0000007).

Northern Gannet *Morus bassanus* – Least Concern, expected to pass through and potentially forage in the marine part of the Aol-2, including mSPA MT0000112, mainly during the winter months

Great Cormorant *Phalacrocorax carbo* – Least Concern, recorded regularly in increasing numbers wintering in the Maltese islands, including the marine part of the Aol-2 and the relevant reserves (MT0000007, MT0000008 and MT0000022).

Little Gull *Hydrocoloeus minutus* – Least Concern, regularly passing through marine SPA MT0000112 during migration, has been occasionally recorded roosting and/or foraging in singles at Is-Salini (MT0000007).

Black-headed Gull *Chroicocephalus ridibundus* - Least Concern, large numbers migrate through the Maltese islands and winter there. Larger flocks forage and roost in the Aol-2, including the Landfill at Maghtab and the relevant Natura2000 sites (MT0000007, MT0000008, MT0000022, MT0000112).

Lesser Black-backed Gull *Larus fuscus* – Least Concern, regular on migration and to some extent wintering in smaller numbers, making use of the Aol-2 for foraging and roosting, recorded regularly in all relevant Natura2000 sites (MT0000007, MT0000008, MT0000022, MT0000112)

Long-tailed Skua *Stercorarius longicaudus* - Least Concern, expected to pass through the marine part of the Aol-2 (including mSPA MT0000112) on migration in small numbers.

Arctic Skua *Stercorarius parasiticus* – Least Concern expected to pass through the marine part of the Aol-2 (including mSPA MT0000112) in small numbers on migration.

Pomarine Skua *Stercorarius pomarinus* – Least Concern expected to pass through the marine part of the Aol-2 (including mSPA MT0000112) in small numbers on migration.

Great Skua *Catharacta skua* - Least Concern expected to make use of marine parts of the Aol-2 (including mSPA MT0000112) in small numbers on migration and when wintering.

Land-birds (Non-passeriformes)

Common quail *Coturnix coturnix* – Least Concern, declining, irregular breeder, common passage migrant (nocturnal), winters in small numbers, expected to occur regularly in the Aol-2, mainly on stopover during migration.

European Turtledove *Streptopelia turtur* – Vulnerable, strong decline, would breed regularly if spring hunting was abolished, regular passage migrant in declining numbers, more commonly seen in spring; can be expected stopping over in the terrestrial part of the Aol-2 regularly in small numbers.

Collared Dove *Streptopelia decaocto* – Least Concern, trend increasing. Likely to occur in the Aol-2 in the near future, as the species is expanding its range across the islands.

European Nightjar *Caprimulgus europaeus* – Least Concern, common on passage in spring and autumn, can be expected to pass regularly through the Aol-2 on migration and make use of its terrestrial parts, including the Natura 2000 sites for foraging and roosting.

Alpine Swift *Tachymarptis melba* – Least Concern, recorded in small numbers during spring and autumn migration, aerial feeder, likely to pass occasionally through the Aol-2.

Pallid Swift *Apus pallidus* – Least Concern, in Malta regularly to commonly seen from March to October, small breeding populations in Malta, can be expected to make regular use of the airspace of the Aol-2 and all relevant Natura 2000 sites (MT0000007, MT0000008, MT0000022, MT0000112).

Common Swift *Apus apus* – Least Concern, common on migration in spring and autumn, small but increasing breeding population, including the Aol. Can be expected/ has been recorded to make regular use of the airspace of the Aol and all relevant Natura 2000 sites (MT0000007, MT0000008, MT0000022, MT0000112).

Common Cuckoo *Cuculus canorus* – Least Concern, fairly common on spring migration, less common during autumn, single breeding records in Malta. Expected to occur in the terrestrial part of Aol-2 during migration and stopping over, reported from Is-Salini (MT0000007).

Western Water Rail *Rallus aquaticus* – Least Concern, population numbers decreasing. Frequent autumn migrant and common winter visitor in the wetlands of the Maltese islands. Some breeding attempts. Regularly reported from Is-Salini (MT0000007) in small numbers.

Spotted Crake *Porzana porzana* – Least Concern, Annex I, small numbers in spring and autumn on migration.

Common Crane *Grus grus* – Least Concern, Annex I, population trend increasing, recorded annually on migration in small flocks, potentially passing through the Aol-2

Black Stork *Ciconia nigra* – Least Concern, Annex I, European population increasing, in Malta annually in small numbers during migration, mainly in autumn.

White Stork *Ciconia ciconia* – Least Concern, Annex I, population increasing, in Malta annually in small numbers on migration mainly autumn, to less extend in spring. White Storks are frequently foraging on landfills. Therefore, the species can be expected to occur in the Aol-2.

Eurasian Spoonbill *Platalea leucorodia* – Least Concern, Annex I, trend increasing, in Malta mainly on passage in spring and autumn. Regularly migrating through mSPA MT0000112 and has been recorded on stopover in Is-Salini (MT0000007). Potentially migrating through the Aol-2.

Glossy Ibis *Plegadis falcinellus* – Least Concern, Annex I, European population increasing, in Malta recorded annually on migration. Has been recorded passing through mSPA MT0000112. Potentially migrating through the Aol-2.

Common Little Bittern *Ixobrychus minutus* - Least Concern, Annex I, European population stable, irregularly breeding in Malta, recorded annually in small numbers on migration. Expected to migrate through the Aol-2 (at night). Recorded on stopover during migration for the Natura 2000 site Is-Salini (MT0000007).

Black-crowned Night Heron *Nycticorax nycticorax* - Least Concern, Annex I, decreasing in Europe, frequently migrating over Malta, regularly observed during stop-over at Is-Salini (MT0000007), can be expected to migrate regularly through the Aol-2.

Squacco Heron *Ardeola ralloides* - Least Concern, Annex I, European population considered stable, passing through Malta in small numbers on migration annually. Has been recorded at Is-Salini (MT0000007), can be expected to migrate through the Aol-2 occasionally.

Grey Heron *Ardea cinerea* - Least Concern, regular visitor to the Maltese islands year-round but higher numbers during migration. Can be expected to migrate regularly through the Aol-2. Has been recorded regularly to frequently in all relevant Natura 2000 sites (MT0000007, MT0000008, MT0000022, MT0000112).

Purple Heron *Ardea purpurea* - Least Concern, Annex I, European population decreasing, passing through the Maltese Islands annually during migration in good numbers. Has been recorded regularly at Is-Salini (MT0000007). Can be expected to pass through the Aol-2 on migration occasionally.

Great White Egret *Casmerodius alba* – Least Concern, Annex I, recorded annually on passage in small numbers, including Is-Salini (MT0000007). Can be expected to pass through the Aol-2 occasionally on migration.

Little Egret *Egretta garzetta* – Least Concern, Annex I, fairly common passage migrant in spring and autumn, few individuals year-round, recently established small breeding population close to Is-Salini, at least partially founded by escapes. Recorded regularly from Is-Salini (MT0000007) and L-Għadira s-Safra (MT0000008). Therefore, it is recorded to occur in the Aol-2 including the relevant Natura2000 sites regularly.

Cattle Egret *Bubulcus ibis* – Least Concern, Annex I, fairly common passage migrant in spring and autumn, some individuals year-round, established a small breeding population close to Is-Salini, at least partially founded by escapes. Recorded regularly from Is-Salini (MT0000007) and L-Għadira s-Safra MT0000008), as well as foraging at Maghtab landfill, thus recorded regularly in the Aol-2 and in the relevant Natura2000 sites.

Stone Curlew / Eurasian Thick-knee *Burhinus oedipnemos* – Least Concern, Annex I, recorded in Malta regularly in small numbers on migration in spring and autumn. Potentially passing through the Aol-2 in low numbers

Oystercatcher *Haematopus ostralegus* – Near threatened, population declines across Europe, recorded in Malta annually in small numbers. Potentially passing through and resting/foraging in the Aol in small numbers, including MT0000008 and MT0000022.

Pied Avocet *Recurvirostra avosetta* – Least Concern, Annex I, recorded in Malta annually in small numbers mainly during autumn migration, potentially wintering. Recorded from Is-Salini (MT0000007).

Black-winged Stilt *Himantopus himantopus* – Least Concern, Annex I, frequent spring migrant in the Maltese islands, scarce breeder of up to 3 pairs in the Maltese Islands Is-Simar

(MT0000006) and visitor of Is-Salina Ghadira (MT0000007). Can be expected to occur occasionally along the rocky shores of the Aol-2 and MT0000022.

Grey Plover *Pluvialis squatarola* – Least Concern, in Malta recorded annually in small numbers during spring and autumn migration. Potentially migrating through the Aol.

Eurasian Golden Plover *Pluvialis apricaria* - Least Concern, Annex I, population trend increasing. Common in Malta during winter months, both on migration and wintering. Has been reported from Is-Simar (MT0000006). Potentially migrating through and/or stopping over in the Aol.

Eurasian Dotterel *Charadrius morinellus* - Least Concern, Annex I, in Malta annually in small numbers, stopping over mainly during autumn migration. Potentially migrating through and stopping over in the Aol.

Common Ringed Plover *Charadrius hiaticula* – Least Concern, decreasing on EU and global level, fairly common passage migrant in spring and autumn. Recorded from Is-Salini (MT0000007). Expected to be also foraging and stopping over at MT0000022 on migration and to pass through the Aol-2.

Little Ringed Plover *Charadrius dubius* – Least Concern, population decreasing, common passage migrant in spring and autumn, breeding annually in few pairs. Recorded regularly from Is-Salini (MT0000007), inside the Aol-2. Expected to also occur in the reserve MT0000022.

Kentish Plover *Charadrius alexandrinus* – Least Concern, Annex I, regular passage migrant in small numbers in spring and autumn. Potentially occurring in the Aol-2.

Northern Lapwing *Vanellus vanellus* – Near Threatened, overall declining population trend, recorded regularly in Malta during the winter months in small flocks; regular passage migrant in small numbers in spring and autumn. Potentially occurring in the Aol-2.

Whimbrel *Numenius phaeopus* – Least Concern, recorded annually in small numbers in spring and autumn during migration. Expected to occur in the Aol-2 in small numbers and irregularly, foraging/ roosting on the rocky shore and migrating through the area at night.

Eurasian Curlew *Numenius arquata* – Near Threatened, global population trend decreasing, passing regularly through Malta during spring and autumn. Expected to occur in the Aol-2 in small numbers and irregularly, foraging/ roosting on the rocky shore and migrating through the area at night.

Black-tailed Godwit *Limosa limosa* – Near Threatened, population trend decreasing, in Malta recorded annually, mainly on spring migration. Potentially migrating through the Aol-2 in small numbers.

Ruddy Turnstone *Arenaria interpres* – Least Concern, recorded in Malta annually in small numbers in spring and autumn. Expected to occur in the Aol-2 in small numbers and irregularly, foraging/ roosting on the rocky shore and migrating through the area at night.

Red Knot *Calidris canutus* – Near Threatened, global population trend decreasing, recorded in Malta almost annually in small numbers on passage. Potentially passing through the Aol-2 on migration.

Ruff *Calidris pugnax* – Least Concern, Annex I, population trend decreasing, recorded in the Maltese islands regularly and in good numbers, mainly during spring migration, including in Is-Salini (MT0000007). Expected to be passing through the Aol-2 on migration.

Curlew Sandpiper *Calidris ferruginea* – Near Threatened, suspected to be declining, in Malta regularly in small flocks on passage migration in spring and autumn. Recorded in Is-Salini (MT0000007) and expected to be passing through the Aol-2 on migration.

Temminck's Stint *Calidris temminckii* – Least Concern, population trend stable, recorded in Malta in small numbers during spring and autumn migration, including in Is-Salini (MT0000007). Expected to be passing through the Aol-2 on migration occasionally.

Sanderling *Calidris alba* – Least Concern, passing through Malta annually in small numbers during spring and autumn. Potentially passing through the Aol-2.

Dunlin *Calidris alpina* – Least Concern, recorded in Malta annually in small numbers mainly on passage in spring and autumn including at Is-Salini (MT0000007). Expected to be passing through the Aol-2 on migration.

Little Stint *Calidris minuta* – Least Concern, singles recorded in Malta year-round, common during spring and autumn migration. Observations also at Is-Salini (MT0000007) and expected to be passing through the Aol-2 on migration.

Eurasian Woodcock *Scolopax rusticola* – Least Concern, trend estimated stable, observed in Malta during the winter months, expected to occur in the Aol-2 during passage and foraging/wintering.

Great Snipe *Gallinago media* – Near Threatened, Annex I, overall trend decreasing, in Malta encountered annually in singles on spring migration. It can't be excluded that the species occasionally passes through the Aol-2 on migration.

Common Snipe *Gallinago gallinago* – Least Concern, common passage migrant, mainly in spring, regularly observed at Is-Salini (MT0000007). Can also be expected to occur at SAC L-Għadira s-Safra u l-Iskoll tal-Għallis (MT0000008) and to pass through the Aol-2 on migration.

Jack Snipe *Lymnocyptes minimus* – Least Concern, population trend stable, passing through the Maltese islands annually in small numbers during the winter months, occasionally passing through and stopping over in the Aol-2, including at Is-Salini (MT0000007).

Common Sandpiper *Actitis hypoleucos* – Least Concern, overall population trend decreasing, common passage migrant in Malta in spring and autumn, recorded in small numbers year-round. Recorded or expected regularly in all relevant Natura2000 sites (MT0000007, MT0000008, MT0000022, MT0000112). Expected to occur frequently in the Aol-2.

Green Sandpiper *Tringa ochropus* – Least Concern, population trend increasing, regular passage migrant through the Maltese islands in spring and autumn, expected to pass through the Aol-2 on migration regularly in small numbers.

Spotted Redshank *Tringa erythropus* – Least Concern, population trend stable, recorded annually in Malta in small numbers on migration and in winter. Expected to occasionally pass through the Aol-2 in small numbers.

Common Greenshank *Tringa nebularia* – Least Concern, population stable, common visitor to the Maltese islands in relatively low numbers on spring and autumn migration. Expected to occasionally pass through the Aol-2 in low numbers.

Common Redshank *Tringa totanus* – Least Concern, European population has undergone a moderate decline, a regular passage migrant in Malta in small numbers, both in spring and autumn. Reported for Is-Salini (MT0000007). Expected to occasionally pass through the Aol-2 in low numbers.

Wood Sandpiper *Tringa glareola* – Least Concern, Annex I, population trend stable, common passage migrant in the Maltese islands in spring and autumn. Reported for Is-Salini (MT0000007). Expected to occasionally pass through the Aol-2 in low numbers.

Marsh Sandpiper *Tringa stagnatilis* – Least Concern, overall population trend decreasing, recorded in Malta regularly in small numbers on migration, including at Is-Salini (MT0000007). Potentially passing through the Aol-2.

Collared Pratincole *Glareola pratincola* – Least Concern, Annex I, overall population trend decreasing, recorded almost annually in singles, mainly on short stop-overs during spring migration, including at Is-Salini (MT0000007). Potentially passing through the Aol-2.

Eurasian Scops-owl *Otus scops* – Least Concern, global population trend declining, regularly recorded in the Maltese islands, mainly during migration. Can be expected to pass through the Aol-2 regularly and in low numbers and also make use of the terrestrial part of the area during stopover on migration.

Short-eared Owl *Asio flammeus* – Least Concern, Annex I, population trend in Europe fluctuating, recorded annually in small numbers, mainly on migration, has been reported nesting in the Maltese islands, at least two times in recent years. Can be expected to pass through the Aol-2 occasionally and in low numbers and also use the area during stopover on migration.

Osprey *Pandion haliaetus* – Least Concern, Annex I, European population trend increasing, regularly recorded in the Maltese islands on spring and autumn migration. Has been observed foraging and roosting at Is-Salini (MT0000007) Can be expected to pass through the Aol-2 regularly in small numbers.

European Honey-buzzard *Pernis apivorus* – Least Concern, Annex I, overall population trend decreasing, common passage migrant over the Maltese islands, mainly in autumn. Can be expected to migrate through the Aol-2 regularly.

Egyptian Vulture *Neophron percnopterus* – Endangered, Annex I, population trend declining in entire range, recorded in Malta almost annually in singles on migration, mainly in autumn. Birds might be attracted to the landfill and therefore the species might occur in the Aol-2 occasionally on migration.

Short-toed Snake-eagle *Circaetus gallicus* – Least Concern, Annex I, population trend stable, appears on passage in the Maltese islands annually in small numbers, mainly in autumn. Potentially passes through the Aol-2 on migration.

Lesser spotted Eagle *Aquila pomarina* – Least Concern, Annex I, European population estimated stable, in Malta almost recorded annually in singles to small flocks mainly on autumn migration. Potentially passes through the Aol-2 on migration.

Booted Eagle *Aquila pennata* – Least Concern, Annex I, population size increasing in Europe, recorded in Malta almost annually in singles mainly during autumn migration. Potentially passes through the Aol-2 on migration.

Western Marsh Harriers *Circus aeruginosus* – Least Concern, Annex I, population trend in Europe increasing, common passage migrant to the Maltese islands both in spring and autumn. Has been reported at Is-Salini (MT0000007). Can be expected to appear in the Aol-2 on passage migration regularly in small numbers.

Montagu's Harrier *Circus pygargus* – Least Concern, Annex I, population decreasing in the EU, recorded in the Maltese islands annually in double figure numbers during spring and autumn migration. Can be expected to migrate through the Aol-2 occasionally.

Eurasian Sparrowhawk *Accipiter nisus* – Least Concern, overall population trend stable, recorded annually in Malta in small numbers on migration, mainly in autumn. Can be expected to pass through the Aol-2 occasionally.

Black Kite *Milvus migrans* – Least Concern, Annex I, population trend unknown, recorded in Malta annually in double figure numbers on migration. The species is attracted to landfills. Can be expected to occur in the Aol-2 occasionally.

Common Hoopoe *Upupa epops* – Least Concern, overall population trend decreasing, common passage migrant in Malta, both in spring and autumn, at least one breeding record in recent years. Has been observed at Is-Salini (MT0000007). Can be expected to pass through the Aol and foraging and roosting there during stop-over on migration.

European Bee-eater *Merops apiaster*, Least Concern, overall population trend declining, common spring migrant in Malta, less common in autumn, has made single breeding attempts on the islands in recent years. Regularly observed in all relevant Natura 2000 sites and can be expected regularly in the Aol-2 during migration.

European Roller *Coracias garrulus* – Least Concern, Annex I, European population trend decreasing, recorded in Malta annually in small numbers, mainly during spring migration. Can be expected to pass through the Aol or to stay in the area during stopover occasionally.

Common Kingfisher *Alcedo atthis* – Least Concern, Annex I, European population trend decreasing, common winter visitor and passage migrant in Malta. Observed regularly making use of all relevant Natura2000 sites, including the coastal marine part of the Aol (MT0000112). Expected to be present in the Aol-2 regularly on migration and when wintering in small numbers.

Eurasian Wryneck *Jynx torquilla* – Least Concern, population trends: long-term decline, short-term increase, fairly common passage migrant and winter visitor to the Maltese islands. Can be expected to be present in the Aol-2 during migration, stopping over and potentially also wintering.

Lesser Kestrel *Falco naumanni* – Least Concern, Annex I, population trend previous severe declines, recently stable, fairly common passage migrant to the Maltese islands in spring and autumn.. Expected to pass through the Aol-2 on migration and also foraging in the terrestrial parts of the area when stopping over.

Common Kestrel *Falco tinnunculus* – Least Concern, population trend decreasing, present in Malta year-round, common during passage in spring and autumn, breeding almost annually in very low numbers (1-3 pairs). Can be expected foraging in the Aol-2 year-round (local birds). Passage migrants can be expected to pass through the area and also forage there on migration.

Red-footed Falcon *Falco vespertinus* – Near Threatened, Annex I, European population trend declining, in Malta fairly regularly encountered on migration, numbers higher in spring. Can be expected to pass through the Aol-2 and forage there during passage.

Eleonora's Falcon *Falco eleonora* – Least Concern, Annex I, European population size increasing, recorded in Malta annually in fairly good numbers on migration in spring and autumn. Can be expected to pass through the Aol-2, including the relevant Natura 2000 sites on migration occasionally.

Merlin *Falco columbarius* – Least Concern, Annex I, population trend fluctuating, recorded in Malta annually in low numbers mainly on autumn migration. Might occasionally migrate through the Aol-2.

Eurasian Hobby *Falco subbuteo* – Least Concern, overall population trend declining, fairly common in Malta on migration in spring and autumn. Can be expected to migrate through the Aol-2 regularly in small numbers.

Peregrine Falcon *Falco peregrinus* – Least Concern, Annex I, population trend increasing, potential breeder in the Maltese islands in very low numbers, would be more common if left undisturbed/ not persecuted; also appears on passage and as winter visitor. Can be expected to make use of the Aol-2 including the relevant Natura2000 sites regularly and year-round, especially hunting for Black-headed Gulls etc. in the landfill area.

Passeriformes

Here we provide a list of all passerine species that are recorded in the Maltese islands regularly to frequently on migration and as winter visitors. We also include those species that are

residents i.e. breeding on the islands. Information regarding their conservation status, whether they are listed in Annex I of the EU-Birds directive, and their local occurrence (wintering, breeding, migrant) and frequency of occurrence (scarce, regular, common) is noted. Furthermore, information on their expected or reported status in the Aol-2, including in the relevant Natura2000 site is given.

The vast majority of species is listed as Least Concern, two are listed as Near Threatened, both not in Annex I. Seven species are listed in Annex I of the EU-Birds-Directive all listed as Least Concern. Two passerine species listed in Annex I have been recorded breeding in the Maltese islands, one a common breeder – the Greater Short-toed Lark *Calandrella brachydactyla*, while the other one has been reported breeding irregularly - the Tawny Pipit *Anthus campestris*.

In general, small passerines have relatively higher reproductive rates and shorter life-spans (generation cycles) compared to most larger non-passerine species. This, together with a large distribution range and often distribution density in most species listed below, reduces their overall population vulnerability. The majority of migratory species listed here mainly migrate during the night and cross the area in broad front. It is not likely that any of the species listed below will reach threshold values in the Aol-2. However, as previously outlined, even broad-front passerine migrants funnel spatially over peninsulas and islands to avoid open sea crossings, and migration over the Mediterranean concentrates temporally as large numbers of birds take advantage of favourable meteorological conditions. In most such “pulse” nights with high numbers and densities of birds actively migrating, the vast majority of birds is likely to pass high over the Maltese islands in a single night without stopover, with mainly some young, inexperienced and weak birds coming down to land and rest. If however, the meteorological conditions change during such nights of high migratory activities, e.g. with a rain-front, deep clouds or fog moving in or the birds suddenly encountering stronger headwinds, the flow of migration slows down, shifts to lower altitudes and birds start being attracted to land where so called bird falls might occur on small islands. Under these circumstances, birds will also be highly attracted by anthropogenic lights of man-made lit up structures such as the proposed development.

Species list of Passeriformes regularly encountered on the Maltese islands

Eurasian Golden Oriole *Oriolus oriolus* - *Least Concern*, common passage migrant, expected frequently in the Aol-2.

Red-backed Shrike *Lanius collurio* - *Least Concern, Annex I*, passage in low numbers, not expected to occur in the Aol-2 in relevant numbers.

Woodchat Shrike *Lanius senator* - *Least Concern*, regular passage migrant, expected to occur in the Aol-2 occasionally.

Penduline Tit *Remiz pendulinus* - *Least Concern*, passage in small numbers, might migrate through the Aol-2 occasionally and in small numbers.

Greater Short-toed Lark *Calandrella brachydactyla* - *Least Concern, Annex I*, common breeder and passage migrant, not reported breeding in the Aol-2, not expected to occur in

the Aol in relevant numbers, but expected to pass through on migration and potentially stopping over.

Woodlark *Lullula arborea* - *Least Concern, Annex I*, passage migrant low numbers, expected to also pass through the Aol-2.

Eurasian Skylark *Alauda arvensis* - *Least Concern*, common on passage and wintering, expected to make use of the Aol-2 regularly.

Zitting Cisticola *Cisticola juncidis* - *Least Concern*, common breeder in the Aol-2, including at Is-Salini (MT0000007).

Olivaceous Warbler *Iduna pallida* - *Least Concern*, passage in low numbers, potentially occurring in the Aol-2.

Isabelline Warbler *Iduna opaca* - *Least Concern*, passage in low numbers, potentially occurring in the Aol-2.

Icterine Warbler *Hippolais icterina* - *Least Concern*, regular passage migrant, expected to pass through the Aol regularly on migration.

Moustached Warbler *Acrocephalus melanopogon* - *Least Concern*, passage and wintering in low numbers, expected to pass through the Aol-2 occasionally in very low numbers.

Sedge Warbler *Acrocephalus schoenobaenus* – *Least Concern*, regular passage migrant, expected to pass through the Aol-2 regularly on migration.

Common Reed Warbler *Acrocephalus scirpaceus* - *Least Concern*, breeder in small numbers, regular passage migrant, single winter records. Expected to pass through the Aol-2 regularly on migration.

Great Reed Warbler *Acrocephalus arundinaceus* - *Least Concern*, regular passage migrant, expected to pass through the Aol-2 regularly on migration.

Savi's Warbler *Locustella luscinioides* - *Least Concern*, passage migrant in low numbers, expected to pass through the Aol-2 occasionally on migration.

Northern House Martin *Delichon urbicum* - *Least Concern*, rare breeder, common passage migrant, expected to make use of the airspace of the Aol-2 regularly, foraging in the area during migration, potentially roosting in the area, too.

Red-rumped Swallow *Cecropis daurica* - *Least Concern*, regular passage migrant, expected to make use of the airspace of the Aol-2 regularly, foraging in the area during migration, potentially roosting in the area, too.

Barn Swallow *Hirundo rustica* - *Least Concern*, breeder in low numbers, common passage migrant, expected to make use of the airspace of the Aol-2 regularly, foraging in the area during migration and potentially during breeding. Potentially roosting in the area, too.

Common Sand Martin *Riparia riparia* - *Least Concern*, regular passage migrant, expected to make use of the airspace of the Aol-2 regularly, foraging in the area during migration and potentially roosting.

Eastern Bonelli's Warbler *Phylloscopus orientalis* - *Least Concern*, regular passage migrant, expected to pass through the Aol-2 occasionally during migration.

Western Bonelli's Warbler *Phylloscopus bonelli* - *Least Concern*, regular passage migrant expected to pass through the Aol-2 occasionally during migration.

Wood Warbler *Phylloscopus sibilatrix* - *Least Concern*, common passage migrant, expected to regularly occur in the Aol-2 on passage.

Yellow-browed Warbler *Phylloscopus inornatus* - *Least Concern*, passage migrant, expected to occur occasionally in the Aol-2 on migration.

Willow Warbler *Phylloscopus trochilus* - *Least Concern*, common passage migrant, expected to regularly pass through the Aol-2 on migration.

Common Chiffchaff *Phylloscopus collybita* - *Least Concern*, common passage migrant and winter visitor, expected to pass through the Aol-2 regularly on migration and winter there regularly.

Cetti's Warbler *Cettia cetti* - *Least Concern*, common breeder, possibly breeding also at Is-Salini (MT0000007). Expected to occur in the Aol-2 regularly during dispersal.

Eurasian Blackcap *Sylvia atricapilla* - *Least Concern*, common passage migrant and winter visitor. Single breeding records in Malta in some years. Expected to pass through the Aol-2 regularly during migration and make use of it during stop-over and wintering.

Garden Warbler *Sylvia borin* - *Least Concern*, common passage migrant. Expected to pass through the Aol-2 regularly during migration and make use of it during stop-over.

Lesser Whitethroat *Sylvia curruca* - *Least Concern*, passage migrant in small numbers. Expected to occur in the Aol-2 occasionally on migration.

Sardinian Warbler *Sylvia melanocephala* - *Least Concern*, common breeder, including at Is-Salini (MT0000007). Probably breeding in the Aol-2 in good numbers and present year-round.

Subalpine Warbler *Sylvia cantillans* - *Least Concern*, common passage migrant, expected to regularly pass through the Aol-2 during migration.

Common Whitethroat *Sylvia communis* - *Least Concern*, common passage migrant, expected to regularly pass through the Aol-2 during migration.

Spectacled Warbler *Sylvia conspicillata* - *Least Concern*, regular breeder in Malta, possible breeder in the wider Is-Salini area (MT0000007), expected to occur in the Aol-2 regularly.

Common Starling *Sturnus vulgaris* - *Least Concern*, breeding in small numbers, common passage migrant and winter visitor, regularly recorded from the reserves, expected to occur

in the Aol-2 regularly in good number on passage and while wintering, including making use of the area for foraging and potentially roosting.

Mistle Thrush *Turdus viscivorus* - *Least Concern*, regular passage migrant, can be expected to pass through the Aol-2 occasionally on migration.

Song Thrush *Turdus philomelos* - *Least Concern*, common passage migrant and winter visitor, can be expected to occur regularly in the Aol-2.

Redwing *Turdus iliacus* - *Near Threatened*, regular passage migrant in small numbers, potentially wintering, can be expected to occasionally occur in the Aol-2 on migration.

Eurasian Blackbird *Turdus merula* - *Least Concern*, regular passage migrant and winter visitor, can be expected in the Aol-2 on passage and during wintering.

Fieldfare *Turdus pilaris* - *Least Concern*, regular passage migrant, potentially wintering, can be expected to occasionally occur in the Aol-2 on migration.

Rufous-tailed Scrub-robin *Cercotrichas galactotes* - *Least Concern*, rare visitor, potentially occurring irregularly in the Aol-2 in very low numbers.

Spotted Flycatcher *Muscicapa striata* - *Least Concern*, breeder in increasing numbers, common passage migrant, expected to be present regularly in the Aol-2 on passage and stopping over.

European Robin *Erithacus rubecula* - *Least Concern*, common passage migrant and winter visitor. Expected to be present in the Aol-2 outside the breeding season in good numbers.

Bluethroat *Luscinia svecica* - *Least Concern*, Annex I, regular passage migrant, potentially wintering in small numbers including at Is-Salini (MT0000007), can be expected to pass through the Aol-2 occasionally on migration.

Common Nightingale *Luscinia megarhynchos* - *Least Concern*, common passage migrant, one breeding record from 1995, expected to regularly pass through the Aol-2 on migration.

Semicollared Flycatcher *Ficedula semitorquata* - *Least Concern*, Annex I, regular passage migrant in small numbers, expected to pass through the Aol-2 occasionally on migration.

European Pied Flycatcher *Ficedula hypoleuca* - *Least Concern*, common passage migrant, expected to be present regularly in the Aol-2 during the migration periods.

Collared Flycatcher *Ficedula albicollis* – *Least Concern*, Annex I, regular passage migrant in low numbers, expected to pass through the Aol-2 during the migration periods.

Black Redstart *Phoenicurus ochruros* - *Least Concern*, common passage migrant, common winter visitor, expected to be regularly present in the Aol-2 during the non-breeding period.

Common Redstart *Phoenicurus phoenicurus* - *Least Concern*, common passage migrant, expected to regularly occur in the Aol-2 during the migration periods.

Rufous-tailed Rock-thrush *Monticola saxatilis* - *Least Concern*, regular passage migrant in low numbers, can be expected to occur in the Aol-2 on passage and stop-over in the migration periods.

Blue Roch-thrush *Monticola solitarius* - *Least Concern*, common breeder, possibly breeding in the Aol, expected to make use of the Aol-2 year-round.

Whinchat *Saxicola rubetra* - *Least Concern*, common passage migrant, expected to pass through the Aol-2 on migration and also stopping over in the area.

Common Stonechat *Saxicola rubicola* - *Least Concern*, common passage migrant and winter visitor, expected to be commonly wintering in the Aol-2.

Northern Wheatear *Oenanthe oenanthe* - *Least Concern*, common passage migrant, can be expected to pass through the Aol-2 on migration regularly.

Isabelline Wheatear *Oenanthe isabellina* - *Least Concern*, regular passage migrant in low numbers, might occasionally pass through the Aol-2 on migration.

Black-eared Wheatear *Oenanthe hispanica* - *Least Concern*, regular passage migrant, expected to occur in the Aol-2 regularly in low numbers during migration.

Goldcrest *Regulus regulus* - *Least Concern*, regular passage migrant and winter visitor, can be expected to regularly occur in the Aol-2 on passage and potentially as winter visitor.

Common Firecrest *Regulus ignicapilla* - *Least Concern*, regular passage migrant and winter visitor, can be expected to regularly occur in the Aol-2 on passage and potentially as winter visitor.

Dunnock *Prunella modularis* - *Least Concern*, regular passage migrant and winter visitor, expected to be present in the Aol-2 outside the breeding season in small numbers.

Spanish Sparrow *Passer hispaniolensis* - *Least Concern*, very common breeder in the Maltese Islands and regular passage migrant, common breeding resident in the Aol-2.

Eurasian Tree Sparrow *Passer montanus* - *Least Concern*, regular breeder in Malta, expected to occur in the Aol-2 during dispersal and in the non-breeding period in low numbers.

Tree Pipit *Anthus trivialis* - *Least Concern*, common passage migrant, expected to occur regularly in the Aol-2 on passage, including stopping over.

Red-throated Pipit *Anthus cervinus* - *Least Concern*, regular passage migrant, wintering in low numbers, expected to occasionally pass through the Aol-2 during migration and also stopping over.

Meadow Pipit *Anthus pratensis* - *Near Threatened*, common passage migrant and winter visitor, expected to make regular use of the Aol-2 on stop-over during migration and as foraging grounds in winter.

Water Pipit *Anthus spinoletta* - *Least Concern*, rare passage migrant or winter visitor, expected to make use of the Aol-2, especially the coastal areas including MT0000022 during migration occasionally.

Tawny Pipit *Anthus campestris* - *Least Concern, Annex I*, rare and irregular breeder in Malta, regular passage migrant, expected to pass through the Aol-2 occasionally on migration.

Western Yellow Wagtail *Motacilla flava* - *Least Concern*, common passage migrant, expected to pass through the Aol-2 regularly during migration, including foraging and potentially roosting during stop-over.

Grey Wagtail *Motacilla cinerea* - *Least Concern*, rare breeder, regular passage migrant and winter visitor, expected to occur in the Aol-2 occasionally to regularly in small numbers.

White Wagtail *Motacilla alba* - *Least Concern*, common passage migrant and winter visitor, regularly reported at Is-Salini (MT0000007), expected to be common in the Aol-2 during the wintering period.

Common Chaffinch *Fringilla coelebs* - *Least Concern*, regular passage migrant and winter visitor, potential breeder, but no breeding confirmed in recent years, expected to occur in the Aol-2 regularly during migration and as winter visitor.

Hawfinch *Coccothraustes coccothraustes* - *Least Concern*, regular passage migrant and winter visitor, expected to occur in the Aol-2 occasionally on migration and as winter visitor.

European Greenfinch *Chloris chloris* - *Least Concern*, common passage migrant and winter visitor, has bred occasionally on the Maltese islands but no confirmed breeding record in recent years. Can be expected to occur in the Aol-2 regularly during migration and as winter visitor.

Common Linnet *Linaria cannabina* - *Least Concern*, common passage migrant and winter visitor, irregular breeder in very low numbers, expected to occur in the Aol-2 regularly during migration and as winter visitor, potentially year-round.

European Goldfinch *Carduelis carduelis* - *Least Concern*, common passage migrant and winter visitor, irregular breeder in very low numbers, expected to occur in the Aol-2 regularly during migration and as winter visitor, potentially year-round.

European Serin *Serinus serinus* - *Least Concern*, common passage migrant and winter visitor, irregular breeder in very low numbers, expected to occur in the Aol-2 regularly during migration and as winter visitor.

Eurasian Siskin *Spinus spinus* - *Least Concern*, regular passage migrant and winter visitor, expected to occur in the Aol-2 on migration and as winter visitor occasionally.

Corn Bunting *Emberiza calandra* - *Least Concern*, formerly regular breeder in small numbers, scarce in recent years, might occasionally occur in the Aol-2 during dispersal.

Ortolan Bunting *Emberiza hortulana* - *Least Concern, Annex I*, regular passage migrant, expected to occasionally pass through the Aol-2 during migration.

Reed Bunting *Emberiza schoeniclus* - *Least Concern*, regular passage migrant and winter visitor, expected to pass through the Aol-2 occasionally during migration and in the winter months.