MOTT MACDONALD

Project Trinity: Greater Changhua Northwest Offshore Wind Farm in Taiwan

Critical Habitat Assessment

February 2024

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Mott MacDonald
5F, No.92 Sec 2
Dunhua S. Road
Da'an District
Taipei City 10668
Taiwan

T +886 (0)2 8978 8978
mottmac.com

Ørsted Wind Power TW
Holding A/S, Kraftværksvej
53, DK-7000 Fredericia
Denmark, (36 03 57 81)

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E	7 February 2024	S Toh	B Lim	B Lim	Final report for disclosure

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Executive summary

The Greater Changhua Offshore Windfarm Northwest Ltd. is a special purpose vehicle established by Ørsted Wind Power TW Holdings A/S (Ørsted) to develop the proposed Project Trinity: Greater Changhua Northwest (NW) Offshore Wind Farm in Taiwan (herein referred to as the "Project"). The Project is located approximately 50km offshore of the area of Xianxi Township, Changhua County, Taiwan.

The Project is located in Taiwan, off the coast of Changhua County. The offshore wind farm area selected was zone #12 of the list of proposed offshore wind farm sites in Taiwan, defined by the Bureau of Energy (BOE). The Project has proposed wind turbine generator (WTG) model with 8-11MW capacity which are planned for the installation of 54 to 74 WTGs, amounting to a maximum total capacity of 598MW. The site of the Project is approximately 117km^2 and the water depth is approximately between 30m to 45m, with an average depth of 36.8m. The electric power will transmit to offshore with 33kV or 66kV inter-array cable strings and one onshore substation as well as two onshore cable connecting to Taipower substation via Changkong grid connection point.

As part of the transaction process undertaken for obtaining project financing from an Equator Principle Financial Institute (EPFI), the Project potentially needs Equator Principles (EP) compliance. Therefore, Mott MacDonald have been commissioned by Ørsted to undertake the Critical Habitat Assessment (CHA), alongside other environmental and social services.

This report presents a CHA which has been undertaken to determine whether the Project footprint and its relevant ecological appropriate area of analysis (EAAAs) is located in 'critical habitat' as defined by IFC PS6 with elaborations provided in the corresponding guidance note, IFC Guidance Note (GN) 6, updated as of 27 June 2019. The EAAAs established for this CHA are delineated based on the habitats of relevant species/groups.

Integrated Biodiversity Assessment Tool (IBAT) was applied to obtain potential biodiversity-related features (ie species, protected areas and Key Biodiversity Areas) in the EAAAs. Project documentation including the approved environmental impact assessment (EIA) of this Project was reviewed as part of this CHA. Various international and national checklists [eg IUCN Red List of Threatened Species, Taiwan protected species lists (保育類野生動物名錄), Important Bird Areas in Taiwan and Map of Taiwan's Wetlands as well as research papers were also reviewed to inform the critical habitat determination process.

The CHA determined that the Project is located in critical habitat for the following biodiversity values:

- Criterion 1 (C1) (a), (b) and (c): the presence of critically endangered, endangered and vulnerable (global range overlapping with >0.5% of the EAAAs) species, namely:
  - Marine flora and fauna: Taiwanese humpback dolphin (*Sousa chinensis ssp. Taiwanensis)* (C1a), Taiwanese Wedgefish (*Rhynchobatus immaculatus*) (C1a)
  - Migratory birds (including seabirds at sea): Black-faced spoonbill (*Platalea minor)* (C1a), Saunders's Gull *(Saundersilarus saundersi)* (C1c), Oriental stork (*Ciconia boyciana*) (C1a and C1c), Chinese crested tern (Thalasseus bernsteini) (C1a and C1c)
- Criterion 2 (C2): the presence of restricted-range species:
  - Marine flora and fauna: Taiwanese humpback dolphin (*Sousa chinensis ssp. Taiwanensis),* Taiwan picnic seabream (*Acanthopagrus taiwanensis)*, Taiwanese Wedgefish (*Rhynchobatus immaculatus*)

- Criterion 3 (a) and (b): the presence of migratory and congregatory species:
  - Migratory birds (including seabirds at sea): Black-faced spoonbill (*Platalea minor)* (C3a), Saunders's Gull *(Saundersilarus saundersi)* (C3a), Kentish Plover (*Charadrius alexandrines*) (C3a), Oriental stork (*Ciconia boyciana*) (C3a), Chinese crested tern (Thalasseus bernsteini) (C3a)
- Criterion 5 (C5): the presence of key evolutionary processes
  - EAAA for marine fauna and flora - coral reef ecosystems

The Project's offshore and onshore impacts during construction and operation phases, as described in the Project EIA, were assessed against the critical habitat features. Mitigation measures proposed in the Project EIA and Coastal Zone Management Assessment (CZMA) were also evaluated against the critical habitat triggers to determine if adequate measures are established to prevent measurable adverse impacts to the critical habitat triggers and prevent a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species.

The proposed mitigation measures contained within the Project EIA must be implemented to prevent significant impacts to the biodiversity values for which critical habitat has been designated and the supporting habitat, as well as prevention of a net reduction in the global, national and/or regional population of any Critically Endangered or Endangered species. To address residual impacts that were deemed to be significant, a biodiversity action plan (BAP) containing additional recommendations and further details on the actions required to achieve net gains for critical habitats and species is recommended for the Project.

1 Introduction

1.1 Overview

The Greater Changhua Offshore Windfarm Northwest Ltd. (herein referred to as "Project Company") is a special purpose vehicle established by Ørsted Wind Power TW Holdings A/S (Ørsted) to develop the proposed Project Trinity: Greater Changhua Northwest (NW) Offshore Wind Farm in Taiwan (herein referred to as the "Project"). The Project is located approximately 50km offshore from the coast of Changhua County, Taiwan.

The Project is planned in compliance with the "Offshore Wind Farm Site Application Regulation", stipulated by the Bureau of Energy, Ministry of Economic Affair on 2 July 2015. The regulation gives endorsement to offshore wind energy development for developers to promote nuclear-free homeland by the year of 2025.

In 2022, the National Development Council (NDC) published Taiwan's Pathway to Net-Zero Emissions by 2050. The plan is to decarbonise the electrical sector and targeted 60% renewable energy come 2050.[1] As of 2021[2], the electricity generation comprised of 81.5% fossil fuels, 9.6% nuclear, 6% renewable energy and 2.9% of other types of energy. By 2025, Taiwan has set an ambitious commitment for their electricity sector to be 20% renewable energy, 30% coal, and 50% gas. The most targeted renewable energy is solar photovoltaic (Solar PV) and wind power.

As part of the transaction process undertaken for obtaining project financing from an Equator Principle Financial Institute (EPFI), the Project potentially needs Equator Principles (EP) compliance. Therefore, Mott MacDonald have been commissioned by Ørsted to undertake the Critical Habitat Assessment (CHA), alongside other environmental and social services.

1.2 Aims and objectives

Taiwan is a highly biodiverse country, and as such there is a high probability that some of the species and ecosystems present in the Project area and its EAAAs here will trigger Critical Habitat, hence the need for this CHA. The Project is located near to the nationally protected and internationally recognised Dadu Estuary Wildlife Refuge and Hanbao Wetlands, which is an internationally recognised Important Bird and Biodiversity Area (IBA) as well as a Key Biodiversity Area (KBA). In addition, the local EIA has identified a number of habitats and species that could trigger Critical Habitat in the relevant ecologically appropriate areas of analysis (EAAAs). This includes globally threatened, restricted range, and migratory species.

The outlined CHA process is defined in IFC PS6 (IFC, 2012) and IFC Guidance Note 6 (GN6) (IFC, 2019). The aim of the CHA is to:

- Determine whether the Project is located in critical habitat
- Assess whether the Project is likely to lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated and on the ecological processes supporting those biodiversity values

[1] Lau, Hon Chung and Tsai, Steve C. 2022. A decarbonization Roadmap for Taiwan and Its Energy Policy Implications. MDPI

[2] Retrieved from 110 年發電概況 - 能源統計 - 經濟部能源局(Bureau of Energy, Ministry of Economic Affairs, R.O.C.)全球資訊網 (moeaboe.gov.tw)

- Assess whether the Project is likely to lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time

The aims of the CHA are achieved by completing the following objectives:

- Defining one or several ecological appropriate areas of analysis (EAAAs) relevant to the biodiversity values regularly occurring the Project footprint and the ecological processes supporting them as identified in the baseline data and published literature
- Undertaking a comparative analysis of the biodiversity values against the critical habitat criteria and thresholds of IFC PS6
- Undertaking a preliminary assessment of the likely impacts of the Project on the critical habitat values
- Reviewing the magnitude, temporal scale and significance of the Projects impacts on the biodiversity values for which critical habitat is designated, identifying those impacts that are likely to result in a measurable adverse impact and a net reduction in the population
- Defining the mitigation strategy for the critical habitat values

The definition of critical habitat and the assessment principles used in this CHA are set out in the following guidance documents:

- IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2012)
- IFC Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2019)

The CHA is based upon information received from the client, publicly available data sources (detailed in Section 2.2.2) and the CHA undertaken for the neighbouring development, Greater Changhua Offshore Wind Farm South East (CHW01), also being developed by Ørsted (Mott MacDonald, 2020).

1.3 Project background

The Project is being developed on the 12th Zone of Potential in Changhua County (彰化縣) according to the Offshore Wind Farm Site Application Regulations announced by the Bureau of Energy, Ministry of Economic Affairs (MOEA) on 2 July 2015[3]. The Project area will be approximately 117km^2 in size and located approximately 50km offshore from Xianxi Township (線西鄉), Changhua County, on the western coast of Taiwan (see Figure 1.1). The Project will comprise 54 to 74 wind turbine generators (WTGs) each of 8-11MW capacity and on- and offshore electrical substations, amounting to a maximum total capacity of 598MW. The WTGs will be located in water depths approximately 30m to 45m below mean sea water level (MSWL). Other project components include inter-array and export transmission cabling to connect to Taiwan's electrical grid, as well as various operational support vessels and ancillary facilities. The operation period is planned for 20 to 25 years and in line with permit requirements.

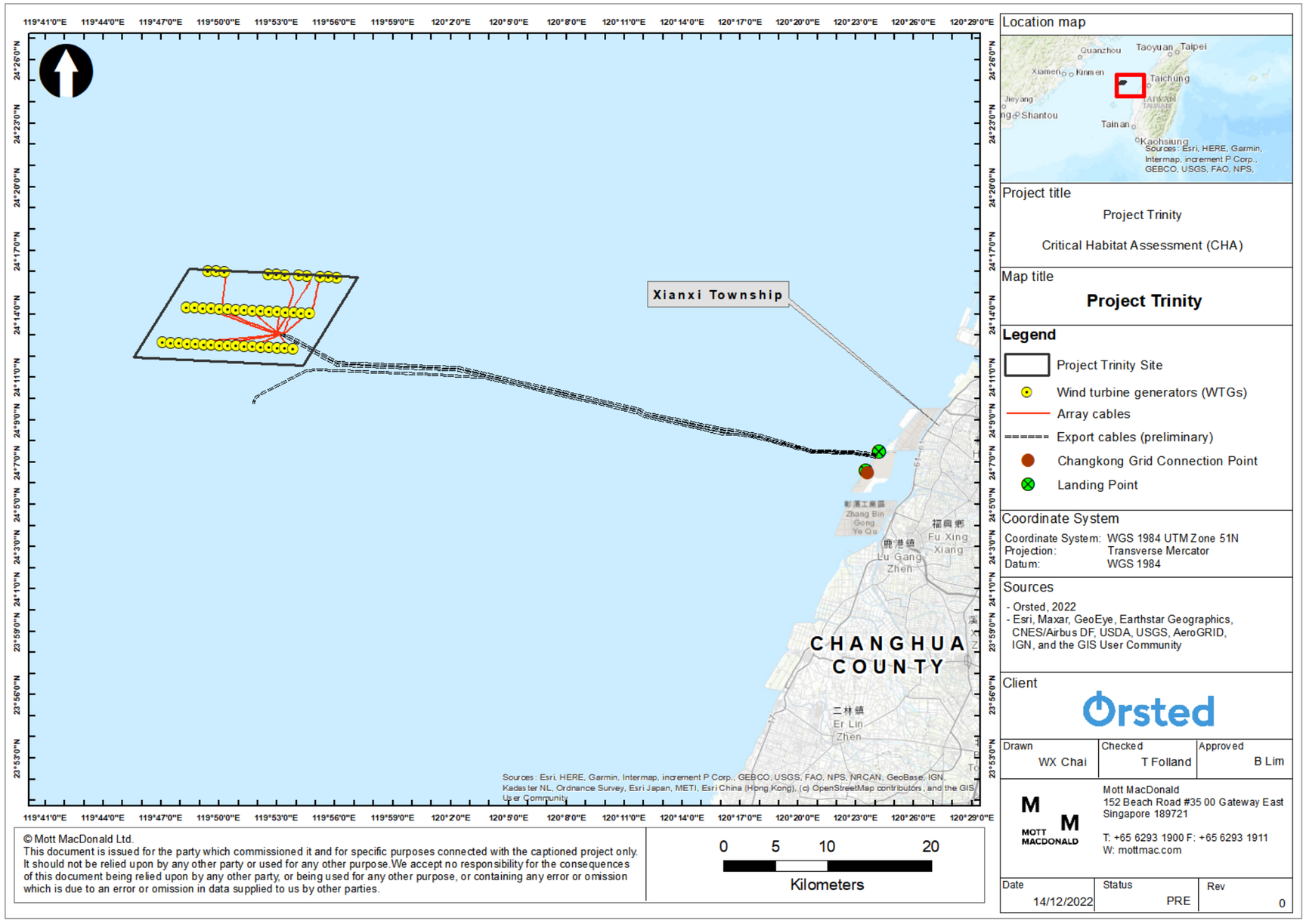
The WTGs will be connected to one offshore substation (OSS) via 33kV or 66kV inter-array cable strings and to the Changkong grid connection point owned by Taiwan Power Company (TPC) through two export cables.

As noted above, the offshore WTG area of the Project (CHW04) is adjacent to the offshore WTG area of Greater Changhua Southeast windfarm (CHW01) which is also being developed by Ørsted. A CHA was developed for CHW01 in 2020 (Mott MacDonald, 2020). Figure 1.2

[3] https://www.moeaboe.gov.tw/ECW/populace/Law/Content.aspx?menu_id=2870

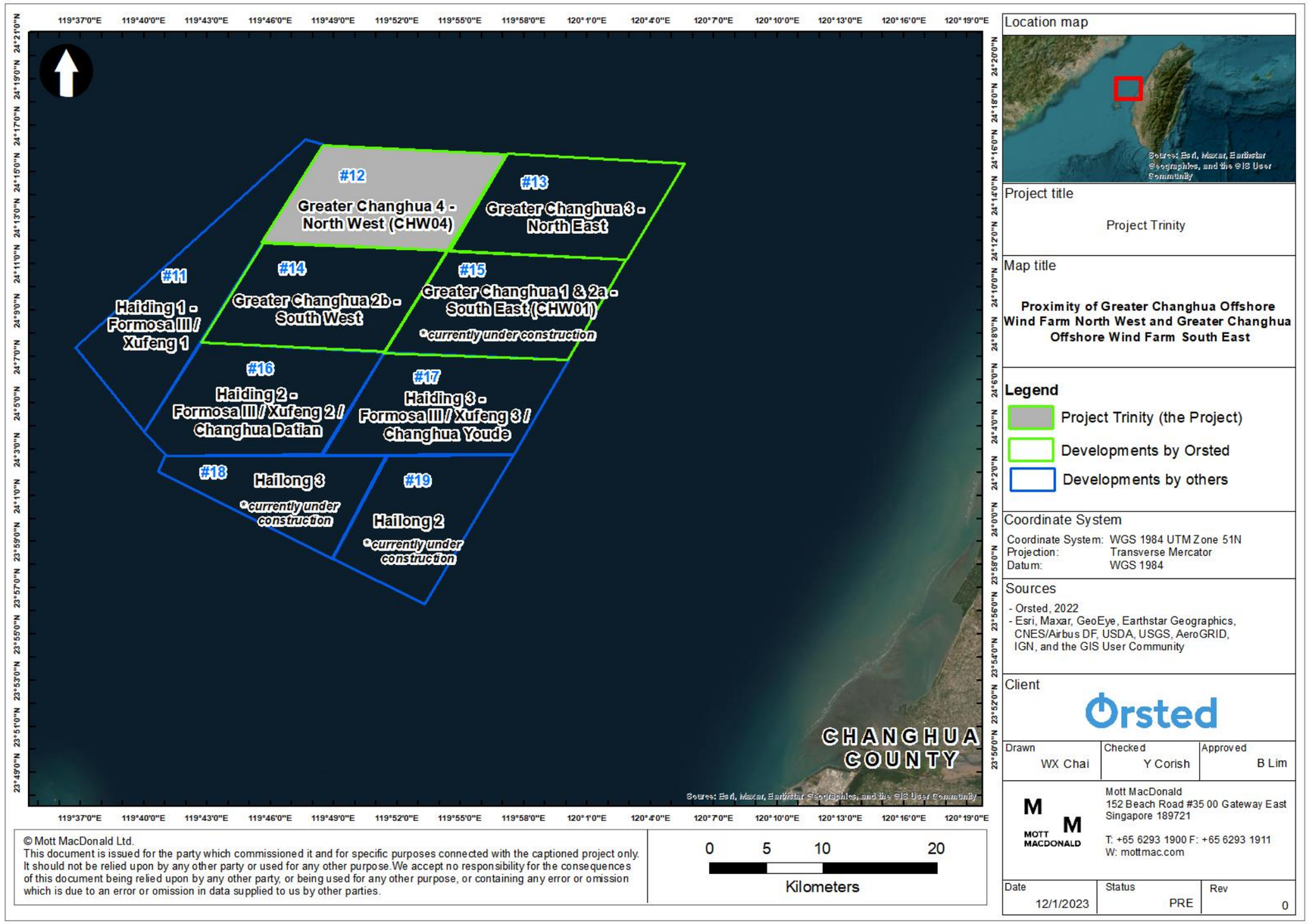
shows the locations of these two sites. CHW04 is serial number #12 on the map, and #15 on the map represents the CHW01 project.

Figure 1.1: Location of Project Trinity



Source: Mott MacDonald, 2022

Figure 1.2: Proximity of Greater Changhua Offshore Wind Farm Northwest and Greater Changhua Offshore Wind Farm Southeast



Source: Mott MacDonald, 2022

The Project components consist of the following:

- Offshore components:
  - 54 to 74 units of offshore WTGs, each with a capacity of 8-11MW (depending on the confirmed model), covering an offshore area of approximately 117km^2
  - 33kV or 66kV inter-array submarine cables to offshore substation (OSS)
  - Interlink cables to ensure back-up power supply to the WTGs in case the grid connection is lost for an extended period
    - WTG to WTG interlink: voltage will be either 33kV or 66kV based on voltage transmitted between turbines
    - OSS to OSS interlink: voltage will be either 33kV, 66kV or 220kV
  - 220kV offshore export submarine cables connecting the offshore substation to Changkong grid connection landing point
  - Offshore substation (OSS) to collect individual array cable strings and transform them to higher voltage before exporting them to shore
- Onshore components:
  - Project-dedicated onshore substation (OnSS) which steps down the voltage from 220kV to 161kV
  - Onshore cables (total length of up to 8.05km) connecting the following locations:
    - 3.7km from transition joint bay (TJB) to the OnSS
    - 4.35km from OnSS to Changkong grid connection point owned by TPC
  - Transition joint bay (TJB) to connect offshore and onshore export cables

The Project has successfully obtained regulatory approval for its EIA report on 10 August 2018.

1.4 Document structure

The CHA is structured as follows:

- **Section 1** (ie this section) outlines the aims and objectives of the CHA and Project.
- **Section 2** of this document describes the methodology for undertaking this CHA, including the definition of the EAAA, the collection of baseline data through desktop study, field surveys, and consultation with experts.
- **Section 3** presents a summary of the biodiversity baseline, including internationally recognised and legally protected areas, natural/modified habitats, and flora and fauna species of conservation importance.
- **Section 4** presents the actual assessment of Critical Habitat against the criteria and thresholds in IFC PS6 and GN6.
- **Section 5** provides a high-level assessment of the likely project impacts on the features that meet Critical Habitat thresholds.
- **Section 6** provides a high-level assessment of ecosystem services present which are likely affected by the Project.
- **Section 7** includes a series of recommendations for mitigation and further studies.

2 Approach and methodology

2.1 IFC critical habitat definition and assessment overview

This CHA follows the methodology in IFC GN6 of June 2019 (IFC, 2019). Critical habitat is defined in Paragraph 16 of IFC Performance Standard 6 (PS6) (IFC, 2012) and Note 53 of IFC GN6 (IFC, 2019) as an area of high biodiversity value that includes at least one or more of the five values specified in Paragraph 16 of PS6 and/or other recognized high biodiversity values. These values are referred to as critical habitat criteria and include:

- Criterion 1 (C1): Habitat of significant importance to Critically Endangered (CR) and/or Endangered (EN) species
- Criterion 2 (C2): Habitat of significant importance to endemic and/or restricted range species
- Criterion 3 (C3): Habitat supporting globally significant concentrations of migratory and/or congregatory species
- Criterion 4 (C4): Highly threatened and/or unique ecosystems
- Criterion 5 (C5): Areas associated with key evolutionary processes

Criteria C1 to C3 apply to the species regularly present within the EAAA, while C4 and C5 apply to the characteristics of the EAAA. Criteria C1-C4 have defined thresholds which enable the determination of critical habitat to be made. Criteria are further explained in Section 2.1.1 below.

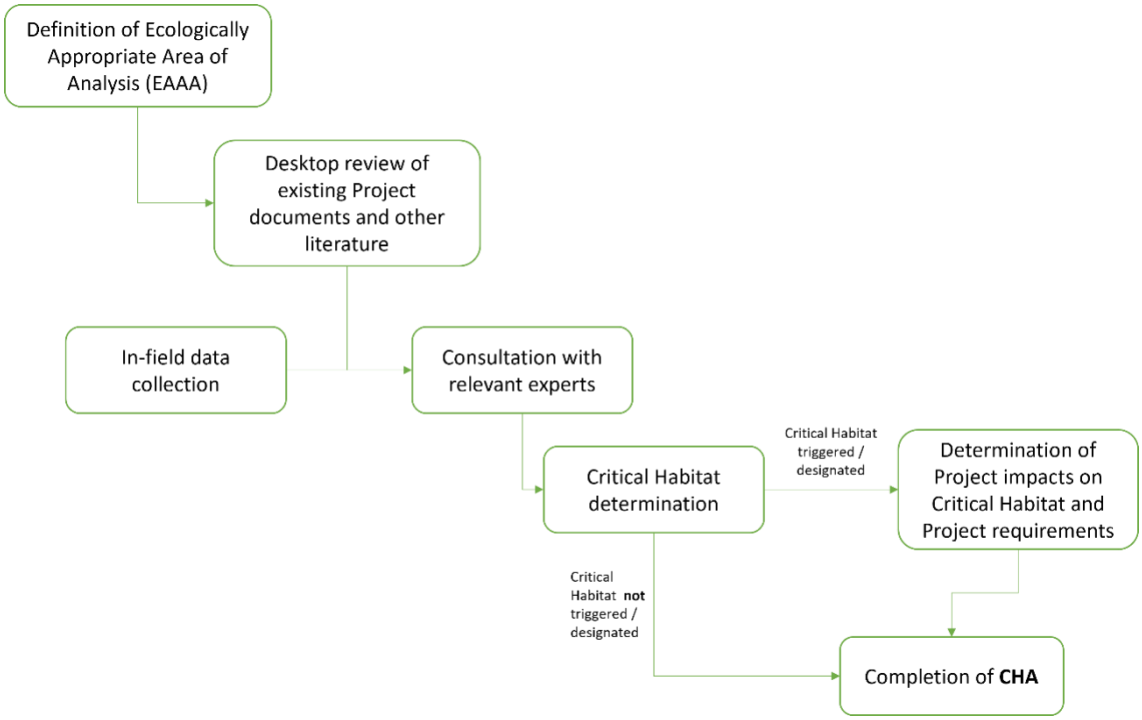
A stepwise process based on guidelines provided by IFC GN6 has been followed for this assessment (Figure 2.1). This CHA uses results from a literature review, and previous baseline biodiversity surveys to determine whether the Project is likely to be located within critical habitat.

In accordance with IFC PS6, the determination of critical habitat is based on the IUCN Red List assessment. Taiwan's National Red Lists[4] (which lists nationally protected flora and fauna species) following IUCN Red List criteria guidance (IUCN, 2012) has been used for context. This will hence be referred to National Red List.

To conduct a CHA, one or several Ecologically Appropriate Area of Analysis (EAAA) (ie the geographic area which is being investigated) must be defined for species with regular occurrence in the Project's area of influence (AoI), or ecosystem, covered by Criteria C1-C4 (see IFC Guidance Note 6, Paragraph GN59). The EAAA is usually larger than the area affected by the Project directly or indirectly and should take into account the distribution of species or ecosystems and the ecological patterns, processes, features, and functions that are necessary for maintaining them. Refer to Section 2.1.1 for the EAAA descriptions for this project.

[4] 紅皮書名錄 - 特有生物研究保育中心 (tesri.gov.tw)

Figure 2.1: Summary of CHA Approach and Methodology



Source: Mott MacDonald, 2022, based on steps outlined in IFC GN6 (IFC, 2019) and applied to this project

This CHA contributes, alongside other relevant documentations, to achieving the Project's aim to deliver the following objectives described in paragraph 17 of IFC PS6 (ie as quoted below).

No project activities can take place in critical habitat unless it can be demonstrated that:

1. There are no viable alternatives within the region for the development of the project on modified or natural habitats that are not critical
2. The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values
3. The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time
4. A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the project's management program

Where all of the above can be demonstrated, the project's mitigation strategy will be described in a Biodiversity Action Plan (BAP). The BAP will be designed to achieve a biodiversity net gain for those biodiversity values for which the critical habitat was designated. Where biodiversity offsets are proposed as part of the mitigation strategy, it must be assessed and demonstrated that the project's significant residual impacts on biodiversity will be adequately mitigated as discussed in detail in Section 0.

2.1.1 IFC PS6 critical habitat criteria

Criteria C1-C3 apply to the species regularly present within the EAAA, while Criteria C4 and C5 apply to the characteristics of the EAAA. Each criterion has defined thresholds which enable the determination of critical habitat to be made. Numerical thresholds have been defined as per IFC GN6 for the first four critical habitat criteria. The quantitative thresholds for triggering Critical Habitat for criteria C1-C4 are described in Table 2.1.

In accordance with IFC PS6 paragraph 16, footnote 11, the determination of critical habitat will be based on the National Red List assessment for the species listed as critically endangered or endangered in the country. Where no national Red List assessment following IUCN criteria is published, the determination of critical habitat will be based on IUCN Red List assessment.

Table 2.1: Quantitative Thresholds for Critical Habitat for Criteria 1, 2, 3 and 4

Criteria		Quantitative thresholds	
1.	Critically Endangered (CR) / Endangered (EN) Species (IUCN, 2012)	a.	Areas that support globally important concentrations of an IUCN Red-listed EN or CR species (⩾0.5% of the global population AND ⩾5 reproductive units[5] of a CR or EN species).
		b.	Areas that support globally important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in GN72(a).
		c.	As appropriate, areas containing important concentrations of a nationally or regionally listed EN or CR species.
2.	Endemic/Restricted Range Species[6]	a.	Areas that regularly hold ⩾10% of the global population size AND ⩾ 10 reproductive units of a species
3.	Migratory / Congregatory Species	a.	Areas known to sustain, on a cyclical or otherwise regular basis, ⩾ 1% of the global population of a migratory or congregatory species at any point of the species' lifecycle.
		b.	Areas that predictably support ⩾10% of the global population of a species during periods of environmental stress.
4.	Highly Threatened / Unique Ecosystems	a.	Areas representing ⩾5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN.
		b.	Other areas not yet assessed by the IUCN but determined to be of high priority for conservation by regional or national systematic conservation planning.

Source: IFC, 2019

2.2 Critical habitat assessment methodology

The method of determining 'critical habitat' within this CHA is based upon the approach described in IFC PS6 (IFC, 2012) and IFC GN6 (IFC, 2019). The steps undertaken are as follows:

- Define an EAAA based on the distribution of species or ecosystems, and the ecological processes necessary for maintaining them (refer to Section 3 for details)
- Review and summarise the published data including Project specific biodiversity survey results, public literature, international data and modelling tools such as the Integrated Biodiversity Assessment Tool (IBAT) to establish the biodiversity values with regular occurrence within the EAAA (refer to Section 3 for details)
- Assess the biodiversity values within the EAAA against the 'critical habitat criteria' as defined in IFC GN6) to identify 'critical habitat' (refer to Section 5 for details)

[5] The minimum number and combination of mature individuals necessary to trigger a successful reproductive event at a site (IFC GN6 2019)

[6] In accordance with IFC GN6 Paragraph 74, restricted range for terrestrial vertebrates and plants are defined as those species that have an EOO less than 50,000km^2. For marine systems, restricted range species are provisionally being considered those with an extent of occurrence (EOO) of less than 100,000km^2. For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic

- Assess the residual Project impacts on the biodiversity values for which critical habitat is designated by considering the mitigation measures that have been proposed as part of the local EIA and EIS report (ie refer to Section 6 for details).

2.2.1 Ecologically appropriate areas of analysis

The species with regular occurrence in the project's area of influence typically occur within relatively broad landscape and seascape units and fall into several distinct ecological groups. As per IFC GN6 (Paragraph GN59), the EAAAs have been defined taking in consideration the distribution of species or ecosystems (within and sometimes extending beyond the Project's area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them (IFC, 2019).

The methodology of the EAAA generation was developed in direct consultation with IFC. The ecological patterns, processes, features, and functions that are necessary for maintaining these groups is however largely limited and are little known in the Project area, particularly in relation to species in the marine environment. A separate EAAA was defined for each of the main ecological groups of species: marine flora and fauna, migratory birds (including seabirds at sea) and terrestrial flora and fauna.

For this CHA three EAAAs, one for each of the main groups of species, are summarised below:

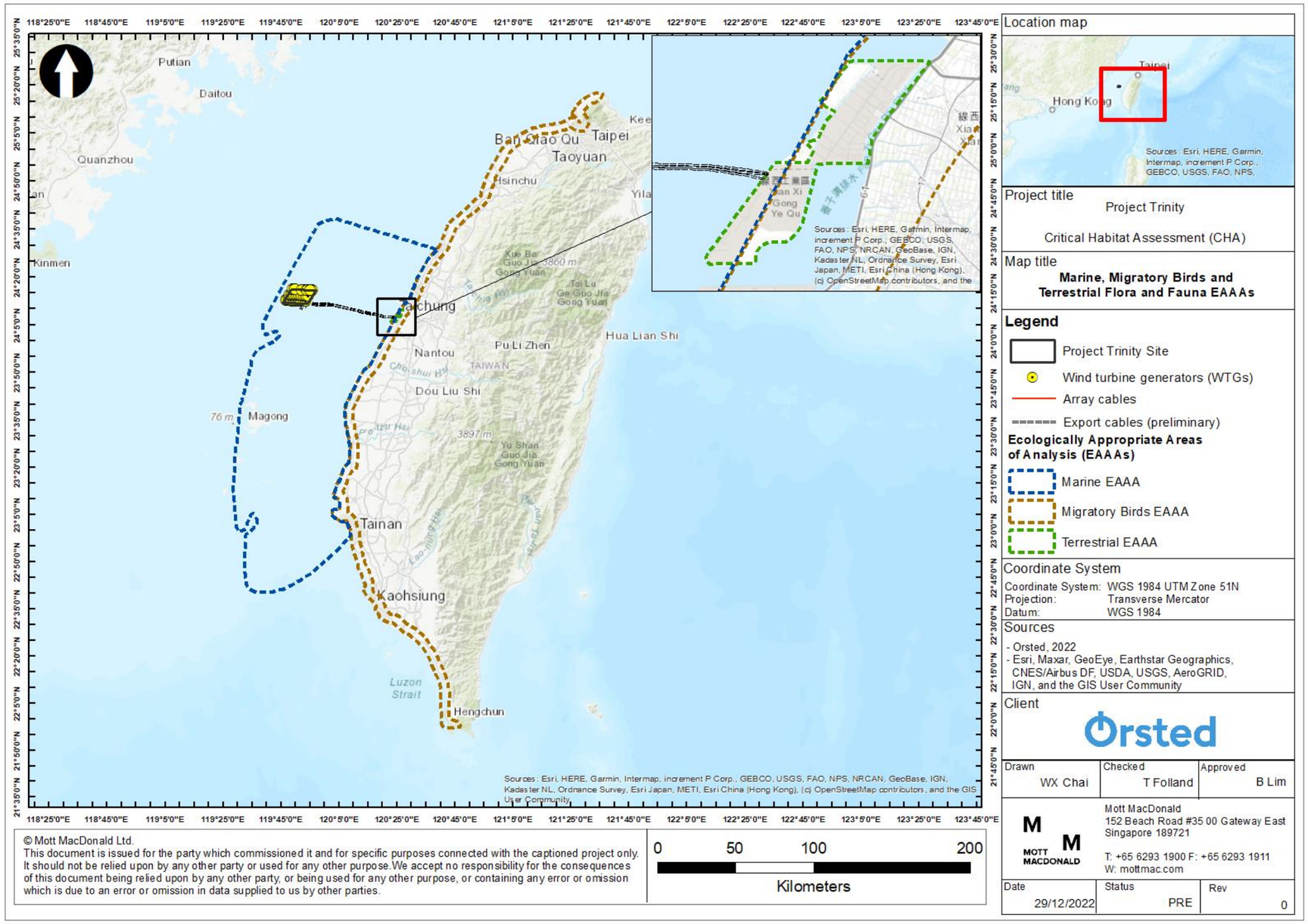
- Marine flora and fauna (Figure 2.2): marine EAAA consists of the south-western marine waters of Taiwan, which is considered as a natural habitat. It takes into account data of threatened species off the west coast of Taiwan, potential underwater noise impacts generated during pilling and the operation phase, and the Marine Ecoregions of the World (MEOW) obtained from ArcGIS Hub (The Nature Conservancy, 2019). The methodology for defining the marine EAAA is presented in Appendix D.
- Migratory birds, including seabirds at sea (Figure 2.2): Migratory bird EAAA includes the Important Bird Areas (IBAs) in the western coast of Taiwan (Figure 2.3) and the corresponding areas of connectivity between the IBAs. Taiwan is an important wintering ground for the black-faced spoonbill (IUCN Endangered) amongst other significant migratory bird species and majority of the IBAs hold important and/or significant populations. Spoonbills have in recent years also expanded their wintering areas to occupy new habitats. As a conservative approach all IBAs along the western coast of Taiwan have been included and delineated to take into account indirect impacts of the Project to bird populations that transverse across the IBA sites. For further contextual understanding, migratory birds EAAA was generated using IBA boundary data, defined using a 5km inland buffer derived from the western coastline of Taiwan. IBAs of note accordingly intersected this boundary along the coastline. The IBAs within the migratory bird EAAA includes the following IBAs, namely:
  - Watzuwei Nature Reserve, Xinbei City (TW002)
  - Kuantu, Taipei City (TW003)
  - Dapingding and Hsutsuo Harbour, Taoyuan City (TW006)
  - Hsinchu City coastal area (TW009)
  - Kaomei Wetlands, Taichung City (TW011)
  - Dadu Rivermouth Wildlife Refuge (TW013)
  - Hanbao Wetlands, Changhua County (TW014)
  - Tacheng Wetlands (TW016)
  - Aogu Wetlands, Chiayi County (TW021)
  - Pohtzi River Estuary, Chiayi County (TW022)
  - Budai Wetlands, Chiayi County (TW023)
  - Beimen, Tainan City (TW025)

- Chingkunshen, Tainan City (TW026)
- Chiku, Tainan City (TW027)
- Sitsao Wildlife Refuge, Tainan City (TW029)
- Yungan, Kaohsiung City (TW030)
- Kaoping River, Pingtung County (TW037)
- Qieding Wetland, Kaohsiung City (TW054)
- Fengshan Reservoir, Kaoshiung City (TW035)
- Kenting National Park, Manchou City (TW038)

- Terrestrial flora and fauna, including bats and resident terrestrial birds (Figure 2.2):

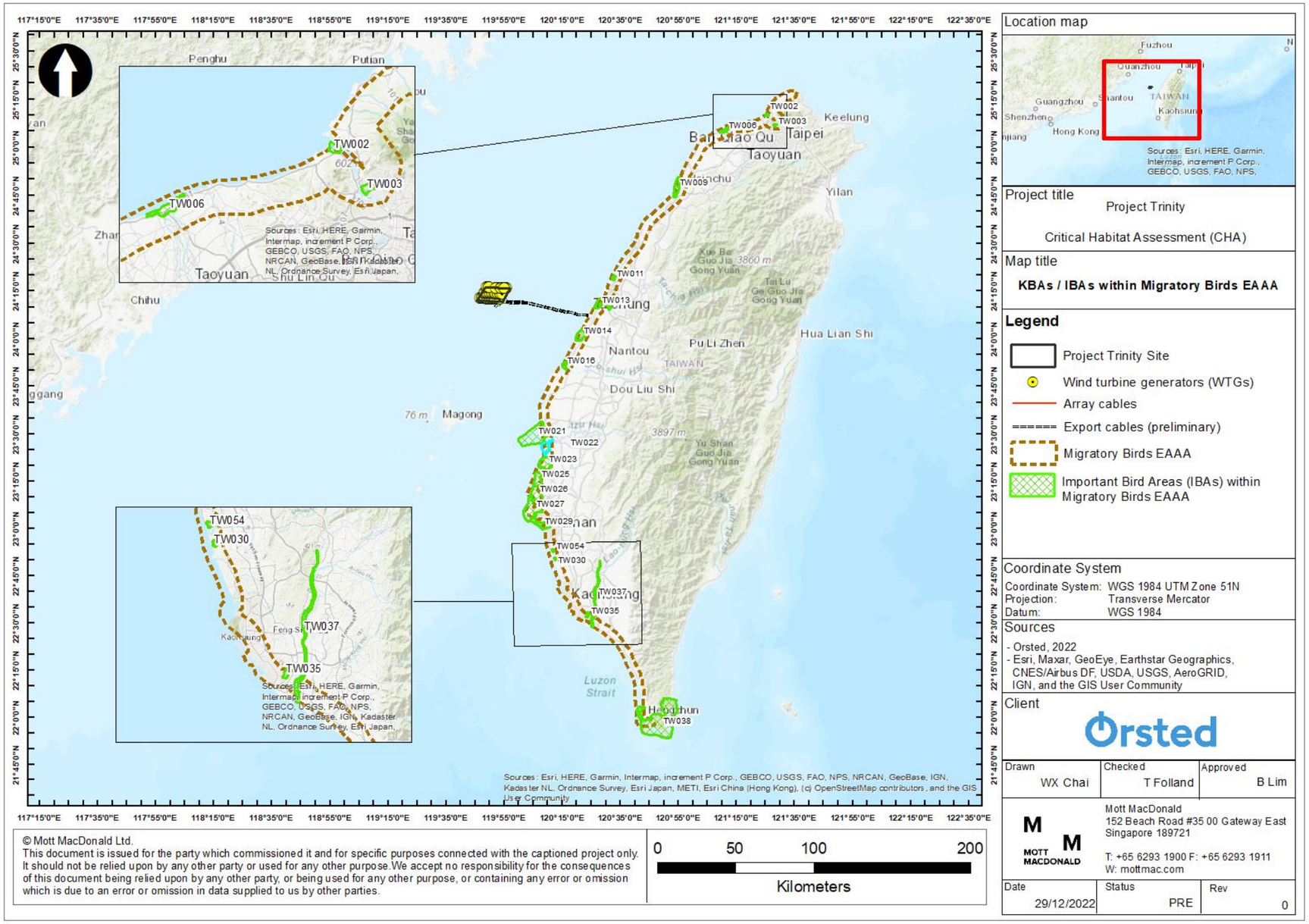
  Terrestrial flora and fauna EAAA includes Xianxi area (線西區) and Lunwei area (崙尾區) of Changhua Binhai Industrial Park (彰濱工業區) in the coast of Changhua County of Taiwan. The Changhua Binhai Industrial Park is located on reclaimed land and separated from Xianxi Township (線西鄉) by Qingan water channel (慶安水道) and Xianxi water channel (線西水道). In light of the artificial and recent nature of the landform creation (c. 1995) and the limited connectivity with the natural landform of Taiwan, it was considered that the land area defined above forms a discrete ecologically significant unit of space within the wider landscape. Furthermore, this area is equivalent in scale to areas mapped for practical site-based conservation such as Important Bird and Biodiversity Areas (IBAs). As the terrestrial flora and fauna EAAA is within a reclaimed industrial land, this area is considered as a modified habitat.

Figure 2.2: Ecologically Appropriate Areas of Analysis (EAAAs) of marine flora and fauna, migratory birds (including seabirds at sea) and terrestrial flora and fauna



Source: Mott MacDonald, 2024

Figure 2.3: Important Bird Areas (IBAs) within the migratory birds (including seabirds at sea) EAAA



Source: Mott MacDonald, 2022

2.2.2 Data sources referenced for CHA

2.2.2.1 Overview

This CHA was undertaken with reference to the ecological baseline, consisting of the habitats and species, identified by the Project EIA as well as those in published literature.

The following sources were used to establish the baseline for this CHA:

- Greater Changhua NW Offshore Windfarm environmental impact assessment (EIA) and its appendices (大彰化西北離岸風力發電計畫 環境影響說明書) (Unitech, 2018a)
- Greater Changhua NW Offshore Windfarm EIA addendum and its appendices (大彰化西北離岸風力發電計畫 環境影響差異分析報告) (Unitech, 2022)
- Greater Changhua SE Offshore Windfarm environmental impact assessment (EIA) and its appendices (大彰化東南離岸風力發電計畫 環境影響說明書) (Unitech, 2018b)

To identify critical habitat within each EAAA, a desk-based review of available information from international and national sources was undertaken. The information sources used in the assessment include those listed below.

- International and national databases
  - Integrated Biodiversity Assessment Tool (IBAT) (https://www.ibat-alliance.org/)
  - International Union for Conservation of Nature (IUCN) Red List of Threatened Species (http://www.iucnredlist.org)
  - BirdLife International Data Zone (http://birdlife.orgxxx
  - Biodiversity A-Z org (https://biodiversitya-z.org)
  - Catalogue of Life in Taiwan (https://taibnet.sinica.edu.tw/home_eng.php)
  - Convention on Biological Diversity (CBD) website (https://www.cbd.int/)
  - eBird (https://ebird.org/)
  - Fishbase (https://www.fishbase.se)
  - The Amphibia Web
  - World Wildlife Foundation (WWF) Ecoregions (https://worldwildlife.org)
- Additional information on the legally protected and internationally recognised areas (existing or proposed) within the EAAA has also been collected and reviewed from online sources:
  - Important Bird and Biodiversity Areas (IBA) (http://datazone.birdlife.org/home)
  - Key Biodiversity Areas (KBA) (www.keybiodiversityareas.org/)
  - World Heritage Sites (WHS) (https://whc.unesco.org/en/list/)
  - UNESCO Biosphere Reserves (http://whc.unesco.org/en/statesparties/id)
- Published literature on various species
  - National Red Lists following IUCN Red List criteria guidance (IUCN, 2012), including Taiwan Red List of Amphibians (Lin *et al*., 2017), Birds (Lin *et al*., 2016), Terrestrial Mammals (Cheng *et al.*, 2017), Terrestrial Reptiles (Chen *et al*., 2017), Vascular Plants (IUCN, 2017) and Freshwater Fishes (Yang *et al*., 2017)
  - Taiwan protected species lists (Forestry Bureau, 2016)
  - Important Bird Areas in Taiwan (Second Edition) (Forestry Bureau COA, 2015)
  - Map of Taiwan's Wetlands (Ramsar Citizen, 2020)

- Population Ecology and Estuary Habitat Monitoring for Chinese White Dolphin (*Sousa chinensis*) (Zhuo *et al.*, 2018)
- Status Review Report of the Taiwanese Humpback Dolphin (*Sousa chinensis taiwanensis*) (Whittaker & Young, 2018)
- Progress report of cetacean research and conservation in Taiwan (Chou, 2002)
- Unsustainable human-induced injuries to the Critically Endangered Taiwanese humpback dolphins (*Sousa chinensis taiwanensis*) (Wang *et al*., 2017)
- Evidence for year-round occurrence of the eastern Taiwan Strait Indo-Pacific humpback dolphins (Sousa chinensis) in the waters off western Taiwan (Wang & Yang, 2011)
- Tropical and subtropical moist broadleaf forests, Southeastern Asia: Taiwan (Brooks, 2018)

2.2.2.2 Landcover and habitat mapping

Habitat types were determined for the EAAAs using information obtained from Copernicus Global Land Service (CGLS, 2019) and consolidated via ground-truthing during baseline studies carried out by Unitech in 2018 for the Greater Changhua NW Offshore Windfarm EIA (Unitech, 2018a). The EIA also provided information on the habitats found on site and plant species that were observed (see Section 2.2.2.3 for a summary of the field surveys).

2.2.2.3 Field survey methodology summary

Baseline studies were conducted between February 2016 to May 2018 as part of the approved local EIA conducted for the Project. Subsequently, an EIA addendum was prepared, and supplementary baseline surveys were conducted between 2019 to 2021. In addition to the local EIA for this Project, an EIA report of the Greater Changhua SE Offshore Windfarm was produced which included additional baseline studies conducted between February 2016 to July 2017 (Unitech, 2018b)

Surveys conducted as part of the EIA included terrestrial, intertidal and marine biodiversity. The field surveys undertaken are summarised in Table 2.2. These surveys were conducted in accordance with following guidelines by the Executive Yuan, Environmental Protection Agency (EPA):

- Technical Specifications for Animal Ecological Assessment (動物生態評估技術規範)
- Technical Specifications for Plant Ecological Assessment (植物生態評估技術規範)
- Technical Specifications for Marine Ecological Assessment (海洋生態評估技術規範)

Table 2.2: Baseline survey summary

Survey type	Timeframe	Methodology
Terrestrial		
Habitat and flora	July 2017 Aug 2017 (Wet season) Nov 2017 (Dry season)	Site walkover and aerial photography Quadrat sampling in major habitats identified
Mammals (including bats)		Transect survey at dawn and dusk Trapping (ie rodent and Sherman traps) Static bat activity monitoring (AnaBat II Bat Detector)
Herpetofauna		Visual detection at dawn and dusk Active searching at dawn Opportunistic sightings
Butterflies and Dragonflies		Visual detection Net capturing
Birds		Point counts at dawn

Survey type	Timeframe	Methodology
		Transect survey at dusk, sights and calls Opportunistic recording between sampling points
Marine		
Birds	March 2016 to December 2017 August 2017 (Summer) October 2017 (Fall) January 2018 (Winter) April/ May 2018 (Spring)	Visual counts by boat-based transect (marine) Visual counts at major habitats (intertidal) Weather and meteorological radar (raptor)
Zooplankton	February 2016 June 2016 August 2016 November 2016 February 2017 July 2017	NORPAC net and laboratory test
Phytoplankton		Water sampler and laboratory test
Marine fauna and flora (excluding marine mammals)	February – March 2016 May – June 2016 August 2016 November 2016 February 2017 July 2017	Transect sampling in the intertidal zone Quadrat sampling in the intertidal zone Trawl survey Fishery resource local catch statistics NORPAC net (fish eggs and juvenile fish)
Cetaceans (marine mammals)	April 2016 – January 2017	Visual monitoring by boat-based transect

Source: Unitech, 2018a

Details of the baseline survey methods can be found in Section 6.3 of the EIA (Unitech, 2018a) and Section 6.7 to 6.9 of the EIA addendum (Unitech, 2022). Baseline survey data have been supplemented by additional literature review and spatial analysis using IBAT species range data relevant to each EAAA.

2.2.2.4 Stakeholder consultations

A series of stakeholder and public consultations as well as EIA appraisals and reviews were conducted during the preparation and review of the local EIA reports. Details are provided in Table 2.3 and Table 2.4. Ecology and biodiversity were one of the main topics included in these consultations. Specific feedback on marine mammals, migratory birds and seabirds was received from relevant stakeholders including concerns on flight corridors, underwater noise level and monitoring of cetaceans, fishes and birds during construction. These comments were incorporated into the final EIA.

In addition, the Project has continued engagements and consultations in compliance with international standards between 2018 to September 2023, which may be found in Table 5.3 of Project Trinity's SEP. The stakeholders engaged since the EIA stages up until September 2023 are outlined in Table 2.4. A brief summary of the environmental and social concerns raised during these stakeholder engagement activities are provided in Table 2.5. It should also be noted that at this point, the Project is still considerably ahead to the commencement of construction (ie early 2025). More engagement and a wider range of stakeholders will be planned to occur as the Project develops.

Table 2.3: Stakeholder and public consultation meetings undertaken for the Project's EIA

Meeting	Date
Online publication of Project information on the Environmental Protection Administration (EPA) website for 15 days	9 January 2016

Meeting	Date
Four meetings/visits with the Changhua Fishermen Association	10 February 2016 – 6 April 2017
Online publication of project development information and EIA survey aspects on the EPA website for 20 days	21 September – 12 October 2016
Public seminar for EIA report at drafting stage	21 & 24 October 2016
Public opinion survey of the Project (750 local community members, 209 fishermen and 67 local leaders)	19 November – 11 December 2016
Online publication of major EIA chapters on the EPA website for 20 days	24 January – 14 February 2017
Opinion Presentation Meeting	20 June 2017
The 1st EIA Review Meeting	30 June 2017
The 2nd EIA Review Meeting	11 September 2017
The 3rd EIA Review Meeting	27 November 2017
EPA EIA Vetting Committee Meeting on the Project (327th meeting)	9 February 2018
Eight meetings with the Changhua Fishermen Association	17 July 2018 – 16 October 2018
Review meeting on EIA report deviation comparison	20 November 2018
CZMA Public Hearing	22 May 2019
EP On-site Audit Meeting	29 October 2019
1st EDA Review Meeting	21 October 2021
2nd EDA Review Meeting	22 December 2021
EPA Vetting Committee (414th meeting)	2 March 2022
Pre-construction EIA Public Hearing CHW04	26 September 2022
Pre-CP Application Public Hearing of CHW04	16 December 2022
1st EIA Supervisory Committee Meeting	23 December 2022

Source: Project Company; Unitech 2018a; Unitech, 2022; Orsted, 2023

Table 2.4: Stakeholders consulted during the Project's EIA stages to September 2023

Government authorities	Stakeholders in Changhua County	Non-governmental organizations
Executive Yuan ● Environmental Protection Administration ● Office of Energy and Carbon Reduction ● Forestry Bureau ● Fisheries Agency ● Coast Guard Administration	● Legislator of Changhua County ● Changhua County Council ● Changhua Fishermen's Association ● Xianxi, Lukang and Fangyuan Township Offices ● Xianxi, Lukang and Fangyuan Township Township Representative Councils ● Village heads and residents in Xianxi, Lukang and Fangyuan Township ● Community Development Associations ● Community representatives of Changhua County ● Show Chwan Memorial Hospital ● Changhua Christian Hospital	● Changhua Environmental Protection Alliance ● Wild Bird Society of Changhua ● Wetlands Taiwan ● Matsu Fish Conservation Union, Taiwan ● Taiwan Cetacean Society ● Taiwan Environmental Information Association ● Taiwan Energy & Climate Law Association ● Wild at Heart Legal Defense Association, Taiwan ● New Power Party ● Taiwan Renewable Energy Alliance ● Coastal Ocean Monitoring Center, National Cheng Kung University
Ministry of Economic Affairs ● Bureau of Energy ● Industrial Development Bureau ● Changhua Coastal Park Service Centre		
Ministry of Transportation and Communications ● Maritime and Port Bureau ● Civil Aeronautics Administration		
Ministry of the Interior ● Construction and Planning Agency	Local academia	

Government authorities	Stakeholders in Changhua County	Non-governmental organizations
Ministry of Culture ● Bureau of Cultural Heritage Changhua County Government ● Environmental Protection Bureau Changhua County	● National Changhua University of Education (NCUE) ● Da-Yeh University ● Mingdao University ● Chienkuo Technology Univrsity ● Chungchou University of Science and Technology ● Xianxi Elementary School and Junior High School	● Industrial Development & Investment Promotion Committee of Changhua County (IDIPC) ● Chunghua Fund fo Children and Families ● Taiwan Ocean and Environmental Sustainability Law Centre (TOESLC)

Source: Greater Changhua Northwest Offshore Wind Farm Project EIA Report, 2018 and SEP, 2023

Table 2.5: Brief summary of environmental and social concerns raised during stakeholder engagement activities from the Project's EIA stage.

Environmental / Social Concern	Stakeholder
Impact on marine ecology, marine mammals and water quality	● Local community members, fisher folk and opinion leaders interviewed in the public opinion survey ● Changhua Environmental Protection Union ● Matsu Fish Conservation Union ● Wild at Heart Legal Defense Association
Safety and maintenance	Local community members, fishermen and opinion leaders interviewed in the public opinion survey
Impact on fisheries and fishing production	● Local community members, fishermen and opinion leaders interviewed in the public opinion survey ● Xianxi Township office
Noise and vibration	Local community members, fishermen and opinion leaders interviewed in the public opinion survey
Impact on fishing boat operation, fisheries activities/area, fishing ground and compensation for fishermen	Fishermen interviewed in the public opinion survey
Benefits of green energy from wind power generation	Local community members interviewed in the public opinion survey
Communication with fishermen	● Changhua District Fishermen's Association ● Xianxi Township Office
Impact of offshore wind turbine on local livelihood, social economic, landscape and recreation, and impact of onshore facilities on traffic, noise, environmental hygiene and handling of dredged materials	Xianxi Township Office
Impact of transportation, environmental hygiene, noise and interference of electromagnetic waves	Xianxi Township Office
Bird collision and flight corridor for migratory birds	● Environmental Protection Bureau, Changhua County ● Changhua Environmental Protection Alliance ● Matsu Fish Conservation Union ● Taiwan Environmental Information Association ● Wild Bird Society of Changhua
Underwater cultural heritage	Bureau of Cultural Heritage, Ministry of Culture
Decommissioning activities of windfarm	Changhua Environmental Protection Alliance
Impact of Project components and activities with surrounding developments	● South Natural Gas Division of CPC Corporation, Taiwan ● CPC Corporation – Exploration and production division

Source: Section 6.5.5-3, Table 6.5.5-1 and Appendix 17 of the Project EIA Report, 2018 and Table 5.4 of the Project SEP, 2023

3 Biodiversity baseline

3.1 General biodiversity description

3.1.1 Ecoregion

The World Wildlife Fund (WWF) has published the Terrestrial Ecoregions of the World (TEOW) as a biogeographic regionalization of the Earth's terrestrial biodiversity ecoregions (WWF, 2012). Ecoregions are defined as relatively large units of land or water containing a distinct assemblage of natural ecological communities sharing a large majority of species, dynamics, and environmental conditions.

Two WWF ecoregions overlap with the EAAAs, as follows:

- Taiwan subtropical evergreen forests (eco-code IM0172); and
- South Taiwan monsoon rain forests (eco-code IM0171)

The South Taiwan monsoon rain forests also overlap with some of the onshore Project components. Both ecoregions are described in the below sub-sections.

3.1.1.1 Taiwan subtropical evergreen forests (IM0172)

The Taiwan subtropical evergreen forests ecoregion represents most of the forests of Taiwan, except for the southernmost section that is covered by the South Taiwan monsoon rain forests ecoregion. A north-south mountain range runs along the length of the island, with about 200 peaks over 3000m in height.

Taiwan is on the boundary between the Holarctic and Paleotropical floristic kingdoms and include floristic elements of both. The broadleaf forests can be divided into vegetation zones based on elevation:

- the Ficus-Machilus zone in the lower elevations dominated by *Machilus japonica*, *Ficus irisana* and *Ficus benjamina*;
- the Machilus-Castanopsis zone dominated by *Castanopsis cuspidata*, *Cyclobalanopsis longinux* and *Beilschmiedia erythrophloia*; and
- the lower and upper Cyclobalanopsis zones dominated by *Castanopsis cuspidata*, *Cyclobalanopsis longinux* and *Trochodendron aralioides*.
- Above 3000 m the forests are mixed broadleaf, dominated by *Alnus formosana*, species of Acer, and *Tsuga chinensis*. The highest elevations have pure stands of conifer forests with *Tsuga chinensis*, species of Picea (spruce) and Abies (fir).

The larger fauna has been extirpated from the island, including predators such as the clouded leopard, and the Eurasian otter. The Asiatic black bear is extremely rare. The Sika deer, Taiwan's largest ungulate, was once extirpated, but has now been reintroduced into the wild through a species recovery programme. Other species of conservation importance include smaller predators such as the leopard cat, gem-faced palm civet, crab-eating mongoose, Formosan ferret badger, Siberian weasel, and yellow-throated marten and larger herbivores and omnivores such as the Sambar deer, Formosan serow, Reeves' muntjac, Formosan macaque, and Chinese pangolin. Several of Taiwan's restricted-range bird species overwinter here, including the Japanese night-heron, Nordmann's greenshank, and spoon-billed sandpiper.

About 68% of the forests in this ecoregion remain, and 20% of the ecoregion is protected, mostly along the central mountains. Most of the lowland forests have been cleared for

agriculture and industry, while the remaining forest cover estimates likely includes monoculture plantations of non-native species (Wikramanayake, One Earth, n.d.).

3.1.1.2 South Taiwan Monsoon Rain Forests (IM0171)

The South Taiwan Monsoon Rain Forests ecoregion covers the low elevation forests in the southern-most part of the island. The topography of the island is comprised of granitic mountains that rise steeply on the eastern slope from a deep oceanic trench to nearly 3,952 m in elevation at the summit of Mount Yushan, while the western and northern sides slope gently into coastal plains that extend to the south.

The forest vegetation is very similar to the coastal forests of southeastern mainland China. Common tree species include *Illicium arborescens*, *Ilex cochinchinensis*, *Castanopsis cuspidate*, *Daphniphyllum glaucescens*, *Microtropis japonica*, and *Lasianthus obliquinervis*. The montane forests in the more seasonally variable climate include evergreen tree species such as *Ficus microcarpa*, *Cryptocarya chinensis*, and *Schefflera octophylla*, as well as some deciduous species such as *Bombax malabaricum* and *Albizia procera*.

Fauna on the island is largely similar to the species described in the Taiwan subtropical evergreen forests subsection above, including the lack of large predators, presence of smaller carnivores, large mammals and several of Taiwan's restricted-range bird species. In addition, two giant flying squirrels – the red and white giant flying squirrel and the Indian giant flying squirrel – live in sympatry in these forests, while the rare black-faced spoonbill and endemic Styan's bulbul are also easily spotted here.

Although close to 70% of the forests in this ecoregion still remain, only a small area is formally protected. The remaining forest cover estimates also likely include monoculture plantations of non-native species. In the meantime, growing industrialisation and urbanisation are taking a toll on Taiwan's natural forests. Even the Kenting National Park is threatened by anthropogenic activities (Wikramanayake, One Earth, n.d.)

3.1.2 Biodiversity hotspot

Biodiversity hotspots are defined as regions that have at least 1500 endemic plant species and/or with 30% or less of its original natural vegetation remaining (Conservation International, n.d.). They are important areas that are used to establish priorities in conservation.

There presently exist 36 defined hotspots around the world (CEPF, n.d.). The Project components (and in fact the whole island of Taiwan) are not located within any of these hotspots. A hotspot analysis study done by Wu *et al*. (2013) showed that the mountainous regions of Taiwan fulfilled various hotspot criteria from a local conservation perspective, including total species richness, endemic species richness, threatened species richness and other conservation-dependent species richness, as they hold most of Taiwan's avian biodiversity. However, these are not located within the Project footprint or EAAAs.

3.2 Legally protected and internationally recognised areas within 10km of the Project

The following subsections detail legally protected and internationally recognised areas within 10km of the Project.

3.2.1 Legally protected areas

3.2.1.1 Overview

Legally protected areas in Taiwan are categorised into the following:

- Taiwanese Humpback Dolphin Major Wildlife Habitat (MWH) (中華白海豚野生動物重要棲息)[7]
- Important wetlands (重要濕地)[8]
- National parks (國家公園及國家自然公園)[9]
- Major wildlife habitats (野生動物重要棲息環境)[10]
- Wildlife refuges (野生動物保護區)[11]
- Nature reserves (自然保留區)[12]
- Forest reserves (自然保護區)[13]
- Coastal natural protected areas (台灣沿海自然保護區)[14]
- Exclusive fishery rights (專用漁業權)[15]
- Fixed net fishing rights (定置網漁業)[16]
- Artificial reef areas (人工魚礁) [17]
- Protection reefs (保護礁)[18]
- KBAs and IBAs

[7] Formally gazetted with effect from 1 September 2020, as follows: https://gazette.nat.gov.tw/egFront/e_detail.do?metaid=118079

[8] Presently 60 wetlands of which 2 are of international level. List of wetlands: https://wetland-tw.tcd.gov.tw/tw/index.php

[9] Presently 10 sites, as follows: https://conservation.forest.gov.tw/nationalpark

[10] Presently 39 locations, as follows: https://conservation.forest.gov.tw/wildlife_habitats

[11] Presently 21 locations, as follows: https://conservation.forest.gov.tw/protectarea

[12] Presently 22 locations, as follows: https://conservation.forest.gov.tw/reserve

[13] Presently 6 locations, as follows: https://conservation.forest.gov.tw/nature_protect

[14] Split into nature conservation zones and normal conservation zones. It is forbidden to change existing ecological characteristics and natural landscape in nature conservation zones. More information: https://www.cpami.gov.tw/最新消息/業務新訊/18327-「臺灣沿海地區自然環境保護計畫」專區.html

[15] Zones with designated exclusive rights to be used by fishery associations, who will need to be compensated for use of these areas. More information: https://www.fa.gov.tw/view.php?theme=web_structure&id=108

[16] Zones which are licensed to individual fishermen. Licensees will have to be compensated if their respectively fishing area is affected. More information: http://140.121.160.124/fi/images/5_075.pdf

[17] Areas established to protect and conserve fisheries resources. Presently 62 protection reefs: https://www.fa.gov.tw/view.php?theme=Info_on_AF_and_PF&subtheme=&id=2

[18] Man-made structures dropped into the seabed to help recruit and encourage coral reef and fishery resources. Presently 89 artificial reef zones: https://www.fa.gov.tw/view.php?theme=Info_on_AF_and_PF&subtheme=&id=1

The Project footprint has avoided most of the above legally protected areas. However, the export cable (ie connecting the WTG area to the landing point) of the Project is located within the Taiwanese Humpback Dolphin MWH (ie for a length of approximately 4km). The Project's export cables, landing point and Changkong grid connection point are not within the Dadu Estuary Important Wetland / Dadu Rivermouth Wildlife Refuge, though it is noted that they are within 10km in proximity. This is summarised in Table 3.1 below, and the locations of each are shown in Figure 3.1. Further details of each legally protected area are also provided in the following subsections.

Table 3.1: Legally protected areas within 10km of Project

Site name	Distance from the Project	Description	Competent authority	Relevant regulations and agencies	Exclusion for offshore wind farm development
Taiwanese Humpback Dolphin Major Wildlife Habitat (MWH)	0km (overlaps with export cables)	● Taiwanese humpback dolphin is listed as Critically Endangered internationally[19] and Endangered nationally[20] ● MWH has been formally gazetted with effect from 1 September 2020[7] ● Covers approximately 695km^2 north and south of the Project footprint	● Ocean Affairs Council (OAC)	**Regulation:** ● Wildlife Conservation Act **Relevant agencies:** ● Local governments ● Fisheries Agency, Council of Agriculture	● WTGs are prohibited within the MWH, although cables are allowed ● Underwater noise from offshore piling, most notably for WTG foundations, is recognised to affect the dolphins ● Due to the potential underwater noise propagation, the WTG area should be at a minimum 2km away – being more than 20km away is ideal
Dadu Estuary Important Wetland / Dadu Rivermouth Wildlife Refuge	Approximately 4km north of the export cables of the Project	● Covers approximately 27km^2, largest waterbird habitat in Central Taiwan ● Over 200 bird species, including 22 protected species, have been recorded (Ramsar Citizen, 2019) ● Designated as Wetland of National Importance, Wildlife Refuge, Major Wildlife Habitat, IBA and KBA	● Construction and Planning Agency, Ministry of the Interior	**Regulation:** ● Wetland Conservation Act ● Wildlife Conservation Act **Relevant agencies:** ● Local governments ● Forestry Bureau, Council of Agriculture	● Wetlands are riverine, coastal or terrestrial. The offshore WTG will not be located within these areas directly. ● The presence (and its level of designation – eg international, national) of wetland sites is an indicator of the likely abundance and protected status of bird species presented ● There is no straightforward general definition on appropriate distance or placement for windfarms relative to wetlands. It is broadly taken that the further the distance the better, as this reduces likely impact

Source: IBAT, 2022

[19] IUCN Red list. https://www.iucnredlist.org/species/133710/122515524
[20] Ocean Affairs Council Notice, Schedule of Protected Marine Species (June 2020), https://gazette.nat.gov.tw/egFront/e_detail.do?metaid=115080

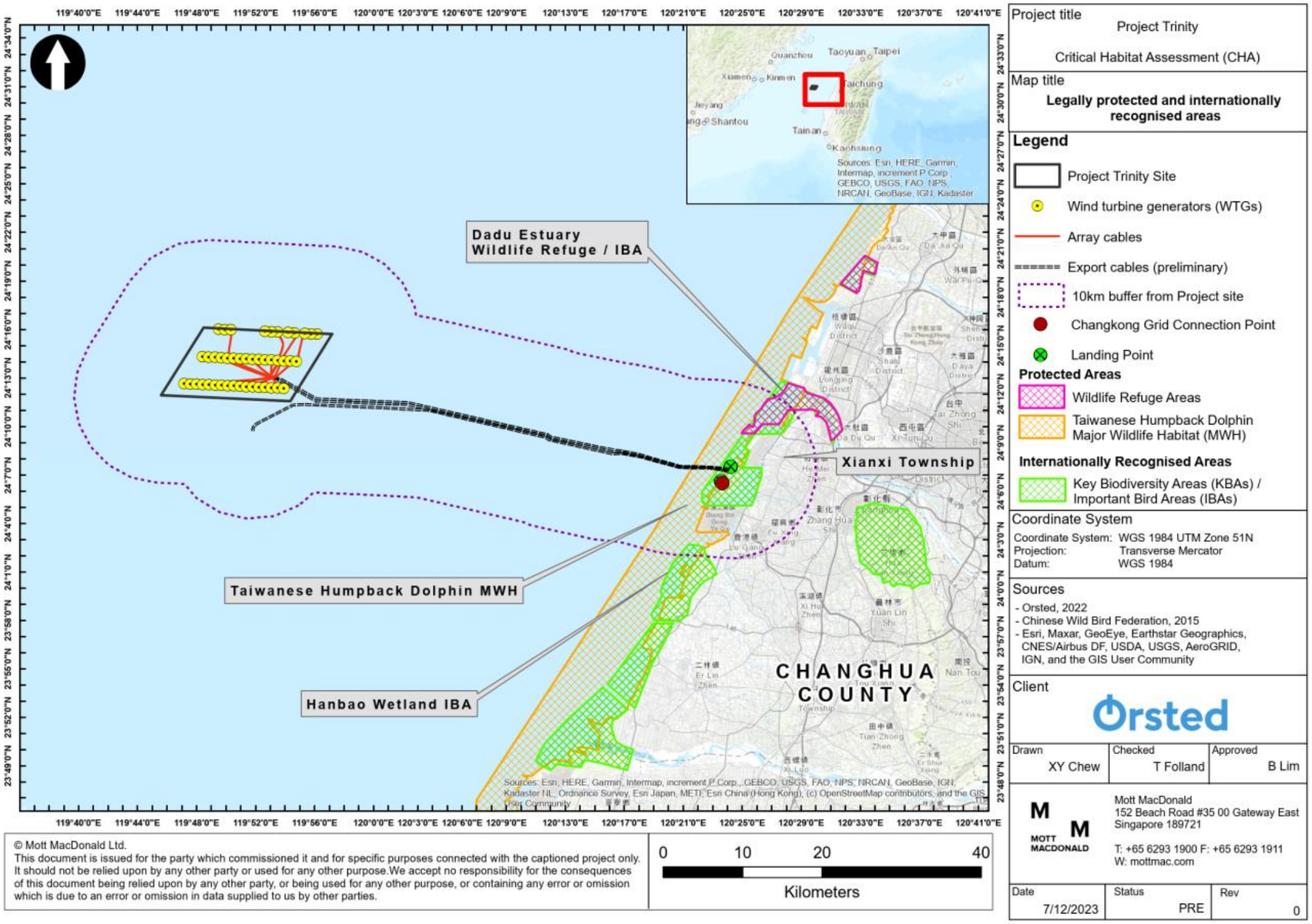
3.2.1.2 Taiwanese Humpback Dolphin Major Wildlife Habitat (MWH)

The Taiwanese Humpback Dolphin MWH was first proposed on 21 April 2014 and was formally gazetted by the Ocean Affairs Council with effect from 1 September 2020 (The Executive Yuan Gazette Online, 2020). It was identified that Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanensis*), an Endangered species (ie under category I) in Taiwan and considered Critically Endangered under the IUCN Red List of Threatened Species, exists in the Eastern Taiwan Strait (ETS) (Reeves *et al.*, 2008) . The Taiwanese Humpback Dolphin inhabits a narrow strip of waters of the western coast of Taiwan, between Miaoli County and Jiangjun fishing port of southern Taiwan. The species distribution comprises shallow coastal waters at depths up to 30m, between 2 and 2.5km from the coast (Wang *et al*., 2017). The range of the Taiwanese Humpback Dolphin is situated outside of the Project's wind farm array but overlaps the export cable route as well as potential construction and operational vessel routes.

3.2.1.3 Dadu Estuary Important Wetland / Dadu Rivermouth Wildlife Refuge (大肚溪口野生動物保護區)

The Dadu Estuary Important Wetland / Dadu Rivermouth Wildlife Refuge is located between Taichung City and Changhua County. The location is designated as a Wetland of National Importance, Major Wildlife Habitat, IBA and KBA. It has an area of around 27km^2 and is the largest waterbird habitat in central Taiwan. A variety of habitats are present, including marine waters, intertidal zone, river, swamp, sand bar, reclaimed land, agricultural land and fish farms. The rich abundance of benthic organisms in diverse habitats attracts thousands of migratory birds in winter for roosting. More than 200 bird species comprising 70% water birds and 30% terrestrial birds have been recorded, including 22 protected species. The area is designated as an IBA and KBA due to the presence of significant populations of globally threatened species (Black-faced spoonbill and Saunders' gull) and significant congregations of Saunders' Gull (Ramsar Citizen, 2019).

Figure 3.1: Legally protected and internationally recognised areas



Source: Mott MacDonald, 2023

3.2.2 Internationally recognised areas

The IFC GN6 exclusively defines internationally recognised areas as UNESCO Natural and Mixed WHS, UNESCO Man and the Biosphere (MAB) Reserves, Key Biodiversity Areas (KBAs), and wetlands designated under the Convention on Wetlands of International Importance ie the Ramsar Convention (IFC, 2019).

KBAs are defined as sites that contribute significantly to the global persistence of biodiversity, in terrestrial, freshwater and marine ecosystems that meet one or more of 11 KBA criteria set out by IUCN (IUCN, 2016). KBAs include IBAs, Important Plant Areas (IPAs) and Alliance for Zero Extinction (AZE) sites.

The Project footprint has avoided most of the above internationally recognised areas. However, the Project is located within 10km of the Dadu Rivermouth Wildlife Refuge / IBA, as well as the Hanbao Wetlands IBA. This is summarised in Table 3.2 below, and the locations of each are shown in Figure 3.1. Further details of each legally protected area are also provided in the following subsections.

Table 3.2: Internationally recognised areas within 10km of Project

Site name	Designation	Distance from the Project	Significant Biodiversity Values
Dadu Rivermouth Wildlife Refuge / IBA	Wetland of National Importance, Wildlife Refuge, Major Wildlife Habitat, IBA and KBA	Approximately 4km north of the export cables of the Project	● Covers approximately 27km^2, largest waterbird habitat in Central Taiwan ● Over 200 bird species, including 22 protected species, have been recorded (Ramsar Citizen, 2019) ● Designated as Wetland of National Importance, Wildlife Refuge, Major Wildlife Habitat, IBA and KBA
Hanbao Wetlands IBA	IBA / KBA	Approximately 9km south of the export cables of the Project	● Covers approximately 24km^2, serves as gathering spot for migratory birds ● Many different types of habitats creating excellent bird roosting environments (Key Biodiversity Areas, 2023)

Source: Mott MacDonald, 2022

3.2.2.1 Dadu Rivermouth Wildlife Refuge / IBA (大肚溪口野生動物保護區)

The Dadu Rivermouth Wildlife Refuge is located between Taichung City and Changhua County of Taiwan. The location is designated as a Wetland of National Importance, Major Wildlife Habitat, IBA and KBA. It has an area of around 27km^2 and is the largest waterbird habitat in central Taiwan. A variety of habitats are present, including marine waters, intertidal zone, river, swamp, sand bar, reclaimed land, agricultural land and fish farms. The rich abundance of benthic organisms in diverse habitats attracts thousands of migratory birds in winter for roosting. More than 200 bird species comprised of 70% water birds and 30% terrestrial birds have been recorded, including 22 protected species (Ramsar Citizen, 2019). The area is designated as an

IBA and KBA due to the presence of significant populations of globally threatened species (Black-faced Spoonbill and Saunders's Gull) and significant congregations of Saunders's Gull.

This has also been covered in Section 3.2.1.3 above as Dadu Estuary Important Wetland / Dadu Rivermouth Wildlife Refuge.

3.2.2.2 Hanbao Wetlands IBA (漢寶濕地)

The Hanbao Wetlands falls under the administration of Fangyuan Village, Changhua County, and has a total area of approximately 24km^2. This site qualifies as a Key Biodiversity Area of international significance that meets the thresholds for at least one criterion described in the Global Standard for the Identification of KBAs (IUCN, 2016). It is bounded by the edge of the Taiwan Strait to the north-west, the Dadu River Estuary to the north, and the Zhuoshui River Estuary to the south, so this site sits at the middle of the sensitive coastal wetlands on Taiwan's west coast. It is also a gathering spot for migrating birds on their way north and south. The Hanbao wetlands hosts a myriad of habitats creating excellent bird roosting environments including model aquaculture farms, fish ponds, beaches, marshes, paddy fields, dry land, grassy scrub, wind-protection forests, rivers, and the sea. Economic activities in the Hanbao area consist mostly of oyster culture, fisheries, and agriculture; within the levee, the lands are under low-level development, including numerous fishponds and paddy fields (Key Biodiversity Areas, 2023). This area has been identified as an IBA based on the presence of significant populations of Black-faced Spoonbill *Platalea minor* (IUCN Endangered) and significant congregations of Saunders's gull *Saundersilarus saundersi* (IUCN Vulnerable and National Red List Critically Endangered).

3.3 Natural and modified habitats

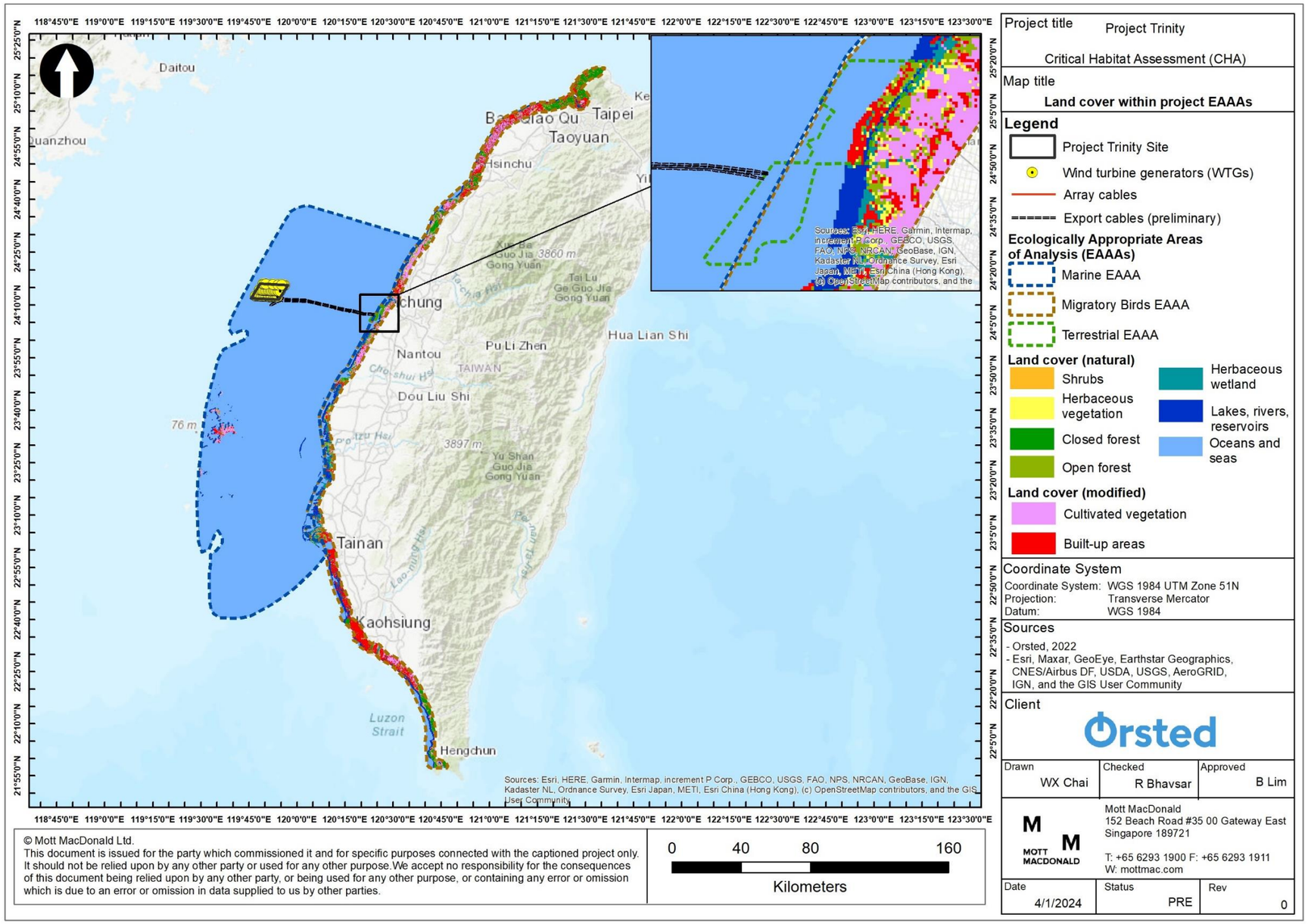
The habitats present in the EAAAs are described in the following sections using Copernicus Global Land Service (CGLS, 2019) and consolidated via ground truthing, literature and survey data from the Greater Changhua NW Offshore Windfarm EIA. Habitats found within the EAAAs have also been further categorised into modified or natural habitat as per IFC PS6 where:

- Modified habitats are areas that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition. Modified habitats may include areas managed for agriculture, forest plantations, reclaimed coastal zones and reclaimed wetlands.
- Natural habitats are areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.

Figure 3.2 below shows the delineation of the natural and modified habitats within the three EAAAs. As based on the land cover types in the Copernicus Global Land Service (100m global resolution), natural habitats include shrubs, herbaceous vegetation, closed forest, open forest, herbaceous wetland, lakes, rivers, reservoirs, oceans, and seas. Modified habitats include cultivated vegetation and built-up areas.

Table 3.3 provides a quantified breakdown of land cover area within each EAAA, while further descriptions of the dominant habitats are presented in Sections 3.3.1 to 3.3.3. It is noted that the entire terrestrial and coastal EAAA has not been ground truthed.

Figure 3.2: Land cover map within the EAAAs



Source: Mott MacDonald, 2023

Table 3.3: Breakdown of land cover area within each EAAA

Land cover type	Coverage within Marine EAAA (km^2)	Percentage coverage of Marine EAAA (%)	Coverage within Migratory Birds EAAA (km^2)	Percentage coverage of Migratory Birds EAAA (%)	Coverage within Terrestrial EAAA (km^2)	Percentage coverage of Terrestrial EAAA (%)
Natural habitat						
Shrubs	0.54	0.0	5.46	0.2	0.03	0.2
Herbaceous vegetation	1.73	0.0	26.12	1.1	0.17	1.1
Closed forest	2.54	0.0	258.4	10.9	0	0.0
Open forest	12.82	0.1	248.83	10.5	0.61	3.7
Herbaceous wetland	12.15	0.1	153.30	6.5	0.20	1.3
Lakes, rivers, reservoirs	77.56	0.6	320.95	13.6	0.41	2.5
Oceans and seas	13,215.22	98.8	448.24	19.0	13.92	82.5
Modified habitat						
Cultivated vegetation	34.3	0.3	358.56	15.1	0.04	0.2
Built-up areas	18.97	0.1	543.38	23.0	1.44	8.4

Source: CGLS, 2019

3.3.1 Habitats within the terrestrial EAAA

The terrestrial flora and fauna EAAA is fully located in Changhua Binhai industrial park, which is a reclaimed land separated from Xianxi Township by Qingan water channel and Xianxi water channel. According to CGLS (2019), the EAAA consists of 90.4% natural habitat and 9.6% modified habitat. The dominant natural habitats within this area include oceans and seas (82.5% of EAAA) and open forest (3.7%), while dominant modified habitat is built-up areas (8.4%). As the terrestrial flora and fauna EAAA is within a reclaimed industrial land, this area is considered as modified habitat overall as per IFC PS6 categorisation (Table 3.3).

3.3.2 Habitats within the migratory birds EAAA

The migratory bird EAAA is located within the western coast of Taiwan. According to CGLS (2019), the EAAA consists of 61.9% natural habitat and 38.1% modified habitat. The dominant natural habitats within this area include oceans and seas (19.0% of EAAA), lakes, rivers and reservoirs (13.6%) and closed forest (10.9%), while dominant modified habitat is built-up areas (23.0%). The migratory bird EAAA is occupied by both natural water habitats and modified built areas (Table 3.3).

3.3.3 Habitats within the marine EAAA

The marine EAAA is situated in the south-western marine waters of Taiwan. According to CGLS (2019), the EAAA consists of 99.6% natural habitat and 0.4% modified habitat. The dominant natural habitat within this area is oceans and seas (98.8% of EAAA), while dominant modified habitat is cultivated vegetation (0.3%) (Table 3.3).

3.4 Flora and fauna within the EAAAs

Species that are likely to be regularly occurring within the Project's EAAA were identified from the sources listed in Section 2.2.2, including data taken from the EIA report baseline[21]. Further details regarding the locations and abundance of species encountered can be found in Section 6.3 of the EIA baseline chapter (Unitech, 2018a). The section below highlights the number of species identified through primary and secondary data collection in the EAAA and their IUCN conservation status.

3.4.1 Terrestrial flora and fauna

The EIA report baseline identified approximately up to 48 species of terrestrial birds, 22 species of terrestrial mammals (including 9 species of bats), three species of reptiles, three species of amphibians, ten species of butterflies, five species of dragonflies and 112 species of plants. In addition to the Project's baseline surveys it was considered that a total of 347 species of terrestrial flora and fauna were likely to be present within the EAAA. Terrestrial flora and fauna within the EAAA are assigned to the following IUCN conservation status categories:

- Critically Endangered: 1
- Endangered: 4
- Vulnerable: 7
- Near Threatened: 6
- Least Concern: 325
- Data Deficient: 4

3.4.2 Migratory birds (including seabirds at sea)

A total of 58 species were recorded during baseline surveys for the EIA and EIS report including two globally EN species ie Far Eastern Curlew (*Calidris tenuirostris,* also nationally EN) and Black-faced Spoonbill (*Platalea minor*). Given the wide-ranging behaviour of migratory birds and seabirds at sea, it was considered that 18 internationally threatened (ie CR, EN and VU) species and a total of 232 species were likely to be present within the migratory bird EAAA. Migratory birds and seabirds at sea within the EAAA are assigned to the following IUCN conservation status categories:

- Critically Endangered: 2
- Endangered: 4
- Vulnerable: 12
- Near Threatened: 15
- Least Concern: 199

3.4.3 Marine fauna and flora

A total of 129 species were recorded during baseline surveys for the EIA report. During the Project's marine mammal surveys conducted between April 2016 and March 2017, five groups of the globally Near Threatened Indo-Pacific Bottlenose Dolphin (*Tursiops aduncus*), consisting of three to six individuals in each group were recorded within the Project boundary. Given the relatively broad seascape and the wide-ranging behaviour of many marine species it was considered that 3299 species of marine fauna and flora were likely to be present within the EAAA. Marine flora and fauna within the EAAA are assigned to the following IUCN conservation status categories:

[21] Note that numbers from the EIA baseline is based on the survey season with the highest number and does not include numbers from the Lunwei District Supplementary Survey and EIA addendum.

- Critically Endangered: 20
- Endangered: 63
- Vulnerable: 178
- Near Threatened: 175
- Least Concern: 2544
- Data Deficient: 249

4 Critical habitat determination

4.1 Overview

Species were screened against the relevant criteria in Section 2.1.1 to determine if they are considered to be significant biodiversity values that may cause critical habitat requirements to be applied. Species that met the criteria were further assessed in this chapter against the thresholds specified in Section 2.1.1. The results of the assessment against C4 and C5 are also presented in this chapter. A summary of biodiversity values that meet critical habitat thresholds is presented in Section 4.7. The results of the full critical habitat species assessment is presented in Appendix A, Table A.1 to Table C.3.

4.2 Criterion 1: Critically endangered and/or endangered species

A total of 331 species were found to be listed as Critically Endangered, Endangered on the IUCN Red List or National Red List, or Vulnerable on the IUCN Red List that occupies more than 0.5% of global population within the EAAA. This consists of 23 plants, 1 fungi, four crabs, 103 marine invertebrates, one hagfish, 139 fish, nine amphibians, eight reptiles, 29 birds, seven terrestrial mammals, and seven marine mammals. Of these, six species (one marine mammal, four birds, and one fish) trigger Critical Habitat Criterion 1. These species are presented in Table 4.1 below.

Table 4.1: Criterion 1 Assessment Outcomes for Significant Biodiversity Values in the EAAAs

Scientific Name	Common Name	IUCN Status	Relevant EAAA
Sousa chinensis ssp. Taiwanensis	Taiwanese Humpback Dolphin	CR	Marine EAAA
Rhynchobatus immaculatus	Taiwanese Wedgefish	CR	Marine EAAA
Platalea minor	Black-faced Spoonbill	EN	Migratory bird EAAA
Saundersilarus saundersi	Saunders's Gull	VU	Migratory bird EAAA
Ciconia boyciana	Oriental Stork	EN	Migratory bird EAAA
Thalasseus bernsteini	Chinese Crested Tern	CR	Migratory bird EAAA

Source: Mott MacDonald, 2024

4.2.1 Marine fauna and flora

It is determined that critical habitat is triggered under C1(a) for two marine species (Table 4.1). The first species is the Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanesis*) which is Critically Endangered and has over 0.5% of its global population within the EAAA. Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanesis*) is listed as Critically Endangered under the IUCN Red List and was recognised by Taiwan's Coast Guard Administration, Executive Yuan via public notice No. 10800000721, dated 9 January 2019, as a Category I Endangered species (ie the most critical species). The population of the subspecies is considered to be 37–44 mature individuals (IUCN, 2022) and its known range is largely within the EAAA. The population in the EAAA therefore exceeds the threshold for C1(a) in respect of the Taiwanese Humpback Dolphin.

The second species is the Taiwanese Wedgefish (*Rhynchobatus immaculatus*) which is also Critically Endangered. It is a poorly known shark-like ray with a restricted distribution around northern Taiwan in the Northwest Pacific. There is a high level of fisheries resource use and increasing fishing pressure across the range of wedgefishes, and as a result, targeted and

incidental fishing effort is placing significant pressure on the wedgefish species in the Indo-West Pacific. While there is no specific population data available, its known range has a significant 15% overlap with the marine EAAA. Given these conditions, the Taiwanese wedgefish is likely to trigger C1(a).

4.2.2 Migratory birds (including seabirds at sea)

The coastal plain of Taiwan is an important area for migratory wetland birds. The wetland areas that support these species are almost entirely located within the coastal plain. Taking into account the mobility of migratory wetland birds, these wetlands are considered to be interconnected. Due to this connectivity, the EAAA encompasses the entire western coast of Taiwan including the IBAs and connectivity between them.

A list of migratory and seabird species with ranges that overlap with the EAAA was produced using IBAT data. As the National Red List of Taiwan follows global IUCN assessment criteria, the National Red List criteria in addition to the IUCN Red List was applied to the species and used for assessment against C1 thresholds. As a precautionary approach, where threat status between National Red List and the IUCN Red List differs for a species, a precautionary approach was undertaken and the higher threat status was used. Among the nationally and/or globally Critically Endangered and Endangered species likely to be present within the EAAA, two bird species, ie Saunders's Gull (*Saundersilarus saundersi)* and Black-faced Spoonbill *(Platalea minor),* have over 0.5% overlap between the species range and the EAAA. A third species, ie Oriental Stork (*Ciconia boyciana*) has had significant numbers of this species recorded within the EAAA in 2023 (Table 4.2).

Saunders's Gull is listed as Vulnerable under the IUCN Red List and Critically Endangered under the National Red List. It is also listed in Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), which means it is a threatened migratory species. This species is found in Taiwan, China, Hong Kong, Macao, Korea, Japan, Vietnam and Russia. Its natural habitats are saltmarsh habitats and estuarine tidal flats (IUCN, 2023a). However, this species was not recorded during the baseline surveys of the EIA and EIS report.

Black-faced Spoonbill is listed as Endangered under the IUCN Red List, and Near Threatened under the National Red List. It is also listed in Appendix I of the CMS. This species currently breeds only on a few small rocky islands off the west coast of North Korea, with four wintering sites at Macau, Hong Kong, Taiwan and Vietnam, as well as other places where they have been observed in migration. In the 2023 global census, the black-faced spoonbill population was recorded at 6603 individuals, of which 4228 were recorded in Taiwan, accounting for 64% of the population worldwide. 60 individuals of Black-faced Spoonbill were recorded during the baseline surveys of the EIA report. This exceeds the threshold for Criterion 1a (ie. $\geqslant$0.5% of the global population AND $\geqslant$5 reproductive units of a CR or EN species), where 0.5% of the global population is equivalent to approximately 31 individuals.

Oriental stork is listed as Endangered under both the IUCN Red List and National Red List. It is also listed in Appendix I of the CMS. It is an IBA trigger species (A1) for Tacheng Wetlands IBA (also known as Zhuoshui River Estuary Wetland IBA), whereby the site is known or thought regularly to hold significant numbers of Oriental Storks. In recent years, the Oriental Stork has been recorded regularly, numbering approximately 1-2 individuals at the Tacheng Wetland IBA. According to eBird, there was a sighting of 13 individuals at the Zhuoshui River estuary (within the migratory bird EAAA) in 2023. Considering that the number of mature individuals globally are estimated to be 1000-2499 individuals, it is likely to result in the migratory bird EAAA supporting a globally important concentration of this species. Thus, this meets critical habitat thresholds under C1(a) (ie 0.5% of the global population) and C1(c) (ie areas containing important concentrations of a nationally or regionally listed CR/EN species).

The Chinese Crested Tern is listed as Critically Endangered under the IUCN Red List and National Red List. The global population of the Chinese Crested Tern is approximately 30 to 49 mature individuals. The IUCN does not present the Chinese crested tern global range. However, according to eBird, the species has been spotted several times in 2023 just south of Chiayi county (within the migratory bird EAAA), numbering between 1-2 individuals each time (eBird, 2024b). As this already constitutes >1% of the global population given its small population size (ie approximately 30 to 49 mature individuals), this species meets critical habitat thresholds under C1(a) and C1(c) (ie. 0.5% of the global population and areas containing important concentrations of a nationally or regionally listed CR/EN species).

The Black-faced Spoonbill, Saunders's Gull and Oriental Stork are designating species for 16 IBAs within the migratory birds (including seabirds at sea) EAAA, including:

- Kuantu (TW003) [a]
- Hsinchu City Coastal Area (TW009) [a]
- Gaomei Wetland (TW011) [a]
- Dadu River Estuary Wetland (TW013) [a, b]
- Hanbao Wetlands (TW014) [a]
- Tacheng Wetlands (TW016) [a, b]
- Aogu Wetlands (TW021) [a, b]
- Pohtzi River Estuary (TW022) [a]
- Budai Wetland (TW023) [a, b]
- Beimen (TW025) [a, b]
- Chingkunshen (TW026) [a, b]
- Chiku (TW027) [a, b]
- Sitsao Wildlife Refuge (TW029) [a, b]
- Yungan (TW030) [a, b]
- Kaoping River (TW037) [a]
- Qieding Wetland (TW054) [a, b]

[a] Sites which are partially designated as IBAs due to the presence of significant numbers of Saunders's Gull and/or Black-faced Spoonbill and/or Oriental Stork

[b] Sites which are partially designated as IBAs as they are known or thought to hold, on a regular basis, >1% of the biogeographic population of Saunders's Gull and/or Black-faced Spoonbill and/or Oriental Stork

The Chinese Crested Tern is not a designating species for any IBAs within the migratory birds (including seabirds at sea) EAAA.

Therefore, critical habitat is triggered within the IBAs for the following species within the migratory bird EAAA (Figure 2.3) under the following criteria:

- Black-faced Spoonbill: C1(a)
- Saunders's Gull: C1(c)
- Oriental Stork: C1(a) and C1(c)
- Chinese Crested Tern: C1(a) and C1(c)

Table 4.2: C1 determination – Migratory birds (including seabirds at sea)

Scientific name	Common name	National Red List	Percentage of global range overlap with the migratory bird EAAA
Saundersilarus saundersi	Saunders's Gull	Critically Endangered	0.70%

Scientific name	Common name	National Red List	Percentage of global range overlap with the migratory bird EAAA
		(Note: IUCN global status – Vulnerable)	
Platalea minor	Black-faced Spoonbill	Near Threatened (Note: IUCN global status – Endangered)	0.84%
Ciconia boyciana	Oriental Stork	Endangered (Note: IUCN global status – Endangered)	0.05%
Thalasseus bernsteini	Chinese Crested Tern	Critically Endangered (Note: IUCN global status – Critically Endangered)	<0.01%

Source: Mott MacDonald, 2024

4.2.3 Terrestrial fauna and flora

A total of 27 species are listed as CR or EN or VU by National Red List and IUCN Red List. This would potentially trigger C1 as the threshold is that the terrestrial EAAA contains important concentrations of a nationally listed CR or EN or VU species. However, there are no exceedance of global population of more than 0.5%, so it is unlikely that the EAAA presents a large enough area of suitable habitat to exceed the threshold for regularly holding >0.5% of the global population AND >5% reproductive units of a CR or EN species. Thus, the terrestrial species, which are either widespread or upland habitat specialists, do not exceed the criterion threshold (Refer to Appendix A, Table A.1 for the full assessment).

4.3 Criterion 2: Endemic and/or range-restricted species

Spatial information from IBAT and the IUCN was used to estimate the total geographical range of species. A total of 37 marine species and 11 terrestrial species (total 48 species) were assessed against the relevant C2 thresholds to determine if they may cause critical habitat requirements to be applied. The majority of the species were screened out based on the extent of occurrence (EOO) or area of occurrence (AOO) which covers the whole or the majority of Taiwan's main island for terrestrial species and is not confined within the coastal waters of Taiwan for marine species (Refer to Appendix B, Table B.2 for the full assessment). Of these, three species (one marine mammal and two fish) trigger Critical Habitat Criterion 2. These species are presented in Table 4.3 below.

Table 4.3: Criterion 2 Assessment Outcomes for Significant Biodiversity Values in the EAAAs

Scientific Name	Common Name	IUCN Status	Relevant EAAA	Justification for Critical Habitat Determination (EOO/ AOO)
Sousa chinensis ssp. taiwanesis	Taiwanese Humpback Dolphin	CR	Marine EAAA	750km^2
Acanthopagrus taiwanensis	Taiwan Picnic Seabream	DD	Marine EAAA	40,288km^2
Rhynchobatus immaculatus	Taiwanese Wedgefish	CR	Marine EAAA	7839km^2

Source: Mott MacDonald, 2024

4.3.1 Marine fauna and flora

Using the species distribution information from IBAT, geographical ranges of two marine fauna species (including one cetacean and one fish) are found to be within the threshold of 100,000km^2 that defines a range-restricted species. The EAAA is considered to regularly hold ⩾10% of the global population size and ⩾10 reproductive units for each of the listed species.

As mentioned in Section 4.2.1, Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanesis*) is IUCN Critically Endangered and listed as a Category I Endangered species. This subspecies is only known from the coastal waters of western Taiwan and its known range is largely within the EAAA (IUCN, 2022).

The marine fish, ie Taiwan Picnic Seabream (*Acanthopagrus taiwanensis*), is listed as Data Deficient in the IUCN Red List. It is a demersal fish (Froese & Pauly, 2019) while there is no information on the depth range of the species. The known geographic ranges are restricted to the Taiwan waters and the whole EAAA overlaps with their geographic ranges. Taiwan Picnic Seabream was not collected during the EIA baseline surveys, however it was recorded in the Greater Changhua SE EIA.

Another marine fish, ie Taiwanese Wedgefish (*Rhynchobatus immaculatus*), is listed as Critically Endangered in the IUCN Red List. It is a poorly known shark-like ray with a restricted distribution around northern Taiwan in the Northwest Pacific. There is a high level of fisheries resource use and increasing fishing pressure across the range of wedgefishes, and as a result, targeted and incidental fishing effort is placing significant pressure on the wedgefish species in the Indo-West Pacific. While there is no specific population data available, its known range has a significant 15% overlap with the marine EAAA.

Critical habitat is therefore triggered under C2 for the AOO of the species listed above (Table 4.3.)

4.3.2 Terrestrial fauna and flora

A total of 14 species of terrestrial fauna and flora species likely to be present within the EAAA that are considered to be ‘range-restricted’, in accordance with the definition presented in IFC PS6 (ie have an EOO <50,000km^2). All species identified are largely confined to the island of Taiwan which has an area of approximately 36,000km^2. The EAAA for terrestrial flora and fauna (shown in Figure 2.2) is 16.5km^2 and largely modified habitat (industrial park). Therefore, it is unlikely that the EAAA presents a large enough area of suitable habitat for the species listed below to exceed the threshold for regularly holding ⩾10% of the global population size AND ⩾ 10 reproductive units of a species. No terrestrial species trigger critical habitat under C2.

4.4 Criterion 3: Migratory and/or congregatory species

A total of 398 species in the EAAAs were screened in as having the potential to qualify as critical habitat triggers under Criterion 3 as they are migratory or congregatory species. The screened in species includes 236 birds, 129 marine fish species, two shark species, five insects, 17 crabs, one marine invertebrate, four marine mammals (cetaceans), and four marine turtles. None of the EAAAs are known to sustain 1% of the global population for the majority of the species, except for three species of birds that caused critical habitat requirements to be applied (Table 4.4) (Refer to Appendix C, Table C.3 for the full assessment).

Table 4.4: Criterion 3 Assessment Outcomes for Significant Biodiversity Values in the EAAAs

Scientific Name	Common Name	IUCN Status	Relevant EAAA	Justification for Critical Habitat Determination
Platalea minor	Black-faced Spoonbill	Endangered	Migratory bird EAAA	64% global population are found in Taiwan[22] of which 0.84% of global population are found within the EAAA. The Black-faced Spoonbill is a trigger species for 11 IBAs within the EAAA. It is therefore likely that more than 1% of the population occurs within the EAAA.
Saundersilarus saundersi	Saunders's Gull	Vulnerable	Migratory bird EAAA	The population estimate of Saunders's Gull in Taiwan is 700 individuals (Cao, Barter, & Wang, 2008), whereas the global population is 14,400 birds. The Saunders's Gull is a trigger species for 8 IBAs within the EAAA. It is therefore likely that more than 1% of the population occurs within the EAAA
Charadrius alexandrinus	Kentish Plover	Least Concern	Migratory bird EAAA	The Kentish Plover is an IBA qualifying species for multiple IBAs within the migratory bird EAAA. This includes the Pohtzi River Estuary IBA, Hsinchu City Coastal Area IBA, Kaomei Wetlands IBA, Dadu Rivermouth Wildlife Refuge IBA, Hanbao Wetlands IBA, Tacheng Wetlands IBA, Aogu Wetlands IBA, Budai Wetlands IBA, Chiku IBA, Sitsao Wildlife Refuge IBA, Yungan IBA and Qieding Wetland IBA. In addition, the Kentish Plover was observed during bird surveys conducted to inform the EIA. In 2014, 5752 Kentish Plovers were observed in Hanbao Wetlands and 1520 Kentish Plovers were observed in Dadu Rivermouth Wildlife Refuge (also known as Dadu River Estuary Wetland). Considering that the global poplulation of Kentish Plovers is 100,000-499,999 mature individuals, it is likely that >1% of global population of Kentish Plovers could be present within this area. Therefore, this species is triggered under C3.
Ciconia boyciana	Oriental Stork	Endangered	Migratory bird EAAA	According to eBird, there was a sighting of 13 individuals at the Zhuoshui River estuary (within the migratory bird EAAA) in 2023. Considering that the number of mature individuals globally are estimated to be 1000-2499 individuals, it is likely that >1% of the global population of oriental storks could be present within this area. This species is therefore triggered under C3.
Thalasseus bernsteini	Chinese Crested Tern	Critically Endangered	Migratory bird EAAA	There is no overlap between the Chinese Crested tern global range with the migratory bird EAAA. However, according to eBird, the species has been spotted several times in 2023 just south of Chiayi county (within the migratory

[22] 2023 International Black-Faced Spoonbill Census

Scientific Name	Common Name	IUCN Status	Relevant EAAA	Justification for Critical Habitat Determination
				bird EAAA), numbering between 1-2 individuals each time. As this already constitutes >1% of the global population (30-49 individuals), this species triggers critical habitat under C3.

Source: Mott MacDonald, 2024

4.4.1 Marine fauna and flora

A total of 125 marine fishes, two shark species, 17 crabs, one marine invertebrate, three marine mammals (cetaceans), and four marine turtles are likely to be present in the EAAA and considered to be migratory. Using IBAT spatial data, none of the species listed are found to have at least 1% of their global population within the EAAA at certain stages of their lifecycle.

4.4.2 Migratory birds (including seabirds at sea)

Taking a precautionary approach using spatial data (IBAT, 2022), the percentage overlaps of the global ranges of bird species identified within the EAAA and the EAAA were calculated as follows:

- Black-faced Spoonbill: 0.84%
- Saunders's Gull: 0.70%
- Kentish Plover: 0.01%
- Oriental Stork: 0.05%
- Chinese Crested Tern: <0.01% (Table 4.4).

The black-faced spoonbill is listed as Endangered under the IUCN Red List and Near Threatened under the National Red List. It is also listed in Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), indicating that it is a threatened migratory species. This species is found in eastern Asia including Taiwan. It feeds on intertidal mudflats and rests at a variety of sites (such as trees, man-made structures, shallow water) around the feeding areas (IUCN, 2023b). According to the 2023 International Black-Faced Spoonbill Census, the global population was recorded at 6603 individuals. This species was recorded along the coast during the baseline surveys of the EIA report.

Saunders's Gull is listed as Vulnerable under the IUCN Red List and Critically Endangered under the National Red List. It is also listed in Appendix I of the Convention on the Conservation of Migratory Species of Wild Animals (CMS), which means it is a threatened migratory species. This species is found in Taiwan, China, Hong Kong, Macao, Korea, Japan, Vietnam and Russia. Its natural habitats are saltmarsh habitats and estuarine tidal flats (IUCN, 2023a). Although this species was not recorded during the baseline surveys of the EIA, it would be appropriate to undertake a precautionary approach considering this species' conservation significance.

The Kentish Plover is listed as Least Concern under the IUCN Red List. Although the global range of the Kentish Plover overlaps with the EAAA by only 0.01%, count surveys conducted in qualifying IBAs of the Kentish Plover show that the area is known to sustain significant concentrations of the global population (Table 4.5). Considering that the global population of Kentish Plovers is 100,000-499,999 mature individuals, it is likely that >1% of global population of Kentish Plovers could be present within this area. In addition, this species was recorded along the coast during the baseline surveys of the EIA report.

The Oriental Stork is listed as Endangered under the IUCN Red List. Although the global range of the Oriental Stork overlaps with the EAAA by only 0.05%, in recent years, the Oriental Stork has been recorded regularly, numbering approximately 1-2 individuals at the Tacheng Wetland

IBA. According to eBird, there was a sighting of 13 individuals at the Zhuoshui River estuary (within the migratory bird EAAA) in 2023 (eBird, 2024a). Considering that the number of mature individuals globally are estimated to be 1000-2499 individuals, it is likely that >1% of the global population of oriental storks could be present within this area.

The Chinese Crested Tern is listed as Critically Endangered under the IUCN Red List. There is no overlap between the Chinese Crested tern global range with the migratory bird EAAA. However, according to eBird, the species has been spotted several times in 2023 just south of Chiayi county (within the migratory bird EAAA), numbering between 1-2 individuals each time (eBird, 2024b). As this already constitutes >1% of the global population given its small population number, this species triggers critical habitat under C3.

Table 4.5: Number of Black-faced Spoonbill, Saunders's Gull, Kentish Plovers and Oriental Storks recorded in IBAs within the migratory birds EAAA

IBAs within migratory birds EAAA	Number of Black-faced Spoonbill	Number of Saunders's Gull	Number of Kentish Plovers	Number of Oriental Storks
Watzuwei Nature Reserve	0	0	0	0
Kuantu	5 [a]	0	0	1*
Dapingding and Hsutsuo Harbour	0	0	0	0
Hsinchu City Coastal Area	15 [a]	2*	750 [b]	0
Kaomei Wetlands	17 [a]	100 [a]	2250*	0
Dadu Rivermouth Wildlife Refuge	4 [a]	3 [a, b]	1520[a]	0
Hanbao Wetlands	0	20 [a, b]	5752[b]	0
Tacheng Wetlands	0	40 [a, b]	5071 [b]	2 [a]
Aogu Wetlands	134 [a, b]	3 [a]	2000 [b]	0
Pohtzi River Estuary	0	12 [a]	5182 *	0
Budai Wetlands	121 [a]	10 [a]	120 [b]	0
Beimen	228 [a]	2 [a, b]	0	0
Chingkunshen	174 [a, b]	0	0	0
Chiku	197 [a, b]	0	1850 [b]	0
Sitsao Wildlife Refuge	349 [a, b]	0	20000 [b]	0
Yungan	131 [a, b]	0	204 [b]	0
Kaoping River	18 [a]	0	0	0
Qieding Wetland	285 [a, b]	0	398[b]	0
Fengshan Reservoir	0	0	0	0
Kenting National Park	0	0	0	0

Note: Maximum counts in 2001 – 2014
[a] Sites which are partially designated as IBAs due to the presence of significant numbers of Saunders's Gull and/or Black-faced Spoonbill and/or Oriental Stork.
[b] Sites which are partially designated as IBAs as they are known or thought to hold, on a regular basis, >1% of the biogeographic population of Saunders's Gull and/or Black-faced Spoonbill and/or Oriental Stork.
*Potential IBA trigger species
Source: Important Bird Areas in Taiwan (Second Edition)

4.5 Criterion 4: Highly threatened and/or unique ecosystems

The IUCN Red List of Ecosystems (RLE) categories and criteria are a global standard for how the status of ecosystems is assessed. It is applicable at local, national, regional and global levels, and determines whether ecosystems are Vulnerable, Endangered, or Critically Endangered. This is measured by assessing losses in area, degradation or other major changes

such as land conversion. There are no IUCN Red List assessed ecosystems in Taiwan[23] and no national level assessments have been conducted using IUCN criteria. The thresholds for C4 cannot therefore be applied to the EAAAs.

4.6 Criterion 5: Key evolutionary processes

Critical habitat can be triggered through the qualitative identification of areas associated with key evolutionary processes. Various project documents and published literature reviewed as part of the assessment presented above highlighted that the marine flora and fauna EAAA (Section 3) is part of the Kuroshio Triangle, the coral ecosystems influenced by an ocean current from the tropical Philippines, subtropical Taiwan and Okinawa, and the high latitudinal coral communities off Shikoku Island, Japan (Chen & Shashank, 2009). Taiwan is a steppingstone situated in the midway corridor of the Kuroshio Triangle and provides connectivity between distant coral ecosystems. There is limited evidence as to the overall importance of Taiwanese reefs in terms of gene flow and climate change adaptation and further research is needed (Chen & Shashank, 2009). On a precautionary approach it is considered that the marine flora and fauna EAAA triggers the thresholds of C5.

4.7 Summary of critical habitat triggers

Critical habitat has been identified for the following criteria within the Terrestrial EAAA, Marine EAAA and the Migratory bird EAAA. Based on the application of the thresholds for C1 to C3, the species listed in Table 4.6 on the basis of regular occurrence.

- C1: Critically Endangered and/or Endangered species
- C2: Endemic and/or restricted range species
- C3: Concentrations of migratory and congregatory species

There is no IUCN Red List assessed ecosystems in Taiwan and no national assessment using IUCN criteria to support the determination of critical habitat in relation to C4 (highly threatened and/or unique ecosystems).

The EAAA for marine flora and fauna can be defined as a critical habitat based on the presence of key evolutionary processes (C5).

Table 4.6: Critical Habitat Assessment (Criteria C1 to C3)

Scientific Name	Common Name	IUCN Status	C1	C2	C3
Marine fauna and fauna					
Sousa chinensis ssp. taiwanesis	Taiwanese Humpback Dolphin	CR	✓	✓	-
Acanthopagrus taiwanensis	Taiwan Picnic Seabream	DD	-	✓	-
Rhynchobatus immaculatus	Taiwanese Wedgefish	CR	✓	✓	-
Migratory birds					
Platalea minor	Black-faced Spoonbill	EN	✓	-	✓
Saundersilarus saundersi	Saunders's Gull	VU	✓	-	✓
Charadrius alexandrinus	Kentish Plover	LC	-	-	✓

[23] https://assessments.iucnrle.org/

Scientific Name	Common Name	IUCN Status	C1	C2	C3
Marine fauna and fauna					
Ciconia boyciana	Oriental Stork	EN	✓	-	✓
Thalasseus bernsteini	Chinese Crested Tern	CR	✓	-	✓

Source: Mott MacDonald, 2023

5 Likely Project impacts and mitigation

5.1 IFC PS6 requirements for developing in critical habitats

According to IFC PS6 2012, in areas of critical habitat, project activities may be implemented provided that all of the following requirements are demonstrated:

- "*No other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical.*
- *The project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values*
- *The project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and*
- *A robust, appropriately designed, and long-term biodiversity monitoring and evaluation program is integrated into the client's management program."*

Where it can be demonstrated that the requirements defined above can be met by the project company, "*the project's mitigation strategy will be described in a Biodiversity Action Plan and will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated*".

5.2 Impact significance definitions

With reference to the aforementioned Project requirements, the following subsections build on the biodiversity impact assessment which was conducted as part of the local EIA with a focus on the Project impacts on those biodiversity values for which the critical habitat was designated (see Section 4). Mitigation and monitoring measures proposed as part of the local EIA and Coastal Zone Management Assessment (CZMA) had been approved by the EPA, are in line with good international industry practice (GIIP) and are common across projects of similar nature across the globe, hence are deemed reasonably adequate. Mitigation and monitoring measures are evaluated in order to determine the residual Project impacts in the following section.

The definitions of impact significance used in this assessment are aligned with the requirements of IFC PS6 (Table 5.1)

Table 5.1: Impact significance definitions

Project impact significance	Definition of impact significance
Adverse significant	• A measurable adverse impact on those biodiversity values for which the critical habitat was designated and on the ecological processes supporting those biodiversity values. • A net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time
Adverse not significant	• No measurable impact on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values
Not significant	• No adverse impact on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values

Source: Mott MacDonald, 2023

5.3 Assessment of Project impacts on critical habitat

The impact of the Project from construction and operation is considered below in relation to the biodiversity values for which critical habitat has been designated. Decommissioning is considered to be the reverse process of construction where the magnitude of the impacts is similar. In the assessment below, the impacts of construction are considered to be the same for decommissioning.

The ecological mitigation for this project is included in the local EIA, environmental survey report and Coastal Zone Management Assessment (CZMA). Although the Project is unlikely to have significant or measurable impacts on the species that trigger Critical Habitat (see Section 4), mitigation is still required to comply with IFC PS6 and to follow good international industry practice (GIIP).

The Project will implement the mitigation hierarchy (avoid, minimise, restore and offset) as part of the EIA and associated plans. It is likely that standard and tested measures can be identified and implemented to achieve no net loss for Natural Habitat and net gain for Critical Habitat (as required under IFC PS6).

5.3.1 Marine flora and fauna

The Project impacts on the marine fauna and flora for which critical habitat was designated (ie two species; Taiwan Picnic Seabream, Taiwanese Humpback Dolphin and Taiwanese wedgefish), as well as the residual impacts after consideration of the proposed mitigation measures, are summarised in Table 5.2 below.

Most residual impacts of the Project on the marine fauna and flora (especially marine mammals) for which critical habitat was designated are deemed adverse not significant. The Project will need to describe in full its marine mammal mitigation strategy in a BAP. This strategy will be designed to achieve net gains of those biodiversity values for which the critical habitat was designated.

Table 5.2: Project impacts and mitigation measures for marine fauna and flora

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
Construction phase				
Habitat loss Footprint of WTGs foundations underwater will result in the loss of benthic habitats.	Permanent	**Adverse not significant** The construction of offshore WTGs and submarine cables will avoid reefs and take up a small footprint offshore	**None proposed**	**Adverse not significant** The total Project's seabed footprint is approximately 0.0003% (0.37km^2) of the marine environment available within the EAAA.
Habitat change and loss Laying and burying of submarine cables will result in loss of habitat within the nearshore environment, which is within the proposed Taiwanese Humpback Dolphin MWH	Temporary	**Adverse significant** Approximately 4km of the submarine cable will overlap with the MWH.	**Project design** ● Scour protection stone (海底防掏刷保護工塊石) used to protect the foundation of the WTG will result in a beneficial reef effect ● The submarine cable route from the WTG to landfall will take the shortest distance feasible. ● The Project footprint avoids the Protected Reef Areas, Artificial Reef Areas, and Marine Protected Areas (including Fisheries Resources Conservation Areas). **Construction method/procedures** ● Sequential laying of submarine cables will be conducted in sections to allow time for the marine environment to return to its original stage before commencing with each new section. ● Use of HDD for cable laying in the intertidal area to minimise impact to the natural coast. **Construction monitoring** ● Intertidal surveys will be conducted once every season.	**Adverse not significant** Mitigation measures are proposed to avoid intertidal habitats and minimise the total and cumulative subtidal habitat footprint and recovery time. The total area affected is not considered to be a significant proportion of the total habitat available.
Underwater noise Offshore trenching, dredging, filling and piling activities and the use of construction vessels would generate underwater noise and sound pressure which can impact	Temporary	**Adverse significant**	**Construction method/procedures** ● A "stop work" warning zone of 750m and pre-warning zone of 750-1500m radius from pile will be established and maintained during pile driving, with the deployment of at least three qualified Taiwan cetacean observers (TCOs) (including at least one member from local ecological group)	**Adverse not significant** "Jacket" piling and noise reduction mitigation techniques are expected to reduce piling sound pressure level to SEL 160dB at 750m from the piling location.

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
marine fauna (especially marine mammals) in the following ways: ● Temporary/ permanent hearing loss ● Behavioural change / reactions, eg temporary loss of feeding / breeding habitats resulting in habitat displacement Interference with communication between individuals due to masking effects (ie in terms of audibility and frequency).			on board conducting visual searches at four different directions of the warning zone and pre-warning zone. ● Continuous acoustic and visual cetacean monitoring will be conducted during piling to monitor cetacean activity as well as monitor sound exposure levels to ensure sound levels do not exceed 160dB [(dB) re. 1μPa2s]4. A stop work notice will be implemented when marine mammals enter the warning zone (ie 750m radius from piling location). ● Pile driving works will only recommence 30 minutes after ensuring no cetacean activity within the warning zone. ● No start of new piling activity during the period of 1 hour before sunset until before sunrise. ● All record of pile driving works must be with date and time, and the recording must remain for at least five years. ● "Jacket" piling and noise reduction mitigation techniques will be used during piling works to minimise underwater noise. ● Soft start (ramp-up) piling method for at least 30 minutes will be used. ● Offshore construction activities will be coordinated between the windfarms of the Project Company to ensure pile driving of only one WTG will be conducted at any one time. **Construction monitoring** ● Four underwater microphones will be deployed 750m away from each WTG piling location during piling works to monitor any cetacean presence. ● Cetacean monitoring will be conducted as boat survey with at least 20 times per year to monitor the cetacean activity and understand the impact significance. ● Fish and benthos surveys will be conducted once every season to understand the impact significance.	Measures are also in place to monitor underwater noise levels so that adaptive management strategies can be employed if required.
Vessel strikes Use of construction vessels may increase potential collision risks	**Temporary**	**Adverse significant**	**Construction method/procedures**	**Adverse not significant** Limitation of vessel speeds to 6 knots, proper design of navigation

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
with marine mammals leading to injury or death. In addition, marine species which are unable to swim, or crawl would be less able to escape collision from vessels, increasing risks of injury or death.			● Vessel speeds will be limited to a maximum of 6 knots within 1.5km from the proposed Taiwanese Humpback Dolphin MWH. ● Construction vessels will avoid entering the Dolphin hot spots during their peak activity periods. ● The navigation route will be designed to avoid sensitive areas. **Construction monitoring** ● Four monitoring stations will be set up 750m away from each WTG pilling location during piling works to monitor marine mammal activity as well as sound exposure levels.	routes and minimising transit routes are expected to reduce the risk of collisions with marine mammals. Measures are also in place to monitor the presence of marine mammals during construction
Decreased water quality Piling works and laying of submarine cables will result in an increase of suspended solids, and as such increased turbidity levels in the water column. This will adversely affect water quality, thereby indirectly impacting the marine organisms. However, concentration of the suspended solids will not be high, and suspension will be of a short duration.	**Temporary**	**Adverse not significant** As presented in the local EIA, baseline levels of suspended solids (SS) for marine water quality were found to range from 2.9 to 10.3mg/L. Piling works and laying of submarine cables are conservatively estimated to increase suspended solid (SS) levels by 3.3mg/L and 4.0mg/L at 500m from the construction area respectively for approximately 14 days	**Construction method/procedures** ● Sequential laying of submarine cables will be conducted in sections to allow time for the marine environment to return to its original stage before commencing with each new section. ● Silt screens will be deployed around the intertidal area during the laying of submarine cables to minimize the spread of suspended sediments while preventing the access of marine organisms into the construction boundary. ● Offshore construction activities will be coordinated between the windfarms of the Project Company to ensure no concurrent piling driving of adjacent WTGs will be conducted. ● Wastewater and excavated material will not be discharged to the intertidal zone. Wastewater will be collected on-site and disposed of by a licensed third-party water waste disposal company. **Construction monitoring** ● Environmental monitoring of sea water quality will be carried out during offshore works (ie WTG foundation, and submarine cable laying). ● At least 12 monitoring stations around the Project's offshore WTG footprint will be set up quarterly.	**Adverse not significant** Increase in turbidity levels are expected to be minimized with the implementation of good practice construction procedures In any event, increased suspended sediment levels are likely to fall within natural variations due to waves and tides for shallow water sites (Cooper et al., 2008).

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
			● One underwater photography (at location prescribed in the local EIA) will be conducted once before construction and after each completion of pile driving during construction.	
Physical processes from the presence of new structures The presence of new subsurface structures may affect local water movements which may in turn influence sediment transport and behaviour of some aquatic species.	**Temporary**	**Adverse not significant** While water currents may play a significant role in the dispersal of pelagic marine larvae (Wolanski & Kingsford, 2014) the direct impact on larger marine mammals are expected to be insignificant.	**Construction monitoring** ● Four underwater microphones will be deployed 750m way from each WTG piling location during piling works to monitor any cetacean presence. ● Four monitoring stations will be set up 750m away from each WTG pilling location during piling works to monitor marine mammal activity as well as sound exposure levels. ● One underwater photography (at location prescribed in the local EIA) will be conducted once before construction and after each completion of pile driving during construction.	**Adverse not significant** Measures are in place to monitor marine mammal activity during construction so that adaptive management strategies can be employed if required.
Accidental pollution events/ contaminant release Pollutants may be unintentionally released into the environment as a result accidents or natural disasters.	**Temporary**	**Adverse significant**	**Construction method/procedures** ● Wastewater and excavated material will not be discharged to the intertidal zone. Wastewater will be collected on-site and disposed of licensed third-party water waste disposal company. ● Silt screens which will be deployed around the intertidal area duringlaying of submarine cables to minimize the spread of suspended sediments may also help to control the spread of other pollutants in the event of an accidental release. ● An emergency preparedness and response plan (EPRP) with overall procedure outline, communication channels and general team structure will be developed to guide the Project Company in the event of an emergency (eg vessel collision, fires and natural disasters). **Construction monitoring** ● Environmental monitoring of sea water quality will be carried out during offshore works (ie WTG foundation, and submarine cable laying).	**Adverse not significant** The EPRP will have to be developed with Project specific details. Emergency preparedness drills will have to be conducted to ensure that the Project team is trained to reactin the event of an emergency. Equipment to handle accidental pollution events (eg spill response kit) will also need to be provided as part of the EPRP.
Operation phase				

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
Underwater noise Operational wind turbines will generate a constant, low, basal level of underwater noise which may affect the behaviour of marine fauna.	**Permanent**	**Adverse not significant**	**Operational monitoring** ● Two underwater microphones will be deployed quarterly. ● 20 visual survey trips will be conducted each year to monitor the cetacean activity and understand the impact significance. ● Fish and benthos surveys will be conducted once every season to understand the impact significance.	**Adverse not significant** Measures are in place to monitor any potential underwater noise impacts to marine fauna and enable adaptive management strategies if required.
Vessel strikes Use of maintenance vessels may increase potential collision risks with marine mammals leading to injury or death. In addition, marine species which are unable to swim, or crawl would be less able to escape collision from vessels, increasing risks of injury or death.	**Temporary**	**Adverse not significant**	No specific measures on reducing vessel collision with marine mammals have been proposed. In order to reduce the impact, it is recommended that project vessels will be sourced and based from the nearest port to minimize transit routes.	**Adverse not significant** If recommendations for mitigation are applied, then the impact would be considered not significant.
Electromagnetic field (EMF) Electric currents in the inter-array submarine cables and submarine cables connecting the WTGs to the cable landing point may induce electromagnetic fields, influencing the behaviour of marine ecology.	**Permanent**	**Adverse not significant**	**Operational monitoring** ● 20 visual survey trips will be conducted each year to monitor the cetacean activity and understand the impact significance.	**Adverse not significant** There have been no conclusive assessments to date to show that EMF affects marine fishes, and it is unlikely that EMF would affect larger marine mammals. Measures are in place to monitor marine mammal activity during operation so that adaptive management strategies can be employed if required.
Barrier effect The presence of marine structure may initiate avoidance behaviour and result in marine mammals having to swim around the WTG area.	**Permanent**	**Adverse not significant** The Project's offshore WTG footprints have been located at least 30km outside the proposed Taiwanese Humpback Dolphin	**None proposed**	**Adverse not significant** The total footprint of the WTG bases is approximately 0.0003% of the marine environment available within the EAAA..

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
		MWH. The added distance that marine mammals have to swim around the wind farm array and adjacent projects is relatively small compared to the total distance travelled by marine mammals.		
Accidental pollution events/ contaminant release Pollutants may be unintentionally released into the environment as a result accidents or natural disasters.	**Permanent**	**Adverse not significant**	No specific measures have been proposed. It is recommended that: ● Waste generated (if any) will not be discharged to the sea. Waste will be collected on-site and disposed of by a licensed third-party water waste disposal company.	**No adverse impact** Impacts to sea water quality is envisaged to be minor or negligible during operations of a offshore wind farm due to the nature of the development. The EPRP will have to be updated with Project specific details (eg names of the EPRP team), and emergency preparedness drills will have to be conducted to ensure that the Project team is trained to react in the event of an emergency. Equipment to handle accidental pollution events (eg spill response kit) will also need to be provided as part of the EPRP.
Reef effect The presence of turbine foundations and rock armour in marine waters will result in the development of a reef community. This includes an increase of reef-dwelling fishes surrounding the Project.	**Permanent**	**No adverse impact** The effects of the development artificial reefs is not considered likely to have a significant adverse effect because the development would represent a positive contribution to	**Operational monitoring** Underwater photography will be conducted at two WTGs once per season for three years to observe fish cluster effect at the bottom of the WTGs.	**No adverse impact** The development of artificial reefs is considered to represent a positive contribution to biodiversity and ecosystem function.

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
		biodiversity and ecosystem function		

Source: CZMA, 2019; Local EIA, 2018; Mott MacDonald, 2023

5.3.2 Migratory birds (including seabirds at sea)

Critical habitat is designated for five migratory birds and seabirds at sea (ie Black-faced Spoonbill, Saunders's Gull, Kentish Plover, Oriental Stork and Chinese Crested Tern) are likely to be present within the EAAA and the Project's area of influence.

Project impacts to these migratory birds, prior to and after the implementation of the proposed mitigation measures, are summarised in Table 5.3 below.

All of the residual impacts of the Project on the migratory birds and seabirds at sea for which critical habitat was designated are considered as adverse not significant. As described above, the project design itself will implement various WTG design considerations to minimize the risk of bird collisions.

Table 5.3: Impacts and mitigation measures for migratory birds and seabirds at sea

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
Construction phase				
Habitat loss, disturbance and displacement Laying of submarine cables and above-ground cables would result in the temporary loss of habitat within the nearshore environment and intertidal environment. This may potentially affect the behaviour of birds (eg daily movement and loss of feeding/foraging grounds).	**Temporary**	**Adverse significant** The density and abundance of seabirds at sea is considered to be low. Furthermore, the presence of seabirds such as divers (Gaviiformes) and sea ducks, typically the most sensitive species, are not recorded in the Project area of influence.	**Pre-construction monitoring** ● Satellite survey will be conducted once in each season for a period of two years to monitor bird migratory flightpaths. **Construction method/procedures** ● Above-ground cable laying within intertidal area will avoid bird migratory season between November and March ● Sequential laying of submarine cables will be conducted in sections. ● Proper disposal of wastewater and excavated material will be undertaken as per the waste management plan.	**Adverse not significant** Mitigation measures are in place to limit the temporary habitat loss during construction phase.
Operation phase				
Collision with wind turbine blades Bird injury and fatalities may result due to collision with rotating wind turbine. Frequency and likelihood of such event is dependent on the bird species, and their flight altitude. Migratory waterbirds and breeding seabirds are most likely to collide with the wind turbines.	**Permanent**	**Adverse significant** As per the local EIA, more than 90% of observed bird flight altitudes were below the minimum height of the rotating wind turbine (ie < 25m). The number of bird collisions have been estimated at 41.93 birds/year[24]	**Project design** ● According to European experience, if too many lights are installed on the turbine, it may have risk of attracting birds to fly close to it. The Project will follow Article 17 of the Aviation obstacle sign and obstacle light setting standard which the electric generator structure will use Type A obstructing light. Its implementing method will follow horizontal direction intervals not exceeding 900m and be implemented on the corners or most outer row. The number of warning lights installed on the turbines will hence be based on the wind farm layout configuration. ● At time of environment monitoring, if large flocks of protected species or large-sized birds are passing through wind farm, the operator will be committed to conduct a feasible speed reduction mechanism. **Operation phase monitoring**	**Adverse significant** Various design considerations have been incorporated to minimize risk of bird collusions. Measures are also in place to monitor any potential bird mortalities and enable adaptive management strategies if required.

[24] Based on a worst case scenario from the bird collision modelling which assumes an individual WTG capacity of 8.0MW and 98% avoidance rate of birds.

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
			● Surveillance devices (ie thermal imaging, acoustic microphone, radar) will be installed within the windfarm to allow continuous monitoring of bird activities. ● Radar survey will be conducted to monitor bird migratory flightpaths. ● Visual surveys will be conducted monthly between March and November and once between December and February throughout operation in the vicinity of Project's offshore WTG footprint	
Barrier effect The presence of WTG may initiate avoidance behaviour and result in birds having to fly around the array area.	**Permanent**	**Adverse not significant** The added distance to fly around the wind farm array and adjacent projects is relatively small compared to the total distance flown by migratory birds and seabirds at sea. Night radar surveys were conducted as part of the baseline studies, and the EIA suggested that there would be minimal impact to the flight path of migratory birds	**Project design** ● WTG placement will be designed to ensure sufficient distance between WTGs to allow for birds flying through the Project's offshore WTG footprint. ● Eight "flight corridor" of at least 2 km wide within the Project's offshore WTG footprint and nearby offshore WTG footprint from other projects will be set aside for birds passing through. **Operation phase monitoring** ● Surveillance devices (ie thermal imaging, acoustic microphone, radar) will be installed within the windfarm to allow continuous monitoring of bird activities. ● Radar survey will be conducted to monitor bird migratory flightpaths. ● Visual surveys will be conducted monthly between March and November and once between December and February throughout operation in the vicinity of Project's offshore WTG footprint	**Adverse not significant** Project design and monitoring are in place to minimise avoidance behaviour and the distance required for birds to fly around the array area.

Source: CZMA, 2019; Local EIA, 2018; Mott MacDonald, 2023

5.3.3 Terrestrial fauna and flora

A total of 18 species were found to be restricted-range but do not trigger thresholds of criterion C2 (as discussed in Section 4.3.2).

Project impacts to terrestrial fauna and flora, including the residual impacts after consideration of the proposed mitigation measures, are summarised in Table 5.4 below.

Impact to reptile and amphibian during construction phase may be significantly minimised with the implementation of the proposed measures described below. Additional measures such as clear demarcation of work areas and progressive construction works are also recommended to reduce disturbance to species.

Similar to reptiles and amphibians, vegetation clearance during the construction phase is expected to have a temporary impact on all terrestrial animals. The movement of construction vehicles may also cause disturbance to animals in the vicinity. No significant impacts on terrestrial fauna and flora is expected during the operational phase of the Project. Mitigation measures proposed for the reptiles and amphibians are also applicable to the mammals, ie demarcation of work areas, progressive construction works, use of low-noise construction machinery, training of Project staff and contractors on prohibition of capture, disturb or abuse of wildlife. Project impacts to bats are likely to be limited to impacts related to the removal of trees that are potential roost sites. Impacts can be avoided and minimised through the implementation of the aforementioned mitigation measures. It is expected that invertebrate density diminishes with distance from the land and at approximately 50km from the coast, it is not anticipated that the Project will have a significant collision impact on foraging bats. There is limited evidence of bats foraging at sea and these are limited to bats on migration rather than from central place foragers (Bach, et al., 2022; Ahlen, Baagoe, & Bach, 2009). It is therefore expected that the Project will not have a significant impact on bats in coastal or marine waters.

Onshore activities of the Project may have limited impact considering that the onshore components of the Project is located on a reclaimed land that is largely separated from the main island of Taiwan where most terrestrial bird species are not likely to occur as a result of poor connectivity with preferred habitat (temperate forests, bamboo forests and dense shrubland/grassland).

Vegetation clearance during the construction phase is expected to have a temporary impact on all terrestrial animals. The movement of construction vehicles may also cause disturbance to animals in the vicinity. No significant impacts on terrestrial animals is expected during the operational phase of the Project. Mitigations measures proposed for the reptiles and amphibians are also applicable to terrestrial birds, ie demarcation of work areas, progressive construction works, use of low-noise construction machinery, training of Project staff and contractors on prohibition of capture, disturb or abuse of wildlife.

Table 5.4: Impacts and mitigation measures for terrestrial fauna

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
Construction phase				
Habitat loss and disturbance Some vegetation clearance is expected during the construction of onshore Project components (ie land cables and sub-station)	**Permanent**	**Adverse not significant** The total length of the land cable is estimated at maximum 8km. The substation is planned to have a footprint of 23,800m^2.	**Project design** Before the construction of substation and cables, comprehensive planning and control on land are needed to avoid extensive vegetation removal works. **Construction method/procedures** ● Low-noise construction machinery will be used to reduce disturbances to wildlife. ● Training will be conducted for Project staff and contractors on habitats and enforcement of no poaching of wildlife.	**No adverse impact** Project components will avoid unnecessary clearance of vegetation to minimize potential impacts to terrestrial fauna. Measures are also in place to reduce disturbances to terrestrial fauna
Accidental pollution events/ contaminant release Pollutants may be accidentally released into the environment as a result of accidents or natural disasters.	**Temporary**	**Adverse not significant** Accidental release of pollutants has the potential to affect the terrestrial habitat and may be difficult to remediate depending on the extent of pollution.	**Construction method/procedures** ● Wastewater and excavated material will not be discharged to the environment. Wastewater will be collected on-site and disposed of by a licensed third-party water waste disposal company. ● An emergency preparedness and response plan (EPRP) with overall procedure outline, communication channels and general team structure is in place to guide the Project Company in the event of an emergency (eg fires and natural disasters). **Construction monitoring** Environmental monitoring of sea water quality will be carried out during offshore works (ie WTG foundation, and submarine cable laying)	**No adverse impact** ● Monitoring is in place to identify potential pollution/ contaminant release ● The EPRP will have to be updated with Project specific details (eg names of the EPRP team), and emergency preparedness drills will have to be conducted to ensure that the Project team is trained to react in the event of an emergency. Equipment to handle accidental pollution events (eg spill response kit) will also need to be provided as part of the EPRP.
Road traffic collisions Use of construction vehicles may result in collisions with terrestrial fauna and lead to injury or death	**Temporary**	**Adverse not significant** Construction vehicle fleet is estimated to have a traffic flow of 265PCU (one-way) per hour. The local EIA	**Monitoring** Monitoring will be conducted quarterly throughout construction around the terrestrial electrical distribution system (ie substations, land cables and their surroundings).	**No adverse impact** Limitation of vehicle speeds is expecte to reduce the risk of collisions with terrestrial fauna. Measures are also on place to monitor the presence of terrestrial

Project impact	Impact duration	Impact significance	Mitigation and monitoring measures	Residual impact significance
		assessed that there wil be minimal impacts to terrestrial animals in terms of roadkill.		fauna during construction and avoid any collisions.
Operation phase				
Road traffic collisions Use of maintenance vehicles may result in collisions with terrestrial fauna and lead to injury or death.	**Temporary**	**Adverse not significant** The number of vehicles required for operation maintenance is not expected to be significant	**None proposed.**	**No adverse impact** As described under construction phase, limitation of vehicle speeds expected to reduce the risk of collisions with terrestrial fauna.
Accidental pollution events/contaminant release Pollutatns may be accidentally released into the environment as a result of accidents or natural disasters.	**Permanent**	**Adverse not significant** Impact to terrestrial environment is envisaged to be minor or negligible during operations of a offshore wind farm due to the nature of the development.	**Operation method/procedures** ● Waste generated (if any) will not be discharged to the environment. Wastewater will be collected on-site and disposed of by a licensed third-party water waste disposal company. ● An emergency preparedness and response plan (EPRP) with overall procedure outline, communication channels and general team structure is in place to guide the Project Company in the event of an emergency (eg fires and natural disasters).	**No adverse Impact** The EPRP will have to be updated with Project specific details (eg names og the EPRP team), and emergency preparedness drills will have to be conducted to ensure that the Project team is trained to react in the event of an emergency. Equipment to handle accidental pollution events (eg spill response kit) will also need to be provided as part of the EPRP.

5.4 Highly threatened and/or unique ecosystems

It is considered that the EAAAs are not critical habitat for highly threatened and/or unique ecosystems.

5.5 Key evolutionary processes

It was identified that the marine flora and fauna EAAA is critical habitat for key evolutionary processes in relation to coral reef ecosystems. The mitigation presented in Section 5.3.1 includes the relevant mitigation measures to avoid and minimize adverse impacts on coral reefs. Given the large spatial scale at which the ocean current operates within the Kuroshio Triangle it is not expected that the Project will influence the movement of genes or impede climate change adaption because the Project will not interfere with the main Kuroshio current located off the Pacific east coast of Taiwan and will likely have little measurable influence on the Kuroshio Branch current moving through the Taiwan Strait.

6 Ecosystem services assessment

IFC PS 6 defines ecosystem services as “the benefits that people, including businesses, obtain from ecosystems”, which accords with the definition provided by the Millennium Ecosystem Assessment (MEA). While there is no single system for categorising ecosystem services, the MEA framework is widely accepted and as acknowledged in IFC PS 6 (paragraph 2), provides a useful starting point.

The MEA identifies four broad categories of ecosystem services as follows:

- Provisioning services are the goods or products obtained from ecosystems, such as food, timber, medicines, fibre, and freshwater
- Regulating services are the benefits obtained from an ecosystem’s control of natural processes, such as climate regulation, disease control, erosion prevention, water flow regulation, and protection from natural hazards
- Cultural services are the nonmaterial benefits obtained from ecosystems, such as recreation, spiritual values, and aesthetic enjoyment
- Supporting services are the natural processes such as soil formation, nutrient cycling and primary productivity that maintain other ecosystem services

6.1 Ecosystems in the Project Area

As described in the EIA, the affected terrestrial area of the project was originally an intertidal zone mud flat, however, since 1970, this has been reclaimed and transformed into the Changhua Binhai Industrial Park (Unitech, 2018a). Within the EIA terrestrial study area, no natural forest or secondary forest was found. Some natural grass was found on the sandhills near Xianxi Dumpling Corner. Man-made coastal forest was planted along the coast, however, most have been damaged by the wind. Some roadside vegetation was also identified but were mostly composed of weeds. The area is pre-dominantly occupied by man-made structures, and hence, considered a modified habitat. The affected marine area of the project is open water habitat which is considered a natural habitat. Section 3.3 above describes the habitats that are found within the terrestrial, migratory birds and marine EAAA.

6.2 Key Project impacts likely to affect ecosystem services

The construction of offshore components such as the wind turbine foundations and transmission lines are likely to affect the existing marine habitats present, and in turn drive ecosystem change. This has the potential to lead to direct and indirect impacts on ecosystem services for communities reliant on marine resources.

The major potential impacts from the construction of the offshore components include:

- Waterborne acoustic disturbances and vibrations from underwater construction activities such as piling works
- Increased sediment dispersal from the underwater construction works including the laying and burying of the transmission cable
- Increased shipping traffic for the transportation of materials and construction labour
- Limitations on access to fisheries due to the Project exclusion boundaries set up around working areas

During the operational phase, Project activities are likely to introduce new drivers of ecosystem change in addition to ongoing impacts from drivers that have been brought about during the

construction phase as described above. The major potential impacts from the operation of the wind farm include:

- Waterborne acoustic disturbances and vibrations from operation of the turbines
- Underwater electromagnetic fields from the underwater transmission cables
- Limitations on access to vessels (ie fisher folks) as established around the operating turbines
- Bird collision with wind turbine blades
- New biodiversity habitat creation/gain from wind turbine bases

6.3 Ecosystem services present in the area

Based on the existing ecosystems present in the area and the key impacts identified above, a list of ecosystem services that are present within the Project area has been identified in Table 6.1 below. The importance of the ecosystem services to the local communities are highlighted and the likely impact of the Project on each ecosystem services are described. Mitigation measures were identified where possible; however, most impacts have been addressed through mitigation measures from other plans, especially those related to biodiversity, hydrology and communities and references to those plans have been added into Table 6.1 below where relevant.

Table 6.1: Ecosystem services present and likely impacts due to the Project

Service	Phase	Importance of the ecosystem services and likely impact to the ecosystem services due to the Project	Impact summary	Mitigation measures
Provisioning services				
Food: Fisheries catch	Construction	Fishing is a livelihood activity for locals within the Changhua County. The fishing ground under the Changhua County Exclusive Fishing Right does not overlap with the offshore windfarm site of this Project. The area of the Changhua Northern Common Corridor for submarine cable installation overlaps with the exclusive designated fishing rights area (ie of Changhua Fishermen Association), but this will only be limited to short periods within the construction phase during the construction of cable trenches and laying of submarine cables. The impact is considered short term and localised as the construction activities will be conducted in sections (ie no more than 200m) and the area will be reinstated. Increased marine traffic, underwater noise from pile driving and increased in sediment dispersal may cause disturbance to fish habitats and subsequent displacement of fish and interference with spawning activities, which may result in shift of productive fishing grounds and affect the livelihood of fishermen in the short term.	The Project is expected to result in temporary loss of the marine open water habitat. However, as this is considered a short-term loss it is unlikely to significant residual impact the provisioning of this ecosystem service.	Refer to relevant assessment and mitigation measures in the cumulative impact assessment and livelihood restoration plan
	Operation	During the operation phase of the Project, loss in fisheries resources or fish ground is not expected as the WTG locations have avoided the Exclusive Fishing Right area, Protected Reef Areas and Artificial Reed Areas. The WTGs are located at an estimated 50km from shore, which is outside the operating range of the fishing vessels registered with Changhua Fishermen Association. Where there are fishing vessels that could possibly operate at such offshore distance (ie approximately 50km from coast), this would imply that the vessel would have correspondingly a very large operating range. The area of the fishing exclusion zone established around the operating WTGs would thus become a very minimal portion of the vessel's range. The foundations of the WTGs can serve the function as artificial reefs, providing substratum for colonisation of marine fauna.	No adverse impact on marine open water habitat is identified during the operation phase of the Project and is therefore unlikely to significantly impact the provisioning of this ecosystem service.	
Regulating services				
Regulation of local, regional and/or global climate	Construction	Coastal forest and seabeds can act as sources of carbon storage which can reduce the amount of atmospheric carbon. The laying of submarine cables requires construction of cable trenches in seabeds which may release stored carbon in the process. Laying of the cable on land to the grid may cause accidental damage to coastal vegetation which can also release stored carbon. However, a common corridor for submarine cable installation has been	The Project is expected to only result in temporary disturbance to coastal forest and wetland habitat and is therefore unlikely to significantly impact the regulating service of this ecosystem.	Refer to mitigation measures in the EIA

Service	Phase	Importance of the ecosystem services and likely impact to the ecosystem services due to the Project	Impact summary	Mitigation measures
		identified which can minimise disturbance and carbon release. The proposed alignment of the onshore cables is not expected to remove large amount of coastal vegetation, and any removal is likely to be accidental. Affected areas will also be reinstated.		
Regulation of natural hazards	Construction	Coastal forest can provide protection of the coasts against natural hazards, protecting communities from severe wind, storms and floods. However, it is expected that there will be minimal loss of coastal forest due to the laying of the cable on land to the grid. Affected areas will also be reinstated.	The Project is expected to only result in temporary disturbance to coastal forest and is therefore unlikely to significantly impact the regulating service of this ecosystem.	Refer to mitigation measures in the EIA
Cultural services				
Aesthetic enjoyment	Construction/ operation	Construction machinery/ WTG structure will obstruct the natural landscape view along the coast of Changhua County, which the communities use for aesthetic purposes such as viewing sunsets/sunrise and enjoying the sea breeze and waves. Construction machinery are temporary and will be demobilised once construction is completed. Positioning of machinery and storage of construction materials need to take into consideration the impact on landscape and will be neatly placed. As assessed by the EIA, during the operation stage, the WTGs are far from the coast (ie approximately 50km) for the human eye to see and is of very limited visibility even during good weather.	The Project is expected to only result in temporary disturbance to the natural landscape during construction and has no significant adverse impact on landscape during operation. Hence, it is unlikely to significantly impact the cultural service that are provided by this area.	Refer to mitigation measures in the EIA.
Recreational value	Construction/ operation	The Project site is located near to the Dadu Wildlife Sanctuary which is used especially during peak migratory season for birds watching. As mentioned above, the windfarm are of limited visibility from the coast. The construction/ operation of the windfarm is unlikely to result in any significant changes to the recreational value (ie bird watching) in the wildlife sanctuary.	No adverse impact on the wildlife sanctuary is identified during the operation phase of the Project and is therefore unlikely to significantly impact the cultural services that are provided by this area.	Not applicable.
Supporting services		Supporting services are services that are necessary for the production of other ecosystem services, some examples include soil formation, nutrient cycling and primary productivity. These have not been assessed separately as they have been covered through the provisioning, regulating and cultural services that they support.		

Based on the assessment above, no adverse significant impact on ecosystem services have been observed. As such, mitigation measures from existing plans are deemed as sufficient to mitigate the impacts on ecosystem services due to the Project. While there are no significant impacts that have been identified, the Project should aim to avoid causing adverse impacts to ecosystem services throughout the Project duration.

7 Recommendations

7.1 On-site restoration

Habitats affected temporarily by construction should be restored to their status before the Project, as much as possible. If appropriate, plans or measures for habitat removal and restoration should be produced, before the start of construction. These plans or measures will set out the minimum requirements in relation to the clearance and restoration of natural habitats (if any). Subsequently, these measures will form part of Construction Environmental and Social Management Plan (CESMP). The plan may include the following practices, as required:

- Manage vegetation removal within the project footprint
- Restore on-site temporary habitat loss

7.2 Offsetting and other forms of compensation

Biodiversity offset will be required to ensure overall net gain of Critical Habitat and no net loss for Natural Habitat, in line with IFC PS6. The guidance published by the Business and Biodiversity Offsets Programme (http://bbop.forest-trends.org/pages/guidelines) will be used to guide the biodiversity offset design steps.

There are various forms of biodiversity offset possible such as habitat compensation, stopping biodiversity degradation and loss in designated sites and 'like-for-like or better' habitat basis. However, the applicability, practicality and feasible of these options will have to be appropriate for a specific development and its associated biodiversity values. Additional conservation measures are also considered, and these can include provision of support to the conservation of biodiversity in the local area, or biodiversity awareness raising programme for the local population. It is recognised that these measures are very difficult to quantify to prove the no net loss or net gain. Offsetting recommendations are not presented in this report, instead, a project-specific Biodiversity Action Plan (BAP) containing offset options and additional conservation actions has been produced to show how the Project will achieve no net loss of natural habitats and net gain for critical habitat features.

7.3 Biodiversity management and action plans

Given that the Project is located in Critical Habitat (see Section 4), and irrespective of project impacts, a project-specific BAP has been developed. The aim of the BAP is to demonstrate net gain in Critical Habitats and no net loss in Natural Habitat, as required by IFC PS6.

It is advised that the BAP includes both onsite mitigation during construction and long-term conservation actions during project operation. The BAP uses the mitigation hierarchy and includes objectives, targets and indicators, responsibilities, programme, reporting and monitoring requirements. The scope of the BAP is commensurate with the biodiversity risks and impacts of the Project, as described in this CH.

The BAP is prepared using international guidance and good practice (IPIECA, 2005; IFC, 2019). The BAP includes the following aspects:

- Rationale and scope of the BAP: provide justification and state the aim and objectives of the BAP.
- Legal, regulatory, permitting and third-party requirements: summary of international biodiversity and nature conservation conventions and policies that apply to the Project and

which have been signed by Taiwan; relevant national legislation and policy; permitting requirements; ESMS requirements; lenders' requirements etc.

- Biodiversity baseline: provide updated summary of the biodiversity baseline in the Project area of influence.
- Current biodiversity threats and project impacts: summarise the current external threats sensitive habitats and species of conservation importance.
- Biodiversity priorities: include the species and ecosystems that trigger Critical Habitat, together with other species threatened globally/nationally, protected nationally, endemic/restricted range etc.
- BAP actions: identify and describe conservation actions for the BAP priorities to ensure the systematic implementation of the mitigation hierarchy; include targets, indicators, timescale and responsibilities for each action.
- BAP implementation: include a clear programme and responsibilities for the BAP implementation together with any training requirements.
- Monitoring, evaluation and improvement: include provisions for the objectives, actions and targets to be periodically reviewed; periodic inspection/monitoring of the biodiversity mitigation and monitoring during all project phases; actions to be taken (and by whom) if inspection/monitoring results show that the practices do not meet applicable requirements.
- Reporting, communication and verification of BAP performance: to verify the outcomes and progress of the BAP implementation, internal and external reporting should be specified.

The BAP actions provides detailed information on the measures listed in Section 6.1 above, as a minimum. The actions is grouped by the steps of the mitigation hierarchy. The BAP is considered the most up-to-date project design, ESMS documents and implementation. Stakeholder consultation is an integral component in the formulation of a BAP. It is essential to engage with stakeholders to gather opinions on the biodiversity baseline, project impacts, conservation priorities and implementation of actions.

A Biodiversity Monitoring and Evaluation Programme (BMEP), comprising a long-term biodiversity monitoring and evaluation programme as required under Paragraph 17 of IFC PS6, is also incorporated within the BAP or prepared separately. The BAP aims to be completed two months before the start of construction.

8 Conclusion

The CHA determined that the Project is located in critical habitat for the following biodiversity values:

- Criterion 1 (C1) (a), (b) and (c): the presence of critically endangered, endangered and vulnerable (a global range overlapping with >0.1% of the EAAAs) species, namely:
  - Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanensis*) (C1a)
  - Black-faced Spoonbill (*Platalea minor*) (C1a)
  - Oriental Stork (*Ciconia boyciana*) (C1a and C1c)
  - Chinese Crested Tern (*Thalasseus bernsteini*) (C1a and C1c)
  - Taiwanese Wedgefish (*Rhynchobatus immaculatus*) (C1a)
  - Saunders's Gull (*Saundersilarus saundersi*) (C1c)
- Criterion 2 (C2): the presence of restricted-range species, namely:
  - Taiwan Picnic Seabream (*Acanthopagrus taiwanensis*)
  - Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanensis*)
  - Taiwanese Wedgefish (*Rhynchobatus immaculatus*)
- Criterion 3 (C3) (a) and (b): the presence of migratory and congregatory species:
  - Black-faced Spoonbill (*Platalea minor*) (C3a)
  - Saunders's Gull (*Saundersilarus saundersi*) (C3a)
  - Kentish Plover (*Charadrius alexandrines*) (C3a)
  - Oriental Stork (*Ciconia boyciana*) (C3a)
  - Chinese Crested Tern (*Thalasseus bernsteini*) (C3a)
- Criterion 5 (C5): the presence of key evolutionary processes
  - EAAA for marine fauna and flora

Therefore, as relevant to this Project, the biodiversity values triggering Critical Habitat are:

- Marine species:
  - Taiwanese Humpback Dolphin (*Sousa chinensis ssp. taiwanensis*)
  - Taiwan Picnic Seabream (*Acanthopagrus taiwanensis*)
  - Taiwanese Wedgefish (*Rhynchobatus immaculatus*)
- Migratory birds:
  - Black-faced Spoonbill (*Platalea minor*)
  - Saunders's Gull (*Saundersilarus saundersi*)
  - Kentish Plover (*Charadrius alexandrines*)
  - Oriental Stork (*Ciconia boyciana*)
  - Chinese Crested Tern (*Thalasseus bernsteini*)
- EAAA for marine fauna and flora

The proposed mitigation measures contained within the EIA must be implemented to avoid and minimize significant impacts to the biodiversity values for which critical habitat was designated and the supporting habitat, as well as avoidance of a net reduction in the global and/or national population of any Critically Endangered or Endangered species.

The residual project impact significance for the species groups that triggered critical habitat (ie marine fauna and migratory birds (including seabirds at sea) are summarized in Table 8.1. To address residual impacts on critical habitat features, a BAP containing additional recommendations (ie. offset options and additional conservation actions) and further details on the actions required to achieve net gains for critical habitats and species is recommended for the Project.

Table 8.1: Residual impact significance for critical habitat features

Project impact	Residual impact significance
Marine fauna	
Construction phase	
Habitat loss	Adverse not significant
Underwater noise	Adverse not significant
Vessel strikes	Adverse not significant
Decreased water quality	Adverse not significant
Physical processes from the presence of new structure	Adverse not significant
Accidental pollution events/ contaminant release	Adverse not significant
Operation phase	
Underwater noise	Adverse not significant
Vessel strikes	Adverse not significant
Electromagnetic field (EMF)	Adverse not significant
Accidental pollution events/ contaminant release	No adverse impact
Barrier effect	Adverse not significant
Reef effect	No adverse impact
Migratory birds and seabirds at sea	
Construction phase	
Habitat loss, disturbance and displacement from cable laying	Adverse not significant
Operation phase	
Collision with wind turbine blades	Adverse significant
Barrier effect	Adverse not significant

Source: Mott MacDonald, 2023

9 References

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Appendices

A. Critical habitat species assessment for criterion 1

Table A.1: Critical habitat species assessment for candidate species for Criterion 1

Class	Scientific name	Common name	IUCN status	National Red List Status	Source
N/A	*Euonymus japonicus*			CR	Taiwan Red List, Trinity DA
N/A	*Garcinia subelliptica*			EN	Taiwan Red List, Trinity DA
Actinopterygii	*Acipenser sinensis*	Chinese Sturgeon	CR		IBAT
Actinopterygii	*Albula glossodonta*	Shortjaw Bonefish	VU		IBAT
Actinopterygii	*Anguilla japonica*	Japanese Eel	EN	CR	IBAT
Actinopterygii	*Argyrosomus japonicus*	Dusky Meagre	EN		IBAT
Actinopterygii	*Bahaba taipingensis*	Chinese Bahaba	CR		IBAT
Actinopterygii	*Bolbometopon muricatum*	Green Humphead Parrotfish	VU		IBAT
Actinopterygii	*Coilia mystus*	Osbeck's Grenadier Anchovy	EN		IBAT
Actinopterygii	*Coilia nasus*	Japanese Grenadier Anchovy	EN		IBAT
Actinopterygii	*Epinephelus akaara*	Hong Kong Grouper	EN		IBAT
Actinopterygii	*Epinephelus bruneus*	Longtooth Grouper	VU		IBAT
Actinopterygii	*Epinephelus polyphekadion*	Camouflage Grouper	VU		IBAT
Actinopterygii	*Eviota aquila*	Dark Dwarfgoby	EN		IBAT
Actinopterygii	*Evynnis cardinalis*	Threadfin Porgy	EN		IBAT
Actinopterygii	*Hippocampus histrix*	Thorny Seahorse	VU		IBAT
Actinopterygii	*Hippocampus kelloggi*	Great Seahorse	VU		IBAT
Actinopterygii	*Hippocampus spinosissimus*	Hedgehog Seahorse	VU		IBAT
Actinopterygii	*Hippocampus trimaculatus*	Three-spot Seahorse	VU		IBAT
Actinopterygii	*Istiophorus platypterus*	Sailfish	VU		IBAT
Actinopterygii	*Larimichthys crocea*	Large Yellow Croaker	CR		IBAT
Actinopterygii	*Makaira nigricans*	Blue Marlin	VU		IBAT

Class	Scientific name	Common name	IUCN status	National Red List Status	Source
Actinopterygii	*Metzia formosae*		LC	EN	IBAT
Actinopterygii	*Mola mola*	Ocean Sunfish	VU		IBAT
Actinopterygii	*Nemipterus virgatus*	Golden Threadfin Bream	VU		IBAT
Actinopterygii	*Oxymonacanthus longirostris*	Harlequin Filefish	VU		IBAT
Actinopterygii	*Platichthys bicoloratus*	Stone Flounder	VU		IBAT
Actinopterygii	*Plectropomus areolatus*	Squaretail Coralgrouper	VU		IBAT
Actinopterygii	*Sillago parvisquamis*	Small-scale Sillago	EN		IBAT
Actinopterygii	*Takifugu chinensis*	Chinese Puffer	CR		IBAT
Actinopterygii	*Thunnus obesus*	Bigeye Tuna	VU		IBAT
Amphibia	*Babina okinavana*	Ryukyu Brown Frog	EN	CR	IBAT
Amphibia	*Hylarana taipehensis*	Taipei Frog	LC	EN	IBAT
Amphibia	*Hynobius arisanensis*	Arisan Hynobiid	EN	VU	IBAT
Amphibia	*Hynobius formosanus*	Taiwan Salamander	EN	EN	IBAT
Amphibia	*Hynobius fucus*	Taiwan Lesser Salamander	NT	EN	IBAT
Amphibia	*Hynobius glacialis*	Nanhu Salamander	CR	CR	IBAT
Amphibia	*Hynobius sonani*	Taichu Salamander	EN	EN	IBAT
Amphibia	*Zhangixalus arvalis*	Farmland Green Treefrog	EN	EN	IBAT
Amphibia	*Zhangixalus aurantiventris*	Orange-bellied Treefrog	EN	EN	IBAT
Anthozoa	*Acanthastrea hemprichii*		VU		IBAT
Anthozoa	*Acropora aculeus*		VU		IBAT
Anthozoa	*Acropora acuminata*		VU		IBAT
Anthozoa	*Acropora anthocercis*		VU		IBAT
Anthozoa	*Acropora dendrum*		VU		IBAT
Anthozoa	*Acropora donei*		VU		IBAT
Anthozoa	*Acropora echinata*		VU		IBAT
Anthozoa	*Acropora horrida*		VU		IBAT
Anthozoa	*Acropora kirstyae*		VU		IBAT
Anthozoa	*Acropora listeri*		VU		IBAT

Class	Scientific name	Common name	IUCN status	National Red List Status	Source
Anthozoa	*Acropora microclados*		VU		IBAT
Anthozoa	*Acropora palmerae*		VU		IBAT
Anthozoa	*Acropora paniculata*		VU		IBAT
Anthozoa	*Acropora papillare*		VU		IBAT
Anthozoa	*Acropora polystoma*		VU		IBAT
Anthozoa	*Acropora solitaryensis*		VU		IBAT
Anthozoa	*Acropora striata*		VU		IBAT
Anthozoa	*Acropora tenella*		VU		IBAT
Anthozoa	*Acropora vaughani*		VU		IBAT
Anthozoa	*Acropora verweyi*		VU		IBAT
Anthozoa	*Acropora willisae*		VU		IBAT
Anthozoa	*Alveopora allingi*		VU		IBAT
Anthozoa	*Alveopora excelsa*		EN		IBAT
Anthozoa	*Alveopora fenestrata*		VU		IBAT
Anthozoa	*Alveopora marionensis*		VU		IBAT
Anthozoa	*Alveopora verrilliana*		VU		IBAT
Anthozoa	*Anacropora matthaii*		VU		IBAT
Anthozoa	*Anacropora puertogalerae*		VU		IBAT
Anthozoa	*Anacropora reticulata*		VU		IBAT
Anthozoa	*Anacropora spinosa*		EN		IBAT
Anthozoa	*Astreopora cucullata*		VU		IBAT
Anthozoa	*Astreopora incrustans*		VU		IBAT
Anthozoa	*Australogyra zelli*		VU		IBAT
Anthozoa	*Catalaphyllia jardinei*	Elegance Coral	VU		IBAT
Anthozoa	*Caulastraea echinulata*		VU		IBAT
Anthozoa	*Cycloseris curvata*		VU		IBAT

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Anthozoa	*Cyphastrea agassizi*		VU		IBAT
Anthozoa	*Cyphastrea ocellina*	Ocellated Brain Coral	VU		IBAT
Anthozoa	*Duncanopsammia peltata*		VU		IBAT
Anthozoa	*Euphyllia cristata*		VU		IBAT
Anthozoa	*Fimbriaphyllia ancora*		VU		IBAT
Anthozoa	*Galaxea astreata*		VU		IBAT
Anthozoa	*Goniopora burgosi*		VU		IBAT
Anthozoa	*Goniopora polyformis*		VU		IBAT
Anthozoa	*Heliopora coerulea*	Blue Coral	VU		IBAT
Anthozoa	*Homophyllia bowerbanki*		VU		IBAT
Anthozoa	*Hydnophora bonsai*		EN		IBAT
Anthozoa	*Isopora brueggemanni*		VU		IBAT
Anthozoa	*Isopora cuneata*		VU		IBAT
Anthozoa	*Leptoria irregularis*		VU		IBAT
Anthozoa	*Leptoseris incrustans*		VU		IBAT
Anthozoa	*Leptoseris yabei*		VU		IBAT
Anthozoa	*Lobophyllia diminuta*	Lobed Cactus Coral	VU		IBAT
Anthozoa	*Lobophyllia flabelliformis*		VU		IBAT
Anthozoa	*Lobophyllia ishigakiensis*		VU		IBAT
Anthozoa	*Micromussa multipunctata*		VU		IBAT
Anthozoa	*Montipora altasepta*		VU		IBAT
Anthozoa	*Montipora angulata*		VU		IBAT
Anthozoa	*Montipora australiensis*		VU		IBAT
Anthozoa	*Montipora cactus*		VU		IBAT
Anthozoa	*Montipora caliculata*		VU		IBAT
Anthozoa	*Montipora cebuensis*		VU		IBAT

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Anthozoa	*Montipora crassituberculata*		VU		IBAT
Anthozoa	*Montipora friabilis*		VU		IBAT
Anthozoa	*Montipora gaimardi*		VU		IBAT
Anthozoa	*Montipora mactanensis*		VU		IBAT
Anthozoa	*Montipora malampaya*		VU		IBAT
Anthozoa	*Montipora samarensis*		VU		IBAT
Anthozoa	*Montipora turtlensis*		VU		IBAT
Anthozoa	*Montipora vietnamensis*		VU		IBAT
Anthozoa	*Moseleya latistellata*		VU		IBAT
Anthozoa	*Pachyseris rugosa*		VU		IBAT
Anthozoa	*Paramontastraea salebrosa*		VU		IBAT
Anthozoa	*Pavona bipartita*		VU		IBAT
Anthozoa	*Pavona cactus*		VU		IBAT
Anthozoa	*Pavona danai*		VU		IBAT
Anthozoa	*Pavona decussata*	Cactus Coral	VU		IBAT
Anthozoa	*Montipora cactus*		VU		IBAT
Anthozoa	*Montipora caliculata*		VU		IBAT
Anthozoa	*Montipora cebuensis*		VU		IBAT
Anthozoa	*Montipora crassituberculata*		VU		IBAT
Anthozoa	*Montipora friabilis*		VU		IBAT
Anthozoa	*Montipora gaimardi*		VU		IBAT
Anthozoa	*Montipora mactanensis*		VU		IBAT
Anthozoa	*Montipora malampaya*		VU		IBAT
Anthozoa	*Montipora samarensis*		VU		IBAT
Anthozoa	*Montipora turtlensis*		VU		IBAT
Anthozoa	*Montipora vietnamensis*		VU		IBAT

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Anthozoa	*Moseleya latistellata*		VU		IBAT
Anthozoa	*Pachyseris rugosa*		VU		IBAT
Anthozoa	*Paramontastrae a salebrosa*		VU		IBAT
Anthozoa	*Pavona bipartita*		VU		IBAT
Anthozoa	*Pavona cactus*		VU		IBAT
Anthozoa	*Pavona danai*		VU		IBAT
Anthozoa	*Pavona decussata*	Cactus Coral	VU		IBAT
Anthozoa	*Pavona venosa*		VU		IBAT
Anthozoa	*Pectinia alcicornis*		VU		IBAT
Anthozoa	*Pectinia lactuca*	Lettuce Coral	VU		IBAT
Anthozoa	*Physogyra lichtensteini*		VU		IBAT
Anthozoa	*Platygyra yaeyamaensis*		VU		IBAT
Anthozoa	*Pleuractis taiwanensis*		VU		IBAT
Anthozoa	*Porites aranetai*		VU		IBAT
Anthozoa	*Porites attenuata*	Hump Coral	VU		IBAT
Anthozoa	*Porites cocosensis*		VU		IBAT
Anthozoa	*Porites cumulatus*		VU		IBAT
Anthozoa	*Porites eridani*		EN		IBAT
Anthozoa	*Porites horizontalata*		VU		IBAT
Anthozoa	*Porites napopora*		VU		IBAT
Anthozoa	*Porites nigrescens*		VU		IBAT
Anthozoa	*Porites silimaniana*		VU		IBAT
Anthozoa	*Stylocoeniella cocosensis*		VU		IBAT
Anthozoa	*Turbinaria bifrons*		VU		IBAT
Anthozoa	*Turbinaria mesenterina*		VU		IBAT
Anthozoa	*Turbinaria patula*		VU		IBAT
Anthozoa	*Turbinaria reniformis*		VU		IBAT
Anthozoa	*Turbinaria stellulata*		VU		IBAT

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Aves	*Acridotheres cristatellus*	Crested Myna	LC	EN	IBAT, Taiwan Red List
Aves	*Acridotheres javanicus*	Javan Myna	VU		IBAT
Aves	*Anser cygnoid*	Swan Goose	VU		IBAT
Aves	*Aquila heliaca*	Eastern Imperial Eagle	VU		IBAT
Aves	*Aythya baeri*	Baer's Pochard	CR	CR	IBAT
Aves	*Aythya ferina*	Common Pochard	VU		IBAT
Aves	*Cacatua alba*	White Cockatoo	EN		IBAT
Aves	*Calidris acuminata*	Sharp-tailed Sandpiper	VU		Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Calidris pygmaea*	Spoon-billed Sandpiper	CR	CR	IBAT, Taiwan Red List
Aves	*Ciconia boyciana*	Oriental Stork	EN	EN	IBAT
Aves	*Clanga clanga*	Greater Spotted Eagle	VU		IBAT
Aves	*Egretta eulophotes*	Chinese Egret	VU	VU	IBAT
Aves	*Emberiza aureola*	Yellow-breasted Bunting	CR	EN	IBAT
Aves	Garrulax taewanus	Taiwan Hwamei	NT	EN	IBAT
Aves	*Gorsachius goisagi*	Japanese Night-heron	VU		IBAT
Aves	*Ketupa flavipes*	Tawny Fish-owl	LC	EN	IBAT
Aves	*Mergus squamatus*	Scaly-sided Merganser	EN		IBAT
Aves	*Nisaetus nipalensis*	Mountain Hawk-eagle	NT	EN	IBAT
Aves	*Numenius madagascariensis*	Far Eastern Curlew	EN		IBAT
Aves	*Passer cinnamomeus*	Russet Sparrow	LC	EN	IBAT
Aves	*Phasianus colchicus*	Common Pheasant	LC	CR	IBAT
Aves	*Phoebastria albatrus*	Short-tailed Albatross	VU		IBAT
Aves	*Phylloscopus ijimae*	Ijima's Leaf-warbler	VU	VU	IBAT
Aves	*Pitta nympha*	Fairy Pitta	VU	EN	IBAT
Aves	*Platalea minor*	Black-faced Spoonbill	EN		IBAT
Aves	*Saundersilarus saundersi*	Saunders's Gull	VU	CR	IBAT

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Aves	*Synoicus chinensis*	Asian Blue Quail	LC	EN	IBAT
Aves	*Thalasseus bernsteini*	Chinese Crested Tern	CR	CR	IBAT
Aves	*Turnix sylvaticus*	Common Buttonquail	LC	CR	IBAT
Aves	*Tyto longimembris*	Eastern Grass-owl	LC	EN	IBAT
Chondrichthyes	*Aetobatus ocellatus*	Spotted Eagle Ray	VU		IBAT
Chondrichthyes	*Aetomylaeus maculatus*	Mottled Eagle Ray	EN		IBAT
Chondrichthyes	*Aetomylaeus nichofii*	Banded Eagle Ray	VU		IBAT
Chondrichthyes	*Aetomylaeus vespertilio*	Ornate Eagle Ray	EN		IBAT
Chondrichthyes	*Alopias pelagicus*	Pelagic Thresher	EN		IBAT
Chondrichthyes	*Alopias superciliosus*	Bigeye Thresher	VU		IBAT
Chondrichthyes	*Alopias vulpinus*	Common Thresher	VU		IBAT
Chondrichthyes	*Anoxypristis cuspidata*	Narrow Sawfish	EN		IBAT
Chondrichthyes	*Bathytoshia lata*	Brown Stingray	VU		IBAT
Chondrichthyes	*Benthobatis yangi*	Taiwanese Blind Electric Ray	VU		IBAT
Chondrichthyes	*Carcharhinus albimarginatus*	Silvertip Shark	VU		IBAT
Chondrichthyes	*Carcharhinus amblyrhynchos*	Grey Reef Shark	EN		IBAT
Chondrichthyes	*Carcharhinus brachyurus*	Copper Shark	VU		IBAT
Chondrichthyes	*Carcharhinus brevipinna*	Spinner Shark	VU		IBAT
Chondrichthyes	*Carcharhinus falciformis*	Silky Shark	VU		IBAT
Chondrichthyes	*Carcharhinus hemiodon*	Pondicherry Shark	CR		IBAT
Chondrichthyes	*Carcharhinus leucas*	Bull Shark	VU		IBAT
Chondrichthyes	*Carcharhinus limbatus*	Blacktip Shark	VU		IBAT
Chondrichthyes	*Carcharhinus longimanus*	Oceanic Whitetip Shark	CR		IBAT
Chondrichthyes	*Carcharhinus melanopterus*	Blacktip Reef Shark	VU		IBAT
Chondrichthyes	*Carcharhinus obscurus*	Dusky Shark	EN		IBAT
Chondrichthyes	*Carcharhinus plumbeus*	Sandbar Shark	EN		IBAT

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Chondrichthyes	*Carcharhinus tjutjot*	Indonesian Whaler Shark	VU		IBAT
Chondrichthyes	*Carcharias taurus*	Sand Tiger Shark	CR		IBAT
Chondrichthyes	*Carcharodon carcharias*	White Shark	VU		IBAT
Chondrichthyes	*Centrophorus atromarginatus*	Dwarf Gulper Shark	CR		IBAT
Chondrichthyes	*Centrophorus granulosus*	Gulper Shark	EN		IBAT
Chondrichthyes	*Centrophorus isodon*	Blackfin Gulper Shark	EN		IBAT
Chondrichthyes	*Centrophorus moluccensis*	Endeavour Dogfish	VU		IBAT
Chondrichthyes	*Centrophorus squamosus*	Leafscale Gulper Shark	EN		IBAT
Chondrichthyes	*Centrophorus uyato*	Little Gulper Shark	EN		IBAT
Chondrichthyes	*Cephaloscyllium fasciatum*	Reticulated Swellshark	CR		IBAT
Chondrichthyes	*Cephaloscyllium sarawakensis*	Sarawak Pygmy Swell Shark	CR		IBAT
Chondrichthyes	*Cetorhinus maximus*	Basking Shark	EN		IBAT
Chondrichthyes	*Chaenogaleus macrostoma*	Hooktooth Shark	VU		IBAT
Chondrichthyes	*Chimaera phantasma*	Silver Chimaera	VU		IBAT
Chondrichthyes	*Cirrhoscyllium formosanum*	Taiwan Saddled Carpetshark	VU		IBAT
Chondrichthyes	*Dipturus chinensis*	Polkadot Skate	VU		IBAT
Chondrichthyes	*Eusphyra blochii*	Winghead Shark	EN		IBAT
Chondrichthyes	*Glaucostegus typus*	Giant Guitarfish	CR		IBAT
Chondrichthyes	*Gymnura japonica*	Japanese Butterfly Ray	VU		IBAT
Chondrichthyes	*Gymnura poecilura*	Longtail Butterfly Ray	VU		IBAT
Chondrichthyes	*Gymnura zonura*	Zonetail Butterfly Ray	EN		IBAT
Chondrichthyes	*Halaelurus buergeri*	Blackspotted Catshark	EN		IBAT
Chondrichthyes	*Hemigaleus microstoma*	Sickelfin Weasel Shark	VU		IBAT
Chondrichthyes	*Hemipristis elongata*	Snaggletooth Shark	VU		IBAT
Chondrichthyes	*Hemitriakis complicofasciata*	Ocellate Topeshark	VU		IBAT
Chondrichthyes	*Hemitriakis japanica*	Japanese Topeshark	EN		IBAT

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Chondrichthyes	*Hemitrygon bennetti*	Bennett's Stingray	VU		IBAT
Chondrichthyes	*Hemitrygon navarrae*	Blackfish Stingray	VU		IBAT
Chondrichthyes	*Hemitrygon sinensis*	Chinese Stingray	EN		IBAT
Chondrichthyes	*Himantura leoparda*	Leopard Whipray	VU		IBAT
Chondrichthyes	*Isurus oxyrinchus*	Shortfin Mako	EN		IBAT
Chondrichthyes	*Isurus paucus*	Longfin Mako	EN		IBAT
Chondrichthyes	*Lamiopsis tephrodes*	Borneo Broadfin Shark	EN		IBAT
Chondrichthyes	*Maculabatis gerrardi*	Whitespotted Whipray	EN		IBAT
Chondrichthyes	*Maculabatis macrura*	Sharpnose Whipray	EN		IBAT
Chondrichthyes	*Mobula alfredi*	Reef Manta Ray	VU		IBAT
Chondrichthyes	*Mobula birostris*	Oceanic Manta Ray	EN		IBAT
Chondrichthyes	*Mobula eregoodoo*	Longhorned Pygmy Devil Ray	EN		IBAT
Chondrichthyes	*Mobula mobular*	Spinetail Devil Ray	EN		IBAT
Chondrichthyes	*Mobula tarapacana*	Sicklefin Devil Ray	EN		IBAT
Chondrichthyes	*Mobula thurstoni*	Bentfin Devil Ray	EN		IBAT
Chondrichthyes	*Mustelus griseus*	Spotless Smooth-hound	EN		IBAT
Chondrichthyes	*Mustelus manazo*	Starspotted Smooth-hound	EN		IBAT
Chondrichthyes	*Narcine brevilabiata*	Shortlip Numbfish	VU		IBAT
Chondrichthyes	*Narcine lingula*	Chinese Numbfish	VU		IBAT
Chondrichthyes	*Narcine maculata*	Smallspot Numbfish	VU		IBAT
Chondrichthyes	*Narke dipterygia*	Spottail Sleeper Ray	VU		IBAT
Chondrichthyes	*Narke japonica*	Japanese Sleeper Ray	VU		IBAT
Chondrichthyes	*Nebrius ferrugineus*	Tawny Nurse Shark	VU		IBAT
Chondrichthyes	*Negaprion acutidens*	Sharptooth Lemon Shark	EN		IBAT
Chondrichthyes	*Notorynchus cepedianus*	Broadnose Sevengill Shark	VU		IBAT
Chondrichthyes	*Odontaspis ferox*	Smalltooth Sand Tiger	VU		IBAT

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Chondrichthyes	*Okamejei acutispina*	Sharpspine Skate	VU		IBAT
Chondrichthyes	*Okamejei boesemani*	Boeseman's Skate	VU		IBAT
Chondrichthyes	*Okamejei hollandi*	Yellow Spotted Skate	VU		IBAT
Chondrichthyes	*Paragaleus tengi*	Straight-tooth Weasel Shark	EN		IBAT
Chondrichthyes	*Platyrhina sinensis*	Chinese Fanray	EN		IBAT
Chondrichthyes	*Platyrhina tangi*	Yellow-spotted Fanray	VU		IBAT
Chondrichthyes	*Pristis zijsron*	Green Sawfish	CR		IBAT
Chondrichthyes	*Proscyllium habereri*	Graceful Catshark	VU		IBAT
Chondrichthyes	*Rhina ancylostoma*	Bowmouth Guitarfish	CR		IBAT
Chondrichthyes	*Rhincodon typus*	Whale Shark	EN		IBAT
Chondrichthyes	*Rhinobatos hynnicephalus*	Ringed Guitarfish	EN		IBAT
Chondrichthyes	*Rhinobatos schlegelii*	Brown Guitarfish	CR		IBAT
Chondrichthyes	*Rhinoptera javanica*	Javanese Cownose Ray	EN		IBAT
Chondrichthyes	*Rhinoptera jayakari*	Oman Cownose Ray	EN		IBAT
Chondrichthyes	*Rhizoprionodon acutus*	Milk Shark	VU		IBAT
Chondrichthyes	*Rhynchobatus australiae*	Bottlenose Wedgefish	CR		IBAT
Chondrichthyes	*Rhynchobatus djiddensis*	Whitespotted Wedgefish	CR		IBAT
Chondrichthyes	*Rhynchobatus immaculatus*	Taiwanese Wedgefish	CR		IBAT
Chondrichthyes	*Rhynchobatus laevis*	Smoothnose Wedgefish	CR		IBAT
Chondrichthyes	*Sphyrna lewini*	Scalloped Hammerhead	CR		IBAT
Chondrichthyes	*Sphyrna mokarran*	Great Hammerhead	CR		IBAT
Chondrichthyes	*Sphyrna zygaena*	Smooth Hammerhead	VU		IBAT
Chondrichthyes	*Squalus brevirostris*	Japanese Shortnose Spurdog	EN		IBAT
Chondrichthyes	*Squalus formosus*	Taiwan Spurdog	EN		IBAT
Chondrichthyes	*Squalus japonicus*	Japanese Spurdog	EN		IBAT
Chondrichthyes	*Squalus montalbani*	Philippine Spurdog	VU		IBAT

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Chondrichthyes	*Squatina formosa*	Taiwan Angelshark	EN		IBAT
Chondrichthyes	*Squatina japonica*	Japanese Angelshark	CR		IBAT
Chondrichthyes	*Squatina nebulosa*	Clouded Angelshark	EN		IBAT
Chondrichthyes	*Squatina tergocellatoides*	Ocellated Angelshark	EN		IBAT
Chondrichthyes	*Stegostoma tigrinum*	Zebra Shark	EN		IBAT
Chondrichthyes	*Taeniurops meyeni*	Blotched Fantail Ray	VU		IBAT
Chondrichthyes	*Telatrygon zugei*	Pale-edge Sharpnose Ray	VU		IBAT
Chondrichthyes	*Triaenodon obesus*	Whitetip Reef Shark	VU		IBAT
Chondrichthyes	*Triakis scyllium*	Banded Houndshark	EN		IBAT
Chondrichthyes	*Urolophus aurantiacus*	Oriental Stingaree	VU		IBAT
Holothuroidea	*Actinopyga miliaris*	Harry Blackfish	VU		IBAT
Holothuroidea	*Holothuria scabra*	Golden Sandfish	EN		IBAT
Holothuroidea	*Thelenota ananas*	Pineapple Sea Cucumber	EN		IBAT
Hydrozoa	*Millepora foveolata*	Fire Coral	VU		IBAT
Hydrozoa	*Millepora tuberosa*		EN		IBAT
Lecanoromycetes	*Gymnoderma insulare*		EN		IBAT
Liliopsida	*Paris polyphylla*	Love Apple	VU		IBAT
Liliopsida	*Trillium tschonoskii*	Tschonoskii's Wakerobin	EN		IBAT
Magnoliopsida	*Albizia retusa*		LC	EN	IBAT, Taiwan Red List
Magnoliopsida	*Cinnamomum austrosinense*		LC	EN	IBAT
Magnoliopsida	*Coldenia procumbens*		LC	EN	IBAT
Magnoliopsida	*Colubrina asiatica*		LC	EN	IBAT
Magnoliopsida	*Euryale ferox*	Prickly Water Lily	LC	CR	IBAT
Magnoliopsida	*Heritiera littoralis*		LC	EN	IBAT
Magnoliopsida	*Hydrolea zeylanica*		LC	EN	IBAT
Magnoliopsida	*Limnophila sessiliflora*		LC	EN	IBAT

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Magnoliopsida	*Lithocarpus formosanus*		CR	CR	IBAT
Magnoliopsida	*Litsea garciae*		LC	CR	IBAT
Magnoliopsida	*Magnolia kachirachirai*		EN	EN	IBAT
Magnoliopsida	*Neolitsea villosa*		LC	CR	IBAT
Magnoliopsida	*Olax imbricata*		LC	EN	IBAT
Magnoliopsida	*Pterocarpus indicus*	Burmese Rosewood	EN		IBAT
Magnoliopsida	*Quercus aliena*		LC	CR	IBAT
Magnoliopsida	*Thespesia populnea*	Portia Tree	LC	EN	IBAT, Trinity DA
Malacostraca	*Geothelphusa yangminshan*	Yangmingshan Crab	EN		IBAT
Malacostraca	*Nanhaipotamon formosanum*	Taiwan's South China Sea River Crab	VU		IBAT
Malacostraca	*Somanniathelphusa taiwanensis*	Taiwan Waist Crab	EN		IBAT
Mammalia	*Balaenoptera borealis*	Sei Whale	EN		IBAT
Mammalia	*Balaenoptera musculus*	Blue Whale	EN		IBAT
Mammalia	*Balaenoptera physalus*	Fin Whale	VU		IBAT
Mammalia	*Lutra lutra*	Eurasian Otter	NT	CR	IBAT
Mammalia	*Manis pentadactyla*	Chinese Pangolin	CR	VU	IBAT
Mammalia	*Neophocaena asiaeorientalis*	Narrow-ridged Finless Porpoise	EN		IBAT
Mammalia	*Neophocaena phocaenoides*	Indo-Pacific Finless Porpoise	VU		IBAT
Mammalia	*Physeter macrocephalus*	Sperm Whale	VU		IBAT
Mammalia	*Prionailurus bengalensis*	Mainland Leopard Cat	LC	EN	IBAT
Mammalia	*Pteropus dasymallus*	Ryukyu Flying Fox	VU	CR	IBAT
Mammalia	*Rusa unicolor*	Sambar	VU		IBAT
Mammalia	*Sousa chinensis ssp. Taiwanensis*	Taiwanese Humpback Dolphin	CR		IBAT
Mammalia	*Ursus thibetanus*	Asiatic Black Bear	VU	EN	IBAT
Mammalia	*Vespertilio sinensis*	Asian Particolored Bat	LC	EN	IBAT
Merostomata	*Tachypleus tridentatus*	Tri-spine Horseshoe Crab	EN		IBAT
Myxini	*Eptatretus taiwanae*		EN		IBAT

Class	Scientific name	Common name	IUCN status	National Red List Status	Source
Pinopsida	*Podocarpus costalis*		EN	CR	IBAT
Polypodiopsida	*Salvinia natans*	Floating Fern	LC	CR	IBAT
Reptilia	*Caretta caretta*	Loggerhead Turtle	VU		IBAT
Reptilia	*Dermochelys coriacea*	Leatherback Turtle	VU		IBAT
Reptilia	*Eretmochelys imbricata*	Hawksbill Turtle	CR		IBAT
Reptilia	*Hebius miyajimae*	Maki's Keelback	VU	EN	IBAT
Reptilia	*Lepidochelys olivacea*	Olive Ridley Turtle	VU		IBAT
Reptilia	*Mauremys mutica*	Yellow Pond Turtle	CR		IBAT
Reptilia	*Mauremys sinensis*	Chinese Stripe-necked Turtle	CR		IBAT
Reptilia	*Myrrophis chinensis*	Chinese Mud Snake	LC	EN	IBAT

Note: CR = Critically Endangered, EN = Endangered, VU = Vulnerable, NT = Near Threatened, LC = Least Concern, DD = Data Deficient
Source: Mott MacDonald, 2023; IBAT, 2023; IUCN; 2023

B. Critical habitat species assessment for criterion 2

Table B.2: Critical habitat species assessment for candidate species for Criterion 2

Class	Scientific name	Common name	Restricted range	Source
Actinopterygii	*Acanthopagrus taiwanensis*	Taiwan Picnic Seabream	Yes	Baseline surveys for Project Mercury / Yunlin, IBAT
Actinopterygii	*Bothus assimilis*		Yes	IBAT
Actinopterygii	*Cirrhimuraena yuanding*		Yes	IBAT
Actinopterygii	*Cirricaecula macdowelli*		Yes	IBAT
Actinopterygii	*Engyprosopon parvipectorale*		Yes	IBAT
Actinopterygii	*Brachysomophis longipinnis*		Yes	IBAT
Actinopterygii	*Callechelys kuro*		Yes	IBAT
Actinopterygii	*Myripristis formosa*		Yes	IBAT
Actinopterygii	*Oligolepis formosanus*		Yes	IBAT
Actinopterygii	*Pseudorhombus ctenosquamis*		Yes	IBAT
Actinopterygii	*Cirrimaxilla formosa*	Taiwanese Barbel Moray	Yes	IBAT
Actinopterygii	*Conger macrocephalus*		Yes	IBAT
Actinopterygii	*Gymnothorax shaoi*		Yes	IBAT
Actinopterygii	*Muraenichthys hattae*		Yes	IBAT
Actinopterygii	*Ophichthus brevicaudatus*		Yes	IBAT
Actinopterygii	*Ophichthus retrodorsalis*		Yes	IBAT
Actinopterygii	*Scolecenchelys fuscapenis*	Black Tailed Worm Eel	Yes	IBAT
Actinopterygii	*Symphurus leucochilus*		Yes	IBAT
Actinopterygii	*Symphurus longirostris*	Long-snout Tonguefish	Yes	IBAT
Amphibia	*Buergeria choui*	Yaeyama Kajika Frog	Yes	
Chrondrichthyes	*Etmopterus splendidus*	Splendid Lanternshark	Yes	IBAT
Chrondrichthyes	*Cirrhoscyllium formosanum*	Taiwan Saddled Carpetshark	Yes	IBAT
Chrondrichthyes	*Hemitriakis complicofasciata*	Ocellate Topeshark	Yes	IBAT
Chrondrichthyes	*Hemitrygon bennetti*	Bennett's Stingray	Yes	IBAT
Chrondrichthyes	*Rhynchobatus immaculatus*	Taiwanese Wedgefish	Yes	IBAT
Chrondrichthyes	*Squatina formosa*	Taiwan Angelshark	Yes	IBAT
Insecta	*Acrida formosana*	Taiwan Cone-headed Grasshopper	Yes	IBAT
Malacostraca	*Metanephrops formosanus*	Formosa Lobster	Yes	IBAT
Mammalia	*Anourosorex yamashinai*	Taiwanese Mole Shrew	Yes	IBAT
Mammalia	*Apodemus semotus*	Taiwan Field Mouse	Yes	IBAT
Mammalia	*Arielulus torquatus*	Necklace Sprite	Yes	IBAT
Mammalia	*Macaca cyclopis*	Formosan Rock Macaque	Yes	IBAT
Mammalia	*Murina puta*	Taiwanese Tube-nosed Bat	Yes	IBAT
Mammalia	*Niviventer coninga*	Spiny Taiwan Niviventer	Yes	IBAT
Mammalia	*Sousa chinensis ssp. Taiwanensis*	Taiwanese Humpback Dolphin	Yes	IBAT
Myxini	*Eptatretus cheni*		Yes	IBAT
Myxini	*Eptatretus chinensis*		Yes	IBAT
Myxini	*Eptatretus fernholmi*		Yes	IBAT
Myxini	*Eptatretus nelsoni*		Yes	IBAT
Myxini	*Eptatretus sheni*		Yes	IBAT

Class	Scientific name	Common name	Restricted range	Source
Myxini	*Eptatretus taiwanae*		Yes	IBAT
Myxini	*Eptatretus wisneri*		Yes	IBAT
Myxini	*Eptatretus yangi*		Yes	IBAT
Myxini	*Myxine formosana*		Yes	IBAT
Myxini	*Myxine kuoi*		Yes	IBAT
Reptilia	*Scincella formosensis*	Van Denburgh's Ground Skink	Yes	IBAT
Reptilia	*Takydromus formosanus*	Formosa Grass Lizard	Yes	IBAT
Reptilia	*Takydromus sauteri*	Koshun Grass Lizard	Yes	IBAT

Source: Mott MacDonald, 2023; IBAT, 2023; IUCN, 2023

C. Critical habitat species assessment for criterion 3

Table C.3: Critical habitat species assessment for candidate species for Criterion 3

Class	Scientific name	Common name	Migratory pattern	Source
Actinopterygii	*Acanthocybium solandri*	Wahoo	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT, IBAT
Actinopterygii	*Acentrogobius caninus*	Tropical Sand Goby	Full migrant	IBAT
Actinopterygii	*Alepisaurus ferox*	Long Snouted Lancetfish	Full migrant	IBAT
Actinopterygii	*Anguilla bicolor*	Shortfin Eel	Full migrant	IBAT
Actinopterygii	*Anguilla luzonensis*	Philippine Mottled Eel	Full migrant	IBAT
Actinopterygii	*Anguilla marmorata*	Marbled Eel	Full migrant	IBAT
Actinopterygii	*Apogon semilineatus*	Half-lined Cardinalfish	Full migrant	Trinity EIA, IBAT
Actinopterygii	*Argyropelecus hemigymnus*	Half-naked Hatchetfish	Full migrant	IBAT
Actinopterygii	*Atherinomorus lacunosus*	Hardyhead Silverside	Full migrant	IBAT
Actinopterygii	*Acentrogobius caninus*	Tropical Sand Goby	Full migrant	IBAT
Actinopterygii	*Alepisaurus ferox*	Long Snouted Lancetfish	Full migrant	IBAT
Actinopterygii	*Anguilla bicolor*	Shortfin Eel	Full migrant	IBAT
Actinopterygii	*Anguilla luzonensis*	Philippine Mottled Eel	Full migrant	IBAT
Actinopterygii	*Anguilla marmorata*	Marbled Eel	Full migrant	IBAT
Actinopterygii	*Apogon semilineatus*	Half-lined Cardinalfish	Full migrant	Trinity EIA, IBAT
Actinopterygii	*Argyropelecus hemigymnus*	Half-naked Hatchetfish	Full migrant	IBAT
Actinopterygii	*Atherinomorus lacunosus*	Hardyhead Silverside	Full migrant	IBAT
Actinopterygii	*Auxis rochei*	Bullet Tuna	Full migrant	IBAT
Actinopterygii	*Anguilla japonica*	Japanese Eel	Full migrant	IBAT, Taiwan Red List
Actinopterygii	*Argyrosomus japonicus*	Dusky Meagre	Full migrant	IBAT
Actinopterygii	*Auxis thazard*	Frigate Tuna	Full migrant	IBAT
Actinopterygii	*Coilia mystus*	Osbeck's Grenadier Anchovy	Full migrant	IBAT
Actinopterygii	*Awaous grammepomus*		Full migrant	IBAT
Actinopterygii	*Bathygobius fuscus*	Brown Frillfin	Full migrant	IBAT
Actinopterygii	*Benthosema pterotum*	Skinnycheek Lanternfish	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT, Trinity DA
Actinopterygii	*Bolbometopon muricatum*	Green Humphead Parrotfish	Full migrant	IBAT
Actinopterygii	*Bostrychus sinensis*	Four-eyed Sleeper	Full migrant	IBAT
Actinopterygii	*Bunaka gyrinoides*	Green-backed Gudgeon	Full migrant	IBAT
Actinopterygii	*Butis amboinensis*	Ambon Gudgeon	Full migrant	IBAT
Actinopterygii	*Butis butis*	Crimson-tipped Gudgeon	Full migrant	IBAT
Actinopterygii	*Coilia nasus*	Japanese Grenadier Anchovy	Full migrant	IBAT
Actinopterygii	*Caecula pterygera*	Finny Snake-eel	Full migrant	IBAT
Actinopterygii	*Callogobius hasseltii*	Hasselt's Flap-headed Goby	Full migrant	IBAT
Actinopterygii	*Caragobius urolepis*	Scaleless Worm Goby	Full migrant	IBAT
Actinopterygii	*Channa gachua*	Dwarf Snakehead	Full migrant	IBAT
Actinopterygii	*Chanodichthys erythropterus*	Redfin Culter	Full migrant	IBAT
Actinopterygii	*Stiphodon percnopterygionus*		Full migrant	IBAT
Actinopterygii	*Collichthys lucidus*	Big Head Croaker	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Actinopterygii	*Conger myriaster*	Whitespotted Conger	Full migrant	IBAT
Actinopterygii	*Congresox talabon*	Yellow Pike-conger	Full migrant	IBAT
Actinopterygii	*Congresox talabonoides*	Indian Putyekanipa	Full migrant	IBAT
Actinopterygii	*Coryphaena equiselis*	Pompano Dolphinfish	Full migrant	IBAT
Actinopterygii	*Coryphaena hippurus*	Common Dolphinfish	Full migrant	IBAT
Actinopterygii	*Ctenopharyngodon idella*	Grass Carp	Full migrant	IBAT
Actinopterygii	*Culter alburnus*		Full migrant	IBAT
Actinopterygii	*Cynoglossus gracilis*	Narrow Tongue-sole	Full migrant	IBAT
Actinopterygii	*Decapterus russelli*	Indian Scad	Full migrant	IBAT, Trinity DA
Actinopterygii	*Dendrophysa russelii*	Goatee Croaker	Full migrant	IBAT
Actinopterygii	*Electrona risso*	Electric Lantern Fish	Full migrant	IBAT
Actinopterygii	*Eleotris acanthopomus*	Spine-cheek Gudgeon	Full migrant	IBAT
Actinopterygii	*Eleotris fusca*	Brown Spinecheek Gudgeon	Full migrant	IBAT
Actinopterygii	*Eleotris oxycephala*	尖头塘鳢	Full migrant	IBAT
Actinopterygii	*Engraulis japonicus*	Japanese Anchovy	Full migrant	IBAT, Trinity DA
Actinopterygii	*Euthynnus affinis*	Kawakawa	Full migrant	IBAT, Trinity DA
Actinopterygii	*Favonigobius reichei*	Indo-pacific Tropical Sand Goby	Full migrant	IBAT
Actinopterygii	*Giuris margaritaceus*	Snakehead Gudgeon	Full migrant	IBAT
Actinopterygii	*Glossogobius aureus*	Golden Flathead Goby	Full migrant	IBAT
Actinopterygii	*Larimichthys crocea*	Large Yellow Croaker	Full migrant	IBAT
Actinopterygii	*Gobiodon rivulatus*	Rippled Coralgoby	Full migrant	IBAT
Actinopterygii	*Grammatorcynus bilineatus*	Double-lined Mackerel	Full migrant	IBAT
Actinopterygii	*Gymnosarda unicolor*	Dogtooth Tuna	Full migrant	IBAT
Actinopterygii	*Hirundichthys speculiger*	Mirrorwing Flyingfish	Full migrant	IBAT
Actinopterygii	*Hypophthalmichthys nobilis*	Bighead Carp	Full migrant	IBAT
Actinopterygii	*Istiompax indica*	Black Marlin	Full migrant	IBAT
Actinopterygii	*Istiophorus platypterus*	Sailfish	Full migrant	IBAT
Actinopterygii	*Johnius belangerii*	Belanger's Croaker	Full migrant	IBAT
Actinopterygii	*Kajikia audax*	Striped Marlin	Full migrant	IBAT
Actinopterygii	*Katsuwonus pelamis*	Skipjack Tuna	Full migrant	IBAT
Actinopterygii	*Konosirus punctatus*		Full migrant	IBAT
Actinopterygii	*Kuhlia mugil*		Full migrant	IBAT
Actinopterygii	*Lobianchia gemellarii*	Cocco's Lantern Fish	Full migrant	IBAT
Actinopterygii	*Lutjanus argentimaculatus*	Mangrove Red Snapper	Full migrant	IBAT
Actinopterygii	*Lutjanus johnii*	John's Snapper	Full migrant	IBAT
Actinopterygii	*Makaira nigricans*	Blue Marlin	Full migrant	IBAT
Actinopterygii	*Megalops cyprinoides*	Indo-Pacific Tarpon	Full migrant	IBAT
Actinopterygii	*Mesopristes cancellatus*	Tapiroid Grunter	Full migrant	IBAT
Actinopterygii	*Microphis brachyurus*	Opossum Pipefish	Full migrant	IBAT
Actinopterygii	*Microphis leiaspis*	Barhead Pipefish	Full migrant	IBAT
Actinopterygii	*Miichthys miiuy*	Mi-iuy Croaker	Full migrant	IBAT
Actinopterygii	*Morone saxatilis*	Striped Bass	Full migrant	IBAT
Actinopterygii	*Muraenesox bagio*	Common Pike Conger	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Actinopterygii	*Muraenesox cinereus*	Daggertooth Pike-conger	Full migrant	IBAT
Actinopterygii	*Myctophum lychnobium*	Nightlight Lanternfish	Full migrant	IBAT
Actinopterygii	*Myctophum spinosum*	Spinose Lanternfish	Full migrant	IBAT
Actinopterygii	*Mylopharyngodon piceus*	Black Carp	Full migrant	IBAT
Actinopterygii	*Nematalosa nasus*	Bloch's Gizzard Shad	Full migrant	IBAT
Actinopterygii	*Nemichthys scolopaceus*	Slender Snipe Eel	Full migrant	IBAT
Actinopterygii	*Caranx sexfasciatus*	Bigeye Trevally	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT, Trinity DA
Actinopterygii	*Nibea chui*	Chu's Croaker	Full migrant	IBAT
Actinopterygii	*Ophiocara porocephala*	Spangled Gudgeon	Full migrant	IBAT
Actinopterygii	*Oxyeleotris marmorata*	Marbled Goby	Full migrant	IBAT
Actinopterygii	*Pagrus major*	Red Seabream	Full migrant	IBAT
Actinopterygii	*Parablennius yatabei*		Full migrant	IBAT
Actinopterygii	*Pennahia argentata*	Silver Sea Meagre	Full migrant	IBAT
Actinopterygii	*Petroscirtes breviceps*	Short-head Sabretooth Blenny	Full migrant	IBAT
Actinopterygii	*Planiliza subviridis*	Greenback Mullet	Full migrant	IBAT
Actinopterygii	*Plecoglossus altivelis*	Ayu sweetfish	Full migrant	IBAT
Actinopterygii	*Pomadasys maculatus*	Saddle Grunt	Full migrant	IBAT
Actinopterygii	*Pseudapocryptes elongatus*		Full migrant	IBAT
Actinopterygii	*Rastrelliger faughni*	Island Mackerel	Full migrant	IBAT
Actinopterygii	*Rastrelliger kanagurta*	Indian Mackerel	Full migrant	IBAT
Actinopterygii	*Remora brachyptera*	Spearfish Remora	Full migrant	IBAT
Actinopterygii	*Rhabdosargus sarba*	Goldlined Seabream	Full migrant	IBAT
Actinopterygii	*Rhinogobius brunneus*	Amur Goby	Full migrant	IBAT
Actinopterygii	*Rhinogobius giurinus*	Barcheek goby	Full migrant	IBAT
Actinopterygii	*Roa modestus*	Brown-banded Butterflyfish	Full migrant	IBAT
Actinopterygii	*Sarda orientalis*	Oriental Bonito	Full migrant	IBAT
Actinopterygii	*Sardinella lemuru*	Bali sardinella	Full migrant	IBAT
Actinopterygii	*Sardinella zunasi*		Full migrant	IBAT
Actinopterygii	*Sardinops sagax*		Full migrant	IBAT
Actinopterygii	*Saurenchelys stylura*	Pillar Wire Eel	Full migrant	IBAT
Actinopterygii	*Scomber australasicus*	Blue Mackerel	Full migrant	IBAT
Actinopterygii	*Scomber japonicus*	Pacific Chub Mackerel	Full migrant	IBAT
Actinopterygii	*Scomberomorus commerson*	Narrow-barred Spanish Mackerel	Full migrant	IBAT
Actinopterygii	*Scomberomorus guttatus*	Indo-Pacific King Mackerel	Full migrant	IBAT
Actinopterygii	*Scomberomorus koreanus*	Korean Seerfish	Full migrant	IBAT
Actinopterygii	*Scomberomorus niphonius*	Japanese Spanish Mackerel	Full migrant	IBAT
Actinopterygii	*Sicyopus zosterophorus*		Full migrant	IBAT
Actinopterygii	*Spratelloides gracilis*	Blue Sprat	Full migrant	IBAT
Actinopterygii	*Stiphodon surrufus*		Full migrant	IBAT
Actinopterygii	*Strophidon sathete*	Giant Estuarine Moray	Full migrant	IBAT
Actinopterygii	*Sufflamen fraenatum*	Masked Triggerfish	Full migrant	IBAT
Actinopterygii	*Takifugu obscurus*	Mefugu	Full migrant	IBAT
Actinopterygii	*Takifugu ocellatus*	Ocellated Puffer	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Actinopterygii	*Tenualosa reevesii*	Reeves' shad	Full migrant	IBAT
Actinopterygii	*Tetrapturus angustirostris*	Shortbill Spearfish	Full migrant	IBAT
Actinopterygii	*Tetraroge nigra*	Freshwater waspfish	Full migrant	IBAT
Actinopterygii	*Thunnus alalunga*	Albacore Tuna	Full migrant	IBAT
Actinopterygii	*Thunnus albacares*	Yellowfin Tuna	Full migrant	IBAT
Actinopterygii	*Thunnus obesus*	Bigeye Tuna	Full migrant	IBAT
Actinopterygii	*Thunnus orientalis*	Pacific Bluefin Tuna	Full migrant	IBAT
Actinopterygii	*Xiphias gladius*	Swordfish	Full migrant	IBAT
Actinopterygii	*Yarica hyalosoma*	Mangrove Cardinalfish	Full migrant	IBAT
Actinopterygii	*Zenarchopterus dunckeri*		Full migrant	IBAT
Actinopterygii	*Exocoetus volitans*	Tropical Two-wing Flyingfish	Full migrant	IBAT
Actinopterygii	*Ilisha elongata*		Full migrant	IBAT
Actinopterygii	*Stolephorus indicus*	Indian Anchovy	Full migrant	IBAT
Aves	*Accipiter virgatus*	Besra	Full migrant	IBAT, Taiwan Red List
Aves	*Aythya baeri*	Baer's Pochard	Full migrant	IBAT
Aves	*Ciconia boyciana*	Oriental Stork	Full migrant	IBAT
Aves	*Emberiza aureola*	Yellow-breasted Bunting	Full migrant	IBAT
Aves	*Thalasseus bernsteini*	Chinese Crested Tern	Full migrant	IBAT
Aves	*Mergus squamatus*	Scaly-sided Merganser	Full migrant	IBAT
Aves	*Numenius madagascariensis*	Far Eastern Curlew	Full migrant	IBAT
Aves	*Platalea minor*	Black-faced Spoonbill	Full migrant	IBAT
Aves	*Accipiter gularis*	Japanese Sparrowhawk	Full migrant	IBAT
Aves	*Accipiter soloensis*	Chinese Sparrowhawk	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT
Aves	*Acrocephalus bistrigiceps*	Black-browed Reed-warbler	Full migrant	IBAT
Aves	*Actitis hypoleucos*	Common Sandpiper	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Agropsar philippensis*	Chestnut-cheeked Starling	Full migrant	IBAT
Aves	*Agropsar sturninus*	Purple-backed Starling	Full migrant	IBAT
Aves	*Aix galericulata*	Mandarin Duck	Full migrant	IBAT, Taiwain Red List
Aves	*Alauda gulgula*	Oriental Skylark	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT
Aves	*Alcedo atthis*	Common Kingfisher	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Amaurornis phoenicurus*	White-breasted Waterhen	Full migrant	IBAT
Aves	*Anas acuta*	Northern Pintail	Full migrant	IBAT
Aves	*Carpodacus formosanus*	Taiwan Rosefinch	Full migrant	IBAT
Aves	*Anas crecca*	Common Teal	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT, Taiwan Red List
Aves	*Anas platyrhynchos*	Mallard	Full migrant	IBAT
Aves	*Anas zonorhyncha*	Chinese Spot-billed Duck	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Anser anser*	Greylag Goose	Full migrant	IBAT
Aves	*Anser cygnoid*	Swan Goose	Full migrant	IBAT
Aves	*Anthus cervinus*	Red-throated Pipit	Full migrant	IBAT
Aves	*Anthus gustavi*	Pechora Pipit	Full migrant	IBAT
Aves	*Anthus hodgsoni*	Olive-backed Pipit	Full migrant	IBAT
Aves	*Anthus richardi*	Richard's Pipit	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Apus pacificus*	Pacific Swift	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Aves	*Aquila heliaca*	Eastern Imperial Eagle	Full migrant	IBAT
Aves	*Ardea cinerea*	Grey Heron	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Ardea intermedia*	Intermediate Egret	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT
Aves	*Ardea purpurea*	Purple Heron	Full migrant	IBAT
Aves	*Ardenna pacifica*	Wedge-tailed Shearwater	Full migrant	IBAT
Aves	*Ardeola bacchus*	Chinese Pond-heron	Full migrant	IBAT
Aves	*Regulus goodfellowi*	Flamecrest	Full migrant	IBAT
Aves	*Arenaria interpres*	Ruddy Turnstone	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Asio flammeus*	Short-eared Owl	Full migrant	IBAT
Aves	*Yuhina brunneiceps*	Taiwan Yuhina	Full migrant	IBAT
Aves	*Asio otus*	Northern Long-eared Owl	Full migrant	IBAT
Aves	*Aythya ferina*	Common Pochard	Full migrant	IBAT
Aves	*Aythya fuligula*	Tufted Duck	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT
Aves	*Aythya marila*	Greater Scaup	Full migrant	IBAT
Aves	*Bombycilla japonica*	Japanese Waxwing	Full migrant	IBAT
Aves	*Botaurus stellaris*	Eurasian Bittern	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Bubulcus ibis*	Cattle Egret	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT, Trinity DA
Aves	*Bulweria bulwerii*	Bulwer's Petrel	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT, Trinity DA
Aves	*Butastur indicus*	Grey-faced Buzzard	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT
Aves	*Buteo japonicus*	Japanese Buzzard	Full migrant	IBAT
Aves	*Buteo lagopus*	Rough-legged Buzzard	Full migrant	IBAT
Aves	*Butorides striata*	Green-backed Heron	Full migrant	IBAT
Aves	*Calidris acuminata*	Sharp-tailed Sandpiper	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT
Aves	*Calidris alba*	Sanderling	Full migrant	IBAT
Aves	*Horornis acanthizoides*	Yellowish-bellied Bush-warbler	Full migrant	IBAT
Aves	*Calidris alpina*	Dunlin	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT, Taiwan Red List
Aves	*Calidris falcinellus*	Broad-billed Sandpiper	Full migrant	IBAT
Aves	*Horornis fortipes*	Brownish-flanked Bush-warbler	Full migrant	IBAT
Aves	*Calidris ferruginea*	Curlew Sandpiper	Full migrant	IBAT
Aves	*Calidris pugnax*	Ruff	Full migrant	IBAT
Aves	*Calidris ruficollis*	Red-necked Stint	Full migrant	Baseline surveys for Project Mercury / Yunlin, IBAT, Taiwan Red List
Aves	*Calidris subminuta*	Long-toed Stint	Full migrant	IBAT
Aves	*Calidris temminckii*	Temminck's Stint	Full migrant	IBAT, Taiwan Red List
Aves	*Calliope calliope*	Siberian Rubythroat	Full migrant	IBAT
Aves	*Calonectris leucomelas*	Streaked Shearwater	Full migrant	Baseline surveys for Project Mercury / Yunlin, Trinity EIA, IBAT, Trinity DA
Aves	*Cecropis daurica*	Red-rumped Swallow	Full migrant	IBAT
Aves	*Charadrius alexandrinus*	Kentish Plover	Full migrant	IBAT, Trinity DA
Aves	*Charadrius dubius*	Little Ringed Plover	Full migrant	IBAT
Aves	*Charadrius leschenaultii*	Greater Sandplover	Full migrant	IBAT
Aves	*Charadrius mongolus*	Lesser Sandplover	Full migrant	IBAT
Aves	*Chlidonias hybrida*	Whiskered Tern	Full migrant	IBAT, Trinity DA
Aves	*Chlidonias leucopterus*	White-winged Tern	Full migrant	IBAT, Trinity DA
Aves	*Chloris sinica*	Oriental Greenfinch	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Aves	*Ciconia nigra*	Black Stork	Full migrant	IBAT
Aves	*Circus cyaneus*	Hen Harrier	Full migrant	IBAT
Aves	*Circus melanoleucos*	Pied Harrier	Full migrant	IBAT
Aves	*Circus spilonotus*	Eastern Marsh-harrier	Full migrant	IBAT, Trinity DA
Aves	*Clanga clanga*	Greater Spotted Eagle	Full migrant	IBAT
Aves	*Cuculus optatus*	Oriental Cuckoo	Full migrant	IBAT
Aves	*Cuculus poliocephalus*	Lesser Cuckoo	Full migrant	IBAT
Aves	*Cyanoptila cyanomelana*	Blue-and-white Flycatcher	Full migrant	IBAT
Aves	*Delichon dasypus*	Asian House Martin	Full migrant	IBAT
Aves	*Dicrurus macrocercus*	Black Drongo	Full migrant	IBAT
Aves	*Egretta eulophotes*	Chinese Egret	Full migrant	IBAT
Aves	*Egretta garzetta*	Little Egret	Full migrant	IBAT, Trinity DA
Aves	*Egretta sacra*	Pacific Reef-egret	Full migrant	IBAT
Aves	*Emberiza pusilla*	Little Bunting	Full migrant	IBAT
Aves	*Emberiza spodocephala*	Black-faced Bunting	Full migrant	IBAT
Aves	*Emberiza sulphurata*	Yellow Bunting	Full migrant	IBAT
Aves	*Eophona migratoria*	Chinese Grosbeak	Full migrant	IBAT
Aves	*Falco peregrinus*	Peregrine Falcon	Full migrant	IBAT
Aves	*Falco tinnunculus*	Common Kestrel	Full migrant	IBAT, Trinity DA
Aves	*Ficedula albicilla*	Red-throated Flycatcher	Full migrant	IBAT
Aves	*Fringilla montifringilla*	Brambling	Full migrant	IBAT
Aves	*Fulica atra*	Common Coot	Full migrant	IBAT
Aves	*Gallicrex cinerea*	Watercock	Full migrant	IBAT
Aves	*Gallinago gallinago*	Common Snipe	Full migrant	IBAT
Aves	*Gallinago megala*	Swinhoe's Snipe	Full migrant	IBAT
Aves	*Gallinago stenura*	Pintail Snipe	Full migrant	IBAT
Aves	*Gallinula chloropus*	Common Moorhen	Full migrant	IBAT
Aves	*Gavia arctica*	Arctic Loon	Full migrant	IBAT
Aves	*Gavia stellata*	Red-throated Loon	Full migrant	IBAT
Aves	*Gelochelidon nilotica*	Common Gull-billed Tern	Full migrant	IBAT
Aves	*Treron formosae*	Taiwan Green-pigeon	Full migrant	IBAT
Aves	*Glareola maldivarum*	Oriental Pratincole	Full migrant	IBAT, Trinity DA
Aves	*Gorsachius goisagi*	Japanese Night-heron	Full migrant	IBAT
Aves	*Gorsachius melanolophus*	Malay Night-heron	Full migrant	IBAT
Aves	*Halcyon coromanda*	Ruddy Kingfisher	Full migrant	IBAT
Aves	*Helopsaltes ochotensis*	Middendorff's Grasshopper-warbler	Full migrant	IBAT
Aves	*Hierococcyx sparverioides*	Large Hawk-cuckoo	Full migrant	IBAT
Aves	*Himantopus himantopus*	Black-winged Stilt	Full migrant	IBAT
Aves	*Hirundapus cochinchinensis*	Silver-backed Needletail	Full migrant	IBAT
Aves	*Hirundo rustica*	Barn Swallow	Full migrant	IBAT
Aves	*Horornis canturians*	Korean Bush-warbler	Full migrant	IBAT
Aves	*Horornis diphone*	Japanese Bush-warbler	Full migrant	IBAT
Aves	*Hydrobates monorhis*	Swinhoe's Storm-petrel	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Aves	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	Full migrant	IBAT
Aves	*Hydroprogne caspia*	Caspian Tern	Full migrant	IBAT
Aves	*Hypothymis azurea*	Black-naped Monarch	Full migrant	IBAT
Aves	*Hypsipetes leucocephalus*	Black Bulbul	Full migrant	IBAT
Aves	*Ixobrychus cinnamomeus*	Cinnamon Bittern	Full migrant	IBAT
Aves	*Ixobrychus eurhythmus*	Schrenck's Bittern	Full migrant	IBAT
Aves	*Ixobrychus flavicollis*	Black Bittern	Full migrant	IBAT
Aves	*Ixobrychus sinensis*	Yellow Bittern	Full migrant	IBAT
Aves	*Lalage melaschistos*	Black-winged Cuckooshrike	Full migrant	IBAT
Aves	*Lanius cristatus*	Brown Shrike	Full migrant	IBAT
Aves	*Lanius schach*	Long-tailed Shrike	Full migrant	IBAT, Trinity DA
Aves	*Larus canus*	Mew Gull	Full migrant	IBAT
Aves	*Larus crassirostris*	Black-tailed Gull	Full migrant	IBAT
Aves	*Larus fuscus*	Lesser Black-backed Gull	Full migrant	IBAT
Aves	*Larus ridibundus*	Black-headed Gull	Full migrant	IBAT
Aves	*Larus smithsonianus*	Arctic Herring Gull	Full migrant	IBAT
Aves	*Limnodromus scolopaceus*	Long-billed Dowitcher	Full migrant	IBAT
Aves	*Limosa lapponica*	Bar-tailed Godwit	Full migrant	IBAT
Aves	*Limosa limosa*	Black-tailed Godwit	Full migrant	IBAT
Aves	*Luscinia svecica*	Bluethroat	Full migrant	IBAT
Aves	*Mareca falcata*	Falcated Duck	Full migrant	IBAT
Aves	*Mareca penelope*	Eurasian Wigeon	Full migrant	IBAT
Aves	*Melanitta stejnegeri*	Siberian Scoter	Full migrant	IBAT
Aves	*Mergus serrator*	Red-breasted Merganser	Full migrant	IBAT
Aves	*Otus lettia*	Collared Scops-owl	Full migrant	IBAT
Aves	*Otus spilocephalus*	Mountain Scops-owl	Full migrant	IBAT
Aves	*Milvus migrans*	Black Kite	Full migrant	IBAT
Aves	*Monticola solitarius*	Blue Rock-thrush	Full migrant	IBAT
Aves	*Motacilla alba*	White Wagtail	Full migrant	IBAT
Aves	*Motacilla cinerea*	Grey Wagtail	Full migrant	IBAT
Aves	*Motacilla tschutschensis*	Eastern Yellow Wagtail	Full migrant	IBAT
Aves	*Muscicapa dauurica*	Asian Brown Flycatcher	Full migrant	IBAT
Aves	*Muscicapa ferruginea*	Ferruginous Flycatcher	Full migrant	IBAT
Aves	*Parus monticolus*	Green-backed Tit	Full migrant	IBAT
Aves	*Passer cinnamomeus*	Russet Sparrow	Full migrant	IBAT
Aves	*Muscicapa griseisticta*	Grey-streaked Flycatcher	Full migrant	IBAT
Aves	*Muscicapa sibirica*	Dark-sided Flycatcher	Full migrant	IBAT
Aves	*Pericrocotus solaris*	Grey-chinned Minivet	Full migrant	IBAT
Aves	*Ninox japonica*	Northern Boobook	Full migrant	IBAT
Aves	*Nisaetus nipalensis*	Mountain Hawk-eagle	Full migrant	IBAT
Aves	*Numenius arquata*	Eurasian Curlew	Full migrant	IBAT
Aves	*Numenius phaeopus*	Whimbrel	Full migrant	IBAT
Aves	*Nycticorax nycticorax*	Black-crowned Night-heron	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Aves	*Onychoprion anaethetus*	Bridled Tern	Full migrant	IBAT
Aves	*Onychoprion fuscatus*	Sooty Tern	Full migrant	IBAT
Aves	*Oriolus chinensis*	Black-naped Oriole	Full migrant	IBAT
Aves	*Oriolus traillii*	Maroon Oriole	Full migrant	IBAT
Aves	*Otus sunia*	Oriental Scops-owl	Full migrant	IBAT
Aves	*Pandion haliaetus*	Osprey	Full migrant	IBAT
Aves	*Pericrocotus divaricatus*	Ashy Minivet	Full migrant	IBAT
Aves	*Pernis ptilorhynchus*	Oriental Honey-buzzard	Full migrant	IBAT
Aves	*Phaethon rubricauda*	Red-tailed Tropicbird	Full migrant	IBAT
Aves	*Phalacrocorax capillatus*	Japanese Cormorant	Full migrant	IBAT
Aves	*Phoebastria albatrus*	Short-tailed Albatross	Full migrant	IBAT
Aves	*Phoebastria immutabilis*	Laysan Albatross	Full migrant	IBAT
Aves	*Phoenicurus auroreus*	Daurian Redstart	Full migrant	IBAT
Aves	*Phylloscopus borealoides*	Sakhalin Leaf-warbler	Full migrant	IBAT
Aves	*Phylloscopus coronatus*	Eastern Crowned Warbler	Full migrant	IBAT
Aves	*Phylloscopus fuscatus*	Dusky Warbler	Full migrant	IBAT
Aves	*Phylloscopus ijimae*	Ijima's Leaf-warbler	Full migrant	IBAT
Aves	*Phylloscopus inornatus*	Yellow-browed Warbler	Full migrant	IBAT
Aves	*Phylloscopus xanthodryas*	Japanese Leaf-warbler	Full migrant	IBAT
Aves	*Prinia crinigera*	Striated Prinia	Full migrant	IBAT
Aves	*Prinia inornata*	Plain Prinia	Full migrant	IBAT
Aves	*Pitta nympha*	Fairy Pitta	Full migrant	IBAT
Aves	*Platalea leucorodia*	Eurasian Spoonbill	Full migrant	IBAT
Aves	*Pyrrhula erythaca*	Grey-headed Bullfinch	Full migrant	IBAT
Aves	*Pluvialis fulva*	Pacific Golden Plover	Full migrant	IBAT
Aves	*Pluvialis squatarola*	Grey Plover	Full migrant	IBAT
Aves	*Podiceps auritus*	Horned Grebe	Full migrant	IBAT
Aves	*Podiceps cristatus*	Great Crested Grebe	Full migrant	IBAT
Aves	*Podiceps grisegena*	Red-necked Grebe	Full migrant	IBAT
Aves	*Podiceps nigricollis*	Black-necked Grebe	Full migrant	IBAT
Aves	*Prunella collaris*	Alpine Accentor	Full migrant	IBAT
Aves	*Pycnonotus sinensis*	Light-vented Bulbul	Full migrant	IBAT
Aves	*Rallina eurizonoides*	Slaty-legged Crake	Full migrant	IBAT
Aves	*Rallus indicus*	Eastern Water Rail	Full migrant	IBAT
Aves	*Regulus regulus*	Goldcrest	Full migrant	IBAT
Aves	*Riparia chinensis*	Asian Plain Martin	Full migrant	IBAT
Aves	*Saundersilarus saundersi*	Saunders's Gull	Full migrant	IBAT
Aves	*Saxicola torquatus*	Common Stonechat	Full migrant	IBAT
Aves	*Scolopax rusticola*	Eurasian Woodcock	Full migrant	IBAT
Aves	*Sibirionetta formosa*	Baikal Teal	Full migrant	IBAT
Aves	*Spatula clypeata*	Northern Shoveler	Full migrant	IBAT
Aves	*Spatula querquedula*	Garganey	Full migrant	IBAT
Aves	*Spilopelia chinensis*	Eastern Spotted Dove	Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Aves	*Spinus spinus*	Eurasian Siskin	Full migrant	IBAT
Aves	*Spodiopsar cineraceus*	White-cheeked Starling	Full migrant	IBAT
Aves	*Spodiopsar sericeus*	Red-billed Starling	Full migrant	IBAT
Aves	*Sterna dougallii*	Roseate Tern	Full migrant	IBAT
Aves	*Sterna sumatrana*	Black-naped Tern	Full migrant	IBAT
Aves	*Streptopelia orientalis*	Oriental Turtle-dove	Full migrant	IBAT
Aves	*Streptopelia tranquebarica*	Red Turtle-dove	Full migrant	IBAT
Aves	*Sturnia sinensis*	White-shouldered Starling	Full migrant	IBAT
Aves	*Tachybaptus ruficollis*	Little Grebe	Full migrant	IBAT
Aves	*Tarsiger cyanurus*	Orange-flanked Bush-robin	Full migrant	IBAT
Aves	*Terpsiphone atrocaudata*	Japanese Paradise-flycatcher	Full migrant	IBAT
Aves	*Thalasseus bergii*	Greater Crested Tern	Full migrant	IBAT
Aves	*Threskiornis aethiopicus*	African Sacred Ibis	Full migrant	IBAT
Aves	*Threskiornis melanocephalus*	Black-headed Ibis	Full migrant	IBAT
Aves	*Treron sieboldii*	White-bellied Green-pigeon	Full migrant	IBAT
Aves	*Tringa brevipes*	Grey-tailed Tattler	Full migrant	IBAT
Aves	*Tringa erythropus*	Spotted Redshank	Full migrant	IBAT
Aves	*Tringa glareola*	Wood Sandpiper	Full migrant	IBAT
Aves	*Tringa nebularia*	Common Greenshank	Full migrant	IBAT
Aves	*Tringa ochropus*	Green Sandpiper	Full migrant	IBAT
Aves	*Tringa stagnatilis*	Marsh Sandpiper	Full migrant	IBAT
Aves	*Tringa totanus*	Common Redshank	Full migrant	IBAT
Aves	*Troglodytes troglodytes*	Northern Wren	Full migrant	IBAT
Aves	*Turdus chrysolaus*	Brown-headed Thrush	Full migrant	IBAT
Aves	*Turdus eunomus*	Dusky Thrush	Full migrant	IBAT
Aves	*Turdus naumanni*	Naumann's Thrush	Full migrant	IBAT
Aves	*Turdus obscurus*	Eyebrowed Thrush	Full migrant	IBAT
Aves	*Turdus pallidus*	Pale Thrush	Full migrant	IBAT
Aves	*Urile pelagicus*	Pelagic Cormorant	Full migrant	IBAT
Aves	*Urosphena squameiceps*	Asian Stubtail	Full migrant	IBAT
Aves	*Vanellus cinereus*	Grey-headed Lapwing	Full migrant	IBAT
Aves	*Zapornia fusca*	Ruddy-breasted Crake	Full migrant	IBAT
Aves	*Zapornia pusilla*	Baillon's Crake	Full migrant	IBAT
Aves	*Zoothera aurea*	White's Thrush	Full migrant	IBAT
Chondrichtyes	*Rhincodon typus*	Whale Shark	Full migrant	IBAT
Chondrichtyes	*Carcharhinus falciformis*	Silky Shark	Full migrant	IBAT
Insecta	*Ischnura aurora*	Gossamer Damselfly	Full migrant	IBAT
Insecta	*Pantala flavescens*	Wandering Glider	Full migrant	IBAT
Insecta	*Tholymis tillarga*	Old World Twister	Full migrant	IBAT
Insecta	*Tramea transmarina*	Red Glider Dragonfly	Full migrant	IBAT
Insecta	*Vanessa cardui*	Painted Lady	Full migrant	IBAT
Malacostraca	*Atyopsis spinipes*		Full migrant	IBAT
Malacostraca	*Caridina brevicarpalis*		Full migrant	IBAT

Class	Scientific name	Common name	Migratory pattern	Source
Malacostraca	*Caridina gracilirostris*		Full migrant	IBAT
Malacostraca	*Caridina longirostris*		Full migrant	IBAT
Malacostraca	*Caridina serratirostris*		Full migrant	IBAT
Malacostraca	*Caridina typus*		Full migrant	IBAT
Malacostraca	*Caridina multidentata*		Full migrant	IBAT
Malacostraca	*Macrobrachium asperulum*		Full migrant	IBAT
Malacostraca	*Macrobrachium esculentum*		Full migrant	IBAT
Malacostraca	*Macrobrachium horstii*		Full migrant	IBAT
Malacostraca	*Macrobrachium japonicum*		Full migrant	IBAT
Malacostraca	*Macrobrachium lar*		Full migrant	IBAT
Malacostraca	*Macrobrachium latidactylus*		Full migrant	IBAT
Malacostraca	*Macrobrachium latimanus*		Full migrant	IBAT
Malacostraca	*Macrobrachium mammillodactylus*		Full migrant	IBAT
Malacostraca	*Macrobrachium placidulum*		Full migrant	IBAT
Malacostraca	*Macrobrachium lepidactyloides*		Full migrant	IBAT
Mammalia	*Balaenoptera edeni*	Bryde's Whale	Full migrant	Trinity EIA, IBAT
Mammalia	*Eschrichtius robustus*	Gray Whale	Full migrant	IBAT
Mammalia	*Megaptera novaeangliae*	Humpback Whale	Full migrant	IBAT
Merostomata	*Tachypleus tridentatus*	Tri-spine Horseshoe Crab	Full migrant	IBAT
Reptilia	*Eretmochelys imbricata*	Hawksbill Turtle	Full migrant	IBAT
Reptilia	*Caretta caretta*	Loggerhead Turtle	Full migrant	IBAT
Reptilia	*Dermochelys coriacea*	Leatherback Turtle	Full migrant	IBAT
Reptilia	*Lepidochelys olivacea*	Olive Ridley Turtle	Full migrant	IBAT

Source: Mott MacDonald, 2023; IBAT,2023; IUCN, 2023

D. Methodology for defining marine ecologically appropriate area of analysis (EAAA)

The methodology of the marine EAAA generation was developed in direct consultation with IFC. The ecological patterns, processes, features, and functions that are necessary for maintaining these groups is however largely limited and are little known in the Project area, particularly in relation to species in the marine environment.

The marine EAAA took into account noise impacts from the piling and operation phase, which does not exceed 5km according to the Trinity EIA (Unitech, 2018a).

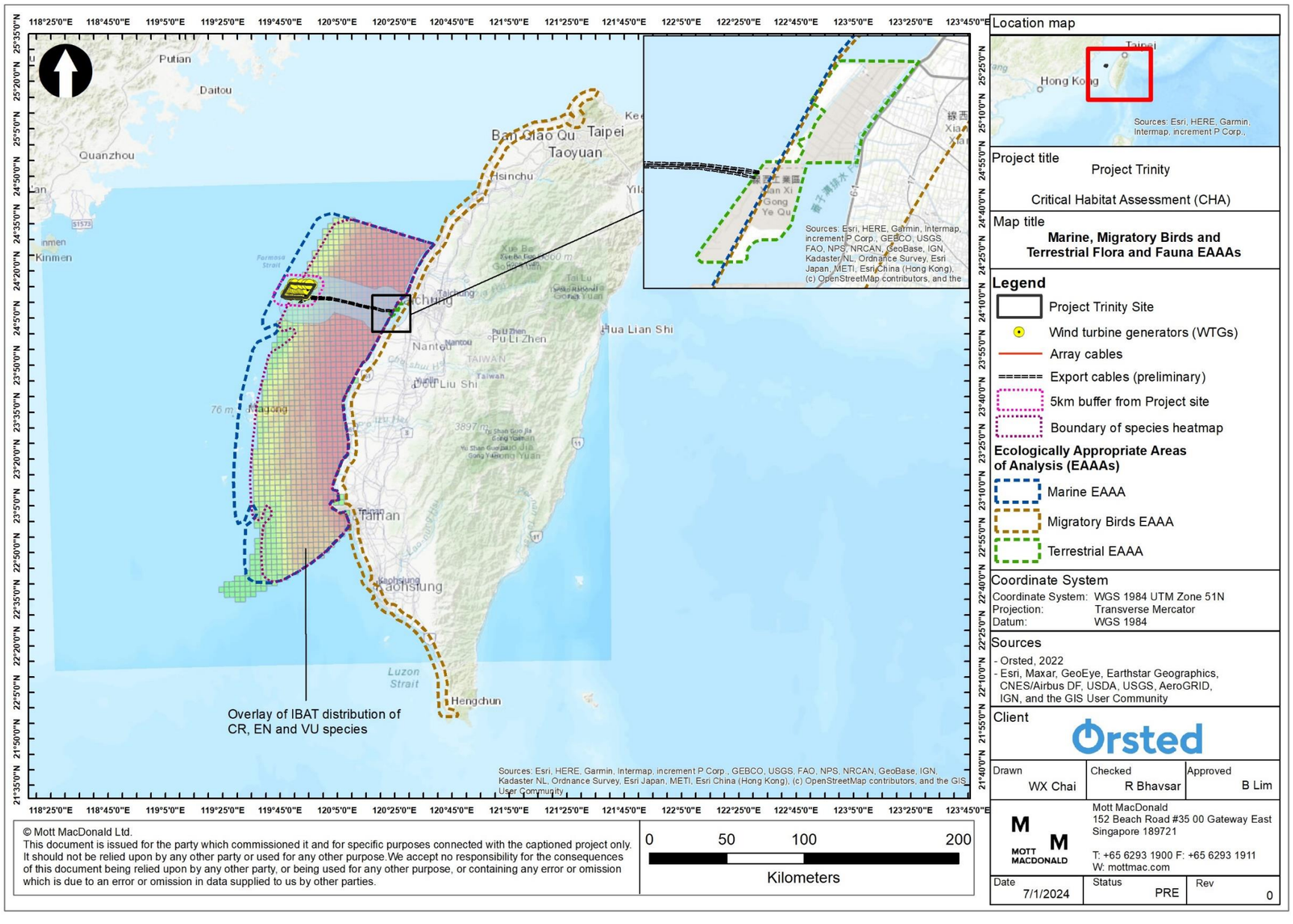
Using data from the Marine Ecoregions of the World (MEOW) obtained from ArcGIS Hub (The Nature Conservancy, 2019), the polygon was divided into two parts according to the two marine ecoregions – East China Sea and South China Sea. For the purpose of Project Trinity, the South China Sea ecoregion was further analysed. Hence the EAAA was extended northward and southward to encompass these ecoregions.

A heatmap from the aggregation of threatened species off the west coast of Taiwan, based on species distribution maps from the IUCN Red List of Species, was also generated and taken into account for the EAAA delineation. The methodology for creating the heatmap was as follows:

- A pixel range was applied to identify a range of pixel sizes which would best correspond to the identified uniform area of threatened species aggregation. A variety of parameters were used, however a pixel size of 70-120 yielded the best result. This range was identified using the Raster Calculator tool within GIS.
- This area was converted into vector polygon format using the Polygon to Raster tool which produced a rough boundary and clipped to the Taiwan coastline to ensure the scope remains marine.
- IBAT species distribution for CR, EN and VU species were intersected using a pairwise intersect function within ArcGIS Pro. This step identified the number of species within the uniform area of threatened species aggregation.
- A spatial join was used to subset species occurrence as a count within each grid and generate the EAAA outline. This formed the basis of designing a choropleth style heatmap to indicate species presence, noting that the red shading represents the highest concentration of threatened species, followed by orange, yellow, light green and dark green. In order to further streamline the EAAA, a threshold of minimum species occurrence was determined based on overall species of occurrence within each cell, and values below the threshold were excluded from the EAAA. As such, the dark green pixels in the southwest portion of the heatmap was excluded from the EAAA due to the species occurrence values falling below the defined threshold.
- An outline over the heatmap was drawn, and as a precautionary approach, a 10km westward buffer from the threatened species (into the Taiwan Strait) heatmap was included, which covers the extent of the expected noise impacts from the Project.

The aforementioned components of the EAAA are presented in Figure D.1 below.

Figure D.1: Ecologically Appropriate Areas of Analysis (EAAAs) of marine flora and fauna, migratory birds (including seabirds at sea) and terrestrial flora and fauna



Source: Mott MacDonald, 2024